

**A  
Report  
On  
Dairy Value Chain Assessment  
In  
Nalanda District, Bihar**



Submitted to:

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## **Abbreviations**

<b>AI</b>	Artificial Insemination
<b>BRLPS</b>	Bihar Rural Livelihood Promotion Society
<b>COMFED</b>	Cooperative Milk Federation
<b>FAO</b>	Food And Agriculture Organization
<b>FGD</b>	Focus Group Discussion
<b>FPC</b>	Farmer Producer Company
<b>GIS</b>	Geographical Information System
<b>ICDS</b>	Integrated Child Development Scheme
<b>ILRI</b>	International Livelihood Research Institute
<b>KCC</b>	Kisan Credit Card
<b>KF</b>	KAUSHALYA Foundation
<b>KII</b>	Key Informant Interview
<b>KVK</b>	Krishi Vigyan Kendra
<b>PRA</b>	Participatory Rural Appraisal
<b>SHG</b>	Self Help Group
<b>SBI</b>	State Bank of India
<b>TIMUL</b>	Tirhut Milk Union Limited
<b>VCA</b>	Value Chain Analysis
<b>VO</b>	Village Organization

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## **EXECUTIVE SUMMARY**

The value chain study on livestock farming in the villages – Mushari and Kharuara (in block- Hanaut) and Kesopur and Mahamadpur (in block- Ekangarsarai) in district Nalanda in the state of Bihar in India is aimed at analyzing the existing value chain scenario and dynamics of livestock farming system so as to propose interventions by identifying gaps and bottlenecks to enhance overall efficacy of the business. Owing to the status of current livestock scenario in the region, the study focuses on dairy farming. It is a widely accepted fact that agriculture is the primary livelihood activity in the villages where crop growers can and do supplement income from cultivation with livestock rearing since both are mutually compatible livelihood activities reciprocating cost-effectiveness and business facilitation to one another. Dairy farming not only is a supplemental income generating activity for farmers but also ensures household nutritional security and fuel consumption requirements. The dairy value chain refers to the interrelationships between different stakeholders of the business who interplay against the backdrop of overall business enabling environment created by the regulatory framework of the Government. The methodology adopted for the study was conceived with the onset of desk research fed with information gained through preliminary meetings and discussion during field visits with various value chain actors. This was followed by data collection using research tools like PRA and FGDs for farmers and KII for other stakeholders with a questionnaire and design-plan developed for each of these tools. While PRA culminated providing various demographic and socio-economic features of the villages with special focus on dairy, FGDs and KII skimmed up various indicators and determinants crucial to dairy farming. After organizing the pooled information, the current value chain structure surfaced with apparent potential systemic gaps and constraints. The major findings of the study can be summed up in following points as enumerated below:

- ❖ Income-Expenditure seasonality of livelihood activities particularly agriculture and wage labour was captured which revealed the criticality of common deterministic factors like rainfall, illness, ceremonies and agricultural requirements in its changeability across year.
- ❖ Gendered nature of segregated livelihood and business practices was visible across the dairy value chain often constricting women at the back-end and less mobile pockets of business activity while also limiting their power in decision making and ownership of proceeds. For example, women were more engaged in rearing than selling the products observing complete exclusion from playing in the input (cattle, cattle feed etc.) and output markets(milk and milk products) as well as the supply chain.
- ❖ Mapped chain actors and stakeholders in the value chain study are :
  - ✓ Cattle market
  - ✓ Cattle feed market
  - ✓ Producers in the four villages
  - ✓ Consumers
  - ✓ Traders/ village level collectors (*Dudhiya*)

- ✓ Milk Society (such as Mahila Doodh Utpadan Sangh)
  - ✓ Sweet shops
  - ✓ Cream separators
  - ✓ Milk collection and chilling centres
  - ✓ Milk processing plant
  - ✓ Retailers (at front end market)
  - ✓ Transportation channel
  - ✓ Credit providers
- ❖ Cattle market comprises the two modes of cattle sales by- 1) fellow farmers within the village often through a middleman and 2) participating in nearby market fairs “*mela*” periodically organized providing various buyers and sellers a common platform to transact. Sadly, due to lack of awareness and knowledge regarding the distinctive breed features and business ethics, farmers sometimes end up buying poor quality cattle prone to sickness and low in productivity.
- ❖ Cow breeds for dairying include both local breeds “*desi*”(Magahi, Patahanian and Saahiwan – in order of their popularity) popular for their disease resistance and fat content and lately adopted breeds (Friesian and Pure Jarsi) popular for higher productivity. In buffaloes – Magahi, Mahiki, Murrah, Gujarati and Punjabi are popularly reared breed owing to their availability and higher fat content than cows.
- ❖ Cattle feed market is constituted both by branded feed sellers like retailers of private feed brands (supplements and constitutes popular in region – *Kapila Pashu Ahar, Kisan, Tulsā*) and TIMUL-Sudha Dana and non-branded feed sellers like those dealing in unpackaged feed varieties like grains, crop residues and green fodder comprising grass and plants. The feed systems include open and tethered grazing which is becoming increasingly less extensively utilized owing to lesser availability of pasture. Branded supplements/concentrates, homemade cooked food and crop residues are available yearlong while green fodder is seasonally available amply in winter. In feeding practices, it was also found that due to lack of knowledge on diet combinations and dosage, excessive feeding of supplements/concentrates for higher productivity leads to cattle diseases like diarrhea.
- ❖ Producers in the four villages produce milk both for household consumption and commercial business purpose. They either sell milk through village level collectors/traders who procure lot size for supplying to other market players (processors) like cream-separators and sweet shops. TIMUL-Sudha Milk Societies also procure milk from farmers. Producers were found to be dissatisfied with both village level collectors and TIMUL Milk Societies as they were unconvinced about the rightful measurement of milk by the former and fat content by the latter in lactometer readings.
- ❖ Sweet shops and cream separators are the processors and retailers who process milk and sell or use its byproducts like cream as an ingredient in other products like sweets etc.

- ❖ Milk collection and chilling centres as well as milk processing plants are infrastructural systems of TIMUL-Sudha business chain wherein the former stores and supply a lot size to the latter from where the pasteurized milk and processed milk products reach the front-end retailers.
- ❖ Each chain actors use their own modes of transport in reaching their buyer/seller which are bullock carts, bicycles and small vehicles.
- ❖ Commercial transactions between the chain actors are carried out in both cash and credit informally. Formal credit sources are Government banks less availed especially by small and marginal farmers while informal mutual credit transactions are more widespread based on long-term relationships and goodwill. Producers undertake credit transactions with back and front market players like –a) feed and cattle sellers and b) buyers like village level collectors and Milk Societies. Similarly other chain actors undertake such practices with those in direct business relationships. There are no hard and fast rules for due payment periods but the stakeholders are mostly sensitive to long-term relationship and business facilitation which largely prevents malpractices.
- ❖ Breeding and health services are provided by both Government and private veterinary doctors but quacks have also found a place in this. While government services are more reliable and cheaper, accessibility constraints provide ample scope for private doctors to market their services. Lack of awareness on the part of producers gives room to quacks for operating illegally often resulting in worsening of cattle health like infections due to treatment failures like unscientific artificial insemination practices. While adoption of artificial insemination has shot up in the past five years, vaccination services are less widely provided primarily due to the fact that private doctors are withdrawing from this finding it less remunerative. Common diseases reportedly in order of their incidence are – SARA (Sub- Acute Ruminant Acidosis), Food and Mouth diseases, Diarrhea, *Galaghot* (as called in local language) and Cold and cough.

Concluding the study, we arrive to major three constraints and proposed interventions for each:

1) Institutional building and strengthening of existing organized arrangements like FPC, SHG and Milk Society can utilize the untapped cottage dairy industry comprising small producer's dairying mostly for household consumption. Such a model promises – training and capacity building, aggregation of inputs and output for better cost and time effectiveness and dissemination of market information even to small producers. These steps can mitigate malpractices in dairy business encouraging its expansion and rewards.

2) In breeding and health services, existing resource base of progressive dairy farmers of FPC, SHG and particularly Milk Society can be skilled in at least primary and paramedical veterinary health services like vaccination etc so as to cater to the unreached larger farmer base. Even existing quacks can be included in this skilling which is also along the principles of localized development strategies.

3) In terms of feed support mechanism, knowledge dissemination in best practices through existing institutional models like SHGs, FPCs and Milk Society can be extended periodically. Centralized feed procurement systems through retailing entrepreneurially at village level can be conceptualized by

progressive dairy farmers from or outside these people's institutions. Genetic modifications in green fodder varieties especially grass suiting local agronomic conditions can also be leveraged. These measures can potentially reduce feeding costs while also ensuring quality and availability.

4) Credit support can be widened to reach even small producers mainly through the SHG model and Value Chain financing among the stakeholders as they do not require perceptibly extensive unmanageable documentation on the part of small producers. Credit support can be widened to reach even small producers mainly through the SHG model and Value Chain financing as they are more readily and easily modes of credit availability. Long term relationships among the chain actors striving for common goal of business efficacy can be leveraged especially in cases of real-time requirements of credit.



## 1 INTRODUCTION

### 1.1 Background

This report is aimed at the study of livestock farming practices in and around Nalanda district, and its contribution to different aspects of a farmer's life. India has the world's largest dairy herd (composed of cows and buffaloes) of over 304 million, and stands first in milk production, with 112.5 million tonnes of milk produced in 2009-2010. India is also the third largest egg-producer in the world, and over 180 million eggs are being produced every day totaling to a figure of 65.7 billion eggs for the year 2011-12. While the majority of India's animal products are consumed domestically, exports are growing.

Bihar is among the top ten states in milk production in India (with Uttar Pradesh leading the way) with a share of 5.5 % in annual national milk production. Level of processing is so high that almost 50% of the milk is converted into dairy products while around 55% of total produce is used exclusively for sweets. The COMFED cooperative model of Bihar has more centres of dairy health points than those provided by the Government. It beckons at the fact that intensification of this cooperative sector has surpassed Government resources in providing dairy services.

Livestock farming provides part time to full time employment, and enterprises like dairy and poultry businesses are the sources of regular incomes due to daily production of saleable products like milk and eggs. Even families of low income groups have been found to supplement the family incomes undertaking livestock farming. In livestock sector, so far there are no schemes like Minimum Support Price or other such schemes for price support by the Government. Notwithstanding the pull market situation makes the enterprise incentivizing enough to be undertaken.

The table given below provides an overview of the list of activities related to livestock farming practices:

**Table 1- Livestock Practice**

<b>Activity</b>	<b>Components</b>	<b>Main output</b>	<b>By-products</b>	<b>Subsidiary Product</b>	<b>Processed Product</b>
Dairying	Cows	Liquid Milk	Dung & Urine	Calf	Curd, Ghee/butter, Paneer/cheese etc.
	Buffaloes	Liquid Milk	Dung & Urine	Calf	Curd, Ghee/butter, Paneer/cheese etc.

Crop	Wheat/Rice/etc	Grain	Straw		
+	+	+	+		
Dairy Animal	Cow/ buffalo	Liquid Milk	Dung & Urine	Calf	Curd, Ghee/butter, Paneer/cheese etc.

There are a number of job opportunities created like processing of feeds and fodder, milking, processing of milk, marketing of milk and/or milk products, breeding & veterinary aid, sale of cattle etc in the dairy value chain.

Blocks under study are shown in below table and map given below.

Table 2- Blocks under VCA study

District	Block	Village
Nalanda	Harnaut	Kharuara
		Mushari
	Ekangarsarai	Mahamadpur
		Kesopur



Figure 1: Map of location under study

## **1.2 Objectives**

The main objective of the study is to undertake value chain analysis for dairy farming in Bihar's Nalanda district. To serve this purpose, following specifications are to be captured:

1. Mapping the Value Chain
  - Mapping the value chain of all the four villages under study
  - Depicting the dynamic relationship between different stakeholders
2. Identifying structural and systemic bottlenecks, constraints and opportunities
  - Another objective of this study is to identify and analyze the key bottlenecks which are preventing the potential efficacy of the value chain from realization and also to propose suggestions for alleviating them accordingly. This study also explores the opportunities which can be leveraged so as to further add value in the livestock farming practices in the region.
3. This study also aims to analyze the gendered nature of livestock farming practices in the region.
4. This value chain assessment also targets assessing an overview of past trends, current status, and likely future directions for it while also identifying the underlying challenges and opportunities faced by different actors in the value chain.

## **1.3 Conceptual Framework**

The conceptual framework for analyzing dairy value chain here includes the assessment of structural and dynamic features of the system through value chain approach. The structural elements, depicted in the stylized dairy value chain ma include all the firms and other actors involved in the value chain, the linkages between these actors, and the business enabling environments within which they interact and make their decisions. The dynamic elements in the value chain framework include the characteristics of the relationships between firms and the ability of the value chain to remain competitive by upgrading in response to changing end market demands and requirements.

The value chain (Porter, 1985) has been widely adopted by many as a tool for understanding and communicating the structure and components of value creation in all kinds of organizations. The participants in a value chain create dynamic elements through the choices they make in response to the



value chain structure. The framework of a value chain includes all the stakeholders in the chain and can be characterized to five elements described below:

**End Markets:** In layman terms, end market is place where the product becomes available for the consumer to purchase. In this way, it captures the importance of this downstream node of the supply chain which acts as a key driver of value chain growth and development. This is where a demand is created, triggering supply chain actors who in turn build capacity to meet the demand and thus compete in the marketplace.

**Business Enabling Environment:** Business enabling environment includes norms, customs, laws, regulations, policies, trade agreements and public infrastructure that either facilitate or hinder the movement of a product or service along its value chain. Improving the business environment by lifting constraints and filling gaps in the regulatory and administrative support mechanisms is central to any comprehensive competitiveness strategy for a targeted value chain.

**Vertical Linkages:** At different level there are linkages within the business among various stakeholders, the strength of these linkages are critical for moving the product to the end consumer. Gaps between the end market and the farmers become critical factors to be analyzed. Flow of information gets blocked between the farmers and the marketplace due to institutional gaps of an emerging economy. Mutually beneficial vertical linkages up and down the value chain do facilitate the delivery of benefits, services, skills, and information between stakeholders.

**Horizontal Linkages:** Efficient horizontal linkages between stakeholders help reduce transaction cost, overheads, create economies of scale and give strategic advantage. These linkages also help in efficient resource utilization and helps in improving the product/service quality. Such linkages also facilitate collective learning and risk sharing while increasing the potential for upgrading and innovation. Horizontal linkages could be the longer-term cooperative arrangements among firms that involve interdependence, trust and resource pooling in order to jointly accomplish common goals.

**Supporting Markets:** These markets play a vital role in upgrading the roles of stakeholders in a value chain. They generally offer products and services in support of a range of business functions to actors throughout the value chain which typically includes financial services, consultations, and sector specific advice such as health care services, breeding services etc.

In summary, this value chain approach takes a market system perspective with a focus on the pivotal role of demand of each product/service in end markets, and attempts to identify leverage points where interventions can catalyze improved value chain competitiveness. Interventions seek to improve the business enabling environment and transform relationships between firms—whether vertical linkages between firms at different levels of the chain or horizontal linkages between firms at the same level—in order to encourage upgradations and broader distribution of benefits.

## 2 METHODOLOGY

This assessment was undertaken using a mixed-methods approach, with the qualitative study nested within a quantitative impact evaluation -a judicious combination of both quantitative and qualitative research tools (see Figure 2) are used. When quantitative studies are combined with a credible understanding of complex real-world situations that characterize good qualitative studies, we can gain a sound understanding of the problems and opportunities faced by different players at various value chain nodes that we are focusing on. A real understanding of the way that a particular value chain works can ‘unlock doors’.

Desk research was done to develop an initial understanding of the existing dairy system in Bihar with special focus on the selected district Nalanda. This was followed by field trips where survey questionnaires were developed and alongside Participatory Rural Appraisal (PRA), Focused Group Discussions (FGDs) and Key Informant Interviews (KIIs) were conducted.

The questionnaires used were prepared and shared by ILRI as a tool for conducting PRA, FGD and KII. Figure 2 provides a graphical description of the overall methodology that was followed for the value chain study and analysis. To get a hands-on understanding on the need of information required from these activities, and method to be followed during various activities was discussed in a training-cum-workshop organized by ILRI in Patna with the team of KAUSHALYA Foundation dedicated for the VCA study.

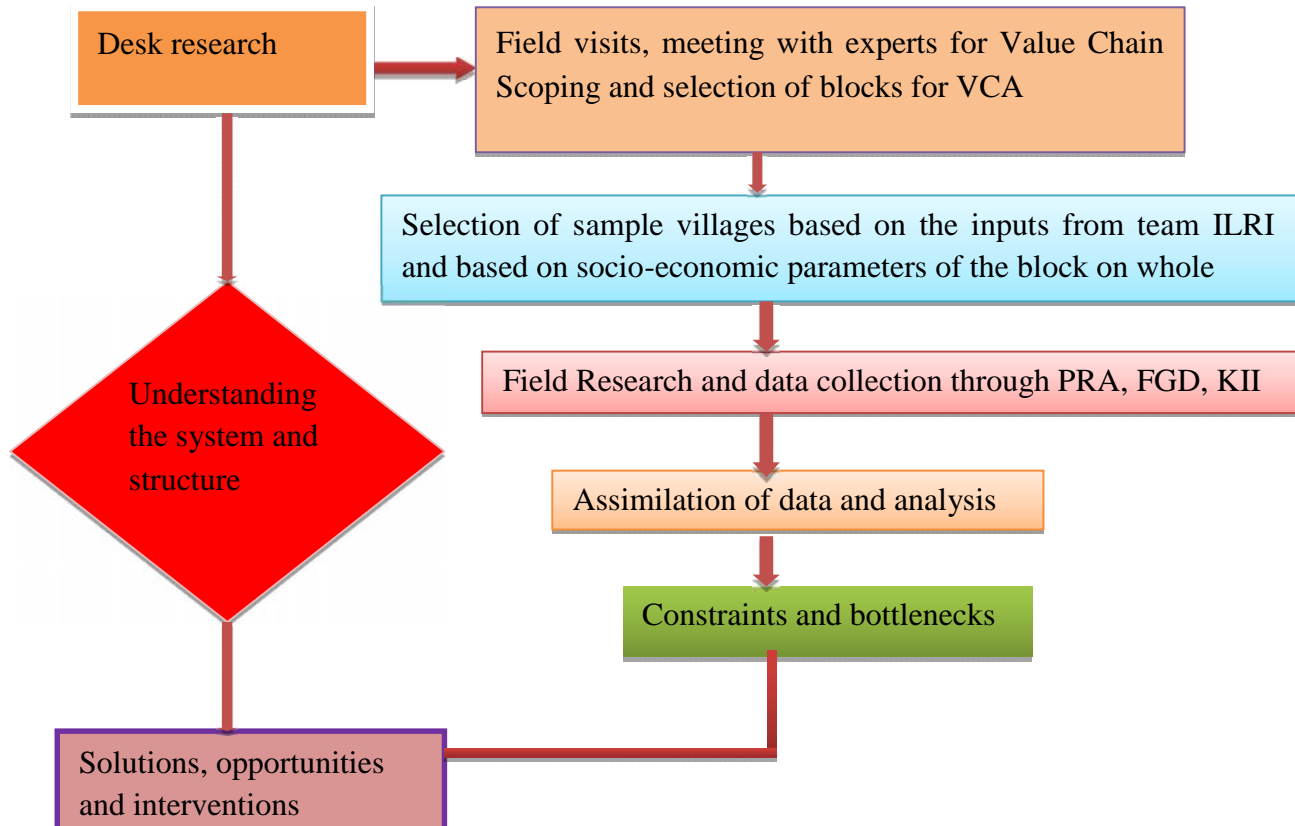


Figure 2: Flow of activity for VCA study

As the first step towards value chain analysis, data from secondary sources such as literature, previous reports on dairy value system, experts' opinion and past experience of the researchers, is collected and analyzed to develop an initial understanding of the system. This first step was a precursor for data collection in the next stage as part of primary research. The fragmented nature of the dairy-value chain system in the scope of work required capturing qualitative and quantitative data to be able to gain an overall picture of the existing system. Data was collected for the various aspects of the dairy value chain from a large number of stakeholders such as the Producer, input suppliers, sweet shops, milk sellers, Milk Societies, small processors, etc.

A set of questionnaires was designed and shared by ILRI for the stakeholders participating in the value chain and to collect quantitative and qualitative inputs from

- Milk Producer groups
- Service Providers
- Processors/Retailers
- Consumers
- Traders

To capture data through primary research and skim information from it, record sheets were prepared and shared by team ILRI. In all the four villages Participatory Rural Appraisal (PRA), Focus Group Discussions (FGDs) and key-informant interviews (KIIs) were conducted to retrieve data on quantitative and qualitative parameters under the VCA (Value Chain Analysis) study. In cases where the number of respondents was found to be limited, field-experts were also contacted to cross-check and consolidate information. A team of two personnel visited all four villages from November, 2014 to January, 2015 to observe and conduct PRA, FGD and KII for extracting information on the overall flow of material, information and finance across the chain. The purpose was also to get exposed to the existing infrastructure, social structure, attitudes and behaviors of the stakeholders that are sometimes difficult to capture using any formal arrangement.

From the selected district of Nalanda in Bihar, two blocks were selected and from them 2 villages in each were identified for conducting the study.

**Table 3- Participants detail in PRA, FGD and KII**

<b>Value Chain Actors</b>	<b>Total No. of participants</b>	<b>FGDs</b>	<b>PRA</b>	<b>KII</b>
<b>Farmer</b>	299	4	4	--
<b>Livestock feed provider</b>	5	--	--	5
<b>Health and breeding service provider</b>	5	--	--	5
<b>Milk traders/village level collectors</b>	6	--	--	6
<b>Processors/Retailer</b>	9	--	--	9
<b>Milk Societies</b>	2	--	--	2
<b>Consumer</b>	12	--	--	12

FGDs were conducted in each of the four villages by bringing the farmers together. During FGDs several sessions were conducted as planned in the study design. Some sessions were conducted exclusively with men and others exclusively with women groups while some sessions were conducted with mixed groups including men and women both as per guidelines in the VCA questionnaire. Due to the limited number of stakeholders, operational challenges and the kind of data required, KIIs were conducted for other stakeholders such as livestock feed provider, milk trader, health service providers, retailers and Milk Societies.

## **2.1 Selection of study area and VCA sites**

For selection of sites a systematic approach consisting 3 stages was designed and followed by team ILRI.

1) In step one, the ILRI geographic information system (GIS) team took a bird-eye-view evaluating the whereabouts of livestock keepers and livestock consumers who were afterwards mapped out on basis of their status in terms of poorer and less poor and more livestock and less livestock. This information differentiates domains, from which the domains containing poor households with livestock are selected. Following the process Bihar was chosen for dairy value chain assessment.

2) In step two, a workshop was organized with different stakeholders where they identified other variables to be considered in selecting the sites. They defined their areas of concern for a more holistic starting point. This stage captured, through a participatory process, information that the global data sets may not be capable of mapping. This step also aided in 'buying in' stakeholder involvement and forging partnerships. Issues such as the level of social capital were also identified at this stage.

A matrix of potential sites was given to participants. All the potential sites were then ranked on the criteria they had defined themselves. And list of potential sites were identified. To add to this process and complement it for surety in appropriation of site selection, field research was done as step three,.

3) This was a cross-checking step where the site selection team went into the fields to select the three to five most promising sites depending on the requirements for the state. During these visits, they talked to individuals in the community and collected data to make an environment specific selection context. The selection process ended up with marking two sites in the same agro-ecological zone in neighboring districts Gaya and Nalanda having very different livestock value chains.

### **2.1.1 Sampling Strategy**

To further this, a visit following a workshop with identified partners to work on VCA assessment, was made by team ILRI to do value chain scoping in order to understand the dynamics of value chain actors in different sites in the district Nalanda. The sites were selected during this scoping exercise based on the systematic approach depicted in figure below.

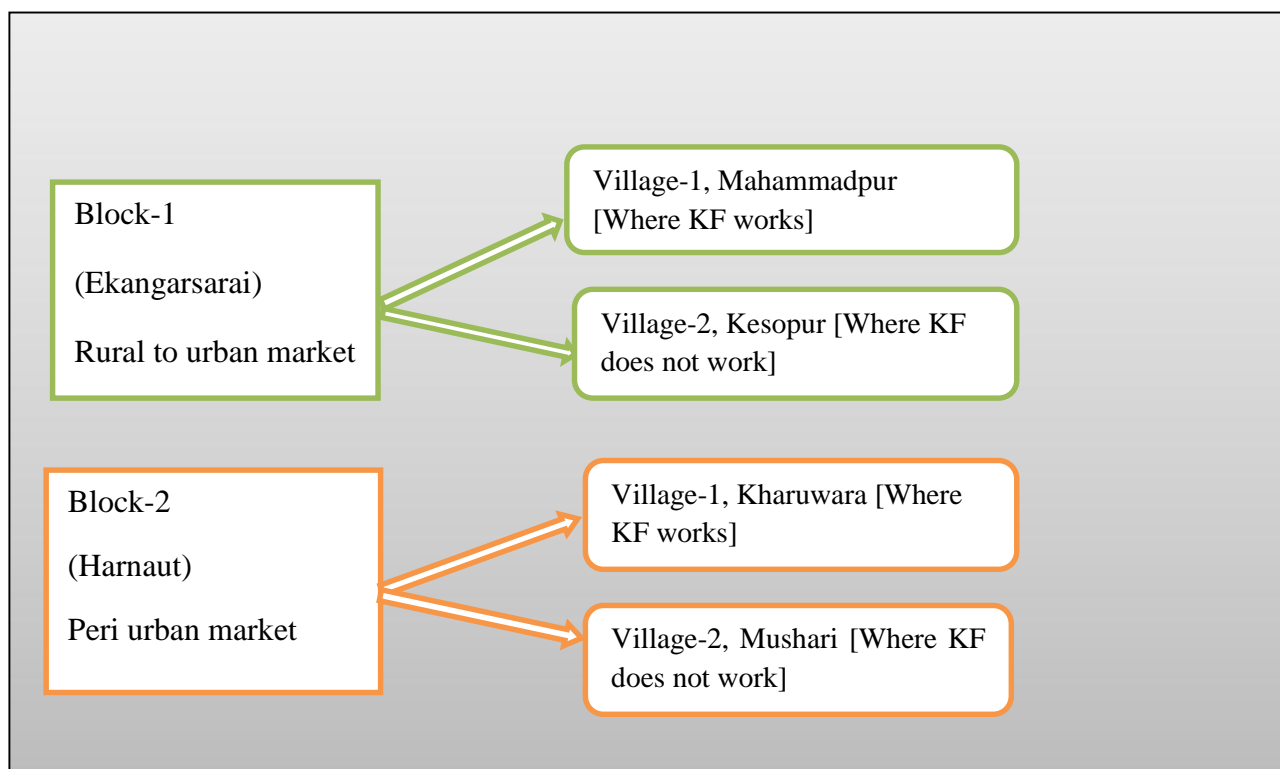


Figure 3: Sampling strategy for VCA sites in district and block

Two blocks were selected, block-1 where rural to urban scenario and block-2 where peri-urban scenario exists. So, Ekangarsarai block was chosen for rural to urban context and Harnaut block for peri-urban context. In each block two villages were identified and selected out of which one is a work area of KAUSHALYA Foundation and other not being work area in each.

The table given below enumerates the villages selected in the blocks.

Table 3- List of villages selected for FGD for VCA study

Name of Block	Name of Village
<b>Ekangarsarai</b>	Mahammadpur
	Kesopur
<b>Harnaut</b>	Kharuwara
	Mushari





### 3. FINDINGS FROM FOCUS GROUP DISCUSSIONS

Focus group discussions were the main tool adopted for data collection from producers. Other activities like observations, meetings and PRA etc also assisted in properly conducting Focus Group Discussions with the identified stakeholders in the study. The study largely draws upon data provided by the sampled respondents and volunteering participants critical for information extraction.

#### 3.1 Findings on community maps

During PRA in the villages a community map for each village was drawn showing the existing structure of villages particularly livestock related system in place. The community maps also helped to understand and assess the existing support systems and infrastructure available in the villages which can be helpful in the context of livestock value chain. They also exhibited the local resource and asset structures in the villages. The community maps gave idea about the general socio-economic landscape as well as an overview of the village. The table given below summarizes the information surfaced from the community maps.

Table 4- Summary of findings from community map of villages

Village-wise Resources	MUSHARI		KHARUARA		KESOPUR		MAHAMADPUR	
	Details	Number	Details	Number	Details	Number	Details	Number
<b>Temple</b>	Hindu	2	Hindu	4	Hindu	2	Hindu	3
<b>School</b>	Primary Govt	1	Middle Govt	1	Primary Govt	1	Primary Govt	1
<b>Bridge</b>	River bridge	1	No	0	No	0	No	0
<b>House</b>	kuchha, pucca mixed	--	kuchha, pucca, mixed	--	kuchha, pucca, mixed	--	kuchha, pucca mixed	--
<b>Anganwadi</b>	ICDS	1	No	0	ICDS	1	No	0
<b>Hand-pump</b>	Drinking	6	Drinking	5	Drinking	5	Drinking	7
<b>Shop</b>	Utility shop	1	Utility shop	2	Agri-input	1	Utility shop	1
<b>Water body</b>	River	1	No	0	No	0	Pond & well	2
<b>Community hall</b>	No	0	Kisan Bhavan	1	No	0	No	0
<b>Panchayat Bhavan</b>	No	0	Yes	1	No	0	No	0
<b>Financial institution</b>	No	0	No	0	S.B.I. bank	1	No	0

The community maps of each village are placed below.

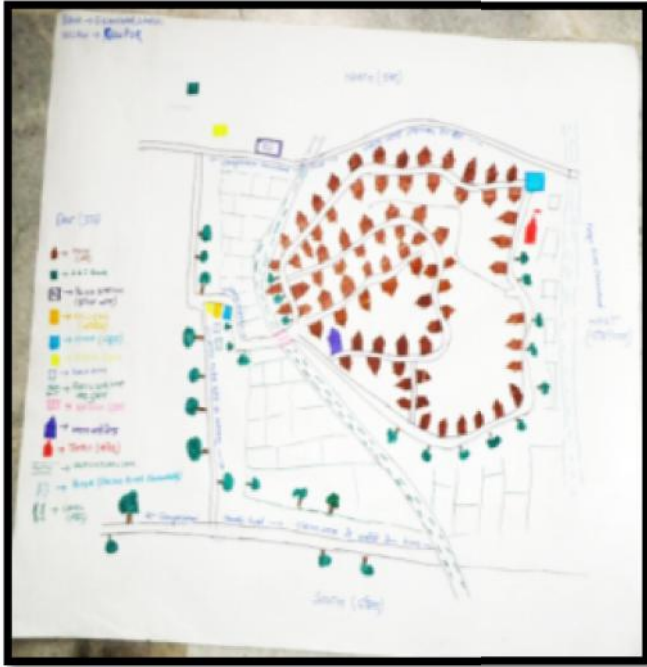


Figure 5: Village map of Kesopur village, block-Ekangarsarai, dist-Nalanda, Bihar, India



Figure 4: Village map of Kharuvara village, block-Harnaut, dist-Nalanda, Bihar, India

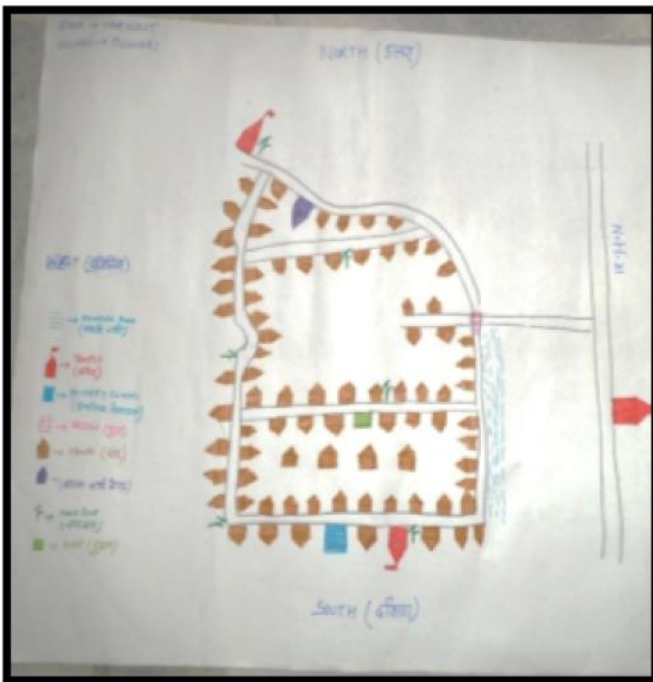


Figure 7: Village map of Mahammadpur village, block-Ekangarsarai, dist.-Nalanda, Bihar, India



Figure 6: Village map of Mushari village, block-Harnaut, dist- Nalanda, Bihar, India



### **3.1.1 Findings on Value Chain Map**

Dairy cattle are mostly kept all day yearlong in completely “kuccha” or “semi pucca” barns. The ruminants were categorized each on basis of their sex, age-groups and lactation status viz. -calves, heifers, first 3-months of lactating females, second 3-months of lactating females, last-phase lactating females those in the last phase until dry period, dry period and gestation group. It has been found that most male calves are reared until 1 year for age after which they are sold off or stay in farm for breeding and animal cart transportation purposes. Artificial Insemination (AI) of young stock starts after 15 months of its birth, hence first calving age with 24 months. Most of the cows are artificially inseminated and ear tagged by the FAO project. The inter-calving period of 18 months has to be observed as per standardised norms. Maximum lifespan of dairy cows is 8-9 years. Cows are both fed and milked twice daily. For ensuring good health, cow-dung is removed timely and the floor (usually concrete) is washed with water.

During PRA in the villages, community Value Chain mapping was done for dairy farming. Flipcharts were used to identify and name the stakeholders of livestock value chain which were placed to show relations and transactions among them. Various details related to -distance, price, gender participation, proportion of stakeholders - these were all noted down on the charts to complete the value chain mapping. Pictures of the maps prepared are attached as **Annexure- A**. Here the picture and maps shown are replica made for the legibility purpose. In the case of village Mushari, we can observe that there are two more players in the value chain than in other three villages viz. Trader which is called *Dudhiya* in local language & Cream Separator (processor).

Value chain maps – such as those displayed in figures as follows – provide a schematic snapshot of the key value chain actors and the existing structure of raw material, product and information flows at a given point in time. The vertical product flows delineate the alternative supply channels while each horizontal level in the value chain designates the productive function.

The Value Chain starts with the producer who supplies milk to the traders, Milk Society and consumers. From the traders/ village level collectors, the milk is supplied to the processors (cream separator & sweet-shops). The other important stakeholders in the value chains are the doctors and feed suppliers who provide input and support services in production.

The milk supplied to the Milk Society is transferred to the processing unit and consumers. Towards assessing the existing condition of the villages, an FGD was conducted with men and women groups to gain some information on dairy value chain.

It was found that in all the four villages marketing channels are developed nearby the producers. All livestock related services are placed in typically a distance of 3 to 6 km.

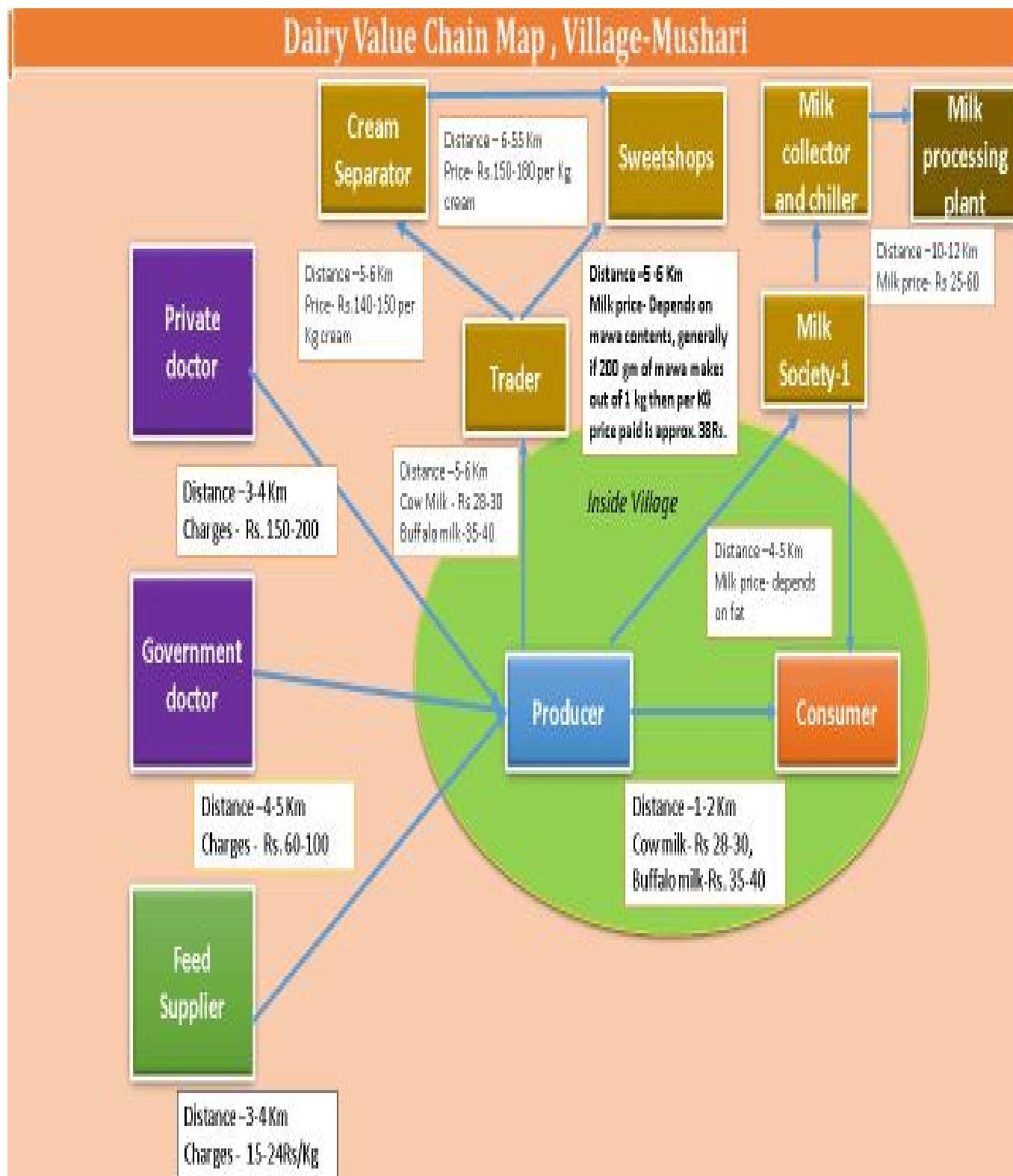


Figure 8: Value Chain map of Mushari village, block-Harnaut, dist-Nalanda, Bihar, India

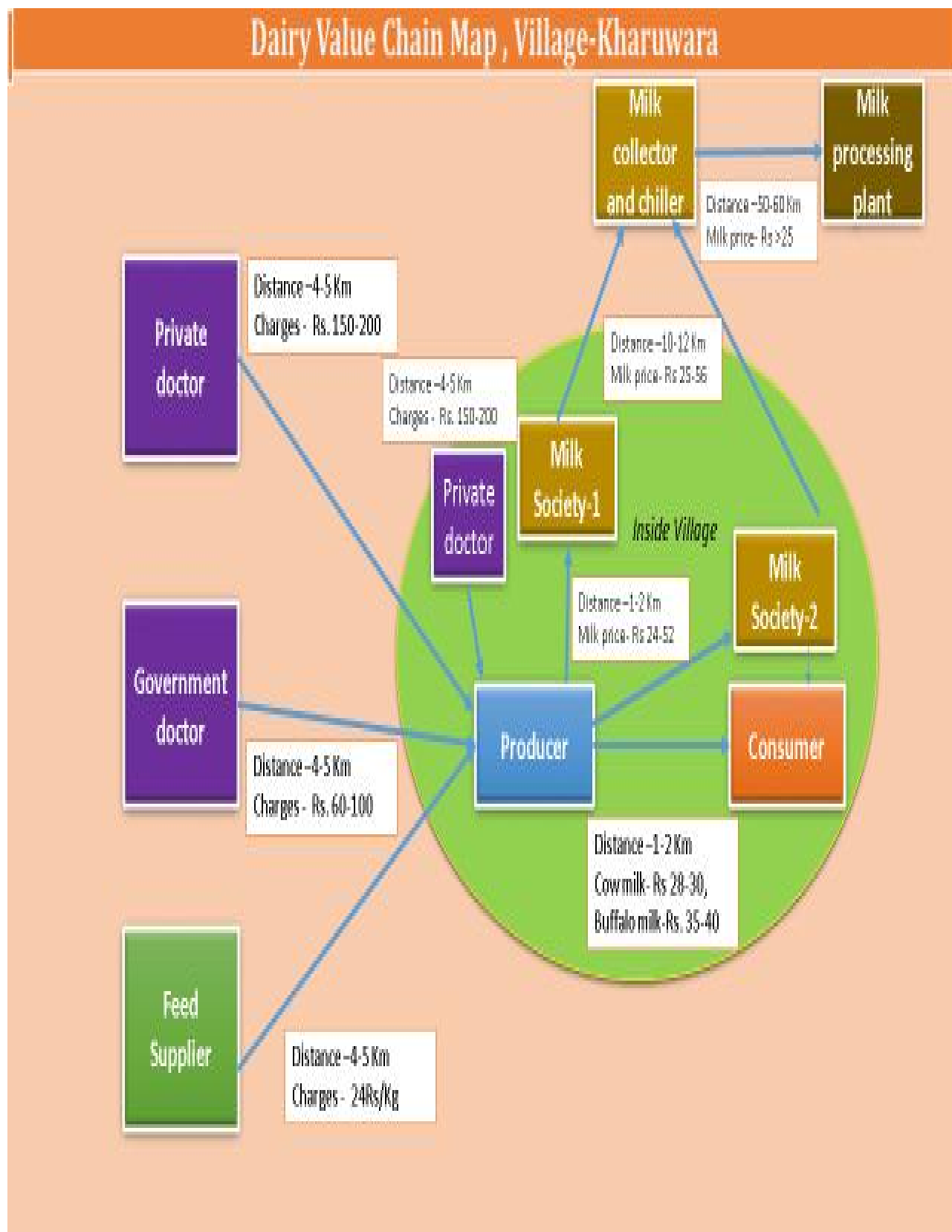


Figure 9: Value Chain map of Kharuara village, block-Harnaut, dist-Nalanda, Bihar, India

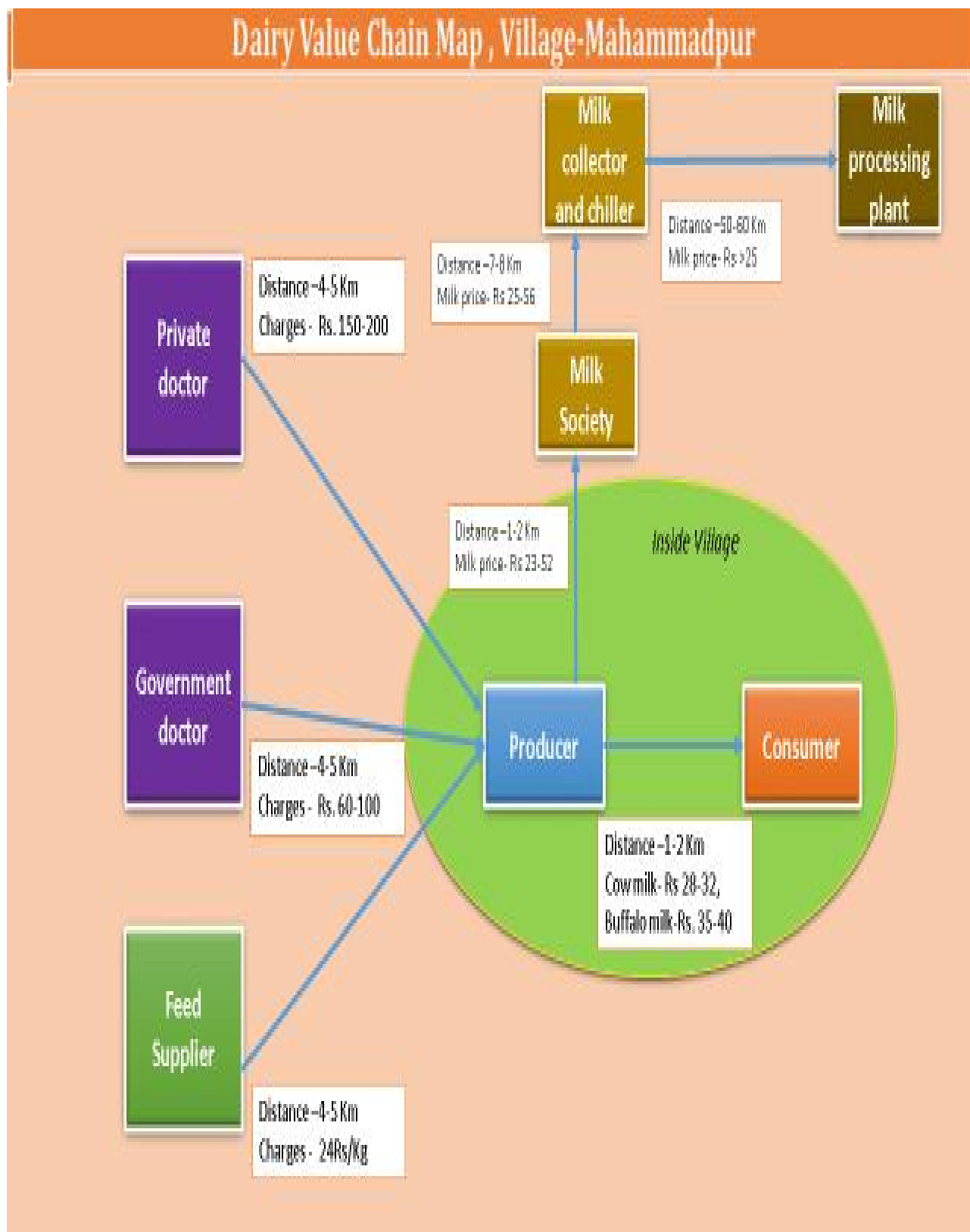


Figure 10: Value Chain map of Mahammadpur village, block-Ekangarsarai, dist-Nalanda, Bihar, India

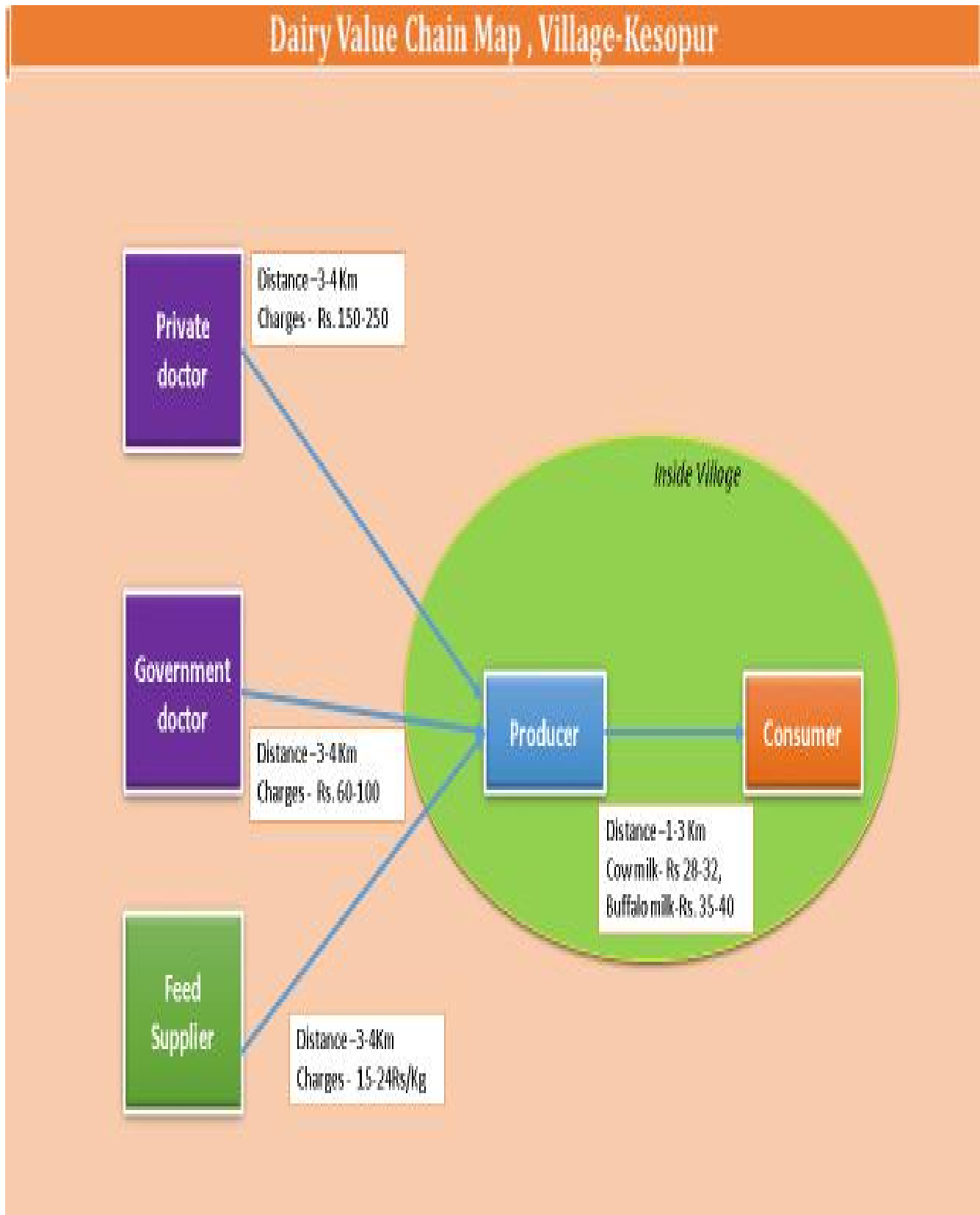


Figure 11: Value Chain map of Kesopur village, block-Ekangarsarai, dist-Nalanda, Bihar, India

The seasonal calendars were drawn by villagers to get the income and expenditure pattern in each month for agriculture and livestock along with rainfall. The outcome was a map showing the pattern of agriculture income & expenditure, livestock income & expenditure and rainfall. Illustration given below depicts the outcomes which came through the exercise. Farmers of these four villages had three major avenues of incomes i.e. Agriculture Income (AI), Labor Wage (LW), & Livestock Income (LI). Income received by farmers from agriculture is highly dependent on the amount of rainfall received in the particular region. Thus, the income from the both the sources become extremely important for the farmers.

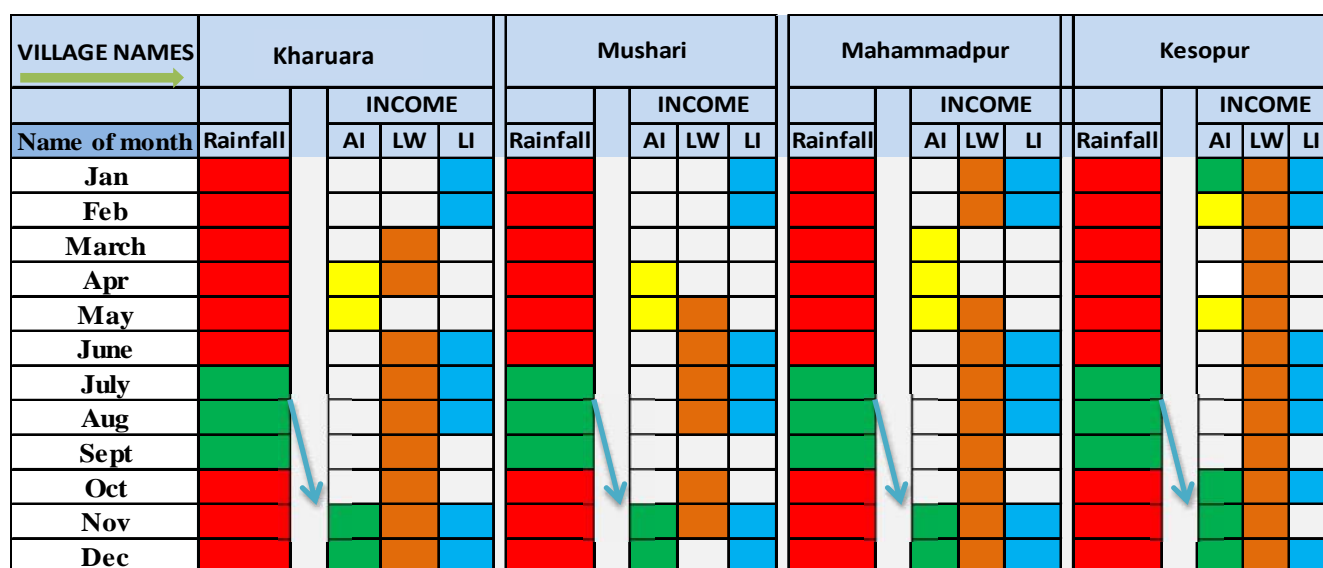


Figure 12: Agriculture, labor and livestock income throughout the year

Legends-

Red	Low Rainfall	Green	Agriculture Income
Green	Optimum rainfall	Yellow	Rainfall Independent AI
Blue	Livestock Income	Orange	Labor wage

Following observations can be made from the illustration provided above:

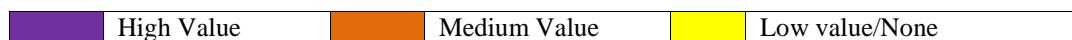
- All the four villages received major rainfall in the months of July, August & September. Arrows indicated above beckons at that the income received in the month of November & December is the result of good harvest after optimum rainfall.
- Farmers continue to receive a continuous stream of income throughout the year through labor wages and from sales of their livestock products.

- Incomes received in the months of April & May from agriculture are from sales of crops that are not dependent on rainfall much.
- The months of March, April, May and September are low income months in all the villages on account of low output from agriculture, dearth of labour wages and less or no income from livestock.
- The sale of livestock produces helps them meet their expenses during the months of June, July and August when there is no significant income from crops. The only other available option is labor wages which is minimal in these areas in seasons when agriculture is not undertaken.

In conclusion, it can be inferred that income from livestock can help them meet the gap which gets created due to the high correlation between agriculture income & rainfall received. If livestock rearing is done in an organized manner along the lines of “best practices” and the required market linkages are made available to them, it can also give them a surplus throughout the year which can help them raise their standards of living and dignity. Now to have a wholesome view of the effect it has on the livelihood of the farmer as well as his family, it’s important to map the income with the major source of expenditure throughout the year. Given below is the snapshot of the income & expenditure pattern throughout the year marked against the categories of agriculture related expenditures, livestock related expenditures, and other expenditures (mostly personal).

Name of month	Income				Expenditure		
	Agriculture Income	Livestock Income	Labor Wages		Agriculture Expenditure	Livestock Expenditure	Personal Expenditure
Jan	High Value	High Value	High Value	←→	High Value	High Value	High Value
Feb	Low value/None	High Value	High Value	←→	Low value/None	High Value	High Value
March	High Value	High Value	High Value	←→	High Value	High Value	High Value
Apr	High Value	High Value	High Value	←→	High Value	High Value	High Value
May	High Value	High Value	High Value	←→	High Value	High Value	High Value
June	Low value/None	High Value	High Value	←→	High Value	High Value	High Value
July	Low value/None	High Value	High Value	←→	High Value	High Value	High Value
Aug	Low value/None	High Value	High Value	←→	High Value	High Value	High Value
Sept	Low value/None	High Value	High Value	←→	High Value	High Value	High Value
Oct	High Value	High Value	High Value	←→	High Value	High Value	High Value
Nov	High Value	High Value	High Value	←→	High Value	High Value	High Value
Dec	High Value	High Value	High Value	←→	High Value	High Value	High Value

Figure 13: Agriculture & livestock income and expenditure



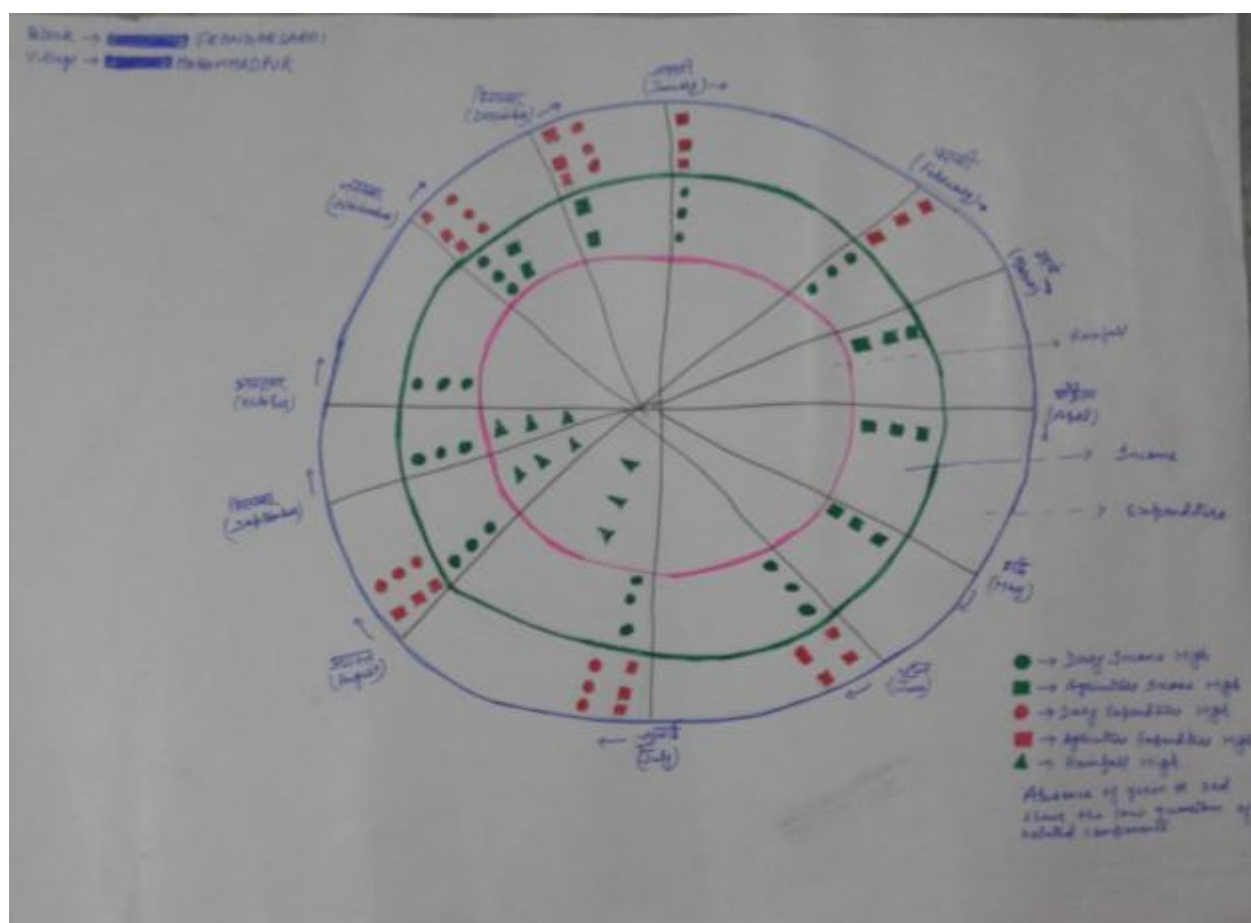
A quick view of income as well as the expenditure pattern throughout the year suggests that by diversifying their incomes from different sources, a farmer is able to mitigate the risk of not being able to meet their expenses. For instance, in the month of July we can find out that their expenses are highest with all the resources contributing but they do not have any income from the agriculture. They are able to meet this requirement by the income of livestock product sales and labor wages.

In the 12 months, for 6 months they are able to meet their expenses through the various income sources, have a deficit for 4 months and a surplus for only 2 months. Diversifying their income pattern to include livestock as an organized source of income will lead them to generate a surplus all the year round.

In addition to agriculture and livestock related expenses, farmers bear several personal expenses in daily lives. In some specific times the expenses become very high for them. Those expenses include these:

- Due to marriages (especially daughter) or in marriage season to attend marriage ceremony of relatives
- During winter & rainy season as family member as well as livestock are vulnerable to diseases mostly in these seasons
- In case of any serious illness of family members.

Pictures given below represent the maps drawn during the FGD on agriculture & livestock income, expense and rainfall.



**Figure 14: Income-expenditure and rainfall patter of Kharura village in Harnaut, Nalanda, Bihar, India**



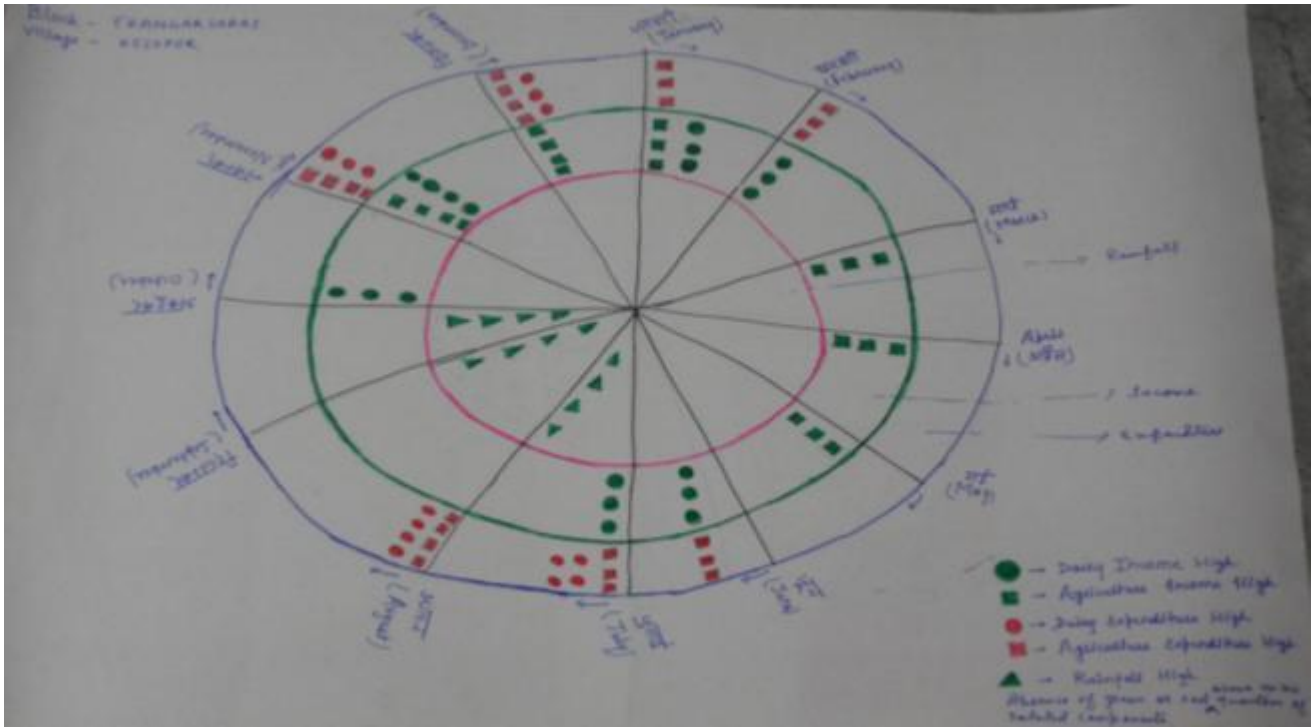


Figure 15: Income-expenditure and rainfall patter of Mushari village in Harnaut, Nalanda, Bihar, India

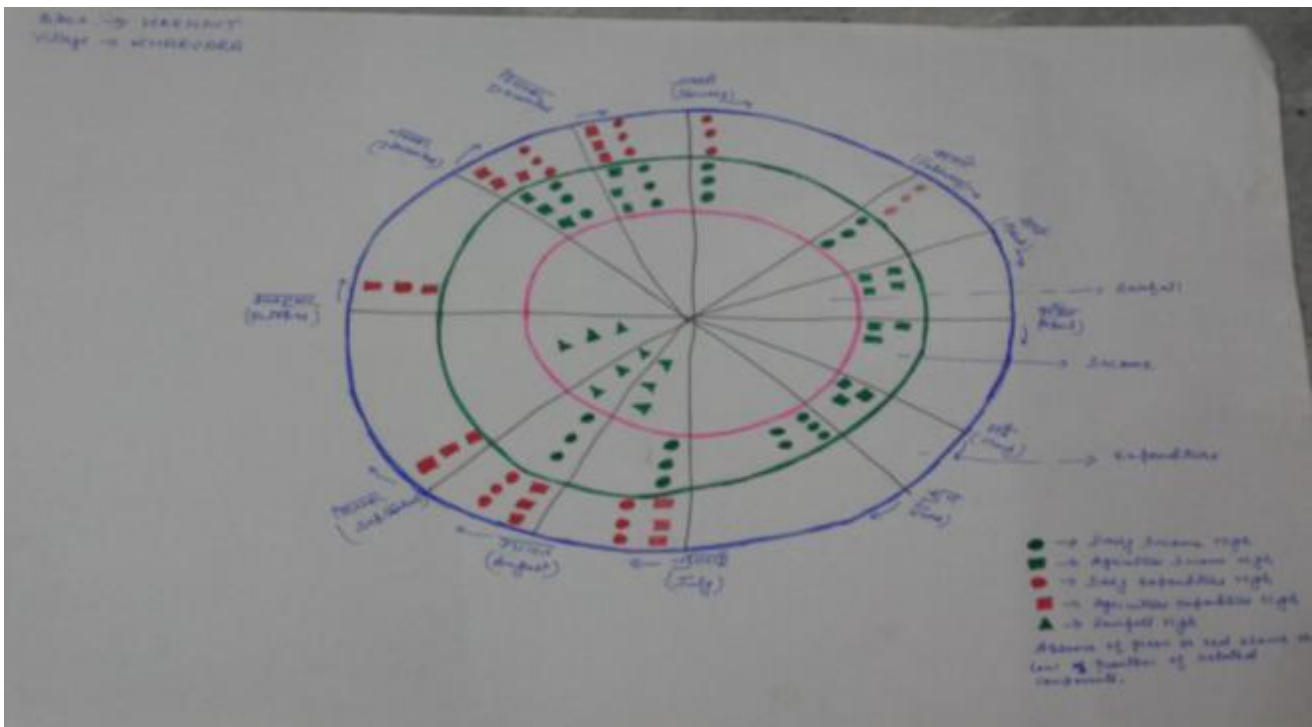


Figure 16: Income-expenditure and rainfall patter of Mahamadpur village in Ekangarsarai, Nalanda, Bihar, India



Figure 17: Income-expenditure and rainfall patter of Kesopur village in Ekangarsarai, Nalanda, Bihar, India

### 3.1.2 Seasonal Calendar

Seasonality study captures the distinctive variances in the pattern of any activity owing to their seasonal nature yearlong because of various determinist factors. In context of dairy farming also such an assessment assumes importance and dairying is largely influenced by seasonality along with other factors pertaining to health, market and production dynamics. Keeping this in view, seasonality calendar for each village was drawn highlighting production and demand of cow and buffalo milk along with participation of men and women in the various rearing practices and processes. It was found that productivity of cow for milk was higher from February to June whereas for buffalo high productivity seasons were from May to November. Thus even two cattle types were influenced by seasonality in terms of production and productivity.

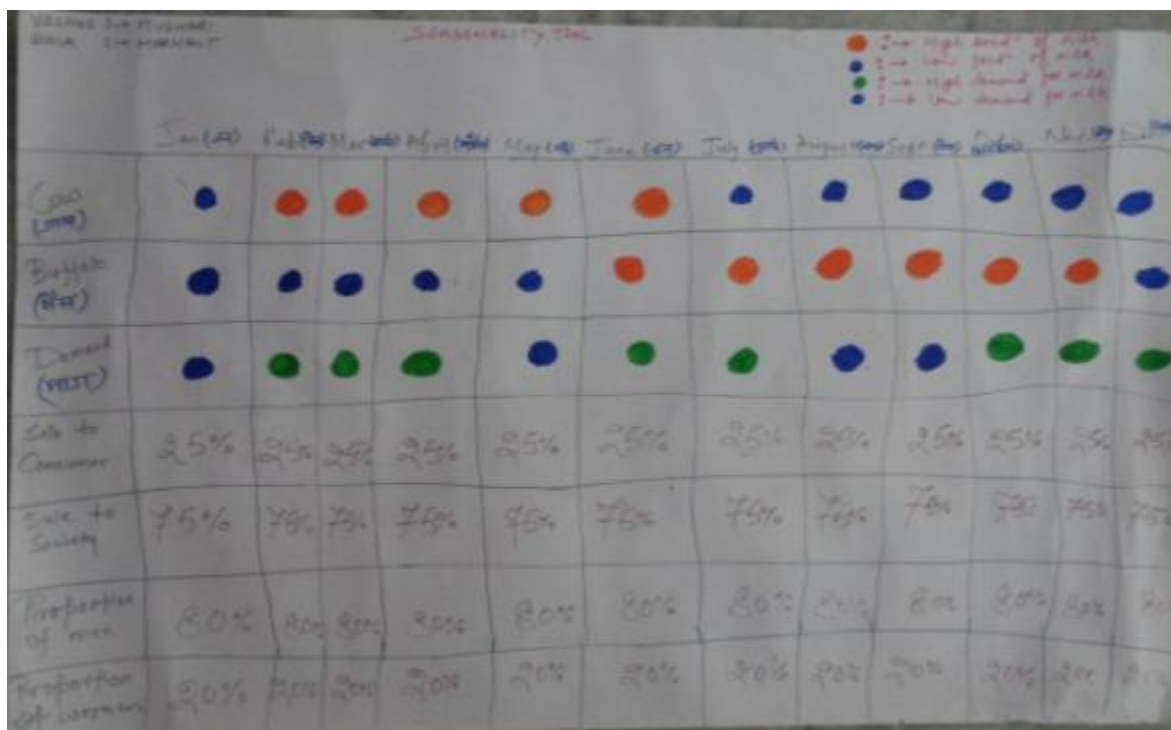


Figure 18: Seasonality map of Village-Mushari, block-Harnaut, dist-Nalanda, Bihar, India

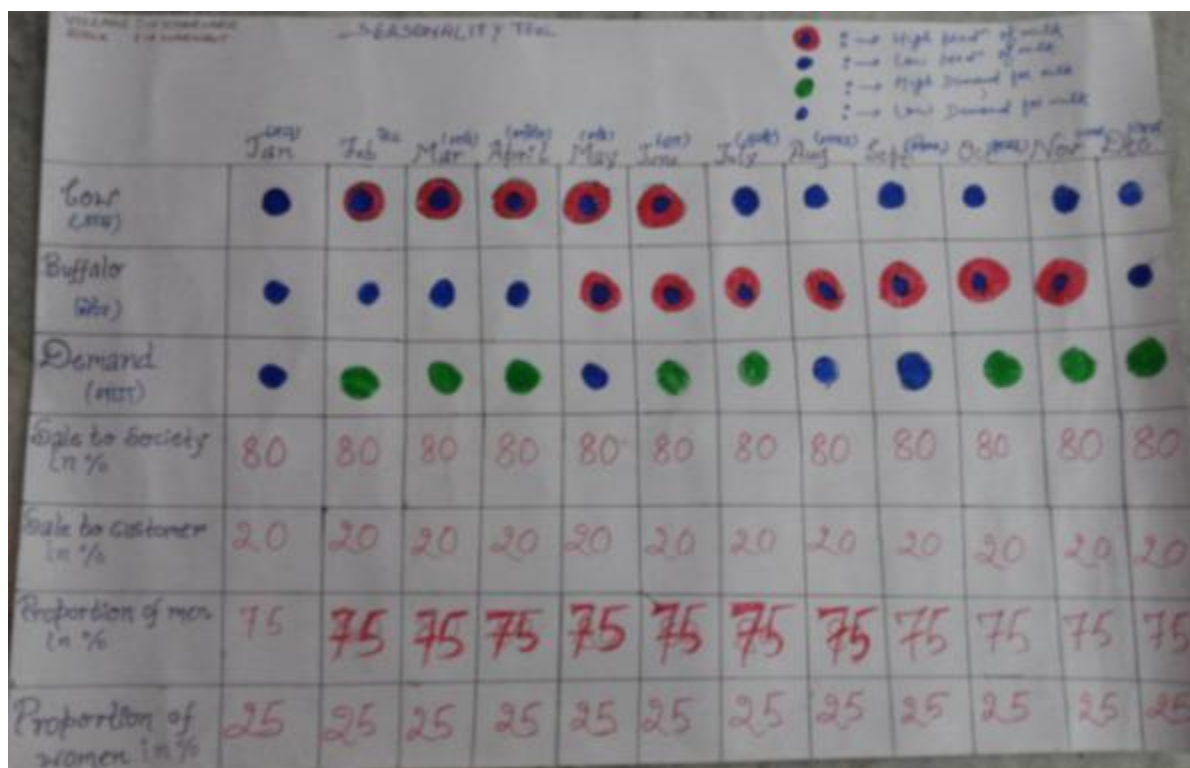


Figure 19: Seasonality map of Village-Kharuwar, block-Harnaut, dist-Nalanda, Bihar, India

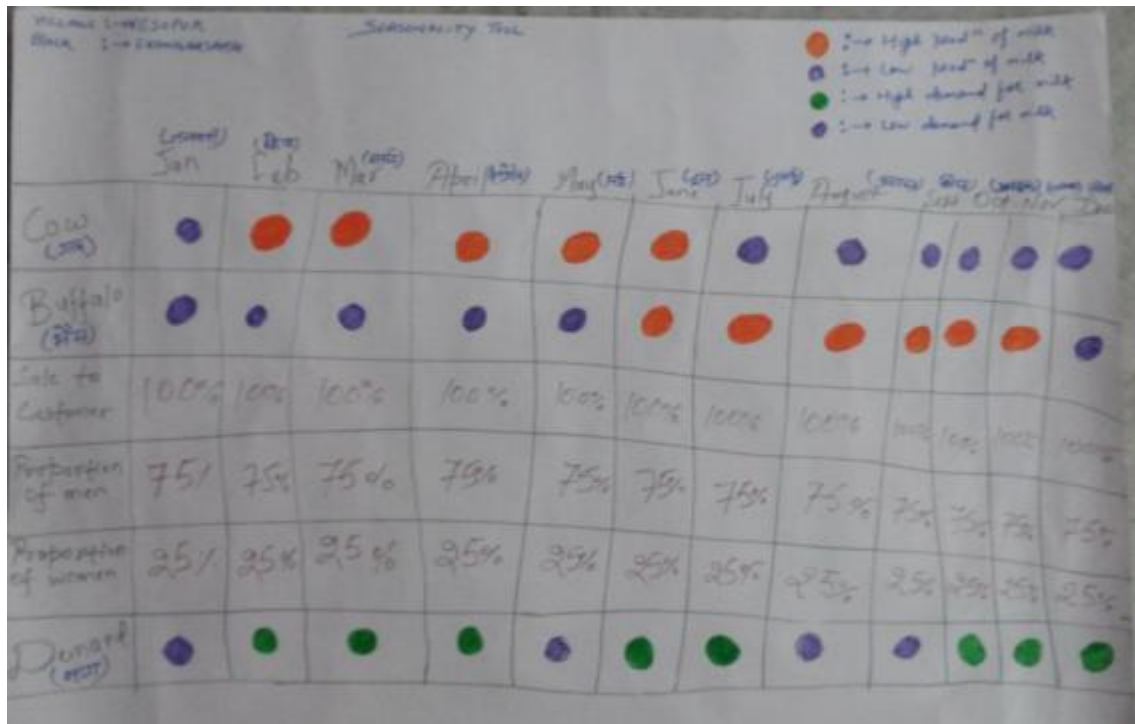


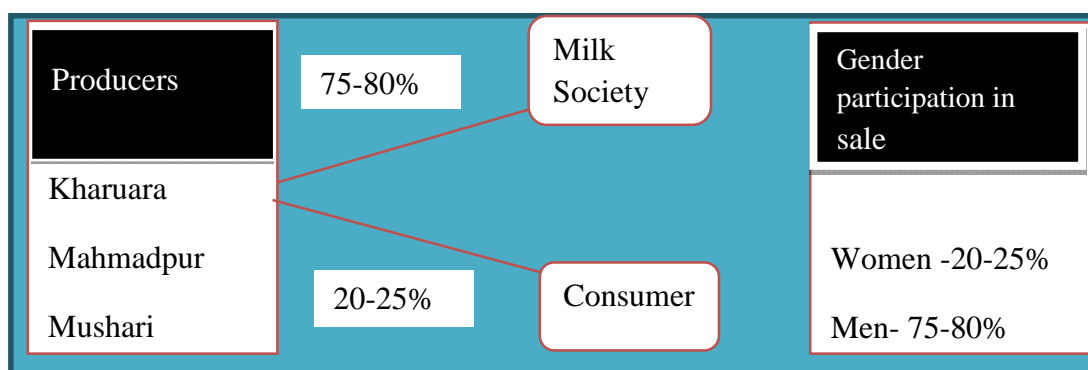
Figure 20: Seasonality map of Village-Kesopur, block-Ekangarsarai, dist-Nalanda, Bihar, India



Figure 21: Seasonality map of Village-Mahammadpur, block-Ekangarsarai, dist-Nalanda, Bihar, India



For milk there is a pull demand in the market for both cow's as well as buffalo's. It has also been found to be consistently high throughout the year except few months viz. January, May, August and September. The demand remains high in the seasons shown in picture above due to wedding season and festive seasons as milk products are used extensively in these seasons.



In villages, producers sell their produce largely to Milk Society and also to consumers but in lesser degree since in villages most of the households rear livestock, and hence they do not buy milk from outside.

Women participation in selling milk in both channels (to Milk Society & to consumer) is as low as 20-25% as shown in the illustration above. During discussion it was found that women do not get time from household work to go for selling milk. Also selling milk by women is not appreciative in society due to cultural reason which makes the selling process difficult for women. Apart from this, transportation of milk is another reason as the collection center for milk/Milk Societies are typically in range of 2-4 km, and hence transporting milk manually on head/by hand without any vehicular system becomes a challenge for women.

### **3.1.3 Findings on Gender roles in production and marketing of dairy value chain**

It was observed that participation in the Focus Group Discussions was dominated by women in all the four villages being present in greater number in comparison to their male counterparts. During discussion, they showed good enthusiasm and were taking keen interest in dairy development planning elaborating their involvement in dairy related activities. When asked about the level of involvement and decision making regarding different aspects of livestock rearing, it was found out that though women were involved in livestock rearing process with significant contribution to it, their say in decision making was very limited. The gender clocks given below give a comparative presentation of male and female daily work routine and their engagement in livestock rearing process on day to day basis.



Figure 22: Activity clock of men and women in villages- Kesopur and Mushari

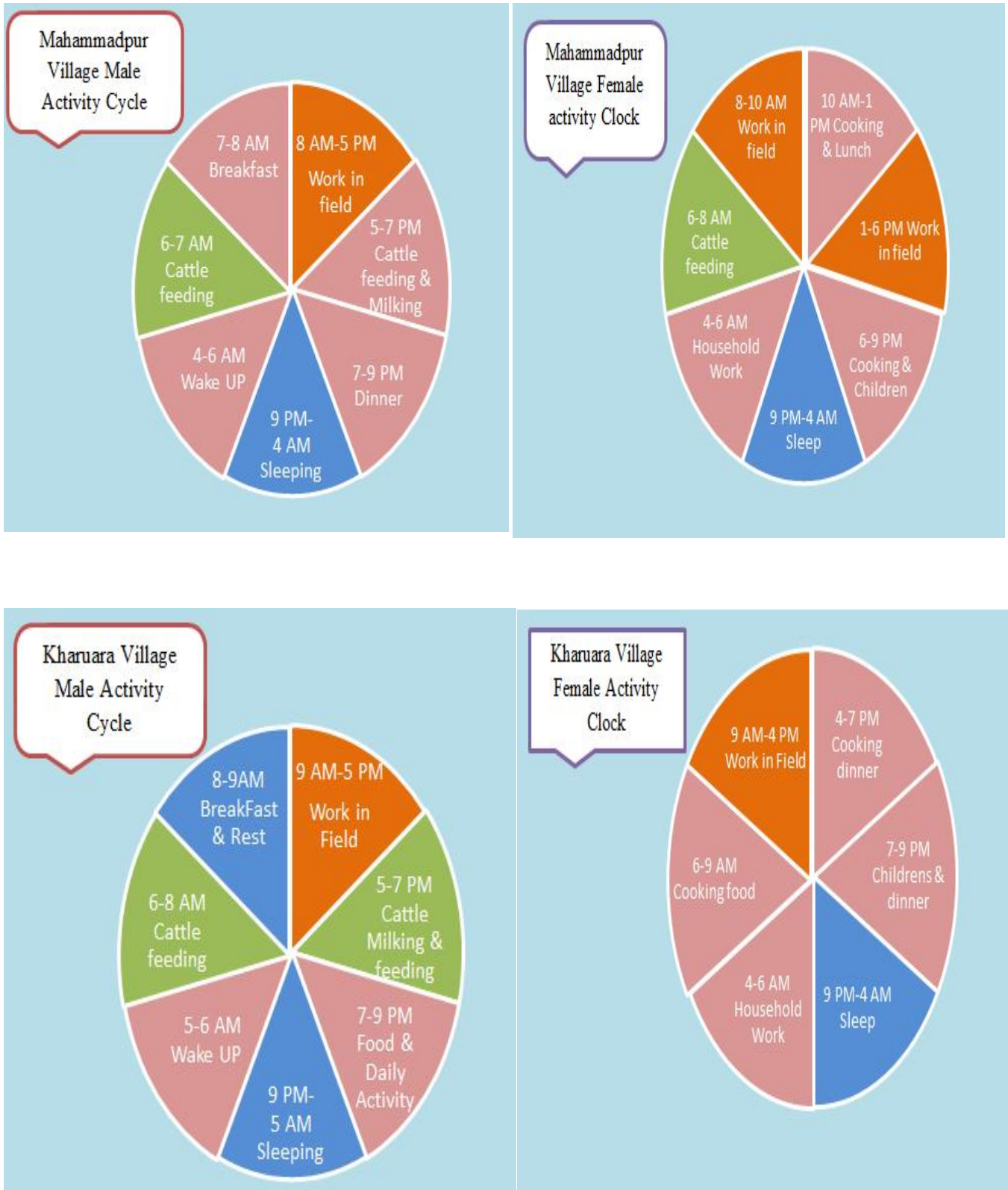


Figure 23: Activity clock of men and women in villages- Mahammadpur and Kharuara

From the charts exhibited above, it can be referred that men and women both participate in the dairy related day to day operations. Men mostly take care of grazing, feeding, bathing and milking process. Whereas women mostly participate in the feeding and looking after the cattle in absence of men like making dung cake and cooking the feed for livestock . In fact it is found that involvement of women is significant in most of the villages. Except Kharuara, where women are much not involved in rearing process, in all other three villages they take care of cattle for feeding or general look-after contributing significantly and equally vis-a-vis to their male counterparts.

Men in Kesopur village spend 9 hours in field for crop cultivation and 2 hours in livestock farming practices whereas women spend 4 hours in cattle rearing activities, and do not much work in the field.

Men and Women, both are involved in field work as well as cattle rearing activities in Mahammadpur.

Illustrations given above highlight the hourly breakup of the daily activities in which the villagers of this region involve themselves.

Chart given below summarizes the time spent by both men and women upon these activities:



**Figure 24: Time invested by men and women in livestock farming**



It can be seen that field work takes most of their working hours, and livestock practice are dedicated less than half the time spent in field work for crop cultivation.

Though the involvement of women in livestock rearing is significant, their say in decision making is quite negligible. In the table given below, summarizing the results from the specific questions asked on decision making process, it is clear that men mostly dominate in the decision making process. Except in Kesopur village, in rest of the three village's women participation in decision making process is very marginal. The decision making happens at the end of male heads of the households who take all decisions. In Kesopur village female participation in the decision making process was better. Here male and female discuss about livestock practices, and women give their opinions due to their high involvement in livestock related activities. Their opinion is taken into account. Table given below gives summarizes the facets of decision making process in villages.

## Decision Making

Table 5- Decision making in livestock farming by men and women

Name of village	Selecting a breed	Feeding	Where to sell milk	Controlling proceeds from sales of milk	Decision making process	Trend change over last five years and why	Scope for change in future and under what circumstances
<b>Kharuara</b>	Male	Male	Male	Jointly	Men & women both discuss and decisions are taken by head of the family, who are mostly men, with consent of family. Except the feed related decision which is taken by men alone as they are more exposed to market.	Nowadays women are more engaged in discussion and decision making due to pressure to get more income and their participation has increased. In selling of milk to some extent whereas in buying feed men still take decisions on their own.	Changes can happen further with increasing women participation as they want to get more control over business practices to increase profitability.
<b>Mushari</b>	Male	Male	Male	Male	Decisions are taken by male members solely.	There has not been much change in the decision making process. Earlier also male were dominant in decision making	Profitability is here also an incentivizing factor for catalysing better participation of women
<b>Mahammadpur</b>	Jointly	Jointly	Male	Mostly men few women	In all three cases decisions are taken with family consent except for feed which is taken by men as they are exposed to market	Earlier decisions were taken by men only but lately women participation has increased due to their increasing interest and awareness for income. Another reason is that earlier women were more confined to their homes and were not exposed to market. Now since women are getting exposure and involvement, it is leading to their increased participation in decision making.	Women were found to be desirous to have a greater say in decision making as many a times they found men too busy with crop production to justifiably dedicate time for dairying.

<b>Kesopur</b>	Male	Male	Male	Mostly men few women	Decisions are taken by male members solely except in case of controlling sales proceeds wherein women are also involved.	There has not been one significant change in the decision making in the selling of milk where women are now being more involved in selling of milk which has increased their say in decision making.	Women showed willingness to exercise increased participation if they are trained and made aware about the business and market dynamics.
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As seen above, in all the villages, all the important decisions are mostly taken by men - like those regarding livestock breed selection, feed selection and market participation where the output would be sold. Another interesting observation is that the proceeds from the sales are mainly controlled by the male members of the family in most of the surveyed villages. One of the reasons for this could be the gender-wise fragmented nature of dairy market practices which constrict women participation particularly in the supply chain.

### **3.2 Findings on Group Membership and Collective Action**

It was found in the FGD and PRA activities that there were some people's institutions already existing at the grassroots in the forms of SHGs, VOs, Milk Societies and FPCs. It is a widely accepted truth that such institutions play a great role in empowerment of the poor before they can be streamlined into market to participate particularly in current economic trends of capitalism and neo-liberalism. All the villages had some form of institutional support structure in which the participants of FGD also had memberships.

Inclusion in such organizations and institutional arrangements not only provide economic benefits in terms of credit support and entrepreneurial support but also enhances social capital empowering and capacitating the members through trainings and knowledge dissemination. The table given below summarizes the figures of percentage of participants in different institutional arrangements as given below:

**Table 6- Institutional arrangements and social capital built in villages**

	<b>KHARUARA</b>	<b>MAHMADPUR</b>	<b>MUSHARI</b>	<b>KESOPUR</b>
<b>Milk Society</b>	46	0	0	0
<b>FPC</b>	23	17	0	0
<b>SHG</b>	27	26	34	3
<b>Total</b>		<b>176</b>		

Out of total 299 participant farmers, we found that 176 were already members of these social institutions which is around 58.9% of total participants.

Milk Societies of TIMUL-Sudha have paved a way for small producers to sell their milk at village level increasing the market scope for even small producers. Not only marketing is facilitated but these Milk Societies also provide cattle feed of brand Sudha Dana which is better in quality than those procured from open market in unbranded and unpackaged forms. Being located at the village level, they also reduce drudgery and transportation costs.

Farmer Producer Company (FPC) provides a range of services to its members ranging from collective marketing of produce to collective purchasing of inputs and even support in capacity building and training through demonstration and exposure visits etc. These package of services availed in FPCs go a long way in empowerment of members on a whole enabling them to make informed decisions.

SHGs are social institutions mobilizing credit from the members also linking them to Government institutional support services like subsidized credit and others.

### 3.3 The reasons for keeping livestock

It was found out that dairying served multiple purposes which are listed as given below:-

- ✓ The primary reason was that it acted as a source of income.
- ✓ Additionally, it helped them improve the health of their family members due to influx of daily milk for their children.
- ✓ Byproducts such as cow dung were a resource which could be used as fuel for cooking as well as manure for crops in fields.
- ✓ Cow is also worshipped in Indian culture, so having a cow especially of indigenous breed was also one reason on cultural grounds.
- ✓ Like agriculture it also requires too much of labor and resources but entails relatively less uncertainty than agriculture.

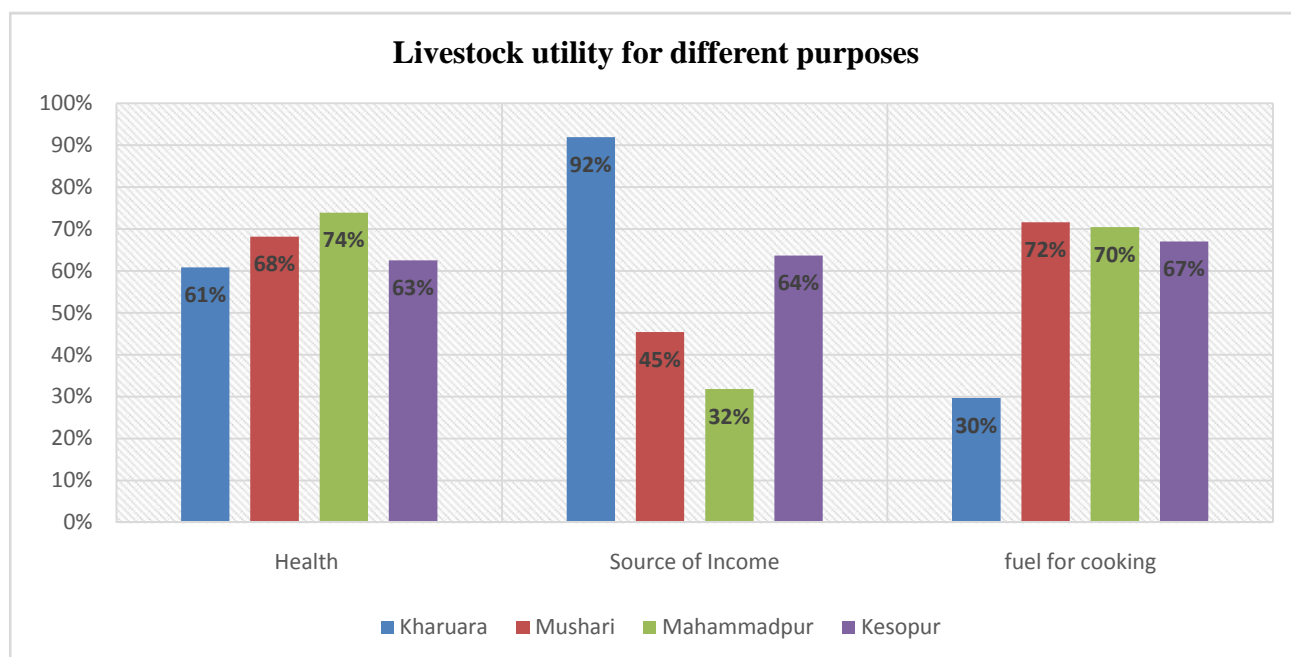


Figure 25: Comparative chart of livestock utility for different purposes

Both for men and women the three major reasons as shown in the chart above were purposeful for keeping livestock. Very few villagers keep goats and hen. When asked about whether they think they achieved the purposes in last 2 years -the answers were different for different villages and varied for purposes as well in degrees. Most of the participants agreed that though their household consumption needs and health requirements are met from current dairy system but income was not found to be satisfactorily as per investment. Also many times they observed a trade-off between health and income choices due to limited production. It was found that illness in their homes had decreased relatively due to dairying which resulted in milk availability for household consumption. In income benefits, it had also increased savings in banks along with providing for sending children to good schools. In fuel requirements also for cooking, consistent availability of dung cake was identified as an incentivizing indicator.

Data tabulated below shows that farmers receive both health and income benefits from adopting the dairy farming. It reduces their dependency on incomes from rainfed agriculture and provide nutritional benefits with milk availability. Constraints were also asked and listed for not being able to meet the objectives completely. Major constraints for realizing each of the purposes are listed below.

**Table 7- Constraints to achieve purposes of keeping livestock**

Determinant	Specific reasons
<b>Health</b>	Lack of doctor Not enough amount of milk and nutritious food due to less number of cattle
<b>Income</b>	Due to lack of information for increasing productivity Lack of proper feed and expense on feed and health services of livestock
<b>Fuel for cooking</b>	Less number of cow/buffalo

Constraints were same for men and women in case of health and income, but in case of fuel for cooking mostly women affirmed their need and constraint.

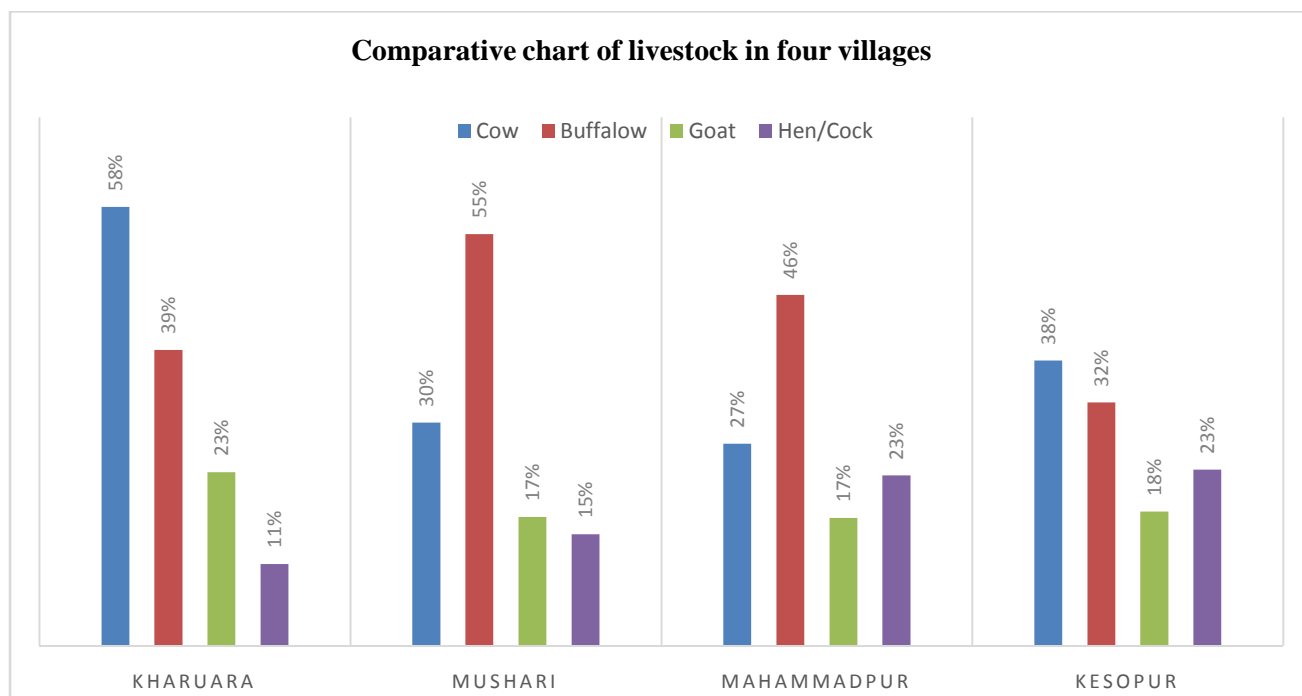
### **3.4 Livelihoods Analysis**

The four villages have been found to be where agriculture and allied activities are prime sources of livelihood. It was found from the FGD that men and women both are involved in the production of crops. It was also found that producers intend to and use the crop and its residue for food, cash and livestock feed. Major crops grown in four villages are listed in table below.

**Table 8- Major crops grown in villages**

Name of Village	Name of major crops grown
<b>Kharuara</b>	Rice, Wheat, vegetable
<b>Mushari</b>	Rice, wheat, pulses, vegetable
<b>Mahammadpur</b>	Rice, wheat , vegetable, gram
<b>Kesopur</b>	Rice, wheat, maize, gram, vegetable

In the villages, villagers reared livestock among which buffalo, cow, goat and hen/cock were main livestock reared by farmers. The chart given below shows the percentage of farmers rearing the livestock. In all the four villages, growers rear cow, buffalo, goat and hen. Majority of farmer rear cows in Harnaut block whereas buffalo is reared more in Ekangarsarai block.



**Figure 26: Comparative chart of livestock in four villages**

Though crop production is prime livelihood activity, the sources of incomes are not limited to it. Other sources of incomes for villagers are livestock, labor work and work in public/private jobs. Both men and women in all four villages get involved to generate income in all of the four categories. It was asked to them to rate these four avenues in order of importance with 1 being the most important and 4 being the least of them. It was crucial to find out that most of them across the villages barring Kesopur rated agriculture as their most important avenue (considering all the risk associated discussed above). Livestock though was a very important part, its importance towards income was rated low among all the villages. Wage labor is another important source of income followed by service/job in public or private. Given below is the data pertaining to these livelihood activities in all the four villages. As seen in the chart, the results can be either attributed to their traditional mindset or the proceeds they receive from the sales of a good harvest are more widespread than other avenues and help them build a corpus. From discussions it also came up that there has been change in the way incomes were perceived and received from all four components. It was found that mostly the change has been between the livestock and labor.

When asked if they hire labor for the production of crop, the response was as recorded as below:

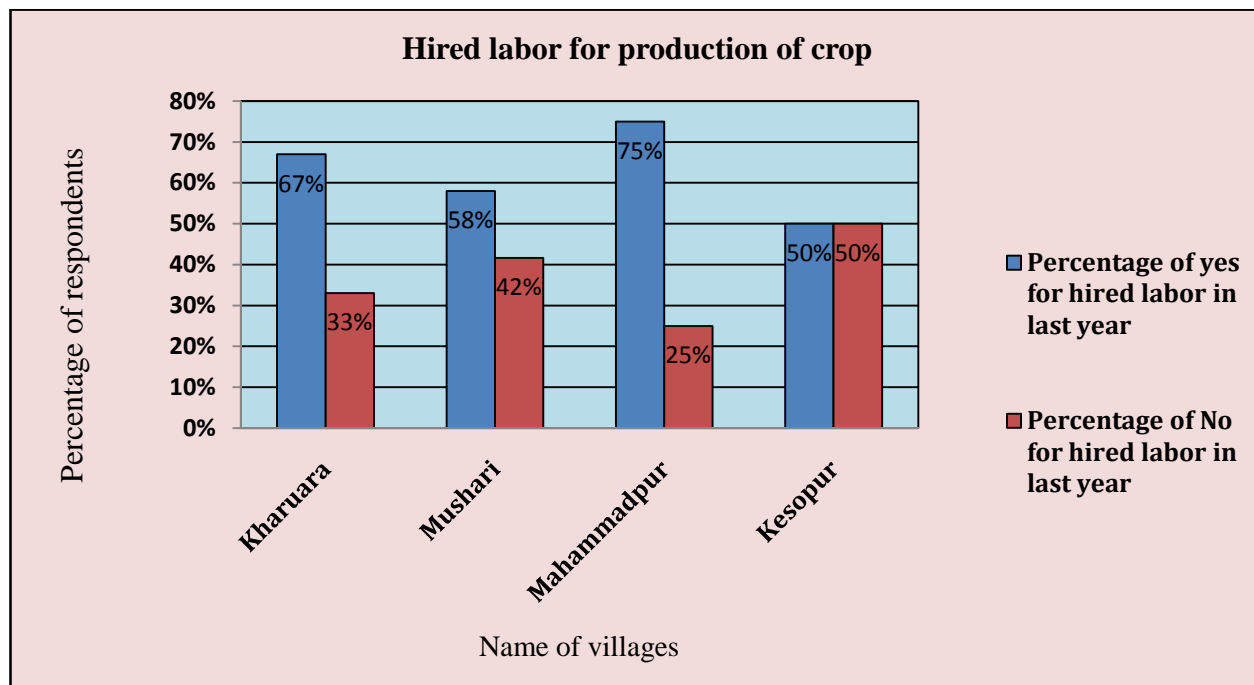


Figure 27: Distribution of Hired labor

As seen from above, more number of people hire labour for agriculture. It again is an indicator of the increasing standard of livelihood achieved by farmers of these regions. In three villages, majority of farmers hire labor for farm activities while the ratio is equal in the fourth village. It can be said that the proceeds from agriculture is relatively higher than other avenues, and it is able to meet the needs of farmers to provide for the hired labor. It shows that that agriculture is more widely practiced in the area.

Livelihood analysis of the people of these villages won't be complete unless we see how they actually spend their time or manage their time across different activities that they take up. This analysis is taken from the section of time clock and signifies that men spend 7-8 hours daily in agriculture activities and 3-5 hours in livestock. Women on the other hand work lesser in the field and look after the household chores more while spending 2-4 hours every day in livestock related work.

### Engagement in the agriculture activity

Agriculture being the prime livelihood activity keeps farmers engaged throughout the year which is evident from the table shown below, as farmers grow crops in all three cropping seasons. Table given below shows the activities undertaken by farmers throughout the year for major four crops.



Table 9- Agriculture activity and engagement of producers

Mahammadpur													
Crop Name	Activities	Month of the year											
		Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec
Paddy, Wheat, Lentil, Onion	Irrigation/land preparation												
	Sowing												
	weeding												
	Pesticides Spray/ Fertilizer												
	Harvesting												
Kesopur													
Crop Name	Activities	Month of the year											
		Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec
Paddy, Wheat, pulse, Chana	Irrigation/land preparation												
	Sowing												
	Ropani												
	Weeding												
	Pesticides Spray/ Fertilizer												
Harvesting													
Mushari													
Crop Name	Activities	Month of the year											
		Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec
Paddy, Wheat, lentil, Gram	Irrigation/land preparation												
	Sowing												
	Ropani												
	Weeding												
	Pesticides Spray/ Fertilizer												
Harvesting													
Kharuara													
Crop Name	Activities	Month of the year											
		Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec
Paddy, Wheat, Masoor, chana	Irrigation(Jutai)												
	Sowing												
	Ropani												
	Nikoni												
	Pesticides Spray/ Fertilizer												
Harvesting													

	Irrigation/Jutai
	Sowing
	Ropani
	Nikoni
	Pesticides/Fertilizer
	Harvesting/Todai

### **Proportion of labor hired for agriculture and livestock activities**

During discussions, it came out that in all the four villages, labor are hired for agriculture activities for crop production. In agriculture activity in all the crop seasons, men and women both are hired as labors though proportion of hiring of men and women depends on the crop. For example in paddy production proportion of women labor are higher whereas in wheat its men who are required and hired as a labor in greater numbers. In livestock, villagers hire labor in very smaller number, and very few hire labor as most of them look after the animals themselves with household members. Either the big livestock farmers hire labor or the cow/buffalo is rented to someone on the agreed returns in terms of milk or money.

### **3.5 Value Chain mapping with producers, including details of value chain actors**

Value chain encompasses the full range of activities and services required to bring the produce from farms to sale in its final markets – whether at the local or national level. The framework of a value chain includes all the stakeholders in the chain.

As observed by the farmers there in four villages, the dairy value chain consists of

1. Cattle market
2. Cattle feed market
3. Producers in the four villages
4. Consumers
5. Traders/ village level collectors (*Trader*)
6. Milk Society(such as Mahila Doodh Utpadan Sangh),
7. Sweet shops
8. Cream separator
9. Milk collection and chilling centres
10. Milk Processing Plant
11. Retailers
12. Transportation Channel
13. Credit Providers
14. Veterinary Doctors

The value chain mapping in the four villages gave a broad sense of value chain which is shown in the illustration given below.

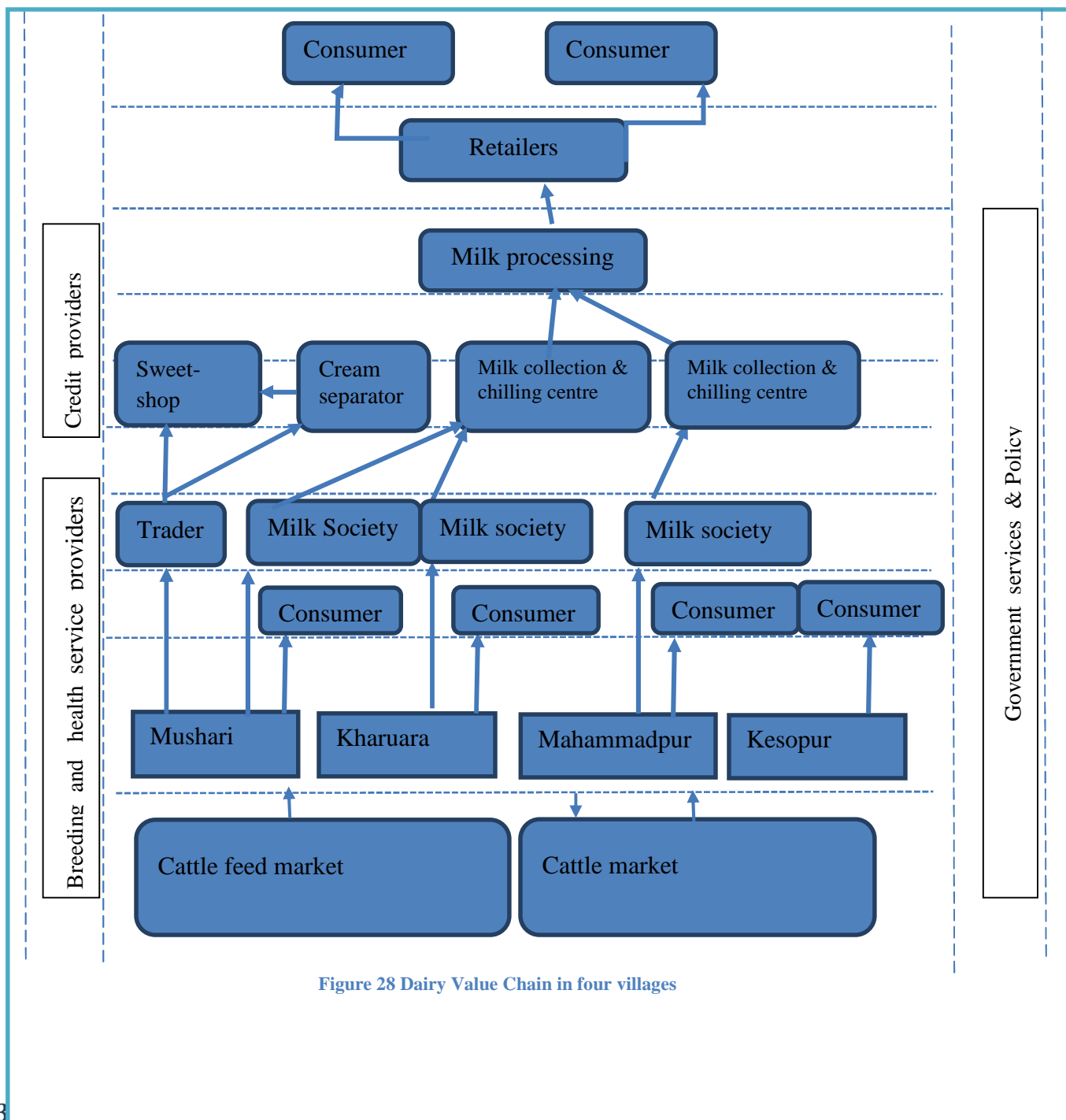


Figure 28 Dairy Value Chain in four villages

Cattle market: It comprises intra-village and inter-village marketers of cattle breeds. They are also found in market fairs “*mela*” periodically organized in and around the villages.

Cattle feed market: It comprises of retailers and distributors of both packaged and unpackaged, and branded and non-branded cattle feed including green fodder (like *brasim* grass) grains and supplements/concentrates. Kapila Pashu Ahar, Neel Kanth, Sudha Dana are packaged feed brands available in the market. Farmers also use green fodder like *brasim* grass and dry fodder of crop residues which are also sold in the market.

Producers in the four villages: They are the livestock farmers who rear livestock for both household consumption and/or business purpose.

Consumers: They are the end consumers including villagers of the respective villages. They are both at the village level from where milk is produced and also at the end markets where milk and its products reach through Milk Societies like in cities.

Traders/ village level collectors: They are the mobile milk collectors at village level who reach individual households of livestock farmers to amass a lot size so as to accomplish economies of scale for selling milk.

Milk Society: These Milk Societies act as a hub between the farmers and processing plants. One such society is *Mahila Doodh Utpadan Sangh* in one of the villages. They play several roles to add value to the produce such as providing input on what kind of feeds to use for their livestock. They even help them get the right service for their livestock such as breeding and health services. They charge no commission from farmers, and have empowered the farmers by bridging the gap between the farmer and market.

Sweet shops: They can be categorized as processors of milk and cream both as these ingredients are used in the products they sell. They procure milk and cream from both traders and cream separators.

Cream Separators: They are at the level of primary processing of milk, and skim out cream from milk for various uses. They sell cream to mostly sweet shops in the nearby village/block level markets.

Milk Collection and chilling centers: They are the collection points of milk aggregated from various Milk Societies of TIMUL-Sudha.

Milk Processing Plant: This is the main processing plant where milk is pasteurized and also converted. A total of 12 staff members work there among which 6 of them work in plant operations. The capacity of the plant is 13,000 liters, and it procures milk from almost 160-162 Milk Societies paying them within 10 days of procurement directly to their bank accounts.

Retailers: They are the terminal market ends situated at block and district level markets for selling packaged milk and milk products.

Transportation Channel: As most of the consumers are from the villages or and even the village level collectors/traders and Milk Society is in or nearby village, producers mostly do not bear any

transportation cost. Other chain actors use bicycle, animal carts, motorbike and small vehicles as per requirements.

Credit Providers: They include both institutional sources of credit from either Government banks or social institutions of the villagers in the form of SHGs etc and also non-institutional sources like those realized from money-lenders and between the Chain Actors like credit relationship between cream separators and sweet shops etc.

Veterinary Doctors: These doctors provide the critical services in health like vaccination, breeding and general medical care for the livestock required by the farmers.

The FGD on Value Chain assessment with producers covered a wide range of questions. In coming sessions the findings are listed in comparative manner.

### **3.5.2 Product Sales Channel**

Producers sell primary product of cows and buffaloes which is milk and also byproducts like dung cake while processed products like Indian butter (Desi Ghee) and offspring viz. calves can be seen as subsidiary products. For dung cake, Indian butter and calves, there are traditional channels of selling which are used to sell them. Dung cake and Indian butter are sold directly to villagers while calves are often sold through a mediator.

For milk, except in Kesopur village, where milk is produced only for household consumption, other three villages sell to consumers and Milk Society. In Mushari milk trader (village level milk collector) is another channel for selling milk. As the trader has limited capacity, and he cannot sell more volume after a certain limit due to transport barrier and cost economy. Thus, he has the limitation to supply. Due to this, instead of slightly higher demand in some months like from February to April, June to July and October to December due to marriage and festive season, he cannot sell much. Volume of production is another issue not being able to fulfill the higher demand. In Milk Society, the price realization on milk depends on the content of fat, hence it varies accordingly. It was found that women participation was very limited in selling in both the channels to Milk Society as well as to consumer, and ranged somewhere around 20-25%. Trader also reported that most of the volumes are obtained from male producers.

### **3.5.3 Price related information**

Table given below shows the prices of milk as produce in different sale channels on the day of FGD.

Table 10- Price of milk in different sale channel from FGD on the day of FGD

Trade channel	Unit used	Price on the day of FGD(Min –Max)
<b>Milk Society</b>	Price per kg	23.30 to 52
<b>Trader</b>	Price per kg	25
<b>Direct Consumer</b>	Price per kg	Rs. 28 to 32 for cow milk Rs. 35 to 40 for buffalo milk

In FGD, producers were asked to list the minimum and maximum milk prices for the different channels. The table given above consist the minimum and maximum prices taking all four villages into account. The prices between the channels vary as trader takes commission to sell milk procured from producers; hence in case of trader prices are lower. In Milk Society, payment is done on the basis of fat content in the milk. Buyers on whole generally look for the fat content, freshness, cleanliness and thickness of milk. The milk quality in sales channel where producers directly sell it to customer/consumer is not tested instrumentally, and thus their prices are not dependent on precision of fat content. Only difference comes in milk prices if it is from cow or buffalo as the latter is widely known for its higher fat content.

A comparative analysis on prices, quality communication, grading, and price realization is done in the following table.

Table 11- Comparative analysis of price, quality assessment, communication, grading and price realization

Village Name	Do buyer inform about product quality	How it is communicated	What are the grades	Do buyers pay premium for good quality	Do buyers pay lower prices for poor quality	Do buyers reject produce due to quality	Do buyers test the produce for quality attributes	Are you able to meet the quality attribute
<b>Kharuara</b>	Yes	Verbally	Listed*	No	Yes	Yes	Yes	Sometimes yes and sometimes no. Do not trust on their quality check
<b>Mushari</b>	Yes	Verbally	Listed*	No	Yes	No	Yes	Yes
<b>Mahammadpur</b>	Yes	Verbally	Listed*	No	Yes	Yes	Yes	We are not sure that the information

								given to us about fat are true so not sure
<b>Kesopur</b>	Yes	Verbally	It depends on cattle type	No	No	Sometimes	No	Not sure

In sales channel through Milk Society the collection center/society in and nearby three villages check quality of milk based on presence of fat in milk. The quality check is done by using lactometer and prices are paid accordingly (List of prices on the basis of fat quantum is listed below). The quality check criteria and mechanism is same in all the villages and has been set by COMFED in villages. The prices are lower in case of poor quality but premium is not paid for good quality of milk. Producers in Mahmmadpur and Kharuara showed their doubt on the testing and evaluation process for quality checking of milk using lactometre. They said they they are probably not communicated the right result which debars them from realizing right prices.

The table given below is price checklist provided by the Milk Society for pricing milk according to fat content as procured from the producers.

**Table 12- Price chart based on fat content**

Fat content range	Price
<b>3.0-3.2</b>	23.29
<b>3.3-3.5</b>	24.3
<b>3.6-3.8</b>	24.77
<b>3.9-4.1</b>	25.5
<b>4.2-4.4</b>	26.4
<b>4.5-4.7</b>	26.98
<b>4.8-5.0</b>	27.72
<b>5.1-5.2</b>	28.45
<b>5.5-5.7</b>	30.3
<b>5.8-5.10</b>	30.95
<b>5.11-5.13</b>	31.6



### **3.5.4 Payment mechanism**

In sales channel of direct selling to consumers, producers get payment on monthly basis. The buyer gives advances to producers depending on their relation with producers, and it also depends on the willingness of the buyer to give advance to producer. Majority of customers are fixed in this case, and customer and producers share long term relationship. The whole transaction and system works on verbal agreement, and no contract is made in this case but records are maintained for calculation purpose at producer end.

In sales channel of Milk Society, payment is either done in 10 days or 30 days. Generally the payment is made on 30 days but if producer wants payment in 10 days the Milk Society provides it accordingly. Payment is done in cash. On demand, due to provision for credit, the secretary of Milk Society also gives advances to producers depending on the goodwill and trust relation between the secretary and the producer. In Milk Society, another check off arrangement is there for producer, and it is leveraged by producers. They sell milk to Milk Society, and buy branded packaged feed Sudha Dana for livestock and payments are adjusted for these transactions. Producer and Milk Society share long term relation with each other. There is no formal arrangement for selling milk to Milk Society on quality or quantity criteria but verbally it is agreed by producers, and again it's a trust factor.

### **3.5.5 Transportation**

In case of sale channel of milk directly to customers- they come to take milk from producer. The customer takes milk from producer who lives in their neighborhood, so no transportation is required.

In case of transportation of milk to Milk Society, producers in all the three villages have to travel on foot for 15-20 minutes which is quite convenient for them and was not problematic. They said it is because the volume of milk is not so large; it does not become too heavy. Also since Milk Society is near, no loss occurs during transportation.

It was also found that once producer decides to sell products, it takes 1 to 2 days to find buyer for milk, dung cake, and Indian butter. Only in case of calves it takes 5 to 7 days to find an appropriate buyer. The proceeds received from selling products like milk, dung cake, calves and Indian utter becomes the part of household expenses, and it is not planned for any specific activity or purpose. It came up during discussion that dedicating the proceeds from sale to some purpose like education or marriage will be much more beneficial. Uses of proceeds received from the sale of products differ for men and women. Women use money mostly for saving and for ceremonies especially marriage of daughters and also invest in education and gold jewelry apart from contributing in other household expenses. On the other hand, men mostly use money for farming, livestock and household expenses.

### 3.5.6 Animal Health Services

Except Mahmadpur village, where only private health service providers are available, in rest three villages both private and public health service providers are available. These health service providers in case of Mahamadpur and Kharuara are available in the village or very nearby village between a range of 3-5 km. Whereas in case of Mushari and Kesopur it is far from village typically in block markets making accessibility difficult for villagers. Since government service providers are placed quite far from villages, and are not easily accessible to most of the people, they are more dependent on private service providers. Though there is high concern about quality of product and services. Private Service providers were comparatively seen as better than government product and service provider owing to their accessibility and promptness in service delivery. This situation is prevalent in three villages except Kharuara where people underlined that the health services and products of the Government to be of better quality. Affordability was the concern for villagers in all four villages, and they said the prices of animal health services and product are quite high when it comes from private service. The situations are similar for men and women both.

The animal health services required by the villagers are listed below -

1. Artificial Insemination – with good success rate,
2. Low cost medicine for cattle,
3. Trained doctors who are easily accessible.

The villagers confirmed the doctors' accessibility except in few cases where doctors do not reach because of their busy schedule, or being far from their area. It was also discussed that though the services are available but quality is poor as available doctors/ Service providers (including quacks) are not well trained and quality of product and medicines are not always good.

On the question of vaccination it was found that the proportion in which villagers vaccinate their livestock has increased significantly. It was found out that the vaccination services reportedly were largely not reliable. It was also found that in case if they do not find drug or service, they try all possible avenues and go to nearest city market like Patna and Biharsarif market for purchasing drugs.

The charges of health services provided in the four villages can be summarized as given below:

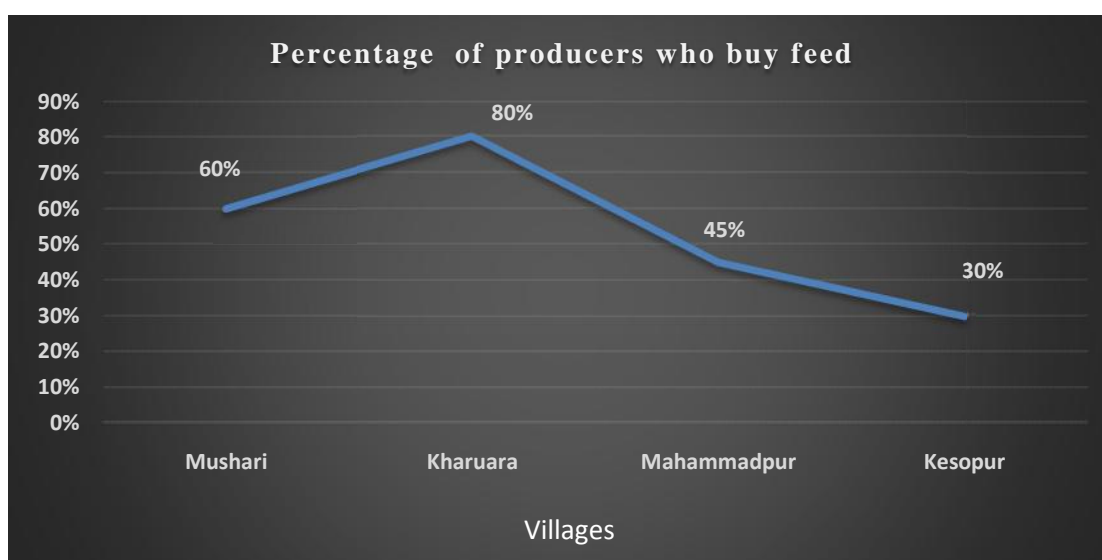
**Table 13- Fee of health service providers**

Fees per visit charged by Government doctors		
Village	Fees	Transportation charge
<b>Mushari</b>	60	40
<b>Kharaura</b>	60	40
<b>Kesopur</b>	60	40
<b>Mahammadpur</b>	60	40

Above the table shows the charges for visit of Government doctor. AI services charges differs in case of private service providers and ranges from Rs.120 to 250, and sometimes even more depending on the distance covered by the service provider.

### 3.5.7 Livestock Feed (Input and services)

In all four villages farmers buy feed depending on their need and depending if they are able to get economic value out of milk. An assessment in the FGD shows that in villages Kharuara and Mushari most of the producers buy feed whereas in other two villages, numbers of producers buying feed is relatively less. The chart given below shows the percentage of farmers buying feed.



**Figure 29: Percentage of producers who buy feed**

Prices of the feeds with unit used for transaction are listed in table below which can be studied for comparative nutritional benefits vis-à-vis cost investment

**Table 14- Price of livestock feed**

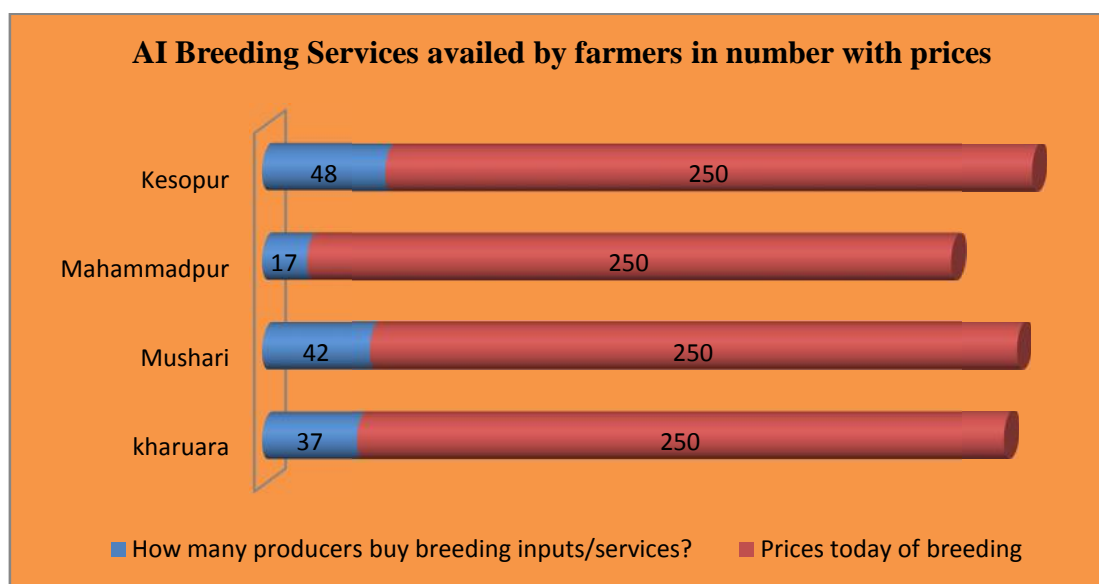
Name of the feed	Unit Used	Price per unit
<b>Barseem Grass</b>	Per Kattha (Per 1360 square feet)/ Per Kg	Rs. 1000-1200/ 150
<b>Kapila Pashu Aahar</b>	Per 50 Kg (sack of 50 Kg)	Rs. 750
<b>Broken Maize seeds</b>	Per 50 Kg (sack of 50 Kg)	Rs. 700

<b>Mustard cake</b>	Per Kg	Rs. 22-24
<b>Neelkanth dana</b>	Per sack of 50 kg	Rs. 690
<b>Kishan brand</b>	Per sack of 50 kg	Rs. 710
<b>Sudha Dana (COMFED)</b>	Per sack of 50 kg	Rs. 850
<b>Dry paddy straw (Cut)</b>	Per 40 Kg	Rs. 110
<b>Dry paddy straw</b>	Per bundle (100 in number in bundle)	Rs. 150

Typically prices remain stable except in rainy or drought season in which black marketing is a common phenomena and price gets increased significantly.

### 3.5.8 Animal breeding (inputs and services)

Animal breeding inputs and services which villagers buy are Artificial Insemination (AI) and natural bull mating services. These breeding services are availed by producers of all the four villages, and they are typically provided by bull-keepers and AI services both by government as well as private doctors. Given below is the chart obtained across the four villages in Artificial Insemination. Data shows the number of participant farmers who bought AI services and prices for the same in four villages.



**Figure 30: AI Breeding Practice and prices for AI**

Breeding services are available in typically 2-5 km range for the three villages except Kharura where AI service provider is available within the village in range of ½ km. The prices for AI services range from 100 to 150 (or more depending upon distance travelled by doctor to reach farmer) in case of private

service providers and Rs.60 to 100 for government service providers. The charges remain same for men and women.

If the doctor visits just to see animal for general check-up and not treatment of disease, the charges are typically cost of medicines for cattle and transportation expenses.

The difference between the AI service charges occurs between the government and private veterinary practitioners is due to transportation cost incurred and due to cost of semen borne in case of private service delivery. In case of Government doctors, the semen is provided by the government for free but in case of private service provider it has to be bought.

When asked whether the villagers would like to pay premium for quality in health services, in all 4 villages the groups agreed to pay it on assurance of good services.

### **3.5.9 Credit Providers**

Credit facility is available to the farmers of these villages with the *exception of Mahammadpur*. Credit facility is provided by self-help group for various purposes like procurement of feed, medicines, getting treatment for their ruminants or even for raw materials required for their crop production. The rate of interest charged is 2% monthly and the credit is quite readily available if a farmer meets the criteria. Banks also provide credit support for livestock farmers through schemes like KCC and other sub-sector specific schemes.

### **3.5.10 Information and extension services**

The sources of information for villagers in three villages are

- ✓ Neighbor
- ✓ Doctor
- ✓ Milk Society and
- ✓ Feed supplier

The information received from men and women were not different but only the quantum of information differed due to less exposure of women. In all four sources of information, those gained from neighborhood were expressed to be more reliable. In case of doctors, Milk Society and feed suppliers people thought many times information to be manipulated for their own benefit.

Information related to breed and feed is acquired by villagers from doctors, family members and neighbor. This information does not differ for men and women but only accessibility differs due to

exposure, and is less available to women. On the question of reliability, it is found that it is sometimes reliable and sometime not.

Doctor and neighbor are the one from whom villagers gets information about animal health, and it remains same for men and women as in case of breed and feed.

### **3.6 Marketing of Ruminants and their products**

Marketing is an essential component in the whole value chain analysis of a product, and it does add value to the product and provides a platform for the product to reach its end consumer. But things are a bit different in the distant villages of Bihar and in particular for products of livestock which are more of a necessity for the populace of these villages rather than being only a marketable commodity.

Price and Quality are the drivers of sales of these products. For example, the response of the farmers reveals following about the sales of milk:-

- ✓ Demand of milk is very stable, i.e. in the range of 90%-80% irrespective of the season of high demand or low.
- ✓ Prices were found to be dependent on the fat content of the milk ranging anywhere between Rs 23.30- Rs 52 per liter throughout the last 12 months.
- ✓ Most of the buyers are sensitive about the quality of the milk which is indicated by the fat content and freshness in the milk.
- ✓ This makes fat content a price driver, i.e. low fat content can reduce the price, and a higher content can fetch a higher price.
- ✓ It was also found out that farmers do sell their produce on credit for a period of 15 to 30 days,
- ✓ Absence of any contract or agreement between the seller and buyer does leave them sometimes vulnerable to malpractices.

### **3.7 Findings on participatory epidemiology with producers**

Animal diseases continue to inflict considerable economic losses on all livestock-owning households, particularly the poor and marginal farming community. Losses arise through high levels of animal morbidity, mortality, declines in production levels, reduced fertility and inefficient feed conversion resulting in poor weight gain. Many diseases were reported by the groups which inflict animals. Following are some of the major diseases listed by the group members in order to their occurrence from higher to lower.

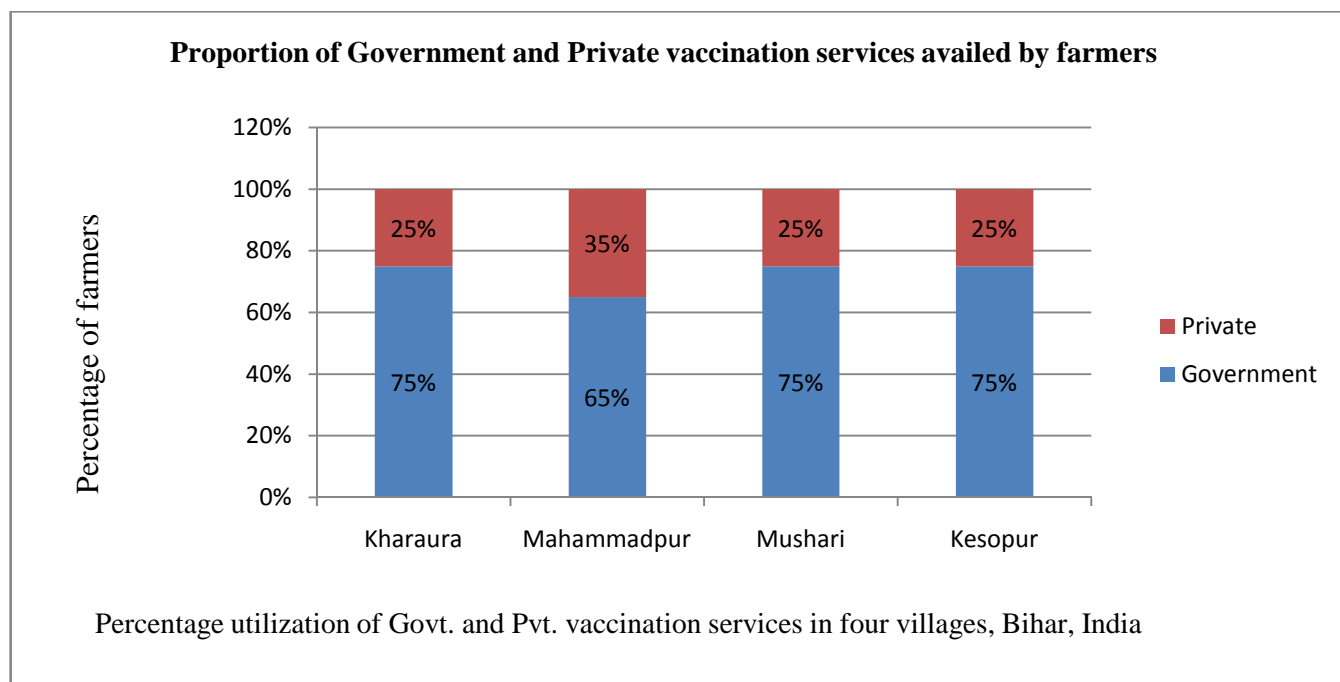
1. *Asari*
2. SARA
3. Food and Mouth disease
4. Diarrhea
5. *Galaghot*
6. Cold and cough

*Asari* & SARA are the usual diseases which affect most of the animal. Foot and mouth disease (FMD) in crossbred animals is very damaging in addition to other health problems that can kill animals. Poor veterinary knowledge and services as well as wrong prescriptions for medicines, antibiotics and hormones are widespread as producers accepted that many a times the animal dies after treatment.

Though the quality of services delivered are doubtful, producers are able to access the health services with problem of delayed service delivery and high cost. The condition is same for men and women. When asked about knowledge and reliability on drugs and vaccines, most of the producers were not aware of the names, and said they follow the doctors' instruction for using drug or vaccine.

In terms of vaccination services, it was found that the Government provides this facility free of cost at the block level veterinary clinics. Mostly the vaccination is done during the rainy season. Usually five to six junior level paramedical veterinary vaccination experts of the concerned Government line department provide this service on the spot at block level. In case some farmers report at the block level veterinary clinic, the experts themselves reach at the farm gate for vaccination but charging Rs 2 to 4 for each cattle. A vaccination workshop is also organized by the Government for mass vaccination at one spot if any "Producer Group" of the Milk Societies demands it. Though private vaccination practitioners reportedly were withdrawing from this service due to lower remuneration realized against time spent in this. They said that it takes a whole man-day for vaccination a maximum of two cattle which compensates only Rs 15 to Rs 20 per cattle.





**Figure 31: Government and Private vaccination services availed by farmers**

The graph showed above exhibits the percentage of farmers who had utilized vaccination services availing Government and Private vaccination services respectively in the four villages. While most of the farmers had not utilized it, those who had largely used Government services as shown above.

The farmers reported remarkable technological advancements in the provision of veterinary health services in the recent past. They were particularly happy with the timeliness contrasting with the past conditions when veterinary doctors rarely reached timely in case of any medical emergency often resulting in demise of the cattle. They avail both the Public and Private Doctors for AI and other veterinary health services. For example, Private Doctors charge as higher than what Public doctors charge for the same set of services respectively in AI viz. farmers reaching them and they reaching farmers for the same. The reason for such high discrepancies was reported to be due to the availability of services as Public Doctors are not so easily and frequently accessible.

The villagers of Mushari were particularly vocal in expressing disappointment over the fact that though veterinary health services have improved, the Public Doctors at the block level are not easily available. However, they said that in the past, the Doctors found it difficult to reach the farmers timely for providing health services due to lack of transportation facilities. But lately with improved roadways and mobile telephony, the Doctors usually reach timely on their own motorbikes.

Farmers of the village Mahammadpur also underlined the fact that Private Doctors are more accessible than Public Doctors. Importantly, they added a point that despite being more accessible and costly than

Public veterinary health services, Private veterinary health services are not always reliable and dependable.

The farmers of Kesopur reiterating the lack of extensive penetration of the services for adequately catering to all went on to propose a provision of availability of one veterinary doctor every 4-5 clusters.

### **3.8 Findings on Ruminants Husbandry System**

Existing husbandry systems have indeed changed a lot now than how it was traditionally observed. Livestock farming has observed some breakthrough changes in the recent past while also carrying forward some age-old traditional practices which are still relevant in present business environment.

As per the viewpoints of the producers, livestock farmers were categorized as small, medium and large based on the herd size of cattle they were keeping as shown in table below.

**Table 15- Categorization of farmers based on number of ruminants**

S.No.	Category of farmer	Number of cattle
1	Small	1
2	Medium	2
3	Large	3 or more

Except the village Kharuara, in all the three villages mostly small farmers (approx 60%- approximation by group) are found followed by medium (30-35%-Approximation by group) farmers. Very few farmers were identified as large farmers by the groups in the three villages. Kharuara relatively have higher number of large farmers. Both indigenous and crossbreed varieties of cows are reared by farmers but the proportion varies in all four villages. Another interesting feature of dairying practice in Bihar is that cows and buffaloes are not only reared by farmers themselves at their farm gate with separate space dedicated for their habitation but they are also leased to other care-takers. Some villagers invest in purchasing cow(s)/buffalo(es) and rent them to a lease-holder livestock farmer who takes care of the rearing in lieu of being supplied a certain portion of produce (usually 50%) while the rest is used and sold by the lease-holders. Such a collaborative feudal model of relationship has been existent traditionally in the villages between a comparatively richer owner of livestock and economically weaker lease-holder.

The cattle is mostly bought from the traders or neighboring livestock farmers from village level market fairs “*mela*” and in village itself. Mostly men transact in buying the cattle. Both sale and purchase of cattle takes place in the market fairs which serves as a market platform for different producers to transact.

Livestock farmers both buy from and sell to the traders there. However it is mostly intra-village transactions which take place between the neighboring livestock farmers.

The breed varieties which the farmers identified and revealed with tip-of-tongue promptness in cows and buffaloes in order of their adoption incidence and respective desirable features as described by the respondents are as given below:

**Table 16- Cow and Buffalo breeds popular in the region**

S.No	Cattle			
	Cow		Buffalo	
	Breed	Attractive Features	Breed	Attractive Features
1	Freezian	High productivity	Magahi	Good fat content and availability
2	Pure Jarsi	High productivity	Mahiki	Good fat content and availability
3	Magahi	Disease resistant and good fat content	Murrah	Good fat content and availability
4	Patahanian	Disease resistant	Gujarati	Good fat content
5	Sahiwan	Disease resistant	Punjabi	Good fat content

Cows and buffaloes are milked twice daily mostly by hands. The milk is mostly collected in a steel bucket during manual milking sessions.

In terms of cattle feed, farmers utilize a range of varieties and systems. Feed varieties include green fodder of grass and plants, dry fodder of crop residues, homemade food and lately adopted supplements and concentrates. While feeding systems are grazing both open and tethered and accompanied and unaccompanied, “cut and carry” of both crop residues and green fodder which does not require cooking, homemade food which is cooked and supplements and concentrates available in the market which are bought.

In terms of health practices, the current trend observes both institutional and non-institutional delivery of modern health services and traditional knowledge systems carried over generations. However, in case of serious illness and emergency only veterinary doctors are sought after. However some of the veterinary practitioners were also found to be not certified but quacks. Apart from some common diseases, some terminal conditions also arise mostly due to medical negligence and malpractices like unscientific practices in artificial inseminations.

Both open barn and housed systems with both *kuchha* and *pucca* flooring are used for keeping cows and buffaloes. Cow dung is amasses at one corner both for manure and fuel purpose. The space has ideally to be kept clean in order to prevent diseases to which most farmers agreed. However, as observed during the study not all farmers were complying with such hygiene norms especially due to lack of space and awareness.

### 3.9 Feeds Assessment with Producers

Farmers in the villages are using mix feed systems each of which can be categorized on the basis of animal mobility into four categories viz. grazing, cut and carry, housed and tethered systems.

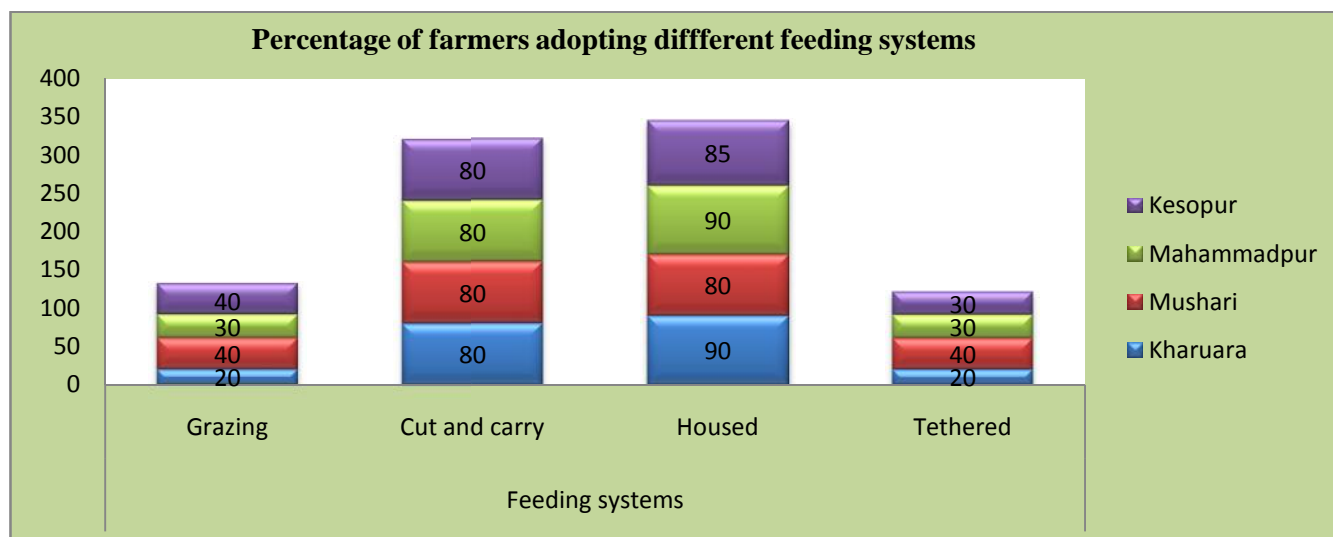


Figure 32: Feed system practiced in the villages

Grazing refers to open unfettered grazing accompanied or unaccompanied by the farmer. Grazing is the least widely practiced system for feeding animals due to shrinking landholdings with only 20 to 40% farmers practicing this system. Tethered is again practiced by a small portion of farmers ranging from 20 to 40% only. Housed system which includes supplementation with concentrates along with homemade food is more widely practiced way of feeding with 80 to 90% farmers practicing it. Cut and carry system is also extensively used for feeding livestock as 80% of farmers practice this.

There has been significant change in the feeding system in last 5 years. Farmers have started giving more nutritious feed to cattle for higher milk productivity. They also give concentrates and supplements. The spending on feed has increased much more comparatively than in previous years.

#### Coping strategies during the feed shortage time:

There are times when in villages there is shortage of animal feed. In those times producers use different techniques to cope up with these situations and feed their livestock. Table below shows the strategies which are used in villages. In all the villages' producers buy feed from market, and also give home cooked/made food to livestock. They also store feed for livestock for off seasons.

Table 17- Coping strategies for feed

Name of village	Coping strategies
<b>Kharuara</b>	Producers buy feed from market Home cooked/made feed is given to livestock
<b>Mushari</b>	Producers buy feed from market Home cooked/made feed is given to livestock Storage of feed is done
<b>Mahammadpur</b>	Producers buy feed from market Home cooked/made feed is given to livestock Storage of feed is done
<b>Kesopur</b>	Producers buy feed from market Home cooked/made feed is given to livestock Storage of feed is done

When asked for feed storage capacity in all the villages people mostly said that they have storage capacity.

Chart below shows the percentage of people having storage capacity. Mushari with 63% has more people using storage mechanism for keeping livestock feed, Mahammadpur with 55% is at 2<sup>nd</sup> position following which Kesopur is at 52% and Kharuara has the least number of people among four having storage capacity.

During discussion with participants, it was found that the storage capacity referred in many case is the space dedicated in a particular room with other stuffs in which cattle feeds are also stored. Some big farmers have been found to be economically able to dedicate a room specifically for storage space for

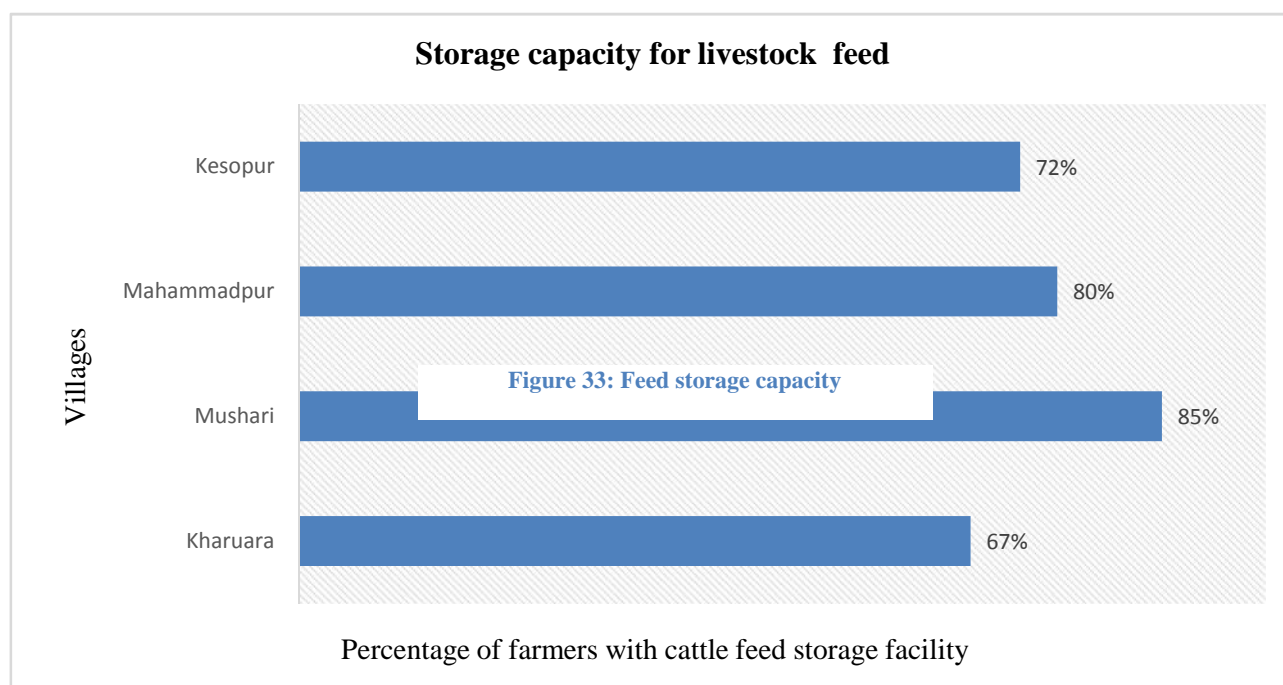


Figure 34: Storage capacity for cattle feed

livestock feed.

When asked about the feed analytical services, it was found that it was not available in any of the four villages.

In village production and use of forages as feed for livestock is also prevalent. Listed forages were found to be grown in the villages as visible in table below which are drought resistant or tolerant. Out of all most of the people produce Barsim grass and wheat residue which is available to them.

**Table 18- Forage resistant/tolerant to drought**

S.No	Name of forges resistant/tolerant to drought
1	Barsim
2	Sava
3	Jhalara
4	Wheat residue

Then participants were asked to assess that under which condition it is profitable to buy and use the feeds and supplements. Following response came through

**Table 19- Feed buying conditions**

Name of village	Conditions under which it is profitable to buy and use feed and supplements
<b>Kharuara</b>	<ul style="list-style-type: none"> <li>• During Natural calamities like drought and flood</li> <li>• Feed shortage</li> </ul>
<b>Mushari</b>	<ul style="list-style-type: none"> <li>• During Natural calamities like drought and flood</li> <li>• In the month when milk production is can be higher</li> <li>• In case if bovine health is not good</li> </ul>
<b>Mahammadpur</b>	<ul style="list-style-type: none"> <li>• During Natural calamities like drought and flood</li> <li>• When milk production is less, hence to increase the production</li> </ul>
<b>Kesopur</b>	<ul style="list-style-type: none"> <li>• During Natural calamities like drought and flood</li> <li>• During pregnancy of bovine</li> <li>• After delivery of bovine</li> <li>• To increase productivity of milk</li> </ul>

### **Feed Conservation**

On the question of feed conservation in all the villages they said they are generally not aware of the techniques and hence do not undertake livestock feed conservation and storage due to lack of space.



### **Drinking source for cattle**

Well and hand pumps are the sources of water for livestock across all four villages. In Mushari river is also a source of water for livestock.

### **Livestock Feeding Practices**

Livestock feeding practices in the present times include the age-old traditional as well as updated practices in sync with the changing socio-economic landscape in general and farming practices in particular. The feeding practices including the feeding systems and fodder types as well their underlying socio-economic dynamics like overall value realization in general were identified and captured in the study. According to the general business practices, the young bulls are usually sold out while young cows and buffaloes are reared. Younger ones reared are fed with green fodder while lactating adult ones are fed with a more comprehensive diet. Lactating adult cows/buffaloes are additionally fed with supplements, salt, jiggery, ginger and gram flour apart from the regular diet with special focus on ensuring nutritional adequacy using different grain-mix.

In green fodder, both *Barsim* grass and *Makkhan* grass are used by the farmers but the latter is less widely adopted owing to its high price even though its productivity is higher. Farmers sell a chunk of land 0.05 acre on lease for cultivating *Brasim* grass at Rs 1100 per acre which then cultivated by leaseholder farmer and the product is sold at Rs. 150/kg .

### **Feeding System**

In the past, farmers of this village were largely dependent on crop residues for feeding the cattle. Also there was more use of green fodder in the past than in recent times when dry fodder is used more. Earlier the farmers fed their cattle with crop straw, broken grains, and grain husk apart from homemade feed and green fodder like grass and plants. However, there has been another remarkable shift in the feeding practices with supplementation carving a niche as nutritional supplements are also being fed to the cattle. However, due to its high price it is used by only big farmers who can profitably achieve economies of scale. The popular supplements in this region were – Kapila Pashu Aahar, Neel Kanth etc. Notwithstanding the popularity of these supplements, farmers were also found to be aware of the fact that overdoses of such supplements with nutrient-concentrates also result in cattle diseases like diarrhea etc.

The farmers of Mahammadpur were reasonable to account for this widespread adoption of packaged and branded feed supplements/concentrates to their easy availability, abandonment of feed storing practices by most of the farmers and shrinking land available for grazing.

### **Advantages and Disadvantages of different Feeding Systems**

The study found that different feeding systems were prevalent in the villages as revealed by the farmers. None of these were standardized complete diet packages but complimentary supplemental modes of

feeding. Keeping this fact in mind, the farmers were asked to enlist the advantages and disadvantages of each system which can be summarized in the table given below:

**Table 20- Advantages and disadvantages of different feed systems**

S.No.	Feeding System	Advantages	Disadvantages
1	Grazing	<ol style="list-style-type: none"> <li>1.) Helps in digestion.</li> <li>2.) Free of cost</li> <li>3.) Fresh grasses high in nutrients to eat</li> </ol>	<ol style="list-style-type: none"> <li>1.) Fertilizers are used in the field which affects the health of livestock.</li> <li>2.) Dry and hard grass during dry season.</li> <li>3.) Creates tension among the villagers if cattle moves to someone else's field.</li> <li>4.) Time taking task.</li> </ol>
2	Cut and Carry (A- Green Fodder, B- Dry Fodder of Crop Residues)	<p>A- Green Fodder</p> <ol style="list-style-type: none"> <li>1.) Fresh grasses high in nutrients to eat.</li> <li>2.) It is nutritious.</li> <li>3.) Enhances milk production.</li> </ol> <p>B- Dry Fodder of Crop Residues</p> <ol style="list-style-type: none"> <li>1.) It is nutritious to eat.</li> <li>2.) Very high in energy and protein.</li> <li>3.) Easy available.</li> <li>4.) It is to digest.</li> <li>5.) Enhances milk production.</li> </ol>	<p>A- Green Fodder</p> <ol style="list-style-type: none"> <li>1.) Time consuming.</li> <li>2.) Fertilizers are used which effects the health of livestock</li> <li>3.) Fertilizers and pesticides affects the quality of milk.</li> <li>4.) Gets difficulty in dry season.</li> </ol> <p>B- Dry Fodder of Crop Residues</p> <ol style="list-style-type: none"> <li>1.) Costly</li> <li>2.) Time taking</li> </ol>
3	Home-made feed	<ol style="list-style-type: none"> <li>1.) Enriched with nutrition.</li> <li>2.) Enhances milk production.</li> </ol>	<ol style="list-style-type: none"> <li>1.) Time taking task</li> </ol>
4	Supplements/ Concentrates	<ol style="list-style-type: none"> <li>1.) Enriched with nutrition.</li> <li>2.) Enhances milk production.</li> <li>3.) High in energy and protein.</li> </ol>	<ol style="list-style-type: none"> <li>1.) Very Costly</li> <li>2.) If it is high given in a high dose it affects health of livestock.</li> </ol>

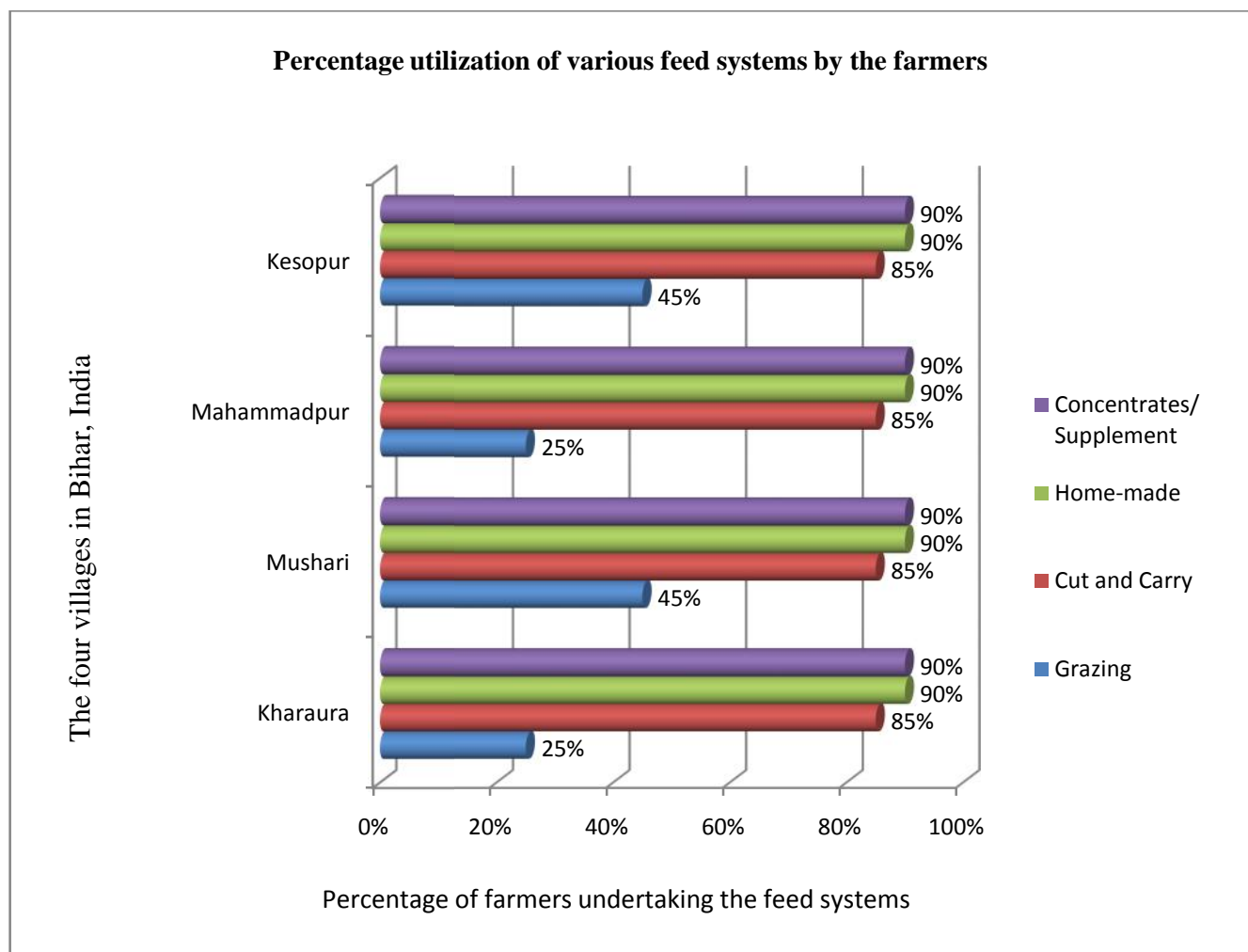


Figure 35: Percentage utilization of various feed systems by the farmers

The graph shown above exhibits village-wise various feed systems undertaken by the farmers.

The graph shown below highlights village-wise adoption of various cattle feed constitutes. While *Brasim* grass and packaged cattle feed are evidently most widely used owing to their availability and popularity Sudha Dana is availed less widely owing to the fact that only members of the Producer Groups buy it. Another remarkable feature is that both Mahammadpur and Kesopur use wheat grain in lesser quantity as compared to other villages due to low production of wheat there.

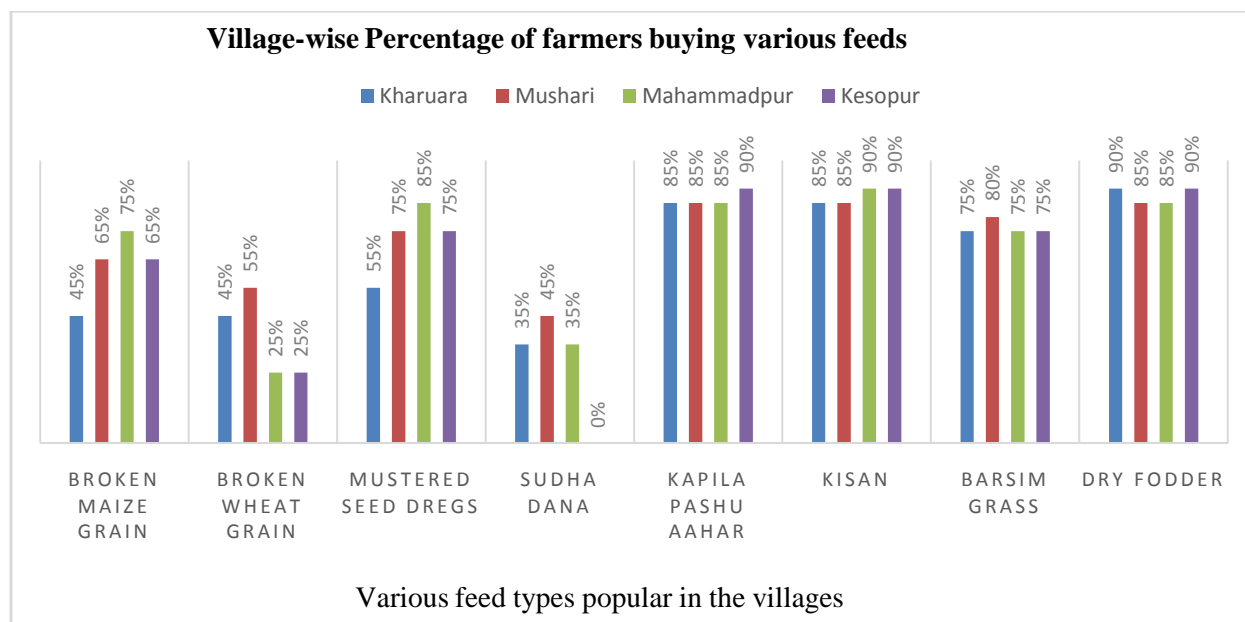


Figure 36: Percentage of farmers buying various feeds

The chart given below illustrates the percentage of farmers using various types of cattle feed ingredients. As evident in the figure packaged branded cattle feed are most widely used by the farmers while Sudha Dana caters only to 29% of the respondents. Even in FGD with the farmers we were validated and reasoned for this figure as open market unpackaged ingredients are often spurious in quality which increases the demand for packaged branded cattle feed.

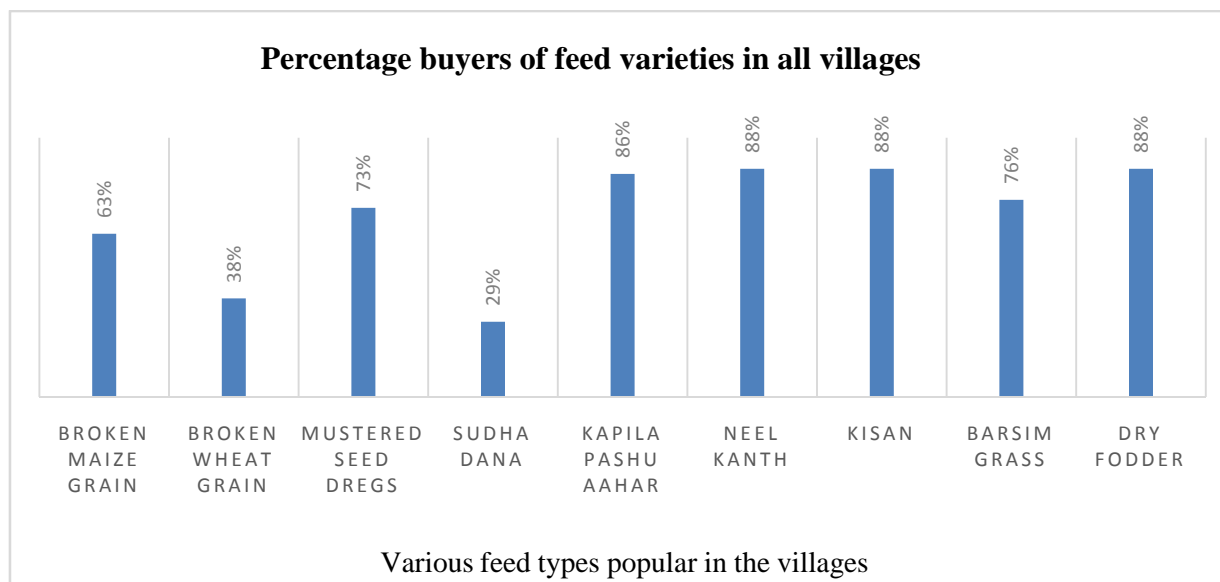


Figure 37: Percentage buyers of diet ingredients

The illustration shown below highlights the availability of different cattle feed types. While dry fodder of crop residues, homemade food and Supplements/Concentrates are available yearlong, Green fodder and Grazing systems are only seasonally practiced as shown below.

Name of crop	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Crop residues	Available	Available	Available	Available	Available	Available	Available	Available	Available	Available	Available	Available
Green forage											Available	Available
Grazing	Available	Available	Available	Available	Available					Available	Available	Available
Supplements/Concentrates	Available	Available	Available	Available	Available	Available	Available	Available	Available	Available	Available	Available
Home-made food	Available	Available	Available	Available	Available	Available	Available	Available	Available	Available	Available	Available

**Figure 38: Availability of various feed during the year**

### 3.10 Breeding Assessment with Producers

**Breeding Mechanism:** Breeding facilities are available in this area but are not regular and satisfactory. Public as well as private practitioners are available, but both have their own issues. Public practitioners are not available most of the times just because the number of them available is not enough to cater to the whole region. Private practitioners take advantage of this and demand a premium, and on top of that they are not often certified practitioners which lead to multiple issues like infection to the cattle often resulting in failure of artificial insemination.

Figure given below shows how prevalent is the breeding practices among the producers.

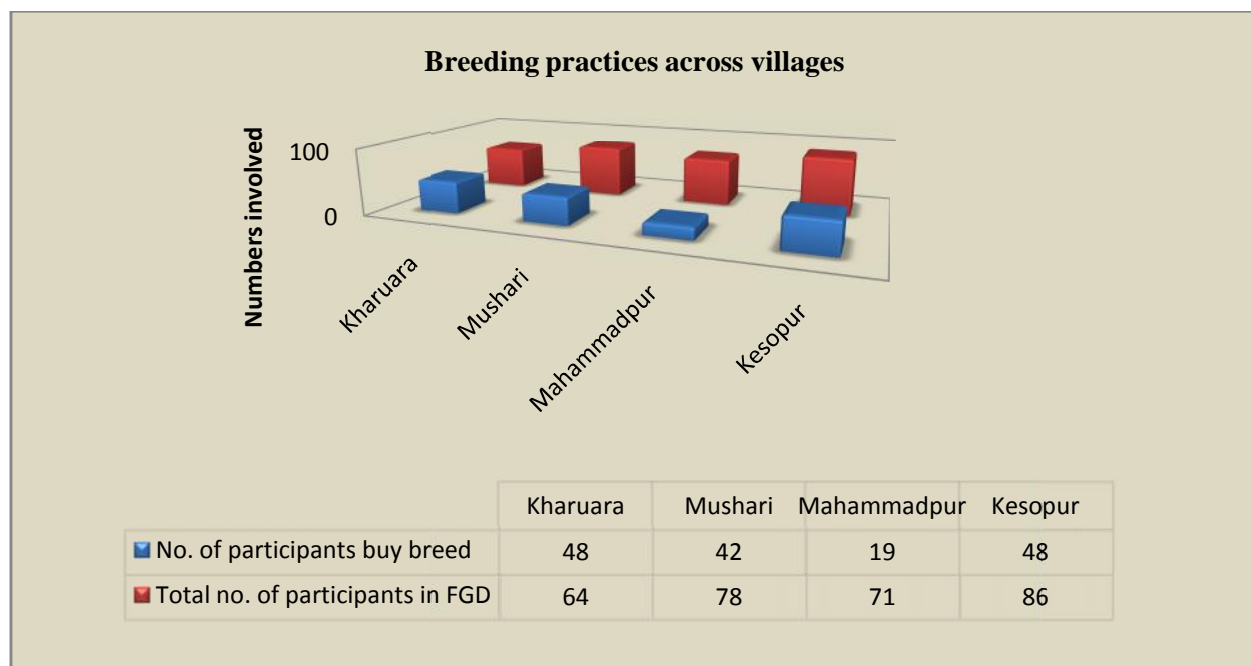


Figure 39: Prevalent Breeding Practices

On the question of willingness for changing current breed to cross breed for higher production of milk, producers in all four villages showed their willingness and to change the breed. Constraints faced by villagers include high cost and untrained doctor. There were no support systems helping villagers to change breed in any of the village. In all the four villages people do not practice controlled mating. AI and bulls were used for breeding purposes which were the sources for sire and dams.

Producers also do not keep record for production/productivity. When asked about the decision maker for keeping/ culling, these decisions were mainly taken by male members of the family.

**Prices discovered on the day of FGD:**

Table 21- AI prices and availability

Prices for today in each channel	Unit used	Are prices different when paid to men and women	High and low during last 12 months	Reason of variation of price between channels
For private channel it is 250 for all villages whereas for government it was 150	Per AI	No	120 to 250	Price of semen in case of government is borne by Govt.



### 3.11 Value Chain mapping with input suppliers and findings on support services and veterinary services

Traditionally and even until recent past, bulls were reared by the farmers for impregnation of cows/buffaloes. However the practices changed over time and now around 80% of farmers undertake “Artificial Insemination” (AI) techniques for this while bulls are now mostly reared for other purposes like transportation etc. In past only around 2-3% of them availed this advanced technique. The farmers informed that doctors from the Private Sector charge Rs. 100 or more for each AI session if the farmers themselves reach their clinics but Rs. 150 or more if they reach farm-gate. On the other hand, doctors from the Government line departments charge Rs. 60 and Rs. 100 for the same set of services respectively. Earlier, farmers mostly had to visit the nearest Veterinary Clinic themselves but now due to the availability of improved infrastructural support systems like telephony, transportation facilities and roadways, they mostly call the doctors at their farm-gate.

Kespor village also observes the same change as adoption of AI has picked up fast being widely practiced nowadays substituting the traditional system. However, the farmers went on to add that traditional genetic variety of bulls reared for this purpose risk deterioration of breed quality whereas AI promises better breed quality.

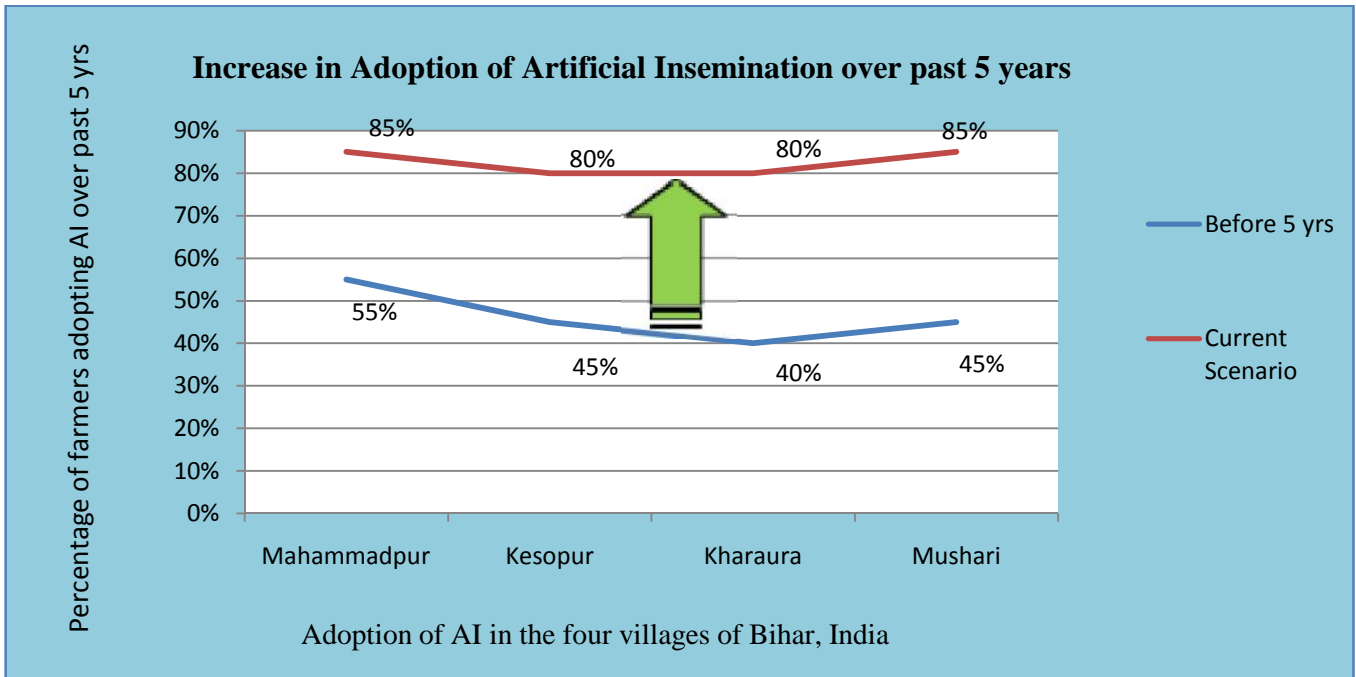


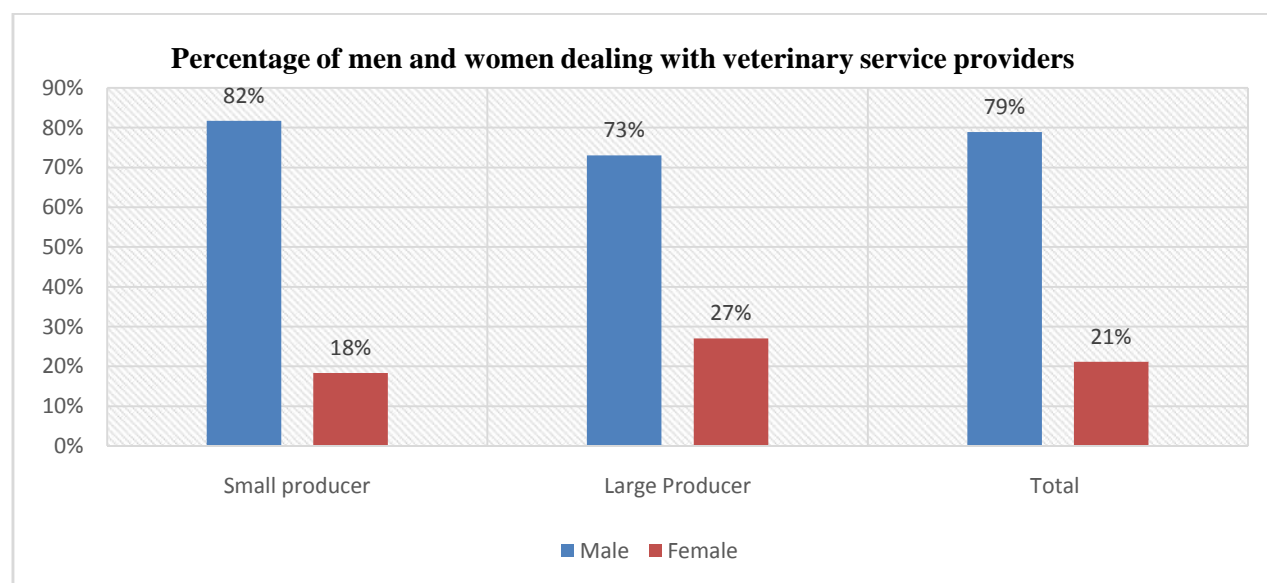
Figure 40: Increase in Adoption of Artificial Insemination over past 5 years in the villages

The graph shown above highlights the data exhibiting remarkable rise in the adoption rate of Artificial Insemination (AI) over the past five years.

### **Veterinary Service**

These services are being provided by government and private veterinary doctors as well as quacks. Number of government doctors is less in the block which increases the dependency of producers on private practitioners. Though during visit and interaction it was found that large number of people comes to government doctors for the livestock service related issue especially small producer. All the doctors were having qualification of PG and only 20% of the doctor was women that too only in the government department. These practitioners were typically based at block offices, and they were also operating from their home as per convenience.

A profile of the farmers visiting to them for taking livestock related services is shown in the chart given below.



**Figure 41: Gender proportion in dealing with veterinary service providers**

It is found during discussion with government and private service providers that there has been a shift in profile of visiting farmers and small farmers are now coming with their issues whereas number of large producers is decreasing. Same trend has been with volume of services provided, and it is increasing in case of small producers and decreasing for large producers.

### **Transportation used by doctors and storage of semen:**

It is found that as a buyer, private veterinary doctors and health service providers buy inputs like drugs from various places, and it depended on the need and availability of product. So, they buy from nearby block level market and even go to cities like Patna or Biharsarif covering distance of 40-50 km as and when required. The time lag between buying and selling was lesser in case of private practitioners than government doctors.. Private practitioners mostly use motorbikes for visiting to cattle and the charges are paid by the producers. Government doctor is provided with a four-wheeler vehicle by the Government for same.

Typically covered distance for providing services is 5 to 60 km for both. Cost for one trip varied for private and government practitioners having different transportation system.

Private practitioners were operating alone, and mostly do not keep any junior health practitioner. Only in case of government doctor they have two support staffs along with while providing health services.

When asked about selling input and services, most of the doctor said they sell animal medicines, supplements and inputs required for breeding services. In addition, 2 private practitioners out of all sampled doctors said they provide credit to producers in terms of money and input. On the question of credit provision almost all the services were being provided on credit in case of dire need.

In terms of innovation there wasn't any innovation in last 5 years; only few new medicines were subscribed.

### **Findings on mapping with the marketing partners (Traders, Sweet-shops, and Processors)**

Producers use all these channels to sell their milk as per availability in their village.

#### **Sweet-shops**

In all the four villages Sweetshops are present out of the villages and mainly in the market area nearer to villages. These sweet-shops were run mostly by men who were all found to be educated till secondary standard. Sweetshops buy fresh milk from milk trader/trader and from farmers. They are mostly supplied by traders, and a very small proportion comes directly from farmers. In all the cases it was found that all traders from which the sweet-shops take milk were male traders. During interview with these sweet-shops, it came that with most of sweet-shops number of small traders who supply them milk has increased while number of big traders has decreased significantly over past five years. Similar has been the trend for volume of milk of milk supplied from big and small producers.

These sweet-shops make

- Sweets
- Paneer/ Cheese

- Khowa/Cream
- Tea

These products are sold directly to consumers. These sweetshops do not do any further processing of milk except storing them in cool places for which they sometimes use fridge. Out of 6 informants, 4 were keeping fridge used for multiple purpose including milk storage.

The annual turnover for small sweet-shops varied from 3 to 8 lakh whereas for big sweet-shops it was found that their annual sale was more than 12 lakh. The share of diary product in their total turnover is 50-60%.

They receive milk from traders who typically travel 2-6 km to deliver milk. These traders are paid by the sweet-shop owners for transportation charge which depends on distance which usually is Rs.20 for per 4.5 km on average.

For operations some of the sweet-shops hire support staff, and others works with the family members. Labors are hired for help, and they work on part time and full time basis. Payments are made in cash. Small sweet-shops keep 1 to 3 staffs whereas big sweet-shops keep 3-4 staffs.

When asked about the product delay; it was experienced by all the sweetshops and it was found to be with frequency of 2-3 times on an average in a month. For price determination, it is generally agreed at the beginning and it is determined on the market rate as well as on the basis of cream present per kg of milk. The sweet-shop owner/employee asks for 1 kg of milk to check the volume of cream in the milk. Usually this takes 1-3 days time to agree on prices. And this process is repeated to keep check on the quality of milk. If sometimes they find milk to deficient in assumed fat content, they pay less prices than agreed. Quantity of cream is the most important characteristic for sweet-shop owners to buy milk.

**Trader:** In villages Trader/village level milk collectors are another source of marketing for milk. During VCA, trader was only found only in village Mushari in Harnaut block. Traders were one of the major channel through which marketing of milk takes place in the village. The traders buy fresh milk from producers and sells to sweet-shops. Many traders also sell milk to sweetshop after getting the cream separated from the milk at place of cream separator. All the traders were found to be men. They have been found to be educated till primary level. Traders in villages buy from small and big producers both, but majority of the producers are small producers which accounts for 70-80% of their supplier base but this do not include the women producer. During interview it was also found that small producer proportion has increased as supplier than large producer which has been decreasing over past five years.

For transporting, the milk traders carry milk pots in hand or use bicycle during purchase which they buy from farm gate, and use small vehicle/small lorry for selling to sweet-shops and cream separators.

In case of selling milk traders get paid for transportation from buyers and typically travel a distance of 3-7 km to sell milk. They function alone and do keep any support staff. While buying milk from producers, traders look for freshness and the content of fat in milk.

Traders share relationship of repeat sale with farmers and they work on the verbal contract. The advances are made to farmers if they need it and there has not been change in the way they have been doing this business in last five years.

For traders when asked Quantity was the constraint at purchase side as they get limited amount of milk from villagers. For selling, quality was the constraint which included whiteness and the quantity of mawa in it. They also collaborate to trader for getting price information and market conditions.

## **4. DISCUSSION AND CONCLUSIONS**

### **4.1 Livelihoods in general**

The main source of livelihood in the villages is agriculture. It was found that income from agriculture has risen over the past five years primarily due to increase in productivity by use of improved farm technologies like hybrid seeds and appropriate application of fertilizers. Frequent extension and training services provided to the farmers through various institutional arrangements by both Public and Private sectors have also added substantially to this change. Improved incomes have translated into enhanced agriculture based livelihood portfolio as farmers have also undertaken livestock business lately. Other major livelihood activities are micro-enterprises, laboring on daily wages in various sub-sectors and employment in the Private Sector. Some of the captured distinctive features of the livelihoods in the villages can be summarized as given below:

- ✓ Off farm Labor: It was found that women who employ themselves in off-farm labor were mostly involved in post-harvest management practices like winnowing, cleaning, sorting and primary-processing of crop grains. However big farmers in particular are increasingly adopting farm equipment for mechanized post-harvest practices.
- ✓ Micro enterprises: Some of the villagers own small utility shops for catering to the daily village needs especially in FMCG products tailor-made for the rural markets.
- ✓ Nonfarm daily wages labour: Some of the villagers were found to be involved in nonfarm activities on daily wages prominently in the infrastructure sector like masonry, brick factories etc.
- ✓ Agriculture: Even though agriculture employs largest chunk of workforce but over the past five years jobs in the Private Sector has decreased the dependency on agriculture.
- ✓ Livestock: Nature of livestock rearing has transformed from subsistence household consumption to focus on business. Milk Societies have emerged after the replication of AMUL model as TIMUL-Sudha in Bihar. It has helped even the small and landless farmers by providing them a market in close proximity to sell milk. It serves the double-edged purpose of fighting against poverty. While cows and buffaloes ensure nutritional security of the household, they have also a market nearby to monetize the practice as an income generating activity. Prevalence of animal diseases were mostly widespread in rainy season.
- ✓ Migrants: Due to improvisation in the outreach of education by growing number of schools and other educational provisions under the ambitious flagship schemes of the Government like *Sarv Siksha Abhiyan* and others, more and more students are becoming employable in the cities outside the village. Even the villagers reportedly had been made more aware and sensitive to the importance of education which incentivizes them to invest in the education expenses of their wards even outside the village in cities. Such wards are usually employed into

- ✓ Financial constraints are prominent during the times of sowing when agri-inputs purchase is at hand. And this is further aggravated in wake of cattle disease. Other prominent reasons for financial hardships were found to be expenditure in human diseases, ceremonies and festivals like marriage that often takes the villagers in debt trap else.
- ✓ Poultry farming was being practiced by the farmers in the village Mushari as Jeevika-BRLPS had formed SHGs and catalyzed the adoption of this activity there.

## **4.2 Role of ruminants**

Role of ruminants can be broadly classified in four categories viz nutritional security, livelihood activity, manure availability and fuel requirements. The livestock reared not only supplemented income generation from agriculture but also ensured nutritional adequacy of rural diets. Also being mutually supportive to crop production which is the main livelihood activity in the villages, it provides manure for growing crops which in turn provides feed to the livestock in form of crop residues. As a livelihood activity also it assumes importance owing to the fact that there has been a strong full demand for milk. It is because apart from being widely consumed in its primary form, milk has a wide scope of processing in various marketable products like cream, sweets, cheese etc which are also very high in demand. The market is extensive as sweet shops abound both in rural and urban areas. Another important use of livestock byproduct is in form of dung-cakes which are extensively used in the villages for fuel. Last but not the least is the fact that cows are especially also bound to the cultural and religious values in the villages making them and even their byproducts sanctified for use in various religious ceremonies without provision for any substitutes.

## **4.3 Gender dimension of ruminants value chain**

Women in the rural areas contribute to livestock production by carrying out a number of tasks such as feeding, cleaning animal shade, harvesting fodder, cooking animal food, making dung cake and other dairy related activities. Young girls are very often engaged in the same range of activities and they are more likely than boys to be kept home from school to help their mothers with household, agricultural and livestock related tasks including cooking food, cleaning and providing water for livestock. Although women are quite involved and contribute a lot towards livestock activities, it is men who tend to be responsible for their disposal as well as decision making for most of the livestock related aspects from breed selection, feed and services for livestock to selling milk and calves, and thus in charge of taking decisions related to their sale.

The gender dimension in the dairy value chain can be well understood by understanding three components.



1. Gender roles and relations within the livestock value chain;
2. Gendered access to and control of resources and benefits that accrue from use of those resources;
3. Gender-based constraints and opportunities or enabling environment.

The roles assigned to men and women have an impact on their ability to access resources and influence their power to decide upon resources and the benefits that accrue from using those resources. The assigned roles also influence the opportunities that might be available for women and other marginalized groups to participate in more remunerative nodes of the value chain. In many societies gender norms influence who is supposed to carry out certain types of activities and who is expected to complete certain tasks, which differentiation may reinforce or transform gender inequalities (CARE 2012).

#### **Gender roles and relations within the livestock value chain:**

Feeding, herding, cleaning, making dung cakes and cooking food for animals are typically being carried out by women. In the same way, selecting of breeding rams and marketing related activity is done by mostly men. As found and discussed previously only 20-25% women participate in the marketing of milk. In other by products like Indian butter or subsidiary product like calves its men who completely control the selling activities apart from their participation of 70-75% in the milk selling. In other decision making activity as for buying and selection of input or health services majority of decisions are taken by male members hence limiting women participation to mostly production stage. In other roles, in the livestock value chain, women participation as trader, processor, retailer and service provider was found negligible.

#### **Gendered access to and control of resources and benefits that accrue from use of those resources:**

Access to and control of resources determines the extent to which women and other marginalized groups can participate in the value chain, their decision making power and potential to directly benefit from participating in the value chain. Research studies have shown that a significant global gender gap exists in asset ownership, control, and decision making power between men and women, and how costs and benefits are shared. It was found from the FGD that women's participation in decisions that affect their livelihoods is still marginal. Hence for women to fully benefit from value chains there must be spaces where they can actively contribute to decisions, raise their voices, have their ideas heard and considered, take part in leadership and decision making. Power and decision making is a key challenge that rural women face who are involved in livestock value chain.

### **Gender based constraints and opportunities:**

Gender-based constraints are factors that inhibit men's or women's access to resources, behaviors, participation, time use, mobility, rights, and exercise of power based on their gender identity (Rubin 2010) whereas gender-based opportunities are "structural and institutional factors that facilitate women's and men's equitable access to resources, behaviors and participation, time use, mobility, rights, and exercise of power". Gendered influence on enabling factors helps to determine how women/men leaders can influence policy-making and legislations to promote their economic rights and make the overall environment more conducive to gender issues (Terrill 2011).

It was found during the discussion that though women were involved in various activities in livestock value chain, their limited knowledge and exposure prevents them from diversifying livestock related activity and decision making ability. The social perception of men being prime bread earner of the family and being the financial controller also limit women participation and hinders their empowerment in terms of their financial inclusion.

In almost all the villages it was found that the environmental and availability status remains similar for men and women like in access to credit, access to health services etc, and also there is no discrimination in availability of services for men and women. It was found during discussion that in comparison to general mindset which used to prevail earlier, now trend is changing, and willingness is there in community (men & women) to increase role as well as participation of women in livestock value chain beyond production expanding women's opportunities. The reason complements with the fact that the increasing migration of young and adult men in the villages to cities for various reasons leaves women in village that has this liability as well as opportunity to participate more.

Following points summarize the gender dimension of ruminant value chain:

- Input suppliers of cattle feed, medicines and other support services and products were all found to be men. While the Government doctors included few women, private practitioners were all men.
- Producers included men and women both but with marked exclusiveness of tasks undertaken for rearing. While men covered the buying part mostly, women mostly undertook caring and feeding part. It was mostly men who sold the products but it was mostly women who procured green fodder.
- All the processors and marketers like village level collectors were found to be men.
- In transportation services in particular it was men who exclusively covered these services be in animal carts, bicycle or motor vehicles.
- There was opportunity for women to increase their participation in the value chain due to increasing social acceptance.

#### **4.4 On Challenges and opportunities to improve ruminants' production and marketing including deterministic factors like input supply and service delivery**

Before concluding the study, it becomes imperative to summarize the challenges and constraints as to identify and propose potential opportunities and solutions respectively. Though livestock management practices have structurally adjusted themselves to the dynamic market modification over time but some interventions are evidently necessary to adjust for better systemic efficacy. Challenges can be broadly classified at both production and marketing sides of the business.

##### **Production challenges**

1. Provision of Institutional credit through the Government banks has been found to be not easily availed by the farmers as they do not find the perceptibly intensive documentation process easily manageable.
2. In some villages like Kesopur there was lack of any institutional models like Milk Society which constrained the extension of livestock business in the village particularly for landless and small farmers who can potentially focus better in this.
3. There was a marked lack of knowledge and information regarding the various breeds and feeds available in the market resulting in uninformed decisions and poor choices.
4. The extension services particularly in health services and knowledge dissemination were found to be inadequate and poor respectively. Not only the number of certified veterinary doctors was found to be low but also the price charged by those from the Private sectors was reportedly costly against the incomes realized.
5. One of the most discouraging fact emerged in the study was that farmers found that rearing livestock under current practices and external scenario was not compensating for the inflating prices of other goods and services. This de-incentivizes the adopting of business.
6. Shrinking landholdings pose a challenge for keeping the livestock due to lack of dedicated proper space for the cattle. The same reason also accounted for increasingly lesser availability of open grazing land thereby limiting the choice in feeding systems.

##### **Marketing challenges**

1. Producers find the market prices not fairly compensating for the investments of time and money undertaken by them.
2. There was also a surprising lack of business intelligence among the producers especially in terms of price information of both the products and inputs. It was particularly accounted to the lack of ethical practices obscuring transparency in price determination of milk.

3. Transportation problem despite improved infrastructure supports systems in forms of roadways and telephony was also underlined as a constraint especially for larger lot sizes. There is an apparent potential gap which can be bridged by small entrepreneurs at village and block levels catering to the producers' transportation constraints.
4. Due to unavailability of diverse institutional models in the business, the market on a whole was not organized. Only some pockets and especially those of TIMUL-Sudha were organized leaving a larger section with untapped potential.
5. Due to lack of technical knowledge and skills on the part of producers like in determining the quality factors also resulted in unfair power differential between producers and market players. For example, the producers have not been capacitated in identifying the determinants of fat content in the milk or in ensuring the technical appropriateness of measurement tools like lactometer. This creates a mindset of confusion and doubt among the producers especially in choosing the market

### **Opportunities**

After observing and analyzing the prevalent business scenario, some of the obvious and skimmed opportunities in the business can be presented as follows.

1. Milk Society can enhance their scope of practices by introducing even feeds, extension and health related services in their portfolio extending them to even non-members of the producer groups engaged in livestock business.
2. Milk producers should be trained in the technicalities of measuring and grading of milk through role-rotations of this task among the members. This shall rule out any incidence of mistrust and doubt in the institution particularly in quality standardization system.
3. Due to the unavailability of any institutional model in the village Kesopur, the farmers can be mobilized into producers groups after being trained and capacitated in the tenets of institutional producer models. Such a model can well manage both the back end and front end dynamics of the business be it in procuring inputs and availing services or marketing the produce to processors and other markets.
4. Regular trainings should be provided to the certified veterinary doctors for upgradation of their skills so that latest technologies reach the farmers through them. Vaccination services in particular need more intensification to cover the larger base of livestock farmers.
5. Credit is another crucial determinant in intensifying the adopting of livestock farming as farmers reported lack of institutional credit support from both the Public and Private sectors. While Government banks can further ease the documentation process, the Development Sector can play a role by mobilizing farmers' institutions for savings and otherwise to create a credit base like amassed in the SHG model.

## **4.5 On ways to mitigate ruminants' diseases**

Ruminants' diseases have also been identified a major discouraging factor for undertaking livestock farming while also constraining in profitability of this business. Despite leaps in technological and infrastructural advancements in the past few years, ruminants' diseases still remain a major constriction factor for the livestock farmers. The major diseases enumerated by the farmers in order to their incidence from higher to lower are found to be -

1. *Asari*
2. SARA
3. Food and Mouth disease
4. Diarrhea
5. *Galaghot*
6. Cold and cough

Apart from these infections due to malpractices in breeding practices particularly due to frequent and improper artificial insemination sessions often result in serious illness and even death. Furthermore, vaccination services are widely adopted by the farmers due to inadequate arrangements on the part of Government and costliness of Private practices. Adding to these, lack of knowledge and awareness on the part of producers also leads to inappropriate rearing practices which hamper the health and productivity of the ruminants. Keeping these in view, the determinants of ruminants' diseases can be summarized in the categories with propositions for each as follows:

- 1) Improper care provided by the farmers due to lack of knowledge and awareness- Trainings on health care of livestock can be provided to the farmers by leveraging the existing institutional structure in forms of Milk Societies, Farmer Producer Companies and SHGs. Farmer member of these institutions can be trained and capacitated on the model of training of trainers (ToT) who can further extend and disseminate the knowledge at village level.
- 2) Inadequate and improper institutional health and breeding services from the Government and Private sector respectively- The number of Government veterinary doctors should be increased as per requirements after a baseline study of the blocks to cater to the requirements extensively. Quacks and other sources of spurious medical and technical inputs should be eliminated both by making farmers aware and ensuring vigilance on the part of Government.
- 3) Malpractices on the part of input suppliers by supplying poor cattle breeds and spurious cattle feed- Quality assurance in terms of both buying cattle and their feed needs to be consolidated. Again, both farmers and Government have a role to play in this as Quality Assurance regulations of the Government can play a role in dismantling such unethical market practices. On the other hand, farmers too can be trained and capacitated to distinguish poor quality from authentic ones.

#### **4.6 On livestock breeds and breeding**

Farmers in the villages have not been found properly aware about the breeds and breeding practices. This leads to exploitation at the hands of traders who often end up selling poor livestock breeds vulnerable to illness and with low productivity. Farmers are even oblivious to the quality assurance of proper bull breeds for impregnating the cows/buffaloes. Artificial insemination techniques mostly are all the more way beyond their understanding for utilization especially in ensuring best practices in choice of the semen quality and insemination techniques. These reasons leave farmers vulnerable to the malpractices of the market.

#### **4.7 On livestock feeds and feeding practices**

Livestock feeds traditionally were never a major constraint for crop growers. Vast availability of grazing land and green fodder amply provided for the dietary requirements of the cattle. However in the recent times all feed systems – cut and carry of green fodder and dry crop residues, grazing, homemade food and newly available concentrates/supplements – have altered the feeding pattern to a greater extent. While grazing land is increasingly less available for use, changes in agriculture practices particularly with use of herbicides have also reduced availability of green fodder. Introduction of supplements and concentrates for boosting productivity has also changed the feeding practices largely. However due to lack of knowledge and awareness overdose of these supplements/concentrates also result in cattle disease like diarrhea.

#### **4.8 Summary of Constraints and Proposed Interventions**

Summing up the discussions on constraints, the participants were involved in a concluding activity by voting for the prioritization of different constraints. The results can be tabulated as given below:

In course of above discussion it could be inferred that there are several constraints that comes across a livestock keeper. Participants of the survey across the four villages where asked to vote for the below identified constraints there response are recorded below:

**Table 22- Responses on Constraints**

<b>Constraints</b>	<b>No. of Votes from Men</b>	<b>No. of Votes from Women</b>	<b>Total Votes</b>
<b>Lack of Trained doctors</b>	115	193	308
<b>Lack of Market Knowledge for input and output</b>	91	169	260
<b>Lack of availability of feeds</b>	88	164	252
<b>Lack of credit facility</b>	89	143	232
<b>Doctors' fees are high</b>	72	117	189
<b>Cost of feeds are very high</b>	52	89	141
<b>Lack of Veterinary facilities</b>	49	82	131
<b>Percentage of successful insemination is low</b>	49	78	127
<b>Cost of Medicines are high</b>	47	79	126
<b>Less number of Milk Societies</b>	47	78	125
<b>Time consumption in making homemade feeds</b>	21	47	68
<b>Black marketing of feeds</b>	17	24	41
<b>Lack of Space for Keeping ruminants</b>	14	19	33

Various constraints can be classified into following major categories with proposed interventions for each:

### **Institutional Strengthening**

In some villages like Kesopur the producers have no access to Milk Societies. There lies a scope for institutional building there by forming Producer groups and Milk Society. Even SHGs can be trained and capacitated in dairy farming. Already existing FPCs and SHGs in other villages can be mobilized and sensitized to tap potential gaps in dairy market. Even the existing Milk Societies can widen their scope of services by introducing training and capacity building services as well as health services. They have an existing member base from which progressive farmers can be chosen and trained for extension and dissemination to other producers.

Alternatively, another institutional model of farmers themselves can be conceived which provided centralized facility particularly in terms of providing product, information and services and creating awareness in “best practices”. Such a model shall not only provide a centralized marketing platform of collectives but also develop linkages with input suppliers like cattle feed and cattle breeds. Such an organized structure shall mitigate the chances of malpractices and exploitation of small producers. Not only this but such linkages also ensure timely availability of inputs and quality assurance but also rules out chances of unfair pricing or premium. In another case the member farmers themselves can be capacitated to enough to enter into entrepreneurial ventures catering to the needs of farmer base.

### **Feed Support System**

One of the major health and productivity determinants is the dairy feed. Analyzing the existing feed systems and varieties, some propositions can be summarized in the following points.



- ✓ Knowledge dissemination – Existing institutional delivery of extension services on the part of Government can be supplemented by making the most of the people's institutions like SHGs, FPCs and Milk Society in particular. Progressive and lead livestock farmers from these institutions can be trained and capacitated periodically on the upgradations in best practices cattle feed practices. Trainings on critical factors like quality assurance and nutritional value of various feed-mix diet packages and dosages can be disseminated to them.
- ✓ A centralized system of feed procurement for its consistent availability can be conceived by the farmers at village level. Entrepreneurial support linkages can be established to mobilize dairy farmers to establish feed support mechanism through village-level retailing. This can be more easily accomplished if the dairy farmers of existing Milk Society, SHG or FPC provided some handholding support.
- ✓ Alternatively, a group of dairy farmers can be aggregated and federated to prepare cattle feed themselves catering to local village level requirements. This not only can reduce cost but also ensure availability and accessibility.
- ✓ Green fodder comprising grass like Brasim and Makkhan constitute a critical feed component owing to their high nutritional value. However, they are available only seasonally while also remaining vulnerable to specific agro-climatic conditions and draught incidence. Such genetic modification of these crop varieties suiting local agronomic requirements can be developed for higher yield and longer availability.

### **Livestock health and breeding practices**

It was found in the discussions that artificial breeding practices were not always observed along the lines of best practices as unscientific frequent artificial insemination resulted in the cattle death.

The number of paramedical veterinary experts should be increased by either training the existing quacks and other progressive farmers into these training modules. Skilling of appropriate local human resources facilitates accessibility of medical services.

### **Credit Support**

Value chain finance among different stakeholders can definitely be improved as apparent gaps in this system have surfaced up. Credit support services from the Government has not been found sufficient in catering to the larger need base especially in case of small producers. While the existing system of Value chain finance in terms of credit exchanges has been found only between the immediate nodal successors, it can be extended even between those stakeholders who do not transact directly.