

**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 1
Master Plan**

October 2011

JAPAN INTERNATIONAL COOPERATION AGENCY

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

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Preface

In response to the request from the Government of the Pakistan, the Government of Japan decided to conduct the "The Project for the Master Plan Study on Livestock, Meat and Dairy Development in Sindh Province" and entrusted the Project to the Japan International Cooperation Agency (JICA).

JICA sent a Project Team, led by Mr. Hiroshi OKABE of Kaihatsu Management Consulting, Inc., organized with C.D.C. International Cooperation, to Pakistan from August 2010 to September 2011.

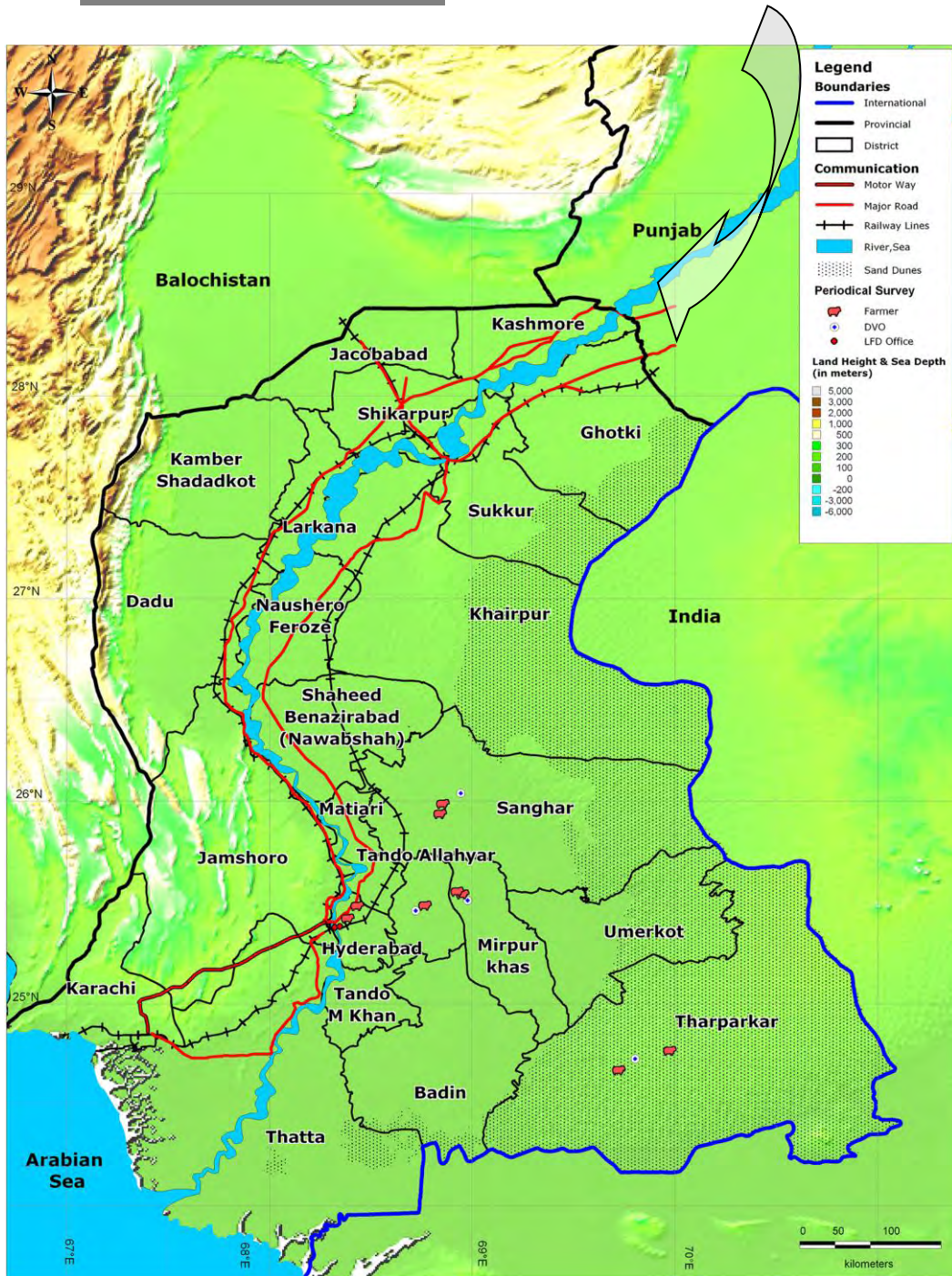
The Team held a series of discussions with the officials of the Livestock and Fisheries Department, Government of Sindh and a wide range of the stakeholders related to the livestock sector, and conducted field surveys. After returning to Japan, the Team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of the project, and to the enhancement of friendly relations between our two countries.

Finally, I wish to express my sincere appreciation to the concerned officials of the Government of Sindh for their close cooperation throughout the Study.

October 2011

Tsuneo KUROKAWA
Vice President
Japan International Cooperation Agency



Project Target Area

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

AI	Artificial Insemination
ADB	Asian Development Bank
ARI	Agricultural Research Institute
ATI	Agricultural Training Institute
AU	Animal Unit
BBSYDP	Benazir Bhutto Shaheed Youth Development Program
BQ	Blackquarter
BS	Bachelor of Science
BSE	Bovine Spongiform Encephalopathy
CCPP	Contagious Caprine Pleuropneumonia
CDWP	Central Development Working Party
CELDAC	Community Empowerment through Livestock Development & Credit
CG	Community Group
CLEW	Community Livestock Extension Worker
CMT	California Mastitis Test
CO	Community Organization
C/P	Counterpart
CP	Crude Protein
CPI	Consumer Price Index
CVDL	Central Veterinary Diagnostic Laboratory
DAB	Directorate of Animal Breeding
DAH	Directorate of Animal Health (proposed)
DAH	Directorate of Animal Husbandry
DCP	Digestible Crude Protein
DDWP	Department Development Working Party
DE	Directorate of Extension (proposed)
DG	Director General
DGI	Directorate of Genetic Improvement (proposed)
DLPM	Directorate of Livestock Planning and Management
DM	Dry Matter
DO	District Officer
DPP	Directorate of Poultry Production (renamed)
DPVP	Directorate of Poultry Vaccine Production (renamed)
DVM	Doctor of Veterinary Medicine
DVRD	Directorate of Veterinary Research and Diagnosis
EC	Electrical Conductivity
EDO	Executive District Officer

ELISA	Enzyme-Linked Immunosorbent Assay
ET	Enterotoxaemia
EU	European Union
FAO	Food and Agriculture Organization
FCM	Fat Corrected Milk
FCS	Food Consumption Scores
FLEW	Female Livestock Extension Worker
FMD	Foot-and-Mouth Disease
FPA	Farm Production Advisor
GDP	Gross Domestic Product
GIS	Geographic Information System
GOP	Government of Pakistan
GTZ	German Technical Cooperation
HH	Household
HIES	Household Integrated Economic Survey
HS	Hemorrhagic Septicemia
IEC	Information, Education and Communication
IFPRI	International Food Policy Research Institute
IRM	Institute of Rural Management
JICA	Japan International Cooperation Agency
LDDDB	Livestock and Dairy Development Board
LLW	Lady Livestock Worker
LSU	Livestock Unit
MCC	Milk Collection Center
MCP	Milk Collection Point
MDGs	Millennium Development Goals
MOA	Ministry of Agriculture
MS	Master of Science
MTDF	Medium Term Development Framework
MTDP	Mid-Term Development Plan
NGO	Non-Governmental Organization
NRC	National Research Council
NRSP	National Rural Support Programme
NWFP	North-West Frontier Province
OCT	Owner-Cum-Tenant
OIE	World Organisation for Animal Health
OJT	On-the-job Training
PARC	Pakistan Agricultural Research Council
PC	Planning Commission

PCR	Polymerase Chain Reaction
PDA	Pakistan Dairy Association
PDDC	Pakistan Dairy Development Company
PDWP	Provincial Development Working Party
PMSIL	Prime Minister's Special Initiative for Livestock
PMN	Pakistan Microfinance Network
PPR	Peste des Petits Ruminants
PRA	Participatory Rural Appraisal
PRI	Poultry Research Institute
PRSP	Poverty Reduction Strategy Paper
PV	Para-Veterinary Officer
PVPC	Poultry Vaccine Production Center
RDF	Rural Development Foundation
RSU	Reform Support Unit
RTI	Research & Training Institute
SA	Stock Assistant
SAFWCO	Sindh Agricultural and Forestry Workers Coordinating Organization
SAU	Sindh Agriculture University
SCARP	Salinity Control and Reclamation Project
SCCDP	Sindh Coastal Community Development Project
SDC	Swiss Agency for Development and Cooperation
SDMDC	Sindh Dairy and Meat Development Company
SIDA	Swedish International Development Cooperation Agency
SLBAP	Sindh Livestock Breeders Association Pakistan
SLSP	Strengthening of Livestock Services Project
SMO	SCARPS Monitoring Organization
SPO	Strengthening Participatory Organization
SRSO	Sindh Rural Support Organization
TDAP	Trade Development Authority of Pakistan
TDN	Total Digestible Nutrients
TOR	Terms of Reference
TRDP	Thardeep Rural Development Programme
UAE	United Arab Emirates
U/C	Union Council
UHT	Ultra-High Temperature
UNDP	United Nations Development Programme
UVAS	University of Veterinary and Animal Science
VDO	Village Development Organization
VMC	Village Milk Collector

VO	Veterinary Officer
VRI	Veterinary Research Institute
WFP	World Food Programme

Currency Exchange Rate
PKR 1 = JPY 0.880
(JICA Official Rate for October 2011)

Chapter 1

Introduction

Chapter 1 Introduction

1.1 Background

The Master Plan Study on Livestock, Meat and Dairy Development in Sindh specifically focuses on Sindh Province and the Livestock Sector¹. However, before going into the heart of the issue, it would be worthwhile to articulate our basic perception towards the issue we are challenging in the context of overall agricultural as well as rural development in Pakistan.

The agricultural sector (in a broader category, inclusive of livestock) is a backbone of Pakistan's economy and society in that it contributes 21% of GDP, absorbs 45% of the total labor force, and provides productive as well as living space for as many as 2/3 of the entire population.² Even though the driving force of economic transformation has been the non-agricultural sector, notably manufacturing industry, the performance of the non-agricultural sector decisively depends upon the strong support of the agricultural sector.

Conventional understanding with respect to the roles of the agricultural sector in economic development are; 1) provision of staple crops and industrial raw materials, 2) earning of foreign currencies for necessary imports, 3) supply of labor force and rural savings for industrial development, and 4) finally provision of market for domestic industries.³ However, this prescription has been challenged in two aspects. One is the unsuccessful transfer of surplus labor force from the agricultural sector, mainly due to the low absorptive capacity of the urban high productivity sectors of economy. Another one is slow growth of rural market, thus consumption, mainly due to the skewed distribution of income and assets and resultant poverty persistent in rural area.

Based on these empirical findings, the new role expected for the agricultural sector is three-fold. The first role is to promote agricultural growth with high employment elasticity. The second role is to reduce the growing inter-regional as well as intra-regional disparity. The third role is to alleviate persistent poverty.⁴ The classical role such as the provision of staples, industrial raw materials and development fund are incorporated in the first role in the new version. Enhancement of consumption in macroeconomic framework can be taken care of by the second and the third role in our new version.

Furthermore, it would be worthwhile to mention that we are guided by the following perceptions. First, we are in a position to believe that economic development could be achieved better in a situation where the agricultural sector is growing, rather than stagnant and being exploited for the benefit of the other sectors. Second, given the rate of population growth and low labor absorptive nature of industry, agriculture is the only sector that could provide transit lounge for the incremental population and labor force. Third, our



Kundhi dairy buffalo in a commercial farm, the pride of the province

¹ See Appendix M for the project outline.

² Government of Pakistan, Economic Survey 2009-10

³ Bruce F. Johnston and John W. Mellor 'The Role of Agriculture in Economic Development,' American Economic Review, September, 1961

⁴ S. Hirashima, 'Crucial Role of Agriculture in Indian Development: A Japanese Perspective,' in Sankar K. Bhaumik ed. Reforming Indian Agriculture, Sage Publication, 2008, India

empirical observation suggests that the inter- as well as intra-regional disparity tends to increase when the non-agricultural sectors are growing fast while the agricultural sector's growth remains stagnant or decelerating. Fourth, growing disparity has to be addressed mainly because it would disturb the national integrity. Fifth, we perceive that the growing unemployment, widening disparity and persistent poverty are the enemy for the stability of any society, and that the way the agricultural sector is developed holds a key to overcome.

1.2 Objective and Rationale of the Project

The grand objective of the project we have set forth was to promote agricultural growth with high employment elasticity, reducing inter- regional as well as intra- regional disparities, and to alleviate poverty, thereby the people of rural Sindh could contribute much more to the prosperity of Pakistan with pride and dignity. We are going to examine the possibility of achieving the objective of the project by taking the case of the livestock sector development in Sindh. The rationale of this project can be spelled out as follows:

First, as explained already, the agricultural sector has to grow further to foster economic development. Even though the crop sector has been steadily increasing over time in quantity terms, land productivity has remained much lower even compared with India and China. Moreover, it is recorded that the average yield at the farmers level has been 30-50% of the yield achieved at the experiment stations. The technologies to double the yield of major crops are already accumulated at the R&D system in Pakistan. What has been the problem is the poor performance in socializing those technologies at the field level.

Second, in spite of the low productivity, Pakistan has successfully achieved self-sufficiency in staple production in real terms. The effort has already been started to diversify the value added structure in agriculture towards horticulture and livestock. However, it is important to bear in mind that the development of horticulture and livestock need strong support from the crop sector. Third, out of these two high value added sectors in agriculture, the livestock sector is as we conceived a driver of change in rural Pakistan and it is more dynamic in Sindh. Fourth, the development of the livestock sector in Sindh demands scrutiny for the following reasons:

- a) In spite of having the second largest irrigated agrarian base in the country, and having huge potentials in terms of diversified natural resources and excellent human resources, Sindh has not played an expected role in development as a front- runner.
- b) The development of agriculture, in particular livestock sector has a potential to grow as a driver of change, not only in terms of growth and poverty reduction, but also reducing inter-and intra-regional disparity of the province.
- c) Compared with Punjab, as will be analyzed later, Sindh has comparative advantages in the livestock sector in terms of its diversify and the higher proportion of livestock income in the total household income, in particular the lower income strata.
- d) The development of the livestock sector in Sindh could contribute immensely not only to the stability and sustainable growth of the province, but also to the development of Karachi, the demand-driven metropolitan city in Pakistan. Unfortunately, Sindh has not fully capitalized the advantages Karachi has in strengthening its socio-economic foundation. At the same time, the instability in Sindh has discouraged the domestic as well as foreign investments in the province.

The chapters followed would demonstrate our basic perception, as well as approach towards the livestock sector development in Sindh, and the technical and institutional components to be incorporated to achieve our grand objective.

Chapter 2

Characteristics of Livestock Sector in Sindh

Chapter 2 Characteristics of Livestock Sector in Sindh

2.1 Basic Features of Rural Pakistan

For those who are concerned with development in rural Pakistan, be it crop production, livestock activities, or even socio-economic structure, there are at least five unique features to take note as follows:

First, advanced irrigated agriculture is prevailed with extensive public network of irrigation canal system, assisted by the private tube-well irrigation.

Second, mix farming is the major form of farm management in Pakistan, where the crop sector and livestock sector are integrated. The small-scale mix farming may not be efficient in terms of productivity, but certainly effective in terms of stability in household economy and rural society. The major advantages of this system can be listed as follows:

- (a) This is a mutually supportive system in that the crop sector provides necessary water and green as well as dry fodder, while the livestock sector in turn provides necessary farmyard manure to the crop sector.
- (b) The livestock sector can act as a hedge against risk and uncertainty at the time of crop failure, and can raise emergency fund by disposing of dairy products and/or livestock.
- (c) The livestock sector provides working opportunities for female family members.
- (d) The livestock sector provides animal protein and other nutrients to the family members, and in addition, cow dung is used as a fuel and construction materials in rural area.

Third, almost 2/3 of the total population lives in rural Pakistan. However, according to the Agricultural Census 2000, the rural population is grouped into 3 occupational categories; farm households (36.7%), non-farm households (55.0%), and livestock holdings (18.3%). Since the livestock holdings are located near the suburban areas in most cases, rural village is essentially composed of farm households and non-farm households. In Punjab, the proportion between the two is 44.5 : 55.5, and 32.2 : 67.8 in Sindh.¹ The most important factors to note in this occupational category is that there has been a social distinction in real terms between farm households and the other two, and the access to land and water has historically been constraint in the case of non-farm households and livestock holdings.

Fourth, ownership of farmland and water has been basically confined to farm households in rural Pakistan. However, the distribution of private ownership of land and tube-wells is highly skewed. In Punjab, 34.1% of farm households owned less than 1 ha, while it was 14.4% in Sindh.² The percentage of those who owned less than 5 ha comes to 85.3% in Punjab, while it was 77.0% in Sindh. On the other hand, those who owned more than 60 hectares were 0.1% in Punjab, while it was 0.3% in Sindh. In regard to land tenure system, it is known that the proportion of pure tenant households are more in Sindh than Punjab, and the size of cultivated land is less.³

Fifth, in rural Pakistan, Biradari (endogamy), known as Jati in India, is a social institution

¹ Government of Pakistan, *Agricultural Census, 2000*

² Ibid.

³ Government of Pakistan, *Economic Survey, 1998-99*

still influencing people's behavior. Biradari is specific to social groups serving the purpose of social identity and mutual help. Although, Biradari cannot cross over the different social classes, and also there are factions within the same Biradari, this institution is important unit of group action. If Biradari can be regarded as a traditional social safety net in rural Pakistan, the mix farming can be regarded as an important socio-economic safety net. These institutional arrangements may not be appreciated as 'efficient' from the analysis of modern social sciences, but understanding development issues in rural Pakistan is not adequate without understanding these institutions.

2.2 Huge Livestock Resources

As shown in Table 2-2-1, there are 6.92 million cattle, 7.34 million buffaloes, 3.96 million sheep, 1.26 million goats, 278 thousand camels in Sindh according to the Livestock Census 2006. These huge numbers of livestock is one of the significant potentials for livestock development, in terms of high production capability, various genetic resources, large amount of food resources, huge value of liquid asset, etc. These potentials should be fully exploited for the development of the livestock sector in Sindh.

Table 2-2-1 Number of Livestock Holdings in Sindh

	Cattle	Buffalo	Sheep	Goat	Camel	Poultry	Total
Pakistan	29,558,812	27,334,985	26,487,741	53,786,988	920,868	73,647,888	216,505,705
Sindh	6,925,022	7,340,162	3,958,508	12,572,221	278,424	14,135,540	46,279,313
	23%	27%	15%	23%	30%	19%	21%

Source: Livestock Census 2006

2.3 Area-wise Potentials for Livestock Development

From the livestock production and marketing view points, three areas are identified in Sindh, such as the irrigated areas, the non-irrigated areas, and the urban areas.

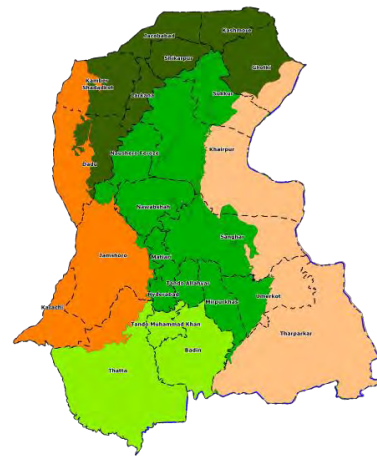
2.3.1 Characteristics in Terms of Production and Demand

(1) The Irrigated and the Non-irrigated Areas

From the agro-ecological viewpoint, Sindh is broadly classified into the irrigated and the non-irrigated areas as shown in Figure 2-3-1. Three basic factors determining the nature of livestock development are land, water and fodder. Along with the development of canal irrigation system built since the mid-19th century in Punjab and Sindh, fodder crop production has integrated in a crop rotation system. In this context, under a mix farming, the crop sector provides necessary land, water and feed to the livestock sector in the irrigated areas. However, this relationship does not hold for the non-irrigated areas with low precipitation. Scarcity of clean water and feed supply in the areas is the key to determine the nature of livestock development.

Figure 2-3-2 shows that the irrigated areas are favorable for livestock production, indicating that animal unit⁴ per area is higher in the irrigated areas, particularly along with the Indus River than the other areas, except for Karachi urban area. Consequently, livestock population and population densities in the irrigated areas are higher than the other areas.

The demands of milk and meat in the irrigated areas seem to be higher than the non-irrigated areas. It is partly supported by Figure 2-3-3, which indicates that the human population density in the irrigated areas and Karachi urban area is higher than the non-irrigated areas. Another reason is that the household cash income and expenditure capacity in the irrigated areas is higher than the non-irrigated areas.



Agro-ecological Classification	
Irrigated area	Upper (right bank of the River, upper reaches)
	Middle (left bank of the River, upper and middle reaches)
	Lower (deltaic plain)
Non-irrigated area	Thar desert
	Kohistan

Figure 2-3-1 Agro-ecological Land Classification of Sindh

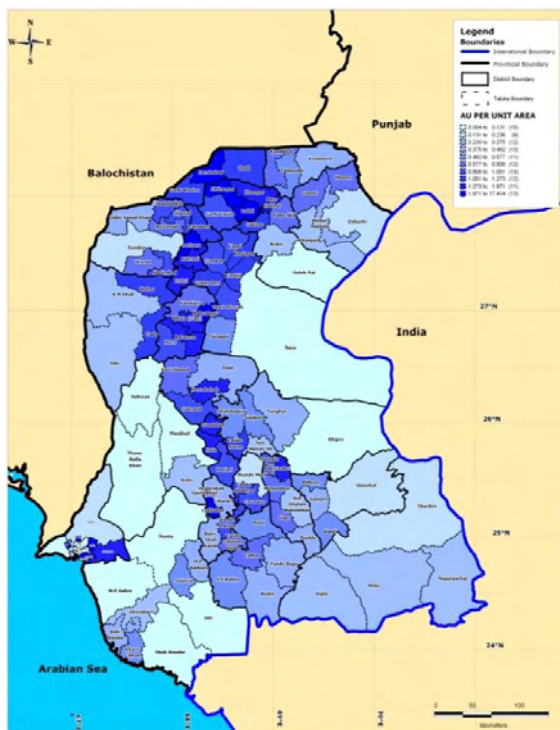


Figure 2-3-2 Animal Unit per Area (2006)



Figure 2-3-3 Population Density (Projected for 2010)

⁴ The animal unit is the total number of livestock in an area, calculated by applying specific conversion ratio for each kind of the livestock.

(2) The Urban Areas

From the view point of high milk and meat demands and existence of cattle colonies, the urban areas, particularly Karachi, Hyderabad, Sukkur, and Larkana, should be considered as a specific area for livestock development.

(i) Cattle Colonies

Cattle colonies are the indispensable suppliers of milk, meat and other dairy products to the huge number of urban consumers. Since dairy farms in the colonies do not have adequate land for growing fodders and keeping dry animals, there is always a huge demand of livestock for milk and feed, currently relying heavily on Punjab province. Moreover, young calves and dry livestock for milk born in the cattle colonies are mostly slaughtered immediately, and they should be regarded as waste and therefore untapped resources for livestock development. These resources could be effectively utilized by small and marginal farmers in other areas. Such alternative avenues should be explored and suggested in this master plan.

Also, environmental issue is one of most serious concerns in cattle colonies because of their proximity to urban areas. Effluent and cow dung come out from the cattle colonies untreated and affect surrounding environment. This issue would be one of the constraints for the development and expansion of the cattle colony development in the near future.

(ii) Karachi

Among the urban areas, Karachi is quite unique and significant because of its geopolitical advantage and demographic conditions. These advantages of Karachi should be fully exerted in livestock development in Sindh.

First, Karachi is located in a geopolitically advantageous area where the Arabian Sea meets the Asian Continent. Therefore, the city plays as a gateway of Pakistan through its airport and seaport to international market including Arab countries, major importing countries of Pakistani livestock products. The Karachi seaport handled largest amount of cargo in Pakistan, about 38,732,000 tons during 2008-09⁵. Moreover, Karachi is a center of commerce and industries in Pakistan, and the private firms engaging in processing and exporting are accumulated. Therefore, an advantage of Karachi is seen in processing and exporting livestock products.

Second, the consumption capacity of Karachi is outstanding in Pakistan. Karachi with 13,386,730 projected population in 2010 is the largest city in Pakistan. In addition, the annual average population growth rate from 1981 census to 1998 census is as extremely high at 3.49%. If the annual average growth rate remains at the same level, the population of Karachi will increase by 40% in 10 years. The demand for livestock products might also be increased by 40% if no dramatic change occurs on consumer preference. Moreover, many Karachi residents including foreigner belong to a high income bracket and are highly educated. It is expected that those consumers may become much keener on quality, variety, safety, and hygienic condition of livestock products, therefore the product

⁵ Pakistan Economic Survey 2009-10

diversification is required to meet those needs. Karachi is the most appropriate area to introduce and create awareness of such issues among the consumers so that the quality livestock production may be promoted.

As mentioned above, characteristics of the three areas vary in terms of production and marketing viewpoints. These are summarized in Table 2-3-1.

Table 2-3-1 Area-wise Characteristics from the View Points of Production and Marketing

Area	Main Potentials and Constraints	
	Production	Marketing
Irrigated areas	<ul style="list-style-type: none"> • Locally available course feed is abundant. • Water for drinking and bathing is readily accessible. • Production capacity of livestock is high. • Large population and high population density of livestock. 	<ul style="list-style-type: none"> • Large population and high population density of human result in high demand of meat and milk. • High household income • Road network including highways is relatively well developed. • More livestock markets exist and deal with a large number of animals.
Non-irrigated areas	<ul style="list-style-type: none"> • Locally available course feed is scarce. • Seasonal feed insufficiency is severe. • Water for drinking and bathing is less accessible. • Production capacity of livestock is low. • Small population and low population density of livestock (except for Tharparkar). • Effective grazing methods and transhumant are developed to survive in the harsh environment of the area. 	<ul style="list-style-type: none"> • Small population and low population density of human result in low demand of meat and milk. • Low household income • Road network is relatively less-developed. • Livestock markets are less in numbers and deal relatively with small amount of livestock.
Urban areas	<ul style="list-style-type: none"> • Farms heavily rely on purchased feed. • Water for drinking and bathing is less accessible. • Livestock reproduction capacity is minimal. Milking animals and feed are delivered from outside of this area. • Larger population and higher population density of livestock in cattle colonies. • Slaughtered young calves and dry animals as untapped resources • Effluent and cow dung from cattle colonies are unaddressed environmental issues. 	<ul style="list-style-type: none"> • Large urban population result in high demand of meat and milk. • High-end consumers in Karachi • Export gateway in Karachi • Export and processing industries in Karachi

2.3.2 Development Potentials

(1) The Irrigated Areas

The irrigated areas are blessed with favorable conditions for livestock development in terms of production and marketing. Increase in production of milk and meat is primarily required by the demand side in this area. Surplus products, both milk and meat, should be marketed to fill the supply

and demand gap in other areas of Sindh and even Balochistan.

Moreover, high availability of water and feed grants the areas an absolute advantage over the non-irrigated areas on producing quality livestock products. The production of quality products should be further facilitated targeting international as well as growing domestic high-end markets. Based on the same context, value-addition to livestock products should also be sought in the areas.

(2) The Non-irrigated Areas

It is clearly shown that conditions for livestock rearing are less advantaged in the non-irrigated areas due to the limitation of water and feed. In comparison to the irrigated areas, lower population density and income level lead to lower demand of livestock products. Therefore, it is not feasible to intensively, as for the irrigated areas, increase in production and improve the quality of livestock products. Limited water access leads to minimal income from crop farming, and therefore the livelihood of the farmers in the non-irrigated areas is quite severe and vulnerable. Therefore, livestock development in the non-irrigated areas should contribute to the stabilization of livelihood of the farmers through strengthening production capacity of goat, sheep, camel and ostrich at low cost, low investment, and low risk management.

(3) The Urban Areas

Given the lack of cold chain and the people's preference to raw milk may continue for the time being, cattle colonies will maintain their significance in the urban areas. Therefore, the cattle colony-centered livestock development is relevant and realistic in the urban areas. The issues with regard to cattle colonies are diverse, and therefore various development potentials are seen. First, unused young calves and dry animals should be utilized as useful resources of livestock development. Second, collaborative development with other areas is necessary for supplying the unused resources to small and marginal farmers from the cattle colonies, and receiving milking animals and feed from other areas. Third, an increase in production and improvement of quality of milk should be addressed to meet increasing and diversifying demand, particularly in Karachi. Fourth, alleviation of negative environmental impacts from the cattle colonies is needed. Fifth, strengthening and utilization of functions of Karachi as export gateway and processing center is another development potential.

2.4 Current Situation of Milk and Meat Industries

2.4.1 Increasing Domestic Demand for Milk and Meat

Domestic milk demand has been steadily expanding as outlined in Chapter 6 in the Part 2 of the Report. In Pakistan, the total supply and consumption volumes of milk has increased by more than 4 times between 1966 and 2006. Milk supply had increased at the similar rate to the population growth until 1986, and it has been significantly outpacing the rate of population growth since then. The growth rate of per capita supply of milk has even outpaced that of per capita income since 1996. It is observed from the field survey that even though some seasonal fluctuations of milk price has been

seen, the milk supply always surpasses the demand, and consequently there is no need of production adjustment.

As described in Chapter 6 the supply of beef has also been increasing more than the rate of population growth since 1986. The per capita beef supply increases at the similar rate of per capita income growth. It indicates that the beef supply has increased at the growth rates of population plus income per capita. The growth rate of beef supply outpaces that of the number of cattle and buffalo, which shows the similar trend to the population growth. It may suggest that the ratio of beef marketed to the total beef produced has been increased during this period. Comparing to milk, meat consumption is far less particularly for rural residents who earn less cash income than urban residents. It implies that there is a sizable room for expanding meat consumption in future.

Looking at demographic movement, the population in major cities has been increasing at the rates higher than overall growth rate of population. Also, the rate of urbanization is expected to rise continuously in the future. Therefore, capacity to supply milk and meat to the urban areas should be enhanced in the rural areas. Moreover, it is also envisaged that the demands for milk and meat will be diversified based on types, quality, healthiness, and safeness along with the increase of the people's income.

2.4.2 Increasing Demand of Meat and Live Animals in Other Provinces and Overseas

There is a huge potential to export halal meat to Islamic countries. The statistic data shows that the export of beef has been increasing since 2004. The major destination countries of the export from Pakistan are Middle-Eastern Islamic countries. Regarding mutton, the exported and imported volumes indicate its high demand in overseas as well. Based on the interviews in livestock markets in the 23 districts in Sindh, a number of livestock animals, i.e. cattle, buffalo, sheep, and goat, are brought to Karachi from all over Sindh, and a portion of these livestock is exported. Moreover, apart from the export, a certain amount of livestock products including milk and live animals are taken to Balochistan from the northern Sindh. It is natural consequence since Sindh has an advantage against Balochistan in livestock production capacity because of its irrigation system. This is one of the strengths of Sindh that having an outlet of livestock not only to foreign countries but also to neighboring provinces.

2.5 Traditional Knowledge and Skills

Livestock rearing has been practiced for long time, and is now deeply rooted in the people's life in rural Sindh. Daily products occupy for important part of the people's dietary habits in Sindh, which has eventually entailed huge demand for milk. Livestock for milk are commonly kept by rural households mainly for own consumption, and other animals are also reared particularly for urgent needs. As a result, most of the rural farmers become familiar with livestock husbandry. Such traditional knowledge and skills accumulated in the long history of livestock rearing should be respected, and based on which the livestock development shall be considered.

2.6 Indigenous Breeds in Sindh

There are several indigenous livestock breeds in Sindh such as Kundi buffalo breed, Red Sindhi cattle breed, Tharparkar cattle breed, etc. These breeds have been living in harsh environment of Sindh and surviving in extensive management for long time. They have strong resistance to illnesses, and endo- and ecto- parasites. As a result, they have been widely introduced to other tropical countries. It must be a pride for livestock related people of Sindh that these breeds are originated from this province. It is possible to improve these genetic resources through selection and culling. Better pure breeds are also important for better cross breeding. Nevertheless, the genetic resources of these indigenous breeds are not properly maintained. It is therefore important that the potential of the genetic resources are fully exploited, particularly for adding economic values to the animals.

2.7 Broad Service Network of Livestock Department

Livestock and Fisheries Department employs totally 1,827 staff, including 260 Veterinary Officers and 732 Para-Veterinary Officers and allocates them to the department's institutes and offices. In particular, 607 Veterinary Centers, 179 hospitals and dispensaries, and in total 76 AI centers and sub-centers provide services to rural farmers throughout Sindh. This is an existing government network which covers the entire Sindh, and it is important basis to upscale and reorganize for livestock development through project implementation.

Chapter 3

Development Scenarios

Chapter 3 Development Scenarios

3.1 Zoning of the Province for Livestock Development

3.1.1 Zoning Process

The agro-ecological land classification of Sindh is already available for crop farming development. It was made based only on the characteristics of the crop sector, namely cropping pattern, in which the livestock sector was not incorporated. Therefore, it is necessary to draw a new map specifically for livestock development.

The zoning map was produced in two steps. First step was to identify three broad areas, namely the irrigated areas, the non-irrigated areas, and the urban areas, based on the functional difference in livestock production and marketing as discussed in Chapter 2. It is acknowledged that the three areas are mutually supportive to each other, and each area includes regional differences.

As the second step, based on the three areas, five zones are identified as illustrated in Figure 3-1-1 in order to strategically formulate the action plans. These five zones are 1) the Northern milk production zone, 2) the Central meat and milk production zone, 3) the Eastern extensive meat production zone, 4) the Western extensive meat production zone, and 5) the Southern integrated livestock development zone. Zones 1 and 2 are located in the irrigated areas, and zones 3 and 4 are separately located in the non-irrigated areas. Karachi and Hyderabad, including their cattle colonies, are the core of zone 5, but it also includes the irrigated districts such as Badin and Thatta. The detailed description on the comparative advantages and characteristics of each zone is spelled out in the following part.

3.1.2 Criteria for Zoning

(1) Potentials and Limitations for Production and Distribution

The potentials and limitations for production and distribution should be reflected on zoning for livestock development. As for production, existing livestock population is the most important indicator to determine production potentials including the production of milk, meat, and reproduction of livestock. Regarding distribution, the size of demands reflecting the population, necessity of cold chain for the delivery of livestock products, and appropriate road network bridging the rural to the consuming areas are important.

In considering distribution of milk and meat, the following characteristics should be noted as the conditions of zoning. As to milk, people in Sindh have a strong preference on raw milk to processed milk, but cold chain for milk transportation from the rural to urban areas is not yet established. These two facts lead to the necessity of geographical proximity between consumers and producers so that raw milk can be delivered without chilling systems. Cattle colonies are the most remarkable example of this condition.

The distribution of meat has different characteristics from milk. Most of meat is processed in slaughterhouses or meat shops in the urban areas, while generally livestock for meat is raised in the rural areas. The live animals are commonly traded in livestock markets and transported for a long distance without requiring cold chain as uncovered in Figure 3-1-4. In short, proximity between consumers and producers is not a necessary condition for meat production, but the road network, which enables farmers to access to market and traders to transport animals, is important.

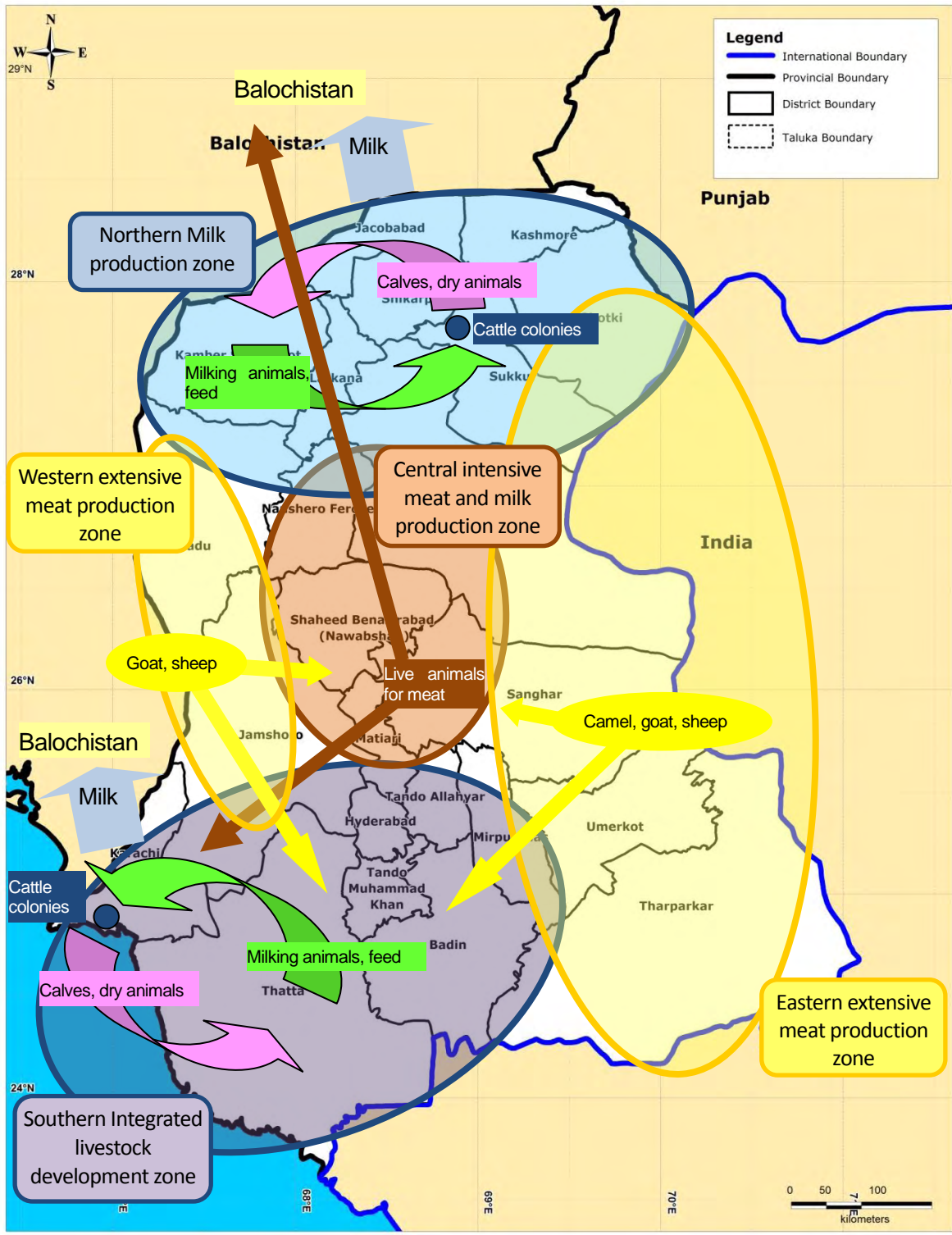


Figure 3-1-1 Strategic Zones for Livestock Development in Sindh

(2) Comparative Advantage

Comparative advantage of each area in the province is another principle for zoning. The irrigated areas have an absolute advantage over the non-irrigated areas in many aspects, but it is not appropriate to always prioritize the irrigated areas for livestock development. In order to increase production through balanced development in the whole Sindh, it is necessary to exploit available resources of not only the

irrigated areas but also the non-irrigated areas as well as cattle colonies in the urban areas. Therefore, the comparative advantage of each area should carefully be examined to strategically identify the zones and their development agendas.

(3) Interaction among the Zones

Each zone has its own uniqueness, and at the same time it is an integral part of Sindh. Therefore, all zones should be mutually supportive to each other aiming at livestock development of this province as a whole. Given the limitation and advantages of each zone, there are many tradable livestock and livestock related products between zones such as milk, livestock for meat, calves for rearing, dry animals for recycling, feed and fodder, etc. In particular, as Karachi is a special city in Pakistan because of its largest population and function as an export gateway, its potentials and functions should be fully made use by all zones.

3.1.3 Characteristics of each Zone

(1) The Northern Milk Production Zone

As shown in Figure 3-1-1, the northern part of Sindh is identified as the northern milk production zone. Figures 3-1-2 and 3-1-3 reveal that the population density of buffalo and cattle of the zone is much higher than the other parts of Sindh. The population of buffalo in the districts of Sukkur and Larkana are largest among the 23 districts¹. Including the cattle colony located in the suburb of Sukkur, this zone's milk production capability is regarded high, and it exceeds the milk demand in the zone. Surplus milk produced in this zone is sold to milk processing companies and outside the zone, specifically Karachi, and recently Balochistan. The outline of the zone is summarized in Table 3-1-1.

¹ Livestock Census 2006

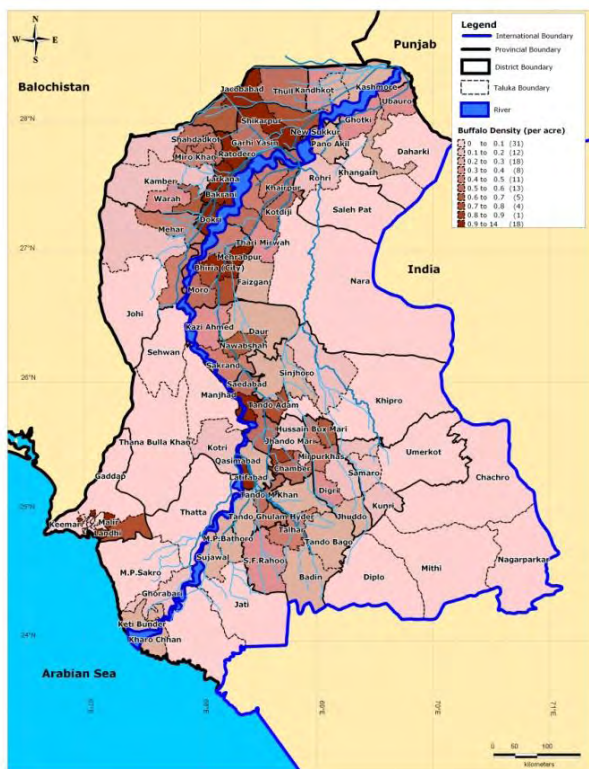


Figure 3-1-2 Buffalo Population Density (2006)

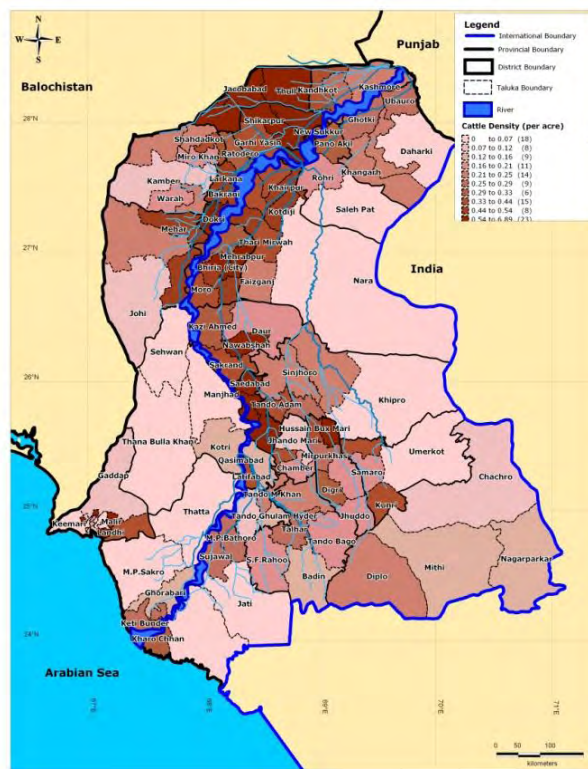


Figure 3-1-3 Cattle Population Density (2006)

Table 3-1-1 Outline of the Northern Milk Production Zone

	Description
Relevant areas and districts	<ul style="list-style-type: none"> • Cattle colony near to Sukkur • Districts of Ghotki, Sukkur, Jacobabad, Kamber Shadadkot, Kashmore, Larkana, and Shikarpur • Both banks of river Indus in the districts of Naushero Feroze, Shaheed Benazirabad (Nawabshah), Dadu and Jamshoro
Production potentials	<ul style="list-style-type: none"> • Large population and high population density of buffalo and cattle • Cattle colony located in the suburbs of Sukkur
Marketing potentials	<ul style="list-style-type: none"> • Large population and high urban population ratio of human • Bordering location to Balochistan

(2) The Central Intensive Meat and Milk Production Zone

The middle part of Sindh is specified as the central intensive meat production zone as shown in Figure 3-1-1. The most significant characteristic of this zone is very active livestock trade. According to Table 3-1-2, livestock markets in the district of Sanghar deal the second largest volume of buffalo and cattle for meat in the province. As depicted in Figure 3-1-4, purchased livestock is sent to all over Sindh and neighboring provinces. It implies that a number of livestock for meat are produced in and around Sanghar, sold there and distributed from Sanghar to outside. It is partly owing to the fact that Sanghar is located in the center of Sindh and the super highway enables traders to smoothly transport livestock. It means that the active livestock markets and available road network should be regarded as the advantages of this zone.

Unlike the northern and southern part of Sindh, this zone is not outstanding in terms of livestock

population and milk demand, but environment for livestock production is favorable thanks to the irrigation network, so the quality livestock can be reared. The outline of the zone is summarized in Table 3-1-3.

Table 3-1-2 Number of Livestock Sold for Meat at Livestock Markets per Week

District	Number of livestock market	Sold number of buffalo	Sold number of cattle	Total
Badin	14	4,359	4,569	8,928
Dadu	7	599	1,078	1,676
Ghotki	5	464	569	1,033
Hyderabad	1	84	68	152
Jacobabad	6	815	1,176	1,991
Jamshoro	5	289	271	560
Karachi	4	27,721	2,701	30,422
Kashmore	3	765	318	1,083
Khairpur	8	179	257	435
Larkana	3	374	167	541
Matiari	2	188	425	613
MirpurKhas	4	405	316	721
N. Feroze	5	350	275	625
Nawabshah	5	181	446	627
Sanghar	6	3,309	9,170	12,479
K. Shahdadt	1	99	66	165
Shikarpur	1	41	78	119
Sukkur	2	220	106	326
T. Allahyar	3	1,811	1,054	2,865
T.M. Khan	4	543	413	956
Tharparker	3	27	240	267
Thatta	4	265	356	621
Umarkot	5	65	113	178
Total	101	43,150	24,233	67,383

Source: Surveyed by the Project Team

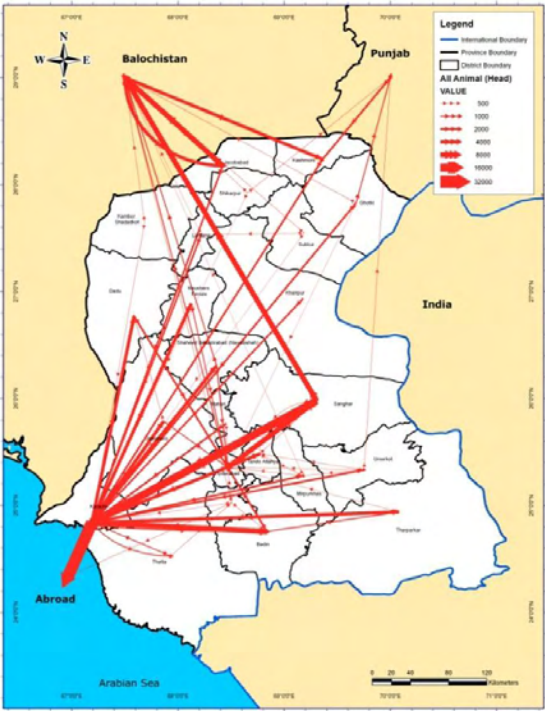


Figure 3-1-4 Flow of Livestock from Livestock Markets

Source: Surveyed by the Project Team

Table 3-1-3 Outline of the Central Intensive Meat and Milk Production Zone

	Description
Relevant area and districts	<ul style="list-style-type: none"> Districts of Naushero Feroze, Shaheed Benazirabad (Nawabshah) and the irrigated part in the districts of Khairpur and Sanghar *District of Matiari belongs to the Southern integrated livestock development zone *Following areas belong to other zones to promote milk production <ul style="list-style-type: none"> Left bank of river Indus → the Northern milk production zone Tand Adam (western edge of Sanghar) → the Southern integrated livestock development zone
Production potentials	<ul style="list-style-type: none"> Favorable condition for livestock production
Marketing potentials	<ul style="list-style-type: none"> Active animal trading in livestock markets in the district of Sanghar Located in the center of Sindh Smooth access to the northern, southern parts of Sindh, and other provinces through the super highway

(3) The Eastern Extensive Meat Production Zone

Figure 3-1-1 shows that Thar Desert located in the eastern part of Sindh is designated as the eastern extensive meat production zone. This zone is classified as a part of the non-irrigated areas, and therefore the capability of livestock production is lower than that of the irrigated areas. However, people

and livestock in this zone particularly in Tharparkar have accustomed to live in its harsh environment, and established unique livestock farming methods at low costs. The methods rely mainly on grazing small ruminants and seasonal transhumance of large animals to Badin and Thatta. As a result, the numbers of cattle, sheep, goat, and camel in Tharparkar are all large as shown in Figures 3-1-5, 3-1-6, 3-1-7, and 3-1-8, respectively. In fact, those figures are all largest among 23 districts in Sindh. In addition, the main road from Badin city to Kasbo in Tharparkar is relatively well maintained and consequently livestock is actively traded and delivered to outside of this zone as indicated in Figure 3-1-9. The outline of this zone is summarized in Table 3-1-4.

Table 3-1-4 Outline of the Eastern Extensive Meat Production Zone

	Description
Relevant area and districts	<ul style="list-style-type: none"> • Thar desert (Districts of Tharparkar, Umerkot, and the non-irrigated area in the districts of Khairpur and Sanghar)
Production potentials	<ul style="list-style-type: none"> • Livestock production capacity is lower than other zones. • The numbers of cattle, sheep, goat, and camel of Tharparkar are the largest among the 23 districts. • Low cost farming methods accustomed in the environment
Marketing potentials	<ul style="list-style-type: none"> • Good access to outside of the zone through relatively well developed road network

(4) The Western Extensive Meat Production Zone

Figure 3-1-1 shows that Kohistan hilly area located in the western part of Sindh is identified as the western extensive meat production zone. This zone is a part of the non-irrigated areas, and the characteristics of this zone from the livestock development view point are more or less the same as the eastern extensive meat production zone, yet there are two major differences. First, the number of livestock in this zone is not as many as the eastern extensive meat production zone, leading to less livestock production capability than the zone. Second, although the Indus Highway is built along with the eastern edge of this zone, inland road network is underdeveloped. It entails that the livestock farmers in this zone have difficulties in access to information, services, and markets that are necessary for livestock development. The outline of this zone is summarized in Table 3-1-5.

Table 3-1-5 Outline of the Western Extensive Meat Production Zone

	Description
Relevant area and districts	<ul style="list-style-type: none"> • Kohistan hilly area (Districts of Dadu and Jamshoro) *Following areas belong to other zones to promote milk production • Right bank of river Indus → the northern milk production zone
Production potentials	<ul style="list-style-type: none"> • Livestock production capacity is lower than other zones. • The numbers of cattle, sheep, goat, and camel are relatively large in the district of Dadu, while these numbers for the district of Jamshoro are less than those. • Low cost farming methods accustomed in the environment
Marketing potentials	<ul style="list-style-type: none"> • Interior road network is underdeveloped.

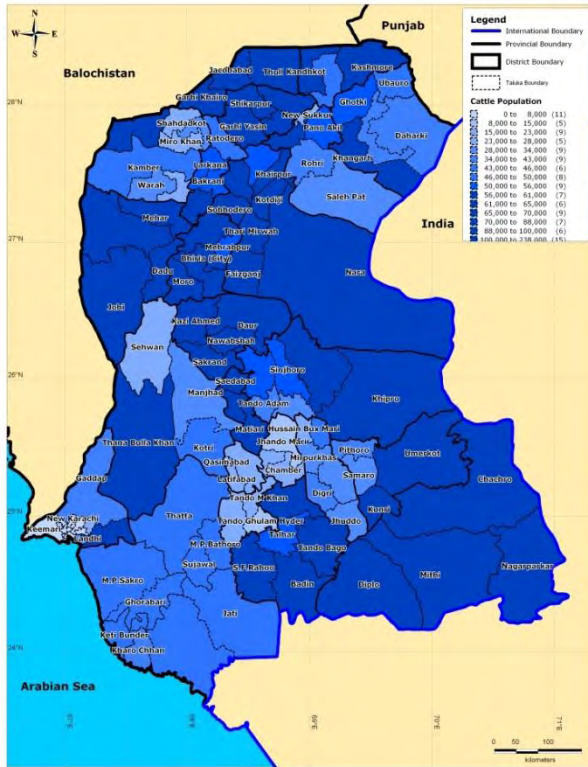


Figure 3-1-5 Cattle Population

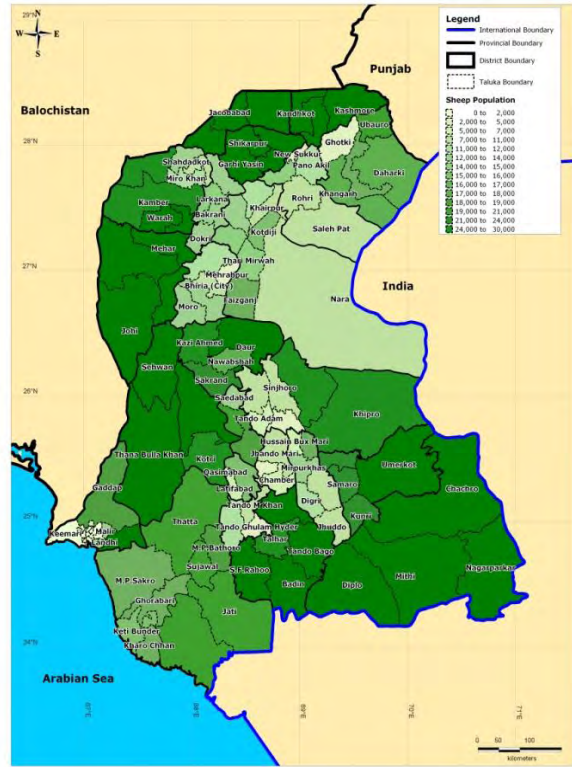


Figure 3-1-6 Sheep Population

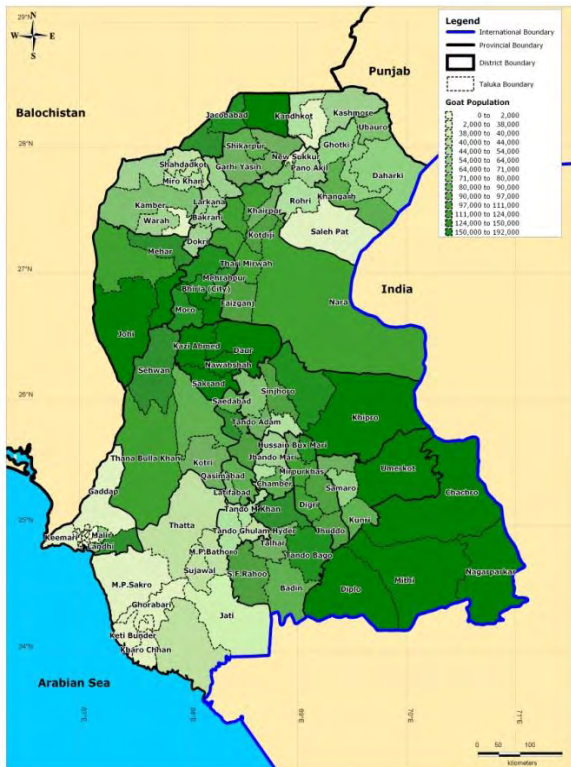


Figure 3-1-7 Goat Population

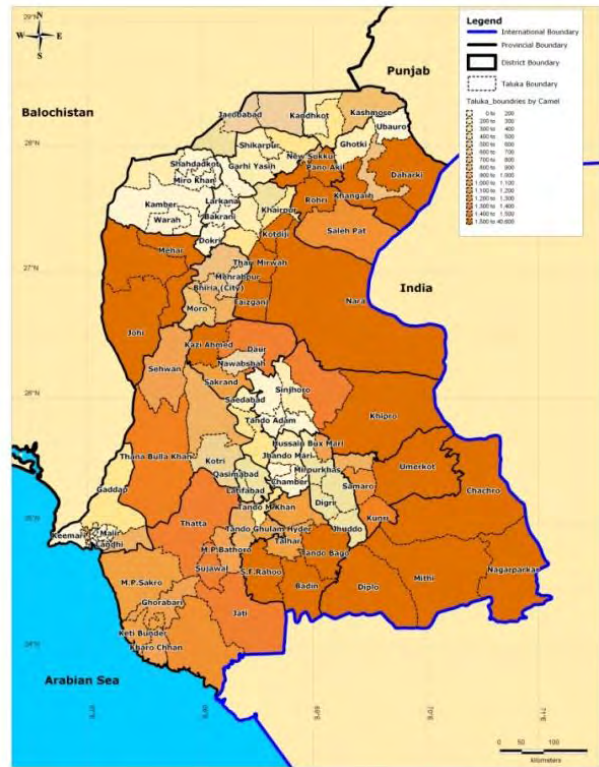


Figure 3-1-8 Camel Population

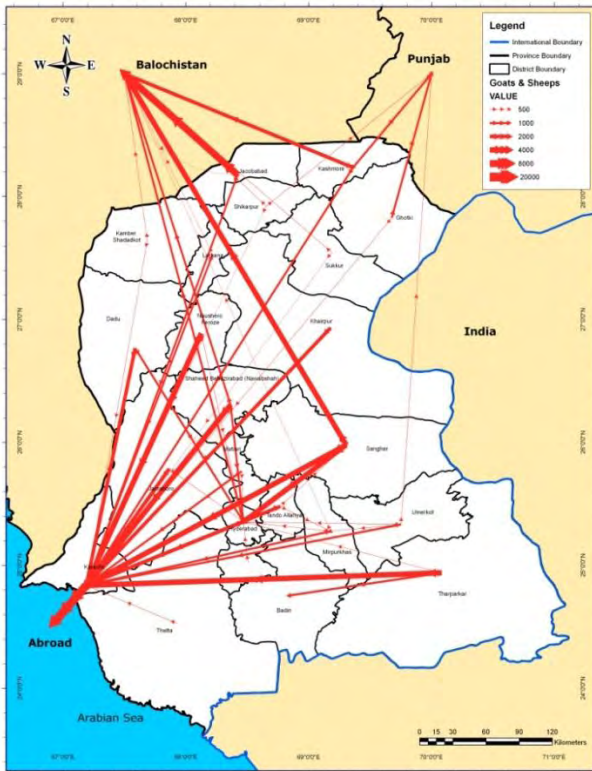


Figure 3-1-9 Flow of Goat and Sheep from Livestock Markets
Source: Surveyed by the Project Team

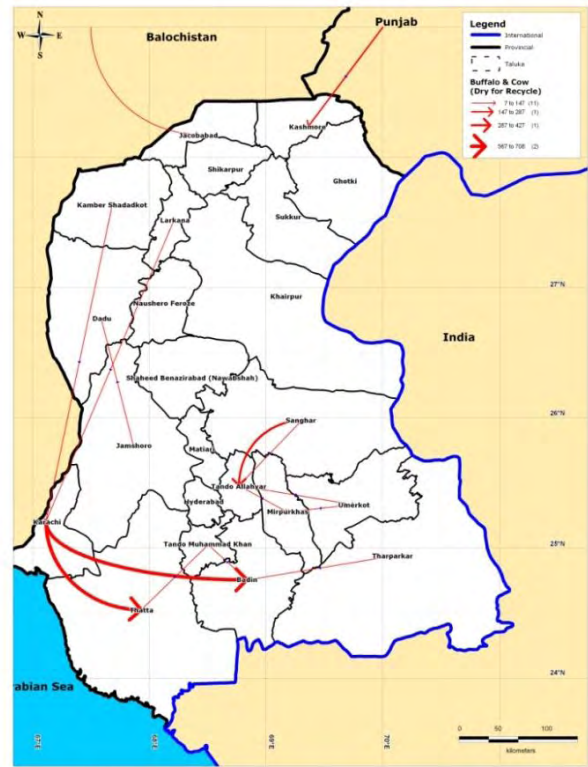


Figure 3-1-10 Flow of Dry Buffalo and Cow for Recycling
Source: Surveyed by the Project Team

(5) The Southern Integrated Livestock Development Zone

The southern part of Sindh is identified as the southern integrated livestock development zone as illustrated in Figure 3-1-1, because this zone has various kinds of development potentials. One of the unique characteristics of this zone is the cattle colonies, which were established to meet a huge milk and meat demand created from the population of Karachi and Hyderabad. Approximately 400,000 livestock produce milk in 8 colonies located near to Karachi, and are slaughtered for meat, but production volume does not fully meet the demand from the city.

Cattle colonies have to rely the supply of livestock for milk and feeds on outside the colonies, and both of which are currently delivered mainly from Punjab. Meanwhile, most of livestock in the cattle colonies are slaughtered once the first lactation period is over, although as Figure 3-1-10 shows some of them are recycled in the districts of Thatta and Badin. Furthermore, calves born in the cattle colonies are also slaughtered immediately after² the born although it is legally prohibited. They are waste of as well as untapped resources for milk and meat production. In addition, the cattle colonies have negative environmental impacts, specifically by untreated effluents and cow dung left outside. This is a serious issue, and should be urgently addressed.

Another main feature of this zone is the unique characteristics and functions of Karachi. First, different from the other cities medium and upper class urban residents exist in the city, and they may concern the quality of foods including milk and meat. Second, the city has functions as an export gateway

² Approximately after one week

and processing center. The outline of the zone is summarized in Table 3-1-6.

Table 3-1-6 Outline of the Southern Integrated Livestock Development Zone

	Description
Relevant area and districts	<ul style="list-style-type: none"> • Cattle colonies near to Karachi and Hyderabad • District of Badin, Hyderabad, Karachi, Mirpurkhas, Matiari, Tando Allahyar, Tando Muhammad Khan, and Thatta • Tand Adam (western edge of the district of Sanghar)
Production potentials	<ul style="list-style-type: none"> • Large population and high population density of buffalo and cattle • Cattle colonies located in the suburbs of Karachi and Hyderabad • Slaughtered young calves and dry animals • Accumulation of livestock processing industry
Marketing potentials	<ul style="list-style-type: none"> • Huge urban population in Karachi and Hyderabad • High-end domestic market including foreign residents and affluent nationals • Available seaport and airport for export • Accumulation of the export industry • Bordering location to Balochistan

3.2 Direction of Livestock Sector Development

In order to meet the challenge set forth as a grand objective of this project, the direction of livestock development in Sindh should be consistent with the grand objective. It should contribute to the higher growth of the agricultural sector by way of improving productivity and quality standard of milk and meat with employment friendly manner. It should contribute to reduce inter-regional as well as intra-regional disparity by taking full advantage of the region specific characteristics of the livestock sector. Also, it should be developed to terminate absolute poverty by the provision of technical assistance, externalities, and supportive institutions. We have already made several suggestions as to where and how the efforts should be directed by identifying 5 strategic zones. Although every zone has its own comparative advantage to be fully developed, the common goals are to enhance productive capacity and productivity per unit of livestock, upgrade quality standard, and enhance household income and asset of small, marginal and non-farm household in each zone. In order to achieve these common goals, the livestock sector development should be directed taking the following issues into consideration.

3.2.1 Improvement in Quantity and Quality

It is usually anticipated that the demand-supply gap in milk and meat would increase along with the rapid growth of GDP and per capita income in developing countries. This gap would appear first in quantity terms and later in quality terms. Fortunately, Pakistan has not reached that stage where the growth of demand exceeds that of supply in both milk and meat. It is primarily because the 2/3 of population lives in rural area where the livestock rearing is a part of life under the mix farming system for the majority of people. However, it is anticipated that the gap would appear soon or later when the non-agricultural sector starts growing with rapid urbanization. The tendency would be accelerated if the rapid increase in per capita income and improvement of income distribution takes place.

It is suggested later in the Report how the issue should be taken care of by the improvement in technology, marketing, social relation, and institution. As a result of such improvement, the long-term goal to be achieved should be that the dairy and meat products are self-sufficient in the province, meet consumers' preference in terms of variety, taste, safety, clean, etc., and internationally recognized with Sindh brand.

One of the biggest challenges is the effective way to improve the standard of quality. This is challenging, because the market is being run with profit by dealing with low quality milk and meat in urban areas. Since the business continues to generate profit under the present market condition, where price is not differentiated according to the quality standard, there is no incentive for those who participate in market transaction to improve the quality standard. One of the effective means to achieve the objective is to establish 'Sindh Agricultural Standard' and assure the higher price according to the quality at the government sales depots, or registered private shops. This may be the quickest way towards not only promoting export of dairy products and meat, but also to improve the market transactions, as well as to provide opportunity for producers to increase income by way of quality improvement.

3.2.2 Meaningful Development for Privileged and Vulnerable Farmers

As mentioned in Chapter 2, three major factors of livestock production, thus significantly influence the living standards and incomes of the livestock farmers, are land, water, and fodder which is subject to the former two factors. Accessibility of farmers to these factors varies area by area, and farmer by farmer. It is also affected by landownership and irrigation network. Therefore, livestock development should be planned and implemented taking such difference into account.

In particular, production of quality and value added products is not easy if farmers do not have good access to the above three factors. Farmers, who are privileged with these three factors, are expected to actively contribute for not only increasing production, but also improving the quality of and adding value to dairy and meat products.

On the other hand, farmers who have difficulty in access to the three factors are generally vulnerable. The enhancement of social opportunity and risk management capacity is therefore primarily essential for those farmers by engaging livestock activities or holding animals. Livestock development for those farmers should be meaningful for the stabilization of their livelihoods, and in this regard the support for strengthening their production and management capacity with low cost and low risk technology, including awareness building for encouraging them to become self-sustainable, is mostly needed. In addition, improvement of their access to livestock should also be prioritized. Traditional ways in Sindh, such as livestock sharing and recycling to be explained later, are worth consideration as the methods to circulate capitals between the privileged and the vulnerable farmers.

3.2.3 Increase of Farmers Income and Asset as an Ultimate Goal

For any of the development plans included herein, the main target is the livestock farmers, both commercial and non-commercial. In particular, small and mid-scale farmers, and landless farmers are focused, and the increase of their income and asset is considered as the ultimate goal when the development plans are formulated. To make sure that the projects will benefit those farmers in terms of income, the

targeting of the beneficiaries is needed. Farmers are therefore classified into different groups considering their landholding and livestock holdings. It should also be studied how the farmers are connected with other groups of the farmers in their activities. In this regard, social structures, such as the relationships between the farmers and landlords, landowners, or any other key stakeholders in the communities, are taken into account.

3.2.4 Potentials and Comparative Advantages for Leading of Pride and Dignity for the People

Throughout the study, the potentials for livestock development have been focused at the macro as well as the field levels. At the macro level, the potentials and the comparative advantages of Sindh are considered as the most important driving force for the stakeholders to push livestock development of Sindh ahead. The intention of focusing them is to develop Sindh province outstandingly unique in various aspects when compared with other provinces in the country. This sort of uniqueness would lead to the pride and dignity of the people in Sindh, and that is why it is important to make clear the potentials and the comparative advantages of the province.

3.2.5 Promotion of Private-led Development

The private sector-led development has been emphasized in the Livestock Development Policy prepared by the federal government in 2006. Considering the current strengths and weaknesses of the Livestock Department of Sindh, it is also true in Sindh that the role of the public sector should be limited to the areas where the private sector cannot do; for example, the milk processing companies are collecting milk in rural Sindh, and their coverage areas are expanding, which suggests that the public sector should let the companies collect milk, and should rather make itself concentrate on other areas. Whereas in reality, the government made the Pakistan Dairy Development Company (PDDC) and the Livestock and Dairy Development Board (LDDDB) functional as non-profit companies since the mid 2000s. Both of them covered a wide range of areas related to production and marketing, and unfortunately LDDDB terminated in June 2011, and PDDC is about to terminate. If this case is taken seriously, the public sector should concentrate more on poverty alleviation such as nutritious improvement rather than commercial activities; making policies, quality standards, and related surveillance; research and development for feeds and other appropriate technologies; demonstration of development models, etc. Assistance to marginal and small scale livestock farmers are also the responsibility of the public sector.

3.2.6 Development Foundations for Advanced and Modernized Livestock Development by 2020

Based on the above statements, it can be said that the livestock sector in Sindh faces a big challenge, in the necessity of shifting itself from traditional and subsistence to industrialized and market-oriented sector. For example, most of the livestock farmers are marginal or small scale, and their skills are far underdeveloped. The Livestock and Fisheries Department is not fully equipped with expertise necessary for supporting those farmers. Thus, among a number of the development options, the establishment of the development foundations, including human resources, technologies, and institutions, should be prioritized when the development plans by 2020 are formulated. When such foundations are established, the development activities could gradually be enlarged based on them.

3.3 Development Direction and Goals of the Five Strategic Zones

(1) The Northern Milk Production Zone

As shown in 3.1, this zone has an outstanding production capacity and marketing advantage on milk, and therefore milk should be the target livestock product. The development focus should be on the increase of production so as to supply more surplus milk to outside the zone. It will contribute to meet the increasing milk demand in the other part of Sindh and Balochistan. For achieving this agenda, productivity improvement and maintain in the number of high-productive livestock for milk are necessary. It is also important that the supply of milking animals and feeds to dairy farmers, particularly those who are in the cattle colony, should be maintained within this zone for sustainable production. Key activities are livestock technology improvement, recycling dry animals, and effective use of young calves. The development direction and goal of this zone are summarized in the following table.

Table 3-3-1 Development Direction and Goal of the Northern Milk Production Zone

	Descriptions
Target products	<ul style="list-style-type: none"> • Milk
Direction of production	<ul style="list-style-type: none"> • Production increase <ul style="list-style-type: none"> ➤ improvement of milk productivity, and maintain the number of high-productive livestock for milk • Quality improvement <ul style="list-style-type: none"> ➤ differentiation of milk by quality
Interaction with other zones and provinces	<ul style="list-style-type: none"> • Supply of surplus milk to other zones and Balochistan • Supply of feeder calves to the central intensive meat production zone
Prioritized actions	<ul style="list-style-type: none"> • Livestock technology improvement for better milk productivity • Extension of the technologies • Recycling dry animals generated from cattle colonies • Young calves salvation for meat and milk production • Introduction of quality standard for milk and awareness creation on quality differences
Goals	<ul style="list-style-type: none"> • Supplying more surplus milk to outside the zone

(2) The Central Intensive Meat and Milk Production Zone

Active livestock markets and favorable condition for livestock rearing are the major potentials of this zone, but the number of livestock for milking is not remarkable as compared with the other part of the irrigated areas. Considering the comparative advantage among the irrigated areas and the strength in livestock marketing, livestock production for meat should be prioritized for this zone, yet milk production is not ignored. In order to differentiate this zone from the western and the eastern extensive meat production zones, high quality and value added livestock for meat should be targeted. Seeking efficiency and complementarity this zone can rear stock cattle, sheep, and goats produced in the two extensive fattening zones for further fattening and value addition. Also male calves salvaged from cattle colonies can be reared in this zone for meat. The ultimate goal of this zone is to produce livestock for meat for export and high-end domestic market. As priority actions for this zone, appropriate fattening technology development and extension, introduction of meat quality standard, branding meat products, etc. should be implemented. The

development direction and goal of this zone are summarized in the following table.

Table 3-3-2 Development Direction and Goal of the Central Intensive Meat and Milk Production Zone

	Description
Target products	<ul style="list-style-type: none"> • Livestock for meat and milk (focusing on cattle and buffalo)
Direction of production	<ul style="list-style-type: none"> • Quality improvement <ul style="list-style-type: none"> ➤ differentiation of meat by quality, value addition, and export • Production increase <ul style="list-style-type: none"> ➤ improvement of meat and milk productivity
Interaction with other zones	<ul style="list-style-type: none"> • Receiving feeder calves from cattle colonies in the northern milk production zone and southern integrated livestock development zone • Receiving stock cattle, goat and sheep from the eastern and western extensive meat production zones • Supply of livestock for quality meat mainly to the urban areas in the southern integrated livestock development zone
Prioritized actions	<ul style="list-style-type: none"> • Livestock technology improvement for better meat productivity • Extension of the technologies • Introduction of meat quality standard and awareness creation on quality differences • Making use of business opportunity of Eid-ul-Azha • Branding meat products and creation of locally specialized products • Improvement of livestock market
Goal	<ul style="list-style-type: none"> • Production of high quality and value added livestock for meat for both domestic and international market

(3) The Eastern Extensive Meat Production Zone

As discussed in Chapter 2, the demand for livestock products seems to be low due to low population density and income level. Furthermore, as a result of the absence of irrigation system, they rely their source of income on livestock production, yet their livelihood is severe and vulnerable. Therefore, livestock development in this zone should principally intend to stabilize the livelihood of farmers through strengthening the source of income from livestock. Based on these circumstances and considering the comparative advantage of this zone mentioned in 3.1 Zoning of the Province for Livestock Development, production of small ruminants and camels mainly through grazing should be the key livestock development agenda of this zone. More specifically, increasing livestock production for meat at low costs, low investment, and low risk management should be aimed. For this to be materialized, improvement of livestock technologies and fodder for the non-irrigated areas and groundwater development are necessary. In addition, ostrich should be added as a target livestock, because it has a tolerant for dryness, heat, and coldness in this zone and marketing potential.

Relatively well developed road network in this zone will contribute to distribute animals to consuming areas. Also, it is expected that this zone supply the central intensive meat and milk production zone with stock cattle, goats, and sheep for further fattening to produce high quality and value added meat. The development direction and goal of this zone are summarized in the following table.

Table 3-3-3 Development Direction of the Eastern and Western Extensive Meat Production Zone

	Description
Target products	<ul style="list-style-type: none"> • Camel, sheep, goat, and ostrich
Direction of production	<ul style="list-style-type: none"> • Production increase <ul style="list-style-type: none"> ➤ improvement of productivity keeping the costs at the low level
Interaction with other zones	<ul style="list-style-type: none"> • Supply of stock cattle, goat and sheep to the intensive meat and milk production zones to produce quality and value added livestock. • Supply of livestock for meat mainly to the urban areas in the southern integrated livestock development zone
Prioritized actions	<ul style="list-style-type: none"> • Livestock technology improvement for the non-irrigated areas • Feeding management improvement in the non-irrigated areas • Fodder supply improvement in the non-irrigated areas • Extension • Groundwater development
Goal	<ul style="list-style-type: none"> • Livelihood of livestock farmers becomes more stabilized.

(4) The Western Extensive Meat Production Zone

The livelihoods of the locals and conditions for livestock rearing in this zone are the same as the eastern extensive meat production zone except for a few conditions. Therefore, the development direction and goal of the two zones are the same as shown in Table 3-3-4. Nevertheless, the inland road network is primarily needed as a pre-condition for the development of this zone.

(5) The Southern Integrated Livestock Development Zone

The production and demand for milk is discussed in 3.1, and it implies that an increase in milk production to achieve milk self-sufficiency should be prioritized in this zone. In order to achieve this, districts surrounding Karachi and Hyderabad should supply the cattle colonies with livestock for milk and feeds at reasonable prices. Effective use of currently slaughtered dry animals and calves brought from cattle colonies is necessary. Day animals are ought to be recycled in the districts of Badin and Thatta, female calves should be reared in this zone as livestock for milk, and male calves can be delivered to central intensive meat production zone for fattening. The improvement of milk productivity by applying appropriate technologies, and the maintaining of the number of high-productive milking animals are the important strategies to increase production. If the milk production meets the demand of this zone in future, it can be traded to Balochistan. In addition, to address the environmental issue of cattle colonies, facilities for waste disposal and treatment are necessary.

As to Karachi's specific development agenda, first, the quality-wise pricing and target marketing of livestock products can be introduced to high-end consumers in the city. Second, export of livestock products should be promoted exploiting such functions of Karachi as the export gateway and processing center. The development direction and goals of this zone are summarized in the following table.

Table 3-3-4 Development Direction of the Southern Integrated Livestock Development Zone

	Description
Target products	<ul style="list-style-type: none"> • Quality milk and meat
Direction of production	<ul style="list-style-type: none"> • Production increase <ul style="list-style-type: none"> ➤ improvement of milk productivity, and maintain the number of high-productive livestock for milk • Quality improvement <ul style="list-style-type: none"> ➤ production and promotion of high quality and value added livestock products for both domestic and international market
Interaction with other zones	<ul style="list-style-type: none"> • Supply of surplus milk to Balochistan • Supply of feeder calves to the central intensive meat production zone • Slaughtering livestock from the central intensive meat production zone for export • Receiving cattle, buffalo, goat and sheep for meat from the central intensive meat production zone, eastern and western extensive meat production zones
Prioritized actions	<ul style="list-style-type: none"> • Livestock technology improvement for better milk productivity • Extension • Recycling dry animals generated from cattle colonies • Young calves salvation for meat and milk production • Introduction of milk quality standard and awareness creation among consumers • Introduction of meat quality standard and awareness creation among consumers • Improvement of livestock market • Export and livestock processing promotion • Waste treatment in cattle colonies environmentally friendly and sustainably • Improvement of plots in cattle colonies to lower the stress of livestock so that increase in yield
Goals	<ul style="list-style-type: none"> • Self sufficiency of milk in the zones through utilizing untapped resources • Development of industrial cluster for livestock processing and export

3.4 Common Development Strategies among Five Livestock Development Zones

In line with the above-mentioned directions of livestock development, the five basic development strategies are delineated as shown below as the cross-cutting strategies over the five livestock development zones, and the detail description of each strategy follows.

1. Livestock Technology Development
2. Quality and Marketing Improvement
3. Entrepreneurship Development
4. Strengthening of the Department
5. Extension System Development

3.4.1 Livestock Technology Development

(1) Ways of Livestock Technology Development

As mentioned in 3.2.1, the directions of livestock development are to increase the production and improve the quality of dairy and meat products so as to achieve the long-term goals, that is, meet the

domestic demands in the province and promote export of those products as Sindh brand. The characteristics, potentials, and comparative advantages of livestock sector in Sindh are described in Chapter 2, based on which the following principles are drawn for livestock technology development in Sindh. First, the increase of dairy and meat production and productivity and the improvement of quality of products have to be promoted by bolstering the livestock industry and commercialization of livestock activities. Second, it is imperative to polish the good dimensions of the traditional ways of livestock rearing and family based management which is the currently predominant practices in the region. Third, it is necessary at this stage to start focusing also on international markets as the response to the increasing demand for Halal meat particularly in the Islamic countries. Fourth, it is necessary to draw the potential of high productivity of livestock as much as possible by the genetic improvement of the proper breeds of livestock, which gives the pride of Sindh as the home of the proper tropical breeds.

In line with the above-mentioned goals and principles, the directions of livestock technology development shall be that appropriate technologies are developed and extended for dairy and fattening farming suitable to the areas, and consequently an area-wise livestock industry becomes active. More specifically, commercial dairy and fattening farming in urban and rural areas, and appropriate dairy and fattening farming for micro, small, and medium scale farmers are rooted in the areas.

(2) Limitation and Countermeasures

For promoting livestock technology development, however, there are a number of issues that have to be overcome as discussed in Chapter 7, and comprehensive measures are desired to be taken. Among the issues discussed, the problem of fodder availability is especially serious. In Sindh, a large amount of by-products of agriculture have been produced thanks to the irrigation system, and these by-products have been



used also as the feed for livestock. However, feedstuff production is unlikely to increase, as the irrigation water has begun to be insufficient in recent years and cash crop production is prioritized to feed production. Consequently it is almost certain to reach the limit soon in the increase of the number of livestock. This point is thought to be one of the biggest bottlenecks for the livestock sector.

Therefore, the increase of productivity of an individual animal is thought to be important as the direction of development in future. As a common agenda for all sizes of livestock farmers, it is important to implement the development and the extension of appropriate livestock technology and the genetic improvement of livestock simultaneously in order to shift their strategy from the current production system that aims to increase production by increasing the number of livestock to the improvement of productivity and weight gain of individual animals.

Nevertheless, for small and medium size farmers, increase in the number of livestock holding is continuously needed as well as the productivity increase. Yet, with the increase in the scale of livestock production, it is necessary to implement the measures to enhance their technology and enable qualified farmers to become commercialized. The means to increase the number of livestock should mainly be taken

by 1) improvement of reproductive efficiency, 2) decrease in morbidity rate, and 3) promotion of the utilization of calves which are slaughtered right after their birth.

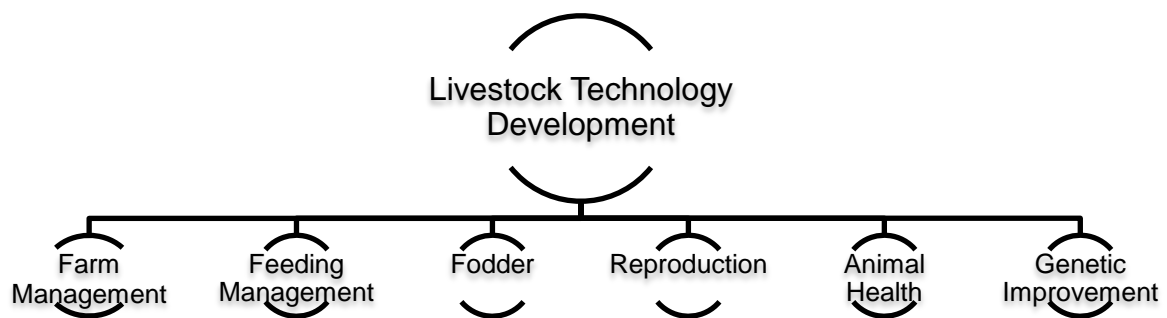
(3) Major Strategic Areas for Livestock Technology Development and Extension

As to the major strategic areas for livestock technology development, the six areas are thought to be important, such as farming management, feeding management, fodder, reproduction, animal health, and genetic improvement. In addition, the way to develop and extend appropriate technologies is another main pillar of livestock technology development. The “appropriate technology” here indicates the basic technologies that enable the farmers to produce the products of good quality with low cost based on their technological levels, the surrounding environment, prices, and markets at the time, and eventually through which they can enjoy the improvement of their livelihoods.

Table 3-4-1 summarizes the goal, the direction of development, and major strategic areas. The short-term countermeasures for the above six areas and the steps to develop and extend appropriate technologies are discussed below.

Table 3-4-1 Goal and Direction of Long-term Strategy for Livestock Technology Development

Goal	Direction of development	Major strategic areas
Dairy and meat products are self-sustained in the province and meet the consumers’ needs. Sindh dairy and meat products are internationally recognized with Sindh brand.	For increasing the production and improving the quality of dairy and meat products, area-wise livestock industry is active through the promotion of (i) commercial dairy and fattening farming in urban and rural areas, and (ii) appropriate dairy and fattening farming for micro, small, and medium scale livestock farmers.	i) Farm management ii) Feeding management iii) Fodder iv) Reproduction v) Animal health vi) Genetic improvement



(4) Development Strategies of Each Technical Field

(a) Farm Management

The types of livestock farming in the province are diverse. With regard to major livestock, cattle and buffaloes, the types of farming can be divided into commercial dairy farming and fattening in the irrigated areas, natural fattening in the non-irrigated areas, and the large-scale and intensive dairy farming at cattle colonies. Goats, sheep, and camels are also popularly reared intensively and extensively both in the irrigated and non-irrigated areas. Still, the farmers in the province differ in terms of scale of farming where they are extended from large to small scale, and there are also landless farmers. However, livestock farmers manage their farm often relying on their experiences and intuition rather than verified methods. All livestock farmers in various size and types should earn stable and sufficient income or benefit through practicing better farm management.

- Improvement of farming management

It is one of the goals that all livestock farmers run their farming activities efficiently and increase their income. In order to achieve this, it is first important to categorize livestock farmers by area, management type, and scale of farming, to analyze appropriate farm management styles for various types of farmers. Next, various farm management strategies and models including appropriate technologies should be established through on-farm verification. Then, these strategies and models should be presented to each category of farmers.

Environmental issue is part of farming management. It is necessary to mitigate the negative impact on environment, which is made by the growth of livestock sector. Especially, it is imperative to deal with animal dung and other wastes created from livestock farms in the urban and peri-urban areas, e.g. cattle colonies.

(b) Feeding Management

Though Sindh has a long history of livestock farming, appropriate feeding management, which is verified on the ground, has not been identified. Feeding management technologies should be improved and practiced depending on species, breed, category of livestock, and farm size, to draw the potential they originally have as much as possible.

- Improvement of Feeding Management

Appropriate feeding management includes the installment of shades and windbreaks that mitigate the heat in summer, the cold in winter, and the outside stresses made by ecto-parasite. It also means the improvement of rearing condition by cleaning of paddocks and sheds, etc., the establishment of the appropriate models that satisfies the necessary energy requirement for each stage of livestock management. These stages include the time for suckling, weaning, rearing, mating, pregnancy, later stage of pregnancy periods, and plus lactation and dry periods for dairy animals. The supply of fresh and ample amount of water, and the improvement of the timing and the way to feed animals are also important issues.

These technologies should be practically tested on the field and carefully selected before widely extended. For smooth extension and adoption by farmers, the technologies should be the ones with low cost and effective and easy to adopt.



(c) Fodder

As mentioned earlier, the problem of fodder availability is an urgent issue and major constraint for production in terms of quality and quantity. The insufficiency of fodder seasonally fluctuates, and it has become serious in these days due to heavy rain, flood, drought, etc. For the farmers to enjoy stable supply of feeds, it is necessary that fodder is sufficiently available within their vicinity by fully utilizing locally available resources. In addition, fodder should be supplied so as to meet nutritious requirement of each animal of different livestock species at any time of their growth.

In order to sufficiently supply fodder to animals, it is important to take some measures to improve the productivity and quality of fodder, and to use the potential lands in the irrigated and non-irrigated areas for producing fodder.



i) Establishment of the feed standard and efficient feeding methods

Through research and development, it is necessary to find out the ingredient of feed (roughage, agro-industrial by-products, concentrates, and formed feed) that are locally available, to analyze the balances of fodder and livestock nutrition, its effect on the production and reproduction of livestock, and to find out the optimum combination of them. The agro-industrial by-products include molasses and its residue after spirit is produced. The objective of this is to establish the feed standard and efficient feeding methods. In this respect, toxic contents of the feed stuff should carefully be analyzed.

ii) Introduction of high yielding fodder crops

With the limited available land and water, high yielding fodder crops will be introduced to increase production per unit area.

iii) Improvement of open land

Open land is generally used for cutting grasses for fodder and grazing animals. Fodder production can be improved by planting leguminous fodder trees as supplemental feed, and the development of range land.

iv) Improvement of salt-damaged land

Salt-damaged land is left fallowed or abandoned. Planting salt tolerant forage crops can contribute to the improvement of the land, and these crops can be used as supplemental feed.

v) Improvement of feed storage

It is important to process and store feedstuff as a form of hay or silage so as to fill the seasonal gap of feed availability and supply nutritious feed to livestock. Production and storage technologies should be demonstrated in selected areas and extended to farmers throughout Sindh. This will be a good preparation for the unforeseeable circumstances such as heavy rain, flood, drought, etc.

(d) Reproduction

Reproduction and feeding management are the two important factors that work together for the improvement of livestock productivity. The objective of reproduction is to increase the conception rates and shorten the calving intervals.

The farmers in general including small and medium farmers should conduct natural mating using the bulls that are improved by breeders and guaranteed with their capacity. Apart from natural mating, there are other methods of copulation as artificial insemination for the male side technology and embryo transfer of the female side. Artificial insemination is effective and low cost, and it is an important tool for genetic improvement. In particular, the non-descriptive animals, the majority breeds in Sindh, are expected to be crossed with high yielding exotic breeds or F1 crosses. Nevertheless, conception rates of artificial insemination of buffaloes are especially low, and therefore it is not spread widely at present.

In Sindh there are the proper breed and its cross breeds of Zebu cattle adapted to harsh environment of the area. A policy measure is important, if milk production is to be increased in short time, to encourage the crossing of such local cow with an European breed. In general, the recommended breed ratio is 3/4 of European breed at maximum and 1/4 of Zebu breed at minimum; however, there is also a risk to produce an unproductive breed unless such ideal breed ratio is seriously maintained, i.e. the heterosis effect cannot be expected any further. It is known that when both a local Zebu and an European breed to be

crossed have high capacity the heterosis effect becomes high in terms of productivity, reproductivity, resistance to diseases, etc. By these reasons, what is more important is to promote genetic improvement of proper pure breed rather than crossing.

In addition, one of the reasons for low conception rates of artificial insemination is inappropriate frozen semen. Without improving quality of frozen semen, higher conception rates and consequential prevalence of artificial insemination are not materialized. Another reason is that skilled AI technicians are limited.

As it is expected to take a long time to make artificial insemination practical and reliable, natural mating should be the main method of breeding for the moment.



i) Improvement of reproduction technologies by teaching the reproductiveness diagnosis method to technicians

It is indispensable to improve the reproductive capacities of both the male and female sides. For the male side, it is necessary to improve the andrology technology and the system of diagnosis for selecting the ones with better reproductive capacity and cull others. For the female side, it is important to check the conception after the delivery as early as possible, and, for the cows which are not pregnant, it is necessary to take diagnosis and necessary treatment. The reproduction management technologies at the farmer level should be enhanced through empirically verifying their effectiveness depending on the management type and scale of farmers.

ii) Preliminary study on reproduction by artificial insemination

A preliminary survey should be implemented by region, season, and feeding management type. It aims to raise the conception rate, and find out the constraints in the production of frozen semen. Based on this, it is necessary to clarify the appropriate artificial insemination technology and system, and establish the basic procedures for artificial insemination. Then, the efforts should be made for upgrading the skills of AI technicians, including the establishment of AI training institute and certification system of the technicians.

iii) Improvement of the production technologies of frozen semen

It is necessary to identify the appropriate production method of the hygienic frozen semen with good motility whose capacity is guaranteed. It is a basis for the use of artificial insemination technology.

(e) Animal Health

In recent years, the occurrence of zoonosis such as brucellosis and tuberculosis has been getting serious for not only livestock but also livestock technicians and farmers who have contacts to livestock on a daily basis, as well as consumers. These diseases and FMD affect the productivities of milk and weight gain,

and moreover, they are the major obstacles for export promotion of livestock products. The other important diseases affecting milk and meat productions such as mastitis, external and internal parasites should also be reduced with proper treatment and management efforts. The major objective in the field of animal health is to decrease mortality and morbidity rates of livestock by enabling livestock farmers to take necessary measures by themselves.

i) Enhance the livestock disease diagnosis system

It is necessary at first to find out the main diseases in the region by conducting an epidemic surveillance, nurture the examination technicians in every part of the province, and install necessary examination machinery. The vaccination coverage for contagious diseases of livestock needs to be increased. Those aim to strengthen the livestock disease diagnosis system through the improvement of the accuracy and the speed of disease examination by the department.

ii) Training of the livestock technicians and farmers on disease prevention and emergency treatments

In order for the farmers to be able to conduct disease prevention and emergency treatments by themselves, it is imperative to conduct training of the livestock technicians and farmers, particularly on vaccinations, prevention of mastitis, treatment of external and internal parasites, etc.



(f) Genetic Improvement

Given the limited feed resources, productivity improvement in terms of milk and meat (weight gain) should be an objective of genetic improvement. Although the proper breeds to Sindh give pride to the people of the province as the owners of native breeds as mentioned above, there is no clear guideline as to how to improve the breeds and on what purpose.

- Improving production capability of milk and meat

Improvement of livestock breeds takes a long time, at least a few years when the improvement results become known and the farmers get the fruits. It is however necessary to start establishing the system of genetic improvement at this moment for drawing the potentials of native breeds, and it is preferably carried out by the investments of the farmers, as its fruits are captured by the farmers at last. In order for it, it is necessary at first to have the consensus among the parties concerned on the desirable goal of genetic improvement and then establish the plans of improvement.

As the genetic improvement is a long time engagement, it is necessary to involve the private sector for setting up an

enforcement institution. The plans of genetic improvement should be prepared under the leadership of that institution. After inviting the farmers and breeders to participate in this activity, the following measures should be taken: i) registration of individual animals, ii) milk inspection (simple method of herd improvement test) and the selection of elite cows, iii) pedigree registration of proper breeds, iv) production and performance record of superior bulls, and v) making mating plans by artificial insemination in a way that is discussed above. By issuing the pedigree registration certificates, it becomes possible for the holders to sell their livestock at higher prices. Thus, it is also expected to lead to the increase of the number of breeders and the improvement of breeding technologies.



(5) Development and Extension of Appropriate Technology

The development and extension of the appropriate technology have not been properly and systematically conducted. Based on the current institutional set up, the department alone cannot fully implement such development and extension. Thus, establishing an extension system is a significantly important task, and it is discussed in the “Extension System Development Strategy” later. The development and extension of the appropriate technology should be made in the three steps shown below.

(i) First Step: Technology Development

For every technological field mentioned above, selection of the seemingly proper technologies, and extraction of appropriate technologies shall be made by conducting on-farm verification at the pilot farms and evaluating them in accordance with the criteria of low cost, effective, easy (to adopt) and valid (well proven). Also, it is important to instruct the farmers with the proper prioritization of the appropriate technologies according to the scales and types of farm management.

(ii) Second Step: Preparation of Extension Texts of the Appropriate Technologies

The extension manuals of appropriate technologies should be prepared. There should be two separate manuals for

extension workers and farmers. The manuals for farmers should be easy to read using as many pictures and figures as possible. Before preparing the texts, it is necessary to clarify who in which institution and how they instruct the extension workers and farmers. The places of extension activities shall be at the backyards of farmers' houses and private and public facilities at the Taluka, city, and district levels. The methods of instruction include training, seminar, workshop, practice, and observation, and for the instruction, teaching materials such as picture story, texts, and practice materials shall be prepared.

(iii) Third Step: Instruction of the Appropriate Technologies

To establish effective extension methods, it should be examined what subject of technologies farmers are likely to be interested, in other word whether or not they put these technologies into practice and continue to use them. After they are confirmed, such subjects shall be applied. At the same time, the extension workers who are responsible for technology transfer should be trained.

3.4.2 Quality and Marketing Improvement

To foster the livestock sector, the mechanism, in which i) farmers produce livestock products for fitting to consumer's needs, ii) their products are evaluated fairly at market, and iii) farmers receive feedback as a shape of better profits, is essential. For this purpose, improvement of distribution channel for enabling producers to sell their products without difficulty, adequate evaluation system for their products, and reasonable returns to producers based on the result of evaluation are important.

Since milk is spoiled fast, the farm gate price heavily depends on the distance and duration from farm to market, and the presence of transportation means. Since some producers at the rural area are discouraged to produce milk because of lack of market access, improvement of distribution channel is important to increase production and distribution volume of milk.

On the other hand, regarding meat, the distance from farm to market is not critical for its marketing because livestock, not meat, is transported from farm to consuming or processing areas. The price of livestock is determined based on experiences of buyers and/or sellers based on variety of livestock, age in months, and physical features, but not either yield rate or quality of meat. Moreover retail prices of beef and mutton are determined by each district government, and price is not reflected by quality of meat. However, once consumers are aware of quality, they would start demanding high quality of meat. The more consumers demand high quality products, the more sales amount or volume producers receive.

Consumers' needs will be more diversified in future; some may require soft meat and others may prefer less fat meat due to their awareness of health. In addition, although consumers, distributors, and retailers are not much aware of hygienic products, it will be rising in accordance with increase of people's income. Moreover, quality improvement, diversification of products, and establishment of quality standards are important to promote export¹. Therefore, the ultimate goal of marketing strategy is that "dairy and meat products which are hygienic and conforming to consumers' needs can reach to the consumers". Accordingly, necessary measures such as an establishment of appropriate quality standard, which will be base of a Sindh agricultural standard, are essential after analysis of consumer needs and future trends is made.

¹ For the promotion of export, firstly the domestic milk and meat supply should be able to meet the domestic demand. To maintain meat supply in the country, the ministry of commerce has been considering to place a ban on meat export as of August, 2011. The export of live animals has been already banned.

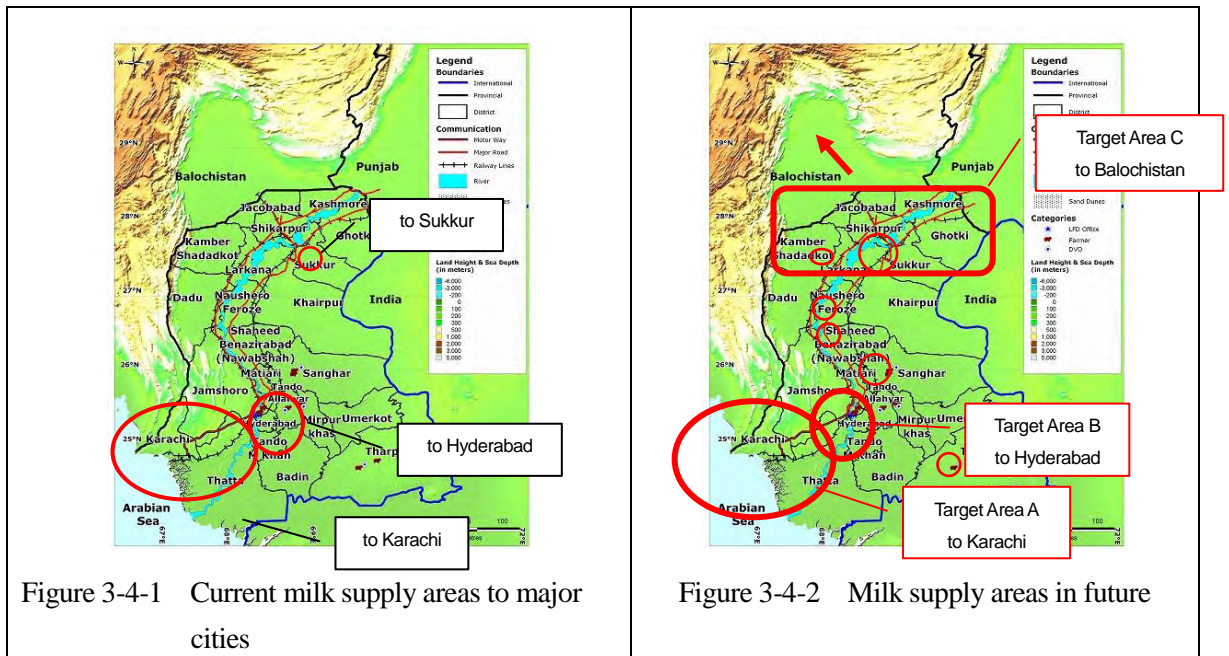
Table 3-4-2 Goal and Direction of Long-term Marketing Strategy

Goal	Direction of development	Major strategic areas
Dairy and meat products which are hygienic and conforming to consumers' needs can reach to the consumers	The appropriate distribution system from production sites in Sindh to consumer sites is established. Dairy and meat products as well as livestock are dealt with prices based on its quality	i) Improvement of distribution channel ii) Quality control iii) Diversification of dairy and meat products

(1) Improvement of Distribution Channel

Figure 3-4-1 indicates the current milk supply areas to major cities. It is expected that cities such as Karachi, Hyderabad, and Sukkur will be further urbanized in future, and demand for milk in those areas, especially Karachi whose population growth rate is high, will increase significantly. Besides, Balochistan will also be urbanized. Since a highway is built from the upper Sindh to Quetta, which has the largest population in Balochistan, the upper Sindh will be the milk supply area to Baluchistan in future.

Although the production of processed milk has been increasing, the market strategy needs to focus on fresh milk's distribution channel because of people's strong preference to fresh milk in Pakistan. Therefore, as shown in Figure 3-4-2, to meet the increasing milk demand, the surrounding area of the large cities and the upper Sindh, potential milk supply area to Baluchistan, should have the priority to improve production and distribution channel from a view point of marketing.



In order to improve the distribution channel, three short-term measures are shown in the following:

i) Capacity development of marketing skills for Marginal, small, and medium scale dairy farmers: improvement of traditional milk distribution channel

A program to improve marketing skills for Marginal, small, and medium dairy farmers who produce majority of milk is required. To be more concrete, a model for joint marketing among the farmers group, market research by farmers themselves, etc., is developed and disseminated in the priority areas mentioned above for increasing sales amount and volume

ii) Improvement of milk distribution channel installed by milk processing companies

The milk processing companies have been developing their own cold chains and have reached the rural areas where milk distribution channel is limited. Since the production volume of processed milk has been increasing by 20% according to the White Paper published in 2006, distribution channel can be developed by private sector. In order to develop distribution channels further, the government needs to clarify the roles of private and public sectors and develop an action plan together with private sector.

iii) Improvement of milk distribution channel by installing chiller facilities

By installing chiller facilities, producers have an opportunity for accessing to market easier. Chiller tanks have been installed in the areas, and private companies have started frozen milk business. By installing chiller facilities as a model, and analyzing its cost benefits, the results are summarized and shared widely among the stakeholders to expand cold chain of milk over the province.



In case of meat, a number of the issues related to livestock market and slaughterhouse are pointed out although these facilities are the key in the meat distribution channel; for example, necessary facilities such as water, feeding area, electricity, medical services, shed, security, etc. are not provided to livestock markets. Slaughterhouses are established at every district, but some of them do not function well. Livestock are therefore mostly slaughtered near meat shops or other selling places. For smooth distribution of livestock and meat, improvement of livestock market and slaughterhouse is essential.

iv) Improvement of livestock market and slaughterhouse

A model livestock market and a model slaughterhouse are demonstrated, and a guideline for managing the livestock market and the slaughterhouse are developed.

(2) Introducing of Sindh Quality Standard

Livestock and meat are graded based on yield rate and quality in developed countries including Japan, and prices are determined based on these grades. However, the quality standard and grading system for livestock and meat do not exist in Sindh. Quality of milk is assessed by smell and hand but not by scientific methods. Nevertheless, consumers would demand high quality of products as well as hygienic products in future, and quality standard should be required for export. Thus, a quality control system, which could practically be adapted to Sindh, needs to be developed. The quality control is necessary to add values to high quality products in the market. The branding of the products is one way to raise the product quality².

i) Survey on quality of meat products and development of draft grading system

Considering the current situations and future market trends, the grading system needs to be drafted. It aims that farmers become conscious with quality and hygiene of meat by sharing the results of the quality survey and consumer survey.

ii) Quality survey of milk

Based on a survey on milk quality and hygiene in distribution channel and a consumer needs survey to be conducted, the relationship between quality of milk and consumers' preferable taste is clarified. With the guideline for quality control to be prepared based on the above survey, the awareness of the farmers and other stakeholders is raised, and consequently the milk quality is improved.



(3) Diversification of dairy and meat products

Consumers' needs on dairy and meat products differ according to areas, religions, incomes, educational levels, etc. Understanding the market needs is essential to diversify dairy and meat products for the purpose of value addition. Moreover dissemination of necessary market information to stakeholders is important for them to be able to deal with their products with appropriate price. The results of consumers' needs survey as well as necessary market information should be shared for facilitating farmers and other stakeholders to efficiently produce and distribute the products based on the consumers' needs.

In addition, promoting local specialty such as local poultry, camel, ghee, butter, cheese, etc. can contribute to income increase of the producers, and regional development, and eventually export of those products in future. Necessary measures are the following.

² There are many Japanese beef brands in Japan. The brand owners are agricultural cooperative, farmers association in collaboration with local government, or large farmers. Many brands are defined by breed as well as quality of meat. If the quality of meat does not meet their product criteria even if it is a proper breed, they do not sell it as their brand beef. The meat grade is defined by yield rate and meat quality. The meat quality is measured by fat content, color, steadiness, texture, etc.

i) Consumers' needs survey

Consumers' needs survey on dairy and meat products is made. The results are used for drafting the grading system as mentioned above. The results of the survey are widely shared in order to facilitate producers and other stakeholders to produce products that meet consumer needs.

ii) Provision of necessary market information

To facilitate that people deal with livestock, dairy and meat products efficiently, necessary market information is provided. For this purpose, market information to be collected is identified, and market information system is established as a trial.

iii) Promotion of local specialty

Based on market survey, local products are selected and promoted. The system necessary for this is established.



3.4.3 Entrepreneurship Development

The demand for livestock products has been increasing according to the recent population and income growth. This is a favourable opportunity for livestock farmers to earn more income and improve their living standards from livestock farming. However, this chance is not fully utilized due to several reasons. Besides the lack of technical capacity of the farmers on production and marketing as mentioned earlier, lack of business mind and basic skills in many of the livestock farmers are the main constraints in this regard. For marginal and small farmers in particular, mechanisms and/or schemes to acquire and increase the number of livestock with their financial capacity seldom exist.

Table 3-4-3 Goal and Direction of Long-term Strategy for Entrepreneurship Development

Goal	Direction of development	Major strategic areas
Livestock farmers generate profits and stabilize their livelihoods by livestock farming.	Livestock farmers are motivated for improving their living standards by livestock farming. Livestock are accessible for marginal and small farmers. Female farmers are focused in project activities.	i) Creation of Business Mind and Opportunities ii) Incorporation of Women iii) Promotion of private-led livestock development iv) Promotion of Livestock Distribution with the Untapped Resources

(1) Creation of Business Mind and Opportunities

Technical knowledge and skills are essential for the livestock development, but first of all, it is important for all livestock holders, particularly vulnerable farmers, to have a mind to generate profits as much as possible and improve their life through livestock farming and believe it is possible. Apart from the marginal farmers, a large number of the farmers have a capacity to expand their production and increase sales, and many of them are motivated to do so. However, due to the lack of appropriate business skills and knowledge, it cannot be materialized.

It is in many cases difficult for marginal and small scale livestock farmers to access to markets and credits. In addition for them, the relationship with the other stakeholders such as government agencies, NGOs, and landholders is not equal. Those partly strengthen their vulnerabilities, and bring difficulties not only in livestock farming but also livelihood as a whole.

The formulation of a farmers group is an effective countermeasure to address these issues if the people can be united and collaboratively work together. In rural Sindh, the relationship between the people in the same Biradari is close, but the relationship between the different Biradaris is relatively weak. In general, multiple Biradaris exist in one village, and one Biradari is composed of several sub-groups in the village. People feel their belongingness to their sub-group. In such group, they mutually cooperate for their lives and/or mitigate risk together in the community. These characteristics of Sindh society are apt to impede collective activities beyond this sub-group. As a result, farmer cooperatives consisting of various Biradaris are hardly seen in rural Sindh.

i) Strengthening business mind and basic skills

To minimize costs and maximize profits should be the common target for all the livestock farmers, including marginal and small scale farmers. In order for this to be materialized, creation of business mind and provision of basic business knowledge for those farmers, in other word basic farming management skills, are necessary.

ii) Fostering Livestock Entrepreneurs

The farmers, those who have a potential for establishing an enterprise or have already been commercialized, will be provided trainings on the farm management and business development skills so that they may improve the balance of payment, analyse market opportunity, prepare and implement their business plan.

ii) Organizing farmer groups

To strengthen small scale livestock farmers, assistance should be provided to organize those farmers into a group so that they may improve access to credit, and facilitate production and marketing activities collaboratively. It is appropriate that sub-group of the same Biradari is the basic unit for organising the farmers into a farmer group.

(2) Incorporation of Women

Women are traditionally responsible for household duties in and around their houses, and also livestock husbandry except for grazing. Their entrepreneurship should not be neglected. In order to increase the productivity of livestock, the women's skills for animal husbandry should be improved, but they have difficulties to receive needed training because of social and cultural norms. Therefore, when any project is planned and implemented, it should pay careful attention to women. Therefore, it is important to facilitate the incorporation of women in livestock development and exerting their potential through such activities as

trainings for entrepreneurship development of women, formulation of women's group, and designing of the models for livestock asset building for women.

(3) Promotion of Private-led Livestock Development

The private-led livestock sector development is focused in this master plan, as it is necessary to foster the market-oriented competitive livestock industry. However, the potential of the private sector has not been fully exerted in the livestock development, because both public and private sides fail to create mutual understanding on development needs, direction, potentials in the livestock sector. It is partly revealed by the fact that public and private collaboration is very limited. Meat processing and milk processing companies rarely jointly work with the livestock department, while several pharmaceutical companies provide or receive technical training at the occasion of farmers' field day.

(i) Fostering the public and private partnership

The public and private sector should actively collaborate. It can be started through a regular sharing of information on appropriate technologies or other topics which could benefit to the companies. For the success of collaboration with the private sector, transparency and accountability of the direct stakeholders are essential³. After making such first-stage collaboration successful, an official structure such as a "marketing board" could be established for promoting public and private partnership. The marketing board could cover not only dairy but also meat industry in future.



(4) Promotion of Livestock Distribution with the Untapped Resources

In order to improve an availability of livestock, the use of the livestock waste is one of the efficient methods. Most of calves and dry animals generated from cattle colonies are immediately slaughtered for meat. They could be supplied at minimal costs, yet no mechanism exists to distribute the untapped livestock resources to rural livestock farmers. Livestock sharing is one of the other potentialities, particularly for marginal farmers to obtain livestock. It is commonly practiced throughout Sindh, but sometimes it is disadvantageous for rearing farmers over owners. Livestock revolving is a relatively new system to supply livestock to farmers at low costs, but it is practiced and succeeded in many developing countries, and worth applying to rural Sindh.

³ Although the board of PDDC consisted of representatives of both public and private sector, representatives from private sector left from the board because of lack of proper balance between public and private, transparency, and accountability. When a board between public and private sector is established, those issues need to be considered well.

i) Salvation and utilization of calves

In order to salvage and distribute calves born in cattle colonies, a mechanism must be established through collaboration between the public and private sectors. The public sector should provide some sort of initial assistance to design and make the mechanism functional, but it should end up in being operated on a commercial base for sustainability. One of important assistances is to provide training and extension services on calf rearing to rural farmers who will buy the salvaged calves.

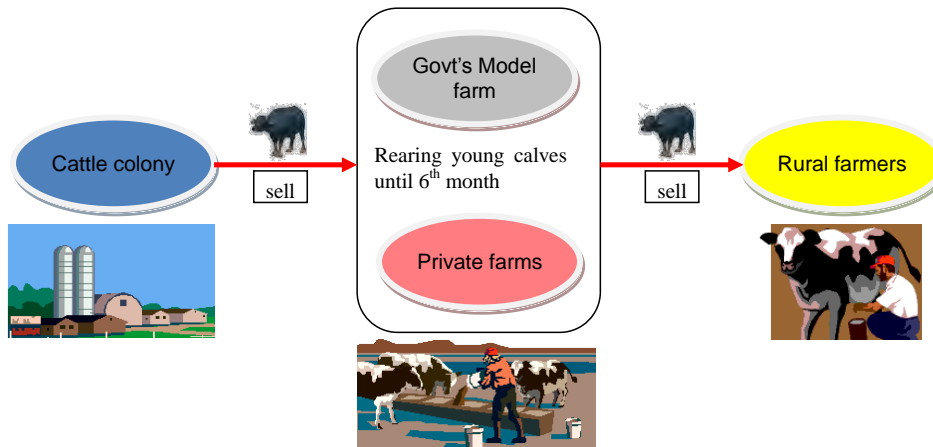


Figure 3-4-3 Calf salvation mechanism

ii) Recycling milking animals

There must be a mechanism to distribute dry animals from cattle colonies to rural villages for recycling. It seems to be two options for recycling. One option is that owners maintain the ownership of dry animals and contract out for recycling animals to rural farmers until the next lactation period begins. Another option is to trade dry animals to other dairy farmers who recycle the dry animals for milking or resale. The public sector should play an important role to establish the mechanism for distributing dry animals and make this operated sustainably on a commercial base.

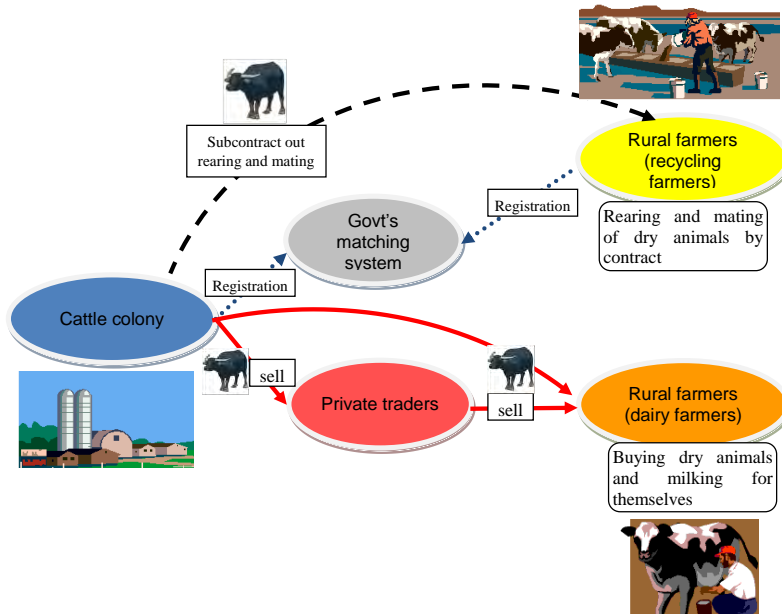


Figure 3-4-4 Livestock recycling mechanism

iii) Promotion of livestock sharing

Livestock sharing system should be reviewed and reasonably redesigned for the fair benefit of both owners and sharers. It is also highly recommended to prepare a document on the agreement which specify the contract period, share ratio, cost sharing between an owner and sharefarmers, so that the probability of fulfilling the agreement become higher. Any type of livestock can be reared and shared by this system.

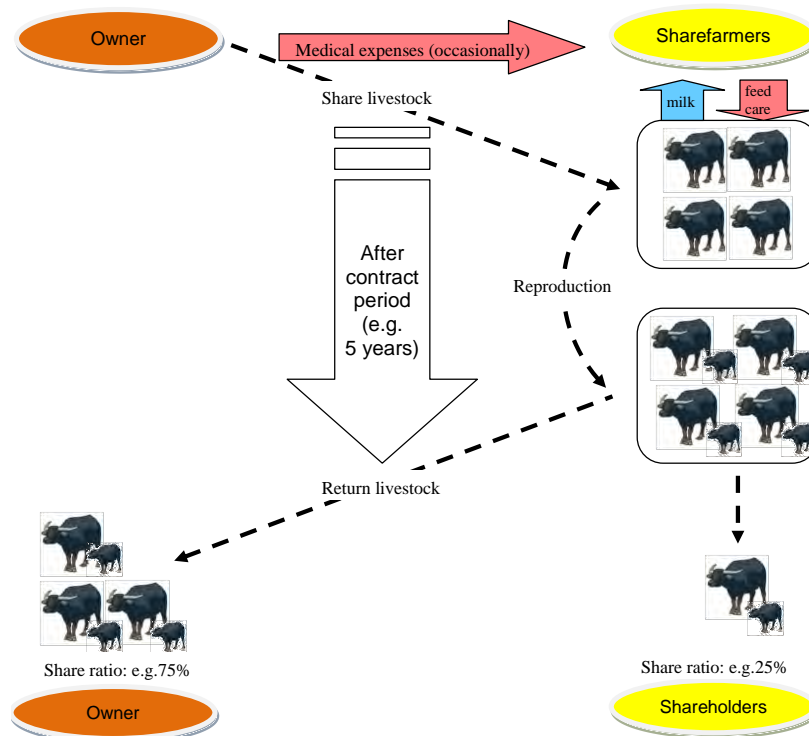


Figure 3-4-5 Livestock sharing system

iv) Introduction of livestock revolving

Provision of livestock to farmers without any cash payment is possible if a livestock revolving system is practiced. A herd of livestock comprised of many females and one male livestock is provided to a small farmers group, so that the members may be able to own offspring from the herd. After a certain period, the herd should be returned with the same composition and condition as they are given, and then the herd will be supplied to another farmer group. Although any type of livestock can be revolved by this system, livestock with a short calving such as goat and sheep is suitable.

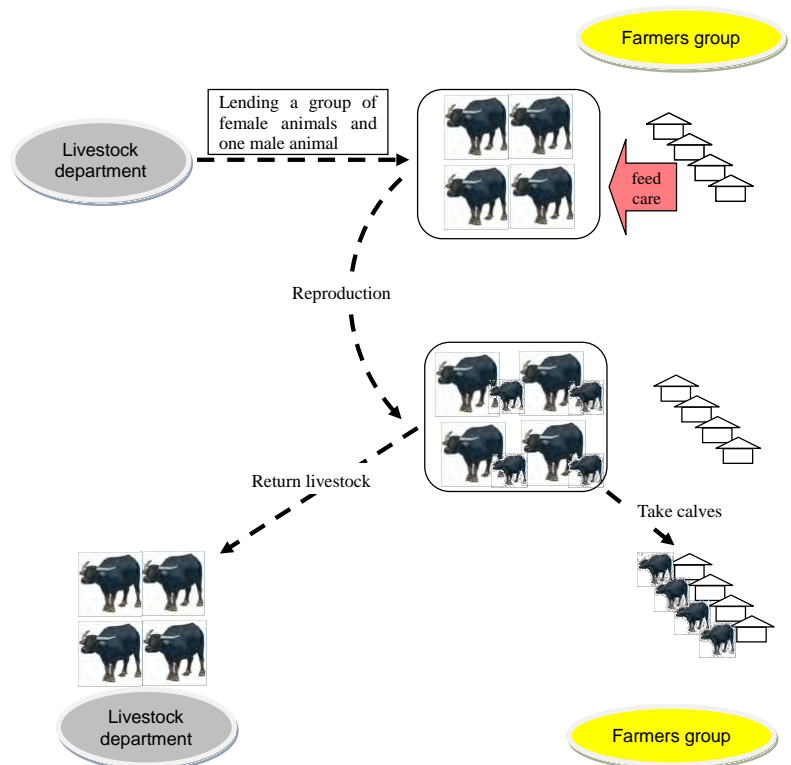


Figure 3-4-6 Livestock revolving system

The above mentioned mechanisms and systems are summarized in the following table.

Table 3-4-4 Summary of livestock distribution mechanisms

Name of activities	Target livestock	Flow of livestock			Method to obtain livestock
		Originated from	Through	To	
Salvation of calves	Calves of milking animals	Cattle colonies	<ul style="list-style-type: none"> • Calf rearing farms (private/public) • Traders 	<ul style="list-style-type: none"> • Dairy farmers • Fattening farmers 	Sell and purchase
Dry animal recycling	Dry animals	Cattle colonies	<ul style="list-style-type: none"> • Matching center (public) • Traders 	<ul style="list-style-type: none"> • Recycling farmers • Dairy farmers 	Sell and purchase Contract base rearing
Livestock Sharing	Not specified	Owners		<ul style="list-style-type: none"> • Sharefarmers 	A certain portion of livestock will be given after a contract period.
Livestock Revolving	Not specified (Small ruminant is suitable.)	Livestock department		<ul style="list-style-type: none"> • Farmers group 	Offspring of the herd will be given to the members of the group.

3.4.4 Strengthening of the Department

As the core organization responsible for the livestock development in the province, the Department of Livestock and Fisheries should be able to take the lead to implement the above-mentioned strategies in collaboration with the concerned organizations and people, and consequently bring the benefits to the livestock farmers and others in the province. Thus, the department should radically shift its key orientation from animal disease prevention



towards wider and more comprehensive livestock development. As a result, it can be expected that the livestock development plans would be smoothly implemented in future, and the long-term objectives of the development could be achieved. To realize them, the department should be strengthened mainly in the 4 major strategic areas as shown in Table 3-4-5. The strategy for each area is described after the table.

Table 3-4-5 Goal and Direction of Long-term Strategy for Strengthening the Department

Goal	Direction of development	Major strategic areas
Livestock development plans are smoothly implemented with long-term objectives	The development policies, strategies, and plans are formulated and smoothly implemented for the development of the livestock sector.	<ul style="list-style-type: none"> i) Formulation and publicity of livestock development policy and strategy ii) Strengthening implementation structure iii) Formulation of human resource management and development plans iv) Strengthening project management capacity

(1) Formulation of Livestock Development Policy and Strategy

At present, there is neither livestock development policy, nor its strategy on which the sector's development should be based. They are occasionally produced, but not widely shared with the major stakeholders. Although each directorate prepares annual plans independently, these plans are not consolidated into one single plan of the department. Thus, the following is the necessary short-term measures for this area:

i) Formulation of Sindh livestock development policy

The livestock development policy for the province is essential as the prime guide for the development strategies and plans to be followed by the department. It is therefore advised that the department review the related policies, consult with the resource persons, and formulate the livestock development policy at the earliest time.

ii) Review and finalization of the livestock development strategy

Based on the master plan proposed by the JICA Project Team, the livestock development strategy should be finalized. To reflect the views and thoughts of various stakeholders such as livestock farmers, related associations, NGOs, universities, the private sectors, etc., on the strategy, the dialogues with them need to be held.

iii) Formulation of the 5 year action plan

The 5 year action plan is needed to make clear what the department should do in the coming 5 years for achieving the goals indicated in the policy and strategy to be prepared.

iv) Publicity

By publicizing the above-mentioned policy, strategy, and the 5 year plan, the stakeholders including the potential donors would clearly acknowledge the commitment and intention of the department. As a consequence, cooperation from those stakeholders could be more easily obtained for promoting the livestock development. The publicity could be made through web page, pamphlet, booklet, radio, newspaper, development forum, seminars, cattle show, etc.

(2) Strengthening implementation Structure

To make sure that the department is able to implement the above-mentioned livestock development strategy and plans smoothly, the department should have the right structure, and the responsibility of all the directorates should be made clearly. In this respect, the department needs to be restructured since the current structure is not considered as appropriated. The following is the major concerns to be considered:

- a) The DG'S office is not adequately staffed to be able to administer the staff and coordinate all the directorates and the district offices. It is expected to work as a control tower of the department when implementing the plans, and therefore more officers and more responsibilities should be allocated to the DG office.
- b) The ways that the department plans, monitors, and evaluate its regular as well as development activities should be more systematized by introducing the project management methods. For this purpose, the Directorate of Livestock Planning and Monitoring (DLPM) should be strengthened.
- c) The Directorate of Animal Husbandry is currently responsible for the administration of district offices and some facilities as well as technical coordination among the directorates. Some of those mandates are however supposed to be given to the DG's office as mentioned above. This directorate also covers a wide range of technical fields in its duties such as prevention of animal diseases, vaccinations, training and extension (related to animal health), breeding, etc. Some of these responsibilities should be allocated to other directorates.
- d) A new directorate of extension should be established for the department to become responsible for disseminating livestock technologies.

- e) To raise income of livestock farmers from livestock activities and consequently facilitate the livestock sector development more firmly, empowerment of these livestock farmers in various aspects is essential. Besides technology development and marketing improvement, the capacity of farm management should be strengthened. The department should therefore be equipped with the necessary expertise for being able to assist them in this regard, and a directorate for dealing with farm management is needed.

Based on the above concerns, the short-term measures related to the restructuring of the department are shown below, and the current and proposed structures are shown in Figure 3-4-7.

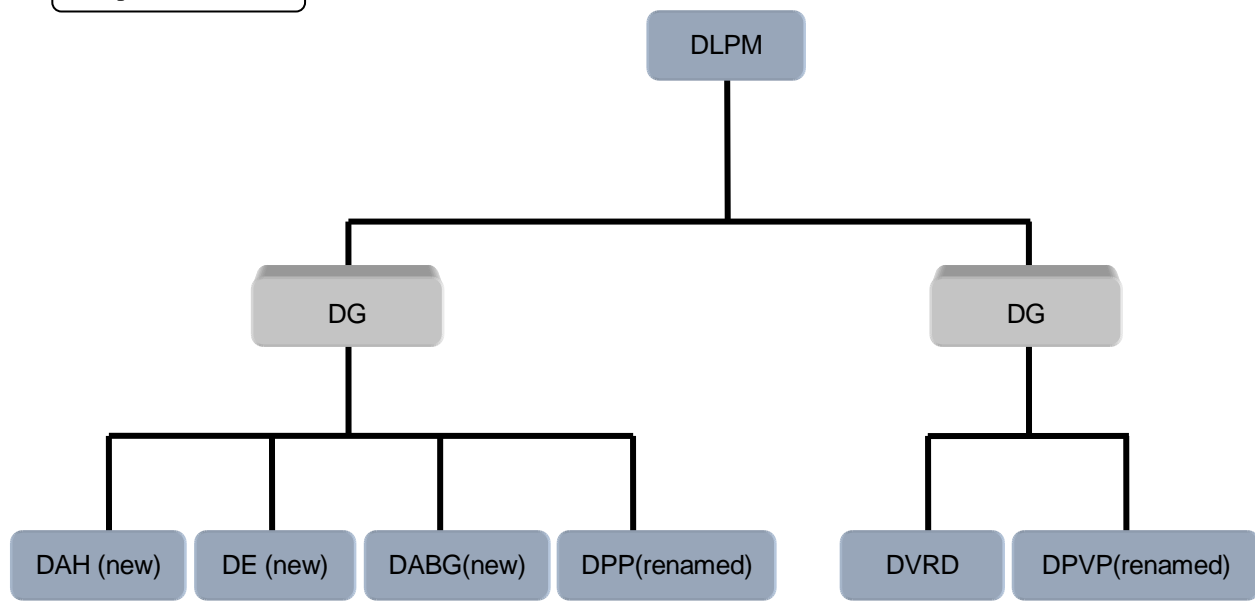
i) Strengthening or establishment of the directorates

- Two DGs shall be appointed by vitalizing one DG position. One DG shall be responsible for extension, and another DG shall be for research. Under these DGs, all the directorates, including the newly established ones, shall be grouped into two wings; extension or research.
- The DLPM shall be reallocated directly above the DG's offices so that the DLPM may be directly linked with the Secretary, monitor and evaluate all the department's activities including the DG's offices, and coordinate two DG groups. The DLPM shall also be responsible for formulating the annual plans by integrating the plans from each directorate. For those purposes, intensive training for project as well as organizational management shall be given particularly to the DLPM.
- Due to its heavy load, the present directorate of animal husbandry shall be dismantled to three new directorates: animal health, extension, and animal breeding and genetics. The directorate of animal health (DAH) shall be responsible for the prevention of transboundary and non-transboundary animal diseases, while the one of animal breeding and genetics (DABG) shall take responsibility for experimental and field activities necessary for genetic improvement as well as cross breeding of animals. The directorate of extension (DE) shall establish an extension system, including the extension platform, by coordinating all the concerned organizations. The DE shall also be the core for the development and extension of livestock technologies including farm management, feeding management, and fodder development.
- In line with the establishment of two wings, extension and research, the department of poultry production and research (DPPR) shall be renamed to the directorate of poultry production (DPP), and allocated under the DG extension. The DPP shall provide training and extension to farmers necessary for poultry production as well as disease prevention of birds.
- On the other hand, the poultry vaccine production center (PVPC), a self-financing institution currently under the DPPR, shall be renamed to the directorate of poultry vaccine production. It shall be allocated under the DG research.
- The directorate of veterinary research and diagnosis (DVRD) shall also be allocated under the DG research.

ii) Preparation of TORs for each directorate

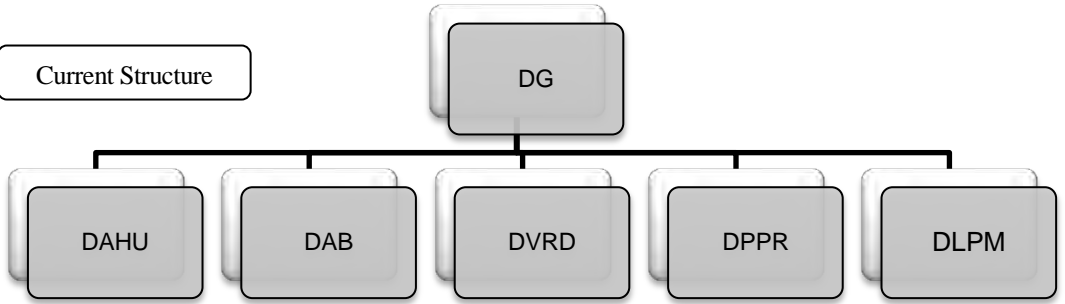
- Based on the department's TORs, the responsibility should be distributed to each directorate. These TORs should be practical, and clearly linked to the strategy and plans for livestock development.

Proposed Structure



DG: Director General
 DLPM: Directorate of Livestock Planning and Management
 DAH: Directorate of Animal Health (proposed)
 DE: Directorate of Extension (proposed)
 DABG: Directorate of Animal Breeding and Genetics (proposed)
 DPP: Directorate of Poultry Production (renamed)
 DVRD: Directorate of Veterinary Research and Diagnosis
 DPVP: Directorate of Poultry Vaccine Production (renamed)

Current Structure



(note: Another DG post was created in the past for taking care of the upper Sindh. However, no office was arranged, no staff was allocated, and no job description was made for the new DG although once the DG was appointed, and therefore as of July 2011 there is only one DG for the livestock part of the department. At the time when the above DG post was created, one directorate for the upper Sindh was also created underneath. However, no director was appointed.)

Figure 3-4-7 Proposed and Current Structure of the Livestock Department

(3) Formulation of Human Resource Management and Development Plans

One of the important issues related to human resources is that the department has not recruited any permanent staff for about 15 years. Consequently, the average age of the staff has been raising, and also the department cannot allocate right staff to right positions for meeting the current development needs of the sector. Moreover, the specialists for any related field have not been fostered in the department since the staff are transferred frequently, and therefore most of them become generalists. Also, the capacity of the staff has not been strengthened much since there has been little training opportunity for them. Thus, the key agenda for human resource is that the department should be able to allocate the adequate number of the right staff, capable for implementing the strategies and plans, to suitable positions in the department. To meet such requirement, the following short-term measures should be taken:

i) Formulation of human resource allocation plan and management plan

The current staff of the department should be allocated according to their aptitude, the TORs and the required number of each directorate. The TORs and the targets of each staff need to be made clear, and their performances should be monitored and evaluated accordingly. For these purposes, a human resource allocation plan and a management plan are necessary. Promotion of the staff should be based not only on seniority and experience, but also qualification.

ii) Formulation of recruitment plan

If the adequate number of the right staff cannot be obtained within the department, the new staff should be recruited. The recruitment plan needs to be formulated so that the staff may be constantly replenished. Recruitment rule should be reconsidered to be able to focus more on qualification based on the TOR. If recruitment of the new staff is difficult, the use of private sector including the veterinarians should be considered.

iii) Formulation of human resource development plan

The capacity building of the staff should be one of the regular activities of the department. The training to the staff is always needed for meeting the needs of the livestock farmers. An award system can be introduced to motivate the staff for enhancing their capacity.



(4) Strengthening Project Management Capacity

As it is mentioned above, annual action plan of the department is not prepared by systematically consolidating the plans of each directorate and the opinions of other key stakeholders. In addition, although progresses of the activities are reported monthly by the district offices to the DG's office as part of monitoring, countermeasures are not always taken even if a problem is found. Evaluations for the regular and development activities are not done, and therefore the lessons from the activities are not properly reflected to the plan of the following years. The short-term measures are therefore proposed as below taking such situations into consideration. As a consequence of those measures, the annual targets of the department would become more achievable, and the department would be recognized more with the better performances.

i) Preparation of operation guidelines and manuals

The department should prescribe the procedures in the form of an operation guideline and manual how the activities of the department as well as each directorate are planned, monitored, and evaluated. Based on that, the staff should be provided training on project management.

ii) Formulation of annual action plan

The above-mentioned procedures include the way to formulate annual action plan through the bottom-up methods from the field. In addition, the needs assessment of the livestock farmers should be conducted to supplement the information. The plan should be formulated also by taking the development strategy and the 5-year plan into consideration. By formulating the annual action plan, the annual targets of the department and each directorate are clearly set.

iii) Conduct of monitoring

The activities and expenditures of each directorate are monitored at the provincial as well as district levels according to the operation guideline and manual. The monitoring results should be reported to the relevant sections of the department, and necessary countermeasures should be taken immediately as needed.

iv) Preparation of annual evaluation reports

At the end of each year, evaluation of the activities should be conducted in line with the annual action plan, and the results should be consolidated in an annual evaluation report. The evaluation results are supposed to be used for the plans of the following years.

v) Establishment of information system

The plans and the results of monitoring and evaluation should be smoothly shared within the department. The system to share necessary information should be made clear, and included in the operation guideline and manual.

3.4.5 Extension System Development

In order to ensure the sustainable development of the livestock sector, it is important that the department distributes the developed appropriate technologies regarding livestock rearing which increase skills and knowledge of individual farmer. Thus the department needs to introduce proper extension system including supportive policies for smooth implementation of the extension services, since the current livestock extension system has not been properly organized yet.

Therefore JICA Project Team suggests the department to improve its extension system regarding

organizational structure, human resource, plan(s), skills and knowledge, equipment, internal and external networking and budgets. The suggested system is expected in the long-term to be autonomous through the strategies as mentioned below, by which problems and their causes are identified and appropriate countermeasures are taken without requiring outside resources.

Table 3-4-6 Goal and Direction of Long-term Extension System Development Strategy

Goal	Direction of development	Major strategic areas
For disseminating appropriate technologies widely to the farmers, problems are identified and appropriate measures are taken.	Through an extension system established by stakeholders, technical skills and knowledge are delivered efficiently and effectively to all farmers in Sindh	(1) Strengthening the relationship between the department and the internal and external stakeholders (2) Building capacity of specialists and extension workers (3) Providing efficient and effective extension services



(1) Strengthening the Relationship Between the Department and the Internal and External Stakeholders

The first major issue is how to set up the organizational structure for implementing extension services. As the department has not had a section specializing into extension services so far, none in the department has taken responsibility for accumulating the valuable lessons learnt and utilizing experimental models of past interventions. Also, various duplications are seen. For example, similar activities are implemented by plural organizations; the same activities as past projects are implemented again and so on. Indeed, these duplications lead huge financial loss. Proposed organizational structure is as follows:

i) Establishing the Directorate of Extension and an extension section in DO Office

Thinking of the efficiency and effectiveness of the operation, the core of extension service provision should be established, namely the “Directorate of Extension” at provincial level and also the full-time staff in charge of extension at the DO Offices. (See Figure 3-4-8). The directorate of extension is responsible for planning, research (developing appropriate technologies and extension materials), trainings, and coordination; and then, the extension in charge in the DO office is mainly responsible for implementation of technical transfer (extension) and coordination with other stakeholders at the district level. Trained extension workers are allocated to the Taluka

level, and should report their activities to the district offices. If any technical inconvenience emerges, it should be reported from the district to the directorate of extension, and then the directorate requests other directorates to modify/improve them. The directorate is also expected to make extension plans like “a guideline of extension activities by 2020”, “(annual) action plan for extension”, “human development plan”, etc. The all activities and budget are managed along with the plans.

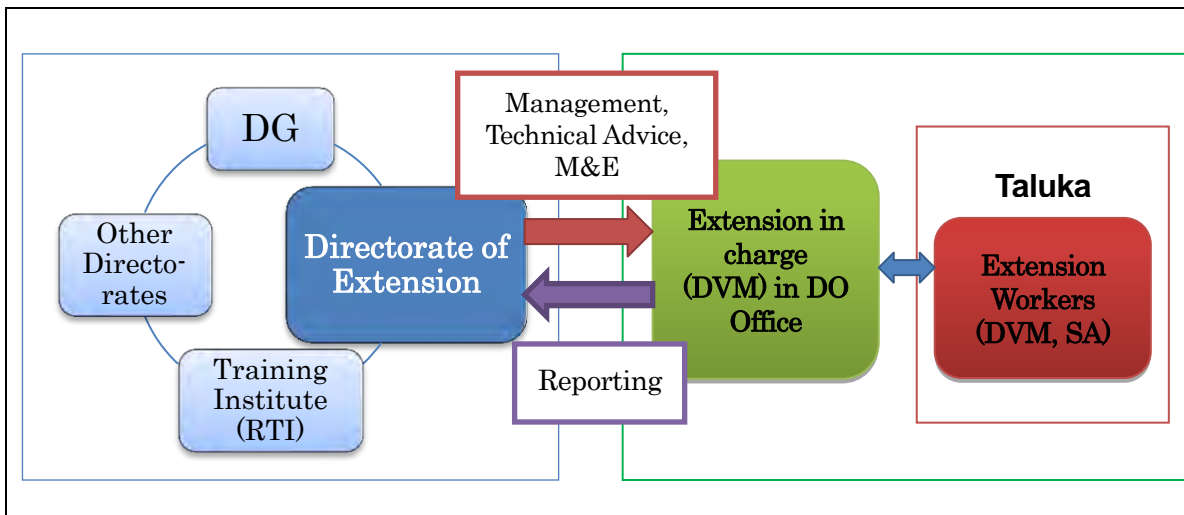


Figure 3-4-8 Plan of Organizational Structure for Extension Service Provision

The demarcation between the province and district offices is as mentioned in Table 3-4-7. Each of organization (all directorates and RTI) at Provincial level is needed to evaluate the validity, efficiency and effectiveness of their performance, and to strengthen the organizational capacity.

Table 3-4-7 Demarcation of Responsibilities between Province and District

Province	District
<p>【The Directorate of Extension】</p> <ul style="list-style-type: none"> • Making plans • Managing, monitoring, and evaluating the activities done by districts regarding progress, quality, and performance • Functioning as an information source on all livestock extension activities in Sindh (by government, private sector, NGOs) • Functioning as the window with district offices: reporting, sharing, and consulting • Coordinating other internal organizations • Enhancing the partnership with external stakeholders <p>【Directorates related to animal production】</p> <ul style="list-style-type: none"> • Developing appropriate technologies • Studying on the feasibility of the developed technologies <p>【RTI】</p> <ul style="list-style-type: none"> • Converting the developed technologies into training materials and/or materials for extension • Conducting trainings for extension workers 	<ul style="list-style-type: none"> • Managing, monitoring, and evaluating the field activities of extension workers on schedule, quality, and performance • Reporting, sharing and consulting to the Directorate on progress, limiting factors, and special issues • Conducting quality control of the extension workers • Providing extension workers with on-the-job trainings and/or follow-up trainings • Enhancing the partnership with external stakeholders at district level

ii) Promoting better coordination with internal and external stakeholders

The good extension system generally has closed relation with technical research/development section, training/human development section, and extension providing section. Technical related sections examine the

feasibility of all extension tools (skills, technologies, knowledge etc.) at the field, and accordingly only passed measures are materialized as extension tools. Then a training institute develops some training methodologies and a set of training module. The extension workers adopt the developed tools into the reality, and they feedback the results/problems to the technical related section. Again, the technical related sections start to study and develop better tools based on the feedback from the fields. So the more they can share information closely and quickly, the better and timely farmers can receive needed advice.

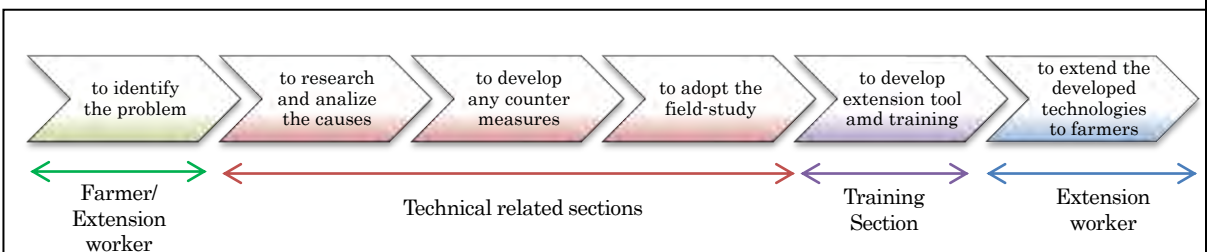


Figure 3-4-9 Process of Extension Services

There are many organizations which have provided livestock extension services in Sindh, for example, donor projects, NGOs, private companies (dairy, pharmaceutical companies etc.), universities, the other governmental organizations (Sindh Government, MoA, PARC). Their purposes of extension are different, but their accumulated knowledge, statistical data and experiences regarding extension service provision are worthy and useful. Therefore the directorate had better cooperates with the external stakeholders, and takes their lessons learnt into extension framework, plans and implementing methods.

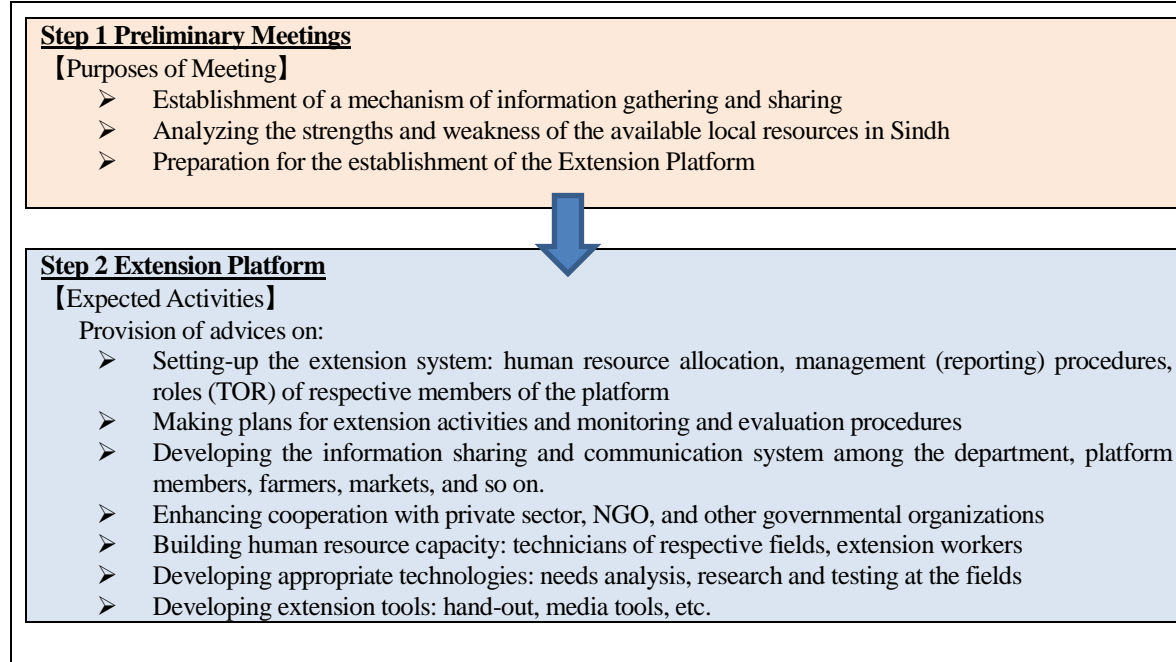


Figure 3-4-10 Concept of Extension Platform

As a common meeting ground, “Extension Platform” shall be proposed. All extension practitioners participate and discuss various issues related to extension services. The concept of the platform is shown in Figure 3-4-10. The directorate of extension will be responsible for the secretariat of the platform at the step 1.

(2) Building Capacity of Specialists and Extension Workers

Producing better human resources for providing extension services

In Sindh, there are certain numbers of who have already trained as an extension worker by the University and colleges (ATI), the department (RTI), donor projects, NGOs etc. Figure 3-4-11 lists up the expecting extension workers on each administrative level.

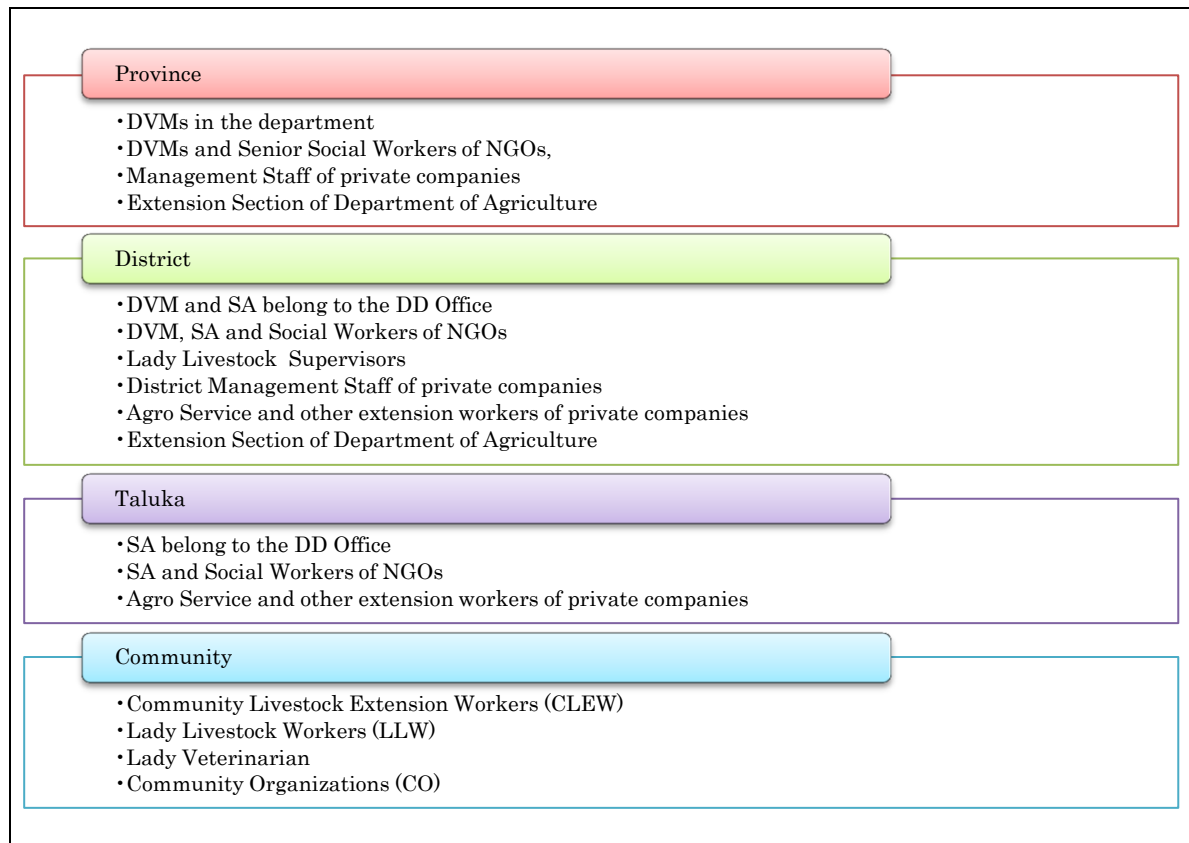


Figure 3-4-11 Expecting Extension Cadre in Sindh

The capacity building of the current human resource is implemented along with “(annual) action plan for extension”, “human development plan”, which the directorate of extension and the platform make. The “human development plan” will be made in taking the difference of their knowledge about the veterinary and animal husbandry and the characteristics (strengths and weakness) into account.

In the “human development plan”, it is indicated a “grading system”, which divides the extension workers into 4-5 grades according to the difficulty, urgency, and use frequency of extension contents (skills/technologies and knowledge). The grading system aims 1) to regulate the requirement skills and knowledge of respective grade, 2) to set up the training contents and schedule in order to reach to the requirement, 3) to register the names of trained extension workers and their grades, and 4) to support the financial incentive according to the grade. Namely, by means of establishing the grade (requirements), the system can standardize the capacity of all extension workers regardless of organization, at the same time, the department and Platform can receive the list of enable extension workers.

While the department is expected as a core training provider, its training institute (RTI) is needed to improve the capacity in terms of management, operation, facility maintenance, and implementing methods of various trainings. Thus the department will share the developed “appropriate technologies”, research results, and any other useful

information with other stakeholders, and enhance their own capacity development activities through technical advice and institutional support (planning and budgeting).

(3) Providing Efficient and Effective Extension Services

Utilizing developed technologies properly in whole area of Sindh

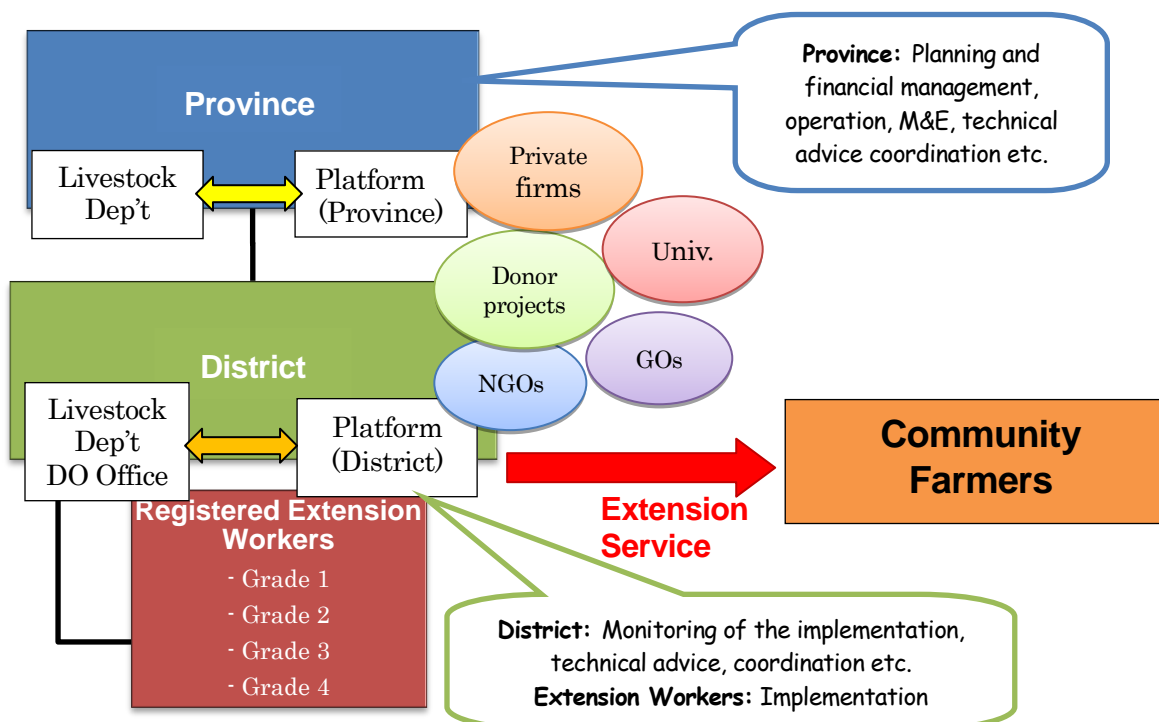


Figure 3-4-12 A Model of Extension Service

Figure 3-4-12 shows a proposed model of extension service. It is noted that the department and the Platform should pay special attention to whether the vulnerable groups like women, the disabled, and the poor can receive the extension services. The grade 4 extension workers basically work at their own community as LLWs and/or CLEWs do. Since women are main animal care takers in many small landholders and landless farms, it is most important for the department and platform to train women to be the grade 4 extension workers. The female master trainers (lady livestock supervisors in the SLSP project and lady veterinarians in the BBSYDP program) who were trained by the department can be useful to support LLWs and CLEWs. However, as their knowledge and skills are not enough, the department should offer the needed trainings. At the same time to develop a good environment (social preparation) under which women can work as extension workers.

There are various extension methodologies. They should be used depending on the purposes, capacities/preferences of target groups, characteristics of extension tools, and so on. While regarding the technical transfer, the training using demonstration farms at field, like the PDDC model, can be the most suitable for Sindh, regarding milk processing and/or marketing, other measures like grouping and/or cooperative will be taken into account. The issues derived from extension activities should be discussed at the Platform. Then along with the decisions, suitable actions will be taken collaboratively by respective participants.