

**Livestock and Fisheries Department, Government of Sindh
The Islamic Republic of Pakistan**

**The Project for the Master Plan Study on
Livestock, Meat and Dairy Development
in Sindh Province
in the Islamic Republic of Pakistan**

Final Report

**Part 3
Appendices**

October 2011

JAPAN INTERNATIONAL COOPERATION AGENCY

**KAIHATSU MANAGEMENT CONSULTING, INC.
C.D.C. INTERNATIONAL CORPORATION**

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Appendix A

List of the Recommended Projects

List of the Recommended Projects

Related Action Plans ⁱ	NO	Project Title	Project Outline	Major Activities	Priority ⁱⁱ	
					Major Reasons	
(1) Irrigated Areas, (2) Non-irrigated areas, (3) Feeds	1	The project for promoting the recycling-based livestock management	To formulate farming models on recycling-based integrated livestock management for each livestock type.	Selection of crop, method of cultivation, and livestock and appropriate recycling-based livestock management are practiced.	○	Since mix-farming is already practiced widely, the urgency is low.
(1) Irrigated Areas, (2) Non-irrigated areas, (3) Feeds	2	The project for environment and livestock	To study on disposal of pastures, wastage from slaughterhouse, and methane gas from burp of cattle and buffalo	Research and suggestions	○	There are other things with higher priorities
(1) Irrigated Areas, (2) Non-irrigated areas, (5) Genetic Improvement	3	The project for the embryo transfer of cow and buffalo	To improve breeding by freeze-preservation of fertilized egg from superior cow and buffalo	Establishment of rules of fertilized eggs production, establishment of the quarantine system of ovum collection, sanitary production of fertilized, printing on fertilized straw.	△	It is important, but the needs of farmers are relatively low.
(1) Irrigated Areas, (2) Non-irrigated areas, (5) Genetic Improvement	4	The project for improving frozen semen of cattle and buffalo	To produce active and hygienic semen	Establishment of rules of frozen semen production, establishment of bulls quarantine system, estimation of the number of semen after collection, hygienic frozen semen production, printing on semen straw, and strict examination of semen vitality	△	It is important, but the needs of farmers are relatively low.
(1) Irrigated Areas, (2) Non-irrigated areas, (5) Genetic Improvement	5	The project for capacity development of livestock AI technicians	To increase conception rate of AI and the number of fertilized animals through capacity development of AI technicians	Trainings	△	It is important, but the needs of farmers are relatively low.
(1) Irrigated Areas, (2) Non-irrigated areas, (5) Genetic Improvement	6	The project for establishing the examination system for reproductive functions of bulls (cattle and buffalo)	To cull inferior bulls by examining their reproductive functions at livestock markets and exhibitions	Developing the examination guideline, a campaign for awareness raising	△	Although it is important, "the project for improving cow and buffalo breeds in Sindh province" has higher priority.
(1) Irrigated Areas, (2) Non-irrigated areas, (5) Genetic Improvement	7	The project for capacity development to examine reproductive functions of bulls (cattle and buffalo)	To improve techniques to examine the reproductive functions of bulls (cattle and buffalo)	Trainings to veterinary doctors	△	Although it is important, "the project for improving of cow and buffalo breeds in Sindh province" has higher priority.

Related Action Plans ⁱ	NO	Project Title	Project Outline	Major Activities	Priority ⁱⁱ	
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(1) Irrigated Areas, (2) Non-irrigated areas, (5) Genetic Improvement	8	The project for capacity development to examine reproductive functions of cow and female buffalo	To improve conception rates of cow and female buffalo which suffer from reproduction disturbance by providing appropriate diagnosis and treatments	Trainings to veterinary doctors	○	Although it is important, “the project for improving of cow and buffalo breeds in Sindh province” has higher priority.
(1) Irrigated Areas, (2) Non-irrigated areas, (5) Genetic Improvement	9	The project for the basic study on the improvement of AI conception rate	To implement a basic study to improve a conception rate of cow and buffalo	Studies on difference of sign and strength of heating by region, by season, by feed management, timing and duration of heating, time of ovulation, and timing of fertilization	○	It is important, but the needs of farmers are relatively low.
(1) Irrigated Areas, (2) Non-irrigated areas, (6) Entrepreneurship, (7) Marketing	10	The project for improving the distribution infrastructure	To improve feeder roads from main road to rural area where there are abundant livestock but not access to market	Discussion with local government and community, planning and construction	△	The road construction seems not a project under the department
(1) Irrigated Areas,	11	The project for developing appropriate technologies for small and medium scale dairy farmers	To identify appropriate dairy technologies of farming, feed and grassland management, reproduction, animal health, and breeding for micro, small, and medium farmers, and develop appropriate teaching manuals	Planning and implementation of the demonstration, extractions of appropriate techniques, and development of manuals	◎	Appropriate dairy technologies for micro, small, and medium scale dairy farmers are not verified on farm yet. It is quite necessary and urgent.
(3) Irrigated Areas	12	The project for developing appropriate fattening technologies	To identify appropriate fattening technologies in the irrigated areas for improvement of fattening efficiency and increase of farmers’ income, and develop appropriate teaching manuals	On farm demonstration and verification of fattening technologies focusing on feeding. - Training of farming, feeding management, fodder, reproduction, animal health, and breeding. - Improvement of target plots for a better rearing condition, e.g. installation of ventilation and lowering rearing density.	◎	Appropriate fattening technologies are not verified on farm. It is quite necessary and urgent.
(1) Irrigated Areas	13	The project for appropriate dairy farming in cattle colonies	To improve milk productivity in cattle colonies		◎	Increase in the production capability of cattle colonies has a significant impact.

Related Action Plans ⁱ	NO	Project Title	Project Outline	Major Activities	Priority ⁱⁱ	
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(1) Irrigated Areas	14	The project for the basic study on saltbush mutton	To study needs, production and supply system of the salt bush mutton as a branded product	Research and suggestions	○	Branding of livestock products is a part of important strategies, but it is not a highly urgent matter.
(1) Irrigated Areas	15	The project for promoting production and sales of high quality meat	To promote production and sales of high quality meat which can be sold by higher price for domestic and international market	Needs assessment, establishment of standard of meat quality, trainings of fattening technique, sales promotion	△	Promoting high quality meat is important, but this should be carefully considered after a meat grading system is officially institutionalized.
(1) Irrigated Areas	16	The project for promoting rearing livestock for Eid festival	To support farmers who rear livestock for Eid festival as aiming increase of the number of livestock and farmers who are involved to the business for Eid festival (targeting areas can be Sanghar district where there are successful cases)	A needs analysis, trainings of rearing techniques, supports of selling	○	The market demand is high. However, the major target of this project would not be micro and small scale but medium and large farmers.
(2) Non-irrigated areas	17	The project for livestock promotion in the non-irrigated areas	To identify appropriate technologies of rearing and marketing for micro, small, and medium farmers in the non-irrigated areas to stabilize their livelihood, and develop appropriate teaching manuals	Planning and implementation of the demonstration of models, extractions of appropriate techniques on rearing and marketing, and development of manuals	◎	Appropriate technologies for non-irrigated areas are not verified on farm yet. It is quite necessary and urgent.
(2) Non-irrigated areas	18	The project for water supply for livestock	To develop ground water in non-irrigated area aiming at improvement of livestock production. Target areas are Thar desert and Kohistan hilly area.	Investigation of ground water, preparation of a plan, well sinker and set-up of water supply facility, and organizing management cooperative	◎	One of largest constraints on livestock production in the non-irrigated areas is limitation of water.
(2) Non-irrigated areas	19	The project for the feed production in salty land	To increase a production of feed by cultivating fodder on salty lands	Implementation of a study on salinity tolerant plants and salty lands, preparation of a plan for development and demonstration of salty land utilization	◎	One of largest constraints on livestock production in the non-irrigated areas is limitation of fodder.

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(2) Non-irrigated areas	20	The project for maintaining pastureland (shrub desert)	To improve management techniques of pastureland and fields for sustainable land use in non-irrigated areas	A study on the standing crop, management of pastureland, development of crop rotation, improvement of soil conservation, evaluation of agro-forestry, and evaluation of drought resistant plant	☉	Main livestock feeding method in the non-irrigated areas is grazing, but the resources for feeding is becoming scarce in the pastureland.
(2) Non-irrigated areas	21	The project for the basic study on livestock development in the non-irrigated areas	To be revealed the current situation of livestock in the non-irrigated areas in Sindh and finalize suggestions on a practical instruction plan of rearing camel, goat, and seep	Research and suggestions	○	It is very important to understand real situation of livestock in the arid area. However, more substantial actions are more prioritized.
(3) Feeds	22	The project for feeding improvement	To identify appropriate feeding techniques to improve quality and quantity of feed in the irrigated areas so that livestock productivities are improved, and develop appropriate teaching manuals	Quality improvement of roughage, improvement of management technique on feed, examination of appropriate amount of feed per animal, and design of appropriate feed composition	☉	Appropriate feeding technologies are not verified on farm. It is quite necessary and urgent.
(3) Feeds	23	The project for a developing feed ingredient list	To develop the ingredient list of feeds, roughage, concentrate, and agricultural by-products, and to analyze soil	Analysis and evaluation of feed and soil, introduction of analysis equipment, provision of reagent	☉	This is a basis of feeding technology improvement.
(3) Feeds	24	The project for promoting the utilization of agricultural by-products	To promote using agricultural by-products such as molasses and unused resources as fodder	Analysis of ingredients of the by-products and acceptability of by-products, demonstration, and development of practical technique	○	This is unstudied and important, but not the issue of mainstream. This should be carried out through public-private partnership.
(3) Feeds	25	The project for establishing feed inspection system	To examine marketed feed in order to contribute to an establishment of appropriate feed standard and inspection system	Examinations of feeds, analysis of the result, and training to stakeholders	○	This contributes to better feeding management, but its urgency is relatively low.
(4) Brucella, Tuberculosis, Mastitis	26	The project for strengthening the animal health central research center, Tando Jam	To strengthen the control of the trans-boundary diseases by improving accuracy and speed of examination of FMD and PPR	Installation of necessary equipment for the examinations, training for the examination, establishment of prevention system	☉	The disease control is one of main pillars for productivity improvement. Significant impact is expected from the project.

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(4) Brucella, Tuberculosis, Mastitis	27	The project for demonstrating the trans-boundary diseases quarantine model	To demonstrate free areas from FMD and PPR in order to establish necessary techniques and system for prevention of FMD and PPR at the provincial level	Revision of rules on animal health, demonstration of quarantine inspection system, training of quarantine officers, design and demonstration of the free areas	⊙	The disease control is one of main pillars for productivity improvement. Though the input of the project is large, significant impact is expected from the project.
(4) Brucella, Tuberculosis, Mastitis	28	The project for increasing the production of vaccine	To improve the production and distribution system of vaccines for livestock	Set up of discussion table for stakeholders of vaccine production, establishment of business models, development of production and distribution plans, production of vaccines	△	Importance of vaccine is clear, but imported vaccines are widely utilized today as well as local made vaccines. Moreover, many stakeholders make the feasibility of the project unclear.
(5) Genetic Improvement	29	The project for improving cow and buffalo breeds in Sindh province	To prepare and implement the practical and simple plan of breed improvement through supporting the Sindh Livestock Breeders Associations	Basic study, training on technicians, list-up of registered farmers, selection of animals, progeny testing, preparation and implementation of genetic improvement plan	⊙	Genetic improvement is one of main pillars for productivity improvement. Improvement of famous local breeds is indispensably important for Sindh.
(5) Genetic Improvement	30	The project for the embryo transfer of cow and buffalo	To improve breeding by freeze-preservation of fertilized egg from superior cow and buffalo	Establishment of rules of fertilized eggs production, establishment of the quarantine system of ovum collection, sanitary production of fertilized, printing on fertilized straw.	△	It is important, but the needs of farmers are relatively low.
(6) Marketing	31	The project for developing marketing skill of farmers	To develop model methods of farmer-oriented marketing techniques	Research, pilot project, suggestion	⊙	By developing and disseminating the model methods, farmers can increase their sales and the distribution channel of milk will be developed
(6) Marketing	32	The project for fostering the public and private partnership	To foster collaboration with private companies so as to disseminate dairy techniques, increase milk and meat production, and improve their quality. There are two levels of collaborations. The collaboration at the provincial level through PDA and that at the district level through private companies working at the same area will be demonstrated in the project.	Establishment of system to collaborate with private companies and NGOs, a planning based on the collaboration at district level, a preparation of policy to homogenized livestock techniques	○	Because of limited government budget, human resources, and strategy, development of livestock sector initiated only by government is difficult. NGOs and private companies are doing many extension activities, but there is no collaborations among them.

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(6) Marketing	33	The project for promotion of cold chain	To develop and demonstrate models of installation of milk chiller facilities based on cost benefit analysis	Case study, pilot projects, evaluation and analysis, and demonstration of models	⊙	Promotion of establishment of cold chain is important to develop distribution network
(6) Marketing	34	The project for improving livestock markets	To develop a guideline for management of livestock market so that livestock transaction become effective and efficient	A study on livestock market, selection of model livestock market, development of a guideline for management of livestock market, application of the guideline at selected markets	⊙	There is a large room for improvement in livestock market, and its positive effect on livestock transaction is expected to be high.
(6) Marketing	35	The project for rehabilitation of slaughterhouse	To develop a guideline for management of slaughterhouses so that processing capacity and conditions are improved.	A study on current situation of slaughterhouses, and planning of rehabilitation/installment of slaughterhouse, development of a guideline, application of the guideline at selected slaughterhouses	⊙	There is a large room for improvement in livestock market. This is necessary for food safety and export promotion.
(6) Marketing	36	The project for improvement of milk quality	To aim standardization of milk based on its quality, and promotion of quality milk.	Survey on milk quality in current distribution channel, consumer needs survey, formulation of milk quality standard, promotion of branded quality milk	⊙	It would be the first step for improvement of milk quality.
(6) Marketing	37	The project on the meat grading system	To aim introduction of meat standard based on its quality, and promotion of quality meat	Survey on current situation of meat quality, consumer needs survey, development of draft meat grading system, institutionalization of the grading system, promotion of branded quality meat	⊙	It would be the first step for improvement of meat and meat products' quality.
(6) Marketing	38	The project for the study on formulation of local specialties	To suggest possibility of local specialties which contribute an increase of income, regional development, and future export promotion such as ostrich, camel, desi poultry, salt bush mutton, ghee, butter, cheese, salt bush mutton, veal meat, and so on	Research and suggestions	⊙	The potential of livestock development in each area is large but is not focused well. This study suggests potential local specialties which will be applied to "the project for promoting local specialties".
(6) Marketing	39	The project for promoting local specialties	To make local people to be proud of and contribute farmers' income, regional	Formulation of the committee for local specialties, a market study and selection	⊙	Active participation of local farmers can be expected through this project. This is a

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			development, and future export promotion through promoting local specialties which are selected in “the project for the formulation study on local specialties” such as camel, desi poultry, ghee, butter, cheese, salt bush mutton, veal meat, and so on	of local specialties at the district level or zonal level, formulation of the executive committees at the district level, development of the implementation plan, support financing the pilot project		quite effective local approach of livestock promotion.
(6) Marketing	40	The project for market information system	To develop a model system for disseminating necessary market information on dairy and meat products	Selection of an organization in-charge, kinds of information, methods of data collection and dissemination, development of a model system	☉	This project will facilitate farmers and distributors to efficiently produce, sell, and distribute their products.
(6) Marketing	41	The project for establishment of export promotion institution	To establish an institution for export promotion in accordance with other institutions. To develop an action plan by the institution	Establishment of the institution for export promotion, and development of action plan	☉	For the export promotion, establishment of institution in associate with the livestock department is important
(6) Marketing	42	The survey on promoting export of livestock and livestock products	To promote export livestock and livestock products	A market study of livestock and livestock products of neighboring countries, quality improvement of livestock and livestock products, and preparation of branding strategy	○	Although promoting export is important, meeting domestic demand is the primarily issue to be addressed.
(6) Marketing	43	The project for promoting export of mozzarella cheese	To promote production and export of hygienic and high quality of mozzarella cheese which meet an international standard	A study on current products and market potential, development of products, promotion and advertisement	○	Mozzarella cheese is a product with high potentiality in an international market, but its impact is limited.
(6) Marketing	44	The project for the basic study on quality and market potential of wool	To contribute to promotion of wool export by studying quality and market potential of wool	Research and suggestions	△	This field is already studied and export wool industry is well-established. Therefore the priority is low
(6) Marketing	45	The project for controlling smuggling	To control smuggling of livestock and livestock products	A study on the current situation, a discussion with stakeholders, and enacting a law and developing activity plan to control smuggling	△	Although controlling smuggling is important, the area the LFD can address is limited.

Related Action Plans ⁱ	NO	Project Title	Project Outline	Major Activities	Priority ⁱⁱ	
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(6) Marketing	46	The project for developing fermented milk products	To develop and promote the fermented milk products in the international market	A study on current products, a needs assessment, and a development and promotion of products	△	Beneficiary farmers might be limited in number. Moreover, A promotion of export products basically should be initiated by the private sector
(6) Marketing	47	The study on the basic study on food safety	To implement a basic study to promote livestock inspection aiming at improvement of the food safety	Study on actual situation, food inspection, and suggestions	△	This is an important issue, but increase in productivity is more significant. Moreover, essential parts of this issue are incorporated in "The project for improvement of milk quality" and "The project for the basic study on meat grading system".
(6) Marketing	48	The project for improving quality of milk and distribution channel	To develop a distribution channel from rural producers to urban markets	Technical training on good quality of milk, establishment of distribution channel from rural producers to urban market, an annual contract and demonstration of a model in collaboration with rural farmers and urban buyers	○	In the real situation, this model may fit to medium and large farmers rather than small farmers.
(6) Marketing	49	The project for the consumer promotion of the processed milk	To study on the consumer preference, a supply system, and a relationship between price and hygiene/quality of processed milk	Research and suggestions	△	The timing might be too early.
(7) Entrepreneurship	50	The project for strengthening business mind of farmers	To create awareness on improvement and business mind, and then provision of basic business skills in order to stabilize the livelihood of targeted landless, micro and small farmers	Awareness creation of farmers, training of production and management, provision of market information	◎	Awareness creation and change of mindset of targeted vulnerable farmers are very important and urgent for stabilizing their livelihood.
(7) Entrepreneurship	51	The project for fostering livestock entrepreneurs	To establish models of livestock entrepreneurs as targeting commercial farmers and farmers interested in livestock business in irrigated area and have a capacity (land and finance) to start business	Trainings of business planning, financing, and livestock management, and marketing support	◎	Not only production technologies but also business skills are necessary to improve the farmers' livelihood.
(7) Entrepreneurship	52	The project for strengthening farmer organizations	This project supports organizing and strengthening farmers' groups comprised of micro, small, and medium farmers. It aims to enable the farmers to produce jointly and sell as	Awareness raising campaign, trainings of participatory development methods, trainings to strengthen farmers' organization, and implementing pilot	◎	Although organizing farmers has a huge potential to make livestock farming more effective and efficient, it has not been addressed. As this is a basis of organizing

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			well as to establish good relationship with their landowner.	activities		farmers, this project should be conducted prior to the above mentioned two projects.
(7) Entrepreneurship	53	The project for formulating livestock cooperatives	To support organizing a livestock cooperative based on farmers groups aiming at the benefits of farmers and effective management of the organizations	A study on the current situation of farmers' organizations at the district level, list-up of motivated farmers' groups, set-up of a discussion among several farmers' groups, an establishment of the agriculture cooperative system, an establishment of necessary facilities, a training for the management of the organizations	△	There are few successes of organizing livestock cooperatives in Pakistan. At least trainings for farmers' leaders or formulation of smaller farmers' organizations need to be carried out before this project.
(7) Entrepreneurship	54	The project for a capacity development of village leaders	To develop capacities of village leaders who can bring benefit widely to his community. This project targets landowners and village leaders, and pay special attention to the strong relationship among the people belonging to the same endogamy groups.	Awareness raising to community leaders and residences, trainings of participatory development method, a support to organize farmers' groups, pilot activities by farmers' groups	○	This project should be implemented after the project for strengthening farmers organizations to develop farmers groups to the next level such as livestock cooperatives.
(7) Entrepreneurship	55	The project for establishing a mechanism for calf salvation	To establish a mechanism to rescue calves generated from cattle colonies and distribute to small and medium farmers	Design of the mechanism, purchasing of young calves, establishment of shed, development of substitute of milk. Development of delivery plan, training of rearing	◎	This project includes two urgent and important issues, utilization of the untapped resource and provision of assistance to small and medium scale farmers.
(7) Entrepreneurship	56	The project for developing livestock revolving system	To improve livelihood of landless and micro farmers through providing livestock by a livestock revolving system	Formulation of farmers' group, training for preparation of business plan, and training of livestock management and marketing	◎	This is a project to present a model for vulnerable landless and micro scale farmers to have livestock at low risk and investment. Sustainability of the project is expected to be high.
(7) Entrepreneurship	57	The project for promoting livestock sharing	To improve income of micro, small, and medium farmers by reviewing, redesigning, and promoting the livestock sharing	Review and redesign of the sharing models, trainings of rearing and selling techniques, a promotion of documentations of agreements, and awareness raising for business	◎	Livestock sharing is widely practiced by a number of farmers. The project enable both an owner and livestock sharers to be benefited at low risk.

Related Action Plans ⁱ	NO	Project Title	Project Outline	Major Activities	Priority ⁱⁱ	
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(7) Entrepreneurship	58	The project for the basic study on promoting dry animal recycling	The mechanism of recycling dry animals in rural areas, which generated from cattle colonies, is established for further application.	A study on current situation from viewpoints of value of genetic conservation and cost effectiveness, design, demonstration, and establishment of a mechanism	◎	This project includes two urgent and important issues, utilization of the untapped and wasted resource and provision of assistance to small and medium scale farmers in rural areas.
(7) Entrepreneurship	59	The project for supporting entrepreneurship of private veterinarians	To support private veterinarians to provide veterinary services on business basis sustainably	Awareness raising of farmers, refreshment of knowledge and techniques of private veterinarians	○	Role of private veterinarians and livestock department is not strategically demarcated yet.
(7) Entrepreneurship	60	The project of the basic study on the promotion of the rural finance	To study feasibility of loan system such as finance provided by livestock related organizations and informal finance between landowner and farmers aiming at promotion of rural finance	Set-up of a table for discussions with livestock related organizations, a study on current situation of informal finance, a pilot project, and proposing suggestions	△	Building consensus on the suggestions seems to require long time and large effort.
(7) Entrepreneurship	61	The project for the basic study on microfinance	To enable farmers who have limited access to finance to receive necessary finance	Study on current MF projects, a pilot project, and proposing suggestions	△	Basically, MF services should be provided by NGOs and private sector not by the LFD. In that case, the impact from this project may be limited.
(7) Entrepreneurship	62	The project for the basic study on promotion of bio bas	To study the cost-effectiveness of bio gas to promote utilization of bio bas	Research and suggestions	△	Although environmental and energy issue is important, improvements of productivity or livelihood have higher priority.
(7) Entrepreneurship	63	The project for establishing the livestock compensation system	In Japan, there is a mutual aid system financed by the country, prefectures, and producers to avoid large management loss caused by an accident or theft of large animals. The project aims to establish mutual aid system to reduce producers' risks by involving contributions from milk processing companies, distributors, and large land owners. Moreover the project introduces livestock insurance system to support producers.	Setting up a table for meeting with stakeholders in dairy sector, needs assessment and establishment of the mutual aid system and the livestock insurance system, and support of pilot activities	○	The needs of livestock compensation mechanisms are still premature.

Related Action Plans ⁱ	NO	Project Title	Project Outline	Major Activities	Priority ⁱⁱ	
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(7) Entrepreneurship	64	The project for one village one product	To support target villages to develop and promote specialized livestock products involving local government, the Industries and Commerce Department, and the Food Department	Formulation of one village one products, trainings of necessary techniques such as processing techniques, rearing techniques, and marketing techniques, holding a contest, sales promotion	△	Products developed and promoted in this project are basically not only livestock products but also various products from multi sectors. .
(7) Entrepreneurship	65	The project for establishing and promoting the roadside stations	To contribute farmers' income and regional development by establishing roadside stations along highway to sell livestock products produced in the surrounding areas	Formulation of management committee, clarification of rules to use the roadside stations, establishment of the roadside stations, training on management	△	This project should be implemented after formulating local specialties and one village one products.
(8) Strengthening of the Department	66	The project for formulating livestock development policy and strategy	To formulate and institutionalize policy, strategy, and 5 year plan as guidelines for implementing livestock development, and for preparing annual activity plans	Formulation of Sindh livestock development policy, finalization of strategy, formulation of 5 year action plan	◎	Policy, strategy, and 5 year plan should be formulated and institutionalized for the development of livestock sector in line with the master plan
(8) Strengthening of the Department	67	The project for publicity	To publicize the livestock development plans by various means	Preparation of web page and pamphlet, opening of development forum	◎	Budget allocations and other necessary cooperation will become easier for the department to obtain through publicity of livestock development
(8) Strengthening of the Department	68	The project for strengthening implementation structure	To restructure the department for implementing livestock development smoothly considering necessary areas of activities, such as farm management, feeding management, fodder, reproduction, animal health, breeding, and extension	Restructuring of the department, and preparation of TORs for each directorate	◎	It is inevitable for the department to establish a new structure for implementing livestock development in line with the master plan
(8) Strengthening of the Department	69	The project for formulating human resource management and development plans	To recruit, allocate, train, and manage human resources properly for smoothly implementing livestock development plans	Formulation of human resource management plan including recruitment plan, human resource development plan, recruitment, allocation, training, and management of the staff based on those plans	◎	Human resource management and development are essential for the development of the livestock sector
(8) Strengthening of the Department	70	The project for strengthening project management capacity	To strengthen the Livestock Department Sindh for its ability of PDC (plan, monitoring, evaluation) which is required for planning and managing the projects	Trainings of project management, preparation of operation manuals, establishment of information system, preparation of annual activity plans and evaluation reports	◎	Project management is one of day-to-day activities, so this is urgent.

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(9) Extension	71	The project for establishing livestock extension system in Sindh	To establish a sustainable extension system in collaboration with the department, universities, private companies, and NGOs	Regular meeting with stakeholders, an establishment of an extension committee, a selection of an implementing organization, a development of a management plan and rules, trainings of management to the organization, and a development of an extension manuals	⊙	As currently there is no extension system in the livestock sector, its establishment is urgent and important.
(9) Extension	72	The project for capacity development of RTI	To restore facility of RTI, and implement trainings	Installation of electricity, water supply, lab and class room, and internet connection, establishment of animal shed, and establishment of audiovisual materials	⊙	RTI is one and only facility of the LFD for training. The sustainability after the project is an issue.
(9) Extension	73	The project for formulating the public and private platform	To formulate a platform where the public and private stakeholders regularly discuss, and clarify their roles to promote livestock sector in Sindh.	Establishment of working groups with stakeholders such as milk associations, processing companies, and pharmaceutical companies based on their needs, and establishment of mechanism of public and private partnership	⊙	It is important to consider possibility to collaborate with private sector widely.
(9) Extension	74	The project for establishing of grading system of extension workers	Establishing the grading system of extension workers, and organizing the certification authority/organization	Classifying the technical requirement into 4-5 grades, and designing the contents. Organizing the certification authority/organization.	⊙	The grading system will motivate extension workers to improve their proficiency leading to efficient and effective activities.
(9) Extension	75	The project for training of the department technicians	To develop capacities of extension workers in the LDF by using developed extension manuals	Theoretical and practical extension training, study tours	⊙	Capacity development of extension workers is necessary to provide quality extension services.
(9) Extension	76	The project for developing capacity of LLW's/Female CLEW's	To aim expanding the activities of LLW's and Female CLEW's to other areas	Selection of new LLW's and Female CLEW's, providing trainings to them, improvement of training materials, training for master trainers, and extension of techniques	⊙	LLW's and CLEW's are important agents of extension activities, and this project can be implemented with "the project for establishing livestock extension system in Sindh".

Related Action Plans ⁱ	NO	Project Title	Project Outline	Major Activities	Priority ⁱⁱ	
					Major Reasons	
(9) Extension	77	The project for follow-up training of LLWs/Female CLEWs	To strengthen skills of the current LLWs and Female CLEWs, and promote a collaboration with the department	A study on current situation, needs analysis for training, extraction of good practices, trainings	☉	LLWs and CLEWs are important agents of extension activities, and this project can be implemented with “the project for establishing livestock extension system in Sindh”.
(9) Extension	78	The Project for enhancing the extension service provision	Mainly through the OJT, developing the capacity of extension workers	Mainly through the OJT, developing the capacity of extension workers regarding extension contents, methods, reporting, information sharing, leadership, role as the change agent etc.	☉	The LFD has not accumulated necessary knowledge and experiences about extension work, so it is necessary to provide the extension workers with practical training on the field.
(10) Formulating future-oriented production system centered on cattle colonies	79	The project for treatment of cow dung and effluent from cattle colonies	Construction of a plant for treating cow dung and affluent from cattle colonies to alleviate a harmful impact on surrounding environment	Basic study on the current situation, designing of the facility is designed, and preparation of marketing plan for manure and biogas, construction of the facility, operation of the facility and marketing activities	☉	Environmental problems arose from cattle colonies are urgent and becoming more serious.

ⁱ Related Action Plans:

- Action Plan (1): Development and Extension of Appropriate Dairy and Fattening Technologies in the Irrigated Areas
Action Plan (2): Development and Extension of Appropriate Fattening Technologies in the Non-irrigated Areas
Action Plan (3): Improvement of Animal Feeds
Action Plan (4): Elimination of Brucella, Tuberculosis, Mastitis and Other Important Animal Diseases
Action Plan (5): Genetic Improvement of Local Breeds
Action Plan (6): Marketing Improvement for Export
Action Plan (7): Entrepreneurship Development
Action Plan (8): Strengthening of the Department
Action Plan (9): Extension System Development
Action Plan (10): Future-oriented Cattle Colony Production System

ⁱⁱ Priority:

- ☉: Mostly prioritized projects included in Action Plans by 2020
○: Prioritized projects
△: Important, but relatively less prioritized projects

Appendix B

Provincial Profiles

Table B-1 Talula Areas (1/2)

District	Taluka	Area (arce)	Area (Sq.km)	District Total (Sq.km)
Ghotki	Daharki	620,774.18	2,512.180	
	Ghotki	218,153.05	882.834	
	Khangarh	397,948.75	1,610.440	
	Mirpur Mathelo	193,645.59	783.656	
	Ubauro	175,528.11	710.337	6,499.447
Sukkur	New Sukkur	31,318.18	126.740	
	Pano Akil	166,471.61	673.687	
	Rohri	246,614.06	998.012	
	Saleh Pat	739,034.27	2,990.770	
	Sukkur	105,233.60	425.865	5,215.074
Khairpur	Faizganj	246,225.87	996.441	
	Gambat	141,524.27	572.728	
	Khairpur	119,059.64	481.817	
	Kingri	140,358.53	568.011	
	Kotdiji	125,430.91	507.601	
	Nara	2,849,496.98	11,531.510	
	Sobhodero	125,958.91	509.738	
	Thari Mirwah	166,855.58	675.241	15,843.087
Naushero Feroze	Bhiria (City)	97,158.08	393.185	
	Kandiario	227,333.63	919.987	
	Mehrabpur	67,723.01	274.065	
	Moro	188,417.90	762.500	
	N.Feroze	171,516.29	694.102	3,043.839
Shaheed Benazirabad (Nawabshah)	Daur	491,976.25	1,990.960	
	Kazi Ahmed	265,470.35	1,074.320	
	Nawabshah	138,809.65	561.743	
	Sakrand	216,698.42	876.947	4,503.970
Kashmore	Kandhkot	175,528.41	710.338	
	Kashmore	344,607.83	1,394.580	
	Tangwani	174,550.82	706.382	2,811.300
Shikarpur	Garhi Yasin	230,718.54	933.685	
	Khanpur	166,756.77	674.841	
	Lakhi	94,855.42	383.866	
	Shikarpur	142,556.13	576.904	2,569.296
Jacobabad	Garhi Khairo	181,499.32	734.502	
	Jacobabad	168,086.67	680.223	
	Thull	331,614.05	1,341.990	2,756.715
Kamber Shadadkot	Kamber	567,891.27	2,298.170	
	Miro Khan	111,391.45	450.785	
	Nasirabad	96,404.84	390.137	
	Qubo Saeed Khan	261,337.16	1,057.590	
	Shahdadkot	105,183.09	425.661	
	Sijawal	80,320.07	325.044	
	Warah	165,822.13	671.058	5,618.445
Larkana	Bakrani	111,172.63	449.900	
	Dokri	120,231.97	486.562	
	Larkana	94,812.60	383.693	
	Ratodero	146,188.90	591.605	1,911.760
Dadu	Dadu	202,941.39	821.275	
	Johi	889,472.09	3,599.570	
	K.N.Shah	646,290.92	2,615.450	
	Mehar	245,920.85	995.206	8,031.501
Jamshoro	Kotri	350,180.70	1,417.130	
	Manjhad	549,300.65	2,222.940	
	Sehwan	579,214.87	2,344.000	
	Thana Bulla Khan	1,306,916.88	5,288.900	11,272.970

Note: The above taluka areas were measured by planimeter for preparing GIS maps, and therefore the district areas do not coincide with the published ones.

Table B-1 Talula Areas (2/2)

District	Taluka	Area (arce)	Area (Sq.km)	District Total (Sq.km)
Thatta	Ghorabari	279,906.29	1,132.740	
	Jati	870,838.41	3,524.160	
	Keti Bunder	178,336.72	721.703	
	Kharo Chhan	142,349.91	576.070	
	M.P.Bathoro	178,495.84	722.347	
	M.P.Sakro	725,750.97	2,937.010	
	Shah Bunder	821,075.78	3,322.780	
	Sujawal	176,927.28	715.999	
	Thatta	921,666.64	3,729.850	17,382.659
Matiari	Hala	96,960.73	392.386	
	Matiari	176,421.12	713.951	
	Saedabad	86,509.82	350.093	1,456.430
Tando Allahyar	Chamber	124,134.81	502.356	
	Jhando Mari	197,499.62	799.253	
	Tando Allahyar	60,720.09	245.725	1,547.334
Hyderabad	Hyderabad (City)	6,956.47	28.152	
	Hyderabad (Rural)	182,488.35	738.504	
	Latifabad	55,361.09	224.038	
	Qasimabad	7,485.01	30.291	1,020.985
Tando Muhammad Khan	Bulri Shah Karim	195,313.06	790.404	
	Tando Ghulam Hyder	93,882.31	379.928	
	Tando M Khan	93,537.39	378.532	1,548.864
Badin	Badin	435,697.02	1,763.200	
	Matli	261,061.86	1,056.480	
	S.F.Rahoo	388,534.89	1,572.340	
	Talhar	198,704.04	804.127	
	Tando Bago	374,028.54	1,513.640	6,709.787
Sanghar	Jam Nawaz Ali	116,394.46	471.032	
	Khipro	1,453,892.07	5,883.690	
	Sanghar	544,487.41	2,203.460	
	Shahdadpur	219,632.54	888.821	
	Sinjhoro	209,673.03	848.517	
	Tando Adam	100,993.74	408.707	10,704.227
Mirpurkhas	Digri	125,710.46	508.732	
	Hussain Bux Mari	61,677.96	249.602	
	Jhuddo	157,762.11	638.441	
	Kot Ghulam Muhammad	195,637.02	791.715	
	Mirpurkhas	116,449.58	471.255	
	Sindhri	78,130.58	316.183	2,975.928
Umerkot	Kunri	177,210.18	717.144	
	Pithoro	122,737.61	496.701	
	Samaro	149,609.35	605.448	
	Umerkot	906,273.53	3,667.560	5,486.853
Tharparkar	Chachro	1,585,325.57	6,415.580	
	Diplo	971,088.24	3,929.850	
	Mithi	1,303,121.82	5,273.550	
	Nagarparkar	933,885.89	3,779.300	19,398.280
Karachi	Baldia	5,482.86	22.188	
	Bin Qasim	150,058.82	607.267	
	Gaddap	518,281.65	2,097.410	
	Gulberg	4,042.25	16.358	
	Gulshan-e-Iqbal	20,263.18	82.002	
	Jamsheed Qtr.	6,540.62	26.469	
	Keemari	106,227.04	429.886	
	Korangi	13,665.69	55.303	
	Landhi	10,996.43	44.501	
	Liaquatabad	3,406.13	13.784	
	Lyari	1,368.88	5.540	
	Malir	23,982.57	97.054	
	New Karachi	5,674.93	22.966	
	North Nazimabad	4,348.02	17.596	
	Orangi	5,390.26	21.814	
	Saddar	5,100.68	20.642	
Shah Faisal Colony	11,036.94	44.665		
Site	6,824.35	27.617	3,653.062	
			141,961.812	141,961.812

Note: The above taluka areas were measured by planimeter for preparing GIS maps, and therefore the district areas do not coincide with the published ones.

Table B-2 Taluka Population (1/3)

District	Taluka	Human Population (projected in 2010)	Cattle	Buffalo	Sheep	Goat	Camel	Horse	Mules	Asses
Ghotki	Daharki	280,688	42,190	40,595	17,673	68,802	2,022	460	85	5,356
	Ghotki	416,005	55,460	70,233	2,209	70,505	206	608	202	7,787
	Khangarh	152,100	95,160	22,690	17,163	93,578	7,012	125	56	1,326
	Mirpur Matteto	243,890	41,640	48,481	16,345	69,506	709	530	98	6,425
	Ubauro	259,317	47,247	64,802	20,113	72,517	188	322	81	5,378
	(district total)	1,352,000	281,697	246,801	73,503	374,908	10,137	2,045	522	26,272
Sukkur	New Sukkur	44,204	21,162	19,650	4,747	24,959	827	79	119	1,032
	Pano Akil	341,613	52,906	49,126	11,868	62,397	2,066	199	298	2,581
	Rohri	312,598	42,325	39,301	9,494	49,918	1,653	159	238	2,065
	Salah Pat	90,070	31,743	29,476	7,121	37,438	1,240	119	179	1,549
	Sukkur	467,515	63,487	58,952	14,242	74,877	2,480	238	358	3,097
	(district total)	1,256,000	211,623	196,505	47,472	249,589	8,266	794	1,192	10,324
Khairpur	Faizganj	203,948	59,664	67,221	16,872	108,753	4,234	270	107	5,922
	Gambat	241,296	61,831	66,878	13,647	118,623	280	417	143	5,543
	Khairpur	402,023	60,236	66,543	10,631	89,578	341	533	160	6,128
	Kingri	298,139	55,642	68,380	11,548	121,248	467	387	155	5,970
	Kotdiji	317,501	65,734	64,973	15,540	105,243	2,598	390	216	5,864
	Nara	128,671	64,341	59,558	10,982	123,821	6,773	294	165	3,779
	Sobhodero	247,142	62,528	67,988	14,961	116,724	321	342	132	5,124
	Thari Mirwah	315,280	63,451	66,334	14,993	116,473	3,215	251	125	6,011
	(district total)	2,154,000	493,427	527,875	109,174	900,463	18,229	2,884	1,203	44,341
Naushero Feroze	Moro	369,498	66,950	112,560	12,342	180,595	830	145	295	7,830
	N.Feroze	334,777	80,560	135,360	13,243	199,230	910	159	305	7,910
	Kandiaro	309,986	70,325	99,830	11,330	165,960	715	122	215	7,215
	Bhiria(City)	284,342	62,293	88,578	10,560	150,368	709	113	209	7,100
	Mehrampur	216,398	54,630	94,202	4,089	124,269	547	88	180	5,538
	(district total)	1,515,000	334,758	530,530	51,564	820,422	3,711	627	1,204	35,593
Shaheed Benazir Abad (Nawabshah)	Daur	424,370	90,352	100,066	31,014	227,229	1,301	1,024	80	11,148
	Kasi Ahmed	343,811	81,207	94,981	29,576	218,523	1,519	1,029	92	11,201
	Nawabshah	391,879	79,358	95,840	17,329	192,456	586	496	73	9,192
	Sakrand	375,940	88,271	99,372	23,891	239,301	1,171	978	84	10,883
	(district total)	1,536,000	339,188	390,259	101,810	877,509	4,577	3,527	329	42,424
Kashmore	Kaudhkot	277,666	59,846	62,861	49,801	48,988	253	931	1,483	11,201
	Kashmore	404,049	81,327	84,276	52,381	61,826	821	1,123	1,854	13,311
	Tangwani	270,284	49,699	48,567	36,162	37,208	337	533	752	7,396
	(district total)	952,000	190,872	195,704	138,344	148,022	1,411	2,587	4,089	31,908
Shikarpur	Garhi Yasin	317,541	100,241	124,637	71,597	81,342	216	412	379	12,317
	Khanpur	266,998	180,734	126,894	80,304	81,096	353	334	276	9,508
	Lakhi	271,897	102,305	146,552	75,671	82,995	271	428	405	10,580
	Shikarpur	379,564	127,760	151,548	65,896	96,621	240	672	623	24,523
	(district total)	1,236,000	511,040	549,631	293,468	342,054	1,080	1,846	1,683	56,928
Jacobabad	Garhi Khairo	163,193	120,096	122,962	125,415	130,460	493	585	377	25,275
	Jacobabad	373,148	173,415	160,540	109,954	176,520	565	725	460	31,460
	Thull	496,659	213,730	185,680	134,324	217,416	530	665	415	26,545
	(district total)	1,033,000	507,241	469,182	369,693	524,396	1,588	1,975	1,252	83,280
Kamber Shadadkot	Kamber	341,346	43,982	74,652	28,453	75,321	186	324	36	17,312
	Miro Khan	137,545	18,951	46,365	11,864	47,632	78	242	25	7,210
	Nasirabad	191,549	21,745	59,231	31,245	28,463	93	108	20	7,452
	Qubo Saeed Khan	88,705	58,924	36,312	26,213	57,964	213	265	19	14,351
	Shahdadkot	176,306	25,571	54,569	13,523	41,876	98	198	34	9,821
	Sijawal	115,607	28,123	44,435	10,980	43,568	103	147	16	7,962
	Warah	235,942	32,321	59,568	37,660	56,589	112	134	18	8,632
	(district total)	1,287,000	229,617	375,132	159,938	351,413	883	1,418	168	72,740
Larkana	Bakrani	243,411	54,649	130,587	12,854	62,004	141	116	24	18,586
	Dokri	235,486	65,331	124,185	12,983	63,842	182	134	28	19,899
	Larkana	601,341	50,482	142,871	14,059	60,214	152	127	29	23,540
	Ratodero	316,762	45,737	133,686	12,341	61,997	133	144	26	20,136
	(district total)	1,397,000	216,199	531,329	52,237	248,057	608	521	107	82,161

Table B-2 Taluka Population (2/3)

District	Taluka	Human Population (projected in 2010)	Cattle	Buffalo	Sheep	Goat	Camel	Horse	Mules	Asses
Dadu	Dadu	456,967	102,320	89,885	75,665	275,670	12,640	1,002	200	8,310
	Johi	288,949	90,640	85,678	86,940	285,989	10,370	732	190	6,540
	K.N.Shah	352,938	146,215	94,093	75,696	112,730	6,126	732	360	7,360
	Mehar	443,146	129,627	116,327	45,428	125,675	12,891	1,009	1,157	16,773
	(district total)	1,542,000	468,802	385,983	283,729	800,064	42,027	3,475	1,907	38,983
Jamshoro	Kotri	289,202	48,360	61,390	25,136	81,921	626	327	37	9,632
	Manjhad	139,471	31,459	22,640	32,346	91,547	938	84	29	5,338
	Sehwan	237,672	24,373	34,105	52,329	125,784	1,019	188	27	7,156
	Thana Bulla Khan	144,655	59,540	605	61,937	114,939	1,495	271	16	7,258
	(district total)	811,000	163,732	118,740	171,748	414,191	4,078	870	109	29,384
Thatta	Ghorabari	146,967	44,386	39,387	16,345	37,562	1,097	297	45	2,039
	Jati	172,708	47,045	41,603	19,485	39,817	1,330	365	75	2,145
	Keti Bunder	35,808	44,909	38,960	15,975	36,985	1,165	180	39	2,117
	Kharo Chhan	35,760	41,305	39,755	16,203	37,311	1,065	389	42	2,089
	M.P.Bathoro	211,661	46,985	41,885	18,495	40,315	1,043	403	73	2,169
	M.P.Sakro	277,058	45,065	40,054	16,975	37,456	1,103	205	45	2,109
	Shah Bunder	140,130	46,052	40,965	19,205	40,315	1,279	389	89	2,149
	Sujawal	177,364	47,302	42,005	19,739	40,103	1,303	399	69	2,105
	Thatta	353,544	47,565	42,503	19,709	41,502	1,317	409	89	2,215
	(district total)	1,551,000	410,614	367,117	162,131	351,366	10,702	3,036	566	19,137
Matari	Hala	225,655	90,534	92,105	19,731	125,405	350	310	25	7,510
	Matari	333,256	95,239	93,390	18,930	108,231	320	217	17	6,125
	Saecorbad	159,089	81,133	49,188	13,204	96,367	206	163	27	6,693
	(district total)	718,000	266,906	234,683	51,865	330,003	876	690	69	20,328
Tando Allahyar	Chamber	174,783	23,259	69,612	6,507	95,685	162	146	68	3,462
	Jhando Mari	189,534	14,538	20,884	7,192	63,790	205	186	86	4,385
	Tando Allahyar	287,683	20,352	48,728	3,425	53,158	172	156	73	3,692
	(district total)	652,000	58,149	139,224	17,124	212,633	539	488	227	11,539
Hyderabad	Hyderabad (City)	731,770	16,121	97,290	2,280	57,970	125	538	30	1,028
	Hyderabad (Rural)	410,158	25,110	46,498	15,974	95,962	415	675	80	5,876
	Latifabad	785,350	21,080	98,225	5,600	72,492	482	145	55	4,094
	Qasimabad	160,722	14,173	67,150	5,280	69,538	53	280	65	4,937
	(district total)	2,088,000	76,484	309,163	29,134	295,962	1,075	1,638	230	15,935
Tando Muhammad Khan	Bulri Shah Karim	219,521	22,721	56,648	11,058	47,352	945	27	78	3,008
	Tando Ghulam Hyder	163,115	12,761	45,339	3,635	42,101	1,164	13	81	1,740
	Tando M Khan	231,364	21,934	55,947	9,540	46,813	320	43	52	3,509
	(district total)	614,000	57,416	157,934	24,233	136,266	2,429	83	211	8,257
Badin	Badin	403,024	69,328	120,625	45,160	93,640	2,066	410	42	4,230
	Matli	394,683	60,530	76,537	45,580	143,039	1,195	400	33	6,500
	S.F.Rahoo	254,543	68,940	128,386	61,633	105,500	2,397	335	40	2,847
	Talhar	146,975	50,938	85,790	24,359	85,390	1,179	209	35	2,530
	Tando Bago	338,776	65,633	86,915	46,340	150,730	1,835	360	34	2,840
	(district total)	1,538,000	315,369	498,253	223,072	578,299	8,672	1,714	184	18,947
Sanghar	Jam Nawaz Ali	125,473	30,965	10,705	3,624	50,916	145	55	119	4,414
	Khipro	320,238	65,334	20,924	28,855	215,538	4,496	74	213	7,130
	Sanghar	368,912	125,948	100,709	24,307	163,534	1,311	560	204	10,118
	Shahdadpur	431,369	54,416	63,602	10,926	76,290	118	195	156	7,680
	Sinjhero	277,816	50,630	51,863	9,539	109,877	201	95	113	7,950
	Tando Adam	321,191	42,942	75,740	6,328	80,429	135	621	184	8,526
	(district total)	1,845,000	370,235	323,543	83,579	696,584	6,406	1,600	989	45,818

Table B-2 Taluka Population (3/3)

District	Taluka	Human Population (projected in 2010)	Cattle	Buffalo	Sheep	Goat	Camel	Horse	Mules	Asses	
Mirpurkhas	Digri	212,616	38,482	38,884	11,794	111,440	449	91	15	2,945	
	Hussain Bux Mari	115,918	21,111	25,152	5,386	82,587	224	48	5	1,677	
	Jhuddo	203,386	32,870	35,644	10,981	102,621	414	78	13	2,714	
	Kot Ghulam Muhamma	249,346	31,267	35,482	9,761	99,414	410	74	10	2,668	
	Mirpurkhas	415,451	33,672	48,200	13,827	115,448	489	99	18	3,128	
	Sindhri	198,283	44,131	50,986	16,173	154,502	1,080	535	185	1,841	
	(district total)	1,395,000	201,533	234,348	67,922	666,012	3,066	925	246	14,973	
Umerkot	Kunri	220,379	65,220	20,410	21,474	92,400	1,430	100	14	5,095	
	Pithoro	113,079	40,800	22,300	23,500	88,450	900	76	10	6,750	
	Samaro	156,907	30,699	26,400	21,732	65,537	1,265	125	16	7,890	
	Umerkot	435,636	60,589	28,732	82,300	290,000	2,864	190	18	8,900	
		(district total)	926,000	197,308	97,842	149,006	536,387	6,459	491	58	28,635
Tharparkar	Chachro	498,118	184,645	6,378	175,841	513,702	40,556	1,835	410	78,014	
	Diplo	225,391	237,339	21,738	359,835	601,804	24,447	2,410	0	52,018	
	Mithi	336,316	182,416	9,604	387,606	553,889	39,210	1,593	338	71,103	
	Nagarparkar	213,175	147,865	8,608	261,840	548,481	31,143	2,681	727	45,522	
		(district total)	1,273,000	752,265	46,328	1,185,122	2,217,876	135,356	8,519	1,475	246,657
Karachi	Baldia		8,433	14,455	7,321	8,544	600	350	60	2,275	
	Bin Qasim	13,729,000	65,320	117,900	38,655	133,990	971	645	425	6,445	
	Gaddap		40,777	47,321	18,322	29,321	360	112	50	1,140	
	Gulberg		150	—	—	900	—	—	—	312	
	Gulshan-e-Iqbal		601	200	50	500	—	200	—	700	
	Jamsheed Qtr.		640	—	—	800	—	25	50	—	
	Keemari		400	—	—	2,000	—	—	—	—	
	Korangi		38,335	60,087	13,776	54,312	500	250	150	1,118	
	Landhi		75,665	108,876	12,433	184,888	600	322	200	3,200	
	Liaquatabad		495	—	50	400	—	50	—	—	
	Lyari		209	—	2,221	1,100	678	322	—	—	
	Malir		24,650	35,998	13,995	69,130	278	100	100	1,230	
	New Karachi		12,500	28,919	5,417	9,755	400	235	150	—	
	North Nazimabad		809	—	—	1,500	50	63	75	400	
	Orangi		543	—	—	1,090	900	412	100	1,990	
	Saddar		85	—	—	200	—	50	45	—	
	Shah Faisal Colony		500	300	200	1,015	100	50	87	1,200	
	Site		435	—	200	300	812	60	—	351	
		(district total)	13,729,000	270,547	414,056	112,640	499,745	6,249	3,246	1,492	20,361
		Sindh Total	42,400,000	6,925,022	7,340,162	3,958,508	12,572,221	278,424	44,999	19,512	1,004,925

Appendix C

**Report of the First Household Survey
in Sindh Province
(by local consulting firm)**

**Household Survey Report of Livestock
in
Sindh Province**

(Final Report)

Submitted

to

JICA/GoS

by

**SEBCON (Pvt.) Ltd.
Islamabd**

(March 24th, 2011)

EXECUTIVE SUMMARY

- The livestock sub-sector in Sindh province occupies a share of 23 percent in livestock population in the country whereas its share in the production of fodder crops is 16 percent. It, therefore, faces fodder shortages particularly in the months of January, July, August, November and December.
- Despite inter temporal shortages of fodder, the average milk productivity levels in Sindh province remain higher among all four provinces.
- With the exception of buffalo (fresh) milk which has the highest productivity in the world, the other type of milk i.e. cow milk, sheep and goat milk display productivity levels far below the levels achieved in major producing countries. It implies substantial potential reposed which needs to be tapped.
- The biggest advantage availed by Sindh province is in the form of significantly high proportions of farm area that is irrigated i.e. 85 to 90 percent which is one among the highest in the world. However, this advantage has not yet been fully exercised which also has adverse effects on livestock sub-sector, in addition to crop sub-sector.
- The assured supply of water through a vast canal network system tends to create potentially for the supply of fodder and other crop residues for the livestock population. In spite of fodder shortages, there is a distinct difference between irrigated and unirrigated areas in terms of type of animals kept. The population of cattle and buffaloes largely exists in irrigated areas, whereas sheep and goats are largely raised in unirrigated areas.
- It is interesting to observe that in between crop and livestock activities there is a substitution effect i.e. those with smaller land and water resources tend to focus less on livestock development. However, the larger size agricultural farms enjoy higher degrees of complementarity between cropping and livestock activities each supporting and reinforcing each other.
- The large scale cattle colonies in Karachi and specific areas in Jamshoro district exclusively raise large size animals i.e. cattle and buffaloes. Their scale of operation is distinctly different and currently not conducive to the pattern observed in rural Sindh. However, in the development plan for livestock in Sindh these areas provide significant learning experiences.
- The responses on willingness to pay for livestock insurance showed that larger proportion of farmers was interested in unirrigated areas in relation to those in irrigated areas. However, on the whole farmers because of their poverty and/or ignorance to the concept of insurance had not shown higher level of willingness. In order for such efforts to succeed a large scale campaign needs to be carried out in increasing the level of awareness.

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1. Introduction

The Sindh province, being part of an arid region, has remained water deficient from the beginning. The irrigation water supplies to the province, as a contiguous part of Indus River System, therefore act as life blood to its fertile land. Currently, over 85 percent of its farm land is irrigated – a proportion which is one among the highest in the world.

The irrigation supplies have thus significantly accelerated the pace of land cultivation in the province during the twentieth century. Nevertheless, the inter-temporal variations in water supplies have given rise to a mix of different crops and livestock production pattern. The prospects for livestock growth were determined in view of the possibility of different fodder crops and residues from other crops.

However, the ghost of famine, drought and hence food insecurity have haunted the region in a historical context. In this backdrop, the agrarian pattern which emerged during the British control of the area created greater inequities in land distribution pattern, particularly in Sindh province. These in turn incapacitated the entrepreneurial urge to emerge among farmers, particularly the small owners and the landless. As a consequence the farmers adopted survival strategies to mitigate the recurrence of food insecurity problem in the area.

1.1 Crop-Livestock Interface in Sindh Province

With a geographical area of 14.09 million hectares, the province of Sindh, a total of 4.87 million hectare is cultivated. The three barrages (divergent dams) in Sindh command a total of 3.44 million hectares of which 3.19 million hectares is irrigated (Development Statistics of Sindh, 2008, page 63). It implies that over 92 percent of the command area of barrages in Sindh is irrigated. A significant which does not come under controlled irrigation system largely depends on rainfall which has an erratic pattern in terms of its timing, amount, regulatory and distribution. In the obtaining situation the canal water supplies carry the status of life blood particularly to the rural population of the province. Due to increased levels of water logging and salinity in Sindh, there has been extremely low level of investment in tubewells particularly in the private sector.

Most of the rainfed areas are in the districts of Tharparkar, Khairpur, and Jamshoro. In the remaining 20 districts, land is largely cultivated by canal water supplies, and limited supplies from tubewells.

With the establishment of a vast network of irrigation water supplies in most of the districts, which also portray different cropping systems, a large number of crops in the Kharif (summer) and Rabi (winter) seasons are grown. These include food and cash crops, pulses, oilseeds, vegetables, condiments, fruits and fodder crops. During 2008-09, fodder crops were grown on 0.3 million hectares in Sindh which accounted for 1.27 percent of fodder area in Pakistan (Agriculture Statistics of Pakistan, 2008-09, page 87). In Sindh the acreage under fodder accounts for 7.85 percent of the total cropped area of 3.82 million hectares. However, it is rather alarming that whereas Sindh contributes 16.1 percent in the total cropped area in Pakistan, its share in fodder acreage is only 1.27 percent.

Along with the crop cultivation pattern in Sindh, raising of a sizeable livestock population also exists which in many ways compliments with the cropping pattern within irrigated areas. In the unirrigated areas the livestock farming in a way tends to substitute the crop cultivation largely due to non-availability of water supplies. Therefore, across different agro-climatic zones in Sindh, different pattern of livestock farming emerged. The type of animals kept includes cows, buffaloes, goats and sheep. In addition, domestic animals like camel, horses, donkeys are also part of the livestock population in Sindh.

Table-1 provides estimates on livestock population in Sindh from 1976 to 2009-10 using various sources of information.

Table – 1
Estimated Livestock Population in Sindh Province

(# Animals in Million unless otherwise Mentioned)

Year	Source	Cattle		Buffalo		Sheep		Goat		Camel	
		#	Periodical Growth Rate (%)	#	Periodical Growth Rate (%)	#	Periodical Growth Rate (%)	#	Periodical Growth Rate (%)	#	Periodical Growth Rate (%)
1976	Livestock Census	2.85	—	1.83	—	1.83	—	4.24	—	0.14	—
1986	Livestock Census	3.87	35.8	3.22	75.9	2.62	43.2	6.76	59.4	0.22	57.1
1996	Livestock Census	5.46	41.1	5.62	74.5	3.71	41.6	9.73	43.9	0.23	4.5
2006	Livestock Census	6.92	26.7	7.34	30.6	3.9	6.7	12.57	29.2	0.28	21.7
2008-09	Ministry of L&DD	7.73	11.7	8.02	9.3	4.08	3.0	13.64	8.5	0.29	3.5
2009-10	Projected	8.02	3.75	8.26	3.0	4.2	3.0	14.01	2.7	0.29	0

- Sources:
1. Various Reports of Livestock Census reported in Development Statistics of Sindh 2008, Government of Sindh.
 2. Derived estimates from national level projection after 2006 by Ministry of Livestock & Dairy Development (MLDD) Government of Pakistan, reported in Development Statistics of Sindh, 2008 (Pages 181-189).
 3. Based on the animal specific growth rates between 2006 and 2008-09, estimated animal population for the year 2009-10 we derived.

It shows the prominent features of the estimated population of 8.02 million cattle, 8.26 million buffaloes, 4.2 million sheep, 14.01 million goats and 0.29 million camels.

As per 2006 livestock census in the country, the relative share of Sindh in the country in this respect shows significant contributions. For example, Sindh carries a share of 23 percent in cattle, 27 percent in buffaloes, 15 percent in sheep, 23 percent in goats and 30 percent in camel population (Agriculture Statistics, Government of Pakistan, 2008-09, Table 120, page 181). In addition, Sindh's share in poultry birds is around 19 percent in the country.

This shows a much larger share of Sindh in the country in terms of livestock population when compared with 16.1 percent share in total cropped area. Furthermore, a comparative estimate on milk productivity across four provinces shows that average level of milk productivity of cows, buffaloes and goats in Sindh is higher.

Table – 2
Comparative Levels of Milk Productivity across Provinces
as per Livestock Census of 2006

Provinces	Cow	Buffalo	Goat
Punjab	6.31	7.71	1.36
Sindh	6.62	8.9	1.72
Khyber Pakhtonkhwa (NWFP)	5.09	7.28	1.33
Balochistan	6.15	7.61	1.09
Pakistan	6.15	7.93	1.42

(Liters/Day/Animal)

Source: Livestock Census of 2006, Special Report, Table-1, Page 1-4.

It further implies that the share of Sindh in total production of milk in the country is even higher than its share in livestock population.

1.2 Rationale for Livestock

The current pattern of livestock activities in Sindh presents a somewhat convoluted role of the livestock sub-sector within the gambit of the overall agricultural sector. The only exception is that of Karachi Cattle Colonies which have no cropping activities and have largely developed on their own initiatives.

The farming community in Sindh largely raises livestock as supplementary activities with cropping culture. The current pattern so observed in Sindh are also common to the entire country where livestock activities compliments to the crop sub-sector on the basis of providing fodder output and residues from main crops.

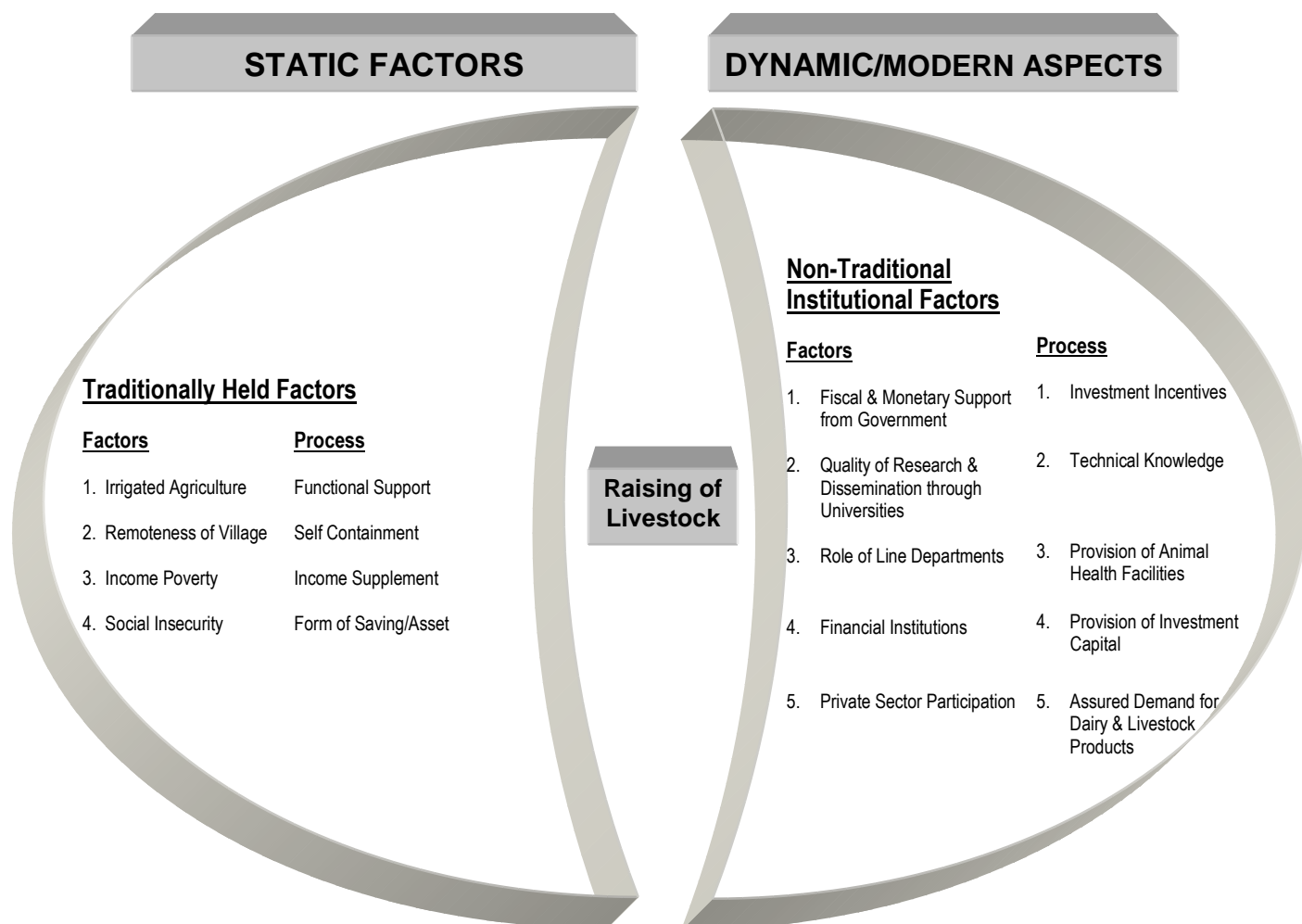
In a socio-economic context, raising livestock appear as part of the survival mechanism against food insecurity and poverty. Therefore, livestock activities are considered a mechanism of not only making complementarities with the cropping output but is a conscious activity to act as a form of savings as well. It is also a part of the food chain of the households, and facilitate in providing instant cash flow at time of distress.

These social and microeconomic aspects of livestock activities in Sindh are largely devoid of the technical and economic potentials reposed. The fertile land, irrigated status and a large number of productive species of different animals are the resource endowments of the province which require a scientifically designed and aggressively planned focus on the development of the livestock sub-sector that can create the basis for a vibrant economic activity in order that effective uplift of the rural masses and a harmonized social development is achieved.

The above discussion shows the relative edge that the province of Sindh carries in livestock population and milk production. It tends to demonstrate the potentials reposed. However, it also shows a relatively smaller share in fodder crops acreages implying insufficiency of fodder production in the province and hence dependence on imports from other provinces. The timeliness required in the prompts supplies of fodder tend to create shortages in different parts of the year and is considered one the main obstacles in improving livestock productivity levels in Sindh.

Another major, rather the most important factor in improving the productivity of the livestock sub-sector in the province (and at the national level as well) is the general lack of a dynamic and scientific approach towards its development. A schematic chart tends to display the current status and approach adapted in the province in developing livestock sub-sector.

Schematic Chart Highlighting Traditional & Non-Traditional Aspects of Livestock Development in Sindh Province



It portrays a set of factors that largely traditional and static in nature which tend to provide a justification for the existence of livestock population. The crop sub-sector provides fodder and residues from other crops as a complementary input to the livestock population. In most of the rural areas, a general lack of social services and economic opportunities imposes self containment of the farming sector they restrict themselves in an enclave for the growth of livestock. It is largely caused by the incapacity of the institutional framework to guide and assist the livestock holders. The element of social insecurity has perpetuated in the region which forces the rural community to use livestock as a form of savings and asset. Therefore, a joint impact of these factors provide the justification for raising livestock population which obviously does not carry the flavor of dynamic and scientifically established approach towards livestock development at the regional level. Therefore, these factors persist

and render the sub-sector as a somewhat static towards its path of development despite the potentials reposed.

The chart also displays a number of non-traditional approaches towards the development of the livestock sub-sector which are the basis for a scientific and efficient followed in countries which lead the world in production and supplies of livestock products. The non-traditional institutional factors include roles of government, educational institutions, service providers, financial institutions and the private sector. The process through which these sources contribute towards the development of livestock sub-sector include investment incentives, creation of technical knowledge through research and its dissemination, provision of animal health care facilities, availability of capital for investment and an assured demand for livestock products through an active and vibrant participation of the private sector.

Currently, these non-traditional factor are not fully participating in the development of the livestock sub-sector of Sindh province largely because of a clear lack of integration among them in focusing on the sub-sector. Through an effective integration of these non-traditional factors in terms of a Development Plan the livestock sub-sector can overcome its current deficiencies and a basis can be created to achieve competitive edge with other developed/developing countries. The further prospects for the export of dairy and livestock products can be established which would help reduce rural poverty and enhance welfare gains all across.

1.3 International Comparison of Milk Productivity

In view of the preceding discussion on the prevailing levels of milk productivity in Sindh and prospects for future development, it would be relevant to examine the relative position of Pakistan among the major producing regions in the world.

Table 3 provides a comparative picture of 21 major countries in the level of milk productivity of cows, buffaloes, sheeps and goats. It shows that of 21 countries Pakistan ranks 18th in cow milk. Among the top 8 countries in terms of milk productivity of buffaloes, Pakistan ranks 1st. In case of sheep and goat milk, Pakistan productivity levels rank 5th and 12th, respectively.

Table – 3

Levels of Milk (Whole Fresh) Productivity by Animals across Major Producing Countries

(Kg/Animal/Annum)

# Countries	Cows	Buffaloes	Sheep	Goats
1. Armenia	2151	0	232	643
2. Austria	6068	0	411	635
3. Belarus	4510	0	0	819
4. Bhutan	257	400	0	0
5. Canada	8395	0	0	0
6. China	2832	547	29	200
7. Czech Republic	7055	0	221	750
8. Egypt	1882	1600	49	14
9. Germany	6794	0	0	972
10. India	1172	1598	0	132
11. Iran	1843	1065	30	30
12. Indonesia	1858	0	30	40
13. Japan	7497	0	0	0
14. Jamaica	952	0	0	391
15. Malaysia	423	1150	0	429
16. Netherlands	7342	0	0	0
17. New Zealand	3500	0	0	0
18. Pakistan	1230	1931	50	141
19. Turkey	2802	1002	78	105
20. United Kingdom	7101	0	0	0
21. USA	9331	0	0	0

Source: FAO STAT 2009 (Website)

In other terms, Pakistan achieves only 13 percent of USA's cow productivity levels, 12 percent of the level of goat milk productivity of Austria, and 14.5 percent of milk productivity of goat of Germany. Only in case of buffaloes milk Pakistan ranks Highest.

Chart – 1

Levels of Fresh Milk (whole) Productivity of Cows across Countries

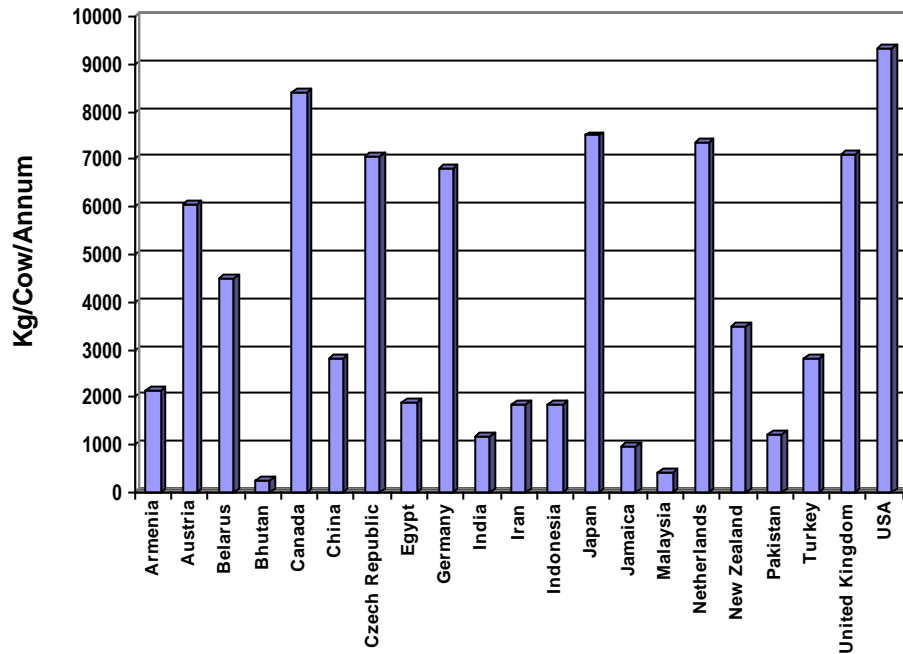
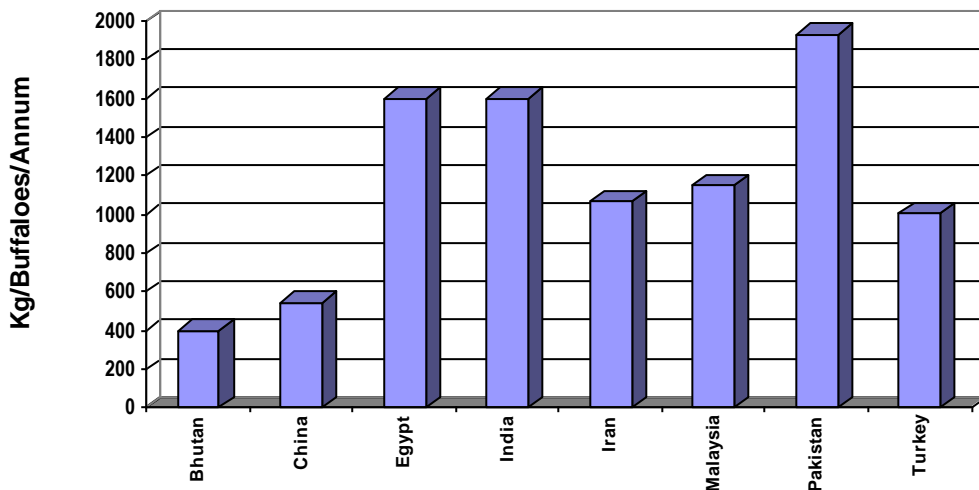


Chart – 2

Levels of Fresh Milk (whole) Productivity of Buffaloes across Countries



Keeping in view these milk productivity levels where Pakistan has significant deficiencies and the fact that it ranks 4th or 5th in the world in total milk production level, it is easier to ascertain the massive opportunity losses incurred by not availing the productivity enhancement measure. Furthermore, the past production loss of milk because of maintaining an age old processing and distribution system of milk, the need for extensive measures for the shifts in production and post-production systems through a Master Plan seems strongly justified.

Chart – 3

Levels of Fresh Milk (whole) Productivity of Sheeps across Countries

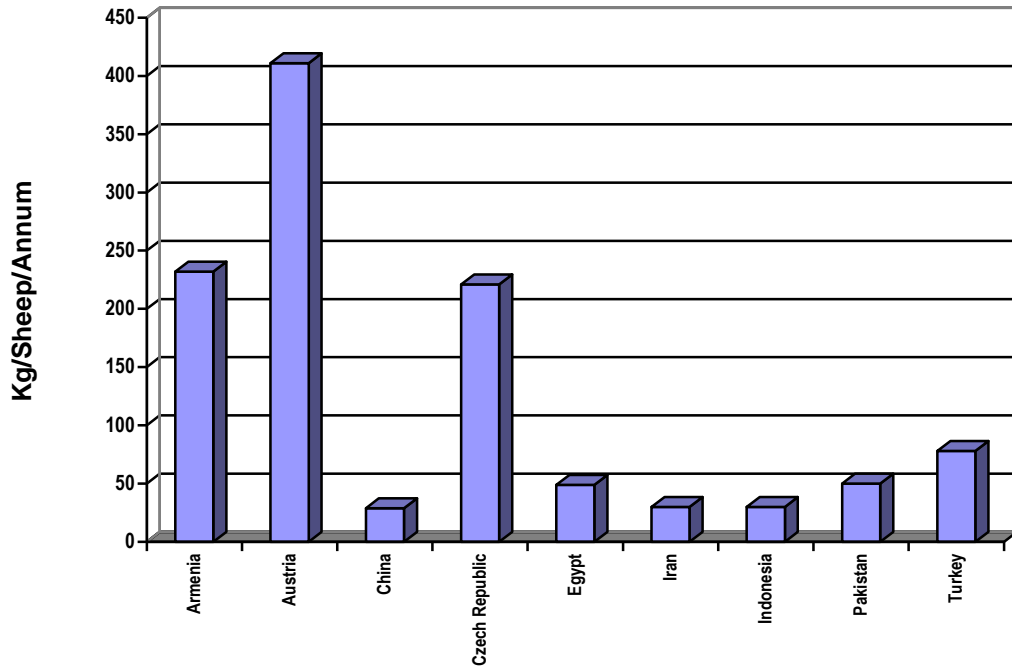
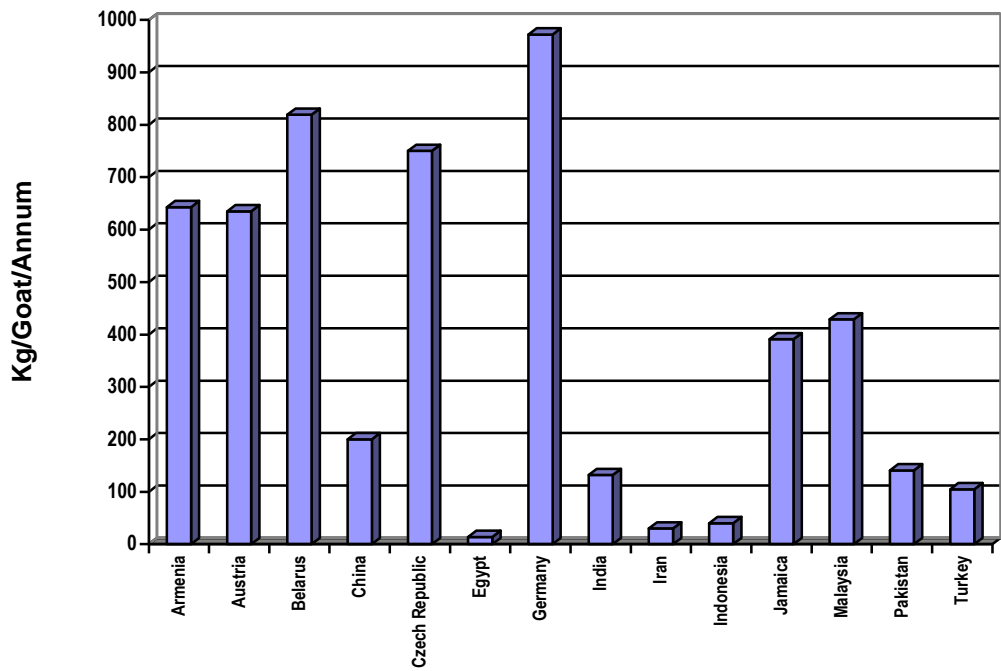


Chart – 4

Levels of Fresh Milk (whole) Productivity of Goats across Countries



1.4 Objectives of the Study

In the light of the discussion presented in preceding sections efforts are being made to prepare a Master Plan for the development of livestock sub-sector in Sindh. Accordingly, a baseline survey of livestock holders in Sindh was undertaken with the following measure objectives:

- a) To furnish necessary data and information to the Project Team in formulating a comprehensive development strategy for livestock and dairy development Master Plan.
- b) To collect information on such aspects as social, economic, agricultural and livestock to prepare a baseline of the livestock sub-sector.

1.5 Sampling Framework

In order to capture the characteristics of farmers in Sindh, the Household Survey was conducted by a local consulting firm. The survey was made in the form of interview, and 720 households in the selected 8 districts were surveyed. The districts covered by the Survey are Karachi, Badin, Tharparkar, Jamshoro, Sukkur, Larkana Tando Allahyar and Sanghar. Six villages were selected from each district, and 15 households were selected from each village, both of them being based on the criteria prepared by the Project Team. The selected villages are shown in Table 1-5-1. The topics of questionnaire were extended to various topics such as income and consumption, agriculture, livestock, credit gender, social organization, etc. Yet the main purpose of the survey is to understand the characteristics of the farm households in relation to the number of the animals, the ownership and size of the land they possess as well as agro-ecological and geographical conditions of the areas they reside. Therefore, specific criteria, as shown in Tables 1-5-2, Table 1-5-3 and 1-5-4, were applied for selecting the households.

Table 1-5-1 List of the Villages for the Household Survey

District	Village	U/C	Taluka
Karachi	Landhi Cattle Colony		
	Nagori Cattle Colony		
	Shedi Goth	Memon Goth	
	Juma Goth	Ibrahim Hydri	
	Qureshi Colony	Near Super Highway	
	Goth Moidan	Goth Moidan	
Badin	Khanai Jat	Khor Wah	Golarchi
	Baghali Mehri	Dubi	Gloarchi
	Chak No.25	Golarchi	Golarchi
	Bukhsho Lund	Pangrio	Tando Bago
	Allah Dino	Badin 2	Badin
	Lakhadino Unar	Chabralo Tando Bago	Tando Bago
Tharparkar	Kasbo	Nagarparkar	Nagarparkar
	Oon Jo Wandha	Nagarparkar	Nagarparkar
	Mithrio Bhiwti	Mithrio Bhiwti	Mithi
	Warwai	Khairo Ghulam Shah	Mithi
	Chapper	Khinsar	Chhachhro
	Baliari	Baliari	Diplo
Jamshoro	Ramazan Rajar	Petaro	Kotri
	Qadan Shoro	Allah Bachayo Shoro	Kotri
	Mian Barecho (Wai)	Arab Khan	Thana Bola Khan
	Salah Muhammad Brahman	Thana Bola Khan	Thana Bola Khan
	Karchat	Thana Arab Khan	Thana Bola Khan
	Ali Murad Barejo	Mole	Thana Bola Khan
Sukkur	Thomi	Tarra	Saleh Pat
	Thatt	Trimhoon	Rohri
	Trimhoon	Trimhoon	Rohri
	Laung Bhambhoro	Tarra	Saleh Pat
	Faqir Indhar (Muhammad Saleh Undhar)	Sultan Pur	Pano Aquil
	Umer Buriro	Sangi	Pano Aquil
Larkana	Darra	Badah-2	Dokri
	Mirpur Bhutto	Pir Bakhsh Bhutto	Rato Dero
	Chato Wahan	Mehrapur	Bakrani
	Dhamrah	Dhamrah	Larkana
	Faridabad	Wada Mahar	Bakrani
	Goth Bosan	Waris Dino Machi	Rato Dero
Tando Allahyar	Chatan Aresar	Bagan Jarwar	Chambar
	Behar Mir Jat	Tando Soomro	Jhando Mori
	Haji Yusif Halephoto	Pak Snghar	Jhando Mori
	Masoo Khan Bozdar	Dad Jarwar	Chambar
	Miandad Rind	Chambar-2	Chambar
	Dito Kalro	Shaikh Moosa	Tando Allahyar
Sanghar	Chuttyaron	Chuttyaron	Sanghar
	Tando Mitha Khan	Chuttyaron	Sanghar
	Naubad	Naubad	Jam Nawaz Ali
	Bahadur Khaskheli	Jhol	Sinjhero
	Urs Chanio	Hathungo	Khipro
	Chutto Mangerio	Jhol	Sinjhero

Table 1-5-2 Household Selection Criteria for Cattle Colonies in Karachi

	Landless	Land owners
Small farmers (No. of animals: 0-50)	4 farms	
Small - Medium farmers (No. of animals: 51-100)	3 farms	
Medium farmers (No. of animals: 101-150)	3 farms	
Medium - Large farmers (No. of animals: 151-200)	3 farms	
Large farmers (No. of animals: 201-)	2 farms	

Table 1-5-3 Household Selection Criteria for Karachi Rural and Other Districts in Irrigated Areas

	Specialized in Livestock (no cropping)	Landless	Land owners
Small farmers (No. of animals: 0-5)	1 household (If not available, add to small landless farmers)	4 households	4 households
Medium farmers (No. of animals: 6-20)			5 households
Large farmers (No. of animals: 50-150)			1 households (If not available, add to medium farmers)

- The selection criteria is not continuous, in order to include the famers who own a large number of livestock in the sample.

Table 1-5-4 Household Selection Criteria for Non-irrigated Areas

	Specialized in Livestock (no cropping)	Landless	Land owners
Small farmers (No. of animals: 0-20)	3 Households	2 households	4 households
Medium farmers (No. of animals: 21-50)			4 households
Large farmers (No. of animals: 101-)			2 households (If not available, add to medium farmers)

- The selection criteria is not continuous, in order to include the famers who own a large number of livestock in the sample.
- Count one for one small ruminant (sheep/goat)
- Count one camel as 12 small ruminants
- Count one cattle as 10 small ruminants

In addition, a key informant survey was also conducted for each village, before the start of household survey, using a village level questionnaire. The purpose was to collect village level characteristics as well as to identify 15 households to be covered through household survey. The questionnaire was administered with key informants of the village in a joint meeting.

1.6 Classification of Farmers and Regions

As described in Table 1-6-1, livestock farmers are grouped into the categories depending on the size of animal holdings for dairy, sheep and goats, and fattening farmers. To obtain a single indicator that reflect the scale of animal holdings for various kinds of livestock, the animal unit which is depicted in Table 1-6-2 is used for the analysis.

Table 1-6-1 Classification of Livestock Farmers

	Number of Head Holdings	Classification
Dairy	More than 11 heads	Large Farmers
	6-10 heads	Medium Farmers
	1-5 heads	Small Farmers
Sheep and Goats	More than 71 heads	Large Farmers
	31-70 heads	Medium Farmers
	1-30 heads	Small Farmers
Fattening	More than 41 heads	Large Farmers
	1-40 heads	Small Farmers

Table 1-6-2 Animal Unit for Sindh

Kind of Livestock	Animal Unit Factor
Buffalo	1.0
Cattle	0.8
Sheep	0.1
Goat	0.1
Donkey	0.4
Horse	1.0
Camel	1.1

As depicted in Table 1-6-3, farmers are grouped into following categories based on the status of land ownership. Owner-cum-tenants are grouped into landowners¹. The landowners are further classified into sub-categories based on the area of own land as depicted in Table 1-6-4. Those who are not engaged in agriculture but holds livestock are classified as “Non-farm livestock holders”. In some cases, non-farm livestock holders are further divided into “Non-farm large livestock holders” who own 10 units of animals in terms of animal unit and “Other non-farm livestock holders” who own less than that unit. An attempt has been made to separately categorize and analyze the landowners who have less than one acre of land since they can be treated as very vulnerable subsistence farmers. However, there are only eight households of this group in the sample, and also the separation of these households does not affect the main findings of this chapter.

Table 1-6-3 Categorization Based on Land Ownership

Categorization Based on Land Ownership
Landowner
Owner-cum-tenant
Tenant
Non-farm large livestock holders
Other non-farm livestock holders

Table 1-6-4 Classification of Landowners

Area of Own Land	Classification
More than 100 Acres	Large Landowner
25-99 Acres	Medium Landowner
5-24 Acres	Small Landowner
Less than 5 Acres	Micro Landowner

Table 1-6-5 describes the regional classification used for the analysis. Farmers in the cattle colonies are grouped as “Colony”. As shown in Table 1-6-1, for the analysis of consumption/income and dairy animals, three villages which are close to Karachi and Hyderabad are classified as “Non-irrigated dairy areas” as the dairy farming is practiced extensively for these areas. The other non-irrigated areas are grouped into “Other non-irrigated areas”.

¹ except for the Chapter 5.7 Rural Finance

Table 1-6-5 Classification of Regions

Regions
Colony
Irrigated Area
Non-irrigated Area

Table 1-6-6 Regions for the Analysis of Consumption and Dairy Animals

Regions for Dairy Section
Colony
Irrigated Area
Non-irrigated Dairy Area
Other Non-irrigated Area

2. Social Aspects of Livestock Holders in Sindh

This section provides descriptive coverage of social aspects of sampled households. These include:

- Education
- Household Size
- Religion
- Mother Tongue
- Source of Fuel
- Access to Electricity
- Land Ownership
- Sources of Irrigation

3. Incidence of Diseases

Information was gathered on the incidence of 6 diseases (diarrhea, Inappetance, mastitis, cold, retention of placenta and dystocia) in the animals from sampled households in the irrigated (462 respondents) and non-irrigated (255 respondents) zones. The information also included data from fattening animals (both large and small ruminants). However, this related to only 3 diseases namely diarrhea, cold and Inappetance and is based on a total of 292 respondents who reported keeping animals for fattening².

3.1 Overall Situation

On the whole, the most common disease reported was calf diarrhea (43.8%) and the least common was dystocia (26.3%). On the basis of landownership, the incidence pattern was similar. Most common was calf diarrhea with 47.6% and the least common was dystocia with 24.5%. The landless reported rather high incidence of all the diseases that varied in the range of 37.4% for diarrhea to 49.6% for retention of placenta.

The farm size seem to influence the incidence of diseases-larger the farm higher the incidence (range 32.0% for dystocia to 58.6% for diarrhea).

3.1.1 Irrigated Zone

On the whole, the most common disease reported was diarrhea (50.4%) and the least common was dystocia (28.4%). On the basis of land ownership the situation was similar for land owners (diarrhea 54.4% and dystocia 25.3%) but for the landless the situation was different. Most common disease was retention of placenta with 62.4% and least common was diarrhea with 45.5%. Animals of the tenants had the lowest incidence of all the diseases that varied between 11.6% (for dystocia) to 43.4% (for diarrhea). Animals with landless respondents had high incidence of diseases that ranged with the highest incidence of 62.4% in retention of placenta to the lowest of 45.5% in diarrhea.

The farm size seems to influence the incidence of diseases. The animals in large farms had the highest incidence of all the diseases except for inappetance.

3.1.2 Non-irrigated Zone

The incidence of diseases on the whole appeared much lower as it occurred in a narrow range of 17.3% to 18.7%. On the basis of landownership, the landowners reported the highest range of 20.6% to 24.7%. The landless reported the lowest incidence from no mastitis to 3.3% for cold. The situation about the animals with the tenants remained between those of the landowners and the landless. Size of the farms greatly influenced the incidence of the diseases with highest rate for all the 6 diseases in large farms

² Detailed tables related to this section of the report have been annexed.

3.1.3 Fattening Animals

These comprised of two types of animals namely, large ruminants (cattle and buffaloes) and small ruminants (sheep and goats). Within each type there were two groups according to the number of heads. For both the large and small ruminant types there were less than 3 respondents for the bigger groups. So the total for each type has been described for the incidence of their 3 diseases (diarrhea, cold and inappetance).

On the whole, in the large ruminants the incidence of diseases was rather high. The highest incidence was of cold (71.4%) and lowest was for inappetance (51.4%). In small ruminants, the disease situation was much better with a high of 32.5% for cold and a low of 19.5% for inappetance.

In the irrigated zone, the disease incidence was high in the large ruminants (highest 73.1% for diarrhea and cold and lowest 46.3% for inappetance). In small ruminants, the disease incidence appeared somewhat lower with highest rate of 43.8% for diarrhea and lowest of 22.5% for inappetance.

In unirrigated zone, the large ruminants had the highest incidence of inappetance and cold (66.7% each) and lowest incidence of diarrhea with 55.6%. The small ruminants had low incidence of the 3 diseases that ranged between 15.9% and 18.9%.

3.2 Service Providers for Treatment of Diseases

Information was gathered about seven service providers from the public and private sectors for providing treatment of diseases to the animals of the respondents. These were government veterinarians and paravets and private veterinarians, paravets, friend, relatives and the farmers themselves. The diseases were the same for which their incidences were surveyed namely, diarrhea in calves, inappetance, cold, mastitis, retention of placenta and dystocia. The information is based on the responses from a total of 315 respondents. For fattening animals the numbers of respondents were 25 for large ruminants and 95 for the small respondents.

3.2.1 Overall Situation

The major providers of the services were the farmers themselves. This varied from a high of 64% for diarrhea, mastitis and cold to a low of 59% for retention of placenta and dystocia. This was followed by private paravets with a high of 42% for the treatment of inappetance to a low of 15% for dystocia. There was indication that for difficult diseases like dystocia and retention of placenta government veterinarians had somewhat greater role although still behind the private paravets. Other service providers had insignificant roles. An important aspect of the treatment of diseases was that almost all farmers did arrange treatment for their animals either themselves or by a service provider.

For landowners, landless and the tenants the patterns were similar with the farmers as the major providers followed by the private paravets and insignificant roles by others. The farm size did not seem to influence the choice of service provider because the pattern of service provision was more or less similar to that of the overall situation.

For both the large and small ruminants under fattening the pattern was similar i.e. major role of farmers followed by private vets.

3.2.2 Irrigated Zone

On the whole the pattern was similar but for difficult diseases like retention of placenta, dystocia and mastitis the government veterinarians had some role but still in third place after farmers and private paravets. This may be due to the presence of government veterinary hospitals in the irrigated areas. This pattern did not seem to be influenced by farm size, as well.

For fattening animals also the self treatment by farmers was followed by private vets and government vets.

3.2.3 Non-irrigated Zone

On the whole, there was much higher role of the farmers themselves followed by the government vets and much reduced role of the private sector service providers. The farmers' role was as much as 81% for diarrhea and a low of 59% for dystocia. For land owners, the high was 86% and a low of 65%. But for the tenants, it was 100% treatment by the farmers for diarrhea and inappetance and the lowest was 50% for retention of placenta. For this disease, government vets had 50% role in its treatment. The landless treated 100% of cold themselves followed 100% cases of retention of placenta and 67% cases of dystokia the by government vets.

On the basis of farm size, it appears that medium sized farms depended more on their own skills for the treatment of some diseases and on government providers some others. For example, 91% for dystokia and 86% for inappetance the treatments were provided by the farmers themselves. However, in addition to their self services, they utilized government vets for diarrhea (17%), cold (27%), mastitis and inappetance (14% each) and retention of placenta (18%). On the other hand, large farmers also depended more on their skills with a high of 100% for the treatment of mastitis, 90% for inappetance and 76% for diarrhea.

For large ruminants under fattening, the pattern was the increased role of farmer themselves 83% for cold to 67% for inappetance. Private paravets were the only other service providers (17% for cold to 33% for inappetance). For small ruminants the pattern was similar but with government service providers in the third place after private paravets.

3.3 Characteristics for Improving Gene of Cattle and Buffaloes

Views of farmers were ascertained on nine characteristics for improving the gene of cattle and buffaloes. The characteristics are milk production, fast growth, height, udder type, teat type, body type, body capacity, colour and liveliness. Out of the total of 720 respondents, the opinions of only 623 are considered because these possessed cattle and buffaloes.

3.3.1 Overall Situation

On the whole, 83% considered milk production to be the top characteristic for gene improvement of cattle and buffaloes. This was followed by teat type (58%) and udder type (52%). Colour, height and body capacity were considered the least important characteristics (24%, 26% and 34% respectively). On the land ownership basis, the

landless had similar choices but with greater emphasis ranging from 90% to 76% and 60% respectively. Land owners also had similar preferences but the tenants had slightly different opinion. Their third choice was for fast growth. Farm size did not seem to affect the choice of characteristics for gene improvement.

3.3.2 Irrigated Zone

On the whole, the pattern for the top three characteristics was similar i.e. milk production followed by teat type and udder type. The least important characteristics were also similar i.e. colour, height and body capacity. Similar was the situation about landless and the land owners. However, the tenants placed fast growth as their third choice. Small farms had the same first three choices. But the large and medium sized farms differed in their second and third choices. The second choice for large farms was liveliness followed by teat type. For medium sized farms, fast growth was the second choice followed by teat type.

3.3.3 Non-irrigated Zone

On the whole and on the basis of land ownership, the patterns of choices were nearly similar i.e. milk production followed by teat and udder types. Colour, liveliness and height were considered the least important characteristics (11%, 14% and 19% respectively). For large farms the choices were milk production followed by udder type and fast growth. However, the medium sized farms chose milk production followed by udder type and teat type. The small sized farms choice was milk production followed by teat type and udder type.

3.4 Characteristics For Culling Cattle And Buffaloes

Views of farmers were obtained about characteristics for culling cattle and buffaloes. The characteristics considered are old age, low production, blind teat, disease, fracture, injury and no reproduction. Opinions of only 623 respondents out of a total of 720 are considered here because these possessed cattle and buffaloes.

3.4.1 Overall Situation

On the whole, the first three major characteristics for culling cattle and buffaloes were old age (74%), low production (57%) and blind teats (51%). These were also the choices for the land owners, landless and the tenants. The size of the farms did not affect the characteristics for culling the cattle and buffaloes.

3.4.2 Irrigated Zone

The choices of characteristics for culling cattle and buffaloes remained the same even in the irrigated zone i.e. old age followed by low production and blind teats. The size of farms did not affect the choices.

3.4.3 Non-irrigated

On the whole, the pattern remained similar to that of the respondents in the irrigated zone. However, there were small changes on the basis of land ownership. For the tenants, the old age was followed by blind teat with low production as the third characteristic. The land owners placed both the low production and blind teats as equally important characteristics (48% each). Large farms had the common pattern of

old age followed by low production and blind teats. But the medium and small farms placed blind teats in second place followed by low production.

3.5 Milking Practices

Information was obtained on six milking practices. These are milking frequency, milking under a roofed place, cleaning the udder, using filter, mastitis test and use of hormone for milking. A total of up to 643 respondents were involved.

3.5.1 Overall Situation

The results of each practice are presented as follows:

Frequency of Daily Milking: On the whole, more than two third of the respondents (67%) milked their animals twice every day. The highest proportion of farmers were the landless who milked twice daily (87%) followed by land owners (64%) and tenants (62%). Farm size did not seem to influence the frequency of daily milking.

Roof in the Milking Place: On the whole, just over half (55%) the farmers had roof over their milking place. However and surprisingly, a high proportion of landless farmers (76%) had roofs followed at a distance by the landowners (53%) and tenants (41%). Farm size did not seem to influence the presence or otherwise of roof over the milking place.

Clean Udder: On the whole, a very high proportion of farmers (92%) cleaned the udder of their animals before milking. This practice did not seem to be influenced by the land ownership or even the farm size.

Use of Filter: On the whole, very few farmers used filters (18%). But there was a wide variation on land ownership basis. The landless were the highest users of filters (55%) followed at a distance by the land owners (12%) and the worst were the tenants (7%). There seem to be no influence of farm size on the use of filter for milking.

Mastitis Test: On the whole, most of the farmers never undertook mastitis test (68%), 26% undertake this test at present while 6% did test their animals in the past. It is not surprising to find that 84% of tenants never had this test followed by 74% by the landowners and 35% by the landless. However, currently more (54%) landless test their animals followed by 21% landowners and 15% tenants. Farm size did not seem to influence the mastitis testing.

Use of Hormone for Milking: More than half (58%) never used hormone while 24% still use it and only 18% did use it in the past but not anymore. On the land ownership basis the landless are the worst culprit because 59% still use it. However, not many landowners (16%) and tenants (18%) use the hormone now. Farm size did not affect the use of hormone for milking.

3.5.2 Irrigated Zone

The results of each milking practice are presented as follows:

Frequency of Daily Milking: On the whole, nearly two third (67%) of farmers milked their animals twice daily. On the land ownership basis, the landless lead in

twice daily milking with 89% followed by 63% land owners and 58% tenants. Farm size did not seem to influence this practice.

Roof in the Milking Place: Roof was present in only 61% of the farmers as a whole. Surprisingly, 84% of landless had roof in their milking place followed by 64% of land owners and 44% of tenants. No influence of farm size on presence or otherwise of roof in milking place was evident.

Clean Udder: A very high proportion of farmers (95%) cleaned the udder of their animals before milking. This practice did not seem to be influenced by land ownership and farm size.

Use of Filter: On the whole, very few (17%) farmers used filter for milking. But a much higher proportion of landless farmers (58%) used filter compared to land owners (8%) and tenants (6%). The use of filter was very scanty in all the farm sizes (6-9%).

Mastitis Test: Nearly two third (66%) of the farmers never used mastitis test, 6% used it in the past and only 28% use it now. A high percentage (58%) of landless use this test now followed by a mere 23% by the landowners and 17% by the tenants. Large sized farms used more of this test (32%) than small farms (17%).

Use of Hormone for Milking: On the whole, 54% of farmers never used hormone for milking, only 26% use it now while 20% used it in the past. However, on land ownership basis 64% still use it now while 26% never used it and only 10% used it in the past. Only 18% of the land owners and the tenants use it now while about the same proportion of them never used it and used it in the past. No effect of farm size was evident on the use of hormone for milking.

3.5.3 Non-irrigated Zone

The results of each milking practice in the non-irrigated zone are presented as follow:

Frequency of Daily Milking: On an average for the zone 73% of the farmers milked their animals twice daily. However, 100% of tenants, 69% of land owners and 67% of landless milked their animals twice daily. No influence of farm size was discernable on daily milking.

Roof in the Milking Place: Very few (15%) farmers in the non-irrigated zone had roof in their milking place. Further, none of the milking place of landless had roof. Only 18% of tenants and 17% of land owners had roof in their milking places. No influence of farm size on the presence of roof in milking place was visible.

Clean Udder: Nearly three fourth (74%) of the farmers in the zone cleaned the udders of their animals before milking. On land ownership basis, this varied from a high of 80% for the land owners to a low of 59% for the landless and 60% for the tenants. Large sized farms had 95% clean udders compared to 62% in small farms.

Use of Filters: Only about one third (30%) of the farmers used filters for milking. Use of filters was practiced by 20% to 33% by the three categories of farmers on land

ownership basis. No influence of farm size was noticed on the use of filters for milking.

Mastitis Test: On the whole, only 12% farmers use mastitis test while 6% used it in the past and 82% never used this test. Tenant farmers never used this test nor use it now. However, only 20% landless farmers and 13% land owners use this test. This practice was much less in large farms (5%) as compared to that in medium sized farms (15%).

Use of Hormone for Milking: On the whole, only 6% of farmers use the hormone, 86% never used it and 6% used it in the past. Tenant farmers were the major users of hormone (22%) followed by landless (10%) and land owners (3%). Large farms did not use it compared to 18% by the small farms.

3.6 Comparison of Cattle and Buffaloes

The respondents were asked to compare cattle with buffaloes on the following four aspects of these animals:

1. Easier to manage
2. More milk production
3. Faster growth
4. Easier reproduction

The results of their responses are presented as follows:

3.6.1 Overall Situation

Easier to Manage: Cattle were reported to be slightly easier to manage (47%) than buffaloes (44%). However, landless farmers considered buffaloes to be easier to manage (59%) than cattle even though the tenants and landowners thought otherwise with cattle preferred by 51% and 49% respectively. Size of the farm did not affect the preference for cattle.

More Milk Production: Buffaloes were preferred by a wide margin with 83% farmers choosing them for greater milk production. All the landless, tenants and the land owners found buffaloes to be better for more production (63%, 86% and 86% respectively). The farm size did not seem to affect the choice of buffaloes.

Faster Growth: Cattle were the choice for faster growth with 65% choosing this species. All the 3 land ownership types voted almost similarly. Farm size did not reflect differently.

Easier Reproduction: On the whole, the buffaloes got slightly more support with 38% followed by 31% for cattle and 29% thought both the species to be similar in matters of reproduction. Farm size did not seem to influence the choices.

3.6.2 Irrigated Zone

Easier to Manage: On the whole, 50% of farmers thought buffaloes to be easier to manage against 41% for cattle with 8% considering no difference between the two species. On the land ownership basis, the landless preferred buffaloes by a wider

margin (64%) against landowners (47%) while the tenants narrowly supported cattle with 47% versus 46% for buffaloes. Farm size did not have a different pattern.

More Milk Production: On the whole, the buffaloes got overwhelming support with 86% against 10% for cattle. Among the different land ownership, the support ranged between 63% by landless to 92% by the landowners with 89% by the tenants. No influence of farm size was seen.

Faster Growth: Cattle were found to be faster growing species by 62% compared to 29% for buffaloes. The pattern was similar for the landless, tenants and the land owners. Moreover, the farm size had no effect on this pattern.

Easier Reproduction: On the whole but against the popular perception, buffaloes were found to have easier reproduction by 42% against 27% for cattle. Interestingly, 29% thought cattle and buffaloes to be similar in reproduction. This pattern remained the same in case of landless, tenants and the landowners. The farm size also did not change this pattern.

3.6.3 Non-Irrigated Zone

Easier to Manage: farmers in this zone overwhelmingly (90%) think that cattle are easier to manage. This view is also reflected (88%-100%) by the 3 types of farmers according to land ownership. Farm size did not influence this choice.

More Milk Production: Buffaloes were reported to be better milk producers by 58% of the farmers. Landless farmers were more supportive (70%) of this view than the tenants (50%) and the land owners (57%). However, medium sized farms supported cattle as more producers of milk by just 52%.

Faster Growth: On the whole, 89% thought cattle to grow faster than buffaloes. The same pattern was reflected in the opinion of tenants (100%), landless (88%) and the land owners (88%). Farm size did not affect this pattern.

Easier Reproduction: There was clear support (65%) for cattle but interestingly 25% thought that both the cattle and buffaloes were similar in matter of easy reproduction. On the land ownership basis, the tenants and landowners supported cattle by 80% and 68% respectively. However, 50% of the landless thought both the species to be similar in this respect and only 30% supported cattle. The farm size almost equally favored cattle.

3.7 Discussion

3.7.1 Diseases

Of the six diseases surveyed, diarrhea in calves was found to be the most common disease. This results in high calf mortality causing great economic loss. High incidence of diarrhea is an indication of poor overall management. This is also likely to be the cause of inappetance and cold. Incidence of diarrhea, inappetance and cold can be greatly reduced if not eliminated by good management. Although not reported to be very high but mastitis is another disease that causes high economic loss. Since not many farmers use mastitis tests, the actual incidence of mastitis may more than

found here. This can also be prevented with appropriate measures like improved hygiene and regular diagnostic tests.

3.7.2 *Service Providers for Treatment of Diseases*

It is a matter of serious concern that the major service provider for the treatment of diseases is the farmer himself. Knowing that the vast majority of farmers are illiterate makes the situation more serious and grave.

4. Financial and Economic Aspects of Livestock Holders

The section highlights the financial and economic aspects of the 717 sampled households. The information gathered from households has been classified across categories of agricultural land ownership pattern and variations across size categories of the livestock maintained. The sub-sections provide information on such aspects as distribution across households, animals; levels of milk productivity, consumption and sales, and incomes generated from agriculture.

4.1 Households

The distribution of sampled households across 8 districts is provided by Table 4.1.

Table - 4.1
Sampled Households by District across Different Categories

(Percentage)

	Karachi	Badin	Sukkur	Larkana	Tando Allahyar	Sanghar	Tharparkar	Jamshoro	Total
Irrigated									
Land Owner	1.1%	6.0%	4.2%	7.3%	7.9%	6.6%	0.0%	0.0%	33.1%
Tenant	0.6%	3.2%	3.2%	3.8%	3.2%	3.3%	0.0%	0.0%	17.3%
Owner-cum-Tenants	0.1%	2.5%	4.3%	0.8%	0.4%	1.8%	0.0%	0.0%	10.0%
Non-Farmer	0.1%	0.8%	0.8%	0.7%	0.8%	0.7%	0.0%	0.0%	4.0%
Total	2.0%	12.6%	12.6%	12.6%	12.4%	12.4%	0.0%	0.0%	64.4%
Non-Irrigated									
Land Owner	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	6.6%	6.8%	14.8%
Tenant	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	1.7%	2.0%	4.0%
Owner-cum-Tenants	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	1.8%	0.4%	2.4%
Non-Farmer	2.2%	0.0%	0.0%	0.0%	0.0%	0.0%	2.5%	3.3%	8.1%
Total	4.2%	0.0%	0.0%	0.0%	0.0%	0.0%	12.6%	12.6%	29.3%
Karachi Cattle Colony	6.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	6.3%
Total	12.4%	12.6%	12.6%	12.6%	12.4%	12.4%	12.6%	12.6%	100%

Table 4.2 highlights the distribution of sampled households which are categorized into large, medium and small holders of livestock (Dairy and Goat/Sheep)

Table - 4.2
Sampled Households across Categories of Livestock in Irrigated Area*
(% against total sample households)

		Goat and Sheep				
		Large	Medium	Small	No goat and sheep	Total
Dairy (Cow and Buffalo)	Large	1%	2%	8%	6%	17%
	Medium	0%	0%	13%	12%	25%
	Small	0%	0%	32%	23%	55%
	No Dairy	0%	0%	3%	0%	4%
	Total	1%	2%	55%	41%	100%

Table – 4.3

**Sampled Households across Categories of Livestock in Non-irrigated Area*
(% against total sample households)**

		Goat and Sheep				
		Large	Medium	Small	No goat and sheep	Total
Dairy (Cow and Buffalo)	Large	2%	2%	2%	6%	13%
	Medium	0%	3%	7%	9%	19%
	Small	1%	3%	21%	4%	30%
	No Dairy	1%	12%	25%	0%	39%
	Total	5%	20%	56%	19%	100%

* Categories refer to weighted size of animal herds.

Animal categories were determined as follows:

1. Dairy Animals (All Cows and Buffaloes)
 - Large = More Than 10 Animals
 - Medium = 6 To 10 Animals
 - Small = 1 To 5 Animals
2. Goats and Sheep
 - Large = More than 70
 - Medium = 31-70
 - Small = 1-30

The tables above show that many of the sample households own both dairy animals and sheep/goats. In the irrigated area, 96% of sample households own dairy animals, whereas 59% of sample households own sheep/goats. In the non-irrigated area, 61% of sample households own dairy animals but 81% of them own sheep/goat.

Most of the sample households are small or medium size holders of dairy animals or sheep/goat, and the number of large size farmers is very small.

4.2 Animals

Table 4-4 provides information on the average number of animals held by sampled households across different categories. It shows that the size of livestock holding is extremely large for the farmers of Karachi cattle colonies compared to other farmers. The average number of buffalo holding is larger in the irrigated than non-irrigated area. However, the average number of goat and sheep holding is larger in the non-irrigated area than irrigated area. The number of cattle holding is a little larger in the non-irrigated area.

Also, the average number of livestock holding is generally larger for the landholders (landowner and owner-cum-tenants) than landless farmers (tenants and non-farm).

Table – 4.4
Average Number of Animal Holdings

	Buffalo	Cattle	Goat	Sheep	<i>(Numbers)</i>
Karachi Cattle Colony	113	39	1	0	135
Irrigated	6	3	8	2	9
Landowner	8	4	10	2	12
Owner-cum-tenant	6	4	6	0	8
Tenant	3	1	3	0	4
Non-farm	4	1	8	7	6
Non-irrigated	3	5	30	7	10
Landowner	5	6	27	8	13
Owner-cum-tenant	4	5	20	5	10
Tenant	0	2	26	2	5
Non-farm	0	1	32	5	4

4.3 Milk Productivity and Sale Pattern

Tables 4.5 to 4.9 provide information on herds of milk productivity, consumption and pattern of sale.

Table – 4.5
Milk Productivity by Dairy Animals across Size Categories

	Cattle and Buffalo		
	Large	Medium	Small
Irrigated			
Land Owner	4.7	4.5	4.3
Tenant	3.9	3.0	4.2
Owner-cum-Tenants	5.5	3.0	3.9
Non-Farmer	3.6	0	4.8
Non-Irrigated			
Land Owner	3.2	3.3	2.9
Tenant	3.8	3.5	3.5
Owner-cum-Tenants	3.0	3.3	3.6
Non-Farmer	4.2	5.8	5.3
Karachi Cattle Colony	8.00	0	0

A macro level picture of Pakistan's position in relation to major producing countries in terms of milk productivity was discussed in section 1 of this report.

The irrigated farms have a higher productivity level of milk of dairy animals as a result of a more assured supply of fodder. However, the Karachi Cattle Colony shows nearly twice the level of milk productivity. The associated reasons for such a high levels include a better feed provision and a comprehensive animal health care system.

Table – 4.6

Proportion of Self Consumption of Milk in the Total Production across Size Categories

(Percentage)

	Cattle and Buffalo		
	Large	Medium	Small
Irrigated			
Land Owner	61.6	55.0	69.0
Tenant	82.5	20.0	70.5
Owner-cum-Tenants	68.8	70.7	70.4
Non-Farmer	74.8	0	48.4
Non-Irrigated			
Land Owner	66.5	57.1	78.4
Tenant	81.7	100	81.8
Owner-cum-Tenants	100	100	90.5
Non-Farmer	67.8	22.4	51.7
Karachi Cattle Colony	1.8	0	0

Table 469 shows the extent to which the produced milk is consumed with the household. On average, over half of the production is consumed within the household. The non-farmers reported a somewhat lower range of self consumption. The Karachi Cattle Colony showed almost negligible proportion of self consumption.

Table – 4.7

Milk Sold to Different Markets (Large Dairy Farmers)

(Percentages)

Large Category	Cattle and Buffalo					
	Self Consumed	Sold	Companies	Wholesalers	Shops	Others
Irrigated						
Land Owner	61.57	38.43	4.66	11.65	8.15	13.97
Tenant	82.55	17.45	0	0	0	17.45
Owner-cum-Tenants	68.76	31.24	10.41	10.41	0	10.41
Non-Farmer	74.85	25.15	1.40	1.40	19.56	2.79
Non-Irrigated						
Land Owner	66.47	33.53	0	17.65	12.35	3.53
Tenant	81.71	18.29	18.29	0	0	0
Owner-cum-Tenants	100	0	0	0	0	0
Non-Farmer	67.79	32.21	0	1.89	26.52	3.79
Karachi Cattle Colony	1.76	98.24	10.34	51.70	36.19	0

Table 4.7 shows the pattern of consumption of large dairy farmers and sale of milk to different sources. The pattern shows that dairy milk is largely sold to wholesales and shops.

Table – 4.8

Milk Sold by to Different Markets (Medium Dairy Farmers)

(Percentages)

Large Category	Dairy Animals					
	Self Consumed	Sold	Companies	Wholesalers	Shops	Others
Irrigated						
Land Owner	55.00	49.04	4.27	10.66	7.46	26.65
Tenant	20.00	80.00	0	0	0	80.00
Owner-cum-Tenants	70.65	29.35	0	7.16	0	21.47
Non-Farmer	0	100	8.33	2.08	29.17	60.42
Non-Irrigated						
Land Owner	57.08	42.92	3.90	19.51	13.66	5.85
Tenant	100	0	0	0	0	0
Owner-cum-Tenants	100	0	0	100	0	0
Non-Farmer	22.40	77.60	0	3.88	54.32	19.40
Karachi Cattle Colony	0	0	0	0	0	0

Tables 4.8 and 4.9 show the pattern of consumption and sale of milk which show that smaller size farms (measured in terms of number of animals) consume more milk and consequently sell less to other sources.

Table – 4.9

Milk Sold by to Different Markets (Small Dairy Farmers)

(Percentages)

Large Category	Dairy Animals					
	Self Consumed	Sold	Companies	Wholesalers	Shops	Others
Irrigated						
Land Owner	68.98	37.00	5.05	5.61	3.93	22.43
Tenant	70.46	32.98	1.94	0	0	31.04
Owner-cum-Tenants	70.41	32.55	1.91	1.91	0	28.72
Non-Farmer	48.40	51.60	2.58	2.58	36.12	10.32
Non-Irrigated						
Land Owner	78.39	25.93	0	14.41	10.08	1.44
Tenant	81.82	45.45	15.15	0	0	30.30
Owner-cum-Tenants	90.48	11.11	0	11.11	0	0
Non-Farmer	51.74	48.26	0	2.84	39.74	5.68
Karachi Cattle Colony	0	0	0	0	0	0

4.4 Income Levels

Table 4-10 shows that the average annual household cash income, per capita income, and the incomes by different sources. It shows that the income levels for the landholders (landowner and owner-cum-tenants) are larger than landless (tenants and non-farm) in the irrigated area. In the non-irrigated area, the income level of landowner is higher than other groups, but that of owner-cum-tenant is lower than the landless farmers.

The income level of the farmers in irrigated area is generally higher than that in the non-irrigated area.

Table – 4.10
Income Level of Household for Different Source

(Rs.)

	Total Cash Income	Per Capita Income	Agriculture Cash Income	Livestock Cash Income	Wages and Salaries
Colony	1,625,644	140,030	0	1,592,933	14,667
Irrigated	314,035	30,073	233,919	-8,796	57,504
Landowner	425,350	40,211	343,351	-13,635	64,051
Owner-cum-tenant	275,180	21,077	167,014	1,402	59,129
Tenant	168,079	19,659	118,318	-11,030	38,573
Non-farm	124,886	14,092	0	14,976	80,905
Non-irrigated	175,392	18,972	63,020	69,050	37,102
Landowner	203,327	22,428	94,583	58,888	43,698
Owner-cum-tenant	108,091	10,585	65,079	-3,512	39,971
Tenant	116,333	12,356	72,481	12,541	28,621
Non-farm	173,593	18,423	0	137,147	28,448
Total	355,747	33,723	169,184	114,531	48,840

Table 4.11 shows the decomposition of income into the sources. Large part of the incomes for the landholders comes from agricultural activities. It is interesting to see that the livestock activities are in red for many farmers in the irrigated area, whereas farmers in the non-irrigated area generate profit from livestock activities except for owner-cum-tenants.

Table – 4.11
Income Source as a Ratio of Total Income

(Percentage)

	Agriculture Cash Income	Livestock Cash Income	Wages and Salaries	Other
Colony	0%	98%	1%	1%
Irrigated	74%	-3%	18%	10%
Landowner	81%	-3%	15%	7%
Owner-cum-tenant	61%	1%	21%	17%
Tenant	70%	-7%	23%	13%
Non-farm	0%	12%	65%	23%
Non-irrigated	36%	39%	21%	4%
Landowner	47%	29%	21%	3%
Owner-cum-tenant	60%	-3%	37%	6%
Tenant	62%	11%	25%	2%
Non-farm	0%	79%	16%	5%
Total	48%	32%	14%	7%

4.6 Fodder Shortages

Information was gathered from the respondents on a month-wise shortage of fodder. Tables 4.12 and 4.13 show the month-wise pattern of fodder shortages for dairy animals and goats and sheep, respectively.

Table – 4.12
Month Wise Reported Fodder Shortage (Cattle and Buffalo)

(% of Households against Total HH)

	Total # of HH	Jan	Feb	March	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Irrigated													
Land Owner	237	22%	8%	5%	18%	24%	35%	31%	12%	4%	13%	32%	27%
Tenant	124	32%	16%	10%	15%	19%	29%	30%	13%	7%	13%	32%	35%
Owner-cum-Tenants	72	25%	13%	10%	18%	19%	21%	17%	6%	0%	8%	38%	33%
Non-Farmer	29	34%	24%	21%	21%	28%	41%	41%	17%	17%	21%	38%	38%
Non-Irrigated													
Land Owner	106	28%	24%	18%	19%	36%	42%	34%	8%	4%	7%	10%	17%
Tenant	29	17%	14%	7%	7%	24%	28%	24%	7%	0%	3%	7%	10%
Owner-cum-Tenants	17	12%	6%	0%	12%	47%	71%	71%	6%	0%	6%	12%	12%
Non-Farmer	58	38%	31%	7%	2%	9%	16%	10%	2%	0%	10%	26%	31%
Karachi Cattle Colony	45	33%	16%	0%	0%	0%	0%	0%	0%	4%	22%	33%	33%

It appears that months of January, April, May, June, November and December experience fodder shortages, particularly at owned farm in both irrigated and un-irrigated areas. This pattern is also evident from Table 4.13 which provides information on goat and sheep farms.

Table – 4.13
Month Wise Reported Fodder Shortage (Goats and Sheep)

(% of Households against Total HH)

	Total # of HH	Jan	Feb	March	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Irrigated													
Land Owner	237	21%	10%	5%	18%	16%	15%	10%	4%	3%	8%	28%	24%
Tenant	124	28%	15%	7%	10%	11%	10%	9%	4%	3%	6%	20%	24%
Owner-cum-Tenants	72	21%	10%	3%	8%	13%	10%	8%	3%	0%	7%	26%	21%
Non-Farmer	29	28%	17%	10%	10%	10%	14%	14%	10%	10%	10%	24%	31%
Non-Irrigated													
Land Owner	106	25%	19%	16%	27%	74%	87%	75%	14%	9%	12%	19%	25%
Tenant	29	48%	28%	21%	17%	52%	62%	48%	7%	7%	17%	17%	34%
Owner-cum-Tenants	17	24%	18%	12%	41%	76%	118%	94%	18%	0%	0%	12%	12%
Non-Farmer	58	16%	12%	7%	26%	52%	66%	50%	7%	5%	7%	7%	16%
Karachi Cattle Colony	45	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

4.7 Fattening of Animals

As evident from earlier tables on animal population, the enterprise of animal fattening was limited. Tables 4.19 to 4.25 show different facts of animal fattening.

Table – 4.19

Sampled Households by Categories Fattening of Farm Cattle and Buffalo

(# Household)

	Large 40-60 Cattle and Buffalo	Small 1-39 Cattle and Buffalo	Others	Total
Irrigated				
Owner	0	0	12 (100)	12 (100)
Tenant	0	0	5 (100)	5 (100)
Owner cum Tenant	1 (33.33)	0	2 (67.77)	3 (14.29)
Non Farmer	0	0	1 (100)	1 (100)
Total	1 (4.76)	0	20 (95.24)	21 (100)
Non-Irrigated				
Land Owner	1 (16.67)	0	5 (83.33)	6 (100)
Tenant	0	0	0	0
Owner-cum-Tenants	0	0	0	0
Non-Farmer	0	0	3 (100)	3 (100)
Total	1 (11.11)	0	8 (88.89)	9 (100)
Karachi Cattle Colony	0	0	0	0

Table – 4.20

Total # Animals across Categories of Fattening of Farm Cattle and Buffalo

(# Animals)

	Large 40-60 Cattle and Buffalo	Small 1-39 Cattle and Buffalo	Others
Irrigated			
Owner	0	116	93
Tenant	0	22	0
Owner cum Tenant	45	24	0
Non Farmer	0	8	0
Non-Irrigated			
Land Owner	0	77	110
Tenant	0	0	0
Owner-cum-Tenants	0	0	0
Non-Farmer	0	16	0
Karachi Cattle Colony	0	0	0

Table – 4.21
Average Number of Animals across Categories of Fattening of Farm Cattle and Buffalo

(# Animals / Household)

	Large 40-60 Cattle and Buffalo	Small 1-39 Cattle and Buffalo	Others
Irrigated			
Owner	17.20	6.68	3.13
Tenant	2.03	10.00	2.64
Owner cum Tenant	11.80	7.00	3.03
Non Farmer	1.96	0	3.68
Non-Irrigated			
Land Owner	27.69	6.65	2.90
Tenant	8.43	5.60	3.36
Owner-cum-Tenants	1.00	5.90	2.28
Non-Farmer	12.25	7.56	3.54

Table – 4.22

Total Income from All Sources across Categories of Fattening of Farm Cattle and Buffalo

(Pak. Rs./Household)

	Large 40-60 Cattle and Buffalo	Small 1-39 Cattle and Buffalo	Others
Irrigated			
Owner	1,737,420	0	13,352,741
Tenant	384,598	0	0
Owner cum Tenant	2,308,660	2,394,721	0
Non Farmer	42,848	0	0
Non-Irrigated			
Land Owner	0	2,222,308	10,043,773
Tenant	0	0	0
Owner-cum-Tenants	0	0	0
Non-Farmer	0	350,220	0

Table – 4.23

Income from Livestock As A Ratio of Total Income across Categories of Fattening of Farm Cattle and Buffalo

(Percentages)

	Large 40-60 Cattle and Buffalo	Small 1-39 Cattle and Buffalo	Others
Irrigated			
Owner	0	35	11
Tenant	0	38	0
Owner cum Tenant	22	31	0
Non Farmer	0	100	0
Non-Irrigated			
Land Owner	0	63	58
Tenant	0	0	0
Owner-cum-Tenants	0	0	0
Non-Farmer	0	100	100

Table – 4.24

**Net Income from Agriculture as a Ratio of Total Income
Across Categories of Fattening of Farm Cattle and Buffalo**

(Pak. Rs.)

	Large 40-60 Cattle and Buffalo	Small 1-39 Cattle and Buffalo	Others
Irrigated			
Owner	0	37	42
Tenant	0	0	0
Owner cum Tenant	0	0	0
Non Farmer	0	0	0
Non-Irrigated			
Land Owner	0	0	0
Tenant	0	0	0
Owner-cum-Tenants	0	0	0
Non-Farmer	0	0	0

Table – 4.25

**Value of Livestock Assets across Categories of
Fattening of Farm Cattle and Buffalo**

(Pak. Million Rs.)

	Large 40-60 Cattle and Buffalo	Small 1-39 Cattle and Buffalo	Others
Irrigated			
Owner	1,233	0	18,140
Tenant	608	0	0
Owner cum Tenant	893	1,385	0
Non Farmer	492	0	0
Non-Irrigated			
Land Owner	0	4,002	22,864
Tenant	0	0	0
Owner-cum-Tenants	0	0	0
Non-Farmer	0	795	0

5. Factors Affecting Livestock Development in Sindh

5.1 Relationship between Crop Cultivation & Livestock Activities

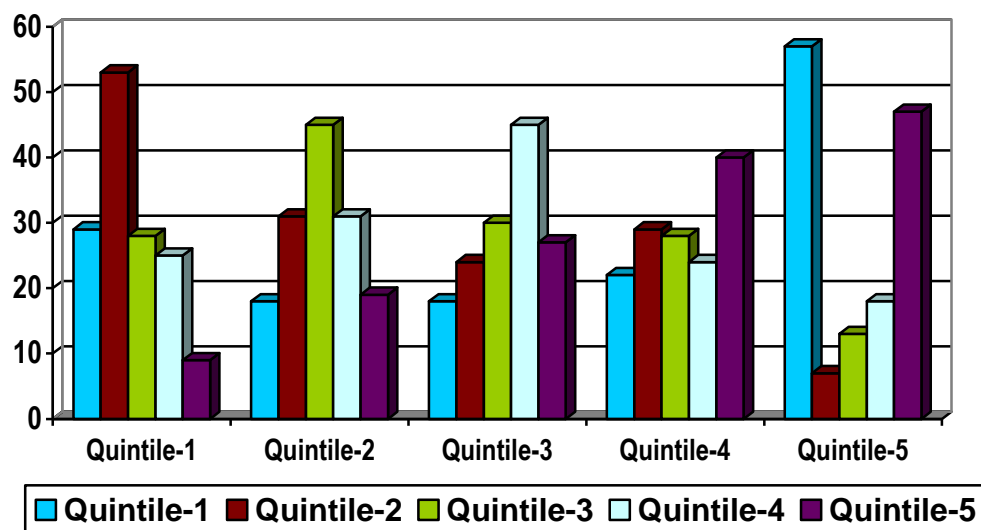
The different levels of income generated through cropping and livestock activities, presented in terms of quintiles, were examined to ascertain any pattern that may have existed between these activities. Table 5.1 shows patterns of distribution of income generated from these sources. It reflects that the farm households associated with the lowest quintiles of both crop income and livestock are strongly interlinked in terms of the proportion of sampled households.

Table – 5.1

Relationship between Cropping and Livestock Activities

Crop Income Quintiles	Quintile-1	Quintile-2	Quintile-3	Quintile-4	Quintile-5	Total
Quintile-1	29	18	18	22	57	144
Quintile-2	53	31	24	29	7	144
Quintile-3	28	45	30	28	13	144
Quintile-4	25	31	45	24	18	143
Quintile-5	9	19	27	40	47	142
Total	144	144	144	143	142	717

Chart - 5.1



It is evident that lowest income quintile of livestock income is gradually related to higher and then lower number of farms as crop income levels shifts to higher quintiles, i.e. from 29 to 9. Similarly in case of the lowest income quintile of crop income, the gradual shift towards higher quintiles of livestock income the number of households initially decline and move upwards i.e. from 29 to 57.

The trends so depicted show that the income initially show inverse relationship between their reflecting substitution effect. However, towards higher income quintiles the income levels co-very reflecting complimentarity between the two sources.

5.2 Milk Productivity – Fodder Shortage Interface

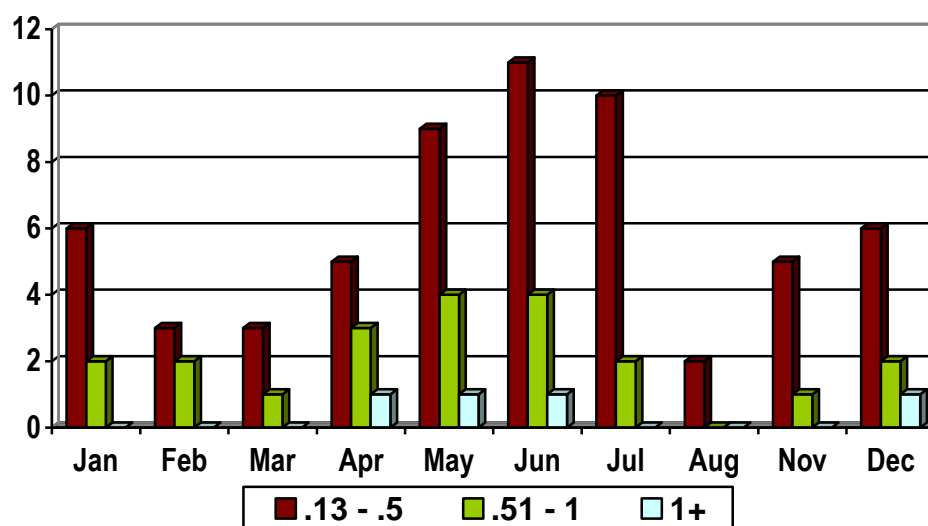
The variability in milk productivity levels were related to fodder shortages across different months as reported by farm households to judge the extent to which these factors are related.

Table – 5.2

Levels of Fodder Shortages across Months and Categories of Milk Productivity (Sheep)

Average Sheep Milk Productivity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Nov	Dec
.13 - .5	6	3	3	5	9	11	10	2	5	6
.51 - 1	2	2	1	3	4	4	2	0	1	2
1+	0	0	0	1	1	1	0	0	0	1

Chart - 5.2



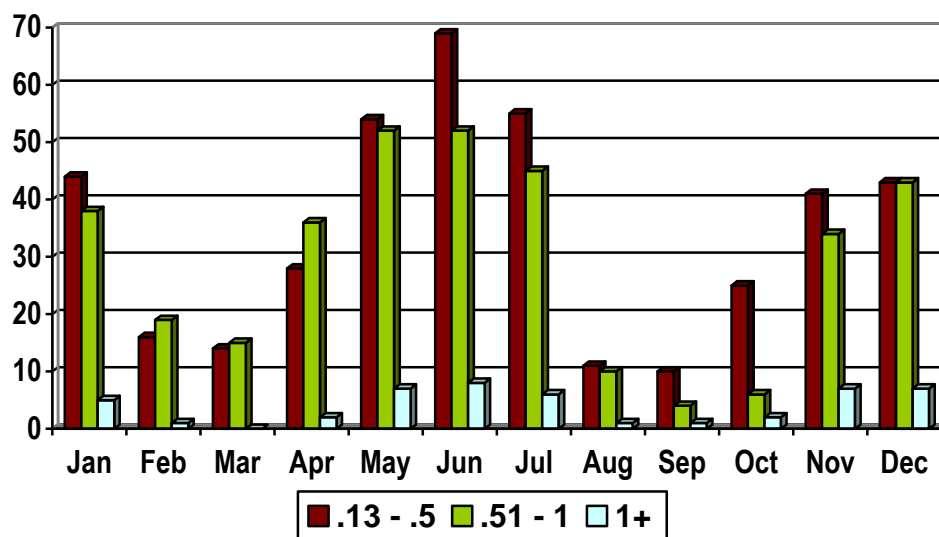
The information on fodder shortages were related to various categories of milk productivity of large and smaller animals. Table shows that those who had higher milk productivity had lower proportions of farmers complaining for fodder shortages. Similarly those with low productivity of milk had higher proportion of farms.

Table – 5.3

Levels of Fodder Shortages across Months and Categories of Milk Productivity (Goat)

Average Goat Milk Productivity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
.13 - .5	44	16	14	28	54	69	55	11	10	25	41	43
.51 - 1	38	19	15	36	52	52	45	10	4	6	34	43
1+	5	1	0	2	7	8	6	1	1	2	7	7
Total	87	36	29	66	113	129	106	22	15	33	82	93

Chart - 5.3



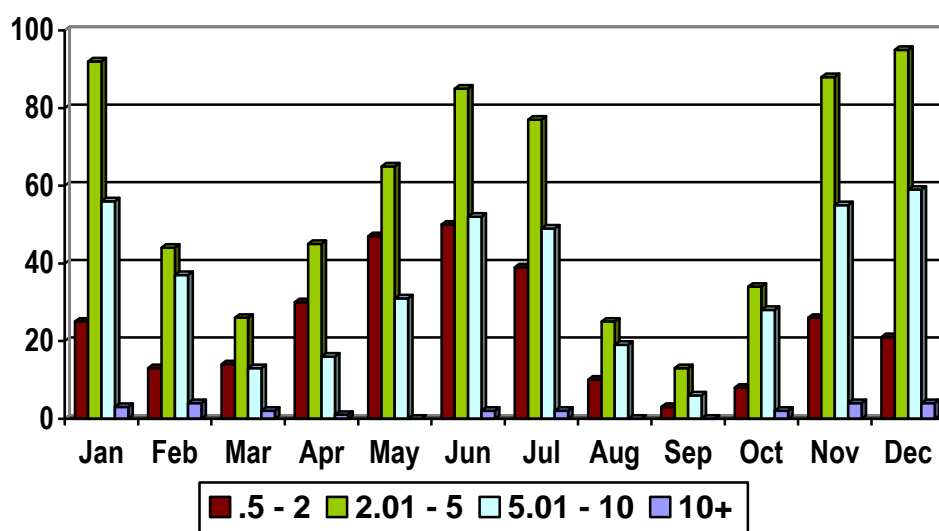
The charts to depict such tendencies. The month of January, May, June, July, November and December seem critical months when fodder remains short and milk productivity is kept at low levels. The relationship seem equally valid for all type of milk and hence appear as the most critical issues facing the livestock sub-sector in Sindh.

Table - 5.4

Levels of Fodder Shortages across Months and Categories of Milk Productivity (Cattle & Buffalo)

Average Cow and Buffalo Milk Productivity	Jan	Feb	March	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
.5 - 2	25	13	14	30	47	50	39	10	3	8	26	21
2.01 - 5	92	44	26	45	65	85	77	25	13	34	88	95
5.01 - 10	56	37	13	16	31	52	49	19	6	28	55	59
10+	3	4	2	1	0	2	2	0	0	2	4	4

Chart - 5.4



5.3 Farmers Willingness to Pay for Livestock Insurance

In view of the risks associated with livestock farming, farmers were asked whether they would be willing to pay for livestock insurance. The responses obtained have been presented through Tables 5.5 to 5.8 using different categories of farms.

Table – 5.5

Willingness to Pay for Animal Insurance

Land Owners	Cattle	Buffalo	Sheep	Goat
Irrigated	235 (69.1)	187 (55)	234 (68.8)	321 (94.4)
Non Irrigated	51 (52.6)	84 (86.6)	25 (25.8)	70 (72.2)
Total	286 (65.4)	271 (62)	259 (59.3)	391 (89.5)
Land Less				
Irrigated	110 (85.3)	84 (65.1)	106 (82.2)	124 (96.1)
Non Irrigated	16 (69.6)	22 (95.7)	8 (34.8)	20 (87)
Total	126 (82.9)	106 (69.7)	114 (75)	144 (94.7)

N ⇒ # farms

% ⇒ Percentage of Farmers not showing willingness.

Table 5.5 shows that at owner operated farms in case of cattle over 69 percent in irrigated areas did not agree to show a willingness as compared to 52.6 percent in un-irrigated areas. Similar trends were also observed in case of sheep and goats. However, in case of buffaloes, the responses in terms of rejection of proposal was higher in unirrigated areas.

On the other hand, it is clear that, landless household are less willing to pay for animal insurance than landowners.

Table – 5.6

Land Owners by Size	Cattle	Buffalo	Sheep	Goat
Small	133 (46.5)	124 (45.8)	117 (45.2)	171 (43.7)
Medium	83 (29.0)	82 (30.8)	69 (26.7)	112 (28.6)
Large	70 (24.5)	65 (24)	73 (28.2)	108 (27.6)
Total	286 (100)	271 (100)	259 (100)	391 (100)

Small ⇒ # cattle and buffaloes less than 5 heads

Medium ⇒ # cattle and buffaloes between 6 and 10 heads

Large ⇒ Above 10 heads.

Others ⇒

Similar pattern were observed in case of landless farmers. Table 5.5 shows that the rate of rejection reduced with increase in herd size in case of all animals on owned land. A somewhat mixed pattern appeared in case of landless farms.

Table – 5.7

Land Less	Cattle	Buffalo	Sheep	Goat
Small	85 (86.7)	68 (69.4)	82 (83.7)	94 (95.9)
Medium	16 (59.3)	13 (48.1)	18 (66.7)	26 (96.3)
Large	2 (66.7)	2 (66.7)	3 (100)	3 (100)
Other	23 (95.8)	23 (95.8)	11 (45.8)	21 (87.5)
Total	126 (82.9)	106 (69.7)	114 (75)	144 (94.7)

Small ⇒ # cattle and buffaloes less than 5 heads

Medium ⇒ # cattle and buffaloes between 6 and 10 heads

Large ⇒ Above 10 heads.

On the whole it appears that landless households are less willing to pay for insurance than landowners. Also, small farmers show higher rejection as compared to bigger farmers. These results may suggest that livestock insurance is “luxury” good where worse-off households tend not to be motivated to purchase.

6. Sales of Milk

Figure 6-1 shows the relationship between the total production of milk and propensity to sell milk for households in the irrigated area with each landholding status of households. The data are drawn from the results of the first household survey. The vertical axis of the table indicates the total production of milk per day for each household and the horizontal axis shows the percentage of milk sold to total production. From the figure, one can see that, except for the households who do not sell milk at all, there is a positive relation between the two variables. It indicates that the households sell the milk which is surplus to the self-consuming portion.

Also, except for the households who do not sell milk at all, the number of households in the quadrant 2 is very small, whereas that in quadrant 1 is quite large. This suggests that households who produce more than 10 liters a day tend to sell large portion of milk they produced. If one applies the average milking cattle ratio to total cattle (50%) and the average milk production per head/day (4 litter) in this region, those who produce more than 10 liters a day (households in quadrant 1 and 2) are almost equivalent to medium and large livestock holders who own more than 5 cattle and/or buffaloes.

Furthermore, all the large landowners in the sample are concentrated in the far left in the table, indicating that they do not sell milk at all regardless of the scale of their milk production. Seemingly, these household do not take milk as a source of income as they have a large amount of agricultural income. This can be supported by the fact that many of them give out their milk to the poor, which was found by the fieldwork of the Project Team.

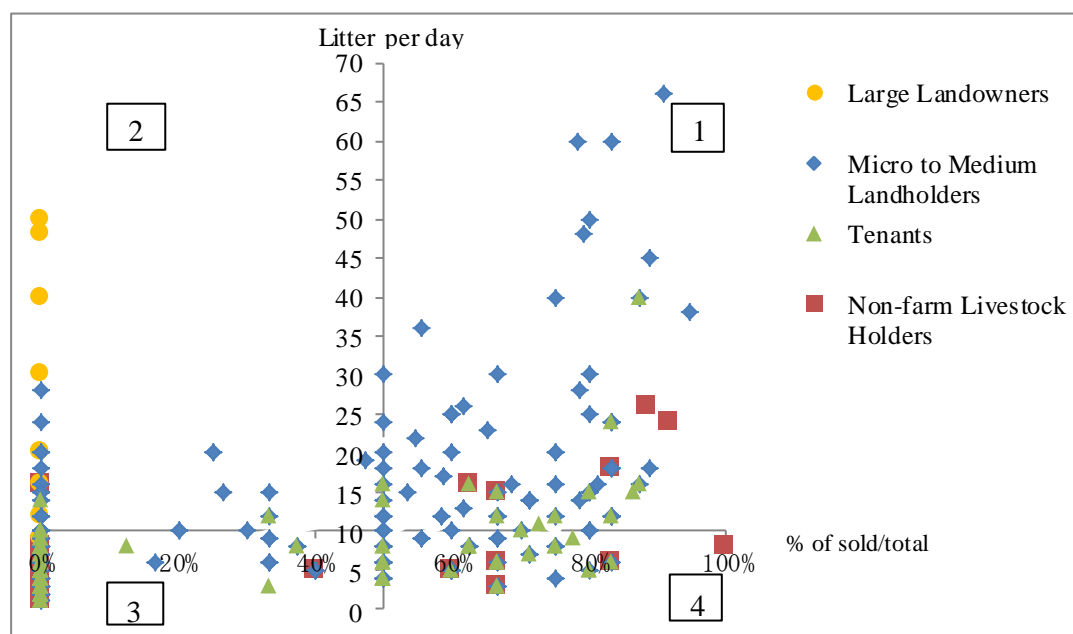


Table 6-1 depicts the distribution of each landholding group of households in terms of total milk production and the percentage of milk sold to total production. One can see that most of the tenants and non-farm households are in the category of producing less than 10 liters a day. Also, the ratio of households who produce more than 10 liters a day tends to be larger for larger landowners.

Table 6-1 Distribution of Households in Total Milk Production and Propensity to Sell

	0-50 %	51-100%	Total
More than 10 liter a day	43	81	124
Large Landowner	10		10
Medium Landowner	6	12	18
Small Landowner	16	28	44
Marginal Landowner	7	27	34
Tenant	4	11	15
Non Farm Livestock		3	3
Less than 10 liter a day	220	56	276
Large Landowner	1		1
Medium Landowner	7	3	10
Small Landowner	67	11	78
Marginal Landowner	68	17	85
Tenant	70	19	89
Non Farm Livestock	7	6	13
Total	263	137	400

Figure 6-2 shows the percentage of households by propensity to sell their milk for each range of the scale of milk production. From the figure, it is clear that most of those who produce less than 5 liters a day do not sell their milk at all, suggesting that this amount is an indicator for those who have surplus milk for sale. This is consistent to the finding of the field survey by the Project Team; for the family of 8-9 members, average consumption of milk is 5 liters a day. Furthermore, with regard to those who produce more than 10 liters a day, which is equivalent to medium and large livestock holders, more than half of them sell 50% or more of total produced milk.

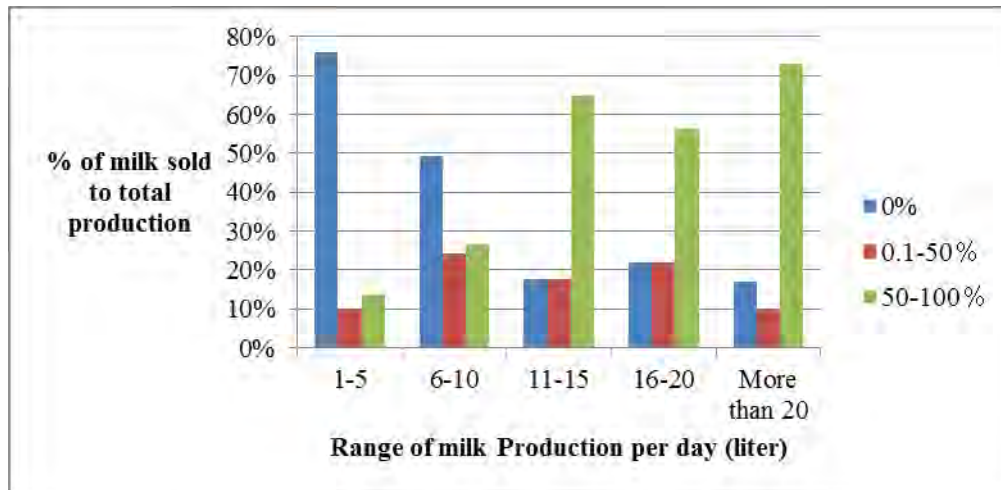


Figure 6-2 Percentage of households by propensity to sell for scale of milk production

The amount of milk consumed at home and the propensity to sell may be affected by the number of family members. However, in case for the sample households of this survey, their propensities to sell are not influenced by the number of family members. Table 6-2 shows the average number of family member for each category of milk production and ratio of milk sold to total production. One cannot find a clear relation between the number of family members and the propensity to sell milk. The findings above appear to be relevant regardless of the number of family members as long as it is within the range of around 8 to 15, as indicated in the table.

Table 6-2 Number of Family Member for Each Category of Milk Production and Propensity to Sell

% of milk sold			
Milk production a day (Range, liter)	0-50 %	51-100%	Total
1-5	10.3	8.4	9.1
6-10	12.8	13.3	11.3
11-15	15.3	12.7	13.1
16-20	12.9	14.0	12.2
More than 20	15.0	13.8	13.6

7. Conclusions and Recommendations

- The livestock sub-sector in Sindh is a vital and integrated part of the crop-sector across all its district with the exception of Karachi and parts of Tharparkar and Jamshoro districts.
- The extensive irrigation system in the province creates the basis for the livestock sub-sector sustenance particularly the large size animal for whom the supply of fodder is assured by the irrigation status.
- In the rainfed areas, a dominating culture of raising sheep and goats prevails which largely depends on natural vegetational systems.
- The sub-sector tends to province supplies of milk and meat to its inhabitants. However, the province despite carrying a share of 23 percent in total animal population only contributes 16 percent in the production of fodder at the national level.
- The average level of milk productivity in Sindh is higher than other provinces. However, when compared at the international level, the productivity level of milk from cows, sheep and goats are significantly below the levels achieved by major producing areas in the world. Only in case of buffalo milk, the productivity levels are highest in the world.
- A diverse social and cultural environment prevails where the livestock raising has remained an integral part. However, the pattern followed in keeping the livestock is largely traditional.
- The institutional framework designed to guide and support farmers seem to have serious limitations in providing the required animal health services to the places those are required. The role of the private sector is extremely relevant and exists but without any policy framework.
- There is an absence of any support from the government through fiscal and monetary measures which may create investment incentives for the sub-sector.
- The post-production processes adopted in the storage processing and distribution of milk seem inefficient and the modern and scientific arrangements have yet to emerge in most of the areas.
- The role of the livestock department is vital and extensive measures would be required to enhance its capacity.
- An enabling environment needs to be evolved for ensuring competition as well as collaboration with the private sector.
- A vast majority of the livestock holders seem to be ignorant about the effectiveness of investments in livestock. A massive campaign need to be initiated in collaboration with the private sector to guide and support.

- At the provincial level, these initiatives need to regularly organize exhibitions and competitions as organized in the provinces of Punjab and Baluchistan. In addition, representatives of the livestock holders be sent to major institutions and markets in the world to observe and learn new techniques of production and post-production processes for milk and milk products.
- The system and practices of animal fattening is weak and operates on a traditional basis which creates inefficiencies.
- The current level of complementarities between livestock and cropping systems need to be re-examined with a market based approach without disturbing the cultural and social network present in the area. This will help sustain any developmental effort designed for the area.
- The most significant benefit of livestock development initiatives would be in the form of resource generation for the poor farm households and would help reduce the levels of rural poverty.
- Of the six diseases surveyed, diarrhea in calves was found to be the most common disease. This results in high calf mortality causing great economic loss. High incidence of diarrhea is an indication of poor overall management. This is also likely to be the cause of inappetance and cold. Incidence of diarrhea, inappetance and cold can be greatly reduced if not eliminated by good management. Although not reported to be very high but mastitis is another disease that causes high economic loss. Since not many farmers use mastitis tests, the actual incidence of mastitis may be more than found here. This can also be prevented with appropriate measures like improved hygiene and regular diagnostic tests.
- It is a matter of great concern that the major service provider for the treatment of diseases is the farmer himself. Knowing that the vast majority of farmers are illiterate makes the situation more serious and grave. The other serious concern is the very minor role of public sector services. The qualified veterinarian is hardly visible. The reason is that there are so few of them. The good news is the appearance of private paravets as the second main provider of livestock services. It seems that he is available in villages where the animals are located irrespective of the quality of his services. Private paravets are the future.
- The majority of respondents chose milk production, teat and udder types and fast growth for gene improvement of cattle and buffaloes instead of phenotypic traits like colour, height, liveliness, etc. This is very encouraging because these are characteristics of economic importance.
- Old age, low production and blind teats were by and large reported to be the reasons for culling cattle and buffaloes. These are the traits that reflect their economic importance. These choices speak of the awareness of the farmers.

- It is interesting to note that while most of the farmers seem to clean the udder of the animals before milking, the incidence of mastitis is still fairly high. The term cleaning needs clarification. If antiseptics are not used, it is not really cleaning the udder. Similarly, use of filter needs clarification. Moreover, the small percentage of farmers using mastitis tests is likely to hide the real situation about the incidence of the disease. Fewer farmers reported using hormone for milking is against the general perception about it.
- Whatever the general public perception about the qualities of cattle and buffaloes in respect of the four traits surveyed here, the results seem to be clear only in respect of milk production and faster growth. For more milk buffalo is the animal of choice and cattle for faster growth.
- The overall perception is that irrigation brings greater resources and prosperity that are likely to support larger herds. But that did not seem to result in better management of animals.
- On the whole, it appears that the tenants and landless were worse off than the landowners but not necessarily always in poor management of animals.
- Only two recommendations are made but it is believed that these two are very comprehensive and address the major problems revealed by the current survey.
 - i) Organize a massive training/awareness program for farmers to cover all aspects of livestock production as an enterprise. The existing graduate veterinary staff of the livestock department may be mobilized/trained to undertake this program on a regular basis.
 - ii) Develop a cadre of village livestock workers (both men and women) in the private sector to provide primary animal health and production services in the rural areas.

Appendix D

Second Household Survey

The Second Household Survey

1 Survey Method

(1) Overview

The second household survey aimed to capture the household economies in rural Sindh in a detailed way. The survey was conducted in the form of interview, and questions of the interview included all the economic activities of each household in the last 12 months, including self-consumed part of their production of agriculture, wage or payment in kind, and gift in kind, as well as the cash revenue and cost/expenditure of households. The non-cash items in their income and consumption were translated to money terms using spot-sale prices, and they were included to total income and consumption expenditure on top of the cash income and expenditure. The items in the questionnaire also included the information on the value of their assets and liabilities such as land, livestock, building, saving, and outstanding loans, etc. The unit value of their lands and buildings were estimated by owner's own assessment. On the other hand, the unit value of each type of livestock was determined by the Project Team considering the selling prices of each type of livestock in the sample.

(2) Sampling Method

(a) Selection of villages

As one of the major objectives of this survey is to compare the livelihood among the household in different social strata, our sampling strategy was to have large number of sample households in a limited number of villages. Therefore, we decided to survey on one village each from Badin (irrigated area) and Tharparkar (non-irrigated area); both districts are strategically important for livestock sector where dairy activities are flourished in Badin and fattening of sheep and goats is prospered in Tharparkar. The following villages were selected as sample, as the sizes of these villages are around 350-500 households, which are typical size for the districts.

- Muhammad Soomar Samejo (M.S.S) in Badin
- Pabuhar in Tharparkar

(b) Selection of Sample Households

The sampling of households was made by stratified sampling method, where sampling strata were based on the classification of Census of Agriculture of Pakistan. The categories of strata and their definition are shown in Table D-1.

Table D-1 Household Category based on Census of Agriculture Classification

		Condition
Landowner	Large	Owens more than 100 acre
	Medium	Owens 25-99 acre
	Small	Owens 5-24 acre
	Marginal	Holds less than 5 acres
Tenants		
Non-farmer	Livestock holder	Holds one or more cattle/buffalo or 5 or more goats/sheep
	Other	

The sample households in each stratum were extracted in proportion to the ratio of households in each stratum to total number of household in the village. Tables D-2 and D-3 show the estimated number of households and the sample household in each stratum in the sample villages. The estimated numbers of households are based on the key informant interviews. The averages of their ranges were used for the stratification.

Table D-2 Total Number of HH and the Sample HH in each Stratum in M.S.S

M.S.S	Estimated # of HH	Average of Estimated Range	%	Number of Sample HH	%
Medium Landowner	5	5	1%	2	2%
Small Landowner	45-50	48	14%	18	14%
Micro Landowner	35-40	38	11%	13	10%
Tenant	80-90	85	24%	31	25%
Non Farm Livestock Holder	100-120	110	31%	39	31%
Non Farm Other	60-70	65	19%	23	18%
Total	325-375	350	100%	126	100%

Table D-3 Total Number of HH and the Sample HH in each Stratum in Pabuhar

Pabuhar	Estimated # of HH	Average of Estimated Range	%	Number of Sample HH	%
Large Landowner	4	4	1%	3	2%
Medium Landowner	30-40	35	7%	9	7%
Small Landowner	110-130	120	24%	29	23%
Micro Landowner	80-90	85	17%	21	17%
Tenant	250-280	265	52%	62	50%
Total	474-544	509	100%	124	100%

2 Characteristics of Sample Villages

(1) Muhammad Soomar Samejo (M.S.S) in Badin

The village is located in east Badin district and is about 5Km from Golarch town. It is faced with a main road, and there is a natural oil field at the entrance of the village where some of the villagers work for. The history of the village started in 1959 when the lands were allocated to 13 families of Sameja groups as the irrigation was newly facilitated. The families of Jatt communities moved from Thatta district to the village 5 years later as they had trouble with canal water in their homeland. Other 2 groups households moved to the villages thereafter.

The numbers of households by endogamous and their basic description at the time of survey (which were drawn from key informants) are shown in Table D-4.

Table D-4 Number of HH by Endogamous Group and Description

Endogamous Group	Number of Households	Description
Sameja	240	Non-farm group who are originally engaged in livestock and labor
Mallah	7	Non-farm group who are originally engaged in livestock and labor
Jatt	110	Non-farm group who are originally engaged in livestock activities (especially camels)
Khaskheli	10	Non-farm group who are originally engaged in fishing

There is one primary school for boys and one for girls in the village. Majority of the village claim that the biggest problem of the village is the low level of education.

(2) Pabuhar in Tharparkar

The village is located in east Tharparkar and about 10Km from Mithi. There are 8 primary schools and 1 secondary school. According to the key informants, the education level of the village is quite high compared to other villages of districts, and there are one or more government employee in half of the households in the village. Many villagers also work at the large cities in Pakistan such as Karachi and Islamabad at temporary basis.

The numbers of households by endogamous group and their basic description at the time of survey (which were drawn from key informants) are shown in Table D-5.

Table D-5 Number of HH by Endogamous and Description

Endogamous Groups	Religion	Number of Household	Description
Oadaja	Muslim	25	Originally landowner group
Thakur	Hindu	150	Originally landowner group
Charan	Hindu	15	Originally religious vocation group
Menghwar	Hindu	320	Non-farm group

3 Production of Beef

As half of the new born cattle or buffaloes are male, all the cattle/buffalo holding farmers can earn incomes from the natural fattening of male cattle/buffalo. All the cattle/buffalo holders can be the targets for the increase in beef production and the improvement of income level by fattening male cattle/buffalo.

It is, however, important to note that fattening male cattle/buffalo is not thought to be an object of the production activity or business for many of the farmers. Rather, they are often considered as liquid assets when the farmers need cash. Accordingly, male calves are often sold for meat before maturity, and this appears to be a loss of livestock resources. Based on the field survey in Badin by the Project Team, many of the male cattle and buffaloes are sold around one year after their birth for around Rs.12,000 when their average weigh is around 180Kg. However, it is found that most farmers acknowledge that the best timing for selling male cattle/buffaloes is at 3 years old when their weight often exceeds 300Kg. They also agree that with good feeding and care for male cattle/buffaloes, they can earn enough profit by selling them after 3 years of rearing after birth. Thus, fattening male cattle/buffalo until 3 year old appears to be good investment, and selling young calves appear to be a loss of an opportunity to generate income.

One important characteristics of fattening male cattle/buffalo is, however, relatively low turnover ratio. That, the period of investment until earning cash by selling it, is quite long, whereas, for the dairy production, farmers can earn cash day by day within the milking period of cattle/buffalo. This makes it hard for resource-less farmers to fat male cattle/buffalo for a long time, even if its rate of return is high.

Thus, the problem of fattening male cattle/buffalo with low turnover ratio involves its difficulty of cash flow management during the period of production. For those who have large amount of income from various sources, it would be relatively easy to make their ends during the fattening period. It is, however, difficult for those who have limited amount of income or assets to manage cash flow of the household during the fattening period. According to Table 8-3-4 above, these households who have difficulty in cash flow management corresponds to marginal landowners, tenants, and non-farm households, who have small or no agricultural income.

Table D-6 Household Cash Flow in Livestock Sector

	# of Sample HH	Annual Milk Selling Revenue minus Purchased Feed (Rs.)	Milk Production a day (liter)	Milk Sold a day (liter)	% of milk sold
Medium Landowner	1	-75,000	19.5	0.0	0%
Small Landowner	5	-17,577	6.5	0.9	14%
Marginal Landowner	4	-5,564	2.3	0.3	14%
Tenant	13	11,721	4.1	1.9	46%
Non Farm Livestock	22	11,186	4.7	2.6	56%
Total	45	4,741	5	2	41%

Table D-6 depicts the status of household cash flow in livestock sector by landholding status. The data of table are drawn from the dairy farmers in M.S.S villages in Badin. The third column of the table shows the annual cash revenue from selling milk minus the amount of purchased feed for livestock. As the feed constitute most of the variable costs for livestock rearing, this figure indicates the annual cash balance for the dairy farmers. One can see that this figure is negative for landowners and the amount of loss is bigger for larger landowners whereas that for landless is positive. This indicates that larger landowners can endure the condition of negative cash flow in the livestock activities while they consume at home or give out to others most of milk produced, probably because they have enough cash income from cropping. Among the categories of landowners, however, marginal landowners appear not to have much capacity to do this, as their cash balances are slightly less than zero. On the other hand, these figures for landless households are positive, indicating that these household appear to have to manage the costs of purchasing feed within the amount of their cash income of milk, as they cannot substitute the negative cash balance by other income sources. The table also shows that they tend to sell large portion of milk they produced and thus the amount of self-consumed at home are lower. They appear to be required to sell their milk to balance the cash flow of their livestock activities.

As indicated above, marginal landowners and landless households appear to have difficulty in conducting planned investment in fattening male cattle/buffalo as they may be required to sell their livestock in the middle of fattening period when they face the urgent need of cash.

4 Feed Management

For the livestock activities, feed is the biggest components of recurring costs. As shown in Table D-7, which is drawn from the results of the second household survey, the costs for fodder and concentrates constitute most parts of the recurring costs for all the groups of households. Also, as the quality of feed considerably affects the health and production ability of milk of livestock, feed management is an important factor for the productivity of livestock farmers regardless of the scale and the types of livestock farming.

Accordingly, improvement of feed management should be targeted to any types of livestock farmers. However, for the improvement of feeding management, it is important to consider the characteristics of households in terms of the access to self-producing fodder. As shown in Table D-8, which is drawn from the results of the second household survey, percentage of feed supplied by self-produced feed

at home is bigger for the larger landowners, whereas landless households M.S.S village (irrigated area) very much depend on the purchased feed. Also, farmers in the Pabuhar (non-irrigated area), farmers are more dependent on open land (or grazing). The optimum strategy for feed management should be different for each type of these farmers. Thus, the different approach of support on feed management should be taken depending on the characteristics of household in terms of the source of feed supply.

Table D-7 Annual Recurring Costs for Livestock (Rs.)

	# of sample HH	Concentrates	Fodder	Medicine	Veterinary Charges	Transportation	Total Recurring Costs	% of concentrates plus fodder to total recurring costs
M.S.S	126	14,429	8,907	742	209	0	24,287	96%
Medium Landowner	2	45,500	12,000	2,000	0	0	59,500	97%
Small Landowner	18	23,273	7,522	1,389	339	0	32,523	95%
Micro Landowner	13	5,105	1,962	331	100	0	7,497	94%
Tenant	31	15,332	5,729	597	226	0	21,884	96%
Non Farm Livestock	39	18,403	18,559	1,059	300	0	38,321	96%
Non Farm Other	23	2,122	1,565	17	9	0	3,713	99%
Pabuhar	124	12,611	5,745	1,159	54	115	19,684	93%
Large Landowner	3	44,667	36,667	6,000	0	0	87,333	93%
Medium Landowner	9	29,911	20,444	1,944	178	0	52,478	96%
Small Landowner	29	12,567	7,510	1,821	126	0	22,024	91%
Micro Landowner	21	9,386	1,814	962	0	190	12,352	91%
Tenant	62	9,662	2,620	568	24	165	13,039	94%
Total	250	13,528	7,339	949	132	57	22,004	95%

Source: The Second Household Survey

Table D-8 Distribution of Feed by Sources

	Number of Sample HH	% of feed self-produced	% of feed supplied by the open land	% of feed purchased
M.S.S	96	26%	31%	43%
Medium Landowner	2	75%	0%	25%
Small Landowner	17	74%	8%	19%
Micro Landowner	11	40%	46%	15%
Tenant	23	28%	22%	50%
Non Farm Livestock	39	0%	43%	58%
Non Farm Other	4	0%	50%	50%
Pabuhar	124	18%	67%	16%
Large Landowner	3	42%	33%	25%
Medium Landowner	9	29%	44%	27%
Small Landowner	29	24%	61%	16%
Micro Landowner	21	23%	63%	14%
Tenant	62	10%	77%	14%
Total	220	21%	51%	28%

Source: The Second Household Survey

Appendix E

Third Household Survey

The Third Household Survey

1 Survey Method

(1) Overview

The third household survey was conducted by the Project Team between July and August 2011. The purpose of this survey is to grasp the state of agricultural and livestock activities and household economies of large landowners. The survey was conducted in the following villages where some large landowners reside.

Table E-1 List of Sample Villages

Village Name	District
Barchani	Tando Mohmmad Khan
Kari Bakar	Sukkur
Juma Khan Talpur	Sanghar

In order to elucidate their roles and positions within the village they reside, samples households were selected from various categories of villagers including large landowners. The survey was conducted in the form of interview, asking them the same questionnaires as in the second household survey. The number of total sample households in these three villages was 159.

Moreover, to further clarify the characteristics of large landowners in Sindh, 15 other landowners in 6 districts were interviewed using the same questionnaires.

(2) Selection of Sample Households

The sampling of households was made by stratified sampling method, where sampling strata were based on the classification of Census of Agriculture of Pakistan, as in the second household survey. The categories of strata and their definition are shown in Table E-2.

Table E-2 Household Category based on Census of Agriculture

		Condition
Landowner	Large	Owns more than 100 acre
	Medium	Owns 25-99 acre
	Small	Owns 5-24 acre
	Marginal	Holds less than 5 acres
Tenants		
Non-farmer	Livestock holder	Holds one or more cattle/buffalo or 5 or more goats/sheep
	Other	

The sample households in each stratum were extracted in proportion to the ratio of households in each stratum to total number of household in the village. Tables E-3 shows the estimated number of households and the sample household in each stratum in the sample villages respectively. The estimated numbers of households are based on the key informant interviews. The averages of their ranges were used for the stratification.

Table E-3 Total Number of HH and Sample HH in each Stratum

	Estimate # of HH	%	Number of Sample HH	%
Barchani				
Large Landowner	5	1.2%	1	1.9%
Medium Landowner	12	3.0%	2	3.8%
Small Landowner	10	2.5%	1	1.9%
Marginal Landowner	40	10.0%	5	9.4%
Tenant	150	37.3%	19	35.8%
Non Farm Livestock	135	33.6%	18	34.0%
Other Non Farm	50	12.4%	7	13.2%
Total	402	100.0%	53	100.0%
Kari Bakar				
Large Landowner	1	0.7%	1	1.9%
Medium Landowner	1	0.7%	1	1.9%
Small Landowner	6	4.1%	3	5.7%
Marginal Landowner	25	16.9%	10	18.9%
Tenant	60	40.5%	20	37.7%
Non Farm Livestock	25	16.9%	9	17.0%
Other Non Farm	30	20.3%	9	17.0%
Total	148	100.0%	53	100.0%
Juma Khan Talpur				
Large Landowner	1	0.7%	1	1.9%
Medium Landowner	1	0.7%	1	1.9%
Small Landowner	7	4.7%	3	5.7%
Tenant	45	30.0%	15	28.3%
Non Farm Livestock	81	54.0%	28	52.8%
Other Non Farm	15	10.0%	5	9.4%
Total	150	100.0%	53	100.0%

2 Household Economy

(1) Living Standards

Table E-4 shows the average annual income and consumption expenditures for each group of the households. Figure E-1 is the graphic representation of average per capita consumption for each stratum of household groups. One can see the huge gap in living standards (indicated by income and consumption expenditure) between large landowners and other groups of households.

Table E-4 Annual Total Income and Consumption Expenditure (Rs.)

	Number of Sample HH	Per capita Total Consumption Expenditure	HH Total Consumption Expenditure	Per Capita Total Income	HH Total Income
Barchani	53	29,101	232,713	48,443	384,080
Large Landowner	1	266,844	2,415,047	553,373	5,300,693
Medium Landowner	2	89,349	1,045,296	155,849	1,320,893
Small Landowner	1	78,903	623,662	113,662	897,716
Marginal Landowner	5	27,788	242,722	30,316	265,182
Tenant	19	17,605	131,817	37,385	291,457
Non Farm Livestock	18	25,079	149,983	30,773	177,980
Other Non Farm	7	13,291	112,386	24,706	206,971
Kari Bakar	53	28,873	332,705	31,867	384,470
Large Landowner	1	513,972	9,955,530	743,782	13,948,344
Medium Landowner	1	26,302	289,323	10,360	113,956
Small Landowner	3	28,153	302,116	18,209	191,000
Marginal Landowner	10	20,873	180,307	18,365	143,146
Tenant	20	19,251	151,289	14,834	115,116
Non Farm Livestock	9	20,406	115,827	22,802	124,837
Other Non Farm	9	14,238	67,878	21,630	98,256
Juma Khan Talpur	53	24,403	220,972	49,201	610,747
Large Landowner	1	213,217	4,051,128	1,126,979	21,412,605
Medium Landowner	1	47,470	569,645	165,325	1,983,904
Small Landowner	3	16,341	118,421	29,221	217,403
Tenant	15	22,329	187,119	27,334	240,136
Non Farm Livestock	28	21,067	129,977	26,153	153,295
Other Non Farm	5	11,766	57,862	17,078	85,316
Total	159	27,459	262,130	43,170	459,766

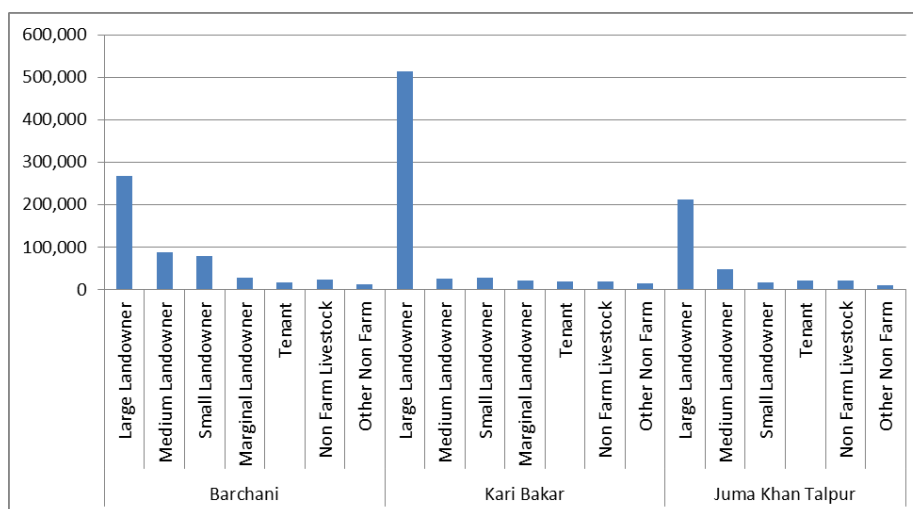


Figure E-1 Per Capita Annual Total Consumption Expenditure (Rs.)

(2) Consumption Expenditure

Table E-5 and Figure E-2 show the consumption expenditure patterns of households in each category, and Figure E-3 depicts that of each household group excluding large landowners. As indicated in Table E-5, the percentage of expenditure on food (self-produced and purchased) to total expenditure for large landowners are between 22% and 39% for the sample villages and are much smaller than those of marginal landowners, tenants, and non-farm households, which are more than 70% for all sample villages.

Table E-5 Percentage Distribution of Each Component of Total Consumption Expenditure

	Self-produced Food	Purchased Food	Apparel, textile, and footwear	Expense for ceremony	Medial Care	Education	Loan Repayments	Other Expenses	Lending loan	Purchasing Asset	Self-produced and Purchased Food
Barchani	23%	34%	5%	4%	4%	2%	2%	11%	1%	15%	57%
Large Landowner	21%	18%	5%	4%	2%	2%	3%	11%	7%	27%	39%
Medium Landowner	14%	13%	2%	4%	7%	2%	6%	17%	0%	36%	26%
Small Landowner	21%	18%	3%	1%	2%	1%	0%	7%	0%	47%	39%
Marginal Landowner	26%	39%	8%	3%	4%	3%	0%	14%	0%	4%	65%
Tenant	32%	42%	5%	4%	4%	1%	3%	6%	0%	3%	74%
Non Farm Livestock	30%	46%	4%	4%	3%	0%	0%	10%	0%	3%	76%
Other Non Farm	0%	73%	5%	5%	3%	3%	0%	10%	0%	0%	73%
Kari Bakar	20%	26%	4%	4%	3%	1%	0%	41%	0%	1%	46%
Large Landowner	6%	16%	4%	4%	2%	2%	0%	66%	0%	1%	22%
Medium Landowner	36%	29%	4%	3%	7%	3%	0%	17%	0%	0%	65%
Small Landowner	43%	21%	4%	6%	8%	0%	0%	11%	0%	7%	64%
Marginal Landowner	42%	35%	4%	11%	2%	0%	0%	6%	0%	0%	77%
Tenant	44%	36%	4%	3%	5%	0%	0%	8%	0%	0%	80%
Non Farm Livestock	38%	43%	4%	2%	5%	0%	2%	6%	0%	0%	82%
Other Non Farm	0%	81%	6%	4%	3%	0%	0%	6%	0%	0%	81%
Juma Khan Talpur	29%	28%	4%	4%	2%	2%	17%	10%	1%	3%	56%
Large Landowner	13%	10%	4%	5%	1%	4%	47%	14%	2%	0%	23%
Medium Landowner	47%	13%	9%	11%	4%	3%	0%	15%	0%	0%	59%
Small Landowner	9%	44%	7%	9%	5%	3%	5%	17%	0%	0%	53%
Tenant	46%	28%	3%	3%	2%	0%	2%	7%	0%	10%	73%
Non Farm Livestock	34%	44%	4%	3%	3%	0%	0%	8%	1%	3%	78%
Other Non Farm	4%	75%	4%	7%	2%	2%	0%	6%	0%	0%	79%
Total	23%	29%	4%	4%	3%	2%	5%	23%	1%	6%	52%

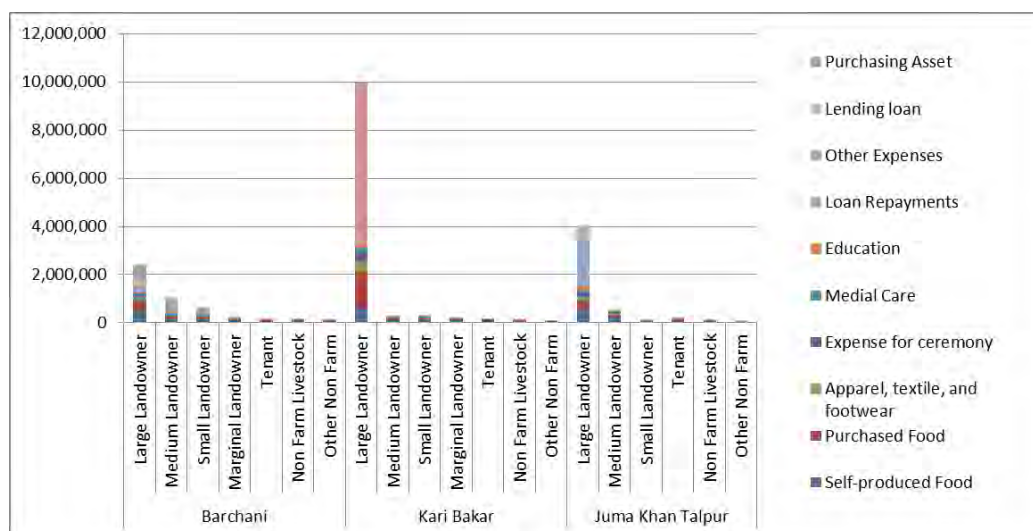


Figure E-2 Annual Consumption Expenditure by Component (Rs.)

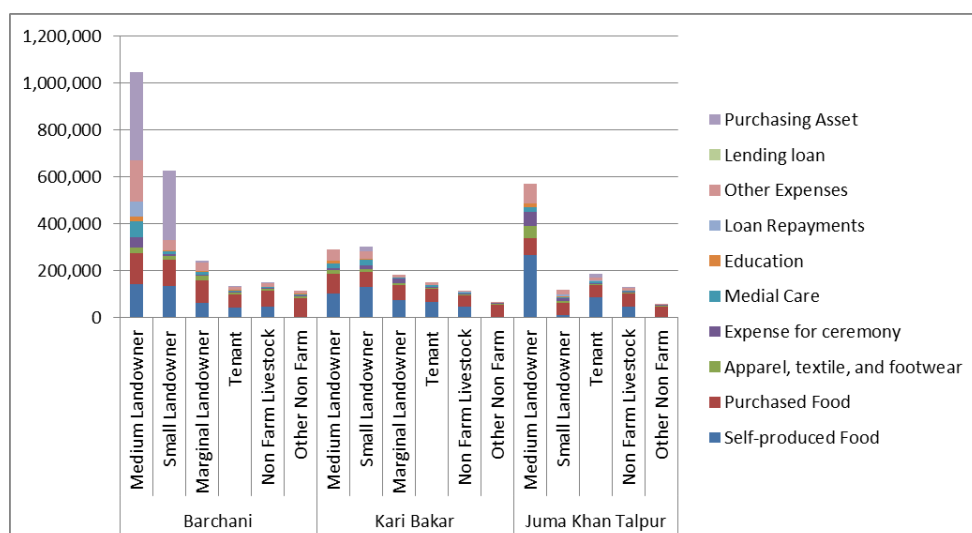


Figure E-3 Annual Consumption Expenditure by Component: Excluding Large Landowners (Rs.)

(3) Sources of Income

The amounts of income by different sources and their contribution to total income are shown in Table E-6 and E-7 and Figure E-4. Figure E-5 presents that of each household group excluding large landowners. One can see that agricultural income constitute the biggest part of the income source for all the household groups except for non-farm households. The contribution of livestock to total household income tends to be larger for the smaller landowners, tenants, and non-farm livestock holders. Its contribution, however, is quite small for large landowners except for Barchani. Large landowners in Barchani are doing relatively large scale of dairy business by taking advantage of its location as a suburb of Hyderabad, a big consumer city. The importance of its location is discussed in Section 3 of Appendix E.

Table E-6 Sources of Income by Household Groups (Rs.)

	HH Total Income	Agriculture Income	Livestock Income	Agriculture Processing	Shop Services	Labor Work	Office Work	Loan interest and paid back	Remittance	Pension	Other	Borrowing	Selling Asset	Fodder Produced at Home
Barchani	384,080	192,010	79,066	0	11,957	35,647	38,206	0	38	5,094	0	19,459	2,604	5,228
Large Landowner	5,300,693	3,295,255	1,402,105	0	0	0	308,000	0	0	138,000	0	157,333	0	226,200
Medium Landowner	1,320,893	977,370	71,523	0	20,000	0	98,250	0	0	15,000	0	138,750	0	19,890
Small Landowner	897,716	664,075	86,141	0	30,000	0	0	0	0	0	0	117,500	0	11,115
Marginal Landowner	265,182	128,661	75,921	0	18,000	6,720	4,080	0	0	0	0	26,800	5,000	0
Tenant	291,457	190,481	34,718	0	17,179	32,868	0	0	0	1,895	0	11,684	2,632	0
Non Farm Livestock	177,980	0	84,463	0	6,617	45,011	28,000	0	0	3,667	0	6,722	3,500	0
Other Non Farm	206,971	0	0	0	4,029	60,143	142,286	0	286	0	0	286	0	0
Kari Bakar	384,470	172,411	33,199	113	18,143	48,340	1,698	0	906	0	226	36,377	73,057	4,670
Large Landowner	13,948,344	7,934,350	437,994	0	520,000	0	6,000	0	0	0	0	1,500,000	3,550,000	116,950
Medium Landowner	113,956	92,100	1,856	0	0	20,000	0	0	0	0	0	0	0	0
Small Landowner	191,000	74,523	29,143	0	10,000	40,000	0	0	0	0	0	30,000	7,333	4,920
Marginal Landowner	143,146	30,168	29,288	0	23,390	19,600	0	0	4,800	0	0	5,900	30,000	6,586
Tenant	115,116	29,304	29,217	0	6,745	35,750	4,200	0	0	0	0	9,900	0	2,496
Non Farm Livestock	124,837	0	39,448	667	2,389	72,667	0	0	0	0	1,333	8,333	0	0
Other Non Farm	98,256	0	0	0	2,367	95,222	0	0	0	0	0	667	0	0
Juma Khan Talpur	610,747	391,385	54,075	0	22,608	38,292	44,783	377	10,264	679	3,755	7,170	37,358	14,447
Large Landowner	21,412,605	18,504,500	528,105	0	300,000	0	730,000	0	0	0	0	0	1,350,000	539,500
Medium Landowner	1,983,904	515,500	352,404	0	0	0	194,000	0	0	0	72,000	250,000	600,000	23,400
Small Landowner	217,403	73,400	28,003	0	20,000	14,667	0	0	48,000	12,000	8,000	3,333	10,000	22,620
Tenant	240,136	100,215	45,238	0	20,400	22,683	37,600	1,333	7,200	0	2,333	3,133	0	8,996
Non Farm Livestock	153,295	0	43,467	0	17,625	49,221	31,625	0	7,571	0	2,071	1,714	0	0
Other Non Farm	85,316	0	1,166	0	7,750	53,400	0	0	16,000	0	2,000	5,000	0	0
Total	459,766	251,935	55,447	38	17,569	40,759	28,229	126	3,736	1,925	1,327	21,002	37,673	8,115

Table E-7 Sources of Income (Percentage Distribution against Total Income)

	Agricultural Income	Livestock Income	Agriculture Processing	Shop Services	Labor Work	Office Work	Loan interest and paid back	Remittance	Pension	Other	Borrowing	Selling Asset	Fodder Produced at Home
Barchani	50%	21%	0%	3%	9%	10%	0%	0%	1%	0%	5%	1%	1%
Large Landowner	62%	26%	0%	0%	0%	6%	0%	0%	3%	0%	3%	0%	4%
Medium Landowner	74%	5%	0%	2%	0%	7%	0%	0%	1%	0%	11%	0%	2%
Small Landowner	74%	10%	0%	3%	0%	0%	0%	0%	0%	0%	13%	0%	1%
Marginal Landowner	49%	29%	0%	7%	3%	2%	0%	0%	0%	0%	10%	2%	0%
Tenant	65%	12%	0%	6%	11%	0%	0%	0%	1%	0%	4%	1%	0%
Non Farm Livestock	0%	47%	0%	4%	25%	16%	0%	0%	2%	0%	4%	2%	0%
Other Non Farm	0%	0%	0%	2%	29%	69%	0%	0%	0%	0%	0%	0%	0%
Kari Bakar	45%	9%	0%	5%	13%	0%	0%	0%	0%	0%	9%	19%	1%
Large Landowner	57%	3%	0%	4%	0%	0%	0%	0%	0%	0%	11%	25%	1%
Medium Landowner	81%	2%	0%	0%	18%	0%	0%	0%	0%	0%	0%	0%	0%
Small Landowner	39%	15%	0%	5%	21%	0%	0%	0%	0%	0%	16%	4%	3%
Marginal Landowner	21%	20%	0%	16%	14%	0%	0%	3%	0%	0%	4%	21%	5%
Tenant	25%	25%	0%	6%	31%	4%	0%	0%	0%	0%	9%	0%	2%
Non Farm Livestock	0%	32%	1%	2%	58%	0%	0%	0%	0%	1%	7%	0%	0%
Other Non Farm	0%	0%	0%	2%	97%	0%	0%	0%	0%	0%	1%	0%	0%
Juma Khan Talpur	64%	9%	0%	4%	6%	7%	0%	2%	0%	1%	1%	6%	2%
Large Landowner	86%	2%	0%	1%	0%	3%	0%	0%	0%	0%	0%	6%	3%
Medium Landowner	26%	18%	0%	0%	0%	10%	0%	0%	0%	4%	13%	30%	1%
Small Landowner	34%	13%	0%	9%	7%	0%	0%	22%	6%	4%	2%	5%	10%
Tenant	42%	19%	0%	8%	9%	16%	1%	3%	0%	1%	1%	0%	4%
Non Farm Livestock	0%	28%	0%	11%	32%	21%	0%	5%	0%	1%	1%	0%	0%
Other Non Farm	0%	1%	0%	9%	63%	0%	0%	19%	0%	2%	6%	0%	0%
Total	55%	12%	0%	4%	9%	6%	0%	1%	0%	0%	5%	8%	2%

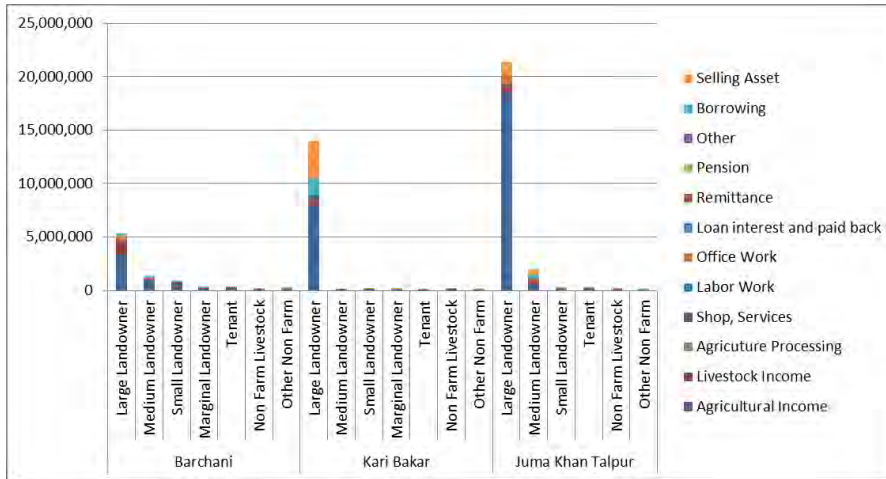


Figure E-4 Sources of Income by Household Group (Rs.)

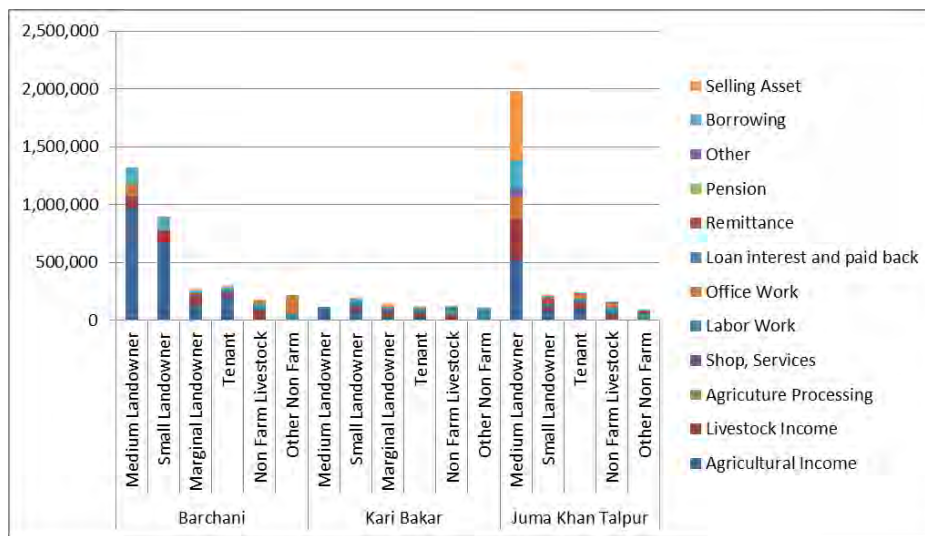


Figure E-5 Sources of Income by Household Group: Excluding Large landowners (Rs.)

(4) Assets and Liabilities

Table E-8 and E-9 and Figure E-6 represent the asset holding position of households for each group. Figure E-7 shows that for each group except for large landowners. One can observe that there is a huge gap in the value of asset holding among the groups. The inequalities in asset holding are even greater than the results of the second household survey, which is discussed in Chapter 9.8.5. This is mainly due to the fact that large landowners in irrigated areas are not included in the second household survey.

Also, one can notice that landholding status play the dominant role in differentiating the values of their asset holding, and agricultural lands constitute 90% of total net worth in the three sample villages overall. Livestock constitute a significant portion of net worth for the tenants and the non-farm livestock holders.

It should also be noted that the lands, livestock, house and other building constitute almost all of the values of their asset holdings.

Table E-8 Value of Assets and Liabilities of Households by Type (Rs.)

	Total Asset	Agricultural Land	Other land (House etc)	Livestock	Houses and Other Buildings	Agricultural Machinery	Vehicles	Saving	Securities	Outstanding Loan	Preservation	Total Liabilities (Outstanding Debt)	Net Worth
Barchani	2,563,850	1,665,094	230,566	180,986	409,590	13,920	40,869	12,042	47	10,044	692	19,513	2,544,337
Large Landowner	59,770,850	48,500,000	1,600,000	5,219,833	2,835,000	219,183	726,833	400,000	0	233,333	36,667	94,000	59,676,850
Medium Landowner	19,395,675	16,075,000	639,750	266,000	2,001,250	75,000	285,925	39,000	1,250	12,500	0	76,250	19,319,425
Small Landowner	5,040,500	3,500,000	580,000	105,300	600,750	30,000	223,200	1,250	0	0	0	118,500	4,922,000
Marginal Landowner	2,031,880	820,000	271,000	128,360	660,600	67,720	81,200	1,000	0	2,000	0	28,000	2,003,880
Tenant	388,074	0	102,000	43,758	219,684	0	4,947	4,053	0	13,632	0	19,421	368,653
Non Farm Livestock	693,778	0	267,917	123,972	290,167	0	7,778	3,667	0	278	0	8,778	685,000
Other Non Farm	322,936	0	92,143	4,343	224,286	0	593	1,571	0	0	0	314	322,621
Kari Bakar	15,847,501	15,341,736	119,583	60,535	141,019	33,538	147,496	434	0	2,264	896	45,906	15,801,595
Large Landowner	817,392,250	800,000,000	5,325,000	655,250	2,002,000	1,702,500	7,560,000	0	0	100,000	47,500	2,000,000	815,392,250
Medium Landowner	5,389,200	5,000,000	0	140,400	151,000	75,000	22,800	0	0	0	0	0	5,389,200
Small Landowner	1,989,167	1,410,000	83,300	158,533	317,333	0	20,000	0	0	0	0	30,000	1,959,167
Marginal Landowner	623,140	388,200	10,000	65,320	150,600	0	8,820	200	0	0	0	5,900	617,240
Tenant	167,410	0	18,150	45,710	101,050	0	1,900	600	0	0	0	9,650	157,760
Non Farm Livestock	110,756	0	27,778	41,078	38,556	0	567	556	0	2,222	0	9,444	101,311
Other Non Farm	65,800	0	5,556	0	55,000	0	4,800	444	0	0	0	667	65,133
Juma Khan Talpur	7,455,945	6,207,547	264,811	118,153	629,000	8,915	47,128	54,654	0	5,642	120,094	11,585	7,444,360
Large Landowner	351,088,200	300,000,000	13,000,000	1,439,000	25,001,000	450,000	2,259,200	2,500,000	0	74,000	6,365,000	0	351,088,200
Medium Landowner	16,176,800	12,000,000	175,000	341,000	3,001,000	0	159,800	300,000	0	200,000	0	250,000	15,926,800
Small Landowner	5,854,367	5,666,667	0	90,367	94,000	0	0	3,333	0	0	0	1,333	5,853,033
Tenant	312,920	0	30,000	100,620	179,133	1,500	0	1,667	0	0	0	19,933	292,987
Non Farm Livestock	195,271	0	14,643	95,993	78,786	0	2,814	2,143	0	893	0	1,286	193,985
Other Non Farm	35,117	0	0	2,783	32,000	0	0	333	0	0	0	5,000	30,117
Total	8,622,432	7,738,126	204,987	119,891	393,203	18,791	78,498	22,377	16	5,983	40,561	25,668	8,596,764

Table E-9 Percentage Distribution of Values in the Net Worth of Households

	Agricultural Land	Other land (House etc)	Livestock	Houses and Other Buildings	Agricultural Machinery	Vehicles	Saving	Securities	Outstanding Loan	Preservation	Total Liabilities (Outstanding Deb)
Barchani	65%	9%	7%	16%	1%	2%	0%	0%	0%	0%	-1%
Large Landowner	81%	3%	9%	5%	0%	1%	1%	0%	0%	0%	0%
Medium Landowner	83%	3%	1%	10%	0%	1%	0%	0%	0%	0%	0%
Small Landowner	69%	12%	2%	12%	1%	4%	0%	0%	0%	0%	-2%
Marginal Landowner	40%	13%	6%	33%	3%	4%	0%	0%	0%	0%	-1%
Tenant	0%	26%	11%	57%	0%	1%	1%	0%	4%	0%	-5%
Non Farm Livestock	0%	39%	18%	42%	0%	1%	1%	0%	0%	0%	-1%
Other Non Farm	0%	29%	1%	69%	0%	0%	0%	0%	0%	0%	0%
Kari Bakar	97%	1%	0%	1%	0%	1%	0%	0%	0%	0%	0%
Large Landowner	98%	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%
Medium Landowner	93%	0%	3%	3%	1%	0%	0%	0%	0%	0%	0%
Small Landowner	71%	4%	8%	16%	0%	1%	0%	0%	0%	0%	-2%
Marginal Landowner	62%	2%	10%	24%	0%	1%	0%	0%	0%	0%	-1%
Tenant	0%	11%	27%	60%	0%	1%	0%	0%	0%	0%	-6%
Non Farm Livestock	0%	25%	37%	35%	0%	1%	1%	0%	2%	0%	-9%
Other Non Farm	0%	8%	0%	84%	0%	7%	1%	0%	0%	0%	-1%
Juma Khan Talpur	83%	4%	2%	8%	0%	1%	1%	0%	0%	2%	0%
Large Landowner	85%	4%	0%	7%	0%	1%	1%	0%	0%	2%	0%
Medium Landowner	74%	1%	2%	19%	0%	1%	2%	0%	1%	0%	-2%
Small Landowner	97%	0%	2%	2%	0%	0%	0%	0%	0%	0%	0%
Tenant	0%	10%	32%	57%	0%	0%	1%	0%	0%	0%	-6%
Non Farm Livestock	0%	7%	49%	40%	0%	1%	1%	0%	0%	0%	-1%
Other Non Farm	0%	0%	8%	91%	0%	0%	1%	0%	0%	0%	-14%
Total	90%	2%	1%	5%	0%	1%	0%	0%	0%	0%	0%

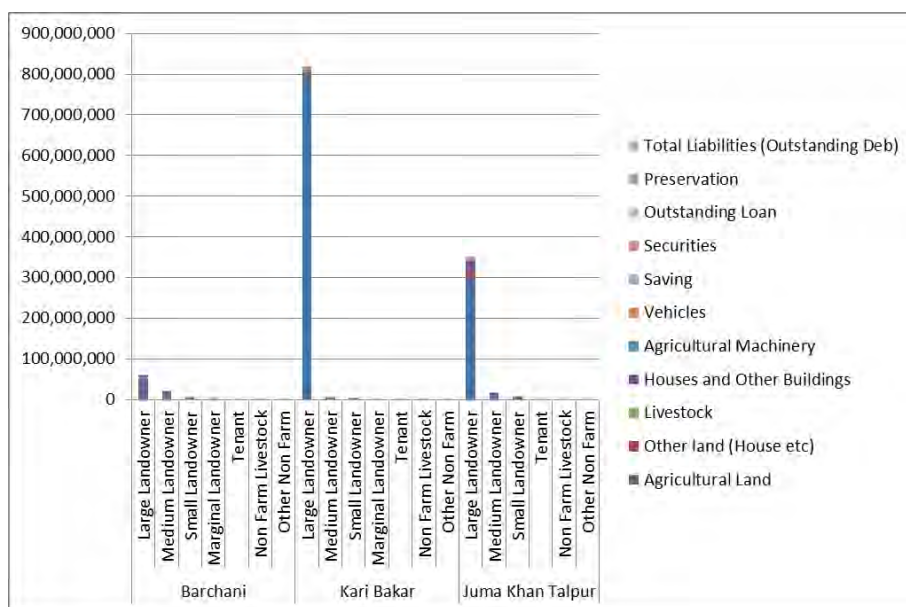


Figure E-6 Value of Asset Holdings by Different Type (Rs.)

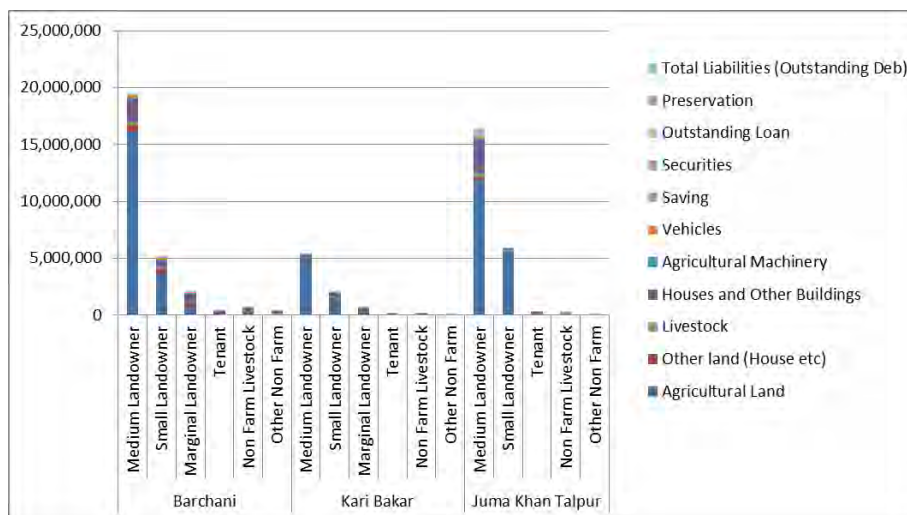


Figure E-7 Value of Asset Holdings by Different Type: Excluding Large Landowners (Rs.)

(5) Lorenz Curves for Consumption Expenditure and Asset Holdings

Figures E-8 and E-9 show the Lorenz curves of consumption expenditure and asset values for the sample villages. These curves show what percentage of total expenditure or assets are owned by any given percentage of households. The percentage of households is plotted on the x-axis, the percentage of expenditure or assets on the y-axis. The more convex curve represents the more inequality in the distribution of wealth.

The figures show that Lorenz curve for the value of asset is much more convex than that for consumption expenditure for all the sample villages, indicates that the inequality is more profound in asset holdings than consumption expenditure. One can also see that the inequalities in asset holding are even greater than the results of the second household survey, which is discussed in Chapter 9.8.6, due to the inclusion of large landowners in irrigated areas for the third household survey.

The disparity in the agricultural land holding status is more profound than that of total asset holdings as the curve for the agricultural land is extremely convex for all villages. As in the case in 9.8.6, the inequality in the livestock holding is not significant for the both villages, probably reflected by the relative easiness to purchase livestock.

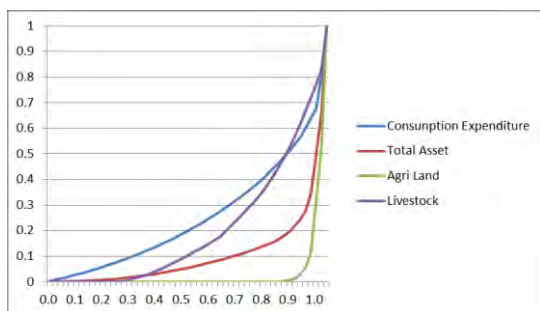


Figure E-8 Lorenz Curves for Barchant

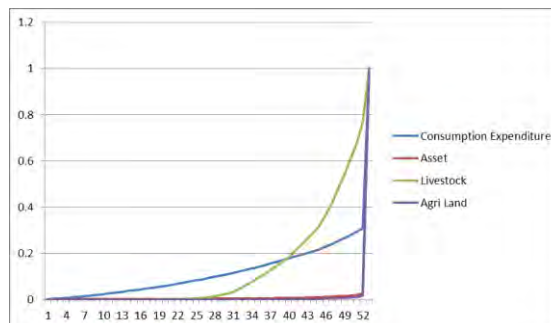


Figure E-9 Lorenz Curves for Kari Bakar

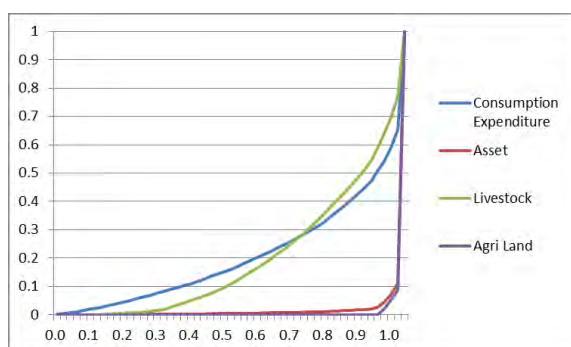


Figure E-10 Lorenz Curves for Juma Khan Talpur

(6) Status of Debt

Table E-11 depicts the percentage distribution of average amount of debt for each type of households. It shows that about 70% of households in the sample do not have debt. For those households who have debts, the amount of debts varies among households.

Table E-11 Percentage Distribution of Amount of Debt by Household Type (Rs.)

Category	Amount of debt								
	0	0-5000	5,001-10,000	10,001-20,000	20,001-30,000	30,001-40,000	40,001-50,000	50,001-100,000	More than 100,000
Large Landowner	67%	0%	0%	0%	0%	0%	0%	0%	33%
Medium Landowner	50%	17%	0%	0%	0%	0%	0%	0%	33%
Small Landowner	40%	10%	0%	10%	10%	0%	0%	20%	10%
Marginal Landowner	53%	7%	0%	7%	20%	7%	0%	7%	0%
Tenant	63%	2%	7%	13%	6%	0%	0%	7%	2%
Non Farm Livestock	80%	2%	4%	5%	5%	0%	0%	4%	0%
Other Non Farm	86%	5%	5%	0%	5%	0%	0%	0%	0%
Total	69%	4%	4%	7%	7%	1%	0%	5%	4%

Table E-12 depicts the percentage distribution of ratio of debt amount to annual income. It shows that percentages of households who have more than 30% debt-income ratio are very small. The table also shows that more than 80% of non-farm households do not have debt at all, which may indicate the limited access to credit for them.

It is important to note that about 40% of tenant households own debt, which is much higher rate than non-farm households. During the interview, many of the tenant interviewees state that they tend to borrow money from their landowners when they need lump sum amount of money for marriage ceremony or funeral. This suggests that having a tenancy relation often provide tenant some access to credit. However, the amount that their landowners can lend is mostly around 2,000- 3,000 Rs. at a time which is usually not enough for their borrowing for investment. During the interview, a couple of tenants state that they borrow money form NGOs for investing on livestock, as they cannot borrow a large amount of money form their landowners.

Table E-12 Percentage Distribution of the Ratio of Debt to Income

Annual income/Debt Category	0%	1-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	More than 80%
Large Landowner	67%	17%	0%	0%	0%	0%	0%	0%	17%	0%
Medium Landowner	50%	17%	33%	0%	0%	0%	0%	0%	0%	0%
Small Landowner	40%	30%	10%	10%	10%	0%	0%	0%	0%	0%
Marginal Landowner	53%	7%	13%	27%	0%	0%	0%	0%	0%	0%
Tenant	63%	13%	13%	4%	0%	2%	2%	2%	0%	2%
Non Farm Livestock	82%	9%	7%	0%	0%	2%	0%	0%	0%	0%
Other Non Farm	86%	9%	0%	5%	0%	0%	0%	0%	0%	0%
Total	69%	12%	10%	5%	1%	1%	1%	1%	1%	1%

(7) Acquisition of Lands

This section investigates the state of new acquisition of lands for the sample households. As suggested in Section 9.8.7, this will indicate the level of mobilization among the social strata. Table E-13 depicts the number of landholding households who did not inherit the land from their families. The table shows that, among 36 land-holding households in the sample, only 10 households in did not inherit land; in other words, only 10 households in the sample became the new landowners within their generation. Also, Table E-14 depicts the size of lands purchased by these 10 new landowners. It shows that the sizes of land they purchased are quite small.

These facts suggest that even though purchasing agricultural lands by landless households exist to some extent, newly acquiring agricultural land in a large scale is quite rare for landless households, indicating the low incidents of mobilization among the social ladders.

Table E-13 Number of Landowners who Did Not Inherit Land

	Number of Landowners	HH who did not inherit land
Barchani	16	1
Large Landowner	3	0
Medium Landowner	4	0
Small Landowner	4	0
Marginal Landowner	5	1
Kari Bakar	15	9
Large Landowner	1	0
Medium Landowner	1	1
Small Landowner	3	1
Marginal Landowner	10	7
Juma Khan Talpur	5	0
Large Landowner	1	0
Medium Landowner	1	0
Small Landowner	3	0
Total	36	10

Table E-14 Acres of Land Purchased

Acres of land purchased	Number of HHs
1	1
2	6
4	1
7	1
25	1
Total	10

(8) Coping Strategy

Table E-15 shows the results of a question for how to cope with a shock such as famine. Increasing livestock sale is the most popular option for all household groups except for non-farm other

households who do not own livestock. This indicates an important role of livestock as a safety net in case of a shock. For tenant households, borrowing money from their landlords is the second option, suggesting that working for landowner as tenant gives another source of safety net which labor workers do not have. On the other hand, borrowing money from friends or relatives and increase labor work are popular strategies for non-farm other households.

Table E-15 Coping Strategy in Case of Famine

	Number of Sample HH	Borrow money from bank or money lender	Borrow money from landowner	Borrow money from friends or relatives	Sell more livestock	Take less food	Take lower quality food	Buy lower quality non-food items	Do nothing	Do more labor work	Sell lands	Sell other asset	Migrate	Other
Large Landowner	6	17%	0%	0%	67%	0%	0%	0%	17%	0%	0%	0%	0%	0%
Medium Landowner	6	33%	0%	0%	50%	0%	0%	0%	0%	0%	17%	0%	0%	0%
Small Landowner	11	18%	9%	0%	45%	0%	0%	0%	0%	0%	9%	9%	9%	0%
Marginal Landowner	17	12%	6%	12%	47%	0%	0%	0%	0%	6%	12%	6%	0%	0%
Tenant	64	14%	25%	3%	33%	0%	0%	2%	2%	19%	0%	0%	2%	2%
Non Farm Livestock	55	15%	0%	15%	47%	0%	4%	0%	2%	15%	0%	0%	2%	2%
Other Non Farm	25	16%	0%	28%	0%	4%	4%	0%	8%	24%	0%	4%	0%	12%
Total	184	15%	9%	10%	36%	1%	2%	1%	3%	15%	2%	2%	2%	3%

3 Livestock Activities

(1) Livestock Holdings

Table E-16 depicts the average livestock holdings among the household groups. It shows that the larger the agricultural land holdings, the larger the number of livestock holdings. This result is consistent with the results of the first and second household survey, which are discussed in Section 9.8.2.

Table E-16 Average Livestock Holdings by Household Type

	Number of Sample HH	Cattle	Buffalo	Sheep	Goat	Animal Unit
Barchani	53	2.0	5.1	0.0	1.5	6.9
Large Landowner	1	93.7	99.7	0.0	46.3	179.2
Medium Landowner	2	6.0	6.5	0.0	0.0	11.3
Small Landowner	1	0.0	4.8	0.0	0.0	4.8
Marginal Landowner	5	0.0	5.0	0.0	0.0	5.0
Tenant	19	0.1	2.2	0.0	1.3	2.4
Non Farm Livestock	18	0.0	4.8	0.0	0.4	4.8
Other Non Farm	7	0.0	0.1	0.0	0.0	0.1
Kari Bakar	53	1.7	0.6	0.9	1.0	2.2
Large Landowner	1	14.5	16.0	0.0	10.5	28.7
Medium Landowner	1	3.0	0.0	20.0	0.0	4.4
Small Landowner	3	5.3	0.3	0.0	3.7	5.0
Marginal Landowner	10	2.1	0.6	2.7	0.3	2.6
Tenant	20	1.4	0.2	0.0	1.3	1.4
Non Farm Livestock	9	0.9	0.7	0.2	0.2	1.4
Other Non Farm	9	0.0	0.0	0.0	0.0	0.0
Juma Khan Talpur	53	2.2	2.4	0.0	4.9	4.7
Large Landowner	1	20.0	49.0	0.0	40.0	69.0
Medium Landowner	1	4.0	5.0	0.0	46.0	12.8
Small Landowner	3	0.7	3.3	0.0	2.7	4.1
Tenant	15	1.6	2.2	0.0	4.3	3.9
Non Farm Livestock	28	2.5	1.1	0.0	3.4	3.5
Other Non Farm	5	0.0	0.0	0.0	0.7	0.1
Total	159	2.0	2.7	0.3	2.4	4.6

Table E-16 shows the average livestock holdings sample 19 large landowners interviewed in the third household survey. In the table, “Hyderabad” represents the large landowner households reside within two hours distance from the city center of Hyderabad (which includes Barchani village). “Absentee”

represents the absentee landowners. It shows that the cattle and buffalo holdings for “Hyderabad” are quite large. Many of the large landowners in this category are in fact intensively engaged in dairy business, utilizing their locational advantages as suburbs of a big consumer city.

It also shows that the livestock holdings for the absentee landowners are relatively small. This is probably reflected by their difficulties in taking care of a large number of animals at the places that are distant from their home. During our interview, one absentee landowner claimed that problem of theft hinders him owning a large number of livestock at home.

Table E-16 Average Livestock Holdings of Large Landowners

	Number of Sample HH	Cattle	Buffalo	Sheep	Goat	Animal Unit
Hyderabad	4	94	127	0	35	206
Absentee	3	5	14	0	0	19
Other	12	27	38	14	36	65
Total	19	37	53	9	30	87

(2) Fodder

The right hand side of Table E-17 shows the total cultivated area and the cultivated area of fodder by household type. It shows that the areas of fodder cultivation are much larger for the larger landholding households than other household groups. The middle part of the table shows the percentage distribution of fodder usage by source. It shows that percentage of feed supplied by self-produced feed at home is bigger for the larger landowners, whereas landless households depend on the purchased feed considerably.

The right hand side of the table shows the annual recurring costs for livestock rearing. The table indicates that large landowners spend much more on concentrates than smaller landowners, tenants, and non-farm households. One can also see that the large landowners spend relatively large amount of costs for permanent laborers. Overall, these observations suggest that the large landowners rear their livestock with the relatively better conditions than other strata of households.

Table E-17 Production of Fodder, Usage of Fodder by Sources, and Annual Recurring Costs for

	Livestock (Rs.)											
	Total Cultivated Area (A)	Cultivated Area of Fodder (B)	% (B/A)	% of feed self-produced	% of feed supplied by the open land	% of feed purchased	Total cost of purchased fodder	Total cost of purchased concentrate	Total cost of purchased other feed	Salary for Permanent Laborers	Other costs for livestock	Number of Livestock Reared (AU)
Barchani	6.1	0.2	3%	26	54	20	43,936	48,338	8,500	90,000	8,400	8
Large Landowner	118.7	6.3	5%	68	3	28	220,667	326,667	12,100	180,000	12,000	83
Medium Landowner	31.0	2.0	6%	69	13	19	15,250	38,050		60,000		11
Small Landowner	12.3	0.6	5%	65	19	16	23,333	29,500		3,000		5
Marginal Landowner	2.6	0.0	0%	34	18	48	25,333	31,170	4,800		4,800	5
Tenant	6.1	0.0	0%	25	62	13	9,880	21,611	100	24,000		3
Non Farm Livestock				0	80	20	25,714	21,053	100			4
Other Non Farm				0	100	0						
Kari Bakar	20.0	0.3	1%	50	45	5	2,700	25,759	2,100	122,667	1,000	4
Large Landowner	848.5	8.0	1%	100	0	0		175,000		181,000		29
Medium Landowner	15.0	0.0	0%	100	0	0		3,000	1,200		1,200	2
Small Landowner	6.8	0.6	9%	100	0	0		13,150				4
Marginal Landowner	6.8	0.3	4%	54	46	0		19,233	1,300	6,000	800	6
Tenant	5.4	0.1	2%	50	49	1	1,500	12,740	100			3
Non Farm Livestock				13	68	21	3,000	12,233	100			2
Other Non Farm												
Juma Khan Talpur	10.4	1.0	10%	17	67	16	8,193	19,172	100	66,600		5
Large Landowner	402.0	43.5	11%	100	0	0		84,000		144,000		69
Medium Landowner	42.0	4.0	10%	100	0	0				62,400		13
Small Landowner	13.5	1.0	7%	33	33	33	25,000	22,000				4
Tenant	4.6	0.3	7%	39	59	3	6,500	34,000	100	36,000		4
Non Farm Livestock				0	78	23	7,031	10,546	100	24,000		4
Other Non Farm				0	100	0						0
Total	12	0.5	5%	31	55	14	19,193	31,706	3,743	92,979	3,643	6

(3) Milk Production and Sales

Table E-18 depicts the average total weekly production of milk and their distribution to sales amount, self-consumption, and other for the household who have milking cows and buffaloes. It shows that the production of milk is prominently higher for large landowners than other groups. One can also see that most of the household retain some portion of the milk they produced for their consumption at home.

Table E-18 Production and Sales of Milk by Household Type

	Number of Sample HH	Total Production of Milk per week (liter)	Total Milk Sold per week (liter)	Total Milk Self Consumed per week (liter)	Total Milk Given per week (liter)	Total Milk Other per week (liter)	Milk Production per head/day (liter)
Barchani	38	219	164	51	3	1	3.9
Large Landowner	1	1,241	1,167	52	11	11	6.8
Medium Landowner	2	75	51	24	0	0	4.3
Small Landowner	1	51	22	27	1	0	5.8
Marginal Landowner	4	65	43	21	1	0	4.9
Tenant	6	79	55	23	2	0	5.8
Non Farm Livestock	17	66	51	14	2	0	4.2
Kari Bakar	31	214	63	141	10	0	2.4
Large Landowner	1	252	183	69	0	0	3.6
Medium Landowner	1	21	0	19	2	0	1.5
Small Landowner	3	19	0	17	2	0	1.0
Marginal Landowner	6	27	2	23	0	0	2.3
Tenant	12	24	1	23	0	0	2.1
Non Farm Livestock	7	34	14	18	2	0	3.6
Juma Khan Talpur	29	49	22	23	3	1	3.5
Large Landowner	1	140	112	14	14	0	2.9
Medium Landowner	1	70	0	65	5	0	3.3
Small Landowner	1	70	63	7	0	0	5.0
Tenant	7	63	33	26	4	0	3.9
Non Farm Livestock	19	36	12	21	2	1	3.4
Total	98	90	64	23	2	1	3.7

Table E-19 depicts the average total weekly production of milk and their distribution to sales amount, self-consumption, and other for 19 sample large landowners. It shows that the milk productions of large landowners who live in the suburb of Hyderabad are quite large, reflecting their investing efforts on dairy business.

It is also important to note that some large landowners refrain from selling milk and tend to give other villagers their milk that are the surplus to self-consumed amount at home. Some interviewees state that people take it appropriate for large landowners to do dairy activities for business and, if they sell surplus milk rather than give them away, it will cause social tensions. Based on the field work of the team, this traditional notion is deep-rooted in Sanghar districts, but it cannot be seen in the northern Sindh such as Sukkur, Larkana, and Shikarpir. This feature can be seen in Table E-19, as the portion of milk sales to total milk production is quite low for the large landowners in the Sanghar district.¹

Table E-19 Production and Sales of Milk: Large Landowners

	Number of Sample HH	Total Production of Milk per week (liter)	Total Milk Sold per week (liter)	Total Milk Self Consumed per week (liter)	Total Milk Given per week (liter)	Total Milk Other per week (liter)	Milk Production per head/day (liter)
Hyderabad	4	1,719	1,588	114	8	8	6.7
Sanghar	5	604	84	206	96	218	5.0
Absentee	3	177	122	32	4	3	6.4
Other	7	324	190	106	28	0	4.3
Total	19	668	446	122	38	60	5.3

(4) Milk Consumption

Table E-20 shows the amount of milk purchased and self-consumed for a household and the per capita milk consumption per week. It indicates that the per capita consumption of milk is significantly larger for the large landowners than other household groups.

¹ This issue is also discussed in Section 6 of Appendix C based on the result of first household survey. It is important to note that all of the sample large landowners in the first household survey do not sell their milk at all. All of them reside in the central and southern parts of the province, and 60% of them reside in Sanghar.

Table E-20 Consumption of Milk (Total Households)

	Number of Sample HH	Total Milk Purchased per week (liter)	Total Milk Self Consumed per week (liter)	Per capita Milk Consumption per week (liter)
Barchani	53	9	15	1.9
Large Landowner	1		52	5.5
Medium Landowner	2	14	28	2.3
Small Landowner	1	7	29	3.8
Marginal Landowner	5	12	22	2.2
Tenant	19	12	13	1.7
Non Farm Livestock	18	5	13	2.2
Other Non Farm	7	7	7	0.9
Kari Bakar	53	4	14	1.7
Large Landowner	1	6	72	4.6
Medium Landowner	1		19	1.7
Small Landowner	3		17	1.8
Marginal Landowner	10	5	15	1.5
Tenant	20	5	15	1.8
Non Farm Livestock	9	3	14	2.6
Other Non Farm	9	3	2	0.5
Juma Khan Talpur	53	5	14	1.8
Large Landowner	1		14	0.7
Medium Landowner	1		65	5.4
Small Landowner	3	4	4	0.6
Tenant	15	5	13	1.5
Non Farm Livestock	28	6	15	2.2
Other Non Farm	5	3	2	0.4
Total	159	6	14	1.8

Table E-21 and E-22 show the amount of milk purchased and self-consumed for a household and the per capita milk consumption per week for milk producing households and non-producing households respectively. The tables indicate that the per capita consumption of milk for milk producing households is much larger than non-producing households even though many of the non-producing households purchase milk for consumption. It is also important to note that all of the non-producing households are lower strata of social group, and thus they tend not to have enough resources to have alternative source of protein. The fact poses an important implication for the development strategy of dairy industry, as the price increase in milk is likely to benefit the milk producers but may damage the nutritious condition and food security of the most impoverished strata of rural societies.

Table E-21 Consumption of Milk (Milk Producing Households)

	Number of Sample HH	Total Milk Purchased per week (liter)	Total Milk Self Consumed per week (liter)	Per capita Milk Consumption per week (liter)
Barchani	38	6	16	2.1
Large Landowner	1		52	5.5
Medium Landowner	2	14	28	2.3
Small Landowner	1	7	29	3.8
Marginal Landowner	4	21	26	2.6
Tenant	6		23	2.6
Non Farm Livestock	17	7	14	2.3
Kari Bakar	31	0	22	2.6
Large Landowner	1	6	72	4.6
Medium Landowner	1		19	1.7
Small Landowner	3		17	1.8
Marginal Landowner	6		23	2.1
Tenant	12		23	2.7
Non Farm Livestock	7		18	3.2
Juma Khan Talpur	29		23	2.9
Large Landowner	1		14	0.7
Medium Landowner	1		65	5.4
Small Landowner	1		7	1.2
Tenant	7		26	3.0
Non Farm Livestock	19		21	3.0
Total	98	11	23	2.8

Table E-22 Consumption of Milk (Non-milk -producing Households)

	Number of Sample HH	Total Milk Purchased per week (liter)	Per capita Milk Consumption per week (liter)
Barchani	22	9	1.1
Marginal Landowner	1	4	0.7
Tenant	13	12	1.2
Non Farm Livestock	1	3	0.1
Other Non Farm	7	7	0.9
Kari Bakar	23	4	0.5
Marginal Landowner	4	5	0.5
Tenant	8	5	0.4
Non Farm Livestock	2	3	0.3
Other Non Farm	9	3	0.5
Juma Khan Talpur	25	4	0.3
Small Landowner	2	4	0.3
Tenant	8	5	0.2
Non Farm Livestock	9	6	0.5
Other Non Farm	6	3	0.4
Total	70	6	0.6

Appendix F

Periodical Data Collection

I. The Periodical Farm Survey

1. Introduction

Periodical farm survey is an important activity to make master plan for livestock development in Sindh Province. The main purpose is to know the actual situation of the farmhouse and to understand true needs for the improvement the farmer`s social, economic status and technical level. Specifically, it is to increase the productivity of livestock and incomes.

2. Plan of Study for Farm

(1) Taking the Farmer's Point of View

Project members will conduct their work from the point of view of the farmer. In this project the livestock sector will be seen through the eyes of the farmer, and their needs identified. After these needs have been identified, activities that meet these needs will form the backbone of the project. Normally in projects, the needs with the greatest return for least investment receive priority. In this project, even if the needs require substantial investments (for instance infrastructure, animal breeding, etc), they must be met. Consequently, it is important to classify and consolidated these needs into categories. Many interesting discoveries will emerge as these needs are met.

In the search and discovery process, there is no need to rely on high technology solutions. It will be important to further polish and enhance the traditional practices and methods that are serving the farmers well. Through the region specific products program, one leading output will be various rural community developments that the local residents can take pride in. Traditional practices will also be respected.

Through development cooperation it is important that the expression of “creating a complete break for farmers from their present situation” be rephrased as “scattering the seeds, to act as entry points for improvement to traditional agricultural practices and customs currently being used”. To be a good seed, it must i) match the current situation, ii) be desired by farmers, and iii) be relatively simple to establish. Once these seeds sprout, an environment (extension services) must be provided that nourishes the development of these young seedlings. The origins of development lie in the actions of the farmers. Without these actions, results will not eventuate. The projects point of departure, will be from examining and analyzing the collected data and survey observations from the point of view of the farmer, and then identifying those needs the farmer is interested in, can easily resolve and break free from.

The project will examine the sought after needs from the perspective of i) yield improvement, ii) product quality improvement, and iii) household livelihood improvement. These will directly lead to increases in household income and poverty reduction. Indirectly connected with increases in household income will be iv) other improvements in rural households, such as issues related to rural community and gender. During Phase 1 of the project these needs will be identified and brought into the spotlight to be addressed and polished in Phase 2.

(2) Subjects of survey farmers

In order to clarify the characteristics related to farm size and economic situation, strict adherence to zoning will not be needed. For the purpose of this survey, farms involved in Dairy Cattle “Included buffalo” will be classified as follows:

- i) Small sized farmers
- ii) Medium sized farmers
- iii) Landless farmers (small scale farmers or agrarian labourers “Halley”)
- iv) Large sized farmers

Before carrying out the farmer selections, the definition of small, medium and large will be considered. (For large sized farmers, collecting data on all livestock will be overwhelming. In this case a representative sample of 10 head will be sufficient.)

In addition, it will be necessary to investigate the farmers of a fattening cattle and also farmers of sheep, goat and camel in the dry land.

(3) A main purpose of survey

- 1) To grasp real situations and needs of the production sites for the preparation of the master plan
- 2) To prepare the questionnaires of the Community and Household survey to be carried out by a local consultant
- 3) To assist to formulate suitable projects

Note: The focus should be placed on small landholders and landless farmers. The data will also be taken from large and mid-size landholders as a reference.

(4) Survey methods

4.1 Farm households

- 1) Household interviews
- 2) Data collection by the project team members (only once)
- 3) Periodical collection of data by the counterpart or others (weekly)

4.2 Communities particularly

- 1) Workshops, group discussions, etc.

(5) Key points

- should consider the limitation of time, manpower, and budget
- should conduct the survey effectively and efficiently
- should obtain as accurate information as possible

Note: It should therefore be considered that the survey is conducted in collaboration with an organization experienced in providing field training on livestock sector, or that the survey is commenced as a pre-test with such organization.

(6) Selection of farm households

6.1 Easiness of the survey

- Good access to the farms
- Near to any city center
- Existence of suitable surveyors
- Full-time farmers

6.2 Attitudes of the farmers

- Interested to the survey
- Faithfull

(7) Selection Criteria

7.1 Dairy farmers (5 - 7 farm households)

Farmers	-Landless	-Landholders Own land less than 5 acres and produce some fodder	Landless or rental land
1. Small-scale -Own animals less than 5 heads	- Livestock priority Village	Livestock and Agriculture Village Mixed Pre test (Hulio Village)	Livestock priority Village
2. Medium-scale -Own Cattle and Buffalo between 6 to 10 heads, total 20 heads included Goat and Sheep.	- Livestock priority Village	Livestock and Agriculture Village Mixed	- Livestock priority Village
3. Large-scale -Own animals between 50 to 150	-Landless Cattle colony		

7.2 Fatten farmers (1 - 2 farm households)

Farmers	Definition
1. Medium-scale Cattle farm	-Land ? -Own animals about 50 heads
2. Medium-scale Goat Farm	-Land ? -Own animals more than 50 heads

7.3 Goat farmers in desert areas (2 farm households)

Farmers	Definition
1. Small-scale	-Own animals: Approximately 20 heads (Sheep and goats) and A few cattle
2. Medium-scale	-Own animals: Approximately 50 heads (Sheep and goats) and a few cattle, a few camel

3. Method of Farmer's Survey (Activity)

1. Hearing

- (1) General Livestock (Dairy, Fattening, Sheep and Goats)
- (2) 24 hours calendar

2. Making list of animals (Identification)

3. Animal Health:

- (1) Examination of Disease:
Brucellosis, hemoparasites etc.
- (2) Examination of endoparasite:
Collection excrement

4. Diagnosis Pregnancy (Rectal Palpation)

5. Examination of Reproductive characteristic Male

6. Measure of the domestic animal (Genetic evaluation)
The weight?, Girth, Height, Length, Width hip, Width rump etc.
7. Evaluation type of udder
8. Milking:
 - (1) Milk production Kg
 - (2) Examination of mastitis:
The comparison between CMT and detergent method (Pakistan method)
 - (3) Milking time
9. Body condition score” BCS”
10. Facility for Livestock
11. Agricultural machinery
12. A measurement of the feed
13. A measurement of fodder in field
14. Feed analysis
15. Soil analysis

(Agreement of the Permission of activities for Farmer)

Farmer Name:

No	Main Activities	Agreement
1	Hearing General Livestock	
2	Examination of Disease Collection Blood sample	
3	Examination of endoparasite Collection excrement	
4	Diagnosis Pregnancy (Rectal Palpation)	
5	Measure of the domestic animal (Genetic evaluation)	
6	Measure of Milk production	
7	Examination of Mastitis	
8	Measure of fodder in field	
9	Use ear Tag	

4. Working Plan of Study (6 months)

No	Duration of Study for Farm	Duration of Study for Farm					
		(1)November	(2)December	(3)January	(4)February	(5)March	(6)April
1	Small scale Dairy Farmer (Landless)	◎○○△△△	●△△△△●	△△△●	△△△●	△△△●	△△△●
2	Small scale Dairy Farmer (Landholder)	◎○○△△△	●△△△△●	△△△●	△△△●	△△△●	△△△●
3	Medium scale Dairy Farmer (Landless)	◎○○△△△	●△△△△●	△△△●	△△△●	△△△●	△△△●
4	Medium scale Dairy Farmer (Landholder)	◎○○△△△	●△△△△●	△△△●	△△△●	△△△●	△△△●
5	Large scale Dairy Farmer (Landless)	◎○○△△△	●△△△△●	△△△●	△△△●	△△△●	△△△●
6	Medium scale Fattening Cattle Farmer	◎○○△△△	●△△△△●	△△△●	△△△●	△△△●	△△△●
7	Medium scale Fattening Goat Farmer	◎○○△△△	●△△△△●	△△△●	△△△●	△△△●	△△△●
8	Small scale Goat and Sheep Farmer in desert area	◎○○△△△	●△△△△●	△△△●	△△△●	△△△●	△△△●
9	Medium scale Goat and Sheep Farmer in desert area	◎○○△△△	●△△△△●	△△△●	△△△●	△△△●	△△△●

Note: ○:Measurement Fodder & Past (Whole day work)

◎:Hearing, Observation, Ear Tagg, Miliking Record etc. (Whole day work)

△: Weekly report (Half day work)

●: Monthly collection Data (Whole day work)

5. List of the local technicians and farmers

- (1) Small scale landless: Started date of survey: 30 Oct 2010
Survey by PDDC in Hyderabad
Name of Responsibility: Dr. Rasool Bux Soomro
Name of Technician in charge: Dr. Naheed Baloch
U/C: Maso Bhurghari, Village: Mathio Hajano,
Farmer: Mr. Ghulam Ali
- (2) Small scale landholder: Started date of survey: 28 Oct 2010
Survey by Livestock Deptt. Mirpur Khas,
Name of Responsibility: Dr. Zawar Laghari
Name of Technician in charge: Dr. Naeem Siddique
Taluka: Hussain Bux Maree, Village: Haji Allah Bux Maree,
Farmer: Mr. Ali Hassan
- (3) Medium scale landless: Started date of survey: 29 Oct 2010
Survey by Livestock Deptt. Mirpur Khas,
Name of Responsibility: Dr. Zawar Laghari
Name of Technician in charge: Dr. Naeem Siddique
Taluka: Hussain Bux Maree, Village: Haji Allah Bux Maree,
Farmer: Mr. Chattan
- (4) Medium scale landholder: Started date of survey: 03 Nov 2010
Survey by Livestock Deptt. Tando Allhayar,
Name of Responsibility: Dr. Javaid Ahmed
Name of Technician in charge: Dr. Mazhar Ali
Taluka: Tando Allahyar, Village: Bachal Khaskheli,
Farmer: Mr. Manthar
- (5) Large scale landless: Started date of survey: 02 Nov 2010
Survey by Livestock Deptt. Hyderabad, Hospital Old Cattle Colony
Name of Responsibility: Dr. Ghulam Jeelani
Name of Technician in charge: Dr. Muhammad Farooq Laghari
Taluka: Hyderabad, Old cattle colony
Farmer: Mr. Haji Aamir Ghouri
- (6) Medium scale Fattening Farmer(Cattle): Started date of survey: 04 Nov 2010
Survey by Livestock. Deptt Sanghar,
Name of Responsibility: Dr. Javaid Ahmed Gujjar
Name of Technician in charge: Dr. Khushi Muhammad
Taluka: Jhole , Village:Jamaldin
Farmer: Mr. Haji Jamal Din
- (7) Medium scale Fattening Farmer(Goat): Started date of survey: 04 Nov 2010
Survey by Livestock Deptt. Sanghar,
Name of Responsibility: Dr. Javaid Ahmed Gujjar
Name of Technician in charge: Dr. Khushi Muhammad
Taluka: Jhole, Village: Muhammad Sharif Marri ,
Farmer: Mr. Wazir Muhammad

(8) Medium scale Sheep and Goats Farm in desert areas: Started date of survey: 14 Nov 2010
Survey by Livestock Deptt. Tharparkar
Name of Responsibility: Dr. Nobat Khan Khoso
Name of Technician in charge: Dr. Jhaman
Taluka: Mithi, Village: Mithrio Bhatti,
Farmer: Mr. Karman s/o Bhojo

(9) Medium scale Sheep and Goats Farm in desert areas: Started date of survey: 15 Nov 2010
Survey by Livestock Deptt. Tharparkar
Name of Responsibility: Dr. Nobat Khan Khoso
Name of Technician in charge: Dr. Jhaman
Taluka: Mithi, Village: Pabuhar,
Farmer: Mr. Pancho

6. Weekly data collection

It must be visit the farm once a week and carry out hearing. You decide with the consultation of farmer to fix a day to visit every week. And you keep it in mind to visit it on the same day you decided with the farmer as much as possible. It dates back between one week from a day before visiting it and interview it such as income and expenditure, reproduction, animal health, feeding etc. There are not many people recording it in a farmhouse. However, it seems that you can get it because farmer still memorize it for one week.

You record all data in registers on the site and you must reconfirm its before returning. And you make modifications it on the site, if you find some abnormal data. You must note the day when you confirmed the delivery of the domestic animal. The measurement for body weight of newborn should be taken.

7. Monthly data collection

It is a milk production and the weight measurement mainly. You do the day when we started an survey with a basic day and you count it from a basic day on an measurement date of the next month and carry it out during -3 days and +3 days.

(an example)

In the case of a day basic 15th

-3 days: 12th, +3 days: 18th

You carry out the measurement between 12th and 18th.

II. Survey Results of Representative Farmers

1. Small-Scale Dairy Farmer (Landless)

1.1 Survey Background

Responsible Organisation:	PDDC, Hyderabad
Responsive:	Regional Manager Hyderabad, Dr. Rasol Bux Soomro
Person in Charge:	Dr. Naheed Boloch
Surveyed Farmer:	Mr. Ghulam Ali
Location:	Mathio Hajano village, Maso Bhugari Union Council, Hyderabad (sub-district), Hyderabad (district)

1.2 Introduction

This farm is close to Hyderabad city and was selected with the co-operation of PDDC. Mathio Hajano village is in an irrigated area, about 20km north of Hyderabad town. In terms of gathering market information and marketing produce it is well located. However, according to the Livestock Department the village has not received any serious guidance on animal health practices. The surveyed farmer and his neighbour's livestock never vaccinated.

It is an old village, established in 1870. It is about 50 acres in area with 430 families living in the village. Most of the villagers do not have own land. There are about 300 households in the village who do not have own land, and are practising small-scale dairy farming. These families are thus unable to grow their own fodder supply. Among the other households, there are ones who raise goats or sheep. These families are among the few who look after dry (non-lactating) buffalo sharing from the commercial or cattle colonies around Hyderabad. These farmers are depending on this source of income.

1.3 Criteria for Farmer Selection

There were three candidate households that fit the category of small-scale landless farmer. All three candidate households are located in Mathio Hajano village, Hyderabad. To evaluate (score) the farmers, we first visited Mr. Shair Khan, second on the list. On his farm they do not graze the buffalo, but rather feed them like a cattle colony. Not the type of farmer we wanted to survey for this category. Next we visited Mr. Ghulam Ali, the first on the list. He is a landless dairy farmer who milks two buffalo, and fits the category of the farmer sought, so we chose to survey him.

1.4 Farmer Outline

Mr. Ghulam Ali lives in the village. Although his house is small, it is solidly constructed of concrete. Although he is enthusiastic to improve his livestock skills, he is not good at reading or writing and keeps no livestock production records. To date, he has received no guidance on livestock husbandry. He lives together with wife, his eldest son (24 years old), and his eldest daughter (23 years old), a family of four adults.

1.5 Farm Management

Diagnosis of Farm Management from January to December 2010 was based on interviews conducted over a 6 month period from November 2010 to May 2011, on weekly data collected, and monthly records of weight measurements and milk tests. During this year there were frequent changes in livestock. Details of these changes were confirmed on the last visit.

It turned out that Mr. Ghulam Ali is participating in a special sharing arrangement with commercial dairy farmers in the vicinity of Hyderabad. He leases cattle out that are heavily pregnant to these farmers for five months. This arrangement began some 3 years ago. In the village, there are 7 families that are participating in this special form of share leasing. The name of the person who rents the cows is Mr. Sharif. A relative of Mr. Ghulam Ali who lives in the village and works for this farmer, introduced the two. The lease period is for 5 months after calving, when milk yields are the highest. The fee is 12,000Rp. Once milk yields drop off in the sixth month, the cows are returned to his farm. At this stage Mr. Ghulam Ali conducts the milking. We also learnt he keeps dry buffalo from another commercial farmer until heavily pregnant for a monthly fee of 1,000Rp/head. Even though this is a special case of dairy farm operation, We completed the diagnosis, as it may be of use in the future.

1.5.1 Basic Information for Farm Management Analysis

(1) Family Labour & Labourer Rates

Table 1. Family labour.

	Main Occupation	Land Owner Farm work	Livestock work	Hour	Amount /year
Ghulam Ali 55years	Management Dairy	No	Cutting grass & transport	2=Rp16	11,680
Wife 40 years	Multiple work	Agriculture 5months busiest season Rp125/day	Milking & cutting grass	4=Rp64	23.360
Son 24 years	Management Dairy	No	Watching grazing, milking, Cutting grass	8=Rp125	45.625
Daughter 17 years	Hose work Labor Agriculture	Agriculture 5months busiest season Rp125/day	No	No	No
Total					80,665

(a) Farm labour rates in the village are 125Rp/day (8 hour day).

(b) Farm income for his wife and daughter (they work in the land owner's fields: a 5 month farming season) is 2 persons x 5 months x 30 days = 300 days x 125Rp = 37,500Rp.

(2) Employees

Temporary employees work for 6 months a year. Their main work is watching grazing animal. Their monthly wage is 2,300Rp. They work for 5 months. The total annual salary is 11,500Rp.

(3) Animal Stock Purchases

No animal stock purchased in survey period.

(4) Livestock Inventory

Mr. Ghulam owns 2 adult female buffalo and 2 calves. Other livestock includes those being looked after.

(5) Feed

(i) Berseem

For the 2.5 months from late January to late March they buy feed. Mr. Ghulam Ali buys the crop from a 0.25 acre portion, from their relatives at a special price of 3,000Rp.

(ii) Concentrate Feed

He feeds the milking cows a concentrate feed of cotton seed cake and wheat bran throughout the year. Total amount is 1,825kg/year, which costs a total of 45,625Rp..

*Cotton seed cake: 30Rp/kg x 2.5 (head of cattle) x 365 days = 27,375Rp.

*Wheat bran: 20Rp/kg x 2.5 (head of cattle) x 365 days = 18,250Rp.

(iii) Wheat Straw

The farmer bought 2,200kg of wheat straw in December for 9,000Rp.

(6) Depreciation of Water Buffalo

In the Hyderabad cattle colonies there are examples of 16-year-old water buffalo still being milked. For commercial purposes though, calculations will assume the milking life of a buffalo is from the beginning of first milking and lasts for 10 years. The value of a heifer about to begin milking in a cattle colony (referring to trading prices among commercial dairy farmers in the district) is provisionally 100,000Rp. For small to

medium-scale farmers in rural areas it is 70,000Rp.

(7) Depreciation of Buildings and Equipment

(i) Cattle Shelter

A simple thatched roof shelter 5m x 6m, 30m² in area. The buildings are thought to last about 5 years. They were built 3 years ago. As no materials were purchased, only the labour of building it will be taken into account.

Labour: 125Rp/day

Building: 1 (day) x 3 (labourers),

Material Collection: 2 (hrs.) x 15 (days) x 1 (labourer)

Total : 855Rp.

Depreciation of one third of this is 285Rp

(8) External Farm Earnings

Sharing of dairy cows after calving: 12,000Rp (5 months)

Sharing of dry cows until calving: 1,000Rp/day

Looking after cattle grazing during the busy farming season: 60Rp/head/day.

1.5.2 Diagnosis of Dairy Farm Management

(1) Summary of Operation Results

Table 2. Abstract of results of Farm Management.

Articul		Last year	This year	Comparing	
Current year total production cost			174,075		
Production Cost			163,615		
Sales gross profit			-92,415		
Net profit year			4,385		
Net income year			85,050		
Dairy situation	Feeding size	Number of cow (head)		3	
		The total land area of fodder (Acre)		0	
	Income labor family	Total income family (Rp)		80,665	
		Income / cow (Rp)		26,888	
	Production Cost	Production cost Rp/milk 1Kg		92	
	Production Cost	Production cost Rp/milk 100Kg		9,192	
	Technical Level	The total production milk (Ton)		1.8	
		Production milk Kg / cow		593.3	
		Average Fat %	%	?	
		Average Fat non solid	%	?	
		Average of milk price	Rp	40	
	Liabilities	Balance of liabilities	Beginning year		0
			End of year		0

(i) Scale of Farm Management

A small-scale dairy farmer milking only the 2 adult female buffalo he owns. As he does not own land, he cannot increase his self-sufficiency in feed supply.

Table 3. Livestock inventory.

Category	Cow	Young animal	New calf	Fattening animal		
				Dairy	Beef	Buffalo
Average	3	2.5				
Beginning year	3	2	1			
Enter	Introduction					
	Birth, Transfer		1			
Out	Sale	1				
	Accident, Culling					
	Transfer					
End of year	3	3	2			

Table 4. No. of labourers.

Number of family	4
Working number family	1
Dairy work number	3
Employment Permanent	0
Employment Temporary	1
Child count 0.5 person.	

(2) Seasonal Production Costs

From the table, production costs are 174,075Rp (see Table 5). This is a cost per adult female cow of 58,025Rp. Milk costs about 92Rp/litre to produce. You can see it is quite a high production cost. As the market price for milk is 40Rp/litre, you realise the severe conditions of farm management.

Table 5. Cost of production.

3. Cost of production		SDLL	Milking Cow number	3	Heads
(1) Current year production cost (Unit: Rp & %)		* Total number of cow & buffalo:		3	Heads
Annual produc. Milk:		1780	0	1780	Kg
		Saling	Self-consumption	Total	
Articul		Amount of money	Cost/Cow	% of distribution	
Maiting cost		0	0	0	
Purchase Livestock animal (from outside)		0	0	0	
Purchase Feed		57,625	19,208	33	
Material for production Feed (Seed, Fertilizer etc.)		0	0	0	
Labor	Employment	11,500	3,833	x	
	Family (A)	80,665	26,888	46	
	Total	92,165	30,722	53	
Medical treatment & medicine	500	167	0		
Electricity & Water	0	0	0		
Fuel	0	0	0		
Depreciation	Building, construct	285	95	x	
	Machine, vehicle	0	0	x	
	Domestic animal	21,000	7,000	x	
	Total	21,285	7,095	12	
Repar cost	1,000	333	1		
Tool of Livestock & Agriculture	500	167	0		
Cost of consumption, Communication, Transport	1,000	333	1		
Cost of rental	0	0	0		
① Current year production cost total		174,075	58,025	146	
		Purchase concentrate:			
			1,825		Kg
② Value of animals beginning of the year		8,650	2,883		2 calves 50Kgx2
③ Amount of cow transferred within the year		0	0		
④ Value of animals end of the year		10,110	3,370		2 Heifer
⑤ Sale of calves		0	0		
⑥ Sale young & fattening animals		9,000	3,000		
Production cost ① + ② - ③ - ④ - ⑤ - ⑥		163,615	54,538		
	Production Cost / Cow	54,538			
	Production Cost / 1 Liter milk	92			
	Production Cost / 100 Liter milk	9,192			

The concentrate feed, which is cotton seed cake and wheat bran, is fed to the milking cows every day (1kg/head, for a total of 2kg/day). This represents about 33% of costs. In Japan, the concentrate feed would represent about 40~45% of costs, a considerably higher figure. When you take into account the heating, veterinary, building, facilities and equipment costs sustained in Japan compared to virtually nothing in this district, you can comprehend the robust, low cost, management structure that is in place.

(3) Calculation of Profits/Loss

See calculations in Table 6.

Gross sales are 174,075Rp. There is a gross deficit of 92,415Rp on these sales. With a production cost of 92Rp/litre, this result is only natural. However, this farmer is actively involved in other forms of revenue raising, such as lending and taking care of other cattle, as well as looking after neighbouring farmers cattle, grazing them during the busy farming season. When you take these other external farm revenues (96,800Rp) into account, together with his family's labour revenue, the family clears 85,050Rp per year.

Table 6. Profit and loss calculations.

Articul		Amount (Rs.)	Amount per cow(Rs.)
Revenue from livestock		0	0
	Sale of milk	71,200	23,733
	Sale of calves	0	0
	Sale young & fattening animals	9,000	3,000
	Other	0	0
	Total (B)	80,200	26,733
Cost of sales	①Value of animals beginning of the year	8,650	2,883
	②Current year total production cost	174,075	58,025
	③Amount of cow transferred within the year	0	0
	④Value of animals end of the year	10,110	3,370
	Total cost of Sales (C) ①+②-③-④ (C)	172,615	57,538
⑤Sales gross profit (B) - (C)		-92,415	-30,805
Selling, general and administrative expenses	Sales cost	0	0
	Insurance fee	0	0
	Office cost	0	0
	Labor cost	0	0
	⑥Total	0	0
Operating profit (Business profit) ⑤-⑥=(E)		-92,415	-30,805
Non-operating income	Interest receivable	0	0
	Subsidy and compensation	0	0
	Other	96,800	32,267
	⑦Total	96,800	32,267
Non-operating cost	Interests payable	0	0
	Rents payable	0	0
	Other	0	0
	⑧Total	0	0
Net profit year (D) ⑤-⑥+⑦-⑧		4,385	1,462
Net income year (A) + (D)		85,050	28,350

Note: Non-Operating Income (profit) ,

Sharing milking cows for 5 months: 12,000Rp/head. (2,400Rp x 2 months = 4,800)

Salary for looking after animals: 60Rp x 5 (head) x 150 (days) = 4,5000Rp. Looking after dry cows : 7 (head) x 5 (month) x 1,000Rp = 35,000Rp

Total 96,800Rp.

(4) Analysis and Technical Evaluation of Dairy Farm Management

For this landless farmer, a production cost of 54,538Rp per head of adult female animal is high. This is especially so as the annual milk yield per head of adult female animal of 593 litres/year is an extremely low result (see Table 7). As mentioned previously, the reason for this is he is lending the cows out for 5 months for 12,000Rp prior to his own milking. With a milk yield of 1.6 litres/head/day, he is only earning 23,733Rp.

In comparison to the revenue earned from milk sales, the price of providing feed concentrate is extremely high at 81% of expenditures. If possible, this should be below 50%, in an ideal situation 30%. This works out to be a feed efficiency of 0.97 for the concentrate feed, a low figure. In future, taking into account the energy of the feed, when a good quality formula feed is supplied, a feed efficiency of 2.50 should be obtainable. That is, for every 1kg of formula feed supplied, 2.5 litres of milk is produced.

Table 7. Analysis of Farm Management.

Category	Item	Year 2010
Farm situation	Beginning of year Number of cows: Head	3
	Land area of fodder: Acres	0
	Land area fodder per Cow: Acres	0.00
	Area of Pasture : Acres	0
	Area of Pasture per Cow: Acres	0.00
Production Cost	Cost / Cow Rp	54,538
	Cost / 1 Kg Rp	92
	Cost / 100 Kg Rp	9,192
Technique Level	1) Production milk / Total cows Kg	593
	2) Production milk / Milking Cows Kg	593
	3) Day production / Total Cows Kg	1.6
	4) Day production / Milking Cows Kg	1.6
	5) Milk production rate: Produc milk Kg per Total cows / Produc. Milk Kg per milking cows %	100
	6) Milk sale incom / Total Cows Rp	23733
	7) Milk sale incom / Milking Cows Rp	23733
	8) Average of Fat rate %	?
	9) Average of Non Fat Solido rate %	?
	10) Average of milk sale price Rp	40
	11) Average of Parturition Number on beginning year	?
	12) Average of Parturition Number on Culling	?
	13) Average of Parturition Interval day	?
	14) Rate of purchase feed Rp / Milk income Rp %	81
	15) Efficiency Feed: Total production milk Liter/Total concentrate used Kg	0.97
	16) Efficiency Feed: Total production milk Liter/Total Formula feed used Kg	Not use
	17) Concentrate feed Kg / Total Cows Kg	
	18) Formula feed Kg / Total Cows Kg	Not use
	19) ⑤Sales gross profit Rp / Total cows Rp	
% of sale milk Sale incomeRp/Using home Rp	0	
% of sale milk Sale income Kg/Using home Kg	100	

1.5.3 Productivity

(1) Calf Growth

We monitored the weight of 2 calves (see Table 8). A daily weight gain of 240g and 220g per day. A result that is lower than the village average (350g/day).

Table 8. Weight of the two calves.

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	DG g
No.13	64	75	77	78	81	96	108		240g
No.15				42	44	51	54	55.5	222g

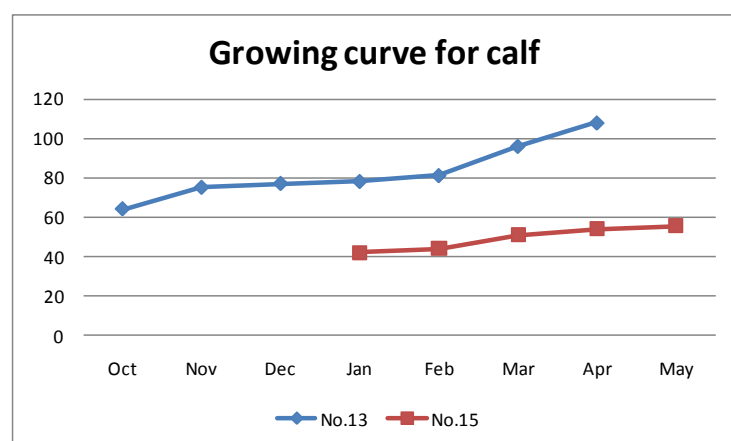


Figure 1. Growth curve of the calves.

(2) Milk Yield

We observed the milking of the two water buffalo. A low average milk production rate of 2 to 3 litres/day was observed. In addition, the period taken to milk the buffalo was quite long. Though No. 10 was calved in October 2009, becomes dry by April 2011 (16 months lactation period). No. 11 was calved in March

2010 and becomes dry in March 2011 (12 months lactation period).

1.5.4 Production Model

We calculated the extra sales if the farmer did not lend his cows out for the first 5 months after calving, and milked them himself. The result was that there was not much difference in revenue income.

1.5.5 Goats

The farmer owns only 1 female goat, and looks after another 3 young female and 1 male goat. The agreement was that he would receive half of the kids born. When the animals are sold, he will receive half the sales price. For breeding buck is borrowed from the village for free to service the female goats.

1.5.6 Cost of Living

The average weekly cost of living over 6 months was 2,063Rp. This works out to be 8,841Rp/month, or 106,092Rp/year. With an annual net income of 69,910Rp, this leaves a shortfall of 36,182Rp in the cost of living. The income of the farm labour wife and daughter does, amounts to 37,500Rp/year, so the family manage to scrape by.

Table 9. Breakdown of weekly expenditures.

Description	Rp	%
Mainpuri, Sopari	301	14.6
Food and beverages	1273	61.6
Apparel, textile, footwear	100	4.8
Transport and communication	66	3.2
Fuel & Lighting	300	14.5
Medical care	23	1.1
Total	2063	100.0

Food costs represent 61.6% of expenditures, a high Engels co-efficient. Moreover, it is interesting to note that within this tight budget lifestyle, the patriarch's tobacco represents 14.6% of expenditure.

1.6 Feeding Management

Mr. Ghulam Ali is responsible for the livestock, while his son actually carries out the livestock management. However, milking and supply of feed is performed by both his wife and son.

1.6.1 Livestock Facilities

The only facility he uses is a thatched roof livestock shelter. When the animals return from grazing they are tethered to stakes in the ground.

1.6.2 Daily Routine

4:30am Feeding time, 5:00 am Milking, 9~16:00 Grazing, watering and bathing, 18:00 pm Milking, 19:00 pm Feeding time, 20:00 Watering.

1.6.3 Milking

After parturition, the calves are used to stimulate milk let down before milking. It was explained that when the calves are separated from their mothers, injections of oxytocin are used to stimulate milk production. Though it was learnt only at the end of the survey, that this farmer lends out his water buffalo for 5 months just after calving (the period when milk production is highest) to a nearby commercial dairy farmer for 12,000Rp. In the 6th month, after the buffalo have become accustomed to injections of oxytocin, the buffaloes are returned to him and milking using this chemical stimulation is continue

1.7 Feed System (Grazing, Cut & Carry and Crop residue Mixed)

(1) Feeding calendar

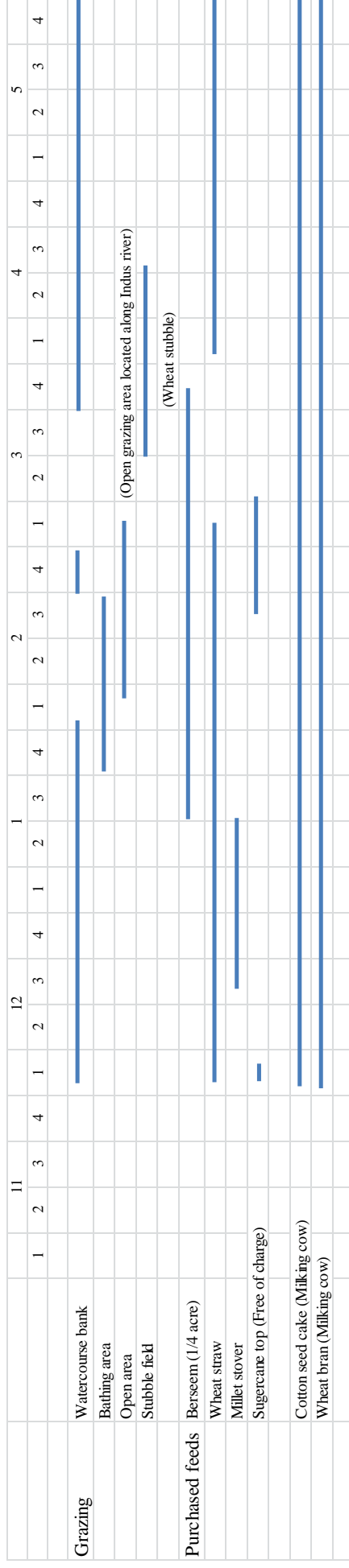


Figure 2 Feeding calendar during Rabi Season

(2) Feeding management

This farmer milks late lactating buffalo and gets 2 litres per day. Although the buffalo are raised mainly by grazing, lactating buffalo are fed supplemental feed (see Table 1.10). Judging from the nutritive value of this feed, the nutrition required to maintain the body and produce 2 litres of milk per day is 4.17kg TDN and 0.58kg DCP. When the nutritive value obtained from supplementary feed is subtracted from this, it is estimated that 50% of TDN and 62% of DCP needs to be obtained from grazing. It is approximately 14.5kg (3.4kg DM basis) of native grasses (see Table 11, Figure 2).

Table 1.10 Value of Supplemental Feed for Buffalo

Supplemental Feed	DM intake	TDN	DCP
	----- Kg -----		
Wheat straw (2.5kg)	2.3	0.91	0
Wheat bran (1.25kg)	1.13	0.83	0.14
Cotton seed cake (0.5kg)	0.44	0.35	0.08
Total (4.25kg)	3.87	2.09	0.22

DM: Dry Matter TDN: Total Digestible Nutrients DCP: Digestible Crude Protein

Table 1.11 Nutritive Value of Native Grasses

Native grasses	DM	DCP	TDN
	----- % -----		
Cynodon dactylon (early vegetative)	19.1	8.3	56.9
Cenchrus setigerus (early bloom)	21.9	14.2	70.5
Dactyloctenium aegyptium (early bloom)	28.6	9.5	58.7
Average	23.2	10.7	62

1.8 Reproduction

In the village, the raising of about 20 dry cattle is shared between two families. Each farmer keeps one stud bull, and when a female is in heat the stud bull is borrowed for free service. Water buffalo are determined to be in heat when a special roaring is heard. They come into heat mostly at night (80%), with the rest during the day (20%). The female in heat is brought to where the stud bull is kept for servicing. To promote servicing, the female is tethered to a rope. In November 2010, we conducted a pregnancy appraisal on two milking buffalo. Both were not pregnant. They came into heat in February and became pregnant.

1.9 Animal Health

1.9.1 Foot & Mouth Disease

Disease come during January the farmer treated their animals locally by feeding 2eggs per buffalo.

1.9.2 Result of examination of samples at CVDL Tandojam.

Blood, milk and faecal sample were collected from 3 animals. Several endoparasites were detected but brucellosis was found negative.

1.9.3 Treatment of Livestock Diseases

In cases of serious sickness, the livestock are seen by a private veterinarian in Hyderabad. The cost of treatment depends on the treatment, but ranges from 300~1,000Rp. With Pakistan having such a long history of raising cattle, the main means of treating sick or diseased livestock is the traditional way of treatment, that has been handed down from grandfather to father to son. It is quite interested in this tradition. Putting aside the effectiveness of these treatments for now, the main treatments are:

1. *Cold (cough):* No special treatment.
2. *Diarrhoea:* Give them butter.
3. *Internal Parasite Control:* They have not treated
4. *Afterbirth Lethargy:* Extract placenta and give an infusion of neem.
5. *Vaginal Prolapse:* Use a local traditional wooden/rope frame to support external vulva.

- | | |
|----------------------------------|------------------------------------------------------------------------------------------------------|
| 6. <i>Tympani:</i> | Occurs when the animals are feeding on Egyptian clover. Feed them oil, and relieve the gas build up. |
| 7. <i>Dystocia:</i> | Depend on local techniques. |
| 8. <i>Sub-Clinical Mastitis:</i> | Give the animal a potion made up of red chillies, sugar, and oil. |
| 9. <i>Promotion of Heat:</i> | Give the animal a herbal medicine sold in the village that is called Burinjeno, Brinjal, Laong etc., |
| 10. <i>Hoof Trimming:</i> | This is done by a carpenter in the village using local techniques. |

1.9.4 Mastitis

We conducted a sub-clinical mastitis test on the 2 water buffalo that were being milked. At milking no special precautions are being taken to clean the udder, but the tests were negative.

1.9.5 Vaccinations

The farmer did not know about vaccinations, therefore the livestock never received any vaccinations.

1.9.6 Common Livestock Diseases

The most common diseases found are HS, FMD, CCPP, PPR, Enterotoxaemia.

1.10 Breeds

The water buffalo being raised were Kundhi buffalo, small in body size and with low milk yields. Selective breeding has not occurred to improve productivity of the breed. Moreover, there are no plans at this date to do so. The two stud bulls being kept in the village were normal, unimpressive males. If the genetic capacity of these water buffalo stud bulls was much higher, then over time the capacity of the entire villages water buffaloes would be improved. This will need to be considered in the future.

2. Small-Scale Dairy Farmer (Owns Land)

2.1 Survey Background

Responsible Organisation:	Livestock Department, Mirpurkhas district
Responsive:	Mr. Zawar Ali Leghari (head of district Livestock Department since July 2008)
Technical Person in Charge:	Dr. Naeem Siddiqhe
Surveyed Farmer:	Mr. Ali Hassan
Location:	Haji Allah Bux village, Hussain Bux Maree sub-district, Mirpurkhas district.

2.2 Introduction

The farmer was selected with the co-operation of the Livestock Department, Mirpurkhas district, and with the permission of the land owner, Mr. Shah Baig (owns 500 acres of land). Haji Allah Bux village is located in an irrigated area, 7 km from the town of Mirpurkhas (about 20 minutes away). This village was established in 1850, and is quite old. The village covers an area of about 15 acres, and contains 67 households. Most of the families in these households are tenants and working for the above mentioned land owner. They either rent land or graze the stubble in the harvested fields of the land owner, or utilize agricultural residues. A very good relationship has been established with the land owner. In Mirpurkhas district there are two privately run commercial animal markets. An urban cattle market held on a Tuesday (about 200 head of cattle), and a small-scale farmer market held on a Wednesday (around 400~500 head of sheep & goat).

2.3 Criteria for Farmer Selection

The farmer was selected with the co-operation of a C/P Dr. Arif Khan. Three candidate farmers were identified as potentially fitting the category of small-scale farmer with property. Each farmer lives in a different district, one in Tando Allayar district, another in Hyderabad district, and the third in Mirpurkhas district. As they are quite some distance from each other, it would have been difficult, in terms of time, to re-evaluate each of them. So the farmer with the highest evaluation score was chosen.

2.4 Farmer Outline

Mr Ali's house sits in the middle of fields for as far as the eye can see. His house is one of a cluster of three houses. His house is a simple house made from mud walls and a roof. Mr. Ali is a Muslim, while the other two families are Hindu, and they are farmer labourers who do not have own land. Mr. Ali himself owns 5 acres of land. He grows sugar cane, wheat, sorghum, and berseem clover. He also manages part of the owner's land everyday in the morning. He receives 1,050Rp for this. As he graduated from primary school, he can read and write. He does not however keep a record of the livestock on his farm. The make up of his family, is two sons and a wife (a household of 5).

2.5 Farm Management

The 5 acres he owns is valued at 300,000Rp/acre. All the farm labour is carried out by family members. He has no special need to hire labourers. Even though he is a small-scale farmer, he is blessed with owning property. His farm management strategy is to improve the profitability of his farm, while supporting his livestock by working in his spare time. The climate and fluctuation in crop prices is quite severe in this area. There is also the handicap of the need for large investments. On the other hand, revenues are also quite substantial, so farming is a worthwhile pursuit. Of the 2 adult female water buffalo he keeps, 1 he is taking care of for somebody else. He is also taking care of two heifers. Thus he only owns one of the 4 livestock being raised. There is little desire to increase his livestock holdings. However, he is growing feed, such as berseem clover and Jantar. Moreover, the agricultural residues from wheat, cotton, and sugar cane production could be used for feed. The livestock production potential for farmers who own land is large.

2.5.1 Basic Information for Farm Management Analysis

(1) Family Labour and Labourer Rates

See details of family labour in Table 12.

Table 12. Family labour.

	Main Occupation	Own Farm work	Livestock work	Hour	Amount /year
Ali Hussan	Management of Land Owner's farm	Management	Management	2=Rp16	11,680
Wife	Multiple work	Work	Milking, clean	2=Rp16	11,680
1 st Son 26year		Work in tenant land	No	No	No
2 nd Son 19year		Work	Watching grazing, milking, Cutting grass	8=Rp12 5	45.625
Total					68,985

(i) Wife's Farm Labour

Mr. Ali's wife works on the farm from 7~11am, and again from 2~6pm (a total of 8 hours).

(2) Revenue

For the 6 months from November 2010 to May 2011 (see Table 13).

Table 13. Revenues.

	Content	Total	%
Income of Agriculture	Sugarcane, Wheat, Cotton	Rp72,000	67
Management of landowners farm	Rp1,050/week Rp27,300/6 months	Rp27,300	25
Dairy	Not selling milk, sell young buffalo Rp9,000/head	Rp9,000	8
Total		Rp108,300	100

(3) Expenditure

For the 6 months from November 2010 to May 2011 (see Table 14).

Table 14. Expenditure.

	Content	Total	%
Fodder	Berseem seed:3,160, Jantar seed:1,200,	Rp4,360	8
Feed	Wheat Straw: 1,050	Rp1,050	2
Cost of agriculture	Wheat seed:4,000, Cotton sed:1,400, Tractor for leveling, preparation:16,300, Sowing:2,000,Urea:23,000, DCP:Free	Rp46,700	90
Total		Rp52,110	100

2.5.2 Diagnosis of Dairy Farm Management

He does not sell milk; moreover no milking occurred during the survey period. Thus no data could be collected. Thus a dairy farm management diagnosis could not be performed.

2.5.3 Cost of Living

During these 6 months the average weekly cost of living was 6,334Rp (see Table 15), which works out to be 25,336Rp/month or 329,368Rp/year.

Table 15. Details of average weekly expenditure.

Description	Rp	%
Food and beverages	4,010	63
Apparel, textile, footwear	358	6
Transport and communication	1,043	16
Fuel & Lighting	70	1
Medical care	858	14
Total	6,334	100.0

Purchase of food commodities represented 63% of this expenditure, a high Engels co-efficient.

2.6 Feeding Management

Mr. Ali Hassan is the person in charge of livestock management, while the actual management of livestock is carried out by his second son. However, the work of milking and feeding the livestock is carried out by both his wife and second son. In the start 2 adult female buffalo and 2 heifers were registered in November. During first visit he did not explain that his own buffalo is only and remaining were on sharing basis.

2.6.1 Livestock Facilities

Two paddocks surrounded by thorny bushes (called a lorho in the local language), where buffalo and goats are kept.

2.6.2 Goat Management

Although this was of interest to the survey, these goats were owned by his eldest son and we missed the opportunity to ear tag and weigh these animals.

2.6.3 Daily Routine for Water Buffalo

6:00am:	Milking
8:00:	Tethered to a tree beside the canal
9~17:30:	Grazing, watering, and bathing
18:00:	Milking
20:00:	Feeding

2.6.4 Milking

Normally the milking is done twice a day. When late in the lactating period, the milk yields are low, and they only milk in the morning during this period. No special measures are taken to clean udders at milking.

2.6.5 Grazing

Grazing land of the land owner is close by his home. Watching on grazing animals carried out by the neighbour's son. The allowance for this watching is not money, but rather provision of grain once a month. The appetite of the water buffalo is hearty and they continue to eat continuously for a long time without resting. They particularly prefer to eat a short grass (a Cinodon type). They can chew this well, which supports the fact they have large capacity rumen. The water buffalo have a relatively narrow tongue compared to cattle, thus the tongue appears to be long and narrow. They deftly manoeuvre this tongue to search for fodder and seem to eat faster than cattle.

2.7 Feed system (Grazing, Cut & Carry and Crop residue Mixed)

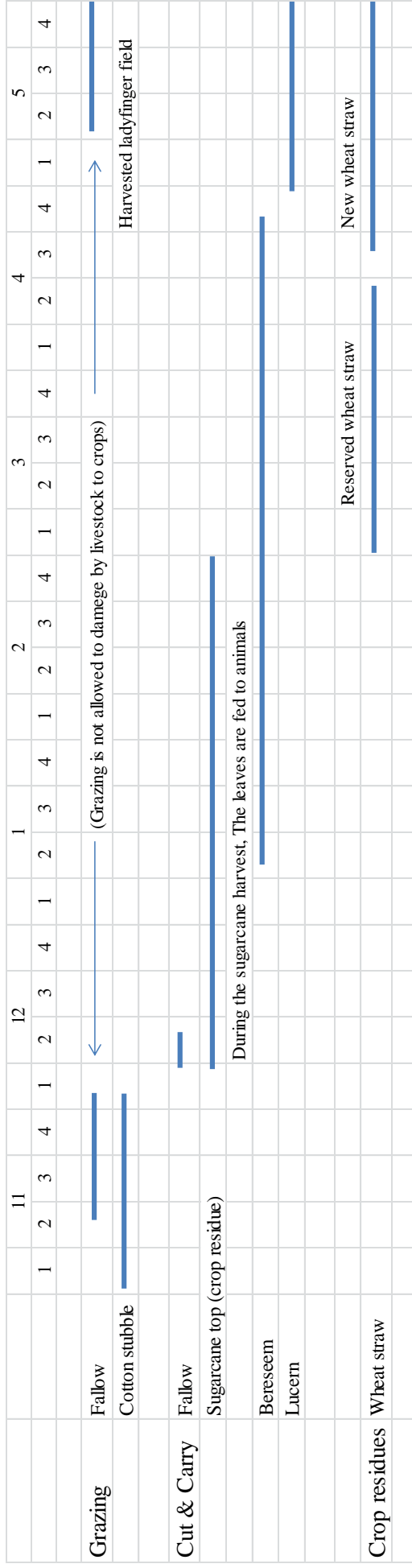


Figure 3 Feeding Calendar during Rabi Season

2.8 Reproduction

The two buffalo heifers becomes in heat during December, but were not serviced by a bull. At this point the Livestock Department technician gave the buffalo heifers a hormone injection for induction of heat. After this they came into heat at irregular intervals. They were artificially inseminated by local technician and pregnancy was not confirmed yet.

2.9 Animal Health

2.9.1 Common Livestock Diseases

The most common found diseases are HS, FMD, CCPP, PPR, Enterotoxaemia, and contagious pneumonia.

2.9.2 Vaccinations

The Livestock Department provides guidance on HS, CCPP, Enterotoxaemia vaccinations.

2.9.3 Diseases during Survey

During the survey the following were observed, fever as a result of coli, mange, and death by rabies of a buffalo heifer being nurtured.

2.9.4 Result of examination of samples at CVDL Tandojam.

Blood, milk and faecal sample were collected from 3 animals. Several endoparasites were detected but brucellosis was found negative. 1 Positive for Blood Parasite (*Anaplasma marginate*)

3. Medium-Scale Farmer (Landless)

3.1 Survey Background

Responsible Organisation: Livestock Department, Mirpurkhas district
Responsive: Mr. Zawar Ali Leghari, Head of District (head since July 2008)
Person in Charge: Dr. Naeem Siddiqhe
Surveyed Farmer: Mr Chattan
Location: Haji Allah Bux village, Hussain Buz Maree sub district, Mirpurkhas district.

3.2 Introduction

This farmer lives in the same village as the surveyed small-scale farmer who owns land. Please see No. 2.2 that for a description of the village.

3.3 Criteria for Farmer Selection

This farmer was selected with the co-operation of a C/P Dr. Babbar. Three candidate farmers were identified as fitting the category for medium-scale farmer (landless). As these farmers were located in Hyderabad district, Tando Allayar district, and Mirpurkhas district, it was, for time reasons, difficult to re-evaluate each farmer, so the farmer with the highest evaluation score was chosen to be surveyed.

3.4 Farmer Outline

Mr. Chattan lives in a house about 100m from the landowner. He lives in an earthen wall tenement style house. He lives in a cluster of 8 households, all relatives. In the courtyard of each house, water buffalo, cattle and goats are kept. He is the leader of this cluster of eight households. Moreover, in the mornings he manages a portion of the land owner's property for a weekly allowance of Rs.700. He rents 5 acres from the land owner to cultivate wheat, cotton, and sugar cane. In the afternoons he manages his own fields, and livestock. As he cannot read or write he does not keep any records of his farm. About once every month a meeting of the relatives is held. At this meeting opinions about livestock management, etc. are exchanged. Livestock income is based on market sales. The reason for this is that when selling through middlemen, the selling price is low and losses are made. The make up of his family is 2 sons, 2 daughters, and a wife (a household of 6).

3.5 Farm Management

The diagnosis of Farm Management is based on data gathered from interviews conducted during the 5 months of the survey, from November 2010 to May 2011, as well as data collected weekly, and from monthly monitoring of livestock weight and milk tests.

3.5.1 Basic Information for Farm Management Analysis

(1) Family Labour and Labourer Rates

Table 16. Family labour.

	Main Occupation	Tenant Land, Own Farm work	Livestock work	Hour	Amount /year
Mr.Chattan	Management of Land Owner's farm	cultivation	Management	1=Rp16	5840
Wife	House work	7~11 am 2~18 pm	Milking & cleaning	2=Rp32	11680
1 st Son 12 years	Student	4 hours in the morning	Watching on grazing & cutting grass	4=Rp32	11680
2 nd Son 6	Student	Helping in	Watching on	4=Rp32	11680

years		agriculture work	grazing		
1 st Daughter 11	Supporting in house work	Helping	Cutting grass	2=Rp16	5840
2 nd Daughter 5	Child	No	Cleaning		0
Total					46720

(i) Women's Agricultural Labour

The women work on the farm from 7 ~ 11:00am, and again from 2~6pm (a total of 8 hours).

(ii) Sons

Mr. Chattan's sons are primary school students. They attend classes from 8:00~13:30. When they return home from school they help with livestock management.

(iii) Regional Agricultural Labour Costs

The labourers in this area general receive 125Rp/ day (8 hour day).

(iv) Family Labour (Livestock Husbandry)

Family members receive the same daily allowance as other agricultural labourers. For adult labourers (per hour rate): $125\text{Rp} \div 8 \text{ (hours)} = 16\text{Rp/hour}$, for children, 50% of adult rates = 8Rp/hour.

(2) Livestock Purchases

During the period from 2010 until May 2011 no livestock were purchased.

(3) Livestock Inventory

All livestock are owned by the farmer. Moreover, no livestock are being lent out.

(4) Depreciation of Water Buffalo

As 16-year-old of age water buffalo are still being milked in the cattle colonies of Hyderabad, the working life of a buffalo will be calculated as starting from the first milking period, and continuing for a period of 10 years. The commercial trading price of heifers when they first commence to be milked in the cattle colonies is 100,000Rp and for small to medium-scale farmers in the rural areas 70,000Rp.

(5) Depreciation of Buildings and Equipment

(i) Cattle Shelter

A simple shelter with a thatched roof is re-built every year. As no materials are purchased, only the labour costs associated with building these shelters will be included in the calculations. The roof material is sugar cane tops, and wooden poles are used for the pillars.

Labour rates: 125Rp/day,
 Building: 1 (day) x 4 (labourers) = 500Rp;
 Collection of roofing material: 2 (labourers) x 1(day) = 250Rp;
Total: 750Rp.

(ii) Equipment Costs

The equipment used includes a fodder cutting machine, motorbike, etc. The expected lifespan of this equipment was determined and the Depreciation applied.

(6) Feed

(i) Berseem Clover

The farmer rents 5 acres of land from the land owner, of which 1 acre he cultivates berseem clover. He harvested the clover for 3.5 months from January 9th to April 23rd, which he supplies to his livestock.

Seed: 1,200Rp,
 Fertilizer: 1,660Rp,
 Labour: 400Rp
Total : 3,260Rp.

(ii) Concentrate Feed

He does not supply his livestock with concentrate feed.

(7) Evaluation of Livestock

The livestock being raised, apart from those water buffalo bearing calves, in other words those water buffalo that are calves or are immature were valued at the end of December 2010 by estimating their weight and using a carcass recovery rate of 50%, and a meat price of 173Rp/kg. The total evaluation price of the 5 young water buffalo was 8,650Rp.

3.5.2 Diagnosis of Dairy Farm Management

(1) Summary of Operations Results (Estimated Value in 2010)

Table 17. Abstract of the Results of Farm Management

Articul		Last year	This year	Comparing	
Current year production cost total			81,480		
Production Cost			44,454		
Sales gross profit			2,096		
Net profit year			2,096		
Net income year			48,816		
Dairy situation	Feeding size	Number of cow (head)		4	
		The total land area of fodder (Acre)		0.25	
	Income labor family	Total income family (Rp)		46,720	
		Income / cow (Rp)		11,680	
	Production Cost	Production cost Rp/milk 1Kg		24	
		Production cost Rp/milk 100Kg		2,387	
	Technical Level	The total production milk (Ton)		1.9	
			Production milk Kg / cow		465.5
		Average Fat %		?	
		Average Fat non solid		?	
		Average of milk price Rp		25	
		Average of interval parturition Months		?	
Liabilities	Balance of liability	Beginning year		0	
		End of year		0	

(2) Scale of Operations

Table 18. Dairy Inventory.

Category	Cow	Young animal	New calf	Fattening animal		
				Dairy	Beef	Buffalo
Average	4	4.5				
Beginning year	4	2	0			
Enter	Introduction					
	Birth, Transfer		2	2		
Out	Sale		1			
	Accident, Culling					
	Transfer			2		
End of year	4	3	0			

Table 19. Labourers.

Number of family	6
Working number family	5
Dairy work number	5
Employment Permanent	0
Employment Temporary	0
Child count 0.5 person.	

Table 20. Land area.

Category	Land use				Production Fodder		
	Total	Own	Tenant	Communal	Total	Own	Tenant
Rice							
Cultivation	5		5		0.25		0.25
Fallowing							
Pasture							
Grazing							

3.5.3 Seasonal Production Costs

See details in Table 21.

Table 21. Cost of production.

3. Cost of production, Profit and loss		MDLL	Milking Cow number	2 Heads
(1) Current year production cost (Unit: Rp & %)		* Total number of cow & buffalo:		4 Heads
Annual produc. Milk:		931	931	1862 Kg
		Saling	Self-consumption	Total
Articul		Amount (Rs.)	Amount per cow Rs.)	% of distribution
Mating cost		0	0	0
Purchase Livestock animal (from outside)		0	0	0
Purchase Feed		0	0	0
Material for production Feed (Seed, Fertilizer etc.)		3,260	815	4
Labor	Employment	0	0	0
	Family (A)	46,720	11,680	57
	Total	46,720	11,680	57
Medical treatment & medicine		500	125	1
Electricity & Water		0	0	0
Fuel		0	0	0
Depreciation	Building, construct	750	188	1
	Machine, vehicle	250	63	0
	Domestic animal	28,000	7,000	34
	Total	29,000	7,250	36
Repar cost		500	125	1
Tool of Livestock & Agriculture		500	125	1
Cost of consumption, Communication, Transport		1,000	250	1
Cost of rental		0	0	0
① Current year production cost total		81,480	20,370	193
		Purchase concentrate:		
				0 Kg
② Value of animals beginning of the year		8,650	2,163	
③ Amount of cow transferred within the year		0	0	
④ Value of animals end of the year		36,676	9,169	
⑤ Sale of calves		0	0	
⑥ Sale young & fattening animals		9,000	2,250	
Production cost ①+②-③-④-⑤-⑥		44,454	11,114	
	Production Cost / Cow	11,114		
	Production Cost / 1 Liter milk	24		
	Production Cost / 100 Liter milk	2,387		

(1) Milk Production

Mr. Chattan did not sell any milk in the period prior to the survey, it was all for home consumption. Then on 26th February 2011, he started to sell milk to a middleman for the low price of 25Rp/litre. Two animals are being milked, with a weekly average milk yield of 35 litres/week, which works out to be a low average milk yield of 5 litres/day. Using this data, a yield simulation for the milking period was performed, a yield of 1,010 kg and 851kg respectively, for a total of 1,861kg. Although half of this is actual being consumed at home, for the purposes of production cost calculations (2010 Management Diagnosis) all of the milk is assumed to be sold.

(2) Profit/Loss Calculations

A gross income of 36,676Rp, and an overall expenditure of 53,454Rp (see Table 22), a net income was 2,096Rp. When family labour income of 46,720Rp is included, there is a net profit of 48,816Rp. Family labour costs represent a large 53% of production costs. From this you can comprehend how livestock management using natural resources requires little financial investment.

Table 22 Profit and loss calculations.

Articul		Amount (Rs.)	Amount per cow Rs.)
Revenue from livestock	Sale of milk	23,275	5,819
	Milk consumed at home	23,275	5,819
	Sale of calves	0	0
	Sale young & fattening animals	9,000	2,250
	Other	0	0
	Total (B)	55,550	13,888
Cost of sales	① Value of animals beginning of the year	8,650	2,163
	② Current year total production cost	81,480	20,370
	③ Amount of cow transferred within the year	0	0
	④ Value of animals end of the year	36,676	9,169
	Total cost of Sales (C) ①+②-③-④	53,454	13,364
	⑤ Sales gross profit (B) - (C)	2,096	524
Selling, general and administrative expenses	Sales cost	0	0
	Insurance fee	0	0
	Office cost	0	0
	Labor cost	0	0
	⑥ Total	0	0
	Operating profit (Business profit) ⑤-⑥=(E)	2,096	524
Non-operating income	Interest receivable	0	0
	Subsidy and compensation	0	0
	Other	0	0
	⑦ Total	0	0
Non-operating cost	Interests payable	0	0
	Rents payable	0	0
	Other	0	0
	⑧ Total	0	0
	Net profit year (D) ⑤-⑥+⑦-⑧	2,096	524
	Net income year (A) +(D)	48,816	12,204

(3) Analysis and Technical Evaluation of Dairy Farm Management

Table 23. Analysis of dairy Farm Management.

Category	Item	Year 2010	Year 2011
Farm situation	Beginning of year Number of cows: Head	4	
	Land area of fodder: Acres	0.25	
	Land area fodder per Cow: Acres	0.06	
	Area of Pasture : Acres		
	Area of Pasture per Cow: Acre	0.00	
Production Cost	Cost / Cow Rp	11,114	
	Cost / 1 Kg Rp	24	
	Cost / 100 Kg Rp	2,387	
Technique Level	1) Production milk / Total cows Kg	466	
	2) Production milk / Milking Cows Kg	931	
	3) Day production / Total Cows Kg	1.3	
	4) Day production / Milking Cows Kg	2.6	
	5) Milk production rate: Produc milk Kg per Total cows / Produc. Milk Kg per milking cows %	50	
	6) Milk sale incom / Total Cows Rp	11638	
	7) Milk sale incom / Milking Cows Rp	23275	
	8) Average of Fat rate %	?	
	9) Average of Non Fat Solido rate %	?	
	10) Average of milk sale price Rp	25	
	11) Average of Parturition Number on beginning year	?	
	12) Average of Parturition Number on Culling	?	
	13) Average of Parturition Interval day	?	
	14) Rate of purchase feed Rp / Milk income Rp %	0	
	15) Efficiency Feed: Total production milk Liter/Total concentrate used Kg		
	16) Efficiency Feed: Total production milk Liter/Total Formula feed used Kg	Not use	
	17) Concentrate feed Kg / Total Cows Kg		
	18) Formula feed Kg / Total Cows Kg	Not use	
	19) ⑤ Sales gross profit Rp / Total cows Rp		
	% of sale milk incomeRp/Using home Rp	50	
% of sale milk quantity Kg/Using homeKg	50		

3.5.4 Productivity

(1) Calf Growth

According to the Sukkur Buffalo Research Centre, the average weight of buffalo calves at birth is 22kg. For the two calves that were born in November 2010, the growth of these calves, given they were not fed concentrate feed but only natural feed, was extremely good. A daily gain of 550g and 450g respectively was observed, a high average of 500g/day.

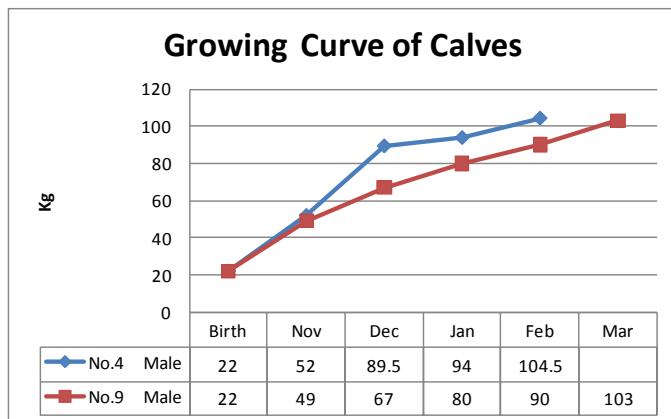


Figure 4 Growth curves of calves.

(2) Buffalo Milk Production Capacity

The figure below notes the milk yield data for 2 cows that were being milked twice a day after calving (see Figure 5).

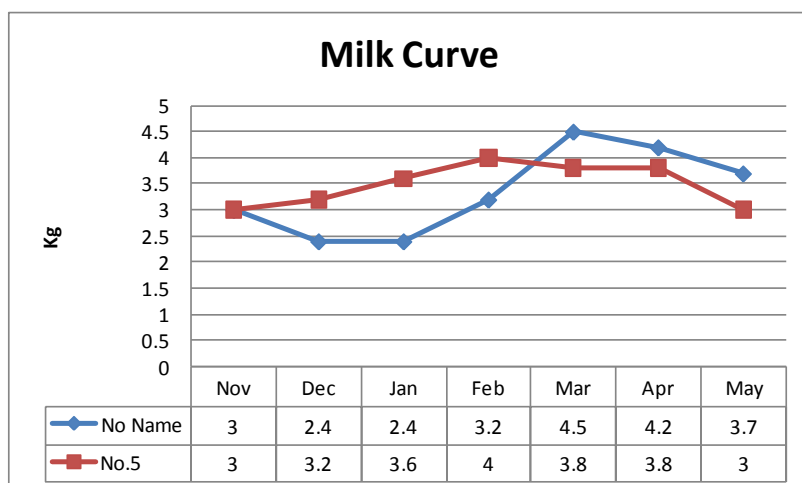


Figure 5. Milk yield curves.

With proper husbandry and healthy animals, milk yields rise after calving, peak, and then slowly decline before entering the non-lactating period. This milk yield curve is abnormal. It is inferred that there was a problem just after calving. If you use this milk yield curve, then the yield simulation (calculated for 305 days of milking) for No Name and No. 5 is 1,010kg and 851kg respectively.

If I use the milk yield curve I have previously obtained, the simulation works out to be 1,166kg and 1,070kg respectively, an increase in yield. This figure is thought to represent a result near the potential production capacity of buffaloes.

(i) Data for No Name

The actual milk yield curve is shown by the blue line (see Figure 6). The red line represents the normal milk yield curve. When husbandry is well performed and a normal milk yield curve is obtained, an increase in yield of 156kg is obtained.

Table 24. Milk yields for No Name

Category	Milk peak	Day of peak	Milk post period	Day of measurement	Estimated milk production
Real Curve	4.5Kg	150 days	3.7Kg	180 days	1,010Kg
Normal curve	5.4Kg	60 days	3.7Kg	180 days	1,166Kg

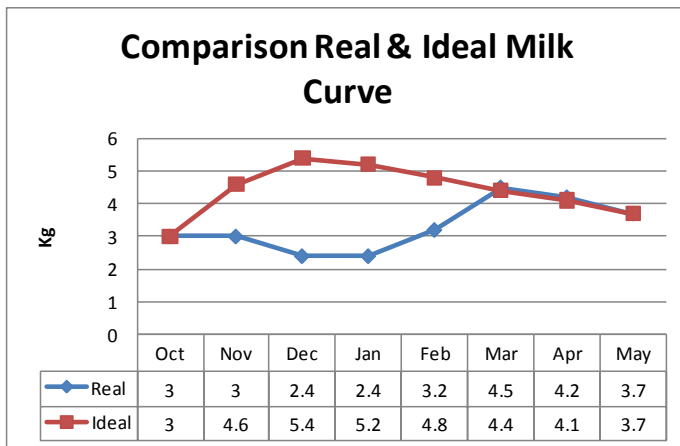


Figure 6. Milk yield curves.

(ii) Data for No. 5

When husbandry is well performed and a normal milk yield curve is obtained, an increase in yield of 219kg is obtained.

Table 25. Milk yields for No.5.

Category	Milk peak	Day of peak	Milk post period	Day of measurement	Estimated milk production
Real Curve	4.0Kg	90 days	3.0Kg	180 days	851Kg
Normal curve	4.5Kg	60 days	3.5Kg	180 days	1,070Kg

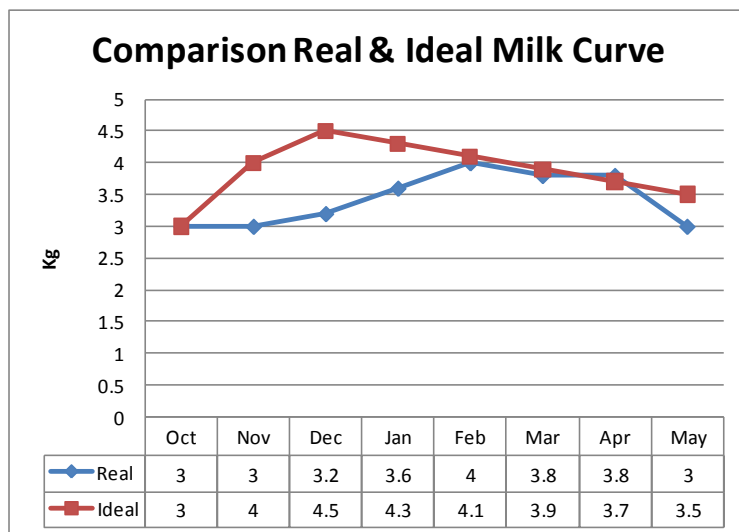


Figure 7. Milk yield curves

(3) Comparison of Production Models

In dairy-farming, the milk yield per animal has a large influence on profitability. For each increase in milk yield per animal, the profits become larger. To demonstrate this, current milk production yields for the farmer was modelled for comparison using 6 different scenarios.

(i) Model 1

The parameters for the model are, half the milk collected is consumed at home for which no income is received, the rest is sold. There are 4 adult female buffalo, 2 of these are being milked.

- Main feed supply: grazing in harvested fields, banks, orchards, etc.
- Cut forage: grass, and winter berseem clover.
- Other roughage: sugar cane tops and wheat straw.

All low cost, natural feed produced on-site. The berseem clover grown on the rented land is supplied for 2.5 months. Volume of milk sold is half the estimated milk yield (1,010 + 851 = 1,861kg). For only half the year this is 931kg.

(ii) Model 2

Under the same conditions and management as above, but all of the milk is sold year round.

(iii) Model 3

In this model the husbandry management is well performed and the milk yield curve obtained is close to the potential production capacity of buffalo. All the milk is sold. The estimated milk sold is 2,236kg (1,166 + 1,070kg). This represents an average milk production capacity of 4kg/head/day.

(iv) Model 4

Is the same as model 3, where the same peak in milk yield is achieved after calving, but the animals are fed the concentrate feed below for 120 days after parturition.

If this production capacity buffalo (4kg/day) is only feed the traditional way with 1kg/day of concentrate feed made up of cotton seed cake and wheat bran, then production efficiency is low and profits are decreased.

- Cotton seed cake:* 30Rp/kg x 2 (head of cattle) x 120 days = 7,200Rp (240kg)
- Wheat bran:* 20Rp/kg x 2 (head of cattle) x 120 days = 4,800Rp (240kg)
- Total:** 12,000Rp 480kg

(v) Model 5

In this model the production capacity of buffalo is achieved in commercial dairy farming. This represents an average milk production capacity of 8kg/head/day. The milk yield peaks 35 days after calving at 12kg/day, and then slowly declines to 6kg/day 50days after calving. At this level, total annual milk production per animal is 2,400kg, and when milking two animals this represents 4,800kg of milk a year. In this model the production capacity of buffalo is achieved, while supplying the concentrate feed noted in model 4. To achieve this, the buffalo breed needs to be improved, and the quality and quantity of feed appropriate to this capacity needs to be supplied. This indicates that if a good capacity breed is used, and husbandry is improved, then large increases in earnings can be obtained.

(vi) Model 6

This model is the same as model 5, but the price the milk is sold at is 40Rp/litre. As would be expected, there is a large increase in profits. The large regional differences in the price of milk are a big problem that will need to be addressed in the future.

Table 26. Comparison of outputs from models.

Articles	Model No.1 Selling half milk	Model No.2 Selling whole milk	Model No.3 Improve feeding management	Model No.4 Supplement concentrate feed 120 days	Model No.5 Improve genetic capacity	Model No.6 Improve price of milk
Selling milk Kg	931Kg	1862Kg	2,236Kg	2,236Kg	4,800Kg	4,800Kg

Milk rate (Rp.)	25	25	25	25	25	40
Cost of production (Rs.)	44,454	44,454	44,454	56,454	56,454	56,454
Cost of production/cow(Rs.)	11,114	11,114	11,114	14,114	14,114	14,114
Cost of 1 kg milk (Rs.)	48	24	20	25	12	23
Revenue from milk sales(Rs.)	23,275	46,625	55,900	55,900	120,000	192,000
Net profit/year (Rs.)	-21,179	2,096	11,446	-554	63546	135,546
Net income/year (Rs.)	-25,541	48,816	58,116	46,166	110,266	182,266

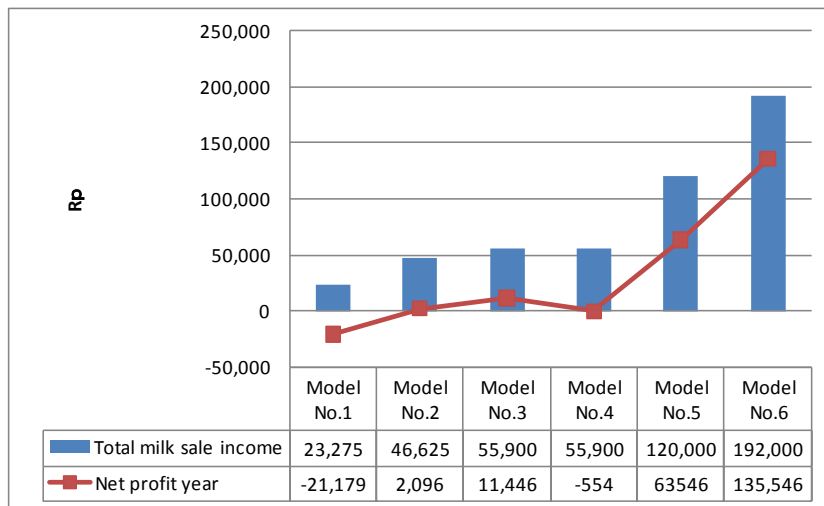


Figure 8. Total milk sale Income & Net profit in year in each models

(4) Milk Price Simulations

Model 6 indicates that the price that milk is sold for has a large influence on the profitability of dairy farming. I will now use model 3 and model 6 and simulate yields when the price of milk changes from 25 to 40Rp/litre (see Figure 9).

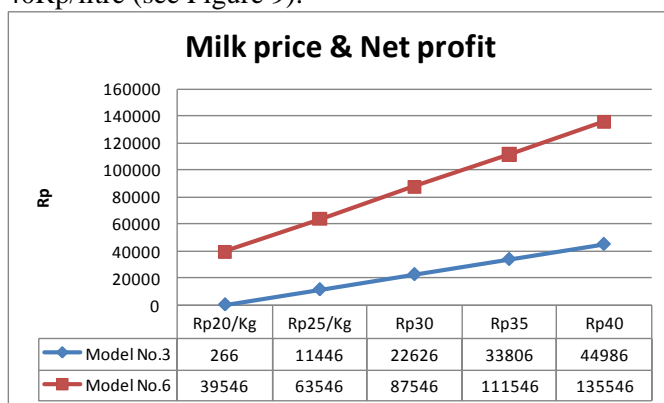


Figure 9. Profit simulations.

(5) Cost of Living

Looking at the weekly data on the cost of living, the average cost of living over the 6 month period was 3,141Rp/week. This amounts to 13,500Rp/month, or an annual cost of living of 164,000Rp/year. Mr. Chattan is consuming half the milk he produces. In this case revenues will decrease by half, a net profit of 21,179Rp. When you add the family wage allowances of 46,720Rp, net income becomes 25,541Rp. This does not cover the annual cost of living of 164,000Rp. Mr. Chattan earns a small allowance (700Rp/week) for managing a portion of the land owner's property. This works out to be 36,400Rp/year. When this is added to the farm income, a net income of 5,015Rp is barely obtained for dairy management. This is however, still insufficient to cover the cost of living. It is thought that Mr. Chattan is renting 5 acres of land from the land

owner and cultivating cash crops, such as sugar cane and wheat, in order to cover the shortfall in the cost of living. Unfortunately the weekly data of farm income and expenditure was not kept so further details cannot be given.

Table 27. Details of weekly cost of living.

	Aount Rp	%
Food, beverage,	2344	71.5
Apparel, textile, and foot wear	380	12.1
Transport & communication	389	12.4
Fuel & Light	34	1.0
Total	3141	100.0

Food supplies cost 71.5% of expenditures, a high Engels coefficient.

3.6 Feeding Management

Mr. Chattan's children are still young, so he is still basically managing the livestock himself. The two boys are herding the buffalo during grazing, but only after they have returned home from school, do they accompany the grazing buffalo. In November there were 4 adult female buffalo, one immature buffalo and 2 calves, for a total of 7 animals being raised. He owns them all.

3.6.1 Livestock Facilities

A simple roofed shelter located in front of the house. At night the livestock are tethered to stakes in the ground.

3.6.2 Daily Routine for Buffalo

5:30am:	Supply feed
6:00 am	Milking
8~17:00	Grazing, watering, and bathing
17:00pm	Milking

3.6.3 Milking

Milking takes place twice a day. In the latter half of the lactating period when milk yields decrease milking is done only once a day, in the morning. At milking no special cleaning of the udder is performed.

3.6.4 Observations of Grazing

The water buffalo have a hearty appetite and continue to eat grass. During the 3 hours I observed them grazing, they hardly took any time to rumination. They were grazing in a cotton field that had been previously harvested. They eat any type of grass. They also ate with relish, 2 types of saline tolerant plants. They even ate the hard shells of cotton left after the harvest. Normally when cattle graze, if there is sufficient grass they will eat for an hour or two until their stomach is full, sprawl on the ground and rumination. In the case where the grass is insufficient grazing takes longer. With poor quality and insufficient pasture, heat stress, long distances to walk, and significant energy spent on feeding, the feeding habits, strength and adaptability of the water buffalo to this harsh environment is remarkable.

(2) Feeding management

This farmer gets 3.8 litres per day in March and April. It is estimated that the nutritional requirement for this period is 5.05kg TDN and 0.83kg DCP. The feed during this period is shown in Table 28. Twenty kilograms of beseem and 26kgs of sugarcane tops are fed to the buffalo in twice a day. Judging from the nutritive value of this feed, the TDN intake has been fully met, and 30% of DCP intake needs to be gained elsewhere. It is estimated that the DCP shortfall is made up by grazing.

Table 28 Value of Supplemental Feed for Buffalo in March

Supplemedntal Feed	DM intake	TDN	DCP
	-----	Kg	-----
Sugarcane top (26kg)	7.54	3.71	0.22
Berseem (20kg)	2.3	1.52	0.39
Total (46kg)	9.84	5.23	0.61

In May, farmer gets 2.0 litres per day. It is estimated that the nutritional requirement for this period is 4.17kg TDN and 0.58kg DCP. The feed during this period is shown in Table 29. Eight kilograms of wheat straw and 0.25kgs of wheat middling are fed to the buffalo in twice a day. Judging from the nutritive value of this feed, when the nutritive value obtained from supplementary feed is subtracted from this, it is estimated that 32% of TDN and 97% of DCP needs to be obtained from grazing. It is approximately 23kg (5.3kg DM basis) of native grasses (see Table 29, Figure 10).

Wheat straw is reserved for periods of feed scarcity, but a diet of wheat straw is not adequate compared to native grasses

Table 29 Value of Supplemental Feed for Buffalo in May

Supplemental Feed	DM intake	TDN	DCP
	-----	Kg	-----
Wheat straw (8kg)	7.36	2.66	0
Wheat middling (0.25kg)	0.22	0.18	0.02
Total (8.25kg)	7.58	2.84	0.02

3. 8 Reproduction

The land owner keeps 2 stud bulls for servicing female buffalo in heat, which the villagers can borrow for free. Water buffalo come into heat 80% of the time at night, most often at 2~3 o'clock in the morning. The sign that the buffalo is in heat is a special roaring sound. As regards servicing by a bull, the buffalo in heat is tethered for a while to delay the servicing. It is still possible to successfully service a buffalo whose heat is declining or has disappeared.

3.9 Animal Health

3.9.1 Common Livestock Diseases

The common diseases found are HS, FMD, CCPP, PPR, E. toxaemia, and contagious pneumonia.

3.9.2 Vaccinations

The Department of Livestock provides guidance for HS, CCPP, E. Toxaemia. The livestock have been vaccinated for contagious diseases.

3.9.3 Mastitis

A sub-clinical mastitis test has been performed. The results were false positives.

3.9.4 Result of examination of samples at CVDL Tandojam.

Blood, milk and faecal sample were collected from 4 animals. Several endo parasites were detected but brucellosis was found negative.

4. Medium-Scale Dairy Farmer (Owns Land)

4.1 Survey Background

Responsible Organisation: Department of Livestock, Tando Allahyar.
Technical Person in Charge: Dr. Mazhar Ali
Surveyed Farmer: Mr. Manthar
Location: Bachal Khaskheli village, Tando Allahyar sub-district, Tando Allahyar district.

4.2 Introduction

This farm was selected with the co-operation of the Department of Livestock, Tando Allahyar district, and the consent of the land owner (owns 40 acres). Bachal Khaskheli village is located in richly irrigated area, about 7km from the town of Tando Allahyar, about 20 minutes travel. This is an old village established in 1835. The village is located on 9 acres of land, and has 110 households. Most of the families in these households are landless, and all keep livestock. The estimated number of livestock raised is 200 water buffalo, 50 cattle, 100 goats, and 4 camels.

4.3 Criteria for Farmer Selection

This farmer was selected with the co-operation of a C/P, Dr. Iqtidar Memon. Three candidate farmers were identified as fitting the category of land owning medium-scale dairy farmer. As the farmers are located in different districts; Hyderabad, Tando Allahyar, and Mirpurkhas districts, and due to time constraints, they could not all be visited for re-evaluation. The farmer in Mirpurkhas district had the highest score (68), however since the land owning small-scale and landless medium-scale representative dairy farmers had already been selected from this area, he was not selected. We did not want the survey to be skewed towards this district. So Mr. Manthar from Tando Allahyar district, with the second highest score was chosen.

4.4 Farmer Outline

Mr. Manthar lives in the village. He owns 5 acres of land and this was reason he was selected as a full-time farmer. However, after the survey commenced we learnt that he also owns a small scale, flour mill in the village, leaving the farm management to his wife and worker. In addition, half way through the survey he became a local government official for tube well water administration. He receives a weekly salary of 1,050Rp for this. In his own land he grows sugar cane, wheat, cotton, sorghum, and berseem clover. The make-up of the family is 5 sons, 2 daughters and a wife, for a household total of 9.

4.5 Farm Management

Though we learnt after the survey had commenced that he was not a full time farmer as we had hoped for, his co-operative attitude and the ability to obtain valuable baseline data convinced us to continue with the analysis.

4.5.1 Basic Information for Farm Management Analysis

(1) Family Labour and Labourer Rates

Table 30. Family labour.

	Main Occupation	Own Farm work	Livestock work	Hour	Amount /year
Mr. Manthar 52 years	Plural work	Management	Management	1=Rp17	6,205
Wife 50 years	House work	No	Milking, Feeding, Clean	4=Rp68	24,820
1 st Son 30 years	Shop	No	No	No	No
2 nd Son 27 years	Flour mill	No	No	No	No
3 rd Son 24 years	Office worker	No	No	No	No
4 th Son 20 years	Office worker	No	No	No	No
5 th Son 18 years	Student	No	No	No	No

1 st Daughter 16 years	Supporting in house work	No	No	No	No
2 nd Daughter 12 years	Supporting in house work	No	No	No	No
Total					31,025

(i) Regional Agricultural Labour Rates

The daily rate for agricultural labour in this area is 100Rp/day (6 hour day).

(ii) Employees

A worker (20 years old) is employed to mainly look after the livestock. He has a 6 hour working day and gets paid 100Rp/day.

(2) Livestock Purchases

None.

(3) Revenue

This is based on the period from November 2010 to May 2011 (see Table 31).

Table 31. Revenue.

	Content	Total
Income Agriculture	Sugarcane, wheat and cotton	Rp
Income Dairy	Milk: Rp11,550/462Kg, Cattle heifer : Rp10,000/head, dry buffalo : Rp20,000/head	Rp9,000
Fodder	Berseem and sorgham	?
Flour mill	Average Rp3,344/week	Rp83,589
Govt. Salary	Rp10,000/month x 6 months	Rp60,000
total		

(4) Expenditure

Table 32. Expenditure.

	Content	Total
Fodder	Berseem seed:3,160, Jantar seed:1,200,	Rp4,360
Feed	Mineral:280, Salt:70	Rp1,050
Animal health	2,600	
Agriculture	Wheat seed:2,250, Cotton sed:1,400, Tractor for leveling, preparation:16,300, Sowing:2,000,Urea:31,850, DCP:16,060	Rp46,700
Total		Rp52,110

4.5.2 Diagnosis of Dairy Farm Management

(1) Summary of Operations Results (Estimated at 2010 Values)

Table 33. Abstract of the results of farm Management

Articul		Last year	This year	Comparing	
Current year total production cost			90,535		
Production Cost			58,771		
Sales gross profit			-21,271		
Net profit year			-21,271		
Net income year			9,754		
Dairy situation	Feeding size	Number of cow (head)		3	
		The total land area of fodder (Acre)		0.5	
	Income labor family	Total income family (Rp)		31,025	
		Income / cow (Rp)		10,342	
	Production Cost	Production cost Rp/milk 1Kg		39	
	Production Cost	Production cost Rp/milk 100Kg		3,918	
	Technical Level	The total production milk (Ton)			1.5
		Production milk Kg / cow			500
		Average Fat %			?
		Average Fat non solid			?
		Average of milk price Rp			25
	Liabilities	Balance of liability	Beginning year		0
End of year				0	

(2) Scale of Farm Operation

Table 34. Livestock inventory.

Category	Cow	Young animal	New ca	Fattening animal			Number of family	9
				Dairy	Beef	Buffalo		
Average	2.5	2.5					Working number famil	2
Beginning year	3	3	2				Dairy work number	2
Enter	Introduction		2				Employment Permane	1
	Birth, Transfer						Employment Tempora	0
Out	Sale	1					Child count 0.5 person.	
	Accident, Culling	1						
	Transfer							
End of year	2	2	2					

Table 35. Labourers.

Table 36. Land area.

Category	Land use				Production Fodder		
	Total	Own	Tenant	Communal	Total	Own	Tenant
Rice							
Cultivation	5	5			5	0.5	
Fallowing							
Pasture							
Graizing							

4.5.3 Seasonal Production Costs

Table 37. Cost of production.

3. Cost of production, Profit and loss		MDLH	Milking Cow number	2	Heads
(1) Current year production cost (Unit: Rp & %)		* Total number of cow & buffalo:		3	Heads
Annual produc. Milk:		1500	0	1500	Kg
		Saling	Self-consumption	Total	
Articul		Amount (Rs.)	Amount per cow Rs.)	% of distribution	
Maiting cost		400	133	0	
Purchase Livestock animal (from outside)		0	0	0	
Purchase Feed		1,050	350	1	
Material for production Feed (Seed, Fertilizer etc.)		4,360	1,453	5	
Labor	Employment	36,500	12,167	40	
	Family (A)	31,025	10,342	34	
	Total	67,525	22,508	75	
Medical treatment & medicine		500	167	1	
Electricity & Water		0	0	0	
Fuel		0	0	0	
Depreciation	Building, construct	100	33	x	
	Machine, vehicle	100	33	x	
	Domestic animal	15,000	5,000	x	
	Total	15,200	5,067	17	
Repar cost		500	167	1	
Tool of Livestock & Agriculture		500	167	1	
Cost of consumption, Communication, Transport		500	167	1	
Cost of rental		0	0	0	
① Current year production cost total		90,535	30,178	175	
		Purchase concentrate:		0	Kg
② Value of animals beginning of the year		28,026	9,342	2 calves, 2 young	
③ Amount of cow transferred within the year		0	0		
④ Value of animals end of the year		39,790	13,263	2 calves, 2 young	
⑤ Sale of calves		0	0		
⑥ Sale young & fattening animals		20,000	6,667	2 heads	
Production cost ① + ② - ③ - ④ - ⑤ - ⑥		58,771	19,590		
	Production Cost / Cow	19,590	6,530		
	Production Cost / 1 Liter milk	39	13		
	Production Cost / 100 Liter milk	3,918	1,306		

From the below table production costs are 58,771Rp (see Table 37). The production cost per adult female is 19,590Rp. The production cost per litre of milk is 39Rp. As lighting, veterinarian, building, facility and equipment costs are close to nothing, this is a strong low-cost management structure based on raising livestock by utilizing natural resources.

4.5.4 Calculation of Profit/ Loss

Table 38. Profit and loss calculations.

	Articul	Amount (Rs.)	Amount per cow Rs.)
Revenue from livestock	Sale of milk	0	0
	Milk consumed at home	37,500	12,500
	Sale of calves	0	0
	Sale young & fattening animals	20,000	6,667
	Other	0	0
	Total (B)	57,500	19,167
Cost of sales	①Value of animals beginning of the year	28,026	9,342
	②Current year total production cost	90,535	30,178
	③Amount of cow transferred within the year	0	0
	④Value of animals end of the year	39,790	13,263
	Total cost of Sales (C) ①+②-③-④	78,771	26,257
	⑤Sales gross profit (B) - (C)	-21,271	-7,090
Selling, general and administrative expenses	Sales cost	0	0
	Insurance fee	0	0
	Office cost	0	0
	Labor cost	0	0
	⑥Total	0	0
	Operating profit (Business profit) ⑤-⑥=(E)	-21,271	-7,090
Non-operating income	Interest receivable	0	0
	Subsidy and compensation	0	0
	Other	0	0
	⑦Total	0	0
Non-operating cost	Interets payable	0	0
	Rents payable	0	0
	Other	0	0
	⑧Total	0	0
	Net profit year (D) ⑤-⑥+⑦-⑧	-21,271	-7,090
	Net income year (A) + (D)	9,754	3,251

Table39. Evaluation of the Dairy Administration

Category	Item	Year 2010
Farm situation	Beginning of year Number of cows: Head	3
	Land area of fodder: Acres	0.5
	Land area fodder per Cow: Acres	0.17
	Area of Pasture : Acres	
	Area of Pasture per Cow: Acres	0.00
Production Cost	Cost / Cow Rp	19,590
	Cost / 1 Kg Rp	39
	Cost / 100 Kg Rp	3,918
Technique Level	1) Production milk / Total cows Kg	500
	2) Production milk / Milking Cows Kg	750
	3) Day production / Total Cows Kg	1.4
	4) Day production / Milking Cows Kg	2.1
	5) Milk production rate: Produc milk Kg per Total cows / Produc. Milk Kg per milking cows %	67
	6) Milk sale incom / Total Cows Rp	12500
	7) Milk sale incom / Milking Cows Rp	18750
	8) Average of Fat rate %	?
	9) Average of Non Fat Solido rate %	?
	10) Average of milk sale price Rp	25
	11) Average of Parturition Number on beginning year	?
	12) Average of Parturition Number on Culling	?
	13) Average of Parturition Interval day	?
	14) Rate of purchase feed Rp / Milk income Rp %	3
	15) Efficiency Feed: Total production milk Liter/Total concentrate used Kg	
	16) Efficiency Feed: Total production milk Liter/Total Formula feed used Kg	Not use
	17) Concentrate feed Kg / Total Cows Kg	
	18) Formula feed Kg / Total Cows Kg	Not use
	19) Sales gross profit Rp / Total cows Rp	
% of sale milk incomeRp/Using home Rp	0	
% of sale milk quantity Kg/Using homeKg	100	

4.5.5 Productivity

(1) Calf Growth

The weight of 2 calves was monitored (see Table 40). The average daily growth was 330 and 82g respectively, for a low total average of 350g/day.

Table 40 . Weight of calves.

	Nov	Dec	Jan	Feb	March	Apr	May	DG
Buffalo	35	36	Died					330g
Cattle	50.5	55	55.5	58	60	62.5	65.2	82g

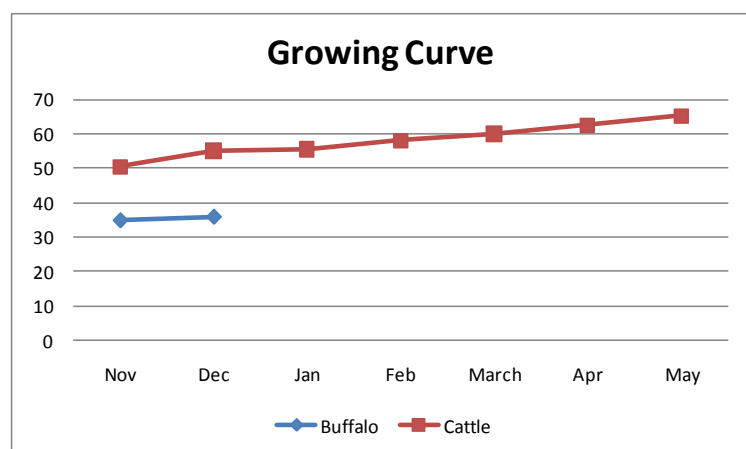


Figure 11. Weight growth curve.

(2) Milk Yield

Milk yield simulations were carried out for 1 water buffalo and 1 cow. In this simulation milking occurred for 305 days, with the buffalo and cow yielding a low 951kg (3.1kg/day) and 1,142kg (3.7kg/day) respectively.

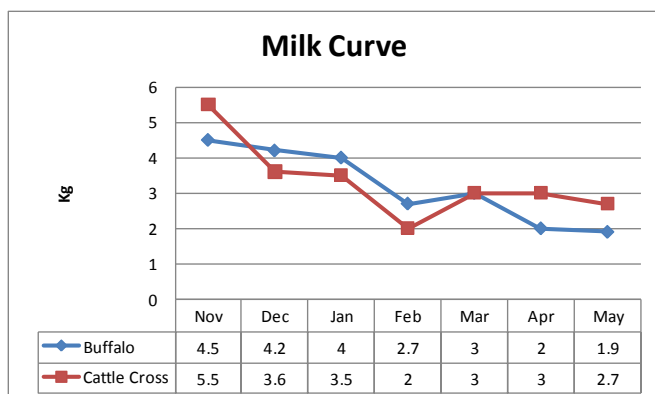


Figure 12. Milk yield curve.

4.5.6 Cost of Living

The cost of living over the 6 month period averaged 8,752Rp/week, which works out to be 35,008Rp/month and 420,096Rp/year (see Table 41). With net income being only 12,229Rp, there is a very large shortfall in covering the cost of living. As he is only a part-time farmer, and earns income from his local government position, as a well technician (100,000Rp/month), and with his mill operations (average of 3,300Rp/week), he is able to comfortably meet the cost of living.

Table 41. Details of weekly expenditure.

	Rp	%
Food, beverage,	5,861	67
Apparel, textile, and foot wear	509	6
Transport & communication	655	7
Fuel & Light	1,001	11
Medical care	7,263	8
Total	8,752	100.0

He spends 67% of his income on food supplies, a high Engels co-efficient.

4.6 Feeding Management

Mr. Manthar is the person responsible for the farm and livestock, the worker looks after the livestock, and his wife milks and feeds the animals. In November there were 3 adult female buffalo, and 2 calves, as well as 2 adult female cows, and 1 calf, for a total of 7.

4.6.1 Livestock Facilities

A simple shade structure with a roof made from grass.

4.6.2 Daily Routine for Water Buffalo

6:00am:	Milking
8:00:	Feeding
9~16:00:	Grazing, watering, and bathing
17:30:	Milking
19:00:	Feeding
20:00:	Watering

4.6.3 Milking

Normally the animals are milked twice a day, as the milk volume decreases milking is performed only once a day in the morning. At milking there is no special cleaning of the udder.

(2) Feeding management

This farmer milks late lactating buffalo and crossbred cow and get 2.7 litres per day and 3 litres per day in February respectively. It is estimated that the nutritional requirement for this period is 4.48kg TDN, 0.66kg DCP in buffalo and 4.61kg TDN, 0.7kg DCP in cow. The feed during this period is shown in table 4.6.1. Ten kilograms of beseem, 20kgs of sugarcane tops and 0.5kg of cotton seed cake are fed to the buffalo and the cow in twice a day. When the nutritive value obtained from supplementary feed is subtracted from this, it is estimated that 12% of TDN and 27% of DCP in buffalo and 14% of TDN and 32% of DCP in cow need to be obtained from grazing and cut and carry systems. It is approximately 7kg (1.6kg DM basis) of native grasses.

Table 42 Value of Supplemental Feed for Buffalo & Crossbred Cow in February

Supplemental Feed	DM intake	TDN	DCP
	----- Kg -----		
Berseem (10kg)	1.15	0.759	0.22
Sugarcane top (20kg)	5.8	2.85	0.17
Cotton seed cake (0.5kg)	0.44	0.35	0.09
Total (30.5kg)	7.39	3.96	0.48

In March, farmer gets 3 litres per day each. It is estimated that the nutritional requirement for this period is 4.61kg TDN, 0.69kg DCP in buffalo and crossbred cow. The feed during this period is shown in Table 43. Ten kilograms of berseem, 5kgs of wheat straw, 1kg of wheat bran and 0.5kg of cotton seed cake are fed to the buffalo and cow in twice a day. When the nutritive value obtained from supplementary feed is subtracted from this, it is estimated that 25% of TDN and 40% of DCP need to be obtained from grazing and cut and carry systems. It is approximately 11kg (2.6 kg DM basis) of native grasses.

Table 43 Value of Supplemental Feed for Buffalo & Crossbred Cow in March

Supplementary feed	DM intake	TDN	DCP
	----- KG -----		
Berseem (10kg)	1.15	0.759	0.22
Wheat straw (5kg)	4.6	1.67	0
Wheat bran (1kg)	0.9	0.66	0.11
Cotton seed cake (0.5kg)	0.44	0.35	0.09
Total (16.5kg)	7.09	3.44	0.42

4.8 Reproduction

The breeding bull owned by the neighbour land owner is about 1km away from the village, and when an animal comes in heat the animal is lead to the land owner's home for mating with a stud bull (a free service).

4.9 Animal Health

4.9.1 Common Livestock Diseases

The most common livestock diseases encountered are HS, FMD, CCPP, PPR, Enterotoxaemia, and contagious pneumonia.

4.9.2 Vaccinations

The Livestock Department provides guidance on HS, CCPP, Enterotoxaemia.

4.9.3 Mastitis

A sub-clinical mastitis test proved negative.

4.9.4 Result of examination of samples at CVDL Tandojam.

Blood, milk and faecal sample were collected from 5 animals. Several endo parasites were detected but brucellosis was found negative.

5. Large-Scale Dairy Farmer (Landless)

5.1 Survey Background

Responsible Organisation:	Livestock Department, Hyderabad district, Old Cattle Colony Veterinary Hospital
Responsive:	Dr. Liaqat Ali Jat
Person in Charge:	Dr. Muhammed Farooque Leghari
Surveyed Farmer:	Mr. Haji Aamir
Location:	Old Cattle Colony, Hyderabad sub-district, Hyderabad district.

5.2 Introduction

The cattle colony was established in Hyderabad 40 years ago. Subsequently, a second colony (new) was built. According to a survey conducted by the Veterinary Department of Sindh Agricultural University in 2010, in the old cattle colony there are 90 farmers with an estimated total number of animals of about 14,000. Thus on average each farmer keeps 155 head of cattle (see Figure 10). The largest farmers (2) have more than 2,000 animals (see Fig 11). The smallest farmer has 40 animals (see Figure 10). This colony is run by the Mehran Cattle Colony Association, with the participation of all farmers. Of the milk produced, 80% of it is marketed through middle men. Thirty percent of the farmers market the milk through their own shops. The Milk Retailer Association has a large influence over the distribution of this milk. Every day huge amounts of manure is generated. From April to November, it is sold, since there is a demand for compost manure. However, in winter when there is no demand for it, middleman are contracted to dispose of it.

Table 38. Situation of the Cattle Colony in Hyderabad, 2010

	Farm	Buffalo	Cattle	Total
New colony	72	5,517 heads (91.2%)	532 heads (8.8%)	6,049 heads
Old Colony	90	12,689 heads (91%)	1,258 heads (9%)	13,947 heads
Total	162	18,206 heads (91%)	1,790 heads (9%)	19,996 heads

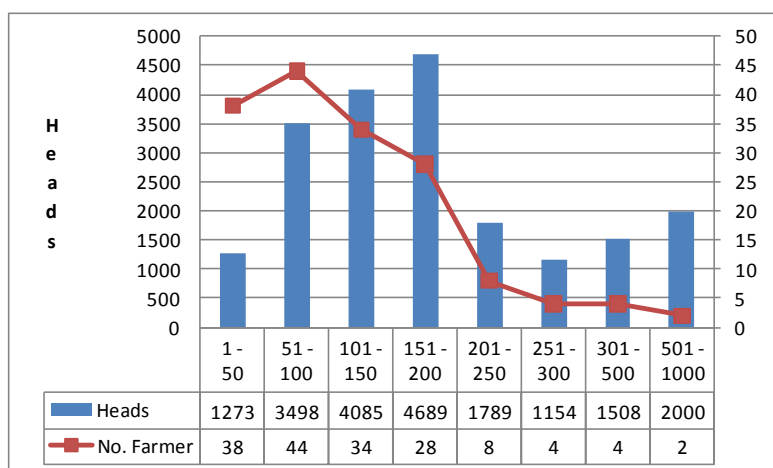


Figure 10. Farmer and cattle numbers at cattle colony, Hyderabad.

5.3 Criteria for Farmer Selection

This farmer was selected with the co-operation of the Livestock Department, Hyderabad district, the Old Cattle Colony Veterinary Hospital, and C/P Dr. Ali Akhtar Shahani and Dr. Mukhtiar Ahmed Babar. Three candidate farmers were identified as fitting the category of large-scale dairy farmer (landless), two were in the Old Cattle Colony, and one was in the New Cattle Colony. Mr. Haji Aamir was selected as he had the highest evaluation score.

5.4 Farmer Outline

Mr Haji Aamir was working as a milk delivery person up until 9 years ago when he purchased a farm and began dairy Farm Management. He has three farms, the main farm he owns is called Dua Dairy farm, for other two farms he rents. He is the eldest son among 5 siblings, the younger brother (2nd eldest) manages a milk shop. The milk produced at Dua dairy farm of Mr. Aamir is sold there.

Main Farm

He bought it in September 2004. The main objective of this farm is milk production. He is milking a total of 120 animals, all of them are being milked. The area of the farm is 1,360m². There are 2 paddocks either side of the livestock shelter for exercising the animals. There is a further paddock that is across the road.

Second Farm

He started renting this farm 8 years ago. The objective of this farm is milk production.

Third Farm

He started renting this farm 8 years ago. The objective of this farm is to raise dry pregnant animals.

5.5 Farm Management

5.5.1 Basic Information for Farm Management Analysis

(1) Livestock Inventory

Table 44. Livestock inventory.

Animal Category	AU	Month					Average	
		Dec	Jan	Feb	March	April	Heads	AU
1. Milking cows	1	243	255	243	242	247	246	246
2. Dry cows	1	81	63	66	68	61	67.8	67.8
3. Bull above 3 years	1.3	4	4	4	4	3	3.8	4.94
4. Female young stock: (13 month until parturition)	0.7	0	15	15	15	15	12	8.4
5. Female young stock: (weaning to 12 month)	0.3	17	5	2	6	6	7.2	2.16
6. Female suckler: (0 to weaning)	0.2	6	2	5	2	9	4.8	0.96
7. Male young stock: (13 month until mating)	0.7	2	4	5	5	5	4.2	2.94
8. Male young stock: (weaning to 12 month)	0.3	6	4	4	4	6	4.8	1.44
9. Male suckler: (0 to weaning)	0.2	3	5	3	4	3	3.6	0.72
10. Castrated male above 3 years	1.3	0	0	0	0	0	0	0
TOTAL:		362	357	347	350	355	354.2	335.4

Animal Category	AU	Month					Average	
		Dec	Jan	Feb	March	April	Heads	AU
1. Milking cows	1	8	9	9	9	7	8.4	8.4
2. Dry cows	1	2	1	1	1	0	1	1
3. Bull above 3 years	1.3	1	1	1	1	1	1	1.3
4. Female young stock: (13 month until parturition)	0.7	3	5	5	5	5	4.6	3.22
5. Female young stock: (weaning to 12 month)	0.3	0	0	0	0	0	0	0
6. Female suckler: (0 to weaning)	0.2	1	1	1	1	1	1	0.2
7. Male young stock: (13 month until mating)	0.7	8	11	11	11	11	10.4	7.28
8. Male young stock: (weaning to 12 month)	0.3	3	1	1	1	0	1.2	0.36
9. Male suckler: (0 to weaning)	0.2	2	1	1	1	0	1	0.2
10. Castrated male above 3 years	1.3	0	0	0	0	0	0	0
TOTAL:		28	30	30	30	25	28.6	21.96

(2) Sales

(i) Milk

Table 45. Milk production and sales (2010).

Description	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Milk													
Quantity (liter)	64,220	59,830	73,498	67,644	67,088	61,918	63,552	65,540	62,088	62,698	58,645	61,221	767,942
Total amount (Rp)	2,584,855	2,408,158	3,160,414	2,908,692	2,884,784	2,906,431	2,983,131	3,076,448	2,914,411	2,943,044	3,020,218	3,152,882	34,943,466
Average Price	40.25	40.25	43	43	43	46.94	46.94	46.94	46.94	46.94	51.5	51.5	45.50

In January 2011 milk was selling for 51Rp/litre (see table 45), but by the 20th April 2011 the price of milk had risen to 56.25Rp/litre.

(ii) Livestock Sales

Fattening of Cattle (for EID festival): 27 head of cattle were fattened and sold for a total of 2,700,000Rp (average of 100,000Rp/head).

Buffalo Bulls: Two animals were sold for 100,000Rp and 120,000Rp, a total of 220,000Rp.

Dry Cows : During 5 months of the survey there 29 dry animals sold for an average price of 49,620Rp. Normally adult females sell for about 49,620Rp. Those animals that are sick or have udder problems sell for an average of 30,000Rp.

Calves: Calves sell for 1,000~1,500Rp/head

(iii) Fattening

It costs about 14,700Rp to fatten the animals (over the 5 month period), or about 35,280Rp/year.

(iv) Purchase of Livestock

Heifers: Two immature females were purchased for 22,500Rp and 28,000 Rp, a total of 50,550Rp

Pregnant or Lactating Buffalo: 21 of these animals were purchased for 2,596,500Rp, an average price of 123,642Rp/head. The main purchasing points are three city livestock markets (Tando Mohammed Khan, Chambar, and Tando Adam).

Bulls: Three animals were purchased for 70,000Rp, 102,000Rp, and 102,000Rp, a total of 274,000Rp.

Steer Cattle: Four of these animals were purchased for an average price of 45,750Rp, a total of 183,000Rp.

(v) Feed

Feed is purchased for 478,546Rp/week, or 68,364Rp/day, or 24,952,860Rp/year. This represents 6,362kg/day, or 2,322,130kg/year (2,322 ton).

(vi) Minerals

Minerals for the animal costs 50,960Rp/ (5 months), or 122,304Rp/year.

(vii) Protein

Protein supplements cost 7,000Rp/(5 months), or 16,800Rp/year.

(viii) Medicines

Medicines, including oxytocin, costs 122,469Rp/(5 months), or 293,925Rp/year. During the year pregnancies are most frequent from December to February together with disease infections which are high during this period.

(ix) Boostin

The cost of Boostin is 170,630Rp/(5 month), or 409,512Rp/year.

(x) Transport & Communication

72,000 Rp/month.

(xi) Livestock Equipment

Equipment purchases average out at 4,500Rp/month, or 54,000Rp/year.

(xii) Materials & Consumables

Materials and other consumables cost 1,000Rp/month or 12,000Rp/year.

(xiii) Electricity

Electricity costs are 186,293Rp/year (2010).

(xiv) Labour

The owner's salary is 40,000Rp/month. His employees (normally 27) are paid 39,200Rp/week, or 2,038,400Rp/year (2011). Eleven employees work on the main farm. The person responsible for the farm and keeping records of milk shipments receives a salary of 7,000Rp/month, labourers receive a salary of 5,500Rp/month. They also receive 1 litre of milk everyday. Seven people are involved in milking the cows in the morning, from 3:00am. The second milking occurs at 15:00 o'clock. This is quite a hard schedule. They receive 3 days off every month.

(xv) Farm Rentals

The 2nd and 3rd farms are rented for 39,500Rp/month, or 474,000Rp/year.

(xvi) Lease tax

Mr. Aamir pay tax for Govt land through ex owner 40,000Rp/month.

5.5.2 Diagnosis of Dairy Farm Management

(1) Summary of Operations Results

A diagnosis of operations in 2010 based on interviews and accurate past data was planned, but this was not available, and the diagnosis was abandoned. In its place, accurate data was collected from November last year until May 2011 and a diagnosis of Farm Management was performed on this half year data (see Table 46).

Table 46. Operation results.

Articul		Last year	This year	Comparing	
Current year total production cost			17,718,348		
Production Cost			15,193,838		
Sales gross profit			3,933,322		
Net profit year			3,933,322		
Net income year			4,173,322		
Dairy situation	Feeding size	Number of cow (head)	323		
		The total land area of fodder (Acre)	0		
	Income labor family	Total income family (Rp)	240,000		
		Income / cow (Rp)	743		
	Production Cost	Production cost Rp/milk 1Kg	41		
	Production Cost	Production cost Rp/milk 100Kg	4,131		
	Technical Level	The total production milk (Ton)		367.8	
		Production milk Kg / cow		1138.79257	
		Average Fat %		?	
		Average Fat non solid		?	
		Average of milk price Rp		52	
	Liabilities	Average of interval parturition Months		?	
		Balance of liabilities Rp	Beginning year	0	
		End of year	0		

(2) Scale of Operations

Table 47. Livestock inventory.

Category	Cow	Young animal	New calf	Fattening animal		
				Dairy	Beef	Buffalo
Average						
Beginning year	333	54	9			
Enter	Introduction					
	Birth, Transfer					
Out	Sale					
	Accident, Culling	1				
	Transfer					
End of year	323	58	13			

Table 48. Labourers.

Number of family	
Working number family	27
Dairy work number	
Employment Permanent	
Employment Temporary	
Child count 0.5 person.	

5.5.3 Cost of Living

Unlike the rural based farmers, Mr. Aamir's cost of living was only 48 and 50% of income (see table 49). The weekly cost of living was however 6,695Rp, 52 times higher than his rural counterparts. His cost of living is estimated to be 200,340Rp/year. It is thought to be even higher, as he has expenses associated with his children's education and other expenses as well.

Table 49. Details of weekly expenditure.

	Rp	%
Food, beverage,	8011	48
Apparel, textile, and foot wear	2283	14
Transport & communication	1256	7
Fuel & Light	4989	30
Medical care	156	1
Total	16695	100

5.6 Feeding management

Mr. Haji Aamir is the owner, cum person responsible for the dairy farm. There is a person in charge at each of the 3 farms, at two of the farms milking is being done. The remaining farm is used to raise dry pregnant animals. Every 2 or 3 days the volume of milk from each animal is measured and its production capacity determined. For those animals with high milk production capacity, when dry they are raised on the farm again until they become pregnant. For those with low production capacity, they are sold to the slaughter house. The animals are not tagged, but the place where the animal is tethered is numbered. Each day the animals are released into a paddock for exercise. They are then returned to the shelter and tethered in the same place.

The calves are sent to the slaughter house within 1 week of being born. Although the numbers are small, there are calves from mothers who have good production capacity who are kept and raised to be milked later on. The daily growth rate of calves is a low 250g. Moreover, the BCS of lactating animals is in the low range of 1~1.8. Many issues of husbandry remain to be addressed in the future.

The average milk yield for all the animals in April was 8.2kg/day/head, with a maximum of 14kg, and a minimum of 3kg. Even with this large range in production rates, the management of adult females remains the same for all animals. It is thought that management could improve productivity by dividing the animals into 2 groups, a high and low production capacity group. The high production capacity group could then be fed a high energy, good quality feed, and managed in a suitable way.

5.6.1 Livestock Facilities

The main cattle shed is built from brick, is sturdy and can be used for the long term. The roof is made from reeds, and needs to be replaced every 10 years. With the walls being brick, the shelter has poor ventilation. During the summer temperatures in the cattle shed are high, increasing poor performance statistics. The floor area is a large 68 x 20m (1,360m²).

5.6.2 Daily Routine

02:00am	Animals are brought back from the paddocks and tethered.
03~05:00	Milking (fed an average of 8~9kg/head)
06:00	Returned to paddock. While in the paddock, the milking shed is hosed down and feed prepared)
09:00	Returned from paddock and tethered in milking shed. The animals are watered in between.
14:00	The animals are hosed down and cleaned with water.
15~17:00	Milking. Fed an average of 8~9kg/head.
18:00	Returned to paddock.

5.6.3 Milking

The animals are milked by hand twice a day, once at 3:00am in the morning, and then at 15:00 pm in the afternoon. The 12 hour interval between milking is ideal. Although the morning milking at 3:00am is hard work, it cannot be helped when milk market requirements are taken into consideration. Basically, as calves are not kept, there is no stimulus from calves to the adult females to produce milk. Therefore, 5 minutes before milking the animal is injected with 2cc of oxytocin.

Each milking takes 2 hours to perform, for a daily total of 4 hours of milking. In the milking operations, the work is organized and carried out briskly. This highlights the competency of Pakistani workers. First of all, there is the person in charge of injecting oxytocin, then there is the person who wheelbarrows in 8.5kg of feed per animal. Five minutes after the injections has been given, the 7 milkers begin milking the animals in order. Though there appear to be a few who are lethargic with poor milking skills, most of the milkers are well-trained and skilled at their job. However, there is no cleaning of the udder prior to or during milking. There is also no dipping of the udder after milking.

The use of growth hormones to increase milk production began about 5 years ago. They use an Korean product called Boosten (Bovine somatotropin Hormone). According to the literature this is expected to boost production by about 10~15%. The price of a 2.1ml vial is 285Rp, with 0.3ml/head being injected every other day. Consequently this works out to be an expensive 41Rp/injection/head.

(1) Milking Speed

It takes 7 people 2 hours (120 minutes) to milk all the animals. As there are 113 animals, that means 1 person milks 16 animals. If you divide 120 by 16, the time necessary to milk one animal is 7.5 minutes. I randomly timed the milking of 11 animals. The average time taken was 3.9 minutes (roughly 4 minutes). In the afternoon the milk yield was 4.4kg/head. This means a milking rate of 1kg/minute. Normally when milking, the oxytocin (a lactogenic hormone) takes 7 minutes to circulate around the blood system. Thus, milking is recommended to be completed within 7 minutes. With this in mind, in those 7 minutes 7kg can be milked, and with a morning and an afternoon milking, milking animals with a 14kg/day milk production capacity is feasible at this speed of milking. If production capacity increases above this, then the animal would be best milked by two people, one from each side.

(2) Milk Filter

The milk is not filtered. The presence of feed and other wind blown impurities in the milk was observed. A special metal bucket is used to collect the milk, the full buckets are then poured into a large metal container. After milking is completed, the milk is shipped (without filtering).

(3) Animal Age

I made observations and interviewed people at the main farm, where 117 animals are being milked, about the age of animals being milked and the months since calving. The average age is 7.9 ± 2.05 , the maximum age was 16 years old, and the minimum age was 3.5 years old. Though an old 16-year-old animal was present, it was quite lean looking. The average age from calving was 4.5 ± 2.72 months, with a maximum of 16 months, and a minimum of 0 months. There was an animal that was still being milked 16 months after parturition. Though it is reported that the lactating period of water buffalo is short, you can see that there are individuals with very long lactating periods.

5.7 Feed

Cattle colony is large scale urban and peri-urban dairy production system. In this system, 100% of ingredients fed to livestock are purchased from markets.

In cattle colonies, even though the milk yield between buffalo varies significantly, they are all fed the same amount of feed. It is thought that the necessary nutritional requirement needed to obtain an average of 9 litres of milk per head per day is being met the TDN basis (see Table 50,51).

The compounding ratio is determined by personal experience and exchange of information between dairy farmers.

Table50 Value of House Compounded Feed for Milking Buffalo

Ingredients	kg/animal/ day	DM intake kg/day	TDN (kg)	DCP (kg)
Maize(Green)	7.4	1.62	0.99	0.09
Wheat straw	4.3	3.96	1.43	0
Cotton seed cake	1.7	1.51	1.19	0.3
Wheat bran	3.4	3.07	2.25	0.39
Mung Churi	1.8	1.63	0.92	0.19
Gram Churi	1	0.9	0.65	0.07
Rice polish	0.4	0.365	0.29	0.04
Mineral premix	0.008			
Total	20.008	13.055	7.72	1.08

Table51 Nutrient Requirements for Milking Buffalo

Nutrient requirements		
	TDN	DCP
Maintenance	3.28	0.329
Milk production/L (6.5% Butter Fat)	0.443	0.124
9 L milk production	3.99	1.12
Total	7.27	1.45

5.8 Reproduction

The farmer owns 2 Kundhi buffalo stud bulls. They are exercised in the paddock twice a day, 3 hours in the morning, and 8 hours in the evening, for a total of 11 hours. Any buffalo in heat is serviced during this time. I carried out pregnancy tests on 21 water buffaloes, (for all of them it was more than 4 months since their last calving). Ten of the buffalo had conceived (a rate of 48%). For these 10 animals the date of conception (servicing) was estimated by subtracting the gestational age. The average was 3.7 ± 1.25 months since the last calving. It is generally said that the conception rate of water buffalo is low, however only looking at these results it is possible to maintain a normal conception rate, that is if good husbandry and reproduction management is in place.

5.9 Animal Health

5.9.1 Common Disease Situation

According to the weekly data collected, there were frequent treatments of pneumonia and mastitis. Other problems included udder problems, abortion, difficult births, and placenta retention after birth. Local technician examined 4 animals that had aborted fetuses and collected the milk samples for diagnosis at CVDL Tandojam. All 4 tested positive for brucellosis. These animals yet not culled, 2 continued to be raised, and the other 2 were sold to butcher. Between mid-January and February 7 cases of foot and mouth disease occurred. The Livestock Department though does not have official evidence. Calves with colds, fever and diarrhoea were

frequent. A number of them died. Fungal infection of teats shows papules also infect the hands of milker was observed mostly in the month of January.

5.9.2 Mastitis

When at milking, no cleaning of the udder is done, and the animals are group fed, the normal rate of sub-clinical mastitis is expected to be about 70%. I randomly tested 13 animals for sub-clinical mastitis.

Nos. Of infected

The result was that 9 of the 13 animals had sub-clinical mastitis. 「

- *Negative*: : 4 animals、 「 ± *False Positive*: : 2 animals、 「
+ *Positive grade 1*: : 2 animals、 「 ++ *Positive grade 2*: : 3 animals、 「
+++ *Positive grade 3*: : 2 animals.

For those animals with a positive grade 2 result, or more treatment, is necessary. That means 5 animals (38%) need to be treated. Of the total number of teats ($13 \times 4 = 52$) tested, 17 (33%) were found to have sub-clinical mastitis. The details are as follows: 「

- *Negative*: : 35、 「 ± *False positive*: : 5、 「
+ *Positive grade 1*: : 7、 「 ++ *Positive grade 2*: : 3、 「
+++ *Positive grade 3*: : 2.

Thus a total of 5 (9.6%) of teats need to be treated. Considering these results, of all the 113 animals being milked, it is estimated that of all the teats (452), only 43 (9.6) need to be treated.

5.9.3 Prevention

The animals were vaccinated for HS, once in June and then again in November. They were vaccinated for foot and mouth disease once in November. They were de-wormed for endo-parasites twice, once in April and then again in October.

5.9.4 Animal Health

5.10 Breeds

Of the 120 animals being milked, 116 were buffalo and only 4 were European hybrids. A breakdown of the buffalo breeds is as follows, there were pure Kundhi, crosses between Kundhi and Nili Ravi, and Nili Ravi; respectively 54 (47%), 60 (52%), and 2 (1%). This is a typical commercial dairy farm, the main objective of which is milk production. From this perspective, they do not prefer any one breed, but rather seek to maximize milk production with high production capacity animals. The animals are purchased in the city livestock markets at Tando Mohammed Khan, Tando Adam and Chambar. At the time of selection, they select those animals with large udders, with teats that are medium in size, and the teats are soft to feel.

6. Medium-Scale Cattle Fattening Farmer

6.1 Survey Background

Responsible Organisation: Livestock Department, Sanghar district
Technical Person in Charge: Dr. Khushi Muhammad, veterinarian of Johl Union Council
Veterinary Center
Surveyed Farmer: Mr. Ghulam Padir
Location: Bahadur Khaskhali village, Johl Union Council, Sinjhora sub-district, Sanghar district

6.2 Introduction

In December 2010 the selected farmer had yet to purchase his livestock, so the survey was not able to start in January 2011. Moreover, whether he will do so or not is not known. Given the importance of the beef fattening study, a new candidate farmer was hastily chosen.

6.3 Criteria for Farmer Selection

The candidate farmer, Mr. Ghulam Qadir, lives in Jhole Union Council. With the co-operation of a C/P, Dr. Ali Akhtar the candidate was selected on January 30. This farmer had already purchased 20 animals for fattening. Of these, 10 he was fattening himself, and the other 10 were contracted for a small margin to be fattened by three tenant farmers in Mitho Brohi village. This is a form of contractual arrangement we are interested in. The survey could begin immediately, so this farmer was chosen to be surveyed.

6.4 Farmer Outline

His house is well built and he lives with his brother's family (5 members), another brother's family (7 members). He owns 25 acres of land, larger than I had imagined. Moreover, he operates a dairy farm, so I could make observations there as well.

6.5 Farm Management

6.5.1 Basic Information for Farm Operation Analysis

(1) Family Labour and Labourer Rates

Table 52. Family labour.

	Main Occupation	Agriculture	Dairy	Fattening	Hour	Amount /year
Mr. Gulam Padir 41 years	Agriculture	Management				
1 st Son	Student					
Brother's Son	In charge Livestock			50%	50%	

Table 53. Employees.

	Main Occupation	Agriculture	Dairy	Fattening	Hour	Amount /year
No.1 30years				In charge	4,000	48,000
No.2 28years			In charge		4,000	48,000
No.3 31years		In charge			4,000	48,000
No.4 12years			Grazing control		1,500	18,000
Total					13,500	162,000

(2) Agricultural Costs

The following costs were confirmed;

<i>Tilling:</i>	39,300Rp	<i>Fertilizer:</i>	84,600Rp
<i>Herbicide:</i>	4,800Rp	<i>Insecticide:</i>	13,400Rp
<i>Cotton Seeds:</i>	19,200Rp	<i>Sowing Cotton:</i>	1,400Rp
Total:	<u>162,700Rp</u>		

(3) Livestock Production Costs

The following costs were confirmed;

<i>Goats:</i>	87,000Rp (1 goat was purchased on 27th February) and 649,000Rp (8 goats were purchased on 2nd May). An average price of 81,125Rp.
<i>Feed:</i>	Green cut corn stalks were purchased for 10,000Rp.
<i>Artificial Insemination:</i>	Performed for 800Rp.

6.5.2 Diagnosis of Cattle Fattening Management

(1) Summary of Operation Results (2010)

The livestock bought in January were bought with the intention of fattening for sale during the EID festival. However, even though the goats were bought with this intention, over half of them have already been sold. They were sold to a farmer who would fatten himself for the Eid festival.

Although valuable data collection began in January, there is still not enough data. For the reason that livestock management costs are intermingled with dairy operation costs, diagnosis of the fattening management was not attempted.

6.5.3 Productivity

(1) Cattle Fattening

The table below notes the livestock purchased, date of purchase and the purchase price. The daily gain between January and May was monitored by measuring chest girth and estimating weight. The measurement scale used was made in the USA for use in South America. The average daily gain was a relatively good result of 545g/day.

Table 54. Purchase and sales of cattle.

ID	Breed	Purchase		Sold		DG
		Date of purc	Price	Sale	Price	
white 1	Dhani	Nov.2010	90,000	19/4	160,000	733.3
white 2	Dhani	Nov.2010	90,000	19/4	160,000	383.3
Brown mouth	Sahiwal cross	Nov.2010	52,000	End of Feb.	75,000	
Black mouth	Sahiwal cross	Nov.2010	52,000	Endo of Feb.	75,000	
Dark red black (+)	Sahiwal cross	Nov.2010	90,000			441.7
Light red (-)	Sahiwal cross	Nov.2010	90,000			375.0
Light black (-)	Thari cross	Nov.2010	60,000			541.7
White roan (+)	Thari cross	Nov.2010	60,000			316.7
Sahiwal RB	Sahiwal2	Nov.2010	90,000	19/4	155,000	966.7
Light red	Sahiwal3	Nov.2010	80,000	19/4	155,000	333.3
Frisian cross	Frisian cross	Nov.2010	130,000	19/4	165,000	816.7
Average						545.4

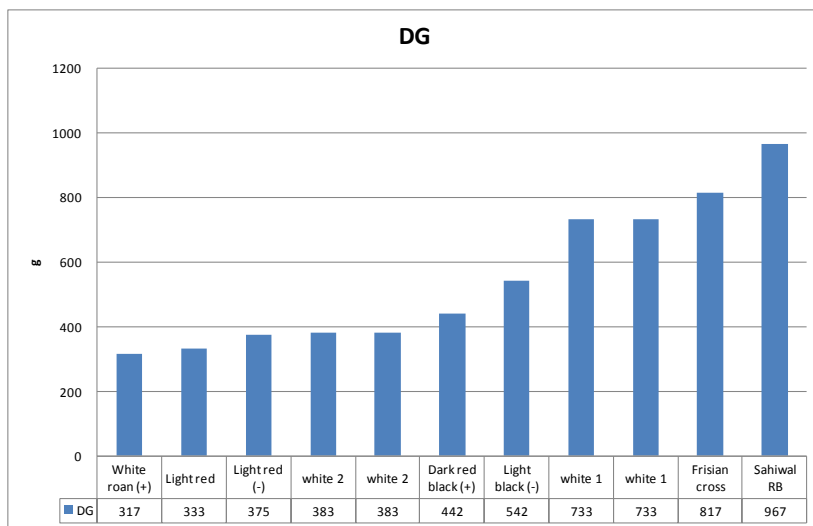


Figure 14. Daily gain.

6.5.4 Cost of Living

During the 6 month period of the survey, the average weekly cost of living was 8,637Rp, which works out to be 34,548Rp/month, or 449,072Rp/year (see Table 55).

Table 55. Details of weekly expenditure.

	Rp	%
Food, beverage,	4,702	55
Apparel, textile, and foot wear	978	11
Transport & communication	1,453	17
Fuel & Light	696	8
Medical care	807	9
Total	8,636	100

Food cost 4,702Rp (55%), Clothes 978Rp (11%), Transportation/Communication 1,453Rp (17%), lighting 696Rp (8%), Medical 807Rp (9%). This is a total of 8,636Rp (100%). During this 6 month period apart from the above weekly expenditures, there were special expenditures related to repair of the house 173,000Rp, Wedding gifts 8,000Rp, Meson 24,350Rp, for a total of 205,350Rp.

6.6 Feeding management

6.6.1 Dairy Farm

Although the objective was to examine fattening management, information related to dairy farming was collected. Milking occurs twice a day, once a 5:00am in the morning and then again at 5:00pm in the evening. The number of animals milked on the day of the survey was 15. A total of 40 litres was collected. Of that 20 litres was sold to a local middleman and the remaining 20 litres consumed by the extended family. Milking is being done in the morning and at night, so with a total milk yield of 80 litres/day that means a milk yield of 5.3 litres/head/day.

(1) Cattle

Milking cows: 7 (1 Sahiwal cross, 1 Red Sindhi, and 3 Red Sindhi cross), Dry cows: 5, heifer: 6, weaned calves: 4 (female) & 4 (male), suckling calves: 4 (Female), & 3 (male), bull for mating: 1 (Kanjej breed), Bullock: 2 (for ploughing and hauling feed), young male stock: 20.

(2) Water Buffalo

By breed: Kundhi: milking: 8, dry: 8, heifer: 9, weaned calves: 3(female) and 5 (male), suckling calves: 7 (female) and 1 (male), bull: 1 and young male stock: 1.

6.6.2 Fattening

They are being raised tethered and bridled, and not grazed Even though he is fattening 10 of his own animals, he is also fattening in a share arrangement (since 10 years ago) with the 3 farmers in Mitho Brohi village. This year he has contracted out fattening of 4, 4, and 2 animals to three farmers. The price of purchase is known when in the EID festival the animals are sold the profits will be shared 50:50. All feed is paid for by the owner, as well as any necessary veterinary fees. At sale all production costs are split 50:50.

Castration is by a crush method administered by a technician from the Department of Livestock. The cost is 50Rp/head.

6.7 Feed

(1) Feeding calendar of cattle fattening

	11	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
Roughage																											
Berseem																											
Wheat straw																											
Maize																											
Sorghum (multi-cut)																											
Concentrates																											
Wheat bran																											
Cotton seed cake																											
Wheat middling																											
Salt (block)																											
Mustard oil																											
Ghee (Desi)																											
Brown suger(Ghru)																											
1. Dilute brown suger(Ghru) with water (Brown suger solution)																											
2. Mix wheat bran, cotton seed cake and wheat middling with brown suger solution																											
*Mixed ration is fed to animals 3 times a day (7:00, 15:00, 20:00)																											

Table 56. Value of House Compounded Feed for Fattening Cattle in February, March

Ingredients	DM intake	TDN	DCP
	----- Kg -----		
Berseem (20kg)	2.3	0.2	0.39
Wheat straw (10kg)	9.2	3.33	0
Wheat bran (0.5kg)	0.45	0.33	0.06
Cotton seed cake (0.5kg)	0.44	0.35	0.09
Wheat middling (0.5kg)	0.44	0.36	0.04
Total (31.5kg)	12.83	4.57	0.58

Table 57. Value of House Compounded Feed for Fattening Cattle in May

Ingredients	DM intake	TDN	DCP
	----- Kg -----		
Wheat straw (10kg)	9.2	3.33	0
Maize (10kg)	2.19	1.33	0.12
Wheat bran (0.5kg)	0.45	0.33	0.06
Cotton seed cake (0.5kg)	0.44	0.35	0.09
Wheat middling (0.5kg)	0.44	0.36	0.04
Total (21.5kg)	12.72	5.7	0.31

Table 58. Value of House Compounded Feed for Fattening Cattle in Jun to September

Ingredients	DM intake	TDN	DCP
	----- kg -----		
Wheat straw (10kg)	9.2	3.33	0
Multi-cut Sorghum (20kg)	3	1.79	0.21
Wheat bran (0.5kg)	0.45	0.33	0.06
Cotton seed cake (0.5kg)	0.44	0.35	0.09
Wheat middling (0.5kg)	0.44	0.36	0.04
Total (31.5kg)	13.53	6.16	0.4

6.8 Breeds

This farmer goes every year to Punjab district to buy livestock. The main breeds are a Bhagnari variety Dajal breed, Sahiwal breed, and Cholistani cross breed. They all are meat type breeds, particularly around the thighs. Through long experience he has learnt that these breeds fatten well, and demand high prices during the EID festival. In fact, during the short data collection period the average daily growth rate was 545g/day, and 967g/day for a Sahiwal and Zebu cross respectively. This indicates that the Zebu breeds have a high potential for fattening.

7. Medium-Scale Goat Fattening

7.1 Farmer Survey Background

Responsible Organisation:	Livestock Department, Sanghar district
Person in Charge:	Dr. Khushi Muhammad
Surveyed Farmer:	Mr. Wazir Muhammad(48 years old, Tel: 0301-3804044
Location:	Muhammad Sharif Mari village, Kur Kali Union Council, Jhole sub-district, Sanghar district

7.2 Introduction

This farmer was selected with the co-operation of the Livestock Department, Sanghar district. The village of Muhammad Sharif Mari is in an irrigated area, about 5km from Jhole town. The village was established in 1970 and covers an area of 8 acres. In the village there are 85 households, all small-scale farmers. About 10% of them having own land, the other 90% are landless. About half the households are raising goats, while only two households are commercially fattening cattle. About 100 water buffalo are being raised, and there are no camels.

7.3 Criteria for Farmer Selection

We selected the farmer with the co-operation of a C/P, Dr. Ali Akhtar. There was one candidate farmer and he was selected a week ago. There were no other farmers to compare with, so Mr. Wazir Muhammad Khan was selected.

7.4 Farmer Outline

There are 5 brothers and sisters and they co-operative operate a 25 acre farm. Mr. Khan's first wife died and he remarried. Moreover, he has married again and now has 2 wives. Consequently, the make up of the household is two wives, 3 sons and 7 daughters, for a total of 13. He owns the village mosque and opens it up to the villagers also pay the expenses.

7.5 Farm Management

7.5.1 Basic Information for Farm Management Analysis

(1) Family Labour and Labourer Rates

Table 59. Family labour.

	Main Occupation	Agriculture	Buffalo, Goat & Sheep	Hour	Rp/Year
Mr.Wazir 48years	Agriculture	Management	Management	4=Rp48	17,520
1 st Wife 38years	House work		Milking, Feeding	2=Rp24	8,760
2 nd Wife 22Years	House work		Milking, Feeding	2=Rp24	8,760
1 st Son 22years					
2 nd Son 12years					
3 rd Son 3.5years					
1 st Daughter 18years		No	No		
2 nd Daughter 13years		No	No		
3 rd Daughter 9years	Student		No		
4 th Daughter 8years	Student		No		
5 th Daughter 5years	Student	No			
Total					35,040

(2) Employees

The in-charge goat (23 years old) receives 3,000Rp/month salary. The in-charge buffalo (15 years old) receives 2,500Rp/month.

(3) Livestock Facilities

(i) Paddock

A simple paddock surrounded by thorny bushes (called a lorho by the locals). It can be used for 2 years.

(ii) Equipment Costs

A motorbike was bought in 2009 for 38,000Rp. This bike is used for livestock purposes about 10% of the time. A feed cutter was bought in 2003 for 12,000Rp. Depreciation has been completed on this. A car was bought in 2010 for 675,000Rp and sold this year. This was used for livestock purposes about 10% of the time.

(4) Agricultural Production Costs

The following costs were confirmed;

<i>Tilling:</i>	70,700Rp	<i>Fertilizer:</i>	77,965Rp,
<i>Herbicide:</i>	90,600Rp	<i>Insecticide:</i>	9,340Rp,
<i>Cotton Seeds:</i>	17,600Rp,	<i>Fuel:</i>	2,500Rp
Total:	<u>268,705Rp</u>		

(5) Livestock Production Costs

Purchase of Goats: In November 21 animals were purchased for 128,100Rp (an average price 6,100Rp/head). Another 7 were purchased in December for 52,500Rp (an average price of 7,500Rp).

Feed:

<i>Minerals:</i>	1,160Rp,
<i>Tree Fodder:</i>	9,440Rp
<i>Acacia Leaves:</i>	1,400Rp,
<i>Jantar Seeds:</i>	2,200Rp.
<i>Medicines:</i>	3,460Rp.

7.5.2 Diagnosis of Goat fattening management

(1) Results of management (2010)

When the first interview started it was already November and the goats had already been sold for Eid festival. Thus I was not able to observe the goats. The goats bought in November and December were bought at Tando Adam market or nearby villages and the average price in November and December was 7,500Rp and 6,500Rp respectively. Of the goats that were bought to fatten for Eid, 7 of them were sold on the 15th May to a middleman for 9,000Rp/head. Unfortunately I was not able to record individual details and monitor weight gains of these animals. Though the aim of the survey was to obtain important basic data on goat fattening, the livestock costs associated with buffalo and goat farming were intertwined and we were unable to conduct the diagnosis on goat fattening.

7.5.3 Productivity

(1) Goat

(i) Goat Fattening

The breeds were pure Pateri, and cross Pateri goats. In November and December 2010 ten bucks were bought for fattening. Their ages were from 7~11 months old, with the average age 9.25 months. The average weight of males was 25.8kg. (see Figure 15). The average daily gain between December and May was 44g/day (see Figure 16).

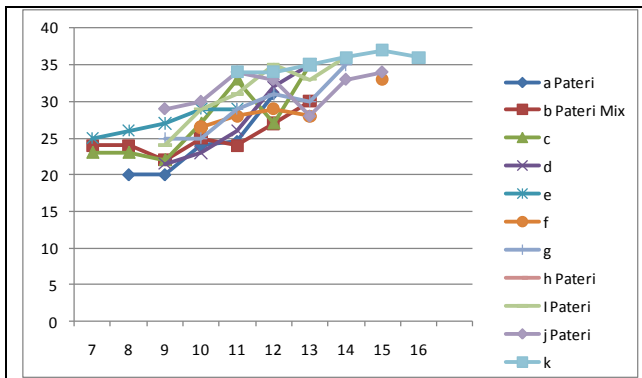


Figure 15. Individual weight.

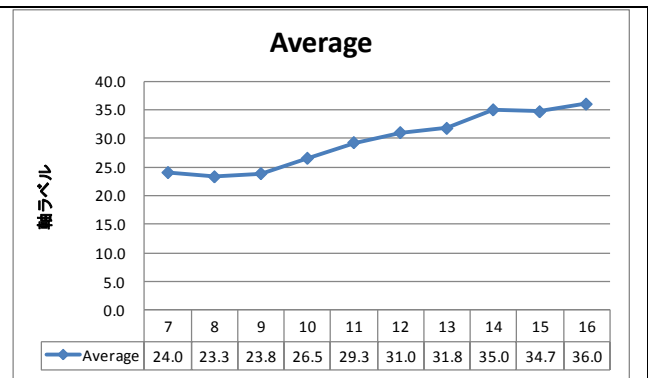


Figure 16. Average weight.

(ii) Growth of Kids

The average daily growth was 76g/day.

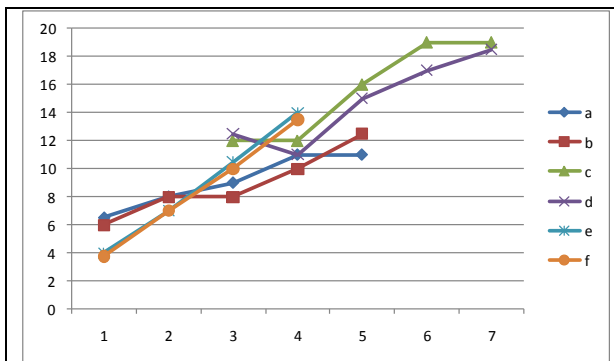


Figure 17. Individual weight.

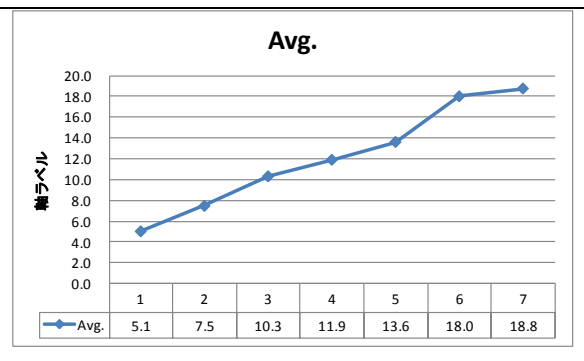


Figure 18. Average weight.

During the first 6 months, growth is very fast, it thereafter decreases to 25g/day. The measurement at 6 months appears to be incorrect. For this reason it appears to have been balanced out in the 7th month.

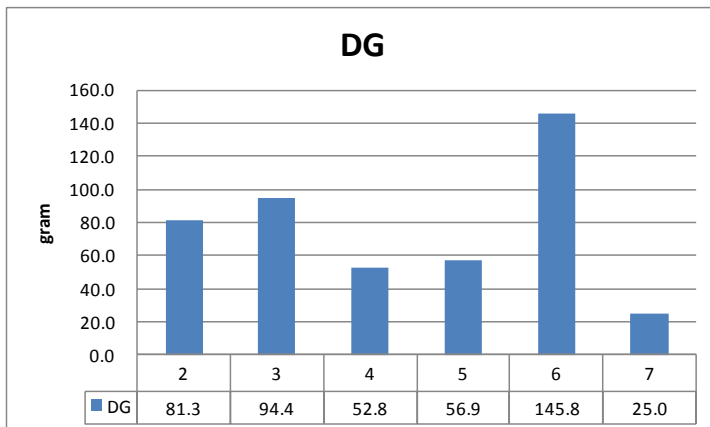


Figure 19. Daily weight gains

7.5.4 Cost of Living

During the 6 months the weekly cost of living data was taken, average weekly cost of living was 12,856Rp/week, or 50,344Rp/month, or 654,472Rp/year (see Table 60). The cost of food supplies represents 35% of expenditures, a relatively good lifestyle. Medical expenses were high at 27%. It is thought to be due to a large number of young children.

Table 60. Details of weekly expenses

	Rp	%
Food, beverage,	4,407	35
Apparel, textile, and foot wear	1,452	12
Transport & communication	2,004	16
Rental	500	4
Fuel & Light	808	6
Medical care	3415	27
Total	12,586	100.0

You see that there is an extremely high Engels co-efficient of 84%.

7.6 Feeding Management

7.6.1 Daily Routine for Goat Husbandry

8:00am	Feed the goats
9~13:00	Grazing
18:00	Feed the goats

7.7 Feed

(1) Feeding calendar

	11			12			1			2			3			4			5		
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Grazing																					
Watercourse bank																					
Surrounding farmland																					
Fallow																					
Cut & Carry																					
Tree branch (leaf, fruit, bark of <i>Acacia nilotica</i>)																					
Roughage																					
Bereseem																					
Wheat straw																					
Cotton leave																					
Lucerne																					
Concentrates																					
Wheat bran																					
Wheat middling																					
Wasted bread																					

Figure 20 Feeding Calendar during Rabi Season

8. Small-Scale Goat/ Sheep Farmer in Arid Area

8.1 Survey Background

Responsible Organisation:	Livestock Department, Tharparkar district
Technical Person in Charge:	Mr. Jammal
Surveyed Farmer:	Mr. Karman s/o Bhojo
Location:	Mithio Bhatti village, Mithi sub-district, Tharparkar district.

8.2 Introduction

This farmer was selected with the cooperation of the Livestock Department, Tharparkar district. Mithio Bhatti village is in a desert area, 22 km from the district capital of Mithi. It takes about 30 minutes to travel there. It is an old village established over 400 years ago. It is 1km² in area, and there are 450 households in the village. Most of the villagers depend on raising goats or sheep for a livelihood.

8.3 Criteria for Farmer Selection

This farmer was selected with the co-operation of C/P, Dr. Muhammad Arif Khan and Dr. Abdul Sattar Memom. There were three candidate farmers, Mr. Chahno (an evaluation score of 68), Mr. Karman (an evaluation score of 59), and Mr. Nandlal (an evaluation score of 56). After interviewing Mr. Chahno and Mr. Karman, we selected Mr. Karman. The reason we chose Mr. Karman was that he had milking the goats, which meant that at milking at 8:30am all the animals were present to be surveyed. As it turned out, Mr. Chahno had already left for grazing and could not have been surveyed anyway.

8.4 Farmer Outline

Mr Karman lives in the village. He has many children and consequently many expenses. He has learnt to handle a number of different jobs on different days. He owns a camel, so he leases land on which he grows sorghum, millet, gowar, etc . The make up of his household is 5 sons, 2 daughters, and a wife. His eldest son, Gansham, lives and works in Mithi. For that reason, his second eldest son (18 years old) manages the livestock.

8.5 Farm Management

8.5.1 Basic Information for Farm Management Analysis

(1) Family Labour and Labourers Rates

Table 61. Family labour.

	Main Occupation	Tenant land work	Livestock work	Hour	Amount /year
Karman	Agriculture	Work	Management	2=24	8,760
Wife	House work		Milking 30 minutes	2=24	8,760
1 st Son 18years	Office work: 2500Rp/month	No	No		
2 nd Son 15years	Livestock		Grazing control & other	8=10 & 0	36,500
3 rd Son 9years	Student		No		
4 th Son 7years	Student		No		
5 th Son 4years			No		
1 st Daughter 17years	House work		No		
2 nd Daughter 2years			No		
Total					54,020

* His second eldest son works from 8~11am, and again from 3~6pm.

8.5.2 Facilities & Equipment

(1) Paddock

He uses a lorho (local name), a simple paddock surrounded by thorny bushes, that needs to be rebuilt every year. To build it, it requires 2 people for 2 days. To gather the materials it takes 2 person days. This is a total cost of 1,200Rp. Depreciation is 1,200Rp/year.

(2) Tools

The following were purchased, shears (1), sickle (2), and some rope.

Agricultural Production Equipment: 2 oxen-ploughs and a planter.

(3) Scale of Farm Management

Table 62. Sheep inventory.

Animal Category	Nov	Dec	Jan	Feb	Mar
1. Milking	0	0	0	0	6
2. Dry	8	7	6	6	0
3. Ram above 1 year	0	0	0	0	0
4. Female young stock: (7 month until parturition)	2	2	2	2	2
5. Female young stock: (weaning to 6 month)	0	0	0	0	0
6. Female suckler: (0 to weaning)	0	0	0	0	3
7. Male young stock: (7 month until mating)	0	0	0	0	0
8. Male young stock: (weaning to 6 month)	0	0	0	0	0
9. Male suckler: (0 to weaning)	0	0	0	0	3
10. Castrated male above 1 years	0	0	0	0	0
TOTAL:	10	9	8	8	14

Table 63. Goat inventory.

Animal Category	Nov	Dec	Jan	Feb	Mar
1. Milking	1	5	6	6	6
2. Dry	7	1	0	0	0
3. Buck above 1 year	0	0	0	0	0
4. Female young stock: (7 month until parturition)	3	3	2	2	2
5. Female young stock: (weaning to 12 month)	0	0	0	0	0
6. Female suckler: (0 to weaning)	0	3	4	4	4
7. Male young stock: (7 month until mating)	0	0	0	0	0
8. Male young stock: (weaning to 6 month)	0	0	0	0	0
9. Male suckler: (0 to weaning)	0	1	2	2	2
10. Castrated male above 1 year	0	0	0	0	0
TOTAL:	11	13	14	14	14

(4) Analysis of farm management

Enough basic data on this farmer has not been collected so a detailed analysis will not be carried out.

8.5.3 Productivity

(1) Goats

(i) Growth of Adult Female Goats

The biggest reach 40kg, after which they maintain this weight (see Figure 21). This probably means they are late maturing, becoming adults at 3.5 years old. The young female adults grow slowly putting on weight during winter in this severe climate. Looking at the overall average, you can see for some reason the weights of the animals decrease in December (see Figure 22).

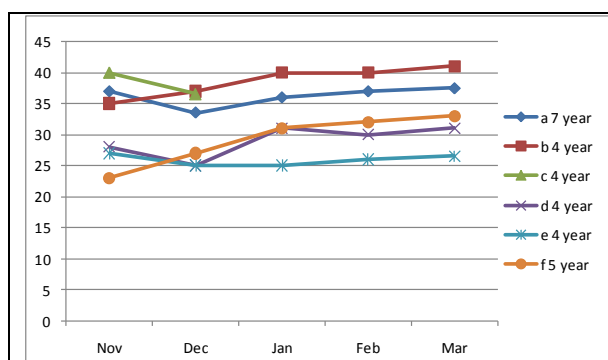


Figure 21. Individual weight of goats.

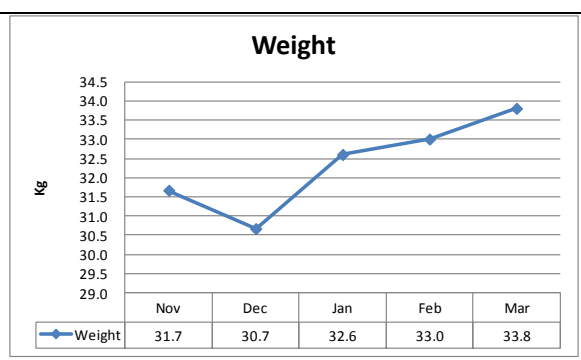


Figure 22. Average weight of goats.

(ii) Growth of Kids

The weight at birth of female goats averages 2.9kg. For males it averages 3.5kg. The overall average is 3.1kg. The average daily gain for the 120 days from November was 55g.

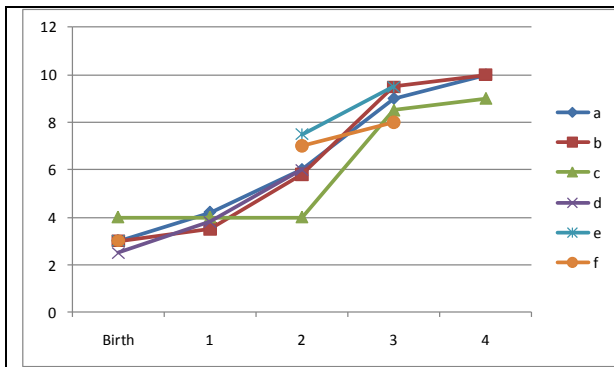


Figure 23. Individual weight of kids

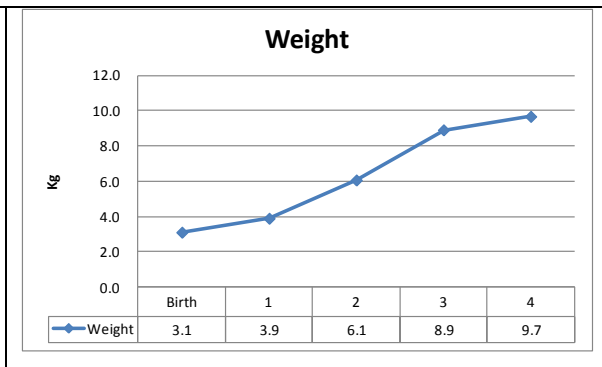


Figure 24. Average weight of kids.

Daily gain increases from birth and peaks at 95g/day at 3 months of age, there after decreasing (see Figure 25).

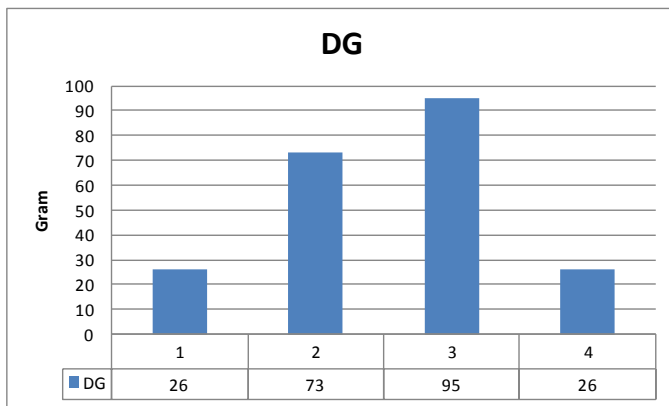


Figure 25. Daily weight gain.

(2) Sheep

(i) Growth of Ewe s

The biggest sheep reach 40kg (see Figure 26). The smallest was 33kg, which they maintain. It was confirmed they range in age from 8 to 9 years old.

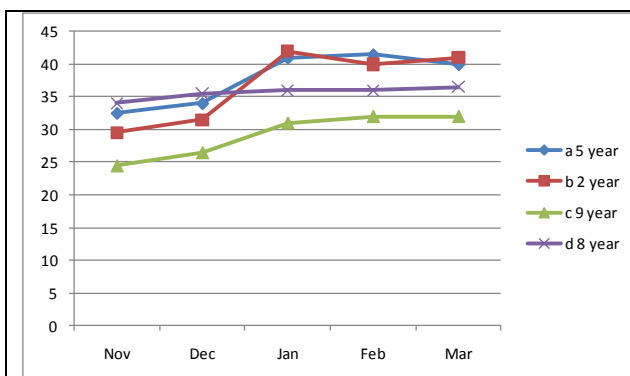


Figure 26. Individual weight of sheep.

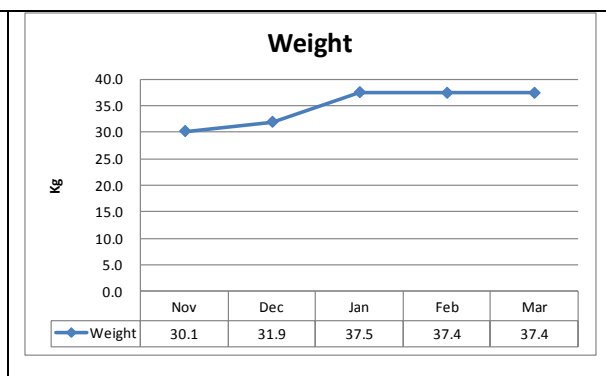


Figure 27. Average weight of sheep.

(ii) Growth of Lambs

The average weight of lambs at birth is 3.0±0.32kg (see Figure 28). The average daily gain at 2 months old is 83g/day (see Figure 29).

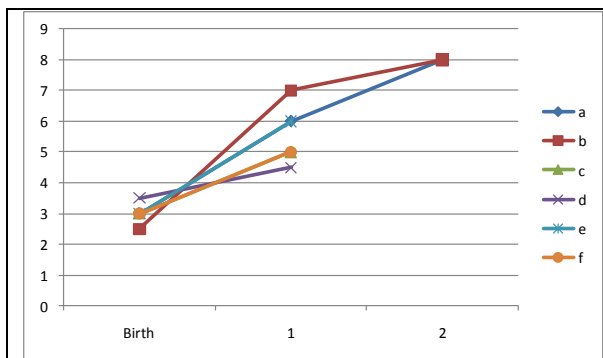


Figure 28. Individual weight of lambs

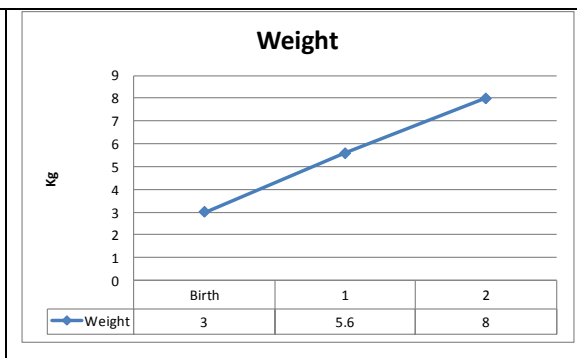


Figure 29. Average weight of lambs.

8.5.4 Cost of Living

The average cost of living over the 6 month period was 3,054Rp/week, or 12,216Rp/month, or 149,592Rp/year (see Table 64).

Table 64. Details of weekly expenses.

	Rp	%
Food, beverage,	2,589	85
Apparel, textile, and foot wear	92	3
Transport & communication	216	7
Fuel & Light	157	5
Medical care	146	5
Total	3,054	100.0

The food supply takes up 84% of income, a high Engels co-efficient.

8.6 Feeding management

The females are at the centre of the herd. The supply of feed is limited, so the females that have given birth are given priority, thus this type of herd structure develops. The goats are sold at a relatively young age, though it is not fixed. Often the animal is sold when there is a need for cash. This farm is unique in that all the goats and sheep are tagged (named). Comparing the goats to sheep, their body is slimmer, their legs longer, and they walk better. Moreover, they can stand on their back legs and reach up into a tree or shrub. In the severe savannah environment this is advantageous. On the other hand, the sheep eat all of the grass cover. But they can only eat the lower leaves on shrubs, so in a harsh environment like this, this is a handicap to survival.

8.6.1 Heat Tolerance

When at 3pm in the direct sun, the temperature was 38.8°C, we measured the respiration rate of goats and sheep, 3 of each. Goats had a respiration of 62, 50, and 56 /min., an average of 56 /min. Sheep had a respiration of 150, 140, and 150/min., and average of 150/min. From this you can see the goats have a higher heat tolerance, compared to the sheep.

8.6.2 Daily Routine for Sheep & Goats

(Rainy season: July to November)

- 6:30am:** Milking
- 7~13:00:** Grazing
- 13~14:00:** Return to village and water
- 14~17:30:** Return to grazing
- 18:00:** Milking

(Winter)

As pastures nearby do not have sufficient feed, grazing is transferred to distant pastures. Every day the animals return to the village at 10:30am to water and then return to the grazing pastures

Open grazing areas (range land) are feed resources for livestock. Small ruminants and camels are grazed throughout the year in range land. In general, milking animals are fed supplements, if grazing land conditions worsen. Sometime weak animal also are fed supplements. Farmer feed haulms and seed of legume crops to animals as protein supplements during the dry season (see Table 65, Figure 30). Tree leaves and fruits also are one of the most important protein supplements. Kandi leaves contain around 15% protein and the pods also provide a good fodder (see Table 66).

Table 65 Nutritive Value of Supplemental feeds

Supplements		DM (%)	TDN (%)	DCP (%)
Cluster bean	Hay		60.6	15.5
	Seed	92.4	70.3	22.2
Moth bean	Haulm		52.3	6.4

Table 66 Useful trees to animal feed during the dry season in Mithi, Tharparkar

Vernacular name	Botanical name	Leave	Fruit	Remark
Kandi	Prosopis cineraria	☉	☉	Cut & Carry
Khumbhat	Acacia senegal	○, ▲	☉	Grazing
Ber	Ziziphas nummularia	☉	☉	Grazing
Khabar	Salvadora oleoides	▲	○, Δ	Grazing
Devi	Prosopis juliflora		○	Grazing

☉All animal, ○Goat, ΔSheep, ▲Camel

8.8 Reproduction

The farmer does not own a stud male goat or ram for mating. He borrows a neighbour's animal for free for this purpose.

8.9 Animal Health

During this survey, 2 of the kids had diarrhoea and tympana, 1 lamb had diarrhoea and died. During the winter many have colds and coughs.

8.10 Breeds

8.10.1 Goats

Of the eleven adult female goats, 1 was a cross Kamori breed, 1 Tharri cross, and 6 Bujri cross. The average age of adult female goats was relatively young at 4.3 years old. The average weight was 31.7kg, with a maximum of 40kg and a minimum of 23kg. Average body height was 63.7cm, with a maximum of 72.7 and a minimum of 63.7cm. Average body length was 60.7cm, with a maximum of 65.6cm and a minimum of 51cm. Average chest girth was 67.6, with a maximum of 73.5cm and a minimum of 54cm.

8.10.2 Sheep

Of the 10 sheep, 7 were ewes. All the sheep were a special Kachhi breed. The average age of the ewes was 5.3 years old, with a maximum of 9 years old. The average weight was 31.3kg, with a maximum of 36kg and a minimum of 24.5kg. The average body height was 65cm, with a maximum of 69cm and a minimum of 61cm. The average body length was 59.3cm, with a maximum of 66.6cm and a minimum of 54cm. The average chest girth was 72.8cm, with a maximum of 77cm and a minimum of 69cm.

9. Medium-Scale Sheep Farmer in Arid Area

9.1 Survey background

Responsible Organisation:	Livestock Department, Tharparkar district
Person in Charge:	Mr. Jamomal
Surveyed Farmer:	Mr. Pancho
Location:	Pabuhar village, Malnor Veno Union Council, Mithi sub-district, Tharparkar district

9.2 Introduction

This farmer was selected with the co-operation of the Livestock Department, Tharparkar district. Pabuhar village is in a desert area, 25km from the district capital Mithi, and takes about 30 minutes to travel there. The Livestock Department para-veterinarian, Mr. Lala Mahraj is located in this village. The village is an old one, established over 300 years ago. It sits on 100 acres of land. There are 500 households in the village, with a total population of 3,500 living there. Almost all the villagers are keeping sheep and goat.

9.3 Criteria for Farmer Selection

Mr. Pancho was selected with the co-operation of C/P Dr. Muhammad Arif Khan and Dr. Abdul Sattar Memon. There were 2 candidates, with Mr. Pancho scoring the highest evaluation (65 points) and Mr. Mukesh scoring 59 points. Although there was not much difference in the scores, Mr. Pancho, who was positive towards the survey, ultimately was selected.

9.4 Farmer Outline

Mr. Pancho lives in the village. He is the eldest of two sons (32 years old). The actual sheep herding and management of the flock is carried out by the second eldest son. His household is made up of 4 daughters and his wife, a total of 6. The sheep and goats are the main livestock he owns. He also milks 1 cow and also raises 1 camel. Although he does not have own land, he does own a camel. So last year he work as tenant and borrow 15 acres from the land owner and cultivated it with the camel. The main crops he cultivated sorghum, millet, guar, and moth. After harvesting the crops he shared 50% with the owner. Camels will work about 6 hours a day, and so can cultivate 1.5 acres. Therefore it takes 10 days to cultivate 15 acres.

9.5 Farm Management

We confirmed with the technical specialist and the villagers that the sheep graze on grass and a shrub. The locals know the names and characteristics of all the vegetation. we can feel the long history of livestock management here. Although his younger brother performs the watching grazing and flock management, they too share management and earned income (there is no allowance). They look after the sheep, together with their uncle's flock. For this they receive an allowance of 40Rp/head/month.

9.5.1 Basic Information for Farm Management Analysis

This time the Farm Management diagnosis concentrated on the sheep and goat.

(1) Family Labour and Labourers Rates

Table 67. Family labour

	Main Occupation	Tenant land work	Livestock work	Hour	Amount /year
Grandmother	Agriculture		Miking	2=Rp24	8,760
Pancho	House work	Work	Management, Sale decision	2=Rp24	8,760
Wife	House work	Work	Milking	2=Rp24	8,760
1 st Daughter 6years		No	No		

2 nd 4years	Daughter		No	No		
3 rd 3years	Daughter		No	No		
4 th 9month	Daughter		No	No		
Brother 25years	Livestock	No	Grazing control & general management	8=100	36,500	
Total					62,780	

His younger brother works from 8~12:00am and again from 2~sunset. In the dry season the grazing pasture is 2km away. The flock walks slowly, grazing on grass as they go. It takes about 1 hour to reach the pasture area.

(2) Livestock Facilities

(i) Paddock

He uses a lorho (local name), a simple paddock surrounded by thorny bushes that needs to be repaired every year and replaced every 5 years. It takes 3 people 2 days to build it. The materials for it take 2 people/ day to collect. It costs 800Rp and Depreciation is on 300Rp

(ii) Watering Place

There are three water places established around the well. Although we thought these were all communal watering facilities, 1 of them is actually owned by Mr. Pancho. He built it 7 years ago for 5,000Rp. It has a life span of 10 years.

(iii) Equipment

No special equipment used.

9.5.2 Diagnosis of farm management

(1) Summary of Operation Results (2010)

Table 68. Abstract of the results of farm management

Articul		Last year	This year	
Current year total production cost			101,930	
Production Cost			43,180	
Sales gross profit			144,020	
Net profit year			161,020	
Net income year			223,800	
Dairy situation	Feeding size	Number of Femal Adult (head)	36	
		The total land area of fodder (Acre)		
	Income labor family	Total income family (Rp)	62,780	
		Income / Femal Adult (Rp)	1,744	
	Production Cost	Production cost Rp/milk 1Kg	69	
	Production Cost	Production cost Rp/milk 100Kg	6,854	
	Technical Level	The total production milk (Ton)		0.6
		Production milk Kg / Female Adult		17.5
		Average Fat %		?
		Average Fat non solid		?
		Average of milk price Rp		40
	Liabilities	Average of interval parturition Months		?
Balance of liabilities		Beginning year	0	
		End of year	0	

(2) Scale of Operations

Table 69. Sheep inventory

Animal Category	Nov	Dec	Feb	Mar	Apr	May
1. Milking	5	5	14	14	11	11
2. Dry	12	12	3	3	8	8
3. Ram above 1 year	2	2	2	2	1	1
4. Female young stock: (7 month until parturition)	2	2	2	2	0	0
5. Female young stock: (weaning to 6 month)	0	0	0	0	0	0
6. Female suckler: (0 to weaning)	2	2	5	5	5	5
7. Male young stock: (7 month until mating)	0	0	0	0	2	2
8. Male young stock: (weaning to 6 month)	0	0	0	0	0	0
9. Male suckler: (0 to weaning)	2	1	7	6	6	6
10. Castrated male above 1 years	0	0	0	0	0	0
TOTAL:	25	24	33	32	33	33

Table 70. Goat inventory

Animal Category	Nov	Dec	Feb	Mar	Apr	May
1. Milking	8	16	21	21	14	16
2. Dry	12	4	0	0	12	10
3. Buck above 1 year	1	1	1	1	1	1
4. Female young stock: (7 month until parturition)	6	6	5	5	0	0
5. Female young stock: (weaning to 12 month)	0	0	0	0	0	0
6. Female suckler: (0 to weaning)	0	3	3	3	4	4
7. Male young stock: (7 month until mating)	0	0	0	0	0	0
8. Male young stock: (weaning to 6 month)	0	0	0	0	0	0
9. Male suckler: (0 to weaning)	0	5	10	10	10	12
10. Castrated male above 1 year	0	0	0	0	0	0
TOTAL:	27	35	40	40	41	43

He owns all of the livestock, and he does not lend out any livestock to anyone else.

(i) Livestock Looked after for Someone Else

During the busy farm season in the wet season (from July to October) he looks after and grazes on average 25 sheep (adults). The fee for looking after these sheep is 40Rp/head/month.

(ii) Other Livestock Owned

He also owns 1 adult female cow (thari breed) for milking, 1 heifer, and 1 camel (Dhatti breed).

(3) Seasonal Production Costs

Table 71. Cost of production.

3. Cost of production, Profit and loss		MediamGoat	Milking number	0	Heads
(1) Current year production cost (Unit:Rp & %)		* Total number Goat & Sheep:		36	Heads
Annual produc. Milk:		630	0	630	Kg
		Self-consumpt	Saling	Total	
Articul		Amount (Rs.)	Amount per cow Rs.)	% of distribution	
Maiting cost		0	0	0	
Purchase Livestock animal (from outside)		0	0	0	
Purchase Feed		0	0	0	
Material for production Feed (Seed, Fertilizer etc.)		0	0	0	
Labor	Employment	0	0	x	
	Family (A)	62,780	1,744	x	
	Total	62,780	1,744	62	
Medical treatment & medicine		0	0	0	
Electricity & Water		0	0	0	
Fuel		0	0	0	
Depreciation	Building, construct	1,100	31	x	
	Machine, vehicle	500	14	x	
	Domestic animal	36,550	1,015	x	
	Total	38,150	1,060	37	
Repar cost		0	0	0	
Tool of Livestock & Agriculture		500	14	0	
Cost of consumption, Communication, Transport		500	14	0	
Cost of rental		0	0	0	
① Current year production cost total		101,930	2,831	100	
		Purchase concentrate:			Kg
② Value of animals beginning of the year		40,900	1,136		
③ Amount of female adult transferred within the year		41,650	1,157		
④ Value of animals end of the year		58,000	1,611		
⑤ Sale of kids		0	0		
⑥ Sale young & fattening animals		0	0		
Production cost ①+②-③-④-⑤-⑥		43,180	1,199		
	Production Cost /Femal adult	1,199			
	Production Cost / 1 Liter milk	69			
	Production Cost / 100 Liter milk	6,854			

(4) Calculation of Profits/ Loss

See Table 72 for details.

Table 72. Profit and loss calculations.

Articul		Amount (Rs.)	Amount per cow Rs.
Revenue from livestock	Sale of milk	0	0
	Milk consumed at home	25,200	700
	Sale of kids	0	0
	Sale young & fattening animals	162,000	4,500
	Other	0	0
	Total (B)	187,200	5,200
Cost of sales	① Value of animals beginning of the year	40,900	1,136
	② Current year total production cost	101,930	2,831
	③ Amount of cow transferred within the year	41,650	1,157
	④ Value of animals end of the year	58,000	1,611
	Total cost of Sales (C) ①+②-③-④	43,180	1,199
	⑤ Sales gross profit (B) - (C)	144,020	4,001
Selling, general and administrative expenses	Sales cost	0	0
	Insurance fee	0	0
	Office cost	0	0
	Labor cost	0	0
	⑥ Total	0	0
	Operating profit (Business profit) ⑤-⑥=(E)	144,020	4,001
Non-operating income	Interest receivable	0	0
	Subsidy and compensation	0	0
	Other	17,000	472
	⑦ Total	17,000	472
Non-operating cost	Interets payable	0	0
	Rents payable	0	0
	Other	0	0
	⑧ Total	0	0
	Net profit year (D) ⑤-⑥+⑦-⑧	161,020	4,473
	Net income year (A) + (D)	223,800	6,217

9.5.3 Productivity

There was an opportunity to observe grazing from January to May. During this dry season it is just a battle to survival in this parched environment until the wet season comes. They seek any kind of greener, whether grass or shrub. The shrubs in particular have dense canopies of green leaves. More than likely, these shrubs have deep reaching root systems to effectively extract subterranean water. For this reason the adult sheep and lambs are able to grow.

(1) Goats

(i) Growth of Adult Female Goats

The cross bred Kamori goats are the biggest, weighing about 40kg when fully grown (see Figure 31). It is presumed because they are late maturing they continue to grow until 3.5 years old. The young adult animals continue to put on weight slowly.

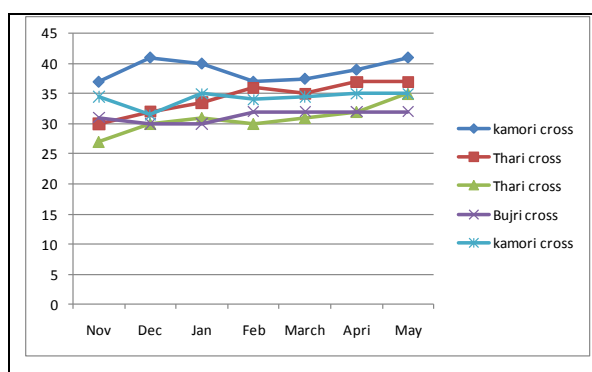


Figure 31. Individual weight of goats

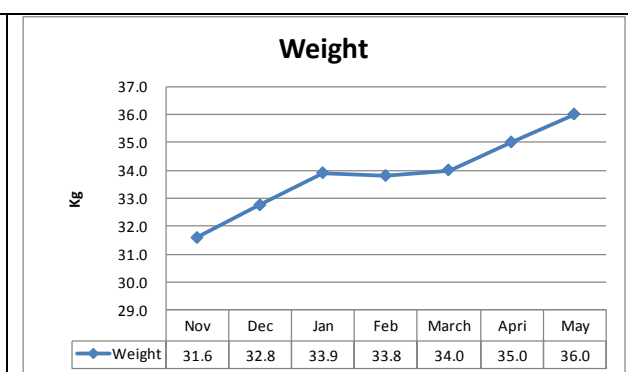


Figure 32. Average weight of goats

(ii) Growth of Kids (young goats)

The average weight at birth of female goats (4) was 3.38kg (see Figure 33). For males (10) the weight was 2.95kg. The overall average weight was 3.07 ± 0.37 kg. For the 240 days from November, the

average daily gain was 50g/day (see Figure 30).

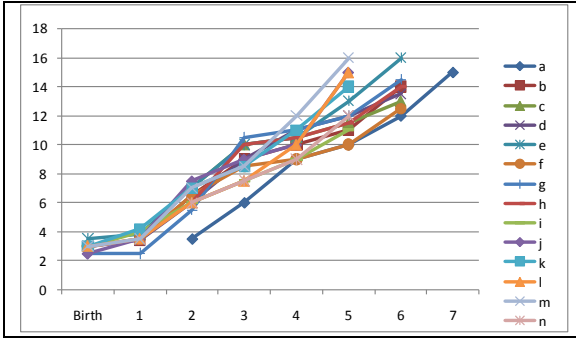


Figure 32. Individual weight of kids.

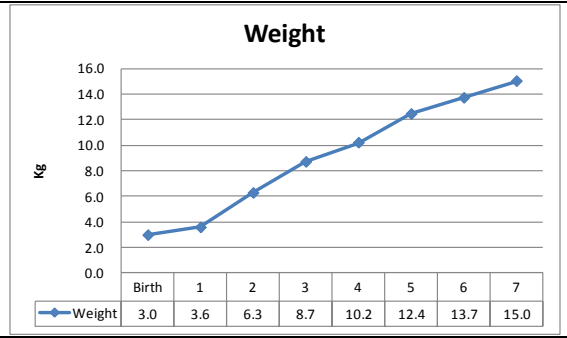


Figure 33. Average weight of kids.

Weight gain peaks at 2 months old (90g/day) and then slowly decreases to 75g at 5 months, and 45g/day there after.

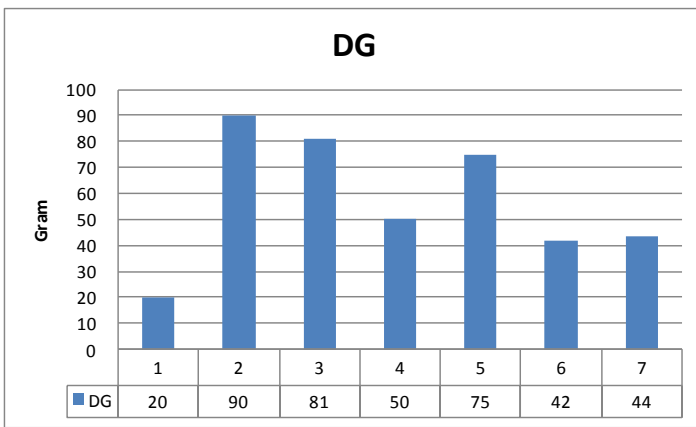


Figure34. Daily gain of kids.

(2) Sheep

(i) Growth of Ewes

The largest ewes are 40kg, with slow ones weighing 33kg (see Figure 35). The overall weight gain continues steadily until the animals reach earlier adulthood (3.5 years old).

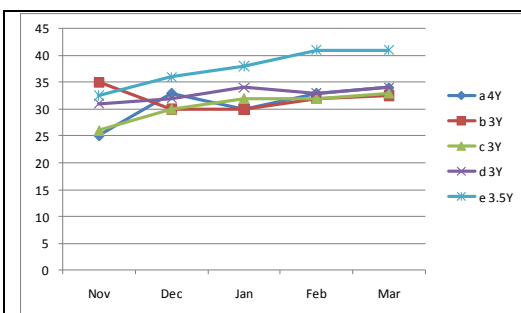


Figure 35. Individual weight of ewes.

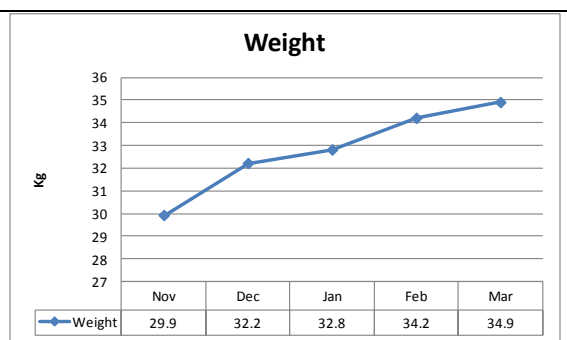


Figure 36. Average weight of ewes.

(ii) Growth of Lambs

The average weight at birth for females (6) is 3.28 ± 0.72 kg, for males (10) 2.85 ± 0.25 kg, for an overall average of 3.06.

For the 240 days from November, the average daily gain was 105g/day.

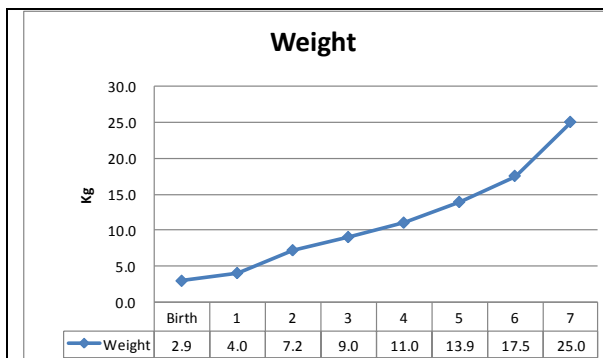


Figure 37. Individual weight of lambs

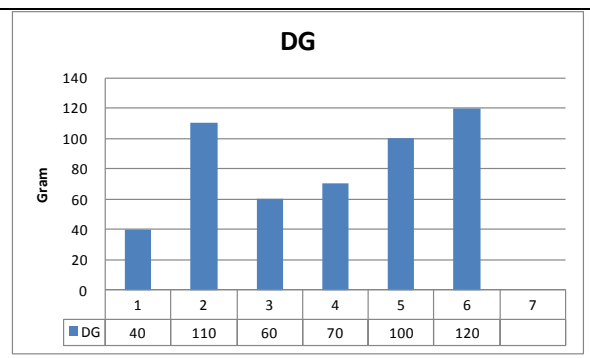


Figure 38. Average weight of lambs.

9.5.4 Cost of Living

During the 6 months of data collection, the cost of living was 3,537Rp/week, or 14,148Rp/month, or 169,776Rp/year (see Table 74). Net income from livestock was 223,800Rp, enough to cover the cost of living, but not with a great deal of room to spare, especially since there is no children's education or other expenses to cover. The cost of food supplies is 84% of expenditures, a high Engels co-efficient.

Table 74. Details of weekly expenditures.

	Rp	%
Food, beverage,	2,979	84
Apparel, textile, and foot wear	212	6
Transport & communication	98	3
Fuel & Light	184	5
Medical care	64	
Total	3,537	100.0

9.6 Feeding management

On the first day of the survey, each individual animal was confirmed, ear tagged, body weight, body measurements were taken in the middle of the paddock. All livestock are owned by Mr. Pancho. The total number of livestock is 27 goats, 24 sheep for a total of 51 animals (all owned by Mr. Pancho). There was 1 male goat, and 2 rams. When selling an animal males have priority. In this way females remain in the flock to produce the current make-up. There is no custom of naming animals, but they know well the individual characteristics of every animal. They also raised a cow for milking, as well as a heifer and a camel.

9.6.1 Livestock Facilities

(1) Paddock

He uses a lorho (local name), that is built near the watering place.

Watering Facilities: There are 3 watering places built near the well, with paddocks made from thorny bushes nearby. I thought all these were communal facilities, but in fact Mr. Pancho owns one of them.

(2) Daily Routine for Sheep and Goats

(Wet season: from July to October)

7:00am: Milking

8:00: Grazing

15:00: Return to village for watering

16:00: Grazing

19:00: Return to village for watering

(Winter)

In the winter, the feed in the pastures near the village is not sufficient, so the animals must travel to more distant pastures. Every day they return to the village at 1:00pm to water and then return to the pasture areas.

9.8 Reproduction

During the wet season there is a short period where feed of high nutrition is more readily available. During this period the sheep and goats recover with sufficient nutrients and in the latter part of the wet season many of the female goats come into heat. For this reason every year from late November to March is the birthing season.

9.9 Animal Health

9.10 Breeds

9.10.1 Goats

Make up of the flock: 20 animals are adult females, 1 male adult, and 6 young female goats.

(1) Breeds

All of the animals are crossbred of the Kamori, Bujri, and Harri breeds. The most prevalent is the Thari breed. The animals are relatively young, with an average age of 4.1 years old. The average weight is 31.7kg, with a maximum of 37kg and a minimum of 27kg. The average body height is 72.9cm, with a maximum of 79.9cm and a minimum of 69.1cm. The average chest girth is 71.8cm, with a maximum of 79cm and a minimum of 67cm. Milking Efficiency Of the 20 animals 8 are being milked (40%).

9.10.2 Sheep

The make up of the flock, 16 adults, 2 rams, 2 young sheep (1 male and 1 female), and 4 suckling lambs (2 male and 2 female).

Breeds They are all a special Kacchi breed. The average age is 3.3 years old, with a maximum of a 4 year old. The average body weight is 29.9kg, with a maximum of 35kg and a minimum of 25kg. The average body height is 63.3cm, with a maximum of 65.5cm and a minimum of 61cm. The average body length is 50.5cm, with a maximum of 66.8cm and a minimum of 50.5cm. The average chest girth is 76.2cm, with a maximum of 78cm and a minimum of 72cm.

Table 75. Body measurements of goat and sheep.

Goat n=6	Esti.	Measurement			
	Age Year	Height Front	Length cm	Girth cm	Weight Kg
Average	4.1	72.9		71.8	31.7
Max.	6.0	79.9		79.0	37.0
Min.	3.0	69.1		67.0	27.0
Sheep n=5	Esti.	Measurement			
	Age Year	Height Front	Length cm	Girth cm	Weight Kg
Average	3.3	63.26	50.5	76.2	29.9
Max.	4.0	65.5	66.8	78.0	35.0
Min.	3.0	61.9	50.5	72.0	25.0

Annex of feed Composition

Table of Feed Composition														
Category	Feed		DM (%)	Chemical composition							Nutrients Value		Ref.	
				CP	CF	E.E	NFE	Ash	Ca	P	DCP	TDN		
				As % of dry matter										
Green	Jowar	Fresh	23.3	8.2	22.6	1.5	61.9	5.8				4.1	54.4	2
Fodder	Maize	Fresh	21.9	10	31.5	1.4	48.4	8.7				5.5	60.9	2
	Bajra	Fresh	15	13.7	27.5	1.7	42.2	14.9				7.1	59.5	2
	Rice(vegetative)			7	25.9	1.8	47.3	18						2
	Rice(regrowth)		32.8	9	28.3	1.8	45	15.9				5.2	55.7	2
	Lucerne	Fresh	22.7	22.9	26	3.5	36.1	11.5	2.56	0.31		18.1	62.0	2
	Berseem	Fresh	11.5	21.4	23.2	3.4	33.8	18.3	2.25	0.3		16.9	66.0	2
Crop residues	Wheat	Dry	92	3.1	45.4	1.1	40.2	10.2				0.02	36.2	2
	Rice	Dry	93.8	2.4	36.5	0.9	43.8	16.5				0.24	41.7	2
	Maize	Dry	84.1	5.9	38.5	1.8	44	9.8				2.1	56.7	2
	Sorghum	Dry	93.7	3.7	41.8	1.1	44	9.4				1.2	55.3	2
	Millet	Dry	94.5	3.8	37.3	1.5	51.5	5.9				0.5	45.3	2
	Barley	Dry	91.7	25	44.6	1.4	33.9	17.6				6.5	47.3	2
	Sugercane top	Fresh	29	5.9	33.5	1.7	50.3	8.5				2.9	49.2	4
	Sugercane trush											0.6	37.3	4
	Cotton leave	Fresh	40.0	22.3	10	—	47.9	19.8	1.93	0.48		15.2	53.7	1
	Chick pea	Dry	90.6	6	44.4	0.5	35.8	13.3	0.34	0.12		2.4	37.0	2
	Lentir	DM												
	Field pea	Dry	88.4	8.4	42.5	1.4	39.6	8.1				4.1	48.1	2
	Mung	Dry		8.9	28.1	2.8	47.1	13.1				6.5	54.9	2
	Rabi pulses	Dry												
	Kharif pulses	Dry		8.9	28.6	2.8	47.1	12.6				6.5	55.1	2
	Groundnut	Dry		9.9	21.1	2.4	57.3	9.3				6.3	68.7	2
	Guar	Dry		10.6	23.9	1.5	53.4	10.6				6.5	67.3	2
	Sunflower	Dry	21.2	19.4	9.3	3.3	49.4	18.6				14.4	57.5	2
By-products	Wheat	Bran	90.2	15.2	10.1	5.6	64.4	4.7	0.12	0.72		12.6	73.3	1
	Rice	Polish	91.20	12.2	13.3	10.6	53	10.9	0.32	0.96		10.6	80.2	1
	Cotton	Seed cake	88.8	27.4	18.9	8	39.3	6.4	0.21	0.84		19.7	78.5	1
	Sunflower	Seed cake	87.5	36.4	12	12.3	29.3	10	0.57	1.37		27.3	71.1	1
	Groundnut	Meal	90	33.5	25.5	10.1	24.6	16.3				31.5	75.4	2
	Sesame	Meal	91	42	7	8.7	30.1	12.2	2.67	0.94		38.2	63.9	1
	Cluster bean	Meal	91.5	45.3	8	6.2	34.1	6.4	0.4	0.67		43.3	75.8	1
	Linseed	Cake	91	43.1	10.8	11.7	28	6.4	0.57	1.03		37.3	83.9	1
	Rape & Mustard	Seed cake	91.5	39	10.2	3.4	36.1	11.3	0.81	1.16		32.8	65.6	1
	Mung Churi	with Hull	90.6	20.5	10.8	2.9	48.3	17.5				11.7	56.3	3
	Chick pea Churi	with Hull	90.3	11.7	23.9	2.8	50.2	11.4				7.7	72.0	3
	Other bean Churi	with Hull	88.8	19.65	14.8	1	60.4	7.8				9.6	69.6	2
	Wheat	Middling	88.9	11.8	0.6	1.7	85.4	0.5				8.7	81.6	2
	Maize	Bran												
Non-conventional feeds	Bagasse		51.2	1.8	48.7	—	47.2	2.3	1.11	0.02		0.0	33.7	1
	Molasses		78									2.6	73.0	1
	Wasted dates													
	Fruit juice													
	Bone meal		89.5	22.8	2.2	2.2	7.8	65	20.75	9.16				1
	Blaad meal		89.3	77.5	1.5	3.2	8.3	9.5	0.7	0.34				1
	Fish meal		92.2	55.6	1.1	9.7	0.3	33.3	7.28	1.96				1
	Banana leave & stem	Fresh	20.5	11	29.6	3	25.8	30.6	1.41	0.26				1

Source:

1 Composition of Various Indigenous Feeding Stuffs of Sindh Province, Pkistan, Sindh Agriculture University, Tandojam, 1982

2 Animal Feed Resource Information System, FAO, http://www.fao.org/ag/aga/AGAP/FRG/afris/index_en.htm

3 Data analyzed at Department of Food and Nutrition, University of Veterinary and Animal Sciences, Lahore December 2010

4 Standard Tables of Feed Composition in Japan, Japan Livestock Industry Association

III. Cross-Sectional Analysis of Dairy Farm Management

1. Background

This diagnosis of dairy farm management is based on a periodic survey of 5 different categories of farm.

No. 1 farm is a small-sized farm operated by a landless farmer in Hyderabad District.

No. 2 is a small-sized farm operated by a land-owning farmer in Mirpurkhas District.

No. 3 is a medium-sized farm operated by a landless farmer in Mirpurkhas District.

No. 4 is a medium-sized farm operated by land-owning farmer in Tando Allhayar District.

No. 5 is a large-sized farm, operated by a landless farmer in a cattle colony near Hyderabad City.

The farm management diagnosis is based on weekly and monthly data collected over 6 months from December 2010 to May 2011. This data was then used to estimate annual production costs, and profits and losses for the year 2010 (see Table 1). However for the No. 5 farmer at the cattle colony, there is a large turnover (purchases and sales) of livestock that has a big influence on monthly balance of payments. Extrapolating this data to annual estimates is problematic, so the farm management diagnosis is performed on the half year period for which there is actual data.

For the purposes of comparative farm analysis, the data for the small-sized land-owning farmer (No. 2) is incomplete, and hence is not included in this analysis. This analysis is restricted to the four remaining farms.

2. Results

In terms of farm scale and location, the No. 5 farm located near Hyderabad City stands out as a large commercial dairy enterprise employing 27 people, and milking an average of 323 head of cattle per month. The other three farms are located in more rural areas and practice more traditional forms of cattle raising and dairy production. As a consequence total milk production for the farms was 1,780; 1,862 ; 1,500; and 367,830 litres respectively for farms No. 1, 3, 4, and 5. Milk production for the No. 5 farm was on a totally different scale (see Table 76).

Table 76. Comparison of Farm Management Results

		Category of Farm	No.1.Small Scale Dairy Landless	No.3.Medium Scale Fdairy Landless	No.4.Medium Scale Dairy Owns land	No.5.Large Scale Dairy Landless	
Articul		District name	Hyderabad	Mirpurkhas	Tando Allahayar	Hyderabad	
		Village name	Mithio Hajano	Haji Allah Bux Maree	Bachai Khaskheli	Old Cattle Colony	
a. Scale	Cow number (head)		3	4	3	323	
	Own land (Acres)		0	0	5	0	
	Tenant land (Acres)		0	5	0	0	
	Production Fodder (Acres)		0	0.25	0.50	0	
	Sale animal (Head)	New calf		0	0	0	?
		Young animal		1	1	2	?
Fattening animal			0	0	0	?	
b. Production Cost	Current year production cost total		174,075	81,480	57,035	17,718,348	
	Production cost Rs.		163,615	44,454	25,271	15,193,838	
	Production cost/1 liter milk Rs.		92	24	17	41	
	Production cost/Cow Rs.		54,538	11,114	8,424	47,039	
c. Income	Net income year Rs.		85,050	48,816	43,254	4,173,322	
	Net income year/ Cow Rs.		28,350	12,204	14,418	12,920	
	% of Income		46	57	54		
d. Profit & loss	Per one cow	Income livestock Rs.	26,733	13,888	19,167	59,279	
		Sale cost price Rs.	57,538	13,364	15,090	47,102	
		% of Purchase feed	33	4	2	?	
		% of Depreciation	12	36	27	?	
f. Production Technique level	Total milk production Liter		1,780	1,882	1,500	367,830	
	Production milk / Total cows Liter		593	466	500	1,138	
	Average of milk sale price Rs.		40	25	25	52	

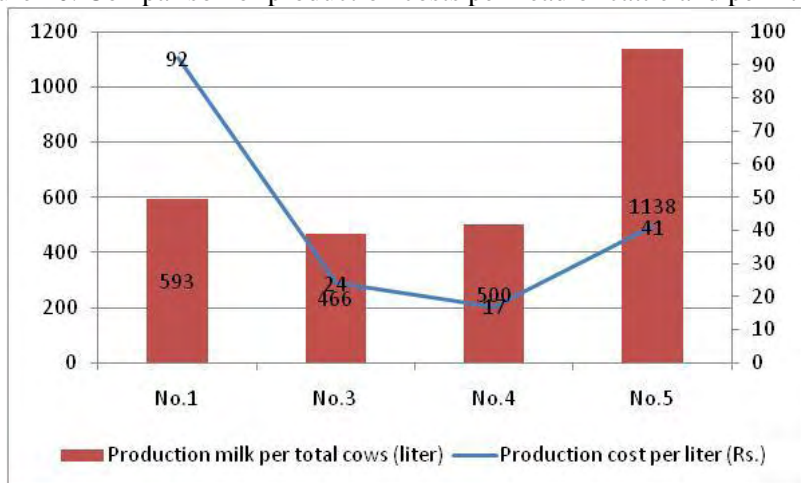
The estimated production costs in the year 2010 (excluding No. 5 farm) were 170,075; 81,480; and 57,035 Rs for farms No. 1, 3, and 4 respectively. Production costs for No. 1 farm were roughly twice those for No. 2 farm, and three times those for No. 4 farm. The reason for this is that the landless No. 1 farmer has to buy in feed (wheat bran and cotton seed cake) throughout the year, while only getting poor milk yields from the water buffalo. It can be seen that this results in high production costs.

Production costs per litre were 92; 24; 17; and 41 Rs respectively. The production costs for No. 1

farm were extremely high compared to the other farms. It is interesting to note that, even though the farmer in the cattle colony (No. 5 farm) had to purchase all his feed and pay a salary to all his employees, his production cost of 41 Rs/litre was still less than the 92 Rs the farmer on the No. 1 farm was paying. When milk production efficiency per head of cattle was calculated, the results were 593, 466, 500 and 1,138 litres/head of cattle respectively (see Figure 40). The production efficiency on farm No. 5 is roughly twice that of the other farms. Thus, it can be inferred that it costs 41Rs per litre to achieve this production efficiency.

Production costs per head of cattle were calculated to be 54,538; 11,114; 8,424; and 47,039 Rs respectively. For No. 3 and 4 farms that do not purchase much feed, costs are about 10,000 Rs/ head of cattle, roughly a fifth of the 54,538 Rs that for No. 1 farm. This cost for No. 1 farm is even higher than that paid on No. 5 farm.

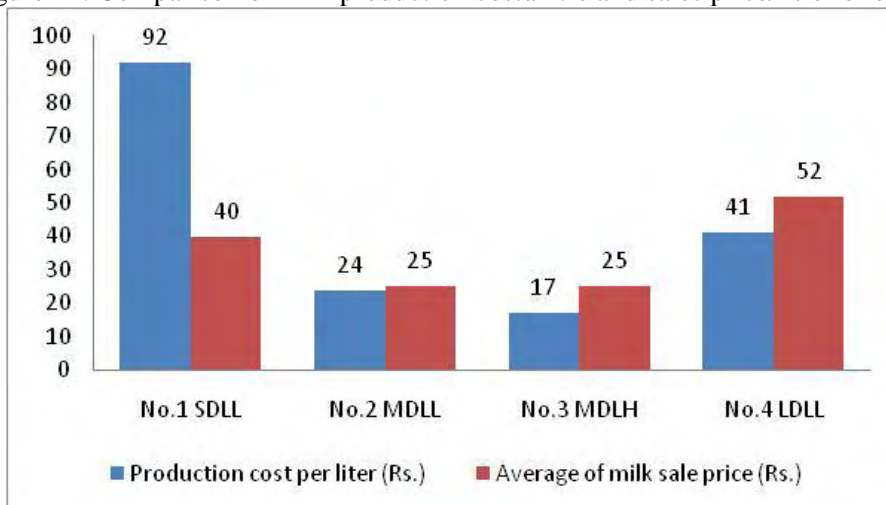
Figure 40. Comparison of production costs per head of cattle and per litre of milk.



The percentage of purchased feed to total production costs was 33%, 4% and 2% respectively. Family labour costs were a relatively high 46%, 57%, and 54% respectively. This indicates how much traditional dairy farming in rural Pakistan depends on raising the cattle on natural feed, such as pasture grasses and crop harvest residues, thereby minimizing feed costs.

When comparing milk production costs and /litre with average sales price/litre, the production costs were 92 for 40, 24 for 25, 17 for 25, and 41 for 52 Rs respectively. Except the No.1 farm, the other three farms getting profit.

Figure 41. Comparison of milk production costs/litre and sales price/litre for each farm.



The price of milk varies significantly depending on region. In the future it will be important to reduce this gap. A price of 52 Rs for milk from the cattle colony, located Hyderabad city is 12 Rs higher than the 40 Rs received for milk from Mithio Hajano village, located 20 kilometers from Hyderabad city. For milk produced in the districts of Tando Allhayar, one hour drive away, and Mirpurkhas, a two hour drive away, there is a large drop in price to 25 Rs.

3. Discussion

3.1 Small-Sized Farms

1) Husbandry on Small-Sized Dairy Farms (<5 head of cattle, including calves)

For dairy farmers operating with this small number of animals, it is difficult to operate the farm on a sound economic basis. There is a need to increase the number of animals being raised.

For example, if there are two animals being milked throughout the year, then a stable volume of milk can be sold. In Sindh province the conception rate of buffalo is estimated to be less than 50%. With this low rate of reproduction, if there are 4 adult females being kept, this will ensure 2 are available for milking at any one time. With this calculation in mind, it is estimated that the small-sized farmer needs to increase his herd size to the level of a medium-sized farmer of 6 to 10 animals.

2) Approach of Small-Sized, Land-Ownning, Livestock Farmers

A dairy farmer of this size cannot live off farm earnings alone, he needs to supplement his income with outside work.

3.2 Small to Medium-Sized Dairy Farms

1) Small to Medium-Sized Dairy Farms Raising Livestock on Naturally Available Feed (Natural feeding)

This traditional, low cost, approach maximizes the use of local conditions and natural resources for raising livestock. In this approach family labour costs account for around 50-60% of total costs.

2) Small to Medium-Sized Farms with Land Rented from the Local Landlord

For example, a very profitable approach in Tando Allhayar and Mirpurkhas districts is to grow cash crops on the rented land, and sharing 50% the harvested crop with the landlord as a form of rental payment. It is also possible to grow some fodder on part of the rented land. Landlords in Mirpurkhas District provide seeds for sowing, and fertilizer on an informal loan basis.

3.3 Medium-Sized Farms

1) A High Potential to Improve Production Efficiency on these Farms (whether the farmer owns land or not).

By improving production efficiency there is a high potential to put dairy farming on a sound economic footing.

2) Even Medium-Sized, Landless Farmers Can Run an Economically Sound Dairy Farm.

For example, in the cattle colony of Jat, in Badin District, if current milk yields from buffalo are ensured, this is more than enough to cover feed purchases. With good nutritional management and husbandry, farm management can be put on a sound economic basis. Even with 100% purchase of feed and the resultant increases in milk yields, it is possible to constrain production costs and put dairy farm management on sound economic basis, similar to above.

3.4 Large-Sized Dairy Farms

1) Opportunities to Improve Productivity on Large-Sized, Landless Dairy Farms

Under current management regimes, it was confirmed that there are large differences in individual animal milk productivity, ranging from 2.7 to 17 litres /day/animal. Given this large difference in individual productivity, it is possible to improve productivity by increasing the number of animals with high production capacity. Moreover, production capacity can be improved by dividing the herd into low and high production groups, and feeding the groups appropriately, according to their production capacity. However, there is the problem in the tightly confined cattle colonies that many of the dry animals are sold off, and new livestock with widely varying production capacity are brought in on a regular basis.

Appendix G

Institutions

(Research and Development Institute of Buffalo)

**DISTRICT WISE LIST OF VETERINARY INSTITUTIONS WORKING IN SINDH PROVINCE
ALONG WITH POSITION OF STAFF SANCTIONED / WORKING IN THESE INSTITUTIONS**

Sr. #	District	No. of Vet. Hospitals / Dispensaries	No. of Vet. Mobile Units	No. of Union Council Vet. Centers	Total	Allocation of Staff						Total				
						Technical		Para Technical		Other		Sanctioned	Working	Sanctioned	Working	
						Sanctioned	Working	Sanctioned	Working	Sanctioned	Working					
1.	Naushahro Feroze	10	01	42	53	14	10	77	60	44	31	135	101			
2.	Sanghar	12	03	28	43	15	11	43	37	49	38	107	86			
3.	Karachi	06	01	08	15	33	32	19	19	30	27	82	78			
4.	Larkana	08	01	16	25	18	12	48	46	40	36	106	94			
5.	Sukkur	07	0	16	23	10	05	25	25	66	66	101	96			
6.	Ghotki	04	01	13	18	09	05	20	20	32	30	61	55			
7.	Mirpurkhas	10	01	50	61	20	19	24	24	28	27	72	70			
8.	Jamshoro	01	01	18	20	10	07	20	14	27	21	57	42			
9.	Khairpur	22	03	75	100	18	17	85	83	75	75	178	175			
10.	Umerkot	02	0	110	112	15	15	22	18	16	16	53	49			
11.	Tando Allahyar	03	0	07	10	07	07	14	08	14	11	35	26			
12.	Shikarpur	08	01	22	31	13	13	26	21	47	47	86	81			
13.	Jacobabad	05	01	20	26	04	03	17	17	26	26	47	46			
14.	Mohtarma Benazir Bhutto Shaheed (Nawabshah)	10	0	44	54	16	12	38	38	32	26	86	76			
15.	Tando Muhammad Khan	04	01	11	16	05	05	09	09	21	21	35	35			
16.	Thatta	12	01	19	32	13	10	15	15	54	54	82	79			
17.	Badin	07	01	23	31	15	14	23	20	45	45	83	79			
18.	Tharparkar	08	02	151	161	17	09	128	82	106	62	251	153			
19.	Hyderabad	04	01	13	18	28	23	26	21	39	39	93	83			
20.	Kashmore	06	0	08	14	06	03	12	11	11	11	29	25			
21.	Matiari	07	0	23	30	12	12	23	23	20	20	55	55			
22.	Qambar / Shahdadkot	08	0	21	29	12	06	13	13	18	18	43	37			
23.	Dadu	08	03	48	59	18	15	61	61	54	54	133	130			
TOTAL SINDH PROVINCE					172	23	786	981	328	265	788	685	894	801	2010	1751

Annual Development Plan (ADP) for the Directorate of Animal Husbandry

2007-2008

1.	TOTAL NO: OF SCHEMES	24
	A. ON GOING SCHEMES	13
	B. NEW SCHEMES	11
2.	NO: OF APPROVED SCHEMES	17

	NAME OF SCHEME	Status	Total Cost of the Scheme (Rs. million)
	<u>ON GOING SCHEMES</u>		
I	Kooka Sheep Farm at Sukkur.	Approved	52.167
II	Training of Rural Women for increasing Livestock Production & Conversion into bi-products.	Approved	35.247
III	Control of Endo & Ecto Parasites in Livestock.	Approved	39.999
IV	Awareness of farmers through transfer of appropriate technology regarding livestock nutrition, breeding, management, disease control and marketing.	Approved	15.027
V	Establishment of Research & Extension Centre for Small ruminants at Dhoru Naro district Umrtkot.	Approved	69.375
VI	Control of Foot and Mouth Disease in Five Districts viz, Karachi, Tharparkar, Hyderabad, Larkana & Jacobabad.	Approved	39.837
VII	Improvement of Existing Livestock Farms in Sindh.	Approved	140.447
VIII	Establishment of Bari Goat Breeding & Research farm for meat development.	Approved	109.174
IX	Establishment of Research & breeding farm for pateri goat breed.	Approved	96.335
X	Establishment of Cattle Colonies with District & Private participation Phase-I.	Approved	3328.912
XI	Establishment of Bhambhore Dairy Village & Processing Zone for Meat Animals with public-Private participation at District Thatta (Survey & Feasibility Studies).	Approved	19.470
XII	Construction of Pre-Fabricated Boundary Wall around Cattle Farm & Poultry Research Institute spread over an area about 535.39 acres in Korangi Industrial Area Near Bilal Colony Karachi.	Approved	56.895
XIII	Improvement of Livestock in Coastal areas of Thatta & Badin.	Approved	39.999

	NAME OF SCHEME	Status	Total Cost of the Scheme (Rs. million)
	<u>NEW SCHEMES</u>		
I	Strengthening of Research & Training Institute for Livestock Dev. at Tando Muhammad Khan.	Approved in principal	39.244
II	Establishment of Salvage Farms.	Approved	44.387
III	Establishment of Bhambhore Dairy Village & Processing Zone for Meat Animals with Public-Private Participation at Dist: Thatta.	Un-Approved	350.000
IV	Capacity Building of Officers / Officials of Livestock wing through Training / Post Graduate Diploma & Short Courses.	Approved	48.520
V	Camel Breeding & Research Farm for Dhatti Camel.	Un-Approved	50.000
VI	Establishment of Directorate of Information & Publicity for Livestock Development.	Un-Approved	15.000
VII	Establishment of Feed Mill & Construction of Two Veterinary Dispensaries and Six Veterinary Centers at District Karachi, Umerko & Khairpur.	Approved in principal	35.624
VIII	Establishment of Community Livestock Farm at Model Village Ahmedabad District Thatta.	Approved	18.383
IX	Provision of Chilling Tanks.	Approved	99.800
X	Establishment of Model Community Farms.	Un-Approved	600.000
XI	Goat Demonstration Farm in the Coastal area of Thatta.	Approved in principal	76.310

2008-2009

1.	TOTAL NO: OF SCHEMES	17
	A. ON GOING SCHEMES	11
	B. NEW SCHEMES	06
2.	NO: OF APPROVED SCHEMES	14

	NAME OF SCHEME	Status	Total Cost of the Scheme (Rs. million)
	<u>ON GOING SCHEMES</u>		
I	Control of Endo & Ecto Parasites in Livestock.	Approved	39.999
II	Establishment of Research & Extension Centre for Small ruminants at Dhoro Naro district Umrtkot.	Approved	69.375
III	Control of Foot and Mouth Disease in Five Districts viz, Karachi, Tharparkar, Hyderabad, Larkana & Jacobabad.	Approved	39.837
IV	Establishment of Bari Goat Breeding & Research farm for meat development.	Approved	109.174
V	Establishment of Research & breeding farm for pateri goat breed.	Approved	96.335
VI	Establishment of Cattle Colonies with District & Private participation Phase-I.	Approved	3328.912
VII	Strengthening of Research & Training Institute for Livestock Dev. at Tando Muhammad Khan.	Approved	39.244
VIII	Capacity Building of Officers / Officials of Livestock wing through Training / Post Graduate Diploma & Short Courses.	Approved	48.520
IX	Establishment of Feed Mill & Construction of Two Veterinary Dispensaries and Six Veterinary Centers at District Karachi, Umerko & Khairpur.	Approved	35.624
X	Provision of chilling Tanks for the Development of Milk Collection Network with Public Private Partnership.	Approved	299.488
XI	Establishment of Community Livestock Farm at Model Village Ahmedabad District Thatta.	Approved	18.383

	NAME OF SCHEME	Status	Total Cost of the Scheme (Rs. million)
	<u>NEW SCHEMES</u>		
I	Establishment of Goat breeding farm at Hala.	Un-Approved	-
II	Improvement of Hostel facilities for farmers and in-service training institute for livestock Development Tando Muhammad Khan.	Approved	39.807
III	Construction of Taluka Veterinary Dispensaries in Sindh Phase-I.	Approved	353.743
IV	Construction and up-gradation of Veterinary Centers to Veterinary Dispensaries.	Approved	165.789
V	Public Private partnership for Developing Livestock and Dairy farming in Sindh.	Un-Approved	500.000
VI	Establishment of Bhambhore Dairy Village & Processing Zone for Meat Animals with Public-Private Participation at Dist: Thatta	Un-Approved	350.000

2009-2010

1. TOTAL NO: OF SCHEMES 02
 - A. ON GOING SCHEMES 02
 - B. NEW SCHEMES 00

2. NO: OF APPROVED SCHEMES 02

	NAME OF SCHEME	Status	Total Cost of the Scheme (Rs. million)
	<u>ON GOING SCHEMES</u>		
I	Construction of Taluka Veterinary Dispensaries in Sindh Phase-I.	Approved	353.743
II	Construction and up-gradation of Veterinary Centers to Veterinary Dispensaries.	Approved	165.789

Buffalo Breed Improvements

In Sindh province milk production is predominantly from buffaloes (only about 10% of the milk is obtained from cattle). Moreover, most consumers prefer to drink buffalo milk compared to cattle milk. Given this situation, in any future development of the dairy industry buffaloes will play a major role. An important key to this buffalo production though will be improvements to productivity. With this in mind, in October 2010 we visited the Buffalo Research Institute in Pattoki district, Punjab province, and the Development & Research Kundhi Buffalo Farm in Sukkur district, Sindh province. There we observed and collected information related to the activities of these institutes, as well as conducted interviews with key staff members.

I. Buffalo Research Institute (BRI); Pattoki, Punjab province

1. Introduction

This institute is involved in the research development of Nili-Ravi buffalo (a milk type buffalo). Their main activities center on a progeny testing program, a form of sib testing that selects proven (tested) bulls to sire offspring with improved productivity. To achieve this the institute maintains a staff of 512 (58 technical staff) and a large budget to perform these activities. Although their level of endeavor and motivation are laudable, low conception rates for artificial insemination and the low level of extension reaching farmers, begs the question about the effectiveness of the progeny testing program.

Efficient artificial insemination is a vital technical link in the successful establishment of a progeny testing program. It is through artificial insemination that candidate bull buffalo and their offspring are produced. And then through selection of proven bulls with desired genetic characteristics frozen semen is collected. This semen is then used to artificially inseminate buffalo being raised by farmers to produce a new generation of buffalo with improve productivity. Although the amount of semen being collected this way and the number of calves produced by artificial insemination using this semen have not been confirmed by the institute, it is thought to be minimal. If the number of calves produced via artificial insemination was divided by the total amount invested in BRI, the cost per offspring would surely be extremely high.

2. History

The Breeding Cattle Center was established in 1977, and Buffalo Research Institute (BRI) functioning since October, 2005, is exclusively mandated for research based development of buffalo.

3. Location

BRI is located at a central place of the famous Nili and Ravi breeds of buffalo. It is 72 km from Lahore on Lahore-Multan Road, is located between latitude 27 to 34 and longitude 68 to 75. It is spanned over an area 1079 acres. Its Southern side is occupied by Ravi campus of UVAS, Lahore.

4. Mission

To increase income of farmers by raising unit productivity of buffaloes through research based applications in area of its reproduction and production resulting into poverty alleviation and thereby socio-economic development.

5. Objectives

- 1) Genetic development in buffalo through production of maximum number of proven bull and their wide scale use in breeding.
- 2) Development and application of the latest reproductive technologies for enhancing reproductive efficiency in buffalo and produce genetics material as per international standards.
- 3) Improving reproductive and productive traits in buffalo.
- 4) Nutritional interventions for balanced feed, TMR and such other non-conventional aspects.
- 5) Training of farmers in buffalo management dairying and meat production.

6. Strategy

Increase in unit productivity by bringing about genetic development through maximum use of proven bulls.

Focused areas:

- 1) Progeny testing Program
- 2) Production of Balanced Feed and introduction of new feed intervention.
- 3) Mechanization in Agriculture and Dairy Operations.
- 4) Embryo Transfer
- 5) Training of farmers in buffalo dairying and meat production and promotion of buffalo.

7. Divisions

- 1) Administrative & Management, 2) Breeding & Genetics, 3) Animal Reproduction, 4) Animal Nutrition, 5) Farm & Health, 6) Economics & Technology Transfer

8. Laboratories

- 1) Computer and Molecular Genetics (field PTP)
- 2) Male Reproduction (semen deep freezing, Andrology)
- 3) Embryo Transfer (E.T)
- 4) Feed Analysis
- 5) Rumen Microbiology

9. Production and Reproduction

Bulls (draft animal) : 3 heads Buffaloes cows : 279 heads Male Young Stock : 13 heads Female Young Stock : 149 heads Male Suckle : 97 heads Female Suckle : 107 heads CRC 'Buffalo Calve raising for semen collection : 12 heads	Total 660 heads
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*Result of Reproduction

Buffaloes Cows Pregnant : 90 heads	(32% of pregnant in 279 heads)
Female Young Stock Pregnant : 30 heads	(20% of pregnant in 149 heads)
Calving due in current month : 20 heads	

*** Supply of Breeding Stock Bulls**

Private Breeder for selling : 29 heads

Annually 400 bulls are bred, of these 100 (25%) are supplied to the artificial insemination centers for semen collection, 150 (38%) bulls are distributed to farmers for natural mating, and the remaining 150 animals are weeded out of the program.

10. Buffalo Breeds

There is relatively small variation in body stature amongst buffaloes. The form of the horn is different, with or without white spot markings in various patterns on the body. I confirmed that the Nili-Ravi buffalo is a cross between Nili and Ravi breeds, and the Nili-Ravi has not been completely fixed pure breed. The characteristics of the Nili and Ravi buffalo were explained to me as follows:

Breed	Lactation period	Number of parturition	Milk production	Weight	Reproduction	Appearance
Nili	Aveg. 300 days	Many Max.12 times	2000~ 3000Kgs	Medium 450Kgs	Same	One white spot: Point of tail
Ravi	Avg. 200days	8~9 times	Many Max.4000Kgs	Large 550Kgs	Same	Five white spots: The position that be decided

12. Feeding Management (24hr calender)

① Milking the Herd

- 03:00am: Herd of milking buffalo are brought in from the paddock and tethered at a stall
- 04:00~07:00am: Morning Milking
At milking, feed concentrate, equivalent to half the milk production (18% crude protein), is supplied to the buffaloes
- 07:00~10:00am: Grazing
- 10:00am: Tethered at the stall again and feed (green roughage, or wheat straw: 1% dry matter). The amount supplied is roughly 10% of body weight.
- 16:00~19:00pm: Afternoon Milking
At milking, feed concentrate, equivalent to half the milk production (18% crude protein).
- 19:30pm: Return to Paddock

② Dry milking Buffalo

The amount of concentrate fed to these animals is 2kg/ day/ head.

13. Artificial Insemination

Frozen semen is produced at four artificial insemination centers in Punjab province.

* The Main Process of Semen Production:

Semen Collection: once a week, diluted with egg yolk and citric acid, sperm count: 40 million sperm/ straw, straw size: 0.5ml, antibiotics used: penicillin and streptomycin.

* Artificial Insemination in field:

Due to poor conception rates, insemination is conducted twice on the day when the animal is in heat (morning and afternoon, or afternoon and morning; using two straws). With this regime a 55% conception rate is achieved.

14. Embryo Transfer

As results have not been very good, and running costs are high, embryo transfer activities are currently suspended.

15. Nutrition Research

Although the laboratory had expensive analytical equipment installed, this was not being used, since the necessary reagents and apparatus were not kept in stock.

16. Progeny Test

Progeny testings is be conducted at three Buffalo Centers (Bhunikey-Pattoki farm in Kasur district; Chak Katora farm in Bahawalpur district; Haroonabad farm in Bahawalpur district) in conjunction with 10 other districts in Punjab province. There are 15,000 dames (adult female) buffalo registered for this testing. There are 68 candidate testing bulls, with tested daughter buffalo: on average 11.6 heads per testing bull, a maximum of 40 head, and a minimum of 4 head. Milk productivity for these tested daughter is on average 2613kg, with a maximum of 3118kg, and a minimum of 2016g. This is very interesting data.

Evaluation of capacity genetic for proven buffalo bulls using the BLUP method and it make necessary environment adjustment such as season of birth, region and parturition number of daughter etc., but the details have not been confirmed.

17. Body Characteristics and Other

① Length of Adult Female Buffalo

The weight data of five milking buffalo were collected, and carried out their mesurement body also Body Condition Score «BCS». Details of the data are appended on the next page.

② Mammary type

There is considerable variation between individuals in the mammary type and teats were long.

II. Development & Research Kundhi Buffalo Institute in Sukkur, Sindh

1. Introduction

This research center was established in 1975, and has operated for 34 years as the only buffalo breeding center in Sindh province. The Center engages in the conservation and improvement of buffalo breeds. The Center is on a huge 820 acre site, in Taluka Rohri, Sukkur. It has a total staff of 60, including an administrative head, and under him an agricultural engineer, a veterinarian, and 4 assistant engineers on site. The Center is divided into two functional; the Kundhi Buffalo Research Institute and the Semen Production Unit.

2. Location

The Center is in Rohri (Taluka), Marrhi (Union Council), Sukkur (District).

3. Mission

The center's mission is to conserve and improve the genetic of Kundhi buffalo.

4. Objective

- 1) Conservation of the Kundhi breed
- 2) Free distribution of male pedigree calves to farmers at the Union Council level

5. Activities

Activities include maintenance of buffalo with high genetic potential for use in improving the Kundhi breed, and distribution of male pedigree buffalo calves to farmers for natural mating purposes.

6. Number of Buffalo Kept (as of September 2010)

	Category	No. of Animals
1	Bulls for natural mating	5
2	Adult female buffalo	75
3	Heifer	90
4	Young Male	62
5	Male suckling calf	23
6	Female suckling calf	15
7	Castrated male buffalo	2
Total		272

7. Milking

As of October 2010 there were a total of 70 adult female buffalo, milk was collected from 35 of these buffalo, and the other 35 were dry. That milking is being performed on 50% of the adult females is a good ratio.

Milking occurs twice a day, once at between 4:30~5:30 am and then again at between 4:30~5:30 pm. The ideal interval of 12 hours between milking was met. Oxytocin was not being used to stimulate milk production. Suckling calves were used to naturally stimulate milk production. When

we visited, the amount of milk collected in the morning was 65 kg and on the previous afternoon 70 kg. This represents a total of 135 kg, or 3.9 kg/day/head if you divide by 35 (the total number of milking buffalo). For buffalo being fed concentrated feed this is a low milk yield. A possible reason for this is that management is putting priority on developing the suckling calves. However, as a center for the breeding of Kundhi buffalo, this milk yield is too low.

They sell the milk to middlemen for 40 Rp/kg. The name of the middleman was Mr. Zuliquar Ali Solangi.

8. Feed

Concentrate feed is produced by mixing cotton seed cake, wheat bran, rice bran, mustard oil cake. Lactating buffaloes are fed 5 kg x 2 = 10 kg/head/day and dry buffaloes are fed 2 kg x 2 = 4 kg/head/day. The average Body Condition Score (BCS) was 1.6. Even though the buffalo were receiving feed concentrate, their milk yields were low and the BCS was also low.

9. Twenty Four Hour Management Routine for Milking Buffalo

4:00 Buffalo are moved from the paddock to the milking shed. They are then fed.

4:30 Milking is performed in a shed (1 hour).

9:00 Buffalo are returned for grazing (6 hours grazing)

14:00 Buffalo are bathed during grazing

15:00 Buffalo are removed from grazing

15:30 Buffalo are fed

16:30 Milking is again performed in shed (one hour)

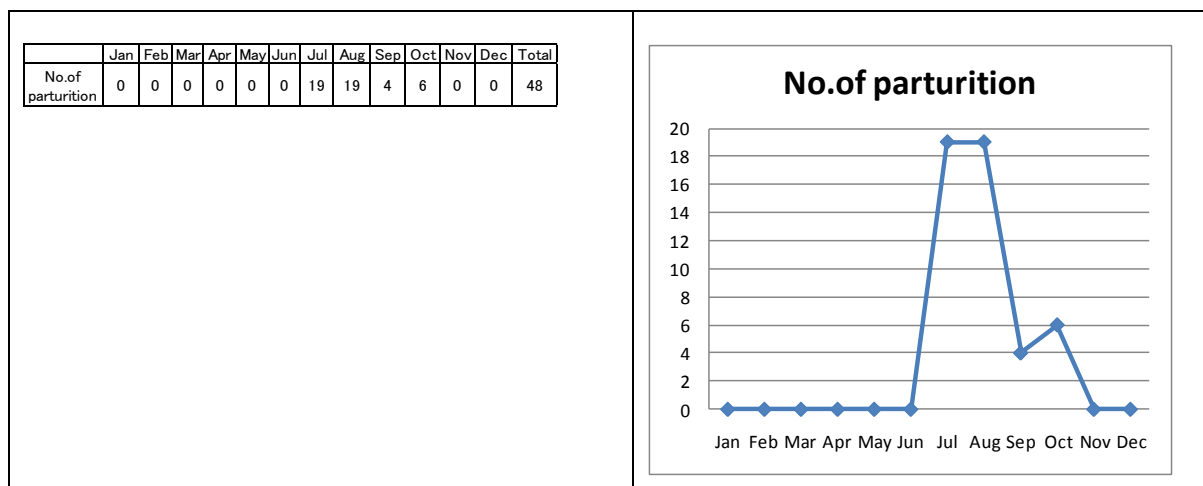
18:00 Buffalo removed to paddock from the milking shed

10. Facilities

The animal shed was constructed in 1976, and even though it is over 25 years old it is still in reasonable condition, and well managed. There is a barn or stall for bull buffalo, one for milking, a paddock for milking buffalo and another paddock for dry buffalo, and a barn for calves, with the other barns being used for sheep. The milking shed is 10m wide, with the milking being conducted by tethering the buffalo in two rows on either side of the shed. A chain is used to tether the buffalo, with a spacing of two meters between chains.

11. Reproduction

The number of pregnant adult female buffaloes was 20, and another 20 heifers were also pregnant. There were a total of 70 adult female buffaloes, and the same number of heifers. So the rate of pregnancy for both was a low 29%. Calving generally begins in June, peaks in July and August, and then declines gradually to zero for a few months from January.



12. Genetic Improvement

12.1. Summary

A training workshop for genetic improvement had not been implemented. Milk yields for individual buffalo, important data for improving the production potential of the Kundhi breed, could not be obtained. Moreover, there was no weight scales or record of body weight. In this situation the data, I expected to review, was not available. Five milking buffalo were randomly selected and their body measurements, Body Condition Score, and a milk test were conducted.

Body measurements: Average shoulder height was 130.4cm, body length was 143.4cm, heart girth 195.2cm. The Kundhi breed is relatively large.

Milk yield: Average of 3 kg/day.

Name of Farm		Development & Research Kundhi Buffalos												
District:		Sukkur			Taluka: Rohri			U/C: Marhi						
Date of Visit		2010/11/6												
ID	Name	Breed	No. Part.	Date of Parturition	Results Repro.	Measurement								Weight
						Height Front	Height Back	Length	Girth	Depth Heart	Width Hip	Width Rump		
1	Susai	Kundi	3	3-Sep-10	No	131.4	129.7	142.2	196.4	75.4	59.3	33.6	?	
2	Arbalee	Kundi	4	4-Jul-10	Preg.	129.6	133.0	149.0	204.0	71.6	60.0	36.0	?	
3	Marvi	Kundi	4	28-Oct-10	No	133.2	130.0	142.6	200.0	72.2	62.8	29.8	?	
4	Shamsi	Kundi	7	10-Aug-10	No	126.1	127.1	148.2	180.2	69.0	55.0	35.0	?	
5	Hameeda	Kundi	3	11-Jul-10	Preg.	131.8	128.2	135.1	195.2	74.1	60.8	36.9	?	
Average						130.4	129.6	143.4	195.2	72.5	59.6	34.3		
Max.						133.2	133.0	149.0	204.0	75.4	62.8	36.9		
Min.						126.1	127.1	135.1	180.2	69.0	55.0	29.8		
ID	Name	Breed	Body Condition Score							Average				
			1	2	3	4	5	Avg	Period Real	Milk PM	Milk 305	Prod. day		
1	Susai	Kundi	1	1.5	1	1	3	1.5	?	3				
2	Arbalee	Kundi	1	2	2.5	3	4	2.5	?	3				
3	Marvi	Kundi	1	1.5	1	1.5	3	1.6	?	3.1				
4	Shamsi	Kundi	1	1	1	1	1.5	1.1	?					
5	Hameeda	Kundi	1	1	1	1	2	1.2	?					
Average									1.6					

12.2 Weight of Calves at Birth

From July until November 48 calves were born, their average weight was 21.7 kg, a max. weight of 24 kg and a min. weight of 19.8 kg.

	No. of Calves Born	Mean	Max.	Min.
July	19	20.2	24	18
August	19	20.5	25	17
September	4	22.3	23	21
October	6	23.5	24	23
Average		21.7	24	19.8

12.3 Liner Classification

12.3.1 Summary

It is not known whether the Holstein liner classification is applicable to buffalo, but for reference purposes 5 randomly selected buffalo were classified using this liner classification system. The average height at the shoulder was 130.4cm, and at the hip 129.6cm, with a drop in the line from the front to the back.

Compared to cattle, buffalo have a deep chest and a robust frame.

Heart (chest) girth: 195.2cm

Chest depth: 72.5cm

Hip width: 59.6cm.

Body length: 143.4cm.

This wide chest confirms the consumption capability of buffalo.

The previous month we had visited the Buffalo Research Institute in Pattoki, Punjab province. At that time we took the body measurements of 5 Nili Ravi milking buffalo. These measurements are compared to those of the Kundhi buffalo. The body frame of the Kundhi buffalo is no less large than that of the Nili Ravi. However, the Nili Ravi had an average body weight of 621 kg, and a BCS of 3.4. Compared to the Kundhi, the Nili Ravi buffalo are slightly more plump (fatter).

12.4 Body Measurements

Breed	Date of Measurement	Measurement							Weight	BCS
		Height Front	Height Back	Length	Girth	Depth Heart	Width Hip	Width Rump		
		Nili Ravi	21-Oct-10	131.9	x	146.2	206.8	77.8		
Kundhi	6-Nov-10	130.42	129.6	143.42	195.16	72.46	59.58	34.26	?	1.6

12.5 Liner Classification

The traits of the hind legs and the hooves were generally good, probably necessary for the support of a large body. Overall, the udder is poor in structure. It is strongly hoped that future breeding efforts will improve this trait.

5 Heads Buffalos (No. 1 --5)	Measurement (cm)					Scoring				
	1	2	3	4	5	1	2	3	4	5
Strength	75.4	71.6	72.2	69	74.1					
Rump Angle						45	50	30	40	45
Thurl Width	33.6	36	29.8	35	36.9					
Rear Leg, Side View						5	5	30	5	5
Rear Legs , Rear View						25	25	30	25	25
Foot Angle						35	35	5	30	10
Fore Udder Attachment						45	1	45	45	45
Rear Udder , Height	10	12	10	12	15					
Rear Udder , Width	12	7	14	14	14					
Udder Cleft						25	30	40	25	25
Deep Udder	14	14	12	8	13					
Teat length	6	10	6	9	12					

12.6 Comparisons of Body Measurements between the Two Breeds

In order to compare the body characteristics of Kundhi and Nili Ravi buffalo, body height relative to body length, hip width relative to body length, chest girth relative to body length, hip width relative to rump width were calculated. The results are respectively 1.1 to 1.1, 2.3 to 2.4, 1.41 to 1.36, and 1.74 to 1.74. There was not a great deal of difference between the breeds. Although the Nili Ravi buffalo has a relative bigger body than the Kundhi buffalo, but their body types are relatively similar.

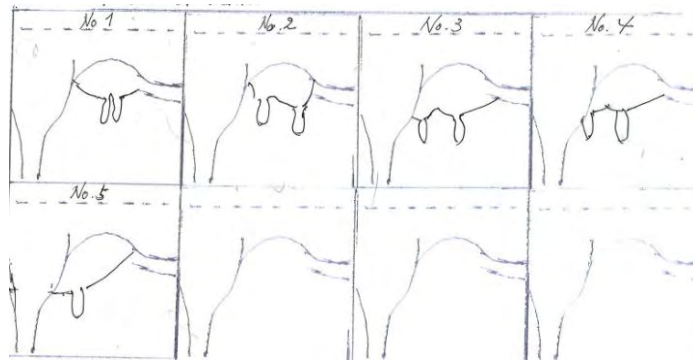
	Nili Ravi	Kundhi
Length/Height	1.1	1.1
Length/ hip width	2.28	2.4
Girth/Length	1.41	1.36
Hip width/Rump width	1.74	1.74

12.7 Tapes for Measurement of Body Weight

In the future when designing a tape for measuring the body weight of buffalo, there should be no need to develop a tape separately for the Nili Ravi and Kundhi breeds, or for that matter for cross breeds, as the scale appears to be the same for both breeds.

12.8 Udder Traits

The volume of the udder is small and poor. Moreover, differences in udder traits between individuals are large. The udder in diagram No.5 has a relatively good structure, with a fore-attachment.



13. Number of Male Buffalos

For the 4 years from 2005 to 2008 the number of male calf was 48. Looking at a yearly breakdown of this, there were 17 in 2005, 8 in 2006, 18 in 2007, and 5 in 2008.

14. Semen Production Unit

14.1 Bulls Buffalo

There were a total of 28 bulls buffalos tethered in a barn/ stall, 23 of these were used for semen collection, and other 5 bulls were used for natural mating. There was also one dummy buffalo used for semen collection. These bulls are fed the same amount of feed concentrate as an adult female buffalo. They are not put out to pasture, but the body is splashed down with water twice a day. Individuals with overgrown hooves are frequent. Periodic trimming of the hooves is thought to be necessary. Buffalo are late maturing, not reaching full maturation until 5 years old.

14.2 Frozen Semen Production

Frozen buffalo semen is produced using the same semen processing procedures as those used with cattle. Semen is collected once a week. As electrical outages are frequent, collection days are flexible depending on whether there is electricity supply on that day. Once semen is collected, a motility test is immediately undertaken. The semen is diluted with egg yolk in citric acid, and then the temperature is lowered in stages in a cooling box, and then dispensed into a straw. The straw is frozen using a local container into which gas of nitrogen is poured to lower the temperature. Then the semen is frozen in the liquid nitrogen. The objective is for one straw to contain 50 million sperm.

Normally, the frozen semen is shipped after it has passed a rigorous evaluation for motility. The semen produced is immersed in liquid nitrogen and stored there. Normally the motility evaluation is made 24 hours (next day) after it is produced. For every lot of semen (for each individual semen collection) three straws are randomly selected and then tested. If even one straw has a motility of semen of less than +++30% (bad semen), the entire lot is discarded. Unfortunately, the motility test is not enforced at the Semen Production Unit.

14.3 Inspection of Semen Collection and Testing of Motility of Frozen Semen

14.3.1 Semen Collection

Collection of semen from buffalo bull was observed at the Institute. A dummy buffalo was used for semen collection. Six milliliters of semen fluid was collected. The motility was normal. The color was however light, and there were few active sperm seen under the microscope. Sperm motility

was evaluated by a technician immediately after the semen was collected. A rating of 80 percent was given by this technician.

14.3.2 Motility of Semen

Frozen semen collected the week before was thawed, and then sperm motility tested. The responsible technician evaluated the sperm at 50%, where as I evaluated it at 5%. This latter figure is at a level that the semen is not worth using. The temperature of the water bath to thaw the sperm was set at a low temperature of 27°C. The motility test must be carried out every time under the same correct conditions. At this point, the temperature of the water bath was raised to 38°C, the contents of one entire straw was placed on a glass slide, evenly mixed, and then two drops were taken for evaluation. Unfortunately, the result was not that good. With such semen, it is questionable that a stable pregnancy rate can be obtained.

There are two possible reasons for such poor motility. Either it is a production process related problem, or a physiological problem with buffalo semen. This will require further research and improvements.

14.3.3 Labeling of Straws

The straw, in which the collected semen was stored, did not have any labeling on it. There was a French printer for printing on the straw, but it was not being used to label the straw. Lot recording is extremely important. The main things that need to be recorded, include breed of bull, name, lot number, date of production, etc.

14.3.4 Calculation of Sperm Numbers after Semen Collection

There was no equipment to calculate sperm numbers, so 2 milliliters of semen was being placed in each straw to produce 22 straws. I respect the experience, instinct and efforts of the technician, but the calculation and placement of the correct number of sperm in each straw is extremely important.

Appendix H

Report on Livestock Disease Control (by local consultant)

Report on Livestock Disease Control

MASTERPLAN STUDY ON LIVESTOCK MEAT AND DAIRY DEVELOPMENT IN SINDH PROVINCE

**FOR KAIHATSU MANAGEMENT CONSULTING INC,
JAPAN**

January – February 2011

DR. BAZ MUHAMMAD JUNEJO,
RT. SECRETARY
LIVESTOCK & FISHERIES SINDH
ADDRESS:- B-25, G. C. H. SOCIETY,
QASIMABAD PHASE-I HYDERABAD

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1.1 CONTROL ON ENDO & ECTO PARASITES IN LIVESTOCK

1.1.1 PROJECT OUTLINE

PROJECT NAME	CONTROL OF ENDO AND ECTO PARASITES IN LIVESTOCK
PERIOD	60 months (2003-2004 to 2007-2008) extended one year up to 30.06.2009
IMPLEMENTING ORGANIZATION:	SPONSORING LIVESTOCK AND FISHERIES DEPTT Execution operation and maintenance D.G L/ F and D.A H Sindh.
COOPERATING ORGANIZATION	i. Farmer communities ii. Related NGO's iii. Drug Dealers iv. Equipment supplier
TARGET AREAS	SINDH PROVINCE
TARGET BENEFICIARIES	1. Livestock Farmers 2. Livestock Traders 3. Milk Dealers 4. Wool / Hairs dealers 5. Butchers / Meat Suppliers 6. Skin & hide Dealer
<u>BUDGET</u> COST OF THE PROJECT	39.999 Million
<u>SOURCE</u>	Government of Sindh

OVERALL GOAL

1. Purchase of Anthelmintic / Drugs for Deworming
2. Purchase of equipment for deworming
3. Repair of Vehicles to be used as mobile units.
4. Drenching of 0.410 (million) cattle and buffalo from 4.232 cattle and buffaloes in milk.
5. Drenching / Deworming of 1.698 (Million) Small ruminants from 9.414 population.
6. Awareness and training of farmers
7. Record keeping regarding disease control.

PROJECT PURPOSE

- i. Training & Awareness of farmers
- ii. Record keeping regarding disease control
- iii. Deworming of infested animals (buffalo / cattle in Milk & sheep & goat).
- iv. Improving physical health
- v. Increasing the production of milk, meat, wool, hairs, skin hides by 40-50%
- vi. Maintaining immunity status of the animal against other diseases.
- vii. Increasing Reproduction.

OUTPUTS

1. Farmers were aware of the losses due to Endo and Ecto parasitic and benefits of deworming.
2. Sense of record keeping regarding disease control created amongst the farmers.
3. About 10% of the milking cattle and buffaloes were drenched and about 12% sheep and goat were drenched against parasitic diseases.
4. 40 to 50% milk meat, hairs, wool were increased along both physical health of animals and quality of skin and hides.
5. Farmers have realized the importance of deworming and trying to provide deworming from their own resource to producing animals.

ACTIVITIES

1. Lectures by the mobile veterinary officers will be delivered on method of controlling the parasites, losses caused by parasites and better management.
2. Publicity material like leaflets / booklet, pamphlets etc, in Sindhi and Urdu language will be produced and distributed in the farmers.
3. Printing of cards distribution to farmers keeping vaccination deworming & treatment record.
4. Four veterinary mobile teams will visit different villages and private farms or each district of the province for 4-5 days a week and collect the information about intensity of different parasites species of the animals and will be identify risk areas.
5. Field days /farmers days will be organized to provide awareness.
6. Demonstration will be arranged regarding correct method of drenching.
7. Necessary treatment related to parasitic disease will also be given during visit or field days.
8. Drenching will be performed in different villages during the visit to 0.410 million large & 1.698 million small ruminants, by completion of the project, to demonstrate its benefits to the farmers so that they may adapt it as a regular feature.
9. During the fourth and fifth year, the value of the drugs used will be partially recovered at the rate of Rs.2.00 per dose for small animals and Rs.10.00 per dose for the large animals. The amount thus recovered will be deposited in government treasury account No.1261-410 Animal Husbandry, Sindh.

INDICATORS FOR MONITORING AND EVALUATION

1.	Deworming	I. cattle Buffaloe (in milk) II. sheep & Goat	0.410 Million 1.698 Million
2.	Equipment for deworming purchased	Drenching gun 120ml	211 Nos.
3	Four vehicles repaired for Mobile units		
4	Training and Awareness of farmers through publicity material	20000 Nos. in Urdu & sindhi	
5.	Production increased	Milk	163.779 Million Liters
		Beef	6.066 Million Kg
		Mutton	5.543 Million Kg
	Amounting to Rs.4457.556 increased in addition 40% wool 40% hairs & 40% quality of Skin & Hide improved		
6	Socio- economy of participating farmers improved because of improving their income.		

1.1.2 RESULT OF THE PROJECT

1. Farmers aware about the losses caused by Endo & Ecto Parasites through public material.
2. Mobility increased as after repair, four vehicles were made road worthy used for training of farmers deworming of animals
3. Physical health of animals and reproductive efficiency were improved by deworming 0.4043 Million Milking cattle and buffaloes, and 1.5581 million sheep and goat.
4. Production of deworming animals were increased i.e. Milk, meat, wool & hairs by about 40% and quality of skin & hide (fetched good price).
5. The income of Livestock traders, butchers blood contractors, Milk, wool, Hairs, and skin & hide traders increased.
6. The income of farmers increased.
7. Out of 80% population livestock raising about 50% socio economy improved by generated self-employment.
8. Poverty reduction.

EFFECTS OF THE PROJECT (INDIRECT OUT COMES) GENERAL

- i. Resistance of animals against disease, were developed
- ii. Income of the benefitted farmers was increased by 40%.
- iii. About 15% farmers were aware about the benefits of deworming to see the result of drenched animals.
- iv. Equipments were made available at hospital.
- v. Overall Development in Livestock sector.
- vi. Poverty alleviation.
- vii. Overall livestock related business were improved i.e. Milk, Meat, fodder medicines etc.
- viii. Trend of fattening was introduced to the farmers.

LESSON LEARNED

a. PROJECT IDENTIFICATION

The stakeholders were involved in project identification process. The ground realities of the areas were studied by visiting the area.

b. PROJECT PREPARATION

The requirement of the project ascertained with the consultation of stakeholders, field staff and the market position.

c. PROJECT APPROVAL

While approving the demands future trends of inflation be considered with realistic approach.

d. PROJECT FINANCING

- a. Funds may be provided accordingly the financial phasing of the project.
- b. Funds were released in time.

e. PROJECT IMPLEMENTATION

- a. Procurement be made in time.
- b. Arrangement may be made for proper and timely monitoring.

POSITIVE POINTS AND BACK GROUND

1. The farmers specially Arid Areas and commercial dairy farming were unaware about the infestation of parasitic and losses caused by them. They were welawared after the project results. Now they are deworming their animals from own resources.
2. The kidding and lambing rate were increased in the drenched animals.
3. The production of milk, meat, wool, hairs were increased.
4. The income of the farmers were increased.
5. Health status were improved.
6. The quality of skin & hide were improved by 40%.
7. The dewormed animals were resistant to other disease.
8. Overall livestock business were improved.

NEGATIVE POINTS AND BACKGROUND

1. The funds were not released as per provision of PC-I there was variation in year wise financial targets and against the total cost of Rs.39.999 Million only 31.180 Millions were released.
2. The physical targets were very low only 10% of the milking of cattle, buffaloe and 12% of sheep and goats were drenched.
3. The stake holders were not involved in activities of the project as the department officers did not informed the beneficiaries about the project name and activities only drenched their animals.
4. Targets of deworming as per PC-I were not achieved as in case of cattle buffaloes 2-3 % in case of Sheep & goat about 9-10% were less.

1.1.3 VIEWS ABOUT CONTROL OF ENDO AND ECTO PARASITIES IN SINDH

Due to geographical conditions of the provinces the animals of interior Sindh are grazing from standing water in ponds, low lying and water logged areas, which is the main source of infestation of flukes and round worms.

In desert, hilly areas and at commercial farms / colonies not housed properly and in insanitary conditions are the main source of external parasites i.e. Ticks lices, mange mites etc producing tick borne disease responsible for mortality and lowering production.

While interviewing Madam Nasreen KB Mirbhar Professor of Parasitology SAU Tando Jam about the Endo Parasitic infestation at commercial colonies of Karachi and Hyderabad where the conditions are totally different then interior Sindh, as there are no ponds, water logging etc how the infestation occurs the reply was very simple that adult flukes / worms can survive for years and fodder from interior Sindh for commercial farmers colonies is the main source of infestation of Endo parasites. It means more than 90% animals (Herbivorous) are infested with worms. The best solution is deworming with quality drugs (Anthelmintics) best strategy is four times a year i.e. first deworming then after 3-4 weeks then after six months then after 3-4 weeks. If not possible at least two times a year with six months interval. Which will improve the physical condition (health) improve reproduction maintain immunity against disease increasing production of milk, meat, wool, hairs, skin & hides by 40-50%.

From the discussion it was observed that parasitic infestation starts after rainfall, mainly in june and july.

While interviewing Dr. A. P. Umerani, Director Vet Research CVDL Tando Jam it was observed that during year 2009-2010 total 8620 specimens were received and processed and 2964 were found positive for parasitic disease and 727 were found positive for other diseases like PPR, Brucellasis, anthrax, Pnuemonia, Mastitis, HS, FMD, Black Quarter, Eenteroxamia, E.Coli and Proteus infection. It means more than 80% positive cases were of parasitic disease.

These like projects to control all types of internal parasites i.e. Flukes, all types of roundworm, tape worms, all types of Haemoparasites, Ticks, Lices, Mange, Mites are important for increasing livestock production, increasing income of farmers and poverty reduction.

AS FAR AS ASSUMABLE FACTS REGARDING COMMERCIAL AND ARID AREAS, FARMERS ARE CONCERNED

Mainly commercial dairy farming Districts in Sindh are Hyderabad, Badin, Thatta, Sukkur, Larkana, Shikarpur & Karachi. In these Districts about 15-20% Buffaloes / Cattle are in commercial setup, except Karachi where 90% animals are kept in commercial dairy farming system.

Arid districts, of Sindh are Thatta about 30% Dadu about 40% Mirpurkhas about 40% Tharparkar about 90% Sanghar about 40% Sukkur about 15%, Khairpur about 30% Larkana about 5% Karachi about 30 %.

This was a smaller project with main idea to show the benefits to farmers. Mainly animals of poor farmers were targeted. In commercial dairy farming 5-6 animals in a farm were drenched to show them results and benefits.

IN COMMERCIAL DAIRY FARMING AREA THE FOLLOWING NUMBER OF ANIMALS WERE DRENCHED

(Figures in Millions)

NAME OF DISTRICT	NO OF CATTLE IN MILK (2003 PROJECTED)	NO OF BUFFALOES IN MILK (2003 PROJECTED)	TARGET TOTAL	PERCENTAGE IN COMMERCIAL SETUP 20%
HYDERABAD	0.131	0.378	0.050	0.010
BADIN	0.064	0.132	0.020	0.004
THATTA	0.105	0.210	0.021	0.004
SUKKUR	0.076	0.145	0.016	0.003
LARKANA	0.081	0.272	0.026	0.005
SHIKARUR	0.060	0.172	0.016	0.003
KARACHI	0.071	0.239	0.023	0.020 (90%)
TOTAL	0.588	1.548=2.136	0.172	0.049

Total about 8-9% animals i.e. 0.172 Million, (cattle & Buffaloes) in Milk were drenched in commercial dairy farming area out of which 26% i.e. 0.049 Million belonging to commercial farmers. It is assumed that per farmer four to five animals were drenched, total 40000 to 43000 farmer's animals were drenched in commercial dairy districts about 12000 commercial farmers were benefitted.

After the completion of project total Milk increased in the province annually were about 164.00 (Million Liters) and in commercial Dairy District about 42% of the total milk increased i.e. about 66.00 Million liters of milk and about 175.0 Million Liters of Milk at Commercial farms were increased.

ARID AREAS OF SINDH ARE AS UNDER

(Fig in millions)

NAME OF DISTRICT	SHEEP POPULATION PROJECTED (2003)	GOAT POPULATION PROJECTED			PERCENTAGE IN ARID AREA	NUMBER 22
		(2003)	TOTAL	TARGETS ACHIEVED		
THATTA	0.128	0.177	0.305	0.044	30% Kohistan	0.013
DADU	0.275	0.587	0.862	0.125	40% Koh. & Kachho	0.050
MIRPURKHAS	0.148	0.692	0.840	0.122	40% Desert	0.050
THARPARKAR	0.628	1.383	2.011	0.291	90% Desert	0.261
SANGHAR	0.150	0.494	0.644	0.093	40% Desert	0.038
SUKKUR	0.044	0.174	0.217	0.033	15% Nara	0.005
KHAIRPUR MIRS	0.093	0.437	0.546	0.079	30% Nara	0.024
LARKANA	0.169	0.178	0.347	0.050	5% Kohistan	0.003
KARACHI	0.033	0.245	0.278	0.040	30% Kohistan	0.012
TOTAL			6.050	0.877		0.456

Out of total 15.58 Million sheep & Goat about 6% i.e. 0.877 animals were drenched in Arid district about 3% i.e. 0.456 animals were targeted in Arid Areas. It is assumed that average holding of one farmer is ten animals, total 45000 farmers of arid areas were benefitted.

Total meat increased in Sindh after completion of the project was about 11.5 Million Kgs and in arid Districts about 0.7 Million Kgs of Meat.

Quality anthelmintics are very costly therefore poor farmers were unable to purchase for deworming their animals.

Realizing the situation government of Sindh Animal Husbandry Department prepared project and provided anthelmintics drugs through this project for free deworming (some amount were charged in last year) than these farmers came to know the benefits of the project.

Other benefits which were not counted were increase in quality and quantity of wool (about 40%) 1 to 1.5 Kg of wool per sheep and about 1.0 KG of Hairs / Goat annually, (Two Times shearing) Quality of skin & Hides and increase in kidding lambing rate by 20-30%. (As per report of DO L/S Mithi & Dr. Jaimal, NGO/ thardeep)

1.2 PARTICIPATORY DISEASE SURVEILLANCE IN PAKISTAN

1.2.1 PROJECT OUTLINE

PROJECT NAME	Support for emergency prevention and control of main Transboundary Animals
DISEASES IN PAKISTAN	Rinderpest, Foot and Mouth, Pestides Petitis Ruminant, GCP / PAK 88-EC
PERIOD	January 2002 to June 2005 (PDS) July 2005 to June 2006 (SLSP)
IMPLEMENTING ORGANIZATION	Project funded by European Commission and implemented by FAO up to 2005 and from July 2005 to June 2006 by SLSP
COOPERATING ORGANIZATION	Ministry of Food & Agriculture Livestock and Provincial Departments of Livestock (Animal health)
TARGET AREA-PAKISTAN	i. Farmers ii. Slaughter house iii. Livestock Traders iv. VO's of Livestock Department v. NGO's
TARGET BENEFICIARIES	i. Farmers ii. Livestock Department iii. NGO's
BUDGET	1.8 Million Euros
SOURCE OF BUDGET	European Commission

OVERALL GOAL

- i. Rinder pest Eradication
- ii. Capture & record present & historical Report of TAD i.e RP, FMD & PPR
- iii. National Policy on TAD Disease i.e. FMD and PPR
- iv. Establish an effective surveillance reporting system and clinical surveillance data base to support the accreditation of rinderpest as a part of the pathway to formal recognition of disease freedom by the office of international des Epizootic (OIE)
- v. Identification & prioritize disease with important livelihood impact in Pakistan from the Livestock owners perspective.

PROJECT PURPOSE

- I. Eradication of RP
- II. Searching TAD through establishing teams in the country from 10% villages.
- III. Strengthening of Livestock Department of the province.
- IV. Awareness of farmers Traders, NGO's for control of Animal Disease.
- V. Control on quackery Treatment.
- VI. To search out other disease of economical importance to farmers other then TAD

OUTPUT

- i. Skills of staff required for disease surveillance, diagnosis and reporting improved.
- ii. Improved surveillance facilities in five research institutes i.e.
 - i. National Veterinary Lab Islamabad (reference lab)
 - ii. Central Veterinary diagnostic Lab. Tando Jam
 - iii. VRI Quetta
 - iv. VRI Lahore
 - v. VRI Peshawar
- iii. Increased knowledge of TAD Prevalence and impact.
- iv. National control strategy for FM Disease by Dr. Zulfiqar Ex .DG Res VRI Lahore
- v. National Control strategy for PPR by Dr. Qurban DG National Lab Islamabad.
- vi. Clinical evidence for freedom of rinderpest

Project management appointed.

ACTIVITIES

- I. TAD Info Training 6 Data Manager Trained
- II. PDS Training 51 VO's trained used in 17 teams for work. (three stage process)
- III. Training of trainers in PE and PDS- 7 Master trainers trained Nationally & internationally (Two Step process trainers trained only for experience PDS practitioners).
- IV. Decision maker workshops arranged.
- V. Inter provincial review of PDS performance.
- VI. Elisa Training of 10 VO's conducted
- VII. Awareness training of progressive farmers, VO's (private and public)
- VIII. Training on disease investigation and surveillance by an expertise consultant Dr. Taylor for all veterinarians (public and private).
- IX. Support for PPR Epidemiological studies by NARC
- X. Support to FMD referral centre at NVL Islamabad.
- XI. Technology transfer for live aerosol vaccine consultant from Nepal for training at VRI Lahore VRI Quetta VRI Peshawar Vaccine production unit Tando Jam NVL Islamabad (one month training)
- XII. Technology transfer for production of PPR Vaccine training in France for one month one RO from VRI Lahore one RO From VRI Quetta trained. Seed virus for production procured from France
- XIII. Pakistan villages searched 2002-2005
10% villages searched in each province including FATA as

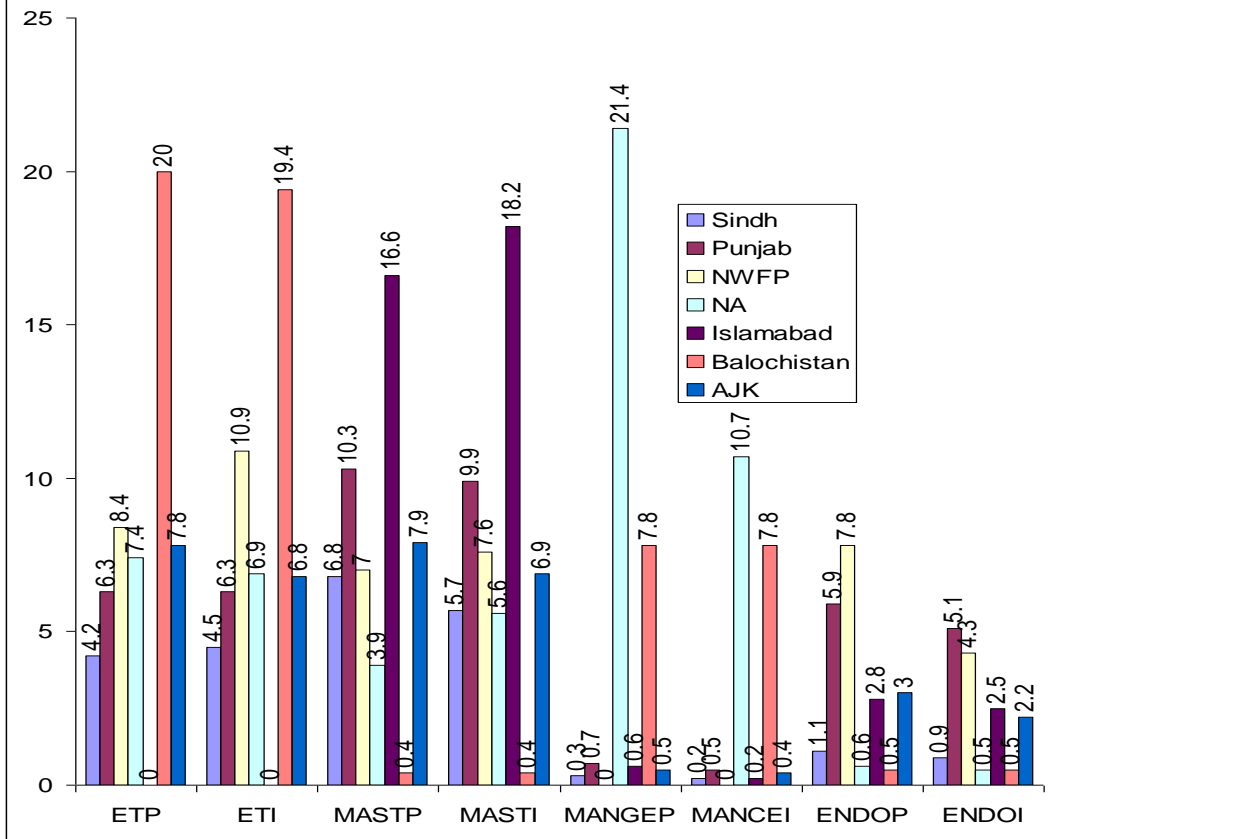
TABLE SHOWING THE DISEASE SURVEILLANCE ACTIVITIES IN PAKISTAN INCLUDING AJK AND NORTHERN AREAS

	ICT	NA	AJK	BALUCHISTAN	SINDH	NWFP	PUNJAB	TOTAL
DISTRICT COVERED	1	6	7	16	15	31	34	110
VILLAGES SEARCHED	46	632	891	713	997	1267	2784	7330
MEETINGS CONDUCTED	74	687	927	735	1702	1323	3103	8551
FARMERS ATTENDED MEETINGS	849	11624	7819	6887	24484	34959	31411	118033
PLACES WITH VETY SERVICES AVAILABLE	74	5	182	379	474	859	1496	3469
PLACES WITH SIANAS SERVICES AVAILABLE	36	8	185	151	280	318	1573	2551
FARMERS WHO DESCRIBED HISTORY OF RP	0	7	0	3	304	0	3	317
FARMERS WHO DESCRIBED HISTORY OF PPR	18	33	200	13	408	6	263	941
FARMERS WHO DESCRIBED HISTORY OF FMD	73	596	472	510	1618	1247	2611	7127
FARMERS WHO DESCRIBED HISTORY OF S.E	0	3	7	2	213	1	23	249
TRACED RP CASES	0	0	0	0	0	0	0	0
TRACED PPR CASES	1	0	2	7	23	1	29	63
TRACED FMD CASES	20	0	1	0	3	0	0	24
TRACED S.E. CASE	0	0	2	0	2	0	1	5

PROVINCE	VILLAGES SEARCHED IN YEAR				TOTAL
	2003	2004	2005	2006	
PUNJAB	659	1385	579	350	2973
SINDH	793	1214	730	405	3142
NWFP	285	415	380	248	1328
BTN	174	309	159	246	888
AJK	203	451	334	100	1088
NAS	127	596	0	100	823
ICT	13	30	15	25	110
TOTAL	2254	4400	2197	1501	10352

During the participatory disease search activities the teams had direct interaction with 118033 farmers during 8551 meetings to gather qualitative disease intelligence regarding Transboundary animals disease particularly Rinderpest, FMD, PPR alongwith some other important Livestock disease in the country.

OTHER IMPORTANT LS DISEASES FROM PDS DATA



ETP (Ent: Prevalence), ETI (Ent: Importance) MAS TP (Mastitis Prevalence), MAS TI (Mastitis Importance) MANGEP (Mange Prevalence) MANGEI (Mange Importance) ENDOP (Endoparasites Prevalence) ENDOI (Endoparasites Importance)

- XIV. National Technical consultant appointed (DR. Manzoor Hussain) FAO Technical Advisory Services provided regularly.
- XV. Convening National Animal disease emergency committee conducted terminal Mid and End Review.

INDICATORS FOR MONITORING

1. Sero surveillance
2. PDS Data
3. Training workshops
4. Field Investigation
5. Meeting with farmers.
6. Villages visited.
7. Livestock markets visited.

1.2.2 RESULT OF THE PROJECT

ACHIEVEMENT (DIRECT OUTPUT)

1. Staff trained to perform disease surveillance and diagnostics
2. Awareness training of farmers about important disease
3. Collected sufficient data about the occurrence of important animal disease particularly TAD i.e R.P, PPR, FMD.
4. All network related with established of PDS activity diagnostic activity field investigation disease awareness training was established under GCP Project final step of RP eradication was completed by SLSP (Result-2) in Last year ie. 2006.
5. Foot and mouth disease and mastitis were ranked in top five concerns due to effects on dairy production after RP ceased to be a problem hemorrhagic septicemia was identified nationally as the most important disease constraint faced by Livestock owners due to acute impact of sudden mortality losses on smaller farmers livelihood.
6. Whilst originally conceived as a means of gathering information from farmers the farmers viewed the exercise as la mean of gaining. Information for themselves and it become an extensive exercise. Instead the advice requested of the educated women professionals in single gender women's group meetings extended for beyond animal husbandry issues in to woman health issues, for example indicative of the power of this technique for enhancing community dialogue where no other means.
7. Participatory approaches offer advantages for the activity of livestock department beyond disease surveillance and should be incorporated in regular programmes. The knowledge experience and training skills of PDS Experts and trainers are a resource that should be utilized to extend participation in to other areas.
8. Participatory disease surveillance and participatory epidemiology provides essential information on disease impact that should be used in policy formulation participatory epidemiological studies on issues such as services delivery vaccination policy and disease specific policies should be integrated with policy analysis activity.

EFFECT FROM THE PROJECT (INDIRECT OUTCOMES)

I INTERNATIONAL

1. Provided confidence to international organizations that veterinary services in Pakistan have capability for the control and eradication of animal diseases.
2. It gave visibility to veterinary services of Pakistan at National and International level.

II NATIONAL

1. Improved diagnostic Network, improved surveillance by introducing PDS.
2. Improved professional skills awareness of farmers increase income of farmers.
3. Two National Master trainers have been appointed by international agencies for PDS work in other countries.

LESSON LEARNED

POSITIVE POINTS AND BACKGROUND

1. Two types of surveillance carried out a) Disease surveillance b) Sero Surveillance (farmers were key informants)
2. Never such type of surveillance were carried out before.
3. Data collected consolidated analyzed and dossier was prepared for submission to concern authorities (OIE) as a result Pakistan was provisionally declared as Rinderpest free country.
4. Capacity building of the departmental officers of the country was carried out including AJK FATA and Northern Areas for:-
 - a. Preparation of Special Diagnostic teams.
 - b. Awareness of farmers regarding disease problems
 - c. Seasonal incidence of different disease in livestock
 - d. Close coordination of departmental officers with farmers and NGOs

NEGATIVE POINTS AND BACKGROUND

1. The project was confined to only one disease i.e. RP as Sero surveillance was carried out for one disease.
2. Mobility problems were seen while performing field work.
3. A main objective was to confirm the presence or absence of Rinderpest in the country.
4. No vaccines / material was provided to deal with TAD on emergency basis.
5. There was no provision of incentives for the elder farmers of the village who worked as coordinator between the village farmers and teams.

VIEWS / HOW TO APPLY

PDS provided Epidemiological Data on Transboundary Animal Diseases i.e. R.P, PPR & FMD Data which helped in declaration of eradication of Rinderpest in the Country.

Also the Data on Disease of economical importance for farmers like HS & Mastitis were captured from the surveillance report, for future strategy for control of infectious diseases in the area.

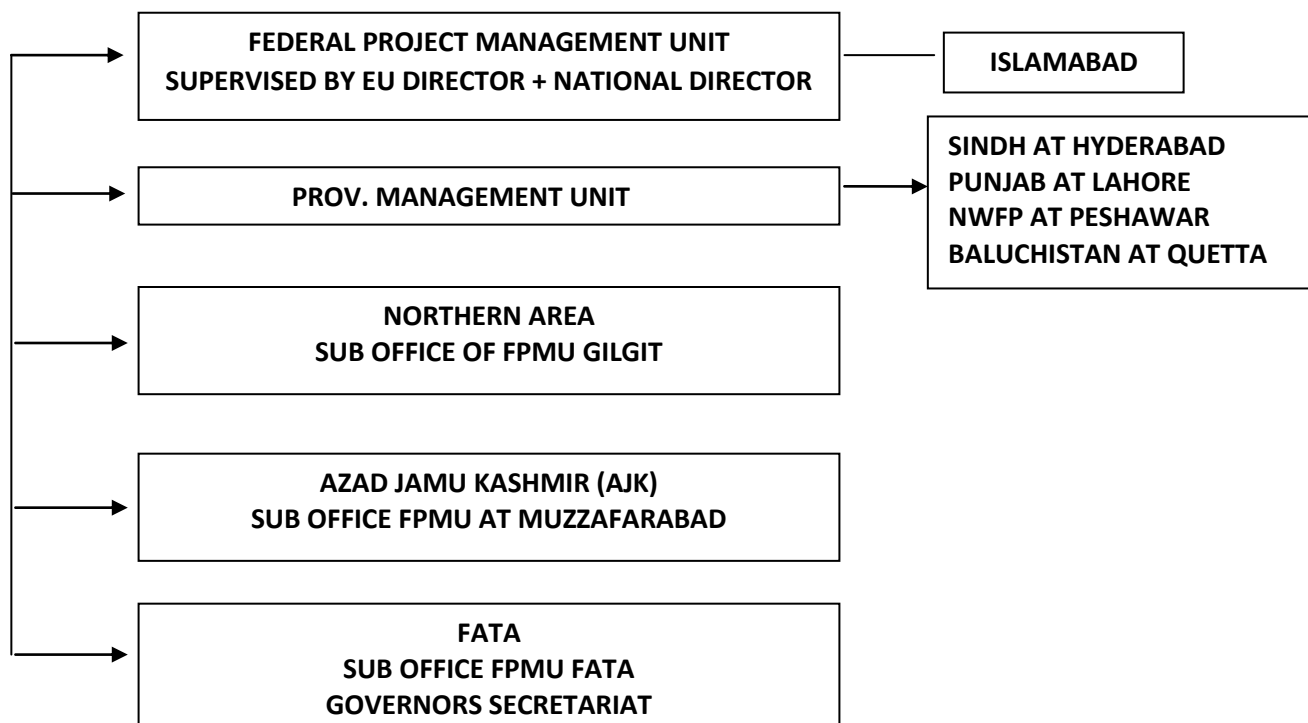
This type of work can be replicated in the province and country for carrying out disease surveillance and technical Monitoring of disease control work.

1.3 STRENGTHENING OF LIVESTOCK SERVICES PROJECT

1.3.1 PROJECT OUTLINE

PROJECT NAME	Strengthening of Livestock Services project:- PAK / RELEX / 2001/0129
PERIOD	Six Years 16 Sept 2003 to 15 Sept 2009
IMPLEMENTING ORGANIZATION	MINFAL (Livestock Division) Islamabad European Union Islamabad

THROUGH



COST	Local (PSDP) Rs.405.39 Million (in kind 70%+cash 30%)
	FEC Rs.1587.27 Million (EU Grant)
	TOTAL Rs.1992.66 Million

COOPERATING ORGANIZATION

1. Livestock Departments of the Country.
2. NGO's
3. Private Vets
4. Pak Vet Medical Council
5. Teaching Institutes

TARGET AREAS

PAKISTAN	
◆ <u>Balochistan</u> : Pishin, Zhob, Kalat, Qilla	
Saifullah, Loralai, Mastung.	
◆ <u>KP</u> : Peshawar, Charsada, Swat,	
Mardan, Abbotabad, Noshehra.	
◆ <u>Punjab</u> : Kasur, T.T. Singh, Bhakkar,	
<u>Gujrat, Chakwal, Bhawalpur.</u>	
◆ <u>Sindh</u> : Thatta, Badin, Sanghar, Dadu,	
<u>Therparker, Khairpur.</u>	
◆ <u>FPMU Sub-Units</u> : AJK, NAs, FATA, ICT	

1. Livestock Department
2. NGOs
3. Livestock Farmers / traders
4. Pakistan Vet Medical Council
5. Teaching Institutes

TARGET BENEFICIARIES

1. Livestock Department all provinces & Sub units
2. NGO's
3. Livestock Farmers
4. Livestock Traders
5. Milk Traders
6. Drug & Vaccine dealers

STUDY OF RESULT

:: SLSP Result-2 :: DISEASE REPORTING AND SURVEILLANCE SYSTEM FUNCTIONS

BUDGET:- 0.987959 Euro (Million)
77.201245 Pak Rs. (Million)
14% of the total project expenditure

SOURCE

"European Union Grant"

OVERALL GOAL

1. To eradicate rinderpest disease from the country.
2. To enhance efficiency and effectiveness of delivery of livestock services.
3. Improvement of disease diagnosis monitoring and reporting system.
4. Vaccine production particularly against newly emerging and TAD.
5. Capacity building of the veterinary staff
6. Awareness / training of farmers.

PROJECT PURPOSE

1. Eradication of Rinderpest Disease
2. Strengthening of Livestock services regarding diagnosis reporting and monitoring
3. Awareness / training of farmers for disease reporting.
4. Capacity building of the staff of livestock department.
5. Production of vaccine regarding Transboundary animal disease
6. Capacity building of the livestock departmental officers.

OUTPUT

1. Pakistan declared Rinderpest Disease free country in 2007.
2. Disease reporting network developed in target areas from hospital to Federal units.
3. Skills of the staff regarding diagnosis reporting and monitoring improved.
4. Farmers aware / trained about disease reporting.
5. Coordination between field staff and farmers developed.
6. Rapid response facility to reach to the farmer's assistance developed.
7. District working groups were formed by officers of diagnostic laboratories Epidemiologist, VO of the area farmers traders drug dealer to strengthen reporting system and disease control measures.
8. Six officers obtained masters degree in Epidemiology (Punjab 2, Peshawar 1, Azad Kashmir 1, N.V.L 1, NARC 1)
9. 13 TAD info / disease reporting training workshop conducted (4 in Sindh, 4 in Punjab and others in other areas)
10. Provincial and district diagnostic lab strengthened in target district (provinces 4 Targets Districts 24, Northern Area 1, Azad Kashmir 1)
11. 292 VOs /Vas trained in diagnostic techniques.
12. PPR vaccine production training at France for 2 scientist (VRI Lahore 1, VRI Quetta 1).

Number of Units, Centers and Institutions in the Epidemiological Network of Pakistan

S.#	Location	EPI Unit	DDRC	MVH	Total
1	Federal	01	0	0	01
2	Punjab	07	06	06	19
3	Sindh	07	06	06	19
4	Baluchistan	07	06	06	19
5	KP	07	06	06	19
6	AJK	02	02	02	06
7	NAs	02	02	02	06
8	FATA	01	0	01	02
9	ICT	0	0	01	01
	Total	34	28	30	92

Source:- Final report of the project given by PD SLSP

List of Equipment Provided to EPI Units

S.#	Item	Federal	Punjab	KP +FATA	Sindh	BTN	AJK	NAs	Total
1	Desktop computer	1	19	25	19	19	06	04	93
2	Lazerjet Printer	1	19	25	19	19	06	04	93
3	GPS	1	07	09	07	07	02	01	34
4	UPS	1	19	25	19	19	06	04	93

Source:- Final report of the project given by PD SLSP

ACTIVITIES

1. 92 EPI units at Federal Provincial, District and Hospital level developed in Pakistan
2. Place and staff of EPI identified by department and posted.
3. Disease reporting workshop held at all provinces / sub units.
4. Desktop computer, printer, GPS and UPS provided to EPI Units.
5. Training EPI unit staff completed in lab diagnosis.
6. Training of officers completed in basic computer literacy.
7. Training of EPI unit staff completed in TAD info software at each EPI unit.
8. Steel board for visibility of EPI unit provided at district level.
9. Training to VO's / SA's provided regarding sample collection and reporting.
10. Disease calcluders / posters provided for field veterinary staff / institutions for publicity to farmers.
11. Set of books provided for field veterinary / EPI units.
12. Farmers day held at selected far flung union councils of target district, where livestock were provided free vaccination against seasonal infectious diseases, deworming, and feed (con centrate) 5 and 10 kg bags free of cost and provided awareness about the infectious disease, losses and precautionary measures and early reporting to the veterinary staff.
13. Cattle show at Hyderabad was organized in 2009 to keep close contact with farmers regarding disease control
14. Staff of the project was installed during the uris and regular shows and mellas.
15. In Punjab 360 CLEW & 240 WLEW were trained from the village farmers and provided them vet kits to report disease outbreaks and provide first aid treatment / vaccination deworming to the livestock of the area.
16. District working group meeting / stake holders meeting at district level
17. Morbidity increased monitoring and indictors for evaluation.

OUTPUT

1. Disease reporting network established in 92 units
2. Staff trained in epidemiology
3. TAD info training / disease reporting training
4. PCS, printers and accessories provided.
5. Provincial / district laboratories strengthened.
6. Vet hospital dispensaries provided clinical and surgical equipment.
7. VO / VA's training in diagnostic techniques investigation reporting.
8. National Policy on use of PPR vaccine notified.
9. One million doses PPR vaccine procured from Jordon and distributed / used in field.
10. Scientist trained in PPR vaccine production quality.
11. PPR vaccine produced at VRI Quetta.
12. Motorcycle has been provided to the field staff.

1.3.2 RESULT OF THE PROJECT

ACHIEVEMENT

1. Disease reporting system strengthened in Punjab disease reports has increased about 200% and Sindh also increased by about 30-40% reports received by the Provincial units of Punjab & Sindh during the period as under:-

CONTAGIOUS DISEASE REPORTS RECEIVED IN TAD INFO UP TO DECEMBER 2008

Name of Disease	Total Reports received	No of Sick animals	No. of Dead animals
FMD	468	2022	377
PPR	98	3974	882
HS	194	693	210
CCPP	55	719	72
ET	165	1292	224
Brucellosis	14	85	9
Theileriosis	15	40	5
CPD	9	129	3
BQ	30	65	32
Rabies	32	34	28
Camel Pox	2	6	0
S/Goat Pox	5	46	3
Buff. Pox	1	50	0
Anthrax	2	2	1
Babesiosis	3	11	0
Total	1093	9168	1846

Source: Director Planning & Development Directorate General Livestock & Dairy Development Punjab

EPI SINDH

Name of Disease	July 2008 to June 2009	July 2009 to 30 June 2010
HS	71	21
Goat Pox	15	4
CPP	55	05
PPR	47	16
Ent: Tox:	92	34
FMD	93	34
Sheep pox	4	
Cow pox	2	
LFD	18	15
Food Poisoning	1	1
Trypanosomiasis	4	1
Anthrax	--	2
TOTAL	403	130

- ◆ Pakistan achieved the status of Rinderpest Disease Free country in May, 2007.
- ◆ Six officers obtained Masters degree in Epidemiology from England and Netherlands.
- ◆ 13 TAD info / Disease Reporting Trainings Workshops conducted.
- ◆ PCs, printers & accessories provided in target districts and sub-units of FPMU.
- ◆ Provincial and District Diagnostic Lab Strengthened in target districts.
- ◆ 292 VOs/Vas trained in Diagnostic Techniques.
- ◆ 900 officers, 316 field staff and 2735 farmers imparted training in different disciplines.
- ◆ Information management units setup at Islamabad Lahore Quetta and Peshawar.
- ◆ Extensive range of messages, leaflets, posters for vaccination and disease, calendar, booklets, prepared and distributed to stakeholders (81 publications) 100 radio, 35 TV programmes and 5000 short messages in national and local languages produced for farmers awareness.
- ◆ Supported the Pakistan vet Medical Council (PVMC) in DVM curriculum revision in order to update / upgrade the education syllabus.
- ◆ Livestock legislation reviewed and revised.
- ◆ Field veterinary hospital / dispensaries were strengthened by providing clinical and surgical equipment.

Source:- Final report of the project given by PD SLSP

EFFECT OF THE PROJECT (INDIRECT OUTCOME)

1. Reduction in disease in the Livestock of country.
2. Reduction in mortality due to Livestock Disease.
3. Per animals production increased.
4. Income of the farmers increased.
5. Awareness of farmers regarding all aspects of Livestock dev.
6. Quality of service improved
7. Exposure Visits of different provinces and different districts.
8. Model of Disease control introduced.

LESSON LEARNED

POSITIVE POINTS AND BACKGROUND

1. Awareness of farmers.
2. Awareness of field staff and policy makers and managers.
3. Political will to give priority to livestock sector
4. Poverty alleviation
5. Increase profit from livestock due to marketing service.
6. Strengthening of institutes.
7. Rinderpest eradication and control of other TAD and economical importance diseases.
8. Disease surveillance and reporting system was further upgraded by upgrading post of project Director diagnostic lab Lahore to provide services in whole province.
9. Mobility improved few four wheel vehicles and 500 Motorcycles provided to each in whole province of Punjab (2200 motorcycles)

NEGATIVE POINTS AND BACKGROUND

1. Agreed resources were not provided like mobility equipment etc.
2. Delay in release of funds.
3. Smaller targets hardly 20-25% districts of the country were targeted still 50 district in the country are left. Farmer's days were organized hardly in 4-5% union councils, which has no or little impact on the farmers. The system was incomplete in whole country including Sindh and Punjab.
4. All the hospital / dispensaries are not provided with EPI units only one hospital in each target district provided with EPI Unit.
5. Farmers are the main source of disease reporting but the farmers are not well connected (required to be more connected) with the reporting system.
6. Foreign training as per agreement not provided.
7. Continuity and sustainability of the Activity after closure of project is questionable.
8. Instead of Rs.1992.0 Million agreed cost only Rs.1339.0 Million released, upto date expenditure was Rs.1286.0 Million saving of Rs.53.00 Million were transferred to settlement of internal displaced person of FATA.

Source:- Final report of the project given by PD SLSP

1.3.3 VIEWS / HOW TO APPLY

This is a very good system for reporting disease outbreaks in field provided this is well connected with farmers.

The present system developed under result 2 of SLSP has three deficiencies.

1. In Sindh out of 23 districts, only 12 districts are connected with network.
2. Out of 179 hospitals / dispensaries only 6 hospitals are connected in target area rest are without EPI Network.
3. Farmers are not well connected with the system even the directorate of animal disease surveillance system in Punjab (development project costing 194.5 Million for the period 2009 to 2012) the farms are required to be more connected.

In Sindh on the pattern of Punjab the post of DIO may be upgraded as Directorate of Disease Surveillance and Reporting in Sindh by well connecting the farmers of the villages through a well coordinated link, so that it works permanently.

The data gathered through the disease surveillance and reporting system will be used for further disease control strategy.

2. **COORDINATION AMONG VARIOUS STAKEHOLDERS IN PARTICIPATORY DISEASE SURVEILLANCE IN PAKISTAN:**

The cooperation ship among various stakeholders especially between federal and provincial government in this project:

1: At federal level there is a steering committee, consisting of:

- | | | |
|------|----------------------------------------------------|--------------------|
| i. | Secretary Ministry of Food & Agriculture Islamabad | Chairman |
| ii. | <u>Provincial Secretaries</u> Livestock | Members |
| iii. | A.H commissioner
(National Coordinator) | Members |
| iv. | FAO / Res Rep | Member |
| v. | EU / Res Rep | Member |
| vi. | National Consultant | Member / Secretary |
| vii. | PDS Expert (Mr. Mariner) | Member |

[Approval & Facilitating Body, for working plan.

2: **TECHNICAL WORKING GROUP**

Federal body under the Chairmanship of Animal Husbandry Commissioner

- | | | | |
|------|----------------------------------------------------|---|--------------------|
| i. | AHC (National Coordinator) | → | Chairman |
| ii. | PDS Expert | → | Member / Advisor |
| iii. | National Consultant | → | Member / Secretary |
| iv. | All provincial DG Livestock / Incharge (Livestock) | → | Member |
| v. | All Provincial Director A Health | → | Member |
| vi. | All Director VRI's | → | Member |
| vii. | Member Animal Science PARC Islamabad | → | Member |

Source:- Final report of the project given by the National Coordinator PDS project

This committee was responsible to prepare work plan and discuss, guide technical matters related to project. Supervision and Monitoring body for field work. Provincial TAD Officer who was supervising and facilitating the activities of TAD Provincial teams, were submitting progress report alongwith Members of the team after every quarter in workshop at provincial head quarters by rotation in every province / unit and Work plan for future quarter was also finalized.

III **NATIONAL COORDINATOR ISLAMABAD**

Animal Husbandry Commissioner Livestock Division at Islamabad was responsible for supervision and monitoring the activities at National Level. National Consultant and PDS Expert (Dr. Meriner) were assisting him.

IV PROVINCIAL COORDINATOR

Director General Livestock Department / in charge Animal Health Activities at provinces / Units were facilitating in operation supervising and monitoring the activities at provincial level.

V TAD OFFICERS (TRANSBOUNDARY ANIMAL DISEASE)

A senior Technical officer working for disease control in the province / unit were selected and trained to work as TAD Officer in the province, he was supposed to facilitate, supervise and monitor the activities of the TAD Teams of the province.

VII TAD TEAMS

There were 17 teams in the country consisting of three members each with Senior VO as in charge plus one Lady Veterinary Officer in few teams in Sindh and Punjab provinces as under:-

1. Punjab	4 teams
2. Sindh	4 teams
3. Baluchistan	2 Teams
4. NWFP	2 teams
5. AJK	2 teams
6. Northern Areas	2 teams
7. Islamabad (Capital)	2 teams

Provincial TAD Officers in consultation with DG Livestock / DAH selected randomly 10 villages of all the Districts in the province and carried out disease surveillance work. Those were supposed to visit each & every selected village regularly as per approved programme and interview almost all the farmers in the village and cattle markets regarding search of disease LVO were interviewing lady farmers of the village

The coordination of team in charge with farmers was through a Elder farmer of the village selected for the purpose and VO of the concern area.

The VO's of the teams were selected on the following criteria. The List (about double than the required) interested and energetic VO's were prepared by Director AH with the consultation of Provincial Coordinator, than after some training by Mr. Merinar (Expert) & National Consultant they were tested and the best were selected accordingly and provided further training to carry out disease surveillance, back tracing etc work. Total fifty VO's for PDS work and Master trainers were trained.

The work was carried out for about 30 months (2003 to 2005) the workers were provided full facilities likes mobility TA & DA and other expenses, without delay.

To provide technical training workshops were held Islamabad. Including provincial coordinators / policy makers. Finally after declaration the country free from Rinderpest in 2006 all good workers were awarded shields at Islamabad by FAO /EU /GO Pakistan.

Source:- Final report of the project given by the National Coordinator PDS project

COORDINATION WITH PROVINCIAL TAD TEAMS

STEERING COMMITTEE

Secretary MINFAL --	Chairman
Provincial Secretaries Livestock --	Member
Animal Husbandry Commissioner ISB	Member
Resident Representative of FAO / EU	Members
PDS Expert (Dr.Merinar)	Member
National Consultant	Member

Approving authority of work plan and facilitating body

TECHNICAL WORKING GROUP

Animal Husbandry Commissioner	Chairman
National Consultant	Member / Secretary
All Provincial DG's Livestock	Member
All Provincial Director AH	Member
All Director VRI	Members
Member Animal Science PARC	Member

To prepare annual work plan and discuss technical matters & monitoring

PROVINCIAL COORDINATOR

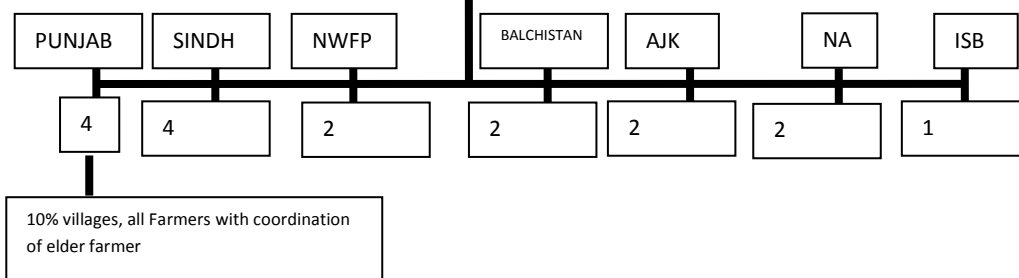
All DG's Livestock / Incharge Livestock Department

Supervision and monitoring of TAD work in province and coordination with National Coordinator

TAD OFFICER

A senior Technical Officer working for disease Control In the province selected and trained for the purpose Teams

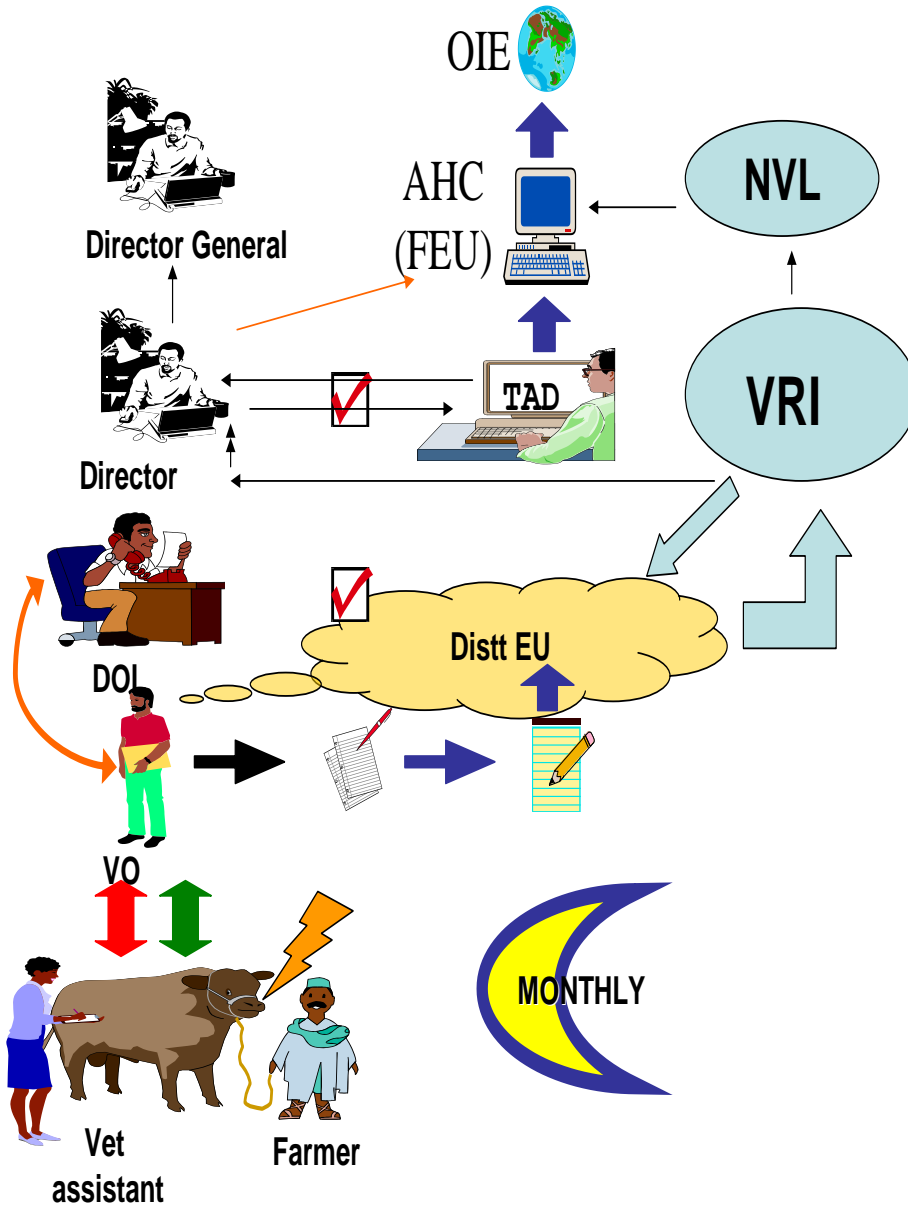
Supervision and monitoring work of the teams in the province and report to National Consultant through provincial Coordinator



Source:- Final report of the project given by the National Coordinator PDS project

Each team was consisting of 3 VO's and Senior Most was incharge with additional Lady Veterinary Officer in few teams of Sindh and Punjab.

10% villages were randomly selected for carrying out disease surveillance with coordination of a (elder farmer selected for the purpose) in the Livestock of the village and livestock market. Villages were visited by the teams after confirmation and willingness of the farmers, to get full cooperation.



Source:- Final report of the project given by the National Coordinator PDS project

3. CONCLUSION

3.1. WHAT IS THE MOST SUITABLE DISEASE CONTROL SYSTEM IN SINDH.

Livestock disease control in Sindh is based on the following components:-

- Disease surveillance & Diagnosis
- Treatment of ailing of animals.
- Production of vaccines / availability of vaccines.
- Preventive vaccination against infectious disease and deworming against parasitic diseases
- Motivation, training, publicity of farmers regarding disease control.

Directorate of Animal Husbandry / Health Sindh has prepared an yearly calendar for control of infectious & parasitic diseases and is issuing a generalized disease forecast on quarterly basis keeping in view the previous record of disease and trying to provide publicity for the information of the farmers of the province. Only progressive and commercial farmers, hardly 10% - 15% who are well aware of the benefits of preventive vaccination and deworming are protecting their animals accordingly animals of the rest farmers are at risk.

For the provision of Disease control measures there are 179 Veterinary Hospital / Dispensary at District & Tehsil Level and 600 Veterinary Centres at union council level, and 23 Mobile units, one on at each District Head Quarter with supporting staff of 334 VO's & 742 Para veterinary workers to provide Veterinary assistance in the province. The working of district is supervised by a District Officer who is also responsible for other Livestock Development activities. Director Animal Husbandry is overall incharge for Disease control activities of the Province, assisted by a Senior Level Officer Disease investigation officer, ADIO, ADCO and two Assistant Res. Officers providing disease diagnosis facilities through a smaller Lab at LCC Karachi mainly for collection of samples. For training and awareness of farmers, field workers, a training center is located at Red Sindhi Cattle Breeding farm TM Khan.

Disease diagnosis and research work is carried out by Directorate of Veterinary research and diagnosis Tando Jam established under assistance of FAO / UNDP. Having one main center, central veterinary diagnostic Lab Tando Jam with sections headed by SRO's are Pathology, Microbiology Parasitology and Epidemiology and six sub centers headed by RO's at Karachi, Dadu, Mithi, Sukkur Larkana and Naushahro feroze . These centers are lacking in equipment and required facilities.

Every year field veterinarians are reporting about 200-300 out breaks of contagious and parasitic diseases, treatment carried out for about 1.5-2.0 million animals, deworming carried out for about 1.7 million animals, preventive vaccination 6.8 to 7.0 million animals with highest number against H.S and lowest number against F&M diseases. The preventive vaccination against most prevalent disease HS is not more than 12% treatment of contagious & non contagious diseases is 8-9% shows that there is acute shortage of manpower and input including mobility and other hand only progressive farmers, commercial farmers in urban & peri urban areas and nearer are getting benefits of service and farmers of far-flung areas are unaware and are at risk.

REGARDING AWARENESS OF DISEASE PREVENTION BETWEEN COMMERCIAL AND SUBSISTENCE FARMERS

It is correct that larger number of urban commercial dairy farmers are well aware, periurban commercial dairy farmers are, having less awareness and subsistence farmers are having lesser awareness or no awareness, specially the farmers of the far flung areas.

Commercial farmers are more aware because mainly they are educated, nearer to vet: hospitals and working in close coordination with field veterinarians and they are having all the required facilities like electronics and print media and they have knowledge about disease symptoms and advance information about outbreaks etc. as they are attending awareness programmes of the dept regularly, where as subsistence (smaller, poor and rural farmers) are devoid of all required facilities and knowledge.

BOTTLE NECKS IN THE EXISTING DISEASE CONTROL SYSTEM

- Unawareness of majority of farmers about :-

FACTS

- Benefits of early reporting of outbreaks of a disease and seeking veterinary help	Hardly 10% farmers of commercial sector are reporting disease outbreaks.
- Benefits of regular vaccination drenching, dipping of animals against various diseases	Hardly 10 to 12 % vaccination and drenching are being carried out for other diseases but in case of foot and mouth preventive vaccination is below 1% no dips for control of ecto parasites are available.
- Benefits of hygienic housing of livestock	Rural farmers are mainly unaware about importance of the hygienic housing.
- Proper disposal of carcasses died due to diseases.	Carcasses of animals died due to disease are lying in open area especially in desert rural area and on super high and spreading diseases to healthy animals and human beings.
• Lack of proper attention towards rearing of sucklers and calves.	There is about 25% to 30% mortality in Buffalo calves at commercial dairy colonies due to white scours, simple diarrrahea, coccidiosis, other parasites and F&M disease. In arid areas mortality in Kids is about 50-70% and in lambs is 30% to 35% mainly due to PPR, F&M disease, diarrhea and internal parasites.
• Delay in response to Disease report	Rapid responses teams are not available under District Officer Livestock and area VO due to lack of facilities are avoiding.
• Lack of adequate treatment facilities in public and private sector	Only 179 Veterinary Dispensary, about 600 Veterinary centers and 23 Mobile units are available for about 37.0 Million Livestock without required facilities
• Lack of appropriate diagnostic facility	Very few centers devoid of required facilities are available.
• Lack of data on disease prevalence	Poor working of Epidemiological section. No culture of upto date reporting by field staff
• Shortage of drugs / medicines in public	There is shortage of drugs and vaccines in the

and private sectors	hospitals and centers of rural area, hardly 10% of the total livestock are covered.
<ul style="list-style-type: none"> Shortage of professionally trained man power for proper diagnosis and treatment 	One veterinary officer is for about 80 thousand Animals and one Stock Assistant is for 45 Thousand animals and the staff working at diagnostic centers are not properly trained and insufficient, private practice by veterinarian is not available in rural areas and not organized. Close coordination between farmers and vets is lacking.
<ul style="list-style-type: none"> Limited production and supply of vaccines, only two vaccines i.e. H.S. Vaccines and E.T.V vaccines are produced in Sindh at limited level 	Production of HS & ETV is very low, Anthrax and BQ vaccines are under trail and other vaccines are procured from sister provinces and foot and mouth vaccine is imported costing Rs.60/- to Rs.120/- per dose.
<ul style="list-style-type: none"> Non existence of a strong body of livestock farmers to work as advisory and mediatory body 	Only few NGOs are working for livestock development but their working is not satisfactory.
<ul style="list-style-type: none"> Self medication by farmers 	Lack of training and motivation of farmers
<ul style="list-style-type: none"> Treatment by quacks and so called wise men 	Shortage of Veterinary dispensaries at Village level and unawareness of farmers. Shortage of permanent veterinary center at union council levels as there are 1017 union council and only 600 veterinary centers are available out of which 70% are without building and temporary in otaq's of land lord, have given space to quackery.
<ul style="list-style-type: none"> Lack of quality control of veterinary drugs and medicine 	Lack of proper checking by concerned department i.e. health department
<ul style="list-style-type: none"> Lack of early warning system 	No trend / system for early warning for specific disease in specific area is available.
<ul style="list-style-type: none"> No check on movement at provincial borders 	Movement is free as lot of disease organisms are being brought by incoming animals to sindh and every day about 2000 dairy buffaloes from Punjab and 500 cattle / sheep for meat purpose from Baluchistan are entering in the province
<ul style="list-style-type: none"> No provision of disease control facility at livestock markets 	About 100 regular weekly (one or two days) markets on fixed dates and about 20 bigger yearly markets for Eid-ul-Azha animals are being organized without any disease control facility creating a lot of disease problems throughout year in the province.

<ul style="list-style-type: none"> • Unavailability of disaster Management programe for livestock in case of any natural calamity 	<p>It has been observed that after every 5-6 years there is heavy drought in arid areas heavy rains, floods, earthquakes. Cyclones in irrigated and coastal areas creating lot of mortality and disease problems in Livestock of whole province but there is no any disaster management programe to provide relief and rehabilitation for livestock in Sindh.</p>
<ul style="list-style-type: none"> • Lack of mobility with field workers 	<p>Hardly 30% of the field workers are having mobility and rest are without mobility and it is very difficult for them to visit farmers far-flung scattered areas for provision disease control measures to their livestock even at many places mobile units, DO Livestock, senior officers responsible for disease control (vaccination & diagnostic work) are without mobility, which has created lot of disease problems in the province.</p>

<ul style="list-style-type: none"> • No trend for keeping record of disease control measures by livestock farmers. 	<p>Livestock farmers are not keeping record of disease control measures carried out at their livestock. Even many commercial farmers are not keeping proper record neither field veterinarians are giving much importance to record keeping. Therefore farmers are unable to arrange for regular vaccination, drenching to their livestock on proper schedule. Always they carry out disease control measures after heavy losses due to disease outbreaks, in their livestock</p>
<ul style="list-style-type: none"> • Lack of research on disease control 	<p>There is no culture of research on any aspect of Livestock Development Scientist university professors are the opinion that the efficacy of vaccines and drugs is lowered due to mutation of organisms. Resistance of animals indiscriminate use of drugs and vaccines</p>
<ul style="list-style-type: none"> • Shortage of Cool chains at field 	<p>Quality of vaccines are maintained if they are kept at required temperature upto use at field level. Storage should have provided deep freezers (Large) hospital dispensaries, equipped mobile units / center with refrigerators and field workers with coolers and thermos flasks. Researchers are of the opinion that even bacterial vaccines are required to be kept at 4 °c (producing better results).</p>

3.2 WHAT SHOULD BE THE STRENGTHENED OR NEWLY DEVELOPED TO MAKE THE SYSTEM FUNCTIONAL

A STRENGTHENING OF EXISTING SYSTEM

i. DISEASE REPORTING SYSTEM

Disease reporting is very weak, either the disease reports are ignored by the farmers due to his illiteracy or far away from the field veterinarians or by field staff due to unknown reasons. Only progressive farmers of rural areas & farmers of the commercial dairy colonies & vet Officers working in those areas are sending Disease out breaks through E.D.R form (Epizootic disease reporting) a semi complicated form which can be simplified.

It is essential that in rural areas from every big village or bunch of smaller villages having population of 5000 animals a livestock disease report Activist/ Reporter be selected / deputed to report disease out breaks promptly. A stock Assistant if available in the area or a progressive farmer / his son of the area with some education may be selected and trained regarding diseases, symptoms of disease, on the pattern of CLEW and WLEW Punjab chapter of result of 2 SLSP and report writing on simple proforma in local language devised for the purpose. The person selected should be assigned other social activities like cattle shows motivation of livestock farmers for vaccinating their livestock & and provide publicity to development schemes to become familiar & popular in area. Carry out simple treatment deworming, vaccination in case of emergency. Two hundred Activist will be sufficient for rural or far flung area (not nearer to Taluka HQ). They may be paid some salary plus some amount on each correct report and plus stationery, proforma and expenses they made on the report Every year in December or June Best Activist should be awarded through a ceremony so that every activist should perform as best worker.

ii. UP GRADATION OF DISEASE DIAGNOSTIC FACILITIES:

C.V.D.L Tando jam and six sub centers may be upgraded by providing required facilities and in first phase new sub centers at Jacobabad and Sanghar district may be established to provide disease diagnostic facilities to the farmers of far-flung areas (new sub centers are required to be established at all remaining districts or the staff and facilities may be increased at nearby existing sub centers so that it is able to provide required services to other district).

At C.V.D.L Tando jam along with existing Facilities, provision for strengthening of pathology section especially histopathology and for diagnosis of viral fungal and Haemoparasites may be included with required trained staff and equipments, antigens etc. Epidemiology section may be activated and up graded well equipped and well staffed so that it is able to carry out epidemiological studies in whole province of Sindh.

Six existing sub centers may be up graded well equipped and well staffed so that they are able to carry out diagnosis for parasitic diseases and for collection of samples for submission to C.V.D.L for processing Diagnosis of other diseases. At least two new sub centers at Jacobabad (Provincial border) and Sanghar (Indian border) presently out of reach from the other centers may be established, to carry out parasitic disease diagnosis work and sample collection work. There is heavy load of work on sub centre Mithi due to very big area (22000 KM) and larger L/S population (more than 4.2 Million) required to be upgraded at the level of Research centre for Arid zone with mandate of parasitic & Bacterial disease diagnosis & research on the disease & control.

iii. **AVAILABILITY OF HIGH QUALITY VACCINE**

The important tool for disease control is Quality vaccine, against all viral, bacterial and P.P.L.O disease.

The capacity of existing vaccine center at Tando Jam be increased and expanded, so that at least it should fulfill the requirement of vaccines, for all viral, and P.P.L.O and Bacterial diseases and antigens like tuberculine brucelline and jhonine etc. The requirement of each vaccine for the province is about 40.0 million doses every year with 10% increase per year.

As far as FMD vaccines is concerned Trivalent vaccine (A.O. Asia-I) produced by Lahore is not liked / not used by commercial farmers very few are using due to lesser cost may be commercial farmers are more quality conscious about 75 to 80% are using imported vaccines costing Rs.60/- to 120/- per dose, which seems to be costly. Annand Dairy Cooperative Society India with assistance of Indian Government has arranged with multinational company Merial for two items they have established the production labs / factory at India and producing / providing FMD vaccine and imizole (control of Haemo paraties) in Friesian cattle and local herd within Rs.20/- per dose both, which has given boost to the dairy industry specially pure Friesian cattle same type arrangements are advised to be taken in Sindh for whole country by collecting seed from LCC Karachi for production of vaccine.

iv **UP GRADATION AND ESTABLISHMENT OF TRAINING CENTERS:**

Training centre at T.M khan farm may be up graded to provide training to farmers , diseases reporter / Activist (male and female) and provide training to the field officers i.e. VO and S.A'S regarding for disease control.

Two more training centers with facility of hostel to accommodate about 50 farmers, well equipped may be established at Sukkur and Mithi to provide training facilities to L/S of the area. From

training centers publicity and awareness programmes be initiated through media audio video equipment with special daily one hour programme in sindhi and urdu on radio and TV regarding disease control in L/S for providing awareness to the farmers for avoiding self medication, quack's treatment and awareness regarding preventive vaccination from veterinary department and management of sucklers and calves / kids

v) **INCREASE DISEASE CONTROL CENTERS IN RURAL AREAS / COOL CHAIN UPTO FIELD.**

The number of veterinary centers mobile units VO's and S.A's may be increased at least by Double specially in rural, Arid and semi arid area's so that farmers reach to the veterinary centres is easy and accessible. All the diseases control centres old and newly opened may be provided with required inputs including cool chains for centres and field worker to maintain the quality of vaccines / drugs.

vi) **STRENGTHING OF EPIDEMOLOGICAL SECTION**

Epidemiology section of CVDL may be well staffed, well equipped so that it is able to carry out cross sectional and longitudinal and other technical surveys of diseases in Livestock and Data may be well circulated to all the Directorates, Director General Livestock and to Secretariat and Livestock Division Federal Government so that planning for future development is carried out effectively.

vii) **(PROVISION OF MOBILITY TO THE WORKERS RESPONSIBLE FOR DISEASE CONTROL)**

All officers responsible for disease control measures at Directorate level, at, district level at diagnostic centers veterinary dispensary and veterinary centres level should be provided with mobility for visiting farmers of far flung areas easily in connection with providing disease control measures. Supervising and monitoring officer may be provided, with four wheel drive vehicles and field worker with motorcycles.

B. **NEW EDITION**

i. **RESPONSE TO DISEASE REPORT**

Rapid response team consisting of One VO and Two S.A's may be established at district HQ under district Officer Livestock to immediate rush at the village on receiving the disease outbreak reports visit affected farms and village animals, segregate sick animals from healthy, arrange collection of samples / Morbid Material treatment of ailing animals / proper disposal of dead animals, vaccination through concern officer with the assistance from Director vet res Tando Jam and DO Livestock of the District after receiving report from the lab; and guide the farmer of area for

checking the movements of outgoing and incoming animals, and provide publicity to neighboring farmers for the purpose.

ii. **INTRODUCTION OF EARLY WARNING SYSTEM**

An **affective early warning system** for specific disease in specific areas be introduced and provided wide publicity to create awareness amongst farmers so that they are able to protect their animals, well in advance.

iii. **DISEASE CONTROL FACILITY AT LIVESTOCK MARKETS**

All the animals entering in regular livestock markets & special markets like Eid-ul-Azha Markets should be provided with Disease control facilities through a **newly established directorate of Livestock marketing**, and the control of Livestock markets may be transferred to Livestock Department through a regulation and newly established Directorate should run the markets by providing other required facilities as there are about one hundred regular market on fixed spots and about twenty L/S Markets during Eid-ul-azha (yearly) for bigger cities like Karachi Hyderabad and Sukkur or L/S department should provide disease control measures at cattle markets through own resources or through a developed project.

(Dr. Zulfiqar FAO National consultant FMD (2003) highlighted the probable links between gathering of animals through movement and seasonal stress with the disease incidence.) Director General Livestock Extension Punjab is of the same view that viral disease like FMD and PPR are prevailing throughout year causing heavy losses only due to cattle piri's.

iv) **ESTABLISHMENT QUARANTINE STATION.:**

To check the movements of animals entering in province from other provinces a quarantine station may be established well equipped well staffed to accommodate sufficient number of dairy Animals at Rohri / Sukkur / Karachi.

v) **FORMATION OF SINDH CHAMBER OF LIVESTOCK(NEW PRIVATE SECTOR ADVISORY BODY):**

To look after the problems of L/S farmers and stake holders Like feed and fodder supplier milk dealers processing and retailers, medicines distributor transporter's livestock and meat tradders cattle piri's holders slaughter houses holders L/S dairy farmers association N.G.O's, consumers, officers of livestock department and local government, An Advisory body may be established in private sector with some infrastructure assistance from public sector up to level of district in first phase than upto level of union councils to deal solve all disease control and other L/S

development affairs, and coordination / mediation of farmers with public sector on the pattern of Sindh Chamber of Agriculture.

vi) **PRIVATIZATION OF VETERINARY SERVICES:**

There are more than one thousands jobless veterinary graduates, in Sindh and it is very difficult for the public sector to utilize all jobless vet graduate, on other hand there is utmost requirement of more vet graduates to be involved in the sector specially to carry out disease control measure in L/S of far flung areas and increase the covering percentage. In Arid Areas especially Mithi District there are 17 posts of VO in public sector and 12 VO (12 clinics) in private sector Thar Deep NGO one VO has to look after more than 150000 animals, which is larger number. On the pattern of Afghanistan privatization of veterinary services a donor project, in Sindh may be started through a assisted project to carryout Veterinary services in private sector in organized way. On about 20,000 animals (50% large+ 50% small) one vet officer after proper training be earmarked an area and provide with one motor cycle and required daily use equipments drugs and vaccines etc, to carry out practice and charge fixed amount per treatment, deworming vaccination etc from a fixed place named as Private vet center / Clinics. He should keep proper record with him and report to D.O L/S of the district progress report, disease outbreaks work done on regular basis. The project may continue supply all required items like instruments, drugs, vaccines etc for Disease control free of charge plus some monthly salary at least for six months or one year, till he is popularize in the area as private practitioner and after that he should go on purchase these items from the income Revolving funds and continue his practice at his own in this way farmers of far flung areas will get more vet facilities , save their animals from quacks Daho's and on other hand jobless veterinarian will get employment.

vii) **PROVISION OF DIPS IN SHEEP / WOOL AREAS**

Dips alongwith required medicines demonstrations and training be provided in Arid Areas to control Ecto Parasites in small ruminants and production of high quality wool, hairs and skin.

VIII **REASEACH ON DISEASE CONTROL OF LIVESTOCK**

Research component is lacking for livestock development in the department Research work may be started on various components of disease control by up gradation the post of Director Veterinary research to the level of DG VET research with coordination of veterinary faculty of Sindh agriculture University Tando Jam so that disease control work is carried out smoothly on scientific grounds, and the production is increased.

XI **CREATION OF DISEASE FREE ZONE**

Efforts may be carried out to carry out disease control work in such a way in isolated areas zones like coastal area or desert area to create disease free zones.

X **DISASTER MANAGEMENT FOR LIVESTOCK**

To face any disastrous situation in livestock, due to flood, heavy rains, earth quakes, drought, cyclones etc. a project/ program to provide relief and rehabilitation measures for livestock on permanent basis is to be established.

As always disease problems mainly due to drought in desert area / heavy floods / rains in irrigated & coastal areas is spreading very fast in other areas of the Sindh as there is no any checking on movement of livestock in the province.

XI) **PROVISION OF HEALTH CARDS BY A.H DEPT TO THE FARMERS:-**

To keep the proper record of disease out breaks, treatment of animal prevention vaccination, drenching and sample collection etc. L/S farmers may be provided with HEALTH CARDS for keeping proper record, which will remind them and field veterinarian for due dates of prevention vaccination and drenching along with pamphlets on disease occurring in the area with symptoms, treatment prevention measure etc for the awareness of farmers.

XII) **INITIATIVES FOR DISEASE CONTROL OF CALVES / KIDS**

A program for control of disease in calves, kids and lambs may be started with special attention to commercial dairy colonies and Arid Areas, along with provisions of Milk replacer at reasonable rates and training of farmers on rearing of calves / kids / lambs.

XIII) **DEMONSTRATIVE PUBLICITY FILMS**

Awareness of farmers regarding disease control in livestock related topics. Demonstrative films may be prepared on area livestock farms locally in Sindhi and Urdu along with interviews of the progress in farmers for the training publicity of farmers so that they are able to carry out proper disease control practices.

XIV) **MONITORING & EVALUATION OF WORK DONE**

Monitoring work at departmental level is very poor working of Directorate of planning & monitoring cell may be activated, and one senior VO (newly created) may be posted as District. Monitoring officers under directorate with to carryout physical / general monitoring of developmental and non-development activities at ground / village level.

Technical monitoring of disease control work is essential which should be carried out by Directorate of Veterinary Research, Tando Jam with coordination of Animal health and Directorate

Monitoring, the blood samples may be collected from the vaccinated animals and checked for immunity titre to check the vaccination done and quality of vaccine.

4. OUTBREAK OF DISEASE

4.1 REGULATION IN THE COUNTRY

IN PAKISTAN FOLLOWING REGULATIONS ARE EXISTING REGARDING DISEASE CONTROL:-

ANIMAL HEALTH

- i. Glanders and Farcy Act, 1899**
- ii. Sindh Glanders and Farcy Rules 1921**
- iii. South African Horse sickness Rules, 1959**
- iv. Dourine Act, 1910**
- v. Punjab Dourine Rules, 1952**
- vi. Sindh Cattle (Contagious Diseases) Rules, 1949**
- vii. NWFP Animal Contagious Disease Act, 1948**
- viii. Bye-laws for Registration and Control of Dogs and Preventive of Rabies, 1979**

GLANDERS AND FARCY ACT, 1899

Substituted by the Central Laws (Status Reform) Ordinance, 1960 and extends to whole of Pakistan. It also includes South African Horse Sickness through the Notification of the Government of West Pakistan in 1959. It is a comprehensive Act and covers all aspects of the infections.

- The provinces of Punjab and Sindh made Rules under this Act. But the Rules framed by Punjab in 1908 were superseded by the South African Horse Sickness Rules 1959. However, the Sindh Glanders and Farcy Rules, 1921 are still in force.

Any animal found positive has to be destroyed.

SINDH GLANDERS AND FARCY RULES, 1959

It has been framed under the Glanders and Farcy Act, 1899 and applies to the whole of Sindh except to the city and port of Karachi.

WEST PAKISTAN AFRICAN HORSE SICKNESS RULES, 1959.

Now extends to all the 4 provinces of Pakistan under Articles 19 of President's order No.1 of 1970.

DOURINE ACT, 1910

Extends to whole of Pakistan and appears fairly comprehensive. **Any animal found positive has to be destroyed.**

SINDH CATTLE (CONTAGIOUS DISEASES) ACT 1948.

As the title suggests this Act extends to all parts of Sindh and is fairly comprehensive. It empowers the veterinary officer under the Act to compulsorily vaccinate animals against a contagious disease, mark the animals and penalize those owners who refuse vaccination of their animals. It also empowers the government to regulate inter and intra provincial movement of livestock to prevent spread of contagious disease. It can also establish movement of livestock to prevent spread of contagious disease. It can also establish quarantine stations and if necessary carryout compulsory vaccinations of the quarantined animals. The government can also control holding of livestock markets, fairs and traffic of animals. Livestock owners are also obliged under this Act to report the incidence of contagious disease to the nearest veterinary hospital. Schedule of disease are 1. Rinderpest 2. H.S 3. Anthrax 4. BQ 5. Contagious abortion & 6. TB.

SINDH CATTLE (CONTAGIOUS DISEASES) RULES, 1949

These Rules have been framed under the Sindh Cattle (contagious Diseases) Act,1948. It mainly clarifies and details some aspects of the Act like declaration as infected area, period of detention in a quarantine, charges for animals under detention, exercise of powers by the veterinary officers, disposal of animals destroyed etc.

NWFP ANIMAL CONTAGIOUS DISEASES ACT, 1948

It is essentially very similar to the Sindh Cattle (Contagious Diseases) Act, 1948. Therefore, the provisions under this Act are also exactly the same. However, the provisions for penalties are more elaborate. Schedule of Diseases are 1.RP 2. FMD 3. HS 4. BQ 5. Anthrax 6.TB 7. Jhone's disease 8. Glanders 9. Epizootic Lymphangitis 10. Dourine 11. Rababies 12. Surra

BYE LAWS FOR REGISTRATION AND CONTROL OF DOGS AND PREVENTION OF RABIES, 1979

It only extends to the Taxila Cantonment. These provisions now exist under the Local Government Ordinance, 2001 (sixth Schedule).

OUTLINES OF THE PROPOSED SINGLE COMPREHENSIVE LEGISLATION ON ANIMAL HEALTH (UNDER SLSP)

An act to prevent and control contagious diseases and regulate import, export and quarantine of animals and animal products.

1. Short title, extent and commencement.

- (i) This Act may be called the Pakistan Animal health Act, 2006.
- (ii) It extends to the whole of Pakistan
- (iii) It shall come into force at once.

2. **CHAPTERS**

- I. Notifiable Diseases
- II. Surveillance and Monitoring
- III. Animal Movement
- IV. Import, Export and Quarantine.

3. **This Act to over-ride all other laws in the subject.**

4. **Definitions**

Act, animals, Animal Products, Notifiable Disease, Contagious Disease, Infection, Carcass, Fodder, Little, Veterinary Inspector, Inoculation, Health Certificate, Prescribed, Local Authority, Head of the Department, Import and Export, Points of Entry, Quarantine, Quarantine Officer (***Under process of approval***) with livestock division

- **Regulations for control of contagious diseases are there can be enforced when required.**

In case of disease outbreak of any contagious nature farmers cooperate fully with the V.O of the area and other officers to carry out diseases control measures, sometimes by force.

- **The provincial department of livestock is mandated to provide treatment and vaccination for the prevention of infectious diseases along with other Livestock development activities. This department has a network of veterinary hospital, dispensaries and veterinary centers. Throughout the province at district, taluka and union council level. However, there is acute shortage of technical staff and funds**

4.2 QUESTION 2:

When the outbreak of disease occurs, how has the Livestock department dealt with the situation

Based on the experience, when there is an outbreak, the area V.O on information through stock Assistant of the area or through media or other source, visiting area attending disease outbreak, segregate. Sick animals, from healthy treat sick animals symptomatically issue EDR mentioning the facts and history of the disease to DO Livestock and Director Animal husbandry Hyderabad Sindh and with the help of C.V.D.L staff collect samples / morbid material for diagnosis and on their advice carry out further treatment of sick and vaccination to healthy animals and animals of willing farmers in the village, and V.O or S.A are visiting regularly at least three times till the disease is subsided. If the disease outbreak is not controlled and continued for some time, help from provincial Directorate of Animal Husbandry Hyderabad and Veterinary Research Tando Jam and National Veterinary Lab: Islamabad is requested, and research team of National Vet. Lab Islamabad is visiting recording the facts of disease and collecting samples morbid material for diagnosis and guiding for disease control measures accordingly.

Hardly 10-15 percent of progressive farmers of commercial sector and veterinary field staff working in that area are reporting disease out breaks promptly & getting proper disease control assistance from the department. Animals of the rest farmers are almost unattended and at the risk of disease.

4.3 IMPORTANT LIVESTOCK DISEASES PREVALENT IN SINDH

BASED ON

- 1- Interviews
- 2- Epidemiological Survey
- 3- Diagnostic reports

AREA: ARID AREAS (DESERT)

S#	Specie	Season/Month	Infections (Viral & Bacterial)	Remarks
<u>VIRAL</u>				
1.	Bovine, Ovine & Caprine	i. November, December & January ii. July & August	Foot & Mouth Disease	1. About 25% Herds are affected 2. Morbidity a. Cattle : 10-15% b. Calves : 50% c. Kids : 40-50% d. Lambs : 40-50% 3. Mortality a. Adult : 1-2 % b. Calves : 10% c. Kids : 50-60% d. Lambs : 40-50% 4. Abortion in goats and sheep.
<p>Note: FMD is causing losses annually of Rs.1.82 Billion (2004). But from the PDS report it has been observed that HS & Mastitis in commercial and other area also causing heavy losses.</p> <p>Vice Chancellor Veterinary and Animal Husbandry Lahore informed that they have developed a Bivalent oil vaccine for control of FMD and HS giving immunity for one year cost is Rs.30/- per dose.</p> <p>Main reason of FMD was said to be stress of drought and winter (Cold weather)</p>				
2.	Ovine & Caprine	Oct to January	i. Pesti, Des petites Ruminants (PPR)	1. About 25% herds are affected 2. More out breaks in goats than sheeps. 3. Morbidity : 100% 4. Mortality a. Goat : 20 – 25% a. Sheep : 25% b. Kids : 50-60% c. Lambs : 40-50%
Main reason was said to be stress of drought and winter				
		Oct to Dec	ii. Goat Pox & Sheep Pox	1. 10-15 % Herds are affected 2. Morbidity a. Adults : 05-10% b. Kids : 10-20%

				c. Lambs : 10-15% 3. Mortality b. Kids : 02-05% c. Lambs : 02-05%
<u>BACTERIAL</u>				
3.	Ovine & Caprine	July to Sept Mainly after rains	Enterotoxaemia	1. About 20-30 % herds are affected 2. More outbreak in goat than sheep. 3. Morbidity a. Goat : 50-60% b. Sheep : 30-40% c. Kids : 30-40% d. Lambs : 30-40% 4. Mortality a. Adults : 10-15% b. Kids : 20-30% c. Lambs : 20-30%
4.	Ovine & Caprine	April to July	Anthrax	1. Outbreaks in i. Mathi - 3 UC's ii. Diplo - 2 UC's iii. Nagarparkar - 1 UC iv. Chachtro- 1 UC 2. Herds affected 50-60% 3. Morbidity - 90% i. Adult 50-60% ii. Kids / Lamb 50-60% 4. Mortality i. Adult 10-20% ii. Kids / Lambs 30%
		Mainly due to injuries in mouth after eating fruits & leaves of tree (khabar)		
6.	Bovine	June & July Dec & January	Hemorrhagic septicemia	1. Barrage area of Diplo and Mathi 2. Herds affected 20-30% 3. Morbidity (Adult and Calves) - 60% 4. Mortality (Adult and Calves) - 10%
7.	Camel	Dec & January	Pneumonia (Bleeding from nostrils)	Pasteurellosis About 5000 Camels were affected with pneumonia 3 died.
		First time Pasteurellosis was diagnosed in Camels in Sindh and Cholistan (Punjab)		Treatment with antibiotics was satisfactory
8	Bovine & Caprine	Round the year	Mastitis	About 10-20% herds are affected Morbidity Cattle 10-20% Goat 20% Due to Quack's treatment, mostly one teat is lost than animals are sold / slaughtered.
9.	Ovine & Caprine	Oct to January	Contagious Pleuro Pneumonia (CPP)	1. About 50% Herds are involved. 2. Morbidity - 40% 3. Mortality -

				i. Adult 10-20% ii. Lambs / Kids 30-40%
PARASITIC INFESTATION				
10	Camel / Goat / Sheep / Cattle	Round the year	1. Flukes 2. Roundworms 3. Ticks 4. Mange & mites 5. Trypano somiasis 6. Theliariasis	While interviewing RO Mithi and checking the work done report 2009-2010 sub center diagnostic Lab Mithi out of 3310 positive samples 3230 samples were positive of parasitic infestation and only 80 were positive of other disease i.e. anthrax -17, entrotoxaemia-17, FMD-28, HS-18, which is evident of larger number of animals are infested with parasites.

COMMERCIAL DAIRY COLONIES KARACHI / HYDERABAD

VIRAL DISEASE

	Bovine	Nov, Dec, January, July & August	FMD	From 12 to 13 lacs animals about 50 to 60% are affected inspite of preventive vaccination by Aftovax (A.O asia-I) Aftibin (A.O) FMD Lahore (A.O asia-I) (Rus) A.O Asia-I. No immunity was created. Losses Occurred i. 50% Milk Production reduced ii. Abortion in 100% advance pregnant buffaloes. iii. Mortality in Suklers-60to70% 4-5 months calves 10%-20%
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Note:- It was informed by DO Livestock Karachi & VOLCC Karachi that FMD has spread after Eid-ul-Azha Market Scientist of National Lab Islamabad are of the opinion that mutation is type 'O' has occurred. The second opinion is that previously (5-6 years back) Iranian FMD vaccine was used at commercial colonies Karachi may be some Iranian type virus has created problems. For confirmation samples have been collected and sent to Pir Bright (Viral Reference Lab). A senior dairy farmer of LCC Karachi Haji Sikandar Ali Nagori and his friends are using FMD vaccine of VRI Lahore, since 12-15 years there is no outbreak of FMD at their farms, but their sanitary condition and other managerial conditions are excellent. It is presumed that management has to play an important role in controlling and spreading FMD outbreaks.

	Bovine	Dec January	Buffaloe Pox / Cow Pox	30-35% wara's from 6000 wara's are affected Morbidity 40% no Mortality production reduced by 10% pustules on hands of Gawalla in below 25years age. Disease spread through gawallas subsided in march automatically but the farmer has to check secondary infection.
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BACTERIAL

Bovine	Dec- January	H.S	5-10% farms are affected Morbidity 5-10% Mortality Adult 1-2% Calves 10% Vaccines produced at Vaccine center Tando Jam and PRI Karachi are working satisfactory
Calves	Whole year	White scours / coccidiosis/ round worms	Morbidity 20-30% Mortality 30-40%

Mainly the problems are caused due to mismanagement and not providing required quality of clostrum.

NOTE:- Salvakia country has developed four protein vaccine for vaccinating dams 3-4 weeks before pasturition to control E-Coli & Streptococcus infection in calves.

PARASITIC DISEASE

Buffaloe / Cattle (Cross)	Sept Oct and Nov	i. Ticks Mange / Mites ii. Haemoparasities iii. Piroplasmosis iv. Theleriasis v. Flukes & Roundwarms	80 to 90% animals are affected. Cross animals are more susceptible to disease (Haemoparasites) Mortality 2-5% adult & calves. Ivermectine, ivomec and ICI drenchs are working satisfactorily.
Note:- Parasitology Department, Vet, faculty SAU Tando Jam are doing research on the Ticks & allied problems with the assistance of Donor.			
Bovine	Oct - Dec	Mastitis	More case are occurred at farms where the conditions are insanitary and Gawala's are careless not washing their hands teats of animals properly about 20% animals mainly buffaloes in about 20% farms are affected. If a teat is totally infected that animal is sold to butcher. Apart 10% affected animals are treated in early stage Animal Health Department, Agriculture university Faisalabad has developed a vaccine against Mastitis (S. Aureus Str. Agalactiae, E-coli) providing 50 to 60% immunity. Another imported vaccine is under trial stage against ten organism mastitis. Medicine department Agriculture university Faisalabad has prepared a project for

				control of HS and Mastitis, sent to PARC for funding.
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OTHER IRRIGATED AREAS
VIRAL DISEASE

	Bovine Ovine & Caprine	Dec – Jan July & August	FMD PPR	10-20% herds involved Morbidity 30 to 40% More production losses. Mortality in calves 10-20% 1. More outbreaks in goat than sheep 2. Morbidity adult 80% Lamb /kid 90% 3. Mortality Adult 10%, Lamb/ Kid 20-30%
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BACTERIAL

	Camel	Dec & Jan	Pasteurellosis	Thatta & Badin 3-4 camels died. Phenumonia Bloody discharge treatment with Antibiotics gave response.
	Bovine	June July Dec Jan	HS	Morbidity 30% Mortality Adults 10% Calves 15-20%
	Ovine & Caprine	June & July	Entrotoxaemia	Morbidity 40% Mortality 20%
	Ovine & Caprine	Dec & Jan	CPP	Morbidity 30% Mortality 20%
	Bovine	June / July	Black quarter	Outbreaks occurring after rains young cattle 1-2 years age are involved. Morbidity 10% Mortality 15-20% Treatment with Antibiotics giving satisfactory results.

PARASITIC INFESTATION

	Bovine Ovine & caprine	June July	Ticks Mange, Mites, Fascialiasis, Round worms, babesiasis, coccidiosis & Theleriasis	Mainly after rains more outbreaks at farms whose floor is wet (No sunlight and fresh air) Both adult and claves / kids involved.
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Further Directorate of vet Res CVDL Tando Jam has carried out research work and diagnosis of Zoonotic disease (Public health importance)

In year 2010-2011 have collected samples from seven districts of the Sindh Province including desert and commercial dairy farming diagnosis work carried out at CVDL Tando Jam

Source: Discussion with Director General, Livestock, Director Animal Husbandry, Disease Investigation Officer, NGOs of the concerned areas and District Officer of the concerned Districts.

SAMPLES COLLECTED

	NAME OF DISTRICT	BRCELLA ABORTUS	B.MELITENSIS	TUBERCULOSIS	ANTHRAX
	Karachi	447	0	10	0
	Tharparkar	439	1004	10	6
	Hyderabad	472	0		
	Tando Allahyar	128	540		
	N. Feroze	23	0		
	Larkana	207	0		
	Dadu				
	Total	2110	1753	20	6

Source: Director Veterinary Research Central Veterinary Diagnostic Lab Tandojam

		NO. OF SAMPLES EXAMINED	NO. OF SAMPLES POSITIVE	PERCENTAGE
	B. Abortus	2110	582	27.58
	B. Melitensis	1753	21	1.19
	T.B	20	4	20
	Anthrax	6	6	100

Source: Director Veterinary Research Central Veterinary Diagnostic Lab Tandojam

The work is important from Public Health point of view, may be extended in whole Sindh by producing Antigen for sensitivity test against all diseases including Jhone's Disease at Sindh Vaccine Center Tando Jam.

SUMMARY

Disease control and maintenance of health of animals is directly related to economic productivity of livestock. Diseases may cause heavy financial losses to livestock farmers because of high morbidity and mortality of many prevalent diseases in Sindh and higher percentage of animals at risk (over 85% animals are without vaccination cover). During outbreaks many animals either die or are made less productive due to the diseases. Healthy animals convert feed more efficiently while diseased animals produce less and become uneconomical. Thus, diseases can be ranked as one of the most important factors. The main reasons of disease outbreaks in the area are stress caused by drought (malnutrition), Heavy rains, cyclones and heavy floods, insanitary conditions, winter & summer season, congestion overcrowding, long duration transportation (Livestock piris).

RECOMMENDATIONS

A Well strengthened well coordinated research based disease control program for livestock is to be initiated in Sindh with active disease reporting, rapid response in connection with diagnosis, supply of quality inputs for treatment deworming and vaccination, awareness and training of farmers with intention to create few small scale disease free zones,

The disease control strategy should be “prevention is better than cure” vaccination against all diseases and deworming should be free of charge in first year then on 50% charges up to project period. The treatment should be on charge basis (cost of patent medicines drugs on company rates, from a store at Hospital Level) except simple treatment, which should be free.

LIST OF ABBREVIATION

SR#		
1.	NGO	Non Governmental Organization
2.	VET	Veterinary
3.	CVDL	Central Veterinary Diagnostic Laboratory
4.	PPR	Pestides Petitis Ruminants
5.	HS	Hemorrhagic Septicaemia
6.	FMD	Foot & Mouth Disease
7.	E. COLI	Escherichia Coli
8.	PDS	Participatory Disease Surveillance
9.	GCP	Government of Pakistan
10.	EC	European Commission
11.	SLSP	Strengthening of Livestock Services Project
12.	TAD	Transboundary Animal Diseases
13.	OIE	Office of International Epizootics
14.	VRI	Veterinary Research Institute
15.	DG	Director General
16.	RES	Research
17.	TAD INFO	Transboundary Animal Disease Information
18.	VO	Veterinary Officer
19.	RO	Research Officer
20.	FATA	Federally Administrated Tribal Agency
21.	ICT	Islamabad Capital Territory
22.	NWFP	North Western Frontier Province
23.	BTN	Baluchistan
24.	AJK	Azad Jammu & Kashmir
25.	LS	Livestock
26.	PVMC	Pakistan Veterinary Medical Council
27.	EPI UNIT	Epidemiological Unit
28.	GPS	Global Positioning System
29.	UPS	Uninterrupted Power Supply
30.	SA	Stock Assistant
31.	CLEW	Community Livestock Extension Worker
32.	WLEM	Women Livestock Extension Worker
33.	PCS	Personal Computer System
34.	CCPP	Contagious Caprine Pleuro Pneumonia
35.	ET	Entero Toxaemia
36.	CPD	Contagious Pneumonia Disease
37.	BQ	Black Quarter
38.	S/GOAT POX	Sheep Pox / Goat Pox

39.	Buff	Buffaloe
40.	LFD	Liver Fluke Disease
41.	FPMU	Federal Project Management Unit
42.	DVM	Doctor of Veterinary Medicine
43.	FAO	Food & Agriculture Organization
44.	RES: REP:	Resident Representative
45.	AHC	Animal Husbandry Commissioner
46.	EU	European Union
47.	GOP	Government of Pakistan
48.	TA & DA	Travelling Allowance & Daily Allowance
49.	ISB	Islamabad
50.	MINFAL	Ministry of Food, Agriculture & Livestock
51.	ADIO	Assistant Disease Investigation Officer
52.	ADCO	Assistant Disease Control Officer
53.	LAB	Laboratory
54.	LCC KYC	Landhi Cattle Colony Karachi
55.	TM Khan	Tando Muhammad Khan
56.	ETV	Entero Toxaemia Vaccine
57.	DO LIVESTOCK	District Officer Livestock
58.	PPLO	Pluro Pnuemonia Like Organisms
59.	TV	Television
60.	TB	Tuberculosis
61.	EDR	Epizootic Disease Reporting
62.	B. Abortus	Brucella Abortus
63.	SE	Stomatitis Enteritis
64.	MAST	Mastitis
65.	ENDO	Endoparasites

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4. Zulfiqar, National Control Strategy for F.M. Disease FAO 2005-2006.
5. Qurban Ali, National Control Strategy for PPR Disease FAO 2005-2006.
6. M. Farani Livestock Laws Manual FAO of UNO Italy 1983.

MEETINGS / INTERVIEWS HELD

SR #	NAME	POST
	Dr. Muhammad Nawaz	Vice Chancellor Vet. And AH Uni. Punjab Lahore
1.	Dr. Ghulam Sarwar Shaikh	Director General Livestock Sindh Hyderabad.
2.	Dr. Abdullah Mewati	Director Animal Husbandry Sindh
3.	Dr. Aslam Pervez Umrani	Director Vet Res CVDL Tando Jam
4.	Mr. Shahbuddin Memon	Chief Agriculture P & D Sindh
5.	Dr. KB Mirbhar	Professor Medicine SAU Tando Jam
6.	Madam Nasreen	Associate Professor of Parasitology SAU T Jam
7.	Dr. Tejmal	DIO Directorate of AH Sindh Hyderabad
8.	Dr. Liaquat Jat	ADIO / TADCO Sindh
9.	Dr. Zulfiqar Bhutto	VO Dev Section DG Office
10.	Dr. Ghulam Hussain Dawach	Deputy Project Coordination LDD Board Hyd
11.	Dr. Noor Ahmed Soomro	Monitoring Officer SLSP Hyderabad
12.	Dr. Khadim Hussain Soomro	DPD SLSP Hyderabad
13.	Dr. Siraj Ahmed Eisani	PD Vaccine Production Unit Tando Jam
14.	Mr. Farooq Ahmed	Samara Medical Store Hyderabad
15.	Mr. Abdul Majeed	China Medical Shotre Hyderabad
16.	Haji Mohammad Aslam	Dairy Farmer Cattle Colony Hyderabad
17.	Mr. Naveed Malik	Dairy Farmer New cattle Colony Hyderabad
18.	Haji Mohammad Bux Jatoi	Dairy Farmer old Cattle Colony Hyderabad
19.	Haji Muhammad Yousuf Jatoi	Dairy Farmer Old Cattle Colony Hyderabad
20.	Haji Muhammad Haneef	Dairy Farmer Old Cattle colony Hyderabad
21.	Abdul Khaliq Qureshi	General Secretary Dairy Farmers Association Old Cattle colony Hyderabad
22.	Riaz Ahmed Abrejo	Dairy Farmer Hala Hyderabad
23.	Rias Iqbal Khan Jatoi	Fodder Dealer old cattle colony Hyderabad
24.	Dr. Zainulabadien Mandan	DO L/S Badin
25.	Dr. Nobat Khan Khoso	DO L/S Tharparkar
26.	Dr. Jaimal Dhamani	Rt. Professor Vet Med. SAU Tando Jam / NGO
27.	Dr. Nasruallah Panwaha	DO L/S Karachi
28.	Dr. A. Hafeez Shaikh	VO LCC Karachi
29.	Dr. Abdul Wahid Mughal	Private Veterinary Practitioner LCC Karachi
30.	Dr. Khushaldas	Private Vet Practitioner Super highway Karachi
31.	Mr. Mohammad Jameel Memon	Progressive Dairy and Beef Cattle Farmer Karachi
32.	Haji Sikandar Ali Nagori	Ex-President Dairy Farmers Association LCC Karachi
33.	Dr. Manzoor Hussain	National Consultant PDS / FAO Islamabad
34.	Dr. Saeed Ahmed	PD SLSP Islamabad
35.	Dr.	DPD SLSP Islamabad
36.	Dr. Mohammad Afzal	Chairman PARC Islamabad
37.	Mr. Naseer Ahmed Memon	Chief Executive SPO NGO Pakistan
38.	Dr. Ghulam Muhammad	Professor Medicine Agriculture Uni. Faisalabad
39.	Dr. Cal. Tariq Mustafa	Vaccine Medicine Dealer
40.	Dr. Irfan Zahid	DG Livestock & Dairy Development Punjab
41.	Dr. Liaquat Ali	Director HQ Planning R/S Punjab Lahore
42.	Dr. Munawar Ahmed	D.S Livestock Secretariat Karachi.
43.	Dr. A. Ghaffar Memon	D.S Technical Livestock Secretariat Karachi.

44.	Dr. Mohan Lal Malhi	Ex-EDO Agriculture CDG Karachi.
45.	Dr. Rasheed Ahmed	Director Disease Surveillance & Reporting Punjab Lahore
46.	Dr. Ashok Kumar	VO Thardeep Mithi
47.	Dr. Rashid Ahmed Dar	R.O Epidemiology CVDL T Jam
48.	Dr. Arshad Mahmood	Data Management Officer Livestock Dept Punjab
49.	Dr. Khushi Mohammad	Professor Microbiology Vet & AH university Lahore
50.	Dr. Shabnam	Dev Section Livestock Punjab
51.	Mr. Ghulam Akbar Dars	Progressive Livestock farmer Kunri Umerkot.

Appendix I

Marketing (partly by local consultant)

- I-1. Information provided by the Sindh Livestock Department
- I-2. Data collected by the value chain study
 - I-2-1. Livestock market
 - I-2-2. Farm gate price of milk, beef, and mutton
 - I-2-3. Major Constraints of retailers of milk, beef, and mutton as well as users of livestock
- I-3. Integrated information
 - I-3-1. Estimated flow of livestock
 - I-3-2. Government price and market price
- I-4. Production cost and farm gate price of milk in Karachi and Hyderabad

I-1 Information provided by the Sindh Livestock Department**i) List of livestock markets in Sindh Province**

Table I-1-1 shows all livestock market in Sindh province. The information is provided by the Sindh Livestock Department. All livestock markets are managed by private sector under the permission of the district government.

Table I-1-1 List of livestock market in Sindh province

District	Name of Piri	Day/Date	No. of Animals per day			
			Buffalo	Cow	Sheep	Goat
Ghotki	Khan pur Mahar	Monday: Buf & Cow Sunday: Goat & Sheep	450	400	300	600
	Mirpur Mathalo	Monday	250	150	150	1,000
	Daherki	Sunday	100	100	300	200
	Ubarvo	Saturday	90	150	80	145
Sukkur	Pano Aquil	Monday: Sheep & Goat Thursday: Buf & Cow	90	115	35	50
	Rohri	Monday: Sheep & Goat Tuesday: Buf & Cow	200	30	25	200
Khairpur	Khairpur	Wednesday	8	15	20	200
	Kot lalo	Sunday	15	20	70	150
	Thari Mirwah	Saturday	35	40	20	350
	Kumb	Thursday	150	100	500	2,500
	Bangu Bahan	Saturday	5	10	50	100
	Wad pagia	Sunday	40	60	40	30
	Kingri	Wednesday	25	18	70	700
	Korki Hajana	Monday	130	250	200	600
Naushero Feroze	Halau	Sunday	70	100	20	500
	-	Sunday	68	80	15	350
	Naushero Feroze	Tuesday	80	100	25	700
	Moro	Tuesday	200	150	25	600
	-	Saturday	200	130	20	605
Nawabshah	Nawabshah	Saturday	50	60	35	500
	Sakrand	Sunday	30	10	200	600
	Dour	Tuesday	250	500	500	3,000
	Taj abad	Friday	20	12	20	350
	Qazi Ahmed	Thursday	200	250	1,000	1,580
Kashmore	Kadh Kot	Saturday	250-300	200-300	200-300	250-300
	Kashmore	Thursday	1,000-1,500	800-1000	1,000-1,200	1,000-1,500
	Tangwani	Friday	80-100	100-150	30-40	50-70
Shikarpur	Shikarpur	Saturday & Wednesday	120 - 150	50 -70	40 -60	200 - 300
Jacobabad	Jacobabad	Monday	250	326	275	950
	Jacobabad	Wednesday	350	580	800	1,350
	Jacobabad	Thursday	270	360	350	750
	Jacobabad	Saturday	380	600	680	1,400
	Jacobabad	Sunday	200	300	320	850

District	Name of Piri	Day/Date	No. of Animals per day			
			Buffalo	Cow	Sheep	Goat
Kumber Shahdadkot	By pass road Naseerabad	Monday	250	150	450	350
Larkana	Larkana	Saturday & Wednesday	200	100	300	500
	Rato Dero	Thursday	100	50	100	200
	Naudero	Sunday	100	70	150	200
Dadu	DADU	Monday	200	250	200	300
	MEHAR	Thursday	400	600	500	700
	JOHI	Sunday	250	300	400	500
	K . N SHAH	Tuesday: Goat & Sheep Thursday: Buf & Cow	100	150	150	200
	Drigh Bala	Thursday	150	200	200	400
	Wahi Pandhi	Friday	100	200	400	600
Jamshoro	Jhangara	Tuesday	200	100	200	600
	Jamshoro	Wednesday	10	20	100	400
	Kotri	Friday & Wednesday	20	100	150	700
	Sann	Tuesday	10	15	200	800
	Bhan	Tuesday	250	150	200	500
Thatta	Thatta City	Thursday	95	76	147	170
	Mirpur Bathoro	Throughout year	250	300	50	200
	Mirpur Sakro	Tuesday	100	200	200	3
	Chuhar Jamili	Tuesday	120	115	210	235
Matari	Hala	First Monthly (monthly)	500	1,000	150	2,000
Tando Allah Yar	Tando Allahyar	Thursday	80	90	250	550
	Usman Shah huri	Wednesday	190	170	40	160
	Town Chamber	Tuesday	2,800	1,200	200	3,000
Hyderabad	By pass piri National Highway	Wednesday	188	275	700	1,800
T. M.Khan	Tando Sain dad	Sunday	400-600	300-500	30-50	250-400
	Mir Mumtaz Talpur (old)	Regular Permanent	250-300	-	-	-
	Dildar Tando Sain dad	Thursday	100-150	50-100	50	50-100
	Al- Fatah Market Near Ayoubia Hotel	Wednesday	100-250	50-100	30	50
Badin	Talhar	Saturday	3,000	4,000	3,500	4,500
	Dumballo	Sunday	200	150	500	1,200
	Nondo	Sunday	100	100	400	600
	Golarchi	Monday	500	400	600	1,500
	Shadi Large	Monday	150	200	400	700
	Kadhan	Tuesday			350	150
	Pangrio	Tuesday	500	800	800	2,500
	Tnado Bago	Thursday			900	2,000
	Haji Sanwan	Thursday			300	400
	Kadhan	Thursday	100	150		
	Seerani	Friday	100	100	300	400
	Badin	Daily Basis	200	200		
	Ghulam Shah	Annual (27 Zulhaji)	(donkey)			

District	Name of Piri	Day/Date	No. of Animals per day			
			Buffalo	Cow	Sheep	Goat
	Tando Ghulam Ali	Annual (11 Moharam)	(camel)			
Sanghar	Shadad pur	Monday	5,500	1,800	1,500	3,500
	Khipro	Monday: Buf & Cow Tuesday: Goat & Sheep	800	5,300	3,500	6,000
	Shah pur Chakar	Wednesday	1,000	1,165	980	2,500
	Sanghar	Thursday	600	1,500	1,200	2,300
	Tando Adam	Saturday	2,500	4,500	2,300	4,500
MirpurKhas	Mirpurkhas	Tuesday: Buf & Cow Wednesday: Goat & Sheep	250	180	60	700
	Belaro	Thursday	125	110	40	250
	Sindhri	Sunday	120	100	90	230
	Kot Ghulam Muhammad	Monday	150	120	50	350
Umar Kot	Bacha Band	Thursday	10	15	200	300
	Soofi Faqir	Saturday	20	25	60	400
	Cheel Band	Friday	110	-	-	-
	Kunri	Saturday	70	100	50	300
	Umar Kot Town	Monday	0	5	100	500
Tharparker	Mithi Piri.	Sunday	20-30	130-170	500-700	1,500-1,800
	Islam Kot pri	Thursday: Buf, Cow, Goat, Sheep	20-25	100-125	200-300	800-1,200
		Wednesday: Camel	Camel: 200-250		-	-
Karachi	Landhi Cattle Colony	Wednesday to Sunday (5day in total)	25,000 (5,000/day)	5,000 (1,000/day)	15,000 (3,000/day)	25,000 (5,000/day)
	Malir Karachi	Tuesday	500	1,000	2,000	2,000
	Mawach Goth Hub River Road	Wednesday	4,000	2,000	5,000	8,000
	Supper High way Temorary piri for eid-ul-azha	Once a year		500,000	800,000	1,200,000

Source: The Sindh Livestock Department

ii) Retail price of milk, beef, and mutton determined by local government in Jan, 2011

Table I-1-2 shows market price of milk, beef, and mutton determined by local government. The related documents from each district were collected in January 2011 through the office of director general (DG office). The right end column indicates the dates when the prices were approved by the district government. In case of Dadu district, the government prices of milk, beef, and mutton have not been revised since July 2006. In some districts, the government fixed prices seem to have become pro forma.

Table I-1-2: Retail price of milk, beef, and mutton determined by local government in January 2011

	District	Milk	Beef	Mutton	Date of the document
1	Ghotki	40	160	300	2010/9/1
2	Sukkur	40	Cow: 230 Buffalo: 240	380	2010/1/10
3	Khairpur	Khairpur City: 50 Other area: 40	Calf & young Buffalo: 200 Buffalo&Cow w/o bone: 220	Goat and sheep: 300 Chella: 340	2011/1/20
4	N. Feroze	42	180-200	300 – 320	2010/11/30
5	Nawabshah	40	160	230 – 250	2009/8/19
6	Kashmore	40	150	260	2009/8/22
7	Shikarpur	40	200 (buffalo) – 220 (cow)	380	2010/1/10
8	Jacobabad	45	220 (cow)	350	2010/11/15
9	K.Shahdadkot	40	150	260	2009/8/22
10	Larkana	40	200 (buffalo) – 200 (cow)	380	2010/1/10
11	Dadu	26 (B) - 28 (A)	130	220	2006/7/10
12	Jamshoro	49	220	340	2010-2011
13	Thatta	Cow: 35 Buffalo: 40	180-200	150 (sheep) – 325 – 350 (goat)	2010/8/10
14	Matari	36	150	260	2009/8/20
15	T.Allahyar	46	180 – 190 (calf)	340	2010/8/16
16	Hyderabad	50	baffalo & cow (bara): 180 Baffalo (bachiya): 190 Cow (bachiya): 200	340	2010/5/12
17	T. M. Khan	44	Buffalo female: 170 Buffalo male: 190	female goat: 300 Young goat: 330	N/A
18	Badin	35	100 – 180 (calf)	280	2010/8/12
19	Sanghar	40	180	300	N/A
20	Mirpur Khas	44	180 – 200	350	2010/8/4
21	Umer Kot	45	180	320	2010/7/26
22	Tharparkar	Cow: 30 Buffalo:40	N.A.	mutton (Halwan) (6 to 8)kg animal/ goat (kid male from 9kg to 12kg animal) Mithi: 380/300 Diplo: 300/280 Chachro: 360/300 NPK: 360/300	2010/11/24
23	Karachi	60	220	415-440	Milk: 2010/05 Others: N/A

Source: the Sindh Livestock Department

iii) Slaughterhouses

Table I-1-3 shows the number of recognized public slaughterhouse in Sindh. All animals slaughtered at these slaughterhouses are all for domestic market. The information was provided by the Sindh Livestock Department.

Table I-1-3 Recognized Slaughterhouses in Sindh During 2008-2009

No	District	Number of Slaughter house
1	Khairpur	3
2	Sukkur	3
3	Jacobabad	4
4	Shikarpur	2
5	Nawabshah	3
6	Noushero Feroz	4
7	Larkana	7
8	Sanghar	5
9	Tarparkar	2
10	Mirpurkhas	9
11	Dadu	6
12	Hyderabad	7
13	Badin	7
14	Thatta	6
15	Karachi	4
16	Umerkot	3
17	Ghotki	3
18	Tando Mohamed Kahn	1
19	Tando Allahyar	1
20	Matiari	2
21	Qambar/Shahdakot	1
22	Kashmore	1
23	Jamshoro	1
	Total	85

Source: the Sindh Livestock Department

I-2 Data collected by the value chain study

I-2-1 Livestock market

i) List of livestock markets surveyed and the number of livestock sold at each livestock market

Table I-2-1 shows names of surveyed livestock markets and the number of livestock sold at each livestock market. A major livestock market is selected for the value chain study in each district. Totally 23 livestock markets in Sindh province were surveyed.

Table I-2-1 The Number of livestock sold at surveyed livestock markets

	District	Name of Market	Buffalo	Cattle	Goat	Sheep
1	Ghotki	Mirpur Mathelo	166	123	113	0
2	Sukkur* ¹	Ali Wahan	775	700	1,225	650
3	Khairpur* ⁴	Khairpur Vegetable Market	8	2	105	0
4	N.Feroze	Moro	663	448	938	185
5	Nawabshah	Nawabshah	464	345	1,123	1,470
6	Kashmore* ²	Kashmore	211	401	655	186
7	Shikarpur* ²	Shikarpur	498	440	490	820
8	Jacobabad	Jacobabad	274	292	344	450
9	K. Shadadkot	K. Shadadkot	85	107	130	0
10	Larkana	Larkana Cattle Colony	398	115	275	155
11	Dadu	Dadu	230	219	910	450
12	Jamshoro	Bhan Sayed Abad	150	182	435	135
13	Thatta	Thatta	66	66	380	295
14	Matiari	Hala	1,053	618	3,200	905
15	Tando Allahyar	Tuesday Market	2,560	1080	2,125	1,700
16	Hyderabad* ⁴	Hyderabad	2,570	1420	2,150	1,950
17	T. M. Khan	Tando Saeendad	1,818	663	248	93
18	Badin* ³	Talhar	465	328	0	0
19	Sanghar	Shehdadpur	5,500	1,400	8,950	980
20	Mirpurkhas* ²	Mirpurkhas	725	420	1,320	1,000
21	Umerkot* ⁴	Umerkot	7	145	3,288	835
22	Tharparkar	Mithi	0	264	870	550
23	Karachi	Landhi Cattle Colony	2,073	1,359	5,125	3,625

*1: The livestock market at Ali Wahan is newly established and it was not on Table 1-1-1

*2: The differences from figures on Table 1-1-1 was caused by the seasonal fluctuation

*3: The livestock market at Talhar is divided into 2 areas, one for large animals and another for small animals. The field researcher may have visited at only an area for large animals

*4: The reasons of the differences from figures on Table 1-1-1 was not confirmed

Source: Survey by the Project Team

ii) Prices of major livestock sold at surveyed livestock market

Table I-2-2 shows prices major livestock sold at surveyed livestock market.

Table I-2-2 Prices of major livestock sold at surveyed livestock market

District	Name of Market	Milking Buffalo	Cattle for meat	Goat for meat	Sheep for meat
1	Ghotki	Mirpur Mathelo 50,000 - 70,000		8,000 - 10,000	
2	Sukkur	Ali Wahan 70,000 - 110,000	27,000 - 30,000	6,000 - 9,000	5,000 - 5,500
3	Khairpur	Vegetable Market 60,000 - 65,000		7,000 - 8,000	
4	N.Feroze	Moro 60,000 - 90,000	40,000 - 45,000	17,000 - 18,000	6,000 - 7,500
5	Nawabshah	Nawabshah 60,000 - 120,000	30,000 - 50,000	6,000 - 8,000	10,000 - 15,000
6	Kashmore	Kashmore 60,000 - 80,000		6,000 - 8,000	9,000 - 13,000
7	Shikarpur	Shikarpur 70,000 - 100,000	30,000 - 45,000	9,000 - 10,000	5,000 - 6,000
8	Jacobabad	Jacobabad 70,000 - 120,000	50,000 - 100,000	5,500 - 6,000	11,000 - 12,000
9	K. Shadadkot	K. Shadadkot 35,000 - 90,000	22,000 - 25,000	10,000 - 12,000	10,000 - 11,000
10	Larkana	Larkana Cattle Colony 70,000 - 80,000		7,000 - 8,000	12,000 - 15,000
11	Dadu	Dadu 70,000 - 100,000	25,000 - 40,000	12,000 - 15,000	3,000 - 35,000
12	Jamshoro	Bhan Sayed Abad 30,000 - 80,000	50,000 - 60,000	10,000 - 12,000	8,000 - 10,000
13	Thatta	Thatta 80,000 - 120,000	70,000 - 80,000	7,000 - 11,000	10,000 - 12,000
14	Matiari	Hala 60,000 - 100,000	35,000 - 45,000	6,500 - 8,000	9,000 - 14,000
15	Tando Allahyar	Tuesday Market 85,000 - 150,000	75,000 - 85,000	4,000 - 4,500	7,500 - 8,000
16	Hyderabad	Hyderabad 60,000 - 100,000	30,000 - 35,000	12,000 - 13,000	4,500 - 5,000
17	T. M. Khan	Tando Saeendad 80,000 - 150,000	40,000 - 60,000	8,000 - 12,000	4,000 - 5,000
18	Badin	Talhar 75,000 - 100,000	70,000 - 100,000		
19	Sanghar	Shehdadpur 70,000 - 100,000	60,000 - 80,000	5,000 - 20,000	3,000 - 6,000
20	Mirpurkhas	Mirpurkhas 90,000 - 120,000	55,000 - 70,000	15,000 - 20,000	12,000 - 15,000
21	Umerkot	Umerkot	50,000 - 55,000	10,000 - 15,000	3,000 - 5,000
22	Tharparkar	Mithi	40,000 - 45,000	7,000 - 8,000	3,500 -
23	Karachi	Landhi Cattle Colony 50,000 - 70,000	20,000 - 50,000	6,000 - 7,000	4,000 - 5,000

Source: Survey by the Project Team

Higher price : Lower price

The prices of livestock are varied as shown in Table I-2-2. The prices of animals are determined by negotiation between buyers and sellers. Major factors of price determination are the estimated milk volume or the estimated carcass volume from the animal. However there is no systematic measurement system such as usage of a body-weight measuring scale or grading system of yield rate. In future, the livestock or meat grading system needs to be introduced.

I-2-2 Farm gate price of milk, beef, and mutton

Farm gate prices were interviewed at rural and urban farmers. In addition to farm gate price, the location of villages where the interviewed farmers belong to, and major buyers are also surveyed. The result is shown in Table I-2-3.

Table I-2-3 Farm gate price of milk in Sindh province

District	Taluka	village	urban/rural	distance from town	middleman	village people	Engro	Nestle	restaurant
Sukkur	Rohri	Trimhoon	urban	24km from Rohri	35-40	40	30-35		35
	Sakh Pat	Thomi	rural	8km from Saleh Pat Rohri	35	40			
Larkana	Dokri	Dara (UC Badeh)	urban	2km from Badeh	30	40		25,28,30	
	Larkana	Dhmrah	rural?	12km from Larkana	30	40-45	30-35	(30-32)	
Jamshoro	Tando Bola Khan	Mian Muhamed Barejo (wahi)	rural	20km from Thano Ahhmed Khan					
	Tando Bola Khan	Karchat	rural	70km from Thano Bola Khan					40
Thatta	Thatta	Saleh Muhamed Karnani	urban	3km from Thatta	30				
Tando Allahyar	Chamber	Miandad Rind	urban?	5km from Chamber 28km from Tando Allahyer	35	40			
	Tando Allayar	Masoo Khan Bozdar	rural	12km from Tando Allayar	30-35	25,35			
Badin	Golarchi	Chak-No25	urban?	4km from Golarchi 30km from Badin	40	40			
	Golarchi	Khanani Jat	rural?	18km from Golarchi	23,25-30, 35,38	25			
Sanghar	Sanghar	Tando Milha Khan	urban	7km from Chotyariyoon	28,35,40	28,30,35, 40	25-38		32
	Sanghar	Muhamed Urs Chanyo		18km from Hathungo					near town 30-35
Tarpurkar	Mithi	Warwai	rural?	12km from Islamkot 54km from Mithi					
	Chachro	Chapper Khosa	rural	39km from Chocolo 105km from Mithi					
Karachi	Moidan	Pathan Khan Burfat	rural	30km from GADAP	25(cow)- 30(Buf)				

I-2-3 Major Constraints of retailers of milk, beef, and mutton as well as users of livestock

In the field survey, interviews to retailers of milk, beef, and mutton as well as people at livestock market were conducted in order to know what issues retailers and other stakeholders are facing. The major findings are shown below.

i) Milk

The result of interviews with 46 mil retail shops is following.

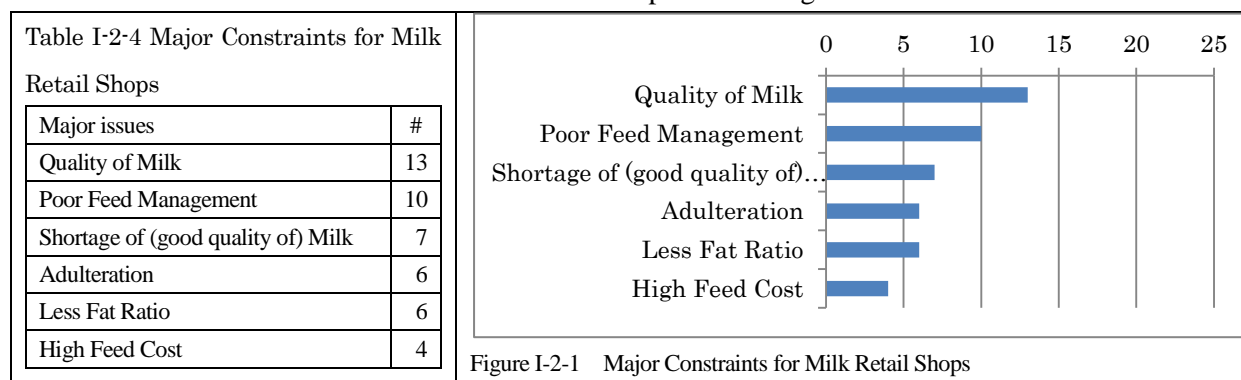


Table I-2-5 shows the opinions on sales trend and its reasons given by the milk shopkeepers. Twelve shopkeepers among 46 milk shops think that his shop has increased the sales in these years while sixteen shopkeepers think that his shop has decreased the sales in these years. The average increase ratio among twelve shopkeepers who think his sales has increased is 51.4% while the average decrease ratio among sixteen shopkeepers who think his sales has decreased is 32.5%.

Table I-2-5 Opinions on Sales Trend and Its Reasons Given by Milk Retail Shops

Sales trend	Answer		% of Increase/ Decrease *	Main reasons
	Count	Percentage		
Increase	12	26.1%	51.4%	Population: 2 Milk quality: 2 Shop is newly open: 1 Shop location: 1 Urbanization: 1
Decrease	16	34.8%	32.5%	Inflation: 6 Direct sales by credit:4 Poverty: 2 Strike: 1 Other newly opened Shops:1
No answer	16	34.8%		
N.A	2			
Total	46	100%		

ii) Beef

The result of interviews with 36 beef retail shops is following.

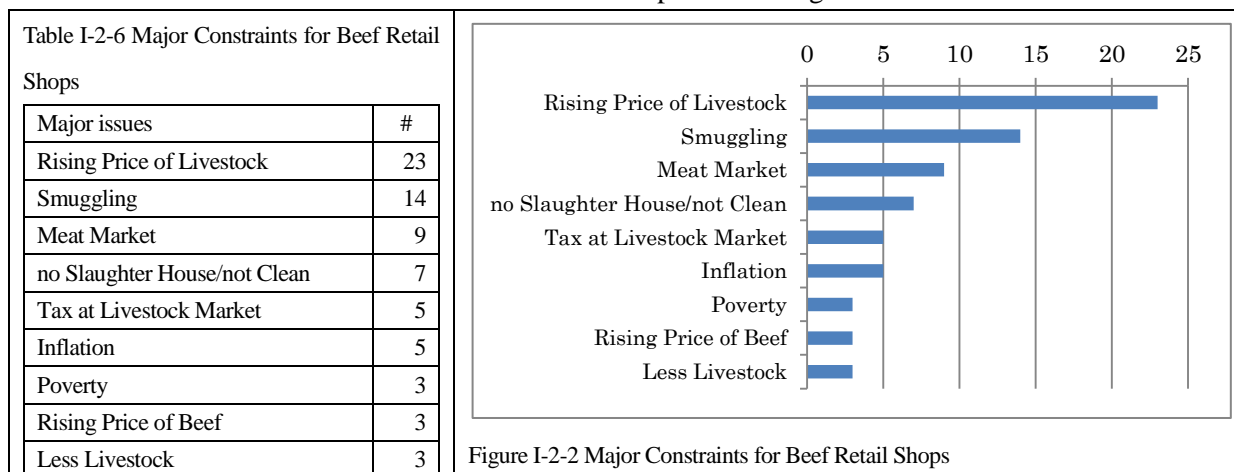


Table I-2-7 shows the opinions on sales trend and its reasons given by the shopkeepers of beef retail shops. Three shopkeepers among 36 beef shops only think that his shop has increased the sales in these years while 28 shopkeepers think that his shop has decreased the sales in these years. The average increase ratio among three shopkeepers who think his sales has increased is 20% while the average decrease ratio among 28 shopkeepers who think his sales has decreased is 43%. As compared with milk shops, beef shops seem to have more difficulty in sales. The same tendency can be observed for mutton retail shops as shown in Table I-2-9.

Table I-2-7 Opinions on Sales Trend and Its Reasons Given by Beef Retail Shops

Sales trend	Answer		% of Increase/ decrease	Main reasons
Increase	3	7%	20%	
Decrease	28	61%	43%	Inflation: 12 ChickenPrice:9 AnimalPrice:6 Poverty: 2 Flood: 1
No answer	5	11%		
N.A	-	-		
Total	36			

iii) Mutton

The result of interviews with 38 mutton retail shops is following:

Table I-2-8 Major Constraints for Mutton

Retail Shops	
Major issues	#
Rising Price of Livestock	11
Smuggling	10
Meat Market	2
no Slaughter House/not Clean	4
Tax at Livestock Market	5
Inflation	7
Poverty	5
Rising Price of Mutton	5
Less Livestock	3
Export	6

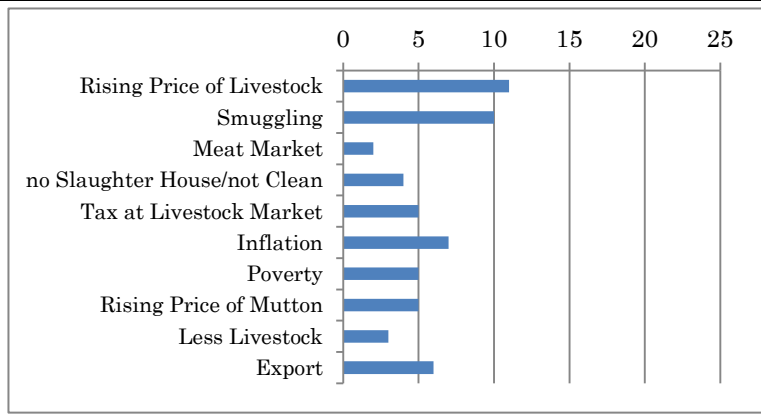


Figure I-2-3 Major Constraints for Mutton Retail Shops

Table I-2-9 shows the opinions on sales trend and its reasons given by the shopkeepers of mutton retail shops. Four shopkeepers among 38 mutton shops only think that his shop has increased the sales in these years while 29 shopkeepers think that his shop has decreased the sales in these years. The average increase ratio among four shopkeepers who think his sales has increased is 45% while the average decrease ratio among 29 shopkeepers who think his sales has decreased is 38%.

Table I-2-9 Opinions on Sales Trend and Its Reasons Given by Mutton Retail Shops

Sales trend	Answer		% of Increase/ decrease	Main reasons
	Count	Percentage		
Increase	4	9%	45%	Population:1 GoodCottonCrop:1 MeatQuality:1
Decrease	29	63%	38%	Inflation: 11 AnimalePrice:3 Shortage Animal: 2 Poverty: 1 Sumgling:1 Export(Dubai): 1
No answer	4	9%		
N.A	1			
Total	38	100%		

iv) Poultry

The result of interviews with 42 chicken retail shops is following:

Retail Shops	
Major issues	#
Price of Fodder	11
Wastage	10
Quality of Medicine	6
Price Fluctuation	5
Expensive chicken	5
Poverty	3
Transportation cost	3
Quality of Fodder	2
Infuriation	2
Infrastructure (electricity etc)	2

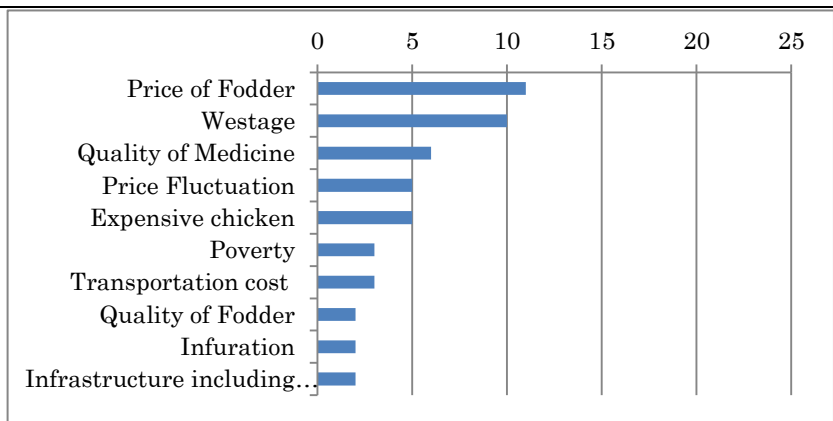


Figure I-2-4 Major Constraints for Chicken Retail Shops

Table I-2-11 Opinions on Sales Trend and its Reasons Given by Chicken Retail Shops

Sales trend	Answer		% of Increase/ decrease	Main reasons
	Count	Percentage		
Increase	17	37%	25%	GoodService:1 GoodCrop:1 HighMeatPrice:2
Decrease	15	33%	26%	Inflation: 5 Low Purchasing Power: 2 Newly Open Shop: 2
No answer	9	20%		
N.A	1			
Total	42	100%		

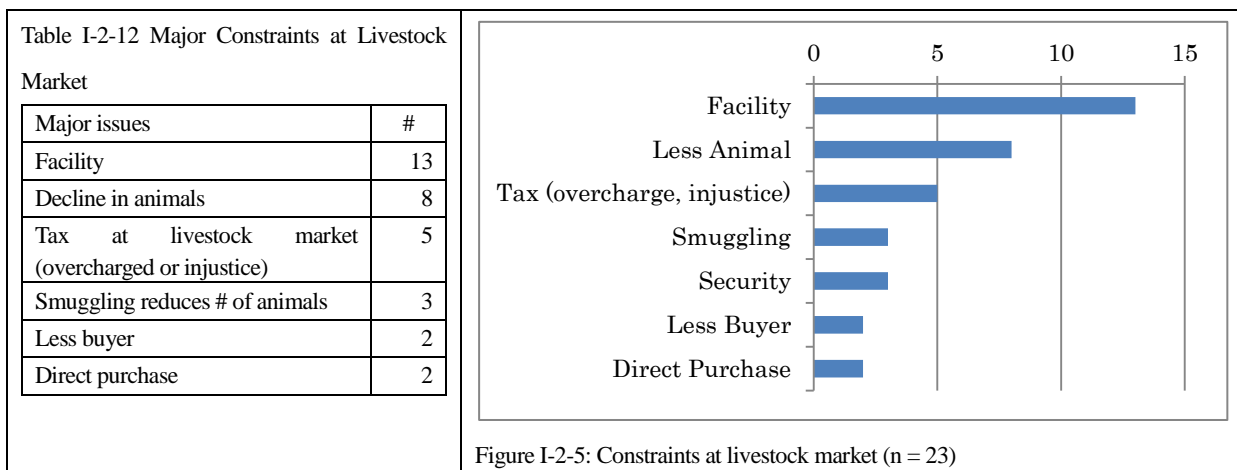
v) Livestock market

Based on the interviews with the persons in charge of the surveyed 23 livestock market as well as sellers and buyers of livestock at livestock market, the major constraints for them are following;

- 1) There is no necessary facility such as water, electricity, shade, banking, security, residence, and so on, (13/23)
- 2) The number of animal at livestock market in Sindh are declining (8/23)
- 3) Tax at livestock market are overcharged or injustice (5/23)
- 4) Smuggling reduces the number of animal (3/23)
- 5) Less buyers come to the livestock market (2/23)
- 6) Some buyers purchase livestock from directly farmers at villages (2/23)

As shown in Figure I-2-5, more than half of surveyed livestock lack necessary facilities. Some persons in charge of the surveyed livestock market complained that government has not provided any facility. Moreover some users such as sellers and buyers of livestock complained that the tax is overcharged or injustice. Indeed, the amounts of tax are varied at each livestock market. On the other hand, Tando Saendad livestock market which is one of the best livestock market in Sindh charges higher tax but

provides necessary facility. Better livestock market management is needed to be studied and shared with stakeholders.



I-3 Integrated information

Based on information provided by the Sindh Livestock Department and information collected by the value chain study, movement of livestock in Sindh provinces was estimated. In addition, the government price and market price of livestock products are summarized into each tables.

I-3-1 Estimated flow of livestock

Tables I-3-1 to I-3-5 and Figure I-3-1 show estimated flow of livestock per week based on information collected through the value chain study at livestock markets and the list of livestock market in Sindh province as shown in Table I-3-1. The estimated flow of livestock is calculated by assuming that all flows of each livestock are identical in same district. As the information collected in the value chain study are based on the interview with major stakeholders such as a person in-charge of livestock market, the provided information may be rough figures which may not fit to statistic data provided by government. In addition, it is said that there are seasonal difference of sales volume, destination, and price at livestock market. If same study is done in summer, for example, the result may be not same as the result of this study done in winter, December 2010 to January 2011.

However, it is important to know brief image of the movement of livestock in Sindh provinces. Tables I-3-1, I-3-2, I-3-3, I-3-4 and I-3-5 show a flow of total head of major 4 livestock, milking bovine, dry bovine, and goat and sheep, as well as total animal unit of major 4 livestock. The Figure I-3-1 is illustrated based on the result of Table I-3-1. The width of allow in Figure I-3-1 indicates the number of livestock brought from the livestock market to other districts. As shown in Figure I-3-1, large number of livestock comes to Karachi from almost all districts in Sindh, and large number of livestock is exported from Karachi. Some of livestock come to Hyderabad which has the second biggest city in Sindh. In addition, a certain amount of livestock go to Baluchistan. Many buyers and sellers at livestock market complained that many livestock smuggle to Iran and Afghanistan through Baluchistan.

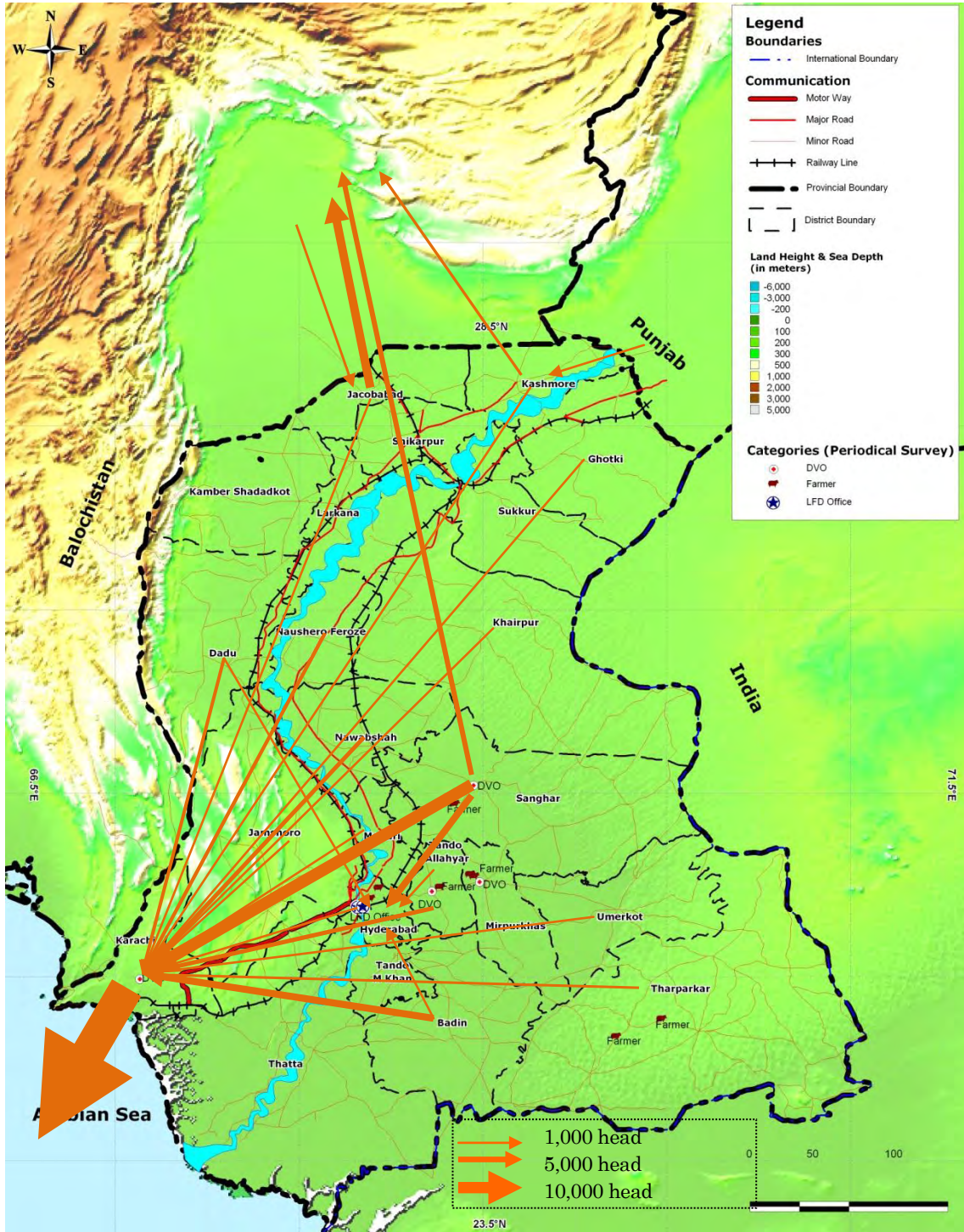


Figure I-3-1 Flow of major 4 livestock in Sindh province

Table I-3-1 Estimated flow of major 4 livestock (buffalo, cattle, sheep, and goat) per week (unit: head)

Destination Origin District	Ghotki	Sukkur	Khairpur	Nawabshah	Kashmore	Shikarpur	Jacobabad	Kamber	Larkana	Dadu	Jamshoro	Thatta	Matari	Tando Allahyar	Hyderabad	T.M. Khan	Badin	Sanghar	Mirpurkhas	Umerkot	Tharparka	Karachi	Punjab	Balochistan	abroad	total
Ghotki	1,048																									3,635
Sukkur		447																								847
Khairpur			3,576																							5,551
Nawabshah				3,645																						4,038
Kashmore					1,870																					8,875
Shikarpur						284																				5,844
Jacobabad							1,943																			720
Kamber Shadadkot								374																		11,341
Larkana									1,894																	768
Dadu										2,999																3,170
Jamshoro											147	2,940														7,488
Thatta													1,567													5,703
Matari														1,283												2,347
Tando Allahyar														2,043	1,306				296	393	67					3,650
Hyderabad															699											7,938
T.M. Khan															374	1,141	18									2,963
Badin															1,832	5,952	5,026									2,245
Sanghar															386			21,876								13,090
Mirpurkhas																			785	785						43,380
Umerkot																			258	289						2,925
Tharparkar																					179					2,265
Karachi																										3,662
Punjab																										91,849
Balochistan																										1,593
total	1,048	447	3,576	3,645	3,462	284	4,211	374	1,916	3,146	2,940	2,253	1,283	2,429	15,380	1,141	6,433	22,172	1,437	356	179	111,038	1,234	17,600	29,864	238,154

Source: Survey by the Project Team in December 2010 to January 2011

Table I-3-2 Estimated flow of milking bovine (buffalo and cow) per week (unit: head)

Destination Origin District	Ghotki	Sukkur	Khairpur	Naushero	Nawabshah(S)	Kashmore	Shikarpur	Jacobabad	Kamber	Larkana	Dadu	Jamshoro	Thatta	Matiari	Tando Allahyar	Hyderabad	Tando Muha	Badin	Sanghar	Mirpurkhas	Umerkot	Tharparka	Karachi	Punjab	Balochistan	abroad	total
Ghotki	55																						165				275
Sukkur		13																						14			27
Khairpur			51																								51
Naushero Feroze				55																				98			218
Nawabshah					156																			32			209
Kashmore						180																		449	269		898
Shikarpur							2																		5		7
Jacobabad								62																434	124		620
Kamber Shadadkot								82																22	6		109
Larkana								66																			66
Dadu										240							18							88			345
Jamshoro											27	57												20			104
Thatta													179											43			222
Matiari														18		34								210			263
Tando Allahyar															277	139					118			420			953
Hyderabad																9											9
T.M. Khan																44	27							237			308
Badin																223		111						780			1,115
Sanghar																1,004				2,925				1,855			5,783
Mirpurkhas																15					22			37			75
Umerkot																					8	2					10
Tharparkar																		5									5
Karachi																											
Punjab							359																				359
Balochistan								124																			124
total	55	13	51	55	156	539	2	186	82	66	267	57	179	18	277	1,627	27	116	2,925	148	2			4,903	404		12,155

Source: Survey by the Project Team in December 2010 to January 2011

Table I-3-3 Estimated flow of dry bovine (buffalo and cow) per week (unit: head)

Destination Origin District	Ghotki	Sukkur	Khairpur	Nawabshah	Kashmore	Shikarpur	Jacobabad	Kamber	Larkana	Dadu	Jamshoro	Thatta	Matari	Tando Allahyar	Hyderabad	Tando Mutha	Badin	Sanghar	Mirpurkhas	Umerkot	Tharparka	Karachi	Punjab	Balochistan	abroad	total
Ghotki	172																									172
Sukkur		22																								22
Khairpur			257																							257
Nawabshah				67																						67
Kashmore					649																					649
Shikarpur						15																				15
Jacobabad							495																			495
Kamber Shadadkot								13																		45
Larkana									52																	86
Dadu										385																385
Jamshoro										38	111															148
Thatta												158														158
Matari												134														134
Tando Allahyar													302								106	67				511
Hyderabad														79												79
T.M. Khan												35														89
Badin																	1,765									1,765
Sanghar																		1,069								1,455
Mirpurkhas																			60							60
Umerkot																				116	34					150
Tharparkar																	7									7
Karachi																										1,359
Punjab																										260
Balochistan							99																			99
total	172	22	257	117	67	909	15	593	13	52	422	111	844	134	688	79	35	2,498	1,175	213	101	67			8,584	

Source: Survey by the Project Team in December 2010 to January 2011

Table I-3-4 Estimated flow of bovine (buffalo and cow) per week (unit: head)

Origin District	Destination	Ghotki	Sukkur	Khairpur	Nasirero	Nawabshah(S)	Kashmore	Shikarpur	Shikarpur	Jacobabad	Kamber	Larkana	Dadu	Jamshoro	Thatta	Matiari	Tando Allahyar	Hyderabad	T.M. Khan	Badin	Sanghar	Mirpurkhas	Umerkot	Tharparkar	Karachi	Punjab	Balochistan	total	
Ghotki		351																											1,690
Sukkur			160																										424
Khairpur				921																									921
Nasirero Feroze					178																								1,178
Nawabshah						629																							1,382
Kashmore							1,165																						2,890
Shikarpur								37																					120
Jacobabad										673																			3,616
Kamber Shadadkot											165																		400
Larkana												280																	920
Dadu													1,358																2,938
Jamshoro													147	503															1,003
Thatta															768														1,256
Matiari																320													1,500
Tando Allahyar																	891	934											4,785
Hyderabad																		146											463
T.M. Khan																			196										1,625
Badin																			1,832										13,090
Sanghar																					5,026								22,680
Mirpurkhas																						11,851							1,155
Umerkot																							204						355
Tharparkar																							133	65					262
Karachi																									208				35,608
Punjab																													1,046
Balochistan																													723
total		351	160	921	178	629	2,211	37	1,396	165	303	1,506	503	1,454	320	1,276	7,209	700	5,805	11,983	566	133							102,029

Source: Survey by the Project Team in December 2010 to January 2011

Table I-3-5 Estimated flow of goat and sheep per week (unit: head)

Destination Origin District	Ghotki	Sukkur	Khairpur	Naushero	Nawabshah(S)	Kashmore	Shikarpur	Shikarpur	Jacobabad	Kamber	Larkana	Dadu	Jamshoro	Thatta	Matiari	Tando Allahyar	Hyderabad	T.M. Khan	Badin	Sanghar	Mirpurkhas	Umerkot	Tharparka	Karachi	Punjab	Balochistan	total
Ghotki	698																										1,945
Sukkur		287																									423
Khairpur			2,655																								4,630
Naushero Feroze				126																							2,860
Nawabshah					3,016																						7,493
Kashmore						705																					2,954
Shikarpur							247																				600
Jacobabad									1,271																		7,725
Kamber Shadadkot										208																	368
Larkana											1,613																2,250
Dadu												1,641															4,550
Jamshoro													2,437														4,700
Thatta														799													1,091
Matiari															963												2,150
Tando Allahyar																1,152						165					3,153
Hyderabad																	553										2,500
T.M. Khan																	179	441									620
Badin																											
Sanghar																					10,025						20,700
Mirpurkhas																						581					1,770
Umerkot																						126	224				1,910
Tharparkar																											3,400
Karachi																							179	2,167			56,241
Punjab																											547
Balochistan																											1,545
total	698	287	2,655	126	3,016	1,251	247	247	2,816	208	1,613	1,641	2,437	799	963	1,152	8,172	441	627	10,189	872	224	179	63,194	1,234	18,681	136,125

Source: Survey by the Project Team in December 2010 to January 2011

Table I-3-6 Estimated Flow of major 4 livestock (buffalo, cattle, goat, and sheep) per week (unit: animal unit)

Origin District	Destination	Ghotki	Sukkur	Khairpur	Naushero	Nawabshah(S)	Kashmore	Shikarpur	Jacobabad	Kamber	Larkana	Dadu	Jamshoro	Thatta	Matari	Tando Allahyar	Hyderabad	Tando Mulla	Badin	Sanghar	Mirpurkhas	Umerkot	Tharparka	Karachi	Punjab	Balochistan	abroad	total	
Ghotki		397																											1,725
Sukkur			178								22																		438
Khairpur				1,084																									1,281
Naushero Feroze					173																								1,352
Nawabshah						845																							1,965
Kashmore							1,117																						2,930
Shikarpur								54																					156
Jacobabad									729																				3,955
Kamber Shadadkot										172																			407
Larkana											418																		1,081
Dadu												1,422																	3,045
Jamshoro												131	693																1,374
Thatta														737															1,227
Matari															376														1,515
Tando Allahyar																940	865					138	54	2,523					4,729
Hyderabad																	190												658
T.M. Khan																		200	697	18									1,577
Badin																		1,533	4,432										11,630
Sanghar																365	2,589				11,713								22,263
Mirpurkhas																		165				240							1,230
Umerkot																		45				142	80						517
Tharparkar																		43	106				18						550
Karachi																													39,779
Punjab																													1,007
Balochistan									791																				791
total		397	178	1,084	173	845	2,124	54	1,520	172	440	1,553	693	1,364	376	1,305	7,073	697	5,175	11,850	592	134	18	51,028	123	5,808	12,405	107,182	

Source: Survey by the Project Team in December 2010 to January 2011

I-3-2 Government price and market price

Tables I-3-6, I-3-7, and I-3-8 show the government prices and market prices of milk, beef, and mutton in each district. People prefer milk with high fat content. Therefore Thatta and Tarparkar districts have set up different prices for cow milk and buffalo milk. Although the other district governments do not differentiate the price of buffalo milk from cow milk, low fat milk such as adulterated milk or cow milk tend to be sold relatively lower price than high fat buffalo milk.

Table I-3-7 Government prices and market prices of milk in urban and rural area

	District	Retail price determined by government	Urban		Rural	
			City	Price	Town	Price
1	Ghotki	40	Mirpur Mathelo	50	Ubaro	40
2	Sukkur	40	Sukkur	44	Saleb Pat	48
3	Khairpur	Khairpur City: 50 Other area: 40	Hairpur	50		
4	N. Feroze	42	Naushehro Feroz	35, 40	Moro	40
5	Nawabshah	40	Nawabshah	50, 55		
6	Kashmore	40	Kashmore	40	Kandh Kot	40
7	Shikarpur	40	Shikarpur	40		
8	Jacobabad	45	Jacobabad	50, 60		
9	K.Shahdadkot	40	Kamber Shahdadkot	50	Nasirabad	35
10	Larkana	40	Larkana	45	Dhamrab	40
11	Dadu	26 (B) - 28 (A)	Dadu	36	Mehar	40
12	Jamshoro	49	Kotri	50	Thano Bola Khan	48
13	Thatta	35 (cow) - 40 (buffalo)	Thatta	40	Mirpur Sakro	40
14	Matari	36	Matari	45	Hala	50
15	T.Allahyar	46	T. Allahyar	55	Chamer city	45
16	Hyderabad	50	Hyderabad	52		
17	T. M. Khan	44	T. M.Khan	45		
18	Badin	35	Badin	60	Golarchi	40
19	Sanghar	40	Sanghar	50	Hatungo	40
20	Mirpur Khas	44	Mirpur Khas	48	Naukot Digri	45 45
21	Umer Kot	45	Umer Kot	52	Samaro New Chhor	35 40
22	Tharparkar	30 (cow) - 40 (buffalo)	Mithi	50	Chachro	40
23	Karachi		Landhi Cattle Colony	60	Gadap	40

Source: The Sindh Livestock Department and Survey by the Project Team

Table I-3-8 Government prices and market prices of beef in urban and rural area

	District	Retail price determined by government	Urban		Rural	
			City	Price	Town	Price
1	Ghotki	160	Mirpur Mathelo	180	Ubaro	160-170
2	Sukkur	230-240	Sukkur	270	Saleb Pat	-
3	Khairpur	200-220	Hairpur	200		
4	N. Feroze	180-200	Naushehro Feroz	200	Moro	200
5	Nawabshah	160	Nawabshah	240		
6	Kashmore	150	Kashmore	200	Kandh Kot	180
7	Shikarpur	200-220	Shikarpur	190		
8	Jacobabad	220 (cow)	Jacobabad	200		
9	Kamber Shahdadkot	150	Kamber Shahdadkot	200	Nasirabad	200
10	Larkana	200-220	Larkana	200	Dhamrab	200
11	Dadu	130	Dadu	200	Mehar	200
12	Jamshoro	220	Kotri	200	Thano Bola Khan	-
13	Thatta	180-200	Thatta	200	Mirpur Sakro	290
14	Matari	150	Matari	180	Hala	160
15	T. Allahyar	180 - 190 (calf)	T. Allahyar	220	Chamer city	200
16	Hyderabad	180-200	Hyderabad	200		
17	T. M. Khan	170(female)-190(male)	T. M. Khan	180		
18	Badin	100 - 180 (calf)	Badin	200	Golarchi	200
19	Sanghar	180	Sanghar	200	Hatungo	-
20	Mirpur Khas	180-200	Mirpur Khas	200	Naukot Digri	180-200 200
21	Umer Kot	180	Umer Kot	180	Samaro	200
22	Tharparkar	N.A.	Mithi	-	Chachro	-
23	Karachi	220	Landhi Cattle Colony	220	Gadap	-

Source: the Sindh Livestock Department and the Survey by Project Team

Table I-3-9 Government prices and market prices of mutton in urban and rural area

	District	Retail price determined by government	Urban		Rural	
			City	Price	Town	Price
1	Ghotki	300	Mirpur Mathelo	380	Ubaro	340
2	Sukkur	380	Sukkur	400	Saleb Pat	-
3	Khairpur	300 - 340	Hairpur	360		
4	N. Feroze	300-320	Naushehro Feroz	250	Moro	380
5	Nawabshah	230-250	Nawabshah	400		
6	Kashmore	260	Kashmore	400	Kandh Kot	400
7	Shikarpur	380	Shikarpur	420		
8	Jacobabad	350	Jacobabad	460		
9	Kamber Shahdadkot	260	Kamber Shahdadkot	400	Nasirabad	400
10	Larkana	380	Larkana	400	Dhamrab	-
11	Dadu	220	Dadu	400	Mehar	380
12	Jamshoro	340	Kotri	450	Thano Bola Khan	400
13	Thatta	150 (sheep) - 325-350 (goat)	Thatta	360	Mirpur Sakro	0
14	Matari	260	Matari	440	Hala	340-400
15	T. Allahyar	340	T. Allahyar	400	Chamer city	400
16	Hyderabad	340	Hyderabad	440		
17	T. M. Khan	300 (female) 330 (male)	T. M. Khan	400		
18	Badin	280	Badin	350-400	Golarchi	400
19	Sanghar	300	Sanghar	400	Hatungo	-
20	Mirpur Khas	350	Mirpur Khas	440	Naukot Digri	400 300-320
21	Umer Kot	320	Umer Kot	400	Samaro	380
22	Tharparkar		Mithi	400	Chachro	380
23	Karachi		Landhi Cattle Colony	440	Gadap	440


Source: Sindh Livestock Department and the Survey by Project Team

I-4 Production cost and farm gate price of milk in Karachi and Hyderabad

Figures I-3-2 and Figure I-3-3 are the copies of official documents related to the production cost of milk in Karachi and Hyderabad. In case of Karachi, the district office, the Dairy Farmers Association Karachi, and other stakeholders discussed and agreed with the costs as mentioned in the Figures and determined the farm gate price, the wholesale price, and the retail prices of milk.

Figure I-3-2 Cost of Production per Litter of Buffalo Milk in Karachi

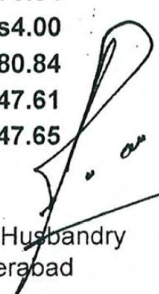
<u>COST OF PRODUCTION PER LITRE OF BUFFALO MILK IN KARACHI</u>	
Milk Production per Buffalo	8 litres per day
A. CAPITAL	
Average cost of fresh milking buffalo	Rs80,000.00
(-) Resale Value	Rs40,000.00
Difference Total	Rs40,000.00
Net Investment per buffalo	Rs40,000.00
<u>COST OF PRODUCTION PER LITRE</u>	
lactation period	270 days
A. <u>PER DAY CAPITAL INVESTMENT</u>	
Capital Investment	Rs148.15
<u>Mortality 4%</u>	Rs5.93
Total	Rs154.07
B. <u>MANAGEMENT</u>	
Labour Pay	Rs20.00
Vaccine/Medicine	Rs6.00
Country medicine, Gur & oil etc.	Rs2.00
Electric equipment (Hardware, purchase/repair)	Rs4.00
Electric charges / Gas Phone bills etc	Rs4.50
Farm rent / repair	Rs5.00
Miscellaneous	Rs1.75
Total	Rs43.25
C. <u>FEEDING CHARGES</u>	
Green fodder 20 Kg at Rs 3.00 per Kg.	Rs60.00
Wheat straw 8 Kg per day at Rs 6.00 per kg.	Rs48.00
Cotton seed cake 2 kg at Rs 22 per kg.	Rs44.00
Wheat Bran 2 Kg per day at Rs 13.20 per Kg.	Rs26.40
Grain 1 Kg per day at Rs 19 per Kg.	Rs19.00
Total	Rs197.40
Total A+B+C	Rs394.72
Suggested Profit	Rs4.00
Cost of Production of 8 litres of milk	Rs398.72
Cost of Production per Litre of Milk	Rs49.84
Say per litre of Milk	Rs50.00


Director Animal Husbandry
Sindh, Hyderabad

Source: Sindh Livestock Department

Figure I-3-3 Cost of Production per Litter of Buffalo Milk in Hyderabad
COST OF PRODUCTION PER LITRE OF BUFFALO MILK IN HYDERABAD

Milk Production per Buffalo	8 litres per day
A. CAPITAL	
Average cost of fresh milking buffalo	Rs80,000.00
(-) Resale Value	Rs52,000.00
Difference Total	Rs28,000.00
Net Investment per buffalo	Rs28,000.00
<u>COST OF PRODUCTION PER LITRE</u>	
lactation period	270 days
A. PER DAY CAPITAL INVESTMENT	
Capital Investment	Rs103.70
Mortality	Rs1.04
Total	Rs104.74
B. MANAGEMENT	
Labour Pay	Rs20.00
Vaccine / Medicine	Rs8.00
Country medicine, Gur & oil etc.	Rs5.00
Electric equipment (Hardware, purchase / repair)	Rs3.50
Electric charges / Gas Phone bills etc	Rs4.00
Farm rent / repair	Rs3.50
Miscellaneous	Rs1.50
Total	Rs45.50
C. FEEDING CHARGES	
Green fodder 20 Kg at Rs 4 per Kg.	Rs80.00
Wheat straw 6 Kg per day at Rs 6.60 per kg.	Rs39.60
Cotton seed cake 2 kg at Rs 26 per kg.	Rs52.00
Wheat Bran 2 Kg per day at Rs 16.50 per Kg.	Rs33.00
Grain 1 Kg per day at Rs 22 per Kg.	Rs22.00
Total	Rs226.60
Total A+B+C	Rs376.84
Suggested Profit	Rs4.00
Cost of Production of 8 litres of milk	Rs380.84
Cost of Production per Litre of Milk	Rs47.61
Say per litre of Milk	Rs47.65


 Director Animal Husbandry
 Sindh, Hyderabad

Source: Sindh Livestock Department

Appendix J

Gender

Results of Households Survey (Gender)

F1.1 Household Chores

	1 Mother Aunt	2 Wife	3 Sister (in-law)	4 Dau- ghter	5 Young girl	6 Dau- Ghter- In-law	7 Other female member	8 Male member
F1.1.1 making a tea	70	347	41	121	46	63	11	18
F1.1.2 cooking	24	350	40	118	73	80	14	18
F1.1.3 taking children to schools	8	51	-	2	7	17	106	56
F1.1.4 processing milk	111	298	5	12	8	11	6	12
F1.1.5 Cleaning livestock and the shed	44	264	22	82	48	43	41	161
F1.1.6 Cutting fodder	19	146	4	11	7	10	71	360
F1.1.11 Grazing animals	5	39	2	4	-	1	108	451
F1.1.13 Feeding animals	47	302	11	38	18	33	44	193
F1.1.14 milking	54	311	6	21	21	23	49	220
F1.1.15 washing dishes	14	248	46	129	68	61	11	27
F1.1.16 washing clothes	11	200	17	70	35	30	14	57
F1.1.17 fetching water	33	99	7	33	15	6	5	40
F1.1.22 gathering firewood	17	118	2	27	9	28	40	281
F1.1.23 Agricultural work	8	127	-	3	3	5	57	410
F1.1.24 Dung collection and storage	48	230	18	84	37	36	34	130

Detail question1 (related to F1.1.6) : "Cutting fodder"

F1.1.7: How far is it?

Distance(km)	Respondents	Distance(km)	Respondents	Distance(km)	Respondents	Distance(km)	Respondents
0.33	1	2.00	146	6.00	2	10.00	2
0.50	35	3.00	46	7.00	2	13.00	1
1.00	294	4.00	13	8.00	1	15.00	1
1.50	7	5.00	5	9.00	1		

F1.1.8: How many KG of fodder do you bring back home per day?

Weight (kg)	Respondents	Weight (kg)	Respondents	Weight (kg)	Respondents	Weight (kg)	Respondents	Weight (kg)	Respondents
5	1	30	60	80	68	160	21	350	2
7	1	35	9	85	1	170	1	360	1
8	1	40	76	90	7	180	8	400	9
10	25	45	6	95	1	200	27	500	2
12	1	50	32	100	26	220	1	800	2
13	1	55	1	110	1	240	6	1200	1
15	20	60	45	120	31	250	4	4000	1
20	50	65	3	130	1	300	9		
25	23	70	1	150	11	320	1		

F1.1.9: How do you bring the fodder back?

Tool	Number
On foot	350
By donkey/house	229
By other	138

F1.1.10: How many times do you go to cut fodder?

Frequency	Respondent	Frequency	Respondent
1 time	208	5 times	4
2 times	292	6 times	-
3 times	48	7 times	6
4 times	3	8 times	41

Detail question2 (related to F1.1.11): “Grazing Plot”

F1.1.12: How far is it to grazing plots?

Distance(km)	Respondents	Distance(km)	Respondents	Distance(km)	Respondents
0.33	1	3.00	72	9.00	1
0.50	23	4.00	13	10.00	4
1.00	219	5.00	14	13.00	1
1.50	7	6.00	7	15.00	1
2.00	160	7.00	1	20.00	1
2.50	1	8.00	28		

Detail question3 (related to F1.1.17): “Drinking Water”

F1.1.18: How far is it to the water points?

Distance(km)	Respondents	Distance(km)	Respondents	Distance(km)	Respondents
0.3	1	2.0	34	4.0	1
0.5	38	2.5	1	5.0	5
1.0	101	3.0	4	8.0	4

F1.1.19: How many litres of water do you fetch per day?

Quantity(litre)	Respondents	Quantity(litre)	Respondents	Quantity(litre)	Respondents
0.5	1	60.0	27	280.0	1
6.0	1	65.0	3	300.0	5
8.0	1	70.0	10	400.0	1
10.0	7	80.0	16	500.0	16
15.0	2	90.0	2	600.0	1
20.0	12	100.0	106	800.0	1
25.0	3	110.0	1	1000.0	3
30.0	23	128.0	1	1200.0	1
35.0	1	150.0	3		
40.0	17	160.0	2		
45.0	3	200.0	48		
50.0	21	250.0	3		

F1.1.20: Is the water safe for drinking?

Yes	699	No	18
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F1.1.21: Is the water sweet or brackish?

Sweet	627	Blackish	82	n/a	8
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F1.2 Power Holder among female members of household

Status	Respondents
Mother (in-law)	490
Daughter	13
Daughter-in-law	16
Educated young ladies	5
Others	193

F2.2. Who makes a decision? (Who has strong influence on livestock management?)

	Treatment of animals	Size of herds	Purchase of animals	Selling animals	Feeding animals	Breeding animals	Fodder	Shed construction
Female	7	6	3	4	184	4	16	73
Male	685	674	694	688	335	703	634	515
Both	25	37	20	25	198	10	67	128

F3.1. What are the constraints of being female?

Movement	Heavy workload	education	Power of decision making	Others
339	250	511	458	14

F3.2. What are benefit of being female?

Little work outside	Little physical labour	Protection by Purdah	Power of decision making	Others
390	366	369	23	61

F3.3 How far can you go freely/without any acceptance of your husband (male member)?

>1km	$1 \leq n < 10$ km	$10 \text{km} \leq$	No rule (no limitation)
327	238	80	30

F3.4 From which distance do you need to be accompanied with male of the household?

Distance(km)	Respondents	Distance(km)	Respondents	Distance(km)	Respondents
0.05	1	12.00	10	50.00	20
0.50	2	15.00	15	55.00	2
2.00	1	18.00	2	60.00	2
3.00	1	20.00	34	80.00	4
4.00	3	21.00	1	90.00	1
5.00	56	25.00	14	100.00	4
6.00	5	28.00	1	150.00	1
7.00	5	30.00	16	200.00	1
8.00	8	35.00	4	500.00	1
9.00	2	40.00	15	888.00	40
10.00	146	45.00	2	n/a	297

F3.5 What is the purpose of the travel?

Shopping	Marriage/ Funeral	Visiting Friend/relatives	Others
41	538	104	32

(ALL)

Appendix K

Extension Services in the Upper Sindh Field Survey Report (by local consultant)

**EXTENSION SERVICES
IN THE UPPER SINDH**

FIELD SURVEY REPORT

By: Karim Nawaz

DECEMBER 2010 - JANUARAY 2011

1. Introduction

1.1 Background:

The government of Sindh and the Japan International Cooperation Agency (JICA) agreed upon the scope of work for the Project for the Master Plan Study on Livestock, Meat and Dairy Development in Sindh province (herein after called "the Project") on the 1st of September, 2009. Then A JICA Study Team (herein after called "the Study Team") headed by Mr. Hiroshi Okabe was dispatched to Sindh province. This field survey was done as a part of the Project.

1.2 Period:

December 2010 – January 2011

1.3 Survey Area:

The upper part of Sindh Province: 9 districts, namely Shikarpur, Jacobabad, Larkana, Quamber- Shadadkot, Ghotki, Sukkur, Khaipur, Naushehro Feroz and Kashmore

1.4 Survey Methodology

The survey was implemented by Mr. Karim Nawaz (herein after called "the Consultant"), who the Study Team entrusted the survey to.

The Consultant had compiled data and information by means of meetings and discussions with district officers, staff and farmers in the field. Then the collected data and information from the district officers were verified at field level through discussions with field staff (triangulation).

The field staff included district officers, veterinary officers, livestock production officers, stock assistants, livestock Inspectors and others. Interviews and discussions were held with community livestock workers in the field, and also directly with livestock farmers, middlemen and traders.

Study also includes the extension service of private sector such as Engro Foods and civil society group – SRSO (the PMILS) working in livestock sector in upper Sindh.

2. Extension Services in Livestock Department, Sindh

2.1 Administrative Framework and its objectives

Livestock department is headed by Director General (DG) under the Secretary, Livestock and Fisheries Department in provincial government framework. It has different divisions such as animal husbandry, planning, animal breeding, poultry production and research, vaccine production, veterinary research and diagnostic centre. Among these the field branch has a presence in all districts, Taluka and union councils across the province. Each district headquarters has at least one veterinary hospital with veterinary officer(s) (hereinafter called "VO"), stock assistant(s) (hereinafter called "SA") and support staff. The district officer (livestock) heads the department at that level and coordinates activities of different sub sectors, routine work and also implements any special program such as donor funded or special project(s). Livestock department has objective to increase farmer's income through adoption of improved production methods and technologies and better access to livestock services. Further to this objectives also include training and extension programs for para-veterinarian staff and farmers at the rural community levels (Livestock Policy Government of Sindh).

In Pakistan historically livestock (large ruminants) are kept by farmers for two main purposes: a) to meet the dietary needs such as milk and meat for rural and urban population,

b) to perform farm activities mainly draught power. They are the cash in hand for farmers and thus are preferred in the farming set-up. About 50% of red meat consumed in the country comes from large ruminants; however, despite this beef production is not considered to be a separate specialized production activity. In fact this is viewed as a by-product from animals kept for milk and draught purposes. Historically most native breeds have been developed for either milk production or draught power with hardly any cattle breed specifically for beef production. Hence under present conditions, the entire livestock production system revolves around milk production. By far milk is the most valuable animal product and has strong demand throughout the year. Similar is the case with small ruminant that most stock is multipurpose and not specifically for meat production. Dairy farming in close proximity to urban centres linkages to the milk processing plants operated by large corporations such as Engro Foods, Haleeb, Nestle and many more, provide bulk buying and technology support to the milk producers and widespread all time availability to consumers. Due to increase in population, per capita income and dietary habits, there has been a modest increase in demand for livestock products mostly milk. Poultry has filled in most of the meat demand, though further scope and potential remain there. Throughout the field survey, the number one issue identified by farmers everywhere and also endorsed by field livestock staff, is how to increase the milk production of cattle and improve weight gain of small ruminants. The present average of milk production and body weight is reportedly far less than the genetic potential. There are several major causes for this low productivity, such as inadequate fresh fodder and absence of hay making and silage making practices, support services such as health, regulation, management and marketing.

It has been pointed out that at district level the department of livestock is not involved in adjusting or regulating the milk prices. There is serious shortfall of green fodder in particular months during a year and at the same time decline in fodder production has been shown over past years in the province. This negatively affects production and health in livestock. During the survey it has been noticed that at many places animals are kept in small compounds: much smaller than area required allowing the animals to move freely. There is not a conducive situation in the province for the growth of the livestock sector on modern and improved levels. Lack of water also hinders the development of this sector in some areas of the province.

To expedite this process, the socially and economical viable technology and practices already tested at research stations need to be introduced at field level. Presently under the traditional production system, increase in livestock products is related to the number of livestock and not correlated to productivity of per animal as such in the country. Nevertheless improved animal efficiency will be a necessity for future increase in food production. It has been noticed during the survey that livestock farms have far less production due to unproductive and less productive animals at their farm. These types of animals consume a substantial share of food and feed and management efforts thus affecting negatively the entire productive animal population at the same time. This results in a decrease in average production of milk and meat, leading to the conclusion that present livestock numbers are not capable of meeting the nation's demand in such farming practices. Moreover, livestock sector contributes towards 50% of agriculture sector but evidences show that its annual budget is far less than 50% of agricultural budget in the province and country. Insufficient funding remains another critical factor to improve this sector at the pace it deserves. The aim of this field survey was to find gaps in livestock development related to extension and recommend possible measures to overcome this situation and ultimately contribute towards optimal productivity.

2.2 Extension Services and Situation Analysis

Generally extension services in livestock sector deal with transfer of information from experts to the farmers and sharing of information among stakeholders for increasing the productivity, enhancing skills and contributing towards attitudinal changes. To achieve this several

approaches can be applied ranging from field visits, discussion sessions, mobilization, demonstrations, study visits, practicals, messages delivery, campaign etc.

District officer is a senior professional in-charge of district for livestock department. There are veterinary officers, livestock (stock) assistant, livestock inspector and dresser in technical team besides auxiliary staff. In some districts there is also livestock production officer responsible for breeding (artificial insemination service). The district officer, livestock production officer and veterinary officers are graduates in veterinary medicine (four years degree course after 12 grade qualification). The stock assistant and other technical staff has usually diploma of two years. There are 10 master degree holders working in 9 districts of upper Sindh.

At field level the Livestock Department mainly focuses on treatment of animals as its major activity in the province besides limited coverage of artificial insemination, i.e. 5%. (page 35, Livestock and Dairy Development Basic Study Report, August 2009) Presently the department does not have specific sub sector of extension wing like agriculture department in the province. Their graduate degree holders (District Officer and Veterinary Officer) don't study extension in depth at degree program level as compared to their university colleagues in the agriculture discipline. The whole veterinary educational system at degree level is dominated by clinical practices. However, at field level livestock department does provide regular field services to farmers on a seasonal and occasional basis for vaccination (against diseases common in the province/country), de-worming and regulatory work.

The current tour plan to vaccinate and drench animals is perceived as "extension service" within departmental circles (personal communication at filed with officials of Department of Livestock in upper 9 districts of Sindh). Presently department services are for general population having more animals at place(s) so that extension worker can perform maximum during his visit but in this way small and dispersedly and remotely located farmers are bypassed and a number of these farmers are high in the province. Similarly the small farmer has fewer choices for milk marketing.

The staff (VO and SA) prepares a tour plan to visit field usually for 10-12 days a month. They inform field staff (in-charge livestock dispensaries/centres, stock assistants/attendants, dressers, guards, bull attendants and other lower staff who stays at field level and farmers through mobile phone, personal messages and sometimes through letters too. Individual and farmers groups are contacted at field level where vaccination and drenching program is performed besides treatment of animals against different diseases. In some cases medicines are prescribed to farmers and they will purchase it from private medical stores. Discussion is also held with farmers about care of animals, proper vaccination, medication and general principles of animal husbandry during meetings. This is done verbally in the local language to an assembly of individuals and groups of farmers.

From time to time farmers also contact department staff and request them to visit the area for vaccination and drenching. Also when any outbreak occurs, farmers communicate to department's staff. They respond to it within its present meagre facilities. The present level of satisfaction regarding extension services is moderate to low in many cases and emphasizing the need to aggressively improve the situation. Most districts don't have mobile unit (a van/field vehicle) for extension services or the unit is not functional due to insufficient funds for maintenance and driving. Therefore field staffs travel by motorcycles or local transport. There is no common and wider use of multimedia, leaflets, brochures, black board, notice boards or other useful tools for explaining different aspects of animal husbandry to farmers. The professionals and staff are not even trained in communication and extension services as such. There is hardly any provision to take farmers for a study or exposure visit to a model farm such as milk pasteurization plant, breeding farm, demonstration site for improved varieties of fodder, feed mills, research stations, pharmaceutical factories and diagnostic laboratories etc.

Due to treatment facilities and long interaction provided by the department, farmers now experience health improvement up to some extent. (Interviews with livestock farmers in 9 districts) However, the next steps required are advice on productivity increase, management aspects, nutrition and reduction of economic losses. Introducing extension approaches in view of integrated activities, coordination approaches, management practises require reform and support at different levels within the livestock department. The present setup of district government where agriculture and livestock comes under the same administrative arrangement could be helpful to integrate and coordinate activities in a better way.

2.3 Gaps

Through field surveys the following gaps have been identified regarding extension services:

1) Human Resources Development/Institutional Set-up

- Lack of staff at field level (present coverage is 1258 animals/per vet staff)
- Lack of skills in extension methods among staff before joining
- Very limited refresher course/up-gradation and tailor made course for staff during the service
- Absence of publicity wing such as directorate at provincial level (Publicity wings designs, promotes and disseminates different messages to be published in news papers, radio, TV and other media channels. This wing also serves as production role of extension messages, leaflets, booklets, manuals and awareness statements). The audience/listener range is quite wide but basically farmers, traders, people involved in livestock production sector)
- Lack of coordination between agriculture and livestock department for the promotion of integrated ventures such as introduction of fodder crops and related issues. It is a similar case with forest department where rangelands and forestry activities can be designed by keeping in view the livestock role and dependency
- Insufficient extension supporting material such as leaflets, pamphlets, posters, documentaries, charts etc.
- No regular aggressive awareness campaign at provincial level to provide information about epidemics control, emergency response and promotion of new technologies and management practices adaptation (only 5% coverage of artificial insemination and same number for vaccination)
- Inadequate human resources in the province (many posts are lying vacant) and existing staff have to perform multiple duties
- Lack of coordination among sub sectors of livestock department such as livestock production, hospitals, poultry, breeding farms, training centres
- Lack of coordination among livestock department, civil society groups (NGOs), private commercial organization (pharmaceutical companies and feed mills) and milk collection and processing companies
- Low level of trust among farmers about government initiatives (This was replied by farmers in some areas (at least 50% cases) during the field interviews)
- Traditional farming practices using local methods
- Law and order situation in some rural areas (This was particularly found in upper Sindh districts where some 40-50 animals were kept in small compound within the house. When asked why not to have a separate and wider site for these livestock the answer was "theft and bad law and order situation does not allow to move outside village even a 100 meters away from the village and this was seen in many places during the field survey)
- Lack of proper monitoring system to cater for the needs and progress of field work based on findings and follow up
- Department has serious shortage of female professionals and staff and thus bypass half of the population
- Insufficient farmers field school approach in the province

- No initiative for organising farmers.

2) Physical Resources

- Lack of any functional mobile unit for extension work at field level in many districts
- Insufficient necessary infrastructure such as proper buildings with facilities, furniture, equipment (presently one veterinary infrastructure covers 158 square kilometres, (page 35, Livestock and Dairy Development Basic Study Report, August 2009))
- Absence of helping tools for extension work such as field unit multimedia, camera, generator and material for awareness raising and new development in the field of livestock
- Absence of model farm and required set up such as artificial insemination production and demonstration facilities for farmer's visits.
- Lack of modern communication facilities such as computer, internet, email etc.

3) Financial Resources

- No specific budget for extension work presently (other than field tour for treatment)
- Insufficient funds for present field extension work
- No funds for demonstration, experiments, exposure, awareness, incentive purposes
- Delay in release of funds
- Nominal fee charges to farmers presently
- No incentive for organising farmers

2.5 Findings and Recommendations:

- Extension services to small and poor farmers need to be stressed and supported with an output of at least one visit to a farmer group in 3 months.
- Department can synchronise the extension approaches based on previous experience, NGOs and private sector experience.
- Government should ensure stability and continuity of extension approaches in the department.
- Professionals and staff need to include extension services in the job description and it must be reflected in the annual/periodical performance evaluation.
- The proposed extension approaches must include participatory methodologies and ways, i.e. need based, feedback and involvement and participation of farmers.
- Incentive policy (Staff covering maximum number of farmers and livestock should be given extra rewards or bonus and similarly farmers using improved practices according to staff recommendations must be appreciated such as certificate, present/gift voucher etc. needs to be introduced – both for staff and farmers.
- Partnership is needed with farmers, NGOs and private sector and training institutions.
- Department has implemented different projects in the past and applied extension methodologies and ways specific to a particular project's life. This experience needs to be consolidated, documented and shared and for this workshop is recommended.
- Farmer organization needs to be established, strengthen on cooperative model.
- Professionals and staff need to be trained in participatory methodologies and practices to establish cooperatives of dairy farmers and livestock holders.
- Livestock management training needs to be provided to farmers including record keeping in order to monitor the progress and see the impact over time period.
- Artificial insemination program need to be run as a joint venture between village para-professionals trained and role of farmer organizations needs to be legitimised.

Extension staff aim is to cater the needs of farmers in order to increase productivity and profitability and facilitate them in overcoming their problems through efficient and safe skills and practices. At the same time extension staff/professionals need to learn with farmers and exchange knowledge and expertise with them in order to cover social and technical aspects at

field level. It is suggested that capacity building is required at both level – Livestock staff and framers level. Among many few are suggested here:

Training Workshops for staff in extension methodologies based on experience gained by private sector, NGOs and staff itself. It will depend upon willingness of participants and trainer/facilitator skills.

On Job training for staff already working – putting theory into practice. It is complementary to training workshops (above)

Mentoring of young and new staff by a senior(s) and qualified livestock professionals (consultants and ex service senior professionals)

Staff joint meetings on regular basis to share experience and plan together. Such events create environment to discuss progress, coordination among different sub sectors, shortfall, feedback and new experiences etc.. It can be facilitated by senior professionals/mangers.

Study Tour/Visits are important to see different and new things and can compare with their own situation/progress.

Farmer field schools allow farmers are helpful in learning from each other in a structured course or experiment. At the same time staff can also learn by facilitating and observing these activities. For this staff need to be trained and must have experience so that best practised can be discussed and learned. Staff also learn to organise farmers for useful and relevant production activities and imparting training.

Onsite training will help staff and farmer to learn and exchange knowledge and good practices.

Formal studies – refresher course/up-gradation course are highly useful to update the knowledge and state of the art skills and technology.

Use of regular news bulletins/magazines related to livestock sectors will be useful for knowledge gaining for staff.

Internet and computer facilities are needed for planning, monitoring and performance of work and staff.

For this workshop can be organised at the start of project (Master Plan under JICA) for orientation, work plan formulation, monitoring etc. And this should be continued on regular basis. Follow up workshop should cover the topics based on monitoring system identifying the gaps/difficulties at field level.

2.6 SWOT ANALYSIS LIVESTOCK DEPARTMENT

1) Strength

- Livestock department has had staff presence in wider geographical locations in the province for quite a long time and thus have trust, familiarity and interaction with farmers at field level.
- Veterinary officers and stock assistants have a tour plan of approximately 10 days every month to visit field farmers.

- Clear understanding of extension approaches at higher level in the department is an advantage to show sensitivity for this important sub sector.
- The printing facilities for extension material are available within the department??
- There are training institutions in the province under livestock department

2) Weakness

- The present extension related approaches are not completely need specific such as AI, nutrition, management and marketing and mainly concentrates around health related activities (It means that what staff is doing presently is mainly treatment/vaccination and not covering other aspects fully and genuinely such as nutrition, feed and fodder, animal husbandry management practices and marketing etc.) .
- The field offices (centres/dispensaries) are less in number and poorly equipped and maintained regarding extension services.
- Poor budget allocation for extension services.
- Inadequate use of modern technology in extension services.
- Lack of clear understanding about extension services exclusively for livestock sector development.
- Absence of female professionals and staff in the department

3) Opportunity

- Untapped manpower in the department and availability of manpower in the province.
- Willingness to learn and obtain training in extension services.
- Huge potential to address the issues pertaining to livestock development in the province such as small farmers and women.
- Diversification in livestock extension services – management, nutrition, marketing etc.
- Collaboration with private sector

4) Threats

- Lack of leadership in coming years as many senior professionals will retire in near future (sorry I don't have exact numbers but it has been widely discussed by staff in the field and also in DG office in Hyderabad – maybe we should delete it if we can't prove it).
- Inadequate political will to support the department.
- Unskilled in extension methodologies.
- Lack of willingness on the part of female staff to join department.
- Presence of liable (dependable) personnel in the department

3. Extension methodologies and contents: Sindh Rural Support Organization (SRSO), Sukkar, Sindh

3.1 Introduction of the SRSO

3.1.1 Profile of the SRSO

Vision	To see socially and economically empowered communities
Mission	To meet the challenge of assaulting poverty and help the poor to get above the poverty line and to help marginalized rural people and harness their potential to bring about change in their quality of life on a self help basis
Organizational Goal	<ul style="list-style-type: none"> ● To alleviate poverty in all UCs of nine districts of upper Sindh and go to scale ● To address and support Government of Sindh’s policy of poverty alleviation ● To complement and supplement Government of Pakistan’s efforts to translate poverty reduction strategies into action
Approach and Strategy	<ul style="list-style-type: none"> ● The people need to be mobilized. They need social guidance to harness their potential. ● Organize communities and prepare investment Plan at household, group and village level, including credit, technical assistance and training required by the community. ● Initiate savings discipline program ● Prepare a local level infrastructure plan in productive and social sector with community ownership and contribution ● Network with local NGOs and CBOs. ● SRSO believes that success of social mobilization is achieved when the community is fully sensitized towards understanding its problems and finding solutions by itself. ● Sustainability of the program is based on creating proactive community organizations by attitudinal change.

3.1.2 Methodology of the SRSO in implementation

The basic unit of the SRSO’s activities is called a “Community Organization” (hereinafter called “CO”). All intervention of the SRSO to the communities and the people is done through the CO. Thus the SRSO initiates its activities from the formulation of the CO.

At the first, the SRSO selects candidates of the CO by its setting criteria (field assessment). The criteria includes whether to have milking cattle(s) and other prerequisite such as water, farming practices and scope of natural resources management, etc.

The SRSO dispatches its social organizers to the candidate communities. The social organizers begin to have a dialogue with community leaders, and then gradually extend the dialogue to the other people and women. The social organizers explore the development needs of the community by means of those dialogues, Participatory Rural Appraisal and the other study methods such as questionnaire and/or interviews. Upon potential and willingness, a CO is formed in that location.

The CO is main body at village level to work with, through participatory approaches and it is aimed that CO will be sustainable organization at grassroots level to carry our development activities in future too, once project is ended. COs are linked with other service organizations, line department and private sector. Also COs take advantages of different programs offered by linked organization. Human resource development, joint saving fund and organizational development are key pillars of this approach.

3.2 Prime Minister's Special Initiative for Livestock

SRSO is a member of Rural Support Program Network. In the Prime Minister's Special Initiative for Livestock (hereinafter called "the PMSIL), as the same as the other RSP Network NGOs, SRSO was in charge of the implementation of the program in the upper Sindh. The PMSIL aimed to expand outreach services of animal health by means of training village people as "community livestock extension worker" (hereinafter called "CLEW"). SRSO and others arranged the trainings and supported the CLEWs technically and logistically during the project.

Under the community development approach of SRSO and based on the field assessment reports the potential villages, having milking cattle and other prerequisite such as water, farming practices and scope of natural resources management are selected to work with. Under regular community development program of SRSO social organiser initiates dialogues and diagnostic survey in villages where need for development is high. Participatory rural appraisal and few different methods such as survey questionnaire and dialogues are used to assess the situation of village(s). Separate meetings and detail discussion are held with male and female population of village.

The SRSO gave 15 days intensive training to candidates of CLEWs. The candidates were selected one suitable person from each CO. This training includes vaccination skills, de-worming methods, general management practices, and nutrition and marketing techniques. Also refresher and up-gradation courses are provided from time to time. It is mandatory for all paraprofessionals to receive refresher training on needed subjects as per agreement between CO and SRSO.

The lectures and trainings are held in local languages and Urdu and use of multimedia and charts is there. Trainees are provided literature, notes, and charts about different topics. Moreover, posters are given to these professionals to put on walls in village guest house, shops and other common places where farmer can see information about livestock development. Feedback is sought from participants, and question answer sessions are held in order to further clarify points of concern pertaining to field issues experienced by trainees. CLEWs are provided transport facilities and food during the training.

At the end of the training, the participants are provided a small tool kit, which is necessary to carryout general and basic treatment for livestock. SRSO technical professionals provide backstopping support to these CLEWs on regular basis during the project's life. Almost 70-80% of these workers have been still functional after the termination of PMSIL. The extension work contents include motivation through discussion, meetings, practical demonstration and leaflets. Participatory process is applied throughout the work and community is involved at each and every step of planning and implementation.

Table 1. Project Achievement of the SRSO in PMSIL

Activity	No.
CLEWs Trained	165
Female Livestock Farmers trained (beneficiaries)	12,014
Field Days/ Community Workshops (Vet)	384
Vaccination of Animals	1,105,613
Animal De-worming	361,571

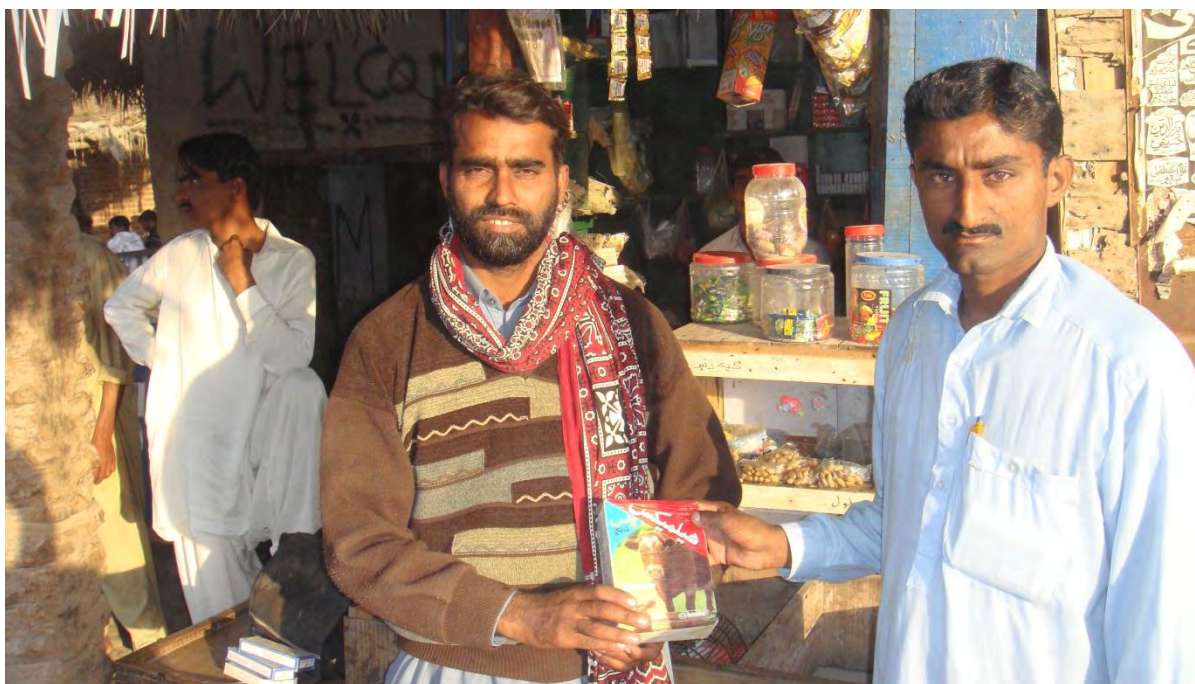
3.3 SWOT Analysis about the Potential of the SRSO in terms of Livestock Extension Service Provider

Table 2. SWOT Analysis about the Potential of the SRSO in terms of Livestock Extension Service Provider

Strength	Weakness
<ul style="list-style-type: none"> ● NGO and thus have flexibility in extension approaches ● Have wide coverage and linkages with grassroots organizations (community organizations/groups) mostly in rural areas throughout the province ● Have multidisciplinary teams for extension work ● Have institutional memories and experience of addressing livestock extension services and human resources development ● Have gender sensitive approaches in extension services 	<ul style="list-style-type: none"> ● Depend upon donor/external funding ● Usually don't work in urban areas ● Don't have special focus on livestock or agriculture as such ● Lack marketing skills enhancement in extension services
Opportunity	Threat
<ul style="list-style-type: none"> ● Long established linkages with rural communities can be further strengthened ● May cover more locations in social mobilization sectors in rural areas ● Trained human resources in capacity development including extension services 	<ul style="list-style-type: none"> ● The government (livestock department) perception towards NGOs extension work is not favourable ● Other NGOs may lead this sector in the future (When other NGO like national rural support program (NRSP) or similar NGO will enter in this field then SRSO may get setback as competitor) ● Overhead cost is higher (government perception)

3.4 Interview with CLEWs in Sukkar

Mr. Fayayz Hussain is 32 years person from village Darawahan in district Sukkar. This village has livestock farmers and is a central position among nearby villages. Date palm and various other crops are cultivated in this area and people mostly depend upon agriculture and livestock. Low quality/grade date palm fruits (both fresh and dried) are used as feed for small ruminants in this area. SRSO is working in this area since last several years. SRSO puts emphasis on human resource development and village paraprofessionals are trained under their capacity enhancement program under livelihood sector.



Picture: Mr. Fayyaz Hussain (left), a paraprofessional trained by SRSO sells medicine to one of his regular farmer client.

The local community organization has nominated Mr. Fayyaz for training in the field of livestock in order to cater the basic needs of livestock improvement in this area. He has been trained by in the field of livestock development by SRSO. He has obtained 15 days training at rural training institute Tando Mohammad Khan under paraprofessional program of SRSO in 2007. He got orientation courses in livestock management, disease control, artificial insemination and nutrition etc. This also included drenching against worms in animals, vaccination timings, hygiene practices for animal farming etc. He is satisfied with quality of training.

Upon return he started providing services to village and area farmers. Initially he had to work very hard to be accepted as livestock paraprofessional. Usually he provides first aid service to sick animals and for serious cases he refers the case to veterinary officer.

He visits farms and also discuss about preventive measures, management practices and nutrition aspects with framers to further develop the production of livestock. He does this all verbally. He does not have any multimedia or documentary and booklets/leaflets to discuss issues accordingly and thus feels handicap in his extension services. According to him there is occasional shortage of green fodder in the area as new and improved varieties of fodder are not cultivated in this area. Moreover, there is a need for balance feed for dairy animals in this area. He has his own small store where he sells feed, basic medicines and provides advice to farmers. He has stock of leaflets, booklets and posters in his shop and distribute freely to farmers for awareness raising and information. He charges for his services, i.e. Rs. 20-30 for goat/sheep and Rs. 40-80 for cattle. He earns about Rs. 3000 to Rs. 4000/month from this job. According to him there is a lot of scope for breed improvement in cattle sector, i.e. artificial insemination. For this he points out that private sector needs to be involved besides government livestock department.

He has visited breeding farm of Kundi buffalo in Sukkar and also has been to some private dairy farms in province and is found of knowing more about latest technology and information about dairy development. He does not keep record of his business and need motivation for this.

4. Engro Foods

4.1 Introduction of Extension Activities of Engro Foods

1) Agri-service

Engro Foods organizes its own extension teams consisted of professionals; veterinary doctor, livestock assistant (SA), social organizer and agronomist. They are called as “Agri-Service”, and provide integrated extension services in 800 villages of 11 districts. The main activities of the Agri-Service are to conduct training sessions, regular seminars, discussion forums and/or demonstration events on topics relevant to dairy development at field level. According to the Engro Foods, the communication network among livestock workers, field staff, villagers/farmers, middlemen and management has been established.

A “complete package” of the Engro Foods is 1) that chiller plants and milk collection centres (MCC) are established at appropriate sites, and 2) that the Agri-Service visits the MCCs and farmers regularly and provides appropriate advice, encouragement and/or appreciation. They considered that the visits (interaction) would be a key of success. Under working contract with villages, farmers bring milk directly to chiller plant twice a day. And in some cases, depending upon the situation, a middle man collects milk from different farmers and brings it to chiller plant. In both cases then milk price is different.

Figure 1. Organization Chart of Engro Foods

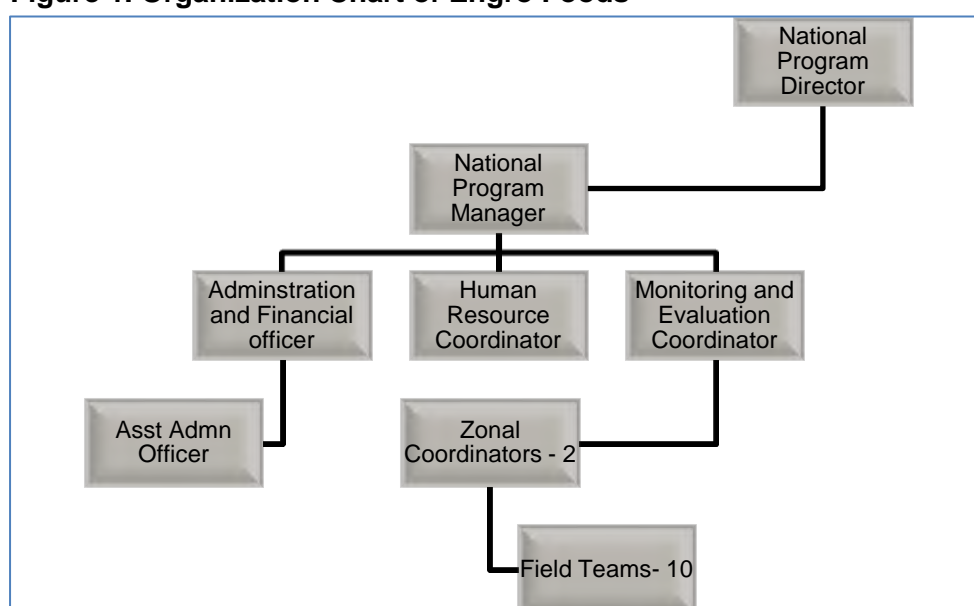


Table 3. Engro Foods Own extension service in Livestock Sector in Sindh

Designation	Number	Qualification	Gender
Field Supervisor	10	Intermediate	male
Area Manger	5	MBA/M Com/ MA Economics	male
Area Officers	18	Vet graduate, MA Economics	male
Agricultural Services Officer	10	Vet Graduates/ M.Sc in vet sciences	male
Stock Assistant	12	Diploma course in relevant field	male
Zonal Agri. Services Manager	01	DVM and MA Rural sociology	male

2) One Window Operation

Further to this, Engro Foods started another innovative program, “one window operation”. In the program, Engro Foods opens stores dealing with equipment for agriculture and livestock management (medicine, feed, seed for fodder and fertilizer) where are nearby MCCs. (Some stores are instituted in a part of MCC.) Engro Foods manages the facility of store and monitors the quality of equipment and services. However they do not touch with the operation of the store, but entrusts trained paraprofessionals in the area called Khushhali Ghar.

Engro Foods claimed that the most important thing of the program is to deal quality products in the store, and to obtain the trust of the farmers. Also Engro Foods allows contracted farmers to buy needed items on credit. The field staff of the Agri-service informs the contracted farmers about the store and its services, and encourages farmers to use this facility for their livestock and dairy improvement.

3) Model Village

Engro has also model village concept where 20-25 or more farmers are ready to sell milk on regular basis and also willing to take part in training and other extension services provided by Engro under a joint program of dairy development. As a private organisation, this is their regular extension program in the province. Under regular extension services budget estimate for human resources is about Rs. 10 million a year.

4.2 The Community Empowerment through Livestock and Credit (CELDAC)

As a women’s development program of the UNDP, the Community Empowerment through Livestock and Credit (CELDAC) Project was initiated in 2006 and ended in 2010. The CELDAC was implemented in Punjab and Sindh provinces. Since Engro Foods achieved good track record of livestock farmer trainings in various parts of country, UNDP selected Engro Foods as the counterpart of UNDP’s project in Sindh Province. (The counterpart in Punjab was Nestle.)

The CELDAC focuses on the empowerment of rural poor women through livestock management. Therefore, the CELDAC aimed to create a cadre of female rural entrepreneurs (Lady Livestock Worker: LLW) who were economically independent and served their communities effectively to address livestock management issues.

Under this program, technical staff of Engro Foods conducted field visits and imparted trainings to villagers. Practical demonstrations and farmers days were organised in livestock improvements skills and new technologies. Use of multimedia is common tool for training besides written materials. Engro Foods has prepared a comprehensive and quality manual of livestock farmers training in Sindhi and Urdu languages. Relevant topics of training were explained in easy language and illustrations in this manual. At the end of training, every participant was given a copy of this manual for further use.

According to interview held with paraprofessionals, one of the best things under this program was what the trained farmers visited to Engro Foods’ main milk plant in Sukkar. In the plant, farmers saw the modern technology – pasteurizations and packing of milk. There was feedback system about effectiveness of training events, and refresher courses were also held when the technical staff felt any necessity. Demonstration of urea straw treatments, vaccination, de-worming skills were provided to farmers and village paraprofessionals.

Ultimately the project aimed to increase farmers’ income, to generate employment opportunities through improving their livestock management skills, to ensure their livelihoods and food security at both levels of the household and community. During discussion with Engro management, they pointed out the necessity of backstopping/support to the newly trained livestock workers continually, at least during initial years.

Table 4. CELDAC staff only – Engro Foods

Designation	No.	Qualification	Gender/Marital Status
Lady Livestock Workers (NOT STAFF, BUT TRAINED IN 3 YEARS PROJECT LIFE)	1209	Primary 41% Middle 35% Matric 29% Inter 125 Graduate 3%	Single 55% Married 43% Widow 2%
Village Milk Collectors (NOT STAFF, BUT WORKING ON COMMISSION BASE)			
Field Team Members (Master Trainers)	20	Vet Graduate/ Masters in Zoology and MA in sociology	female
Para Vets	10	Diploma in concerned field	male
National Project Manager	one	MA in sociology	male
M&E Coordinator	one	MA In sociology/ MBA	male
HR Coordinator	one	MBA	male
Finance and Admn Officer	one	MBA	male
Assistant to Finance manager	one	MA Economics	male
Zonal Coordinators	2	MA Sociology	Female
National Project Director	one	M.Sc. Agronomy	male

4.3 SWOT Analysis about the Potential of the Engro Foods in terms of Livestock Extension Service Provider

Table 5. SWOT Analysis about the Potential of the Engro Foods in terms of Livestock Extension Service Provider

Strength	Weakness
<ul style="list-style-type: none"> ● Engro has coverage at strategic field levels. ● It has multidisciplinary approach in extension – livestock health, nutrition, preventive aspects and human resources development and marketing. ● It has doorstep/village level facility for milk collection. ● Its main emphasis is on quality and productivity. ● It has human resources development capacity, ability and experience 	<ul style="list-style-type: none"> ● So far its coverage is limited (not in all districts or all villages). ● It is a business oriented private company and does not necessarily work with the poorest of the poor or in remote locations. ● It only works in dairy sector and meat, poultry and other animal sector are not covered.
Opportunity	Threat
<ul style="list-style-type: none"> ● It has field experience in Sindh and ranks topmost in the private commercial sector. ● It can expand its coverage based on potential. ● Possibility of joint venture with the government. ● It has effective extension models and can serve as training prototype for others. 	<ul style="list-style-type: none"> ● Quality control of extension services may not be maintained over longer period (during the field survey it has been discussed with farmers and even some of Engro Foods staff did partially agree that Engro Foods progress needs further improvement over a time period. This means that initially work is in rapid progress but later on the progress is slowed). ● Government policies may affect adversely progress (presently Engro has somewhat a monopoly of big private firm but as soon as Government will boost the livestock sector in the province then many other private and commercial firms will enter in this field – in this way government policies are directly affecting private sector in the province).

Presently Engro Foods has started establishment of its own dairy farm with more than 300 cattle heads (Cows) in Nara canal area in Khairpur district. This dairy farm will also serve as research and training site for professionals and farmers of Sindh in future under its human resources development program.

Appendix 1: Diploma of Livestock Assistant in ARI

1. Livestock

Term	No.	Title	Theory	Practice	Class (theory)	Field (practice)	Lecturer
introduction	1	Introduction					
	2	Aims and objectives					
	3	Subject covered during term wise					
	4	Detail of hours and marks according					
	5	Time table					
	6	Tentative schedule program for working					
	7	General information					
	8	Teaching staff					
First	1	Agronomy	48	64	1. Agriculture: definition, importance and allied branches 2. Meteorology, climate and weather, weather recording instruments, agricultural seasons, agro-ecological zones of Sindh and Pakistan 3. Land utilization, cropping pattern, mono-cropping and multiple cropping, farming system, irrigated farming, dry farming and organic farming 4. irrigation system, irrigation water sources and methods.	1. study of units of measurements used in agriculture 2. identification of crops and seeds 3. study of Kharif and Rabi season crops 4. study of agro-ecological zone of Sindh by drawing map 5. study of meteorological instruments for weather forecast 6. demonstration of irrigation methods for different crops	NA
	2	Agriculture	32	32	refer to the other sheet	refer to the other sheet	NA
	3	Poultry husbandry	32	32	Introduction, terminology, present status of poultry in Pakistan, Nutritive values of poultry products, classification and breeds of poultry, housing system and requirements poultry equipment, litter, brooding management of poultry farms, feed requirements its disorders in poultry, layer management, cannibalism, handling of eggs, incubation and hatchery management, record keeping, cleaning and sanitation of farm	practical study and experiments at the field	NA
	4	Dairy husbandry	48	64	Brief history and present status of livestock and livestock products. Care and management of livestock at various phases of life. Handling and care of pregnant, at the time of parturition and new borns. Handling restraining and casting of animals methods of identification of animals. Housing requirement and facilities for different classes of livestock farm sanitation, breeding, feeding and reproduction management. Management practices (vi) dehorning, docking castration, dipping, searing etc. collection Mortgage and	Body points of animals, determination of age of animals, handling and casting of animals during various operations. Methods of identification of animals (tattooing, ear-tagging, branding). Preparation of animals for shows. Management practices viz dipping shearing dipping drenching and dehorning. Milking practice. Cleaning and disinfection of farm houses, sampling of milk, determination of fat in milk, cream and butter (Geber method), determination of total solids and solids not fat	NA
Second	1	Agronomy	32	32	1. Agronomy: definition and scope 2. Crop classification 3. Tillage: the objects and types, operation, laser leveling technology, seed bed preparation and soil tilt 4. seed qualities, types, production/ processing/ testing, storage, sowing methods, broadcasting bed, 5. Soil: definition, types/ characteristics, fertility and productivity, organic matters, management practice 6. fertilizers and manures 7. irrigation and water management	1. classification of field crop 2. agricultural equipment and practice 3. identification of seeds, chemical fertilizers, manures, weeds for different crops, preparation weed album 4. demonstration of sowing, irrigation, and weed management methods 5. inter-cultivation practice: weeding, inter-culturing, earthing up, mowing, mulching, top dressing of fertilizers, pesticide spraying, etc. 6. seed purity germination and viability test	NA
	2	Agriculture	32	32	refer to the other sheet	refer to the other sheet	NA
	3	Anatomy physiology	48	64	Veterinary Anatomy and Physiology 1. introduction and importance of veterinary anatomy terminology, functions of physical and chemical composition, skeleton, muscles 2. reproductive system, function of endocrine glands 3. nervous system	1. demonstration and explanation 1) skeleton and bones, 2) joints of the body, 3) muscles, 4) organs and the system, 5) sense organs 2. The use of microscope and the practice of microscopic examination	NA
	4	Feed and animal nutrition	48	64	1. the function of each nutrient 2. classification of feed: hay, silage, crop, composite feed 3. difference of needed nutrition depending on the animal's condition: heifer, pregnant cow, young bull, dairy cow and buffalo, the cow after calving 4. feeding for fattening	1. identification of feed samples 2. preparation of ration 3. formulation of urea and molasses mineral block 4. feeding urea 5. making hay and silage 6. visit of feed mills note: practical feeding at University farm	NA

Tern	No.	Title	Theory	Practice	Class (theory)	Field (practice)	Lecturer
Third	1	Livestock extension service	32	32	1. Basic principles of extension and extension workers to enhance people's behaviour/attitude change 2. Extension methods 1) audio visual aid 2) listening method 3) writing method: articles, report etc. 4) reading method	interviews to farmers about their socio-economic problems 1. formulation of small groups 2. preparation: interview structure, practice among the students 3. interview to the farmers 4. report writing	NA
	2	Islamiat	32	na	1. basic beliefs of Islam 2. Islamic identity 3. Quran and Hedith		NA
	3	Animal health/veterinary physiology	64	64	introduction and scope of physiology 1. cell: structure and function 2. homeostasis nervous system 3. endocrine system: function of hormone hypothalamus and its relation with pituitary gland 4. blood: composition and functions, characteristics of blood, blood pressure	general laboratory instruction 1) collection of blood 2) preparation of blood smears 3) erythrocyte sedimentation rate counting 4) determination of blood groups 5) urine analysis	NA
	4	Veterinary pharmacology			1. terminology and source of drugs 2. dosage forms 3. administration of drugs 4. classification of drugs 5. general effects of drugs 6. mechanism of drug actions, absorption, distribution, metabolism and excretion of drugs 7. adverse reaction of drugs	1. weight and measures prescription 2. writing prescription 3. incompatibilities preparation 4. preparation of some internal dosage forms	NA
	5	Animal reproduction and artificial insemination	32	32	1. Functional anatomy of male and female reproductive system 2. introduction of A.I.: history, scope and development; advantage and limitation of A.I.; semen collection, evaluation and processing	1. Determination of donor bulls/semen after quality assesment 2. Collection of semen 3. Training for insemination, pregnancy diagogis in cows	NA
	6	Animal breeding and genetics	32	32	1. methods for improvement of performance of farm animals: inbreeding, linebreeding, outbreeding 1) the use, 2) advantages/disadvantages 2. selection 1) basic principle, 2) kinds and methods of selection, 3) selection of superior male and female animals for seed stock 3. Record keeping	1. exercise of data recording for different productive trails of cattle, sheep and goats 2. to observe different breeds of livestock 3. exercise of calculating ERPA	NA
Forth	1	Animal health: Vet. Micro biology and pathology	32	32	1. Microbiology and bacteriology 2. Fungi 3. Viology structure size of virus, general properties of viruses, classification, transmission, multiplication interferon viruses 4. Vaccine	1. microscope care and handling microscope 2. collection of specimen for microbiological examination sterilization 3. methods of sterilizations stains and staining of bacteria	NA
	2	veterinary clinic: medicine and surgery	48	64	Control, diagnosis and treatment of various diseases 1. definition of preventive veterinary medicine and public health 2. Various prophylactic measures (control strategies) 3. Vaccine 1) Vaccine preventable diseases 2) Non-vaccine preventable diseases 3) Vaccine schedule 4. Epidemiologies		NA
	3	Animal production and management	32	32	1. Brief history of livestock and the products 2. Care and management of livestock at various phases of its life 3. Handling, restraining and casting metod 4. Hygine and sanitation of house and facility 5. Productivity: breeding, feeding and reproduction 6. Management practice: dehorning, docking, castration, dipping, shearing, etc. 7. Quality of milk and the value added products	1. Body points of animals 2. Determination of age of animals 3. Handling and casting of animals 4. Method of identification of animals 5. Preparation of animals for fine show 6. Dipping, shearing, clipping, drenching, dehorning, etc. 7. Cleaning and dis-infection of farm house 8. Detemination of fat, solid in milk and the products, preservation, pasteurization and sterilization of milk 9. Sanitation	NA
	4	Veterinary parasitological	32	16	1. Introduction and historical background 2. Injury and death (necrosis and gangrene) of cells 3. Disturbance of circulation 4. Inflammation and repair neoplasia 5. Classification and differentiation of pathology of common	1. Demonstration of general 2. Gross and histopathological lessons 3. Procudere of postmortem examination collection 4. preservation and dispatch of laboratory species 5. Demonstration of section cutting and staining	NA
	5	Veterinary public health	32	32	Scope and importance of milk and meat inspection in public health 1. Physical and chemical properies of milk 2. Source of contamination 3. Methods of preservation: transportation, chilling and storage 4. Milk borne diseases and treatment 5. Adulteration of milk 6. Characters of good meat 7. Postmortem changes of meat 8. Inspection of meat in the market 9. Slaughtering law/Acts	1. Physical examination of quality of milk 2. Labo practice: sampling, various testing →milk quality(MMT, Surf test), pH, and specific gravity and cell count detmination, Methylene blue reduction test, detection of adulteration and water content 3. Comparative study on various organ systems 4. Demonstration at local slaughter houses: ante- and post- mortem examination 5. Detection of lesion carcass rendering meal (unfit for human consumption)	NA

2. Extension

	Sr.	Objectives	Contents	Teaching methods
	101	1 Define agricultural extension and state its role in the rural economy	"Extension Education" (Urdu) Muhammad Ata-ur-rehman Technical Bulletin No. 8-1978 Operational Manual for the Agriculture extension service United Publisher Lahore	Lecture Library Assignment
	101	2 Describe the history of agricultural extension in Pakistan	See Library	Lecture Library Assignment
	101	3 Describe the organization of agricultural extension in the province	see organization chart of agriculture department	Lecture Library Assignment
	101	4 Describe the 6 steps extension process	1. understanding the problem 2. deciding how to solve the problem 3. planning to solve the problem 4. carrying out the plan 5. judging the success of your action 6. what is new problem	Discussion
	101	5 State the objectives of an agricultural extension worker and explain his role as a change agent	see library	Lecture Library Assignment
	101	6 State the duties and responsibilities of a field Assist. In the Union Council	see library report on visit to Union Council	Lecture Visit Union Council
	101	7 Organize and run an extension office using prescribed procedures	Maintaining including diaries, obtaining sanctions muster roles etc. Write memos, officials correspondence and monthly reports, order office supplies, goods and equipment, Periodical progress reports and returns, prepare tour programme, tour report and TA/DA claims, maintain a register showing, Enrichment position of the agricultural condition of the area. Correspondence: Maintain office services equipment and transport Obtain acknowledgement from farmers whose lands have been sprayed	Visit to extension office Lecture to train students to complete duty reports and Lecture from officer working in extension service
	101	8 Supervise beldars and other staff, prepare work schedules and train new employees and officers as directed	study of work schedules in extension office	Lecture, discussion with officer from extension service
	101	9 Assist in institutional from operations	Crop cultivation, orchard planning and plantation, spray operation against pests and diseases	Lecture, discussion with officer from extension service
	101	10 Maintain receipt and dispatch registers, and store registers and keep accurate financial records of receipts and expenditures	Study of documents in extension officer	Lecture from an administrative/accounts officer
	101	11 Understand a giradawari register and other documents of the revenue patwari	Study of giradawari register	Lecture from member of revenue staff
	101	12 Obtain and maintain agricultural statistics	Refer bureau of statistics	Lecture
	101	13 Prepare charts and maps of the local area	Local area excursion	Field practical work Assignment to prepare map of area near institute
	101	14 Visit a farm for the first time and discuss the farmers problems and tell him how the extension services can help him solve his problems	Refer department of Agriculture literature	Lecture Role playing
	101	15 Write a report on a farm visit based on his own observations and discussion with the farmers	Farm visit	Practical assignment
	101	16 To make an official telephone call on extension matters and write a brief record of the conversation for file	Simulated telephone call procedure	Role playing
	101	17 Write an official letter a) to a farmer b) to higher authority on extension matters	Refer department of Agriculture literature	Lecture Assignment
	101	18 Help farmers obtain supplied of inputs for farmers	Improved seeds, planting material and equipment maintain correct and up to date register of supplied, received and recoveries made from the farmers and to handover amount received against proper receipt	Lecture
	101	19 Visit a government office to obtain information about extension matters	1) information on agricultural laws and acts 2) information on technical matters from Department of Agriculture other Government departments and private industry	Lecture visit
	101	20 Help farmers obtain information	Refer department of Agriculture literature	Lecture
	101	21 Obtain information on credit and financial matters	1) teccavi and other bank loans 2) information on subsidy for improving water course and land levelling installing tube wells renting tractors	Lecture, lecture from loan section of community, and agriculture development banks
	101	22 Design and implement an plan for personal improvement and updating of own technical knowledge and skills	maintain a file on sources of useful information for extension work	Assignment
	101	22 ditto	maintain a scrap book of newspaper articles useful for extension work	Assignment
	101	22 ditto	Keep a record of useful Urdu Language agricultural publications	Assignment
	101	22 ditto	Keep a record of radio and TC programmes useful for extension	Assignment
	101	23 Organization conduct a group meeting of farmers to list and sort problems or to give information	1) conduct a discussion with farmers to evaluate past action to solve a problem	Role playing
	101	23 ditto	2) mediate in dispute between farms	Visit of meeting of farmers
	101	23 ditto	3) organize and conduct a panel discussion (buzz group) of experts for an audience of farmers	
	101	23 ditto	4) untrained farmers in attending a farmers training centre	
	101	23 ditto	Assist farmers to enrol in courses conducted by the open University and other distance training organizations	
	101	24 Analyse problems raised in a group meeting	what happened where did it happen, when did it happen what quantity? Discuss alternate solutions in a group meeting and decide on the best action. Prepare a plan of action for the month ahead based on decisions of a group meeting and discussions with superior officers	Discussion Role playing
	101	25 Speak clearly and with authority to a group of farmers on an agricultural topic	The essential features of a good speech see library	Role playing, each student to deliver a short speech on agriculture topic

	Sr.	Objectives	Contents	Teaching methods
101	26	Demonstrate improved practices using visual aids	Real examples, charts, flipcharts flannel boards etc. when speaking to a group of farmers	Practical work filmstrip each student to demonstrate use of each visual aid
101	27	Demonstrate correctly improved methods of spraying harvesting, use of machinery, planting	Field demonstration	Practical work each student to demonstrate
101	28	Advise on establishment and maintenance of kitchen gardens for improved nutrition	"Vegetable growing for demonstrable use" (Urdu) Alama Iqbal Open University. "Grow Vegetables" by Niaz Muhammad Refer	Discussion
101	29	Set out trail plots and use them for demonstration and keep records of the results both within institutions and on farms	department of agriculture literature	Lecture Visit to trail plots
101	30	Take part in the organization and teaching of a course given at farmers training centre	Library references	Discussion Visit to farmer training course
101	31	Visit a Union Council and later write a report on its organization and activities	Report on visit	Visit
101	32	Identify cooperative progressive farmers for on-farm demonstrations and arrange a visit to a farm of a progressive grower	visits	Discussion Visit progressive farmers
101	33	Carry out the correct procedures for electric connection, installation of tube-well rebate on diesel fuel etc.	WAPDA literature	Lecture Lecture from WAPDA
101	34	Conduct a crop estimation acreage and yield survey for each crop in each season by cutting crop samples	Library reference Literature from Department of Revenue and Agriculture	Lecture Visit crop estimation work
101	35	Assist in the organization of a field day in an institution	1) Organize an agricultural stall in a local fair (male) 2) Organize an agriculture competition 3) Assist in judging animals or produce in an agricultural competition	Assist in arranging institute field day
101	36	Use the media for the extension message	1) Prepare an article or news item for a newspaper 2) Prepare a script for a radio broadcast 3) Take record on interview for use in rural broadcasting	Assignment
101	37	Describe the general problems with extension and how extension can be referred using the basic guidelines of the T and V system describe the history of the T and V system	Reasons why the T and V system was introduced into Pakistan and where it is now operating. "Agriculture extension" by Benor, D. and Harrison, J. World Bank 1977	Lecture Library Assignment
101	38	Describe the chain of command and operation of a T and V system in Pakistan and explain the relationship to "Contact" farmers and "Follower" farmers	Visit a district where a T and V system is operating and write a report on the method of operation and chain of command	Assignment Visit T and V system and write report
101	39	State the responsibilities of a field assistant working in a T and V. System to the Union Council	RefereDepartment of Agriculture Literature	Discussion
101	40	Describe the basic concepts of rural society in Pakistan	Social values, norms and the relationship of the individual to his society. Social organization, stratification and institutions of rural society village, mosque, school. The village as a unit of social organization. "Pakistani Society" (Urdu) by Ghulam Hurtaza Turk	Lecture
102	1	Describe the basic concepts of rural society in Pakistan	Social values, norms and the relationship of the individual to his society. Social organization, stratification and institutions of rural society village, mosque, school. The village as a unit of social organization. "Pakistani Society" (Urdu) by Ghulam H	Lecture
	2	Describe the major socio-economic problems in rural society		Lecture
	3	Describe the forces for and against social change in Pakistan		Discussion
	4	Describe the sources conflict between groups of people in rural society		Discussion
	5	Discuss the role of the extension agent in promoting social change		Discussion
	6	State the objectives of the cooperative movement		Lecture
	7	Explain the need for cooperative activity to achieve goals in rural society		Role Playing
	8	State the different types of cooperative organizations and their functions	Visit a cooperative and write a report on the aims and organization	Assignment for visit cooperative and write report
	9	Describe how to organize a cooperative society	Methods of encouraging cooperative behaviours in a group of farmers	discussion
	10	Analyse the advantages and disadvantages of cooperative organizations and farming based on their success on failure in Pakistan	Refer to reports on cooperative movements	Discussion
	11	State the seed for and objectives of program planning of extension work	Library reference	Lecture
	12	State the steps of program planning	Library reference	Lecture

Sr.	Objectives	Contents	Teaching methods
13	Analyse a local extension activity into its separate steps of the planned extension program	Report on visit	Assignment visit to local extension activity and report
14	Describe different rural development program analyse the success and failure of different rural development programme which have been implemented in Pakistan	Monthly journal (Marboot) (Urdu) "Review of progress- IRDP" 1972-76 Ministry of Social Welfare	Discussion
15	Define leadership and explain its Islamic concept	The qualities of a good leader; the types of leadership and how to select, develop and train leaders "Local leadership" (Urdu) by Qazi Nasir Ahmeed	Lecture
16	Describe the types of motivation and techniques for motivation	a) Psychological drive b) Social motive c) ego or integrative motive d) self development (achievement motivation)	Lecture
17	Use group dynamics to assess and control group activities	Refer hand-book for discussion leaders	Discussion Role playing
18	Describe communication patterns in rural society	1) The need for communication and the importance for effective communication of communication skills knowledge and empathy 2) The reason for breakdown in communication giving real examples	Lecture
19	Discuss the work of the extension worker as a professional leader	Refer: "Rural community organization" by D.Sanderson and R.A.Poison. "Local leadership (Urdu) by Qazi Nasir Ahmed "The art of Leadership" by O.Tead	Discussion
20	Explain the importance of youth clubs for rural development	4H clubs movement, future framers of America and other rural youth movement "The 4H Handbook" by H.A.William	Lecture Discussion
21	Organize a rural youth club in a village	Educational and promotional activities for a rural youth club	Visit/organize rural youth club
22	Write a report on the aims and functions of a rural youth organization	Report on visit	Assignment report on visit to youth club
23	Explain the importance of adult educational and non formal education to improve rural life	The different methods of instruction on organization for adult education in Pakistan. Refer "Adult Education" (Urdu) by Ch. Ghulam Hussain	Lecture
24	Write a report on the successes and failures of adult education programme which has been studied near the institute	Report on visit Refer to catalogue of courses at Allma Iqbal Open University	Assignment report on visit to adult education program

Appendix 2: RTI Training

1. CLEW

Day	Title	Trainer
1	Introduction	
2	Skeletal system of farm animal	Dr. Ghansham Das
2	Digestive system mono-gastric vs ruminant	Dr. Ali Akhtar Shahani
2	Circulatory system	Dr. Rukhsana Vighio
2	Respiratory system	Dr. Ghansham Das
3	Excretory system	Dr. M. Mubarak Jatoti
3	Muscular system	Dr. Ali Akhtar Shahani
3	Nervous system	Dr. Ghansham Das
3	Endocrine system	Dr. Ghansham Das
3	Reproductive system	Dr. Ali Akhtar Shahani
4	Concept of good management for animal production	Dr. Noor-un-Nissa Marri
4	Principle and design of dairy farm	Dr. Ali Akhtar Shahani
4	Housing of large and small ruminants – on farm livestock facilities	Dr. Ali Akhtar Shahani
4	General principles for carrying out distressful management procedures	Dr. Liaqat Ali Abro
4	Visit to different sheds – layout of small large ruminant sheds	Dr. Ali Akhtar Shahani
5	Care and management of dam and calf	Dr. Liaqat Ali Abro
5	Care and management of heifers	Dr. Rukhsana Vighio
5	Care and management of pregnant and dry animals	Dr. Rukhsana Vighio
5	Selection and management of breeding bull	Dr. M. Mubarak Jatoti
5	Selection and management of breeding bucks and ram	Dr. M. Mubarak Jatoti
6	Field visit 1) visit to model livestock farm 2) visit to livestock market	Dr. Ali Akhtar Shahani Dr. M. Mubarak Jatoti Dr. Liaqat Ali abro
7	Preparing time schedule for dairy farm operation	Dr. Liaqat Ali Abro
7	Restraining different farm animals – practical	Dr. M. Mubarak Jatoti
7	Maintenance of high level of fertility in the herd	Dr. Ali Akhtar Shahani
7	Importance of farm records – different farm records	Dr. Liaqat Ali Abro
7	Qualities of farm manager	Dr. Ali Akhtar Shahani
8	Principles and scope of animal breeding	Dr. Sahib Khan Shahani
8	Livestock breeds of Sindh – practical	Dr. Ali Akhtar Shahani
8	Systems of breeding	Dr. Sahib Khan Shahani
8	Principles of farm animal selection	Dr. Liaqat Ali Abro
8	Breeding bull soundness	Dr. Ali Akhtar Shahani
9	Artificial breeding – history, advantages and techniques	Dr. Abdul Qadir Junejo
9	Demonstration of AI	Dr. Sahib Khan Shahani
9	The estrus cycle in cattle and buffalo	Dr. Sahib Khan Shahani
9	Heat detection methods – proper time of insemination	Dr. Abdul Qadir Junejo
9	Ovulation and fertilization	Dr. Ali Akhtar Shahani
10	Female reproductive organs – practical	Dr. Abdul Wahab Ansari
10	Pregnancy diagnosis – practical	Dr. Ali Akhtar Shahani
10	Causes of pregnancy failure	Dr. Sahib Khan Shahani
11	Factors affecting cow fertility	Dr. Sahib Khan Shahani
11	Factors affecting bull fertility	Dr. Ali Akhtar Shahani
11	Sign of parturition – birth handling	Dr. Sahib Khan Shahani
11	Dystokia – cause and handling	Dr. Abdul Wahab Ansari
11	Abortion – causes, treatment and control	Dr. Sahib Khan Shahani
12	Retention of placenta – causes, treatment and control	Dr. Sahib Khan Shahani
12	Prolapse of the uterus – causes, treatment and control	Dr. Ali Akhtar Shahani
12	Repeat breeding – causes, treatment and control	Dr. Sahib Khan Shahani
12	An-estrus – causes, treatment and control	Dr. Abdul Wahab Ansari
12	Reproductive herd health program	Dr. Ali Akhtar Shahani
13	Dairy Technology – importance and scope	Dr. Ali Akhtar Shahani
13	Milk – composition of milk	Dr. Rukhsana Vighio
13	Factors affecting composition of milk	Dr. Rukhsana Vighio
13	Clean milk – how to produce clean milk	Dr. M. Mubarak Jatoti
13	Milking methods – demonstration	Dr. Ali Akhtar Shahani
14	Factors affecting milk quality	Dr. Noor-un-Nissa Marri
14	Preservation of milk – lecture and demonstration	Dr. Liaqat Ali Abro
14	Milk bi-products	Dr. Noor-un-Nissa Marri
14	Milk born diseases	Dr. Ali Akhtar Shahani
14	Marketing of milk	Dr. Liaqat Ali Abro
15	Causes of range land degradation – recommendations	Dr. Aslam Pervaz Umrani
15	Fodder trees shrub and grasses of barani areas	Dr. Ghansham Das
15	Meeting the needs of nomads	Dr. Aslam Pervaz Umrani
15	Grazing practice	Dr. Ali Akhtar Shahani
16	Nutrients – functions and requirements in animal body	Dr. Ghansham Das
16	Composition of feed stuffs – importance, functions and sources	Dr. Nazir Ahmed Nizamani
16	Basics of ration formulation	Dr. Ali Akhtar Shahani
16	Effects of nutritional deficiencies on production	Dr. Ghansham Das
16	Hay making – lecture and practical	Dr. Nazir Ahmed Nizamani

Day	Title	Trainer
17	Urea – straw treatment – lecture and demonstration	Dr. Nazir Ahmed Nizamani
17	Feed for calf rearing	Dr. Noor-un-Nissa Marri
17	Feed for livestock fattening	Dr. Nazir Ahmed Nizamani
17	Feed for milking animals	Dr. Ali Akhtar Shahani
18	Urea – molasses lick and choran – lecture and demonstration	Dr. Nazir Ahmed Nizamani
18	Metabolic disorders	Dr. Ghulam Hussain Dawach
18	Cultivation and management of rabbi and kharif fodder crops	Dr. Ali Akhtar Shahani
19	Health – signs and benefits of healthy animal	Dr. Ali Akhtar Shahani
19	Disease – signs and losses of sick animal	Dr. Liaqat Ali Abro
19	Diseases classification – lecture and group work	Dr. M. Mubarak Jatoi
19	Occurrences and spread of disease	Dr. Ali Akhtar Shahani
19	Techniques of restraints – practical	Dr. Liaqat Ali Abro
20	Examination of sick animal – lecture and practical	Dr. Ghansham Das
20	Important viral diseases of ruminants – causes, symptoms, treatment, prevention and control	Dr. Ghulam Hussain Dawach
20	Important bacterial diseases of small ruminants – causes, symptoms, treatment, prevention and control	Dr. Liaqat Ali Abro
21	Important bacterial diseases of large ruminants – causes, symptoms, treatment, prevention and control	Dr. Ghulam Hussain Dawach
21	Principles of immunization – vaccination schedule for contagious diseases	Dr. Talib Hussain Chandio
21	Manufacturing, storage and transportation of vaccines	Dr. Talib Hussain Chandio
21	Dosage and administration techniques – practical	Dr. Ali Akhtar Shahani
21	Vaccination in small ruminants – demonstration	Dr. Ali Akhtar Shahani
22	Vaccination of large ruminant – demonstration	Dr. Ali Akhtar Shahani
22	Endo parasitic diseases of livestock – causes, symptoms, treatment and control	Dr. Rukhsana Vighio
22	Ento parasitic diseases of livestock – causes, symptoms, treatment and control	Dr. Liaqat Ali Abro
23	Important Protozoal diseases of livestock	Dr. Ghansham Das
23	Digestive disorders	Dr. Ali Akhtar Shahani
23	Wounds, hemorrhages, dehydration and anaemia	Dr. Liaqat Ali Abro
24	Principles of Rural and commercial poultry farming	Dr. Aziz Ahmed
24	Systems of poultry production and selection of birds for poultry farming	Dr. Kabir Ahmed
24	Site selection, construction of poultry houses, equipments and materials used at poultry farm	Dr. Aziz Ahmed
24	Preparation of poultry shed	Dr. Kabir Ahmed
24	Basic poultry feed formulation	Dr. Aziz Ahmed
25	Balanced feed and commercially available feeds	Dr. Kabir Ahmed
25	Management of poultry farm	Dr. Kabir Ahmed
25	Contagious poultry diseases – causes, symptoms, treatment and control	Dr. Aslam Jalali
25	Bird flu – bio-security	Dr. Aslam Jalali
25	Non-contagious poultry diseases – causes, symptoms, treatment and control	Dr. Ali Akhtar Shahani
26	Importance and principles of livestock marketing	Dr. Ali Akhtar Shahani
26	Role of livestock in poverty alleviation	Dr. M. Mubarak Jatoi
26	Hygienic milk handling	Dr. Liaqat Ali Abro
26	Collective milk marketing	Dr. Ali Akhtar Shahani
26	Marketing of livestock	Dr. Liaqat Ali Abro
27	What is extension? Extension techniques	Dr. Rukhsana Vighio
27	How to conduct dialogue with community?	Dr. Ali Akhtar Shahani
27	Attitudinal constraints in community participation	Dr. Ali Akhtar Shahani
27	Motivation	Dr. Liaqat Ali Abro
27	Role of local leadership in community development	Dr. Liaqat Ali Abro
28	Visit to milk market at Hyderabad and observations on market facilities, rate and taxes, hygienic condition of market (place, people, milk and utensils) and areas of milk coming from	Dr. Ali Akhtar Shahani Dr. Liaqat Ali Abro Dr. M. Mubarak Jatoi
28	Field visit to Poultry Science Complex and learning about layer management, principles of incubation and principles of brooding and design of poultry farm etc.	Dr. Ali Akhtar Shahani Dr. Liaqat Ali Abro Dr. M. Mubarak Jatoi
29	Adult learning – steps and barriers in adult learning	Dr. M. Mubarak Jatoi
29	Communication – principles and barriers	Dr. Noor-un-Nissa Marri
29	Social mobilization – steps and barriers	Dr. Liaqat Ali Abro
29	How to approach with community	Dr. Liaqat Ali Abro
30	Comprehensive test	
	Presentation by group leaders	
	Comments from trainees	
	Comments from the NRSP representative	
	Distribution of certificates	
	Address by the chief guest	

2. CELDAC

Day	Title	Trainer
1	Introduction	
2	Sustainable dairy farming	Dr. M. Mubarak Jatoi
2	Factor of dairy production	Dr. Rasheed Ahmed Nizamani
2	Concept of good management – management systems	Dr. M. Mubarak Jatoi
2	Principles and design of dairy farm	Dr. Ali Akhtar Shahani
2	Visit to different farm buildings	Dr. Ali Akhtar Shahani
3	Importance and advantages of mixed farming system	Dr. M. Mubarak Jatoi
3	Care and management of calf	Dr. Ali Akhtar Shahani
3	Care and management of dry and milking animals	Dr. M. Mubarak Jatoi
3	Importance of farm records	Dr. Ali Akhtar Shahani
3	Qualities of good farm manager	Dr. Liaqat Ali Abro
4	Livestock breed of Sindh – group work	Dr. Ali Akhtar Shahani
4	Principles of farm animal selection	Dr. M. Mubarak Jatoi
4	Selection and management of breeding bull	Dr. M. Uris Samo
4	The estrus cycle – Heat detection and time of insemination	Dr. Ali Akhtar Shahani
4	Artificial breeding – history, advantages and techniques	Dr. M. Uris Samo
5	An estrus and repeat breeding – causes, treatment and prevention	Dr. M. Uris Samo
5	Pregnancy diagnosis methods	Dr. Ali Akhtar Shahani
5	Factor affecting reproduction	Dr. Ali Akhtar Shahani
5	Abortion – causes, treatment and control	Dr. M. Uris Samo
5	Problems during parturition and its handling	Dr. M. Uris Samo
6	Retention of placenta – causes, treatment and control	Dr. M. Uris Samo
6	Prolapse of the uterus – causes, treatment and control	Dr. M. Uris Samo
6	Reproductive herd health program	Dr. Ali Akhtar Shahani
6	Milk and milk bi-products	Dr. Rukhsana Vighio
6	Income generating activities and opportunities for rural women	Dr. Rukhsana Vighio
7	Milk Preservation Factors affecting milk quality – how to produce clean milk	Dr. Liaqat Ali Abro
7	Milk borne diseases and need for microbiological test facility	Dr. Ali Akhtar Shahani
7	Concept of milk producer group	Dr. Liaqat Ali Abro
7	Composition of feed stuffs – importance and resources	Dr. Ali Akhtar Shahani
7	Formulation of balanced ration	Dr. Amir Amanullah Solangi
8	1) Visit to Semen Production Unit Karachi 2) Visit to Poultry Research Institute Karachi 3) Livestock Experimental Station Karachi	Dr. Ali Akhtar Shahani Dr. Liaqat Ali Abro Dr. M. Mubarak Jatoi
9	Weekly written test 1	
9	Effect of nutritional deficiencies on production	Dr. Amir Amanullah Solangi
9	Preparation of yearly fodder calendar	Dr. Liaqat Ali Abro
9	Importance of urea in livestock feeding	Dr. Amir Amanullah Solangi
9	Urea – molasses Chorán – demonstration	Dr. Ali Akhtar Shahani
9	Urea – straw treatment – demonstration	Dr. Ali Akhtar Shahani
10	1) Visit to CVDL, Tando Jam 2) Visit to Vaccine Production Unit Tando Jam 3) Visit to District Officer, Poultry Production Mirpurkhas	Dr. Ali Akhtar Shahani Dr. Liaqat Ali Abro Dr. M. Mubarak Jatoi
11	What is extension – extension techniques	Dr. M. I. Leghari
11	How to approach to community	Dr. M. I. Leghari
11	Attitudinal constraints in participatory approach	Dr. Ali Akhtar Shahani
11	Role of local leadership in community development	Dr. Mubarak Ali Jatoi
11	Qualities and duties of extension worker	Dr. Rukhsana Vighio
12	Health – signs and benefits – group work	Dr. Ali Akhtar Shahani
12	Disease ranking – group work	Dr. Rukhsana Vighio
12	Examination of sick animals	Dr. Ghanshamdas
12	Occurrence and spread of disease	Dr. Ali Akhtar Shahani
13	Important Viral diseases of small ruminants	Dr. Ali Akhtar Shahani
13	Important viral diseases of large ruminants	Dr. M. Mubarak Jatoi
13	Important bacterial diseases of small ruminants	Dr. Ali Akhtar Shahani
13	Important bacterial diseases of large ruminants	Dr. Ghanshamdas
13	Eradication of contagious diseases – surveillance and reporting system	Dr. M. Soomar Khoso
14	Important Protozoal diseases of ruminants	Dr. Ali Akhtar Shahani
14	Mastitis – causes, symptoms, losses, diagnostic methods and control	Dr. Ali Akhtar Shahani
14	Endo parasitic diseases – causes, symptoms and treatment	Dr. M. Mubarak Jatoi
14	Ecto parasitic diseases – causes, symptoms and treatment	Dr. M. Mubarak Jatoi
14	Digestive disorders	Dr. Ghanshamdas
15	Principles of immunization – vaccination schedule	Dr. Talib Hussain Chandio
15	Sample collection and submission for laboratory diagnosis	Dr. Perakash Dewani
15	Systems and management of poultry farming at village level	Dr. Aziz Ahmed Khan
15	Basic poultry feed formulation at village level	Dr. Aziz Ahmed Khan
15	Vaccination of ruminants – dosage and techniques – practical	Dr. Ali Akhtar Shahani
16	Weekly written test 2	
16	Contagious poultry diseases – vaccination schedule	Dr. Aslam Jalali
16	Avian influenza – current situation and measures for its prevention	Dr. Aslam Jalali
16	Presentation of group leaders	
16	Comment from UNDP representative	
16	Distribution of certificates	
16	Address by the Chief Guest	

Appendix L

Review and Suggestions from Major Related Projects in the Past

- **Study of Pakistan Livestock & Dairy Development Board**
- **Study of the Pakistan Dairy Development Company (PDDC)**
- **Study of the Prime Minister`s Special Initiative for Livestock Project**
- **Study of Strengthening of Livestock Services in Sindh (SLSP)**
- **Study of the Community Empowerment through Livestock Development and Credit**
- **Review of Sindh Dairy and Meat Development Company (SDMDC)**

Survey Report
On
the Review and Suggestions from Major Related Projects in the Past

Dr. Yameen Memon
Consultant

February, 2011

Study on the Livestock & Dairy Development Board

Acronyms

AJK	Azad Jammu & Kashmir
DPC	Deputy Project Coordinators
FANA	Federal Administered Northern Areas
FATA	Federal Administered Tribal Areas
FMD	Foot and Mouth Disease
HS	Hemorrhagic Septicemia
JICA	Japan International Cooperate Agency
LDDDB	Livestock & Dairy Development Board
MCT	Milk Chillers Technicians
MINFAL	Ministry of Food, Agriculture & Livestock
MOU	Memorandum of Understanding
PDDDB	Pakistan Dairy Development Board
PDDC	Pakistan Dairy Development Company
SPU	Semen Production Unit
VLW	Village Livestock Workers

1 Introduction

The project report presents the lessons learnt from Livestock & Dairy Development Board (LDDDB) project by reviewing the information from the secondary sources, interviewing the relevant stakeholders and visiting the fields. The study has been undertaken for Kaihatsu Management Consulting Inc. (KMC) & C.D.C. International Cooperation to facilitate in preparation of the Master Plan Study on Livestock, Meat and Dairy Development in Sindh Province.

1.1 Field Visits and Meeting with the Relevant Stakeholders

The Consultant made visits to various relevant places and convened meeting with the pertinent stakeholders in relation to the assignment. The list of persons met is presented as Annex –I

2 Background:

Until very recently the importance of the livestock commensurate with its contribution to the national economy was never fully appreciated and recognized. However the age old perception about this sector are now changing for the better. The President, the Prime Minister and the Ministers are talking about the importance of livestock, therefore, Ministry of Food Agriculture and Livestock, Government of Pakistan had established an autonomous agency under companies Act namely Livestock & Dairy Development Board (LDDDB) to promote development of livestock in the country.

The Livestock & Dairy & Development Board has been implementing the project entitled “Milk Collection, Processing and Dairy Production & Development Program” with the total cost of Rs.1520.847 Million in all four provinces including AJK, FANA and FATA from 2006 to 2011.

3 Objective of the Project

The overall objectives of the proposed program was to increase milk production by about 10-15% thus ensuring better availability of milk and milk products in the country. The specific objectives were to:

- Move from subsistence dairying farming to market oriented farming (more than 10,000 rural substance dairy farmers are likely to enter into the milk marketing chain due to project interventions);
- Produce 20,000 additional breeding animals of better genetic potential for milk production;
- Improve milk collection and marketing from small and landless dairy farmers through farmer organizations in order to improve livelihood of dairy farmers (production and marketing of milk is expected to increase the milk production by 30-40% in the project area); and
- Make available superior quality and progeny tested bulls for genetic improvement.

4 Expected Outcomes

The following were the quantifiable targets for overall project at the end of 5 years:

- Form 300 village based farmers' organizations, and establish 300 milk cooling centers;
- Mobilize and train 500 milk collectors;
- Register 3,000 and 1,000 market-oriented rural and progress dairy farmers respectively;
- Establish operational mechanism for provision of services and feed to the registered farmers;
- Produce and market additional 35,000 liters of milk per day in the project area;
- Register 800 and 600 additional farmers in Punjab and Sindh respectively in progeny testing program;
- Establish two and three calf rearing centers in Punjab and Sindh respectively;
- Production of 500,000 frozen doses of semen from the progeny tested bulls; and
- Make operational milk processing plant in NWFP.

5 Planned Activities

The following main activities are envisaged in the program:

- Registration and formation of farmer organizations of small and landless dairy farmers;
- Establishment of milk cooling centers;
- Establishment feedlot fattening farms for Beef and Mutton;
- Establishment of Slaughter Houses;
- Establishment of Butcheries;
- Capacity building for Butchers, registered farmers, Village Livestock Workers (VLWs);
- Provision of technical and financial assistance to the registered farmers;
- Creation of linkages between producer and processors;
- Production of quality breeding animals;
- Initiation and implementation of progeny testing program;
- Technical assistance for production of quality breeding animals;
- Arranging animal fairs and exhibitions for sale of quality stock produced by farmers; and
- Coordination with various organizations and stakeholders.

6 Administrative Arrangements for Project Implementation

The LDDB is made responsible for planning, execution and implementation of the project activities throughout the country having its federal office at Islamabad. The Deputy Project Coordinators (DPC) at project areas. The DPC of Sindh is based at Hyderabad. He is assisted staff including Field Operation Managers, Progeny Testing Managers, Personal Assistant, Admin and Finance Assistant and support staff including drivers and office boy.

The federal office develops overall project action plan, coordinates with various offices in the provinces, and monitors and evaluates project activities on quarterly and yearly basis. The Board assesses the project progress and monitoring reports and approves the work/ action plans.

7 Implementation of the Project in Sindh

The project is being implemented in nine districts of Sindh Province including: Tando Mohammad Khan, Tando Allahyar, Badin, Thatta, Matiari, Shaheed Benazirabad (Nawabshah), Sanghar, Sukkur and Ghotki. So far achievements are presented below:

Milk Collection and Marketing for Small and Landless Farmers

The project has established 75 farmer organizations involving 5,079 farmers in all nine districts after identifying various villages where potential milk was available. These farmer organizations have signed MOU/Agreement with LDDDB and have opened joint bank accounts.

The members of these organizations have been provided veterinary cover including vaccination –66,792 animals were vaccinated against HS disease, while 24,710 animals were vaccinated against FMD. A total 12,542 adult and calves have been provided de-worming.

Trainings have been imparted to 50 Milk Chillers Technicians (MCTs) and Village Livestock Workers (VLWs) from Chiller Manufacturer Company and Sindh Agriculture University Tando jam respectively. In addition 3,714 farmers have been trained at the field level.

Total 21 milk chiller units have been installed along with generators and milk testing kits were provided to these organizations in addition, the support of concentrate feed and first aid veterinary cover on revolving basis was provided.

Total 22,682.5 and 326,410 kgs fodder seed and concentrates respectively have been distributed. The medicines worth Rs.815,328 and 4,871 kg of Booster Vanda have been provided to the registered farmers.

The equipment related to semen collection and artificial insemination has been provided to Semen Production Unit at Experiment and Research Buffalo Kundi Farm Rohi and Experiment and Research Red Sindhi Cattle Farm Korangi Karachi.

One Semen Production and Calf Rearing Center is under construction in private sector on cost sharing basis (50-50%).

Provision of Services to the Progressive Farmers

- The project has registered 142 progressive farmers and 19,153 animals.
- In all seven AI technicians have been trained.
- Total 38, 218 animals were vaccinated against HS disease, while 14,073 animals were vaccinated against FMD.
- De-worming of calves and adult animals were 8,670 and 3,486 respectively

- Total 586 animals have been tagged
- Supplies of Concentrate feed 4238.34 kgs on 50% support basis.

Services in Progeny Testing Program

- Total 303 farmers have been registered with 10,886 animals have been tagged and 103 ear tattooing
- Total 25,478 and 56,323 animals vaccinated against FMD and HS respectively.
- 16,208 and 4,440 calves and adult animals respectively were de-wormed

Meat Development Program

Under this program, in all 137,148 animals were registered under beef and mutton fattening program with 4,190 farms. Total 7 trainings were imparted to 200 community farmers; technical assistance provided to 3138 farmers include vaccination, drenching, tagging, treatment, feed formulations, feasibility of shed construction and 1211 meetings were convened where 8,650 farmers participated.

8 Perception of the Stakeholders

The stakeholders' perceptions on the success and failure of the project are presented below:

8.1 Stated Successes

- The project has developed participatory approach by involving small and landless farmers to increase the milk and meat production by improving the health of livestock through preventive and curative measures including feed improvement.
- Supported farmers to identify different marketing channels by providing chillers resultant the prices of milk has been increased from Rs. 15 to 35 per kg due to the development of marketing channel as milk has been sold to towns/cities.
- Milk record keeping system has been introduced through the project to assess the loss and profit from the farm, hence targeted farmers are maintaining milk record.
- Capacity has been enhanced through training of farmers for fodder production, hay/silage making, and they have understood the benefits of balanced ration (concentrate).
- Due to project interventions, the mortality is reduced to around 60% in calves in the project area as reported by the Deputy Project Coordinator, LDDDB, Sindh.
- Farmers understand the benefits of productive animals and they have started keeping pure bulls for better productivity.

8.2 Stated Failures

- Delay supply of chillers from the MINFAL, Government of Pakistan, therefore, 54 farmer organizations identified are still waiting for chillers since August 2008, resultant project has adverse impact.
- The project could not purchase the calves for progeny testing bulls.

- Project activities have been stopped on the instruction of MINFAL from 2008 to May 2009 and again from July 2010 to date due to non release of operational funds.
- Instruments are not provided specifically for semen production unit (SPU) and calve rearing center (CRC).

9 Project Analysis

Sustainability: The farmers fetch immediate benefits from milk with initial mobilization and training. Therefore in the project, farmers were motivated to form milk producing groups and start milk collection and marketing. Hence out of 21 chillers provided in the project, 20 are still functional. One chiller is non functional due to conflict among community members themselves. This model of milk providing groups and collective marketing seems successful and can be sustainable with due mobilization and technical assistance. Besides other 40 milk producing groups formed under the project, reportedly, are also motivated to run a chiller participatory business if provided by the project. Moreover, after the pullout by the project, most of the chillers are functional and working, which itself is an indicator of sustainability.

Whereas the fattening of animal for meat production, what, requires longer duration in relative terms, and has been a challenge for the project and farmers. This component involves direct subsidy as a cash payment which provides immediate relief but could not be successful. It has been observed that after the pullout by the project, farmers could not continue these practices, hence it is concluded that this component is not sustainable.

9.1 Factors of Success or Failures:

Successes

- Farmers' awareness and understanding has been increased due to capacity building program and adoption of modern practices in health management, and marketing channels.
- As stated by the farmers and Deputy Project Coordinator, LDDDB, Sindh, the productivity of milk and meat has been increased (around 5%) and mortality reduced in animals (around 30%) and particularly in calves (around 60%) due to project interventions.
- Farmers were motivated to form milk producing groups and start milk collection and marketing. Hence out of 21 chillers provided in the project, 20 are still functional. One chiller is non functional due to conflict among community members themselves.
-

Failures

- Since superior quality progeny tested bulls for genetic improvements of Red Sindhi cattle and Kundi buffaloes are not available, consequently the program of breed improvement has no significant success.
- Chillers committed to the farmer group could not be supplied to them as per schedule of the program, therefore, farmers shown their concerns on the program.
- The purchase of calves from elite milk producers mothers could not be made according to the program, therefore, the breed improvement program was not materialized.

- Project activities have been stopped on the instruction of authorities from 2008 to May 2009 and again from July 2010 to date due to non release of funds, resultantly discontentment among livestock farmers has been observed.
- The fattening of animal for meat production involves direct subsidy as a cash payment which provides immediate relief but could not be successful. It has been learnt that only 30% of farmers are practicing the fattening program.

9.2 Major Lessons Learnt for the Master Plan

Some of the lessons learnt are:

- In this project superior quality progeny tested bulls for genetic improvements of Red Sindhi cattle and Kundi buffaloes as envisaged in this project could not be provided and project ended with no results. In order to improve the livestock breed and conduct pilot research on different aspects of livestock needs project activities continue for more than 10 years.
- The milk adulteration issues must be addressed at all levels including production, collection and processing units/ levels through implementation of the legislation, so that the role of middleman in the market is minimized and profit share goes to the farmer.

References

1. Report of Dairy Development Board, Regional Office Sindh Hyderabad
2. Milk Collection, Processing and Dairying Production & Development, PC-1, Government of Pakistan, June 2006.

Annex I - Persons Met

1. Dr. Ghulam Hussain Dawach, Deputy Project Coordinator, LDDB Sindh Hyderabad
2. Dr. Mushtaque Hussain Jokhio, Feedlot Fattening Specialist, LDDB Sindh, Hyderabad.
3. Dr. Himraj Veterinary Officer, LDDB, Mirpurkhas.
4. Mr. Mohd Bux, Farmer, Umerkot Road near Mirpurkhas.
5. Mr. Shoukat, Farmer Umerkot Road near Mirpurkhas.
6. Syed Osaf Rasool Shah, Farmer, Haji Pir Shah Village, old Shadi Pali, District Mirpurkhas.
7. Dr. Fayaz Laghari Superintendent, Livestock Experiment and Research Kundi Buffalo Farm, Rohri.
8. Dr. Mohammad Allam Solangi, Deputy Director, Semen Production Unit, Livestock Experiment and Research Kundi Buffalo Farm, Rohri.

Study of the Pakistan Dairy Development Company (PDDC)

Acronyms

DVM	Doctor of Veterinary Medicines
JICA	Japan International Cooperate Agency
KMC	Kaihatsu Management Consulting
MINFAL	Ministry of Food, Agriculture & Livestock
NGO	Non Government Organization
NRSP	National Rural Support Program
PDDC	Pakistan Dairy Development Company
SAFWCO	Sindh Agricultural and Forestry Workers Coordinating Organization
SRSO	Sindh Rural Support Organization
SWOG	Dairy Strategic Working Group
USAID	United States Agency for International Development

1 Introduction

The report presents the lessons learnt from the Pakistan Dairy Development Company (PDDC) project by reviewing the data collected from the secondary sources, interviewing the relevant stakeholders and by visiting the project areas. The study has been undertaken for the Kaihatsu Management Consulting Inc. (KMC) and C.D.C. International Corporation to support the project of Master Plan Study on Livestock, Meat and Dairy Development in Sindh Province.

1.1 Field Visits and Meeting with the Relevant Stakeholders

The consultant made visits to various relevant places and convened meetings with the pertinent stakeholders in relation to the assignment. The list of persons met is presented as Annex – 1.

2 Background

Pakistan Dairy Development Company (PDDC) has been established as a public-partnership to coordinate the dairy development activities of the private sector. It is registered under section 32 of the Companies Ordinance 1984. PDDC aimed to establish a strategies direction for realizing the Dairy sector of Pakistan and is determined to establish one of the best private-public Partnership cultures. The process was initiated by the industry in partnership with government while strategic support was provided by the Dairy Strategic Working Group (SWOG) of USAID program.

3 Project Components

PDDC project was initiated for five years (2006 – 2011), with the following components:

- i. Model farm program
- ii. Cooling Tanks Program.
- iii. Biogas Program
- iv. Community Farm Program
- v. Rural Service Provider
- vi. PDDC Extension Service

4 Goal, Objectives and Activities of the Project

The project goal is to enhance milk and meat production of livestock small farmers.

The specific objectives and activities of the various components of the project are presented below:

Establish Farmer Model for Development of Dairy Sector

Activities:

- Provides cost effective ways to install essential infra-structure for the proper management of dairy herds;

- Trains active farmers in the farm management practices necessary to achieve production potential of their herds; and
- Enhances farm incomes by mentoring and advising farmers throughout the transition to modern practices.
- To provide education and training to farmers

Provide Technical Support to Construct Biogas Plant by the Farmers

Activities:

- To provide cheaper source of fuel for cooking;
- To improve hygienic conditions at the farm and in the home;
- To improve livelihood of the dairy farmers; and
- To provide bio slurry (rich source of Nitrogen) for field.

Provide Technical Know How for Low Cost Fodder Production

Activities:

- To provide low cost fodder for dairy animal for the promotion of dairy industry;
- To minimize the labor cost by introducing mechanization in fodder production; and
- To provide technology for better fodder production and conservation.

Establish Community Farm by Providing Technical Support

- To establish community farms in five districts of Sindh; and
- To provide technical and financial support through bank.
- To provide education and training to farmers

Establish Cooling Tanks to Access Milk Marketing to Farmers

- To provide market access to small milk producers, middlemen and milk processing plants; and
- To protect milk from adulteration.

5 Expected Targets

The following targets were set in five districts of Sindh (Mirpurkhas, Umerkot, Dadu, Sukkur and Nawabshah):

- Establishment of 270 model farms;
- Installation of 83 cooling tanks;
- Construction of 57 biogas plants;
- Organization of field days, training, and farm days and
- Establishment of 26 community farms in the targeted areas

6 The Role and Linkages with Various Organizations

Project linkages have been developed with various NGOs and other organizations like SAFWCO, SRSO, NRSP, Aga Khan Economic Board, Livestock Department, Government of

Sindh, Local Farmer’s Associations, Sindh Agriculture University Tando Jam, ICI Pakistan and Nestle Pak Ltd.

7 Implementation of the Project

Component/Activity	Target	Accomplishment
Model farms	270	213
Community farms	26	26
Bio gas plants	57	57
Milk Cooling Tanks	83	83
Field days organized		20
Milk collection and transportation ¹		
Implementation of pasteurization program ²		

8 Perceptions of the Stakeholders

The stakeholders’ perceptions on the successes and failures are presented below:

Success

- The company facilitates the target farmers to avail the Bank loan facility to establish livestock model farm. The company pays the interest of the loan on the borrowed amount, whereas farmer has to repay the capital/borrowed amount to the bank, hence farmer owns the investment made in the farm.
- Due to proper livestock management practices, around 60% of the livestock mortality has been reduced and around 10% milk and meat production increased as perceived by the Project Farm Manager and farmers.
- The farmers are keeping only productive animals and raising calves for fattening.
- Due to the project interventions, farmers understand the need of animals i.e. feed, concentrates, water, pre and post care of parturition, hence they have started practicing feeding concentrates, providing water according to animal need and pre and post care of parturition.

Failures

- Initially due to supply of low quality equipment / materials (Shavers, pipes, water pumps, chafing machines, fencing materials) to the farmers created negative impact on the project.
- Due to financial constraints the project field activities are on hold since 2008 which in result has not only stopped the process but de-motivated farmers for their participation in the project.
- Farmers are always expecting cash or kind (like feeds etc.) as has been done in other projects like LDDB.

¹ The program could not be implemented.

² The program could not be implemented.

- Change of ministries from Ministry of Industries to MINFAL created administrative and financial problems. Since Officers of MINIFAL were not involved in the inception of the project, therefore, they had different perceptions of the project activities.

9 Project Analysis

9.1 Factors of Success and Failure

Success

- The rural communities use wood and animal dung as a source of kitchen fuel. It creates smoke and causes women health hazards. Due to installation of biogas plants, deforestation and health hazards has been decreased.
- Per animal productivity in milk (around 5%) and economic profitability (around 25%) has been increased due to project interventions as awareness among farmers for better feeding, breeding, management and health cover were provided through the project activities as stated by the farmers interviewed.
- Milk market activities increased due to installation of milk collection tank program.

Failure

- Most of the project activities were stopped before their maturity, however, sustainability is questionable at this time as the transformation of farmers from traditional farming to progressive farming and enterprising is a daunting task which required continued process of mobilization and support. The results of a process stopped half way are obviously affecting sustainability.

9.2 Major Lesson learned for Master plan

Some of the lessons learnt are:

- To develop the livestock sector as a whole, the needs of the small landholders, landless livestock owners or tenants to be identified and supported through package of husbandry innovation for rural farm animals demand that technologies that are cost effective, efficient, practicable and most appropriate to local conditions should be introduced on mass scale, which will enable them to stand on their feet and make the livestock production system more sustainable and viable.
- In order to develop efficient and affordable animal sheds, the design of sheds if made by the livestock housing experts it will improve the design and farmers may be attracted to replicate.
 - As farmers are selling their draught animals on lower prices in the market, hence it is suggested that an awareness program be started that the farmer may feed these animals for some time to improve their weight to fetch good prices in the market.
 - Introduction of processing technologies like establishment of milk processing plants and meat processing plants (modern slaughter houses) should be considered by the government so that farmers get better prices of their products.

References:

1. The White Revolution- Dhoodh Darya, June 2006. Huma Fakhar et al, Market Fakhar Law International.
2. Livestock and Dairy Development Basic Study Report, August 2009.
3. Rural Livestock Production in Pakistan by Mohammad Younis & Mohammad Yaqoob, Research Paper, Department of Livestock Management, Faculty of Animals Husbandry, University of Agriculture Faisalabad, Pakistan.

Annex-I Persons Met

1. Dr. Rasool Bux Soomro, Farm Manager PDDC, Hyderabad.
2. Dr. Zahid Mangrio, PDDC, Umerkot.
3. Mr. Bashir Ahmad Mehar, Livestock Farmer, Village Frush Mori, District Umerkot.
4. Mr. Ahmad Halepoto, Livestock Farmer, Village Habib Halepoto, District Umerkot.
5. Mr. Mohammed Musa, Livestock Farmer, Village Habib Halepoto, District Umerkot.
6. Mr. Allhwayio, Livestock Farmer, Village Habib Halepoto, District Umerkot.
7. Mr. Sahibdine, Livestock Farmer, Village Habib Halepoto, District Umerkot.
8. Mr. Mohammed Sallar, Village Habib Halepoto, District Umerkot.

Study on the Prime Minister`s Special Initiative for Livestock Project

Acronyms

AI	Artificial Insemination
AJK	Azad Jammu & Kashmir
AKRSP	Aga Khan Rural Support Program
BRSP	Balochistan Rural Support Program
CEO	Chief Executive Officer
CLEW	Community Livestock Extension Workers
CO	Community Organizations
CVDL	Central Veterinary Diagnostic Laboratory
DLO	District Livestock Officer
DMV	Doctors of Veterinary Medicines
FANA	Federal Administered Northern Areas
FATA	Federal Administered Tribal Areas
GBTI	Ghazi Barotha Taraqiati Idara
IEC	Information, Education and Communication
JICA	Japan International Cooperate Agency
KMC	Kaihatsu Management Consulting, Inc.
MINFAL	Ministry of Food, Agriculture & Livestock
NRSP	National Rural Support Program
NSC	National Steering Committee
PCC	Provincial Coordination Committee
PMU	Project Management Unit
PRSP	Punjab Rural Support Program
RSP	Rural Support Programs
RSPN	Rural Support Program Network
SMT	Social Mobilization Team
SRSO	Sindh Rural Support Organization
SRSP	Sarhad Rural Support Program
TRDP	Thardeep Rural Development Program

1 Introduction

The report presents the lessons learnt from the Prime Minister's Special Initiatives for Livestock Project by reviewing the information/ data collected from the secondary sources, interviewing the relevant stakeholders, and visiting the fields. The study has been undertaken for Kaihatsu Management Consulting, Inc. (KMC) in coordination with Japan International Cooperate Agency (JICA) to facilitate in preparation of the Master Plan Study on Livestock, Meat and Dairy Development in Sindh Province.

1.1 Field Visits and Meeting with the Relevant Stakeholders

The consultant made visits to various relevant places and convened meetings with the pertinent stakeholders to accomplish the task. The list of persons met is presented as Annex – 1.

2 Background

The Prime Minister's Special Initiative for Livestock Project was initiated by the Ministry of Food, Agriculture & Livestock nationwide (all four provinces, AJK, FANA and FATA) in January 2007 initially for 5 years time period. The project was envisaged to implement in 80 districts, 1,963 Union Councils and for over 13 million rural poor/small farmers with the total cost of Pak Rs. 1,696.40 Million supported by the Government of Pakistan. The key project stakeholders were: MINFAL, RSPN, RSPs (AKRSP, BRSP, GBTI, NRSP, PRSP, SRSO, SRSP, TRDP), Provincial Governments, District Governments, Livestock Training Institutes, and Rural Poor/Livestock Farmers through Community Organizations.

3 Objectives of the Project

The main objectives of the project were to:

- Enhance the livestock productivity by using social mobilization mechanism for provision of improved veterinary services at farmers' doorsteps targeting 13M rural poor for Pakistan and 3M rural poor for Sindh;
- Create rural livestock assets, 12.17M liters annual additional milk production for Pakistan and 3M liters for Sindh and 0.20M tons for Pakistan and 0.047M tons for Sindh annual additional meat production after completion of the project; and
- Reduce poverty among the small livestock farmers.

4 The Project Activities

The project activities devised in the project were to:

- Establish veterinary clinic at the field unit level and provide animals health artificial insemination, livestock production extension services and curative and preventive treatment;
- Advise farmers for animals fattening breed improvement, milk production enhancement, and improved farm management practice;

- Assist Community Organizations (CO) to identify male and female Community Livestock Extension Workers (CLEWs);
- Develop linkages and arrange with Government Institutes/Department for training of CLEWs, supervise guide CLEWs on the job; and
- Assist social mobilization teams (SMTs) in Social Mobilization and CO formation and assist livestock farmers in accessing micro credit.

5 Salient Features of the Project

The objectives of the project were two pronged; first was the enhancement of livestock productivity and second was the creation of rural livestock assets. The enhancement of livestock productivity was to be achieved through the provision of livestock production and extension and veterinary services at farmers' doorsteps targeting 13 million rural poor. For this community organizations of livestock farmers' were to be created through Social Mobilization.

The RSPN has partnered with eight RSPs, these RSPs employ Doctors of Veterinary Medicines (DMV) to oversee training and support. The DMVs are housed in a veterinary clinic that have a clinic assistant and are given PKR 100,000 worth of veterinary supplies & Equipments. The DMV is also provided with a motorbike to visit surrounding areas to treat and vaccinate animals. The project also trains a cadre of 7,250 "self-employed" and voluntary Community Livestock Extension Workers (CLEWs). These CLEWs are trained for one month at a government Livestock Training institution in basic veterinary skills, and enhancement of meat and milk production. The CLEWs get paid by community members for the services they offer and are in touch with the DMVs in case of any emergency and outbreaks of disease. To create rural livestock assets, the goal of the project was to help produce an additional 12.17 million liters of milk and 0.2 million tones of meat.

6 The Roles of Various Organizations and Committees

The project was implemented under the auspices of the Ministry of Food, Agriculture and Livestock, Government of Pakistan through National Rural Support Program Network (RSPN). In order to implement the project, MINFAL created a project management unit and constituted committees at different level. The roles and responsibilities of the relevant organizations and committees are presented in the following sections:

6.1 MINFAL – Project Management Unit

The Project Management Unit (PMU) was established under MINFAL mainly to:

- Prepare consolidated progress and annual reports and their presentation before the National Steering Committee (NSC); and
- Act as a liaison between NSC and RSPs through RSPN, monitor and coordinate the activities and undertake performance reviews and provide secretarial support to the NSC.

6.2 National Steering Committee

The National Steering Committee (NSC) constituted to:

- Provide strategic direction to the PMU in the management of PM's Livestock Initiative;
- Approve work plans for implementation, and set goals and targets for the RSPs;
- Approve quarterly budgets for RSPs before these are released by the PMU;
- Review and progress of work and approve quarterly and annual reports, accounts of the RSPs;
- Ensure the presence of an appropriate monitoring and accountability mechanism in the PMU and RSPs for assessing the quantitative and qualitative progress of the project; and
- Approve the selection and appointment of Third Party Auditor for auditing accounts/ activities of RSPs.

7 RSPN Project Implementation Unit

The project implementing partner created project implementation unit within RSPN largely to:

- Develop in consultation with the RSPs annual and quarterly work plans and budgets and submit these to PMU; and
- Monitor and facilitate the RSPs in the implementation of project activities.

7.1 Rural Support Programs

The project implementation responsibility was with the Rural Support Programs (RSPs) working in all four provinces, AJK, FANA and FATA. These include: AKRSP, BRSP, GBTI, NRSP, PRSP, SRSO, SRSP, and TRDP. In Sindh TRDP, NRSP and SRSO were responsible to implement the project. These organizations were obliged to:

- Use the holistic approach of social mobilization as per the work plans and budgets approved by the NSC;
- Hire DVMs, DLOs and other project staff in a fair and transparent manner; and
- Manage the implementation of this program.

7.2 Provincial Governments

The Provincial Coordination Committee (PCC) was formulated to:

- Undertake physical progress review and coordinate with RSPs to ensure timely and effective implementation of project activities;
- Ensure complementarities with other projects and activities of the provincial and federal government;
- Advise MINFAL for improvements in the project;
- Facilitate provision of medicines and vaccines; and
- Facilitate project related technical training (e.g. CLEWs).

8 Implementation of the Project in Sindh

As discussed earlier, in Sindh TRDP, NRSP and SRSO on behalf of RSPN implemented the project in 19 districts (Tharparkar, Umerkot, Dadu, Jamshoro, Khairpur, Badin, Hyderabad, Matiari, Tando Allahyar, Tando Mohammad Khan, Thatta, Mirpurkhas, Sukkur, Shikarpur, Jacobabad, Larkana, Ghotki, Khairpur, Naushero Feroz). The following staff was deployed by the RSPs:

- one Project Coordinator of TRDP;
- three District Livestock Officer (DLO) - one in each organization TRDP, NRSP, SRSO;
- 71 Doctors of Veterinary Medicines [TRDP (44), NRSP (18) SRSO (9)];
- 71 Clinical Assistants [TRDP (44) NRSP (18) SRSO (9)];
- one Accountant; and
- four Drivers [TRDP (2) NRSP (1) SRSO (1)].

8.1 Projects Accomplishments/ Achievements

The project was started on 1st January, 2007 by TRDP, NRSP and SRSO simultaneously in their respective districts for five years. However, due to budget cuts by the present government, it was closed on 30 June, 2010. The following are the accomplishments of the project:

(Figures in Numbers)

Components	TRDP	NRSP	SRSO
Coordinator	1	-	-
District Livestock Officer	1	1	1
Veterinary Doctors	44	18	9
Clinical Assistants	44	18	9
Districts covered	4	8	7
Male Participation in the training	340	150	93
Female Participation	6,889	4,900	6,516
Training to Male CLEW	340	227 (20 female)	165
Animal Vaccinated (HS and FMD)	2,015,000	1,101,364	406,109
De-worming	1,107,962	862,548	160,876
Household Benefited	157,488	99,744	NA

9 Perceptions of the Stakeholders

9.1 Stated Success or Failures:

Success

- Training to the CLEW has been a successful experience in the project. The community livestock extension workers (CLEW) engaged in this project were selected amongst the community of small farmers having background of livestock farming and were from the same village /area after obtaining training they served to provide veterinary service at the door step of the farmers.

- Social mobilization to the small farmers' was needed to understand the concept. Most of the farmers do not understand the objective of the project activities and their benefits. Though community extension workers, the farmers understand the message about the benefits.
- Government role in the monitoring process of the project has been supportive as Provincial Coordination Committee headed by the Ex-Secretary, Livestock Department convened meetings of relevant officials and paid visits to monitor the project activities.

Failure

- The field vehicles were not exclusively provided to the Veterinary Doctors and their visits were jointly planned with social organization and microcredit teams; therefore, they were constrained to follow their own work plan.
- During emergencies or outbreak of diseases, like H.S, FMD, PPR, and Anthrax, essential required medicines and vaccines were not available. On the other hand, Veterinary Doctors were not authorized to purchase any medicines, vaccines, de-wormers etc. from the market on their own to handle the emergency; resultantly in some cases the farmers were not benefited.
- Due to financial constraints, project activities were discontinued after three years of project period, consequently the project objectives could not be achieved as planned for example the service of artificial insemination (AI) for the improvement of genetic potential of the livestock could not be provided as these were planned for the last two years of the project.
- Similarly, training on AI was not imparted to the CLEWS in the project as it was envisaged in the fourth year of the project.
- Project Veterinary Officers at the field level were unable to obtain technical support /advice from staff of livestock departments on disease control particularly in case of any outbreak of animal diseases as they did not have direct linkages with them.
- Since it was envisaged that each clinic will be provided with Rs.400,000 as a revolving funds, Rs.100,000 for equipment and Rs. 70,000 and Rs. 75,000 for Office furniture of motorcycle respectively of as one time grant for its sustainability but it could not be materialized.

10 Project Analysis

Sustainability: The sustainability of the project was dependant of social mobilization, training, service products including medicines and ratification insemination and establishment of clinics of qualified veterinary doctors through government grants. Two dependant factors social mobilization and training of CLEW were done as per the project plan, whereas medicines and semen were not provided as well as clinics were not established by Doctors, thus sustainability of the project came under risk.

It could be concluded that social mobilization and trainings of CLEW will continue its positive impact, which in result may motivate farmers for treatment of their animals and go for artificial

insemination. This could further be strengthened by supplementing the missing parts by another project by government or other donor to take the stock forward.

10.1 Factors of Success and Failures

Successes

- Veterinary clinics established at field unit level equipped with qualified veterinary doctors and trained CLEWS effectively provided livestock production extension services (preventive and curative) at the door step of small livestock farmers has been a successful model as perceived by the farmers and staff, resultantly around 60 percent mortality rate has been reduced and around 5 percent milk production increased as reported by the Project Coordinator and Veterinary Officers interviewed.
- Around 20% of CLEW are still working in the field particularly in the rural areas who are connected with the NRSP and TRDP (where their centers are working), whereas the rest of them based in towns/cities could not continue as they have no funds money to buy the medicines and support to get the credit.
- Effective role of male and female CLEW in preventive and curative animal diseases at the door step of small farmers in their respective areas played key role in the success. As they have been earning Rs.1500 - 2000 per month for themselves.
- Out of 71, 20 clinics are still functioning after three years (project ended) through the resources of TRDP and NRSP.
- The concept of service charges from the farmers has been accepted by the community that supports for financial sustainability of the sector.
- Animal migration reduced to around 50% as animals had to travel long distance (around 100 kms) from desert to irrigated areas. The migration was being made due to unavailability of fodder in desert area. However, due to recent past rains and provision of feed through the project, the animal migration had reduced.
- due to recent rains in the area and project intervention as perceived by the staff and community.

Failures

- The component of AI, breed improvement, nutritional and fattening program could not be implemented for reasons that semen and liquid nitrogen were not supplied to the project.
- Occasionally releases of finances from the Government to the implementing organizations delayed the planned project activities during the implementation of the project.
- Discontinuation of the project after 3 years period could not achieve the project objectives fully like AI services etc.
- The concept of the revolving funds for sustainability of the veterinary clinics through the trained Veterinary Doctors could not be materialized due to sudden stoppage of the project.

10.2 Major Lessons Learnt for the Master Plan

The lessons learnt from the project are:

- The project initiated with the activities detailed out for five years and chopped off after three years could not give the desired results.
- The reasonable subsidies on feed, medicines, vaccines for the poor livestock farmers will encourage to keep the animals for their livelihood, as these farmers are unable to afford the high prices of medicines and vaccines.
- Organization of the trainings, refresher courses and follow-ups be considered a significant contribution towards livestock development, however, need assessment be made part of the capacity building programs.
- Livestock services should be at the door step of the farmer, as mostly farmers do not take livestock to the hospital for treatment and vaccination. In this case, the mobile veterinary clinic model will work.
- A well designed monitoring mechanism with transparent accountability ensures the high rate of project success as learnt from the discussions with the project officials, as participatory review process as monitoring tool will be helpful.
- The baseline, midterm impact evaluation, and the end line should be the part of the project. The project baseline could not be made at the start of the project, whereas the final evaluations (end line) could not be done as the project closed before the specified time. As the baseline, midterm and final evaluation of the project is of significance importance, it is recommended that these studies be carried out.
- Easily understandable Information, Education and Communication (IEC) material in local languages guides to the farmers, communities and technical persons as it was lacking in this project as perceived by the communities in particular.

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2. Progress Report of Prime Ministers Special initiative Livestock. February, 2007 to June 2010, National Rural Support Program, Badin Region.
3. M.A. Younis & M. Yaqoob, 2009. Rural Livestock Production in Pakistan. Department of Livestock Management, Faculty of Animal Husbandry, University of Agriculture Faisalabad. Pakistan.

Annex – 1 Persons Met

The meetings were convened with the following persons:

1. Dr. Zahid Hussain Mangrio, Veterinary Doctor PDDC, Umerkot.
2. Dr. Ghunsham Das, Veterinary Doctor TRDP, Umerkot.
3. Dr. Ashok Kumar, Veterinary Doctor, TRDP, Mithi.
4. Mr. Santosh Kumar, Community Livestock Extension Worker (CLEW), Village Pabhohar, District Tharparkar.
5. Mr. Malook Livestock Farmers, Village Nanisar, Union Council Mithrio Bhatti, Taluka Mithi, District Tharparkar.
6. Mr. Wasand, Livestock Farmers, Village Nanisar, Union Council Mithrio Bhatti, Taluka Mithi, District Tharparkar.
7. Dr. Sono Khangarani, Chief Executive Officer (CEO), TRDP.
8. Dr. Jaimal Dhanani, Coordinator, Prime Minister Special Initiatives for Livestock Project.
9. Dr. Jhamandas, In charge CVDL Branch, Mithi.
10. Dr. Zeeshan, Veterinary Doctor NRSP, Tando Mohammed Khan.
11. Ms. Aneela Nizamani, Female CLEW NRSP, Village Bakhar Nizamani Taluka Tando Mohammad Khan.
12. Ms. Shahnaz Khaskeli, Female CLEW NRSP, Village Rajo Nizamani, District Tando Mohammad Khan.
13. Mr. Dildar Ali Nizamani Male CLEW Village Ghulam Mohammad Nizamani Taluka Tando Mohammad Khan
14. Mr. Ubaidullah Solangi, CLEW, Village Shaikh Bhurikio, Taluka Tando Mohammad Khan.
15. Mr. Ahmed Khan Soomro, Sub Cluster Coordinator Bisp PTS SRSO Sukkur Head Office.
16. Dr. Mukhtiar A. Noonari, Ex – Coordinator SRSO, Sukkur.

Study of Strengthening of Livestock Services in Sindh (SLSP)

Acronyms

AI	Artificial Insemination
AJK	Azad Jammu Kashmir
CVDL	Central Veterinary Diagnostic Laboratory
DLO	District Livestock Officer
DAH	Director Animal Husbandry
DG	Director General
EA	Executing Agency
EU	European Union
FMD	Foot and Mouth Disease
FPMU	Federal Project Management Unit
GoP	Government of Pakistan
HS	Hemorrhagic Septicemia
JICA	Japan International Cooperate Agency
KMC	Kaihatsu Management Consulting, Inc.
LSMIS	Livestock Sector Management Information System
M&E	Monitoring & Evaluation
MINFAL	Ministry of Food, Agriculture & Livestock
MTR	Mid Term Review
NRSP	National Rural Support Program
NARC	National Agriculture Research Center
NGO	Non Governmental Organization
NWFP	North-West Frontier Province
PM&E	Planning, Monitoring and Evaluation
PPMU	Provincial Project Management Unit
PPR	Pestedes Petites Ruminants
PSC	Project Steering Committee
RP	Rinderpest
SLSP	Strengthening of Livestock Services in Sindh
SPO	Strengthening Participatory Organization
UC	Union Council
UNDP	United Nations Development Program
VRI	Veterinary Research Institute
WLEW	Women Livestock Extension Worker

1 Introduction

The report presents the lessons learnt from the Strengthening of Livestock Services Project (SLSP) by reviewing the data collected from the secondary sources, interviewing the relevant stakeholders, visiting the field activities in the project areas. The study has been undertaken by the consultations by Kaihatsu Management Consulting Inc. (KMC) and C.D.C. International Corporation to support in preparation of the Master Plan Study on Livestock, Meat and Dairy Development in Sindh Province.

1.1 Field Visits and Meeting with the Relevant Stakeholders

The consultant made visits to various relevant places and convened meetings with the pertinent stakeholders in relation to the assignment; the list of persons met is presented as Annex – 1.

2 Background

Initially the project was designed to eradicate Rinderpest disease from Pakistan. After sometime the government declared that Pakistan is free from Rinderpest disease. Then the project was converted into Strengthening of Livestock Services Project (SLSP). The project had ten (10) components which at letter stage were integrated into five components.

The project covers the entire territory of Pakistan including AJK Northern Areas and Islamabad Capital Territory. It was being implemented from Islamabad being project's national headquarters and Lahore, Peshawar, Hyderabad and Quetta as provincial headquarters.

The project was funded by the European Union (EU) and the Government of Pakistan (GoP). The total project budget was Euro 25,942 M of which the EUs contribution as a grant was Euro 22.9 M (88.3% of total budget), and that of GoP was the equivalent of Euro 3,042 M (11.7%). Implementation of the project started from September 2003 and was supposed to complete till September, 2009. Two-year project extension was provided till September, 2011.

3 Objective of the Project

The overall objective of the project was to assist the Government of Pakistan (GoP) to realize the potential of the livestock sector, by improvement of farmers' livelihoods through better provision of livestock services, especially of disease control, and through enhancing productivity.

The specific objective were to strengthen the GoP capacity to plan and manage the sustainable delivery of public services to the sector in the context of a difficult economic situation, while at the same time examining ways in which the private sector delivery of services can be improved.

Beneficiaries: The immediate beneficiaries are the national, provincial and, eventually district livestock services, while the ultimate beneficiaries are the farmers, particularly smallholders, whose livelihoods will be improved.

4 Project Description and Components

As described by the Mid Term Review (MTR) mission, the project, which should be considered as a process project rather than a technical blueprint approach, has ten components, which are linked to different mechanisms of the sector. Activities in the field addressed the two key areas, i.e. animal production (animal health, nutrition) and marketing. The project targeted the problems of animal disease control. Following up on the progress made in the final eradication of Rinderpest, the project could have brought its resources to bear on other key diseases of socio-economic importance, which may include, for example, Foot and Mouth Disease (FMD), *Peste des petites ruminants* (PPR), Haemorrhagic Septicaemia (HS) and parasitic infestation. Animal nutrition and feed supply strategies, especially fodder supply, together with the improvement of markets and the marketing system for internal as well as external needs were also to be addressed by the project. The ten components were:

- i. Policy and regulatory framework.
- ii. Disease surveillance, diagnostic and reporting.
- iii. Vaccine production.
- iv. Strengthening of field veterinary service.
- v. Human resource development.
- vi. Interdisciplinary livestock sector research.
- vii. Information and communication.
- viii. Studies and surveys.
- ix. Regional and sub-regional co-operation and coordinator.
- x. Core project management.

5 Expected Outcomes

A summary of the main outputs expected were:

- Final eradication of Rinderpest from the country;
- Control of Foot and Mouth Disease (FMD) and other key disease through successful progressive strategies;
- Adequate status of animals nutrition and fodder supply;
- Improved markets and marketing system for internal as well as for export needs;
- Reliable Livestock Sector Management system;
- Functional epidemiological units for proper diagnosis monitoring and surveillance of animals disease; and
- Federal and Provincial Governments are better able to address policy issue concerning operation of the livestock sector.

In order to implement the recommendations of the midterm review of the project, the government made revision in the project's logical framework and project focused on the

delivery of results, rather than comprising a series of components. Thus SLSP was expected to achieve:

- Public and private sector service delivery system improved/ strengthened in selected districts;
- Disease reporting and surveillance system functional;
- Model for improved productivity and service delivery demonstrated/ developed;
- Information and communication system form central part of service delivery; and
- Systems, capacities and structures for project management developed, followed and transferred to GoP.

6 The Role of Various Organizations and Committees

The implementation partners are Federal Ministry of Food, Agriculture and Livestock (MINFAL) which is the executing agency (EA) represented by its livestock wings and the Provincial Departments of Livestock. The EA has established Project Steering Committee (PSC) for policy guidelines and coordination between all institutions involved in this project. The PSC assisted the EA in determining the project orientation and review work plan and budgets.

A Federal Project Management Unit (FPMU) established by the EA at the Livestock Division Headquarters in Islamabad, and headed by the one full-time National Co-Director appointed by the EA and endorsed by the Commission, and one European Co-Director, appointed by the Commission and endorsed by the EA, as Team Leader of the EC Technical Assistance Team.

Four Provincial Project Management Units (PPMUs) set up in the Livestock Departments of each of the major Provinces (Balochistan, NWFP, Punjab and Sindh) and each headed by one full-time National Co-Manager and one European Co-Manager appointed by the EA and endorsed by the Commission,

7 Monitoring and Evaluation

Day-to-day technical and financial monitoring was part of the FPMU Co-Directors' and PPMU Co-Managers' responsibilities. Independent consultants recruited directly by the EC on specially established terms of reference to implement the external monitoring and evaluation on behalf of the EA and the EC.

The baseline survey was carried out by the consultancy firm. Special Monitoring & Evaluation (M&E) staff recruited and trained for this purpose. The mid term review was carried out during 2006.

8 Implementation of the Project in Sindh

The project implemented in the districts - Thatta, Badin, Dadu, Sanghar, Tharparkar, Khairpur of Sindh Province. So far achievements are:

Public and private sector service delivery system improved/ strengthened in selected districts

- One provincial stakeholders workshop on problem identification in livestock sector
- 11 Senior Officers received trainings for better planning and leadership
- Participation of livestock Department & PPMU staff in review of Log frames
- Participation of DG in International Symposium on privatization of clinical services at Kabul.
- Initial consultation workshops held in 5 targeted districts
- Provincial Strategic planning workshop at Hyderabad for project year – 5.
- Two district Strategic Planning Workshops at Thatta and Badin

Disease reporting and surveillance system functional

- Provincial Vet. Epid. Unit formed under DAH
- 6 district Vet. Epid. Unit formed under DLOs
- 2 workshops held to define role/ mandate / needs of provincial diagnostic service system at CVDL Tando Jam
- One provincial workshop on EPI Network at Hyderabad
- Computer training to EPI Network designed staff
- Diseases surveillance working group notified
- Vaccine Production (BQ/ Anthrax) supported through in service training at V.R.I. Lahore/ Quetta.
- Cold chain material supplies
- Clinical and surgical instruments distributed
- Sero-surveillance samples (8200) collected for RP eradication program

Model for improved productivity and service delivery demonstrated/ developed

- Concept/ framework document prepared for Cluster Extension work in target districts
- Rehabilitation works at two Vet. Hosp./ one Farm Sheds completed.
- A.I services supported through training
- Exposure visit of male and female farmers of targeted districts to NWFP (Khyber Pakhtun Khuwa) production models for replication
- Need Assessment of targeted districts for production models
- Social Mobilizer meetings with female farmers for implementation of Poultry Production Model.
- Booklets on “Social Mobilization & Rural Poultry” in Sindhi language circulated in targeted districts and provincial department

- Booklet on “Community Livestock Extension Workers” developed by SLSP-Punjab is being translated Sindhi language is at final stage
- Fodder plots trial established at Agriculture Research Facility Tandojam
- Linkage developed with Nuclear Institute of Agriculture (NIA) Tandojam for establishment of salinity resistant fodders

Information and communication system form central part of service delivery

- Material developed and disseminated in local language during training and workshops
- Photographs and reports of different event sent to FPMU for dissemination

Systems, capacities and structures for project management developed, followed and transferred to GoP.

- Report schedule is followed both for technical progress reports and preparing work-plans

9 Perception of the Stakeholders

9.1 Stated Successes

Perceived successes by the stakeholders are presented below:

- Provision of 500 motorbikes to the Veterinary Doctors strengthened around 50% efficiency in services at the grass root level as stated by the Project Officials. Even during recent flood in Dadu districts staff helped to flood affectees.
- The strengthening of Training Institute at Tando Mohammad Khan through its repair and provision of appropriate equipment resulting long run support for organizing trainings.
- Under SLSP, the trainings were imparted on social mobilization aspects to the staff of Livestock Department as master trainers by the resource persons of National NGOs like Strengthening Participatory Organization (SPO). Resultantly, the master trainers of the Department provided training to the participants of various organizations like NRSP and TRDP under Prime Minister’s Special Initiatives for Livestock project.
- Disease reporting /sampling system has become effective as samples are being collected and sent to Central Veterinary Disease Diagnostic Laboratory on regular basis.

9.2 Stated Failures

Some of the reasons stated by the stakeholders are presented below:

- In order to implement the project, Agro-Technical Co. deployed staff from Islamabad to work in Sindh. Those staff members had not close interaction with the local staff.
- Initially logical framework analysis was not prepared in consultation with the relevant stakeholders, consequently, it was revised at least three times.
- Most of the money spent on the high charges of the consultancies, rather than field project activities.
- The project staff from the government side has been governed under Government of Sindh rules for their daily allowances and hotel stay. The actual cost of hotels and meals were higher than the government rates which burdened the pockets of staff from government resulting demonization at their part. Whereas, the company staff was entitled to higher allowances and hotel changes.
- Limited number of Project Steering Committees due to busy schedule of Secretary Livestock Department, as a result policy decisions got delayed.
- Implementation in project activities hindered due to late releases of funds from the government.

10 Project Analysis

10.1 Factors of Success or Failures

Sustainability: Synthesizing project activities and interventions to the regular and core functions of the department was a challenging task. However, project made an effort to strategize the project interventions by developing a logical framework of the project, yet the ownership of the logical framework remained an issue. Besides, the project interventions seem to be activities without having results based strategic outcome which could continue after the phase out of the project.

Successes

- Extension veterinary services were improved through project intervention, resulted in around 50% reduction in livestock mortality as reported by Department Officials like DLO, Tharparkar.
- Disease reporting systems has been improved by providing equipment and computers to strengthening the CVDL Mithi (Tharparkar), Dadu, Sukkur and Tando Jam under the project.
- Training facilities have been improved by strengthening the capacity and capability of Tando Mohd Khan Training Institute.

Failures

- The start of the project was plagued by a host of problems, the most serious of which were: a 5-month delay by the EC to advance the initial funding, shortage and lack of constancy of staff, senior staff provided by GoP holding other posts simultaneously

and unable to give adequate attention to SLSP, delays in the procurement of vehicles and equipment.

10.2 Major Lessons Learnt for the Master plan

- The participatory process of project formulation and design requires more attention in order to have collective understanding and ownership.
- The value of participatory approaches has been recognized, which increases the sense of ownership of the project. Participatory approaches tend to result in more effective interventions as the ultimate beneficiaries are involved in determining what is feasible in addressing their problems.
- The most compelling farmers' need is to enhance animal productivity by strengthening the advisory services for production – embracing nutrition, breeding, housing and management as well as animal health – that should be need based, as it is envisaged that needs of farmers is different with regard to geographical area and number of animals.
- In case of national level project, flow of funds committed to the concerned units be released well on time with no hindrances to continue activities at the field level.
- A separate project for strengthening the extension services that work for the livestock sector be designed and implemented.
- Planning, Monitoring and Evaluation (PM&E) Directorate staff need their capacity building enhanced in PM&E system so that they are able to monitor and evaluate project activities on regular basis.
- Strengthen the staff capacity of Department's Training Institute to train other staff in Artificial Insemination (AI) component.
- Addressing the matter of gender for the improvement of livestock at all levels as learnt from the discussions of project officials particularly rural women be trained for management of livestock.
- The frequent changes of European Co-Manager hampered and delayed the implementation of project activities. Therefore, project success depends on the staff availability for the complete project period.

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2. Strengthening of Livestock Services Project (SLSP) Pakistan. Mid Term Review Final Report prepared by Agrisystems limited, May 2006.

Annex -1 Persons Met

1. Dr. Ghulam Sarwar Shaikh, Director General Sindh, Animal Husbandry Department, Hyderabad
2. Dr. Aslam Pervaiz Umrani, Director, Central Veterinary Diagnostic Laboratory, Tandojam.
3. Dr. Noor Mohammad Soomro, Monitoring Officer of GoP, SLSP Project, Hyderabad.
4. Dr. Khadim Hussain Soomro, Deputy Director SLSP Sindh, Hyderabad.
5. Dr. Nobat Khan Khoso, District Livestock Officer, Mithi.
6. Dr. Jhaman Das, Veterinary Officer & In-charge CVDL Centre, Mithi.
7. Dr. Zanzwar Hussain Laghari, District Livestock Officer, Mirpurkhas.
8. Mr. Mohammed Malook, Trainee Wool Shearing & Weaving, Village Nainisar, UC Mithro Bhatti, District Mithi.
9. Dr. Ghulam Rasool Samajo, Manager Natural Resources Manager, Thardeep Rural Development Program, Sukkur
10. Dr. Noor Nisa Marri, Field Operations Manager, Livestock Dairy Development Board, Matiari.
11. Dr. Mastan Ali Khokhar, Livestock Advisor to DCO Sukkur.

Study of the Community Empowerment through Livestock Development and Credit

Acronyms

CBO	Community Based Organization
CELDAC	Community Empowerment through Livestock Development and Credit
EFL	Engro Food Ltd.
GPS	Gender Support Program
JICA	Japan International Cooperate Agency
KMC	Kaihatsu Management consulting Inc
LEAD	Leadership for Environment and Development
LLW	Lady Livestock Worker
M&E	Monitoring & Evaluation
MEWS	Mehran Educational Welfare Society
MFI	Microfinance Institute
NGO	Non Government Organization
PMU	Project Management Unit
SBE	Small Business Enterprise
UNDP	United Nations Development Programme
VDO	Village Development Organization
VMC	Village Milk Collector

1 Introduction

The report presents the lessons learnt from the Community Empowerment through Livestock Development & Credit Project supported by the UNDP by reviewing the data collected from the secondary sources, and interviewing the relevant stakeholders. The study has been undertaken for Kaihatsu Management consulting Inc. (KMC) and C.D.C. International Corporation to facilitate in preparation of the Master Plan Study on Livestock, Meat and Dairy Development in Sindh Province.

1.1 Field Visits and Meeting with the Relevant Stakeholders

The consultant made visits to various relevant places and convened meetings with the pertinent stakeholders in relation to the assignment. The list of persons met is presented as Annex – 1.

2 Background

The Community Empowerment through Livestock Development & Credit (CELDAC) project was implemented for three year period i.e. September 2006 to September 2009. It was designed to enhance the income and employment of rural women through livestock skills development, improved livelihood and food security at the household and community level. The project implemented under the auspices of UNDP's and the Government of Pakistan overarching Gender Support Program (GPS). The initiative was being implemented in Punjab and Sindh with two private sector partners from the dairy sector namely Nestle Pakistan (Punjab) and Engro Foods Limited (Sindh). The total cost of the project was US\$ 1.3026 million (Donor contribution US\$ 1.0206 million and Engro Fertilizer Ltd contribution was US\$ 0.282 million).

3 Goal and Output of the Project

The project goal was to enhance income and employment generation of rural women through livestock skills development, improved livelihoods and food security at the household and community level.

The outputs envisaged in the project were to:

- At least 1200 women self employed and generating extra income through livestock extension services and improving nutritional status and food security at the household level. Livestock production increased through timely provision of primary animal health and production services by reducing livestock morbidity and mortality rate; and
- Income and employment generation of poor livestock households through facilitation to institutionalized collateral free credit and saving facilities.

4 Planned Activities

Under the first output the following main activities were designed to implement the project:

- Develop project mobilization strategy;
- Conduct baseline survey and develop Monitoring and Evaluation (M&E) system;
- Convene meeting with the Project Steering Committee and potential partners NGOs/ Community Based Organizations (CBOs);
- Organize training of Project Management Unit (PMU) staff and Training of Trainers;
- Design curricula for Lady Livestock Workers (LLWs) training and develop training modules;
- Printing of material including modules, brochures, manual, and signboards for LLWs;
- Conduct mid-term review of the project; and
- Develop networking with the other development actors of similar projects for the sustainability of CELDAC interventions.

In order to achieve the second output, following main activities were envisioned in the project:

- Facilitate and collaborate with microfinance institutes (MFIs) and LLWs to develop customized micro financing;
- Establish of female Village Milk Collectors (VMCs) to establish female small business entrepreneurs;
- Organize training of LLWs on Small Business Enterprise (SBE);
- Create networking among LLWs and Vendors/suppliers for Livestock products; and
- Follow up and income generation of LLWS.

5 Implementation of the Project in Sindh

In order to implement the project, Engro Foods Limited – the implementing partner established the Project Management Unit (PMU) at Sukkur. The project steering committee was established and has conducted two meetings during the project period April 2007 – September, 2009.

The PMU management hired a team of Lady Master Trainers and Lady Social Mobilizers. To mobilize the project, the team organized a Project Mobilization workshop at Sukkur mainly to create understanding among UNDP, EFL & PMU team members about the design of the project besides knowing their respective obligations at all the stages of project management cycle.

The comprehensive baseline survey was carried out by LEAD Pakistan. The baseline survey indicates many minor and major indicators through which the impact of the project was supposed to gauge. The baseline survey area was divided into four parts based on crops, canal water availability, desert, and grazing areas, considering the diseases, available nutrition and services to livestock owners vary in all four parts. The project implemented in Ghotki, Sukkur, Khairpur, Naushahro Feroze, Shaheed Benazirabad, Dadu, Larkana, Kambar, and Shikarpur Districts.

In all 1,209 LLWs were trained in project districts of upper Sindh province, covering around 706 villages over a period of six weeks by the Lady Master Trainers and Social Mobilizers. The trainings focused on livestock management & role of women, livestock healthcare and prevention, livestock products and marketing, and community empowerment.

The project made efforts to establish network with other development NGOs working in the area such as Mehran Educational Welfare Society (MEWS) in District Khairpur, Goth Seenghar Foundation District Khairpur and Village Development Organization (VDO) District Nawabshah. Some of the LLWs were engaged in livestock projects carried out by these NGOs. These LLWs were involved in looking after the basic health of the animals at village level.

The project facilitated LLWs, Small Business Enterprisers (SBEs) and Female Village Milk Collectors (VMCs) in meeting with MFIs for provision of collateral free credit and saving facilities in order to enhance income generation. Total 59 female VMCs were established against the target of 50. The female VMCs practice has considerably increased the income of LLWs and on an average one female VMC earns Rs. 2000 – 2500 per month through commission from milk collection and marketing.

6 Perception of the Stakeholders

The stakeholders' perceptions on the success and failure of the project are presented below:

6.1 Stated Successes

- The skilled developed by 1200 LLWs through this project is a successful step to provide services at the grass root level where male members do not have access and their services could be utilized for different projects for example Vaccinators in government department.
- The project helped in enhancing the income of about Rs.2000 per month to around 40% of trained LLWs who are self employed and around 2% have been employed by various NGOs in their livestock projects after the project has been completed.
- Since the project is a successful model by indulging ladies livestock workers in veterinary services, it can be replicated in other areas with some lessons learned from this pilot project.
- The focus of LLWs training was not solely on technical aspect of livestock management & disease prevention but also special attention was given to build her personal capacity and skills to work with the community for extension services in livestock, as a result they are earning for the livelihood.

6.2 Stated Failures

- While identifying and registering LLWs, rural based educated and motivated girls were not available. In some cases motivated and education girls were available but due to social constraints, their families were not willing to allow them for the project.
- The project faced difficulty to deploy Lady Veterinary Doctors for the project activities, as some of them were not up to mark in their skills though they were qualified.

- Due to scattered villages and unavailability of regular communication facilities around villages, females felt difficulty to travel from one village to another to provide extension livestock services to the farmers.
- Since LLWs did not qualify their trainings from any recognized institution including University, therefore, legal certificate from the Govt. for veterinary services could not be awarded to them for future practice in the field as Veterinarian.

7 Project Analysis:

Sustainability: The human skill is an important capital for sustainable livelihoods. The LLWs trained through the project now possess the basic skills for livestock management and health which in result they are not only getting income by providing services to the farmers in their villages but the livestock of their own family is also benefited. Further, there are spillover effects of these women to other women for improved livestock management practices.

7.1 Factors of Success or Failures

Successes

- The skilled and trained LLWs are available and are able to provide the extension services related to livestock management, health and nutrition at the household level in the villages, resultantly the services are available at the doorsteps that has improved the income through developing a marketing channel of milk by collection of milk from individuals and channelized to milk processing plants. In addition some around 3% LLWs were involved as Village Milk Collector (FVMC) and they were earning Re.1 per liter as a commission for milk collection and marketing consequently the milk market channel developed.
- The project has not only opened the opportunities for under valued rural women to earn but it has also positively impact an improving their self esteem.

Failures

- The community could not see the benefit from getting microcredit loan from NGOs like Sindh Rural Support Organizations (SRSO) on the interest rates (around 25%) perceived by them on high side, therefore, they were not willing to get the credit facilities, and hence the pilot project intervention could not be implemented.
- Through social mobilization process, the girls were identified from various villages and get them trained as LLWs in the project. After the project, the sustainability of their services is questionable, as coordination of LLWs with private medicine companies could not be materialized as most of the companies are established in cities whereas the LLWs are based in scattered villages in various districts.
- The project conceptualized the linkages of LLW with milk processing plants, governmental organizations, NGOs and pharmaceutical company that were not carried out for their future sustainability.

7.2 Major Lesson Learnt for the master Plan

Some of the lessons learnt are:

- As the community lacks the livestock services at their door steps, the services of LLW were first experience in the villages. LLW provided services to the community and simultaneously were earning for their living.
- LLW can offer a vital solution to and can play an important role in an effective delivery of animals' health services and community mobilization at the doorstep of small livestock holders.
- LLW had improved their qualification as they were motivated to seek high education for example around 3% LLWs improved their qualification from Matriculation to the intermediate level.

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Annex – 1 Persons Met

1. Mr. Mohammad Ramazan Buriro Project Manager UNDP / Engro Food Pak. Sukkur
2. Mr. Aftab Ahmed Solangi Monitoring & Evolution Coordinator UNDP, Engro Food Pak Sukkur.
3. Ms. Gul Bahar, Ex-LLW, UNDP Engro Food Pak, Village Sadarjune Bhatune Near Pir-jo-Ghot Dist Khairpur
4. Ms. Zakia Khatoon, Ex-LLW, UNDP Engro Food Pak, Village Sadarjune Bhatune Near Pir-jo-Ghot Dist Khairpur
5. Ms. Phapul W/O Mr Qadir Bux Rahujo, Ex-LLW, UNDP Engro Food Pak, Village Sadarjune Bhatune Near Pir-jo-Ghot Dist Khairpur
6. Ms. Punia Khatoon, Ex-LLW, UNDP Engro Food Pak, Village Sadarjune Bhatune Near Pir-jo-Ghot Dist Khairpur
7. Mr. Shakeel Ahmed, Coordinator, Mehran Education trust Sadarjune Bhatune Dist Khairpur.

Review of Sindh Dairy and Meat Development Company (SDMDC) (prepared by the Project Team)

1. Objectives

Objective of SDMDC is to enhance milk and meat production through providing effective market mechanism to the milk and meat producers in rural area and also to resolve the bottlenecks and problem causing low production of their animals.

2. Mechanism

SDMDC will become a self-dependend entity, which would generate business to run its operations.

3. Target

Major emphasis to be on small farmers with 5 or less animals. Most of them are landless or small landholders. Whereas they own 95% of cattle population.

4. Expected Activities and interventions

SDMDC interventions would be to initially train master trainers and then facilitate model farms and community farms all over Sindh. Improvement in Farm Management will be practiced to increase productivity and incomes.

Originally 3 new government farms were planned to be established, and it was planned to transfer the management of the new 3 farms and 6 existing government farms in Sindh to SDMDC. However the construction of the new farms has been suspended, because necessary budget was not released. As of August 2011, the department is requesting the provincial government to provide a necessary fund to finish the construction of the new farms, or to give permission of auction or lease of the farms.

5. Progress

Establishment of SDMDC was announced by the government of Sindh in July 2009. After that seven member board of directors were appointed - three senior government officials and four persons from the private sector. Later on, the recruitment of a chief executive officer was on public but the post has not been appointed yet. One time budget as much as 500 million Rs was released from Sindh Government as seed money for operation of SDMDC.

However, no staff has been assigned and no activity plan has been prepared as of August 2011, though they were planned in 2010-11 Pakistani fiscal year. There is no clear prediction to the future of SDMDC.

Appendix M

Project Outlines

Project Outlines

1.1 Background

Pakistan is outstanding in terms of the number of livestock the country possesses. It has the 8th largest number of cattle in the world, is 2nd in number of buffalo, 3rd in goats, and 9th in sheep. It is also the 5th largest dairy producer in the world. Even with the relatively large size of the livestock sector in world terms, however, the domestic demand for dairy and meat products will be outstripping its supply in near future along with the sharply increasing population and the urbanization. This challenges the livestock sector in Pakistan to tackle various and immediate issues. That includes that i) milk is mostly self-consumed by rural households, ii) technologies for the improvement of production and productivity are undeveloped, iii) feed resources in the country are hardly sufficient for nutritious requirements of the livestock, iv) there is huge loss of dairy and meat products due to poor cold chain facilities and management, v) these products are unhygienic due to poor marketing infrastructures, and vi) institutions and regulatory framework are outdated.

The Government of Pakistan has in recent years focused policy on the promotion of the livestock sector. The Poverty Reduction Strategy Paper (PRSP II) enacted in January 2009 is an example of this. This is in response to the rapid increase in Pakistan's population and the need to secure food supplies for this population. In addition, the first Livestock Development Policy was enacted in 2007 at the federal level to promote livestock and dairy production. The Ministry of Livestock and Dairy Development was established in 2008 as a separate entity from the Ministry of Agriculture.

To date, Punjab Province has been the sole focus of livestock and dairy production development by both the public and the private sectors (investment), as well as other donor support. In comparison, the number of cattle and buffalo in Sindh Province is about half that in Punjab Province. On the other hand, the common Red Sindhi cattle and the Kundhi buffalo breeds have their ancestral origins in Sindh Province, and these and other breeds found in Sindh Province represent important genetic breeds for tropical livestock production. In addition, Karachi, the largest commercial city in Pakistan, is located on the coast. In terms of meeting growing demands on dairy and livestock products, and developing livestock-related exports, this city has huge potential.

In Sindh Province the disparity in economic earning power between large and small land owners, as well as landless non-farming households, is enormous. There is a strong relationship between lack of land or livestock ownership and poverty. In such a situation, the livestock is an important asset, particularly for small and landless farmers. This livestock also provides an important source of nutrition and income for these rural households. For these reasons, efforts to reduce poverty in rural communities of the province should be made based more on the livestock sector, paying attention to its significance and high development potentials.

However, the organization of the Ministry of Livestock and Fisheries, Government of Sindh, and government services to the livestock sector in general are weak. This weak structure has been inherited from the English colonial period, where the focus was on disease prevention and veterinarian services. Little attention was given to personnel development or animal production/nutrition in the livestock sector. This situation was further worsened by a lack of public sector vision and lack of private sector involvement

in the sector.

These facts lie behind the Government of Pakistan's request of a technical cooperation to the Government of Japan for identifying the regional strengths and comparative advantages of the livestock sector in Sindh Province. This project aims to formulate a livestock development strategy through to 2020, and a master plan which recommends practical policies, implementation structures, and action plans. The Project Team, composed by the consultants, has been assigned since July 2010 for implementing the project.

1.2 Project Objectives

The project aims to strengthen potentials and comparative advantages for the development of the livestock sector in Sindh Province, and ultimately achieve balanced regional development and poverty reduction through promoting the sector. It is expected that the stakeholders of the livestock sector in Sindh fully exploit such development potentials and comparative advantages, which would eventually lead to the development of Sindh, and enhance the proud and dignity of the people.

In this project, a comprehensive development strategy of the entire livestock sector and the master plan including the action plans are drawn up, considering small and medium scale farmers as ultimate beneficiaries. In the master plan, the development scenarios are prepared and based on that, the priority actions are indicated. It would then be reflected to the formulation of a project in the next phase.

1.3 Expected Outputs

In order to achieve the above mentioned objectives, the outputs of the project are set as follows:

- (1) Conduct the field survey on the current situation. Identify potentials, comparative advantages, and bottlenecks of the livestock sector. Draft a livestock development strategy targeted through to the year 2020.
- (2) Draft a Master Plan through to 2020 for the livestock development of Sindh Province.
- (3) Provide technology transfer to Pakistani counterparts (C/P) during the implementation of the project.

1.4 Schedule and Phases of the Project

As shown in Figure 1-4-1, the project was implemented over 14 months. The schedule and scope of the project are as follows:

- (1) Phase-1 (July 2010 to March 2011; 8 months): Conduct the field survey and analysis of current situations and the bottlenecks to development. Draft livestock development strategies to 2020 for each zone in Sindh Province.
- (2) Phase-2 (April 2011 to September 2011; 6 months): Based on the above livestock development strategies, draw up a mid-term Master Plan through to 2020, that focuses on small rural households as the ultimate beneficiaries.

The reports were submitted as shown in Figure 1-4-1.

	2010						2011								
	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9
Report Submission		△					△		△			△	△		△
		IC/R					P/R		I/R			P/R2	DF/R		F/R
Phase	Phase I														
							Phase II								

IC/R: Inception Report, P/R: Progress Report, I/R: Interim Report, DF/R: Draft Final Report, F/R: Final Report

Figure 1-4-1 Project Phases and Report Submission Schedule