Islamic Republic of Pakistan
Government of Sindh
Livestock and Fisheries Department

Project on Sustainable Livestock Development for Rural Sindh in the Islamic Republic of Pakistan

Project Completion Report (Appendix 2)

August 2021

Japan International Cooperation Agency

Kaihatsu Management Consulting, Inc.

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Project on Sustainable Livestock Development for Rural Sindh
in the Islamic Republic of Pakistan

Project Completion Report
(Appendix 2)

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Output 3: List of the Technical Products for the Project (Extension Material)

Appendix Z1-1 Manual for Hoof-Cutting Workshop

WORKSHOP OF HOOF CUTTING TECHNIQUE

19 July, 2017

I. Introduction:

The objectives of the hoof cutting is to reduce the problem of hoof disease, to take a body balance of cows when they stand up or rest, and to reduce stress for increase productivities of cattle and buffalo.

The growing speed of the hoof is affected by the contents of feed, the health condition of animal, and the environment. The growing of hoof means not only lengthened but also thickenes. Within 1 month usually the thickness will increase average 5 mm in case of Holstein breed. In young cattle and buffalo under 15 month old, the growing speed of the hoof is very rapid. Therefore it is very important to trim hoof of the growing calves. Trimming hoof of adult cattle should be done once or twice a year.

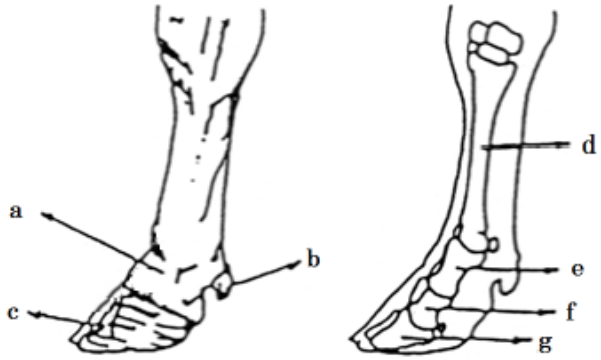
There are no cases of periodical hoof cutting in Sindh province.

Therefore the PSLD is verifying this in two pilot farmers.

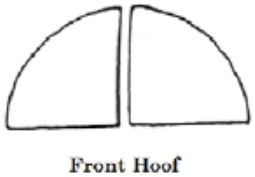
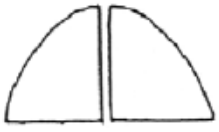
The advantage of periodical hoof cutting are (1) short time. (2) easy work (3) animal can reduce maximum stress of their weight.

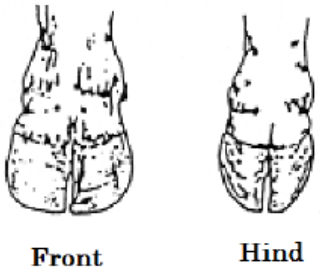
II. Hoof Cutting Technique

1. Anatomy and name of cattle leg.

	Anatomy and name of cattle a. Pastern b. Accessory Claw c. Claw d. Metatarsal Bone e. Long Pastern Bone f. Short Pastern Bone g. Coffin Bone
Anatomy and name of cattle leg.	

2. Shape of cattle hoof

 Front Hoof  Hind Hoof	When the cattle is standing, the front legs support 60-65% of the body weight, and hind legs 30-35%. This affects the shape of cattle claw; the front claw become round and wide, and the hind claw oval and slim.

 Front Hind	The shape of cattle claw can be observed from the front and behind. Right and left claw should be similar size. The line between the skin and claw is considered as the end of the claw.

3. Preliminary Examination

Cow should be examined before trimming in accordance with proper procedures. It is important to develop a trimming approach that best suits each cow. A series of tests conducted before trimming is called the preliminary examination such as (1) Observation standing position, (2) Gait examination and (3) Examination of the raised claw.

The following three areas are checked during this preliminary examination.

(1) Observation standing position:

The cow is made to stand on flat surface. The trimmer then should examine the cow from a distance of about three meters during which time he looks at the cow from the front, side and back to check body conformation and legs conformation, and to see if animal has any obvious problems with its legs and claw.

(2) Gait examination:

The cow is made to walk in a straight line on a flat surface. The trimmer examines the gait of the animal, how it placed its claw on the ground and looks for any problems with its legs and claw.

(3) Examination of the raised claw:

Each leg of animal is raised and the weight-bearing surface is examined.

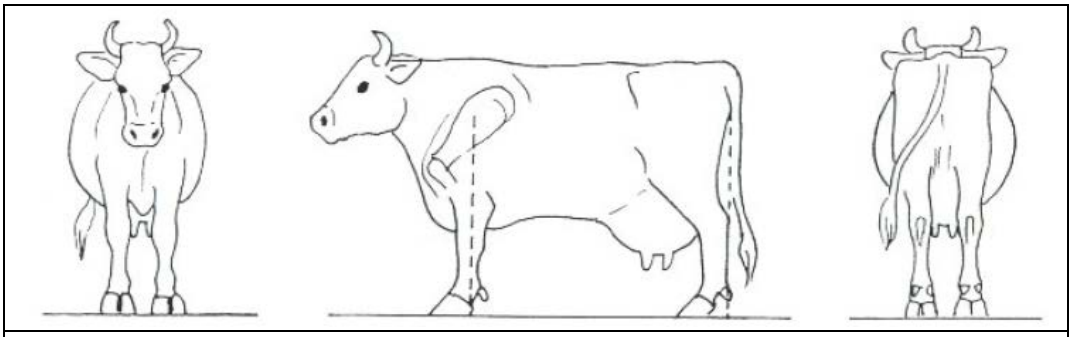
3.1 Observation standing position

3.1.1 The normal (standard) and abnormal conformation

Let's learn the standard and abnormal conformation at first.

In reality, few cows have a standard conformation.

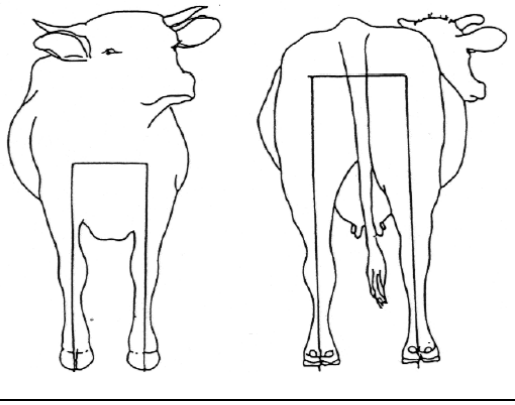
(1) Standard conformation



Front leg Side view Hind leg

Normal Shape of Legs

In the good shape of legs in standing position, 4 legs and front and hind legs should be looked strong and straight.

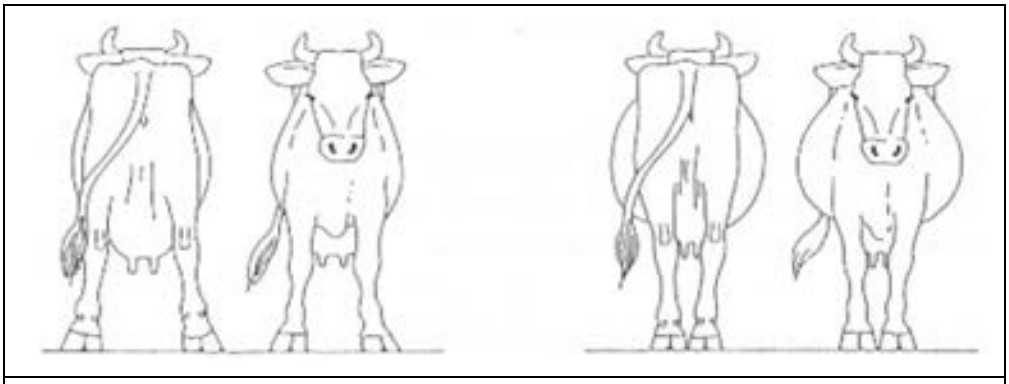


Figure

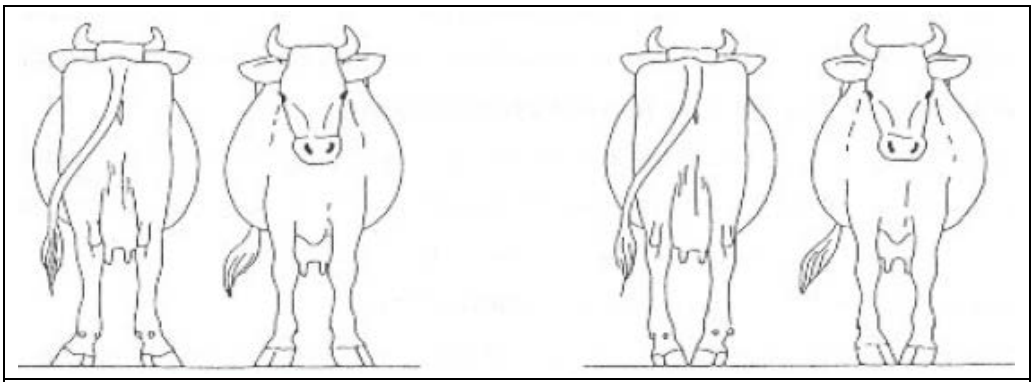
In the good shape of cattle legs when standing, 4 legs, both front and hind legs should be looked straight. The distance between claws should be 2-2.5 times width of the claw in front legs, and 3 times in hind legs.

(2) Abnormal conformation

Conformation viewed from front and back

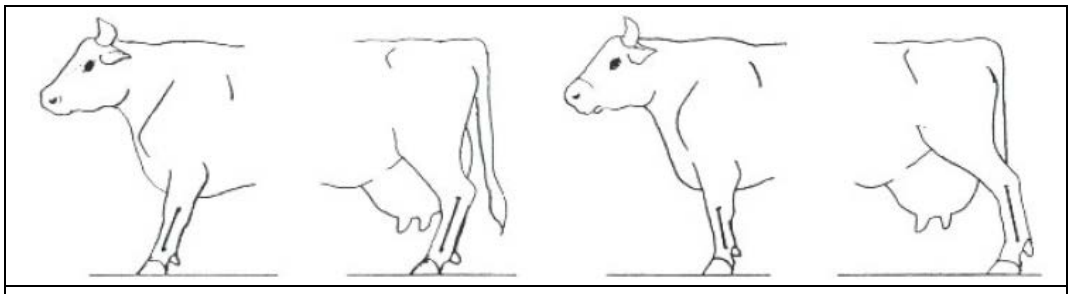


広踏肢勢 base-wide　　狭踏肢勢 base-narrow

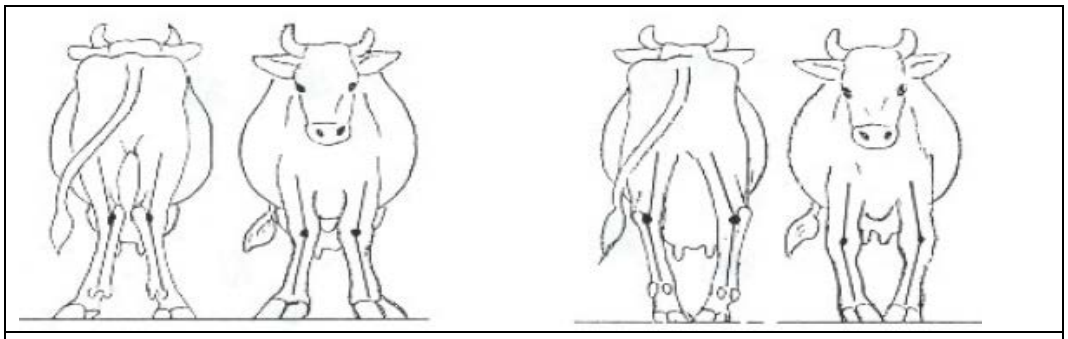


外向肢勢 toe-out　　内向肢勢 toe-in

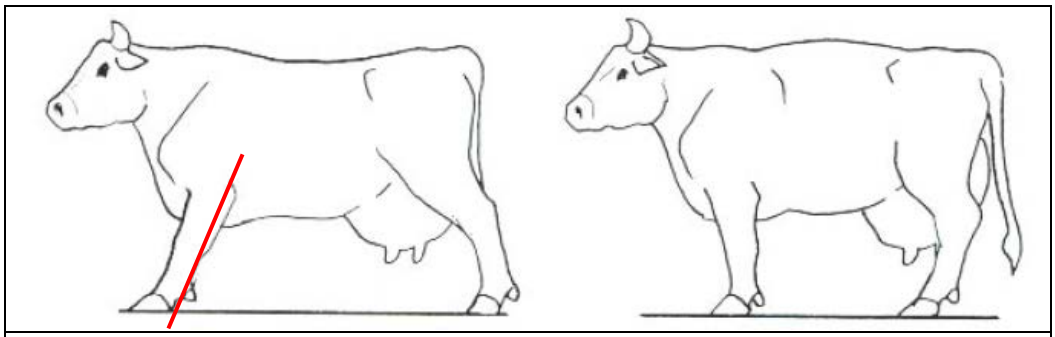
conformation viewed from the side



前踏肢勢 front inclination　　後踏肢勢 rear inclination



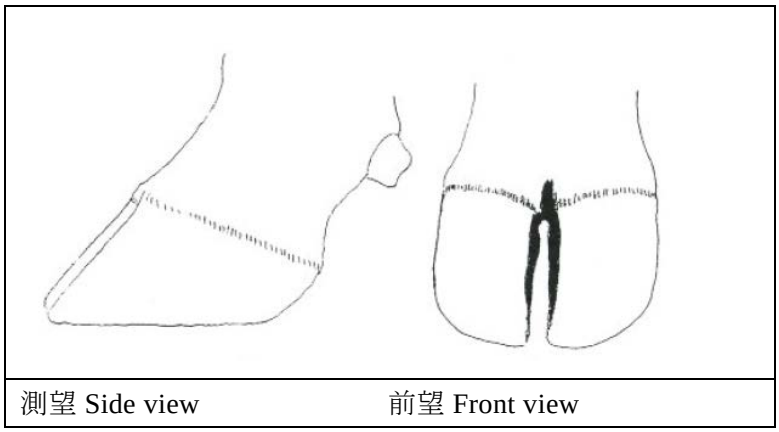
Valgus cow-hocked　knock-kneed　　valgus (bow-legged)



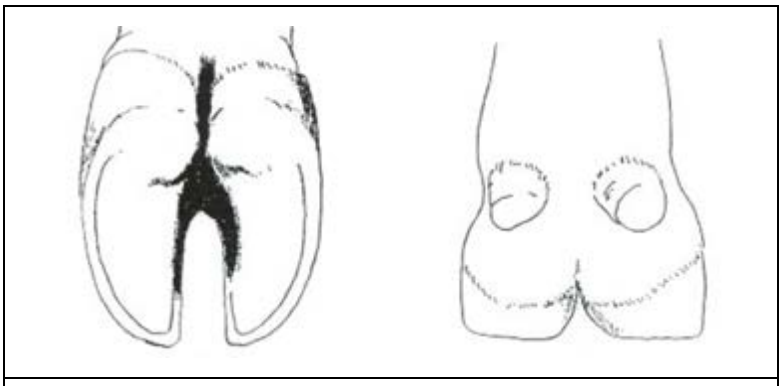
分散肢勢 opened antero-posterior stance　　集合肢勢 close antero-posterior stance

3.1.2　Standard and abnormal claw

(1) Standard claw



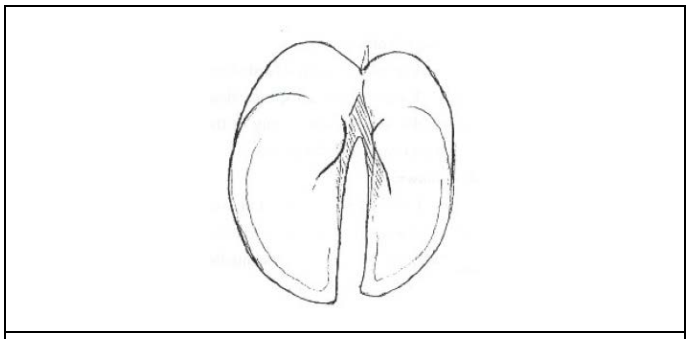
測望 Side view　　前望 Front view



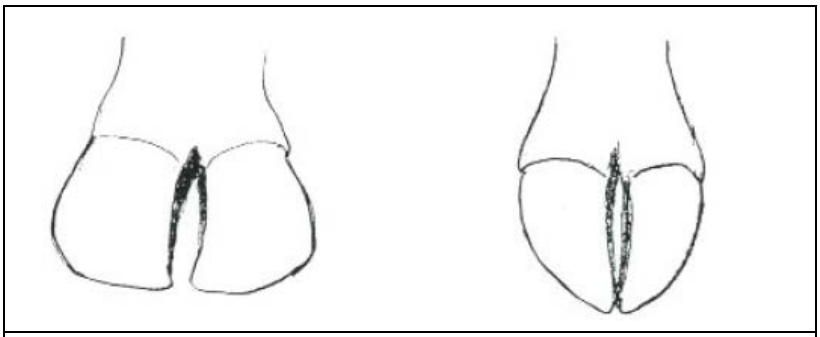
底面 Ground surface　　後望 rear view

Each claw is equally supporting the body weight; 50% - 50%.

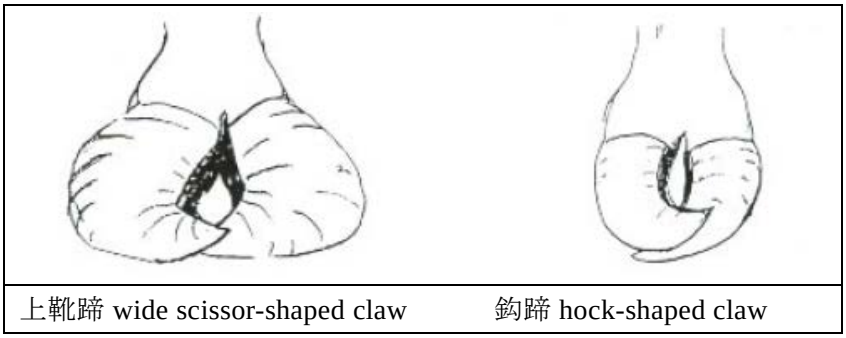
(2) Abnormal claw



不同蹄 Asymmetrical claw (medical claw 内蹄)

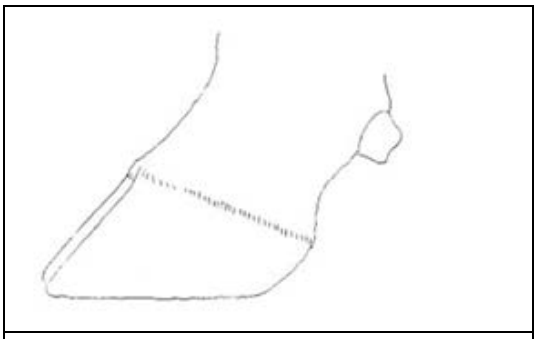


広蹄 wide claw　　狭蹄 contracted claw



上靴蹄 wide scissor-shaped claw　　鈎蹄 hock-shaped claw

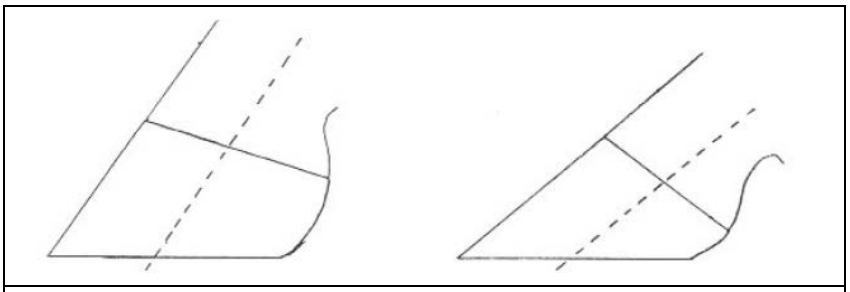
(3) Sideview of the Standard claw



Ideal side view

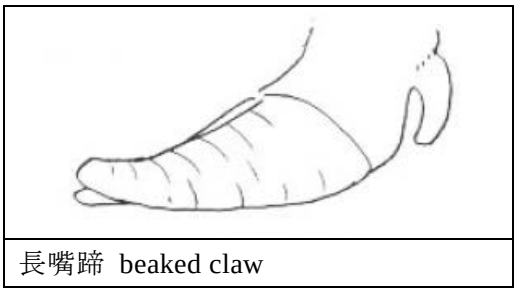
The angle of claw to the flat floor should be 45°.

(4) Sideview of the Abnormal claw

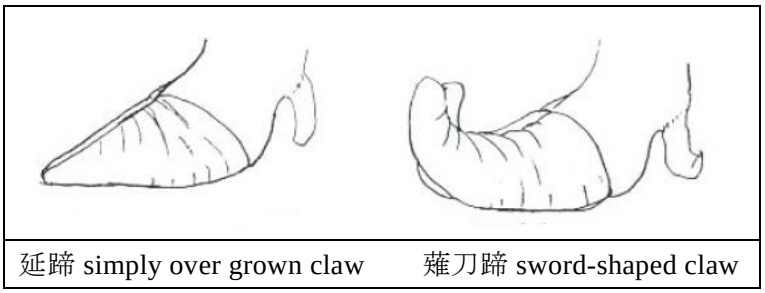


高蹄 upright claw　　低蹄 flat claw

The shape of legs is largely affected by the shape of claws. When the shape of claws is good, the cattle can stand up straight. On the contrary, when the claws are too long or short, the shape of legs become curved and the legs weakened.

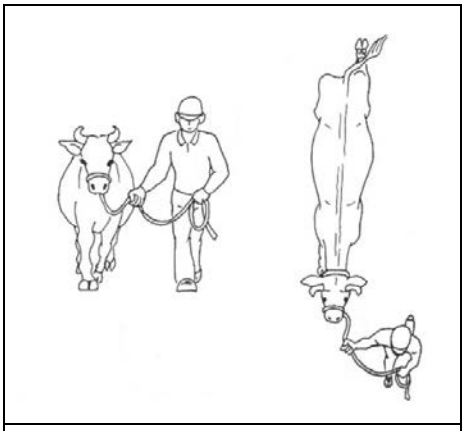


長嘴蹄 beaked claw



延蹄 simply over grown claw　　薙刀蹄 sword-shaped claw

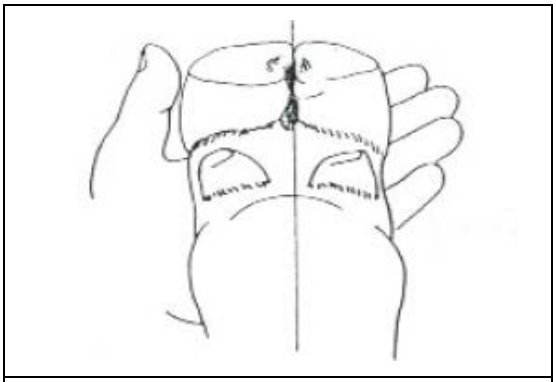
3.2 Gait examination



How to lead cow

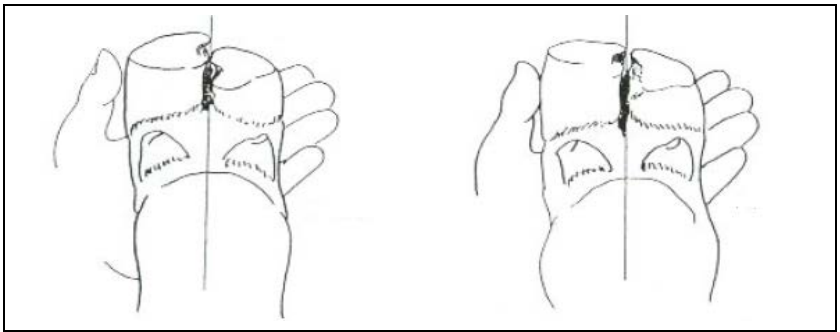
3.3 Examination of the raised claw

3.3.1 Standard claw



Normal (Ideal)

3.3.2 Abnormal claw

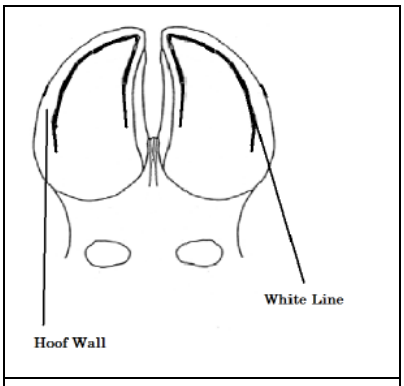


一測が過高 uneven　　負面の傾斜 sloping

4. Claw Trimming technique

4.1 Order of Trimming

With putting your fore-finger and middle-finger at the claw wall, you can observe the right and left claw from the heel side, then you can know how each claw is similar or different with their thickness and length. To avoid the cattle's tiredness, it is better to start with the hind part of hind legs, then diagonally move to the front part of hind legs.



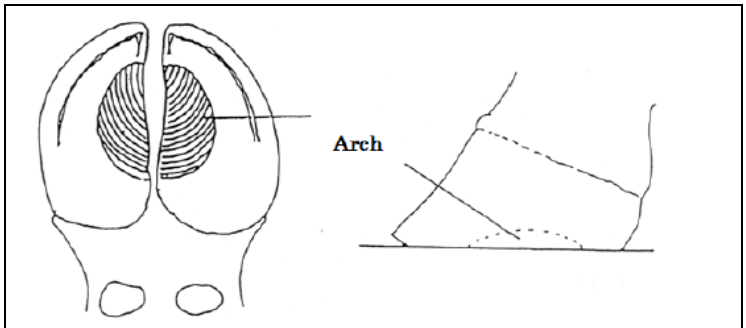
Figure

4.2. White Line

At first the thickest part of the claws should be trimmed using Sickle-shaped Claw Knife. This trimming is carried out by slicing-cut the claw. And the slicing should be done flatly and little by little. Finally the border of the white line will be clear. When the palm, especially around the white line become reddish, you have to stop the trimming. This means the claw has already become too thin, and if more trimmed the bleeding will occur.

4.3 Arch

After the both claws become flat, make the Arch by slicing.

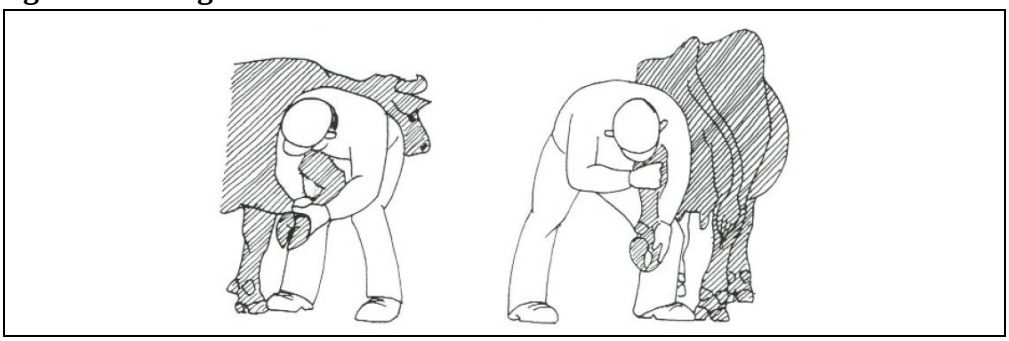


Figure

Too thick claw wall should be thinned using a rasp, until 0.5-1.0 cm thick from the white line. This thinning of the claw wall should be start from behind to front along the white line. Even without noticing the claw shape, we can know the direction with the white line.

5. Fixing Technique

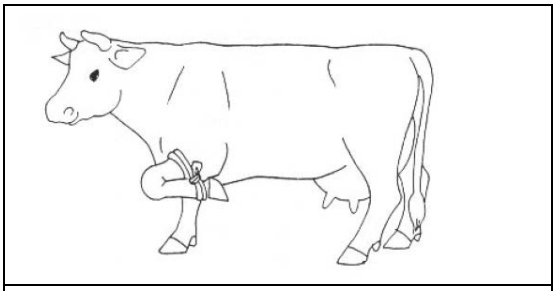
5.1 Fixing the hind leg



前肢と後肢の単独保定法 Restraining without a assistant for front and hind legs

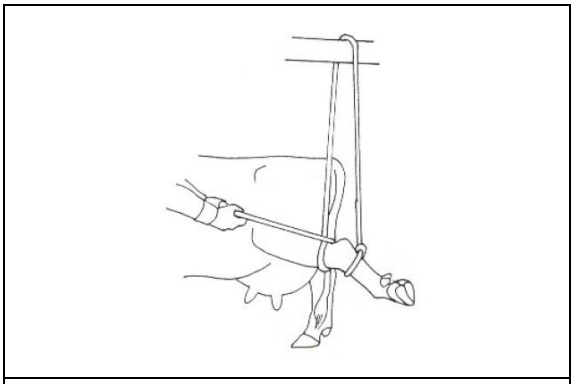
5.2 Restraining with rope

5.2.1 Restraining front leg



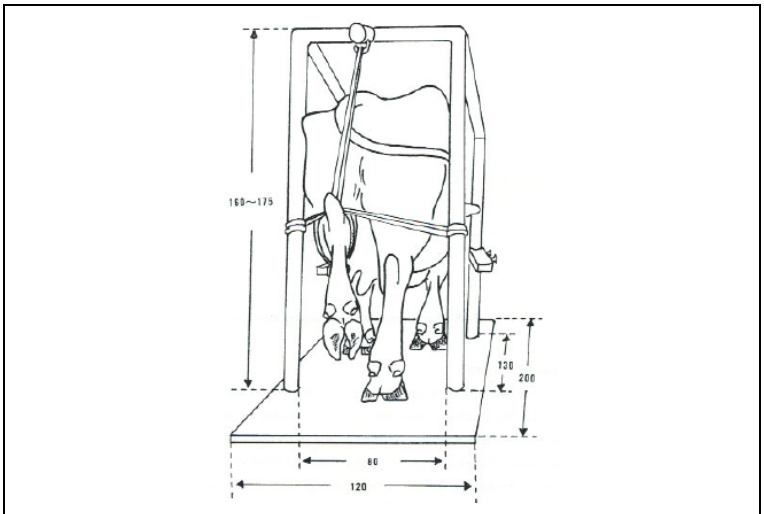
前肢の保定 restraining front leg

5.2.2 Restraining hind leg



後肢の保定 restraining hind leg

5.2.3 Restraining with chute to fix the hind leg



枠場による後肢の保定 restraining with chute to fix the hind leg (dimensions of the chute are in cm)

II. Safe work

Let's do a safe work

1. Hoof-cutting in safety matter

Local technicians wear either lubber sandal, leather sandal or leather shoes and traditional simple clothes when performing hoof-cutting. They often got injured while performing hoof-cutting since they use sickle and knife with bare hands. They showed interests in protective tools such as covering for the back of the hand and wrist and gloves used in Japan. The Project will procure such protective tools locally with less cost in the fourth year.

2. Clothes and shoes of local hoof-cutting technicians

			
Local clothes	Lubber sandal	Leather sandal	Bare hands

3. Protective tools to be procured locally in the fourth year

	
Japanese cloth covering for the back of the hand and wrist	Japanese gloves

4. How to use a safe sickle

Photo 切る方向は内側から外が安全です。

The direction of cutting is safe from inside to outside.

	
Photo	Photo

b) Hoof-cutting

On the dispatch of the hoof-cutting expert from Japan, the Project gave technical guidance on hoof-cutting and developed the principle for technical guidance on hoof-cutting for the remaining two years. The overview of activities of the hoof-cutting expert were as follows:

i) Understanding the local traditional hoof-cutting technique

The Project made an activities' plan of the expert in such a way to utilize strength of local techniques and to supplement their techniques with Japanese hoof-cutting techniques to make up weakness. To follow this strategy, the expert tried to familiarize himself with local techniques through observation. Basically, local hoof-cutting is lay-down type. However, during observation visit, the Project found that sometime hoof-cuttings were done in standing position according to necessity.

		
Local lay-down style hoof-cutting (Mr. Khano and his son as assistant)	Local hoof-cutting in a standing position (with an assistant)	Local hoof-cutting in a standing position (without an assistant and tied with a rope)

ii) Technical guidance on Japanese hoof-cutting technique:

Five local hoof-cutting technicians were invited for technical guidance on Japanese hoof-cutting technique. DVD video on Japanese hoof-cutting technique were screened. The tools and special clothes for hoof-cutting were introduced. The Japanese experts demonstrated hoof-cutting at P/F (Single retainer type and simple retainer type).

		
Introducing tools and clothes for hoof-cutting	Hoof-cutting of foreleg using retainer	Single retain hoof-cutting technique

Table 4-7 List of hoof-cutting technicians participated in the technical guidance session

No	Name	Address		Full or Part time	Age	Years of Experience
		District	Village			
1	Mr. Premo Bheel	Tando Allahyar	Manzoor Jamali	Full time	50	25
2	Mr. Ali Ahmed Awan	TMK	Mirzo Awan	Part time (Tenant)	55	20
3	Mr. Khano	TMK	City (Mir Monwer Colony)	Part time (Shoes repairing)	52	26
4	Mr. Qamerdin	Matiari	Gul M. Ghambeer	Part time (Dairy labor)	33	12
5	Mr. Jani	Hyderabad	Mitto Vigio	Full time	32	8
				Average	44	18

iii) Technical guidance and exchange of opinions

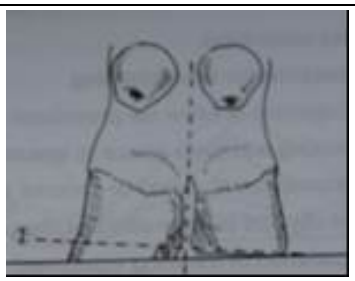
The Project organized technical guidance session for three hoof-cutting technicians at P/F in Tando Muhammad Khan District. Each technician demonstrated their hoof-cutting techniques. The Japanese expert gave advice, if any. They both exchanged their opinions. There were some differences in quickness of the uptake of new technique among local technicians but all of them showed their desire to improve their skills and techniques. They learned skills of other technicians and Japanese techniques on the occasion. There was no such occasion of exchanging the skills of local technicians in the area. The Project found the usefulness and importance of such occasions like skill competition organized annually in Japan.

[Example of outstanding improvement of techniques]

* Local technicians learned their skills each other: 1) Fixing animals with a rope and an assistant, 2) Cutting hoof with chisel and hammer

	
Fixing animal with a rope and an assistant	Cutting hoof with chisel and hammer

* Japanese hoof-cutting techniques: 1) Cutting the arch of hoof with hoof sickle, 2) Keeping side balance of bearing surface with hoof sickle, and 3) Finishing hoof with file.

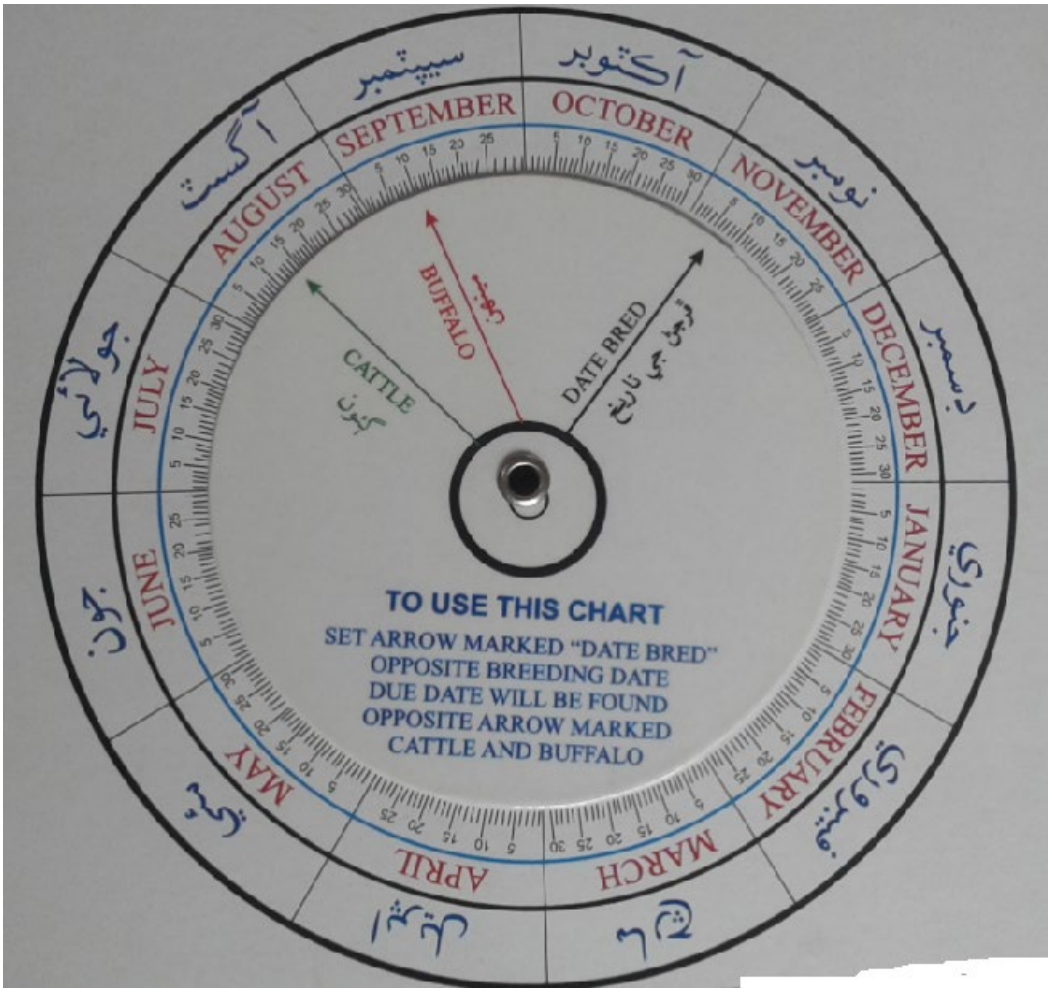
		
Arch of hoof	Figure 4-3 Side balance of bearing surface*	Finishing hoof with file

*Source: The Japan Livestock Technology Association ‘Manual for protection of cattle hoof’

Appendix Z1-2 Delivery Estimate Scale

Delivery estimation scale

By setting a black arrow on a day of mating, a green arrow indicates estimated date of delivery for cow and a red arrow indicates estimated date of delivery for buffalo. Within 10 days before and after an estimated date indicated by an arrow are the estimation period for delivery, i.e. 20 days' period in total.



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The Project on Sustainable Livestock Development

for Rural SINDH "PSLD"

(JICA Technical Cooperation)

Manual Milk Fat Analysis

Gerber Method

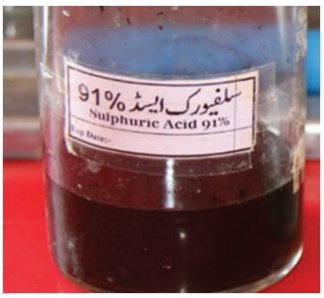
March 2019

Gerber Method

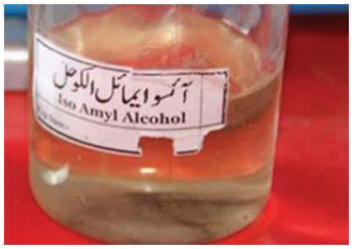
(i) Equipment and reagents

a. Reagents

(a) Chemical grade 90-91 % sulfuric acid of specific gravity 1.820 – 1.825 at 20^0 C.



(b) Amyl alcohol of highest purity, specific gravity 0.81, and boiling point 128 – 132^0C.



(c) Equipments

(a) Gerber milk tester

(b) Elastic rubber stoppers of amber color. Stoppers supplied with butyrometers may be used**.**

Application type	Original type
	

(c) 10-ml pipets for sulfuric acid, 11-ml pipets for milk, and 1-ml pipets for amyl alcohol. Pipets for milk should have a short discharging part. Pipets for sulfuric acid and amyl alcohol should be equipped with a safety bulb. An autoburette may be used.

(d) A water bath with enough depth to immerse the lipid phase in the rubber-stopped butyrometer completely. It is used at 60-65^{0}C.

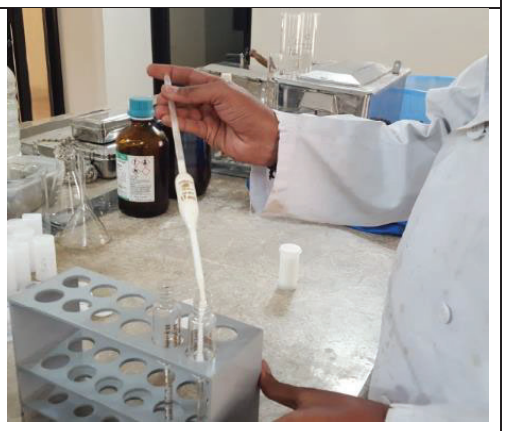
(e) An electric Gerber centrifuge equipped with a revolution counter.

(ii) Measurement

1) Add 10 ml sulfuric acid using a pipette for sulfuric acid to a butyrometer

2) Add 11 ml milk sample along the wall of the butyrometer so that it form layer over the sulfuric acid.

Sample temperature to comply between 15 to 20 ℃	Milk sample pour quietly
	

Pour while warming by hand the central part of the pipette	Do not blowing breath
	

3) Then add 1 ml amyl alcohol

4) Cap the butyrometer with a rubber stopper

Push in the rubber stopper	It is not crowded press until the end
	

5) Invert the butyrometer several times until the curds are completely dissolved. Wrap the butyrometer with cloth or other appropriate material for safety in case of a vigorous exothermic reaction with sulfuric acid.

Using the safety mixing box.	Repeated quietly
	

6) After warming the butyrometer in a hot water bath at 60-65^{0}C for 15 minutes

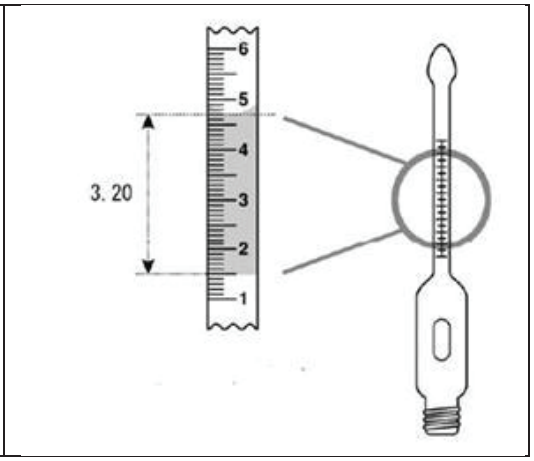
7) Centrifuge it ar 900 rpm for 5 minutes to separate the lipid phase.

Wipe off the water	It is always an even number of tester for balancing
	

8) Replace the butyrometer in the water bath to completely immerse the lipid phase, keeping it at 60-65^{0}C for 5 minutes.

9) As shown in Figure as fallow, read the lower level of the top and bottom meniscuse.

Using divider	Read up to two digits after the decimal point



Notes

a. Both sulfuric acid and milk should be used at 15-20^{0}C. A higher temperature of milk will result in foaming when mixing with sulfuric acid.
The room of laboratory be in cooler in advance.

b. The mouth of the butyrometer should be wiped with filter paper after adding amyl alcohol. The rubber stopper should be wiped as well. A stopper may slip out of a wet mouth, which may lead to an unexpected accident.

c. Reading the column of lipid phase should be done quickly.

d. Once the measurement is complete, empty the butyrometer and treat the waste sample as waste water.

e. After washing with warm water, boil the butyrometer in weak alkaline or other appropriate detergent for 20 to 30 minutes, rinse and dry.

Record od The Milk Fat Content by Gerber Metod

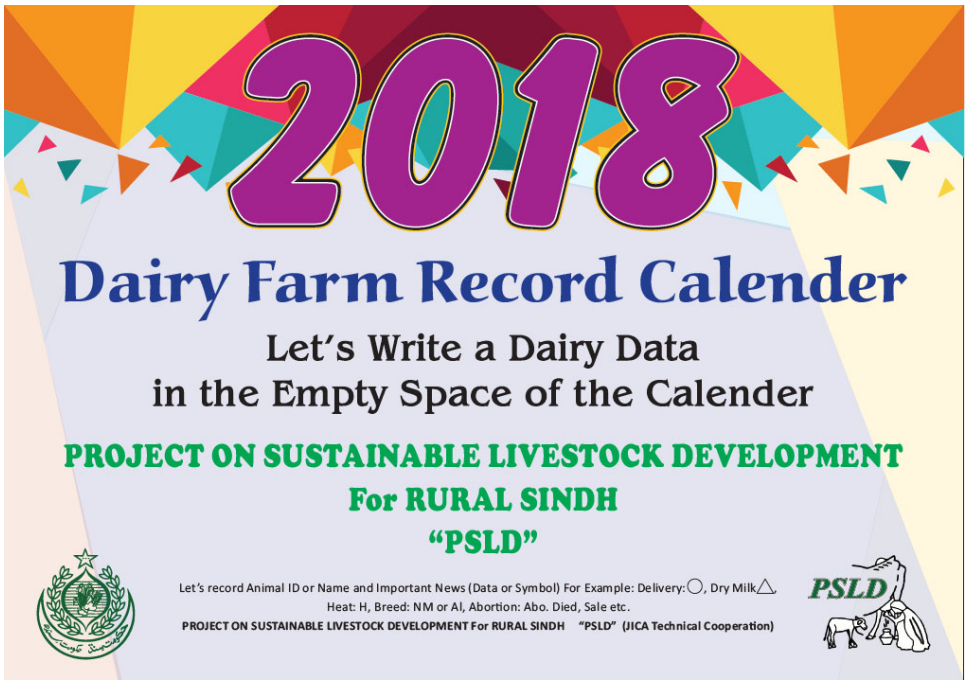
Date:

Centrifuge: rpm, Time: minuts

Sample Number	Temperature , Hot water bath	Fat % (a)	Fat % (b)	Average Fat %

Name of Inspector:

Appendix Z1-4 Dairy Farm Record Calendar 2018



JANUARY

جنوري

DAIRY FARM RECORD CALENDAR

By using this calendar improve dairy farming records

Let's Record In The Calendar!

ڈيري فارم تي جانورن جي ريڪارڊ رکڻ جو ڪئلنڈر

هن ڪئلنڈر جي استعمال سان ڈيري فارمنگ جو ريڪارڊ بهتر ڪري سگهجي ٿو

اچو تہ روزانو ٹيندڙ تبديلين جو ريڪارڈ ڪئلنڈر ۾ تبديليون درج ڪريون

JANUARY 2018

MONDAY	TUESDAY	WEDNESDAY	THUSDAY	FRIDAY	SATURDAY	SUNDAY
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Let's record Animal ID or Name and Important News (Data or Symbol) For Example: Delivery:○, Dry Milk△, Heat: H, Breed: NM or AI, Abortion: Abo. Died, Sale etc.

PROJECT ON SUSTAINABLE LIVESTOCK DEVELOPMENT For RURAL SINDH "PSLD" (JICA Technical Cooperation)

PSLD

FEBRUARY فيبروري

GUARANTEED FORMULA FEED

تصديق ٿيل جانورن جي خوراڪ

Let's use guaranteed formula feed to increase milk production!

اچو ته جانورن کي تصديق ٿيل خوراڪ کارائي کير جي پيداوار وڌايون.

FEBRUARY 2018

MONDAY	TUESDAY	WEDNESDAY	THUSDAY	FRIDAY	SATURDAY	SUNDAY
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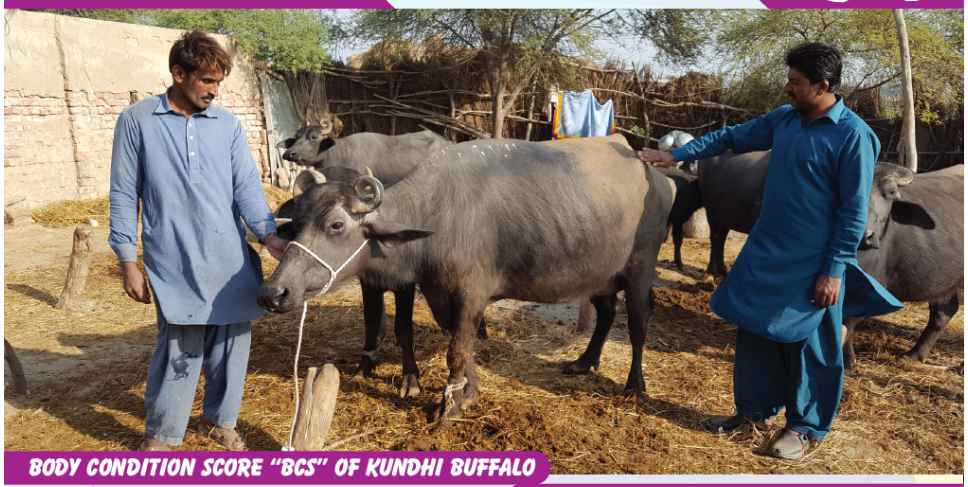
Let's record Animal ID or Name and Important News (Data or Symbol) For Example: Delivery:○, Dry Milk△,
Heat: H, Breed: NM or AI, Abortion: Abo. Died, Sale etc.

PROJECT ON SUSTAINABLE LIVESTOCK DEVELOPMENT For RURAL SINDH "PSLD" (JICA Technical Cooperation)

PSLD

MARCH

مارچ



BODY CONDITION SCORE "BCS" OF KUNDHI BUFFALO

"PSLD" BCS is very easy and useful.

Let's know the nutritional condition of Kundhi Buffalo!

ڪنڊي مينهن جي جسماني حالت جو مشاهدو ڪرڻ

پي ايس ايل ڊي منصوبي جي تحت جانورن جي جسماني حالت جو اندازو لڳائڻ آسان ۽ مفيد آهي.
اچو ته ڪنڊي مينهن جي جسماني صحت جو اندازو متوازن خوراڪ ڏيڻ سان ڪريون

MARCH 2018

MONDAY	TUESDAY	WEDNESDAY	THUSDAY	FRIDAY	SATURDAY	SUNDAY
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
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Let's record Animal ID or Name and Important News (Data or Symbol) For Example: Delivery:○, Dry Milk△,
Heat: H, Breed: NM or AI, Abortion: Abo. Died, Sale etc.

PROJECT ON SUSTAINABLE LIVESTOCK DEVELOPMENT For RURAL SINDH "PSLD" (JICA Technical Cooperation)

PSLD

APRIL

اپريل

BODY WEIGHT MEASUREMENT OF KUNDHI BUFFALO

By Measuring Tape Developed by the "PSLD"

Let's measure Heart Girth to know the body weight of Kundhi Buffalo!

ڪنڊي مينهن جي جسماني ماپ لاءِ منصوبي تحت تيار ڪيل ٽيپ جو استعمال

اچو ته ڪنڊي مينهن جي ڇاتي/ سيني جي ماپ ونی ان جي جسماني وزن جو اندازو لڳايون

APRIL 2018

MONDAY	TUESDAY	WEDNESDAY	THUSDAY	FRIDAY	SATURDAY	SUNDAY
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
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23	24	25	26	27	28	29
30						

Let's record Animal ID or Name and Important News (Data or Symbol) For Example: Delivery:○, Dry Milk△, Heat: H, Breed: NM or AI, Abortion: Abo. Died, Sale etc.

PROJECT ON SUSTAINABLE LIVESTOCK DEVELOPMENT For RURAL SINDH "PSLD" (JICA Technical Cooperation)

PSLD

MAY

مئي

HAY FOR CALF FEEDING

Let's make quality hay from natural grass and feeding calves for good growth!

قرن جي خوراڪ لاءِ سڪل گاهه جو استعمال ڪرڻ

اچو ته قدرتي گاهن کي معياري نموني سڪائي قرن جي سني واڌويجهه لاءِ کارايون

MAY 2018

MONDAY	TUESDAY	WEDNESDAY	THUSDAY	FRIDAY	SATURDAY	SUNDAY
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
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28	29	30	31			

Let's record Animal ID or Name and Important News (Data or Symbol) For Example: Delivery:○, Dry Milk△, Heat: H, Breed: NM or AI, Abortion: Abo. Died, Sale etc.

PROJECT ON SUSTAINABLE LIVESTOCK DEVELOPMENT For RURAL SINDH "PSLD" (JICA Technical Cooperation)

PSLD

JUNE جون

REPRODUCTIVE DIAGNOSIS BY RECTAL PALPATION

هٿ طريقي سان ڍڪي مينهن جي چڪاس ڪرائڻ

Let's reduce postpartum period by technical advice of Veterinarian!

Let's early checkup of buffalo¥cow

40 days after parturition!

اچو ته ڇوپائي مال جي تجربيڪار ڊاڪٽر کان چڪاس ڪرائي ۽ فني صلاح سان بن قرن جي وچ ۾ پيدائش جو وقفو گھٽايون.

اچو ته مينهن/ ڍڳي جي ويهر جي ٤٠ ڏينهن کانپوءِ تکڙو چڪاس ڪرايون

JUNE 2018

MONDAY	TUESDAY	WEDNESDAY	THUSDAY	FRIDAY	SATURDAY	SUNDAY
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
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Let's record Animal ID or Name and Important News (Data or Symbol) For Example: Delivery:◯, Dry Milk△, Heat: H, Breed: NM or AI, Abortion: Abo. Died, Sale etc.

PROJECT ON SUSTAINABLE LIVESTOCK DEVELOPMENT For RURAL SINDH "PSLD" (JICA Technical Cooperation)

PSLD

JULY جولاءِ

REGULAR VACCINATION

Prevention is better than cure

Let's prevent animals from diseases to reduce losses!

پابندي سان هر سال حفاظتي ٽڪا لڳرائڻ

بچاءُ علاج کان بهتر آهي

اچو تہ چوپائي مال کي وچڙندڙ بيمارين کان بچاءُ جا ٽڪا لڳرايون ۽

بيمارين جي ڪري ٿيندڙ نقصان کان بچايون.

JULY 2018

MONDAY	TUESDAY	WEDNESDAY	THUSDAY	FRIDAY	SATURDAY	SUNDAY
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

Let's record Animal ID or Name and Important News (Data or Symbol) For Example: Delivery:◯, Dry Milk△,
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PROJECT ON SUSTAINABLE LIVESTOCK DEVELOPMENT For RURAL SINDH "PSLD" (JICA Technical Cooperation)

PSLD

AUGUST

آگسٽ

REGULAR DEWORMING

Regular deworming improves the health status and production

Let's prevent animals from worms!

باقاعدگي سان پيٽ جي ڪيڙن جي دوا پيارڻ

پيٽ جي ڪيڙن جي دوا جو باقاعده استعمال چوپائي مال جي صحت ۽ پيداوار وڌي

اچو تہ چوپائي مال کي پيٽ جي ڪيڙن جي بيمارين کان بچايو

AUGUST 2018

MONDAY	TUESDAY	WEDNESDAY	THUSDAY	FRIDAY	SATURDAY	SUNDAY
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Let's record Animal ID or Name and Important News (Data or Symbol) For Example: Delivery:◯, Dry Milk△,
Heat: H, Breed: NM or AI, Abortion: Abo. Died, Sale etc.

PROJECT ON SUSTAINABLE LIVESTOCK DEVELOPMENT For RURAL SINDH "PSLD" (JICA Technical Cooperation)

PSLD

SEPTEMBER سيپٽمبر

SELECTION OF POTENTIAL KUNDHI BUFFALO پيداواري صلاحيت واري ڪنڊي مينهن جي چونڊ ڪرڻ گهرجي

Rear productive kundhi buffalo for good genetic improvement

سڀني نسل واريون مينهون پالڻ گهرجن ته جيئن ايندڙ نسل بهتر ٿئي.

Let's use a good bull to get better generation!

اڇو ته سڀني نسل جي سانهه جي چونڊ ڪندي سڻو نسل حاصل ڪريون

SEPTEMBER 2018

MONDAY	TUESDAY	WEDNESDAY	THUSDAY	FRIDAY	SATURDAY	SUNDAY
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Let's record Animal ID or Name and Important News (Data or Symbol) For Example: Delivery:○, Dry Milk△,
Heat: H, Breed: NM or AI, Abortion: Abo. Died, Sale etc.

PROJECT ON SUSTAINABLE LIVESTOCK DEVELOPMENT For RURAL SINDH "PSLD" (JICA Technical Cooperation)

PSLD

OCTOBER

آڪٽوبر

SALVATION OF BUFFALO CALVES

مينهن جي قرن جي پالنا ڪرڻ

Livestock Department Sindh "LDS" / PSLD distributing Kundhi buffalo calves.

Let's rear calves to increase future assets of poor farmers!

چوپائي مال جي پالنا واري ڪاتي ۾ پي ايس ايل ڊي منصوبي تحت ڪنڊي مينهن جا قرن پاڻين ۾ ورهايا آهن.

اچو ته قرن پاليون ۽ غريب پاڻين جي مستقبل لاءِ انهن جي مال جا اثاثا وڌايون

OCTOBER 2018

MONDAY	TUESDAY	WEDNESDAY	THUSDAY	FRIDAY	SATURDAY	SUNDAY
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Let's record Animal ID or Name and Important News (Data or Symbol) For Example: Delivery:○, Dry Milk△, Heat: H, Breed: NM or AI, Abortion: Abo. Died, Sale etc.

PROJECT ON SUSTAINABLE LIVESTOCK DEVELOPMENT For RURAL SINDH "PSLD" (JICA Technical Cooperation)

PSLD

NOVEMBER نومبر

SUCKLING TECHNIQUE قرن کي هٿرادو نموني کير پيارڻ

Provide required quantity of milk to calves hygienically through bucket

Let's feed the calves with required of milk

بالٽي وسيلي قرن کي انهن جي ضرورت موجب جراثيم کان پاڪ کير ڏيڻ

اچو ته قرن کي انهن جي ضرورت موجب کير پياريون

NOVEMBER 2018

MONDAY	TUESDAY	WEDNESDAY	THUSDAY	FRIDAY	SATURDAY	SUNDAY
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Let's record Animal ID or Name and Important News (Data or Symbol) For Example: Delivery:○, Dry Milk△, Heat: H, Breed: NM or AI, Abortion: Abo. Died, Sale etc.

PROJECT ON SUSTAINABLE LIVESTOCK DEVELOPMENT For RURAL SINDH "PSLD" (JICA Technical Cooperation)

PSLD

DECEMBER دسمبر

HOOF - CUTTING چوپائي مال جا ڳر ڪترائڻ

Long hoof causes extra stress on buffaloes and reduce milk production

Let's periodically trimming of hoof to increase productivity of animal!

وڌيل ڳر مال کي تڪليف ڏين تا ان ڪري انهن جي مال جي پيداوار گهٽجي وڃي.

اچو ته وقت سر ڳر ڪترايون ۽ مال جي پيداوار وڌايون

DECEMBER 2018

MONDAY	TUESDAY	WEDNESDAY	THUSDAY	FRIDAY	SATURDAY	SUNDAY
					1	2
3	4	5	6	7	8	
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

Let's record Animal ID or Name and Important News (Data or Symbol) For Example: Delivery:○, Dry Milk△, Heat: H, Breed: NM or AI, Abortion: Abo. Died, Sale etc.

PROJECT ON SUSTAINABLE LIVESTOCK DEVELOPMENT For RURAL SINDH "PSLD" (JICA Technical Cooperation)

PSLD

SURVEY ON SHARING SYSTEM OF BUFFALOES IN THE PROJECT AREA

The Project on Sustainable Livestock Development for Rural Sindh

Kaihatsu Management Consulting, Inc.

Table of Contents

Executive Summary

The project on sustainable livestock development for rural Sindh is the joint project of Japanese Government and Sindh Livestock department aiming for uplifting livelihood of small scale farmers in the project area through developing and disseminating appropriate livestock techniques. One of the activities of the project is to increase livestock assets of small scale farmers through salvation and distribution of calves born to high productive mother buffaloes. To examine appropriate ways to distribute these calves for a benefit of small scale farmers, the project attempted to learn the traditional sharing system of livestock in the region for possible application in the project.

The survey conducted interviews in the 23 villages of 5 districts. 60 respondents including 28 owners and 32 caretakers provided their information on their sharing practices.

Sharing in and out of livestock are widely practiced in the project area. Majority of owners who share out their animals are land owners but also includes livestock traders and milk traders. Majority of caretakers are daily wage workers and agricultural tenants who possess less than 3 heads of own animals on average. Animals shared in and out include calves, heifers, dry female buffaloes and cattle as well as male calves of buffaloes and cattle.

As far as milch buffalo is concerned, 2 major patterns of sharing practices were found in the surveyed area, i.e. 1) short-term agreement up to parturition of female buffalo and 2) long-term agreement of female buffalo throughout its 2 to 3 lactation periods. Besides, commercial type contract was also found near the city with commercial farms. The sharing practices brings various benefits to both owners and caretakers of livestock according to their different needs. For caretakers, the sharing practice gives an opportunity to save cash in a form of accumulation of labor and an opportunity to get additional income in kind, i.e. milk and offspring of animals. The prevailing pattern of sharing practice, however, is short term agreement up to parturition, which only brings lump sum cash savings for caretakers. Keeping the view that the project aims to increase animal assets of small scale farmers, it is difficult for small scale farmers to obtain their own animal assets through short term agreement up to parturition. On the other hand, long term agreement is providing more advantages to caretakers, including chances of ownership of animals. Long term agreement, however, is only found in some region, but not everywhere and it is difficult to follow the same type of agreement by a third party organization since agreement duration is long like 10 years.

To reduce risks under the sharing of livestock an owner usually try to select a caretaker those who has good livestock rearing skills and those who are physically accessible. The risks of reproductive disorder of animals are, however, not properly tackled and no concrete countermeasure have been taken due to scarcity of technicians specialized in reproductive diagnosis and treatment.

To increase chances of ownership, shared animals needs to be kept with a caretaker for longer duration including its parturition and lactation period so that a caretaker could have additional income from milk and

offspring, i.e. surplus income from leased assets. To do that, similar form of sharing practice which allow a caretaker to keep a shared-in animal over its lactation period should be devised by the project. The short term growing agreement can be combined with the current sharing practice the project applies to increase a profit and return for both a caretaker and the project. In additional to a form of agreement, technical guidance especially on reproductive diagnosis and treatment to farmers is a key to maximize their profit. The provision of technical guidance service and its mechanism should be devised by the project.

1 Background

The project on sustainable livestock development for rural Sindh is the joint project of Japanese Government and Sindh Livestock department of Pakistan Government aiming at uplifting livelihood of small scale farmers in the project area through developing and disseminating appropriate livestock technologies. One of the activities of the project is to increase livestock assets of small scale farmers through salvation of calves born to high productive mother buffaloes, which are often slaughtered right after their birth to save the cost of rearing at the commercial farms. To utilize such potentially-high-productive but untapped resources in the region and make them available for small scale farmers to increase their assets, the project will make a trial to bring the calves to small scale farmers in the pilot villages through provision of calves on sharing basis with technical guidance from the veterinarian officers of the project.

In the pilot districts of the project, the sharing practice has long been practiced by being intertwined with the social structure of rural Sindh. The survey on traditional sharing systems in the project area has been carried out to grasp the pattern of sharing practice prevailing in the area and suggest how it can be applied for the project.

2 Objectives

The objectives of this survey are listed as follows:

- To understand traditional livestock sharing systems by classifying the patterns of sharing practice in the project area
- To analyze cost and benefit of each sharing practice pattern
- To examine existing patterns of sharing practice whether they can be introduced to the project or not

3 Overview of the survey

3.1 Survey period

The field interview was conducted from November 2014 to June 2015.

3.2 Survey area

The project, as of June 2015, is being implemented in the 5 districts in Sindh province, namely, Hyderabad, Matiari, Tando Allahyar, Tando Muhammand Khan and Badin with 13 pilot farmers and 10 breeder farmers. The location of the farmers of each districts are as per the table given in the annex 1;

The interviews were conducted with pilot farmers, breeder farmers and nearby villagers. Information on sharing systems was obtained from 23 villages and one cattle colony, which included some of villages nearby but no pilot farmer or breeder farmer is located.

3.3 Methodology

Questionnaire was developed as a guideline for interview, with which individual face to face interviews were conducted. The respondents were identified by snowball sampling methods through the information of villagers. The information obtained were recorded and saved onto the database for the further analysis.

3.4 Definition of terms

Terms used in this survey are defined as follows:

Livestock sharing; A lease of assets in the form of animals or entrusting animals from an owner to a caretaker tenant with the condition that profits are shared between them based on the value of animals at the end of term.

The animals being traded in the livestock sharing and focused in this survey are categorized as follows.

- Calf aged under 1 year; Newly born calf up to 1 year of age
- Young heifer aged 1 to 2 years old; Heifer between the age of 1 to 2 years which is under formative period of its body
- Old heifer aged 2 years to up to first parturition; Heifer between age of 2 years to 1st parturition which is close to or reach its puberty
- Milking buffalo; Buffalo kept by a caretaker during its lactation period
- Dry buffalo; Buffalo which ends its lactation period from last parturition and waiting for another conception or delivery
- Male buffalo; Male buffalo kept for fattening purpose
- Cow; Heifer or dry cow
- Male cattle; Male cattle kept for fattening purpose

This survey excludes goats from the scope of survey considering that the project is going to distribute female buffalo calves only. Though male buffaloes, cow and cattle are included in the survey, more attention was given to milch buffaloes for the same reason.

4 Overview of respondents

Fifty six respondents, both animal owners and caretakers, were interviewed. The number of the respondents by district are as follows:

Table1 No. of respondents by district

	Hyderabad	**Matiari**	**Tando Allahyar**	**Tando Muhammad Khan**	**Badin**	**Total**
Owner	2	7	5	6	8	28
Caretaker	7	9	2	8	6	32

Occupations of the owners and the caretakers are as shown in the following tables:

Table2 No. of owners by occupation

Occupation	N	%
Commercial farmer	3	11%
Land load	16	57%
Livestock trader	3	11%
Salaried employee	3	11%
Tenant	3	11%

Table3 No. of caretakers by occupation

Occupation	N	%
Commercial farmer	1	3%
Daily wage worker	7	22%
Land load	4	13%
Livestock trader	1	3%
Milk trader	1	3%
Salaried employee	1	3%
Tenant	16	50%
Other	1	3%

The ratio of land load is the highest among the owners whereas same number of commercial farmers, livestock traders, salaried employees and tenants are also identified as the occupations of the owners. On the other hand, tenants and daily wage workers are the majority of the caretakers.

Average number of animals owned by the owners and the caretakers are 37 and 2.48, respectively. Distribution of the number of own animals of owners and caretakers are shown in the Figure 1. Minimum number of the owners is 1 and maximum number is 260 whereas minimum number of the caretakers is 0 and maximum number is 12. The majority of the caretakers do not own an animal as shown in the Figure 2.

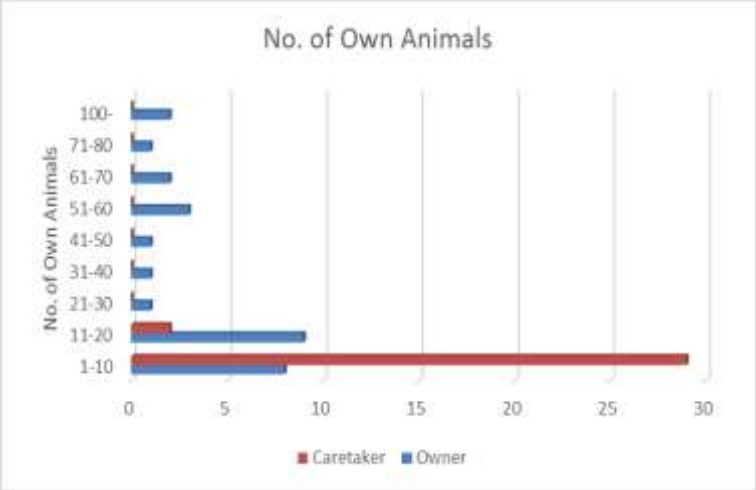

Figure 1 No. of Own Animals

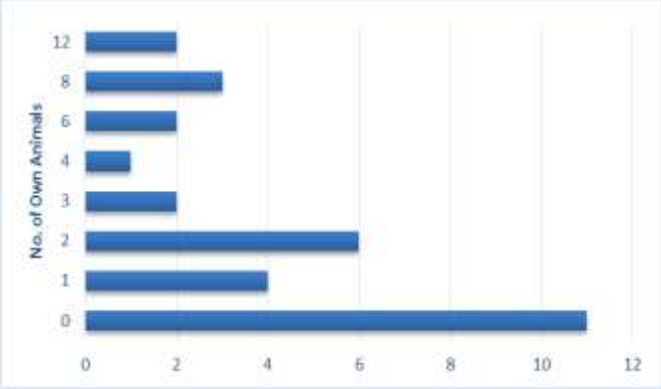

Figure 2 No. of Own Animals of caretaker

Average number of animals reared by the owners is 18 whereas those of the caretakers is 4.6. Maximum number of animals taken care by the owners is 89 and minimum number is 0. Maximum number of the caretakers is 15 and minimum is 1.

The numbers of animals taken care by the caretakers which include their own animals are shown in Figure 3 and Table 4.

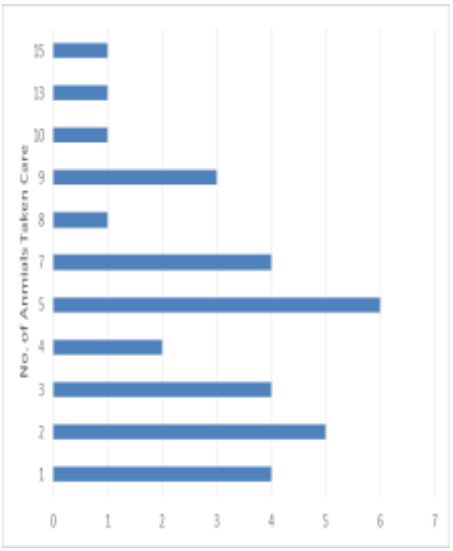

Figure 3 No. of Animals taken care by caretaker

Table 4 Number of own animals and animals shared-in

Number of animals shared-in by caretaker

Number of own animals of caretaker	1	2	3	4	5	8	Rent-in
0	4	2	2	1	2		
1	3			1			
2	2	1	2			1	
3		1		1			
4			1	1			
6	2						
8	1						2
12			1				1

Majority (more than 70%) of the caretakers take care of animals within the range of 5.Those who own more than 8 animals rent in milking animals from the other farms. They get income from selling milk, which implies they have positive cash flow.

In a nutshell, majority of the caretakers are either tenants or daily wage workers who often do not possess animals or own small number of animals, i.e. less than 4.

Both the owners and the caretakers have good experience of the sharing practices as shown in Table 5.

Table 5 Years of experiences engaged in sharing practice

Category	Average	Minimum	Maximum
Owner	15	1	40
Caretaker	11	3	30

5 Observed patterns of sharing practices

5.1 Patterns by type of buffaloes

Depending on sex and growing stages of animals, the purposes of sharing practice vary. The patterns of the sharing based on the type of animals can be categorized as follows:

[Female buffaloes / cow]

Growing - Female calf, Heifer- : It normally takes 3 to 4 years for a female buffalo to become able to conceive in rural Sindh. After a female animal delivers a calf, it brings income to farmers. The expenses bringing up female animals up to her first parturition are simply costs for farmers in terms of money, time and space. Sharing practice is widely applied to save these costs incurred to owners. The caretakers are expected to bring those female animals up to parturition from a calf or a heifer. The profit depends on if heifer could be conceived or not.

Recycling – Dry female buffalo - : Once a female buffalo ceases milking and become dry, it becomes unprofitable like a heifer until next parturition. The sharing practice is again applied to save costs of keeping such an unprofitable dry buffalo until her next parturition.. Two patterns were observed regarding the payment method under the sharing practices. One pattern is lump sum payment to a caretaker at the time of completion of contract. Another pattern is the fixed monthly payment to a caretaker from an owner for the animals already pregnant.

Long term – Female buffalo or cow - : Some owners entrust female animals to caretakers for long period, 10 years or more.

[Male calf / cattle]

Fattening: Male buffaloes or cattle are kept for fattening and meat purpose. The male animals are usually kept until their price reaches to its peak so that an owner may receive maximum profit.

[Male cattle]

Eid-ul-Azha: Eid-ul-Azha is the Muslim religious event when Muslims sacrifice animals to God. Muslims who can afford to sacrifice animals purchase animals before or during this holiday, and a number of animals are traded during this period. The animals preferred for the sacrifice are male cattle, female cattle, male goats, sheep and camels in order. Sharing practices were occasionally observed in the case of goats but not cattle during the survey.

The type of animals which 60 respondents interviewed in this survey keep under the sharing systems are as follows:

Table 6 Type of animals keeping under the sharing system

Unit: Cases[1]

Type of Animals	Owners	Caretakers
Heifer	23	23
Dry Buffalo	12	8
Milking Buffalo	1	6 [2]
Female buffalo calf	8	6
Male buffalo calf	1	7
Cow		4
Cattle	1	

Heifer is the most popular type of animal kept under the sharing system whereas sharing of male animals is

[1] Some owners and caretakers keep different types of animals under their sharing system. Each different type of sharing animals is counted as one irrespective of numbers of animals kept by them.
[2] 3 cases are monthly rental buffalo

not popular as milking buffaloes.

5.2 By type of agreement contract

The type mentioned in the 5.1 can be re-categorized based on the type of agreement between an owner and a caretaker.

Short term (up to parturition):

Milch animals- Milch animals including heifers and dry buffaloes are shared out by an owner only for short term for being taken care up to their parturition. The duration of the agreement between an owner and a caretaker depends on when it conceives and therefore is not precisely defined at the time of agreement. However, a caretaker will take care of the animal only up to its parturition, meaning that they only keep animals for limited period in their reproductive and milking cycle. The caretaker, therefore, does not enjoy benefit of milch animals, i.e. milk or its offspring from them. In addition, the caretaker cannot fully learn how to take care of animals in this case. Under this agreement, initial cost of animals is borne by an owner whereas labor and fodder costs are borne by a caretaker. The costs of medical care and concentrates depend on the cases. Initial costs are deducted from the price of animals at the end of agreement. Remaining profit is divided into half for both an owner and a caretaker. Besides this 50-50 profit share practice, there are some cases that fixed amount is paid to a caretaker. This practice was observed in the contract between a commercial farm and a caretaker.

Male animals- Male animals are kept for fattening purpose for a year or so. The share of profit is the same as the case of a heifer and a dry buffalo. A half of profit after deduction of initial cost is shared between an owner and a caretaker.

Long term (2-3 lactations):

There are cases of long term sharing agreement of milch animals. The sharing period is more than 2 lactations of milch animals, and the duration of the agreement is rather longer; 5 to 10 years. A caretaker can keep milch animals over its lactation period, and milk is usually care taker's share. There are 2 types of sharing of profits. One type is that no initial cost of animals is borne by a caretaker whereas profit is shared between an owner and a caretaker at 3:1. Another type is that profit is shared at 50:50, but the initial cost borne by the owner is deducted from the profit.

Monthly:

A commercial farm offers a different type of contract to a caretaker for taking care of animals. Some respondents were paid 1,500 to 2,000 Rs per month as a remuneration of taking care of a dry buffalo until it conceives or a pregnant buffalo until it gives a birth.

Rent:

There are cases of renting milch animals for one lactation to those who wish to utilize them by paying costs. The price is fixed per month, and payment is made advance in some cases and monthly in some other cases. It depends on an owner.

5.3 By relation between owners and caretakers

The sharing agreement was made between an owner and a caretaker, but the relationship between them sometimes goes beyond merely owner-caretaker. The observed types of the relationships are categorized as follows:

Land load – tenant: The sharing practice has been exercised in rural Sindh. Many of caretakers are agricultural tenants. It is, therefore, presumed sharing of animals are practiced under the same setting of relationship, i.e. land load – tenant. However, this relationship is not as popular as expected. The land load of tenant are not necessarily own livestock to share with his tenants, or not necessarily match with the agriculture land load – tenant relationship.

Same Biradari: There supposed to have more interactive relationship and sense of trusts among same biradari in the rural Sindh. It is, therefore, presumed that sharing of animals among same biradari are popular than other relationship. It was, however, not many cases of same biradari relationships in the sharing practice. One of respondents replied that same biradari did not mean they were good at keeping animals. On the other hand, some owners prefer to choose their caretakers from different and specific biradari who are well known as good animal caretakers and their hard working, especially Kohli biradari of Hindu.

Same Villages: There are a number of cases that owners found their caretakers from a same village but who are not either their tenants nor from same biradari. A number of owners claims that they know very well who are good at taking care of animals in the village so that they could make selection of caretakers from them. At the same time, the distance seems matter to the selection of caretakers. There were owners stopped their sharing agreement due to the reason that caretakers moved away from their village, which made difficult to monitor them.

Other: Sometimes sharing practice starts with the offer from caretaker who wish to receive shared-in animals. In those cases, caretakers are neither from same village, same biradari nor land load –tenant relationship. One example is the caretaker who asked the manager of his work place to entrust the manager's animals to him. Sometimes those caretakers whom owners could entrust their animals live nearby the villages. Such relationship is categorized into 'other'.

Commercial contract: There are cases of relationships between an owner and a caretaker bound under the commercial contract; for example, a commercial farm gave rural farmers commissioned to take care of their animals for them. There found a middleman to connect commercial farms with caretakers as well. The survey

found a case that a middleman charged 2,000 Rs to a commercial farm as commission fee.

The relation between owners and caretakers were counted as follows;

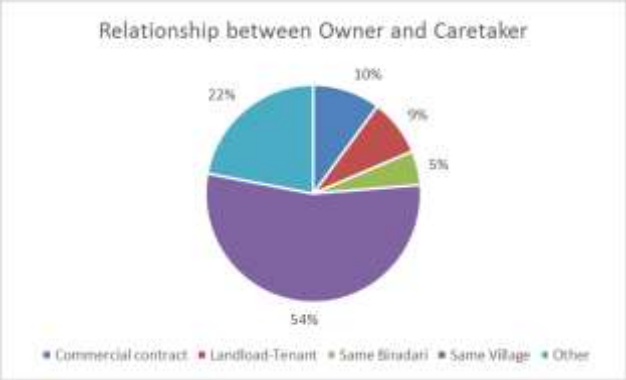

Figure 4 Relationship between owner and caretaker

The most popular (54%) relationship between an owner and a caretaker of animals is 'same villagers' followed by 'the other' category. Though the sharing practice is exercised in rural Sindh, the selection of owners and caretakers are not bound to the existing other relationships like agricultural land load – relationship or same biradari relationship. The criteria of selection of caretakers are rather based on their skills and place of living, i.e. those who can take good care of animals and those who are able to monitor easily. The same village people easily come under this criteria, which might be the reason why the number of relationship between owner and caretaker mostly are found in the same village relationship.

5.4 By region

There are clear distinction in agreement period in the region. Long term contract was mostly found in Badin among 5 districts during the survey. The reason behind it was not clear but the pattern in Badin is different from other districts.

Table 7 Number of type of contract by district

	Hyderabad	Matiari	Tando Allahyar	Tando Mohammad Khan	Badin
Up to parturition	9	22	8	16	6
Specific years	5	5	0	5	17
Unspecific years	0	0	1	0	1

In Badin the agreement contract periods of sharing animal are 2 to 5 year in general, and sometimes up to 10 years whereas the short term agreement up to parturition is much more popular than long term agreement which covers throughout lactation periods of female animals.

5.5 Needs and Benefits for livestock owners and caretakers

Sharing patterns can be changed according to needs of both livestock owners and caretakers. Needs are different among owners and caretakers depending on their occupation, economic situation, land holdings, etc. In the following sections, the needs and benefits from the sharing practice for owners and caretakers are discussed to further examine the patterns of sharing practice.

[Needs and Benefit for owners]

Benefit of reducing labor cost: Under the sharing system, the labor costs are incurred by caretakers till the time when their share is paid to them. The owners do not need to consider labor costs of a caretaker based on the time and manpower spent by caretakers but is calculated based on the final evaluated value of animals, which is comparatively less than one borne by an owner when he hire a labor.[3]

Benefit of overcoming shortage of land (limited space): The number of animals one farm can keep depends on their space. The sharing system provides solution for those who want to keep more animals than their space capacity without spending additional costs for spaces.

Benefit of overcoming shortage of fodder: Owners of animals faces the shortage of fodder in some certain period of seasons. To overcome this shortage of fodder without losing the ownership of the animals, owners sometimes take advantage of sharing system. They share out their animals to those who can find enough fodder to feed these animals.

Benefit of capturing the superior genetics: Shared-out animal by an owner either can be sold to a market to transform animals into cash or returned to their owners' farms. Some owners make selection of individual animals when they terminate the agreement, i.e. an owner will make decision whether they will sell animals to a market or collect their animals back to their own herd depending on an animal's ability. If an animal has good milk production capacity, owners will keep it in their own farms, otherwise they will sell it to an open market. The sharing system gives opportunity to capture the superior genetics of buffaloes without losing the number of their own animals.

Box 1: Case of Kamal-ud-Din:

Kamal-ud-Din is an owner of good Khundi buffalo breeds. He shared out his animals to his neighboring daily wage workers. He himself wishes to keep his own animals at his farm but his farm space has reached to maximum limit to keep his all animals with him. He, then, is sharing out his animals to neighbors to keep his good breeds without losing ownership of those animals. He will make selection of animals when he wants to terminate the contract. If an animal is good breed, he will keep otherwise he will sell those out to someone.

Benefit of investment: Owners of animals are not necessarily livestock farmers who keep their own animals at their own farms. Some of them are trading animals or milk but does not keep their animals with them at all. An owner also can be a salaried employee who does not rear any of his/her animals by themselves. Those who have enough capitals to purchase animals to be entrust to care takers, are gaining profit from sharing system of

[3] Daily wage rate varies in type of labor and season. According weekly interview of pilot farms of the project, one pilot farmer in Matiari district is earning 5,000Rs per month as a livestock labor. The other case is the beneficiary of the project calves distribution in Matiari who earns 8,000 Rs per month as a livestock labor. Suppose they work 26 days a month, daily wage of the former case is 192Rs and that of the latter case is 307 Rs, respectively. The other pilot farmer in Badin is earning 200 Rs per day as an agricultural labor. As discussed in chapter 6, a caretaker can earn 145 Rs per a day at most in case of sharing of livestock, which is comparatively less wages than those of daily workers.

animals. The profit gained from investing shared-out animals are often much more than interests to be earned from bank deposits[4].

The other type of investment can be observed in the case of milk trader. As a milk trader, they need the milch animals. The milking animals are, however, much costly than those calves and heifers of milch animals. Milk traders can make use of sharing system by investing less amount of money to obtain higher value of milch animals for their milk trading business by entrusting a heifer to caretakers to bring up to milking animal.

Benefit of increasing value of animals (recycling/revolving): Not only the investors but also owner farmers are gaining profit from sales of shared-out animals to a market. The owner can keep those animals which would not be collected by owners with caretakers until those animals' value reach to their maximum point. Long-term agreement cases also come under this advantage category. Under the long-term agreement, owners can sell their animals and their offspring at any time of their convenience. Owners can gain profit without spending much costs, but risk.

Benefit of using animals as collateral (security / guarantee for borrowing money): There are cases that owners use animals as a guarantee for getting money while still keeping ownership of animals. One case was the getting lump sum money while keeping shared ownership of the animals. The other case is monthly rental of milch animals to receive monthly income from those animals without losing ownership.

Box 2: Case of Pehraj:

Pehraj, a small scale farmer, keeps both his own animals and someone's sharing animals. He owned a heifer of 3 years of age. Once he was in need of money, he sold his heifer at the price of 32,000 Rs to a future owner of his animal. Though he sold his animal, he still keeps that heifer as a sharing-in animal. According to him, an initial cost of a heifer will be deducted at the end of the agreement, which means 50% of its cost, i.e. 16,000Rs. If an initial cost is deducted when the sharing agreement is terminated, the cost born by Pehraj will be 32,000 plus 16,000 Rs. It can be regarded as if he borrows 32,000 Rs in return of his heifer with the 50% of mark-up rate.

[Needs and Benefit for caretakers]

Benefit of utilizing surplus labor: Caretakers will have opportunity to utilize their surplus labor into economically- productive activities through getting control of extra assets without spending any initial costs. The caretakers can have opportunity to earn extra money through sharing system by transforming their labor into form of cash.

Benefit of getting lump sum income (marriage, death, construction of house): A certain number of caretaker respondents replied that money earned from sharing practice is used for the expenses such as

[4] As shown in the chapter 6, profit from short term heifer sharing gave more than 100% return to an owner whereas the bank deposit interest is 7.26% as of 2014.

children's marriage, funerals or construction of houses, in other words, on the occasions when lump sum money is required. Caretakers take a sharing system for opportunity to have lump sum cash at one time of their agreement. In other words, under a sharing system, caretakers can accumulate their labor and transform it into form of cash over their agreement period. The sharing system, therefore, can be regarded as one of the saving practices of caretakers as a form of labor.

Benefit of getting milk: Under the sharing system, especially in the case of a long term agreement, milk getting from milch animals are usually caretaker's share. Milk is one of essential food items for the people in Pakistan and an important source of protein, particularly for economically disadvantaged households who have limited occasions to have meats. The sharing system provide nutritious food essentials to caretakers' families without paying for that.

There were some caretakers who sell those extra milk to a market, however, not the majority of them. It is difficult to get benefit under the short term agreement. In case a caretaker shares in dry buffalo, there is a chance of getting some milk during their late lactation period, but the quantity is not as much as those of milking animals and the duration of milking period is also limited. After the parturition, a care taker has to hand these milch animals to either an owner or a market. A caretaker, therefore, has less chance to earn income from selling milk in case of short term agreement for dry buffalo. For the case of heifer, there is no chance of getting milk from them. Only for a case of long term agreement, caretaker can have maximum benefit of milk from shared-in animals.

Benefit of acquisition of own animals: It is few cases that a caretaker takes over ownership of animals at the end of agreement, but not zero cases. Under the short term agreement, no cases were found that a caretaker acquire an animal through sharing practice. Profit from sharing animals are shared between an owner and a caretaker only when those animals are sold or retuned to an owner. A caretaker, therefore, has rare chances to acquire animals. Whereas the case of long term agreement, there were much chances for a caretaker to acquire his/her own animals through sharing practice. In the case of one of care taker respondent, namely, Luqman, during the 10 years of sharing practice, he got 2 heifers out of 8 female calves born to his sharing-in 6 cows as his 1:3 share.

Box 3: Case of Luqman:

Luqman started sharing in 6 cows in 2001 and kept those animals with him for 10 years. Over the 10 years he got 2 male calves and 8 female calves. He earned 20,000 Rs as 50% share of 2 male calves. During 10 lactation periods, on average he got 4 litter of milk per day for 7 months. 2 litter was consumed at his household whereas remaining 2 litter was sold to a market. On estimation, he received 151,200 Rs benefit of milk. He got ownership of 2 heifers at the age of 3 years as his share. 35,000 Rs were paid to him as his share of 6 original cows at the end of contract. He purchased daily grocery items and vegetables with the income from selling of milk. He purchased two goats with income from male calves. The goats were kept for 5 years and sold to raise fund for his brother's marriage ceremony. Income from 6 original cows were used for repay of loans from local shop.

5.6 Summary

There are several types of sharing practice, which can be categorized by the type of animals and contract durations. The benefits for owners and caretakers vary by the type of sharing practice.

Table 8 Types of sharing practice

Contract	Type of animals	Benefit for an owner	Benefit for a caretaker
Short Term	Female calf, Heifer, Dry buffalo	・ Reduction of costs ・ Solving issues of shortage of space for rearing animals ・ Solving issues of shortage of fodder ・ Capturing superior genetics	・ Utilization of surplus labor ・ Accumulating labor in a form of cash (Opportunity to save lump sum money)
		・ Return of investment ・ Increase value of animals	
	Male calf	・ Return of investment ・ Increase value of animals	
Long Term	Milch animals	・ Reduction of costs ・ Solving issues of shortage of space for rearing animals ・ Solving issues of shortage of fodder ・ Increase value of animals	・ Utilization of surplus labor ・ Accumulating labor in a form of cash (Opportunity to save lump sum money) ・ Extra income in kind in a form of milk ・ Milk for own consumption

The sharing of animals are often practiced within a same village irrespective of the biradari or land load – tenant relationship. The more important factor is whether they can take good care of animals and they are in sight of owner or not.

More owners and caretakers are engaged in the short term sharing practice than the long term sharing practices and long term sharing can be found especially in Badin, which gave more benefits to caretakers than short term sharing practice.

6 Cost and benefit of each pattern of sharing practice

Though the sharing practice brings benefits to both parties, it is often observed that the share of caretakers are comparatively less than owners. To examine if the current sharing practice will bring enough profit to

caretakers so that they could acquire their own animals through sharing practices, this section examines the cost and benefit of each pattern of sharing practice.

6.1 Item of costs

Costs of sharing animals are listed as follows;

Cost of animals: At the start of sharing practice, a cost is required for obtaining animals. One way to obtain animals is to purchase from either an open or a closed market. Another way is that owner share his animal with a caretaker. In case of the former, the cost is determined according to the market price of an animal. For the latter, its price is evaluated by either third parties or by both an owner and a caretaker. Such costs are deducted at the termination of contract in the case of 50% profit share, but initially borne by an owner. For the case of long term 1:3 profit share, no initial cost is incurred to a caretaker.

Fodder for animals: A cost for fodder of animals are borne by a care taker. Caretakers, living in a rural area can usually find fodder with free of charge.

Labor for taking care of animals: Provision of labor is a sole responsibility of a caretaker. Surplus labor in his family are mobilized to take care of animals.

Concentrate for animals: Use of concentrates depends on the intension of owners and caretakers and does not have fixed pattern on this. In 50 out of 93 cases in the survey concentrates were given. The cost sharing pattern also varies. Among the above 50 cases, caretakers bore the cost of concentrates in 34 cases whereas in 7 cases the cost was deducted from the profit at the end of the contract. The cost of concentrate was largely borne by caretakers.

Medical costs for animals: Out of 93 cases, medical costs of 34 cases were borne by owners. Medical costs of 32 cases were initially borne by owners but deducted at the termination of the agreement. Medical costs of 27 cases of were borne by caretakers. Compared to concentrate costs, more owners bore medical costs but still considerable share of medical costs caretakers were bearing.

6.2 Profit share

There are a few types of profit sharing patterns observed during the survey.

[50:50]

One type of profit sharing pattern is 50:50. Profits of sharing practice are divided at the termination of agreement after the deduction of initial costs of animals. The deduction of concentrates and medication depends on each agreement.

[1:3]

The other type of profit sharing is 1:3. One share goes to a caretaker whereas three share goes to an owner. In this sharing pattern, the initial costs are not be deducted from profits and are 100% borne by an owner. Offspring of an animal are also shared according to ratio of share between an owner and a caretaker. As for the

case of one respondent, male animals are shared 50:50 whereas that of female animals are 1:3, i.e. one share for a caretaker and three share for an owner.

[Fixed Amount]

There are a few cases which profit amount is fixed. Such cases are seen in commercial type contract with commercial farms. One example is monthly fixed pay and the other one is fixed remuneration for conceived animals.

6.3 Cost and benefit estimation of each pattern of sharing practice

Based on the figures obtained from the respondents, each pattern of costs and benefits in short term (50:50 share) contract were calculated and compared as follows:

Table 9 Comparison of benefits by each type of animals

(Figure in Rs)

	Calf up to 1 year (Own farm to Own farm)		Heifer 1 to 2 years (Own farm to Own farm)		Heifer 2 years to parturition (Market to Market)		Dry Buffalo (Market to Market)	
	Owner	Caretaker	Owner	Caretaker	Owner	Caretaker	Owner	Caretaker
Initial Cost	27,500	-	15,000	-	28,000	-	35,000	-
Concentrate	Not given		Not given		Not given		Not given	
Medicine	✓	-	✓	-	✓	-	✓	-
Selling Price	155,000		90,000		110,000		140,000	
Profit	-	63,750	-	37,500	41,000	41,000	52,500	52,500
Duration	36 months		44 months		12 months		12 months	
Per year profit	-	21,250	-	10,227	41,000	41,000	52,500	52,500
Per month profit	-	1,770	-	852	3,416	3,416	4,375	4,375
Per day profit	-	59	-	28	113	113	145	145
	Cost saving 63,750	-	Cost saving 37,500	-	Annual interest earned 146%	-	Annual Interest earned 150%	-

For the 1st and 2nd case, the owner of animals could save the costs of replacing animals by 63, 750 Rs and by 37,500Rs respectively. Suppose the owner of animals for the 1st case wishes to replace his heifer to a milking buffalo, he has to pay 155,000 Rs while he gets 27,500 Rs by selling his heifer. The owner therefore, has to

spend 127,500 Rs to replace his heifer to a milking buffalo. When the owner shares out his heifer to a caretaker, he only has to spend 63,750Rs to get milking buffalo but after 3 years. If the owner keeps his heifer at his farm with a labor, he has to bear costs of feed as well as has to pay a labor every month. For the 1st case, the owner has to pay 180,000 Rs (if a monthly wage is fixed as 5,000Rs) to his labor. Comparing the alternative cases, we can say that the current sharing system is providing good advantage for the owner. On the other hand, a caretaker could save only 1,770 Rs and 852 Rs per month as a remuneration of work, which is much less than remuneration they get as a daily wages worker.

The longer the duration of keeping animals is, the less profit a caretaker could receive. Though the growing stage of sharing-in animals of each caretaker might be different, the point of time at selling animals are not so different, i.e. at the time of parturition. The selling price of animals of different growing stage are, therefore, not so different. Longer the duration is, profit per day obviously become less.

In contrast to calf and young heifer cases, caretakers could save more for the case of elder heifers and dry buffaloes since the duration of keeping animals are shorter. The profits were 3,416 and 4,375 Rs per month. The gains of owners are bigger, ranging around 150% against the initial costs they invested. Even though we calculated profit per month, the actual profit can only be available at the time of terminating contract. The use of profit, therefore, somehow would be limited and will not be regarded as regular income for daily consumption of households. Since it is difficult to expect income from milk from this sharing practice, no other extra income will be earned from animal assets even though a caretaker took over the control of it during the tenancy.

For the case of male animals, the profit is even smaller since the selling price is less than those of milch animals.

Table 10 Benefits from Male Calf Sharing (Rs)

	Male Calf No.1	Male Calf No.2
Initial Cost	8,000	6,500
Selling Price	45,000	35,000
Care takers Profit	18,500	14,250
Duration	24 months	24 months
Per year profit	9,250	7,125
Per month profit	770	593
Per day profit	25	19

As for the long term contract, the estimated costs and benefits were analyzed by using the case of one respondent.

Table 11 Benefits from milch animals under long term contract

(Rs)

	Owner		Caretaker	
Costs				
Initial costs	6 cows	120,000	0	
Concentrate			42,000	
Fodder			4,000	
Profits				
Male Calf	50% share of 2 calves	20,000	50% share of 2 calves	20,000
Heifer	6 nos. of heifer	150,000	2 nos. of heifer	50,000
Milk			2L for 10 lactation for own consumption 2L for 10 lactation for sales	151,200
Original Cow	3 portions	105,000	1 portion	35,000
Total Profit	155,000		210,200	
Duration	10 years			
	Annual interest earned	2.9%	Annual interest paid	2.9%

In contrast to the short term sharing practice, the profit of a caretaker is higher than those of an owner. Annual interest gained by the owner was 2.9%, much less than the interest rate obtained from a bank saving. Supposing that a caretaker borrows the amount of 120,000 Rs for purchasing or leasing the same value of assets over the 10 years, annual interest he pays would be 2.9%. Keeping the view that the micro credit interest rate available in the country is around 14 to 18 %, this figure is much reasonable and favorable to a caretaker. Considering the risks taken by the owner extended over the 10 years, this rate can be regarded as quite low. In addition, over the 10 years, a care taker got the ownership of 2 heifers.

6.4 Summary

To examine if the current sharing practice brings enough profit to caretakers so that they could acquire their own animals through sharing practices, this section discussed the cost and benefit of each pattern of sharing practice.

Acquisition costs of animals are initial responsibility of an owner, which will be, in most cases, deducted from final profits and equally shared by a caretaker at the time of termination of agreement, though. The labor and feed costs are sole responsibility of a caretaker. The medical costs and concentrates costs does not have fixed pattern but a caretaker shares those costs in more than half of the cases. Profits are shared by 50:50 ratio in case that both parties share acquisition cost of animals whereas 3:1 (an owner: a caretaker) ratio is applied in case that the initial cost of animals are borne by an owner.

Comparing wages a caretaker can earn as a hired livestock worker, a cash s/he could earn from sharing

practice is less than those s/he could earn as a livestock worker. Namely, calculated daily wage of a hired livestock worker is between 192 to 307Rs whereas those of a caretaker is ranging from 19 to 145Rs depending on the duration and final price of animals a caretaker rears.

As far as the short term agreement for milch animals is concerned, the longer the contract duration is, the less the profit is since the time of selling of these animals is at the same point regardless of their growing stage so that the selling price of these animals are more or less same.. Calves and young heifers are less remunerable than elder heifers and dry buffalo because they need to more time to bring them up to parturition stage.. Male calf is even less profitable due to its lower selling price. Both short term agreement for milch animals and male animals do not provide an opportunity for a caretaker to earn income from those animals other than remuneration for labor. In other words, a caretaker rarely enjoy to earn money from milk and offspring of those animals since they have to sell those animals to get profit at the time of their parturition along with their offspring.

Comparing to short term agreement, the long term agreement brings more benefits to a caretaker. A caretaker could utilize animal assets over the years, which enable him/her to receive extra income from original assets, i.e. milk and its offspring. Suppose a care taker pays back his rental fee or interests to owners under this long term agreement, the interest rate can be regarded as 2.9% annually, which is very low compared with microcredit available in the open market. There are much benefits to a caretakers in long term sharing agreement, but it seems not so much popular practices in the area surveyed. The long term practice could be mostly found in Badin and only a few cases in Tando Mohammad Khan but not in other districts. Short contract sharing practice is more prevailing in the area. It is difficult to expect increase of animal assets or shifting ownership of animals from an owner to a caretaker under the short term contract.

Though each sharing practice is providing benefits to a caretaker, the money to be earned from short-term agreement is less than a daily wages earned from a hired livestock worker. The capital accumulation is, therefore, less. Since those animals have to be sold at the time of parturition under a short term agreement, a caretaker rarely has chance to takeover an ownership of those animals. It is, therefore, difficult to accumulate animal assets through current short term contract. Long term agreement, on the other hand, is much favorable to a caretaker in terms of capital accumulation and increase of animal assets. However, it is difficult to implement it by the third party organization.

7 Risks in existing sharing system

Sharing of livestock not only brings benefits but also risks. How such risk has been shared is discussed in this section. The risks include death of animals, loss of profit, and so on. The profit from sharing practice is affected by type, characteristics (such as milk production capacity) and condition (such as reproductive disorder) of animals as well. Condition of animals is affected by the technical knowledge of owners and caretakers as well as access to technical services.

7.1 Break of contract

There was a few cases which observed the break of contracts by owners. Some animal owners stopped sharing

practice due to the reason that their caretaker cannot be reached easily. In case that a care taker is not physically accessible by an owner, there is be a fear of broke of contract, which sometimes move an owner to terminate the sharing contract with those caretakers.

7.2 Death of animals

Death of animals are generally sole responsibility of an owner. Since most of owners understand caretakers as those who are economically disadvantaged and will not be able to bear those losses, they will take sole responsibility on death of shared-out animals. However, there are some cases reported in the survey that dead animal initial costs were also shared with a caretaker. In case the shared-out animals to one caretaker are more than 2 heads, an owner deduct all heads of animals including dead animal when they terminate agreement[5]. To avoid death of animals, an owner must select caretakers from those who well know how to take care of animals.

7.3 Reproductive disorder

As for milch animals, it becomes valuable only after an animal become conceived and deliver a calf so that they can produce milk. It matters, therefore, whether animal is reproductively healthy or not to profits both an owner and a caretaker receive. The 2 cases below showed the comparison of the profits between reproductively healthy animals and animals with reproductive disorder.

Table 12 Fixed remuneration for conceived and unconceived milch animals

(Rs)

	Conceived heifer / dry buffalo	Unconceived heifer / dry buffalo
Fixed Remuneration	15,000	5 – 6,000
Maximum duration	18 month	15 months

Table 13 Comparison of profits between reproductive healthy and unhealthy animals

	Dry Buffalo – No.1 – (Market to Market)		Dry Buffalo – No.2 – (Market to Market)	
	Owner	Caretaker	Owner	Caretaker
Initial Cost	35,000	-	45,000	-
Concentrate	Not given		Not given	
Medicine	✓	-	✓	-
Selling price	140,000		85,000	
Profit	52,500	52,500	20,000	20,000
Duration	12 months		8 months	
Per year profit	52,500	52,500	-	-

[5] For example, when one animal is dead out of 3 shared animals, 3 animal initial costs will be deducted from 2 animals' final selling price. Profit is shared after the deduction of 3 heads of animal costs.

Per month profit	4,375	4,375	2,500	2,500
Per day profit	145	145	83	83
	Annual interest earned 150%	-	Annual Interest earned 55%	-

The first case is the example of fixed different remuneration for those conceived and those which cannot be conceived. Though a caretaker takes care of animals for a similar duration, the remuneration would be different due to different value of animals. The second example of dry buffalo also shows different profit both owners and caretakers receive from those conceived and those unconceived. The dry buffalo No. 2 had reproductive problems, so the selling price was much lower than No.1.

Calving interval also mattes to profits for both an owner and a caretaker. In the case of Luqman, he got 10 calving from 6 cows over the 10 years, which is extremely long calving intervals. The shorter the calving interval is, the bigger the profits both an owner and a care taker could have receive. From the shorter calving intervals, they can get more off springs and much milk.

Though the reproductive disorder is one of the risks, it was observed that no significant measures have been taken both by an owner and a caretaker so far.

7.4 Summary of risk sharing

Entrusting animal assets to someone else without collateral contains risks. Most of the owners avoid risks of break of contract and death of animals by selecting caretakers from those who have good skills of taking care of animals and who are physically accessible for monitoring. The risks of reproductive disorder seems to be well recognized by both owners and caretakers, however, not substantial measures have been taken due to the scarcity of technical services.

8 Conclusion

Sharing in and out of livestock are widely practiced in the project area. Majority of owners who share out their animals are land owners but also includes livestock traders and milk traders. Majority of caretakers are daily wage workers and agricultural tenants who possess less than 3 heads of own animals on average. Animals shared in and out include calves, heifers, dry female buffaloes and cattle as well as male calves of buffaloes and cattle. As far as milch buffalo is concerned, sharing agreement can be categorized into following 3 types, i.e. 1) Growing, 2) Recycling and 3) Long-term. Duration of 1) and 2) type of agreement is around for 1 to 2 years, which is shorter than type 3). Under 1) and 2) type agreement, a caretakers is expected to bring those heifers and dry buffaloes up to parturition in. Under type 3) agreement, a caretaker can keep female animals over 2 to 3 lactations. Most common types practiced in the project area is type 1), i.e. buffalo heifers, which

entrusted to a caretaker to bring up to parturition stage.

Sharing of livestock brings benefits to both owners and caretakers of livestock. Benefits include reduction of costs in labor and fodder, solving the issues of shortage of space for rearing animals and fodder, capturing superior genetics, return of investment and increase value of animals for owners, whereas utilization of surplus labor through gaining control of extra asset is the advantage for caretaker. By doing this, caretakers can find an opportunity for saving cash in form of accumulation of labor under the type 1) and 2) agreement and an opportunity for getting additional income in kind, i.e. milk and offspring of animals under the type 3) agreement. Further, they will find a chance to obtain the ownership of animal assets.

The needs of owners and caretakers varies. Every form of sharing practice, therefore, has some advantages against different needs of owners and caretakers. Keeping the view that the project aims to increase animal assets of small scale farmers, however, the long term sharing practice (type 3) edge over the short term practice (type 1 and 2). Short term agreement type of sharing gives caretakers to save lump sum money by utilizing their surplus labor in a year or so but will not give chance to gain extra income from animals, which makes difficult for caretakers to save money for transferring ownership of the animals. On the other hand, the long term agreement provides much opportunity for those who wish to have ownership of the animals and benefit from milk. The share of owners, however, is less than of caretakers, which might hamper commercial farmers or those who wants to have return in early cycle to enter this type of contract.

To reduce risks to be incurred under the sharing of livestock an owner usually try to select a caretaker those who has good livestock rearing skills and those who are physically accessible. The risks of reproductive disorder of animals are, however, not properly tackled and no concrete countermeasure have been taken due to scarcity of technicians specialized in reproductive diagnosis and treatment.

9 Implications for applying sharing systems in Rural Sindh

[Duration of contract with lactation cycle]

As discussed in the chapter 6, a long term sharing agreement over 2-3 lactation will benefit a caretaker much more than a short term sharing agreement for the purpose of growing calves and heifers since a caretaker can utilize shared-in animals as an animal assets which produce milk and offspring. A caretaker, therefore, has more chances to earn from shared-in animals than just utilizing their surplus labor for earning. Keeping this view, for caretakers to seek more earnings and eventually an ownership of animals shared in, a long term contract should be applied so that caretakers receive extra income for accumulating their earnings or repaying back for owners to claim ownership of any of their animals. The project, therefore, should device a sharing agreement which allow caretakers to keep to milch animals with them over the lactation period to earn extra income for accumulating more earnings or repay.

[Combination with a short term contract]

In contrast to a long term sharing agreement, a short term contract for growing a calf or heifer is less chance to obtaining an ownership of animals since a profit from sharing animals become available only at the time when

these animals to be sold or to transfer to someone else other than a caretaker. Though short term contract animals alone may not provide a caretaker to chance to obtain ownership of animals or sufficient money to pay an ownership of shared animals, it can be utilized for increasing profits for a caretaker by combining with longer term of sharing contract. The current sharing agreement the project applies allow a caretaker keep 2 heads of animals. At the time of closing an agreement, one head would be kept with a caretaker whereas the other head would be returned to the project. If latter become conceived and delivered a calf, a value of it will increased more than 2 times. The profit will provide more earnings to a caretaker as well as increase of return of capitals to the project. The project should explore the possibility of introducing renewed short term growing agreement with a caretaker to increasing a profit and a return.

[Developing micro credit or micro lease mechanism]

The long term sharing of animals can be regarded as a lease of animal assets to a caretaker. The repayment of lease condition under the traditional sharing system was quite favorable to a caretaker. Since this practice was not found in the other districts than Badin district, the alternative mechanism using micro credit or micro lease mechanism might be devised in favor of small scale farmers so that they could own their own animals.

Though there are some limitations and conditions due to the nature of livestock rearing, micro credit or micro lease products needs to be developed according to the limitations, conditions as well as needs of small scale farmers.

[Maximizing the profit through the introduction of technical services]

Though risks of reproductive disorders were recognized by owners and caretakers, substantial measures to reduce this risk were not taken so far due to scarcity of technical services to reduce this risk. The technical services to improve reproductive health of those shared animals should be sought to maximize the profits of both owners and caretakers. The project should devise effective and efficient mechanism to deliver these services to small scale farmers.

This implication will be a key to devise micro credit or micro lease products as well since improvement of reproductive health result in profitable cycle of animal rearing allow micro finance institutions develop their products in confidence.

Annex 1: Location of farmers of each district

Pilot Farms				
	Village Name	Taluka	District	Remarks
1	Adur Faqir Noohpoto	Matiari	Matiari	
2	Gul Muhammad Ghambeer	Hala	Matiari	
3	Haji Suleman Rahu	Saeedabad	Matiari	
4	Saleh Dal	Hyderabad Rural	Hyderabad	
5	Khan Muhammad Shoro	Latifabad	Hyderabad	
6	Haji Bahadur Daudani	Chamber	Tando Allahyar	
7	Jamal Khan Bodar	Chamber	Tando Allahyar	
8	Peerani Wasi	Bulri Shah Karim	Tando Muhammad Khan	
9	Haji Hussain Dall	Bulri Shah Karim	Tando Muhammad Khan	
10	Adam Panhwar	Tando Muhammad Khan	Tando Muhammad Khan	
11	Moosa Junejo	Badin	Badin	
12	Tayab Sand	Talhar	Badin	
13	Ghulam Hussain Jamali	Talhar	Badin	
	Maso Bozdar	Chamber	Tando Allahyar	1 pilot farms previously working with the project
Breeder Farmers				
1	New Saeedabad town	Saeedabad	Matiari	2 breeder farms
2	Haji Suleman Rahu	Saeedabad	Matiari	
3	Shahmir Rahu	Saeedabad	Matiari	
4	Sono Khan Almani	Tando Muhammad Khan	Tando Muhammad Khan	
5	Near Baker Nizamani	Tando Muhammad Khan	Tando Muhammad Khan	
6	Kath Babhan	Tando Ghulam Hyder	Tando Muhammad Khan	
7	Haji Naimat Gujjar Ward 4	Shahed Fazil Rahu	Badin	2 breeder farms
8	Haji Ahmed Khaybar	Tando Ghulam Hyder	Tando Muhammad Khan	

Note: In village 'Near Baker Nizamani' and 'Kath Babhan', no interview was taken place whereas villages where interview was conducted in nearby village of pilot farmers include 'Ch Faqir' in Tando Allhayar, 'Mirsri Burfat' in Hyderabad and 'Water Supply' in Matiari.

The Project on Sustainable Livestock Development
for Rural SINDH "PSLD"
(JICA Technical Cooperation)

Textbook for Utilizing Livestock Resources

(Salvation Buffalo Calf and Dry Buffalo)

First Edition

March 2019

Developed by The Project on Sustainable Livestock Development for Rural Sindh
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Preface

Livestock is the largest sub-sector in agriculture of Pakistan, contributing 11.4 percent to overall GDP of the country. Livestock plays vital role in rural economy and livelihood of rural poor, so as in rural Sindh. It is a source of cash income, nutrition and sometimes only asset for the rural and marginalized people.

The Project on Sustainable Livestock Development for Rural Sindh (The Project) is the 5 year technical cooperation project implemented in collaboration with the Livestock and Fisheries Department, Government of Sindh and Japan International Cooperation Agency (JICA), Government of Japan, aiming for creating foundations of sustainable livestock sector development in Sindh province, which benefit small scale dairy farmers who comprises more than 80 percent of the sector. The Project was initiated in February 2014 and implemented in 5 pilot districts, namely Matiari, Hyderabad, Tando Muhammad Khan, Tando Allahyar and Badin. The Project focused on development of appropriate technologies for dairy farming. Throughout five years of implementation, appropriate technologies were developed, piloted and verified for the use of small scale formers in Sindh province. Along with the appropriate technologies, useful basic technologies for livestock professional technicians were developed. The technologies range over 8 areas, namely, farm management, marketing, feeding management, fodder, animal health, animal reproduction and genetic improvement, Livestock assets. The Project worked on effective utilization of livestock resources, i.e. calves and dry buffaloes in the commercial cattle colony as well. Method for salvation of calves and dry buffaloes were verified.

Technologies developed by the Project are compiled as textbooks, guidelines and booklets for wider application and dissemination to professional technicians, and ultimately to farmers. The Livestock and Fishery Department hope that these series of publications will widely be used by livestock professional technicians both public and private and dairy farmers in Sindh province for uplifting their livelihood.

Director General / Project Coordinator
The Livestock and Fisheries Department
Government of Sindh

Foreword

The Project on Sustainable Livestock Development for Rural Sindh has been implemented in Southern parts of Sindh Province, Pakistan in collaboration with Livestock and Fisheries Department, Government of Sindh and Japan International Cooperation Agency (JICA). The Project was supported by the team of Japanese experts headed by Mr. Hiroshi Okabe.

The long-term objectives of the Project are improvement of productivity of milk and increase of income of small scale dairy farmers. The number of cattle/buffalo reared by one small scale dairy farm is small, generally within 5 heads, which includes both adult cattle/buffalo, heifers and calves. Most of small scale dairy farmers do not possess their own land. Under such conditions it is difficult to run sound dairy farming.

The activities of 'utilization of livestock resources' in the Project are to develop a model of increasing income and livestock assets of small scale farmers through establishing techniques and a system of buffalo calf and dry buffalo salvation.
The fact that useful livestock resources like buffalo calves and dry buffalo are slaughtered for meat purpose can be considered as economically viable in a way.
It was not easy to change this embedded system in limited time frame of 5 years. Fortunately, the activity of salvation buffalo calves and dry buffalo have been achieved successfully by 9 Pakistani Veterinary Officers of Sindh Livestock and Fisheries Department as the counterparts of the Project along with 6 Japanese experts. The Project could develop plural models and text book with the support of great enthusiasm of concerned people.
The utilization of livestock resources, however, is still needs to be worked out according to the different background and needs of stakeholders who show their interest in this activities. The Project is just standing at the starting point of the theme. We need to continue accumulating experiences of technical guidance and advise to stakeholders according to different needs of different stakeholders.
We would like to take this opportunity to thank all those involved in development of this textbook. We hope this textbook is useful for technicians and stakeholders who shall give technical guidance to NGOs, Commercial farmers, ordinary farmers, microfinance banks in Sindh province.

Editor in Charge Dr. Hideo Tominaga
Along with Support of the Technical Counterparts of Sindh Livestock and Fisheries Department
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Contents

Chapter 1 Background

1.1 Present situation in cattle colony in Karachi and Hyderabad

There are cattle colonies in the suburb of Karachi, Hyderabad and Sukkur where many commercial dairy farms are packed in. The number of rearing herds are 1.2 million heads in Karachi, 20,000 heads in Hyderabad and 10,000 heads in Sukkur, totaling 1.23 million heads. 90% of them are buffaloes whereas 10% are cows. The cattle colony is comprised of large scale commercial dairy farms. All the feed, both roughage and concentrates is purchased. All milking is done manually.

1.1.1 Dry buffalo[1]

Commercial dairy farms in cattle colonies apply one time milking type dairy farming. The adult female buffaloes are slaughtered on completion of one lactation. Normally, one dairy buffalo / cow have 4 to 5 lactation throughout life and they are slaughtered after completing 4 to 5 lactations.

Majority of milking buffaloes are purchased from outside. Once milking is stopped (become dry), farms do not keep them rearing but sell or slaughter. 20% of them which are conceived at the time of dry or those which are high milk yielding buffaloes are kept in farms whereas remaining 80%of them are sold or slaughtered for meat purpose.

Among 80% of dry buffalo slaughtered, 30 % are supposed to be those which have problems such as old age, reproductive disorder, mastitis, blind teats, low milk yield and unhealty. They are appropiate targets for culling. Remaining 50% (620,000 heads) are good for recycling. Improvement of conception rates through introduction of appropriate reproduction diagnosis and treatement techniques is key for reclying dry buffaloes.

The Project verified the technology of improving conception rate of buffalo through introduction of reproducive distorder diagnosis and treatment 40 to 45 days after delivery so that dry buffaloes could properly utilized. The Project found positve result at the commercial farm in Hyderabad where the Project piloted awareness raising and technical guidance. When buffalo could achieve early conception after delivery, a farm can shorten time gap between dry period and next delivery. Early conception enable farmers to reduce unnecessary cost of feed and other rearing cost, which demotivate farmers to cull those buffaloes The recycling rate of buffaloes will increase ultimately. (See Chapter 4 Dry buffalo salvation)

1.1.2 Buffalo calves

20% of replacing buffaloes (246,000 heads) are born at farms in cattle colony. 80% of replacing buffaloes (984,000 heads) are purchased from outside either from a market or a farm as a replacement. 80% of purchased buffalo (784,000 heads) are either in the latter stage of pregnancy or right after parturition with newly born calf, bringing 1,000,000 heads (246,000 + 784,000) of calf in cattle colony every year. 100% of male calf (500,000) and 50%[2] of female calf (250,000), total 750,000 heads are slaughtered within 1 week of age.

It takes 1 and half years to 2 years for male buffalo calf to be sold for meat purpose. As for female buffalo

[1] Lactation period of buffalo is for 10 months after delivery. Buffalo that stopped milking after lactation period is called ‘dry buffalo’.

[2] From remaining 50% female calf, 25% are used for replacement, and 25% are for sales and sharing.

calf, 2 and half years to 3 years are required for maturity and becoming milking buffalo. Long rearing period is required for calf to start generating income. Major reasons for slaughtering calves are; 1) financial investment required for long period, 2) long time required till recovering investment, 3) high mortality rate of calves and 4) lack of space for rearing calves.

Being the situation, the Project established the calf salvation center in the courtyard of the livestock department in Hyderabad aiming to utilize livestock resources in the cattle colony as well as to increase livestock assets of small scale farmers in the region. The Project brought female buffalo calves born in the cattle colony in Hyderabad to the calf salvation center to rear for 3 months. The Project verified the calf rearing techniques without mother, achiving less than 10% mortality rate and 0.5 kg daily gain. The Project, then, distributed 2 heads of 3 months old calves to small and medium scale farmers. Regular vaccination and deworming, formula feed for growing female calves for 6 months, technical guidance and monitoring were provided to those calves and farmers. At the age of 3 years, one buffalo out of 2 heads were recoverd to the Project. The Project verfied one cycle of this model.

The Project started organizng a calf salvation seminar once in a year from the 3rd year. A calf salvation seminar aims for providing technical guidance on calf rearing technologies and calf salvation models developed by the Project. As results, rolling out of the calf salvation activities by the particpants of seminars were observed. One of NGO established their own calf salvation center in Karachi and started distributing calves to marginal farmers. Several dairy farmers outskirts of Hyderabad started rearing buffalo calves.

The Project initiated another trial of models, i.e. distribution of a few days old calves and one month old calves from the latter half of the 3rd year. The models are under verifiction.

The Project provides technical guidance to various stakeholders who show interest in calf salvation activites (See chapter 2 calf salvation activities).

In addition, the Project developed the activity proposal for verifying ‘economically viable model of calf salvation through financial support to small scale farmers’ in collaboration with microfinance banks and institutions, which is in progress of verification (See Chapter 2, 2.3.8 Financial support for buffalo calf salvation activities).

(Note)

Since the slaughter of dry milk buffalos and calves is an illegal act defined by the law. Law prohibits slaughter of useful livestock. Therefore, there is a limitation of collecting accurate information. The document referred is limited to the reference below[3] only. The rate of slaughtering mentioned above is based on estimation.

1.2 An act to prohibit the slaughter of useful animals

The slaughtering dry buffaloes and buffalo calves are illegal act prohibited ty the act of West Pakistan in 1963.

The useful animals other than sheep and goats can be defined as;

[3] Reference: ‘History of Landhi Dairy Colony, Karachi’ by Dr. Nasrullah Panhwar, ex-national field officer, Singh, Progressive Control of Foot & Mouse Disease in Pakistan

1) Cattle bulls castrated, cattle bulls, adult cow, adult buffalo cow, male buffalo
2) Cows / Buffalo cows under milking, pregnancy and reproductively healthy
3) All female cattle / buffalo under the age of 3 years

Those female animals certified by the veterinary officers of the livestock department as injured, sick or culled are excluded.

THE PANJAB/SIND/N. W.F.P./BALUCHISTAN, ANIMALS SLAUGHTER CONTROL ACT, 1963.
(WEST PAKISTAN ACT NO. III OF 1963)
An Act to Prohibit The Slaughter of Useful Animals and to regulate
the slaughter of other animal in West Pakistan
COMEMNTARY

Preamble:

WHEREAS it is expedient to prohibit the slaughter of useful animals and to regulate the slaughter of other animals in the Province of West Pakistan; it is hereby enacted as follows.

1. Short title extent and commencement:

(1) This Act may be called the West Pakistan Animal Slaughter Control Act, 1963.

2. Definitions:

In this Act, unless the context otherwise requires, the following expression shall have the meanings hereby respectively assigned to them, that is to say:

(a) "animal" means a bullock, bull, cow, buffalo, buffalo-bull, goat and sheep of any age;

(k) "useful animal" means:

(i) a female sheep below of one year and six months;

(ii) a female sheep of the age exceeding one year and six months but not exceeding four years, which is pregnant or fit for breeding purposes;

(iii) any female animal, other than sheep, below three years of age;

(iv) any female animal, other than sheep, which is pregnant or in milk or fit for breeding purpose;

(v) any female animal, other than sheep, between three to ten years of age, which is fit for draught purpose; but does not include any such animal which on account of culling, injury, illness or other cause, is certified in writing by a Veterinary Officer or any Gazetted Officer of the Livestock and Dairy Development Department as not likely to live or as no longer a useful animal for the purpose of this Act;

The illegal practice of slaughtering dry buffalos and buffalo calves taken place every day in the cattle colonies has been continued with the implicit consent of society till today. They have been practiced to meet the 2 major demands, i.e. supply of milk to consumers and profitability of dairy commercial farm business.

Source: LIVESTOCK LAWS MANUAL, Publisher: FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, ROMA(ITALY)

Chapter 2 Calf Salvation Activities

2.1 Purpose

The purposes of the activities are to verify the calf rearing technologies so that NGOs, Commercial farmers, ordinary farmers and other stakeholders such as microfinance banks could introduce and apply technologies and join systems of calf rearing. The ultimate purpose is to save and utilize numbers of calves which are slaughtered now. Purposes of the calf salvation activities can be summarized as below.

1) **To save high yield buffalo calves** from slaughtering & to utilize useful livestock resources
2) **To replace low genetic animals** of small scale farmers in rural area with high yield dairy animal
3) **To increase milk production** by technical guidance and proper calf rearing in rural area, especially of small scale farmers
4) **To try to establish calf salvation system** including calf rearing technique to grow productive dairy animals and deliver them to small scale farmers

2.2 Strategy

The Project applied the following strategies to achieve the purposes.

1) Developing appropriate calf rearing technique (separate from mother) since no proper calf rearing technique has been established in Sindh so far.
2) Distribute calves to small scale farmers through calf sharing system to improve small scale farmers' livelihood and assets.
3) Promote calf rearing technique and distribution system to private farms & NGOs to sustain this cycle and establish calf salvation system in Sindh.

2.3 Results of the Project activities

2.3.1 Calf salvation center

The Project established the calf salvation center for rearing newly born female buffalo calves in the cattle colony without mother to verify low mortality rate of less than 10% and high daily gain of 500g.
The Project developed the strict quarantine system to achive low mortality rate of buffalo calves.

(1) Qurantine system

Wire fence is installed surrounding the calf salvation center. The center is off limit except those who are concerned. Notice board of off limit is installed to make sure everyone follow the rule. Those who enter into the calf salvation center must disinfect shose with lime stone and fingers and hands with disinfectant solution.

	
Photo 2-1 Wire-netting fence model, 2m High	Photo 2-2 Notice board at the entrance

	
Photo 2-3 Disinfecting foots with limestone powder	Photo 2-4 Cleaning hands with anti-septic

Photo 2-5 Change shose with lubber boots

(2) Bringing healthy buffalo calves

Calves must be brought from the cattle colony to the calf salvation center after birth as soon as possible. The good communication mechanism should be set up so that a calf attendant could go to cattle colony before

parturition and attend at the time of delivery. After a birth, place a calf on clean vynile sheet to dry its body. Milk colostrum in hygeinic manner and feed colosrum as soon a possible.

	
Photo 2-6 Hygienic milking of colostrum	Photo 2-7 Feed first colostrum at the cattle colony in hygienic manner.

(3) Cleaning and disinfection of equipment and tools

	
Photo 2-8 Washing with detergent	Photo 2-9 Washing with detergent

(4) Calf hutch

During suckling period, calves are caged into individual calf hutch to monitor individual condition. The advntages of use of calf hutch are twofold. It allows to monitor intake of calf starter and hay to judge nutritous condition of each calf, which is difficult to perform if it is reared in a group. Calf hutch prevents calf from contigineous desease, allow to find sickness symptom such as diarrhea at early stage, and allow to give early treatment accordingly.

There are two types of calf hutch, i.e. movable type and fixed type. Fixed type is suitable for limited space. Drain board is fixed on the floor of fixed type calf hutch to allow dung drop on the ground. (See details in page 26)

Calf hutch is equipped with an airy roof for shade to reduce heat stress of calves.

Calf hutch is used for two months for each calf and replaced with another new calf after two months. Disinfection of calf hutch before introducing new calf is important for prevention of diarrhea.

	
Photo 2-10 Movable type calf hutch	Photo 2-11 Fixed type calf hutch

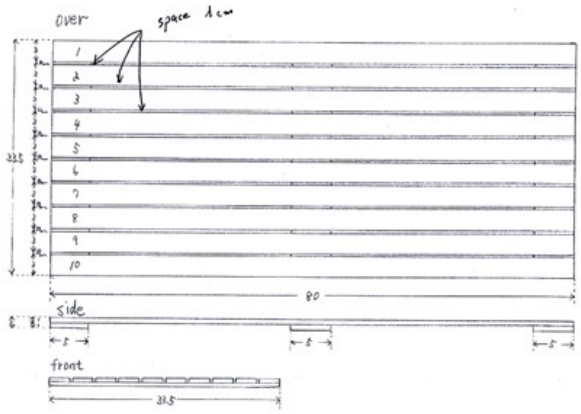


Figure 2-1 Drawing of drain board	Photo 2-12 Photo of drain board
	
Photo 2-13 Disinfectant	Photo 2-14 Disinfection of calf hutch

2.3.2 Procedure of introduction of calves

Calves are introduced according to the following procedures.

（Cattle colony）

a) Note the date of birth of each calf.

b) Note the day and time of first suckling and its' quantity (Same quantity of colostrum equivalent to 10% body weight of calf is recommended to be fed to a calf in a day).

c) Inject antibiotic (OXTRAL.A. 1.3 ml / 10 kg).
d) Carry a calf from the cattle colony to calf salvation center.
（At center）
e) Put ear tag
f) Measure the weight of a calf.
g) House a calf in the calf hutch.
h) Suckle a calf after 6 hours from last suckling.

2.3.3 Daily calf management

Calves are managed according to the suckling calf management work table: For 3 days after birth, suckle a calf with colostrum.

Table 2-1 Activities for caring suckling calves in the calf salvation center

	Daily activities	Weekly activities	Occasional activities
8:00	Health Check（Scoring of dung and vigorousness）	Measurement of weight	Vaccination
	Preparation of suckling → Suckling		Treatment
9:00	Measurement of remaining feed. Feeding. Replacing water with fresh one. Supplying hay.		Preparation of hay
10:00			Preparation of calf starter
11:00			
	Observation of calves		
12:00	Performing weekly activities		
	and occasional activities		
13:00			
14:00			
15:00			
16:00	Health Check (Scoring of dung and vigorousness)		
17:00	Preparation of suckling → Suckling		
18:00	Replacing water with fresh one, Supplying hay		

	
Photo 2-15 Put an ear tag with a calf on arrival at the center.	Photo 2-16 Measurement of the body weight

	
Photo 2-17 Warm milk up before feeding. Warm feeder containing milk in the hot water.	Photo 2-18 Feed colostrum at the center again. Colostrum was brought from the same farm in the cattle colony.

2.3.4 Verification of calf distribution system; Two heads distribution and one head recover of 3 months old calf

(1) Distribution of calves

The Project distributed two heads of 3 month old calves per a farmer. Calves were distrubuted to small and medium scall farmers. Formula feed were provided till calves became 6 months old age. The Project carried out regular vaccination and deworming as well as technical guidance and monitoring of calves' conditions.

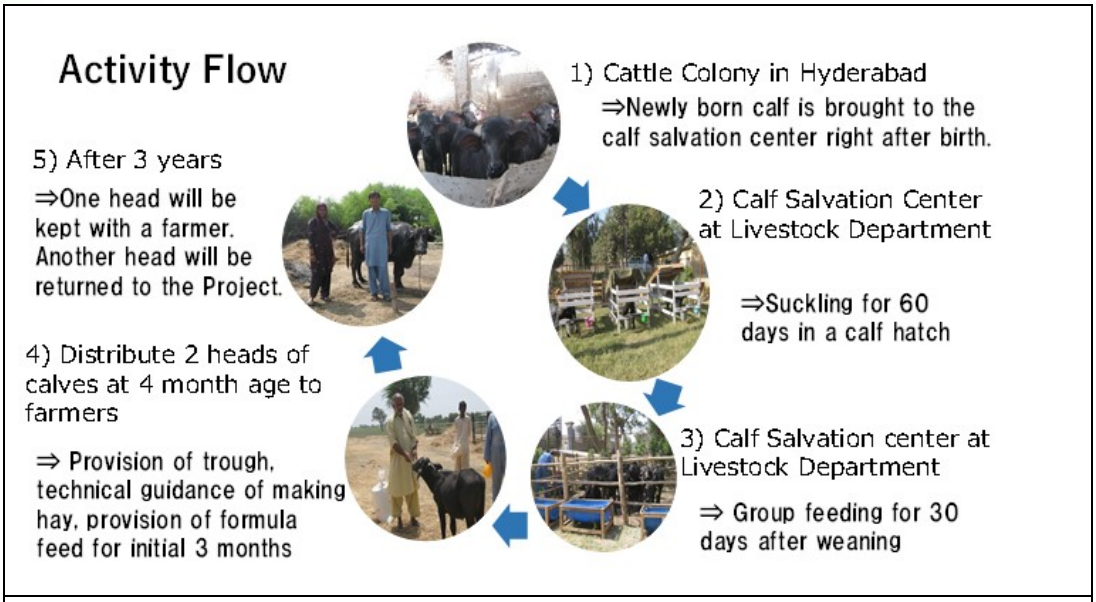


Figure 2-2 Activity Flow

Criteria for selecting beneficiaries :

Criteria for selecting beneficiaries for calf distributions were set as follows. Beneficiaries were selected based on these criteria accordingly.

1) Small scale farmers (less number of animals and less land holding)
2) Experience of buffalo rearing including sharing in experience
3) Animal management by family members focused on involvement of female members
4) Priority to female headed household
5) Availability and accessibility of fodder
6) Availability of space

(2) Recovering heifers

The Project verified the recovering system. Two heads of 3 months old calves distributed to farmers based on the contract made between a farmer and the livestock department. One head became a property of a farmer and another head was recovered by the livestock department 3 years later when the contract period was completed.

The buffalo recovered by the livestock department was auctioned for converting into cash which was planned to supplement operational cost of the department calf center.

Initial price of a pregnant buffalo was set as 90,000 PKR. Initial price of an unpregnant heifer was calculated by body weight based on the rate of 150 PKR per kg. The sold price differed in condition of heifers, depending on if it is pregnant or not and if it has good body weight and nutritious condition or not.

The Process of recovery was as follows;

1) Asking a famer about willingness of purchasing a heifer of the department share; Prior to recovering process, ask a farmer if s/he wish to purchase a heifer or not. In case that a farmer wish to purchase it, the price of a heifer is calculated according a body weight at the rate of 150 PKR per kg.

2) Advertisement in newspapers; In case a farmer doesn't want to purchase a heifer, the department advertise the detail of auction of heifers to be taken place in newspapers for prescribed period.
3) Auction of heifers; The livestock department organizes an auction on the day prescribed in newspapers.
4) Reporting to the competent authority of the livestock department; The officer in charge of the department make a report of an auction and submit it to competent officers.

Photo 2-19 Assessment of a heifer to be auctioned

Photo 2-20 Successful bidder (Right)

2.3.5 Trial of a Few Days Old Calf Distribution (Second Model)

(1) Overview of the trial

The Project started a few days old calf distribution in December 2016 on trial basis. The full-scale trial was started in May 2017. In August 2017 the PC-1 budget became available, with which calves were distributed to farmers. Activity flow of a few days old calf distribution was described in the drawing below.

Figure 2-3 Activity Flow

(2) Criteria for selecting beneficiaries

Criteria for selecting beneficiaries for calf distributions were set as follows. Beneficiaries were selected based on these criteria accordingly.

1) Small scale farmers (less number of animals and less land holding)
2) Experience of buffalo/cow and their calf rearing
3) Pay Rs.2500/= (cost of calf)
4) Having one milking animal
5) Animal management by family members focused on involvement of female members
6) Priority to those area where milk price is low i.e. 40-50 Rs/Kg
7) No calf mortality
8) Availability and accessibility of fodder
9) Availability of space

(3) Technical Guidance to Farmers

The Project provides technical guidance on calf rearing to farmers at the time of calf distribution. The method of feeding milk with a bucket was also taught to farmers who received a few days old calves.

Photo 2-21 Feeding milk with a bucket

(4) Lessons learnt from the trial of a few days old calves

- It is difficult to apply early weaning at a farmer's place. Although the Project guided farmers to feed 2 kg milk per time, i.e. 4 kg in a day, most of farmers fed much little quantity of milk than 4 kg. Being the situation, suckling period for a few days old calf is better be instructed to farmers as 4 to 6 months at their places.
- It is not easy for farmers to change their traditional feeding method and introduce new practice such as 24 hours free access to drinking water, continuous feeding of hay, and so on. The Project therefore develops milk feeding unit as shown the photo below. The unit is comprised of three buckets, for water, calf starter, and hey. This unit will be provided to farmers at the time of distribution of calves.

	
Photo 2-22 Wooden type milk feeding unit	Photo 2-23 Iron type milk feeding unit

After distributing this unit, no case of death of calves were reported and issues were resolved.

2.3.6 Seminar/workshop on calf salvation activities

Since third year of the project, the Project has been organizing seminar/workshop on calf salvation activities once in a year. Participants includes commercial farmers in the cattle colony, ordinary commercial dairy farmers, ordinary framers, NGOs, microfinance bank and so on. The seminar/workshop program was comprised of 1) explanation of overview of the calf salvation activities, 2) site visit of the calf salvation center, 3) lecture on calf rearing techniques, 4) case study of successful application by a stakeholder, and 5) question and answer sessions. The seminar/workshop drew interest of stakeholders. The participants gradually applied the techniques. There are some good cases as well.

	
Photo 2-24 Exchange of opinion by the participants	Photo 2-25 Site visit to calf salvation center

2.3.7 Cases of application of calf salvation activities by stakeholders

(1) Calf Salvation Activities by (National NGO-A in Karachi

National NGO-A, participated the second calf salvation seminar/workshop organized in April 2017. NGO-A showed keen interest in introducing calf salvation activities as their own program. Upon their request, the

Project started the technical guidance to NGO-A. In April 2018, NGO-A completed the construction of their own calf salvation center in their premise. The first batch of 35 calves were reared under the existing program funded by UK Aid. Calves were distributed to the beneficiaries in district Sujwal starting from January 2019. NGO-A successfully completed the distribution of first batch of 35 heads of calves.
The progress of technical guidance and activities were mentioned in the table 2-2.

Table 2-2 Progress of NGO-A related activities

April 2017	NGO-A participated in the second calf salvation seminar/workshop
August 2017	NGO-A requested the Project to provide technical guidance
November 2017	NGO-A recruited veterinary staff and sent to the Project for 25 days for technical training.
December 2017	The Project and NGO-A executive officers had discussion on the NGO-A project activity plan (total 2 times both in Karachi and Hyderabad)
March 2018	NGO-A stated construction of their own calf salvation center.
April 2018	NGO-A completed construction of their own calf salvation center. The Project dispatched the Para-vet to NGO-A center for two weeks for further technical assistance.
June 2018	NGO-A distributed first calves to the beneficiaries in district Sujawal.
January 2019	NGO-A completed distribution of first batch of 35 heads calves in district Sujawal.

Photo 2-26 Practical training on feeding milk with bucket

Photo 2-27 NGO-A calf salvation center

NGO-A intends to continue their calf salvation activities.

(2) Calf salvation at commercial dairy farm in Hyderabad old cattle colony

The commercial dairy farm in Hyderabad old cattle colony started calf rearing born in their own farm. This commercial farm has been working with the Project since 2010 when the master plan study project was carried out. The farm owner participated in the second calf salvation seminar/workshop. As of August 2018, 21 heads of buffalo heifers and 20 heads of young male buffaloes are reared. In total 41 heads are salvaged. The farm measure individual buffaloes body weight every month.

Photo 2-28 Heifer and young male buffaloes reared in the commercial dairy farm

2.3.8 Financial support for buffalo calf salvation activities

The Project worked on the verification of 'economically viable model of calf salvation activities through initial financial support to small scale farmers' in the fifth year of the Project.

The Project had meetings with 4 institutions on possible financial support during November 2018 and January 2019.

As a result of meetings, 2 institutions agreed to pilot the activities with the Project, i.e. Institution-At and Institution-B. The Project developed the proposal and under discussion with them. When these pilot activities are successfully completed, small scale farmer can obtain buffalo calves with the use of loan.

(1) Proposed pilot activities with Institution-A

Outline of the pilot activities is that a farmer borrows 30,000 PKR from Institution. Out of that, 20,000 PKR will be spent for purchasing 3 months old calves and 10,000 PKR will be used for purchasing formula feed and regular vaccination and deworming.

The Project further explore the possibility of distribution of a few days old calf with the Institution loan. Loan amount from Akhuwat will be 17,000 PKR, which comprise of 2,500 PKR for the cost of a calf, 2,500 PKR for the cost of feeding unit, 2,000 PKR for the cost of calf starter for 3 months, and 10,000 PKR for the cost of formula feed for 3 months and regular vaccination and deworming for 3 years.

(2) Proposed pilot activities with Institution-B

The Institution-B only targets women. Currently their maximum loan limit is 40,000 PKR. Livestock loan have so far been limited to small animals (goats, sheep, etc.) but not for buffalo and cattle. The Project discussed and agreed with Institution to conduct a small-scale pilot project (10 heads). The Institution is positive in implementing the pilot activities, as the calf price set by the Project is to be within the upper limit of Institution's loan products and the economic benefits of the farmers can be confirmed.

	
Photo 2-29 Visit the calf buffalo center	Photo 2-30 Discussion in the Project office

Chapter 3 Calf Rearing Technology

3.1 Healthy calf which have good appetite

3.1.1 Let's grow the calves which have good appetite for feed

Calves which have good appetite for feed will grow up to an adult female mother buffalo which have good appetite for feed.

An adult female mother buffalo which have good appetite for feed has large rumen and a deep body. Such adult female mother buffalo will no doubt to produce good quantity of milk. In addition to good milk production, those buffalo will conceive more and will produce milk for longer duration in her whole life. The milk production capacity of adult female mother buffalo depends largely on ways and management of rearing calves during early period of their growing, i.e. their sucking and weaning period.

3.1.2 Stomach of large ruminants

Large ruminants such as cattle and buffaloes have 4 stomachs.

Stomach of large ruminants includes rumen, reticulum, omasum and abomasum. Abomasum functions same as human stomach. There are thousands of bacteria and protozoa in rumen of adult animals. Those bacteria and protozoa ferment and decompose feed. The rumen of adult animal occupies 80% space of their stomach and abomasum which functions as human stomach is small. The rumen of newly born calf, however, occupies only 30% space of their stomach. It is very important to grow calves so as to enhance their rumen, which should be started from their early age.

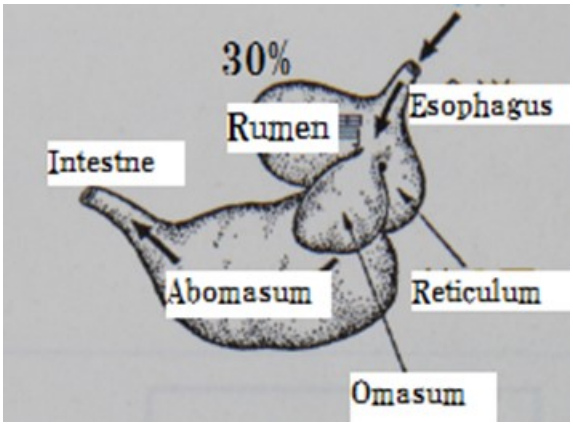


Figure 3-1 Stomach of a calf (Rumen occupies 30% of stomach)

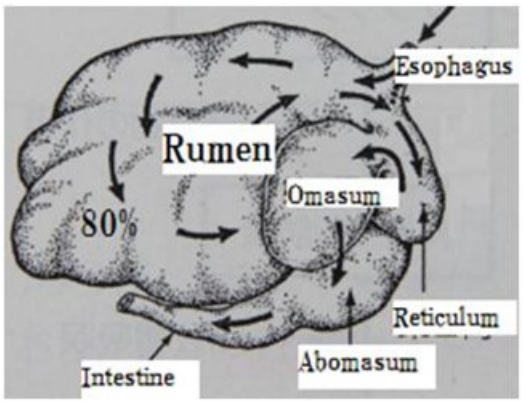


Figure 3-2 Stomach of an adult buffalo (Rumen occupies 80% of stomach)

3.1.3 How to develop rumen of calves

(1) Let's develop rumen of calves

In this section, how to develop rumen of calves will be explained.

1) Start feeding calves with good quality of green grass from 2 weeks after their birth.

Good green grass is fibrous green leafy graminae grass. Fibrous grass gives good stimulus to calves' rumen, which allows their rumen to grow. In the beginning, calves' intake of grass is very small quantity.

But they will start eating good amount of grass gradually.

2) Feeding Hay

Rumen of calves is small. Green grass contains much water. 70% of green grass volumes are water. If calves take green grass, their small rumen becomes filled with water. Intake of green grass, therefore, will not allow calves to take enough nutrition. Hay is good alternative for green grass. Hay is not only given sufficient nutrition to calves but also prevent them from diarrhea which is common and frequent disease for calves.

(2) How to prepare good quality of hay

Hay is made of green grass by deducting water content to less than 15%, which helps to restrain function of enzyme and microorganism so that they can be stored for a long time without deteriorating its quality. Natural grass and graminae grass such as star grass are preferable for making hay for calves. Stalk of sorghum and maize are too hard fiber and are not suitable for calves.

Sunshine in Sindh is strong. Drying one and half day under the sunshine is enough for grass like chabbar to prepare as hay. Cut grass in a morning and spread them under the Sun and turn them over every a few hours. Pile them up in the night to prevent from dew. Cover them with vinyl sheet, if necessary. On next morning when the Sun rise, spread grass over again and turn them over every a few hours. Hay becomes ready by an evening of second day. 1kg of hay can be made from 5 kg of green grass.

(3) Feed good quality hay to calves in good quantity.

It is recommended to feed hay to calves up to 8 months of their age. Irrigated land has advantage of availability of green natural grass throughout the year thanks to irrigated water. Adult animal consumes large quantity of roughage whereas intake of 6 months' age calves is small. The priority, therefore, should be given to calves. Natural grass can be stored for a longer duration. It is recommended, therefore, to cut as much grass you can when your time allows and store them as hay.

Photo 3-1 Chabbar which is widely available in the area

Photo 3-2 Technical guidance on hay preparation

Photo 3-3 Calves are delighted to eat hay

3.2 Cow cattle/buffalo management during parturition

A cow will lose its calm if it is near to parturition. For proper delivery assistance, you should tie the cow near to your resident and carefully observe it.

You should also contact a reliable veterinarian who can help you in emergency case such as difficult delivery beforehand. In case of a delivery in night time, you should attend a birth and help as much as possible to avoid an unexpected accident.

3.3 Calf management right after its birth

First things you have to do right after their birth to grow healthy calves.

(1) Drying of calf's body

Dry calf's body by allow mother buffalo to lick calf's body. Licking stimulates hormone secretion of mother buffalo as well as facilitates discharge of placenta.

(2) Disinfection of umbilical cord

Umbilical cord needs to be either disinfected with 10% iodine tincture solution or inject iodine solution into umbilical cord.

Photo 3-4 The umbilical cord should be disinfected by dipping into. Iodine Tincture solution

(3) Intramuscular injection of antibiotic

Injection of antibiotic is recommended for those calves born to a farm where many of calves get disease, in humid season right after the rainy season and in winter season. Intramuscular injection of 3ml of OTC-LA is performed.

(4) Place for rearing

The calf should be reared at dry and clean place. In case of hot season, the place where there are moderate shade and good ventilation should be chosen for calf rearing. In case of winder season, you put straw down on the ground and avoid strong wind. Cleaning should be done regularly to keep cleanness of rearing place.

(5) Good observation of suckling calves

Once suckling calves become sick, their condition often can easily and quickly deteriorate.

You should always observe movement of the calf carefully. If the calf has shining eyes, moves around vigorously and not shows dirty on the surroundings of the buttocks, the calf is in health. It is important to make a habit of observation about the calf such as color of droppings, times of breathing, having or not having fever, times of diarrhea.

(6) Colostrum

Feed colostrum to a calf within 6 hours of its birth.

It is important to feed colostrum to a calf for the prevention of infectious diseases.

Especially, the first colostrum is highly effective because it includes a lot of gamma globulin. The first suckling of colostrum should be done within 3 hours after delivery. The second suckling of colostrum should be done within 6 hours after delivery. It will be better if the calf sucks colostrum as much as possible.

After 6 hours of its birth, a calf cannot absorb gamma globulin contained in colostrum. Colostrum or milk in 3 to 5 days after parturition cannot be sold as milk, but it contains more nutrition than normal milk. Feed such colostrum as much as possible to a calf.

3.4 Separate rearing of mother cow and calf

Dairy farm of the developed countries rear mainly European cattle. After a delivery, a mother cow will be allowed to lick calf's body. The mother cow and the calf will be separated immediately after birth.

In tropical countries including Sindh province, Pakistan, Milking is carried out after suckling of calf. This is traditional method for milking to help secretion of oxytocin (lactogenesis hormone) by stimulation of calf suckling. It is believed that it is impossible to milk cows without calf suckling. However, innovative farmers in Italy and Thailand, they rear buffalo it is called *Murrah* breed, and carried out milking without calf suckling. Moreover, milking is done by a milking machine. Following pictures show example of Thailand. Separate rearing of mother cow and calf. It is possible if you make mother cow adjust to the situation.

	
Photo 3-5 Sucking of calf which separated from their mother right after their birth	Photo 3-6 Milking of a buffalo by milking machine

Even in Sindh, farmers apply massage before milking without calf suckling. This method is applied when a calf died during lactation period. The below photo is the case from district Matiari.

	
Photo 3-7 Massage of the teat	Photo 3-8 Normal milking after massage

3.5 Buffalo calf rearing at calf salvation center of the Project

The project is conducting separate rearing of mother buffalo and calf buffalo through the calf salvation activities. Buffalo calves which are born at the cattle colony will be given colostrum at the birth place to prevent from disease. Then, a calf is transferred to the calf salvation center of the Project (hereafter the Center) as soon as possible.

3.5.1 Colostrum

(1) Milking colostrum

Milk hygienic colostrum.

Prepare 2 to 3 pieces of towels cleansed with clean water beforehand. It is preferable to dip into disinfectant and wring towels. Applicable disinfectant are such as chlorine and Dettol. Bucket used for milking and

suckling needs to be washed with clean water beforehand. It is preferable to use disinfectant. Clean teats with prepared towels about 30 minutes after delivery and start milking colostrum. Initial 2-3 drops of colostrum needs to be discarded.

(2) Suckling of colostrum

Minimum 1.5 to 2 liter of colostrum is recommended to be fed to a calf within 6 hours of its birth.

The first suckling of colostrum should be done within 3 hours after delivery at the cattle colony. After that a calf will be transferred to the Center. Remaining colostrum should be brought to the Center with the calf for second suckling. The second suckling of colostrum should be done within 6 hours after delivery. It will be better if a calf sucks colostrum as much as possible. Feed colostrum as much quantity as a calf wants.

	
Photo 3-9 Milking colostrum	Photo 3-10 Feed colostrum to a calf

3.5.2 Suckling by purchased fresh milk from outside

Make sure always feeding fresh milk to a calf. In case of purchased milk from outside, check smell of milk before feeding to calf. If you feel any nasty smell, do not feed those milk to a calf. When a calf feel hungry, it drinks even bad quality milk. Do alert of milk quality even a calf drinks them.

3.5.3 Artificial Suckling

Main suckling methods are use of a bucket and use of a nipple. There are advantage and disadvantage for both of them.

(1) Suckle with a bucket

Prepare a bucket big enough to put a head of calf and an arm of a caretaker. Hold and keep a bucket at angle. Insert a finger into a mouth of a calf so that they start to suck and bring its mouth to milk in a bucket. A calf often try to dip their mouth as well as nose. Guide a calf to raise its head so that its nose can breathes. After a few days, a calf become used to suck milk from bucket and can suck milk by themselves. A bucket size can be changed at this point of time from bigger one to a smaller one but enough to insert a calf head.

(2) Suckle with a nipple

Put a finger into a mouth of a calf so that it starts to suck and bring a nipple into their mouth gently. Once a calf start suckling, do not move a feeder. Height of feeder should be kept as same height of its head. When a

calf stop suckling in the middle of feeding, move a feeder slightly back and forth to guide a calf to suckle again. When tightening nipple cap is too tight, milk is not running smoothly from a nipple. If a calf looks difficult to suckle, adjust the tightness of a nipple cap. Speed of suckling with nipple is slower than those with a bucket. Nipple must be completely cleaned with detergent and brush every time it is used.

	
Photo 3-11 First suckling with a bucket	Photo 3-12 Suckling with a feeder

Various types of feeders are available.

	
Photo 3-13 Box type feeder	Photo 3-14 Bucket type feeder

3.5.4 Suckling calf management

Start feeding calf starter and hay 8 days after its birth. In the beginning, let a calf play with calf starter and hay in their mouth to get used to them. Free access to fresh drinking water plays key role to facilitate a calf to eat good quantity of calf starter. In Pakistan, it is believed that suckling calf does not need drinking water, however, this is wrong perception. Prepare a small bucket for their drinking water. Replace water with fresh one at least 2 times per day, i.e. in the morning and in the evening.

(1) Calf Starter

Let’s feed calf starter

The project designed calf starter from locally available concentrates.

Feeding calf starter from 2nd week of its birth allow their rumen to develop, increase daily weight gain and make early weaning possible.

The Project developed 2 models of calf starter, i.e. model 1 and model 2. Model 2 contains soybean cake and palatability is high. It contains comparatively more crude protein than model 1, which increase daily gain results of calves.

Table 3-1 Calf Starter

	Model 1	Model 2
Name of Feed	Mixed proportion %	Mixed proportion %
Maize crush	15	22
Wheat (Crush)	30	28
Cotton Seed cake	7	0
Soybean	0	14
Rapeseed cake	0	4
Wheat Bran	30	20
Guar meal	7	0
Coan gluten 60	5	6
Molasses	5	5
dcp(Bone meal)	1	1
Total	100	100
TDN:	68.7	70.6
CP:	18.4	18.8

(2) Early weaning (60 days suckling)

Suckling period is 60 days. During sucking period, fresh milk, calf starter, hay and adequate water should be given to a calf.

When a calf is grown up as one which have good appetite for feed, rumen is developed enough in 2 months of time, which allows smooth weaning. Target day of weaning is 60 days after its birth. Target daily weight gain is 0.5 kg. Average birth weight of calves at calf salvation experimental center is 34 kg. Target weight at the time of weaning, i.e. 60 days after its birth is 62 kg.

The Project applied the methods of suckling fresh buffalo milk to verify early weaning.

1) Volume of suckling and feeding volume of calf starter

Colostrum should be fed from day 1 to day 5 after birth.1.5litter of colostrum per time and 2 times per day are to be fed[4]. Total 3 liter of colostrum per day to be fed to a calf. 1.5 liter of fresh milk per time and 2 times per day are to be fed in day 6 and 7. Total 3 liter of milk per day to be fed to a calf. From second week to 6th week, 2 liter of milk per time and 2 times per day are to be fed. Total 4 liters milk per day to be fed to a calf. Calf starter and hay are started to be fed from 2nd week. A small quantity of calf starter and hay will be given to a calf to play with them in their mouth to get used to them in the beginning. Increase quantity of calf starter and hay gradually after that. Once a calf eat calf starter up to 1kg per day, it can be weaned. Drinking water should be placed close to a calf so that it can drink water anytime of a day.

[4] In general, colostrum should be fed from day 1 to day 5 after birth. 1.5 liter of colostrum per time and 2 time per day are to be fed. In the calf salvation experimental center, colostrum was fed only on day 1 due to logistic hurdles of purchasing colostrum from the outside farms.

Table 3-2 Feed table for suckling calves

Week	Day	Body weight (Kg)	Milk (Liter)/day	Calf starter (Kg)/day	Hay	Water
1 week	1 ～ 5	34	Colostrun 1.5L x 2 times=3L	0	0	0
	6 ～ 7		Milk 1.5 L x 2 times = 3L			
2 Weeks	8 ～ 14	37	Milk 1.5 L x 2 times = 3L	Little	Trial	Free
3 Weeks	15 ～ 21	41	Milk 2.0 L x 2 times = 4L		Little	
4 Weeks	22 ～ 28	45	Milk 2.0 L x 2 times = 4L		Little	
5 Weeks	29 ～ 35	48	Milk 2.0 L x 2 times = 4L	0.5	Free	
6 Weeks	36 ～ 42	52	Milk 2.0 L x 2 times = 4L	0.5		
7 Weeks	43 ～ 49	55	Milk 1.5 L x 2 times = 3L	0.6		
8 Weeks	50 ～ 56	59	Milk 1.0 L x 2 times = 2L	0.8		
9 Weeks	57 ～ 59		Milk 0.5 L x 2 times = 1L	1.0		
	60	62	0 L Wean			

Following pictures are shown basic equipment to use suckling period.

Photo 3-15 Utensil for drinking water and calf starter

Photo 3-16 Hay rack

2) Suckling fresh Cow milk

Fresh cow milk can be used for suckling buffalo calves. Cow milk has less fat ratio compared to buffalo milk, which makes price of cow milk less than buffalo milk. The advantage of using cow milk is less cost than buffalo milk. Due to low fat ratio, energy obtained from cow milk is less than buffalo milk. The daily gain (DG) of calves become less accordingly. Calves, however, can grow healthy enough with cow milk.

Rearing milking cow for suckling purpose in an own farm is one option to reduce cost of purchasing milk for suckling from outside. It is practical for large scale farms and effective when rearing a number of calves at one time. Crossbreed of European dairy cow and Zeb dairy cattle will produce more milk than buffalo. The cost of suckling per calf can be further reduced.

3) Milk replacer

As of now, guaranteed and proper milk replacer for buffalo calves have not been developed all over the world. The Project made trial of feeding milk replacer manufactured in France and Japan. The cost of suckling was half or one third of fresh buffalo milk. French and Japanese milk replacer have both advantages and disadvantages. French milk replacer gave better results of dairy gain, i.e. 371g than Japanese one, i.e. 310g. The difference was

61 g. However, there were more diarrhea cases when French milk replacer was used. Two heads out of 8 heads under experiment of French milk replacer showed no sign of recovering from diarrhea. The Project has, therefore, stopped experiment. There were less diarrhea cases with Japanese milk replacer compared to French one. Guaranteed milk replacer exclusively developed for buffalo calves should be sought.

4) Calf hutch

Calf hutch is used during suckling period. Advantage of calf hutch is prevention from contagious diseases among calves. It also allows management of individual calves.

Care takers can measure accurate intake of milk quantity and calf starter of each individual calf as well as observe health condition of each calf properly. It is important to observe health condition of each calves to take early prevention of disease. Next to prevention, early detection, diagnosis and treatment is important. The Project developed 2 types of calf hutch, i.e. movable type and fixed type.

a) Movable type of calf hutch

Movable type is suitable for a spacious place.

Care takers shift location of calf hutch every day gradually to a place where green grass is available. Till a calf hutch returns to an original place, new grass grows and available for fodder of calf.

	
Photo 3-17 Calf hutch is placed on the green grass	Photo 3-18 Shift a calf hutch gradually every day

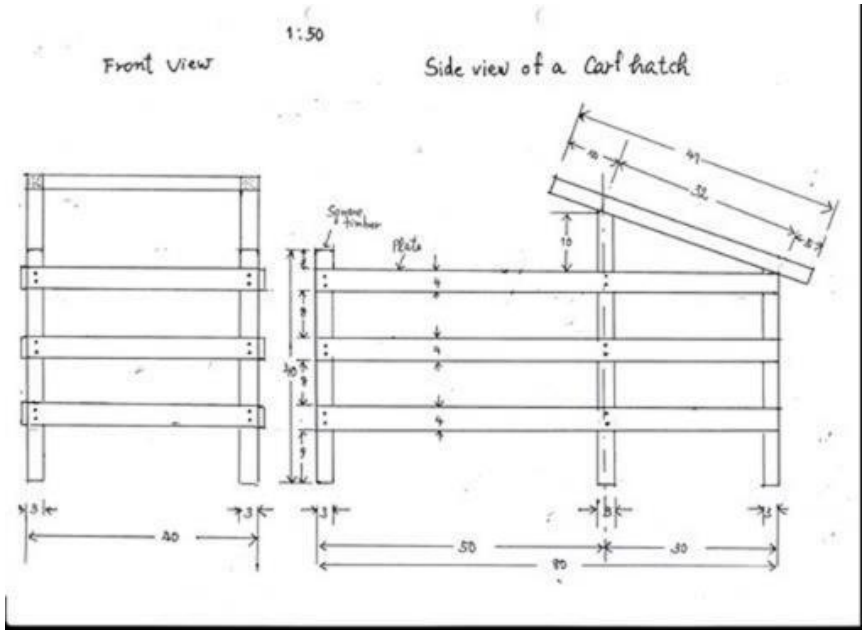


Figure 3-3 Drawing of Calf Hutch

b) Fixed type of calf hutch

The Project developed 2 types of fixed calf hutch, i.e. connecting type and single type. Connecting type is more convenient for rearing numbers of calves at a time.

Drain board as a floor needs to be equipped with fixed calf hutch. Dung and urine are dropped down to the ground. Cleaning of drain board, however, is required every day.

Photo 3-19 Connecting type

Photo 3-20 Single type

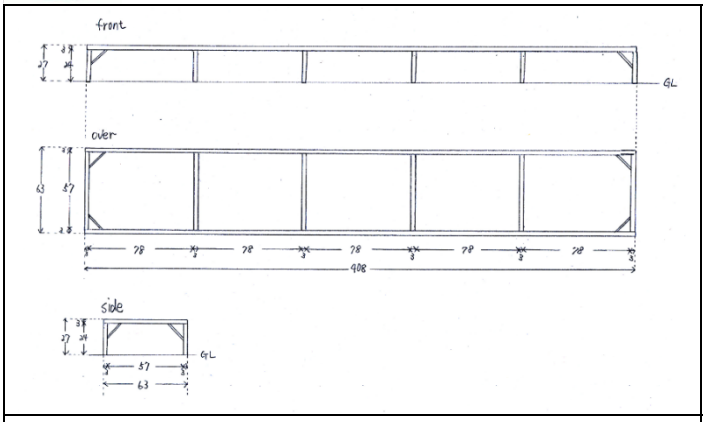


Figure 3-4 Drawing of Calf hutch base

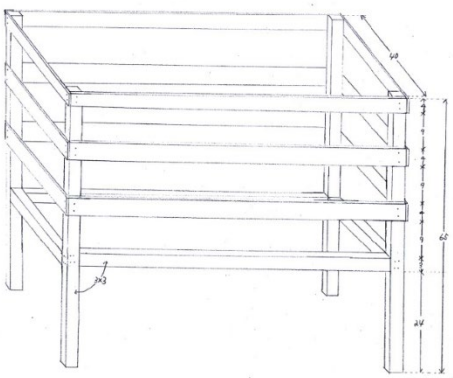


Figure 3-5 Drawing of Single type calf hutch

Photo 3-21 Calf Hutch Model in Indonesia

Photo 3-22 Calf Hach Model in USA

2) Wooden Rack

It is efficient to feed hay with a wooden rack for calf hutch

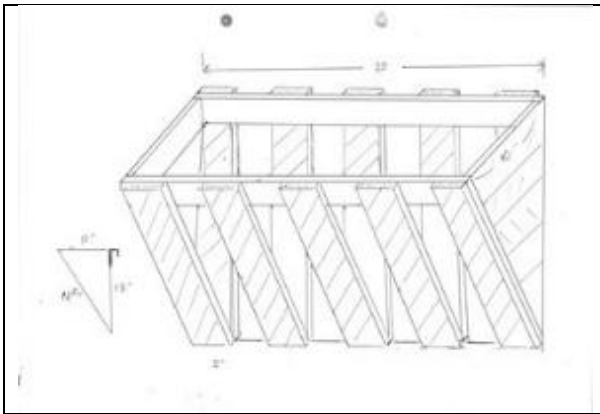


Figure 3-6 Drawing / Sketch of wooden hay rack

Photo 3-23 Local carpenter making wooden hay rack

3.5.5 Weaning

Target early weaning days is 60 days age. Ideal weaning timing is when a suckling calf can intake 1 kg

calf starter.

According to the Project trials, however, calve that can intake 1 kg calf starter at the time of weaning was less than 5% of total number of calves. Therefore, you can wean a calf at 60 days of age, when it can intake 500 to 600 g of calf starter.

Table 3-2 on page 19 shows quantity of calf starter provision to suckling calves. This tables are used for calculation and preparation of calf starter for one day. Calf starter should be placed in front of calves for 24 hours.

3.5.6 Feeding management after weaning

(1) Feeding

Stress given to calves due to weaning is strong. Feed same calf starter continuously for a week after weaning. From a second week after weaning, start mixing formula feed for growing heifer. In the second week, mix formula feed for 30 % of quantity. In the third week, mix 60% of formula feed. In the fourth week completely change to 100% formula feed. Feed formula feed to calves up to 6 months of age. Refer to Table 3-3 for provision of formula feed to calves after weaning. Once rumen is developed properly by 6 months of age, heifer can eat well and grow well.

Feed plenty of hay for 24 hours so that calve can eat enough quantity of hay. Drinking water should be accessible for 24 hours. Hay is better to be fed continuously at least up to 8 months of age.

From 7 months after birth, a calf will grow well only with roughage feeding. However, feeding of good quality roughage is must. Amount of roughage intake of the calf is less than mother buffalo's one. Therefore, green grass or good quality hay should be given specially to the calf

Table 3-3 Feed table by age of calves

Month	Day	Body weight (Kg)	Milk (Liter)/day	Calf starter (Kg)/day	Formula feed for rearing calf (Kg)/day	Hay (Kg)	Green grass	Water
1 month	1 ～ 30	45	Average 3.5	Average 0.2	-	Little	-	
2 months	31 ～ 60	62	Average 3.0	Average 0.5	-	0.5	-	
3 months	61 ～ 90	77	-	Average 1.0	Average 0.5	1	-	
4 months	91 ～ 120	92	-		Average 1.5	1.5	-	
5 months	121 ～ 150	107	-	-	2	1.7	-	Free
6 months	151 ～ 180	122	-	-	2	2	-	
7 months	181 ～ 210	137	-	-	-	2	2	
8 months	211 ～ 240	152	-	-	-	1	9	
9 months	241 ～ 270	167	-	-	-	-	15	

(2) Formula feed for growing animals

The Project developed 2 models of formula feed for growing heifers. Model 1 employed concentrates widely available in local markets as ingredients. The model 1, therefore, is easy to produce.

The model 2 was designed to increase crude protein for high effectiveness on daily gain. Soybean cakes, rape seed and cone gluten are included as ingredients, which are only available in city markets.

Table 3-4 Formula feed for growing heifers

	Model 1	Model 2
Name of Feed	Mixed proportion %	Mixed proportion %
Maize crush	10	30
Wheat (Crush)	10	15
Soybean	0	17
Rapeseed cake	0	5
Cotton Seed cake	5	0
Wheat Bran	62	25
Guar meal	5	0
Sunflower Seed meal	7	2
Coan gluten 60	0	5
dcp(Bone meal)	1	1
Total	100	100
TDN:	68.7	70.4
CP:	16.7	20.0

(3) Paddock

Weaned calves will be reared by group rearing in the paddock. Group rearing in a paddock allow them to train and strengthen their legs and develop strong skeleton structure. Group rearing also make calves get used to compete with each other to eat their feed in a herd.

Photo 3-24 A paddock for weaned calves

Photo 3-25 Hay rack for shed (Bolivia)

3.5.7 Necessity of supplemental feed for calves and heifers

Intake quantity of roughage of calves and heifers are comparatively less than those of adult animals. Feed as much as green leafy natural grass and green forage to calves and heifers.

Green natural grass can be found even in winter season in irrigated land in Sindh, though availability is less than summer season. Give priority to calves and heifers for feeding green natural grass to promote good daily gain.

Before and after winter which difficult season to supply good quality of roughage, calves' body weight stop to increase and started decrease in most of the cases. To help healthy growth of a calf, locally available

concentrate should be given to a calf. It is highly effective even only 2 kg of concentrates because weight of calf is less than adult's one.

3.6 Rearing calves at small scale farms in rural areas

3.6.1 Using the Feeding Unit

It is difficult for small scale farmers to practice early weaning same as practiced in the calf salvation center. Application of early weaning at small scale farmers might cause high mortality of calves.

Small scale farms require time to adopt new technologies including proper milk feeding, free access to drinking water and 24 hours provision of calf starter and hay. The Project developed feeding unit. With the use of this feeding unit, a calf can access easily to drinking water, calf starter and hay for 24 hours.

Photo 3-26 Feeding unit distributed to small scale farms

3.6.2 Weaning at 4 months of age

Early weaning is not possible in case nutritious condition of a calf is not good due to insufficient milk and quality roughage even though introducing feeding unit. In such a case, weaning at 4 to 5 months of age is recommended. Traditionally, calves are weaned at 4 to 5 months at small scale farms in Sindh.

Weaning methods at 4 months of age is explained below;

(1) Feeding management during suckling period

Quantity of milk fed in the beginning is same as early weaning method. Feed colostrum on day 1 to 5 after birth. Feed 1.5 kg of colostrum at a time. Feed 2 times in a day. Total 3 kg of colostrum per day is to be fed. On day 6 and 7, feed 1.5 kg of milk at a time, 2 times in a day. Total 3 kg of milk per day is to be fed. From 2nd week to 8th week, feed 2 kg of milk at a time for 2 times in a day. Total 4kg milk per day is to be fed. From 9th week, reduce quantity by 1 liter. Feed 1.5 kg at a time for 2 times in a day. Total 3 kg per day is to be fed. From 13th week, reduce quantity by 1 liter. Feed 1 kg at a time for 2 times in a day. Total 2 kg per day is to be fed. Wean on 17th week.

Table 3-5 Quantity of milk fed

Month	Week	Day	Body weight (Kg)	Milk (Liter)/day
1st Month	1 week	1 ～ 5	34	Colostrun 1.5L x 2 times=3L
		6 ～ 7		Milk 1.5 L x 2 times = 3L
	2 Weeks	8 ～ 14	37	Milk 1.5 L x 2 times = 3L
	3 Weeks	15 ～ 21	41	Milk 2.0 L x 2 times = 4L
	4 Weeks	22 ～ 28	45	Milk 2.0 L x 2 times = 4L
2nd Months	5 ～ 8 Weeks	29 ～ 56	48	Milk 2.0 L x 2 times = 4L
3rd Months	9 ～ 12 Weeks	57 ～ 84	77	Milk 1.5 L x 2 times = 3L
4th Months	13 ～ 16 Weeks	85 ～ 91	92	Milk 1.0 L x 2 times = 2L
	17 Weeks	113 ～ 118		Milk 0.5 L x 2 times = 1L
		120	107	0 L Wean

Provide calf starter and hay for 24 hours. It is ideal that a calf intake 1 kg hay at 3 months of age. Provide drinking water for 24 hours. From 4th months start mixing formula feed for growing heifers with calf starter gradually to shift from calf starter to formula feed. At the end of 4th month, replace calf starter completely with formula feed and wean.

(2) Feeding plan in different age of month

Table 3-6 Feed table for a calf

Month	Day	Body weight (Kg)	Milk (Liter)/day	Calf starter (Kg)/day	Formula feed for rearing calf (Kg)/day	Hay (Kg)	Green grass	Water
1 month	1 ～ 30	45	Average 3.5	Average 0.2	-	Little	-	Free
2 months	31 ～ 60	62	4	Average 0.5	-	Free	-	
3 months	61 ～ 90	77	3	Average 1.0	Average 0.5		-	
4 months	91 ～ 120	92	Average 1.5		Average 1.5		-	
5 months	121 ～ 150	107	-	-	2		-	
6 months	151 ～ 180	122	-	-	2		-	
7 months	181 ～ 210	137	-	-	-		2	
8 months	211 ～ 240	152	-	-	-	Little	9	
9 months	241 ～ 270	167	-	-	-	-	15	

3.7 Judgment of nutrient condition of calf

Let's learn 4 stages of nutrient level of calf

Level 4 [Fatty]	It is fatty and its whole body is covered by fat. Hip bone and rib bone cannot be recognized. Fatty calf will have physiological problems easily. It is needed to reduce amount of feed to keep proper weight.
Level 3 [Normal]	Desirable nutrient condition
Level 2 [Slightly weak]	Observe calf carefully and add some concentrate or formula feed if necessary.

Level 1 [Very weak]	Check whether calf has a disease and carry out necessary treatment and drenching. After that add some concentrate or formula feed.

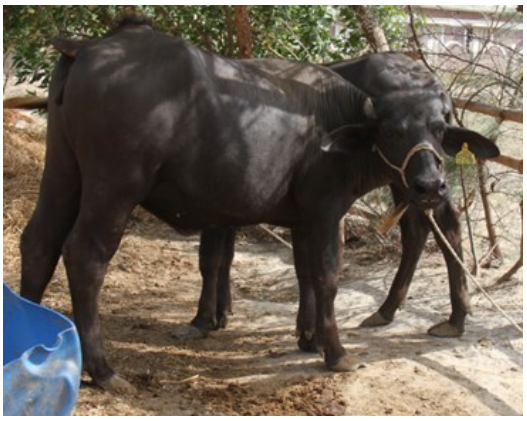


Photo 3-27 Level 4: Fatty

Photo 3-28 Level 3: Normal

Photo 3-29 Level 2: Slightly weak

Photo 3-30 Level1: Very weak

3.8 Preventive measures against heat for a calf

Heat preventive measures are important for calf rearing.

Bathing of a calf can be started from 6 months of its age. Heat preventive measures in hot season are important. Secure airy and shady place for calves. Sprinkle water over the surrounding area to reduce air temperature. Water spray can be used to sprinkle water over a body of calves every 30 minutes during excessively hot hours of the day so that the temperature of body surface of calves can be decreased.

Photo 3-31 Sprinkling water over calves with knapsack type spray

3.9 Preventive measures against calf diarrhea

There are two major causes of diarrhea.
1) Improper nutrition and feeding management
2) Infectious diarrhea caused by bacteria, virus and internal parasites.
Countermeasures for calf diarrhea such as timely diagnosis, proper treatment and prevention are explained as below;

Physiological diarrhea and transient diarrhea

There is no need to treat in this case of diarrhea. Symptoms are as follows;

- Frequency of scours is once in a day
- Color of scours is white or yellow
- Calf is moving with its tail lifting up

3.9.1 In case of lethargic calf

In this case following points should be checked.

1) Checking Dehydration:

Pull neck skin of calf. If the skin is tense or no elasticity, and eye balls recede into their sockets are the symptoms of dehydration.

2) Measurement of body temperature:

In general, normal body temperature of calf is higher than the adult animal. The normal range is 101.5-102ºF (38.1-39.2ºC). If the measurement shows high temperature beyond this range, calf has a fever.

3.9.2 Treatment for dehydration

It is important to maintain the moisture in a body of a calf. If a calf is still vigorous, oral rehydration solution (ORS) such as electrolytes solution should be given orally as soon as possible. If calf is lethargic, intravenous

injection of Ringer's solution or Normal saline (Nacl) should be given with the help of veterinary doctors.

3.9.3 Treatment for Infectious diarrhea with fever

Antibiotic or anthelmintic can be used to suppress infectious diarrhea.

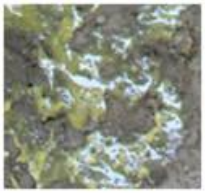
3.9.4 Appropriate nursing-care protocol

1) Separate a sick calf from a herd of healthy calves
2) Keep the calf on well dried place.
3) Disinfect the floor, rope, enclosure fence, feeding utensils etc. thoroughly

In case a calf become sick due to diarrhea, diagnose its level referring to the table 3-7.

There are three categories of diarrhea score 1, score 2 and score 3.
Score 3 form is too soft to form its shape but its condition is better than score 2 and it splashes on solid floor when a calf defecates.
Score 2 is loose and soup form of stool. The stool does not splash on the solid floor because it is liquid form.
Score 1 is bloody stool. Black in color and blood is mixed. There is a possibility that a calf is infected with coccidiosis.
Each score is categorized into 2 conditions. Check the condition of a calf every time, if you find diarrhea then provide treatment with most appropriate manner. If the condition of calf gets worse quickly, immediate treatment is necessary. Medicine for stomach and intestinal disorder, antidiarrheal, oral replacement fluid “ORS” and antibiotic should be always kept available.
Once determined, treatment should be continued at least for 3 days.

Table 3-7 Diarrhea score of a calf

			Treatment by farmer	Treatment by veterinarian
Score 3 	**Light diarrhea** Stool is too soft to form its shape. When animals defecate, stool splashes.	Calf is standing. Calf drinks milk but slowly or does not drink.	ORS Medicine for stomach and intestinal disorder: 2 times	x
		Calf doesn't stand up. Calf doesn't drink milk.	ORS Antidiarrheal (Scorex oral suspension) : 2 times a day	
Score 2 	**The terrible diarrhea** Very loose, soup form of dung.	Calf is standing. Calf drinks milk but slowly or does not drink.		It is better intravenous injection 2 liter of physiological saline solution containing sulfa drug by veterinarian
		Calf doesn't stand up. Calf doesn't drink milk.	ORS Injection Sulfa drug by intramuscular injection	
Score 1 	**Bloody stool** Sometimes blood is mixed with stool	Calf is standing. Calf drinks milk but slowly or does not drink.		It is better intravenous injection 2 liter of physiological saline solution containing sulfa drug by veterinarian + Anti-coccidium
		Calf doesn't stand up. Calf doesn't drink milk.		

3.10 Pneumonia in calves

Pneumonia is a major problem in calves it may be due to bacterial and viral infection.

Symptoms

- Dull and depressed
- High temperature up to 105ºF
- Raised breathing due to infected lungs
- Nasal discharge
- Dry muzzle
- Coughing
- Decreased food intake

Treatment

Antibiotics, anti-inflammatory and anthelmintic drugs can be prescribed for treatment.

3.11 Health calendar to prevent the calves against contagious and parasitic diseases

Vaccination

Category and Species	Jan.	Feb.	March	Apr.	May	Jun	Jul	Aug	Sep	Oct	Nov.	Dec.
						Rainy Seasons						
Adult & Young of Cattle and Buffalo				**B.Q. Vaccine** once in a year		**H.S.Vaccine** twice in a year				**F.M.D.Vaccine** twice in a year		**H.S.Vaccine** twice in a year

Birth →	1st Month				2nd Month				3rd Month				4th Month				5th Month				6th Month				8 Month				9 Month				10 Month			
Week	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Calves of Cattle and Buffalo							**H.S.Vaccine** 1st dose 6th weeks , than twice in a year as per calendar																				**H.S.Vaccine** After 6th months from 1st dose											
									F.M.D.Vaccine 1st dose 1st week of 3rd months																													
													Booster dose after 1 month from 1st dose 2nd dose after 6th month from1st dose																							
																					B.Q. Vaccine 1st dose 6th months and above, than follow annually calendar															

Deworming

Category and Speci	Jan.	Feb.	March	Apr.	May	Jun	Jul	Aug	Sep	Oct	Nov.	Dec.
Adult & Young						2 times drenching might be enough. Will be examined again by seeing the result.						
of Cattle and Buffalo		1) Drench				2) Drench				3) Drench		
		1)Ivermectine (2 weeks after drench)				2)Ivermectine (2 weeks after drench)				3)Ivermectine (2 weeks after drenc		

Month	1st Month				2nd Month				3rd Month				4th Month				5th Month				6th Month				8 Month				9 Month				10 Month			
Week	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Calves of Cattle and Buffalo	1st Dose of **Drench** shuould be given at the age of 30 days, than follow the calendar						**Ivermectin** should be applied after 10 days of drench than follow the calendar																															

HS:Hemorrhagic Septicemia FMD: Food and Mouth Disease BQ: Black Quarter

Figure 3-6 Animal Health Calendar

Chapter 4 Dry Buffalo Salvation

4.1 Purpose

The purposes of the activities are to verify the dry buffalo salvation technologies and system so that NGOs, Commercial farmers, ordinary farmers and other stakeholders such as microfinance banks could introduce and apply technologies and join systems of dry buffalo salvation. The ultimate purpose is to save and utilize numbers of dry buffalos which are slaughtered now. Purposes of the dry buffalo salvation activities can be summarized as below.

1) **To save high yield dry buffalo** from slaughtering & to utilize useful livestock resources
2) **To replace low genetic animals** of small-scale farmers in rural area with high yield dairy animal
3) **To increase milk production** by technical guidance and proper cow management in rural area, especially of small-scale farmers

The above purposes were set prior to implementation of the project activities. By the progress of the project activities, purpose 2) and 3) were excluded since adult female buffalo is high in price so that small scale farmers cannot afford to buy it. The purpose of dry buffalo salvation is, therefore, kept as 'to save high yield buffalo from slaughtering & to utilize useful livestock resources' through improving conception rate of buffaloes reared at commercial dairy farmers'.

4.2 Strategy

The Project applied the following strategies to achieve the purposes.

1) Developing appropriate reproductive technique for improving conception rate since no proper reproductive technique has been established in Sindh so far.
2) Duration of rearing pregnant dry buffalo depends on timing of conception. For those that have to rear several months, the Project try to connect commercial formers with small scale farmers in rural areas under a proper contract of sharing system.
3) Developing skilled technicians through technical training on reproductive disorder diagnosis and treatment.

4.3 Outcome of the Project activities

The Project piloted the activities of reproductive technical guidance at Nagori farm in Hyderabad New Cattle Colony in the 4th year of the Project period and Haji Amir farm in the 5th year of the Prject period. During 2 years pilot activities, the Project verified the improvement of concepion rate.

The dry buffalo salvation model verified through these pilot activities is as follows;

1) Confirmation of mother buffalo condition (milk yield, mastitis, BCS etc.)
2) Diagnosis by rectal palpation 40 to 45 days after delivery (diagnosis of reproductive organs recovery and reproductive disorder)
3) Proper treatment on reproductive disorder
4) Checking estrus condition and recording

5) Mating with normal ability and reproductively functional bull
6) Pregnancy diagnosis

4.3.1 Model verified at Nagori farm in New Cattle Colony in the 4th year of the project period

In the 4th year, the Project made trial on improving conception rate at Nagori farm of New cattle colony. Twenty heads of buffaloes that made parturition in October 2016 were targeted. The diagnosis frequency was 2 to 3 weeks since November 2016. Pregnancy diagnosis and necessary treatment through rectal palpation were conducted. Average days after parturition was 44 days for first diagnosis, 58 days for second diagnosis, 78 days for third diagnosis and 100 days for fourth diagnosis. The main treatment was injection of iodine solution into the uterus, injection of prostaglandin F2α (Prostaglandin F2α) and human chorionic gonadotropin (HCG).

(1) Diagnosis 100 days after parturition

The number of buffalo showed estrus sign as of 100 days after parturition was as low as only one head. The figure below is an example of ovary function and recovery of the uterus of cattle after parturition. Cow begin to secrete gonadotropin on day 10 after parturition, and there is a first ovulation (arousal) around 15 days and a second ovulation around 30 days then showing estrus signs. It usually becomes a normal estrus from about the fourth day. Kundhi breed buffalo are said to have a slower recovery of the uterus after parturition compared to cattle. However, 40% on day 40 and 55% on day 60 had recovered. Nonetheless, only one by day 100 showed estrus sign was too low, suggesting that the worker overlooked the estrus sign.

Cow uterus weight is as heavy as 9 kg at the time of parturition. Cow rapidly recovers its uterus to 1 kg by day 20 after parturition, and recovers it to a normal size of 750 g around 60 days. In the case of Kundhi buffalo, the recovery at 40 days tended to be as low as 50%.

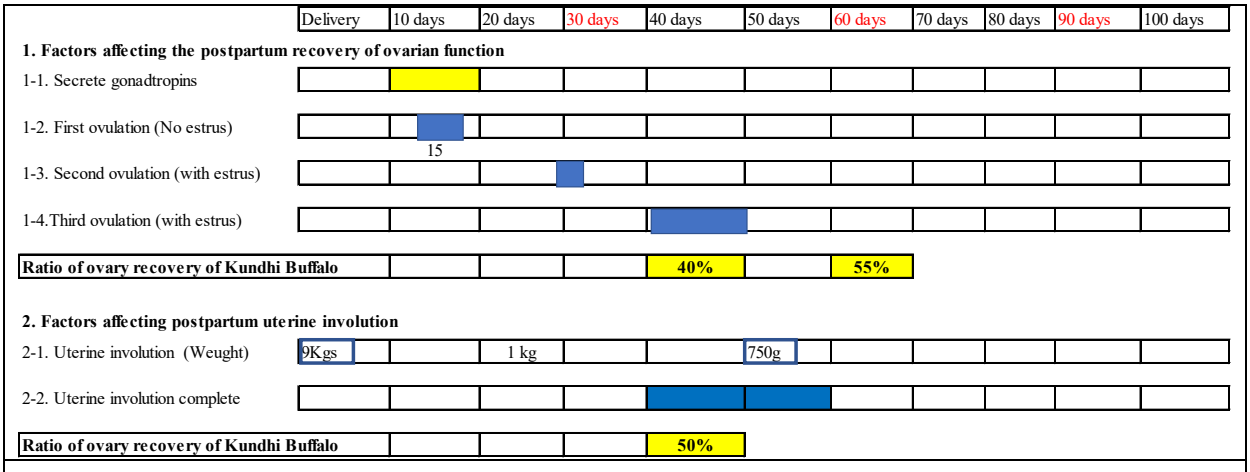


Figure 4-1 Recovery of ovary and uterus

(2) Conception rate

The Project confirmed a good result of conception of 12 heads (60%) out of 20 heads in average 6 months after parturition. BCS of pregnant buffalo and unpregnant buffalo was 3.4 and 2.7 respectively. The

outstanding difference in nutritious condition suggested the close relation between nutritious condition and conception rate.

The conceived buffaloes remained kept in the commercial farms and not slaughtered. The Project, therefore, could achieve its purpose.

4.3.2 Model verified at Haji Amir farm in Old Cattle Colony

In the 5th year, the Project verified improvement in conception rate at Haji Amir farm of Old cattle colony. The number of targeted buffaloes was 18 heads. The number of conceived buffaloes was 15 heads, i.e. 83%. At 6 months after parturition, conceived buffaloes was 12 heads, i.e. 66.7%. At 11 months, conceived buffaloes was 15 head, i.e. 83%.

Postpartum	Conception Heads
2 mon.	1
3 mon.	4
4 mon.	2
5th	3
6 mon.	2
7 mon.	1
8 mon.	1
9 mon.	
10 mon.	
11 mon.	1
Total	15

Table 4-1 Number of buffaloes conceived by numbers of months after parturition

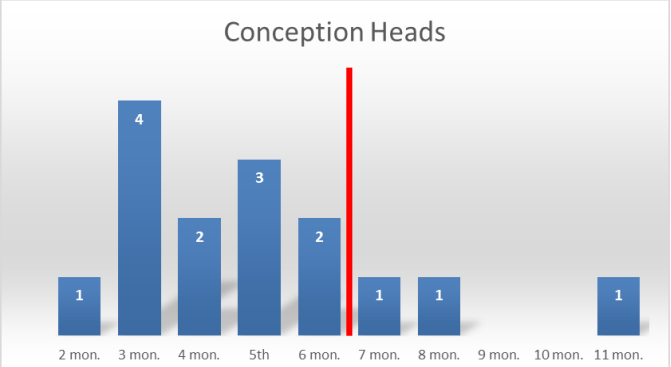


Figure 4-2 Number of buffaloes conceived by numbers of months after parturition

In the 5th year, the verification of dry buffalo salvation was carried out together with the practical training of participants in the reproductive training under the guidance of C/P.

Photo 4-1 Trainee of 1st batch training (Front)

Photo 4-2 Injecting iodine solution into uterus by 2nd batch trainee

4.4 Challenges

Through the technical service of reproduction, the Project verified dry buffalo salvation by improving conception rate of buffaloes. In addition, private veterinarians who have been trained in reproductive diagnosis and treatment training are showing steady results such as starting the reproductive diagnosis services.

As a future challenge, the issue that the iodine solution and human chorionic gonadotropin (HCG) injection solution used for treatment cannot be obtained in Pakistan will be obstacle for further dissemination of reproductive diagnosis and treatment services. The Project is in negotiation with the medicine importing agent, however the issue is still not resolved yet.

Technical guidance and advisory

- **Technical Support Day**

The Project set technical support day. Every Tuesday between 10 and 16 o'clock, the Project receive phone calls and visit for consultation about buffalo calf and dry buffalo salvation activities, calf rearing techniques, high mortality rates and low weight gain issues of calves and so on. The Project receives visitors to the calf salvation centers as well.

Address:
The Project on Sustainable Livestock Development for Rural Sindh
The Office of Director General Livestock Sindh
Animal Science Complex, Main Auto Bhan Road, Hussainabad, Hyderabad – 71000 Pakistan
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Officers in charge and specialized fields

Dr. Naeem Siddique Ansari, Specialist in Animal Assets
Dr. Safdar Ali Fazlani, Specialist in Feeding Management
Dr. Muhammad Arif Khan, Specialist in Fodder
Dr. Zulfiqar Ali Pathan, Specialist in Animal Health
Dr. Brohi, Veterinary Officer, the Calf Salvation Center
Dr. Ghullam Muhammad Jiskani, Specialist in Farm management
Dr. Akthar Ali Shahani, Specialist in Animal Reproduction
Dr. Muhammad Mubarak Jatoi, Specialist in Genetic Improvement
Dr. Iqtadar Ali Memon, Specialist in Marketing

- **Calf salvation seminar**

The Project organizes calf salvation seminars once or twice in a year for those who show interest in calf salvation activities and calf rearing techniques. The seminar is comprised of lectures on calf salvation model and calf rearing techniques developed by the Project, site visit and observation of the calf salvation center and question and answer sessions. No participation fee is charged.

Upon requests, the officers in charge will hold individual meeting and visit farms to provide necessary technical guidance and advisory.

سنڌ جي بهراڙي لاءِ چوپائي مال جي پائيدار ترقي وارو منصوبو

مينهن جي ڦرن جي پالنا بابت ڪتابچو

اپريل 2017

1. قرن کي بچائڻ جو بنيادي منصوبو

1. مقصد

هن تجربي جو مقصد ڪيٽل ڪالوني مان صحتمند ۽ سٺي پيداواري صلاحيت واري نسل جي قرن کي بچائڻ آهي. انهي لاءِ کين هٿرادو طريقي سان کير ڏائڻ، وقت تي کير ڇڏرائڻ، کير ڇڏرائڻ ڪانپوءِ گروپ ۾ پالنا ڪرڻ ۽ نتيجن جو مشاهدو ڪري سائنسي ۽ اقتصادي بنيادي طريقن جي چڪاس ڪرڻ آهي. هن منصوبي ۾ کير ڇڏيل قرن کي غريب ۽ ننڍن پاڪئن ۾ رواجي اڏ تي پالنا واري ۽ يا مائيڪرو فائننس جي طريقي کي استعمال ڪندي ورهايو ويندو ۽ ٽيندڙ پيش رفت جي جانچ ڪئي ويندي.

2. دورانيو/ عرصو

نومبر 2014 کان فيبروري 2017 (2 سالن تائين)

3. بجٽ

هن منصوبي ۾ جاپان حڪومت پالنا جي تجرباتي عرصي جو خرچ پريندي، جنهن ۾ سامان، اوزار، دوائون ۽ بيمارين جو جائزو ونڊ شامل آهي باقي ان کي اڳتي وڌائڻ جو ڪم سنڌ حڪومت ذريعي جاري رکندي PC-1

4. جاءِ/ هنڌ

منصوبي ۾ چوپائي مال واري پالنا جي ڪاتي حسين آباد حيدرآباد جي آفيس اندر موجود جاءِ جي چونڊ ڪئي وئي، چونڊ ڪرڻ جا سبب هي آهن.

چوپائي مال جي ڪاتي جي لاءِ هن آفيس ۾ سارسنپال ۽ نگراني ڪرڻ آسان رهي.

ويجهڙائي ۾ ڪوبہ فارم نہ هئڻ جي ڪري بيمارين ۽ وبا کان بچاءُ ڪرڻ آسان رهي.

.هن جاءِ تي ٻين مالدارن کي قرن جي پالنا جي عملي تربيت ڏيڻ آسان آهي.

5. بچاءُ/ حفاظتي نظام قائم ڪرڻ، سهولت مهيا ڪرڻ

قرن کي پالڻ جي هي سهولت عارضي بنياد تي قائم ڪئي وئي آهي، ان ڪري منصوبي ۾ سادي چپري جو استعمال ڪيو ويو آهي ۽ 10 قرڙن جا پنجرا انهن جي تجرباتي پالنا ڪرڻ جي لاءِ ناهيا ويا آهن.

هن منصوبي ۾ 2 ميٽر اونچي نيٽ جي وائر لڳايل آهي، چوپائي مال جي وبا جي اثر کان بچاءُ لاءِ. قرن کي وڇڙندڙ بيمارين کان بچائڻ جي لاءِ صرف منصوبي سان تعلق رکندڙ ماڻهن کي اندر داخل ٿيڻ جي اجازت هوندي.

	
قرن جي لاءِ پنجرا ناهڻ جا نمونا	سادا خيما

	
لوهي تار جي ديوار (اونچائي 2 ميٹر)	اندر داخل ٹيڻ جي لاءِ هدايتون

	
	جراثيم ڪش صابڻ سان هٿ صاف ڪرڻ

6. قرن کي متعارف ڪرائڻ

	
صاف طريقي سان قرن کي پس پيارڻ	پالنا واري مرڪز ۾ قرن کي ڪنن ۾ نمبروارا والا ٽيگ لڳائڻ /

	
پس پيارڻ	بوتل کي جراثيم ڪش سان ڏوئڻ

7. قرن جي سارسنپال

(الف) ڪير پيئندڙ قرن جي سارسنپال

قرڙن جي پالنا صاف ستري طريقي سان پالنا ڪرڻ جي لاءِ منصوبو قررن جي پنجرن جي جڳهه کي روزمره جي بنيادن تي تبديل ڪندو رهندو ته جيئن قر پنهنجي مرضي جي مطابق پاڻي پي سگهن ٿا ۽ سانڌيل گاهه کائي سگهن ٿا. قرن کي متبادل خوراڪ ڏني ويندي جيڪو منصوبو ناهيندو ۽ ڪير ان صورت ۾ چڏرايو ويندو جڏهن هي 700 گرام في ڏينهن خوراڪ کائيندا.

60 ڏينهن تي ڪير چڏرائڻ: شروعاتي عرصي ۾ ڪير چڏرائڻ

ڪير پيارڻ	هر سومر تي جسماني وزن ڪرڻ
	

(ب) ڪير چڏر ائڻ کان پوءِ واري پالنا

ڪير چڏائڻ کانپوءِ قرن کي هڪ گروپ ۾ 1 کان 30 ڏينهن تائين گروپ ۾ پاليو/ رکيو ويندو

جانورن جي لاءِ ڪليل جڳهه	ڪير چڏايل قر

8. **قرن جي ورهاست**

منصوبو تجرباتي بنيادن تي هڪ ياڄئي کي 2 قر ڏيندو ۽ جڏهن اهي قر جوان ٿيندا تہ هڪ واپس وٺندو.

منصوبواڳواڻ ياڄئي کان علاوه ان جي ويڑهاسي/ چوڌاري رهندڙ ياڄئن سان گڏوگڏ ٻين ننڍن ياڄئن کي بہ قر ڏيندو ۽ ورهاست جي مختلف قسمن/ طريقن کي اپنائيندو ۽ پوءِ انهن نتيجن جي نگراني پڻ ڪندو.

11. قرن جي پالڻ واري مرڪز تي ڄاڻ/ ٽيڪنالاجي جي تصديق ڪرڻ

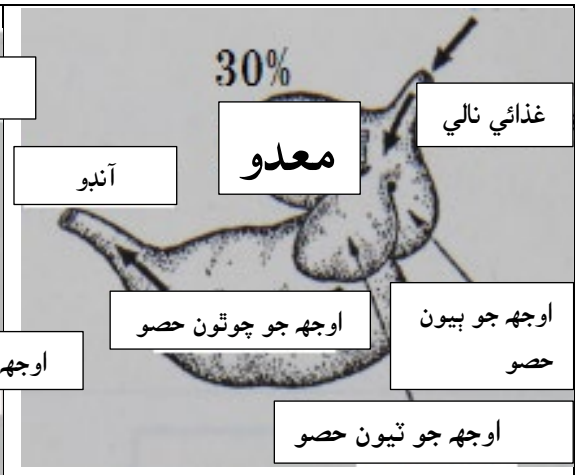
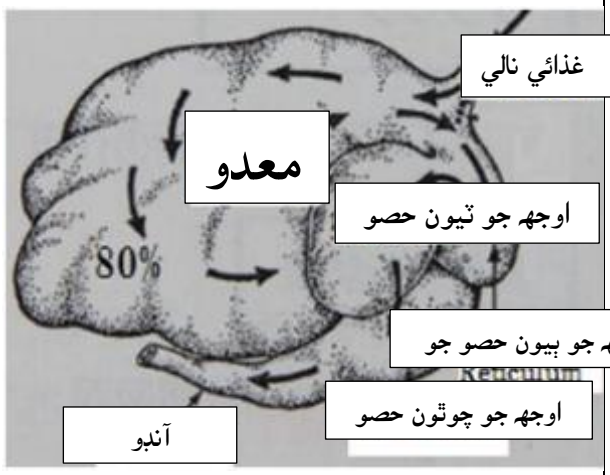
1 صحتمند قر اهي ٽيندا آهن، جن جو هاضمو بهتر هوندو آهي.

اچو تہ اهڙن قرن جي پالنا ڪريون جن کي خوراڪ جي گهٽي بک/ طلب وڌيڪ هجي.

اهي قر جن جي خوراڪ کي هضم ڪرڻ جي صلاحيت وڌيڪ هوندي اهي جلدي جوان ٽين ٿا. جيڪا مينهن وڌيڪ بک واري هوندي ان جو اوهہ وڌو هوندو ۽ جسم گهرو هوندو آهي.ان ۾ ڪو شڪ نہ آهي تہ اهي مينهون وڌيڪ ڪير جي پيداوار ۾ ڏين ٽيون.اهي مينهون ڏيکيون ۾ جلدي جوان ٽيندیون آهن ۽ انهن جو ڪير جو عرصو سڄي زندگي واري عرصي ۾ ۾ وڌو هوندو آهي. ڪير جي وڌيڪ پيداوار ڏيندڙ مينهن جو دارومدار گهٽو ڪري انهن جي سارسنبال تي آهي.

2. چوپائي مال جو اوجهہ.

چوپائي مال جي اوجهہ جا چار حصا آهن اهي جيڪي مختلف ڪم ڪن ٿا. هڪ حصو انساني معدي وانگر ڪم ڪري ٿو، جنهن ۾ هزارين جراثيم ۽ جيوڙا هوندا آهن. هڪ جوان مينهن ۾ اهي جيوڙا ۽ جراثيم خوراڪ کي ٽوڙڻ، سانڍڻ ۾ ڪم ايندا آهن.جڏهن تہ ٻيو حصو 80% هوندو آهي. اوجهہ جو ۽ نئين ڄاول قر ۾ جيڪو انساني معدي وانگر ڪم ڪري ٿو.(پر انساني معدو ننڍو ٽيندو آهي). نون ڄاول ٻار ۾ جيڪو اوجهہ جو اهو حصو 30% جاءِ گهري ٿو. اهو ضروري آهي تہ وڌندڙ قرن ۾ اوجهہ جو اهو حصو ڦڻ وڌي جيڪو ضروري آهي تہ انهن جي ابتدائي عمر ۾ وڌڻ شروع ڪري.

	
قرن جي اوجھ جنهن ۾ معدي وارو حصو30% آهي.	جوان مينهن جو اوجھ جنهن ۾ معدي واري حصو 80% جاءِ تي آهي.

3. ننڍڙن قرن ۾ اوجھ ڪيئن وڌائجي.

3-1 اچو تہ قرن ۾ اوجھ وڌايون

هن سيشن ۾ قرن جي اوجھ کي ڪيئن وڌائجي ان بابت سمجھاڻي ڏني ويندي.

1) قرن جي جمڻ کانپوءِ بن هفتن اندر سڀني خاصيت وارو سائو گاھ ڏيڻ گھرجي. سڀو سائو گاھ ڏاڍي دار سائي پنن واري گاھن اناج وارن فصلن جي خاندان مان هوندو آهي. ريشيدار/ تندوري دار گاھ قرن جي اوجھ وڌائڻ ۾ مدد ڪري ٿو.

2) سانڊيل گاھ کارائڻ

قرن جو اوجھ ننڍو هوندو آهي. ساون گاھن ۾ پاڻي جو مقدار70% هوندو آهي. جڏهن قر سائو گاھ کائن ٿا تہ انهن جو اوجھ پاڻي سان پرجي وڃي ٿو، جيڪو وڏيڪ خوراڪ کائڻ کان قرن کي روڪي ٿو، جڏهن تہ سانڊيل گاھ نہ رڳو مناسب غذائيت ڏئي ٿو پر انهن کي دستن کان پڻ بچائي ٿو.جيڪا قرن جي عام رواجي بيماري آهي.

3-2 گاھ سانڍڻ جي تياري

اچو تہ سنو گاھ سانڍيون

سانڍيل گاھ ساون گاھن مان نھندو آھي.ساون گاھن مان15% پاڻي خشڪ ڪري ان ۾ موجود جراثيم جي ڪيميائي عمل کي محدود ڪري، انھن کي ڏگھي عرصي تائين محفوظ ڪري ڇڏي ٿو.ان جي معيار کي برقرار رکندي، جھنگلي گاھ تر جا گاھ، ڇپر واري گاھ کي سانڍڻ لاءِ ترجيح ڏيڻ گھرجي. جوئر جا ڪانا ۽ مڪئي جا ڪانا تمام سخت ريشہ آھن، جيڪي ڦرن لاءِ مناسب نہ آھن.

سنڊ ۾ اس جي سني روشني آھي، انھي ڪري ھڪ ڪان ڏيڍ ڏينھن اس ڪافي ٿيندي ڇپر کي سڪائي سانڍڻ ۾ صبح جو ڇپر جو گاھ ڪٽي اس ۾ پکيڙي ڇڏيو ۽ ڪجھ ڪلاڪن ڪانپوءِ اٿلائيندا رھو. رات جو ڍير جي صورت ۾ گڏ ڪري رکو تہ جيئن ماڪ کان بچل رھي، پلاسٽڪ يا تال پتري سان ڍڪي ڇڏيو ۽ صبح جو ٻيھر گاھ کي زمين تي پکيڙي اٿلائيندا رھو. ٻئي ڏينھن شام تائين سانڍيل گاھ تيار ٿي ويندو.ھڪ ڪلو گرام سانڍيل گاھ 5 ڪلو گرام سائي گاھ مان نھي ٿو.

ڦرن کي معياري ۽ سني مقدار ۾ سانڍيل گاھ کارايو.

3-3 ڦرن کي معياري ۽ سني مقدار ۾ سانڍيل گاھ کارايو.

سانڍيل گاھ ڦرن کي 8 مھينن جي عمر تائين کارايو.آبپاشي واري زمين جو اھو فائدو ھوندو آھي، اتي سڄو سال جھنگلي تر جا گاھ موجود ھوندا آھن.جوان جانور وڌيڪ مقدار ۾ چارو کائن ٿا. ساڳيو چارو ننڍا ڦر بہ کائين ٿا. ڇھن مھينن جي عمر وارا جيڪي ننڍا آھن.

انھي ڪري ترجيحي بنياد تي ڦرن لاءِ سانڍيل چارو ناھڻ گھرجي جڏھن بہ وقت ملي وڌيڪ مقدار ۾ گاھ سانڍي جمع ڪري سگھجي ٿو ۽ ڪافي عرصي تائين خشڪ ۽ ھوادار جاءِ تي رکجي.

	
چپر جيڪا تر ۾ روڌيڪ موجود هوندي آهي.	چپر کي سانڍڻ جو طريقو.

قر هن کي دلچسپي سان کائيندا آهن.

(1) قرن جي جمڻ کانپوءِ صحيح سنپال

صحتمند قر پالڻ لاءِ پهريون ڪجهه ڳالهيون جيڪي قر جمڻ کانپوءِ هڪدم توهان کي ڪرڻيون آهن.

1) قرن جي جسم کي خشڪ ڪرڻ

قر جمڻ کانپوءِ ان کي ماءُ جي آڏو چڌيو ته جيئن ان کي چٽي چو ته قر کي چوسڻ سان ماءُ جا غدود تحرڪ ۾ ٻ اينداآهن جيڪي جر جي جلد خارج ڪرڻ ۾ ٻ مدد ڪندا آهن.

2) ناڙي کي جراثيم کان پاڪ ڪرڻ

ناڙي کي 10% آيوڊين ٽنچر جي محلول سان صاف ڪريو يا آيوڊين جي سئي ناڙي ۾ ٻ لڳايو.

ناڑي کي جراثيم کان پاڪ ڪرڻ لاءِ آيوڊين ۾ ٻوڙيو

3) اينٽي بائيوٽڪ جي سئي مشڪ ۾ لڳايو

وٽاڻ تي اينٽي بائيوٽڪ جي سئي انهن ڄايل . گهم وارن ڏينهن ۾ يا برسات کانپوءِ ۽ سياري جي مند ۾ مشڪ واري سئي لڳايو.

4) کيرڏائڻ وارن ڦرن جو مشاهدو ڪرڻ

جيڪڏهن کير پيئندڙ ڦرڙا هڪ پيرو بيماري ۾ مبتلا ٿي وڃن ٿا تہ انهن جي حالت جلدي ۽ آساني سان خراب ٿي سگهي ٿي پاڻئي کي بيمار ٿيل ڦرن جي نشاندهي ڪرڻ گهرجي ۽ پوءِ ترت علاج فراهم ڪجي. پاڻين کي ڦرن جي سمهڻ ، جاڳڻ، ساهه کڻڻ، کائڻ ، پيشاب ڪرڻ ۽ چيٽي لاهڻ جو مشاهدو ڪرڻ گهرجي. ڪا بہ تبديلي جيڪا عام رواجي تبديلي کان مختلف هجي تہ انهن کي بيماري جي نشاني/ علامت سمجهڻ گهرجي.

5) پس

ڦرن کي پس ڄمڻ کانپوءِ 6 ڪلاڪن جي اندر پيارڻ گهرجي.

پس پيارڻ انهي ڪري اهم آهي جو اها ڦرن کي جراثيمي بيمارين کان محفوظ ڪندي آهي. ڦرن کي بيمارين کان بچاءُ لاءِ پهرين پس جو خاص اثر هوندو آهي.. ڦر جيتري پس پيئڻ چاهي ان کي پيارڻ گهرجي.

گهٽ ۾ گهٽ 1.5 ليٽر کان 2 ليٽر تائين ڄمڻ جي 6 ڪلاڪن اندر پيارڻ گهرجي. ڦر پئدائش جي 6 ڪلاڪن کان پوءِ پس ۾ موجود هڪ عنصر گاما گلوبن هوندو آهي. انهي کي جذب ڪري ڪونہ سگهندو. ويامڻ کانپوءِ 3 کان 5 ڏينهن پس يا کير کي وکٽڻ نہ گهرجي. ڇوتہ ان وقت ان جي غذائيت عام کير کان وڌيڪ هوندي آهي ۽ انهي ڪري اهو کير يا پس ڦرن کي جيترو ٿي سگهي پيارڻ گهرجي.

5. قُرن ۾ مينهن کي الگ ڪاڏ خوراڪ ڏيڻ

5.1 قُرن کي بچائڻ جي لاءِ اسان جي رڀابندي

اسان جي منصوبي مينهن ۾ قُرڻن کي الڳ ڪاڏ خوراڪ ڏيڻ جي لاءِ تصديق ڪئي آهي. قُر جي جمڻ کانپوءِ جيترو جلدي ممڪن ٿئي ان کي پس پياريو ۾ انهن کي قُرن جي پالنا واري مرڪز ڏانهن منتقل ڪيو.

1) پس جي ڏُهائي

صاف پس پيارڻ

ٻہ ٽڪرا ٽوال جا ڪٽو انهن کي جراثيم ڪش دوا ۾ ٻوڙيو. جراثيم ڪش دوا ڪلورين ۾ ڏيڻ آهي. ان جي لاءِ بالٽي جو استعمال ڪريو ۾ اوھ ۾ ٽٽن کي انهن ٽوال جي ٽڪرن سان صاف ڪريو. ويم جي اڏ ڪلاڪ کان پوءِ ۾ پس پيارڻ کان اڳ ٽٽن مان ٻہ ٽي ڳوھا هاري ڇڏيو.

2) پس ڏارائڻ

	
پس جي ڏُهائي	قُرن کي پس پيارڻ

(3) کير خريد ڪرڻ

اهو ضروري آهي تہ قُرن کي کير ڏارائڻ کان اڳ کير کي سنگهجي جيڪڏهن ڪا بدبوءِ اچي ٿي تہ قُرن کي پيارجي ٿو. قُرن کي بک لڳي ٿي تہ اهي بدبوءِ وارو کير پيءُ ٿا وجن پر خبردار ٿيو تہ کير جي معيار بابت چاهي قُر ان کي پي چو نہ وجي.

5-2 هٿرادو طريقي سان کير پيارڻ

1) بالٽي وسيلي ڏارائڻ

هڪ بالٽي تيار ڪيو جيڪا ڦر جي مٽي کان وڌي هجي ۽ پاڻي جي ٻانهن کان ٻه بالٽي کي ڪنڌائتو جهليو ۽ پنهنجي آڏو ڦر جي وات ۾ وجهو تڏهن ڦر ان کي چوسڻ شروع ڪندو پوءِ ان جو منهن بالٽي جي اندر ڪريو. ڦر پنهنجو منهن بالٽي ۾ ٻوڙيندو نڪ پڻ ٻوڙيندو. ڦر کي سيکاريو ته مونهن مٽي ۽ نڪ ٻاهر ڪڍي ۽ پوءِ وات سان ڏائي.ڦر پيئڻ بند ڪري ته بالٽي کي هٿائي ڇڏيو جيستائين ڦر کير پيئڻ شروع ڪندو. بالٽي جو وزن مطابق.

2) نپل وسيلي کير ڏيڻ

هڪ آنگر ڦر جي وات ۾ڏيو جيئن ڏائڻ شروع ڪري ته نپل کڻي انجي وات ۾ ڏيو. هڪ دفعو ڏائڻ شروع ڪري ته نپل کي نه هٿايو. کير جو ٿانو ڦر جي مٽي کان مٿاهون نه هجي کير ڏائيندي جڏهن ڦرکير پيئڻ ڇڏي ڏئي ته ٿانو کي آهستي سان پري ڪري ڇڏيو ۽ ٻيهر ان کير پيئڻ لاءِ رهنمائي ڪريو. نپل سخت هوندي ته کير پيئڻ ڏکيو هوندو آهي ۽ کير جو وهڪرو ٻه صحيح ڪونه هوندو آهي. جيڪڏهن ڏسوته ڦر صحيح نموني نه ٿو چوسي سگهي ته نپل کي ٻيهر نيڪ نموني سان لڳايو نپل مان کير جي وهڪري کي مناسب ڪريو.نپل صاف ڏوتل هجي ۽ ڪنهن برش ۽ صابڻ سان صاف ڪريو.

پهرين بالٽي وسيلي ڏارائڻ

فيدر وسيلي ڏارائڻ

مختلف قسم جا فيدر موجود آهن

	
بالٽي نما فيڊر	ڊبي نما فيڊر

5-3 ڪير ڏائڻ واري عرصي جي دوران خوراڪ

قرن ڪي پيدائش جي 8 ڏينهن ڪانپوءِ خوراڪ ۽ سانڍيل گاھ تي آڻجي. پھرين ڏينهن شروعات ۾ ڦر خوراڪ ۽ سانڍيل گاھ سان ڪيڏندو رهندو. پوءِ هن جو وات ان سان هري ويندو.

هر وقت تازي پاڻي جي موجودگي اهم ڪردار ادا ڪندي ڦر ڪي سڻي ڪاڏي ڪائڻ لاءِ. پاڪستان ۾ اهو خيال آهي ته ڏائڻ وارو ڦر پاڻي ڪو نه پيئندو ته اهوغلط تصور آهي. هڪ ننڍڙي بالٽي ۾ پاڻي فراهم ڪريو ۽ روزانو تازو پاڻي مهيا ڪريو گهٽ ۾ گهٽ ڏينهن ۾ 2 دفعا صبح ۽ شام جو.

1) متبادل خوراڪ

اسان جي منصوبي قرن جي لاءِ متبادل خوراڪ موجود مقامي داڻيدار خوراڪ مان تيار ڪئي وئي آهي. متبادل خوراڪ قرن کي جمڻ جي ٻئي هفتي ۾ شروع ڪرائجي جيڪا جنهن سان هن جي اوجھ کي وڌائڻ سان گڏوگڏ ڦر جو روزانو وزن بہ وڌي ٿو ۽ ڦر جلدي ڪير ڇڏي خوراڪ ڪائڻ تي اچي ٿو.

چارٽ1. متبادل خوراڪ جو چارٽ

خوراڪ جو نالو	گڏيل حصو	في عدد قيمت روپيا / ڪلو
مڪئي جو ڏارو	%15	32
ڪڪ جو ڏارو	%30	31
ڪڪڙن جو ڏارو	%7	37
ڪڪ جو پوسو	%30	18
گوار	%7	33
مڪئي جو نشاستو 60	%5	25
گڙ جو شيرو	%5	20
هڏين جو چورو	%1	100
ٽوٽل	100	
خشڪ مادو	**91.3**	
ٽوٽل هاضم جزا	**76.3**	
ڪچو پروٽين	**18.5**	

2) **ڪير ڇڏرائڻ جو ڏينهن ڪٽڻ 60 ڏينهن**

اسان جا قر 60 ڏينهن تي ڪير پيئڻ ڇڏين ٿا. ڪير شروع واري عرصي ۾ ڇڏڻ صحيح آهي

جڏهن قر سنو ڪائڻ وارو هوندو سني واڌ ڪائيندو . بن مهينن ۾ هن جو اوجھ ڪافي وڌي ويندو. جيڪو هن کي ڪير ڇڏائڻ ۾ سولو ٿيندو. ڪير جا ڪٽيل ڏينهن 60 هوندا آهن. ڄمڻ کان پوءِ بہ شرطئ قر روزانوسراسري 0.5 ڪلوگرام وڌندو هجي. قرن جي پالنا جي تجرباتي مرڪز تي جنهن ۾ قر جو وزن 34 ڪلو هيو ڪٽل ڏينهن تي ڪير ڇڏايو ويو. مطلب 60 ڏينهن ۾ جم ڪانپوءِ 62 ڪلو وزن ٿيو.

3) **ڪير ڏارائڻ جي مقدار ۽ متبادل خوراڪ**

پس پهرين ڏينهن کان 5 ڏينهن تائين پيارڻ گهرجي 1.5 ليٽر روزانو 2 وقت ڏينهن ۾ ٽوٽل 3 ليٽر روزانو قرن کي. ساڳئي نموني 1.5 ليٽر ڪير ڏينهن ۾ 2 دفعا روزانو 6 کان 7 ڏينهن ٽوٽل 3 ليٽر ڪير روزانو هر قر کي. 2 هفتي کان 6 هفتي تائين 2 ليٽر ڏينهن ۾ 2 دفعا هر قر کي.ٽوٽل 4 ليٽر هر قر کي. قرن جي متبادل خوراڪ ۽ سانڊيل چارو 2 هفتي کان پوءِ شروع ڪجي. ٽورو سانڊيل چارو ۽ خوراڪ قرن آڏو رکي ڇڏجي تہ هو ان سان پيا کيڏندا. آهستي آهستي ان تي منهن هٽڻ جي ڪري هو ان کي ڪائڻ لاءِ آماده ٿي ويندا. جيئن ڪائڻ شروع ڪن آهستي آهستي انهن جي تعداد پڻ وڌائي ڇڏجي. هڪ دفعو جڏهن قر هڪ ڪلو خوراڪ کائي وجن تہ هڪ ڏينهن ۾ ان کي ڪير تان هٽائي ڇڏيو. پيئڻ جو پاڻي قر جي ويجهو رکو. هر وقت ۽ سجو ڏينهن پاڻي پيئندا رهن.

چارٽ 2. متبادل خوراڪ جو چارٽ ڪير وارن ڦرن لاءِ

هفتو	ڏينهن	ڦر جو وزن ڪلو گرام ۾	ليٽر	متبادل خوراڪ	سانڍيل چارو	پاڻي
1 هفتو	5-1	34	پس 1.5 ليٽر * 2 وقت = 3 ليٽر	0 ڪلو گرام	0 ڪلو گرام	0 ليٽر
	7-6		ڪير 1.5 ليٽر * 2 وقت = 3 ليٽر			
2 هفتو	14-8	37	ڪير 2 ليٽر * 2 وقت = 4 ليٽر	ٽورڙو	آزمائشي	سڄو ڏينهن
3 هفتو	21-15	41	ڪير 2 ليٽر * 2 وقت = 4 ليٽر		ٽورڙو	
4 هفتو	28-22	45	ڪير 2 ليٽر * 2 وقت = 4 ليٽر			
5 هفتو	35-29	48	ڪير 2 ليٽر * 2 وقت = 4 ليٽر	0.5 ڪلو گرام	جيترو ڪائين	
6 هفتو	42-36	52	ڪير 2 ليٽر * 2 وقت = 4 ليٽر	0.5 ڪلو گرام		
7 هفتو	49-43	55	ڪير 1.5 ليٽر * 2 وقت = 3 ليٽر	0.6 ڪلو گرام		
8 هفتو	56- 50	59	ڪير1 ليٽر * 2 وقت = 2 ليٽر	0.8 ڪلو گرام		
9 هفتو	59-57		ڪير 0.5 ليٽر * 2 وقت =1 ليٽر	1 ڪلو گرام		
	60	62	ڪير ڇڏائڻ جو ڏينهن			

ڪير ڏائڻ وارن ڦرن لاءِ ڪير ، متبادل خوراڪ، سانڍيل چارو ۽ پاڻي

هيٺين تصويرن ۾ اوزار ۽ خوراڪ جا ٿانو ڪير ڏائڻ وارن ڦرن لاءِ

	
پاڻي پيئڻ ۾ متبادل خوراڪ لاءِ ٽانو	سانڊيل چاري جو خانيدار ڏانچو

5-4 ڪير ڇڏايل ڦرن جي سارسنڀال

1) ڪير ڇڏائڻ ڪانپوءِ ڦرن جي سارسنڀال

ڪير ڏائڻ جو عرصو 60 ڏينهن آهي. ڪير ڏائڻ واري عرصي ۾ ڪير جي متبادل خوراڪ شروع ڪرڻ گهرجي. ڪير ڇڏائڻ ڪانپوءِ اها متبادل خوراڪي مرڪب ڏيڻ گهرجي وڏندڙ ڦرن کي.
خوراڪ جي تبديل هڪ هفتي کان مٿي نہ ڪجو گهٽو وقت ڦرن کي دٻاءُ کان بچائڻ لاءِ تہ اوچتو خوراڪ ۾ تبديلي نہ ڪجي.

وڏندڙ ڦرن کي خوراڪي مرڪب 6 مهينن جي عمر تائين ڏيڻ گهرجي.
ڦرن جو روزانو سراسري وڏندڙ وزن خوراڪي مرڪب هجي يا ڪير وارو عرصو 0.5 ڪلوگرام هجي.
ڦر جو اوجهہ سڻي نموني وڏندو 6 مهينن تائين ۾ سڻو ڪائڻ وارو ٽي ويندو.
خوراڪ ڪانسواءِ ڦر چاري تي اچي ويندا. جڏهن تہ اهي چارا سڻي معيار جا هوندا. انهن ڦرن جي خوراڪ، جوان مينهن جي مقابلي تمام گهٽ هوندي آهي. بشرطيڪ چارو سڻي معيار جو هجي.

چارٽ 3 . ڪير ڇڏائڻ ڪانپوءِ ڦرن جي خوراڪ

خشڪ مادو	88.7
ٽوٽل هاضم غذا	72.1
ڪچو پروٽين	18.2

خوراڪ جو نالو	گڏيل حصا (مقدار فيصد ۾)	1 ڪلو گرام/ في روپيہ مارڪيٽ جي حساب سان قيمت گهٽ وڌ ٽي سگهي ٽي.
مڪئي جو ڏارو	%10	32
ڪڻڪ جو ڏارو	%10	31
گوگڙن جي ڪڻ	%5	37
ڪڻڪ جو پوسو (چوڪر)	%62	18
گوار ڪٽي	%5	40
سورج مکي جا بج	%7	32
ڊي.سي.پي(هڏين جو چورو)	%7	100
ٽوٽل	%100	

2) ڪير ڇڏائڻ وارن ڦرن لاءِ واڙيون

ممڪن هجي تہ ڦرن لاءِ ننڍيون واڙيون ٺاهجن ڦرن کي رسو 2 کان 3 مهينن جي عمر ۾ وجهجي ۽ 3 مهينن کانپوءِ انهن کي گڏ ٻڌجي تہ جيئن اتي پلجن. واڙين ۾ گڏ ڇڏڻ سان انهن جي جنگهن کي طاقت ايندي ويندي ۽ انهن جو ڏانچو سڻي اوسر ڪندو. جڏهن/ ٽولي ۾ پالنا ڪرڻ سان ڦرن ۾ خوراڪ کائڻ جو رجهان وڌندو ۽ هڪ ٻئي سان خوراڪ کائڻ جو مقابلو پڻ وڌندو.

واڑيون

5-5 مختلف عمر جي قرن لاءِ خوراڪ جو چارٽ

چارٽ نمبر4. مختلف عمر جي قرن جي خوراڪ جو چارٽ

عمر مهينن ۾	ڏينهن	جسماني وزن (ڪلوگرام)	ڪير (ليٽر)	نعمل البدل خوراڪ ڪلوگرام	خوراڪي مرڪب ڪلوگرام	سانڊيل چارو ڪلوگرام	سائو گاھ	پاڻي
1	30-1	45	3.5 ليٽر	0.2 ڪلوگرام	-----	ٽورو	----	سڄو ڏينهن / هر وقت
2	60-31	62	3 ليٽر	0.5 ڪلوگرام	-------	0.5	-----	
3	90-61	77	------	-------	1.5	1	-----	
4	120-91	92	-------	---------	2.0	1.5	-------	
5	150-121	107	------	--------	2.0	1.7	-------	
6	180-151	122	-------	----------	2.0	2	--------	
7	210-181	137	-------	----------	0	2	2	
8	240-211	152	-------	----------	0	1	9	
9	255-241	167	-------	-------	0	0	15	

5-6 ورهايل قرن سان گڏ 3 مهينن جي خوراڪي مرڪب مهيا ڪرڻ

اسان قرن کي 4 مهينن جي عمر ۾ ورهائينداسين ۽ خوراڪي مرڪب بہ ڏينداسين.

6. گرمي کان بچاءُ لا قدم کڻڻ

قرن کي پالڻ لاءِ گرمي کان بچاءُ لاءِ تدبيرون ڪرڻ ضروري آهن.

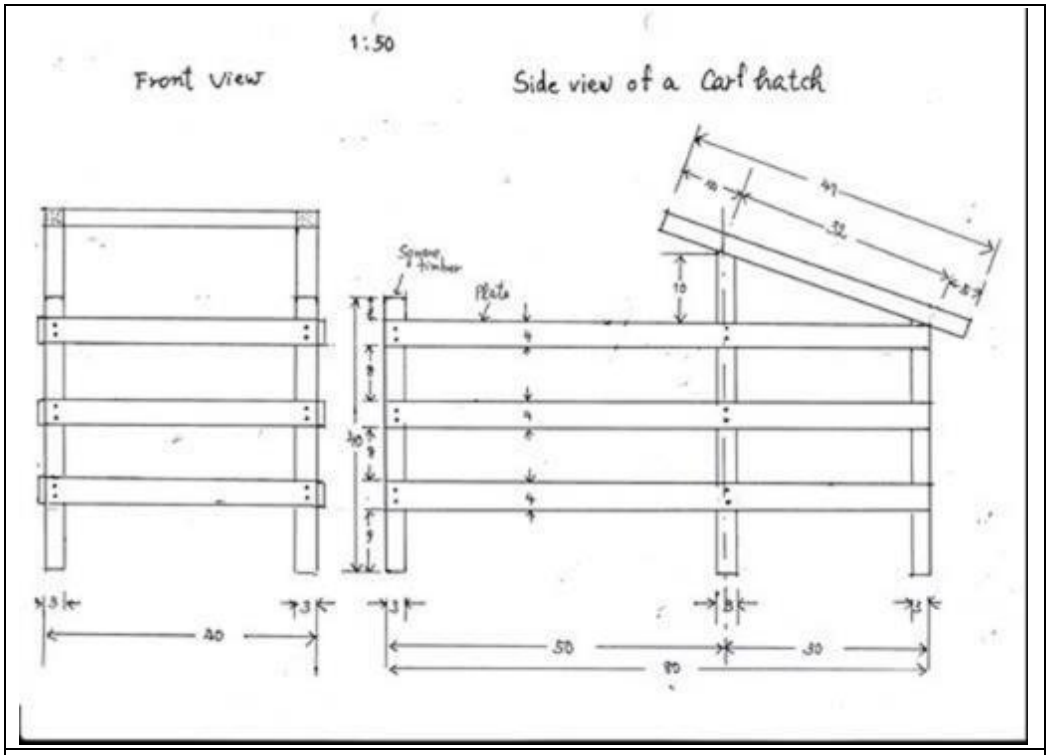
قرن کي 6 مهينن جي عمر کان وهنجارڻ گهرجي، اونهاري جي موسم ۾ گرمي کان بچائڻ ضروري آهي. قرن کي هوادار چانو ۾ رکو. پسگردگي ۾ پاڻي جي موجودگي هوا ۾ گرمائش گهٽ ڪندي. پاڻي جو ڦهارو هر اڌ ڪلاڪ ڪانپوءِ قرن جي مٿان ڪجي تہ جيئن سخت گرمي واري وقت قرن جي جسم جي گرمي پد گهٽ ٿي ٿئي.

قرن مٿان پاڻي جو ڦهارو ڪرڻ

7. سهولت ۽ سامان مهيا ڪرڻ

7.1 قرن جا پنجرا

دنيا ۾ ڪيترن ئي قسمن جا قرن جا پنجرا استعمال ڪيا وڃن ٿا.
قرن کي پنجرن ۾ پالڻ جو مقصد انهن جي الڳ سارسنڀال ڪرڻ ۽ هيٺيون ڪاميابيون حاصل ڪرڻ آهي.
1.ڪيتري خوراڪ ۽ پاڻي واپرايو آهي ان جي تصديق ڪرڻ
2. قر جي صحت جو مشاهدو ڪرڻ
3. قرن کي وڇڙندڙ بيمارين کان محفوظ ڪرڻ



قرن جي پنجرن جو خاڪو

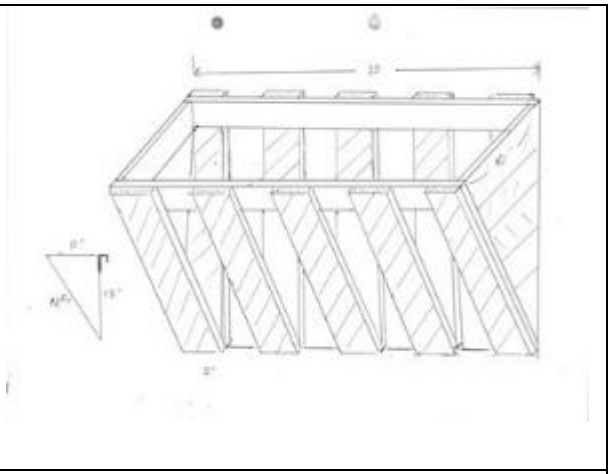
بوليويا ۾ قرن لاءِ پنجرا

اسان جومرڪز

	
آمريڪا	انڊونيشيا ۾ ڦرن جا پنجرا

7-2 ڪاٺ جو پنجرو

ڪاٺ جي پنجري جي استعمال سان سانڌيل گاهه سنڌي طريقي سان ڏئي سگهجي ٿو.

	
ڪاٺ جي پنجري جو خاڪو	واڌو ڪاٺ جو پنجرو ٺاهيندي

	
چرائي جي لاءِ سانڊيل گاھ جي پنجري جو استعمال	سانڊيل گاھ جو پنجرو (بوليويا)

9. ڦرن ۾ دستن جي خلاف قدم کڻڻ

ڦرن کي دست ٻن اهم سببن جي ڪري ٿيندا آهن.

پهريون سبب مناسب خوراک ۽ سارسنيال جو نہ هجڻ ۽ ٻيون سبب آهي جراثيمن جو حملو.

ڦرن ۾ دستن جي سجاڻپ، علاج ۽ بچاءُ ڪيئن ڪجي هيٺ ڏجي ٿو.

2. ڦرن ۾ دستن جي تشخيص، علاج ۽ بچاءُ جا طريقا

1. جسم جي اندروني تبديلي ۽ عارضي طور تي ٿيندڙ دستن لاءِ علاج جي ضرورت نہ هوندي آهي. انهن ٻنهي قسمن جون نشانيون هيٺ ڏجن ٿيون.آهي.
1) دست ڏينهن ۾ هڪ دفعوٿيندا آهن.
2) دستن جو رنگ اڇو يا پيلو هوندو آهي.
3) ڦر گهمڻ دوران پڇ متي ڪري هلندو آهي.
2. ڦر جڏهن صفا ٽڪيل نّظر اچي تہ هيٺيون ڳالهيون نوٽ ڪريو.
1) ڦرن ۾ پاڻي جي کوٽ کي چڪاسيو.
ڦرن جي ڪنڌ واري کل کي چڪي ڏسو جيڪڏهن اها چڪجي بيهي رهي تہ اها پاڻي جي کوٽ جي اهم نشاني آهي.
2) جسماني بخار کي چڪاسيو.
عام طور تي ڦرن جي جسماني گرمی پد بنسبت وڏن جانورن جي ڪجھ وڌيڪ هوندو آهي. ڦرن جو نارمل بخار 101.5-102°F هوندو آهي.
3. ڦرن ۾ پاڻي جي کوٽ جو علاج.
ڦرن کي پاڻي جي کوٽ کان بچائڻ لاءِ جيترو ٿي سگهي او آر ايس پيارجي. سست نظر اچي تہ ڊاڪٽر جي صلاح سان انکي گلوڪوس يا وري نمڪيات جي ٽيلهي لڳرائجي.
4. جراثيمن وسيلي ٿيندڙ دستن ۾ وڏي اثر واري جراثيم ڪش سئي لڳائجي يا وري پيٽ جي ڪيڑن جي دوا پيارجي.

5. مناسب سارسنپال ڪئي وڃي.

1. بيمار جانورن کي صحتمند جانورن کان ڌار ڪجي.

2. صاف ۽ خشڪ جاءِ تي ڦرن کي بيهارجي
3. رسي، واڙي، ٽانو، خوراڪ جي ٽانون کي صحيح طرح جراثيم ڪش دوائن سان صاف ڪجي.

ڦرن ۾ دستن جا ٿي مرحلا آهن.

1 قسم: رتاوان دست ، ڪاري رنگ جا هوندا آهن ۽ جلابن سان گڏ رت پڻ خارج ٿيندو آهي جيڪو آنڊي ۾ موجود جراثيمن (ڪاڪسيڊيوسس) جي ڪري ٿيندو آهي.

2 قسم: هن قسم جا دست پاڻياڻ جهڙا ۽ صابڻ جي جهڳي جهڙا ٿين ٿا. جيڪي پڪي فرش تي ڪرڻ ڪانپوءِ ڦهلجي ويندا آهن. .

3 قسم: هن قسم جا دست پاڻياڻ جهڙا نه هوندا آهن ۽ نه وري اهي فرش تي ڦهلجي ويندا آهن. ان قسم جي دستن ۾ ڦرن جي هر وقت نظرداري ڪرڻ گهرجي ۽ ترت علاج ڪرائڻ گهرجي. ان صورت ۾ ضروري دوائون جيڪي دستن ۾ استعمال ٿيندڙ هجن اهي هر وقت موجود هجن. ان سان گڏ او آر ايس جو هجڻ تمام ضروري آهي.

چارٽ 10 قرن ۾ دستن جي بيماري

1 . دست 	رتاوان دست دستن ۾ رت ايندو	قر بيهندو، کير پيئندو پر آهستي ۽ کنهن مهل کونہ پيئندو.	اينٽي ڊاريل : 2 وقت او آر ايس2 ليٽر : 2 وقت اينٽي بائيوٽڪ سلفا گروپ 2 وقت اينٽي کوسيديم
		قر بيهي کونہ سگهندو، کير کو نہ پي سگهندو.	اينٽي ڊاريل : 2 وقت او آر ايس2 ليٽر : 3 وقت اينٽي بائيوٽڪ سلفا گروپ 2 وقت اينٽي کوسيديم
2 . دست 	شديد دست ڇڙا پاڻيان وانگر	قر بيهندو کير پيئندو پر آهستي سان کنهن مهل کير کونہ پيئندو.	اينٽي ڊاريل : 2 وقت او آر ايس2 ليٽر اينٽي بائيوٽڪ 2 وقت
		قر بيهي کونہ سگهندو، کير کو نہ پي سگهندو.	اينٽي ڊاريل : 2 وقت او آر ايس2 ليٽر: 2وقت اينٽي بائيوٽڪ 2 وقت
3 . دست 	هلڪا دست ڇيٽو تمام نرم هوندو آهي ۽ خاره ٽيڻ کانپوءِ فرش تي ڇنڊن جي صورت ۾ ڦهلجي ويندو آهي.	قر بيهندو آهستي کير پيئندو کنهن مهل کير کونہ پيئندو.	معدي ۽ آنڊي جي خرابي لاءِ دوا 2 وقت
		قر بيهي کونہ سگهندو کير کو نہ پي سگهندو.	اينٽي ڊاريل : 2 وقت

Appendix T2-4 Manual for Distribution of Calves

Manual for Distribution of Calves

Every farmer welcomes an arrival of new calves to their farms. Especially, children love calves. We, therefore, can easily trust calves to farms. However, environment and conditions of each farms differ in households. It is, thus, not easy to maintain appropriate feeding management for every calves at every household.

1. Appropriate feeding management:

1) Good environment

The place where calves are reared should be well ventilated and have some shady place. The floor should be dry and clean. The farm should have grazing place or paddock where calves can do exercise.

2) Minimize stress caused in the herd

In case calves are tied: When calves are tied, stress caused in the herd is less. The fighting can be occurred during grazing in the beginning. The farmer has to carefully watch them not to harm each other.

In case calves are reared in a paddock: Buffalo is gregarious animal. Once a buffalo join a new herd, they continue fighting each other till hierarchical rank of them are fixed. 3 months age of calves has not enough physical strength and feel stress from transportation from the center to a farm on 1st day. The newly arrived calves, therefore, are recommended to tie for a few days upon arrival of farm or keep in another paddock separately in the beginning. After that, calves are gradually made used to rearing in the herd.

3) Feeding formula feed for young calves

In case calves are tied: Calves should be tied in the place where other buffalo will not come to eat their formula feed. Feed trough of formula feed will be placed near calves so that they can eat calf them at any time. Appropriate length of tying rope will be decided at each farm.

In case calves are reared in a paddock: Calves more than 7 month old in the same paddock should be shifted to other place. Calves of similar age can be fed in the same paddock.

4) Feed plenty of water

Big size water trough is not required since calves take less amount of water. Remaining water in the big size water trough might become unclean water, which is not good for calves.

5) Feeding good grass

See other paper.

2. Implementation of appropriate feeding management

1) Observe the environment and condition of a farm where calves to be distributed carefully.

2) Give technical guidance to a farm and get consensus on the way of feeding management. Explain about appropriate feeding management to a farm. Opinion of a farm should be fully

incorporated in the way of appropriate feeding management. It is important to create good environment for calves as much as possible together with a farm.

3) Make a follow up visit in a few days after the day distribution. Check the outcome of the technical guidance and give further advice, if necessary.

3. Tools and equipment distributed on the day of distribution of calves

Bridle and a rope for leading
Formula feed for young calves
Measuring plastic cup
Feed trough (with septum)
Small water trough

Appendix T2-5 Guideline for Treatment of a Calf

Guideline for treatment of a calf (for calf salvation center)

① Check 1) appetite, 2) vital energy, 3) body temperature, 4) respiration rate, 5) dryness of nasal, 6) nasal mucus, 7) feces condition, 8) hollow on eye orbit, and 9) result of pinching test (Take skin of neck with fingers and twist it into 90 degrees. Then, release fingers to check time for skin to return to original position. When it takes more than 5 seconds, it means a calf is dehydrated.). Check function of heart, lung and digestive organs with a stethoscope. Record diagnosis and observation onto a calf clinical record card. Considering each diagnosis and observation comprehensively and chose appropriate treatment option.

② Check a condition of a calf next day morning after a first diagnosis and chose and decide an option for treatment.

Treatment option 1: A calf is vigorous and has appetite. No fever and bloody feces symptom it has. It shows initial symptom of simple diarrhea.

- Twice in a day
  - Give medication of Anti-diarrhea
  - Give intravenous injection of 1 bottle (500ml) of vitamin added ringer's solution
- Once in a day
  - Give intramuscular injection of anti-biotics

Treatment option 2: No recovery is found after the treatment according to option 1.

- Twice in a day
  - Give medication of anti-diarrhea
  - Give intravenous injection of 2 bottles (500ml x 2) of vitamin added ringer's solution
- Once in a day
  - Give intramuscular injection of anti-biotics

Treatment option 3: No recovery is found after the treatment according to option 2. Symptoms of decrease of vital energy and appetite as well as advanced dehydration are found. Rise or fall of body temperature is found.

- Two to Three times in a day
- Give medication of anti-diarrhea
- Give intravenous injection of 4 bottles (500ml x 4) of vitamin added ringer's solution
- Give intramuscular injection of anti-biotics

Treatment Option 4: High body temperature, diarrhea and respiratory symptom (nasal mucus, high respiratory rate and rough sound in alveolus bronchi) are found with a calf.

- Twice in a day
- Give medication of anti-diarrhea when diarrhea is found
- Give intravenous injection of 2 bottles (500ml x 2) of vitamin added ringer's solution. Dissolve one day dose of anti-biotics for intravenous injection with 500ml of 5% glucose. After that intravenous injection of vitamin added ringer's solution, give intravenous injection of half of one day dose of glucose dissolved anti-biotics.
- For a calf shown high body temperature, give medication of cortisone once in a day. Medication of cortisone should be only up to 2 days. Quantity of cortisone given on 2nd day should be half dose of 1st day.

Note) Do not mix anti-biotics for intravenous injection with ringer's solution. Remaining glucose dissolved anti-biotics must be kept in refrigerator. Warm it up and check no muddiness found before injecting it.

Treatment Option 5: When bloody feces are found in above 4 options, protozoiasis such as coccidium infection can be suspected. Give medication of protozoa sterilizing agent such as sulfa drug along with medication of each option.

2. Note for treatment

1) When anti-biotics is given to a calf, continue giving medication for 3 days to complete full medication cycle even though a calf condition get recovered.

2) Though a calf recovers and gains her appetite, do not relax and give same treatment for additional one day and observe its condition.

3) When give oral medication such as anti-diarrhea or ORS, place a head of a calf slightly upper than the normal position and give little amount of oral medicine little by little for several times to avoid accidental ingestion.

4) Make sure to warm liquid medicine up with warm water to slightly higher temperature than body temperature when given by intravenous injection. Check its temperature by touching liquid with a cheek before injecting it to a calf.

5) To avoid a calf to be treated from infection of disease during treatment, disinfect their skin where syringe to be injected before giving medication. Do not to touch needles, instrument and edge of tubes with hands and other materials.

6) Use syringe and fluid tube as a disposal in principle. Same syringe and fluid tube can be used for a same calf only for treatment done in a same day. After use, wash syringe and fluid tube and sterilized them by boiling for more than 10 minutes. Then those can be reused but only up to 2 times in total.

3. Note for body temperature measurement

1) Use lubrication liquid to help inserting a thermometer into a vent and insert it slowly not to damage vent mucus membrane.

2) Judge measured body temperature according to the table below.

Fahrenheit ° F	Celsius ℃	Judgement of condition of a calf
Less than 99	37.2	Excessively low body temperature, serious case
100	37.8	Low body temperature, under observation
101 - 103	38.3 39.4	Normal body temperature

104	39.7	High body temperature, under observation
More than 105	40.0	Excessively high body temperature, serious case

Note) Measure body temperature once again when a measured body temperature shows abnormal one, i.e. below 100 or more than 104 F.

Appendix Z2-1 Results of Interview at Microfinance Banks

Results of interview at microfinance banks

The overview of 4 microfinance banks in Tando Allahyar visited by the project are as follows;

	The First Microfinance Bank Ltd.	Pak-Oman Microfinance Bank Ltd.	National Rural Support Program Bank	Tameer Microfinance Bank
Number of total loan borrowers	1,425	1,200 （730 was default borrowers due to floods.）	1,700	1,040
Number of livestock loan borrowers	1,125 default borrowers	150（50 are borrowers of dairy loan programme and 100 are borrowers of livestock trading programme）	300 （All borrowers are of fattening programme）	258（250 borrowers are of loan scheme up to 100,000 Rs. 8 borrowers are of loan scheme up to 500,000 Rs.）
Livestock loan products	Currently suspended	Dairy programme and livestock trading programme (fattening programme is suspended)	Dairy programme and Fattening programme	Dairy business (small scale) and Dairy business (middle scale) programme
Livestock loan amount	Ditto	10,000 – 80,000 Rs	30,000 – 150,000 Rs	10,000 – 500,000 Rs.
Loan duration	Ditto	1 year	6 months to 1 year	1 year to 2 years
Markup rate	Ditto	23.5%	20 – 28%	23%
Repayment term	Ditto	Monthly / 6 months / 1year	Monthly for dairy programme Lump-sum payment for fattening proramme	Monthly

Issues	The livestock loan has been suspended till non-performing loan due to the floods in 2010 is recovered.	It is difficult to purchase good dairy animals with Maximum loan amount the bank currently offers, i.e. 80,000 Rs. The maximum loan amount should be raise up to 100,000 to 150,000 Rs according to the branch manager.	・The dairy programme are not feasible both for customers and the bank since milk market is not fully developed in the area. ・40% of loan are used for the other purpose than the original one. ・Some farmers do not keep animals for growing but just trading them within a short time, which is not accord with original objective of fattening programme. ・The price of meat animal is not stable.	・Farmers have to own animals as guarantees to apply middle scale programme. ・Livestock insurance scheme is available but only for those animals for guarantees. ・Free vaccination service is available but only for those animals for guarantees, which is not effective from the view point of prevention of infectious disease of herd.

All the bank the project visited provides livestock loan products, which shows the banks recognize demands of such type of loans. Their products can be categorized into 3 types, namely 1) loan program to purchase dairy animals and return with monthly repayment from milk sales profit, 2) loan program to trade livestock and return with rump sum repayment, and 3) loan program to purchase animals for fattening purpose and return with lump sum repayment. It is not clear what kinds of animals are purchased by the customers with programme 2) and 3). One possible example is a case that a customer purchases animals for Eid-ul-Azha. A customer will grow it and will sell it before Eid-ul-Azha. During Eid-ul-Azha, animals are traded with comparatively higher price. A customer, therefore, can secure profits easily compared to normal animal training. The preferable animals for Eid-ul-Azha are cattle, male goats and female goats in order. Investment and time for growing required for goats are less than cattle. It is, therefore, easy even for small scale farmers to collect profits from investments. Goats, therefore, can be regarded as animals which can expect profits in one year loan. There are more customers of 2) and 3) programme compared to 1) dairy programme.

Dairy programme is designed to return its repayment with income from milk sales. It is, therefore, difficult to apply those scheme unless a customer is sure to secure enough income from milk sales. It is also same for the fattening progarmme.

Calves distributed by the project is supposed to be brought up as a dairy animals. They are distributed at the age of 3 months and 3 to 4 years are required for them to grow up to milking animals. The current loan scheme available with the banks are, therefore, not applicable to the project unless a customer secure another source of income for repayment.

As shown in the case of First Microfinance Bank, there is a risk of loss of animals due to disease, natural disasters and so on. There is no livestock insurance is available with 3 banks expect Tameer Microfinance Bank whereas life insurance of a borrower is mandatory. National Rural Support Program Bank is considering development of livestock insurance scheme. Livestock insurance available with Tameer Bank is for the animals for guarantee with 2.5% insurance premium. They are not applicable to animals to be purchased with loan money. Their insurance scheme, therefore, is similar to a life insurance scheme for a borrower.

It seems current livestock loans are not fully utilized for the following factors, 1) there is no risk hedge of loss of livestock due to natural disaster and disease, 2) market for milk and meat in the area are not fully developed and prices are not stable. These factors increases a risk of repayment both for a customer and a bank.

Being the situation, it is early for the project to suggest any collaboration plan with microfinance institutions. The project will continue grasping the situation through interview with other microfinance institutions and existing customers.

Appendix Z2-2 Report on the Current Situation of Livestock Microfinance in Sindh

Report on the Current Situation of Livestock Microfinance in Sindh

1. Introduction

It is estimated that approximately 20,000 heads of buffalo calves are born annually at the cattle colony in Hyderabad district of Sindh province. Among them, it is said that 100% of male calves and 55% of female calves are slaughtered within 1 week after their birth. Partly because some farmers do not have enough spaces for rearing calves and partly because it is not profitable and they cannot bear rearing costs of calves. The project on sustainable livestock development for rural Sindh (the project) is trying to develop a system for utilizing those precious livestock resources.

The project established 'the calf salvation experimental center' in the first year. Female buffalo calves are brought to the center right after their birth. They are raised up to 90 days of age at the center. This rearing model is under experiment by the project. The 90 days of age calves are distributed to ordinary farms whom contracted to raise them for 3 years. Under this contract, the project entrusts 2 heads of calves to a farmer for bringing them up to adult buffalo. Once 3 years' contract is completed, farmers are supposed to keep one head with them as their own property and to return the other to the project.

The livestock sharing is common practice in the project area. Caretakers of sharing animals are mostly tenant farmers and daily wage agriculture workers who do not have financial resources to purchase their own animals but do have surplus labor force. The condition of sharing practice varies in regions and individual owners. Most common type of livestock sharing is that a caretaker keeps animals for some certain periods of time and receives their share in profits at the time of completion of the sharing contract. Caretakers receive cash as remuneration however they hardly increase their number of own animals through livestock sharing. The project employs the traditional livestock sharing system with slight modification and makes trial use of it for calf salvation activities aiming to provide opportunities for small scale farmers to increase their own animal assets. The trial sharing model that the project is applying is the one which enables farmers to own one head of buffalo without paying monetary resources but paying by their labor force.

The project aims not only for utilizing wasted livestock resources but also for increasing animal assets of small scale farmers. The project currently applies the livestock sharing system for distribution of calves. Once calf rearing model is established and disseminated to other governmental departments, private firms, commercial farms and NGOs, calves might be priced and sold on commercial basis. In such cases, a microfinance loan might become one of financial resource for dairy farmers. The project, therefore, decided to survey microfinance products available in the project area to examine if a microfinance loan can be an option for dairy farmers or not. The project conducted desk researches and interview with concerned organizations and individuals. This report complies survey results.

2. Overview of livestock related microfinance in Pakistan

The State Bank of Pakistan (SBP) formulated 'Guidelines for Livestock Financing' in 2006 and started promoting loans to the livestock sector in the country[1]. The loan to the livestock sector was only Rs. 6.8 billion in 2005. In 2008, SPB formulated 'Financing Scheme for Small Farmers', in which group loans for those who does not have collateral, working capital loan and promotion of application of insurance were highlighted. In 2014 SBP formulated 'Value Chain Contract Farmer Financing'. This scheme aims at expanding outreach of loan services to small scale farmers through traditional value chain while absorbing risks of default and market risk of agricultural products in this traditional value chain. The scheme ultimately aims to increase agricultural production through expanding loans services to more number of small scale farmers. In March 2015[2], 'Credit Guarantee Scheme' was approved and taken into force in January 2016[3]. This scheme is further promoting loans for small and even marginal farmers. SBP is supposed to bear 50% of default risks under this scheme and allocated the budget of Rs. 50 billion[4]. The target group are farmers of tenant farmers who cultivate less than 5 acres in the irrigated land or 10 acres in the rainfed land and who do not have collateral. The maximum loan amount is Rs. 100,000 and loan term is 1 to 1 and half years with consideration to crop cycle.

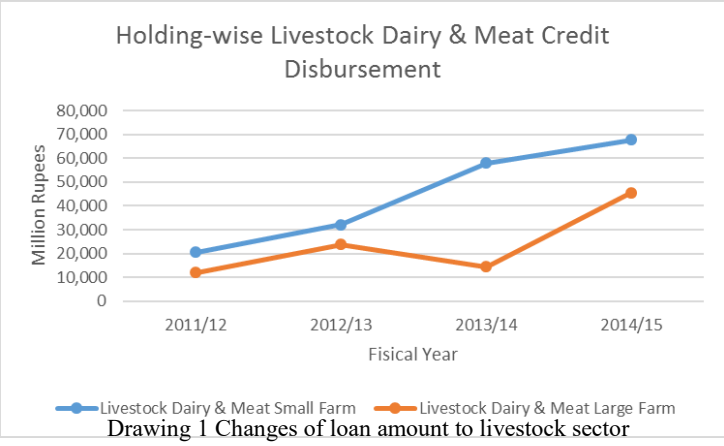
Table 1 List of livestock financing scheme by SBP

Year	Name of Scheme	Outline
2006	Guideline for Livestock Financing	Guideline for promoting development of livestock loan products
2008	Financing Scheme for Small Farmers	Guideline for group loans without collateral. The upper loan limit is 200,000 PKR. The guideline promotes introduction of insurance.
2014	Value Chain Contract Farmer Financing	The scheme aims for expanding outreach of loan services to small scale farmers who does not have collateral through traditional value chain. The scheme aims at reducing default risks and promoting loan services.
2016	Credit Guarantee Scheme for Small and Marginalized Farmers	SBP guarantees default risks under this scheme so that loan service for small scale farmers is further promoted.

Source: Compiled by the author based on various SBP documents.

[1] http://www.dawn.com/news/207901/guidelines-for-livestock-loan, http://www.sbp.org.pk/press/2006/Guidelines-Livestock-28-Aug-06.pdf
[2] http://nation.com.pk/business/18-Mar-2015/credit-guarantee-scheme-for-small-farmers-approved
[3] http://www.brecorder.com/top-stories/0:/2806:small-marginalized-farmers-credit-guarantee-launched/?date=2016-01-08
[4] http://nation.com.pk/business/18-Mar-2015/credit-guarantee-scheme-for-small-farmers-approved

The above SBP efforts might lead to the steady growth of loan amounts for the country's livestock sector. The loan amount to the livestock sector in 2012/12 was approximately Rs. 32.7 billion whereas those of 2014/15 was Rs. 113.4 billion. The growth is nearly 4 times (Drawing 1).



Drawing 1 Changes of loan amount to livestock sector

Source: Compiled by the author based on 'SBP Annual Report-Statistical Supplement FY15'

The SBP data[5] (Table 2) shows that loan target achievement rates of microfinance bank are comparatively higher than those of the other category banks. The total loan amount itself is merely 1/20 of those commercial banks. Nevertheless, the high target achievement in the agricultural loan of microfinance banks shows their important roles in the agricultural loan[6].

Table 2 Comparison of agricultural loan disbursement between 2013/14 and 2014/15 (for 11 months)

	Target Loan Amount (million Rs)		Actual Loan Disbursement (million Rs)		Achievement rate (%)	
Type of Bank	2013-14	2014-15	2013-14	2014-15	2013-14	2014-15
Commercial Bank	357,900	469,550	314,518.842	407,224.989	87.88	86.73
Microfinance Bank	21,600	28,160	19,626.083	27,822.109	90.86	98.80
Islamic Bank	532	2,290	523.943	4,707.046	98.49	205.55

Source: Compiled by the author based on the documents mentioned in the footnote 5.

3. Overview of Livestock Microfinance in Sindh

The agricultural loan amount in Pakistan has been showing remarkable growth since 2011/12 till 2014/15. The actual loan disbursement exceeds targets set by SBP for 4 consecutive years[7]. The actual loan disbursement of year 2014/15 was Rs. 515.9 billion, which exceeded the SBP target of Rs. 500 billion. According to the bank officer of SBP Hyderabad branch, Sindh province could not achieve SBP target while Punjab province recorded good progress[8] (Table 3). The hindering factors the officers pointed out were 1) Banks were reluctant to release loan, and 2) Land registration records of the revenue department were not computerized. Further, Sindh province were not only able to achieve their target but also repayment rate was low. The low repayment is assumed to be one of reasons why banks are reluctant to release loan. Since microfinance loan does not require collateral land,

[5] SBP internal documents 'Agricultural Credit & Microfinance Department, Target, Disbursement, Recoveries & Outstanding during July, 2014 – May 2015 (2014-15) 11 months analysis'
[6] The data is of agricultural loans. The share of livestock loans in this agricultural loans are not clear.
[7] http://www.thenews.com.pk/print/52754-banks-surpass-agri-credit-target-disburse-rs515bln
[8] Information is based on the interview took place in July 2015.

issue of computerization of land registration cannot be the hindering factor for releasing loans for the case of microfinance. To cope with these situations in Sindh, SBP officers are joining bank officers who organizes financial awareness campaign.

Table 3 Comparison of loan disbursement of 5 main banks in provinces (2013/4 and 2014/5)[9]

Name of Province	Target 2013/14 (million Rs)	Actual loan 2013/14 (11months) (million Rs)	Achievement	Target 2014/15 (million Rs)	Actual loan 2014/15 (11months) (million Rs)	Achievement
Punjab	294,698	287,997.842	97.7%	389,999	369,928.363	94.8%
Sindh	55,042	37,056.820	67.3%	70,057	59,673.377	85.2%
KPK	21,297	8,337.225	39.1%	29,980	8,729.357	29.1%
Balochistan	5,660	338.659	5.9%	7,518	380.534	5.1%
AJK	2,010	646.607	32.1%	1,223	612.557	50.1%
GB	1,325	291.715	22%	1,223	429.956	35.2%
Total	380,032	334,668.868	88%	500,000	439,754.144	88%

Source Compiled by the author based on the internal documents of SBP

4. Overview of Livestock Microfinance in the Project area

The 5 districts covered by the project are located in the Southern Sindh province. They are Hyderabad, Matiari, Tando Mohammad Khan, Tando Allahyar and Badin district. The survey selected Tando Allahyar district as a target district for interview. Both microfinance institutions and microfinance users in the district were interviewed.

4.1 Interview with Microfinance Institutions

(1) Overview of interview

Pakistan formulated 'Microfinance Institution Ordinance 2001' in 2001. The microfinance institutions in the country can be largely categorized into those who are regulated by this ordinance, i.e. microfinance specialized bank and those who are not, i.e. non-bank microfinance institutions. The latter is further categorized into microfinance specialized institutions and Rural Support Program. The microfinance specialized bank can do all banking business including deposit whereas the non-bank microfinance institutions cannot operate deposit functions. As of 2014, microfinance specialized banks hold 40% share of loan users, microfinance specialized institutions hold 31 and Rural Support Program hold 27%[10] share, respectively.

Microfinance specialized banks of Tando Allahyar branches were interviewed in the first place. Following interview at Tando Allahyar, microfinance specialized institutions and Rural Support Program were interviewed.

[9] The loan includes all agricultural loan. Loan allocated to livestock sector are not known.
[10] Pakistan Microfinance Network 'Pakistan Microfinance Review 2014'

Since most of them hold their main office in Hyderabad, the interviews were made in Hyderabad. Some of microfinance specialized institutions and Rural Support Program do not extend their services in the project area. Nevertheless, the information was collected for the purpose of comparing the content of livestock loan products. The name of banks and institutions interviewed are listed in the table below.

Microfinance Specialized Bank		
1	First Micro Finance Bank	Tando Allahyar Branch
2	NRSP Bank	Ditto
3	Pak Oman Micro Finance Bank	Ditto
4	Tameer Microfinance Bank	Ditto
5	APNA Microfinance Bank	Ditto
6	FINCA Microfinance Bank	Ditto
7	Khushhari Bank	Badin Branch[11]
Microfinance Specialized Institutions		
1	Safco Support Foundation	Hyderabad Head Office
Rural Support Programme		
1	National Rural Support Programme	Hyderabad Office
2	Al Mehran Rural Development Organization	Ditto
3	Community Initiative for Development Pakistan	Ditto

(2) Overview of the livestock loan products

All the microfinance institutions interviewed provide livestock loan products to their customers. Since the livestock sector is one of the main source of income in the target area, every institution place importance on livestock loans. They see the livestock loan is one of the prominent products for future growth.

The livestock loan products provided by microfinance institutions are listed in the table 4.

[11] Khushhari Bank has branch in Tando Allahyar, where the author could not obtain enough information. The interview, therefore, organized in Badin branch to collect sufficient information.

Table 4 List of Livestock loan of Microfinance Specialized Bank

	The First Microfinance Bank Ltd.	Pak-Oman Microfinance Bank Ltd.	National Rural Support Program Bank	Tameer Microfinance Bank	APNA Microfinance Bank	FINCA Microfinance Bank	Khushhali Bank[12]
No. of Total Customers	1,425	1,200 (730 are defaulters due to floods)	1,700	1,040	2,000	350	2,700
No. of Livestock Loan Customers	1,125 defaulters	150 (50 are milking program, 100 are livestock trading program)	300 (All loans are under fattening program)	258 (250 are loan of 100,000PKR limit, 8 are for loan of 500,000 PKR limit)	500	20	1,100
Type of Livestock Loan	Currently suspended	Milking program and Livestock trading program (Fattening program is currently suspended.)	Milking program and Fattening program	Dairy business (small scale), Dairy business (middle scale) program	Milking assets (small scale) Milking assets/ Livestock business (middle scale)	Milking program	Livestock program
Loan Amount	Ditto	Rs. 10,000 – 80,000	Rs. 30,000 – 150,000	Rs. 10,000 – 100,000. Rs. 100,000-500,000.	Maximum Rs. 150,000 – 500,000.	Rs. 35,000 – 150,000.	Rs. 50,000 – 150,000.
Loan Term	Ditto	1 year	6 months -1 year	1year -2 years	1 year	6 months, 1 year, 1.5 year	3 months – 1 year
Mark-up rate (Annual)	Ditto	23.5%	20 – 28%	23%	19 – 24%	28%	30%
Repayment Term	Ditto	Monthly, 6 months, 1 year	Monthly for milking program Bullet repayment	Monthly	Monthly (Running finance 11 month mark-up	Monthly	Monthly, 3 months, 6 months and bullet

[12] Since enough information could not be collected from Tando Allahyar branch, additional information was collected from Badin branch. The number of customers and loan borrowers mentioned here is of Badin branch.

	The First Microfinance Bank Ltd.	Pak-Oman Microfinance Bank Ltd.	National Rural Support Program Bank	Tameer Microfinance Bank	APNA Microfinance Bank	FINCA Microfinance Bank	Khushhali Bank[12]
			for fattening program		repayment and 12th month mark-up and capital or 12 months repayment including mark-up		
Grace Period	Ditto	NIL	NIL	NIL	Running Finance	NIL	NIL
Remarks	• Most of disbursed loans became default due to the floods occurred in August 2010. Livestock loans are suspended till all the default cases are cleared.	• Maximum loan limit is Rs. 80,000 which is difficult to purchase good quality milking buffalo. Maximum loan amount should be increased up to Rs. 100,000 to 150,000 according to the branch manager.	• Milk market is not fully developed in the area. The milking scheme, therefore not fully functional. • 40% of loan are used for other purpose than the original plan. • There are several cases a loan user simply trade livestock in short period but not spend time for fattening. • The price of meat is not stable.	• Owing existing animals as a collateral is the condition for a loan for more than Rs. 50,000. • The bank has livestock insurance scheme but insurance covers collateral animals only. • The bank has free vaccination service but covers only collateral animal. The effectiveness of vaccination is questionable.	• The bank has livestock insurance scheme which insures animals purchased by a loan. In case purchased animals die, money for replacing those animals are to be paid from an insurance. • Insurance premium is Rs. 5,000 – 15,000. • Main loan target is for replacing dry animals to milking animals	• The branch was newly opened in 2015.	• When sales agreement is almost concluded, both buyer and seller go to a bank and make sales agreement in front of a bank officer. Veterinary doctor carries out medical check of those animals. • Livestock insurance is covered with free of cost. 80% of loan will be borne by an insurance company whereas 20% is

	The First Microfinance Bank Ltd.	Pak-Oman Microfinance Bank Ltd.	National Rural Support Program Bank	Tameer Microfinance Bank	APNA Microfinance Bank	FINCA Microfinance Bank	Khushhali Bank[12]
							a borrower's share. ・ If repayment is significantly delayed, animals will be seized.

The summary of the livestock loan products are as follows;

Usage of loans: Usage of loans set by the microfinance institutions can be categorized into 1) to purchase milking animals, 2) to purchase goats for Eid-ul-Azha (sacrifice), 3) to purchase animals for any other purposes.

Loan amount: The maximum loan amount set by the microfinance institutions are within the range of Rs. 80,000 to 150,000. The most institutions set their maximum loan limit as Rs. 150,000. The current market price of milking buffalo is around Rs. 130,000. It is assumed that maximum loan amount is set based on this figure, which allows a farmer to purchase one milking buffalo[13].

Mark-up rate: The mark-up rate varies in institutions with the range between 19 to 30 % per year. The 20 to 30 % range of annual mark-up rate is common.

Lending term and repayment method: Longest lending term is 2 years of Tameer Microfinance Bank followed by 1.5 years of FINCA Microfinance Bank. The other banks' maximum lending term is 1 year. The repayment term is either monthly, quarterly, 6 months or bullet. The APNA Bank has the scheme called 'running scheme'. In this scheme, borrowers repay only their mark-up in initial 11 months. On the 12th month, borrowers repay rest of amount including principal amount. The other banks do not offer any grace period.

Livestock insurance: Three institutions including Tameer Microfinance Bank, APNA Microfinance Bank and Khushhali Bank offer livestock insurance scheme to borrowers. The livestock insurance of Tameer Microfinance Bank covers a borrower's existing own animal which is regarded as a collateral of a loan. Those of APNA Microfinance Bank and Khushhali Bank cover animals purchased by loans. The livestock insurance of Khushhali Bank is free of charge.

Non-performing loan: First Microfinance Bank has been suspended their livestock loan. They have non-performing livestock loan cases due to the floods occurred in August 2010. They have still not recovered all those non-performing livestock loan. The livestock loan scheme has been suspended till they recover those non-performing livestock loan. The Pak-Oman Microfinance Bank has 700 non-performing livestock loan cases due to the same reason. Other than the non-performing loan due to floods, repayment rate of loans is nearly 100% and there are no issues of non-performing loans according to all institutions.

Others: Tameer Microfinance Bank employs a private veterinarian and provides free vaccination services to their borrowers. However, they provide vaccination services only those of collateral animals.

There are many microfinance institutions in Tando Allahyar and competition is high. Loan products offered by each institution are slightly different. It is not sure that each of their features are influencing

[13] The maximum loan amount of Pak-Oman Microfinance Bank is 80,000 PKR. The branch manager is of the view that the maximum amount should be increased.

borrowers to choose products. The Khushhali[14] bank provides the loan products with high risk hedge. The bank makes a veterinarian doctor check individual animals to be purchased by a loan prior to making a loan agreement and provides a livestock insurance with free of charges, which work as a risk hedge for the bank. The mark-up rate of the Khushhali bank is highest but number of customers are also high.

According to the SBP Hyderabad branch, repayment rate of agricultural loans in Sindh is comparatively low. Every microfinance institution interviewed in the survey, however, replied that repayment rate was nearly 100%.

Following the loan products of microfinance banks, the livestock loan products of Non-bank microfinance institutions and rural support program were listed in the table 5. There is little difference in their loan purposes, loan amounts, mark-up rate as well as repayment terms between microfinance banks and Non-bank microfinance institutions[15]. The notable differences are 1) Group loan is the principle loan term for Non-bank microfinance institutions, and 2) The loan products of Non-bank microfinance institutions are designed according to the needs of different economic strata of rural society, including grant money, interest free loans, group loans a loan with mark-up. Besides, the lending program is designed in such a way to allow borrowers step up their lending term from grant to a loan with mark-up gradually.

[14] Khushhali Bank was established in 2000 as a part of poverty alleviation programme of Government of Pakistan. They hold biggest customer share of microfinance as of 2012.

[15] The maximum loan amount of NRSP is comparatively low since they differentiate and share the category of customer with NRSP microfinance bank. The NRSP serves economically lower strata of groups whereas NRSP microfinance banks serves rather upper strata of group.

Table 5 List of Livestock Loan Products of Microfinance Institutions and Rural Support Programme

	SAFWCO Support Foundation	National Rural Support Program	Al Mehran Rural Development Organization	Community Initiative for Development in Pakistan
No. of Total Customers	57,000	34,000	12,000	No active microfinance program right now
No. of Livestock Loan Customers	Approximately 50% of total loan customers	Approximately 20% of total loan customer	30,000	Ditto
Type of Livestock Loan	Milking program, Eid-ul-Azhar goat program, Goat fattening program	Agricultural and livestock business	Livestock business	Ditto
Loan Amount	Rs. 5,000 – 120,000.	Rs. 25,000 – 75,000.	Rs. 5,000 – 300,000.	Ditto
Loan Term	6 months, 1 year, 1.5 year	1 year	Unknown	Ditto
Mark-up rate (Annual)	22%	28%	20 %	Ditto
Repayment Term	Monthly, Quarterly, 6 months, Bullet	Monthly, Bullet	Monthly	Unknown
Grace Period	NIL	NIL	NIL	NIL
Remarks	・A loan is extended to a group of 3 to 7 members in principle. Only those who complete graduation program are eligible for individual loans.	・Individual loan ・Loan borrowers and their spouse are entitled to buy health insurance with Rs. 100. ・Districts covered: Hyderabad, Matiari, Tando	・A loan is extended to a group of 3 to 7 members in principle. ・District covered: Hyderabad, Matiari, Tando	・Interest-free loan program for purchasing goats was implemented in Tando Allahyar from September to December 2011 as a part of flood rehabilitation program.

	SAFWCO Support Foundation	National Rural Support Program	Al Mehran Rural Development Organization	Community Initiative for Development in Pakistan
	・Districts covered: Hyderabad, Matiari, Sangar, Thatta, Benazirabad ・Interest free loan (Prime Minister Interest Free Loan) is provided to those whose poverty score is below 40. ・Demands for a loan is high. The shortage of loan fund is the issue for SAFWCO Support Foundation.	Muhammad Khan, Tando Allahyar, Badin, Mirpur Khaas, Umerkot, Thatta, Sajiwar ・Cash grant for purchasing animals are extended to those whose poverty score is below 23 (Badin and Mirpur Khaas district). ・Microfinance program operated by communities themselves extend interest free loans services to their community members. ・NRSP and NRSP microfinance banks differentiate their target groups to avoid overlapping and competition among themselves.	Allahyar, Badin, Thatta, Sajiwar, Benazirabad ・They are not expecting repayments from milk sales profit of a borrower even they extend a loan for purchasing milking animals. Repayment capacities are assessed by overall cash flow of a household including other incomes. ・They once extended a loan for dry buffaloes in cattle colonies. They found conception rates of those buffaloes are low. Therefore, no plan of loans to dry buffaloes in cattle colonies are considered.	100 heads of goats were distributed. ・Interest free loan for purchasing goats for Eid-ul-Azhar was implemented in Tando Allahyar. Funds were provided by OPP-RTI. Loans were extended to 200 borrowers. Loan period was 9 months. Loan amount range was Rs. 10,000 to 20,000. ・They facilitated formation of 2 women group in Tando Allahyar. One women leader plays a role of a middle man. She buys milk from 30 members and sells to Engro chiller. Rs. 10 per liter is her commission.

(3) Issues of current livestock loan products

1) Income cash flow of small scale livestock farmers

NRSP microfinance bank is suspending their loan scheme for purchasing milking animals. The reason is that repayment risks are high. The milk market in the area have not been fully developed, thus, farmers cannot expect stable income from milk sales, according to them. The unstable meat price is one of hindering factors for livestock loan, they added. The same statement was not heard from the other banks, however Al Mehran Rural Development Organization mentioned that they were not expecting repayments from profit of milk sales. Rather, they see repayment capacity of those households from overall cash flow of households including other incomes. Al Mehran Rural Development Organization's statement, somehow, corresponds with NRSP microfinance bank's statement.

Suppose a loan borrower borrows Rs. 100,000 for a 1-year period to purchase a milking animal. If an annual mark-up rate is 20% and repayment term is monthly, a borrower has to repay Rs. 10,000 every month[16]. When milk price is presumed as Rs. 80 per liter, s/he has to make a profit of more than Rs. 336 per day from average daily sale of 4.2 liters' volume of milk or 125 liters per month. NRSP microfinance bank officials did not discuss the issue based on the actual figures of production cost and sales price. The actual profit that their customers are earning, therefore, are not known. However, the unstable milk sales price implies unstable profit margin. It can be assumed that NRSP microfinance suspended their loan scheme since it was difficult for small farmers to make more than Rs. 336 profits per day from milk sales.

According to the periodical farm survey conducted in the master plan project prior to the project, the annual net profits of small and middle scale farmers are within the range of – Rs. 27,271 to + Rs. 4,385. These figures are far from reaching total repayment amount of Rs. 120,000 in the above case. The household survey in the master plan explained if a famer could produce more than 10 liters per day, a farmer could start selling milk. Those who can produce more than 10 liters per day fall under the category of middle or large scale farmers who rear more than 5 heads of animals (supposing half of them are milking animals) according to the household survey. Small scale farmers are, therefore, difficult to produce more than 10 liters per day. Further, the master plan made simulation of several patterns of milk sales by small scale farmers. It was concluded that even the milk productivities were improved by feeding management and genetic improvement, it was difficult for small scale farmers to earn enough profit from milk sales unless milk selling price in a market was improved. The one of big issues was reginal difference of wholesale milk price, the master plan project concluded. This

[16] Total amount of loan capital 100,000 plus 20,000 of 20% mark-up rate is 120,000 PRK. If repayment term is monthly for a year, monthly repayment amount is 10,000 PRK.

conclusion corresponds with the statement of NRSP microfinance bank. It can be also emphasized an importance of marketing of milk along with improvement of productivities from this context.
If a farmer can secure more than Rs. 336 profit per day, they can, theoretically, repay his/her loan. However, those farmers tend to be middle or large scale farmers, but not small scale farmers. It is more difficult for those farmers who reside in rural area where wholesale milk price is comparatively low to repay. It is, therefore, difficult to expect milk sales profit as a source of repayment. There are less chances for small scale farmers to avail loan facilities unless they have other regular sources of income. SBP is trying to expand loan services to small scale farmers. However, there are still hurdles for that, in case of small scale farmers.

2) Technical services

Some microfinance banks contract with private veterinary doctors. These doctors provide services such as medical checks of collateral animals or newly purchased animals with loans and vaccination of those animals. Their services are limited to animal health. No other technical services to increase milk productivities or profitability of farms including feeding management, reproductive diagnosis and treatment and farm management, which are much needed for small scale farmers to increase their income and profit from their livestock. There are no institutions who can provide such technical services to farmers. It is desirable that such services will be delivered to farmers by government veterinary officers, extension workers as well as private veterinary technicians, who have trained by the project, in collaboration with provision of livestock loans.

3) Loan grace period

Among microfinance banks and institutions interviewed by this survey, only APNA microfinance bank has a loan scheme with grace period. A loan borrower is to repay only mark-up rate amount in initial 11 months and the rest including capital amount is to be paid in 12th month. The scheme is called as 'running finance'. It is difficult to estimate a timing when a farmer receive income from livestock like as a case of agricultural crops[17]. It needs a long period till farmers start receiving income from livestock, too, which makes banks difficult to set grace period for livestock loans like as agricultural crop loan. Nevertheless, some livestock farmers are engaged with agricultural farming at the same time. It might be possible for microfinance banks and institutions to develop loan products which allow such farmers to repay at the time of harvesting of agricultural crops with some grace period.

4.2 Some examples of microfinance users in the project area

(1) Overview of interview

[17] As for fattening for Eid-ul-Azhar, time for sale of animals is somehow fixed. The loan for fattening goats of Eid-ul-Azhar is designed as a bullet repayment of 6 months loan. Fattening for Eid-ul-Azhar can produce enough profits and suitable for loan.

A few microfinance loan users from banks and institutions interviewed in the section 3 were picked up and interviewed. The interviewees were introduced by those banks and institutions. They were the loan users of APNA Microfinance Bank, FINCA Microfinance Bank and SAFWCO Support Foundation. One from APNA Microfinance Bank in Tando Allahyar, two from FINCA Microfinance Bank in Tando Allahyar and One from SAFWCO Support Foundation in Matiari. Total 4 users were interviewed. The interview results were mentioned in the table 6.

(2) Cases of interviewed microfinance users

Mr. Mollah Bux (27 years old, male): Mr. Mollah Bux runs his commercial dairy farm with his family in Tando Allahyar. He rears 75 heads of animals including buffaloes and cows. He sells 360 kg of milk at the rate of Rs. 70 per kg to the contracted shop. For the first time, he borrowed Rs. 500,000 from APNA microfinance bank. He purchased 3 heads of milking buffaloes and paid to the animal trader. At the same time, he bought additional 3 heads of milking buffaloes on credit. He will pay for additional 3 heads of milking buffaloes later on, which has been usual practices for him. He often buys his animals on credit from animal traders. He used a loan service of the microfinance bank to compromise the loan officer's repeated sales approach. He feels difficulties to repay every month. He has decided not to use microfinance loans anymore.

Ms. Hameeda (45 years old, female): She is a widow and works as a lady health worker. She has 3 sons. Out of them, 2 are employed and earning their salaries. She owns 8 animals including 3 of milking buffaloes, 2 of heifer buffaloes, 1 young male buffalo, 1 young male cattle and 1 buffalo calf. Income from milk sales is the biggest source of income for her household. She sells 23 kg of milk per day. Sales price is Rs. 80 and Rs. 90 to different places. This is the second time for her to borrow a loan from a microfinance bank. She borrowed Rs. 50,000 with the first loan and purchased 2 heads of heifer buffaloes. This time she spent her loan for gaining ownership of her shared-in milking buffalo from the owner. She paid Rs. 35,000 to the owner for her share.

Ms. Shamshad (58 years old, female): She is a widow and earns her living by milk sales and handicraft sales. She owns 8 animals including 2 heads of milking buffaloes, 1 dry buffalo, 1 heifer buffalo, 1 young male buffalo and 2 buffalo calves. She sells 15 kg of milk daily to her neighbors at the rate of Rs. 100 per kg. This is third loan from a microfinance bank for her. She borrows Rs. 120,000 and spent for purchasing milking buffalo. She asked her neighbors where she could borrow money. Her neighbor introduced her about microfinance banks.

Ms. Dadli (35 years old, female): She borrows Rs. 30,000 from SAFWCO Support Program in Matiari. Besides, she borrows Rs. 120,000 from Khushhali bank. She owns 10 animals including 3 milking

buffaloes, 2 dry buffaloes, 3 heifer buffaloes and 2 young male buffaloes. Income from milk sales is the biggest source of income for her household. She sells 27.5 kg per day at the rate of Rs. 70 per kg. Her loan is a group loan. This is fourth loan for her. The first loan was used for purchasing a goat. The second loan was for purchasing a donkey cart. She purchased heifer buffaloes with her third and fourth loans. She wishes banks increase upper limit of loan amounts.

All the loan users introduced by the microfinance banks and institutions for the interview were middle scale farmers or large scale farmers who owns more than 6 heads of animals. Except Mr. Mollah Bux, the loan users own 2 to 3 milking animals. Their volume of milk production was large enough and the milk selling prices were comparatively higher, too. Milk sales profit of all farms exceeds Rs. 336, which discussed in the previous section as minimum profit required to repay Rs. 10,000 per month. 2 farmers out of 4 have other regular sources of income than milk sales. They have a piece of their own land where they can cultivate fodder, as well. With these favorable conditions, they utilized microfinance loans several times and steadily increased their animal assets.

Mr. Mollah Bux, commercial large scale farmer, has access to informal credits by animal traders. He still avails these means. For him, microfinance loans seem to be not flexible as informal credits he has been familiar with. On the other hand, female dairy farmers hardly have access to such informal loans as Mr. Mollah Bux. For these female dairy farmers, microfinance loans seem to provide good source of capital to increase animal assets of their households.

When the interviewees asked if they felt mark-up rate was high or not, most of them replied as high. Nevertheless, they seem not to pay so much attention to mark-up rate. Rather, their concern is on the monthly repayment amount, i.e. if they can repay those amounts easily or not.

Table 6 Microfinance users and their loans

	1	2	3	4
Microfinance banks & institutions	APNA Microfinance Bank (Tando Allahyar)	FINCA Microfinance Bank (Tando Allahyar)	FINCA Microfinance Bank (Tando Allahyar)	SAFWCO Support Foundation (Matiari)
Age	27 years old	45 years old	58 years old	35 years old
Occupation	Commercial dairy farmer	Lady Health Worker	Dairy farmer	Dairy farmer (with the other source of income from her family members)
No. of animals owned	75 heads	8 heads	8 heads	10 heads
Milk production	360 Kg	26 Kg	28 Kg	30 Kg
Milk sales volume	360 Kg	23 Kg	15 Kg	27.5 Kg
Milk selling price	Rs. 70	Rs. 80 – 90	Rs. 100	Rs. 70
Loan amount	Rs. 500,000.	Rs 50,000.	Rs 120,000.	Rs 30,000.
Mark-up rate	Monthly 2% (Annual 24%)	Annual 30%	Annual 28%	Annual 20%
Purpose of loan	To purchase milking buffaloes	To gain ownership of her shared-in buffalo, milking and 9 months after her parturition	To purchase milking buffaloes	To purchase heifer buffalo
Repayment term	Mark-up amounts are repaid during initial 11 months.	She repays Rs. 5,417 every month for 12 months.	She repays Rs. 10,500 every month for 15 months.	She repays Rs. 3,000 every month for 12 months.

	1	2	3	4
	Remaining Rs. 510,000 is to be paid back in 12th month.			
Beginning of using loan services	He started using microfinance loan services to compromise the loan officer's repeated sales approach.	She had been having interest in microfinance banks she found on the way to her offices. Her friends introduced some of them to her and she started to utilize loan services.	She needed funds for purchasing milking animals. She requested her villagers to introduce some of microfinances to her.	She came to know about microfinance through female loan officers who visited her house. She uses loans to increase animal assets and milk production.
Other loans used	He used to buy animals from animal traders by installments when he does not have enough funds. He borrowed Rs. 500,000 from the microfinance bank this time. He purchased 6 heads of animals in total. Payment of 3 heads of animals are done with microfinance loan and remaining 3 heads will be paid installment later on.	She used loan from Khushhali bank before. This is second loan for her. She borrowed Rs. 50,000 this time. She borrows Rs. 40,000 from her first loan and purchased 2 heads of heifer male buffaloes.	This is third loan for her. She borrowed Rs. 50,000 from her first loan and purchased fodder. She purchased a milking buffalo with her second loan of Rs. 100,000.	Currently she borrows Rs. 120,000 from Khushhali bank with the annual mark-up rate of 31%. Repayment term is bullet. This is her forth loan from SAFWCO. Her first loan of Rs. 10,00 was used for purchasing a goat. Second loan of Rs. 15,000 was used to purchase a donkey cart. The third loan of Rs. 20,000 was used for purchasing a heifer buffalo.

	1	2	3	4
Issues	Milk production volume is not stable for whole year. It is difficult for his to repay fixed amount every month. He is not willing to use microfinance loans from next time.	No particular issues.	No particular issues.	She wishes banks to increase maximum loan amount.
Remarks	He sells 360 kg milk daily at the rate of Rs. 70 per kg. He purchases fodder, which costs him Rs. 300 per day per animal. Demand for purchasing milking animals is high in May and June when milk production decreases. January is the month when repayment is comparatively easy since milk production is high and it is time for harvesting sugar cane.	She shared-in a heifer buffalo in 2012. The initial price was Rs. 15,000. A heifer delivered a calf 9 months ago. This buffalo produces 3 to 4 kg milk per time. The price of this buffalo was evaluated as Rs. 85,000. She paid Rs. 35,000 as her share in March 2016 to gain ownership of this buffalo. Income from animals is around Rs. 1,800 per day. The expenditure for animals is around Rs. 1,100 per day. She owns 7 acres of land. She cultivates fodder in 1 acre of	Daily income from milk sales is approximately Rs. 1,500. Daily expenditure for rearing animals is around Rs. 1,000. Main source of income of her household is sales of milk followed by earnings from handicraft or embroidery (approximately Rs. 3,300 per month). According to her, she saves Rs. 4,000 to 5,000 per month. All fodder is purchased.	Milk sales is biggest source of income for her household, followed by agricultural income, salaries and labor charges for their donkey cart. She owns 7.5 acre of land. 1.5 acre is used for fodder cultivation. Since she is illiterate, she does not keep her household accounting record. She, however, memorizes it. She uses micro insurance services as well.

	1	2	3	4
		her land. 50% of her household income are obtained from sales of milk. 35% is from agriculture and 15% is from salaries. The price of animals is comparatively low in April. Milk production decreases in April, too.		

(3) Issues

1) Economic status of loan users

Loan users introduced by microfinance banks and institutions are those of successful cases among various other cases. Number of cases of medium scale farmers is only 3, which cannot be generalized easily. Nevertheless, it can be concluded that those who can utilize microfinance loan services repeatedly so that they can increase animal assets and milk production step by step are those who can produce good amount of milk and sells it at a good rate. Besides, they can cultivate fodder in their own land and have other sources of income to support a stable cash flow of a household. They tend to be medium scale farmers. This group falls under a target group for microfinance sector, as well.

On the other hand, the target group for the project is small scale farmers who rear less than 5 heads of animals. It is difficult for small scale farmers to avail current microfinance loan products since it is assumed that they do not have enough milk production and cash flow. For this circumstances, the program designed by the non-bank microfinance institutions run by NGOs will give us some suggestions. Their program is ranging from cash grant, interest free loans to individual loan with mark-up rates, which is designed in accordance with needs of each economic strata of farmers. Small scale farmers have to increase number of animals and milk production gradually through this type of program as a first step. It is required for microfinance institutes to wait till the time when small scale farmers have enough cash flow for a repayment. On the other hand, the cases in this survey showed it is possible for farmers to increase their animal assets with microfinance loans once they are ready to repay.

Being the situation, it is better to avoid introducing microfinance loans to small scale farmers immediately. Rather, it is desirable to try other means to increase their animal assets without extending loans. Currently, the project utilizes the traditional sharing system for increasing animal assets at small scale farms. This modified sharing system is enable for small scale farmers to obtain an animal asset, namely, a female buffalo calf as a compensation of their labor but not by a cash. It is desirable if those farmers could increase number of animals gradually by this system so that they could increase their milk production. Eventually they avail programs like cash grants, interest free loan and microfinance loans with mark-up rate step by step.

2) Technical services to loan users

Issues of technical services were already discussed in the previous sector as issues of livestock loan products. Technical services are also critical for loan users as well. Productivities of buffaloes reared by loan users interviewed in this survey were generally high. Their milk selling price was comparatively high as well. These 2 factors naturally result in improvement of cash flow of farms. It is essential for farmers to have access to technical services to improve productivities and profitability.

Technical services include such as feeding management, genetic improvement, marketing and farm management, for which the project is development appropriate technologies.

5. Conclusion

SBP has been developing various livestock loan schemes to increase loans to the country's livestock sector for these 10 years. As a result, the loan disbursement to livestock sector has been growing remarkably.

Microfinance banks and institutions operating in the project districts recognize high demands for livestock loans in the area since livestock sector is playing important roles in their economy. The livestock loan products available currently are for purchasing goats and cattle for fattening and milking animals. The loan products offered by each banks and institutions are slightly different but similar. The farmers who can avail loan services are limited to medium and large scale farmers who own certain number of animals and have surplus milk production for sales. Those are farmers who can repay their loans with milk sales profits or those who have other sources of income to supplement their repayment. Small scale farmers that the project works with cannot produce enough volume of milk currently. Moreover, milk selling price is low in some areas, which makes difficult to expect enough sales profit from milk sales. Being the situation, it is difficult for small scale farmers to avail current loan products at this moment.

Some banks contracted veterinary doctors to provide services like vaccination. However, their technical services contents to loan users are limited. There are no banks and institutions which provide loans in collaboration with technical service delivery to loan users. It is desirable to extend technical services to loan users including feeding management, reproductive diagnosis and treatment, farm management and marketing so that their productivities and profitability could be increased.

There are few loan products allowing a bullet repayment and grace period, except loans for fattening purpose. It can be considered for banks and institutions to develop such a loan product which can be paid back in a bullet at the time of harvesting since some dairy farmers do engage in farming as well. This might increase their repayment capacity.

Loan users who used loan amount for purchasing milking buffaloes were interviewed in this survey[18]. Those who succeeded in utilizing loans tend to avail loan services repeatedly and increased their animal assets steadily. The survey found that microfinance loans have brought positive impacts on female dairy farmers who does not have access to informal loans embedded in the traditional value chain of animal trading in the area.

Financial services program tailored for each economic strata of farmers like those developed by NGOs are needed to increase number of farmers who can utilize microfinance loans. For small farmers who

[18] The survey team could not interview with those loan users who have failed to use loans effectively. It is necessary to learn from those cases as well.

still have difficulties to utilize microfinance loans, increase number of own animals by such grant programs as the project is currently implementing might be a first step. At the same time, technical services to improve productivity and profitability need to be extended to those small scale farmers. It is not possible for small scale famers to utilize microfinance services until they own certain number of animals for earning enough income from them.

6. Implication for the project: Use of microfinance for the project activities

The livestock resources which the project is targeting are 3 months' age female buffalo calves and dry buffaloes. There are no microfinance products which are designed exclusively for those calves and dry buffaloes in the first place at this moment. Following issues might arise when loan products for calves and dry buffaloes are considered.

1) Female buffalo calves

It takes approximately 3 years for 3 months' age calves to become matured and conceived on average. Besides, additional 1 year is required till a conceived buffalo gives her birth and start to milk. It takes altogether 4 years to start repayment in case a loan is paid back with milk sales profit of those calves. It is impossible to set such a long grace period.

At first, the project needs to set a price of 3 months' age of calves in consideration with market prices of those calves. Once delivered prices of those calves are fixed, microfinance loan products tailored for small scale farmers can be designed. It should not take income form milk sales of those calves as a source of repayment but other source of income should be examined as a financial source of repayment when banks and institutions develop loan products for calves. Once loan products for calves with good consideration of economic situation of small scale farmers are developed, microfinance loan might be one option for small scale farmers to increase their animal assets.

2) Dry buffaloes

The recycling system of dry buffalo sold and abandoned by commercial dairy farmers is planned to be examined by the project. It takes at least 1 year till dry buffalo start milking again. Being the situation, certain duration of grace period should be considered when microfinance products are designed. Insurance for a loss compensation due to the case that dry buffalo is not conceived might also better be considered when loan products are designed. The project recently started technical verification of dry buffalo recycling system. Once those technical verification is completed and improvement of conception rates of dry buffalo are in prospect, selling channel and system for ordinary farmers to purchase those dry buffalo from commercial farmers needs to be examined. Once those processes are completed, introduction of microfinance loans can be started to be examined.

Proposal of the New Project for Buffalo Calf Salvation

The Project on Sustainable Livestock Development for Rural Sindh

20 January 2020

1

The Project established the Calf Salvation Center in the courtyard of the livestock Department in Hyderabad

Aiming to salvage buffalo calves for increasing the livestock assets of small scale farmers.

2

PROGRESS AND ACHIEVEMENTS

Case Study of the Female Buffalo calves Salvation

Strategy:
Poverty alleviation through livestock asset building

3

1ST MODEL

Verification of calf distribution system;

Two heads of 03 months age distributed and one head recovered at the age of 3 years

4

Activity Flow

1) Cattle Colony in Hyderabad

⇒Newly born calf is brought to the calf salvation center right after birth.

2) Calf Salvation Center at Livestoc Department

⇒Suckling for 60 days in a calf hutch

⇒ Group feeding for 30 days after weaning

4) Distribute 2 heads of calves at 3 months age to farmers

⇒ Provision of feeding trough, technical guidance of making hay, provision of formula feed for initial 3 months

5) After 3 years

⇒One head will be retained by the farmer. Another head will be returned to the Project.

5

2ND MODEL

Verification of calf distribution system;

Trial of a Few Days age Calf Distribution

6

Activity Flow

1) Cattle Colony in Hyderabad

⇒ Newly born calf is brought to the calf salvation center right after birth.

2) Calf Salvation Center at Livestock Department

⇒ Necessary colostrum feeding and preventive treatment at calf center

3) Purchased by a farmer in 2-3 days after birth

4) Rearing a calf separate from mother by a famer

⇒ Provision of feeding trough, technical guidance of making hay, provision of formula feed for initial 3 months

7

Rearing cost of 6 months age

From 2014/12/09 to 2016/12/02 (Two year)

		QTY		RATE	TOTAL
Calf & transportation Charges		1	head	2,500	2,500
Production Cost	Colostrum 3kg x 2 days	6	Kg	90	540
	Fresh milk	**187**	**Liter**	**80**	**14,960**
	Calf Starter Feed	5	Kg	42	210
	Calf rearing Feed, 1 to 3months:45Kg, 4 to 6 months:165Kg	210	Kg	32	6,615
	Hay (Natural Grass)	90	Kg	15	1,350
Management cost up to 6 months	Labour cost@Rs.8,000/month/person 3 worker for **50 calves**	1	head	5,760	5,760
	Mortality replacement cost 10%	1	head	300	300
	Consumable(Vaccination, Deworming , medicine, LPG gas etc.)	1	Unit	300	300
	Tagging cost	1	Pc	100	100
Material for farmer	Water trough	1	Pc	1,500	1,500
	Feeding trough	1	Pc	1,500	1,500
Transpotation	**P.O.L** (Transportation Rs.3,000 of 2 calves to beneficiary village) Rs.3,000 /2 heads=1,500	1	head	1,500	1,500
	P.O.L (Transport of Fresh Milk bring from Cattle colony Rs.150/day and for 365 days) Rs.54,750/50 head=1,095	1	head	1,095	1,095
Total rearing cost/calf up to 6 months of age					**38,230**

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Grant Type: 1st Model

2 Heads distributed & 1 Head will be returned

Rearing cost of 6 months age is Rs.76,460
(Rs.38,230 x 2 calves)

It takes 3 years till cost recovery.
Recovered amount (Liquidation) is average **Rs. 46,270.**
Accordingly, a shortage of **Rs.30,190** was shown, which was less than the input cost
(Rs.76,460 – Rs.46,270 =Rs.30,190)

9

Payment Type: 2nd Model

Trial of a Few Days age calf 1 Head Distribution

Farmer with milking buffalo

Calf price：Rs. 2,500
Milk is born by a farmer.

⇒ Provision of feeding trough, technical guidance of making hay, provision of formula feed for initial 6 months

This cost is the shortfall

10

= Advantage and Disadvantage of 2 MODELS =

The 1st Model:

Advantage:

1. Low mortality

Only 3 heads out of 96 heads were dead among distributed calves in 1st and 2nd year

2. Owned assets:

Farmer got one female buffalo as owned assets and other was recovered by the project and sold (The collected money will be allocated to the cost of raising two buffalo calves)

Disadvantage:

It takes three years to become owned asset of the farmer

11

= Advantage and Disadvantage of 2 MODELS =

The 2nd Model:

Advantage:

1. Low cost. Milk is borne by a farmer. Famer bear the cost of a calf Rs.2,500 per head.
2. Calf immediately become own asset of a farmer which increases their motivations

Disadvantage:

1. Mortality rate after distribution is high
2. This cost of services is the shortfall to the project

12

SUGGESTED PROPOSAL FOR NEXT 5 YEARS AS REQUESTED BY THE SECRETARY LIVESTOCK

13

Considering the 5 years experience of the project, a realistic and effective proposal

1. Female Buffalo calves

Strategy:

Poverty alleviation through livestock asset building

1.1. Option : Two Female Buffalo Calves Distribution

Two calves are distributed at the age of 6-month (115Kg-120Kg)
One buffalo recovered at the age of the 3-year

1) Target Farmers

Small scale and poorest farmers

14

1. Option : Two Female Buffalo Calves Distribution

Activity Flow

1) Cattle Colony in Hyderabad

⇒Newly born calf is brought to the calf salvation center right after birth.

2) Calf Salvation Center at Livestock Department

3) New Center

⇒Suckling for 60 days in a calf hutch

⇒ Group feeding for 4 months after weaning

4) Distribute 2 heads of calves at 3 months age to farmers

⇒ Provision of feeding trough, technical guidance of making hay

5) After 3 years

⇒One head will be retained by the farmer. Another head will be returned to the Project.

15

1.2 Option (Method): One Female Buffalo Calf Distribution

Use a Micro finance loan to distribute one buffalo calf at the age of 6 months

1) Target Farmers

Small and medium scale farmers who can afford

2) Advantage

One buffalo calf of 6 months age become owned asset at the distribution (liquidation ends)

3) Disadvantage

Repaying borrowed money by farmers is not easy

16

2 Option (Method): One Female Buffalo Calf Distribution

Activity Flow

1) Cattle Colony in Hyderabad

⇒Newly born calf is brought to the calf salvation center right after birth.

2) Calf Salvation Center at Livestock Department

3) New Center

⇒Suckling for 60 days in a calf hutch

⇒ Group feeding for 4 months after weaning

4) Use a Micro finance loan to distribute one buffalo calf at the age of 6 months

⇒ Provision of feeding trough, technical guidance of making hay

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2. Male Buffalo calves

Strategy:
Farmers operate with their own funds and demonstrate profitable management.

Name of Option: Male buffalo calves Fattening

Register the farmers who are interested in fattening, supply buffalo calf of few days age on purchase basis and provide the following Incentive Program.

* Vaccination & treatment services
* Technical guidance etc.

18

1) Target Farmers

- Farmers interested in fattening
  Cattle colony farmer (Rearing buffalo calves at their own farm)
- Large and Medium scale farmers, Commercial dairy farmers, Breeders (Government supply few days age buffalo 5 heads/Unit)

2) Advantage

- Farmer pays the cost of calf and becomes own asset when calves are distributed.
- One commercial dairy farmers at old cattle colny already verified this system.

3) Disadvantage

The government does not pay cash incentive due to this reason, it take time for dissemination and enlightenment, but it is sustainable.

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Establishment of a new female buffalo calves salvation center is essential for the success of this proposal

Establish the new buffalo calves salvation center at the appropriate location.
The area will be 4Ha (10 acres) and irrigated.

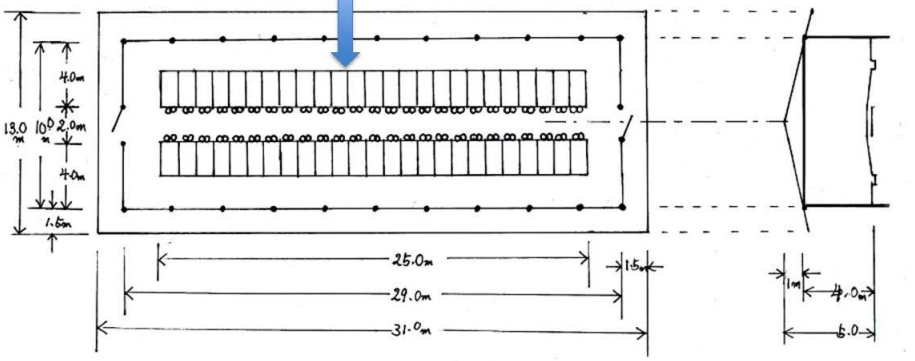
Reasons for setting up a new center:

1. Availability of Roughage on low cost
2. Enough space for rearing at age of 6 months
3. Transportation of formula feed during three months after distribution was complicated.
4. Reduces rearing costs
5. Enables healthy buffalo calves distribution

20

Shed for Buffalo calves

Set up 50 fixed type of calf hutches



Above View

Side View

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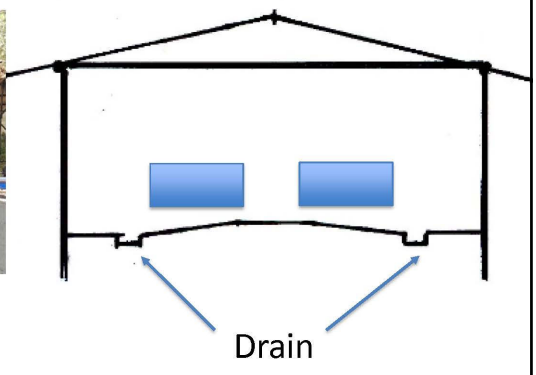
Side View

Calf hutches



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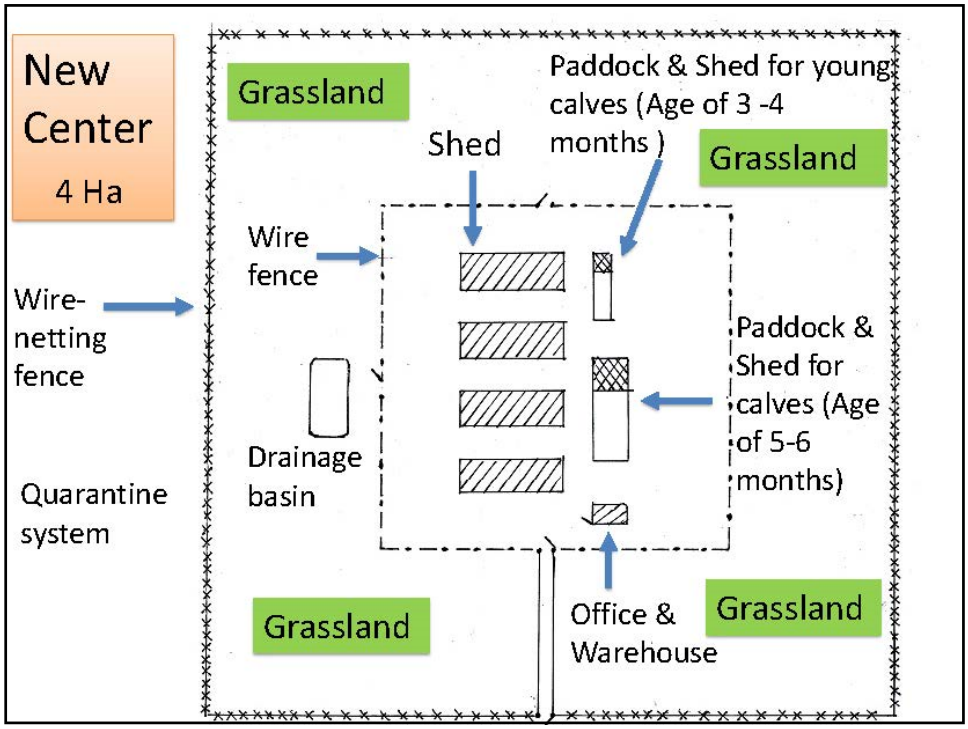

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Rearing cost of 6 months age

		QTY		RATE	TOTAL
Calf & transportation Charges		1	head	3,500	3,500
Production Cost	Colostrum 3kg x 2 days	6	Kg	110	660
	Milk Replacer BM4	187	Liter	60	11,127
	Calf Starter Feed	5	Kg	35	175
	Calf rearing Feed, 1 to 3months:45Kg, 4 to 6 months:165Kg	210	Kg	35	7,350
	Hay (Pasture or Natural Grass)	90	Kg	5	450
Management cost up to 6 months	Labour cost@Rs.9,000/month/person 3 worker for **250 calves/Shed**	1	head	250	250
	Mortality replacement cost 10%	1	head	300	300
	Consumable(Vaccination, Deworming , medicine, LPG gas etc.)	1	Unit	300	300
	Tagging cost	1	Pc	150	150
Material for farmer	Water trough	1	Pc	2,500	2,500
	Feeding trough	1	Pc	2,500	2,500
Transpotation	**P.O.L** (Transportation Rs.1,000 of 5 calves from Hyd. Center to New center every week) Rs.1,000 /5 heads=500	1	head	500	500
	P.O.L (Transportation Rs.4,000 of 4 calves to beneficiary village) Rs.4,000 /4 heads=1,500	1	head	1,095	1,095
Total rearing cost/calf up to 6 months of age					**25,102**

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Grant Type: 1st Model
Using the new Center

2 Heads distributed & 1 Head will be returned

Rearing cost of 6 months age is Rs.50,000 (Rs.25,000 x 2 calves)

It takes 3 years till cost recovery.
Recovered amount (Liquidation) was average **Rs. 46,270**
However, this amount will be improved due to the effect of technical training of Appropriate technology at District Livestock office.

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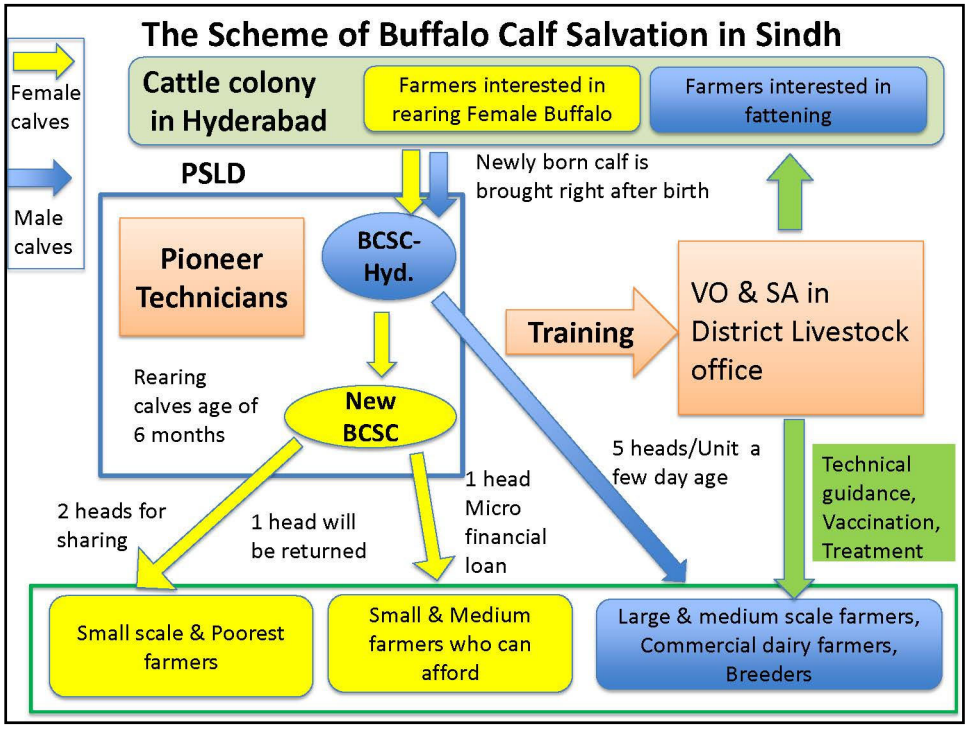

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Schedule of 5 yeas

Shed numbers should be flexible based on calf supply and budget conditions

1st Year

Year	Activity in Hyderabad		Activity in Karachi	Distribution Female Buffalo Calves
	Existing center in courtyard of DG office	New Center	New Center	
1st Year 2020-2021	1.Distribution of Female buffalo calves 50 heads 2. Distirbution of Male bufalo calves ? heads	1.Selecting Appropriate location for the new center 2.Installation 1st shed	x	50

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From 2nd year to 4th year

Year	Activity in Hyderabad		Activity in Karachi	Distribution Female Buffalo Calves
	Existing center in courtyard of DG office	New Center	New Center	
2nd Year 2021-2022	1.Newly born female and male calf is brought to center right after birth. 2.Rearing for few days and maximum 7 day. 3.Female calves transferred to new cente and male calves sold to farmers who are interested in fattening. 4.Demonstration rearing technique for visitors	1.Distribution of Female buffalo calves 250 heads 2.Guidance for new woker and VO 3.Installation 2nd shed	1.Installation 1st shed at the Livestock Experimental Station	250
3rd Year 2022-2023		1.Distribution of Female buffalo calves 500 heads 2.Installation 3rd shed	1.Distribution of Female buffalo calves 250 heads 2.Installation 2nd shed	750
4th Year 2023-2024		1.Distribution of Female buffalo calves 750 heads 2.Installation 4th shed	1.Distribution of Female buffalo calves 500 heads 2.Installation 3rd shed	1,250

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5th Year

Year	Activity in Hyderabad		Activity in Karachi	Distribution Female Buffalo Calves
	Existing center in courtyard of DG office	New Center	New Center	
5th Year 2024-2025		1.Distribution of Female buffalo calves 1,000 heads	1.Distribution Female buffalo calves 750 heads 2.Installation 4th shed	1,750

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THANK YOU

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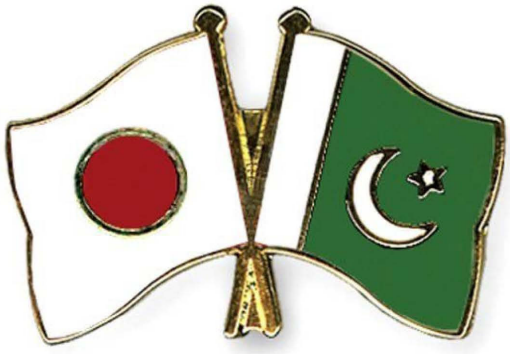
Long live Pakistan Japan friendship



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Monitoring Report on Application of Appropriate Technology by Farmers (Part1)

August 2018

The Project on Sustainable Livestock Development for Rural Sindhi in Islamic Republic of Pakistan

Index

1. Overview of the Monitoring

1-1 Purpose of the monitoring

Monitoring is the last step of extension activity in the village as shown in Figure 1. Monitoring is conducted to grasp the situation of the farmers on application of appropriate technology.

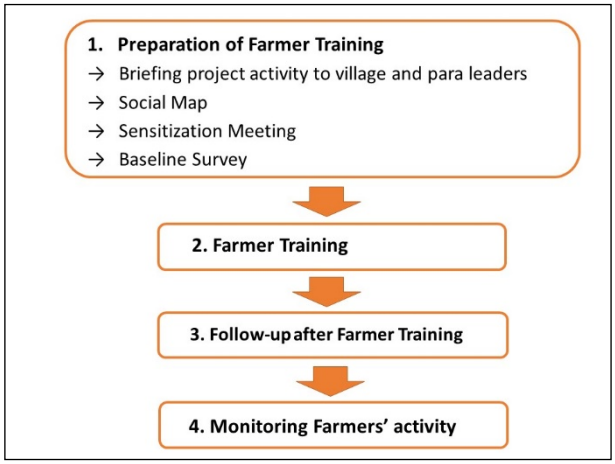


Figure 1 Flow of the Extension Activity in the Village

The Appropriate Technology Development Checklist was finalized in November 2016. It was reflected into PDM version 3 which issued on December 2016. List of 'A' rank Appropriate technology is shown in Table 1.

Table 1 Appropriate Technology Development Check List (A rank)

No.	Field	Title	Content
1	Marketing	Production of quality milk	A farmer doesn't adulterate milk with water.
2	Feeding Management	(for milking cow) Supply of sufficient water	A milking cow drinks sufficient water.
3	Feeding Management	Clean water	A water tank is regularly (at least once a week) washed.
4	Feeding Management	(for milking cow) Use of improved tie method	A milking cow is kept by less stressful way.
5	Feeding Management	(for milking cow) Use of simple roof	Simple roof for milking cow has a structure which provides comfortable environment with cool air.
6	Feeding Management	(for milking cow) Dry floor	Floor where milking cows are kept is dried.
7	Feeding Management	(for calf) Proper management of calf at birth	Newly born calf is managed properly.
8	Feeding Management	(for calf) Provision of colostrum to calf at birth	Colostrum is given to calf within 6 hours after birth.
9	Feeding Management	(for calf) Prevention management against heat	A calf under age of 3 months is kept in shade and is showered or water-sprayed to lower its body surface temperature.
10	Feeding Management	Cow management at parturition	A cow is delivered at comfortable space and immediately treated.

No.	Field	Title	Content
11	Feeding Management	(for buffalo) Bathing/shower	A buffalo is bathed or showered during hot season.
12	Feeding Management	(for milking cow) Hoof-cutting	A cow at least one year gets hoof-cutting.
13	Feeding Management	(for milking cow) Body Condition Score "BCS"	A farmer judges milking cow's body condition by BCS.
14	Feeding Management	(for calf) Nutrition diagnosis	A farmer diagnoses nutrition level of his/her calf.
15	Fodder	Cleaning of feed trough	Leftover in feed trough is thrown away so that cattle can always eat new fodder.
16	Fodder	(for calf) Hay making	A farmer provides enough and good quality of dry fodder to calf.
17	Reproduction	Heat detection	For heat detection, a farmer observes cow's condition before bedtime, such as mucus, bellowing and milk production volume.
18	Genetic Improvement	Identification of good bull	Ability of a breeding bull which is used for mating is confirmed
19	Genetic Improvement	Identification of good cow	Ability of a cow is confirmed

1-2 Development of *the Appropriate Technology Development Checklist* Questionnaire

To grasp situation of farmers about practice of appropriate technologies, technical C/Ps and the appropriate technology development experts developed the appropriate technology development checklist questionnaire. It was finalized after the pre-test which held in December 2016. The questionnaire of English version and Sindhi version are shown in Attachment 1 and 2 respectively.

1-3 Method of the monitoring

Monitoring was carried out by the interviews along with the appropriate technology development checklist questionnaire and farm observation. At the beginning of the monitoring, only questionnaire was used, however, the extension team developed observation sheet later to cross-check farmers' answers with real situation on the ground. The observation sheet of English version and Sindhi version are shown in Attachment 3 and 4 respectively

1-4 Target of the monitoring, number of samples, period of data collection

Farmer training for male farmers was conducted in 25 villages while for female farmers conducted in 22 villages[1]. However, the project suspended all extension activity in one village after completion of four subjects because the villages head was not cooperative. Target of monitoring is the farmer who attended training sessions more than two times (male 904, female 514) in 24 villages for

[1] Three villages out of 25 pilot villages do not require training for female farmer because females are not involved in livestock activity.

male farmers and 16 villages[2] for female farmers. The Project collected answers for questionnaire from 552 male farmers and 188 female farmers. The result of farm observation was collected for 463 male farmers and 184 female farmers. Monitoring period was from September 2017 to June 2018, however, data collection timing is different from village by village. Target of monitoring, collected sample numbers and period of data collection is shown in Attachment 5.

2. Calculation of practice ratio and result

2-1 Data treatment for calculation of practice ratio

There are some questions for one technology. Therefore, key question for each technology was set. If the answers to the key question fulfilled, the project considered the farmer was doing practice. If there is big gap between result of questionnaire and observation, practice ratio was collected based on observation result.

2-2 Practice Ratio (%) for ‘’A” rank Appropriate technologies No.1~No.19 (the whole male farmers in 24 pilot villages)

Practice ratio of 19 rank A technology of 552[3] male farmers in 5 districts are shown in Figure 2 (No.1~No.10) and Figure 3 (No.11~No.19). Practice ratios are corrected for ‘No.3 Clean water supply’, ‘No.4 Use of improved tie method’, ‘No.5 Use of simple roof’, ‘No.6 Dry Floor’, ‘No.12 Hoof-Cutting’ and ‘No.15 Feed Trough Cleaning’ based on the result of observation.

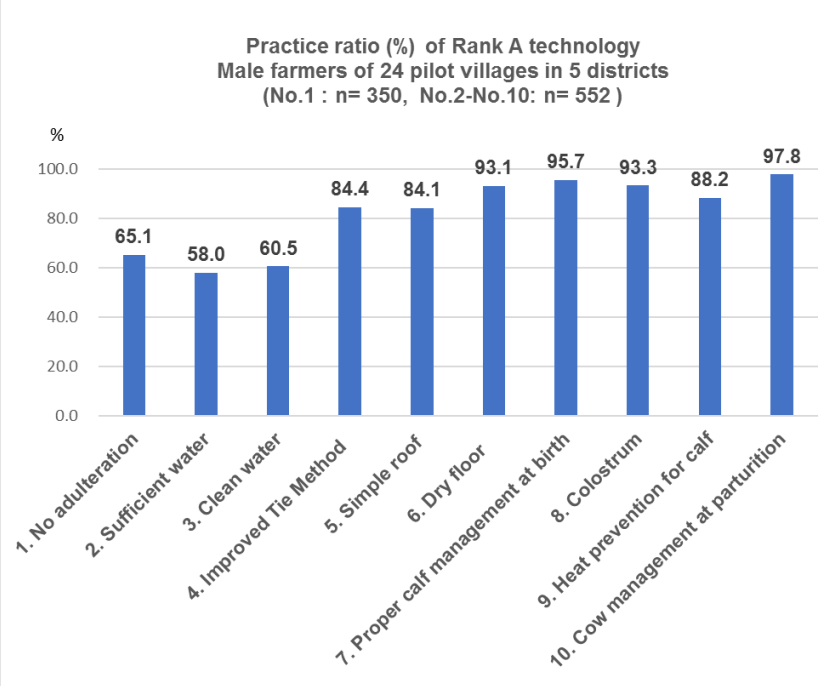


Figure 2 Practice Ratio (%) for ‘’A” rank Appropriate Technologies (No.1~No.10) of the Male Farmers in 24 Pilot Villages

[2] Training for female farmer is not completed in 5 villages of Badin district.
[3] Population of marketing is 350 because not all farmers involved in milk selling.

High practice ratios are generally show as the result. For 'No.1 No Adulteration', the farmers continue adulteration even in the pilot villages. It implies that it is not easy to change their behavior in short time. For 'No.8 Provision of colostrum to calf at birth', 93.3% of farmers gave colostrum to a calf. This is new information for the farmers. Therefore, this result is outcome of technical training and follow-up by extension team.

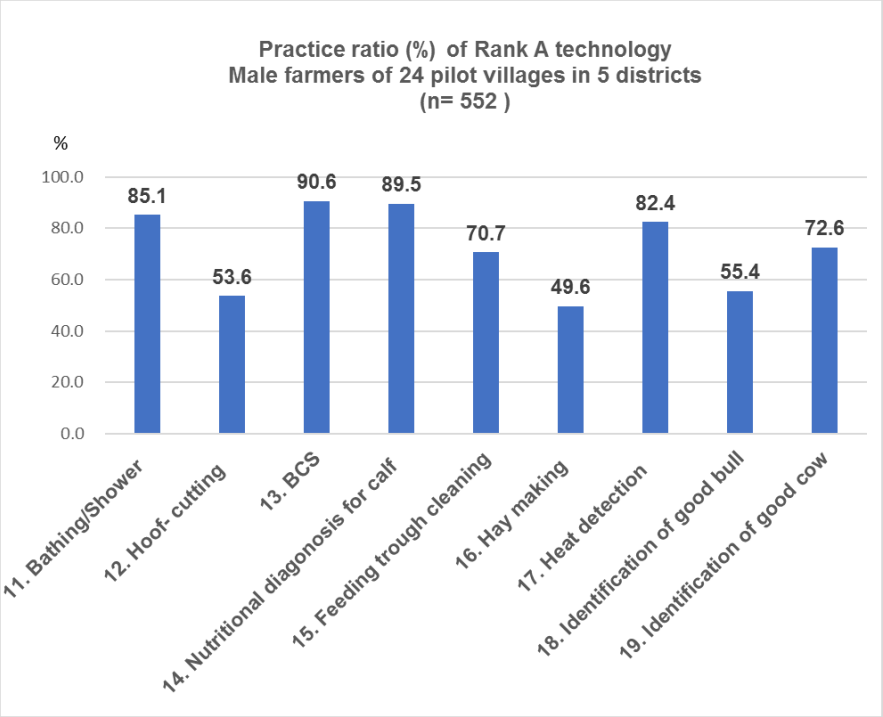


Figure 3 Practice Ratio (%) for ''A" rank Appropriate Technologies (No.11~No.19) of the Male Farmers in 24 Pilot Villages

'No.13 Body condition Score (BCS)'and 'No.16 Hay making for calf' were introduced by the Project. The farmers can use No.13 immediately after they remember it, however, No.16 needs resources and time for preparation for practice. Therefore, there are big gap between No. 13 and No. 16 on practice ratio. Apart from that No. 3 Cleaning of water trough and No.15 Cleaning of feed trough are also relatively low practice ratio because it is time-consuming practice.

2-3 Practice Ratio (%) for ''A" rank Appropriate technologies No.1~No.19 (the whole female farmers in 14 pilot villages

Practice ratio of 19 rank A technology of 188[4] female farmers in 4 districts are shown in Figure 4 (No.1~No.10) and Figure5 (No.11~No.19). Practice ratios are corrected for 'No.3 Clean water supply', 'No.4 Use of improved tie method', 'No.5 Use of simple roof', 'No.6 Dry Floor', 'No.12 Hoof-Cutting' and 'No.15 Feed Trough Cleaning' based on the result of observation.

[4] Population of marketing is 135 because not all farmers involved in milk selling.

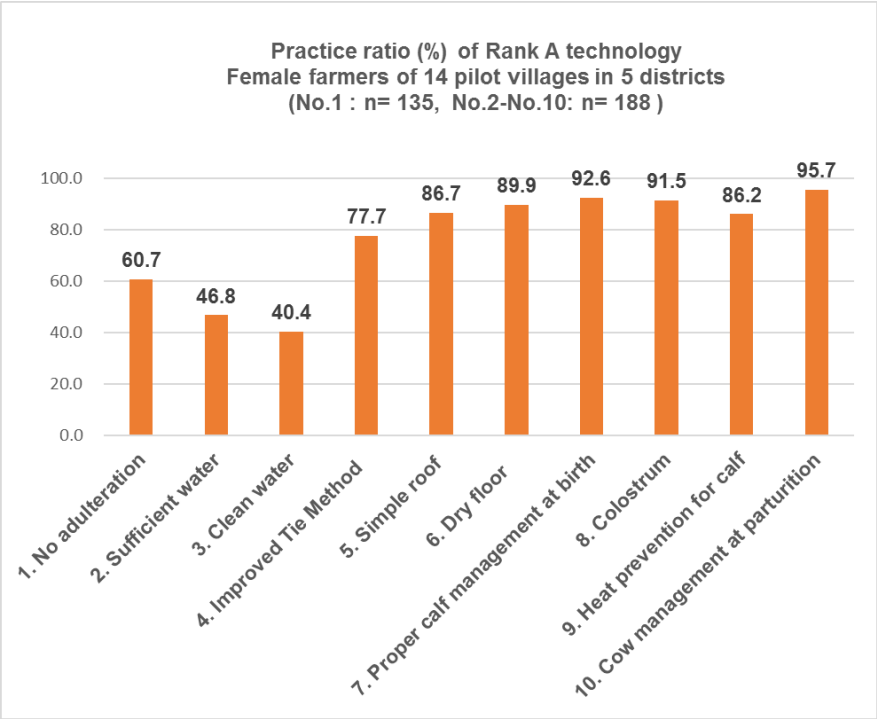


Figure 4 Practice Ratio (%) for ‘’A” rank Appropriate Technologies (No.1~No.10) of the Female Farmers in 14 Pilot Villages

Practice ratios of female farmers are also high. It is not so different tendency from practice ratios of male farmers.

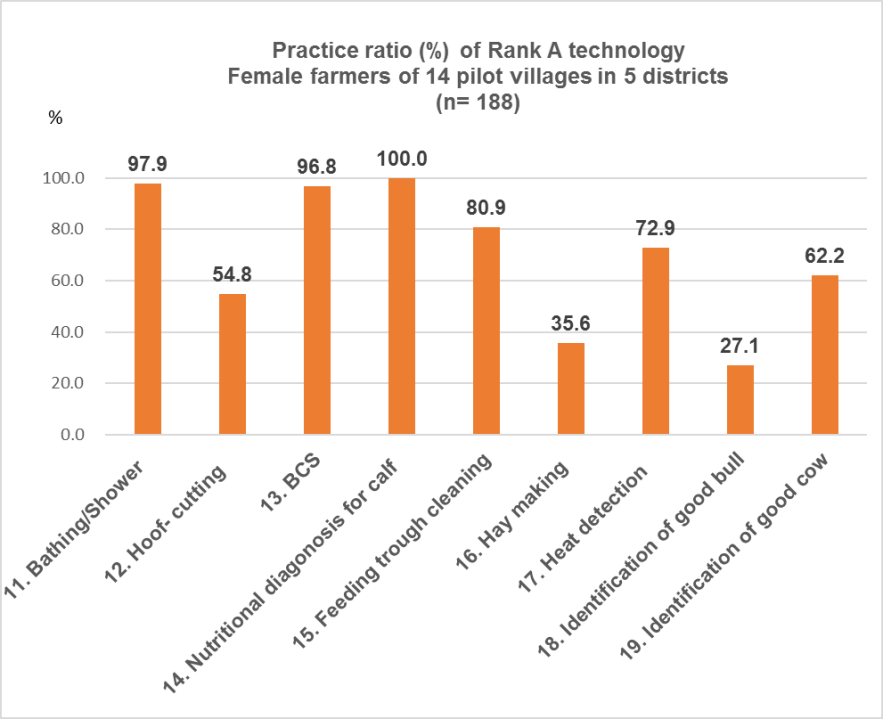


Figure 5 Practice Ratio (%) for ‘’A” rank Appropriate Technologies (No.11~No.19) of the Female Farmers in 14 Pilot Villages

Practice ratio of 'No.13 Body condition Score (BCS)' was for male farmers as 90.6% and female farmers as 96.8% while 'No.14 Nutrition diagnosis for calf was for male farmer as 89.5% and female farmers as 100%. Practice ratio of female farmers higher than male's one. It seems one of reasons is female farmers take care of livestock. Therefore, they are interested in nutrition condition of their animals.

For 'No.18 Identification of good bull', practice ratio of male farmers was 55.4% while female was 27.1%. The reason is identification of good bull is men's work in several villages Women cannot be involved in that activity.

On the other hand, for 'No.19 Identification of Good Cow', practice ratio of male farmers was 72.6% while female was 62.2%. Difference is only 10%. Female farmers are not involved in livestock selling however, they regularly doing milking. Therefore, female farmers checked capacity of cow when they do milking.

3. Considerations

Considerations based on the result of monitoring are as follows:

<Practice Ratio>

- Practice ratio of pilot farmers were shown near to 100% at the highest and around 50 % at the lowest. Their practice ratio was generally high.
- In Matiari district, the male extension workers visited farmers often when they went to field. Their voluntary follow-up helped to keep farmers motivation to continue practice.

<Monitoring method and Data collection>

- When the Project conducted interview on ' No adulteration', we use market price for double check. If farmers selling adulterated milk, selling price will be automatically low. The Project could verify what the farmer said using objective information.
- However, it should careful that sometimes farmers are selling pure milk, but the buyers discounts price.

Attachment

Attachment 1 Appropriate technology development check list questionnaire (English version)

Appropriate Technology Development Checklist Questionnaire

Date :
Village name:
No. of Farmer:
Name of Farmer:
Name of Interviewer:

Marketing

1 Production of quality milk

A farmer doesn't adulterate milk with water.

1-1 Do you sell pure milk?

Yes | No

1-2 How much is milk selling price per kg? Rs. ____

Feeding Management

2 (For milking cow) Supply of sufficient water

A milking cow drinks sufficient water.

2-1 Do you use enough size of water tank to give water to animals?

Yes | No

2-2 (If no,) Do you bring water multiple time to give it to animal more than 60 liters per day?
(Each model size of water container will be shown to interviewee during the interview.)

Total volume ____ Liter

Up to 10	11～15	16～20	More than 21
*Average7	*Average13	*Average18	*Average 25

2-3 How many times a day do you give water?

2 | 3 | 4 | 5 | More than 6

2-4 Do your animals have a chance to drink water from other water source?

Yes | No

2-5 (If yes,) What kind of water source it is ?

River | Stream | puddles | During bathing | Canal | others

3 Clean water

A water tank is regularly (at least once a week) washed.

3-1 Do you wash a water trough at least once a week?

Yes | No

4 (For milking cow) Used of Improved Tie Method

A milking cow is kept by less stressful way.

4-1 Do you move a milking cow from one place to another within a day?

Yes | No

4-2 Do you release a milking cow from tie to go to grazing or bathing? (more than 6 months)

Yes | No

4-3 What kind of materials do you use to tie a milking cow?

Muchi | Chain | Plastic rope | Hemp rope | Others

4-4 Which body parts do you use to tie a milking cow?

Head | Neck | Foreleg | Hind leg | Others

4-5 Do you use enough length of tie material to make a milking cow move freely to eat and drink?

Yes | No

5 (For milking cow) Use Simple roof for milking cow

Simple roof for milking cow has a structure which provides comfortable environment with cool air.

5-1 Do you use a simple roof ?

Yes | No

5-2a (If yes,)
a. Is it provide enough shade to milking cow?
Yes No

5-2b b. Has it a high roof and good ventilation? (the height of lower poles should be more than 8~9 feet)
Yes No

5-3 There are few obstacles that affect good ventilation?
Yes No

5-4 Result of observations

6 (For milking cow) Keeping dry floor
Floor where milking cows are kept is dried.

6-1 Is floor dried where milking cows are kept?
Yes No

(If no,)
6-2a a.Do you shower to milking cows at same place where tie it?
Yes No

6-2b b. Do you have drainage system at tie place?
Yes No

6-2c c. Do you clean the floor to remove animal dung and urine every day?
Yes No

6-3 Result of observations

7 (For calf) Proper management of calf at birth
Newly born calf is managed properly.

7-1 Do you dry new born calf's body by allowing mother cow to lick or wipping clean cloth?
Yes No

7-2 Do you disinfect umbilical cord with 10% iodine tincture solution ?
Yes No

7-3 Do you rear a calf at dry place?
Yes No

7-4 Do you keep new born calf at clean place ?
Yes No

8 (For calf) Provision of colostrum to calf at birth
Colostrum is given to calf within 6 hours after birth.

8-1 Do you give colostrum to a calf before placenta come out?
Yes No

8-2 Do you give colostrum to a calf within 6 hours after birth?
Yes No

9 (For calf) Prevention against heat stress for calf
A calf under age of 3 months is kept in shade and is showered or water-sprayed to lower its body surface temperature.

9-1 Do you tie a calf under the shade during hot hours in a day?
Yes No

9-2 (If yes,)
What kind of shade do you use?
Shed shade of a tree Others

9-3 Do you shower water over a body of a calf under 3 months?
Yes No

10 Cow management at parturition

A cow is delivered at comfortable space and immediately care.

10-1 In case of a delivery in daytime, do you tie your animal to shady cool place ?

Yes No

10-2 In case of a delivery in night time, do you stay near to your animal?

Yes No

10-3 Do you give assistance for a delivery immediately?

Yes No

10-4 Do you disinfect your hand before handling a parturition?

Yes No

11 (For buffalo) Bathing/Shower

A buffalo is bathing or showering during hot season.

11-1 Do you take your buffaloes/cows for bathing during hot season?

Yes No

(If yes,)

11-2 How many hours do you take for bathing buffaloes/cows in average?

_____ hours

11-3 If no, what is the reason?

No time No worker No place to bath

11-4 Do you give your buffaloes/cows a shower due to no place for bathing?

Yes No

11-5 a.(If yes,)

Which means do you use for shower?

Hose Bucket Spray Others

12 (For cow) Hoof- cutting

A cow at least one year gets hoof-cutting.

12-1 Do you rear your milking cows by tying method?

Yes No

12-2 Do you take your milking cows for grazing?

Yes No

12-3 Do you give hoof cutting to adult cows ?

Yes No

12-4 a (If yes,)

Do you apply hoof cutting to your cow at least once a year?

Yes No

13 (For milking cow) Body Condition Score "BCS" for milking cow

A farmer judges milking cow's body condition by BCS.

13-1 Do you check nutrient condition of milking animal by BCS?

Yes No

14 (For calf) Nutritional level for calf

A farmer diagnoses nutrition level of his/her calf.

14-1 Do you observe nutrient condition of a calf by their body condition for 3 stages, fatty, normal and emaciated?

Yes No

14-2 Do you check nutrient condition of a calf by their body condition in accordance with the standard of PSLD project for 4 level, Fat, Normal, Slightly thin , Very thin?

Yes No

Fodder

15 Cleaning of feeding trough

Leftover in trough feed is thrown away so that cattle can always eat new fodder.

15-1 Do you throw leftover away and replace with new feed?

Yes | No

15-2 (If yes,) How often do you replace with new feed?

every day | every other two days | longer interval than 2 days

15-3 Result of observations

16 (For calf) Hay making for calve

A farmer provides enough and good quality of dry fodder to his/her calf.

16-1 Do you make hay and provide it to a calf?

Yes | No

16-2 (If yes,)
Do you use green grass which have a lot of green leaves to make hay?

Yes | No

16-3 (If yes,)
Do you give enough hay to calf as she want everyday?

Yes | No

Reproduction

17 Heat detection

For heat detection, a farmer observes cow's condition before bedtime, such as mucus, bellowing and milk production volume.

17-1 Do you detect heat by 'Mucus from the external vulva' ?

Yes | No

17-2 Do you detect heat 'Bellowing' ?

Yes | No

17-3 Do you detect heat'Milk production dropping'?

Yes | No

17-4 Do you detect heat before bedtime?

Yes | No

Genetic Improvement

18 Identification of good bull

Ability of a breeding bull which is used for mating is confirmed

18-1 Do you ask the owner of bull about milk production volume of its' mother, and/or sister and/or daughter?

Yes | No

18-2 Do you ask the owner or neighbors who are using bull about its conception rate?

Yes | No

18-3 Do you check a bull whether he has strong mounting desire (libido)?

Yes | No

19 Identification of good milking cow

Ability of a cow is confirmed

19-1 Do you estimate total milk volume in one milking period of milking cows which you are rearing?

Yes | No

19-2 Do you check the capacity of udder?

Yes | No

19-3 Do you check the development of milk vein ?

Yes | No

Attachment 2 Appropriate technology development check list questionnaire (Sindhi version)

فني مهارت جي واڌاري واري فهرست سوالنامو

Date :
Village name:
No. of Farmer:
Name of the Farmer:
Name of Interviewer:

کير جو واپار

-1 سڌي خالص کير جي پيداوار

پاڳيو کير ۾ پاڻي جي ملاوت نہ ڪندو.

1-1 ڇا توهان خالص کير وڪرو ڪيو ٿا؟

ها | نہ

1-2 هڪ ڪلوکير ڪيتري رپين ۾ وڪرو ڪيو ٿا؟ روپيہ

خوراڪ جي سارسنڀال

-2 کير واري مينهن/ ڏڳي جي لاءِ گهربل پاڻي مهيا ڪرڻ

کير واري مينهن/ ڏڳي گهربل پاڻي پيئي ٿي.

2-1 توهان وٽ جانورن کي پاڻي پيارڻ جي لاءِ گهربل ماپ جي ٽانڪي/ آهورا آهن؟

ها | نہ

2-2 جيڪڏهن نہ پوءِ ڇا توهان مختلف وقتن تي پاڻي آڻيندا آهيو جانورن جي لاءِ هڪ ڏينهن ۾ 60 ليٽر کان مٿي.

توڙل مقدار ليٽر

10ليٽر	11-15ليٽر	16-20ليٽر	21کان وڌيڪ
سراسري 7	سراسري 13	سراسري 18	سراسري 25

2-3 توهان ڏينهن ۾ گهٽا دفعا پاڻي پياريو ٿا؟

2	3	4	5	6کان وڌيڪ

2-4 ڇا توهان جي جانور کي پاڻي پيئڻ جو موقعو ملي ٿو تہ ٻئي ڪنهن ذريعي سان پاڻي پيئي.

ها | نہ

2-5 جيڪڏهن ها تہ اهو ڪهڙو ذريعو آهي.

دريا	ندي نهر	حوض	وهنجڻ جي دوران	واهہ	ٻيو ڪو

-3 صاف پاڻي

پاڻي جي ٽانڪي/ پاڻي جو آهورو روزانو صاف ڪجي يا هفتي ۾ هڪ دفعو ضرور

3-1 ڇا توهان هفتي ۾ هڪ دفعو پاڻي جا ٽانو صاف ڪندا آهيو؟

ها | نہ

-4 کير وارن جانورن لاءِ ٻڌل جو صحيح طريقو استعمال ڪرڻ

.کير وارا جانور اهڙي طريقي سان ٻڌجن جو انهن تي گهٽ دٻاءُ هجي

4-1 ڇا توهان کير وارا جانور سجي ڏينهن ۾ هڪ جڳهہ کان ٻي جڳهہ تي ٻڌو ٿا؟

ها | نہ

4-2 ڇا توهان کير وارن جانورن کي چرائي لاءِ يا وهنجارڻ لاءِ موڪليو ٿا؟

ها | نہ

4-3 کير وارن جانورن کي ٻڌڻ لاءِ ڪهڙي قسم جو مواد استعمال ڪيو ٿا؟

مڇي	زنجير	نائيلون جي رسي	نوڙي	ٻيو ڪو

4-4 کير وارن جانورن کي ٻڌڻ لاءِ جسم جو ڪهڙو حصواستعمال ڪيو ٿا؟

مٿو	ڳچي	اڳيون جنڱهون	پويون جنڱهون

4-5 کير وارن جانورن کي جيڪا رسي ٻڌو ٿا ان جي ڊيڱهه ايتري آهي جو جانور آرام سان چرپر ڪري ڪائي پي سگهي؟

ها	نہ

5- کير وارن جانورن لاءِ سادي ڇت استعمال ڪيو ٿا؟

سادي ڇت کير وارن جانورن لاءِ ناهجي جيڪا ٽڏي هوا سان گڏ وٽاڻ جي ماحول کي آرامده ناهي.

5-1 ڇا توهان جانورن لاءِ سادي ڇت استعمال ڪيو ٿا؟

ها	نہ

5-2a جيڪڏهن ها

ڇا اها کير واري جانور کي پوري ڇانو ڏئي ٿي؟

ها	نہ

5-2b ڇا اهي سڀ هوادار ۽ مٽي ٺهيل آهي(زمين کان ڇت تائين اونچائي 8-9 فوٽ آهي)

ها	نہ

5-3 اهڙيون کي رکاوٽون آهن جيڪي هوا کي اندر اچڻ کان روکين

ها	نہ

5-4 مشاهدي جا نتيجا

6- کير وارن جانورن لاءِ خشڪ جڳهه رکجي

جتي ڏاهائي ٿئي ان جڳهه کي خشڪ رکجي.

6-1 جتي ڏاهائي وارا جانور بيهاريو ٿا ان جڳهه کي خشڪ رکو ٿا؟

ها	نہ

جيڪڏهن نہ

6-2a ڇا توهان کير وارا جانور جتي ٻڌو ٿا اتي جانور کي ڦوهاري سان وهنجاريو ٿا؟

ها	نہ

6-2b ڇا توهان وٽ ٻڌڻ واري جڳهه تي نيڪال جو انتظام آهي؟

ها	نہ

6-2c ڇا توهان روزانو جانور جو ڇيڙو ۽ پيشاب صاف ڪيو ٿا؟

ها	نہ

6-3 مشاهدي جا نتيجا

7 قُرن جي لاءِ) قُر ڇمڻ وقت صحيح نموني جي سارسنڀال

نئين ڄاول قُر جي سارسنڀال صحيح طريقي سان

7-1 ڇا توهان نئين ڄاول قُر کي ماءُ ڏي ڇڏيو ٿا اها ان کي چٽي خشڪ ڪري يا ڪنهن ڪپڙي سان قُر جي جسم کي خشڪ ڪيو ٿا.

ها | نہ

7-2 ڇا توهان قُر جي ڏن کي 10% ٽنڪچر آيوڊين سوليوشن لڳايو ٿا.

ها | نہ

7-3 ڇا توهان قُر کي خشڪ جڳهه تي پاليو ٿا؟

ها | نہ

7-4 ڇا توهان نئين ڄاول قُر کي صاف جڳهه تي رکو ٿا؟

ها | نہ

8- قُرن جي لاءِ قُرن جي ڇمڻ وقت پس مهيا ڪرڻ

قُر ڇمڻ کانپوءِ 6 ڪلاڪن اندر پس ڏيڻ

8-1 ڇا توهان جانور جي جر ٻاهر اچڻ کان پهريان قُر کي پس ڏيو ٿا؟

ها | نہ

8-2 ڇا توهان قُر جي ڇمڻ کانپوءِ 6 ڪلاڪن اندر پس ڏيو ٿا؟

ها | نہ

9- قُرن کي گرمي کان بچاءُ لاءِ

3مهينن جي عمر جا قُر چاپري/ منهه ۾ رکيا وڃن ۽ انهن جي جسم تي پاڻي جو ڦوهارو يا اسپري ڪيو وڃي تہ جيئن ان جي جسم مان ڪجهه گرمي گهٽ ٿئي.

9-1 ڇا توهان قُرن کي ڏينهن جو گرمي دوران چاپري/ منهه ۾ جي هينان ٻڌو ٿا؟

ها | نہ

9-2 جيڪڏهن ها

ڪهڙي قسم جو چاپرو استعمال ڪيو ٿا؟

چاپرو/ منهه | وڻ جي هينيان | ٻيو ڪجهه

9-3 ڇا توهان 3 مهينن جي قُر جي جسم تي پاڻي جو ڦوهارو ڪيو ٿا؟

ها | نہ

-10 ويم وقت ڊڄي جي سارسنڀال

ڊڄي/ مينهن جو آرامده جڳهه تي قُر ڏيڻ ۽ هڪدم سان انجي سنڀال ڪرڻ

10-1 ڏينهن جو ويم وقت ڇا توهان جانور کي ٽڏي چاپري واري جڳهه تي ٻڌو ٿا؟

ها | نہ

10-2 رات جو جانور جي ويم جي وقت توهان پنهنجي جانور جي ويجهو رهو ٿا؟

ها | نہ

10-3 ڇا توهان جانور جي هڪدم مدد ڪيو ٿا تہ جيئن جانور جي ويم ۾ آساني ٿئي؟

ها | نہ

10-4 ڇا توهان جانورن جو ويم ڪرائڻ کان پهرين وقت پنهنجا هٿ جراثيم کان پاڪ ڪيو ٿا؟

ها | نہ

11- مينهن جي لاءِ / وهنجڻ/ ڦوهارو ڪرڻ

. گرمي جي موسم دوران مينهن وهنجندي يا ڦوهارو ڪيو ويندو آهي

11-1 ڇا توهان گرمي جي موسم ۾ مينهن/ ڏڳي کي وهنجاريو ٿا.

ها | نہ

جيڪڏهن ها

11-2 سراسري گهٽا ڪلاڪ وهنجاريو ٿا؟

ڪلاڪ

11-3 جيڪڏهن نہ ته ڪهڙي سبب جي ڪري

ٽائيم نہ آهي | ڪم وارو نہ آهي | وهنجڻ جي جڳهہ نہ آهي

11-4 توهان وٽ جانور کي وهنجارڻ لاءِ جڳهہ نہ آهي پوءِ بہ ان کي ڦوهاري سان وهنجاريو ٿا؟

ها | نہ

11-5 جيڪڏهن ها

ان جو مطلب توهان جانور جي وهنجارڻ لاءِ استعمال ڪيو ٿا؟

حوض | بالٽي | ڦوهارو | ٻيو ڪو

12- مينهن/ ڏڳين جي لاءِ ڪر ڪٽڻ

مينهن/ ڏڳين جا سال ۾ هڪ دفعو ڪر ڪٽڻ گهرجن

12-1 ڇا توهان پنهنجا ڪير وارا جانور ٻڌڻ واري طريقي سان پاليو ٿا؟

ها | نہ

12-2 ڇا توهان پنهنجا جانور چرائي جي لاءِ ونڃي وجو ٿا؟

ها | نہ

12-3 ڇا توهان جوان جانور جا ڪر ڪٽرائيندا آهيو؟

ها | نہ

12-4 جيڪڏهن ها

ڇا توهان سال ۾ هڪ دفعو ڪر ڪٽرايو ٿا؟

ها | نہ

13- ڪير وارين ڏڳين لاءِ) ڪير وارن جانورن جي جسماني حالت جي ڳٽپ

پاڳيو ڪير واري جانور جو جسماني حالت جي ڳٽپ جي حساب سان اندازو لڳائڻ

13-1 ڇا توهان ڪير وارن جانورن جي غذائي حالت جو اندازو جانور جي جسماني حالت جي ڳٽپ سان لڳائي سگهو ٿا؟

ها | نہ

14- ڦرن جي لاءِ غذائي سطح

پاڳيو پنهنجي ڦر جي ڪاڌي جي تشخيص ڪري

14-1 ڇا توهان پنهنجي ڦر جي غذائي حالت مطابق 3 مرحليوار جسماني حالت سجاڻي سگهو ٿا، ٿلهي، نارمل، سنهو

ها | نہ

14-2 ،پي ايس ايل ڊي) منصوبي جي معيار مطابق 4 ڦر جو حالتون ٻڌايل آهن. ٿلهو، وچولو، هلڪو سنهو تمام سنهو. ڇا توهان پنهنجي ڦر جي جسماني حالت مطابق سجاڻي سگهوٿا؟

ها | نہ

چارو

15- خوراڪ جي آهورن جي صفائي

آهوري ۾ بچيل خوراڪ پري اڇلايو ته جيئن جانور هميشہ نئون تازو چارو کائي؟

15-1 چا توهان آهوري مان بچيل خوراڪ ڪڍي اڇلايو ٿا ته جيئن ان ۾ نئين تازي خوراڪ وجهو؟

ها | نہ

15-2 جيڪڏهن ها) ته ڪڏهن خوراڪ متايو ٿا نئين خوراڪ سان

روزاني | هر ٻئين ڏينهن | ٻن ڏينهن کان وڌيڪ

15-3 مشاهدي جا نتيجا

16- ڦرن جي لاءِ) گاهہ سکائي رکڻ (هي)

پاڻيو پنهنجي ڦرن جي لاءِ پوري مقدار ۾ گاهہ سکائي مهيا ڪري

16-1 چا توهان پنهنجي ڦر جي لاءِ گاهہ سکائي رکو ٿا ۽ پنهنجي ڦر کي ڏيو ٿا؟

ها | نہ

16-2 (جيڪڏهن ها)

چا توهان سائو گاهہ استعمال ڪيو ٿا جنهن جا پتا تمام گهٽا ساوا هجن (هي) ناهڻ جي لاءِ

ها | نہ

16-3 (جيڪڏهن ها)

ڦر کي پوري مقدار ۾ (هي) سڪل گاهہ ڏيو ٿا جيتري ان جي روزانو گهرج هجي.

ها | نہ

توليدي

17- وهر جانچڻ

وهر جانچڻ لاءِ پاڻيو سمهڻ کان پهرين مينهن/ ڏڪي جي حالت جي جانچ ڪري سارمان مادو خارج ٿيڻ، رنيڻ ۽ کير جي پيداوار گهٽ

17-1 چا توهان جانور جي سارمان مادو خارج ٿيڻ جي جانچ ڪيو ٿا؟

ها | نہ

17-2 چا توهان جانور جي رنيڻ سان وهر جانچيو ٿا؟

ها | نہ

17-3 چا توهان جانور جي کير جي گهٽ پيداوار سان وهر جانچيو ٿا؟

ها | نہ

17-4 چا توهان سمهڻ کان پهريان جانور جي وهر جي جانچ ڪيو ٿا؟

ها | نہ

نسلي واڌارو

18- سڻي سانهہ جي سڃاڻپ

سڻي نسل جي خوبي جيڪو لڳ جي لاءِ تصديق ٿيل هجي.

18-1 چا توهان سانهہ جي مالڪ کان پڇو ٿا ته ان جي ماءُ، پيڻ ۽ ڏي ڪيترو کير ڏيندي هئي؟

ها | نہ

18-2 چا توهان سانهن جي مالڪ جي پاڙيوارن کان پڇندا آهيو ته سانهن جي قرائڻ جو عدد ڪيترو آهي؟

ها | نه

18-3 چا توهان سانهن کي ڏسندا آهيو ته هو مادي جانور جي مٽان چڙهڻ جي خواهش رکي ٿو يا نه

ها | نه

توليدي

19- سڀني ڪير ڏيندڙ مينهن/ ڍڳي جي سجاڻپ

مينهن/ ڍڳي جي صلاحيت جي پڪ ڪريو

19-1 جيڪا توهان ڍڳي/ مينهن پاليو ٿا چا توهان ان جي ڪير واري عرصي جي ٽوٽل ڪير جي پيداوار جو اندازو لڳائي سگهو ٿا؟

ها | نه

19-2 چا توهان جانور جي اوهه جي صلاحيت ڏسو ٿا؟

ها | نه

19-3 چا توهان اوهه جي مٽان ويندڙ ڪير واري نس ڏسو ٿا؟

ها | نه

Attachment 3 Observation sheet for animal farm (English version)

Check list observation of animal farm

Date :	
Village name:	
No. of Farmer:	
Name of the Farmer:	
Name of Interviewer:	

Sr. no:	Description	score	Remarks
1	Farm ventilation		
2	Simple roof for milking cow/ buffalo		
3	Clean and dry floor		
4	Required floor space		
5	Availability of water trough and its cleanliness		
6	Clean water		
7	Availability of feeding trough and its cleanliness		
8	Availability of fodder		
9	Tie Method		
10	BCS of animal		
11	Condition of hoof		

Score=(A Good) - (B Medium) - (C Poor)

Attachment4 Observation sheet for animal farm (Sindhi version)

جانورن جي وٽاڻ جي جائزي دوران مشاهدو

Date :	
Village name:	
No. of Farmer:	
Name of the Farmer:	
Name of Interviewer:	

نمبر	تفصيل	اسڪور	ريمارڪس
1	وٽاڻ ۾ هوا جو گذر		
2	وٽاڻ جي ڇت ڪير واري مينهن/ ڳئون لاءِ		
3	وٽاڻ جي زمين خشڪ ۽ صاف		
4	گهربل جاءِ جانورن کي ٻڌڻ لاءِ		
5	پاڻي جي آهورن جي موجودگيءَ ۽ ان جي صفائي		
6	صاف پاڻي		
7	خوراڪ جي آهورن جي موجودگيءَ ۽ ان جي صفائي		
8	چاري جي موجودگي		
9	ٻڌڻ جو طريقو		
10	جانورن جي جسماني حالت جي ڳٽپ		
11	جانورن جي ڪرن جي حالت		

اسڪور (اي سنو) - (بي وچولو)- (سي خراب)

Attachment5 Target of monitoring, number of collected samples and data collection period

No.of Village	District Name	Village name	Male					Female					
			Target number	No. of Questionnaires	No. of Observation	Starting date	Completed date	Target number	No. of Questionnaires	No. of Observation	Starting date	Completed date	Note
1	Matiari	Adur Faqir Noohpoto	24	15	10	9-Nov-17	21-Feb-18	28	18	15	12-Apr-18	30-May-18	
2	Matiari	Gul Muhammad Ghambheer	42	29	22	7-Nov-17	10-Jan-18	33	12	11	7-May-18	19-Jun-18	
3	Matiari	Haji Suleman Rahu	36	17	4	16-Oct-17	27-Dec-17	17	7	7	2-Apr-18	2-May-18	
4	Matiari	Qaiser Detho	33	17	5	9-Oct-17	22-Jan-18	23	3	3	14-May-18	14-May-18	
5	Matiari	Punhoon Sahoowal	36	13	12	5-Dec-17	29-Dec-17	0	Training was not completed.				Group1:Jat
			18	10	9	6-Nov-17	21-Dec-17	26	11	11	4-May-18	23-May-18	Group2:Sheedi
6	HYD	Saleh Dal	30	15	15	19-Feb-18	25-Jun-18	15	14	14	19-Feb-18	6-Mar-18	
7	HYD	Khan Muhammad Shoro	27	10	9	14-Nov-17	9-Feb-18	3	Female training was not conducted.				
8	HYD	Haji Khan Watto	28	14	14	6-Nov-17	9-Nov-17	23	15	15	13-Feb-18	7-May-18	
9	HYD	Jahan Khan Kathio	0	All activities were suspended.				0	All activities were suspended.				
10	HYD	Muhammad Ibrahim Mangwano	43	25	25	3-Nov-17	1-Feb-18	0	Training was not completed.				Group1:Mangwano
								25	20	20	23-Feb-18	19-Mar-18	Group2:Kolhi
11	TAY	Haji Bahadur Daudani	32	25	24	19-Dec-17	23-Feb-18	36	19	19	7-Feb-18	15-Mar-18	
12	TAY	Jamal Khan Bozdar	16	14	3	27-Sep-17	4-Dec-17	0	Female training was not conducted.				
13	TAY	Maqbool Ahmed Memon	42	37	36	18-Dec-17	25-Apr-18	25	21	21	15-Feb-18	27-Mar-18	Group1:Solangi
								32	14	14	22-Mar-18	8-May-18	Group2:Kolhi
14	TAY	Gazi Khan Lashari	29	26	23	21-Nov-17	26-Jan-18	0	Female training was not conducted.				

No.of Village	District Name	Village name	Male					Female					
			Target number	No. of Questionnaires	No. of Observation	Starting date	Completed date	Target number	No. of Questionnaires	No. of Observation	Starting date	Completed date	Note
15	TAY	Haji Gul Muhammad Bahrani	33	20	19	17-Jan-18	27-Apr-18	22	2	2	23-May-18	23-May-18	
16	TMK	Haji Hussain Dal	37	23	23	5-Oct-17	2-Nov-17	43	11	11	20-Mar-18	28-Mar-18	
17	TMK	Adam Panhwar	48	27	27	5-Dec-17	16-Jan-18	31	The interviews were not carried out.				
18	TMK	Haji Ghulam Nabi Shah	34	23	23	25-Oct-17	7-Dec-18	39	23 out of 39 are Hindu females. Their interviews were carried out with males. 16 out of 39 are muslim females. Their interviews were not carried out.				
19	TMK	Chaudero Sharif	61	32	32	11-Oct-17	20-Dec-17	41	10	10	10-Apr-18	19-Apr-18	
20	TMK	Haji Muhammad Siddique	34	19	17	9-Oct-17	2-Jan-18	32	11	11	7-Apr-18	17-Apr-18	
21	Badin	Moosa Junejo	52	23	23	14-Dec-17	14-Dec-17	0	Training was not completed.				
22	Badin	Tayab Sand	39	36	21	1-Jan-18	22-Jan-18	0	Training was not completed.				
23	Badin	Ghulam Hussain Jamali	40	27	22	12-Oct-17	22-Jan-18	20	The interviews were not carried out.				Group1
								0	Training was not completed.				Group2
24	Badin	Sadiq Jat	38	26	18	18-Oct-17	19-Jan-18	0	Training was not completed.				
25	Badin	Hyder Shah	52	29	27	10-Oct-17	23-Jan-18	0	Training was not completed.				
		Total	904	552	463		Total	514	188	184			

AP2-205

Appendix T3-2 Monitoring Report on Application of Appropriate Technology by Farmers (Part 2)

Monitoring Report on Application of Appropriate Technology by Farmers (Part 2)

Monitoring of farmer activity was conducted through interviews using the appropriate technology development checklist and farm observations from September 2017 to June 2018. The monitoring target was 1,418 farmers (male 904, female 514) who attended the training sessions more than two times from 24 villages for male and 16[1] villages for female farmers who completed the farmer training. The number of interviews conducted was 552 for men and 188 for women. The number of farm observations conducted was 463 for males and 184 for female farmers. The monitoring results were compiled into a monitoring report. The target technology for monitoring was the Rank A technology alone. A high practice ratio was shown in the monitoring results; however, this result is somewhat doubtful when compared with the actual situation on the ground.

To solve the issue of large sample size, which was observed in the first monitoring that targeted the pilot villages, the project reduced the sample size after the second monitoring of pilot villages and the first monitoring of surrounding villages by selecting the target farmers through random sampling from those who had participated in training sessions more than two (2) times. Moreover, the project targeted only those technologies that extension workers could check visually. The target monitoring items included 1) clean water; 2) improved tying methods, 3) simple roof, 4) dry floors, 5) colostrum, 6) heat prevention for calves, 7) BCS, 8) feeding trough cleaning, and 9) hay-making.

The results of the second and third monitoring of pilot villages are shown in Figure 1; the results of the first and second monitoring of the first group of surrounding villages are shown in Figure 2 and Figure 3; and the results of the second group of surrounding villages are shown in Figure 4.

Table 1 Number of Target Villages and Number of Valid Samples of Monitoring in Pilot Villages

	Period	Male			Female		
		No. of Target villages	No. of valid samples		No. of Target villages	No. of valid samples	
			Farm observations	Interviews		Farm observations	Interviews
First monitoring	September, 2017 to June, 2018	24	463	552	16	184	188
Second monitoring	December, 2019 to January, 2020	24	80	80	20	86	86
Third monitoring	February to March, 2021	24	78	82	20	82	87

[1] In the five villages in Badin, female training was not completed by June 2018. Therefore, those 5 villages of female were excluded from the monitoring targets.

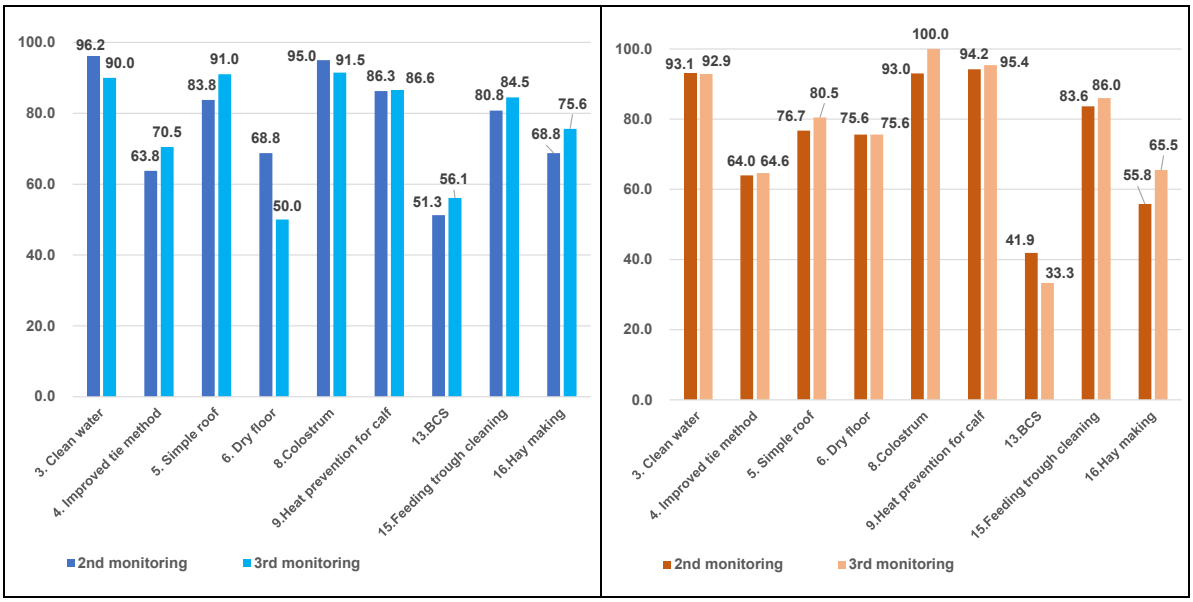


Figure 1 Results of the Second and Third Monitoring of Male Farmers (Left) and Female Farmers (Right) in the Pilot Villages

Table 2 Number of Target Villages and Number of Valid Samples of Monitoring in the First Group of Surrounding Villages

	Period	Male			Female		
		No. of Target villages	No. of valid samples		No. of Target villages	No. of valid samples	
			Farm observations	Interviews		Farm observations	Interviews
Baseline	July to December, 2018	15	155	205	14	106	175
First monitoring	January to February, 2020	15	79	80	14	80	80
Second monitoring	March to April, 2021	15	83	85	14	79	82

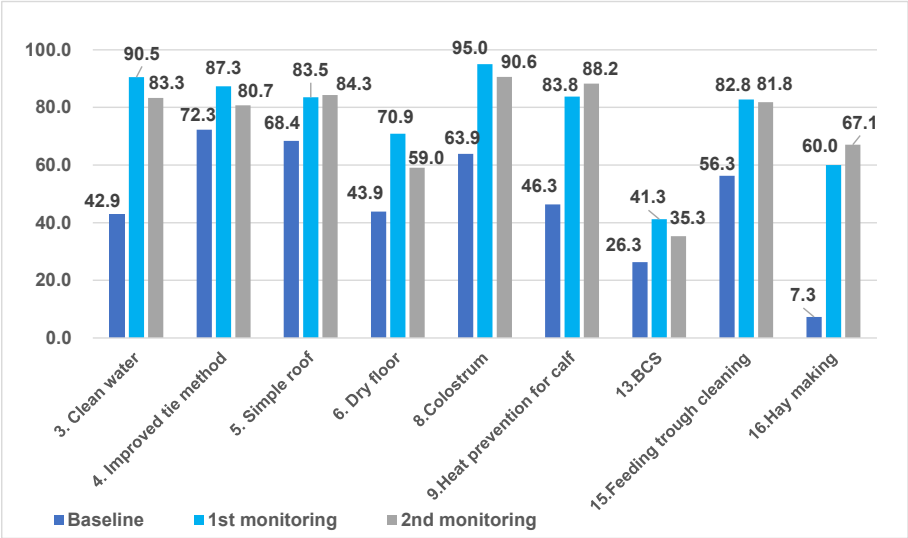


Figure 2 Results of the Baseline Survey, the First and Second Monitoring of Male Farmers in the First Group of Surrounding Villages

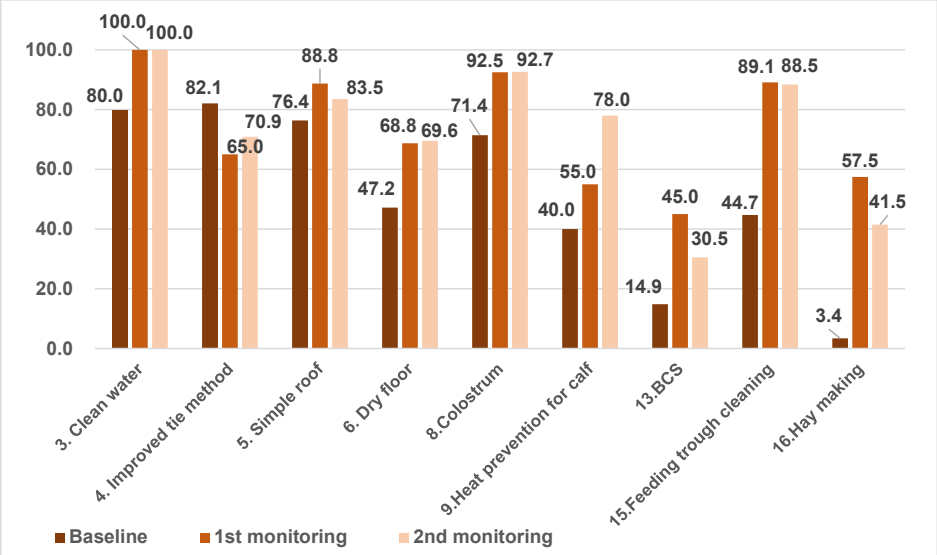


Figure 3 Results of the Baseline Survey, the First and Second Monitoring of Female Farmers in the First Group of Surrounding Villages

Table 3 Number of Target Villages and Number of Valid Samples of Monitoring in the Second Group of Surrounding Villages

	Period	Male			Female		
		No. of Target villages	No. of valid samples		No. of Target villages	No. of valid samples	
			Farm observations	Interviews		Farm observations	Interviews
Baseline	February to September, 2019	27	331	353	6	75	77
First monitoring	May, 2021	28	85	86			

(Note: After the target number of female farmers was achieved, the farmer training for female farmers in the second group of surrounding villages was stopped. The remaining time and workload of the extension team members were used for training male farmers, which did not achieve the target number at that time.)

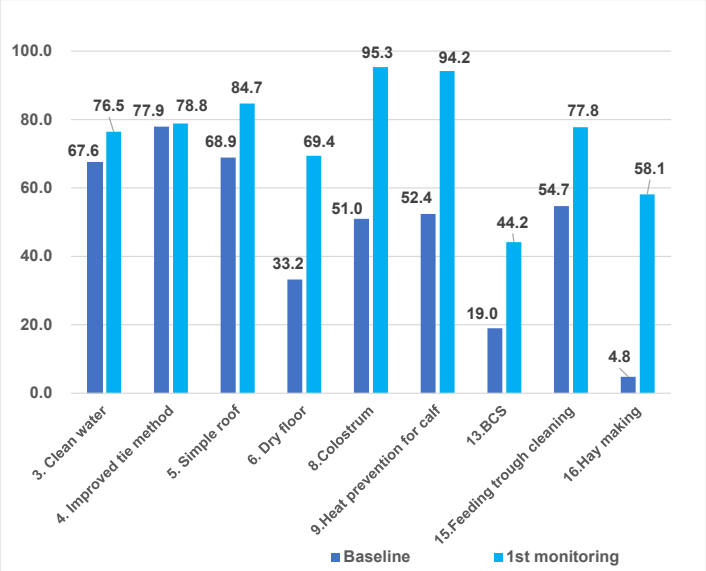


Figure 4 Results of the Baseline Survey and First Monitoring of Male Farmers in the Second Group of Surrounding Villages

Objectively Verifiable Indicator 1 is defined as "in the project districts more than 70% of the target group (excluding the pilot farmers) regularly use at least one of the nine "A" rank appropriate technologies within one year after training completion, and more than 50% even after more than one year". However, it was found that more than 50% of the target group continued to regularly use at least one of the same nine "A" rank appropriate technologies even after more than one year of training completion.

The simple average of practice ratio (%) for nine appropriate technologies in the third monitoring of the pilot villages, the second monitoring of the first group of surrounding villages, the first monitoring for the second group of surrounding villages was higher than 50%, despite the time of more than one year from training completion. The details are shown in Table 4.

Table 4 Simple Average of Practice Ratio (%) for Nine (9) Appropriate Technologies

Category	Simple Average of Practice Ratio (%)	
	Male farmer	Female farmer
Pilot village (the third monitoring)	77.3	77.1
Surrounding village, the first group (the second monitoring)	74.5	72.8
Surrounding village, the second group (the first monitoring)	75.5	N/A

One reason for the high practice ratio is that the A-rank technology is easy to practice for farmers. According to the extension team, they continued to visit the farmers after completion of training, apart from monitoring. This helped farmers retain their interest in appropriate technologies. Among the target technologies for monitoring, No.5 (colostrum), No.7 (BCS), and No.9 (Hay making) were newly introduced to the farmers by the project. The practice ratio of these technologies was drastically increased in the second group of surrounding villages. The second group of surrounding villages had already obtained some information from the first group of surrounding villages and their willingness and interest to join the farmer training was high before the project activity was started. This could be related to an increase in the practice ratio.

Appendix T3-3 Report on Selection of the Core Farmers

Report on Selection of the Core Farmers

1. Purpose of the Selection of the Core Farmer

One of Objectively Verifiable Indicator for Output 3 is *' 3-3 Effective methods for farmer-to-farmer dissemination of technologies are demonstrated.* To promote information dissemination from the farmers who attended training session to other farmers, the Project planned to select the Core Famers from active farmers.

2. Criteria of Selection of the Core Farmers

The selection criteria of the core farmers were as follows: 1) times of attendance in the farmer training sessions, 2) practice of appropriate technologies (visual inspection by the extension team), and 3) personality of the farmer.

3. Method of the Core Farmer Selection

Based on the above-mentioned criteria 1) and 2), candidate core farmers were nominated by the extension team as three to four persons for each village in 24 pilot villages. To judge criterion 3) , the extension team leader, the extension expert and each district extension team formed the interview team and conducted interviews for candidate core farmers in April and May 2018. the interview team also visited farmers' farms and confirmed how the candidate farmers were practicing what learnt. After interview and filed observation, the interview team members discussed interview results and selected the Core Farmers.

4. Result of Selection

Nineteen core farmers were selected from among 72 candidates in the 24 pilot villages. It is shown in Attachment 1. According to the interview results, every farmer disseminated information to others to some extent. In the narrow range, the core farmer disseminated information to relatives and friends. In a broad range, the core farmer disseminated information to multiple surrounding villages. In addition, the farmers of the surrounding villages visited the core farmers to obtain information.

5. Expected Challenges

Farmer-to-farmer information dissemination of appropriate technology relies on the Core Farmers' spontaneous activity through day-to-day communication with others. The Project never ask them to conduct the technical training as part of their work. The Project will carefully look at the situation how information will be disseminated to the other farmers through the Core Farmer.

Attachment 1 List of the Core Farmers

No.	District Name	Group of PF	Village name	Category	Core farmer	Relationship between PF
1	Matiari	1st	Adur Faqir Noohpoto	Core farmer	Mr. Shah Nawaz Khaibar	Neighbour of PF
2	Matiari	1st	Gul Muhammad Ghambheer	Core farmer	Mr. Shamir Ghambeer	Neighbour of PF
3	Matiari	1st	Haji Suleman Rahu	Core farmer	Mr. Hakim Rahu	PF Brother
4	Matiari	2nd	Qaiser Detho	Core farmer	Mr. Sajan Detho	Cousion of PF
5	Matiari	2nd	Punhoon Sahoowal (Group1)	Core farmer	Mr. Kadim Sahuwal (Gul Hassan Para)	Cousion of PF
6	Matiari	2nd	Punhoon Sahoowal (Group2)	Core farmer	Mr. Sodo Sahuwal (Hussain Bux para)	Neighbour of PF
7	HYD	1st	Saleh Dal	Core farmer	Mr. Mithu Kachi (Kolhi Para)	Son of PF
8	HYD	2nd	Muhammad Ibrahim Mangwano	Pilot farmer/Core farmer	Mr. Waleed Mangwano	PF himself
9	TAY	1st	Jamal Khan Bozdar	Core farmer	Mr. Samiullah Bozdar	Son of PF
10	TAY	2nd	Maqbool Ahmed Memon	Core farmer	Mr. Nazeer Arain	Neighbour of PF
11	TAY	2nd	Gazi Khan Lashari	Pilot farmer/ Core farmer	Mr. Muhammad Sultan Lashari	PF himself
12	TMK	1st	Haji Hussain Dal	Core farmer	Mr. Faiz Khandel (khandel para)	Neighbour of PF
13	TMK	2nd	Haji Ghulam Nabi Shah	Pilot farmer/ Core farmer	Mr. Faqeero Thakur(wishram para)	PF himself
14	TMK	2nd	Chaudero Sharif	Core farmer	Mr. Nazar Sattio	Brother of PF
15	TMK	2nd	Haji Muhammad Siddique	Core farmer	Mr. Ibrahim Palijo	Cousion of PF
16	Badin	1st	Tayab Sand	Core farmer	Mr. Muhammad Saleh	Son of PF
17	Badin	1st	Ghulam Hussain Jamali	Core farmer	Mr. Faheem Jamali	Nephew of PF
18	Badin	2nd	Sadiq Jat	Core farmer	Mr. Sawan Jatt	Brother of PF
19	Badin	2nd	Hyder Shah	Core farmer	Mr. Parso Kolhi	Neighbour of PF

Attachment 2 Questionnaire of the interview for the Candidate Core Famers

Date:
Name of candidate farmer:
Village name:

1. What kind of topics were new for you?
2. Which practice of the appropriate technology are you using regularly?
3.Do you recognize any difference about your animal before and after practice?
4.Have you ever share your learnings to other farmers?
5. Are you willingly to share information to other farmers, if they ask?
Note

Attachment 3 Farm Observation Sheet

Check list observation of animal farm

Date :	
Village name:	
No. of Farmer:	
Name of the Farmer:	
Name of Interviewer:	

Sr. no:	Description	score	Remarks
1	Farm ventilation		
2	Simple roof for milking cow/ buffalo		
3	Clean and dry floor		
4	Required floor space		
5	Availability of water trough and its cleanliness		
6	Clean water		
7	Availability of feeding trough and its cleanliness		
8	Availability of fodder		
9	Tie Method		
10	BCS of animal		
11	Condition of hoof		

Score=(A Good) - (B Medium) - (C Poor)

The Project on Sustainable Livestock Development
for Rural SINDH "PSLD"
(JICA Technical Cooperation)

Extension Guideline

January 2019

Extension Guideline

The third draft of Extension guideline which developed in the fourth year was revised to the final version as below, based on the result of extension activities in the fifth year.

1. Outline of Extension Activities

As a means of dissemination of appropriate technology to the farmers, the Project will provide technical training to the farmers. The Project aims at two types of technology transfer; 1) technical training by extension workers to farmers, and 2) farmer to farmer extension. For the latter, the Project assume spontaneous occurrence or voluntary activity by the first beneficiaries. The Project will disseminate appropriate technology to 3,000 farmers (2,000 male, 1,000 female) who lives in the Project area of five districts by the end of the Project.

2. Extension Structure

In provincial level, there are the Extension Leader and Social mobilizer at the Project office in Hyderabad. In district level, there are an Master Trainer (M/T) and Extension Workers (E/Ws). The Extension Team consists of the Extension Leader, Social mobilizer, M/Ts, and E/Ws while district Extension Team consists of a M/T and E/Ws. Extension structure is shown in Figure 1. Roles of each position are shown in Table1.

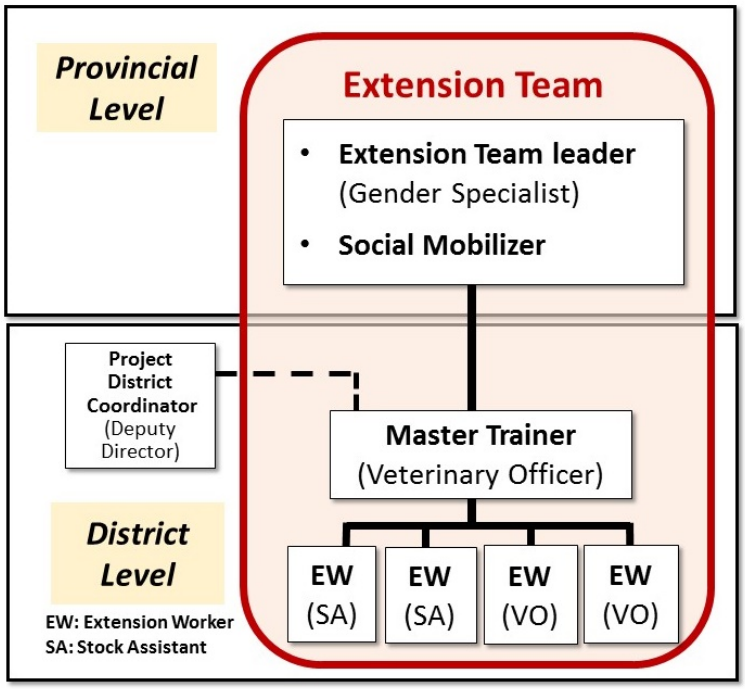


Table 1 Extension structure

Table 1 Role of Extension Staff

Position		Role
Extension C/P		
	Extension Leader (Gender C/P)	・ Develop extension materials ・ Develop training contents and make a training plan ・ Develop training contents, make a training plan, and conduct Extension Team training ・ Perform as the trainer for Extension Team training ・ Monitor activities of M/Ts and E/Ws ・ Guide to M/Ts and E/Ws including field observation ・ Check the reports from M/Ts and E/Ws ・ Submit the report to Extension/Gender Expert on training implementation and monitoring ・ Conduct meetings for extension team ・ Preparation of monthly report
	Social Mobilization C/P	・ Monitor activities of M/Ts and E/Ws ・ Submit the report to the extension leader on training implementation and monitoring ・ Conduct meetings for extension team
Master Trainer (M/T)		・ Perform as the facilitator for social map making in each village ・ Submit the report to Extension Leader on training implementation and monitoring ・ Conduct follow-up activity after Farmer Training ・ Participate meeting for extension team ・ Manage the district car ・ Share information with the Deputy Director
Extension Worker (E/W)		・ Perform as the assistant for social map making in each village ・ Perform as the facilitator for sensitization meeting in each village ・ Perform as the trainer for farmer training ・ Conduct follow-up activity after Farmer Training ・ Monitor the situation of farmers about acquisition of appropriate technologies by the appropriate technology development checklist ・ Submit the report to M/T on training implementation and monitoring ・ Participate meeting for extension team

3. Training implementation structure and number of planned beneficiaries

Target districts are five districts, Badin, Hyderabad, Matiari, Tando Allayah and Tando Muhammad Khan. The beneficiaries are those who rear one to five cattle/buffalo regularly in the Project area.

Training implementation structure is shown in Figure2. Number of planned beneficiaries is shown in Figure3. Appropriate technology will be transferred from the Project to M/Ts and E/Ws through the Extension Team training, from E/Ws to the first beneficiaries though the Farmer Training. The second beneficiaries are defined who obtain information on appropriate technologies from the Core farmers or the first beneficiaries.

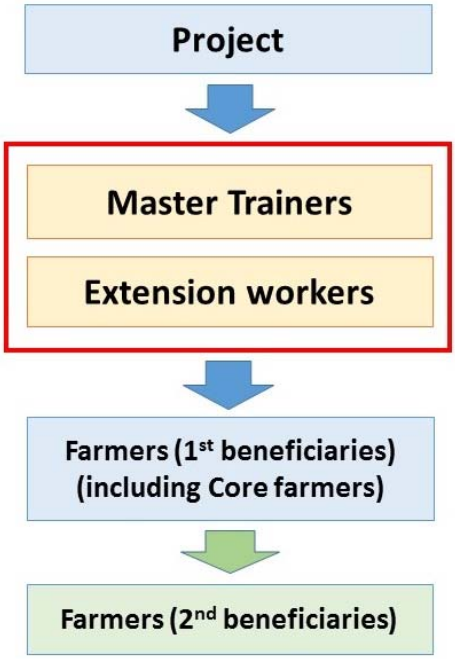


Figure 2 Training implementation Structure

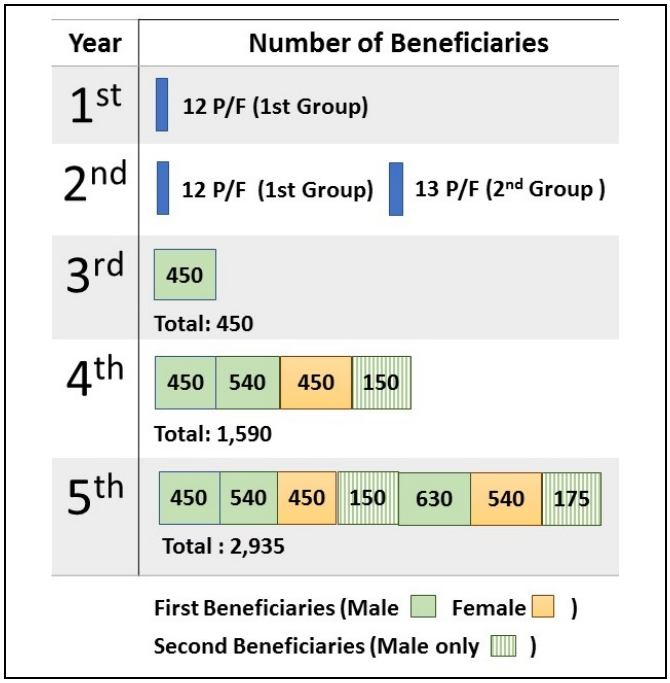


Figure 3 Number of Planned Beneficiaries

4. Principles of extension activities

Extension will be planned and conducted with the following principles, based on the results of the PRA survey.

1) Promote market consciousness of the farmers to produce good quality milk and meat.
   In some villages, the farmers add water to milk before sale since they can get more profit. The project will promote the production and sale of unadulterated milk, expecting project beneficiaries to be recognized as producers of good quality milk. One of the long-term development goals of the Project is to promote market-oriented products that meet consumers' needs, and therefore adulteration will not be accepted by the Project even if it brings short-term benefit to the farmers. Market consciousness of the farmers will be raised through the process of extension activities of the Project.
2) Identify leaders who will be supportive of the Project, and actively involve them in extension activities. The Project will need opinion leaders in the villages who can mobilize the villages for effectively disseminating the technologies.
3) Provide training to every farmer interested in training, although there should be criteria for selecting participants. The project will provide training for everyone willing to learn appropriate technologies of livestock management. The Project focuses on small-scale farmers as the project target; however, large- and medium-scale farmers will also be accepted as training participants. Nevertheless the number of trainees will have to be limited, therefore criteria for selecting the participants will be drawn up and applied.

4) Form training groups and plan training based on biradaris and paras.
   Biradaris and paras in each village will be considered when grouping training participants and planning extension activities.
5) Involve women in disseminating appropriate technologies, depending on the role of women.
   Women are also involved as the target of dissemination of appropriate technologies when they are considered to be playing an important role in livestock activities.
6) Conduct assessments of training needs for each training group, and combine the results with experts' views for planning training.
   The Project will conduct needs assessment for the training with those interested in the training. These results will be combined with the views of livestock experts, and reflected in the planning for the training.
7) Mixed-gender training will be conducted if a village allows it.
   If a village allows it, the Project will conduct mixed-gender training because it will provide a good opportunity for both men and women to learn from each other for their income generating activities.
8) Training venue to be in each village.
   Training will be conducted in the village for both men and women for their convenience. In the case of specific training for core farmers or other purposes, the training venue will be considered depending on the requirement. The venue needs to be visible and accessible for as many farmers as possible in every case.
9) The Project will not form any village organizations, but existing organizations can be utilized for the dissemination of appropriate technologies.
   If there is an existing and functioning organization in a village, it will be considered as one of the bases for disseminating appropriate technologies.

5. Village selection and expansion of extension activities

Target villages for extension activities will be selected by shortest distance from the pilot villages, considering the ability of E/Ws and the area in their charge. Number of target villages is adjusted without changing the number of planned beneficiaries as shown in above mentioned Figure 3 because the number of first beneficiaries more than planned number was achieved by extension activity of the fourth year. The number of villages allocated per extension worker in each year are shown in Table 2. These numbers include both newly selected villages and villages for follow-up.

1) In the third and fourth year, a M/T and two male E/Ws work shall be in charge of 5 pilot villages as a team.

2) In the first half of fifth year, two male E/Ws shall be in charge of new 4 villages (2 villages per a E/W) where surrounding pilot villages and follow up the 5 pilot villages for the third and fourth

year. Two female E/Ws will work as a pair and shall be in charge of the same 5 pilot villages as the male E/Ws in the third and fourth year.

3) In the second half of fifth year, two male E/Ws shall be in charge of new 4 villages (2 villages per a E/W) where surrounding villages of the first half of fifth year and follow up in total 9 villages (5 villages for the third and fourth year, and 4 villages for the first half of fifth year). Two female E/Ws will work as a pair and shall be in charge of the same 4 villages as the male E/Ws in the first half of fifth year and follow up 5 villages of the fourth year.

Table 2 Number of the Extension Team members and number of assigned villages for E/W

	Project year			Total (5 districts)	Note
	4th	5th 1st half	5th 2nd half		
Extension Team					
Master Trainer	4	4	4	4	
Extension Worker (Male)	10	10	10	10	
Extension Worker (Female)	8	8	8	8	
Number of the villages covered by E/W					
For the male farmers	25	20	20	65	No. of villages will be adjusted according to the actual number of training participants
For the female farmers	25	(25)	20	45	Villages of the 1st half of the 5th year are same as the 4th year.
For follow-up	0	25	45	45	cumulative number of previous and current period
Number of the beneficiaries (Target of monitoring)					
1st beneficiaries (male)	927	500	500	1927	4th year is actual number. 5th is assumption based on 25 farmers per village.
1st beneficiaries (female)	397	100	400	990	Expected participants number is for 1st half of the 5th year while calculated number is for 2nd half of the 5th year based on 20 participants per village.
(Core farmers, male only)	0	(24)	(20)	(44)	Core farmers will be selected among the 1st beneficiaries.
2nd beneficiaries (male only)	0	48	40	98	Assumption is two farmers per one core farmer.

Note: Target of monitoring is the farmer who attended training more than 2 sessions.

Grand total (1st beneficiaries male, female and 2nd beneficiaries)	**3,015**

6. Flow of extension activities

Extension activities will be expanded in accordance with the flow which shown in Figure 4. One cycle of extension activity from Preparation of Farmer Training to Monitoring Farmers' activity will be required about nine months per village. Model schedule of extension activity is shown in Attachment 1

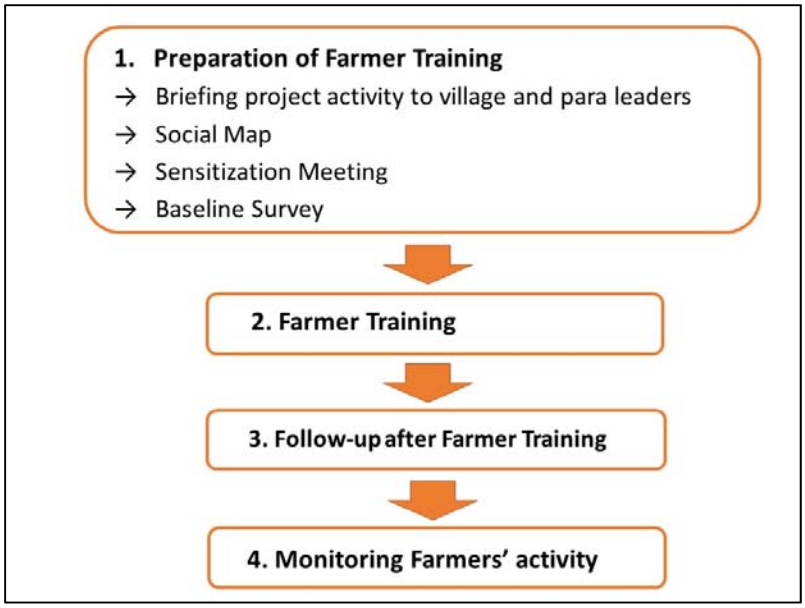


Figure 4 Flow of extension activities in the villages

1) Preparation of Farmer Training

There are four stages for preparation of the Farmer Training. First, the Extension Team briefs the Project activity to village and para leaders of new village and request them to cooperate to the Project activity. Second, Social map will be conducted to know physical and social structure of the village. Household list will also be prepared. Third, Sensitization meeting will be held to introduce the Project activity to farmers in the village. Training participants register will be taken. At last, baseline survey will be conducted to check current situation for usage of appropriate technology by the Appropriate Technology Development Checklist. Detail of each step is as follows:

a) Brief village or para leader, asking them for cooperation with project activities

Most villages have their own village leaders. For smooth implementation of extension activities, the cooperation of the village leader/para leaders is necessary. Therefore, the Project will explain about project activities to the village leaders and confirm the outline of the village situation. Then, the Project will ask them to cooperate with project activities.

b) Social Map

The Project will conduct a workshop in each village to make a social map, collect the name of household heads, and interview about training preparation. The social map is to identify the number of biradaris and paras, including their location in the village. The household list is to identify target households for the training by livestock and landholding status. This information is useful for proper grouping for training. Items for data collection by social map making are proposed in Table 3. This data can be collected in half a day, even if the target village is very large.

Table 3 Data collection by social map making

Drawing Item on the Social Map	Interview Items
1. Border of the village including roads and canals	1.Name of village leader
2. Name of surrounding villages and location	2. Name of biradari (or para) leader
3. Facilities in the village	3. Name of social workers with livestock holding status and main role for activities
4. Number of biradaris and location of paras	4. Relationship among biradaris
5. Name of the household heads of each biradari or each para	5. Relationship among surrounding villages

(Note) It is difficult to find out the name of female social workers from a survey of the whole village because attendance is normally only male. It is necessary to briefly interview women in a separate session.

On the social map-making day, only the name of household heads should be collected. After that, detailed data, such as population of each household, number of livestock and area of owned land, should be collected on another day. Items of data collection for making the household list are proposed in Table 4.

Table 4 Data collection for making household list

Details of data to be collected for making household lists	
1. Population of household (household means they have a separate kitchen from other households and a different income source)	3.Area of owned land
2. Number of livestock (only large milk animals such as buffaloes and cows; number of animals owned individually and shared should be separated.	4. Occupation (main income source)

(Note) The name of household head and name of biradaris or paras will be identified during making of the social map.

The following items in Table 5 should be collected through interviews during making the social map.

Table 5 Interview about training arrangements

Interview items
1. Role and responsibility for livestock activities (Prepare activities list before the interview. Both men and women should be asked.)
2. Possibility of conducting mixed-biradari training
3. Possibility of conducting mixed-gender training
4. Possibility of accepting a male trainer for female training
5. Suitable training timing for farmers
6. Possibility of visiting pilot farmer by other farmers

e) Conducting sensitization meetings

The Project will conduct a sensitization meeting in each village to explain the project activities and appropriate technologies. The program will consist of an introduction to the Project, contents of the project activities, and confirmation of those interested in participating in the training. During the sensitization meeting, the Project will clearly explain to the villagers what the Project can do and cannot do, to avoid the villagers having excessive expectations of the Project. The Project will provide only technical support and advice for livestock activities through training and monitoring. Apart from training materials, materials for Project introduction will be prepared. As for a resource person of the Project introduction, pilot farmers and village heads will be considered. At the end of meeting, name of farmers who willingly to attend Farmer Training will be collected as a training participants register. Then, training group will be formed and training type will be confirmed. There are three types of training: 1) Mixed- gender and separate baradari, 2) separate gender and mixed-biradari, 3) separate gender and separate biradari.

d) Baseline survey on current situation for usage of appropriate technology

Before start Farmer Training, baseline survey will be conducted to check current situation for usage of appropriate technology by the Appropriate Technology Development Checklist Questionnaire. Target of this survey is the farmer who registered for Farmer Training.

2) Farmer Training

There are eight subjects for Farmer Training; Feeding management, Animal health, Mastitis, Calf rearing, Marketing, Reproduction, Genetic improvement and Livestock Management. One cycle of Farmer training will complete once a week training in continuous eight weeks (about 2 months). Training duration is from 60 minutes to 90 minutes per a time. Other subject will be added according to necessity. The Extension Leader will confirm whether training had been implemented properly through reports from M/Ts. Guidance to the Extension Team will be given through field observation by the Extension Leader.

3) Follow-up after Farmer Training

Because of Farmer Training, the Extension Team will work at the same village once a week in continuous eight weeks. Therefore, the Extension Team will make simple questions about previous training contents to the training participants to check their level of understanding. Then the Team will also check situation of livestock management by the training participants and necessary advice will be given. Basically, E/Ws will conduct follow-up activities in the village, however, M/Ts will be involved in follow-up activities according to the level of difficulty of the issues from the farmers. Even if M/Ts could not solve the issues, the Extension Leader will ask the Technical C/P for help to give proper guidance to the farmers. If a time for follow-up activities is not enough in case of right after the training session, the Extension Team will visit that village for follow-up another time.

4) Monitoring Farmer activity

Monitoring will be conducted to measure degree of adoption of appropriate technology by the farmers using the Appropriate Technology Development Checklist Questionnaire after six months from the end of a series of training. Not only the interviews, but also actual condition of livestock farm will be checked by direct observation of E/Ws in accordance with the items in observation sheet. Monitoring will be conducted every six months.

7. Standard Operation Procedures (SOP)

The Extension C/P and M/Ts learned about SOP and developed five SOPs for extension activities during Management training (SOP Development) which held in November 2016. Then, three SOPs were developed later according to progress of extension activity. List of developed SOPs is shown in Table6. Developed SOPs are attached as Attachment 2. Those SOPs were revised according to necessity.

Table 6 List of developed SOPs

No. of SOP	Name of SOP
1	SOP for Development of Training Materials for Farmer Training
2	SOP for Social Map
3	SOP for Sensitization Meeting
4	SOP for Baseline Survey
5	SOP for Farmer Training
6	SOP for Follow-up after Farmer Training
7	SOP for Monitoring Farmers' activity
8	SOP for Car management

8. Reporting and Monitoring Structure

Flow of reporting and information sharing system on extension activities is shown in Figure 5. In Figure 5, flow of order and flow of reporting are shown by solid arrows and break arrows respectively. Details of each step are shown in Attachment 3.

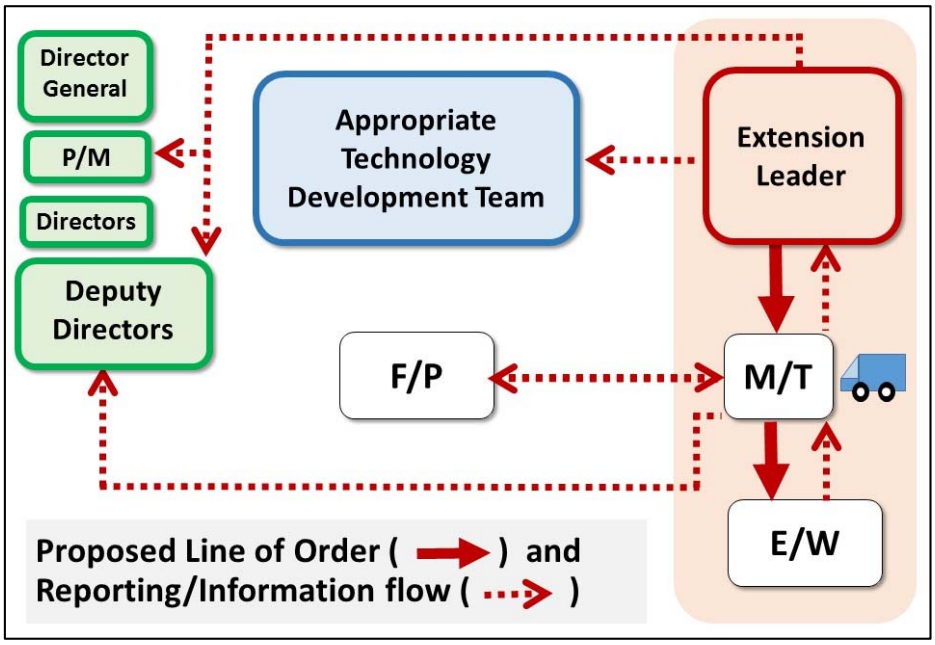


Figure 5 Flow of reporting and information sharing on extension activities

For example, when the Project conducts Farmer Training, the Extension Leader order to M/Ts for training implementation according to the line of order which shown by the solid arrow in Figure 5. Then, M/Ts will order to E/Ws. M/Ts will only share the training schedule to the Deputy Director (D/D) of assigned district.

After the training implementation, E/Ws will submit a training implementation report to M/Ts following by flow of the break arrow. M/Ts will compile the report from E/Ws and submit to the Extension Leader. The Extension Leader will share contents of reports to the Appropriate Technology Development Team and D/D. There is no direct line between M/Ts and D/D for the order. Therefore, M/Ts will only share training schedule to D/D as a part of information sharing. Training implementation report to D/D will be made by the Extension Leader. There is no obligation to share information between F/P and M/Ts officially. They could share information and experience freely without permission from the Project.

9. Extension Materials

The Project will develop extension materials as shown in Table 7. It consists of four categories; 1) text book for extension team, 2) teaching guide for extension team, 3) materials for teaching the farmers, and 4) handbook for extension team. Extension materials will be developed under collaboration with the appropriate technology team and the extension team.

In particular, materials for teaching the farmers will cover the necessary information, are visually attractive, and will be enjoyable to learn from. In the villages, there is a big gap in the education level. Only a few women can read. The level of understanding is different between educated villagers and non-educated villagers.

Table 7 Outline of Extension Materials

Extension materials	Outline
1) Textbook for Extension Team	Textbook title is 'Textbook for Appropriate Technology of Dairy Farming for Extension Team'.
2) Teaching Guide for Extension Team	This is a reference for extension team when they give technical guidance to farmers. Contents will be simplified for extension workers.
3) Materials for Teaching the Farmers	Flip charts, posters, pamphlet, reproduction calendar, tape of measurement of body weight etc. It will be distributed to Farmers according to necessity.
4) Handbook for Extension Team	Compiled useful information for extension team such as the appropriate technology development checklist, veterinary services in each district etc.

10. Capacity building of the Extension Team

For the Extension C/P, four skills are required: 1) technical skill, 2) understanding for Extension activities, 3) ability in guidance, and 4) report writing. Items of Capacity Development for the Extension C/P are shown in Table 8.

Table 8 Items of Capacity Development for the Extension C/P

No.	Items of Capacity Development	Contents
1	Technical skill	Understanding of Textbook for Appropriate Technology of Dairy Farming for Extension Team
2	Understanding for Extension activities	Understanding of Extension Guideline, SOPs and Handbook for Extension Team
3	Ability in guidance	Understanding of Teaching Guide for Extension Team and preparation of model answers for frequently asked questions about Extension activity
4	Report writing	Document preparation and data analysis by a computer.

For the Extension Team, three skills are required: 1) technical skill, 2) understanding for Extension activities, and 3) report writing. Items of Capacity Development for the Extension Team are shown in Table 9.

Table 9 Items of Capacity Development for the Extension Team

No.	Items of Capacity Development	Contents
1	Technical skill	Understanding of Textbook for Appropriate Technology of Dairy Farming for Extension Team

2	Understanding for Extension activities	Understanding of Extension Guideline, SOPs and Handbook for Extension Team
3	Report writing	Daily activity report

It will be pay attention to enhance capacity further for the Extension Team members who were worked as veterinarian or para-vet before joining in the Project activity. In the fourth year, technical training such as vaccination and drenching will be conducted through the Extension Team training under collaboration with the Appropriate Technology Development Team. Orientation training will be conducted for ten of newly-recruited female E/Ws. The Project will provide both technical training and management training such as project orientation, team building, appropriate technology, on the job training at the pilot farms, to newly-recruited staff as same as previous orientation training. For report writing, it is recommendable to use a computer, however, it is not obligation for the Extension Team.

The Extension Leader will organize the extension team meeting once a month at the Project office. Then, progress and challenges of extension activities will be shared among the extension staff. Participants are the Extension Leader, Social mobilizer, M/Ts and E/Ws.

11. Village classification for future extension

The Project attempts to classify the villages according to their characteristics to find the ways to standardize future extension for each classification. Figure 6 is one of the examples of classification of the villages. It shows closeness among the biradaris of nine surveyed villages. One box either blue or yellow shows one biradari, and a distance between two boxes shows their closeness or apartness. For example, in the village number six, the blue and yellow boxes are near. This means that Muslim biradari and Hindu biradari have close relationship, indicating the technology transfer between the two biradaris would be possible. On the other hand, when a biradari is located far from the other biradaris, the training should be conducted at each biradari since no farmer-to-farmer extension could be expected.

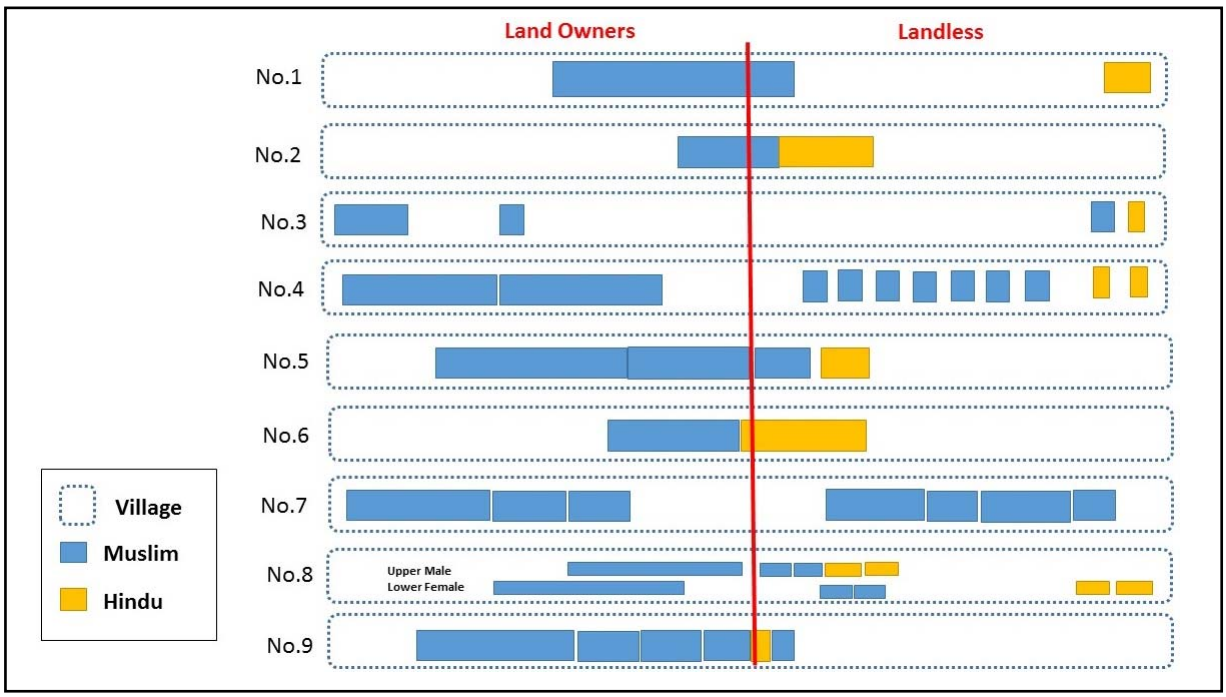


Figure 6 Example of village classification for future extension

12. Selection and training of core farmers

From 25 pilot villages, 19 core farmers were selected based on criteria. Criteria are following 3 points 1) times of attendance to training sessions, 2) situation of appropriate technology adoption and 3) personality. The Project developed 'Basic information for the core farmers' as a text book for the core farmers. Three days training program for the core farmers as refresher course was also developed. Core farmer training and activity by the core farmers will be implemented in extension period of the fifth year. The core farmers will be selected in surrounding villages after completion of Farmer training.

13. Extension for female farmers

Farmer Training for female farmers has been conducted very smoothly by the female extension workers. Female farmers show high repeating ratio than male farmers and achieve the project target earlier than male farmers despite delay of assignment of female extension workers to the Project.

Attachment 1 Model schedule for Extension activity

	Month	January					February				March				April				May					June				July					August				September			
	Month	1st month					2nd month				3rd month				4th month				5th month					6th month				7th month					8th month				9th month			
	Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
1. Preparation of farmar training	Required day																																							
a) Briefing to the village head	1day	★																																						
b) Social map	1day		★																																					
c) Sensitization meeting	1day			★																																				
d) Baseline survey	3~4days				★	★																																		
2. Farmer training	1day						★	★	★	★	★	★	★	★																										
3. Follow up	1~2days per month															★				★					★				★					★							
4. Monitoring	3~4days																																				★	★	★	★

Attachment 2 (SOP for Extension Activity 1)

	**Livestock and Fisheries Department.** **Project: Project Sustainable livestock development.**	**SOP #**	01
		Revision #	02
		Implementation Date	25-Nov-2016
Page #	1 of 2	**Last Reviewed/Update Date**	21-Jan-2019
SOP Author	Dr. Anisa Soomro	**Approval**	N/A

Development of Training Materials for Farmer Training

1. Purpose

To develop effective and understandable training materials for farmers

2. Scope

This SOP will be applied on all training materials for Farmer Training

3. Implementation Structure

This SOP will be implemented by Extension Leader and Master Trainers.

4. Responsibilities

Extension Leader and Master Trainer are responsible for developing Training Materials for Farmer Training

5. Prerequisites

Textbook

6. Procedure

Step1 Training program should be prepared.
Step2 Think story line for training subject based on Textbook
Step3 Choose suitable pictures for the story line and think suitable description for each picture.
Step4 Compile pictures and its descriptions in a table as talking notes.
Step5 Take some pictures from field and put into the talking notes, if necessary.
Step6 Arrange the picture format for panaflex printing
Step7 Send picture data to printing company for panaflex printing

7. Expected Results

Panaflex for Farmer Training, List of training materials with talking notes and training program

8. References

Text book

9. Definitions

1. **Text book**- Textbook for Appropriate Technology of Dairy Farming for Extension Team
2. **Panaflex**- Banner material
3. **Extension Leader**- -A person who is the head of extension activity. For PSLD project, it is Gender specialist.
4. **Master Trainer**- A person who monitor farmer training and extension related activities in the village.

Attachment 2 (SOP for Extension Activity 2)

PSLD	**Livestock and Fisheries Department.** **Project: Project Sustainable livestock development.**	**SOP #**	01
		Revision #	01
		Implementation Date	25-Nov-2016
Page #	1 of 2	**Last Reviewed/Update Date**	17-Nov-2016
SOP Author	Dr. Farzana Ayaz	**Approval**	N/A

Social Map

1. Purpose

To collect necessary data about physical and social structure of the target village

2. Scope

This SOP will be applied on Social Map making in the villages of five pilot districts, Hyderabad, Matiari, Tando Allahyar, Tando Muhammad Khan and Badin

3. Implementation Structure

This SOP will be implemented by Extension Leader, Social mobilizer and Extension Team.

4. Responsibilities

Extension Team facilitates Social map making, collect necessary data, and report to Extension Leader.
Extension Leader and Social mobilizer monitor the performance of Extension Team.

5. Prerequisites

Notes, stationary and registration forms for household list

6. Procedure

1. Extension Leader contacts with Extension Team to make appointment.
2. Master Trainer contacts with key person in the village. (If the key person has conflict with other villagers, Extension Team communicates with other villagers directly.)
3. The key person ask other farmers for suitable date, time and venue. Then, he/she informs to Master trainer.
4. Master trainer communicates with Extension Leader for date, time and venue.
5. Extension Team conducts Social map at the village.
6. During Social map making, Extension Team should collect data carefully.

7. After completion of Social map making, Master trainer submits a report to Extension Leader.

.

7. Expected Results

1. Social Map of the village
2. Household list

8. References

1. Extension Guideline

9. Definitions

1. **Extension Leader**- -A person who is the head of extension activity. For PSLD project, it is Gender specialist.
2. **Extension Team**-Master Trainers and Extension Workers

Attachment 2 (SOP for Extension Activity 3)

PSLD	**Livestock and Fisheries Department.** **Project: Project Sustainable livestock development.**	**SOP #**	01
		Revision #	01
		Implementation Date	25-Nov-2016
Page #	1 of 2	**Last Reviewed/Update Date**	21-Jan-2019
SOP Author	Dr. Anisa Soomro	**Approval**	N/A

Sensitization Meeting

1. Purpose

To introduce project activity to farmers to prepare training register

2. Scope

This SOP will be applied for sensitization meeting in five pilot districts, Hyderabad, Matiari, Tando Allahyar, Tando Muhammad Khan and Badin

3. Implementation Structure

This SOP will be implemented by Extension Leader, Training specialist, Social mobilizer and Extension Team.

4. Responsibilities

Extension Team makes appointment with a village and facilitates the sensitization meeting and collects necessary data. Extension Leader develops the sensitization materials. Extension Leader and Social mobilizer monitor the sensitization meeting.

5. Prerequisites

List of sensitization material, meeting program, panaflex for sensitization meeting, stationary and registration forms

6. Procedure

Points to be consider before planning meeting

1. Facilitator must be follow the cultural norms, customs, Religious behavior of Villagers and assure their dress cord and attitude with the villagers

2. Extension Team ensures the Routine/seasonal activities of the farmers.

Conducting Meeting

1. Extension leader contacts Extension Team to make an appointment for sensitization meeting at the village.
2. Extension Team contacts the key person in the village. (If the key person has conflict with other villagers, Extension Team communicates with other villagers directly.)
3. Master trainer informs Extension Leader about training time and venue.
4. Extension Team conducts sensitization meeting at the village. For female farmers, female extension workers should conduct sensitization meeting.
5. During the meeting, Extension Team shows the panaflex to give information about project activities and motivate farmers to attend the training.
6. At the end of session, Extension Team should collect the name of farmers who have buffaloes/cows and take interest in attending a training session as a training register.

After Meeting

After completion of the sensitization meeting, Extension Team should make the report and submit to Extension Leader

7. Expected Result

1. Training register

8. References

1. Extension Guideline

9. Definitions

1. **Extension Leader**- -A person who is the head of extension activity. For PSLD project, it is Gender specialist.
2. **Extension Team**-Master Trainers and Extension Workers

Attachment 2 (SOP for Extension Activity 4)

PSLD	**Livestock and Fisheries Department.** **Project: Project Sustainable livestock development.**	**SOP #**	01
		Revision #	0
		Implementation Date	25-Nov-2016
Page #	1 of 2	**Last Reviewed/Update Date**	21-Jan-2019
SOP Author	Dr. Anisa Soomro	**Approval**	N/A

Baseline Survey

1. Purpose

To check current practice ratio of farmers about livestock management and condition of farms before starting the Farmer Training

2. Scope

This SOP will be applied for Baseline survey

3. Implementation Structure

This SOP will be implemented by Extension Leader and Extension Team

4. Responsibilities

- Extension Team is responsible for conducting Baseline Survey and submits questionnaire and observation sheet of the farm to Extension Leader.
- Extension leader is responsible for compiling the data from Extension Team

5. Prerequisites

- Questionnaire
- Observation sheet

6. Procedures

1. Extension Team makes an appointment with farmer using mobile phone and set the day, time and venue.
2. Master trainer informs Extension Leader about the schedule.
3. Extension Team confirms the schedule before a day from farmer in case of emergency/postponed.
4. Extension Team checks vehicle/motor bike and its fuel before going to the village.
5. Extension Team should reach before 15 minutes at the village.
6. Extension Team conducts baseline survey for the farmers who registered in the training register
7. Master trainer submits all questionnaires and observation sheets to Extension Leader.

7. Expected Results

1. Current situation of the farmer and farms will be identified.

8. References

1. Appropriate technology development check list

9. Definitions

1. **Appropriate technology development check list**-List of 50 appropriate technologies with Rank A, B, C which developed by the Project
2. **Questionnaire** (Appropriate technology development check list questionnaire) a questionnaire for the farmers which focused Rank A appropriate technologies.
3. **Observation sheet** -Check list for observation of animal farm
4. **Training register**- A list of the farmers' name who registered to attend the farmer training during sensitization meeting.
5. **Extension Leader**- -A person who is the head of extension activity. For PSLD project, it is Gender specialist.
6. **Extension Team**-Master Trainers and Extension Workers

Attachment 2 (SOP for Extension Activity 5)

	**Livestock and Fisheries Department.** **Project: Project Sustainable livestock development.**	**SOP #**	01
		Revision #	0
		Implementation Date	25-Nov-2016
Page #	1 of 2	**Last Reviewed/Update Date**	21-Jan-2019
SOP Author	Master Trainers Dr. Mubeen Soomro, Dr. Kabir Kalhoro, Dr. Farooq Pathan, Dr. Iqbal Memon	**Approval**	N/A

Farmer Training

1. Purpose

To disseminate appropriate technologies to small scale livestock farmers for an increase in milk production and assets for their livelihood.

2. Scope

This SOP will be applied for Farmer Training in 8 subjects, Feeding management, Livestock management, Animal health, Mastitis, Body measurement and BCS, Reproduction and genetics, Calf rearing and Marketing.

3. Implementation Structure

This SOP will be implemented by Extension Leader and Extension Team

4. Responsibilities

- Extension worker is responsible for conducting Farmer Training and submit training implementation report to Master trainer.
- Master trainer is responsible for monitoring Extension workers' activity and submit monitoring report to Extension Leader

5. Prerequisites

- Training pictorial material (panaflex)
- Reporting proforma
- Attendance sheet
- Necessary stationaries and materials for demonstration/activity during the training session such as Mastitis kit, flip charts and markers
- Note book
- Pen

6. Procedures

1. Extension Team makes an appointment with farmer using mobile phone and set the day, time and venue.
2. Master trainer informs Extension Leader about the schedule.
3. Extension Team confirms the schedule before a day from farmer in case of emergency/postponed.
4. Extension Team checks vehicle/motor bike and its fuel before going to the village.
5. Extension worker should reach before 15 minutes at the selected venue.
6. Extension worker conducts training based on the talking notes which prepared by SOP1.
7. While extension worker is conducting training, Master trainer monitors Extension worker's performance. However, if training sessions are conducted in different places in same time, Master trainer may choose which training session should be monitored.
8. After completion of training session, extension worker should prepare training implementation report and submit to Master trainer.
9. Master trainer should prepare training monitoring report and submit to Extension leader together with training implementation report from Extension worker.

7. Expected Results

1. Implementation of proper feeding.
2. Less wastage of feeding.
3. Data of fodder will be collected with the help of seasonal calendar.

8. References

1. Extension Guideline
2. Text book

9. Definitions

1. **Text book**- Textbook for Appropriate Technology of Dairy Farming for Extension Team
2. **Extension Leader**- -A person who is the head of extension activity. For PSLD project, it is Gender specialist.
3. **Extension Team**-Master Trainers and Extension Workers

Attachment 2 (SOP for Extension Activity 6)

PSLD	**Livestock and Fisheries Department.** **Project: Project Sustainable livestock development.**	**SOP #**	01
		Revision #	0
		Implementation Date	25-Nov-2016
Page #	1 of 2	**Last Reviewed/Update Date**	21-Jan-2019
SOP Author	Dr. Anisa Soomro	**Approval**	N/A

Follow-up after Farmer Training

1. Purpose

To give technical guidance to the farmers after Farmer Training

2. Scope

This SOP will be applied for Follow-up after Farmer Training

3. Implementation Structure

This SOP will be implemented by Extension Leader and Extension Team

4. Responsibilities

- Extension Team is responsible for conducting follow-up after Farmer Training and sharing their findings to Extension Leader.
- Extension leader is responsible for giving necessary advice to Extension Team

5. Prerequisites

Question guide for follow-up

6. Procedures

1. Extension team should visit the target villages once or twice a month after completion of Farmer Training. The visiting schedule can be arranged by the Extension team flexibly without permission from Extension Leader.
2. Extension Team reports their findings to Extension Leader.

7. Expected Results

1. Farmers can remember and practice what they have learnt during Farmer Training

8. References

1. Teaching guide for Extension Team

9. Definitions

1. **Teaching guide for Extension Team**- A guide book which explained about extension activity. Question guide for follow-up is included.
2. **Extension Leader**- -A person who is the head of extension activity. For PSLD project, it is Gender specialist.
3. **Extension Team**-Master Trainers and Extension Workers

Attachment 2 (SOP for Extension Activity 7)

	**Livestock and Fisheries Department.** **Project: Project Sustainable livestock development.**	**SOP #**	01
		Revision #	0
		Implementation Date	25-Nov-2016
Page #	1 of 2	**Last Reviewed/Update Date**	21-Jan-2019
SOP Author	Dr. Anisa Soomro	**Approval**	N/A

Monitoring Farmers' activity

1. Purpose

To find out practice ratio of the farmers on appropriate technology Rank A after six months from the end of a series of trainining

2. Scope

This SOP will be applied for Monitoring Farmers' activity

3. Implementation Structure

This SOP will be implemented by Extension Leader and Extension Team

4. Responsibilities

- Extension Team is responsible for conducting monitoring farmers' activity and submits questionnaire and observation sheet of the farm to Extension Leader.
- Extension leader is responsible for compiling the data from Extension Team

5. Prerequisites

- Questionnaire
- Observation sheet

6. Procedures.

<u>This activity should be started after six months from the end of a series of training sessions</u>

1. Extension Team makes an appointment with farmer using mobile phone and set the day, time and venue.
2. Master trainer informs Extension Leader about the schedule.
3. Extension Team confirms the schedule before a day from farmer in case of emergency/postponed.
4. Extension Team checks vehicle/motor bike and its fuel before going to the village.
5. Extension Team should reach before 15 minutes at the village.

6. Extension Team conducts monitoring the farmer who attended Farmer Training more than two times.
7. Master trainer submits all questionnaires and observation sheets to Extension Leader.

7. Expected Results

1. Practice ratio of the farmers will be identified.

8. References

1. Appropriate technology development check list

9. Definitions

1. **Appropriate technology development check list**-List of 50 appropriate technologies with Rank A, B, C which developed by the Project
2. **Questionnaire** (Appropriate technology development check list questionnaire) a questionnaire for the farmers which focused Rank A appropriate technologies.
3. **Observation sheet** -Check list for observation of animal farm
4. **Training register**- A list of the farmers' name who are registered to attend the farmer training during sensitization meeting.
5. **Extension Leader**- -A person who is the head of extension activity. For PSLD project, it is Gender specialist.
6. **Extension Team**-Master Trainers and Extension Workers

Attachment 2 (SOP for Extension Activity 8)

PSLD	**Livestock and Fisheries Department.** **Project: Project Sustainable livestock development.**	**SOP Number**	01
		Revision Number	02
		Implementation Date	25-Nov-2016
Page Number	**1 of 3**	**Last Reviewed/Update Date**	21-Jan 2019
SOP Author	**Master Trainers** **Dr. Mubeen Soomro, Hyderabad** **Dr. Kabir Kalhoro, Badin** **Dr. Farooq Pathan, Matiari** **Dr. Iqbal Memon, TMK**	**Approval**	N/A

CAR MANAGEMENT

1. Purpose

To make sure the car is available in good condition for travelling and effective manner to be taken for the safety of car.

2. Scope

Car management-SOP is benefited for each master trainer and driver to carry out the project activities within the nominated districts (Hyderabad, Tando Allahyar, Tando Muhammad Khan, Matiari, Badin), smoothly, timely and without anxiety.

3. Implementation Structure

Car management will be implemented under the supervision of Project Manager, Deputy Director, Master Trainer, Female Extension worker and Driver.

4. Responsibilities

Project Manager is responsible for issuing budget for car management.
Master Trainer is responsible for checking the implementation of car management and report to the Extension Team Leader and the Project Manager
Female Extension worker is responsible for using the car to go to the villages only with the permission from the Master Trainer.
Driver is responsible for car management.

5. Prerequisites

- Driver License
- Registration book of the car
- Car manual (Ref-01)
- Logbook
- Car tool kit
- Spare tire

6. Procedure

RULES TO FOLLOW THE PROCEDURE

1. Master Trainer will only use the car with driver.
2. Car manual will be followed (Ref-01)
3. Use safe route to travel at destination.
4. Don't cross the speed of 70km/hour.
5. Park car at safe side in the villages.

6.1 REGULAR CASE PROCEDURE

1. Checking of car will be done by driver. (According to the check list)
2. Get fuel from nearby filling station selected by project manager.
3. Examine the car on the mileage of 1,000 KM, 5,000 KM and 10,000 KM at Pak Suzuki Official workshop at Zeeshan Autos at Auto Bhan Road near Railway Crossing Latifabad for oil change, tuning of fuel system and detailed checking. Vehicles shall be maintained and repaired there in consultation with the Project Manager.
4. Reach back at district office before 4:00 PM and Park the car at district office.
5. Note routinely the mileage travelled in logbook.

6.2 EMERGENCY CASE PROCEDURE

1. Take safety measure in the case of accident and reach at nearby hospital as quick as possible and inform for help to focal person/deputy director and inform to the farmers.
2. Inform to farmer and extension supervisor in the case of late due to the reason of other car problem and take immediate steps to resolve it.

6.3 CONDITIONAL CASE PROCEDURE

1. In the case of security risk of car parking at district office, master trainer discuss with project manager and deputy director for counter measures.
2. For emergency maintenance, Mater trainers need to discuss with the Project manager for deal.

7. Expected Results

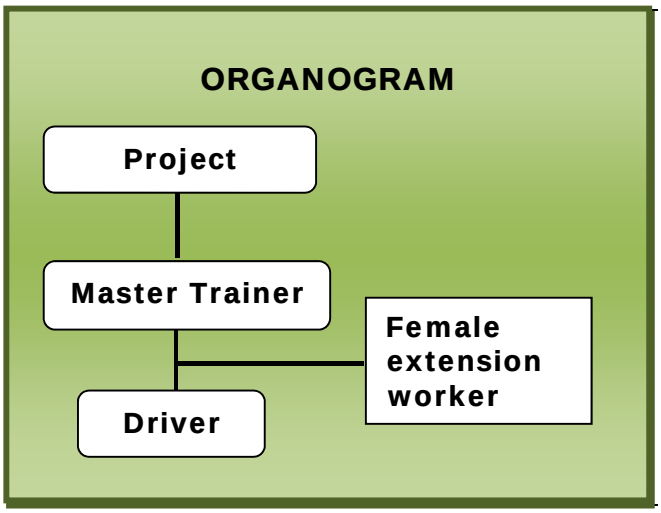
1. Car will be in good travelling condition all the time.
2. Less chances of fatigue and accidents.

8. References

- Ref-1 Car manual provided by Suzuki cars.

9. Definitions

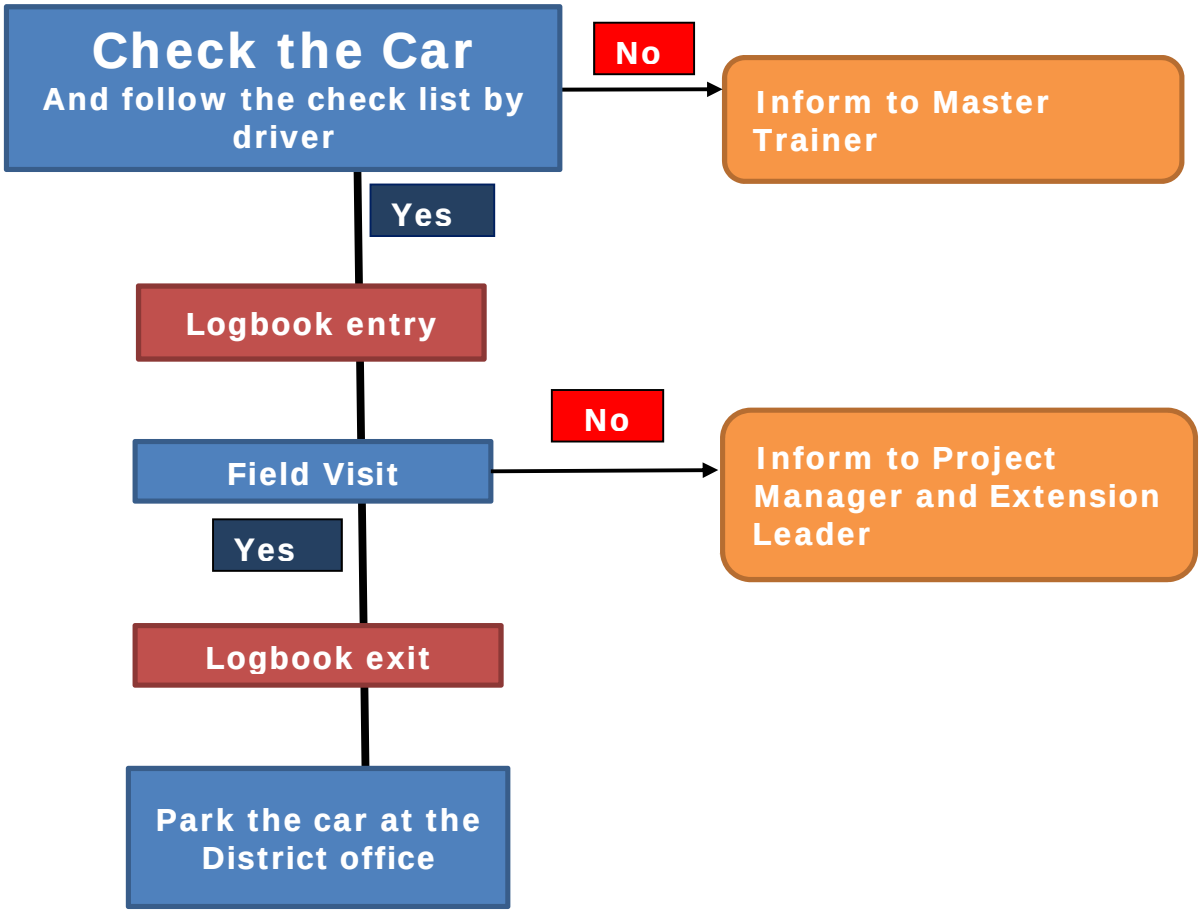
1. **Extension Leader**-A person who is the head of extension activity. For PSLD project, it is Gender specialist.
2. **Master Trainer**- A person who monitor farmer training and extension related activities in the village.



Check List

S.no	Items
1	Daily cleaning of car.
2	Check fuel
3	Engine oil
4	Water in radiator
5	Break oil

FLOW CHART



Attachment 3 Summary of Reporting and Information Flow on Extension Activity

S #	From	To	What	When	Frequency	By what mean
1	Extension Worker	Master Trainer	1. Training implementation report 2. Sensitization meeting(female) report (Female E/W only) 3. Questionnaire and observation sheet for monitoring	After the completion of activities	After the completion of activities	1. Prescribed Proforma in Sindhi Submission by hand 2. Cell phone (Emergency case only)
2	Master Trainer	Extension Leader	1. Social Mapping report 2. Sensitization meeting (male) report 3. Monitoring report on extension activity 4. Questionnaire and observation sheet for monitoring	Every Thursday	Once a week	Prescribed Proforma, Email, by hand (Phone Call and SMS are emergency case only.)
3	Master Trainer	Extension Leader	Weekly schedule for next week	Every Thursday	Once a week	Hard copy, by phone
4	Master Trainer	Deputy Director	Weekly schedule for this week	Every Monday	Once a week	Hard copy and visit
5	Master Trainer	Project Manager / Extension Leader	Logbook	Every extension team meeting	Once a month	By hand
6	Social Mobilizer	Extension Leader	1. Monitoring report on extension activity	Within the one day after the completion of monitoring	Within the one day after the completion of monitoring	Through email in word document or hard copy
7	Extension Leader	Project Manager / Deputy Directors	Monthly report	the first week of the month	Once a month	Hard copy
8	Extension Leader	1. Appropriate Technology Development Team 2. Project Manager	Reporting of all extension activities in pilot district	Every Friday	Once a week	Sharing information in weekly CP meeting