パキスタン国
シンド州畜産局

パキスタン国
シンド州持続的畜産開発プロジェクト

業務完了報告書
（別添資料２）

2021年8月

独立行政法人
国際協力機構（JICA）

株式会社かいはつマネジメント・コンサルティング

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目次

別添資料 **Z1-1 削蹄ワークショップマニュアル**

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.

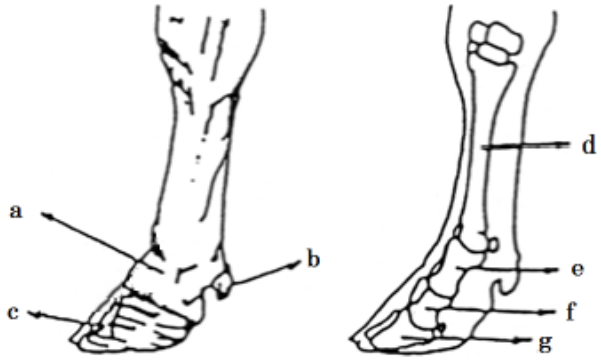
There are no cases of periodical hoof cutting in Sindh province.

Therefore the PSLD is verifying this in two pilot farmers.

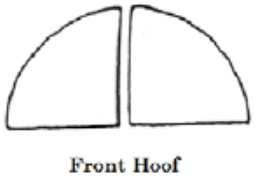
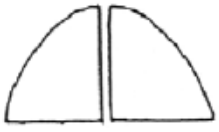
The advantage of periodical hoof cutting are (1) short time. (2) easy work (3) animal can reduce maximum stress of their weight.

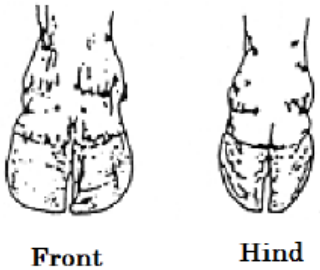
II. Hoof Cutting Technique

1. Anatomy and name of cattle leg.

<table>
<tr>
<td> 
</td>
<td>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</td>
</tr>
<tr>
<td>Anatomy and name of cattle leg.</td>
<td></td>
</tr>
</table>

2. Shape of cattle hoof

<table>
<tr>
<td> 
Front Hoof
 
Hind Hoof</td>
<td>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.</td>
</tr>
</table>

 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.

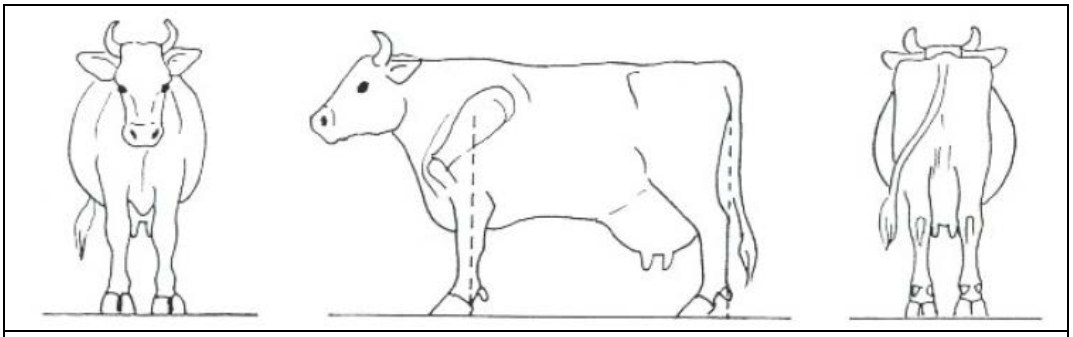
3.1 Observation standing position

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.

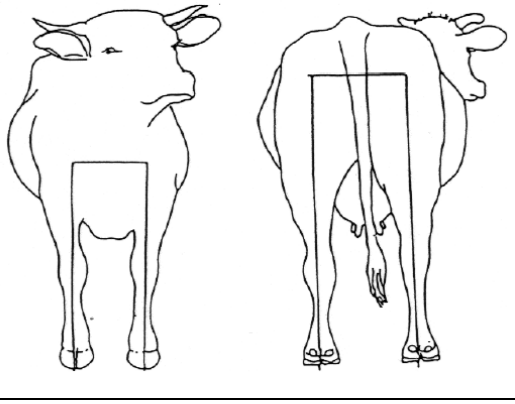
(1) Standard conformation



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.

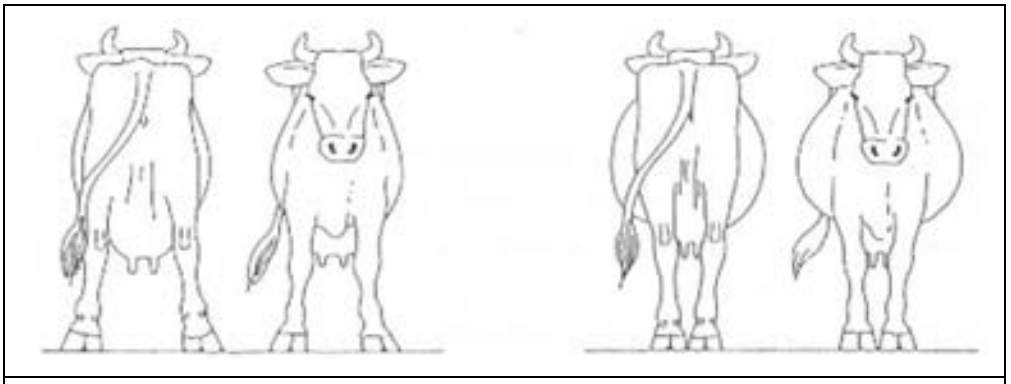


Figure

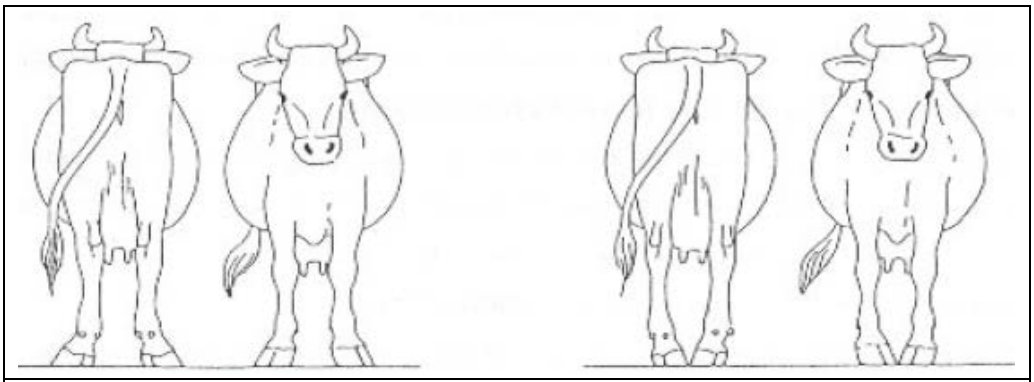
In the good shape of cattle legs when standing, 4 legs, both front and hind legs should be looked straight. The distance between claws should be 2-2.5 times width of the claw in front legs, and 3 times in hind legs.

(2) Abnormal conformation

Conformation viewed from front and back

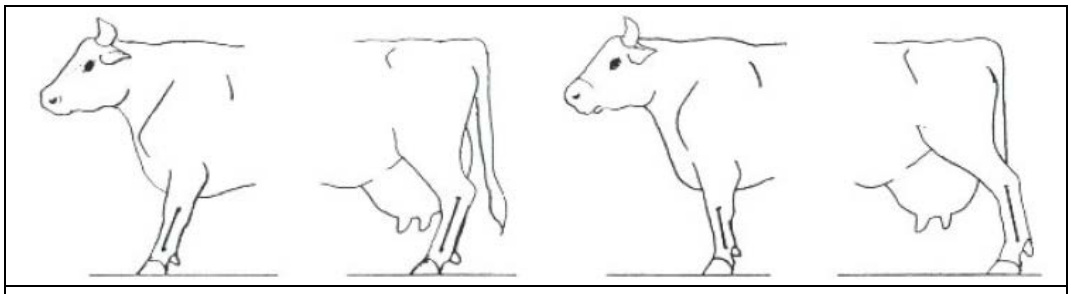


広踏肢勢 base-wide　　狭踏肢勢 base-narrow

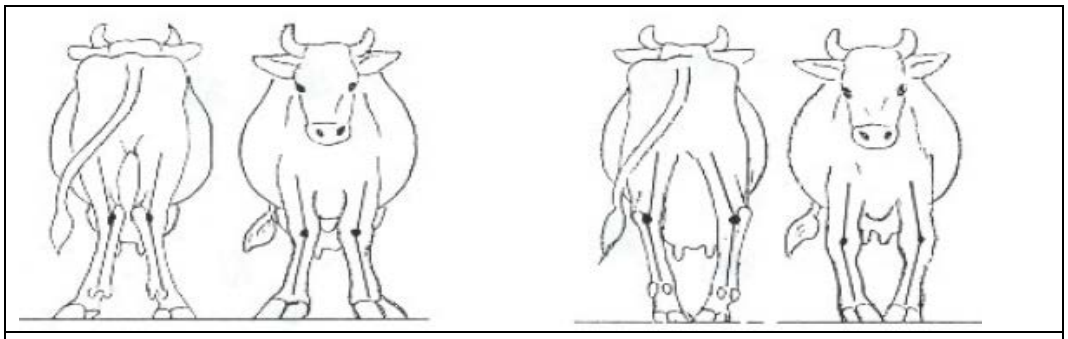


外向肢勢 toe-out　　内向肢勢 toe-in

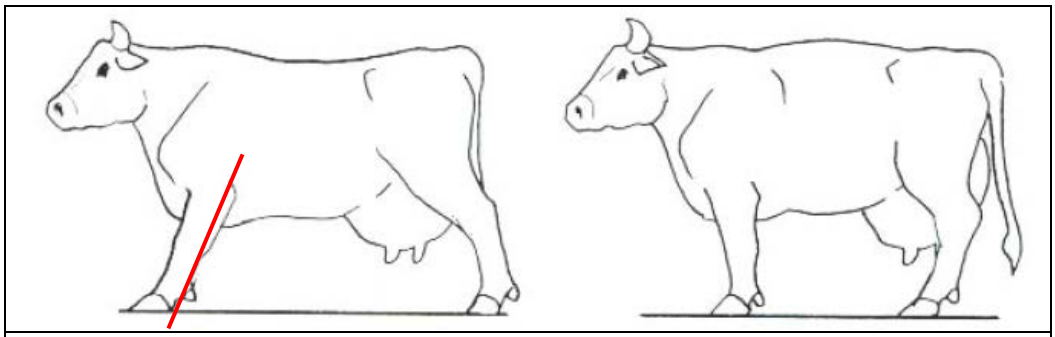
conformation viewed from the side



前踏肢勢 front inclination　　後踏肢勢 rear inclination



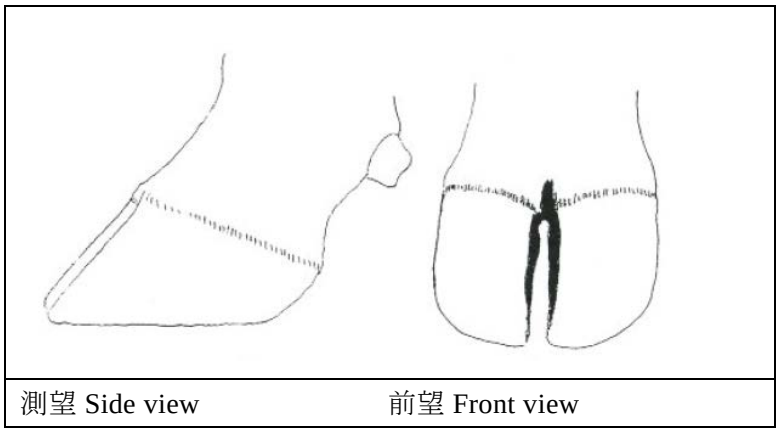
Valgus cow-hocked　knock-kneed　　valgus (bow-legged)



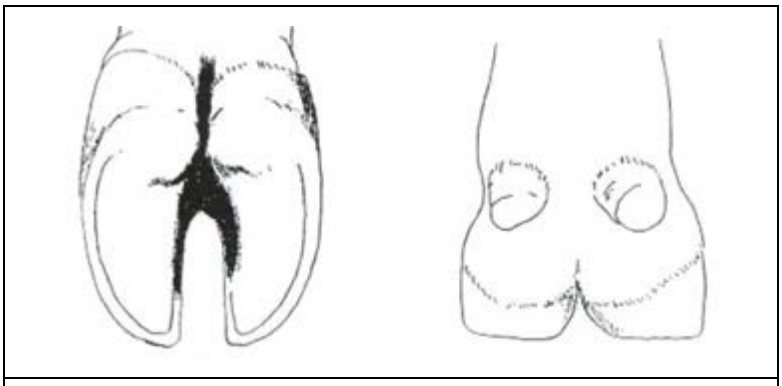
分散肢勢 opened antero-posterior stance　集合肢勢 close antero-posterior stance

3.1.2　Standard and abnormal claw

(1) Standard claw



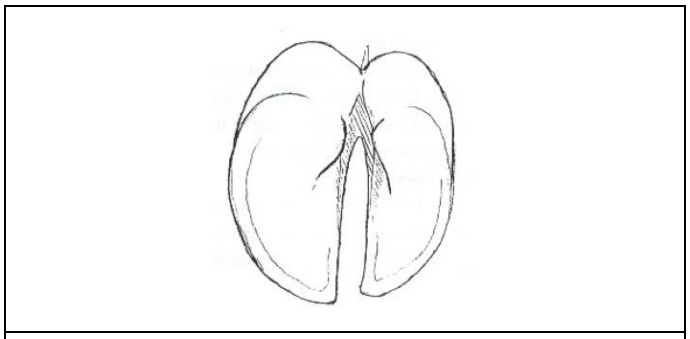
測望 Side view　　前望 Front view



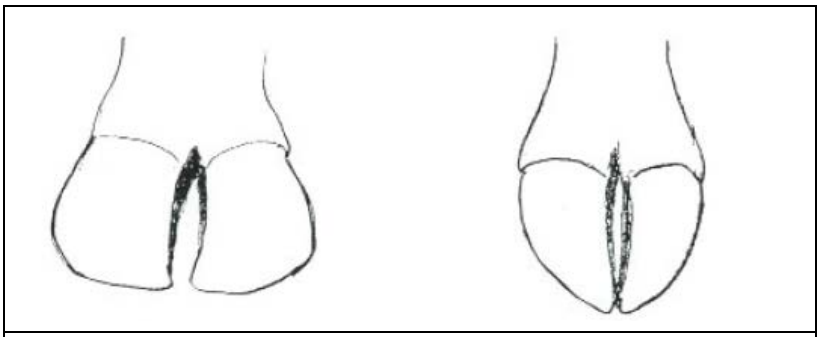
底面 Ground surface　　後望 rear view

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

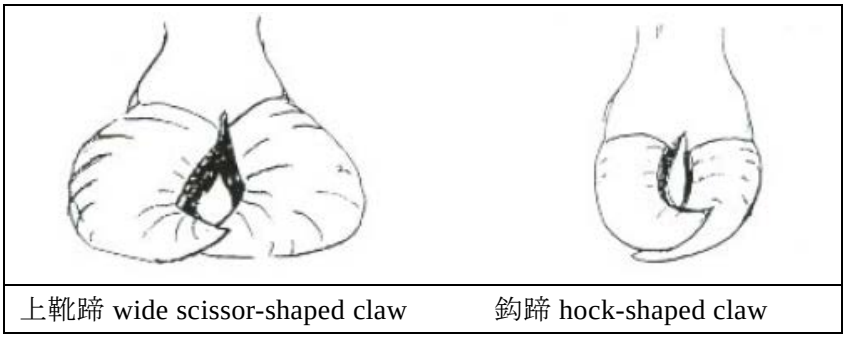
(2) Abnormal claw



不同蹄 Asymmetrical claw (medical claw 内蹄)

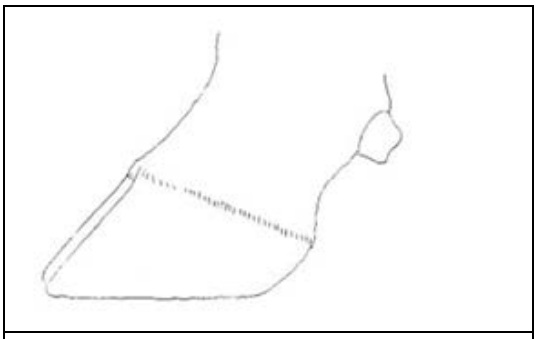


広蹄 wide claw　　狭蹄 contracted claw



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

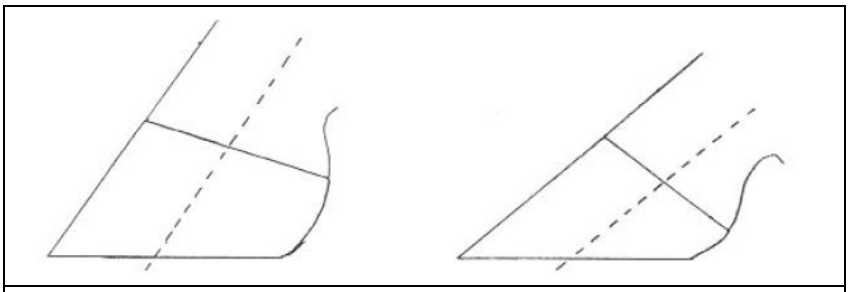
(3) Sideview of the Standard claw



Ideal side view

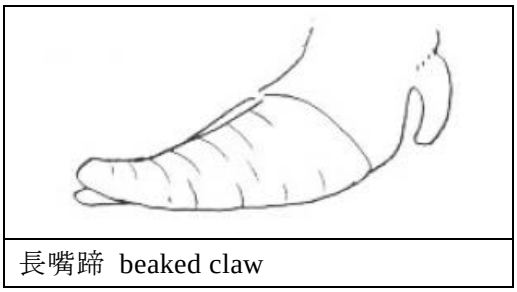
The angle of claw to the flat floor should be 45°.

(4) Sideview of the Abnormal claw

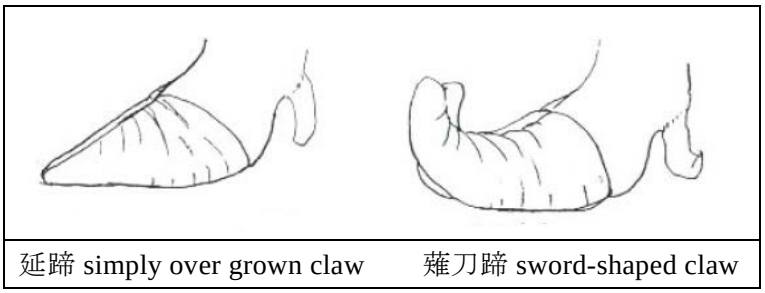


高蹄 upright claw　　低蹄 flat claw

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.

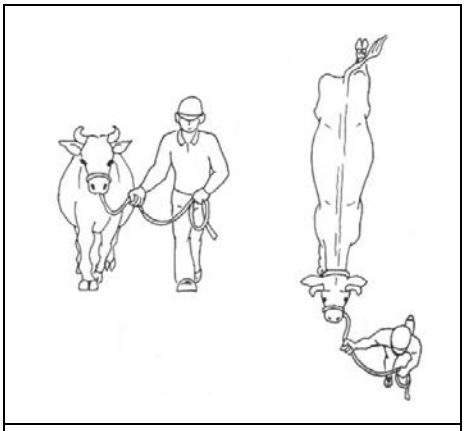


長嘴蹄 beaked claw



延蹄 simply over grown claw　　薙刀蹄 sword-shaped claw

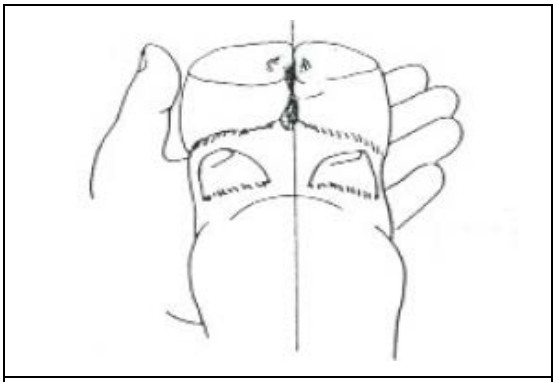
3.2 Gait examination



How to lead cow

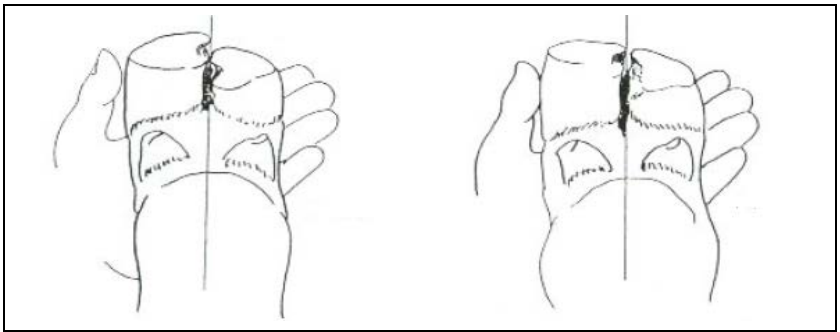
3.3 Examination of the raised claw

3.3.1 Standard claw



Normal (Ideal)

3.3.2 Abnormal claw

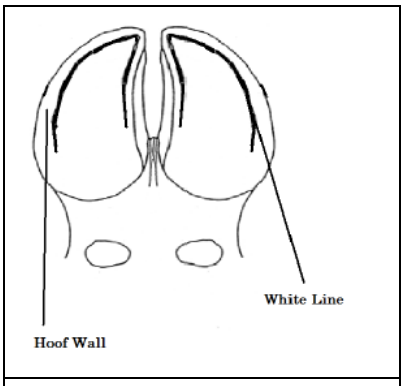


一測が過高 uneven　　負面の傾斜 sloping

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.



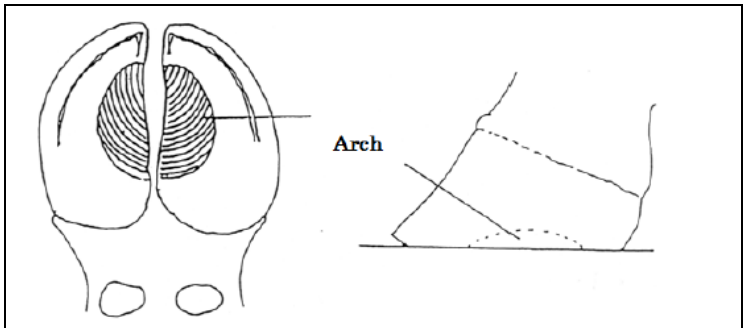
Figure

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.

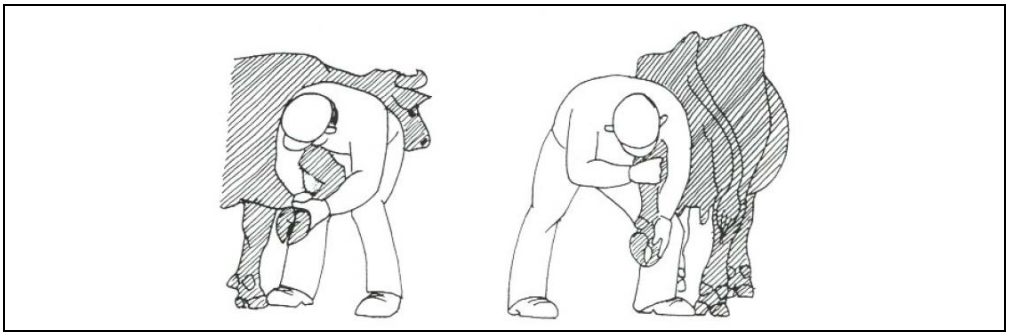


Figure

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

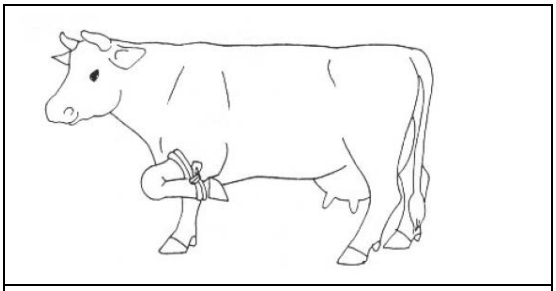
5.1 Fixing the hind leg



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

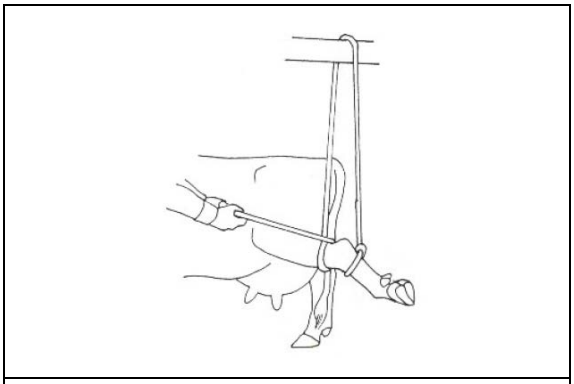
5.2 Restraining with rope

5.2.1 Restraining front leg



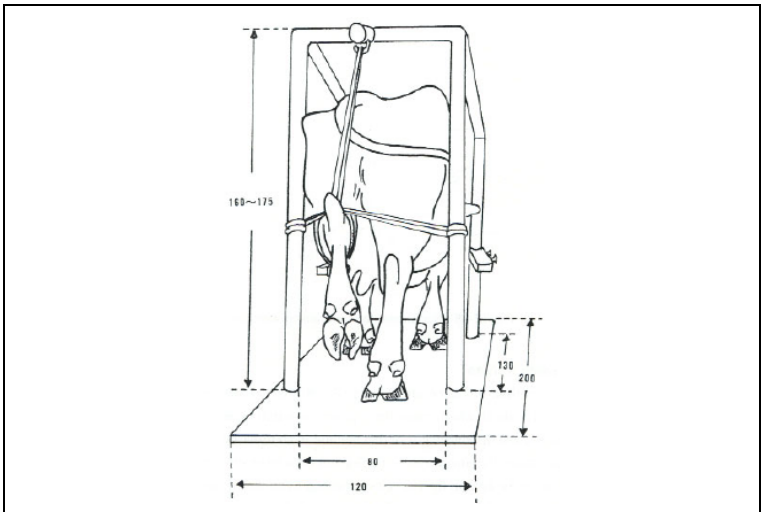
前肢の保定 restraining front leg

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

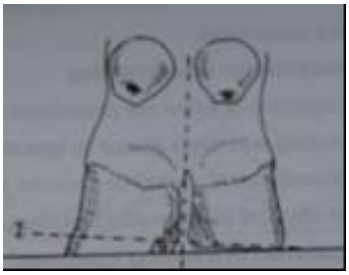
The Project organized technical guidance session for three hoof-cutting technicians at P/F in Tando Muhammad Khan District. Each technician demonstrated their hoof-cutting techniques. The Japanese expert gave advice, if any. They both exchanged their opinions. There were some differences in quickness 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.

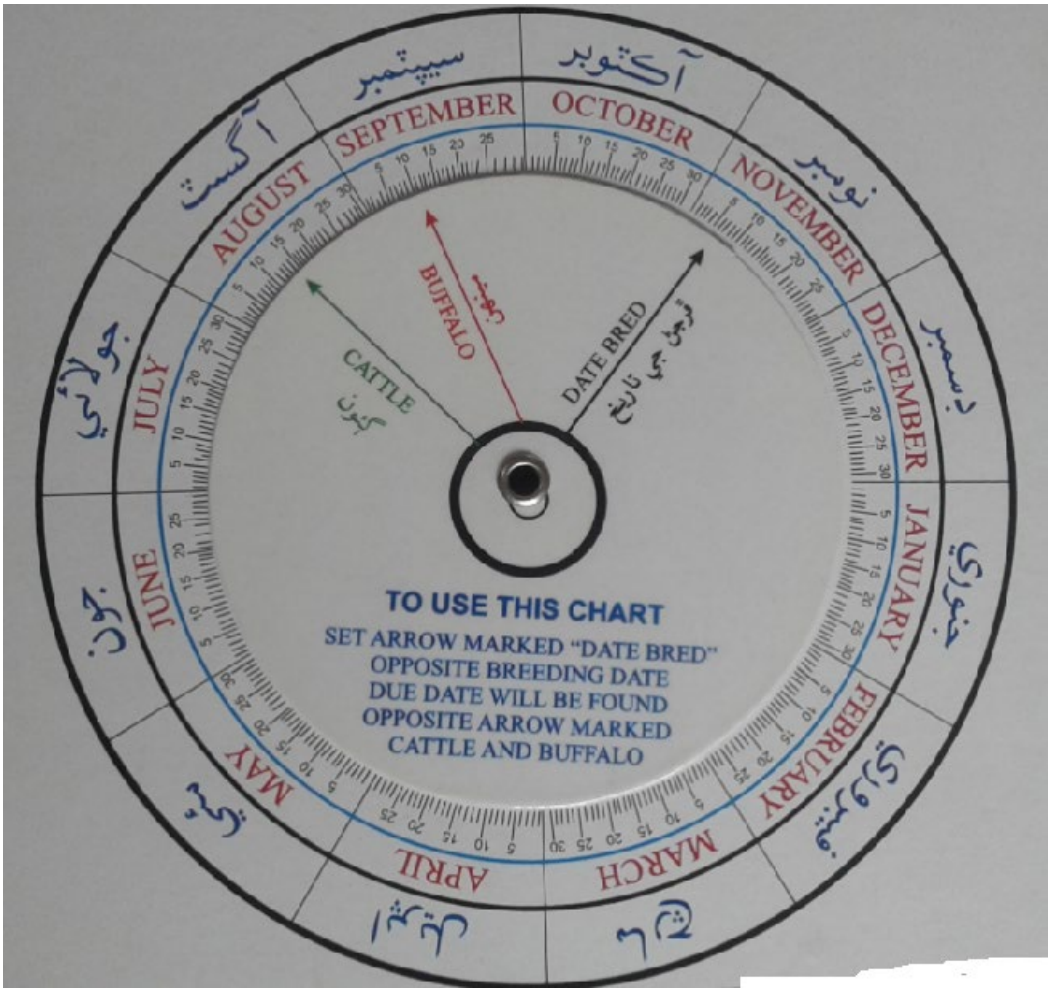
		
Arch of hoof	Figure 4-3 Side balance of bearing surface*	Finishing hoof with file

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

別添資料 **Z1-2** 分娩推定尺

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.



OFFICE OF THE PROJECT ON SUSTAINABLE LIVESTOCK DEVELOPMENT for RURAL SINDH_

(JICA Technical Cooperation)

Animal Science Complex, Auto Bhan Road Hussainabad, Hyderabad – 71000,

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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

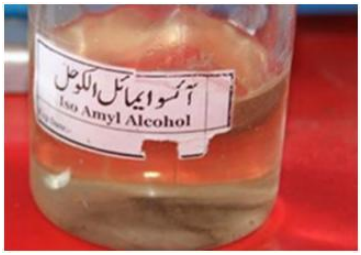
Gerber Method

(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

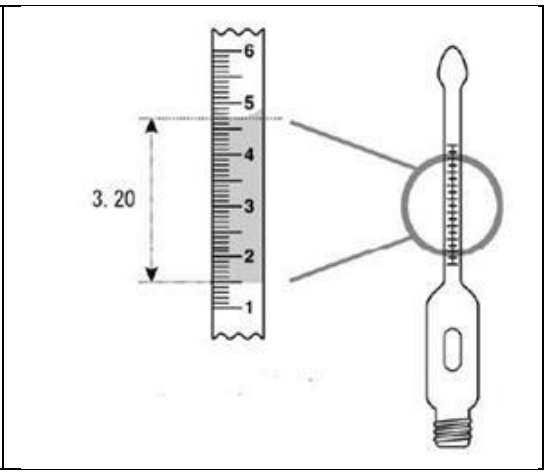
7) Centrifuge it ar 900 rpm for 5 minutes to separate the lipid phase.

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

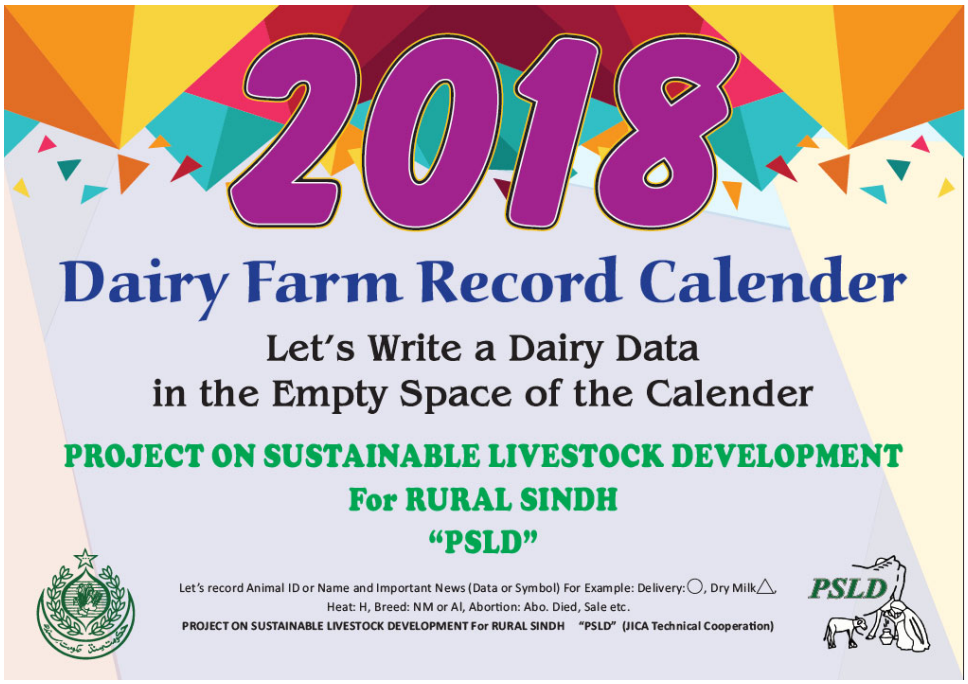
Date:

Centrifuge: rpm, Time: minuts

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

Name of Inspector:

別添資料 **Z1-4 酪農記録カレンダー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 ريڪارڈ بهتر ڪري سگهجي ٿو

اچو ته روزانو ٽيندڙ تبديلين جو ريڪارڊ ڪئلنڈر ۾ تبديليون درج ڪريون

JANUARY 2018

MONDAY	TUESDAY	WEDNESDAY	THUSDAY	FRIDAY	SATURDAY	SUNDAY
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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△,
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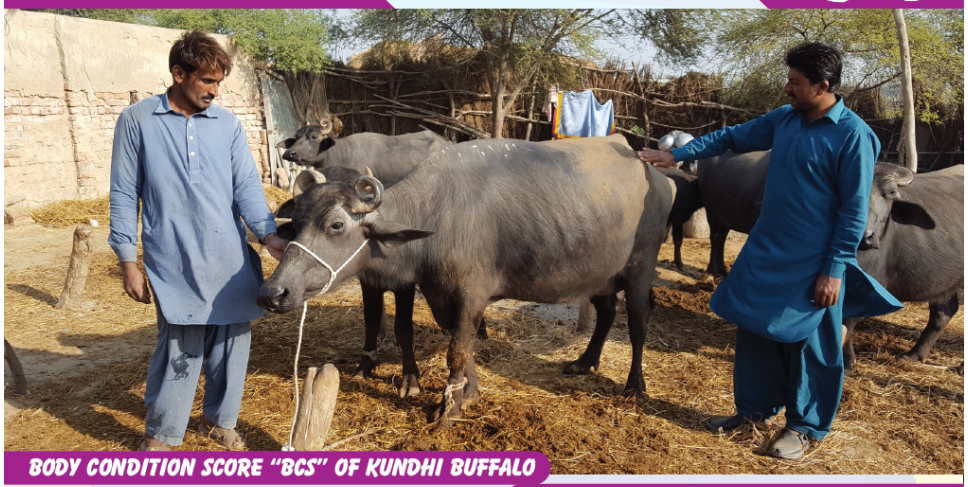
PROJECT ON SUSTAINABLE LIVESTOCK DEVELOPMENT For RURAL SINDH "PSLD" (JICA Technical Cooperation)

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 ميڻهن 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 ميڻهن جي جسماني صحت جو اندازو متوازن خوراڪ ڏيڻ سان ڪريون

MARCH 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

APRIL اپريل

BODY WEIGHT MEASUREMENT OF KUNDHI BUFFALO

By Measuring Tape Developed by the "PSLD"

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

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

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
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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

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
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7	8	9	10	11	12	13
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28	29	30	31			

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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 ويٺ جي ٤٠ ڏينهن کانپوءِ تکڙو چڪاس ڪرايون

JUNE 2018

MONDAY	TUESDAY	WEDNESDAY	THUSDAY	FRIDAY	SATURDAY	SUNDAY
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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
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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
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27	28	29	30	31		

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

PSLD

OCTOBER آکٹوبر

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 تہ 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
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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 ٿي.

اچو ته وقت سر ڳر ڪترايون ۽ مال جي پيداوار وڌايون

DECEMBER 2018

MONDAY	TUESDAY	WEDNESDAY	THUSDAY	FRIDAY	SATURDAY	SUNDAY
					1	2
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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

別添資料**T2-1** プロジェクト地域における水牛のシェアリング調査

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.

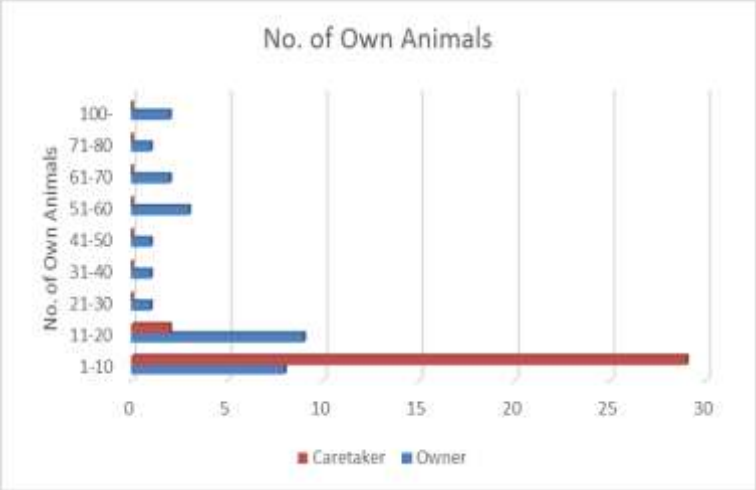

Figure 1 No. of Own Animals

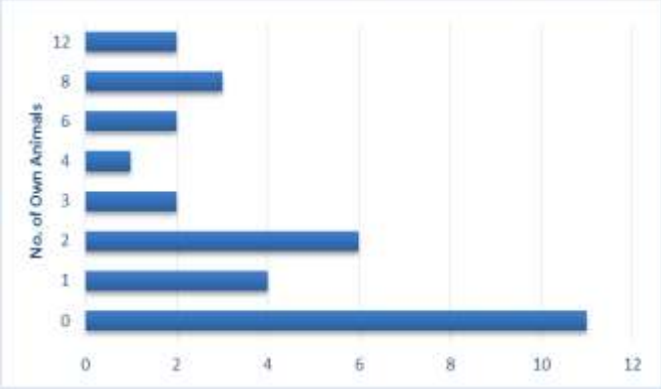

Figure 2 No. of Own Animals of caretaker

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.

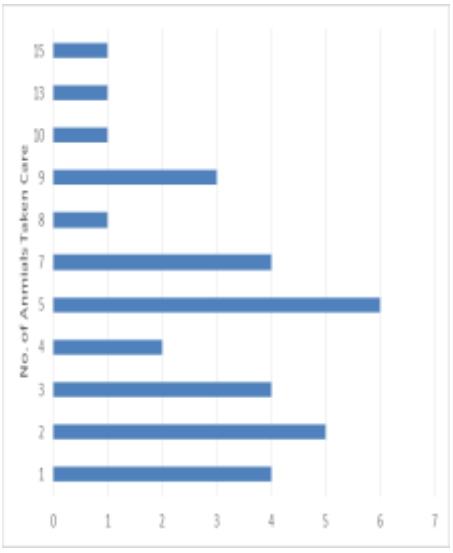

Figure 3 No. of Animals taken care by caretaker

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;

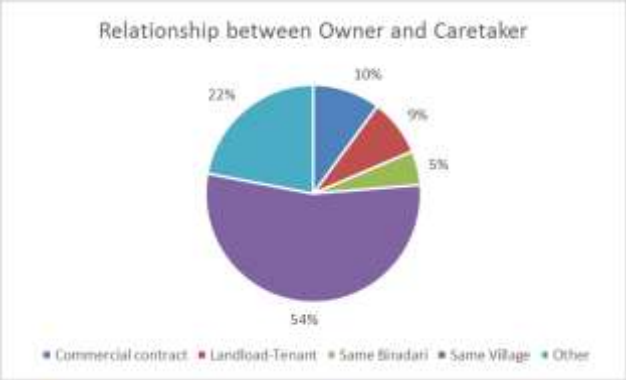

Figure 4 Relationship between owner and caretaker

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
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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

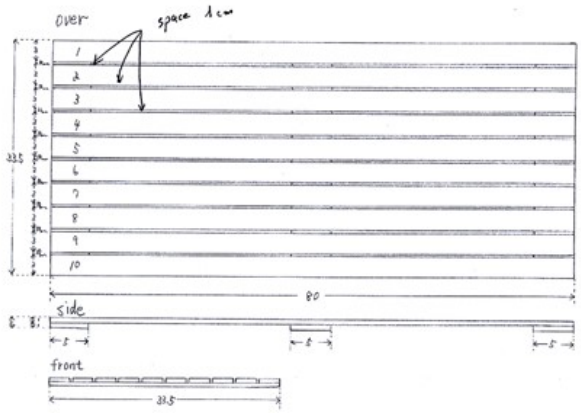


Figure 2-1 Drawing of drain board	Photo 2-12 Photo of drain board
	
Photo 2-13 Disinfectant	Photo 2-14 Disinfection of calf hutch

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.

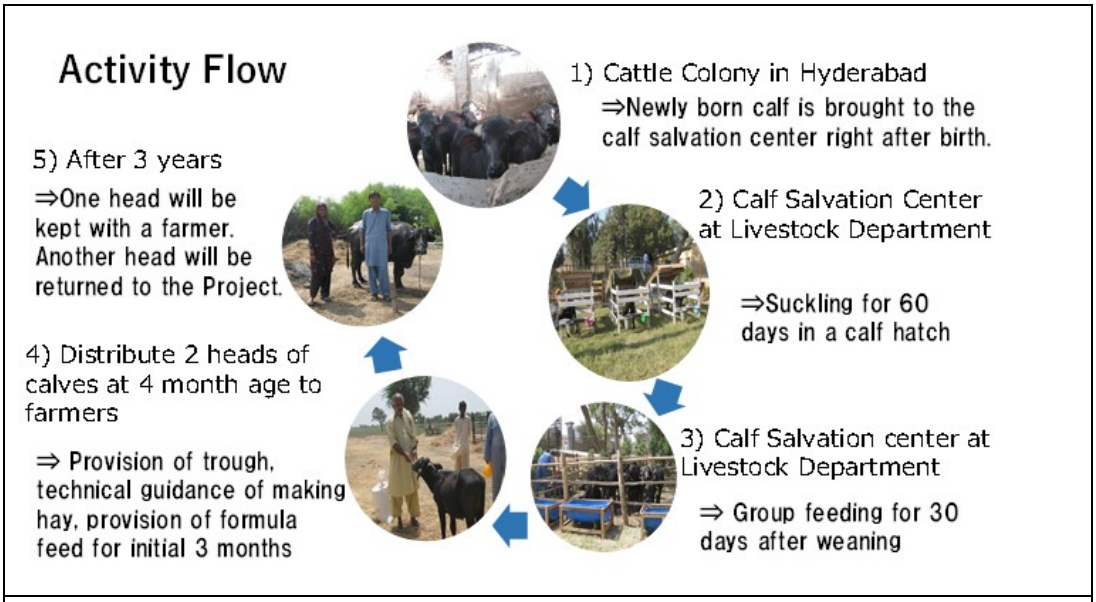


Figure 2-2 Activity Flow

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.

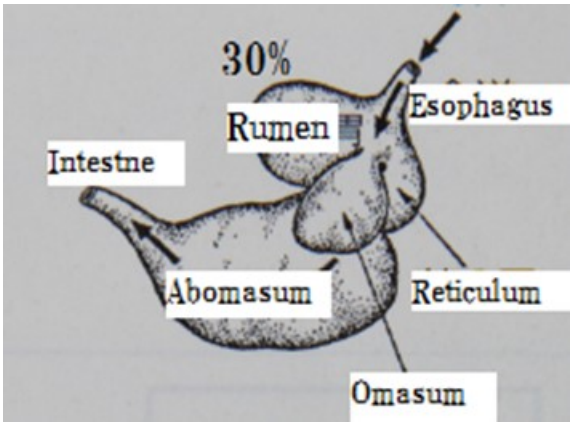


Figure 3-1 Stomach of a calf (Rumen occupies 30% of stomach)

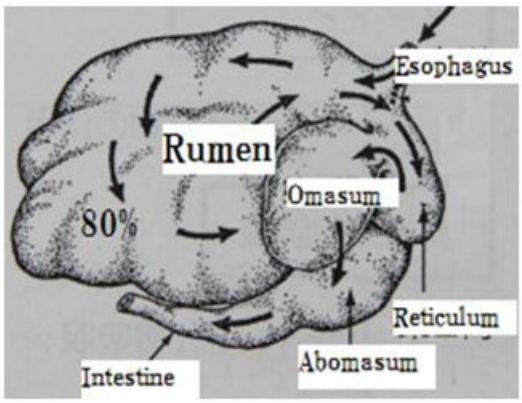


Figure 3-2 Stomach of an adult buffalo (Rumen occupies 80% of stomach)

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

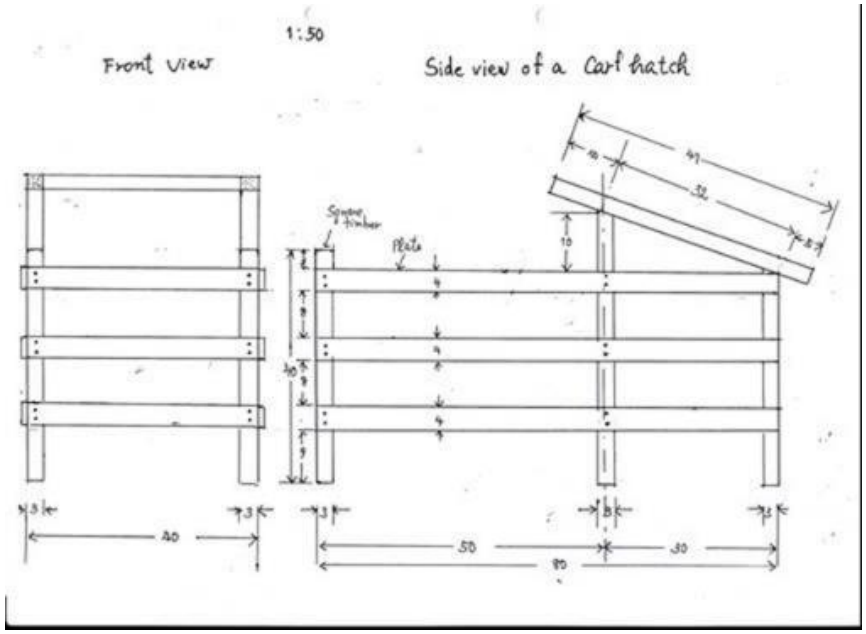


Figure 3-3 Drawing of Calf Hutch

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

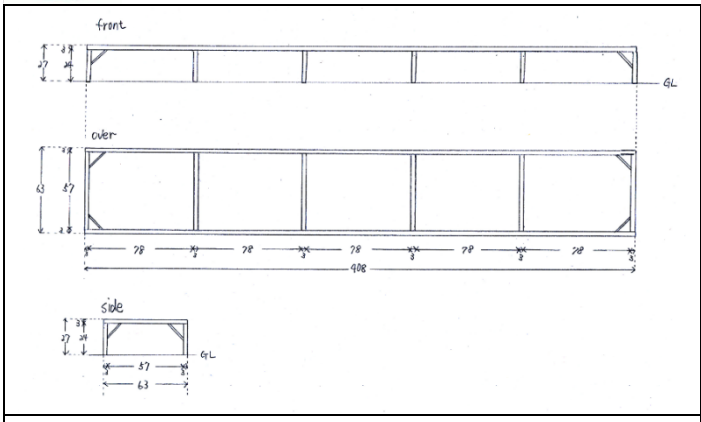


Figure 3-4 Drawing of Calf hutch base

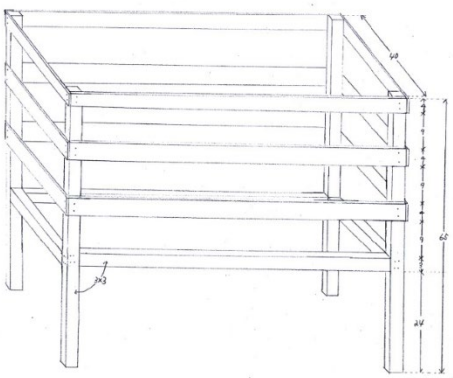


Figure 3-5 Drawing of Single type calf hutch

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

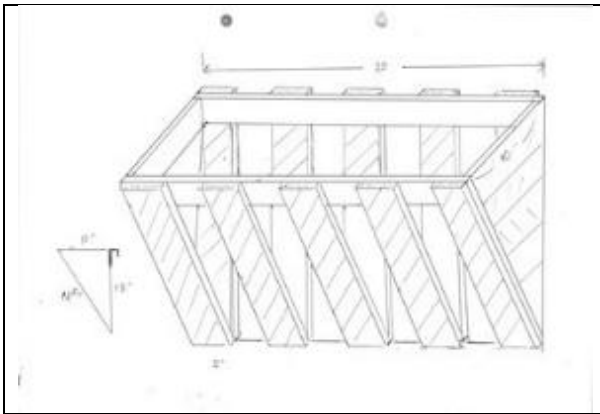


Figure 3-6 Drawing / Sketch of wooden hay rack

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.

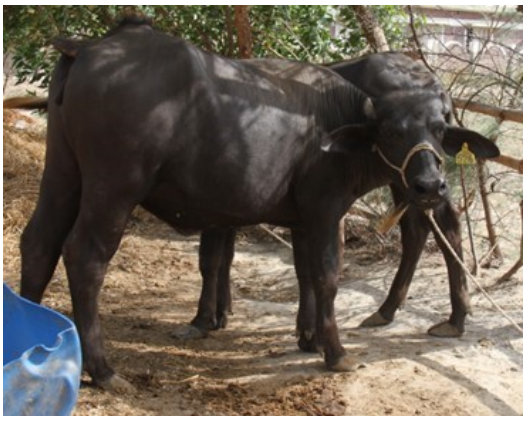


Photo 3-27 Level 4: Fatty	Photo 3-28 Level 3: Normal

	
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.

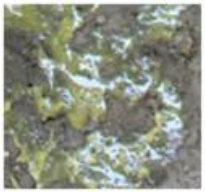
3.9.4 Appropriate nursing-care protocol

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%.

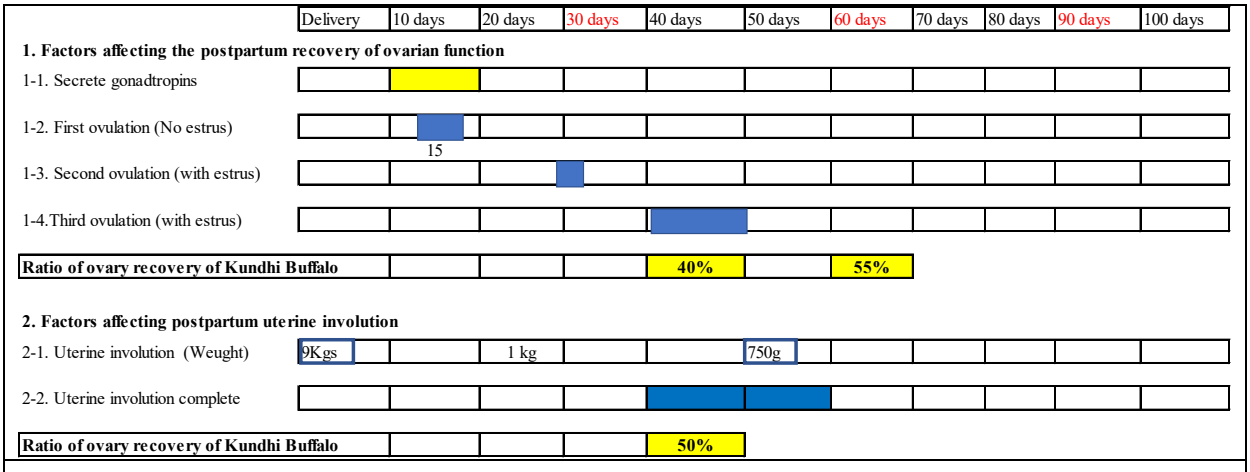


Figure 4-1 Recovery of ovary and uterus

(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

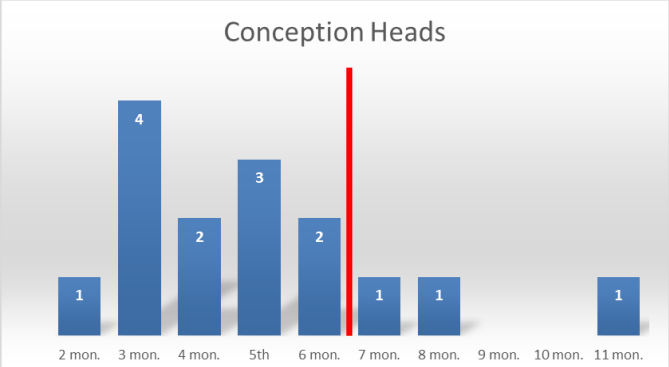


Figure 4-2 Number of buffaloes conceived by numbers of months after parturition

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
Phone: +92-(0)22-3402715

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 پاڳئن ۾ 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 ميٽر)	اندر داخل ٿيڻ 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 ياڳئي کي 2 قر ڏيندو ۽ جڏهن اهي قر جوان ٿيندا تہ هڪ واپس وٺندو.

منصوبواڳواڻ ياڳئي کان علاوه ان جي ويرپاسي/ چوڌاري رهندڙ ياڳئن سان گڏوگڏ ٻين ننڍن ياڳئن 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

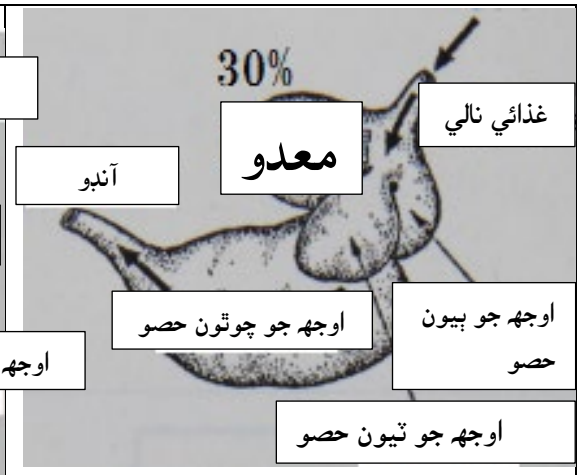
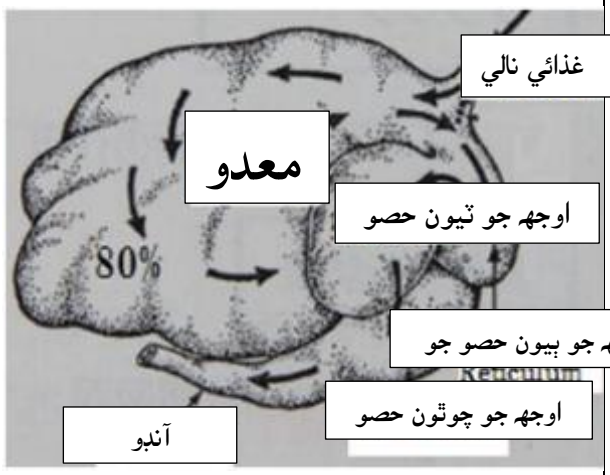
1 صحتمند قر اهي ٽيندا آهن، جن جو هاضمو بهتر هوندو آهي.

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 وڏو 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 ۾ ۾ وڏو هوندو آهي. ڪير جي وڌيڪ پيداوار ڏيندڙ مينهن جو دارومدار گهٽو ڪري انهن جي سارسنڀال 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 پڻ وڌي جيڪو ضروري آهي تہ انهن جي ابتدائي عمر ۾ وڌڻ شروع ڪري.

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

3. ننڍڙن ڦرن ۾ اوجھ ڪيئن وڌائجي.

3-1 اچو تہ ڦرن ۾ اوجھ وڌايون

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

1) ڦرن جي جمڻ کانپوءِ ٻن 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 ڦرن جي اوجھ وڌائڻ ۾ مدد ڪري ٿو.

2) سانڊيل گاھ کارائڻ

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

ڦر هن کي دلچسپي سان کائيندا آهن.

(1) ڦرن جي ڄمڻ کانپوءِ صحيح سنڀال

صحتمند ڦر پالڻ لاءِ پهريون ڪجھ ڳالهيون جيڪي ڦر ڄمڻ کانپوءِ هڪدم توهان کي ڪرڻيون آهن.

1) ڦرن جي جسم کي خشڪ ڪرڻ

ڦر ڄمڻ کانپوءِ ان کي ماءُ جي آڏو ڇڏيو تہ جيئن ان کي چٽي چو تہ ڦر کي چوسڻ سان ماءُ جا غدود تحرڪ ۾ ٻ اينداآهن جيڪي ڄر 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 ۾ 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) ڪيرڏائڻ وارن ڦرن جو مشاهدو ڪرڻ

جيڪڏهن ڪير 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. ڦرن ۾ مينهن کي الگ کاڌ خوراڪ ڏيڻ

5.1 ڦرن کي بچائڻ جي لاءِ اسان جي رڀابندي

اسان جي منصوبي مينهن ۾ ڦرڻن کي الڳ کاڌ خوراڪ ڏيڻ جي لاءِ تصديق ڪئي آهي. ڦر جي جمڻ کانپوءِ جيترو جلدي ممڪن ٿئي ان کي پس پياريو ۾ انهن کي ڦرن جي پالنا واري مرڪز ڏانهن منتقل ڪيو.

1) پس جي ڌهائي

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 اڌ ڪلاڪ کان پوءِ ۾ پس پيارڻ کان اڳ ٽٽن مان ٻہ ٽي ڳوھا هاري ڇڏيو.

2) پس ڏارائڻ

	
پس جي ڌهائي	ڦرن کي پس پيارڻ

(3) کير خريد ڪرڻ

اهو ضروري آهي تہ ڦرن کي کير ڏارائڻ کان اڳ کير کي سنگهجي جيڪڏهن ڪا بدبوءِ اچي ٿي تہ ڦرن کي پيارجي ٿو. ڦرن کي بک لڳي ٿي تہ اهي بدبوءِ وارو کير پيءُ ٿا وجن پر خبردار ٿيو تہ کير جي معيار بابت چاهي ڦر 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 آڳر 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 هٽائي 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 هٽايو. کير جو ٽانو ڦر جي مٽي کان مٽاهون نه هجي کير ڏائيندي جڏهن ڦرکير پيئڻ ڇڏي ڏئي ته ٽانو 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

	
بالٹي نما فيدر	دبي نما فيدر

5-3 ڪير ڏائڻ واري عرصي جي دوران خوراڪ

ڦرن ڪي پيدائش جي 8 ڏينهن ڪانپوءِ خوراڪ ۽ سانڍيل گاھ تي آڻجي. پھرين ڏينهن شروعات ۾ ڦر خوراڪ ۽ سانڍيل گاھ سان ڪيڏندو رھندو. پوءِ ھن جو وات ان سان ھري ويندو.

ھر وقت تازي پاڻي جي موجودگي اھم ڪردار ادا ڪندي ڦر ڪي سڻي ڪاڏي ڪائڻ لاءِ. پاڪستان ۾ اھو خيال آھي تہ ڏائڻ وارو ڦر پاڻي ڪو نہ پيئندو تہ اھوغلط تصور آھي. ھڪ ننڍڙي بالٹي ۾ پاڻي فراھم ڪريو ۽ روزانو تازو پاڻي مھيا ڪريو گھٹ ۾ گھٹ ڏينهن ۾ 2 دفعا صبح ۽ شام جو.

1) متبادل خوراڪ

اسان جي منصوبي ڦرن جي لاءِ متبادل خوراڪ موجود مقامي داڻيدار خوراڪ مان تيار ڪئي وئي آھي. متبادل خوراڪ ڦرن ڪي جمڻ جي ٻئي ھفتي ۾ شروع ڪرائجي جيڪا جنهن سان ھن جي اوجھ ڪي وڏائڻ 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. ڇمڻ ڪان 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 ڪان 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 ڪان 7 ڏينهن ٽوٽل 3 ليٽر ڪير روزانو هر قر کي. 2 هفتي ڪان 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 ڪان 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 کانپوءِ ڦرن جي سارسنڀال

ڪير ڏائڻ جو عرصو 60 ڏينهن آهي. ڪير ڏائڻ واري عرصي ۾ ڪير جي متبادل خوراڪ شروع ڪرڻ گهرجي. ڪير ڇڏائڻ کانپوءِ 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 ٿي 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 روپيه مارڪيٽ جي حساب سان قيمت گهٽ وڌ ٿي سگهي ٿي.
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 ٻج	%7	32
ڊي.سي.پي(هڏين جو چورو)	%7	100
ٽوٽل	%100	

2) ڪير ڇڏائڻ وارن ڦرن لاءِ واڙيون

ممڪن هجي ته ڦرن لاءِ ننڍيون واڙيون ٺاهجن ڦرن کي رسو 2 کان 3 مهينن جي عمر ۾ وجهجي ۽ 3 مهينن کانپوءِ انهن کي گڏ ٻڌجي ته 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 ڦرن لاءِ خوراڪ جو چارٽ

چارٽ نمبر4. مختلف عمر جي ڦرن 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	-----	ٿورو	----	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.

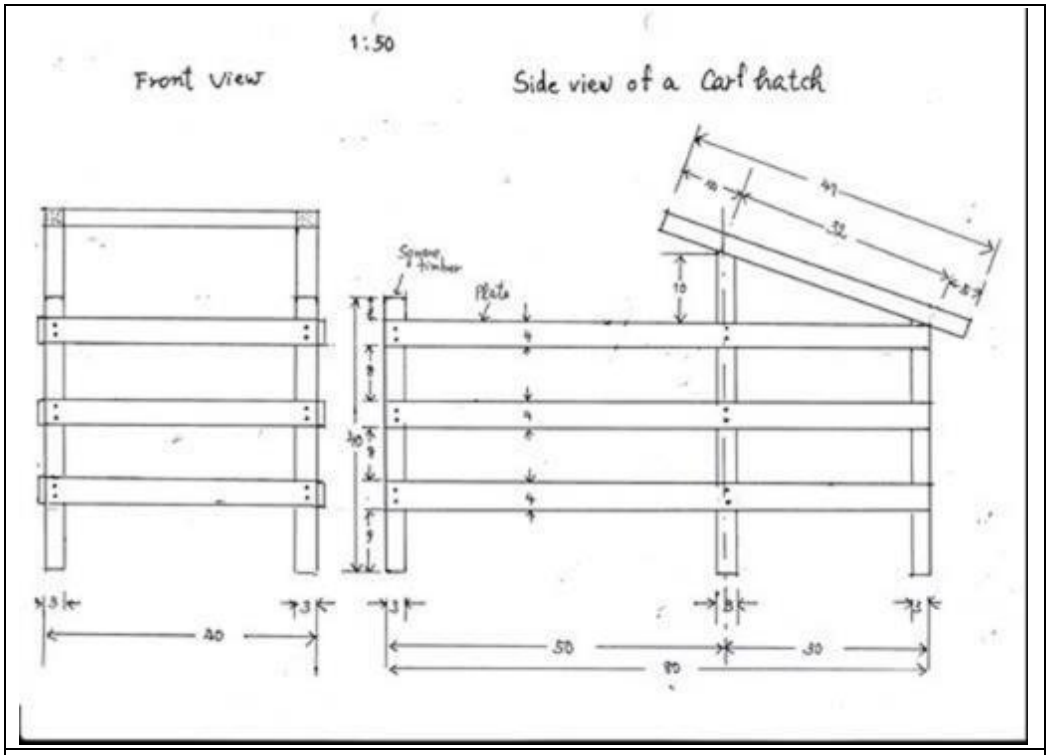
قرن کي 6 مهينن جي عمر کان وهنجارڻ گهرجي، اونهاري جي موسم ۾ گرمي کان بچائڻ ضروري آهي. قرن کي هوادار چانو ۾ رکو. پسگردگي ۾ پاڻي جي موجودگي هوا ۾ گرمائش گهٽ ڪندي. پاڻي جو ڦهارو هر اڌ ڪلاڪ ڪانپوءِ قرن جي مٿان ڪجي تہ جيئن سخت گرمي واري وقت قرن جي جسم جي گرمي پد گهٽ ٿي ٿئي.

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 سارسنيال 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

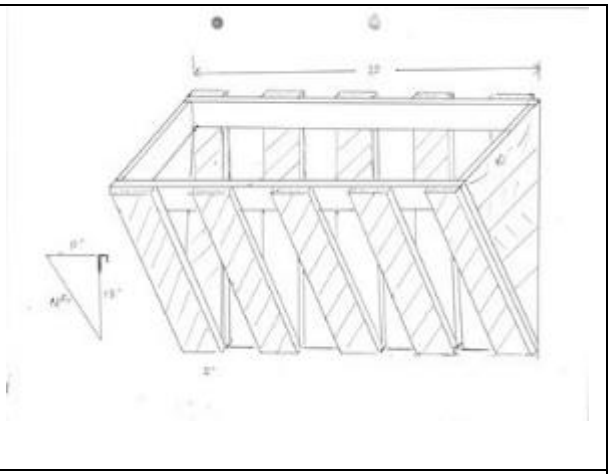
بوليويا ۾ قرن لاءِ پنجرا

اسان جومرڪز

	
آمريڪا	انڊونيشيا ۾ ڦرن جا پنجرا

7-2 ڪاٺ جو پنجرو

ڪاٺ جي پنجري جي استعمال سان سانڌيل گاهه سڻي 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 خوراڪ ۽ 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 ڇڪي ڏسو جيڪڏهن اها ڇڪجي 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 ڪيڙن 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، ٿانو، خوراڪ جي ٿانون 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 نہ هوندا آهن ۽ نہ 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 چڀا 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 چيٽو تمام نرم هوندو آهي ۽ خاره ٽيٽ ڪانپوءِ فرش تي چنڊن 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

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

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.

別添資料 Z2-1 マイクロファイナンス機関調査

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.

別添資料 Z2-2 シンド州の家畜関連マイクロファイナンスの現況

シンド州の家畜関連マイクロファイナンスの現況

１．はじめに

パキスタン国シンド州ハイデラバード県のキャトル・コロニー（商業酪農を営む農場が集積する区域）では、年間推定 2 万頭の子水牛が出生している。出生した子水牛のうち、100%の雄子水牛、55%の雌子水牛が、生後 1 週間以内に屠殺されているといわれている。子水牛を飼育する場所がなかったり、子水牛の育成費用が商業農家の経営採算に合わないためである。「シンド州持続的畜産開発プロジェクト」（以下、プロジェクト）では、貴重な畜産資源であるこの子水牛を屠殺せずに、有効活用する仕組みづくりに取り組んでいる。

プロジェクトは、1 年目に「子水牛救済試験場」を開設し、キャトルコロニーから生後数時間の雌の子水牛を購入し、日齢 90 日まで飼育するモデルづくりを開始した。試験場で飼育された子水牛は、一般農家に配布され、3 年間の委託飼育が行われている。現在試行中の委託飼育契約では、水牛あるいは牛の飼育経験を有する小規模農家に 2 頭の子水牛を預け、委託飼育期間の後、1 頭を農家の所有とし、1 頭をプロジェクトに返却することとしている。

プロジェクト対象地域では、家畜の委託飼育が一般的に行われている。家畜受託者の多くは、家畜資産を取得する資金的余裕はないが、余剰労働力を有する小作農家や日雇い農業労働従事者である。委託内容・形態は、地域や個々人の事情によりさまざまであるが、一定の期間家畜を飼育し、請負期間満了時の家畜資産額のうちの割り当て分を受託者が現金で受け取る形態が多い。請負農家は、対価として現金を受け取るものの、同農家が委託飼育を通して家畜を自らの家畜資産とするケースはまれである。

プロジェクトでは、余剰労働力はあるが資金を持たない小規模農家にも家畜所有者として資産増加の道を開くことを目的に、地域でなじみの深い委託飼育の形態を変形させた委託飼育を採用し、試行している。プロジェクトが試行する委託飼育は、資金の移動なく、小規模農家が労働で対価を支払うことで、家畜 1 頭を自己所有とすることを可能とする。

上述したように、プロジェクトでは、家畜資源の有効活用に加え、小規模農家の家畜資産の増加を目指している。小規模農家の家畜資産増加のために、現在は委託飼育の形態をとっているが、将来的に子水牛の飼育モデルが、広く政府機関や民間企業、NGO 組織などに採用されることになった際には、農家に子水牛を販売する形態も考えられる。そのような場合に、農家の購入資金源として、マイクロファイナンスの活用が可能か否かを検討するため、プロジェクト地域でアクセス可能なマイクロファイナンスについて、既存資料および聞き取り調査を実施した。本報告は、この調査結果をまとめたものである。

２．パキスタンの家畜関連マイクロファイナンスに関する概況

2005 年時点で 68 億ルピーにすぎなかった畜産分野への貸付額を伸ばすべく、パキスタン中央銀行は、2006 年に“ Guidelines for Livestock Financing”を策定し、同分野への貸し付け促進を開始している[1]。2008 年には“Financing Scheme for Small Farmers” を策定した。同スキームでは、「貸し付け担保を持たない小規模

[1] http://www.dawn.com/news/207901/guidelines-for-livestock-loan, http://www.sbp.org.pk/press/2006/Guidelines-Livestock-28-Aug-06.pdf

農家へのグループ貸し付け」、「運転資金への貸し付け」、「保険（借り手の生命保険および農業や家畜保険）の適用の推進」をうたっている。2014 年には“Value Chain Contract Farmer Financing”を策定している。パキスタンの農業分野に従来存在するバリューチェーンを通じて、貸し付け担保を持たない小規模農家へのアウトリーチを広げることと、貸付金の返済リスク、農業生産品の市場リスクをバリューチェーン内で吸収しながら、貸し付けを増やし、農業生産高を伸ばしていくことを目的としている。2015 年 3 月には、小規模・零細農家への貸し付けをさらに増やすべく、“Credit Guarantee Scheme”が承認され[2]、2016 年 1 月に施行された[3]。このスキームでは、債務不履行のリスクの 50%を政府が負担することになっており、50 億ルピーの予算が充当されている[4]。対象者は灌漑地で 5 エーカー以下、天水地で 10 エーカー以下の耕作を行っている農家および小作農で、かつ借り入れ担保を持たない農家である。貸付上限額は 10 万ルピー、貸付期間は作物サイクルを考慮して 1 年から 1.5 年となっている。

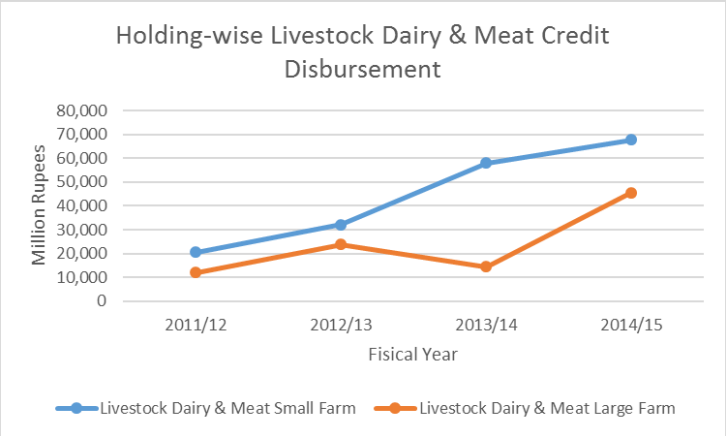
表 1　パキスタン中央銀行の畜産セクター向け貸し付け促進スキーム

施行年	スキーム名	概要
2006	Guidelines for Livestock Financing	畜産業向けのローン製品開発促進のためのガイドライン
2008	Financing Scheme for Small Farmers	借り入れ担保が不要なグループローンについてのガイドライン。貸し付け上限額 20 万ルピー。保険適用の奨励をしている。
2014	Value Chain Contract Farmer Financing	既存のバリューチェーンを通じ、貸し付け担保を持たない小規模農家へのアウトリーチ拡大のためのスキーム。貸し付けリスクの軽減と貸し付け促進を目的とする。
2016	Credit Guarantee Scheme for Small and Marginalized Farmers	債務不履行のリスクを政府が保証し、貸し付け促進を図るスキーム

出所：パキスタン中央銀行上記スキーム資料より執筆者作成

こうした政府の取り組みが功を奏してか、畜産分野へのローン貸付額は順調な伸びを見せている。

2011/12 年の畜産セクターへの貸付額は約 327 億ルピー、2014/15 年の貸付額は約 1 兆 134 億ルピーと約 4 倍の伸びを示している（図 1）。



[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

パキスタン中央銀行のデータ[5]では（下表２）、同行の農業金融・マイクロファイナンス部局の貸し付け目標、達成額比において、マイクロファイナンス銀行の達成度が他行と比べて高いことがうかがえる。貸付額は一般銀行の 20 分の 1 程度にすぎないが、目標達成度の高さから、農業貸し付けにおいてマイクロファイナンス機関が重要な役割を担っているといえるであろう。なお、同データでは「農業貸付額」となっているため、同額のうち畜産関連貸し付けの占める割合は不明である。

図１　畜産セクター貸付額推移

出所：’SBP Annual Report-Statistical Supplement FY15’を基に執筆者作成

表２　農業貸し付け 2013/14 年度および 2014/15 年度の 11 カ月実績比較

	目標貸付額 (million Rs)		貸付額 (million Rs)		目標達成度 (%)	
銀行種別	2013-14	2014-15	2013-14	2014-15	2013-14	2014-15
一般銀行	357,900	469,550	314,518.842	407,224.989	87.88	86.73
マイクロファイナンス銀行	21,600	28,160	19,626.083	27,822.109	90.86	98.80
イスラム銀行	532	2,290	523.943	4,707.046	98.49	205.55

出所：脚注 5 資料を基に執筆者作成

３．シンド州における家畜関連マイクロファイナンスの概況

パキスタン全国の農業貸付金額は、2011/12 年から 2014/15 年までの 4 年間、連続して中央銀行の目標貸付額を上回る伸びを見せている[6]。2014/15 年の貸し付け実績は、目標額 5 兆ルピーを超える 5 兆 159 億ルピーで、前年比 31.8%増である。一方、中央銀行ハイデラバード支店の職員によれば、パンジャブ州が順調に目標貸付額を達成する中、シンド州は目標額に達しない状況とのことであった[7]（下表３参照）。目標額に達しない要因としては、１）銀行が貸し出しに消極的である、２）税務局の土地登記記録が電子化されていない、が挙げられた。さらに、シンド州はパンジャブ州と比較して、目標貸付額を達成できないのみではなく、返済率も低いとのことであった。低い返済率が銀行の消極的姿勢の一要因であると推察される。マイクロファイナンスは土地担保が不要であるため、土地登記の問題は貸し付けの阻害要因としては該当しない。州内の低迷する貸し付け状況を打破するため、中央銀行では、銀行や NGO スタッフに同行して金融サービスに関する啓蒙活動を実施しているとのことである。

[5] パキスタン中央銀行内部資料’Agricultural Credit & Microfinance Department, Target, Disbursement, Recoveries & Outstanding during July, 2014 – May 2015 (2014-15) 11 months analysis’

[6] http://www.thenews.com.pk/print/52754-banks-surpass-agri-credit-target-disburse-rs515bln

[7] 2015 年 7 月時の聞き取り情報による。

表３　州別の主要５銀行による農業貸付額年次比較（2013/4 と 2014/5）[8]

州名	2013/14 目標(million Rs)	2013/14 貸付額（11 カ月）(million Rs)	達成率	2014/15 目標(million Rs)	2014/15 貸付額（11 カ月）(million Rs)	達成率
パンジャブ	294,698	287,997.842	97.7%	389,999	369,928.363	94.8%
シンド	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%
バロチスタン	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%
合計	380,032	334,668.868	88%	500,000	439,754.144	88%

出所：パキスタン中央銀行内部資料を基に執筆者作成

４．プロジェクト実施県の畜産関連マイクロファイナンスの概況

プロジェクトでは、シンド州南部の 5 県（ハイデラバード県、マティアリ県、タンド・モハンマド・カーン県、タンド・アラヤ県、バディン県）を対象地としている。本調査では、タンド・アラヤ県を対象県として選出し、同県でマイクロファイナンス事業を行う機関と利用者から聞き取りを行った。

４．１　マイクロファイナンス機関での聞き取り

（1）聞き取り概要

パキスタンでは 2001 年に「マイクロファイナンス機関法 2001」が制定されている。マイクロファイナンス機関は、この法令により規制されているマイクロファイナンス専用銀行と、それ以外の非銀行系マイクロファインナンス機関に大別される。後者はさらに、マイクロファイナンス専用機関と Rural Support Program に区分される。マイクロファイナンス専用銀行は、預金を含む全ての銀行業務が可能である。一方、非銀行系マイクロファイナンス機関は、預金業務ができない。2014 年時におけるローン利用者のシェアはマイクロファイナンス銀行 40%、マイクロファイナンス専用機関 31%、Rural Support Program27％である[9]。

本調査では、まずタンド・アラヤ県に支店を有するマイクロファイナンス専用銀行に対する聞き取りを行った。続いて、マイクロファイナンス専用機関、Rural Support Program への聞き取りを実施した。マイクロファイナンス専用機関、Rural Support Program は多くがハイデラバード県にオフィスを有していることから、ハイデラバード県で聞き取りを行った。マイクロファイナンス専用機関、Rural Support Program の中には、プロジェクト対象県を事業地に含めていない機関もあったが、畜産関連のローン商品の比較を目的として情報収集をした。聞き取りを行った機関の一覧を下記に示す。

[8] 上記貸付額は農業貸付額総額であるため、シンド州における家畜セクターへの貸し付け目標達成度は不明である。

[9] Pakistan Microfinance Network ‘Pakistan Microfinance Review 2014’

マイクロファイナンス専用銀行		
1	First Micro Finance Bank	タンド・アラヤ支店
2	NRSP Bank	同上
3	Pak Oman Micro Finance Bank	同上
4	Tameer Microfinance Bank	同上
5	APNA Microfinance Bank	同上
6	FINCA Microfinance Bank	同上
7	Khushhari Bank	バディン支店[10]
マイクロファイナンス専用機関		
1	Safco Support Foundation	ハイデラバード本部
Rural Support Programme		
1	National Rural Support Programme	ハイデラバード事務所
2	Al Mehran Rural Development Organization	同上
3	Community Initiative for Development Pakistan	同上

（2）畜産関連のローン商品の概要

聞き取りを実施したマイクロファイナンス機関全てが、畜産事業を対象としたローン商品を提供している。対象県において畜産が重要な産業であることから、どの機関でも畜産業への貸し付けを重要視していた。今後の市場の成長についても有望視している。

マイクロファイナンス専用銀行が有する畜産関連のローン商品の一覧を次頁表４に示す。

[10] Khushhari Bank はタンド・アラヤにも支店を有するが、同支店からは十分な情報が得られなかったため、バディン支店にて聞き取りを行った。

表４　マイクロファイナンス専用銀行の畜産関連ローン商品一覧

	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[11]
貸付顧客数	1,425	1,200 （うち 730 は洪水被害による不良債権者）	1,700	1,040	2,000	350	2,700
畜産ローン顧客数	1,125 の不良債権者	150（うち 50 は乳牛プログラム、100 は家畜売買プログラム）	300（全てが肥育プログラムによる貸し付け）	258（うち 250 が 10 万ルピー、8 が 50 万ルピーを上限とする貸し付け）	500	20	1,100
畜産ローン商品種類	現在停止中	乳牛プログラムと家畜売買プログラム（肥育は現在停止中である）	乳牛プログラムと肥育プログラム	酪農事業（小規模）、酪農事業（中規模）プログラム	乳牛資産（小規模） 乳牛資産・畜産事業（中規模）	乳牛プログラム	畜産プログラム
畜産ローン貸付可能額	同上	10,000 – 80,000 Rs	30,000 – 150,000 Rs	10,000 – 100,000 Rs. 100,000-500,000 Rs.	上限 150,000 – 500,000 Rs.	35,000 – 150,000 Rs.	50,000 – 150,000 Rs.
貸付期間	同上	1 年	6 カ月-1 年	1 年-2 年	1 年	6 カ月、1 年、1.5 年	3 カ月―1 年
貸付金利（年）	同上	23.5%	20 – 28%	23%	19 – 24%	28%	30%
返済期日	同上	毎月、6 カ月、1 年	乳牛は毎月 肥育は一括	毎月	毎月（11 カ月の利息返済＋12 カ月目の元本返済、利息を含む毎月返済）	毎月	毎月、3 カ月、6 カ月、一括
支払猶予期間	同上	なし	なし	なし	11 カ月の利息返済＋12 カ月目の元本返済	なし	なし

[11] タンド・アラヤ支店では十分な情報が収集できなかったため、同行のバディン支店より聞き取りを行った。顧客数はバディン支店のものである。

	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[11]
特徴・課題	・2010 年 8 月の洪水被害により、家畜ローンの多くが不良債権化した。不良債権が回収されるまで、家畜ローンは停止されている。	・貸付額の上限は 8 万ルピーである。8 万ルピーでは良質の乳牛を購入することが難しいため、上限額を 10－15 万ルピーに引き上げることが望ましい（支店長談）。	・生乳のマーケットが発達していないため、乳牛スキームを活用できない。 ・40％の貸し付けが本来の目的以外に使われている。 ・肥育プログラムで肥育を行わず、短期間で売買を行っている例が散見される。 ・肉牛の値段が不安定。	・5 万ルピー以上の貸し出しの場合、担保となる既存の家畜がいることが条件。 ・家畜保険スキームを有するが、保険対象は担保家畜のみ。 ・家畜の無料ワクチン接種も行っているが、担保家畜のみであり、疾病予防上の有効性に問題がある。	・ローンで購入した家畜の保険スキームを有する。購入家畜が死亡した際に新規家畜を購入する資金が保険会社より支払われる。 ・保険料は 5,000 – 15,000Rs。 ・乾乳牛から搾乳牛への買い替えを主目的としている。	・2015 年に支店が新規開設された。	・家畜の売買契約の成立見込みがついた時点で、売り主・購入者両者が銀行に出向き、売買契約を結ぶ。同時に、契約時に当該家畜のメディカルチェックを獣医師が実施する。 ・家畜保険が無料で付保される。家畜が死亡した場合、80%の金額が保険会社より支払われ、20%がローン利用者の負担となる。 ・ローン返済遅延がみられる場合、家畜は差し押さえとなる。

上表から畜産関連ローン商品の概要をまとめると以下のとおりである。

ローン用途の設定：ローンの用途は１）搾乳牛の購入、２）犠牲祭[12]用山羊の肥育、３）その他の家畜購入に分類できる。

貸付額：各行の貸付上限額は、小規模事業の場合、8～15 万ルピーの範囲にあり、15 万ルピーとしている銀行が過半数である。当地の搾乳牛の価格は 13 万ルピー程度であることから、小規模農家が 1 頭の搾乳牛を購入できる価格を想定した設定になっていると思われる[13]。

金利：貸付金利は年 19～30%と各行によって異なる。20%台が最も多い。

貸付期間と返済方法：貸付期間は Tameer Microfinance Bank の 2 年が最長、次いで FINCA Microfinance Bank の 1.5 年、他行は 1 年を期限としている。返済期日は毎月、四半期、半年、一括とそれぞれである。APNA Bank は返済開始から 11 カ月間は金利支払いのみで 12 カ月目に一括返済というスキームを有している。その他の銀行は返済の据え置き期間を設けていない。

家畜保険：Tameer Microfinance Bank、APNA Microfinance Bank、Khushhali Bank の 3 行が家畜保険を提供している。Tameer Microfinance Bank は貸し付け担保となる家畜資産への保険、APNA Microfinance Bank と Khushhali Bank はローンで購入した家畜の保険である。Khushhali Bank は保険料無料となっている。

不良債権者：First Microfinance Bank は 2010 年 8 月の洪水を原因とした不良債権者の債権回収が完了しておらず、家畜ローンスキームを停止中である。また Pak-Oman Microfinance Bank も洪水被害による 700 の不良債権を未だ抱えている。一方、洪水被害による不良債権の他は、どの行も返済回収率は 100%に近く、不良債権の問題はないとの回答であった。

その他：Tameer Microfinance Bank は民間獣医師と契約し、無料でワクチン接種を行っているとのことであった。ただし、担保対象の家畜のみが接種対象であった。

タンド・アラヤ県では複数のマイクロファイナンス専用銀行が林立しており、銀行間の競争も激しいとのことであった。それぞれの商品内容に多少の差異があるが、細かな商品の特長が顧客獲得につながっているかは不明である。Khushhali Bank[14]は、獣医師が購入対象となる家畜の個体確認をしたり、家畜保険を無料で付保する等、他行と比べて返済へのリスクヘッジが高い商品を提供している。金利は最も高いが、顧客数も多い。

中央銀行ハイデラバード支店によれば、シンド州は返済率が比較的低いとのことであったが、どの行も返済率はほぼ 100%に近いとの回答であった。

次に、非銀行系マイクロファイナンス機関であるマイクロファイナンス専用機関と Rural Support Program の提供する畜産関連のローン商品を次頁表５に示す。

ローン用途、貸付額、貸付金利、支払方法ともマイクロファイナンス専用銀行と大きな差はないといえる[15]。大きく異なる点は、1）グループ貸し付けを基本としていること、2）資金提供（無償資金供与）を行う層、ゼロ金利でローンを提供する層、グループ貸し付けを提供する層、個人向け金利付き貸し

[12] イスラム教の宗教行事である犠牲祭には、動物をいけにえとして捧げる。犠牲祭前、期間中にはいけにえ用に多くの動物が売買される。

[13] Pak-Oman Microfinance Bank では上限 8 万ルピーとなっており、上限を引き上げるべきであるというのが支店長の意見であった。

[14] Khushhali Bank は 2000 年にパキスタン政府の貧困削減プログラムの一環として設立された。2012 年時点でパキスタンのマイクロファイナンス機関中、最大の顧客シェアを持つ。

[15] NRSP は NRSP 銀行とのデマケーションを行っているため、貸し付け上限額は低い。

表５　マイクロファイナンス専用機関と Rural Support Programme の畜産関連ローン商品一覧

	Safco Support Foundation	National Rural Support Program	Al Mehran Rural Development Organization	Community Initiative for Development in Pakistan
貸付顧客数	57,000	34,000	12,000	現在実施中の貸し付けはなし
家畜ローン顧客数	総貸出件数の約 50%	総顧客の約 20%	30,000	同上
家畜ローン製品種類	乳牛プログラム、犠牲祭用雄山羊肥育プログラム、山羊・羊肥育プログラム	農業・畜産事業	畜産事業	同上
家畜ローン貸付可能額	5,000 – 120,000 Rs.	25,000 – 75,000 Rs	5,000 – 300,000 Rs	同上
貸付期間	6 カ月、1 年、1.5 年	1 年	不明	同上
貸付金利	22%	28%	20 %	同上
返済期日	毎月、四半期、6 カ月、一括	毎月、一括	毎月	不明
返済猶予期間	なし	なし	なし	なし
特徴・課題	・3-7 人のグループ貸し付けが原則。卒業プログラムを終了した顧客のみ個人貸し付けが利用可能。 ・事業実施地：ハイデラバード県、マティアリ県、サンガー県、タッタ県、ベナジラバード県。 ・貧困スコアが 40 以下の世帯に金利ゼロのローン（Prime	・個人貸し付け ・ローン利用者と配偶者が 100Rs の保険料で健康保険に加入することができる。 ・事業実施地：ハイデラバード県、マティアリ県、タンド・ムハンマド・カーン県、タンド・アラヤ県、バディン県、ミルプルハース県、ウメルコット県、タッタ県、サジワー	・3-7 人のグループ貸し付けが原則 ・事業実施地：ハイデラバード県、マティアリ県、タンド・アラヤ県、バディン県、タッタ県、サジワール県、ベナジラバード県。 ・水牛購入資金への貸し付けでは生乳販売収入からの返済は期待していない。その他	・2011 年 9 月から 12 月にかけて、洪水復興プログラムの一環として、山羊購入のためのゼロ金利ローンをタンド・アラヤ県で実施した。100 頭の山羊が配布された。 ・OPP-RTI の資金を基に、犠牲祭用の山羊の肥育を目的としたゼロ金利ローンのプログラムをタンド・アラヤ県

	Safco Support Foundation	National Rural Support Program	Al Mehran Rural Development Organization	Community Initiative for Development in Pakistan
	Minister Interest Free Loan）を提供している。 ・ローン需要が高いが、供給資金が不足しているのが課題である。	ル県。 ・貧困スコアが 23 以下の世帯に家畜購入を目的とした資金提供（無償資金供与）プログラムを実施（バディン県とミルプルハース県)。 ・コミュニティ自身が運営するマイクロファイナンスプログラムではゼロ金利での貸し出しを実施している。 ・NRSP 銀行とは事業のすみ分けをしている。	のキャッシュフローから貸し付け審査を行っている。 ・キャトルコロニーの乾乳牛への貸し付けを試行したが、受胎率が低く、今後積極的に貸し付けを行う予定はない。	で実施した。200 名の顧客を対象として 10,000 – 20,000Rs を 9 カ月の貸付期間で貸し出した。 ・タンド・アラヤ県で 2 つの女性グループを結成した。1 名の女性リーダーが仲買人となって 30 名のメンバーから生乳を買い取り、Engro チラーに販売している。仲買人利益は 1 リットルにつき、10 ルピー。

付けを提供できる層と、世帯の経済状況に応じたローンスキームを提供していることである。また、各層から徐々に個人貸し付けができる層へと移行できるように、プログラムが組まれている。

（3）既存ローン商品の課題

1）小規模農家の収入キャッシュフロー

NRSP 銀行では、乳牛購入のローンスキームを一時停止しているとのことであった。生乳のマーケットが発達していないため、生乳販売からの安定した収入が期待できず、返済リスクが高くなることが理由である。また同行は肉牛の価格が安定しないことも貸し付けの不安要因であるとしている。他行では同様の意見は聞かれなかったが、例えば、Al Mehran Rural Development Organization では、貸し付け世帯の生乳販売の収入からの返済は期待しておらず、世帯のその他の収入のキャッシュフローから返済能力を審査しているとのことである。

仮に、10 万ルピーを 1 年間借り入れ、乳牛を購入し、20%の借入金利で毎月返済した場合、毎月の返済額は元利合計で 1 万ルピー[16]となる。農家の生乳売価を 80 ルピーと仮定すると、1 万ルピーの収入を得るためには、月に 125 リットル、1 日平均 4.2 リットルを販売し、336 ルピー以上の販売利益を確保する必要がある。

NRSP 銀行では、生乳生産コストと生乳販売価格の実際の数字を基にした話ではなかったため、生乳販売からの利益額がどのくらいか不明であるが、生乳価格が不安定であるということは、利益幅も安定しないという意味と捉えられる。スキームが停止しているということは、農家が現生乳価格で 1 日 336 ルピー以上の販売利益を出すことは難しいということであろう。

本プロジェクト前に実施されたマスタープラン策定調査における農家定点観測では、小・中規模農家の年間純利益は、-27,271 ルピーから＋4,385 ルピーの間であった。この数字は借入返済額 12 万ルピーに遠く及ばない。また、同調査内での世帯調査結果によると、生乳を販売できる農家の分岐点は、1 日 10 リットル以上の牛乳生産が可能か否かであり、10 リットルを生産できる農家は 5 頭以上（うち半分が搾乳牛と仮定）を所有する中規模か大規模農家とされており、小規模農家が 10 リットル以上生産することは難しいということになる。さらに、同マスタープランで行ったシミュレーションでは、飼養管理と育種の改善により牛乳生産性が向上しても、生乳の売価が改善されない限り、農家が十分な利益を得ることが難しく、牛乳卸売価格の地域差に課題があると結論づけられている。これは、NRSP 銀行の主張と一致する。また、マーケティング面の強化が生産性の向上と合わせて重要であるともいえる。

農家が 1 日 336 ルピー以上の販売利益を確保すれば返済は可能となるが、同額以上の利益を確保できる農家は、中規模、大規模の農家に限定される。生乳卸売価格の低い農村部では、さらに返済は困難である。したがって、返済資金源として生乳販売収入を想定することは難しく、生乳以外の定期的な収入源を持たなければ、小規模農家が同ローンを利用することは難しい。パキスタン中央銀行は、小規模農家にも金融ローンサービスを拡充することを目指しているが、小規模農家への貸し出しは依然、障壁があるといえる。

2）技術サービス

[16] 10 万ルピーの元本に 20%の金利額 2 万ルピーの合計で 12 万ルピーとなる。12 カ月の返済とした場合、毎月の返済額は元利含めて 1 万ルピーとなる。

聞き取りを行った銀行のうち数行は、民間獣医師と契約を結んでいるとのことであった。彼らによって、担保対象の家畜やローンで購入する家畜の健康状態の確認やワクチンの接種など、衛生分野のサービスが提供されている。別途聞き取りを行った NGO もシンド州政府畜産局と契約しワクチン接種をしていた。技術サービスは衛生分野に限られ、農家の生乳生産性を向上させるような飼養管理の指導、利益率を高めるための繁殖サービス、経営改善の営農指導といった技術サービスの提供をローン貸し付けとともに行っている例はなかった。ローンを家畜購入に利用し、同家畜からの収入で返済を行っていくためには、衛生分野のみではなく、飼養管理の指導や繁殖率向上のための技術サービスの提供、営農指導を通して農家の畜産事業からの収入を増やし、利益を増やす支援が必要である。現在これらの技術サービスを提供できる機関はほとんどない。今後、本プロジェクトにおいて育成される畜産局の職員、普及員、民間の畜産技術者等により、飼養管理や繁殖、営農指導といった技術サービスが、家畜ローンとの連携の下に提供されることが望まれる。

3）返済据え置き期間

聞き取りを行ったマイクロファイナンス機関の商品で、返済据え置き期間を設けているローンは APNA Microfinance Bank のみであった。11 カ月は利息分のみの返済、12 カ月目に全残額を返済する Running Finance という呼称のスキームを有している。畜産は農作物の収穫時期のように収入を得られる時期を特定することは難しい[17]。また収入を得られるようになるまでに要する期間も長い。したがって、農作物のように収穫時期に合わせた返済期間の設定、据え置き期間の設定をすることは難しいと思われるが、畜産業と兼業で農業や小作業に従事している農家は、農作物の収穫期にまとまった収入があることから、このような時期まで返済据え置き期間を設けるなどの工夫は可能かもしれない。

４．２　マイクロファイナンス利用者の声

（1）聞き取り概要

前節で聞き取りを実施した機関のうち、面会が可能であった APNA Microfinance Bank、FINCA Microfinance Bank、Safco Support Foundation のローン利用者に畜産関連ローンの利用状況について聞き取りをした。対象としたのは、APNA Microfinance Bank の利用者 1 名（タンド・アラヤ県）、FINCA Microfinance Bank の利用者 2 名（タンド・アラヤ県）、Safco Support Foundation の利用者 1 名（マティアリ県）の計 4 名である。この 4 名のマイクロファイナンス利用状況を表 6 にまとめた。

（2）利用者の状況

Mollah Bux 氏（27 歳男性）：タンド・アラヤ県で商業酪農を家族経営している。水牛・牛合わせて 75 頭を飼育している。1 日 360 キロの生乳を年間契約した納入先に 1 キロ 70 ルピーで納入している。APNA Microfinance Bank から 50 万ルピーを初めて借り入れた。3 頭の搾乳牛を購入し、代金を支払った。同時に 3 頭の搾乳牛を同じ家畜商から付けで購入した。3 頭分の残金は追って支払う。これまでも家畜商から付けで牛や水牛を購入してきた。今回、銀行からの度重なる営業に応じてローンを利用したが、毎月の返済は容易でなく、次回からは銀行のローンは利用しないつもりである。

[17] 犠牲祭用の肥育については、販売時期が決まっていることから、肥育用の山羊は 6 カ月くらいの一括返済でローンが設定されている。十分な利益幅が期待でき、例外的にローンに適しているといえる。

Hameeda 氏（45 歳女性）：寡婦で Lady Health Worker として働いている。3 人の息子のうち 2 人は既に職に就いている。搾乳水牛 3 頭、育成雌水牛 2 頭、育成雄水牛 1 頭、育成雄牛 1 頭、子牛 1 頭の計 8 頭を所有している。家計収入で最も比率が高いのは生乳販売収入であり、1 日 23 キロを販売している。売価は 80 ルピーと 90 ルピー。今回マイクロファイナンスローンを利用するのは 2 回目である。1 回目は 5 万ルピーを借り入れ、2 頭の育成雌水牛を購入した。今回は受託飼育していた産後 9 カ月の搾乳牛を取得するためにローンを利用し、家畜所有者に自分の費用負担分 3 万 5 千ルピーを支払った。

Shamshad 氏（58 歳女性）：寡婦で生乳販売と手工芸品制作の請負収入で生計を立てている。搾乳水牛 2 頭、乾乳水牛 1 頭、育成雌水牛 1 頭、育成雄水牛 1 頭、子水牛 2 頭の計 8 頭を所有している。1 日 15 キロの生乳を近隣の世帯に 1 キロ 100 ルピーで販売している。今回の借り入れは 3 回目である。12 万ルピーを借りている。搾乳牛の購入に充てた。近所の人に FINCA Bank を紹介してもらった。

Dadli 氏（35 歳女性）：マティアリ県で Safco Support Programme から 3 万ルピーを借りている。その他、Khushhali Bank からも 12 万ルピーを借りている。3 頭の搾乳水牛、2 頭の乾乳水牛、3 頭の育成雌水牛、2 頭の育成雄水牛の計 10 頭を所有している。家計収入において生乳からの収入の割合が最も高く、1 日 27.5 キロ、1 キロ 70 ルピーで販売している。ローンはグループ借り入れで、今回は 4 度目になる。1 回目は山羊の購入、2 回目はロバの荷車の購入、3、4 回目は育成雌水牛の購入に利用した。借り入れの上限額を高くしてほしいと希望している。

今回の聞き取りで銀行から紹介された利用者は、いずれも 6 頭以上を飼育する中規模以上の農家であった。タンド・アラヤ県の商業酪農家である Mollah Bux 氏以外の農家は 2～3 頭の搾乳牛を所有している。報告された乳量は正確なものであるか否か留意する必要があるが、比較的乳量も多く、売価も高い。いずれの農家の生乳の販売利益も、前節で述べた 1 万ルピーを返済する場合の日額販売利益の基準 336 ルピーを超えている。うち、2 者は生乳販売の他、就労所得からの定期的な収入源を世帯として持っている。また、いくらかの土地を所有しており、飼料も栽培していた。彼らはこれらの好条件を基に複数回にわたりローンを利用しており、着実に資産を増やしている。

商業大規模酪農家である Mollah Bux 氏は、家畜商による利息無しの分割払いによる家畜購入手段を持っており、現在でもこのインフォーマルな分割払いを活用している。同氏にとって、マイクロファイナンス専用銀行のローンは融通が利かず魅力的ではないようであった。一方、Mollah Bux 氏が利用する伝統的バリューチェーンによるローンにはアクセスがない女性酪農家にとって、彼女たちに資金を提供してくれるマイクロファインナンス銀行は、これまでになかった資金提供元となって、彼女たち世帯の資産増加に貢献しているといえる。

「利息率は高いと感じるか」、という問いには、「高い」という回答が多かったが、回答者は利息率に高い関心を払っているようには見受けられなかった。それよりも 1 カ月の返済額が無理なく返済できる額かどうかという点により注意が払われてるという印象を受けた。

表６　マイクロファイナンス利用者状況一覧

	1	2	3	4
利用マイクロファイナンス機関	APNA Microfinance Bank (Tando Allahyar)	FINCA Microfinance Bank (Tando Allahyar)	FINCA Microfinance Bank (Tando Allahyar)	Safco Support Foundation (Matiari)
年齢	27 歳	45 歳	58 歳	35 歳
職業	商業酪農家	Lady Health Worker	酪農業	酪農業（その他家族の農業、就労からの収入あり）
所有家畜頭数	75 頭	8 頭	8 頭	10 頭
生産乳量	360 Kg	26 Kg	28 Kg	30 Kg
販売乳量	360 Kg	23 Kg	15 Kg	27.5 Kg
販売価格	70 Rs	80 – 90 Rs	100 Rs	70 Rs
ローン借入額	Rs. 500,000.	Rs 50,000.	Rs 120,000.	Rs 30,000.
利息	月利 2%（年利 24%）	年利 30%	年利 28%	年利 20%
ローン利用目的	搾乳牛の購入	シェアリングで飼育していた産後 9 カ月の搾乳牛の自身の費用負担分を支払い、取得	搾乳牛の購入	育成雌水牛の購入
返済方法	11 カ月は金利分のみ 1 万ルピーの返済。12 カ月目に残額 510,000 ルピーを返済	毎月 5,417 ルピーを 12 カ月で返済	毎月 10,500 ルピーを 15 カ月で返済	毎月 3,000 ルピーを 12 カ月で返済
ローンを利用したきっかけ	銀行からの度重なる営業に譲歩してローンを初めて利用した。	自身の通勤路にたくさんのマイクロファイナンス銀行があり、関心を持っていた。知人に依頼して銀行を紹介してもらい、ローンを利用することにした。	搾乳牛購入資金を必要としており、村人に依頼してローンを利用できるマイクロファイナンス銀行を紹介してもらった。	女性ローンオフィサーが家まで営業に来たことによりマイクロファイナンスを知った。資産と牛乳生産を増やすためにローンを活用している。
他のローン利用	これまで資金が不足する際には家畜商から分割払いで購入をしていた。今回銀行から 50 万ルピーを借り入れた	以前に Khushhali Bank の金ローンを利用したことがある。今回の 5 万ルピーの借り入れは 2 回目の借り入れである。	今回の借り入れは 3 回目である。初回は飼料購入のために 5 万ルピーを借りた。2 回目は搾乳牛購入のために 10 万	現在 Khushhali Bank から年利 31%で 12 万ルピーを借りている。一括返済。 今回の Safco からの借り入れ

	1	2	3	4
	が、実際購入した搾乳牛は 6 頭。3 頭分の支払いとして 50 万ルピーを支払い、残り 3 頭分は付けで 2 カ月後に残金を支払う予定にしている。	初回は 4 万ルピーを借り入れ、2 頭の育成雌水牛を購入した。	ルピーを借り入れた。	は 4 回目である。1 回目は 1 万ルピーの借り入れで山羊購入に充てた。2 回目は 1 万 5 千ルピーをロバの荷車の購入に、3 回目は 2 万ルピーを育成雌水牛の購入に充てた。
課題	牛乳の生産量は年間を通して安定しているわけではないので、毎月の返済は困難である。今後は銀行からのローンは利用したくない。	特になし。	特になし。	借り入れの上限額を引き上げてほしい。
備考	平均 360Kg/日を 70Rs/Kg で販売している。飼料は購入しており、1 頭につき 1 日 300Rs のコストがかかるとのことであった。 搾乳牛取得の需要が高まるのは、生産乳量が減る 5 月、6 月。 返済が比較的容易な月は砂糖キビの収穫時期であり生産乳量の増える 1 月。	2012 年に受託した育成雌水牛の初期価格は 15,000 ルピーであった。産後 9 カ月で 3-4Kg/回の乳量であった当該搾乳牛（時価 85,000Rs）を取得すべく、2016 年 3 月に 35,000Rs を支払った。 家畜からの収入は 1 日約 1,800Rs、支出は約 1,100Rs である。 7 エーカーの土地を所有しており、1 エーカーは飼料を栽培している。世帯収入の 50%は生乳販売、その他 35%は農業、15%が就労所得。 4 月は家畜の価格が比較的安い。また生乳の生産量も落ちる。	1 日の生乳からの収入は平均 1,500Rs、支出は 1,000Rs であるとのこと。 世帯の主収入は生乳販売で、その他、刺繍や裁縫などからの収入（月 3,300Rs ほど）である。（女性世帯主世帯）。毎月 4,000 – 5,000 Rs ほど貯蓄しているとのことであった。 飼料は購入に頼っている。	世帯収入の中で生乳販売が占める割合が最も高く、続いて農業収入、就労所得、ロバ荷車による収入となっている。 7.5 エーカーの土地を所有しており、1.5 エーカーに飼料を栽培している。 非識字者であるため家計の収支記録は付けていないが、記憶している。 保険を利用している。

（3）課題

1）ローン対象者の経済状況

銀行に紹介された利用者は、多くの利用者の中の成功例である。話を聞いた中規模農家は 3 例しかないため一般化はできないが、ローンを繰り返し利用し、資産や生産量を徐々に増やしていけるのは、乳量、売価とも好成績で、かつ、飼料が自家栽培で入手でき、他の収入源を持つキャッシュフローの安定した農家であり、主に中規模農家が該当するといえる。これは、マイクロファイナンスセクターが本来ターゲットとする層と一致している。

一方、プロジェクトが対象としている農家は飼育する家畜数が 5 頭以下の小規模農家である。これら小規模農家が現行のローン商品を活用していくことは難しい。小規模農家は十分な生産量とキャッシュフローを有さないことが多いと推察されるからである。この状況に対し、先に聞取りを行った非銀行系マイクロファイナンス機関である NGO が展開する受益者の貧困度に合わせた無償資金供与、ゼロ金利、金利つき融資といった各プログラムの設定を参考にすることができる。つまり、小規模農家に対しては、このような段階的プログラムで、徐々に飼育家畜頭数と生乳生産量を増やし、農家がローン返済に可能なキャッシュフローを持つまで待つ必要があるということである。一方、こうしたプロセスを踏むことで、農家がローンを利用できるまでになった際には、マイクロファイナンスによって、着実に家畜資産を増やすことができることが、本調査による聞取り結果によって示されている。

このことから本プロジェクトでは、小規模農家に早急にマイクロファイナンスローンを導入することは避け、まずは資金貸し付けを伴わない形での家畜資産の増加方法を試みることが望ましいと考える。現在、本プロジェクトの子水牛の配布では、委託飼育形態（シェアリング方式）を活用し、金銭の代わりに労働力で対価を支払う方法が採用されており、これによって資金借り入れをせずに農家が家畜資産を増やすことを可能にしている。まずは、この方法により家畜数を増やした農家が、生乳生産量を増やし、後に NGO のプログラムを活用し、ゼロ金利、金利付き融資と段階的にステップアップしていくことが将来的にできれば望ましいであろう。

2）技術サービス

技術サービスへのアクセスの有無については、ローン供給側の課題として前述したが、需要側にとっても同様に大きな課題である。聞き取りを行った利用者が所有する水牛の生産性は高く、生乳の売価も高い。このことは、当然ながら、キャッシュフローの改善につながる。生産性を高めるための飼養管理指導、育種事業、生乳売価を高めるためのマーケティング指導、収益率を高めるための営農指導など、本プロジェクトで行う技術サービスがローン利用者にとっても不可欠である。

5．まとめ

パキスタン中央銀行は畜産セクターへの貸し付けを増やすことを目的に、10 年ほど前からさまざまなスキームを開発してきており、畜産セクターへのローン貸付額は大きな伸びを見せている。

本プロジェクトの対象県で事業を行うマイクロファイナンス機関でも、畜産業が地域において重要な役割を担っていることから、同セクターへの貸し出しニーズは高いと認識している。現行の畜産セクター向けマイクロファイナンス商品は、肥育用の山羊・牛および搾乳目的の牛・水牛の購入を主としている。各行・機関の商品内容は差異があるが、その差は微小なものといえる。ただし、こうしたローンを利用できる農家は、一定数の家畜を所有し、販売できる余剰生産生乳のある中規模以上の農

家に限られるといえる。一定量の生乳販売で返済額を賄えるような定期収入のある農家、あるいは返済を補完する別の収入源を有する農家である。プロジェクトが対象とする小規模農家は、十分な販売乳量を生産できていない。また地域によっては乳価が低く、十分な販売収入が期待できない。そのため現行のローン商品を小規模農家が活用することは、現状では難しいといえる。

銀行によっては獣医師を抱えたり、ワクチン接種を行ったりしているが、技術サービス内容は限られており、ローン商品が技術サービスと連動して提供されている例はほとんどない。飼養管理や繁殖治療、営農指導、マーケティング指導など農家の生産性、収益率を向上させるような技術サービスとの連携が望まれる。

肥育用の場合以外、一括返済や返済期間を設定している商品は少なく、返済据え置き期間も特にない。畜産酪農家は農業と兼業のものも多いため、農作物の収穫時期に一括返済を行えるような商品の開発によって、農家の返済が可能になるかもしれない。

本調査では、搾乳目的で水牛を購入するためにローンを利用した人の聞き取りを行った[18]。ローンの活用に成功している人は、複数回にわたりローンを利用しており、着実に資産を増やしている。多くは生産性が高い水牛を有しており、一定の販売乳量を生産すると同時に、比較的高い売価で販売していた。また伝統的なバリューチェーンに存在するインフォーマル融資にアクセスのない女性にとっては、マイクロファイナンスによるローンが効果的で好ましいインパクトを生み出しているように見受けられた。

今後マイクロファイナンスサービスを利用できる層を増やしていくためは、NGO が展開しているような農家の経済状況に応じた段階的金融サービスプログラムが必要であると考えられる。現時点で利用が困難である小規模農家には、技術サービスにより生産性と収益率を改善しつつ、プロジェクトで実施している労働対価による家畜取得、無償配布による家畜取得で自己所有の家畜数を増やすことがまず必要であろう。そうしてある程度の数の家畜を保有することになってからようやく、マイクロファイナンス機関からのサービスを活用することが可能になるといえる。

６．考察：プロジェクトでのマイクロファイナンスの活用

プロジェクトで対象としている畜産資源は月齢 3 カ月の子水牛と乾乳牛である。そもそも現行のマイクロファイナンス商品で子水牛と乾乳牛を対象にしている商品はない。子水牛、乾乳牛を対象とした場合、下記の課題が想定される。

１）子水牛

プロジェクトで配布している月齢 3 カ月の雌子水牛が成熟、受胎するには平均 3 年ほどの期間を要する。さらに、受胎してから出産し、搾乳が可能になるまでに 1 年弱の時間がかかる。当該子水牛からの収益により返済を行うことを想定すると、返済が可能になるまで 4 年ほどを要することになる。このような返済期間を設定することは不可能である。

まずプロジェクトで、3 カ月飼育した子水牛の引き渡し価格を、市場価格に応じて設定する必要がある。引き渡し価格が設定されれば、小規模農家が利用できる返済モードの商品を設計することができる。その際には、返済資金源として、当該子水牛が生産する生乳販売からの収入を前提とせず、別資金源を想定した商品とする必要がある。農家の経済状況を十分考慮した商品が開発されれば、マイ

[18] 対象者はローンの活用に成功している人たちで占められたため、失敗例から学ぶことはできなかった。今後、失敗例から学ぶことも必要であろう。

クロファイナンスローンは、家畜資産取得の一つのオプションになるであろう。

2）乾乳水牛

プロジェクトでは、商業酪農家が売却する乾乳水牛をリサイクルするシステムの検討も行っている。子水牛同様、乾乳水牛を購入した場合、受胎し搾乳が可能になるまで最低 1 年を要する。何らかの返済据え置き期間の設定が必要であろう。また当該乾乳水牛が受胎せずに損失が発生する場合、返済額を補完するための保険も有効かもしれない。乾乳水牛については、その有効活用の仕組みについての技術的検証が始まったばかりである。まずは、技術検証を行い、乾乳水牛の受胎率改善について見通しを立てた上で、農家が乾乳水牛を購入するルート、仕組みの検討がなされる必要がある。その後マイクロファイナンス活用の検討をしたい。

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**

8

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

17

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.

19

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.

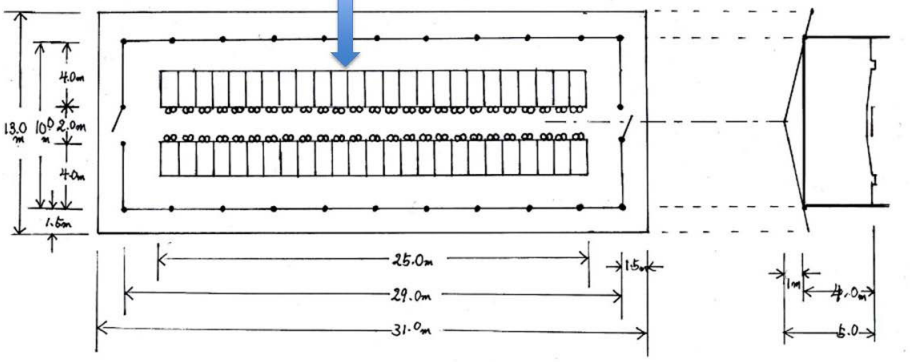
Reasons for setting up a new center:

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



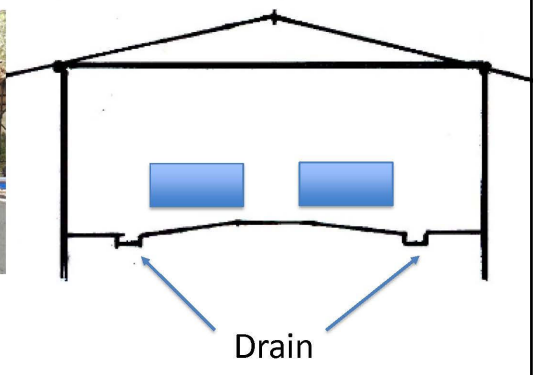
Above View

Side View

21

Side View

Calf hutches



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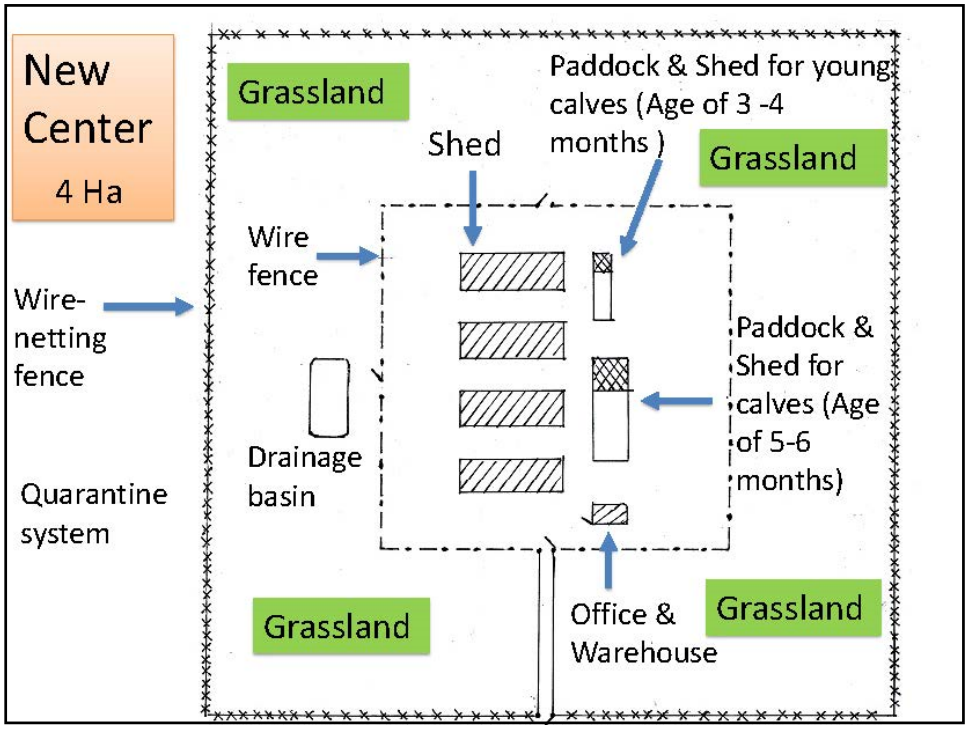


23

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**

24

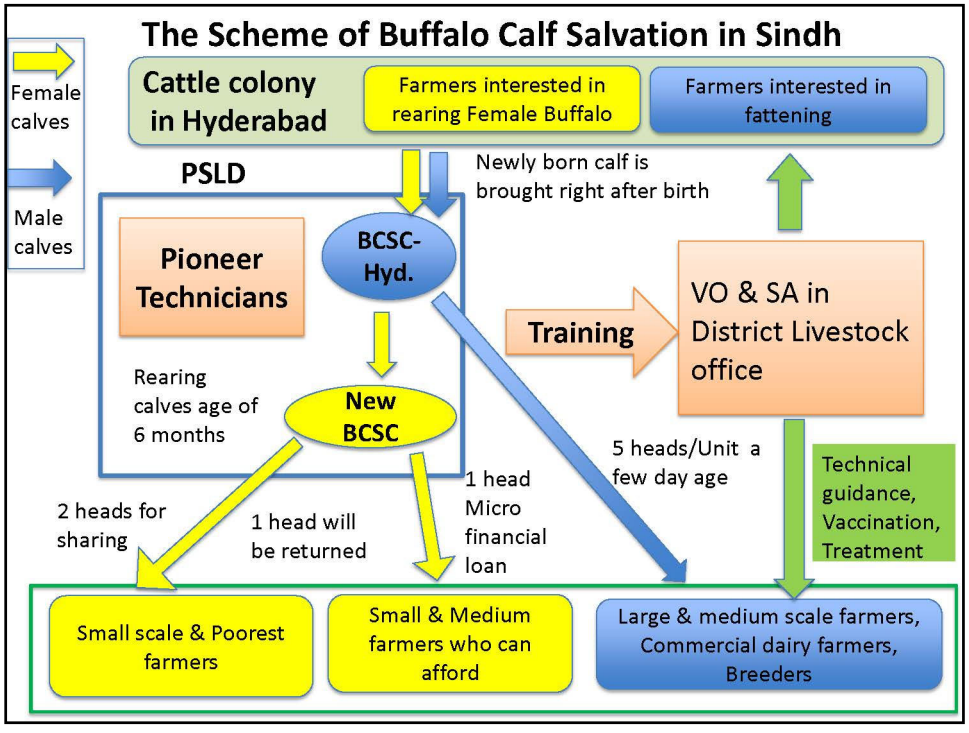
Grant Type: 1st Model
Using the new Center

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.

25



26

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

27

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

28

5th Year

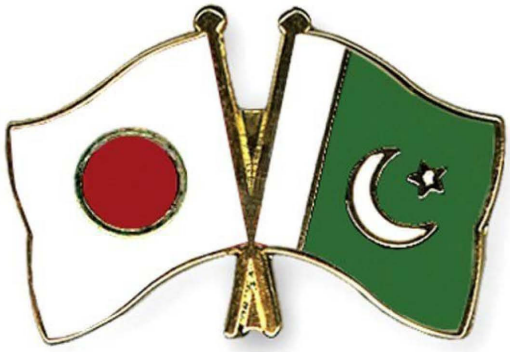
Year	Activity in Hyderabad		Activity in Karachi	Distribution Female Buffalo Calves
	Existing center in courtyard of DG office	New Center	New Center	
5th Year 2024-2025		1.Distribution of Female buffalo calves 1,000 heads	1.Distribution Female buffalo calves 750 heads 2.Installation 4th shed	1,750

29

THANK YOU

30

Long live Pakistan Japan friendship



31

農家による適正技術実践のモニタリング報告書（その 1）

2018 年 8 月

パキスタン国シンド州持続的畜産開発プロジェクト

目次

1. モニタリング概要

1-1 モニタリングの目的と位置づけ

モニタリングは、図 1 に示すように一連の普及活動の最後のステップにあたる。プロジェクト目標の指標 1「(対象県において) ターゲット・グループ (パイロット農家を除く) のうち、日常的に適正技術 (添付「適正技術開発チェックリスト」で示された“A”ランク技術) を使っている農家の数が、村での普及活動開始後 1 年間で 10%、2 年間で 20%増加している。」を明らかにするために実施する。

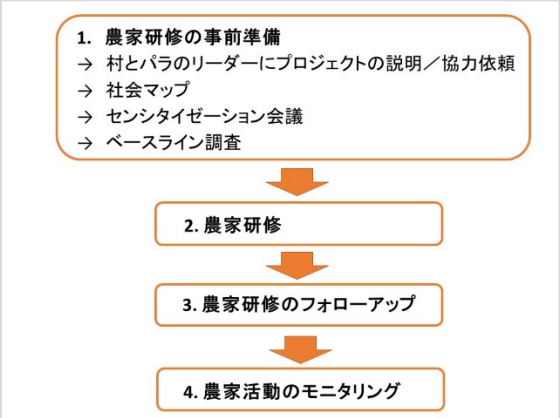


図 1 普及活動の流れ

2016 年 11 月に適正技術開発チェックリストが確定され、PDM 第 3 版 (2016 年 12 月) に、反映された。適正技術開発チェックリストの A ランクの一覧は、表 1 のとおりである。

表 1 適正技術開発チェックリスト (A ランク)

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.

No.	Field	Title	Content
10	Feeding Management	Cow management at parturition	A cow is delivered at comfortable space and immediately treated.
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 適正技術開発チェックリスト質問票の作成

前述の適正技術開発チェックリスト（以下、チェックリスト）に沿って、農家が技術を実践しているか否かを判断するために、適正技術開発専門家と技術 C/P が、「適正技術開発チェックリスト質問票（以下、質問票）」を作成し、2016 年 12 月のプレテストを経て、最終化した。質問票の英語版およびシンド語版は添付資料 1 と 2 のとおりである。

1-3 モニタリング方法

モニタリング方法は、前述の質問票を使用したインタビューと農場観察である。モニタリングの初期は質問票のみを使用していたが、農家の回答を確認するため、普及チームで観察シート（英語版は添付資料 3、シンド語版は添付資料 4）を作成し使用した。

1-4 モニタリング対象者、データ収集数、データ収集期間

パイロット村 25 村において、男性対象の農家研修を 25 村、女性対象の研修を 22 村[1]で実施した。ただし、このうちの 1 村では、村長兼パイロット農家の協力が得られなかったため、4 科目を完了した時点で男女ともに普及活動を中止した。モニタリング対象者は、農家研修の全 8 科目を完了した男性対象 24 村、女性対象 16 村[2]において、研修に 2 回以上参加した農家（男性農家 904 名、女性農家 514 名）とした。データ収集の結果、男性 552 名、女性 188 名から質問票への回答

[1] パイロット村のうち 3 村では、村の意向（女性が畜産に関わっていないなど）により、女性対象研修は不要とされた。
[2] バディン県の 5 村では、未だ女性対象研修が完了していない。

が得られた。また、農場観察により、男性 463 名、女性 184 名分の結果が得られた。モニタリングの全体期間は、2017 年 9 月から 2018 年 6 月であるが、村によって実施時期が異なる。モニタリング対象者、データ収集数、データ収集期間の詳細は、添付資料 5 のとおりである。

1-5 モニタリング対象者数とデータ収集数の差

モニタリング対象者数とデータ収集数には差がある。その主な理由は以下のとおりである。

- ✓ 男性農家へのインタビューについて：農家研修では、研修参加者人数を頭数で数えるが、実際の農場管理では、親兄弟など複数のメンバーで農場を管理しているケースがあった。その場合は、同じ農場を管理している研修参加者のうち、もっとも活動的な代表者 1 名に対してインタビューを実施した。
- ✓ 質問票の数と観察結果の数の差について：観察シートは後から導入されたことと、モニタリング対象者の農場が自宅に隣接している場合に、男性普及員では（男性が自宅に入ることを良しとしないため）農場を見せてもらえないことが、差が生じた主な理由である。後者については、女性普及員がモニタリングを行うことで解決した。
- ✓ 女性農家のデータ収集について：女性農家対象のモニタリング調査は、本報告書のとりまとめ時期を考慮し、2018 年 6 月末までとした。そのため、男性農家に比べるとデータ収集数が少なくなっている。また TMK 県のハジ・グラム・ナビ・シャー村では、マスタートレーナーと男性普及員がヒンズーのビラダリを対象に男女混合研修を実施し、女性普及員が産休から復帰する前に、男性普及員によりモニタリングも終了したことから、ヒンズーの女性農家のみのモニタリングはしなかった。その後、女性普及員によってムスリムのビラダリの女性農家を対象に研修が実施されたが、6 月末で調査終了としたことにより、やはりムスリムの女性農家対象のモニタリングはしなかった。TMK 県のアダム・パンワー村も同様である。したがって、女性農家のモニタリング対象村は 16 村の予定であったが、最終的には TMK 県 2 村を除く 14 村となった。

2. 実践率の算出方法およびその結果

2-1 実践率算出にあたってのデータの取り扱いについて

質問票では一つの技術に対して複数の質問をすることにし、それらの中から「キークエスチョン（これを満たしていれば実践していると数える）」を設定した。キークエスチョンの設定は、適正技術開発専門家の判断を仰いだ。

観察が可能ないくつかの項目では、「質問票による結果」と「観察結果」に乖離がみられる場合がある。このような場合は、観察結果を加味して質問票に示された実践率を補正した。

女性農家については 14 村のデータがあるが、調査を途中で完了させたことからデータ数が少ない村もある。そのため、各技術の実践率の検討においては、少なくとも 10 名以上のデータがある 10 村のみを解析の対象とした。

2-2 適正技術 A ランク No.1~No.19 の実践率（パイロット村 24 村・男性農家全体）

パイロット村 24 村の男性農家 552 名[3]の適正技術 A ランク 19 項目の実践率を図 2（No.1~No.10）および図 3（No.11~No.19）に示す。以下の結果のうち、6 項目（「No.3 清潔な水の給水」、「No.4 改善繋留方法の使用」、「No.5 簡易屋根の使用」、「No.6 乾いた床」、「No.12 削蹄」、「No.15 飼槽の清掃」）については、観察結果を勘案した補正後の実践率を表示している。各項目における解説、計算方法は、県別の結果と合わせて、2-4 以降、項目別に記載する。

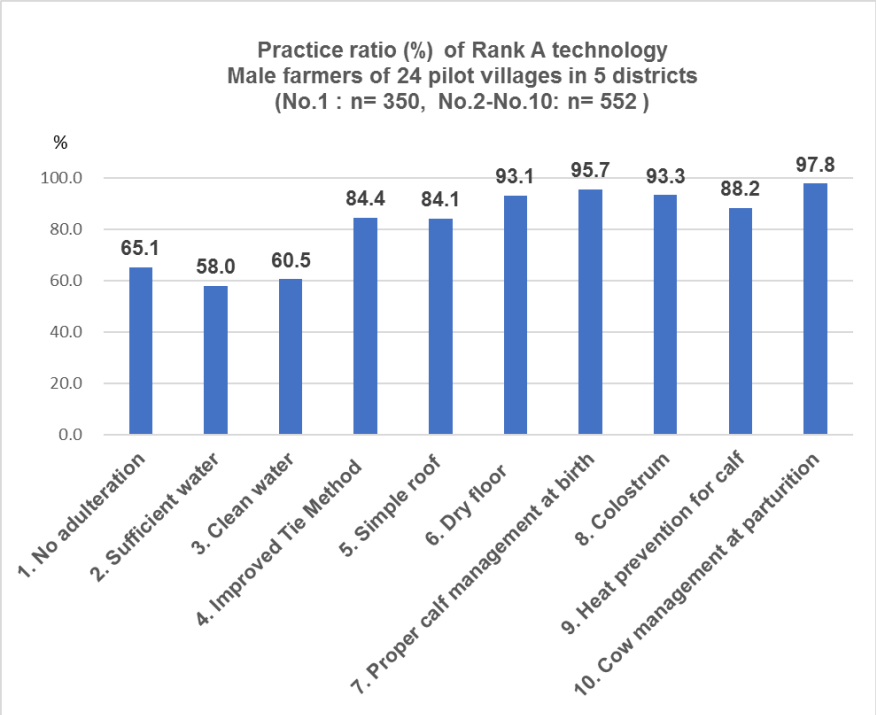


図 2 パイロット村 24 村における男性農家の適正技術 A ランクの実践率（No. 1~No.10）

全体的に高い実践率となっている。「No.1 牛乳に混ぜ物をしない」について、逆をいえば 3.5 割

[3] ただし、1 番のマーケティングについては、牛乳の販売をしていない農家もあることから、この項目のみ母集団が 350 名である。

の人はまだ混ぜ物をしているということであり、パイロット村をもってしても混ぜ物がいまだ撲滅できないでいることがわかった。また、例えば「No.8 初乳の哺乳」は、慣習的な対応（胎盤が出てから初乳を飲ませる、あるいは初乳自体を飲ませない）がわかっているので、調査結果（93.3%の農家が出産後 6 時間以内に初乳を哺乳している）は、農家研修やその後のフォローアップの成果といえる。

しかし、質の問題はあるにしても、農家も元々なんらかの形で実践していた項目（例えば、「No.5 簡易屋根の利用」、「No.7 新生子牛の適切な扱い」、「No.10 出産介助」）は、ベースラインがないため、農家研修やその後のフォローアップによって、どの程度その実践率が向上したのかはなんともいえない。

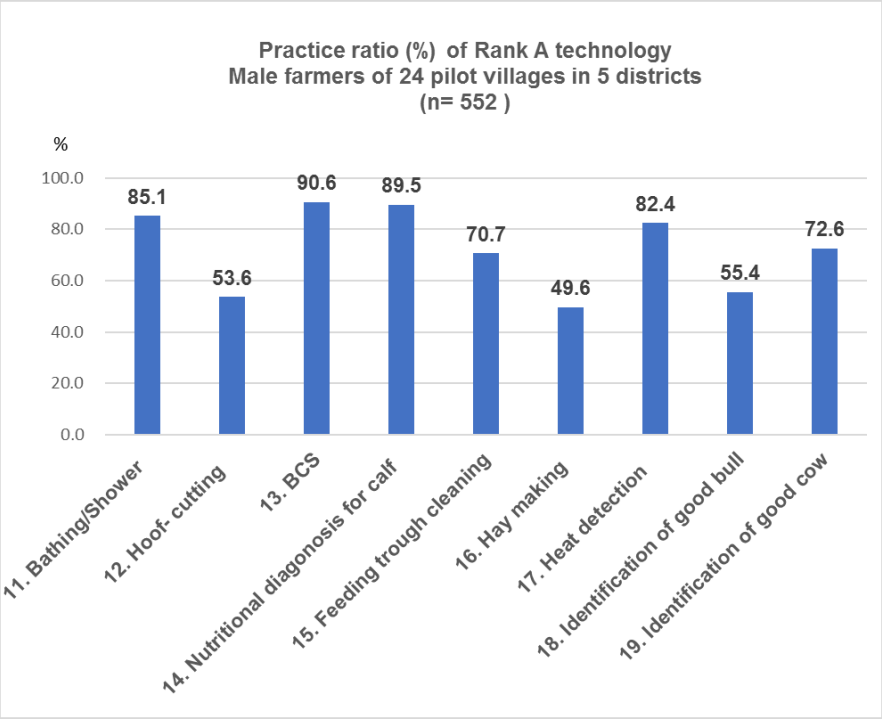


図 3 パイロット村 24 村における男性農家の適正技術 A ランクの実践率（No. 11~No.19）

「No.13 BCS」と「No.16 乾燥作り」は、これまで農家の習慣にはなく、プロジェクトによって導入された新しい技術であるが、覚えれば使える前者と子牛限定かつ作業を伴う後者では、実践率に大きな開きがある。相対的に、水槽や飼槽の清掃や乾草作りなど、手間がかかるものの実践率が低い。

2-3 適正技術 A ランク No.1~No.19 の実践率（パイロット村 14 村・女性農家全体）

パイロット村 14 村の女性農家 188 名[4]の適正技術 A ランク 19 項目の実践率を図 4（No.1~No.10）および図 5（No.11~No.19）に示す。以下の結果のうち、男性農家と同様に 6 項目（「No.3 清潔な水の給水」、「No.4 改善繋留方法の使用」、「No.5 簡易屋根の使用」、「No.6 乾いた床」、「No.12 削

[4] ただし、1 番のマーケティングについては、牛乳の販売をしていない農家もあることから、この項目のみ母集団が 135 名である。

蹄」、「No.15 飼槽の清掃」）については、観察結果を勘案した補正後の実践率を表示している。

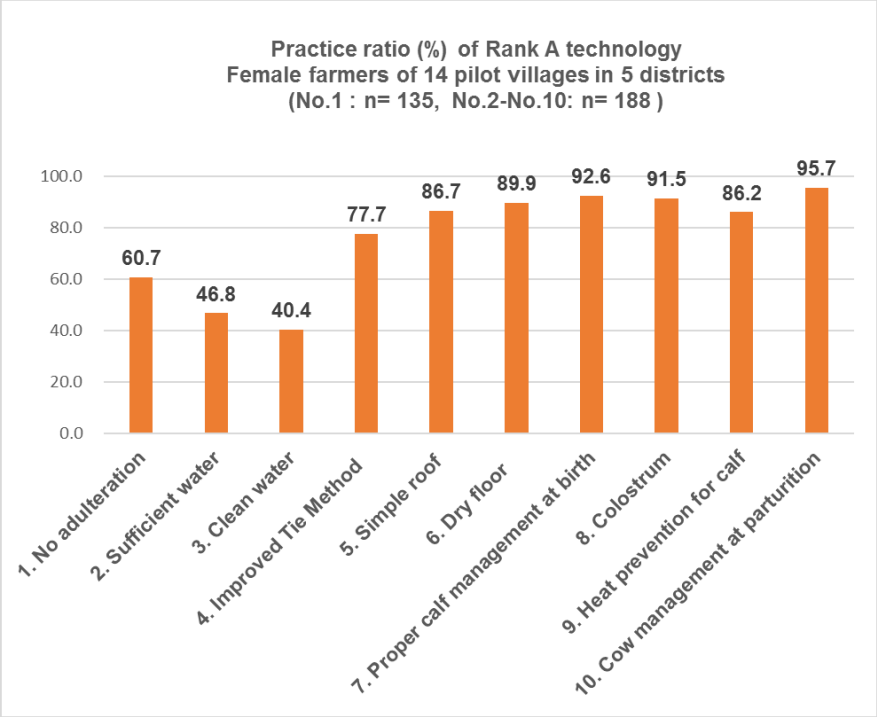


図 4 パイロット村 14 村における女性農家の適正技術 A ランクの実践率（No. 1~No.10）

女性農家も全体的に高い実践率となっており、実践率の高低の傾向としては男性農家とそれほど差がない。

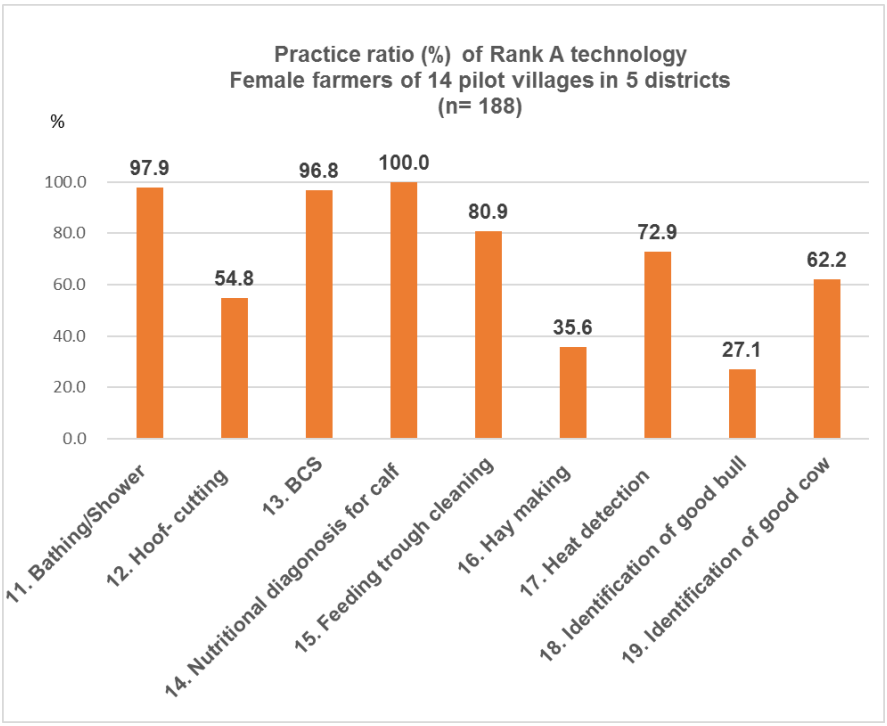


図 5 パイロット村 14 村における女性農家の適正技術 A ランクの実践率（No. 11~No.19）

搾乳牛の栄養状態診断に使用する「No.13 BCS」と「No.14 子牛の栄養状態診断」について、前

者の結果は、男性 90.6%、女性 96.8%、後者の結果は、男性 89.5%、女性 100%となり、いずれも女性農家の実践率が高かった。女性農家が家畜の世話をすることが多く、家畜の栄養状態を気にかけているといえる。

「No.18 雄牛の能力確認」について、男性農家 55.4%の実践率であるところ女性農家は 27.1%に留まっている。この理由は、雄牛の能力確認が女性の仕事とは見なされず、女性は関与できない村が複数あることによる。

他方、「No.19 雌牛の能力確認」については男性農家 72.6%の実践率であるところ、女性農家は 62.2%で 1 割程度の差に収まっている。その理由は、女性農家は、多くの場合家畜の売買には関与しないが、搾乳などで雌牛に接する機会が多く、その時に雌牛の能力を確認しているようである。

2-4 適正技術 A ランク No.1 の実践率（男性農家 5 県合計、県別、男女比較）

1) チェックリストの記述と質問

適正技術の No.1 は、「牛乳に混ぜ物をしない」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。2 つの質問ともキークエスチョンとした。

表 2 チェックリスト No.1 の内容と関連する質問

No.1	Marketing
Title	Production of quality milk
Content	A farmer doesn’t adulterate milk with water.
1-1	Do you sell pure milk?
1-2	How much is milk selling price per kg?

2) 算出方法

まず、質問 1-1 で牛乳を販売している農家の数を把握した後、1-2 で聞き取った価格情報と、マーケティング C/P から入手した「各村の取引先における混ぜ物のない乳価」を比較した。その結果、純粋な牛乳を販売していると回答した農家のうち、質問 1-2 で提示された乳価が、純粋な牛乳の価格と同じかそれ以上の農家を「混ぜ物をしていない農家」とした。その人数を、「牛乳を販売している農家の数」で除して、実践率を算出した。

3) 男性農家の 5 県合計および県別の結果

男性農家の 65.1%が、牛乳に混ぜ物をしていないとの結果になった。市場にアクセスしやすいハイデラバード県の村が 45.8%と一番低い結果となった。

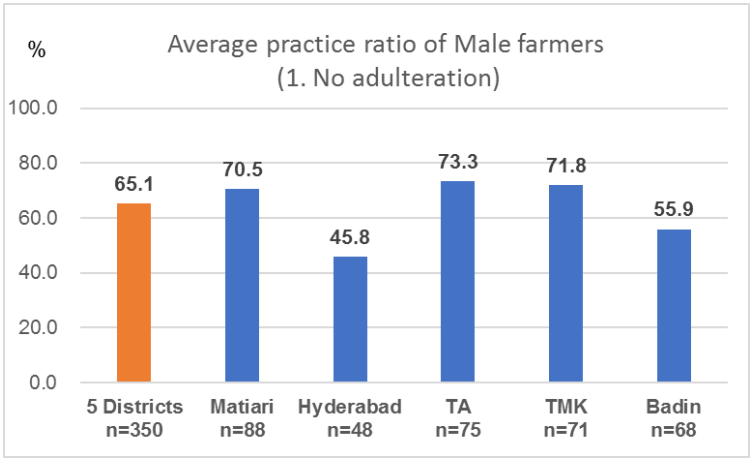


図 6 男性農家の 5 県合計および県別平均実践率（No.1 牛乳に混ぜ物をしない）

4) 男女比較

男女の比較が可能な 10 村のデータで実践率を算出してみると、マティアリ県（2 村合計）は、男性全体のデータとは異なり、混ぜ物をしていない率が男女とも最も低くなった。

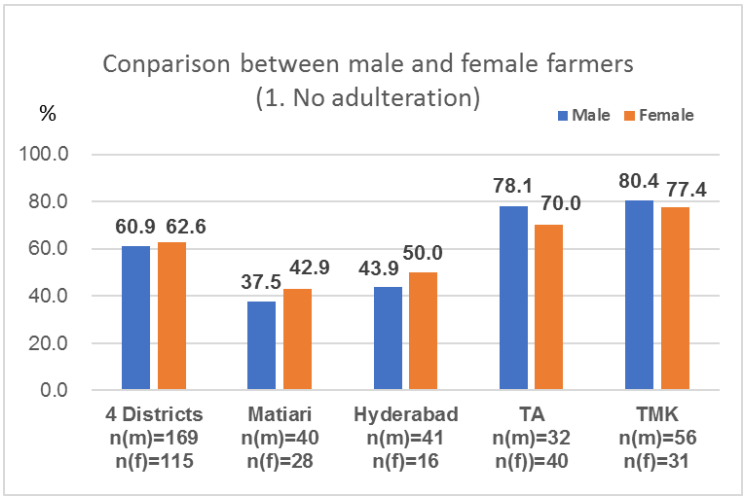


図 7 4 県 10 村における男女別平均実践率（No.1 牛乳に混ぜ物をしない）

2-5 適正技術 A ランク No.2 の実践率（男性農家 5 県合計、県別、男女比較）

1) チェックリストの記述と質問

適正技術の No.2 は、「十分な給水」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。5 つの質問のうち 2 つ（2-1 が 2-2）をキークエスチョンとした。

表 3 チェックリスト No.2 の内容と関連する質問

No.2	Feeding Management
Title	(for milking cow) Supply of sufficient water
Content	A milking cow drinks sufficient water.
2-1	Do you use enough size of water tank to give water to animals?
2-2	(If no,) Do you bring water multiple time to give it to animal more than 60 liters per day?
2-3	How many times a day do you give water?

2-4	Do your animals have a chance to drink water from other water source?
2-5	(If yes,) What kind of water source it is ?

2) 算出方法

「水槽の大きさが十分」か、もしくは十分でない場合は、「1 日 1 頭あたり 60 リットルの給水」をしていれば、「十分な給水」をしていると判断する予定であった。そのため質問 2-2 において、普及員が給水に使う容器の大きさと給水回数から水量を概算することになっていた。しかし間違いが多く計算をしていないケースもあり、実践率の算出には使えなかった。そこで、「水槽の大きさが十分」か、「水をあげる回数が 4 回以上」のいずれかを満たした農家を十分な給水をしている農家と数え、実践率を算出した。

3) 男性農家の 5 県合計および県別の結果

男性農家の 58.0%が、十分な給水をしているとの結果になった。TMK 県には、水の確保が難しい村もあり、その傾向がよくでている。

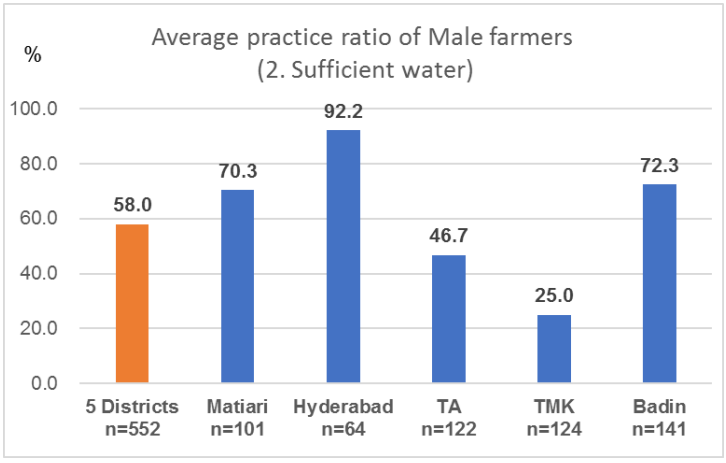


図 8 男性農家の 5 県合計および県別平均実践率（No.2 十分な給水）

4) 男女比較

男女の比較が可能な 10 村のデータで実践率を算出してみると、ハイデラバード県（3 村合計）とタンドアラヤ県（2 村合計）は、男女で真逆かつ極端な結果になっている。

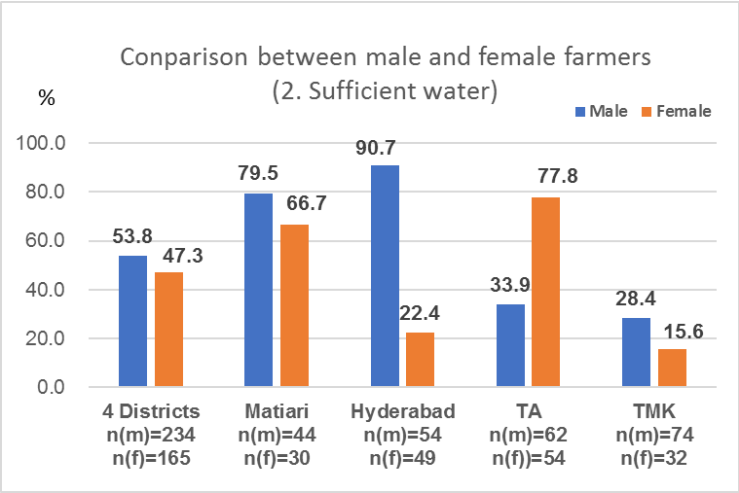


図 9 4 県 10 村における男女別平均実践率（No.2 十分な給水）

2-6 適正技術 A ランク No.3 の実践率（男性農家 5 県合計、県別、観察比較、男女比較）

1) チェックリストの記述と質問

適正技術の No.3 は、「清潔な水の給水」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。本項目の質問は 1 つであった。

表 4 チェックリスト No.3 の内容と関連する質問

No.3	Feeding Management
Title	Clean water
Content	A water tank is regularly (at least once a week) washed.
3-1	Do you wash a water trough at least once a week?

2) 算出方法

単純に、水槽を少なくとも週に 1 回洗っていると答えた農家の人数をサンプル数で除して実践率を算出した。

3) 観察結果との比較と補正

下図のグラフは、質問票の結果と観察の結果を比較したものである。質問票の結果では、男性農家の 96.7%が水槽を少なくとも週に 1 回洗っていると回答したが、普及員による水槽の観察の結果は、きれい（A）が 34.2%、汚い（C）が 36.6%、それらの中間（B）が 26.7%となった。実際に観察をしてみなければ、実態がわからない好例といえる。そこで、A と B を満たす人を実践している人とみなし、質問票の回答者数に補正係数を乗じて補正した。その後、補正後の質問票の回答者数と観察の結果のうち、いずれか低い数を実践者数とした。

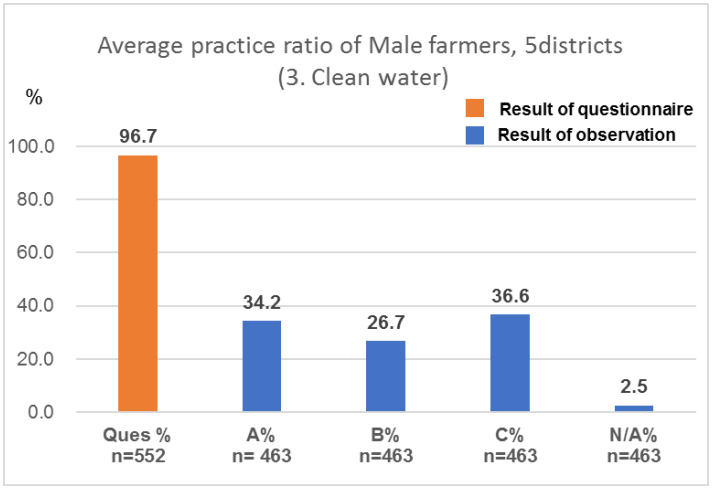


図 10 男性農家の 5 県合計の質問票結果と観察結果の比較（No.3 清潔な水の給水）

4) 男性農家の 5 県合計および県別の結果

実践者数の補正後、男性農家全体の実践率は、96.7%から 60.5%に下がった。全体および県別（補正済み）の実践率は下図のとおりである。県別でそれほど大きな差は見られなかった。

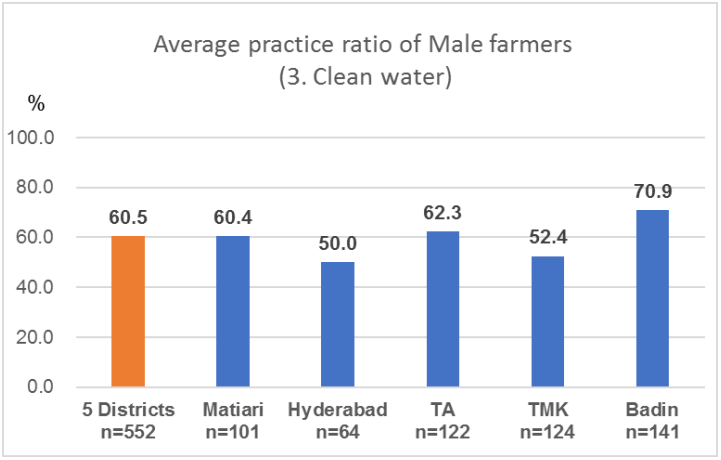


図 11 男性農家の 5 県合計および県別平均実践率（No.3 清潔な水の給水）

5) 男女比較

男女の比較が可能な 10 村のデータで実践率（補正済）を算出した。ハイデラバード県と TA 県では、男女間で大きさ差が生じている。

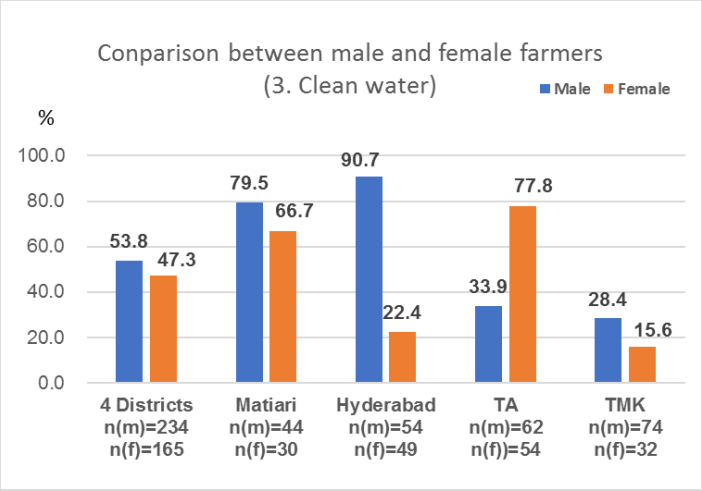


図 12 4 県 10 村における男女別平均実践率（No.3 清潔な水の給水）

2-7 適正技術 A ランク No.4 の実践率（男性農家 5 県合計、県別、観察比較、男女比較）

1) チェックリストの記述と質問

適正技術の No.4 は、「改善繋留方法の使用」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。5 つの質問のうち 3 つ（4-1、4-2、4-5）をキークエスチョンとした。

表 5 チェックリスト No.4 の内容と関連する質問

No.4	Feeding Management
Title	(for milking cow) Use of improved tie method
Content	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?
4-2	Do you release a milking cow from tie to go to grazing or bathing? (more than 6 months)
4-3	What kind of materials do you use to tie a milking cow?
4-4	Which body parts do you use to tie a milking cow?
4-5	Do you use enough length of tie material to make a milking cow move freely to eat and drink?

2) 算出方法

1 名あたりの回答につき、キークエスチョンにおいて、3 つの質問とも「はい」であれば 1.00、2 つなら 0.67、1 つなら 0.33 と傾斜配点した。配点後のスコアを合計し、サンプル数で除して、実践率を算出した。

3) 観察結果との比較と補正

下図のグラフは、質問票の結果と観察の結果を比較したものである。質問票では、男性農家の 86.6%が、改善繋留方法を使用していると回答した。普及員による観察の結果でも、繋留方法が良い（A）が 76.7%、悪い（C）が 2.2%、それらの中間（B）が 21.2%となり、概ね質問票の結果と齟齬がないことがわかった。ただし、県や村のレベルでは、ばらつきがあるため、A と B を満たす人を実践している人とみなし、質問票の回答者数に補正係数を乗じて補正した。その後、補正

後の質問票の回答者数と観察の結果のうち、いずれか低い数を実践者数とした。

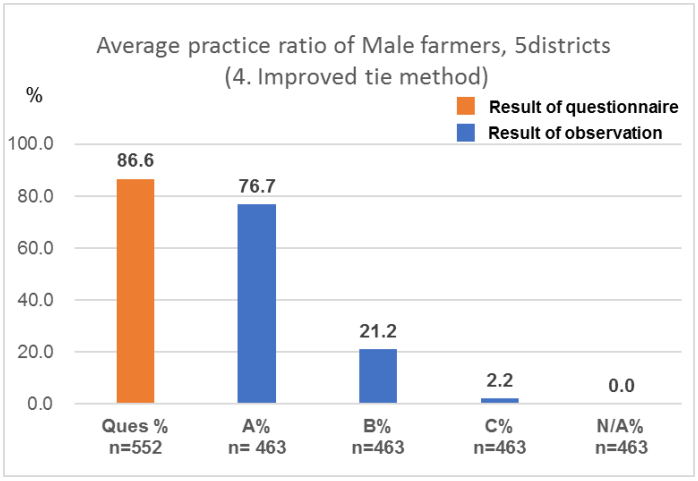


図 13 男性農家の 5 県合計の質問票結果と観察結果の比較（No.4 改善繋留方法の使用）

4) 男性農家の 5 県合計および県別の結果

実践者数の補正後、男性農家全体の実践率は、86.6%から 84.4%に下がった。全体および県別（補正済み）の実践率は下図のとおりである。いずれの県も 7 割以上の実践率を示している。

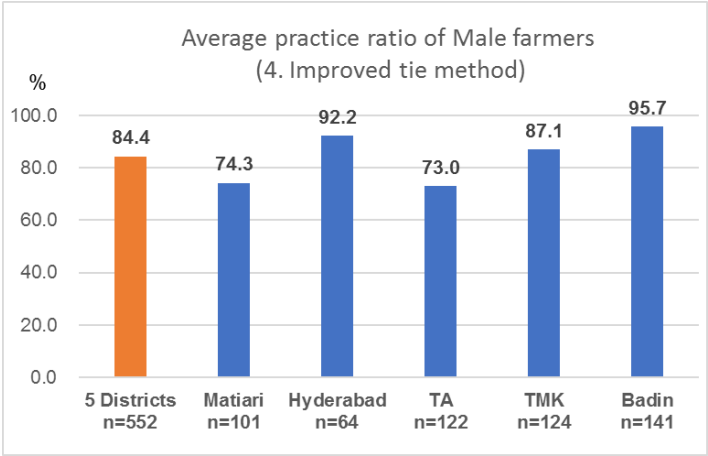


図 14 男性農家の 5 県合計および県別平均実践率（No.4 改善繋留方法の使用）

5) 男女比較

男女の比較が可能な 10 村のデータで実践率を算出してみたが、男女間であまり大きな差はみられなかった。

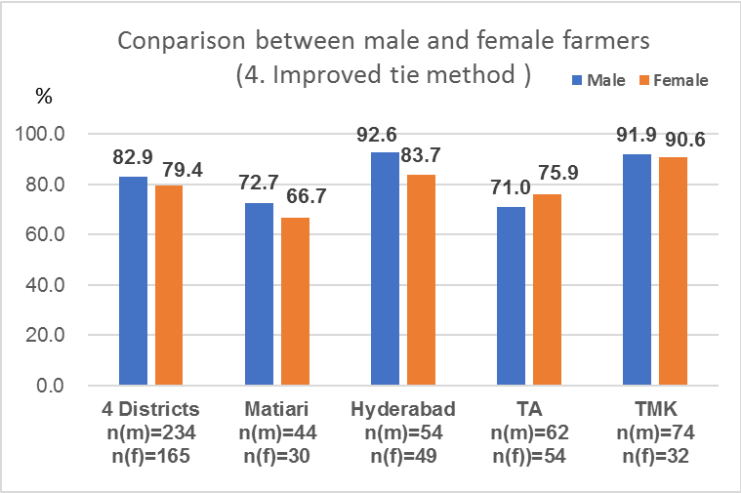


図 15 4 県 10 村における男女別平均実践率（No.4 改善繋留方法の使用）

2-8 適正技術 A ランク No.5 の実践率（男性農家 5 県合計、県別、観察比較、男女比較）

1) チェックリストの記述と質問

適正技術の No.5 は、「簡易屋根の使用」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。5 つの質問のうち 3 つ（5-1、5-2）をキークエスチョンとした。

表 6 チェックリスト No.5 の内容と関連する質問

No.5	Feeding Management
Title	(for milking cow) Use of simple roof
Content	Simple roof for milking cow has a structure which provides comfortable environment with cool air.
5-1	Do you use a simple roof ?
5-2a	(If yes,)a. Is it provide enough shade to milking cow?
5-2b	b. Has it a high roof and good ventilation? (the height of lower poles should be more than 8-9 feet)
5-3	There are few obstacles that affect good ventilation?
5-4	Result of observation

2) 算出方法

1 名あたりの回答につき、キークエスチョンの 2 つの質問とも「はい」であれば 1.00、1 つなら 0.5 と傾斜配点した。配点後のスコアを合計し、サンプル数で除して、実践率を算出した。

3) 観察結果との比較

下図のグラフは、質問票の結果と観察の結果を比較したものである。質問票では、男性農家の 91.5%が、簡易屋根を使用していると回答した。普及員による観察の結果でも、簡易屋根の状態が良い（A）が 58.3%、悪い（C）が 8.0%、それらの中間（B）が 33.0%となり、B まで許容すれば、概ね質問票の結果と齟齬がないことがわかった。ただし、県や村レベルではばらつきがあることから、A と B を満たす人を実践している人とみなし、質問票の回答者数に補正係数を乗じて補正した。その後、補正後の質問票の回答者数と観察の結果のうち、いずれか低い数を実践者数とし

た。

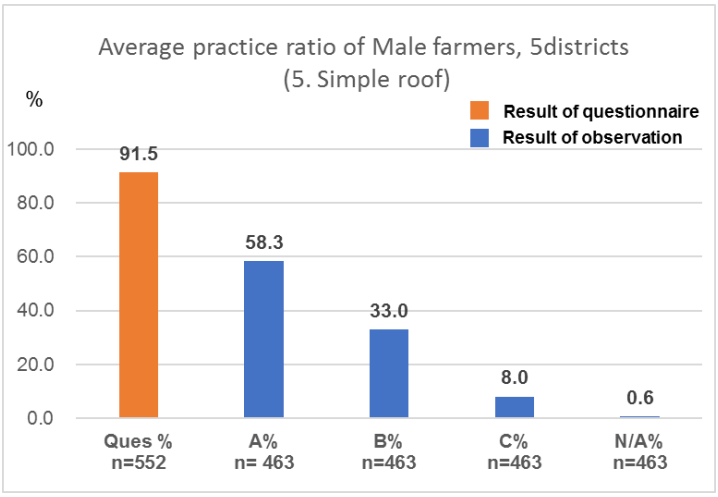


図 16 男性農家の 5 県合計の質問票結果と観察結果の比較（No.5 簡易屋根の使用）

3) 男性農家の 5 県合計および県別の結果

実践者数の補正後、男性農家全体の実践率は、91.5%から 84.1%に下がった。全体および県別（補正済み）の実践率は下図のとおりである。県別でみると、すべての件でほぼ 8 割以上の実践率となった。

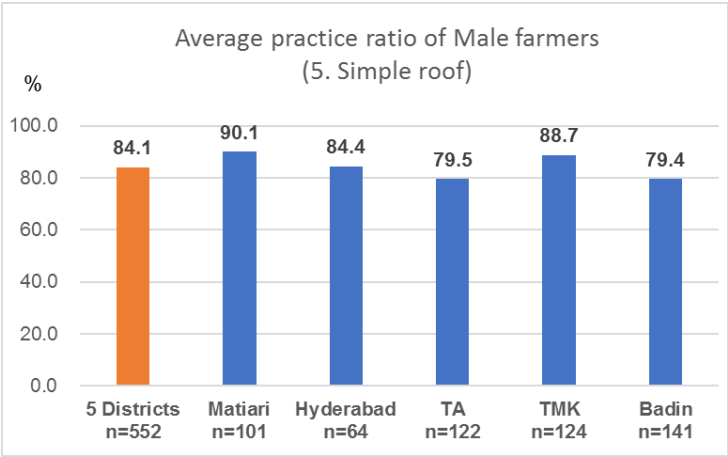


図 17 男性農家の 5 県合計および県別平均実践率（No.5 簡易屋根の使用）

5) 男女比較

男女の比較が可能な 10 村のデータで実践率を算出したが、男女間でそれほど大きな差は見られなかった。

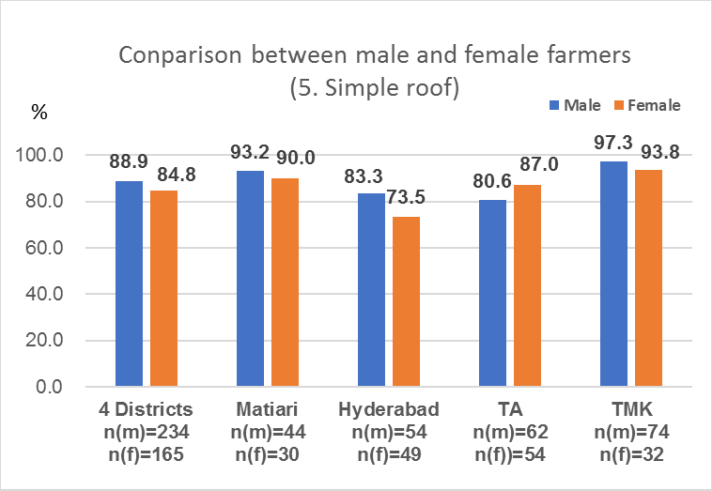


図 18 4 県 10 村における男女別平均実践率（No.5 簡易屋根の使用）

2-9 適正技術 A ランク No.6 の実践率（男性農家 5 県合計、県別、観察比較、男女比較）

1) チェックリストの記述と質問

適正技術の No.6 は、「乾いた床」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。5 つの質問のうち 2 つ（6-1, 6-3）をキークエスチョンとした。

表 7 チェックリスト No.6 の内容と関連する質問

No.6	Feeding Management
Title	(for milking cow) Dry floor
Content	Floor where milking cows are kept is dried.
6-1	Is floor dried where milking cows are kept?
6-2a	(If no,) a. Do you shower to milking cows at same place where tie it?
6-2b	b. Do you have drainage system at tie place?
6-2c	c. Do you clean the floor to remove animal dung and urine every day?
6-3	Result of observation

2) 算出方法

1 名あたりの回答につき、キークエスチョンの 2 つの質問とも「はい」であれば 1.00、1 つなら 0.5 と傾斜配点した。配点後のスコアを合計し、サンプル数で除して、実践率を算出した。

3) 観察結果との比較

下図のグラフは、質問票の結果と観察の結果を比較したものである。質問票では、男性農家の 98.9%が、乾いた床を保持していると回答した。普及員による観察の結果でも、床が乾いている（A）が 66.7%、濡れている（C）が 5.8%、それらの中間（B）が 27.4%となり、B まで許容すれば、概ね質問票の結果と齟齬がないことがわかった。ただし、県や村レベルではばらつきがあるため、A と B を満たす人を実践している人とみなし、質問票の回答者数に補正係数を乗じて補正した。その後、補正後の質問票の回答者数と観察の結果のうち、いずれか低い数を実践者数とした。

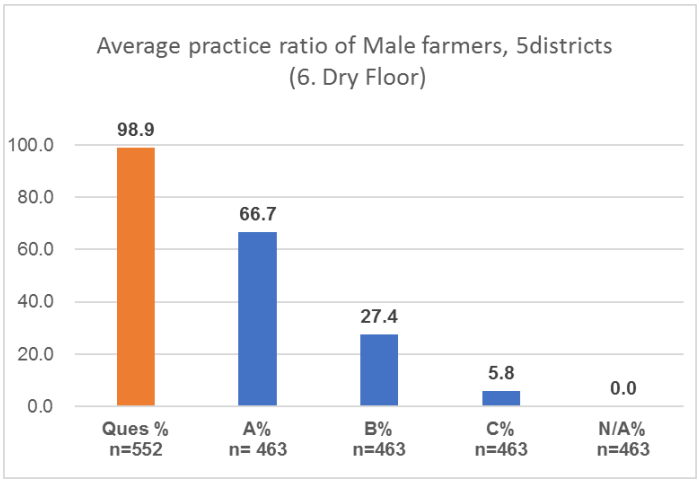


図 19 男性農家の 5 県合計の質問票結果と観察結果の比較（No.6 乾いた床）

3) 男性農家の 5 県合計および県別の結果

実践者数の補正後、男性農家全体の実践率は、98.9%から 93.1%に下がったが、すべての県で 8.5 割以上の実践率を示している。

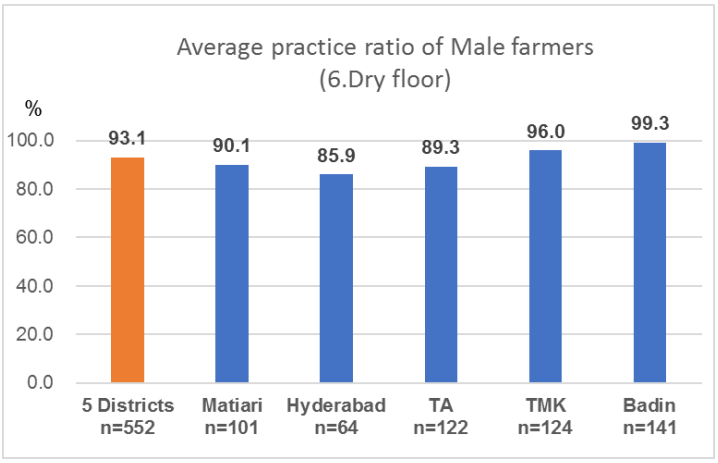


図 20 男性農家の 5 県合計および県別平均実践率（No.6 乾いた床）

5) 男女比較

男女の比較が可能な 10 村のデータで実践率を算出したが、男女別で差は見られなかった。

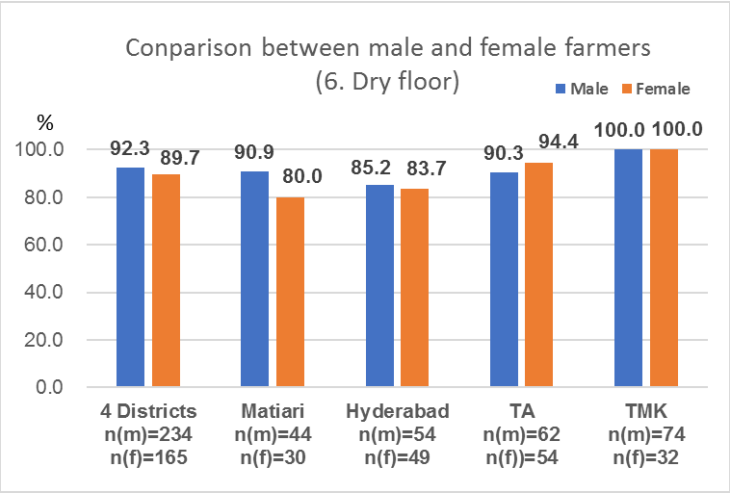


図 21 4 県 10 村における男女別平均実践率（No.6 乾いた床）

2-10 適正技術 A ランク No.7 の実践率（男性農家 5 県合計、県別、男女比較）

1) チェックリストの記述と質問

適正技術の No.7 は、「新生子牛の適切な扱い」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。4 つの質問のうち 1 つ（7-1）をキークエスチョンとした。

表 8 チェックリスト No.7 の内容と関連する質問

No.7	Feeding Management
Title	(for calf) Proper management of calf at birth
Content	Newly born calf is managed properly.
7-1	Do you dry new born calf's body by allowing mother cow to lick or wiping clean cloth?
7-2	Do you disinfect umbilical cord with 10% iodine tincture solution ?
7-3	Do you rear a calf at dry place?
7-4	Do you keep new born calf at clean place ?

2) 算出方法

単純に、新生子牛を母牛になめさせるか、清潔な布で拭いていると回答した農家の人数をサンプル数で除して実践率を算出した。

3) 男性農家の 5 県合計および県別の結果

男性農家の 95.7%が、新生子牛を母牛になめさせるか、清潔な布で拭いていると回答した。県別では、タンドアラヤ県が他県よりも低いが、それでも 9 割に近い結果になっている。

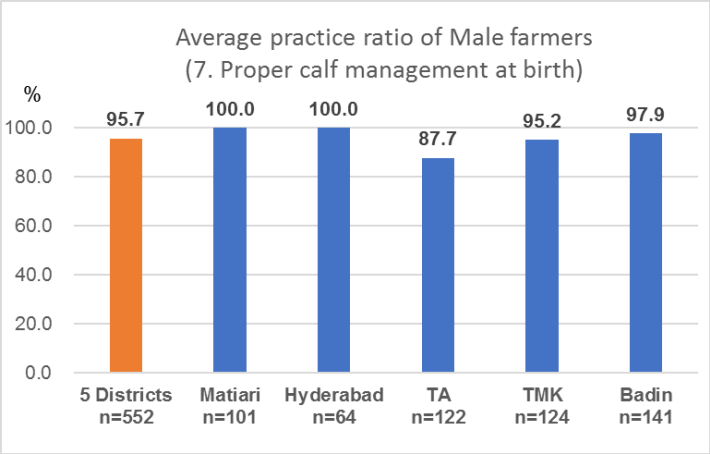


図 22 男性農家の 5 県合計および県別平均実践率（No.7 新生子牛の適切な扱い）

4) 男女比較

男女の比較が可能な 10 村のデータで実践率を算出したところ、マティアリ県とハイデラバード県では、男女間の実践率に差があり、女性の方が低かった。

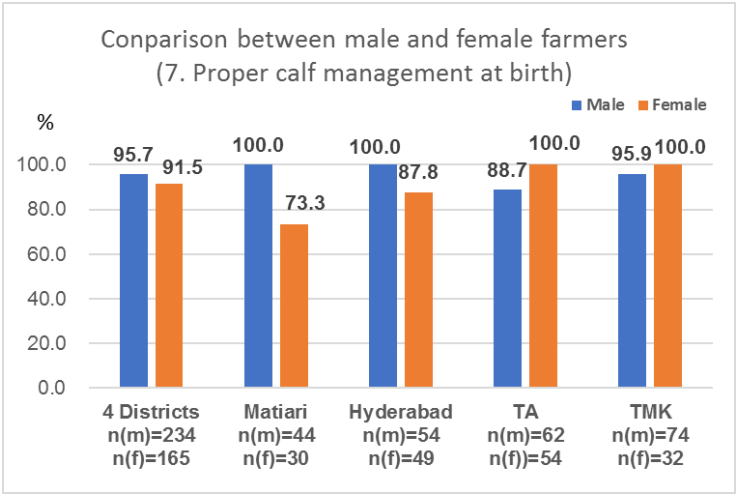


図 23 4 県 10 村における男女別平均実践率（No.7 新生子牛の適切な扱い）

2-11 適正技術 A ランク No.8 の実践率（男性農家 5 県合計、県別、男女比較）

1) チェックリストの記述と質問

適正技術の No.8 は、「初乳の哺乳」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。2 つの質問のうち 1 つ（8-2）をキークエスチョンとした。

表 9 チェックリスト No.8 の内容と関連する質問

No.8	Feeding Management
Title	(for calf) Provision of colostrum to calf at birth
Content	Colostrum is given to calf within 6 hours after birth.
8-1	Do you give colostrum to a calf before placenta come out?
8-2	Do you give colostrum to a calf within 6 hours after birth?

2) 算出方法

単純に、子牛の誕生後 6 時間以内に初乳を与えていると答えた農家の人数をサンプル数で除して実践率を算出した。

3) 男性農家の 5 県合計および県別の結果

男性農家の 93.3%が、子牛の誕生後 6 時間以内に初乳を与えていると回答した。県別でもそれほど大きな差は見られなかった。

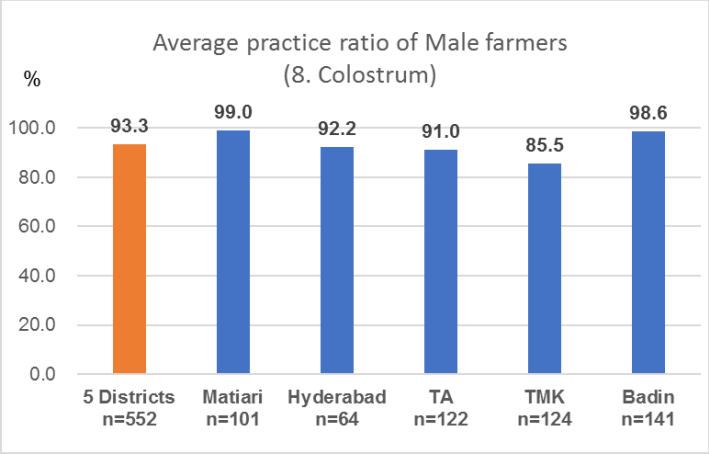


図 24 男性農家の 5 県合計および県別平均実践率（No.8 初乳の哺乳）

4) 男女比較

男女の比較が可能な 10 村のデータで実践率を算出してみたが、男女間でも県別でもあまり大きな差はみられなかった。

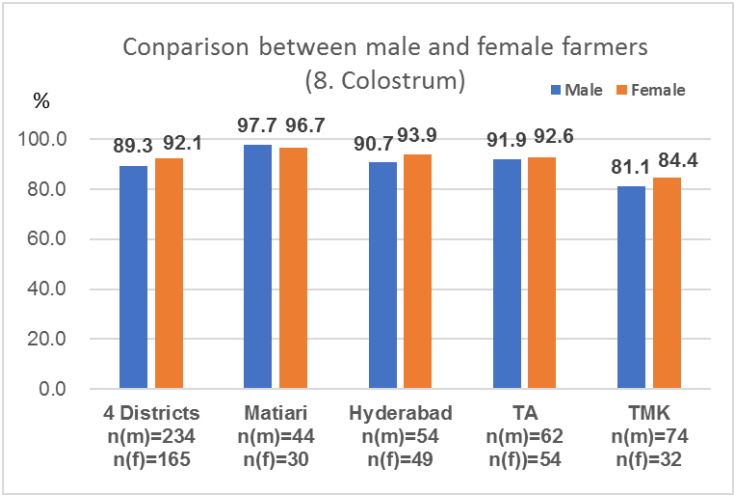


図 25 4 県 10 村における男女別平均実践率（No.8 初乳の哺乳）

2-12 適正技術 A ランク No.9 の実践率（男性農家 5 県合計、県別、男女比較）

1) チェックリストの記述と質問

適正技術の No.9 は、「子牛の防熱対策」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。3 つの質問のうち 1 つ（9-3）をキークエスチョンとした。

表 10 チェックリスト No.9 の内容と関連する質問

No.9	Feeding Management
Title	(for calf) Prevention management against heat
Content	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?
9-2	Do you shower water over a body of a calf under 3 months ?
9-3	(If yes,) What kind of shade do you use?

2) 算出方法

単純に、月齢 3 か月以下の子牛にシャワーをしていると回答した農家の数をサンプル数で除して実践率を算出した。

3) 男性農家の 5 県合計および県別の結果

男性農家の 88.2%が、月齢 3 か月以下の子牛にシャワーをしていると回答した。県別では、TMK 県の実践率が他県よりも若干低いがそれでも 8 割に達している。

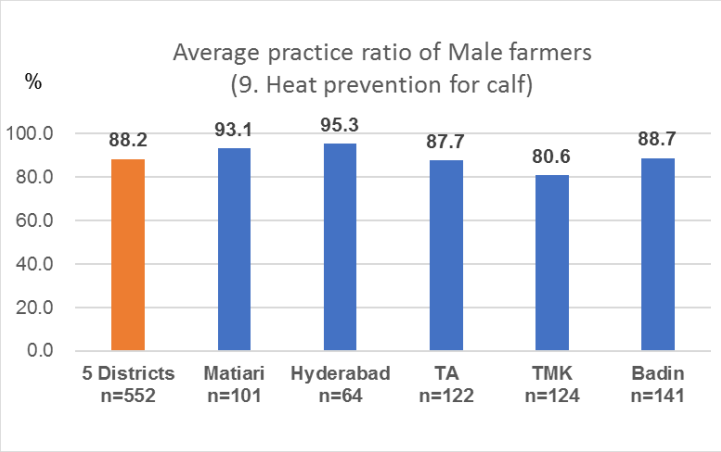


図 26 男性農家の 5 県合計および県別平均実践率（No.9 子牛の防熱対策）

4) 男女比較

男女の比較が可能な 10 村のデータで実践率を算出してみたが、男女間であまり大きな差はみられなかった。

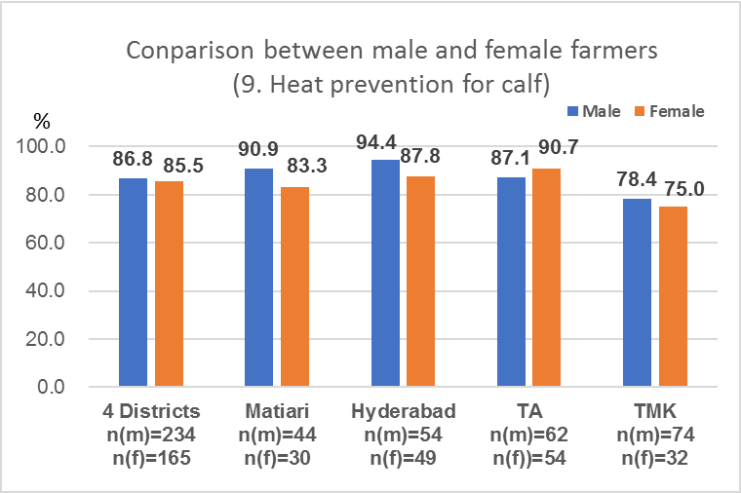


図 27 4 県 10 村における男女別平均実践率（No.9 子牛の防熱対策）

2-13 適正技術 A ランク No.10 の実践率（男性農家 5 県合計、県別、男女比較）

1) チェックリストの記述と質問

適正技術の No.10 は、「出産介助」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。4 つの質問のうち 2 つ（10-1、10-3）をキークエスチョンとした。

表 11 チェックリスト No.10 の内容と関連する質問

No.10	Feeding Management
Title	Cow management at parturition
Content	A cow is delivered at comfortable space and immediately treated.
10-1	In case of a delivery in daytime, do you tie your animal to shady cool place ?
10-2	In case of a delivery in night time, do you stay near to your animal?
10-3	Do you give assistance for a delivery immediately?
10-4	Do you disinfect your hand before handling a parturition?

2) 算出方法

1 名あたりの回答につき、キークエスチョンの 2 つの質問とも「はい」であれば 1.00、1 つなら 0.5 と傾斜配点した。配点後のスコアを合計し、サンプル数で除して、実践率を算出した。

3) 男性農家の 5 県合計および県別の結果

男性農家の 88.2%が、すばやく出産介助をしているという結果になった。県別でみると、一番低い TMK 県でも実践率が 8 割を超えた結果となった。

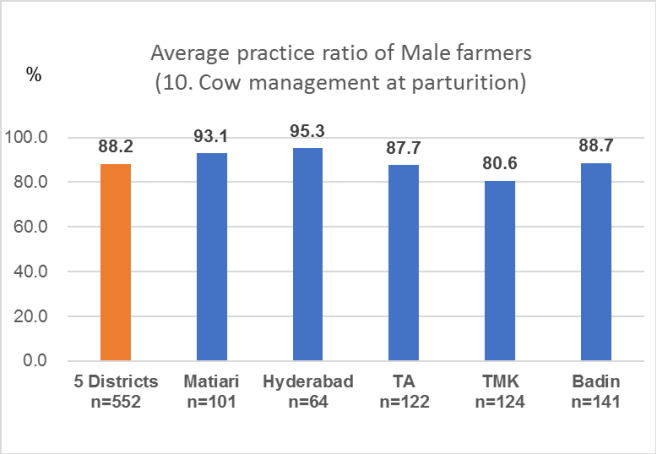


図 28 男性農家の 5 県合計および県別平均実践率（No.10 出産介助）

4) 男女比較

男女の比較が可能な 10 村のデータで実践率を算出してみたが、TMK 県以外は、男女間の差があまりないことがわかった。

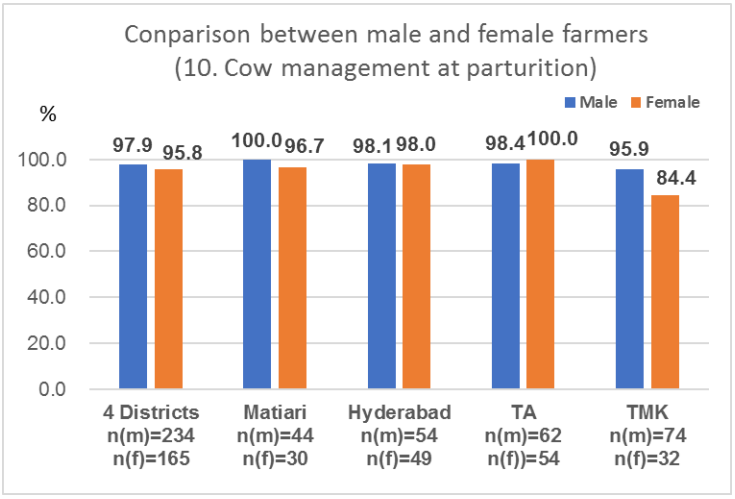


図 29 4 県 10 村における男女別平均実践率（No.10 出産介助）

2-14 適正技術 A ランク No.11 の実践率（男性農家 5 県合計、県別、男女比較）

1) チェックリストの記述と質問

適正技術の No.11 は、「水浴/シャワー」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。5 つの質問のうち 2 つ（11-1、11-4）をキークエスチョンとした。

表 12 チェックリスト No.11 の内容と関連する質問

No.11	Feeding Management
Title	(for buffalo) Bathing/shower
Content	A buffalo is bathed or showered during hot season.
11-1	Do you take your buffaloes/cows for bathing during hot season?
11-2	(If yes,)How many hours do you take for bathing buffaloes/cows in average?

11-3	If no, what is the reason?
11-4	Do you give your buffaloes/cows a shower due to no place for bathing?
11-5	a. (If yes,) Which means do you use for shower?

2) 算出方法

1 名あたりの回答につき、キークエスチョンの 2 つの質問とも「はい」であれば 1.00、1 つなら 0.5 と傾斜配点した。配点後のスコアを合計し、サンプル数で除して、実践率を算出した。

3) 男性農家の 5 県合計および県別の結果

男性農家の 85.1%が、暑い時期に水浴もしくはシャワーをしているとのことであった。県別で実践率にばらつきがみられ、ハイデラバード県と TA 県が同率 73.4%で最も低かった。

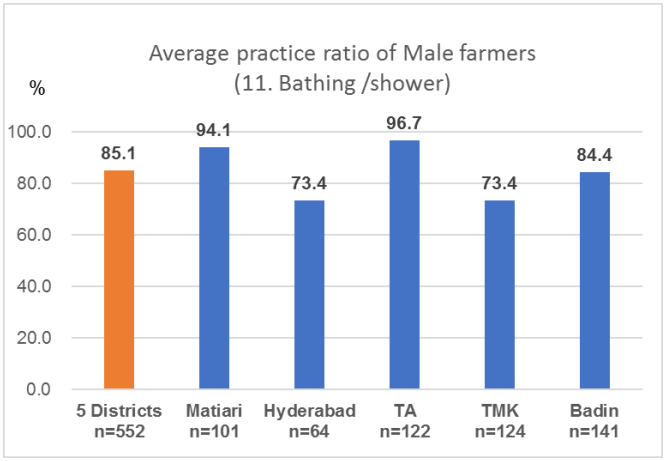


図 30 男性農家の 5 県合計および県別平均実践率（No.11 水浴/シャワー）

4) 男女比較

男女の比較が可能な 10 村のデータで実践率を算出したところ、マティアリ県、ハイデラバード県、TMK 県の 3 県で、女性の実践率の方が男性より高い結果となった。

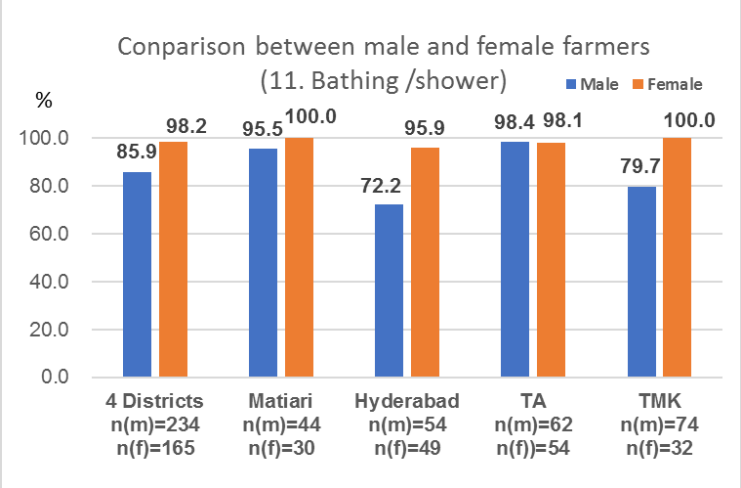


図 31 4 県 10 村における男女別平均実践率（No.11 水浴/シャワー）

2-15 適正技術 A ランク No.12 の実践率（男性農家 5 県合計、県別、観察比較、男女比較）

1) チェックリストの記述と質問

適正技術の No.12 は、「削蹄」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。4 つの質問のうち 1 つ（12-3）をキークエスチョンとした。

表 13 チェックリスト No.12 の内容と関連する質問

No.12	Feeding Management
Title	(for milking cow) Hoof-cutting
Content	A cow at least one year gets hoof-cutting.
12-1	Do you rear your milking cows by tying method?
12-2	Do you take your milking cows for grazing ?
12-3	Do you give hoof cutting to adult cows ?
12-4	a (If yes,)Do you apply hoof cutting to your cow at least once a year?

2) 算出方法

単純に、削蹄をしていると答えた農家の人数をサンプル数で除して実践率を算出した。

3) 観察結果との比較

下図のグラフは、質問票の結果と観察の結果を比較したものである。質問票では、男性農家の 56.9%が、削蹄をしていると回答した。普及員による蹄の状態の観察結果は、良い（A）が 60.5%、悪い（C）が 6.0%、それらの中間（B）が 33.0%となり、質問票の結果よりも良い結果となった。牛が放牧に出かける場合は、蹄が自然に削れることから削蹄は不要である。削蹄要らずの牛が一定数いたために、観察結果の方が良くなったと推察される。ただし、県や村のレベルではばらつきがあるので、A と B を満たす人を実践している人とみなし、質問票の回答者数に補正係数を乗じて補正した。その後、補正後の質問票の回答者数と観察の結果のうち、いずれか低い数を実践者数とした。

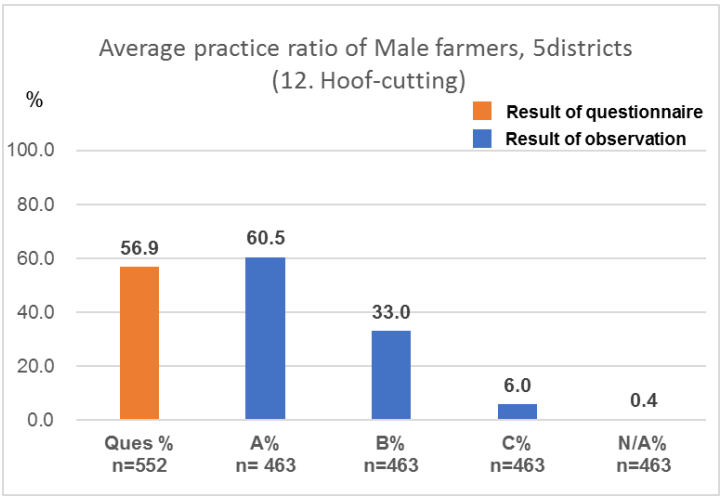


図 32 男性農家の 5 県合計の質問票結果と観察結果の比較（No.12 削蹄）

3) 男性農家の 5 県合計および県別の結果

実践者数の補正後、男性農家全体の実践率は、56.9%から 53.6%に下がった。ここでいう実践とは、自らが削蹄をするということではなく、削蹄士に依頼して削蹄をするということである。県別では TA 県の実践率が突出して高い。TA 県と TMK 県については、プロジェクトが技術力強化を図った削蹄士がおり、その人達が活用された可能性もある。

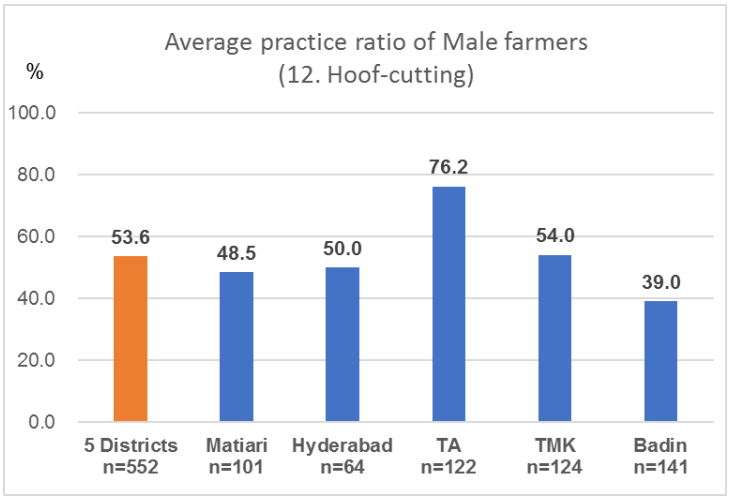


図 33 男性農家の 5 県合計および県別平均実践率（No.12 削蹄）

5) 男女比較

男女の比較が可能な 10 村のデータで実践率を算出したところ、マティアリ県と TMK 県では、男女間で大きな差がみられた。特に、TMK 県の女性の値が突出して高いが、その要因は特定できていない。

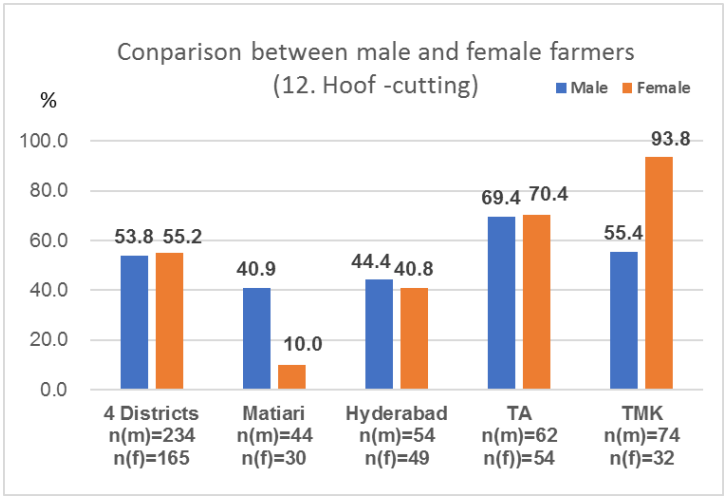


図 34 4 県 10 村における男女別平均実践率（No.12 削蹄）

2-16 適正技術 A ランク No.13 の実践率（男性農家 5 県合計、県別、男女比較）

1) チェックリストの記述と質問

適正技術の No.13 は、「Body condition Score (BCS)」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。本項目の質問は 1 つであった。

表 14 チェックリスト No.13 の内容と関連する質問

No.13	Feeding Management
Title	(for milking cow) Body Condition Score “BCS”
Content	A farmer judges milking cow’s body condition by BCS.
13-1	Do you check nutrient condition of milking animal by BCS?

2) 算出方法

単純に、搾乳牛の栄養状態を BCS によって判断していると答えた農家の人数をサンプル数で除して実践率を算出した。

3) 男性農家の 5 県合計および県別の結果

男性農家の 90.6%が、搾乳牛の栄養状態を BCS によって判断していると回答した。県別でもそれほど大きな差は見られなかった。水牛の BCS は、プロジェクトによって 2017 年に開発された技術であるが、下表の結果は高い実践率を示しており、早くも農家の間に浸透しつつあることがわかった。

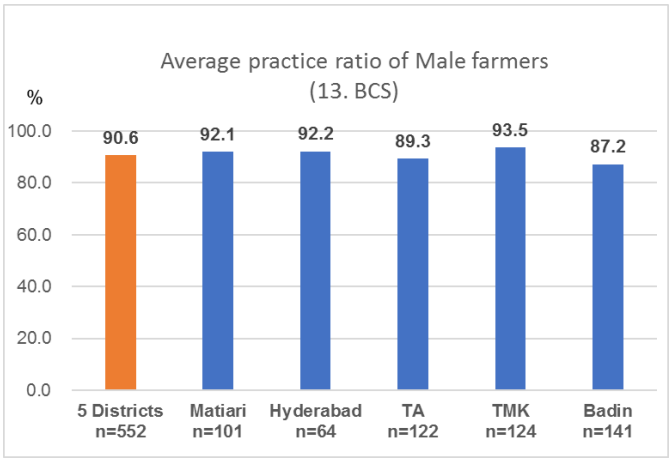


図 35 男性農家の 5 県合計および県別平均実践率（No.13 BCS）

4) 男女比較

男女の比較が可能な 10 村のデータで実践率を算出してみたが、いずれの県もわずかながら女性の方が、男性よりも実践率が高い結果になった。

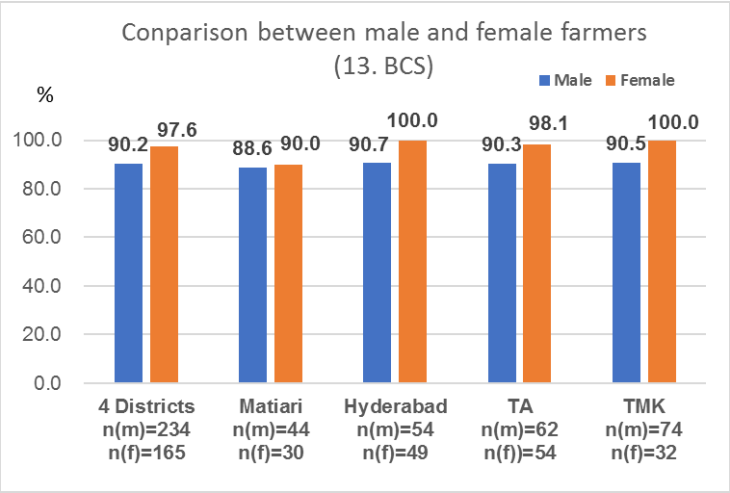


図 36 4 県 10 村における男女別平均実践率（No.13 BCS）

2-17 適正技術 A ランク No.14 の実践率（男性農家 5 県合計、県別、男女比較）

1) チェックリストの記述と質問

適正技術の No.14 は、「子牛の栄養状態診断」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。2 つの質問のうち 1 つ（14-1）をキークエスチョンとした。

表 15 チェックリスト No.14 の内容と関連する質問

No.14	Feeding Management
Title	(for calf) Nutrition diagnosis
Content	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?
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, fatty, normal, weak , very weak?

2) 算出方法

単純に、子牛の栄養状態を診断していると答えた農家の人数をサンプル数で除して実践率を算出した。

3) 男性農家の 5 県合計および県別の結果

男性農家の 89.5%が、子牛の栄養状態を診断していると回答した。県別ではそれほど大きな差は見られなかった。

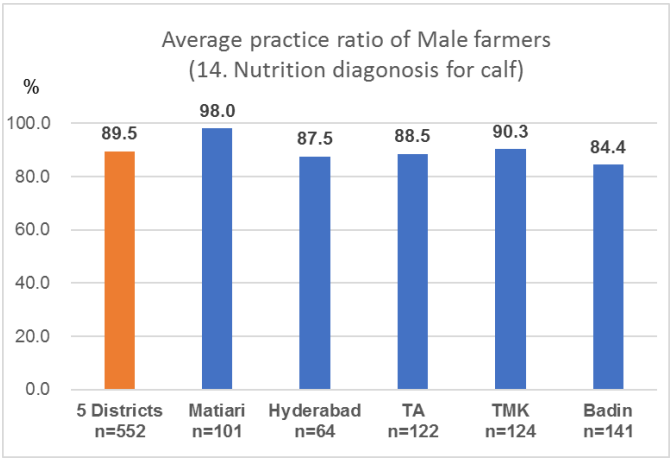


図 37 男性農家の 5 県合計および県別平均実践率（No.14　子牛の栄養状態診断）

4) 男女比較

男女の比較が可能な 10 村のデータで実践率を算出したところ、いずれの県も 1 割程度女性の方が、男性よりも実践率が高い結果になった。

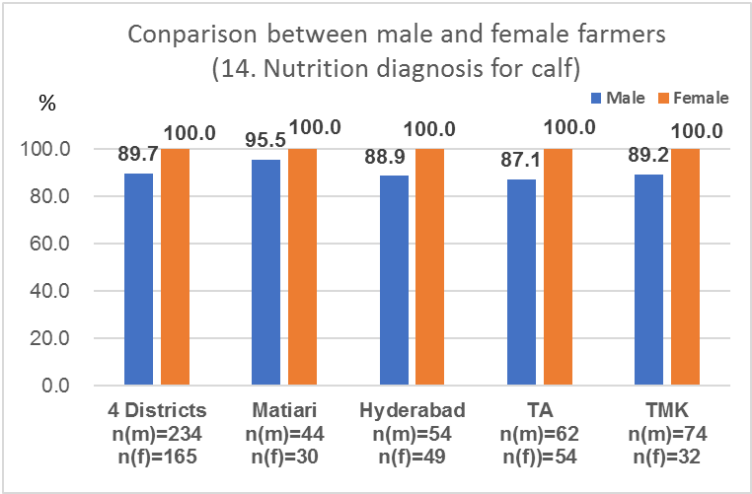


図 38 4 県 10 村における男女別平均実践率（No.14　子牛の栄養状態診断）

2-18 適正技術 A ランク No.15 の実践率（男性農家 5 県合計、県別、観察比較、男女比較）

1) チェックリストの記述と質問

適正技術の No.15 は、「飼槽の清掃」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。3 つの質問のうち 1 つ（15-1）をキークエスチョンとした。

表 16 チェックリスト No.15 の内容と関連する質問

No.15	Fodder
Title	Cleaning of feed trough
Content	Leftover in feed trough is thrown away so that cattle can always eat new fodder.
15-1	Do you throw leftover away and replace with new feed?
15-2	(If yes,) How often do you replace with new feed?
15-3	Result of observation

2) 算出方法

単純に、飼槽の残渣を捨て新しい飼料と交換していると答えた農家の人数をサンプル数で除して実践率を算出した。

3) 観察結果との比較

下図のグラフは、質問票の結果と観察の結果を比較したものである。質問票では、男性農家の94.2%が、飼槽の残渣を捨て新しい飼料と交換していると回答したが、普及員による飼槽の観察の結果は、きれい（A）が 20.7%、汚い（C）が 52.7%、それらの中間（B）が 22.7%となった。そこで、A と B を満たす人を実践している人とみなし、質問票の回答者数に補正係数を乗じて補正した。その後、補正後の質問票の回答者数と観察の結果のうち、いずれか低い数を実践者数とした。

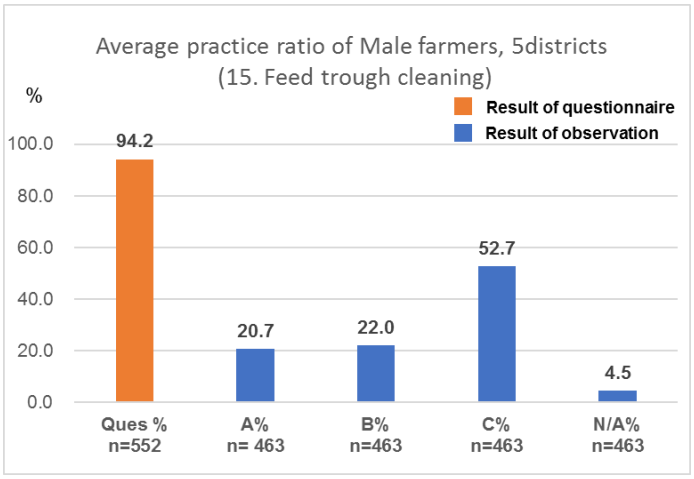


図 39 男性農家の 5 県合計の質問票結果と観察結果の比較（No.15 飼槽の清掃）

4) 男性農家の 5 県合計および県別の結果

実践者数の補正後、男性農家全体の実践率は、94.2%から 70.7%に下がった。県別の結果では、最も高いマティアリ県と最も低いバディン県の差が約 4 割で大きな差があった。飼料の確保のしやすさが飼槽の掃除の頻度や清潔さに関係している可能性もある。

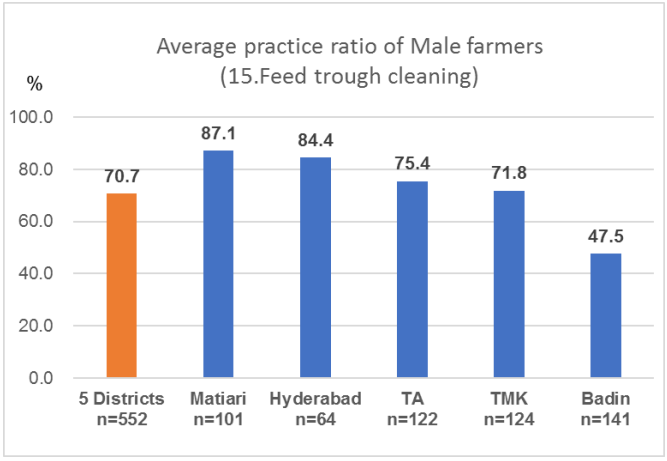


図 40 男性農家の 5 県合計および県別平均実践率（No.15 飼槽の清掃）

5) 男女比較

男女の比較が可能な 10 村のデータで実践率を算出したところ、マティアリ県、ハイデラバード県、TMK 県では、男女間で 2 割程度の差があった。多くの場合、清掃関係の作業には女性が関与しており、その傾向が示されている。

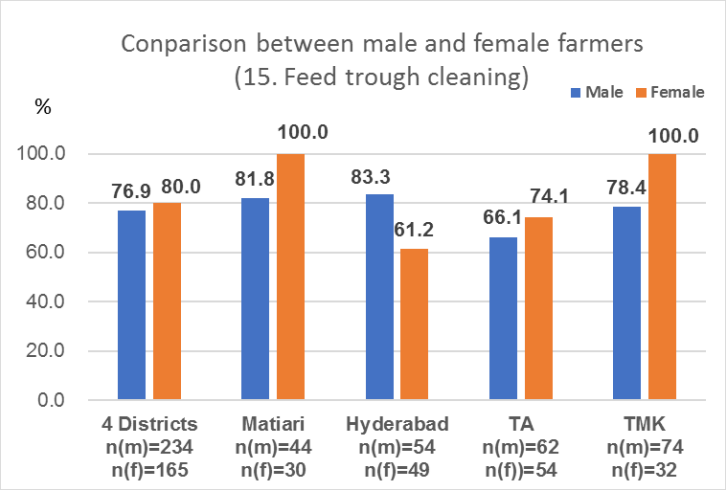


図 41 4 県 10 村における男女別平均実践率（No.15 飼槽の清掃）

2-19 適正技術 A ランク No.16 の実践率（男性農家 5 県合計、県別、男女比較）

1) チェックリストの記述と質問

適正技術の No.16 は、「乾草作り」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。3 つの質問のうち 1 つ（16-1）をキークエスチョンとした。

表 17 チェックリスト No.16 の内容と関連する質問

No.15	Fodder
Title	(for calf) Hay making
Content	A farmer provides enough and good quality of dry fodder to calf.
16-1	Do you make hay and provide it to a calf?
16-2	(If yes,) Do you use green grass which have a lot of green leaves to make hay?
16-3	(If yes,) Do you give enough hay to calf as she want everyday?

2) 算出方法

単純に、乾草を作って子牛に与えていると答えた農家の人数をサンプル数で除して、実践率を算出した。

3) 男性農家の 5 県合計および県別の結果

男性農家の 49.6%が、乾草を作って子牛に与えていると回答した。県別で実践率はばらついており、最も高いハイデラバード県で 67.2%、最も低いマティアリ県で 36.6%と約 3 割の差がある。プロジェクト対象地域の農家には、これまで乾草を作る習慣はなく、乾草作り自体がプロジェクトによって、新しく指導されたものだった。それを勘案すると、他の技術（ほぼ 8 割以上）に比べて実践率が低いのは、まだ技術がよく定着していないからと考えられる。

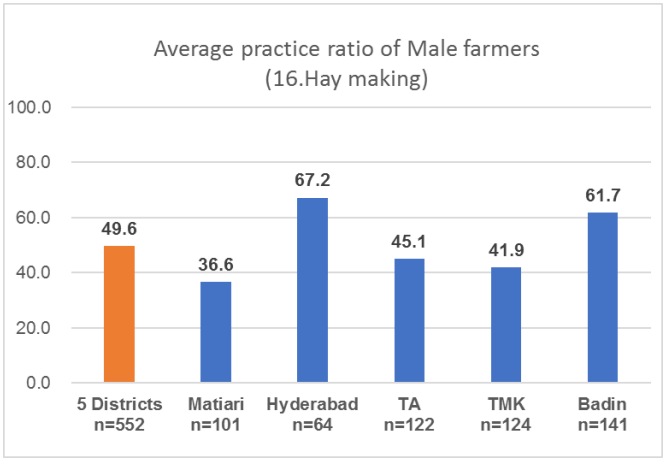


図 42 男性農家の 5 県合計および県別平均実践率（No.16 乾草作り）

4) 男女比較

男女の比較が可能な 10 村のデータで実践率を算出したところ、ハイデラバードの男性の実践率が突出して高い以外は、男女ともに 5 割以下の実践率であった。

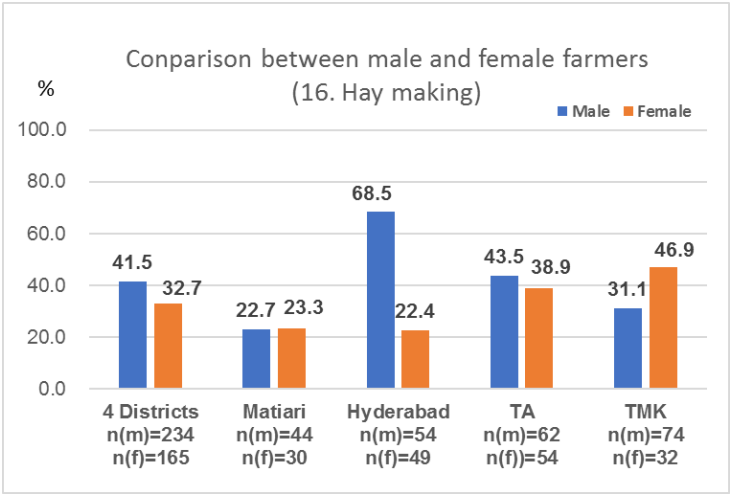


図 43 4 県 10 村における男女別平均実践率（No.16 乾草作り）

2-20 適正技術 A ランク No.17 の実践率（男性農家 5 県合計、県別、男女比較）

1) チェックリストの記述と質問

適正技術の No.17 は、「発情兆候の確認」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。4 つの質問のうち 1 つ（17-4）をキークエスチョンとした。

表 18 チェックリスト No.17 の内容と関連する質問

No.17	Reproduction
Title	Heat detection
Content	For heat detection, a farmer observes cow's condition before bedtime, such as mucus, bellowing and milk production volume.
17-1	Mucus from the external vulva?
17-2	Do you detect heat "bellowing"

17-3	Milk production dropping
17-4	Do you detect heat before bedtime?

2) 算出方法

単純に、就寝前に発情兆候を確認していると答えた農家の人数をサンプル数で除して、実践率を算出した。

3) 男性農家の 5 県合計および県別の結果

男性農家の 82.4.%が、就寝前に発情兆候を確認していると回答した。実践率は、県ごとに若干ばらついており、最も高いタンドアラヤ県（87.7%）と最も低い TMK 県（75.0%）の差は、1.2 割程度である。

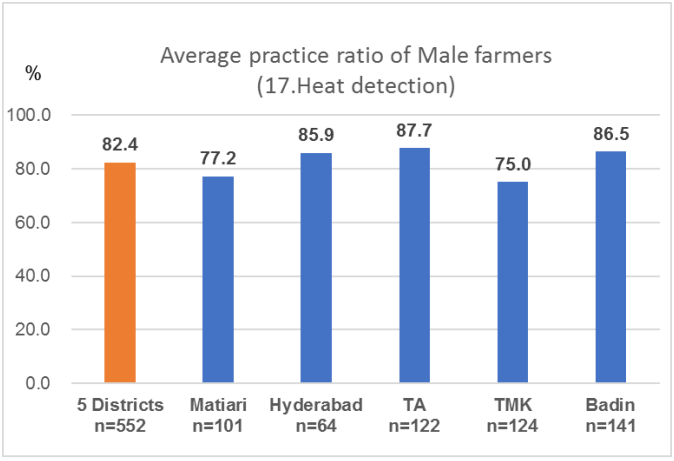


図 44 男性農家の 5 県合計および県別平均実践率（No.17 発情兆候の確認）

4) 男女比較

男女の比較が可能な 10 村のデータで実践率を算出したところ、県別でも男女間でもばらつきがあることが分かった。マティアリ県の女性の実践率は 53.3%に対して、タンドアラヤ県の女性の実践率は、90.7%で、その差は 3.8 割に及ぶ。

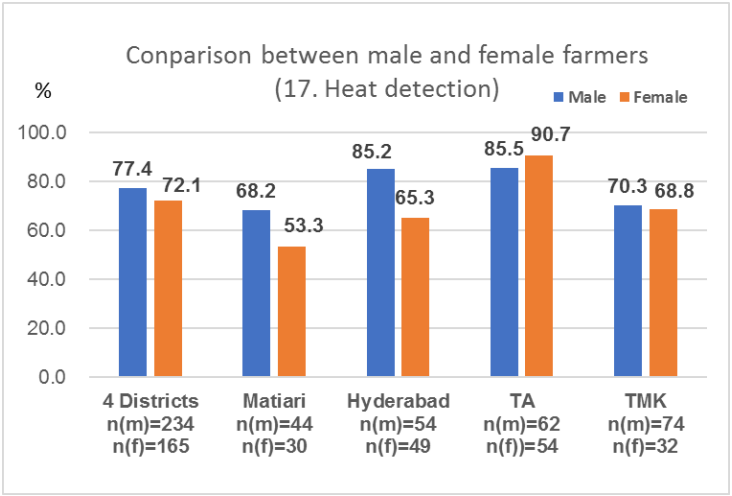


図 45 4 県 10 村における男女別平均実践率（No.17 発情兆候の確認）

2-21 適正技術 A ランク No.18 の実践率（男性農家 5 県合計、県別、男女比較）

1) チェックリストの記述と質問

適正技術の No.18 は、「雄牛の能力確認」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。3 つの質問すべてをキークエスチョンとした。

表 19 チェックリスト No.18 の内容と関連する質問

No.18	Genetic Improvement
Title	Identification of good bull
Content	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?
18-2	Do you ask the owner or neighbors who are using bull about its conception rate?
18-3	Do you check a bull whether he has strong mounting desire (libido)?

2) 算出方法

1 名あたりの回答につき、3 つの質問とも「はい」であれば 1.00、2 つなら 0.67、1 つなら 0.33 と傾斜配点した。配点後のスコアを合計し、サンプル数で除して、実践率を算出した。

3) 男性農家の 5 県合計および県別の結果

男性農家の 55.4%が、雄牛の能力を確認していることがわかった。県別でみると、ハイデラバード県が 73.4%と最も高く、バディン県が 47.5%で最も低かった。

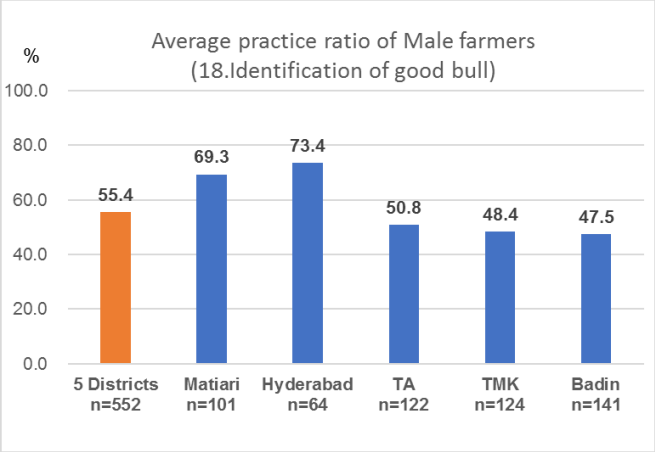


図 46 男性農家の 5 県合計および県別平均実践率（No.18 雄牛の能力確認）

4) 男女比較

男女の比較が可能な 10 村のデータで実践率を算出したところ、実践率に男女間で差があった。その理由は、通常雄牛の能力確認は、男性の仕事とみなされ、女性は関与できない場合があることによる。

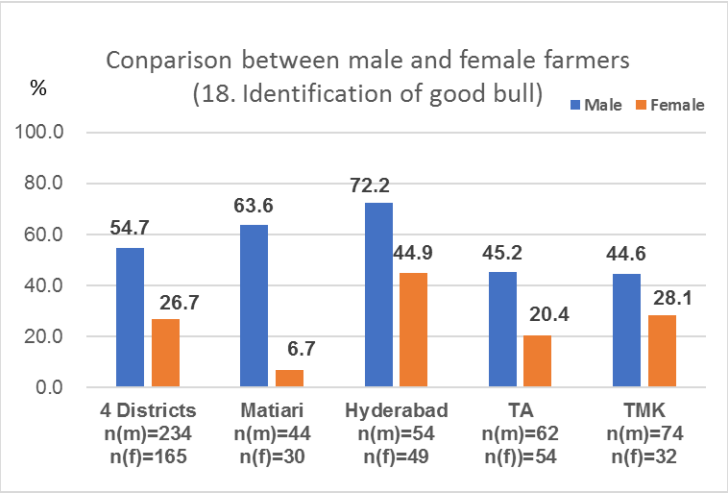


図 47 4 県 10 村における男女別平均実践率（No.19 雄牛の能力確認）

2-22 適正技術 A ランク No.19 の実践率（男性農家 5 県合計、県別、男女比較）

1) チェックリストの記述と質問

適正技術の No.19 は、「雌牛の能力確認」である。チェックリストと質問票から抜粋した関連項目は下表のとおりである。3 つの質問すべてをキークエスチョンとした。

表 20 チェックリスト No.19 の内容と関連する質問

No.19	Genetic Improvement
Title	Identification of good cow
Content	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?
19-2	Do you check the capacity of udder?
19-3	Do you check the development of milk vein ?

2) 算出方法

1 名あたりの回答につき、3 つの質問とも「はい」であれば 1.00、2 つなら 0.67、1 つなら 0.33 と傾斜配点した。配点後のスコアを合計し、サンプル数で除して、実践率を算出した。

3) 男性農家の 5 県合計および県別の結果

男性農家の 72.6%が、雌牛の能力を確認していることがわかった。県別でみると、ハイデラバード県が 84.4%と最も高く、TMK 県が 65.3%と他県よりも低かった。

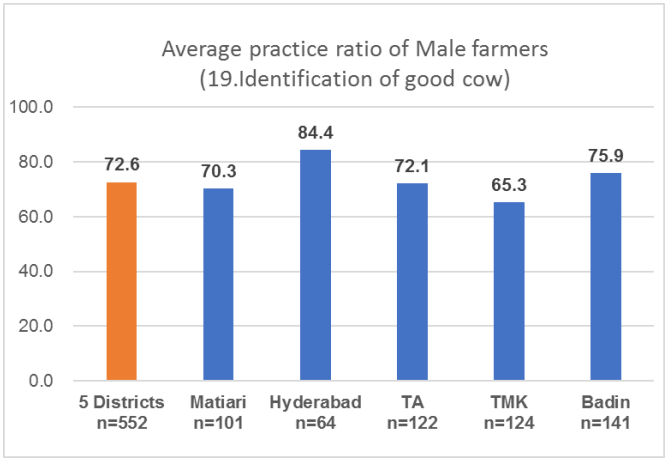


図 48 男性農家の 5 県合計および県別平均実践率（No.19 雌牛の能力確認）

4) 男女比較

多くの場合、女性農家は家畜の売買に関与しないため、この技術自体を使う機会がない農家もおり、マティアリ県でその傾向が顕著にでている。ただし、前項で扱った「No.18 雄牛の能力確認」に比べると、女性は搾乳の時間など雌牛に接する機会は多いので、そのときに乳房を観察しているなどの回答もあった。このような背景により、タンドアラヤ県や TMK 県では、女性の実践率が男性よりも高くなっていると思われる。

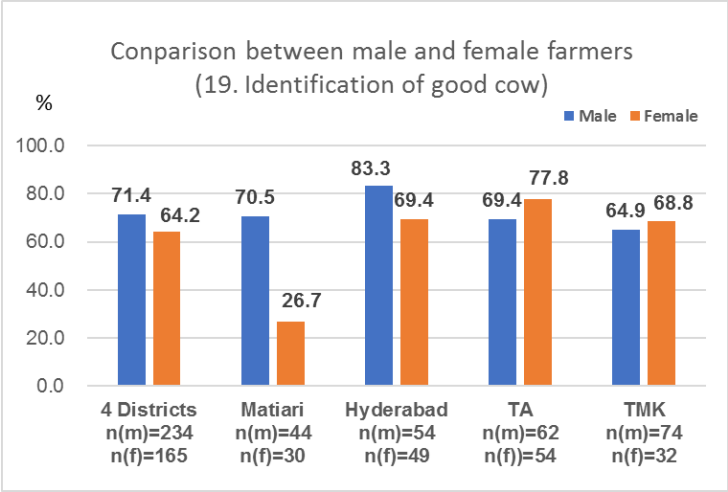


図 49 4 県 10 村における男女別平均実践率（No.19 雌牛の能力確認）

2-23 各村の適正技術 A ランクの実践率

各村の適正技術 A ランク（No.1~No.19）の実践率は、別冊の別添資料に掲載した。

3. 考察

今回のモニタリング結果にかかる考察は以下のとおりである。

＜実践率について＞

- パイロット農家による実践率は、女性が担当することのできない技術を除けば、最も低いもので約 5 割、最も高いものでは 10 割に近く、全体的に高い実践率となった。
- 当初、農家の回答が一部水増しではないかと疑ったが、普及チームに確認したところ、特にマティアリ県では、研修終了後、男性普及員が他の村の活動のためフィールドに出た際、近くのパイロット村にも立ち寄ってさまざまな農家と話をし、状況を把握していたことがわかった。つまり、普及員による自主的なフォローアップが、ある程度効いていたと思われる。
- 「No.3 水槽の清掃」や「No.15 の飼槽」の清掃は、インタビューの結果と観察の結果に大きな乖離があり、補正をしたところ、実践率が前者は約 3.5 割、後者は約 2 割も下がった。これらのように、重要性が分かっていても、利益に直結せず手間だけかかるように思える作業は簡単には取り組まない場合があると推察される。
- 「No.13BCS」と「No.16 乾草作り」は、いずれもこれまで農家には使う習慣がなかった技術であるが、覚えれば使える前者（男性農家全体で 90.6%）と子牛限定かつ作業を伴う後者（男性農家全体で 49.6%）では、実践率に大きな開きがあった。乾草作りは、子牛に給与すると栄養効率がよいので子牛対象としているが、飼料の確保が難しい場所では飼料の保存という点でも有用な技術である。もう少しこの点のアピールが必要かもしれない。

＜モニタリング方法およびデータ収集について＞

- 「No.1 牛乳に混ぜ物をしない」のように、マーケット情報という客観的な基準を併用することで、混ぜ物をしていても純粋な牛乳を売っているという、うその回答を排除することができた。モニタリング調査の精度を上げるための一つの方法といえる。
- ただし、上記のように価格で判断するやり方は、純粋な牛乳を売っているのに買い叩かれているようなケースを、「混ぜ物をしている」とカウントする可能性がある。研修後のフォローアップで農家の実態をよく把握しておくなど注意が必要である。
- 「No.3 水槽の清掃」や「No.15 の飼槽」について、農家が単に本当のことを言いたくなかったとも考えられるが、何をもって「清潔」というかの認識が、調査される側と調査する側で、必ずしも一致していなかったかもしれない。より明確な基準が必要である。

4. 今後の課題

＜周辺村での普及展開について＞

- パイロット村については、パイロット農家にさまざまな資材投与がなされ、他の農家の身近なところに見本があった。また、パイロット農家でなくても、PC-1 予算によりワクチン接種や駆虫の家畜衛生サービスを無料で受けることができた。しかし、周辺村ではそれがない。周辺村の選択にあたっては、一切の資材投与はないことを説明し、それでも関心のある村を選んでいるので、研修自体は円滑に進むことが期待されるが、農家が技術を採用するためには、パイロット村を対象にした時以上の工夫が必要と考える。その一つが普及員による密な

フォローアップである。

- パイロット村では、フォローアップの試行として、フォローアップ質問票を作り、1 村で実践してみたが、時間がかかりすぎた。そこで、次回の研修の時に前回の研修の内容を振り返って、意見を出し合う形のフォローアップで落ち着いた。その後は、普及員の自主的なフォローアップに任せていたが、周辺村ではこれをもう少し効果的な形で活用したい。農家への質問票にすると時間がかかってしまうので、逆に普及員側でチェックだけすれば済むシートを準備する、また訪問回数を平準化して行きやすい農家だけ訪問することを避ける、などである。
- 周辺村では、ベースライン調査をするので、研修が始まる前に研修参加者の農場の状態がわかっている。普及員が農家を訪問するときに以前の状態に比べてどう変化したかがわかるように、履歴が書き込めるカルテのようなものを作って活用したい。1 村 1 冊程度で済むはずである。
- 考察の箇所で乾草作りを例にとって述べたように、個々の技術のアピールポイントを、よりよく農家に伝える必要がある。例えば、パイロット村では、「農場の清掃をしたことで、外部寄生虫が減った。」などの感想を聞くことがあったが、この状態に至るまでには、手間に思えることでも、まず農家にやってみてもらえなければ効果も伝わらない。フォローアップの機会を活用して、対面での指導が有効と思われる。

＜モニタリングの実施について＞

- 質問票によるインタビューが、1 人あたり 45 分から 1 時間要し、長期間にわたって、モニタリングにまとまった時間を取られた。質問票の内容を、キークエスチョンを中心に絞り、質問の量を減らす必要がある[5]。
- 質問票の質問の順番が、チェックリストの順番になっていたため、調査する側とされる側双方とも若干混乱したようである。例えば、「搾乳牛に対する質問のあと、子牛に関する質問に飛んで、また搾乳牛に戻る」、「似たような質問が別のセクションで繰り返される」などである。質問の順番を見直したい[6]。
- 観察シートのスコアリングを Good (A)、Medium (B)、Poor (C)の 3 段階にしており、詳細を普及チーム研修で説明したが、調査を担当したマスタートレーナーや普及員達の基準が必ずしも一致していなかった。観察シートのチェック項目をより具体化して、「Yes/No」あるいは「有無」でチェックできるように改訂する必要がある[7]。
- 集計方法が煩雑であるため、現状のままでは普及 C/P では対応できない。現在のモニタリングは、PDM の指標を取るためのものであるので、かならずしも畜産局が継続する必要はないが、可能な限りデータ集計の方法を簡素化する必要がある。今回のモニタリングの集計では、条件付き傾斜配点や平均など複数の計算方法を使った。これを、単にあてはまるか否かで判断できるようにすれば、回答を 0 か 1 に集約することができる。もう少し試行錯誤してみたい。

[5] この後、ベースライン用の質問票作成時に改訂済み
[6] この後、ベースライン用の質問票作成時に改訂済み
[7] この後、ベースライン用の観察シート作成時に改訂済み

添付資料

添付資料 1 適正技術開発チェックリスト質問票（英語版）

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

添付資料 2 適正技術開発チェックリスト質問票（シンド語版）

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.

توٽل مقدار ليٽر

10ليٽر سراسري 7 | 11-15ليٽر سراسري 13 | 16-20ليٽر سراسري 18 | 21کان وڌيڪ 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.

درياندي نهرحوضوهنجڻ جي دوراناواهہيبو 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 ٻڌڻ 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 قرن جي لاءِ) قر ڇمڻ وقت صحيح نموني جي سارسنڀال

نئين ڄاول قر جي سارسنڀال صحيح طريقي سان

7-1 ڇا توهان نئين ڄاول قر کي ماءُ ڏي ڇڏيو ٿا اها ان کي چٽي خشڪ ڪري يا ڪنهن ڪپڙي سان قر جي جسم کي خشڪ ڪيو ٿا.

ها | نه

7-2 ڇا توهان قر جي ڏن کي 10% ٽنڪچر آيوڊين سوليوشن لڳايو ٿا.

ها | نه

7-3 ڇا توهان قر کي خشڪ جڳهه تي پاليو ٿا؟

ها | نه

7-4 ڇا توهان نئين ڄاول قر کي صاف جڳهه تي رکو ٿا؟

ها | نه

8- قرن جي لاءِ قرن جي ڇمڻ وقت پس مهيا ڪرڻ

قر ڇمڻ کانپوءِ 6 ڪلاڪن اندر پس ڏيڻ

8-1 ڇا توهان جانور جي جر ٻاهر اچڻ کان پهريان قر کي پس ڏيو ٿا؟

ها | نه

8-2 ڇا توهان قر جي ڇمڻ کانپوءِ 6 ڪلاڪن اندر پس ڏيو ٿا؟

ها | نه

9- قرن کي گرمي کان بچاءُ لاءِ

3مهينن جي عمر جا قر چاپري/ منهه ۾ رکيا وڃن ۽ انهن جي جسم تي پاڻي جو ڦوهارو يا اسپري ڪيو وڃي ته جيئن ان جي جسم مان ڪجهه گرمي گهٽ ٿئي.

9-1 ڇا توهان قرن کي ڏينهن جو گرمي دوران چاپري/ منهه ۾ جي هينان ٻڌو ٿا؟

ها | نه

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 قر جي جسم تي پاڻي جو ڦوهارو ڪيو ٿا؟

ها | نه

10- ويم وقت ڊڄي جي سارسنڀال

ڊڄي/ مينهن جو آرامده جڳهه تي قر ڏيڻ ۽ هڪدم سان انجي سنڀال ڪرڻ

10-1 ڏينهن جو ويم وقت ڇا توهان جانور کي ڏڏي چاپري واري جڳهه تي ٻڌو ٿا؟

ها | نه

10-2 رات جو جانور جي ويم جي وقت توهان پنهنجي جانور جي ويجهو رهو ٿا؟

ها | نه

10-3 ڇا توهان جانور جي هڪدم مدد ڪيو ٿا ته جيئن جانور جي ويم ۾ آساني ٿئي؟

ها | نه

10-4 ڇا توهان جانورن جو ويم ڪرائڻ کان پهرين وقت پنهنجا هٿ جراثيم کان پاڪ ڪيو ٿا؟

ها | نه

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 ونڊي 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 ڪاڏي 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

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- قرن جي لاءِ) گاهہ سکائي رکڻ (هي)

پاڻيو پنهنجي قرن جي لاءِ پوري مقدار ۾ گاهہ سکائي مهيا ڪري

16-1 چا توهان پنهنجي قر جي لاءِ گاهہ سکائي رکو ٿا ۽ پنهنجي قر 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)

قر 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- سڌي سانهہ جي سجاڻپ

سڌي 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 ٿوٽل 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

添付資料 3 適正技術開発チェックリスト観察シート（英語版）

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)

添付資料 4 適正技術開発チェックリスト観察シート（シンド語版）

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 کير 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 کرن جي حالت		

اسڪور (اي سنو) - (بي وچولو)- (سي خراب)

添付資料 5 モニタリング対象者数、データ収集数、データ収集期間

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			

別添資料 T3-2 モニタリング報告書（その２）

モニタリング報告書（その２）

2017 年 9 月から 2018 年 6 月にかけて、農家研修全 8 科目を完了した男性対象 24 村、女性対象 16 村[5]（すべてパイロット村）において、研修に 2 回以上参加した農家（男性農家 904 名、女性農家 514 名）を対象とし、適正技術開発チェックリスト質問票によるインタビューと農場観察を実施した。質問票への回答（男性 552 名、女性 188 名）と農場観察の結果（男性 463 名、女性 184 名）をモニタリング報告書（その 1）に取りまとめた。また、調査の対象とした技術は、適正技術 A ランクの 19 の技術であった。調査結果は、軒並み高い実践率を示したが、実際の農家の状況と照らし合わせると、真の実践状況よりも良い結果がでていると言わざるをえなかった。

そこでこの問題点に対処するため、パイロット村 2 回目および周辺村第 1 グループ 1 回目以降のモニタリングでは、全数調査よりもサンプル数を減らすこととし、研修に 2 回以上参加した人の中からランダムサンプリングによって調査対象者を抽出した。また、普及員が直接目視確認できる技術のみをモニタリングの対象とすることにした。モニタリングの対象内容は、①清潔な水の給水、②水牛の係留方法、③簡易屋根の設置、④乾燥した床、⑤初乳の給餌、⑥子牛の遮熱対策、⑦BCS、⑧飼槽の清掃、⑨乾草の給餌である。

パイロット村モニタリング 2 回目および 3 回目の結果は図 1、周辺村モニタリング 1 回目および 2 回目の結果は図 2 および図 3、周辺村第 2 グループの結果は図 4 のとおりである。

表 1　パイロット村モニタリングの対象村数および有効サンプル数

	実施期間	男性			女性		
		対象村数	有効サンプル数		対象村数	有効サンプル数	
			農場観察	聞き取り		農場観察	聞き取り
モニタリング 1 回目	2017 年 9 月~2018 年 6 月	24	463	552	16	184	188
同 2 回目	2019 年 12 月~2020 年 1 月	24	80	80	20	86	86
同 3 回目	2021 年 2 月～3 月	24	78	82	20	82	87

[5] バディン県の 5 村では、2018 年 6 月までに女性対象研修が完了しなかったため、調査から対象から外した。

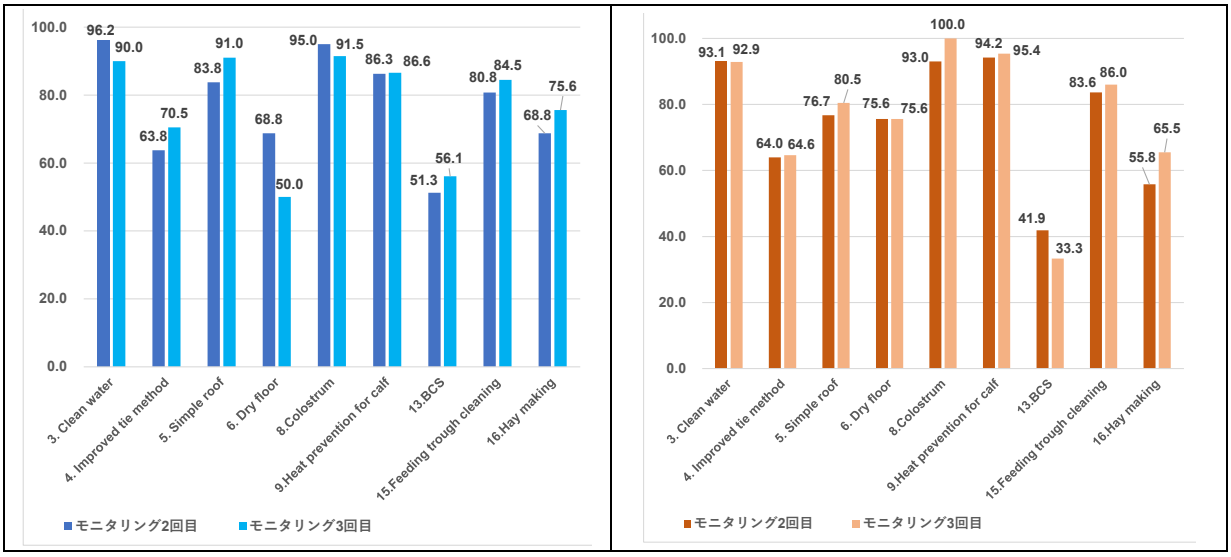


図 1　パイロット村 男性農家（左）および女性農家（右）モニタリング 2 回目および 3 回目結果

表 2　周辺村第 1 グループベースラインおよびモニタリング対象村数と有効サンプル数

	実施期間	男性			女性		
		対象村数	有効サンプル数		対象村数	有効サンプル数	
			農場観察	聞き取り		農場観察	聞き取り
ベースライン	2018 年 7 月～12 月	15	155	205	14	106	175
モニタリング 1 回目	2020 年 1 月～2 月	15	79	80	14	80	80
同 2 回目	2021 年 3 月～4 月	15	83	85	14	79	82

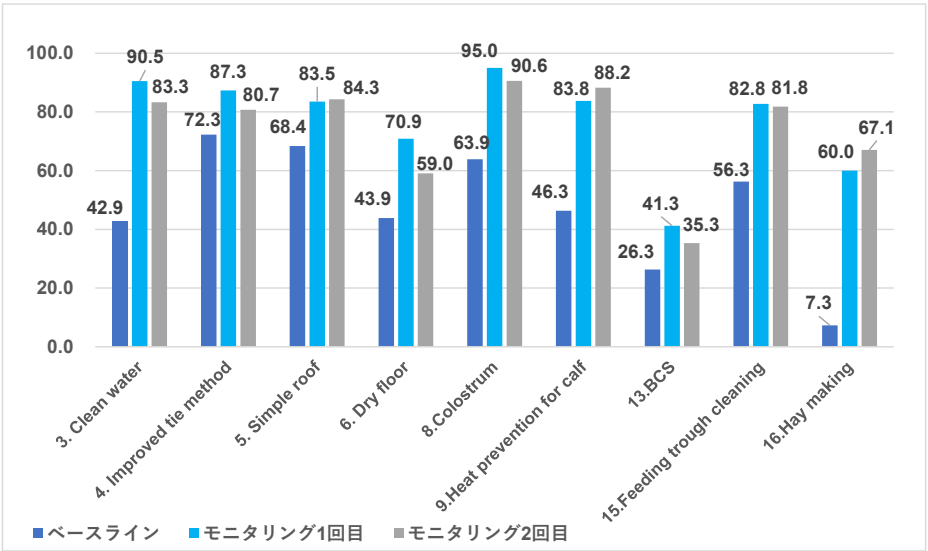


図 2 周辺村第 1 グループ男性農家のベースラインとモニタリング 1 回目および 2 回目の結果

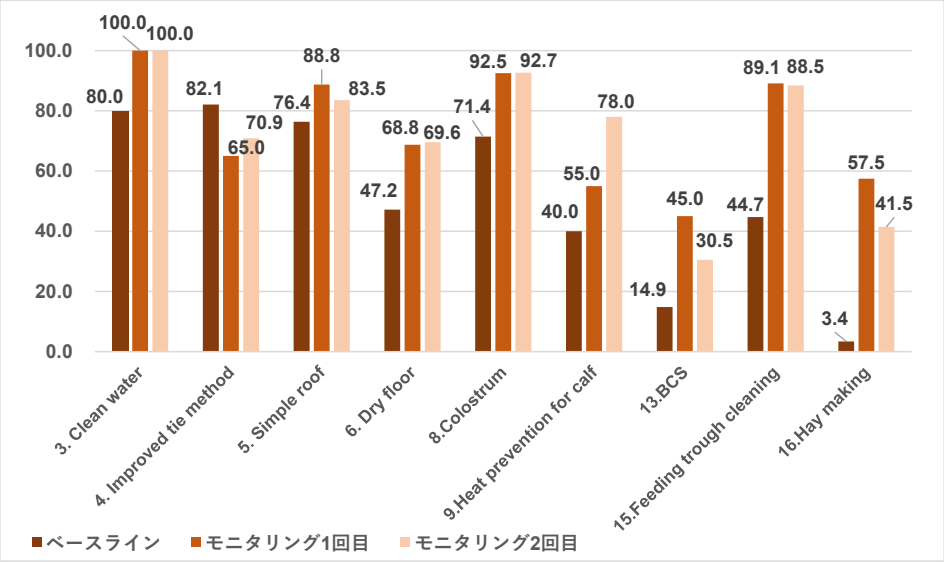


図 3 周辺村第 1 グループ女性農家ベースラインとモニタリング 1 回目および 2 回目の結果

表 3　周辺村第 2 グループベースラインおよびモニタリング対象村数と有効サンプル数

	実施期間	男性			女性		
		対象村数	有効サンプル数		対象村数	有効サンプル数	
			農場観察	聞き取り		農場観察	聞き取り
ベースライン	2019 年 2 月～9 月	27	331	353	6	75	77
モニタリング 1 回目	2021 年 5 月	28	85	86			

注：女性農家を対象とする研修の参加人数が指標を達成してからは、その時点ではまだ指標を達成していなかった男性農家の研修に注力することとし、周辺村第 2 グループでの女性農家研修は打ち切った。

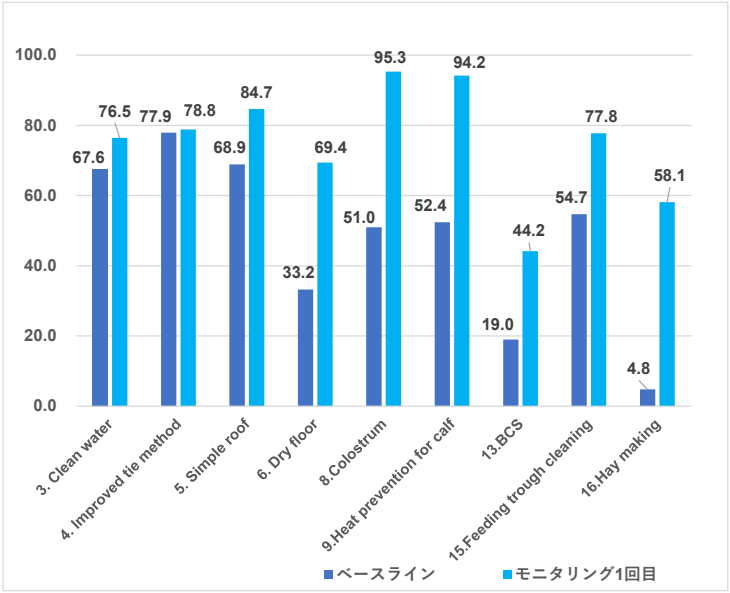


図 4　周辺村第 2 グループ男性農家ベースラインとモニタリング 1 回目の結果

PDM のプロジェクト目標の指標 1 として、「対象県において、ターゲット・グループ（パイロット農家を除く）のうち、日常的に適正技術（「適正技術開発チェックリスト」で示された“A”ランク技術の内 9 つの技術のうち一つ以上）を使っている農家の割合が、研修終了後 1 年未満は 70%以上、1 年以降は 50%以上に維持される。」と定められている。この 9 つの適正技術実践率の単純平均は、パイロット村 3 回目、周辺村第 1 グループ 2 回目、周辺村第 2 グループ 1 回目のモニタリングは、いずれも研修終了から 1 年以上が経過しているが、それぞれ 50%を超えていた。具体的には、表 4 のとおりである。

表 4 適正技術（モニタリング対象の 9 つ）実践率（%）の単純平均

区分	実践率の単純平均（%）	
	男性農家	女性農家
パイロット村モニタリング 3 回目	77.3	77.1
周辺村第 1 グループモニタリング 2 回目	74.5	72.8
周辺村第 2 グループモニタリング 1 回目	75.5	N/A

適正技術の実践率が高かった理由としては、A ランクの技術のため農家にとって取り組みやすい技術であったことがあげられる。また普及チームは研修終了後もモニタリングの時以外にも農家と接触する機会を持っていたため、農家が適正技術への関心を維持する助けになったと考えられる。モニタリング対象の適正技術のうち⑤初乳の給餌、⑦BCS、⑨乾草の給餌は、プロジェクトによってもたらされた新しい技術であるが、特に周辺村第 2 グループの実践率の伸びが顕著であった。周辺村第 2 グループは、周辺村第 1 グループでの研修時に口コミで研修情報が伝わるなどして、研修への参加意欲や関心が高い村が選ばれていた。そのことが実践率の伸びにも関係していたかもしれない。

別添資料 T3-3 中核農家選定報告書

中核農家選定報告書

１．中核農家選定の目的

成果 3 の成果指標の一つに、「3-3.農家間普及の効果的な手法が示される」とある。研修を受けた農家から他の農家への情報伝達を推進するため、活動状況のよい農家の中から中核農家を選定することにした。

２．中核農家選定基準

中核農家選定基準は、①研修参加回数、②適正技術の実践状況（普及チームによる目視確認)、③人柄の 3 つとした。

３．中核農家選定方法

選定基準の①と②に基づき、パイロット村 24 村における中核農家候補者を各村 3～4 名程度に絞りこんだ後、③について確認するため、2018 年 4 月から 5 月にかけて、中核農家候補者へのインタビューと農場訪問を実施した。その後、各県の普及チームと協議をし、中核農家を決定した。

４．選定結果

最終的に、24 村の 72 名の中から、19 名の中核農家を選定した（添付１)。インタビューの結果、習ったことを誰にも伝えたことがないという人は皆無で、情報伝達の範囲が狭い人で親戚や友達に、広い人になると近隣の複数の村に情報を伝えていることがわかった。また、近隣村の農家が情報を聞きにきているケースもあった。

5. 今後の課題

基本的に中核農家による情報伝達を彼ら自身の自発的な活動を想定しており、プロジェクトから指示をだして他の農家に対する研修をさせるようなことはしない。このようなやり方で、どの程度情報が波及していくのかについては、注視する必要がある。

添付 1 中核農家リスト

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

添付 2 中核農家への質問票

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

添付 2：農場観察シート

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.

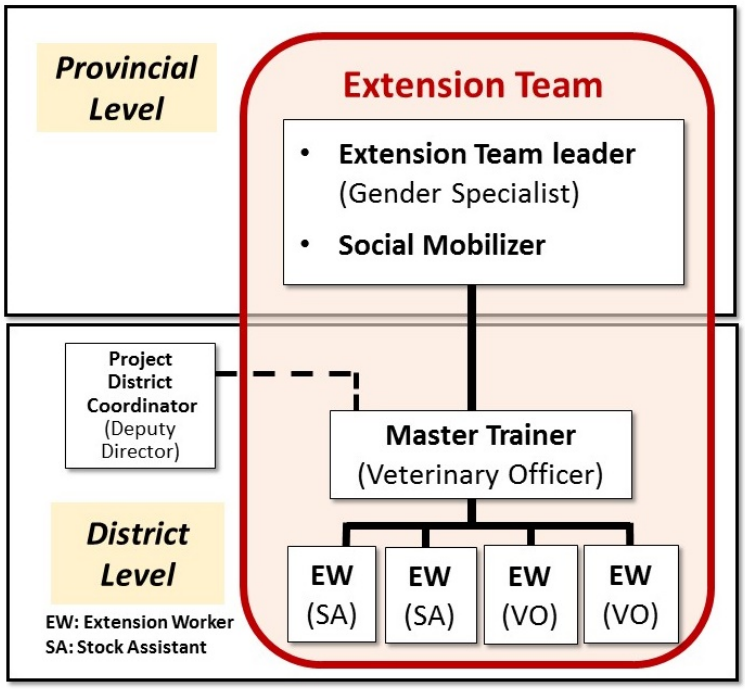


Table 1 Extension structure

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.

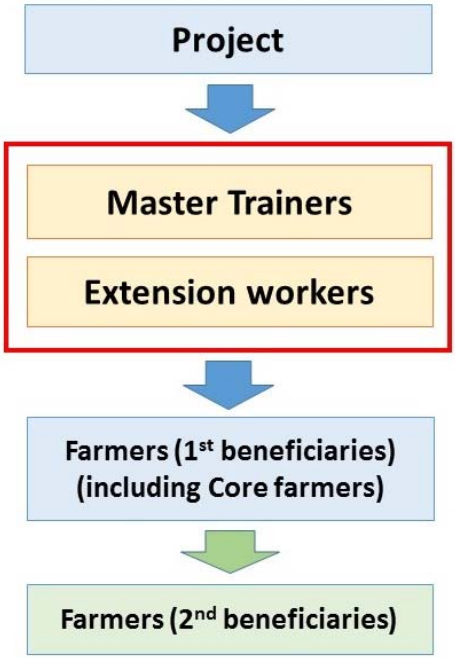


Figure 2 Training implementation Structure

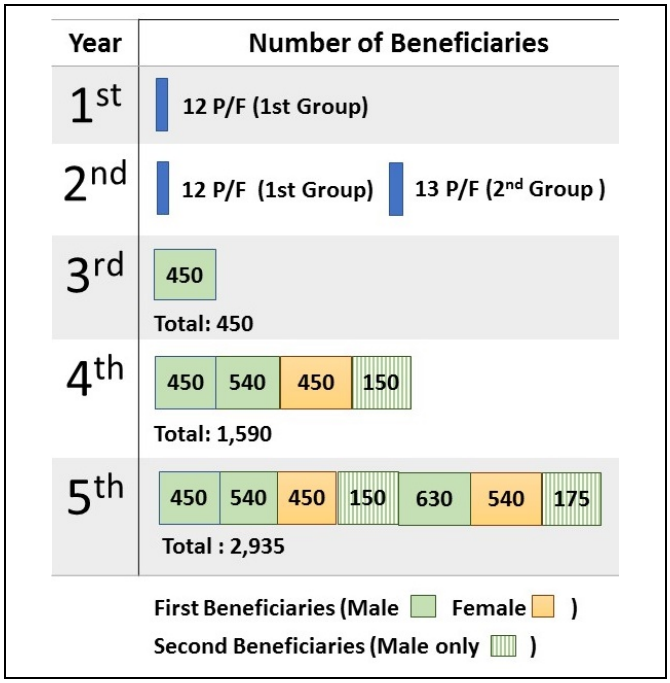


Figure 3 Number of Planned Beneficiaries

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

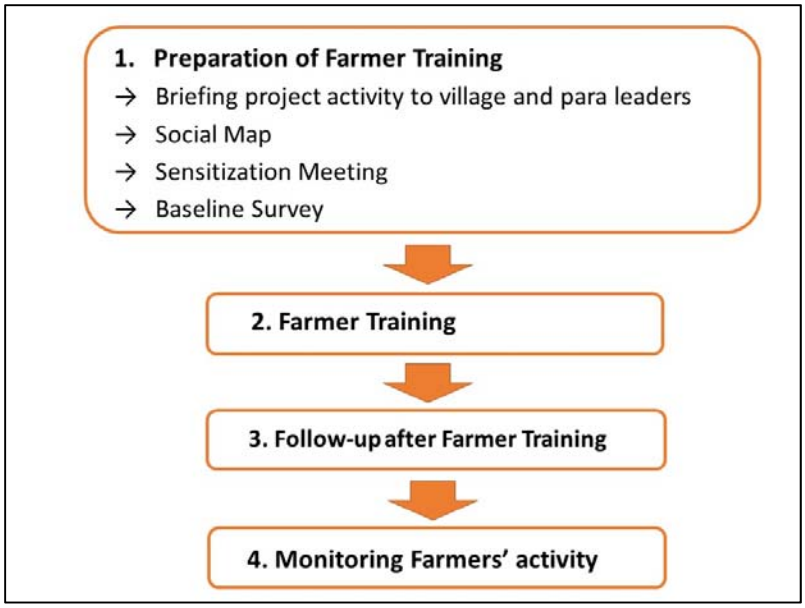


Figure 4 Flow of extension activities in the villages

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.

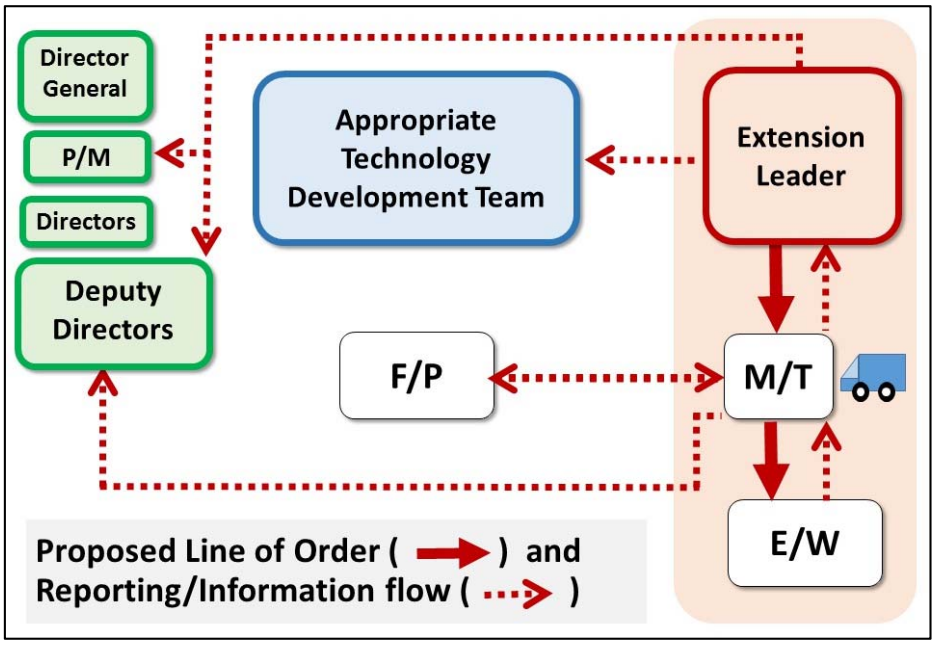


Figure 5 Flow of reporting and information sharing on extension activities

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.

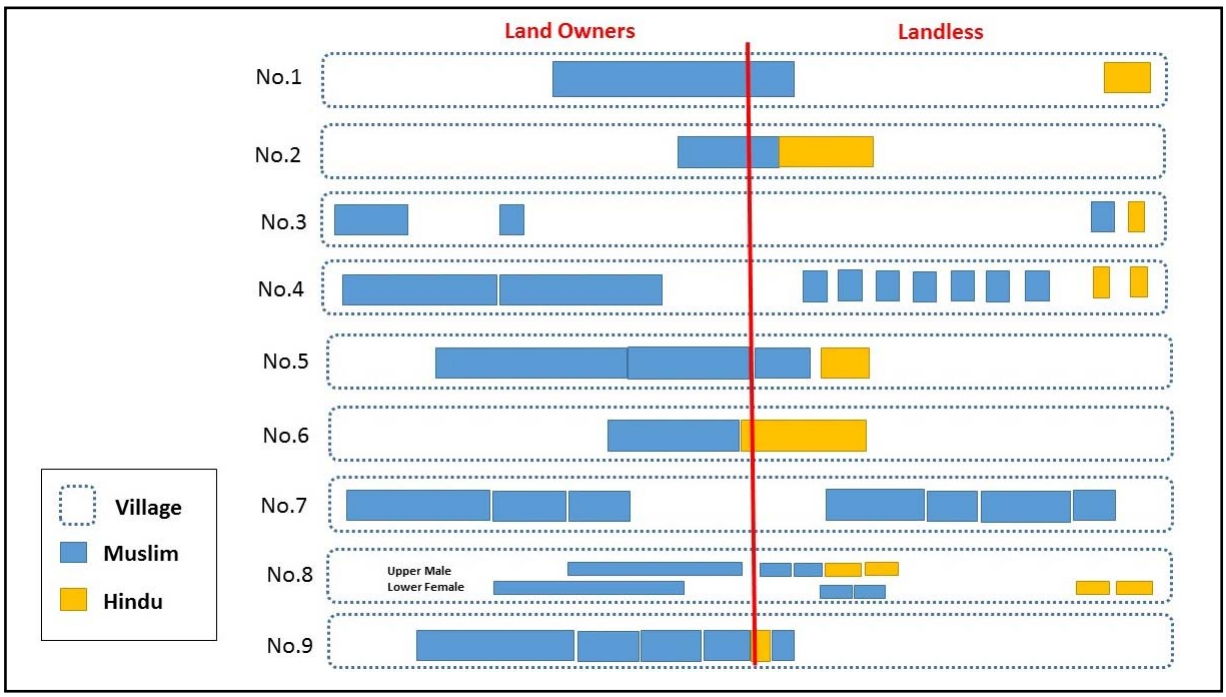


Figure 6 Example of village classification for future extension

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)

	**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)

	**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)

	**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

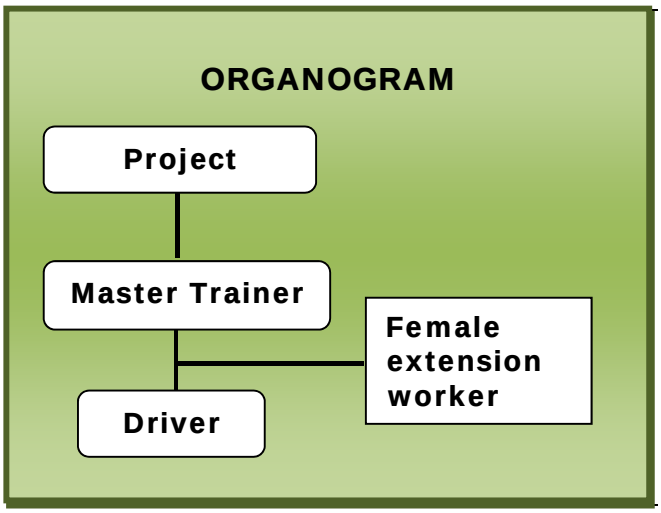
1. Car will be in good travelling condition all the time.
2. Less chances of fatigue and accidents.

8. References

- Ref-1 Car manual provided by Suzuki cars.

9. Definitions

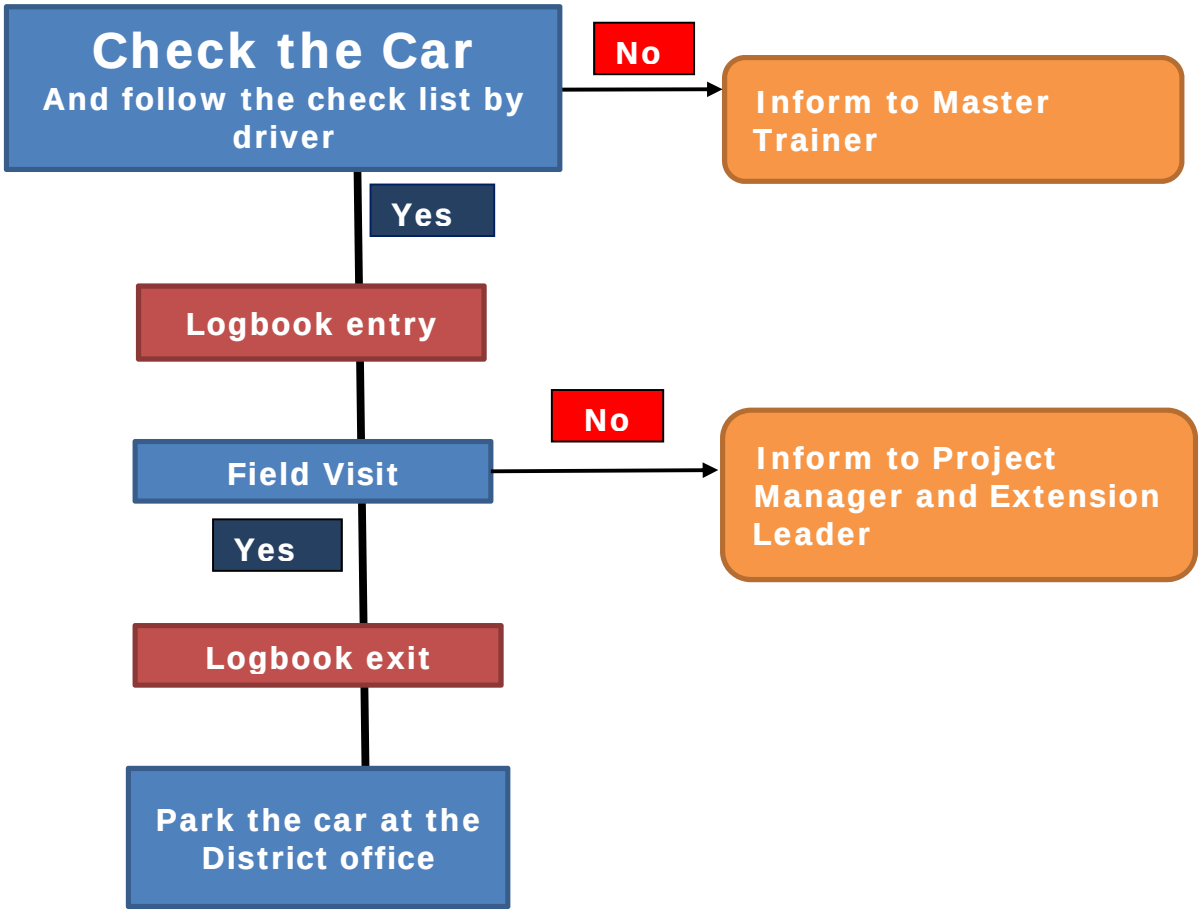
1. **Extension Leader**-A person who is the head of extension activity. For PSLD project, it is Gender specialist.
2. **Master Trainer**- A person who monitor farmer training and extension related activities in the village.



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