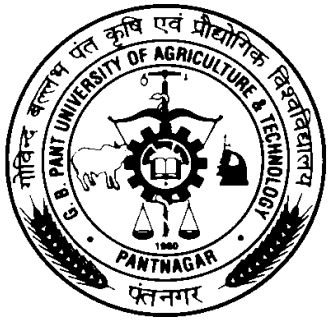
Improvement in Supply Chain Efficiency of Milk Production in Udham Singh Nagar (Uttarakhand)

Project Report

Submitted to the



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By

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF

Master of Business Administration (Agribusiness)

June, 2017

CERTIFICATE

We, the undersignedmembers of the Project Advisory Committee of **Mr. Shashank Dumka**, Id No. **41641** a candidate for the degree of Master of Business Administration (Agribusiness), agree that the project report entitled **"Improvement in Supply Chain Efficiency of Milk Production in Udham Singh Nagar (Uttarakhand)"** may be submitted in partial fulfillment of the requirements of the degree.

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ACKNOWLEDGEMENTS

Firstly, I express my sincere gratitude to "Almighty" who helped me in this great endeavor by making so many great minds to guide me and so many loving hearts to enlighten my path and it is only by the blessing of that almighty lord and the creator of world, who bestowed upon me the zeal and strength, that I was able to complete this arduous task.

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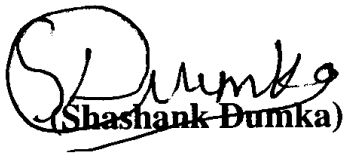
Pantnagar

June, 2017



(Shashank Dumka)

EXECUTIVE SUMMARY

In the current competitive scenario supply chain management assumes a significant importance and calls for serious research attention, as companies are challenged with finding ways to meet ever-rising customer expectations at a manageable cost. The supply chains of different agricultural commodities in India, however, are fraught with challenges stemming from the inherent problems of the agriculture sector. Milk contributes a major share in the agriculture sector as well as in income of farmer. Supply of milk is the main problem in front of the farmers because of its long supply chain and very low shelf life. So a study was conducted in Uttarakhand Udham sing nagar region to analyze the supply chain of milk and to provide ways to improve the existing supply chain. Two types of supply channels have been observed in this region channel-1 (Farmer/owner-contractor- corporative - Distributor-Retailer- Consumer) and channel-2 (Farmer/Owner- local retailer –consumer). Channel - (1) was preferred by maximum no. of the farmers while 20% of farmers market their produce through channel- (2). In case of first channel, share of farmer in consumer rupee is 66%. Price spread through contractors lays 17%. In second case in which milk is supply through local retailer only one intermediator is present between farmer and consumer and share of farmer in consumer price paid is 73.8% and price spread is 11%. But this system is adopted by only those farmers whose lives near to the local market or have a better road connectivity to cities. A farmer cannot wait for a one hour after milching his cattle also there is no cold chain facility available in the districts. Only corporative and big contractors have cold storage facilities. Milk transportation from villages in done by average loaders with no refrigerator. The study also reveals the constraints faced by various stakeholders involved in milk supply chain and it has been found out that by minimizing the intermediaries. By entrance of private player and more corporative farmer will get a better price for it produce and also customer will get a quality product.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF EXHIBITS

1. Introduction:

Supply Chain Management (SCM) is the process of planning, implementing and controlling the operations of the supply chain with the purpose to satisfy customer requirements as efficiently as possible. Supply chain management spans all movement and storage of raw materials, work-in-process inventory and finished goods from point-of-origin to point-of-consumption. The term supply chain management was coined by consultant Keith Oliver, of strategy consulting firm Booz Allen Hamilton in 1982.

As it is clearly seen in the business environment nowadays, effective supply chain management seems to be considered as a crucial concern that has to be dealt with in a global business context **(Haghighat 2008).** In the local activities of traditional business, those involving in the supply chain have been doing such activities independently. But at present, it is not advised to perform business independently considering the ever growth of the competitive market **(Xu and Beamon 2006).** Consequently, more developed and well-organized supply chain coordination is ideal for consistent success and profitability of any business. The most convincing reason for such claim is that the ever increasing competition that is constantly influenced by business globalization, product diversity and technological advancement motivated independent firms to work in unity in a supply chain that allows them to gain mutual benefits **(Thomas and Griffin 1996).** In today's business, competition is among integrated supply chains instead of individual organizations. Hence, a supply chain shall be well coordinated and that will play a huge role in making supply chain attainable to customer demands **(Singh RK 2011).** Supply chain coordination also involves cooperation between firms a sharing of important information with each other in the process of developing, producing and distributing goods and services to end marketplaces. Coordination can also be defined as structuring the efforts of a couple or more of supply chain drivers for the outcome of achieving effectiveness and be aware of each other's tasks while working independently to achieve their actual set of goals **(Ning C, Zhiming Z, Kin Man T, Keng PN 2008).** However, lack of coordination occurs in the supply chain, when each stage has incomplete information about the flow of products, information and, funds. Such causes will reduce the supply chain performance as a whole. Thus, supply chain coordination becomes vital to achieving the all level consensus, in which different members along a supply chain can respond to market requirements in proper ways **(Chopra S, Meindl P 2005).**

Indian Dairy Industry is one of the largest and fast growing industries in the country which provide ample job opportunities and contribute significantly to the economy of the country. India now has indisputably the world's biggest dairy industry- at least in terms of milk products, last year (2014-15) India produced close to 100 million, 15% more than US and three times as China **(Shiv Kumar, and Md. Kashif Ansari**). India continued to be the largest milk and its products producing nation in 2013-14 with an anticipated milk production of 137.6 million tonnes. The country's share in world milk production stands at 18 per cent. According to pre-budget Economic survey 2013-2014, India recorded peak production of milk at 132.43 million tonnes (MT) in 2012-13, becoming the top milk producer globally. Milk production in the year 2011-12 was 127.9 MT, according to the **National Dairy Development Board (NDDB)** data. "The average year-on-year growth rate of milk at 4.04 per cent vis-a-vis the world average of 2.2 per cent shows sustained growth in availability of milk and milk products for the growing population,". From chronic shortages of milk, India has emerged as the largest milk producer in the world crossing 132.4 million tonnes in 2012-13 and per capita availability of milk increasing from about 110 grams per day in early-1970s to 299 grams in 2012-13 (GoI, 2014). This success story of milk production has been written primarily by the millions of smallholder producers, who dot the landscape of milk production in the country. Although the yields have remained quite low compared to the world average, the dairy sector has not only survived but also flourished. Several factors appear to have helped it flourish. The "Operation Flood", one of the world's largest dairy development programs, which helped to create strong network and linkages among millions of smallholder milk producers, processors and urban consumers, was an important instrument in achieving this success. It is well known that all this happened under autarky and highly regulated domestic markets.

India is said to have crossed the milestone of the world average per capita availability of 295 grams per day per person, reaching 322 grams in 2014-15. From 2009-10 and 2014-15 it grew at 3.4% on CAGR basis, whereas the estimated growth rate in consumption for 2015 is 4.8% **(Indian Express, April 2015)**. This again indicates that the present growth in milk production is in sufficient to meet the increased needs of growing population for more animal proteins including milk. For a more detailed analysis of the growth in milk supply, we need to understand its two major factors: increase in herd size and improvement in productivity. In 1998 - 99 to 2014-15, milk production in India has grown at a compounded annual growth rate (CAGR) of 4.25%, growing from 72.1 MMT to 146.3 MMT. The highest growth rate of

6.25% seen in 2014-15 surpassed earlier highest growth achieved in 2006-07 of 5.7%. This production level is above the set target of 145.77 MMT and compares well against the estimated milk production of 147 MMT in 2015 **(Mani and Intodia, 2015).**

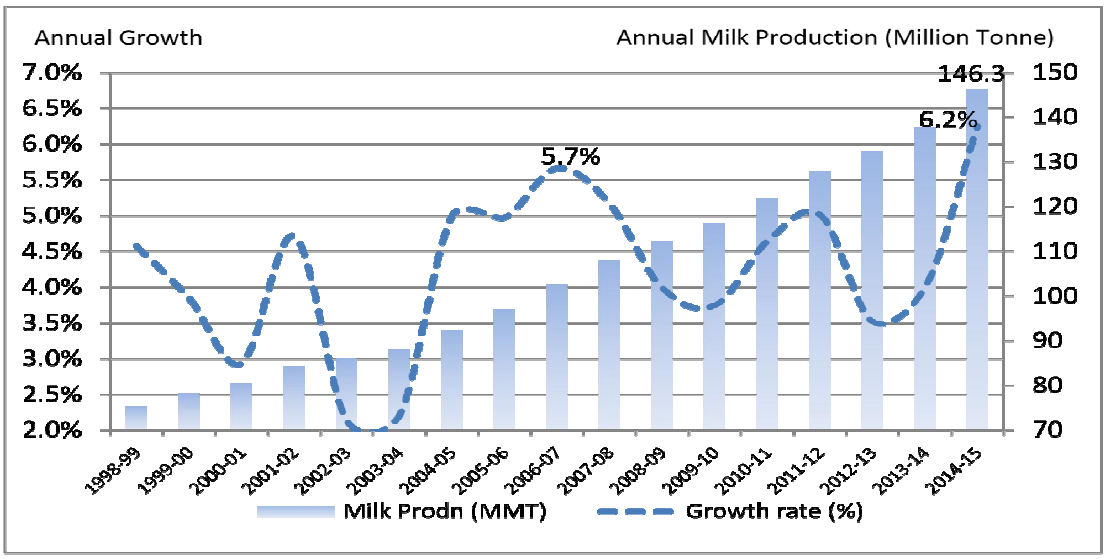


Exhibit 1.1: Milk Production Quantity and Year-on-Year growth rate

Management of supply chain, irrespective of type of industry, has been acquiring considerable importance throughout the world due mainly to the fact that it is the most comprehensive approach integrating all the stakeholders in the system to make the product or the service available at least cost and with maximum customer satisfaction (Bozarth and Handfield, 2006; Chopra and Meindl, 2003). In the case of dairy activity, supply chain consists of coordination of production, procurement, processing and distribution system. The efficient movement of produce chiefly depends on the management of supply chain involving transportation, processing and handling of produce. Supply chain management, therefore, needs to be given top priority as under-developed supply chains are unlikely to help industry (Murali and Roy, 2008). Long term profitability and sustainability can be achieved only if supply chain is realigned into efficient, agile and adaptable network. While extending scalability, such supply chain should have capability to handle larger volumes, expand reach, balance costs and address the demographic variations. Efficient supply chain management involves adequate planning, implementation and control of operations. The present study, therefore, attempts to address issues relating to supply chain management of Indian dairy sector with focus on both cooperative and private sector.

1.2. Problem Statement:

Milk is highly perishable in nature and require immediate processing, storage and preservation, to move them from production areas to demand centers. Therefore efficient supply chain is prerequisites for value creation and addition.

The rapid growth of milk production in India has been mainly because of the increase in the number of animals rather than that of improved productivity. The low productivity of dairy animals is of great concern and average productivity of Indian cow is only 987 Kg/ lactation as against the world average of 2038 Kg/ lactation. The gradual breed deterioration generally occurs from negligence over centuries and consequent rise in the population of non-descript cows (80%) and buffaloes (50%) along with the chronic shortage of feed and fodder coupled with their nutritive values and low fertility of our dairy animals has resulted in the low productivity. In India, low animal productivity results due to climatic, social and economical factors. India possesses enormous bovine wealth, but their per capita production is one of the lowest in the world due to reasons that the farmers do not adopt improved dairy management practices at the desired level.

(Source: Veterinary World)

On estimates by the National Dairy Development Board (NDDB), the demand for milk is likely to reach 180 million tons by 2022. To supply the market, an average incremental increase of 5 million tons per annum over the *next* 15 years is required – a doubling of the average incremental rate achieved over the *past* 15 years. In the absence of sufficient increased production, India will need to rely on the world market for imports. And because of the huge volume required, it will affect global milk prices. But the average milk yield of Indian cows is about 4 kg per day which is very low when compared to other major milk producing countries. For instance, the average milk yield per cow is 7.8 Kg per day in China, and 25.6 kg per day in the US. The main reason for low production is, in breeding the emphasis has been on breed improvement through cross-breeding, with little attention to improvement of indigenous breed. The other problem for dairy production at input and production stages include low quality and poor timeliness of AI and animal health service provision, where farmers complain about the inefficiency of the AI services

(Source: National Dairy Development Board NDDB)/ (Source: Global Agriculture Information Network.)

The Indian supply chain for milk products is affected by abnormal wastage and poor handling. The wastage occurs because of multiple points of handling. A report by Dr. Saumitra Chaudhuri Committee in 2012 constituted by the then Planning Commission had indicated that the cold storage requirement of 61 million tonnes but the present capacity of cold storage is estimated at around 32 million tonnes in the country. The table shows the loss of milk at various stages

Table 1.1: losses in milk transportation

Commodity/ Crop	Losses during Transportation (%)	Losses during Farm Operations (including transportation loss) (%)	Losses during Storage (%)	Overall Total Loss (%)	Monitory value of the loss (in Rs. crore)
Milk	0.02	0.71	0.21	0.92	4409

(Source: Press Information Bureau Government of India Ministry of Food Processing Industries 2016)

The co-operative dairy plants in India are handling milk much below their installed capacity and face severe competition from the private milk vendors. According to the NDDB, the total dairy cooperative processing capacity is approximately 43 million liters per day; however, only 77 percent of total capacity is used. Total private sector processing capacity data are unavailable; however, the NDDB believes it could be as high as 73 million liters per day. This is because only approximately 30 percent of India's total milk production is further processed or pasteurized via the organized sector, which includes government supported dairy cooperatives and licensed private sector dairies. With growing demand for fluid milk and other value-added dairy products, cooperatives and private dairy companies are expanding their distributional network and processing capacities. Most state players distribute product at the state or regional level; only a few have a wider national presence.

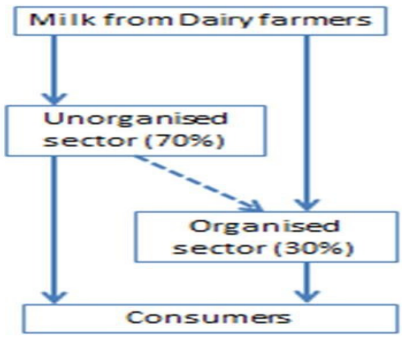


Exhibit 1.2: Relation between organized and unorganized sector

(Source: working paper No. 518 IIM-B 2016), (Source: Export-Import Data Bank: Directorate General of Foreign Trade)

Due to low handling capacity of co-operative dairy plants, the cost of procurement, processing and distribution has increased enormously. The price of milk, an important item contributing to the steady rise in the milk products. In the last one year from May 2013 to May 2014, the consumer price of milk has risen by 14.5%. Continues increase in procurement have led to increase in milk price.

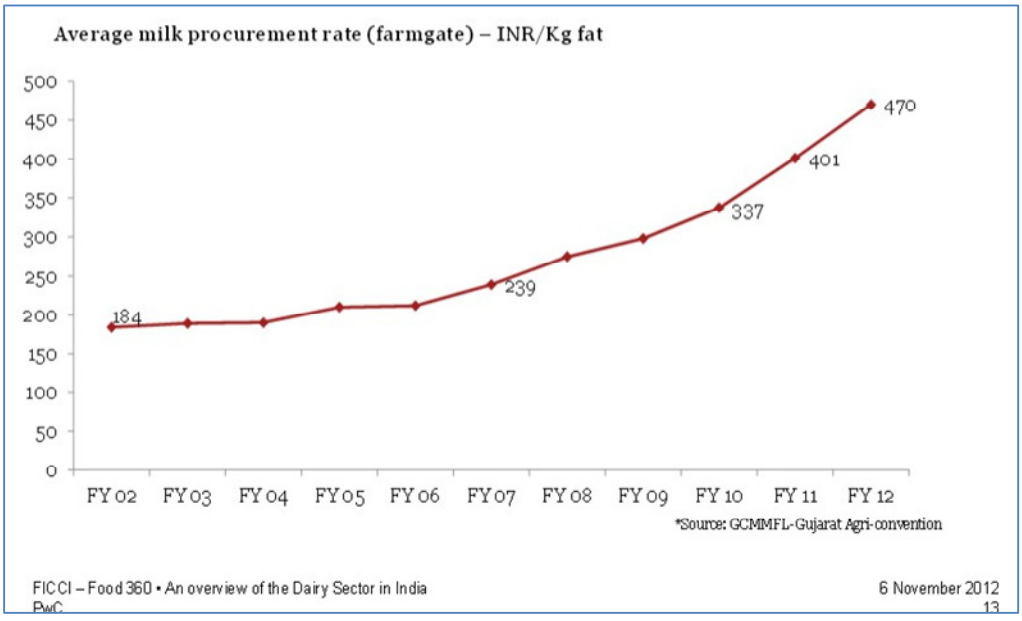


Exhibit 1.3: Average milk procurement price (Rs./Kg butter fat)

(Source: IIMB-WP N0. 472)

This is particularly challenging given what a study from the Associated Chambers of Commerce and Industry of India (ASSOCHAM) said is the country's "concentration" of milk production in pockets of the state. That is good news for companies based in areas with burgeoning dairy sectors, such as Andhra Pradesh, Rajasthan, Kerala, Karnataka and Gujarat. However, other states have much lower dairy production, for instance northern states such as Jammu & Kashmir, or Himachal Pradesh. This, together with the high cost of transportation in India's under-financed infrastructure has led to increasing disparities between states in terms of per-capita milk availability, according to the ASSOCHAM report. The leading livestock producing states, such as Punjab, Haryana, Gujarat, and Tamil Nadu, where livestock activity is increasingly a commercialized and market-driven enterprise. It is backed by relatively higher levels of animal productivity, and contributes significantly to agricultural output and rural poverty reduction in these states. In Punjab, for example, the share of livestock's output in total agricultural output is 35 percent. The average dairy animal productivity in Punjab is nearly 2,000 kg/lactation compared to an all India average of 1306 kg/lactation.

Table no. 1.2: Milk production of different states.

Milk Production BY States					
('000 tonnes)					
State	11-12	13-Dec	13-14	14-15	15-16
All India	127904	132431	137685	146314	155491
Andhra Pradesh	12088	12773	13007	9656	10817
Gujarat	9817	10315	11112	11691	12262
Haryana	6661	7040	7442	7901	8381
Madhya Pradesh	8149	8838	9599	10779	12148
Uttar Pradesh	22556	23330	24194	25198	26387
Uttarakhand	1417	1478	1550	1565	1656
Source: Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, GoI					

(Source: Global Agriculture Information Network)

1.3. Objectives:

1. To analyze the marketing cost, marketing efficiency, price spread, marketing margin received at different channels of supply chain of milk.
2. To recommend strategies for improvement in the supply chain of milk.

1.4. Work already done:

Cohen and Huchzermeier presented a survey of the literature pertaining to analytic approaches for global supply chain strategy analysis and planning. The integrated supply chain network model is developed to capture the complexities of a multi-product, multi-echelon, multi-country, multi period planning problem for the optimal choice of facility locations, capacity and technology used.

Dr. N. MariMuthu and Dr. M. Subbarayulu(1987), in their article, studied the problems pertaining to dairy industry under different heads namely problems related to milk producers society Organisation setup, Problems related to Feeding system, Problems related to Breeding system, Problems related to Management system, Problems related to Health Input System, Problems related to Milk production system, Problems related to Milk marketing system etc and stated that there is an excess availability of unproductive milchi animals and felt that fodder problem poses a real challenge to dairy industry.

Anjani Kumar et al (2010), in his study examined the different alternatives of milk chains and their impact on milk producers. The data collected through field surveys was used to estimate the costs and benefits for different stakeholders in milk supply chain, viz. milk producers, traders and processors. Partial budget analysis was carried out to estimate and compare costs and returns of these stakeholders. Quantities of inputs used and output obtained, marketed and consumed were calculated as the mean of sample households in the survey area. The study observed that the profit margin of those farmers who are adopting modern channels for marketing milk supply chain is more than that of others because of their ability to follow modern practices to run their farming activity which helped them to reduce cost of producing milk.

Pramod Kumar Mishra, Prof. B. Raja Shekhar (2011) et al in their work, studied the various risks and uncertainties from a dairy industry perspective and their impact at various stages of the supply chain. Mostly survey based research method has been adopted to gather information from various stakeholders in the system along with in-depth personal interviews with the corporate authorities. It is estimated that only about 5 percent of the milk market is handled by the organized sector in Orissa and the rest 95 percent of the market is unorganized. Lower involvement of the milk producers in the societies brings down collections and lower level of collection due to low production increase the cost of collections and decrease profit substantially thereto.

Dr. Gouri Krishna Saha, (2014) identified a number of problems faced by the milk farmers. The major problems faced by the milk farmers include small herd strengths, small land holdings, shortages of green and dry fodder, low productivity of animals, non-availability of timely inputs for breeding, feeding and health care of animals, lack of suitable education/training for skill development for new viable and sustainable technology, inadequate finances, poor rural infrastructure facilities and lack of proper marketing support for their produce.

Vijay Paul Sharma, (2015) et al studied the determinants of smallholder milk producers' participation in modern supply chains, the impact of this participation on growth of smallholder milk producers in terms of farmers' income, production, and technology choices and concluded that Market infrastructure such as road, provision of veterinary services, distance from milk collection center, markets, price risks, etc. are found to have significant effects on farmers' marketing choices.

2. Industry Description:

India has always been the largest producer (an estimated 400 million litre per day currently) and consumer of milk in the world. But it remained a boring market largely because the per capita consumption was low, and most of the milk was consumed in its basic, liquid form, or at best as ghee and some butter.

Over the past few years, though, a couple of things have changed to make the market vastly more attractive to new players. One, as global dairy consumption stagnates or even dips, Indian consumption is going up. India's per capita consumption of milk at 97 litres a year is way below that of western countries like the US, which boasts per capita consumption of 285 litres per year, or the EU, which consumes 281 litres per capita per year. But while Indian per capita demand is going up 4.5 per cent year-on-year, global per capita consumption is growing at an anaemic 1.5 per cent, and in some countries in the West it may actually be falling, points out T. Nandakumar, Chair-man, National Dairy Development Board (NDDB).

The second reason is that the Indian consumer - especially the affluent urban consumer - is consuming more value-added products, which bring in bigger profits for dairy companies than raw milk. The fact that the Indian cooperatives had largely stuck to basic milk, butter, processed cheese slices and ice cream for many decades, had left a gap in the market that allowed some of the new players to come in with new product offerings. And the phenomenon of working couples, single men and women with high disposable income also provided the impetus to look at the category with fresh eyes. Finally, global prices of milk are dipping because of overcapacity, while the Indian market is still growing, both for basic milk as well as for value-added products.

Out of the 400 million litres of milk that India produces per day, 160 million litres per day (48 per cent) is retained by the producers for their own consumption. The surplus milk that is available for sale is around 240 million litres per day (52 per cent) and out of that only 70 million litres per day is being used by the organised sector - consisting of co-operatives such as Amul, Mother Dairy (wholly-owned subsidiary of NDDB) and Nandini (a brand owned by the Karnataka Cooperative Milk Producers Federation (KMF), as well as private sector players such as Nestle and Danone. Over 170 million litres of the surplus milk continues to be with the unorganised sector, comprising traditional doodhwalas. In value terms, the Indian

milk economy is worth Rs 5 lakh crore, growing at a CAGR of 15-16 per cent, out of which the organised milk economy is worth Rs 80,000 crore.

Over 80 per cent of milk consumption in India is that of liquid milk and over 55 per cent of the revenue of large co-operatives, such as Amul and Nandini, comes from selling liquid milk. There are still limited takers for value-added dairy products such as cheese, yogurts or flavoured milk, but this is where much of the action is taking place today simply because of its higher margins, and the ability to differentiate and introduce new products. Equally, the fact that the milk cooperatives did not tap this market until the multinationals came in made it an area where the competition was relatively equal.

3. Methodology

To attain the objectives of this study following research methodology would be adopted

3.1. Research Design

Descriptive research design will be used for the study. The basic emphasis of the study is to assess the factors responsible for inefficiencies of existing supply chain of milk.

3.2. Information required

The study emphasis on the existing supply chain of milk production. The basic emphasis of the study is to assess the factors responsible for ineffectiveness of existing supply chain of milk.

3.3. Data Source

Both primary and secondary data was collected to accomplish this study.

Secondary data: The secondary data was collected from books, journals and magazines.

Primary data: The primary data for the study was obtained through personal interview of the farmers, traders (processors, retailers).

For the collection of primary data open and close ended questionnaire will be used.

3.4. Area of study

Udham Singh Nagar district of Uttarakhand is chosen as area of study.

3.5. Sampling plan

3.5.1. Universe

All the farmers involved in production of milk in Udham Singh Nagar district of Uttarakhand will serve as universe for the study.

3.5.2. Sampling Unit

Sampling unit for the study will include farmers involved in production of milk in highest production blocks.

3.5.3. Sampling Technique

Multistage sampling will be used. Judgmental sampling method will be used for the selection of blocks and villages. Multistage sampling has been used for selection of farmers in order to obtain proper information.

3.5.4. Sampling Size

For the study, 60 producers, 30 traders which will include wholesalers, retailers and contractors will be selected. Total number of sampling size will be 90.

No. of Farmers – 60

No. of Traders – 30

3.6. Research Instrument

Data would be collected through structured questionnaire, by observation and personal interview of farmers. Questionnaire would consist both open-ended and close ended questions.

3.7. Analysis of Data

Proper mathematical and statistical tools will be used for the analysis of data. The project will be carried out to accomplish the stated objectives. Methods such as Shepherd Method and Acharya and Agarwal method will be used for the calculation of marketing system, efficiency marketing cost, marketing margin, price spread and efficiency related to the supply chain of tomato.

3.8. Statistical technique

Different techniques were used for different objectives

Tabular analysis: Market margin, Market cost, Price spread, marketing efficiency

Graphical: Pie chart for Market cost and Price spread

Flow chart for market channels: For all the identified supply chain

Market efficiency

Acharya's modified market formula

MME=FP/(MC+MM)

Where,

MME is modified measure of market efficiency

FP is price received by farmer

MC is marketing cost

MM is marketing margin

Price spread

It is the difference between the price paid by the consumer and price received by the producer.

For e.g. P1-P2

Where,

P1 is the price at one level in the market

P2 is the price at another level

Producer share in consumer rupee

PS= (PF/PR)*100

Where,

PF is price received by farmer

PR is retail price

Marketing margin of middle men

Ami=Pri-(Ppi+Cmi)

Where,

Pri is total value of receipt per unit

Ppi is the purchased value of goods per unit

Cmi is the cost incurred on marketing per unit

3.8. Duration of Research

Research will be conducted for a span of 2 months i.e. from 11th March, 2017 to 11th May, 2017.

4.Result and Discussion

The present study was undertaken to find out the problems that occur in the supply chain of Milk in Udham Singh Nagar region of Uttarakhand and also to understand the price spread, marketing cost and marketing efficiency related to various supply chain of litchi.

4.1 Farmers rearing no. of cattle:

The distribution of the farmers on the basis of farm holdings is shown in Exhibit 4.1, which is based on the farmers with operating land holding less than one hectare, between one to two hectare, between two to four hectare and more than four hectare.

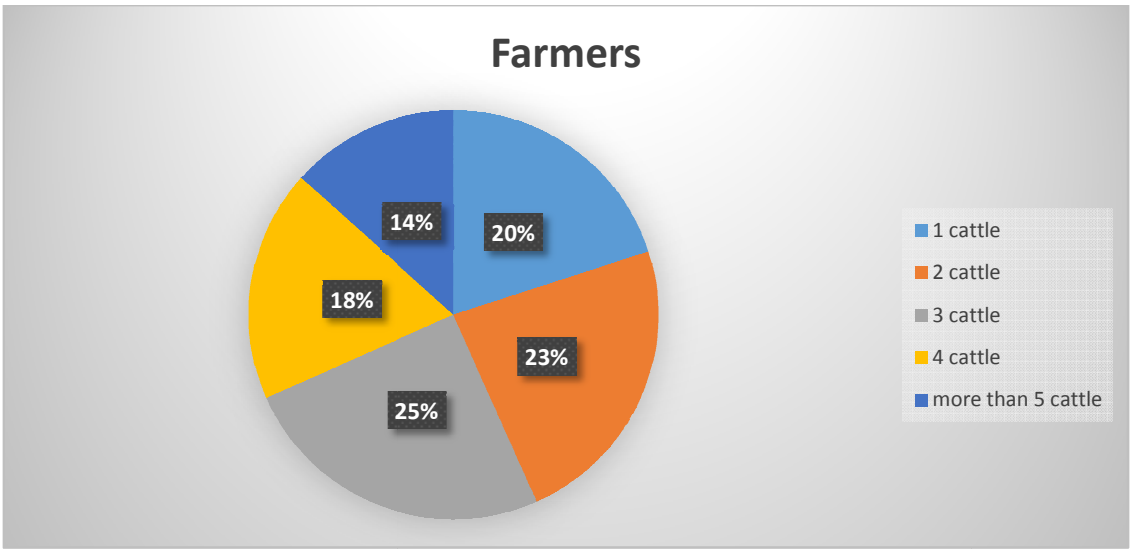


Exhibit 4.1: Farmers rearing no. of cattle

It is clear from the exhibit that about 20 percent farmers were rearing only 1 cattle and 23 percent are rearing only 2 cattle's. Another 25 percent of farmers were found with 3 cattle rearing. 18 percent of farmers are rearing 4 cattles and 14 percent farmers are rearing more than 5 cattle. Based on this one can infer that farmers are rearing 2 -3 cattles.

4.2 Cattle varieties rear by farmers

Generally two varieties of cattle are reared by farmers indigenous and exotic. Indigenous cattle are local breed (giri, Sahiwal, mura) and exotic cattles are frogen breeds (jersey, holeistian ferasian).

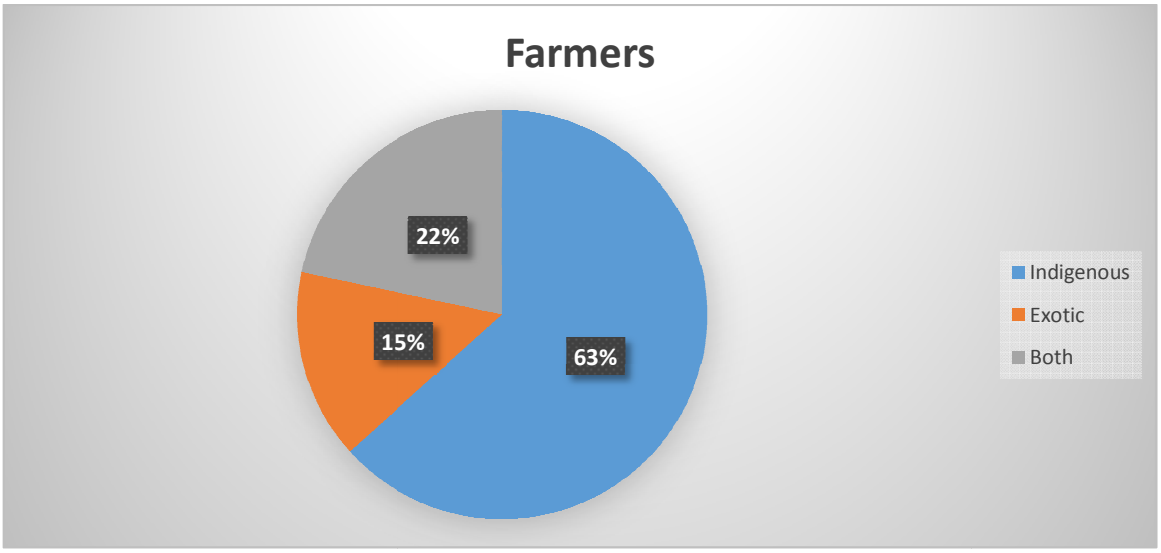


Exhibit 4.2: Cattle varieties rare by farmers

Exhibit 4.2 shows that maximum farmers are rearing indigenous breed i.e. 63 percent followed by exotic breed (15%) and 22 percent of farmers are rearing both breed. The maximum breed reared by farmers are indigenous variety because can easily adapt in these climatic condition.

4.3 Milk Production of over last five years in Uttarakhand

Milk profile of Uttarakhand in the past five years from 2011-12 to 2015-16 shows the increasing production.

Table: 4.1 MILK IN (000) TONNES

	2011-12	2012-13	2013-14	2014-15	2015-16
Uttarakhand	1417	1478	1550	1565	1626

Source: Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, GoI

Cattles	2001–02	2013–14	Change (%)
Milching cow (indigenous)	389,554	466,060	19.3
Milching cow (cross-breed)	40,041	155,732	288.9
Milching buffalo	457,600	541,939	18.4

Table 4.1 reveals that production has increased 3.8 percent from previous year because there is increase in milching cattles. Mulching cattles has increased as there is large demand of milk in day to day working of people.

4.4 Existing supply chain of Milk (Channel I)

Supply of milk through this channel was **90 %** and this traditional method is adopted by farmers for selling of their milk. Thus, channel I was very long due to presence of various other intermediaries which is shown in exhibit 4.3.

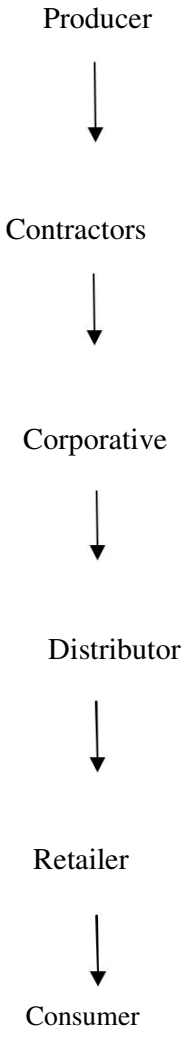


Exhibit 4.3: Milk supply through (Channel I)

4.5 Supply chain of Milk through (Channel II)

Supply of milk through local retailer was **20 %** and adopted by farmers because they have not enough facilities to sell their produce and wanted to sell it immediately in the market so they sold the products to local retailers who were local milk men who then sold milk directly to consumers. Thus, channel II was short and is shown in exhibit 4.4.

Exhibit 4.4: Milk supply through (Channel II)

4.6 Price spread in channel I

At the time of purchase, contractors' pays amount to farmers on their produce as per the quality of the milk i.e. according to the fat content present in milk. **Cost is total cost which includes production cost, maintenance cost and marketing cost**. In case of channel I producer's price realization in consumer's purchase price was only **66%** and price spread was **17%**. Table 4.2 showing the price spread in channel I.

Table 4.2: Price spread in case of Channel I

Sr. no.	Particulars	Price (Rs./lit)	% share in consumer's price
A.	Gross price received by the producer	33	**66**
B.	Cost incurred by the producer	20	**40**
C.	Net price received by the producer	13	**26**
D.	Cost incurred by contractor	6	**12**
E.	Contractor sales/ Corporative purchase Price	41	**82**
F.	Margin of contractor	2	**4**
G.	Cost incurred by corporative	3.42	**6.8**
H.	Corporative sales price/distributor purchase price	47.58	**95.16**
I.	Margin of corporative	3	**6**
J.	Cost incurred by distributer	.42	**.84**
K.	Distributor margin	1	**2**
L.	Distributor sales price/retailer purchase price	49	**98**
M.	Cost incurred by retailer	.30	**.6**
O.	Retailer margin	.70	**1.4**
P	Retailer sale/ Consumer purchase price	50	**100**
Q.	Price spread	**17%**	

4.7 Price spread in channel II

Other method used by farmers was selling milk directly to local retailers. In this case the producer's price realization in consumer's purchase price was **73.8%** and price spread was **11%**, so farmers received maximum benefit in this channel as there is no bar of quality in this chain but production and supply risks were beard by farmers themselves. The price spread has been given in table 4.3.

Table 4.3: Price spread in case of Channel II

S. no.	Particulars	Price (Rs./lit)	% share in consumer's price
A.	Gross price received by the producer/ Purchase price of retailer	31	**62**
B.	Cost incurred by the producer	20	**47.61**
C.	Net price received by the producer	11	**26.19**
D.	Cost incurred by retailer	5	**11.9**
E.	Retailer's margin	6	**14.28**
F.	Retailer sales price/consumer purchase price	42	**100**
G.	Price spread	**11%**	

4.8 Marketing cost, margin and efficiency of channels

The important calculation of the study manifested in table 4.4. The marketing cost comparison of channel I with channel II, marketing margins bear by producer and intermediaries in both the channels and marketing efficiency (with the SHEPHERD'S METHOD and ACHARYA & AGARWAL'S METHOD). The result of this calculation reveled that channel II was far effective then channel I in any comparison. In the market, sale and purchase of milk happened in liters. Transport of milk to domestic local and interstate market was done in quantity (MT).

Table 4.4: Marketing cost, margin and efficiency of different channels (Rs/ lik)

Sr. No.		Marketing cost	
	Farmer's price (per lit)		
1	Particulars	**Channel-I**	**Channel-II**
1.1	Producer	20	20
1.2	Contractor	6	––
1.3	Corporative	3.58	
1.4	Distributor	.42	––
1.5	Retailer	.30	5
I	**Total marketing cost**	**30.3**	**25**
2		**Marketing margin**	
2.1	Producer	---	--
2.2	Contractor	2	––
2.3	corporative	3	
2.3	distributor	1	––
2.4	Retailer	.70	6
II	**Total marketing margin**	**6.70**	6
3		**Marketing efficiency**	
3.1	Net price received by grower (GP) or (FP)	33	31
3.2	Consumer price (V)	50	42
3.3	Total marketing cost (I) or (MC)	30.43	25
3.4	Total marketing margin (MM)	6.70	6
	Total (I+II)	**37.13**	**31**
III	**Marketing efficiency (Shepherd's Method)**	**0.88**	**1**
IV	**Marketing efficiency (Acharya and Agarwal's)**	**0.34**	**0.68**

Marketing cost is the only cost considered in the table 4.4.

The conclusion of all calculations such as total marketing cost, marketing margins, producer's share in consumer's rupee, price spread and marketing efficiency in channel I and channel II was summarized in table 4.5. In the very first sight, it has been clear that channel II is more effective and needed a consideration to be formulated.

Table 4.5: Results of all calculation for both channels

Sr. No.	Particulars	Channel-I	Channel-II
1	Total marketing cost	Rs. 30.43	Rs. 25
2	Total Marketing margins	Rs. 6.70	Rs. 6
4	Producer's share in consumer's rupee	66%	73.8 %
5	Price spread	17%	11%
6	Marketing efficiency (Shepherd's Method) Marketing efficiency (Acharya and Agarwal's)	0.88 0.34	1.0 0.68

4.9 Constraints faced by the stakeholders at different stages involved in milk supply chain

As milk is a highly perishable commodity, so the stakeholders involved in its supply chain has to face many problems for its early distribution to customers.

4.9.1 Problems faced during purchasing stage of cattle -

It is the primary stage in the supply chain of milk. As cattles are the only source of the milk. According to the survey conducted, 36% of the farmers believed that the reliability of cattle milk production as promised by the owner is the major problem that they face at purchasing stage followed by high price of cattle (27%), availability of cattle in local area (22%) and transportation of cattle (15%).

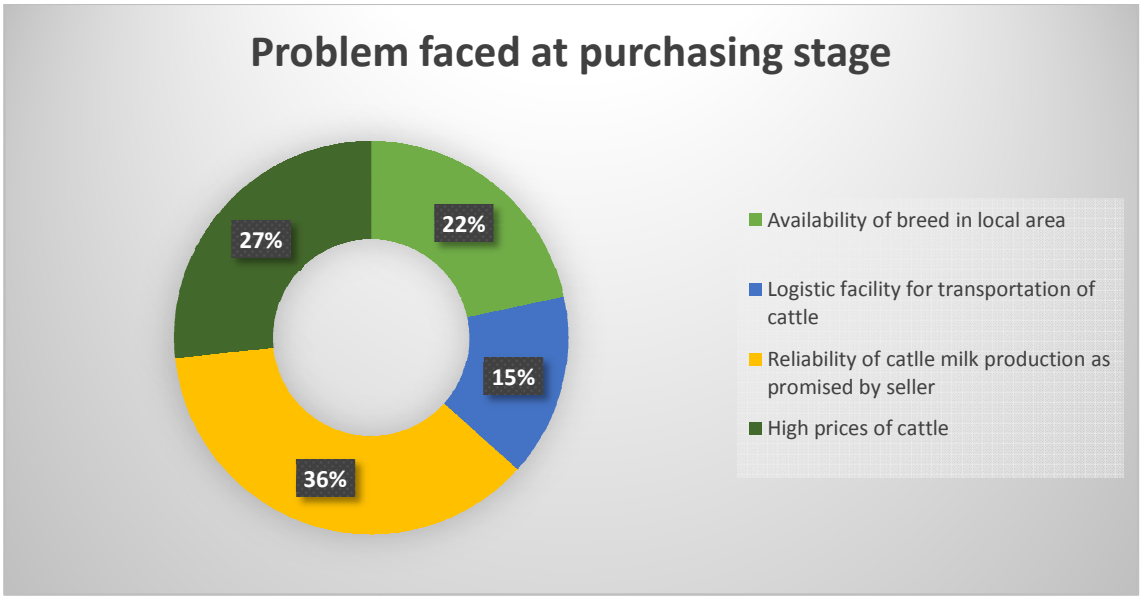


Exhibit 4.5- Problems faced at purchasing stage

4.9.2 Problems faced during Production stage

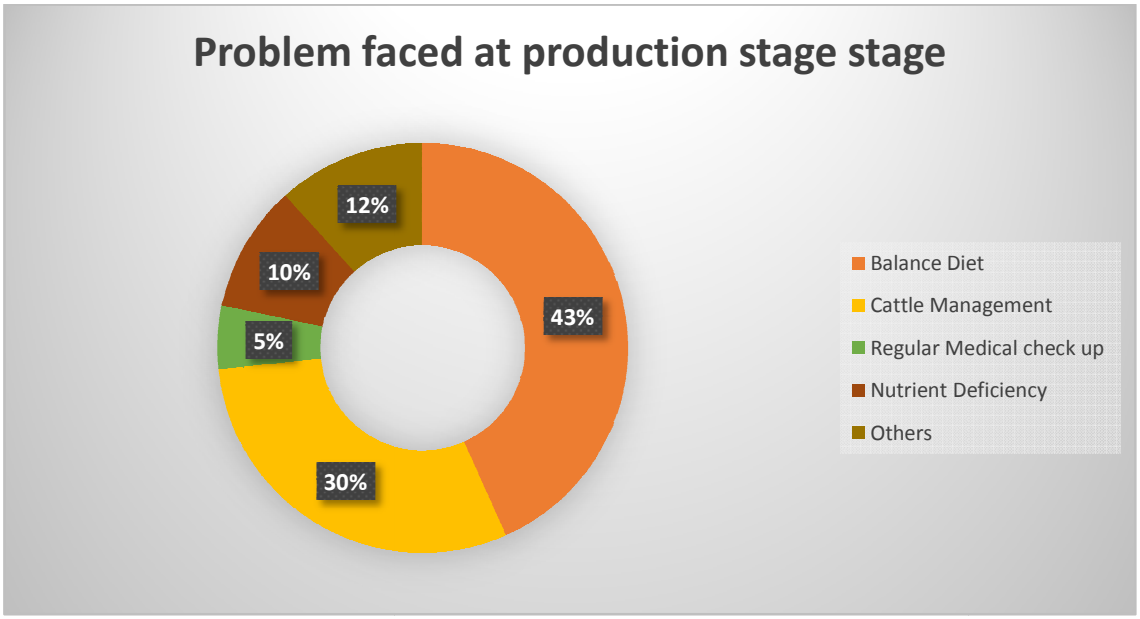


Exhibit 4.6 – Problems during production stage

During production stage, the major problem that arise is of balance diet (43%) followed by cattle management (30%) and nutrient deficiency (10 %). Whereas 6% of the respondents feel regular check up of cattle in the problem while 12% of the respondents belief other factors such as long gestation period, climate changes, insurance of cattle etc. lead to lower production.

4.9.3 Problems faced during Harvesting and Storage

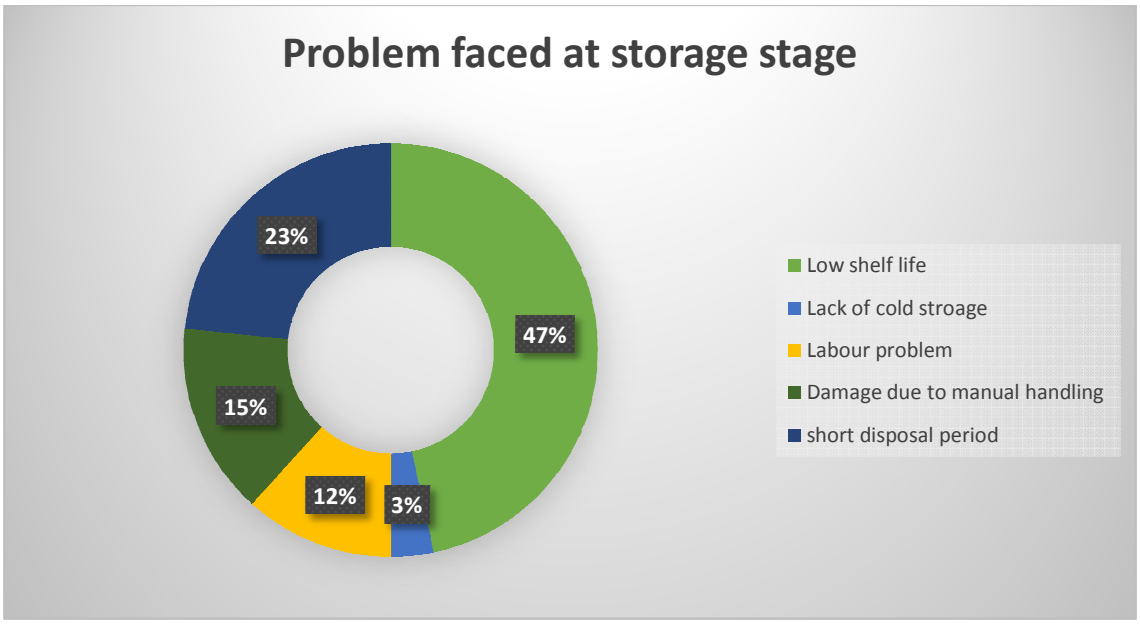


Exhibit 4.7 – Problems during Storage stage:

The shelf of milk is very low. According to the survey conducted, 47% farmers believe that the low shelf life of milk is a major problem and due to non- availability of the cold storages this problem becomes more severe. Damage due to manual handling of milk especially during loading and unloading of milk adds in loss of product. Low shelf life leads to short disposal period this problem worsens leading to huge loss in the income of the farmer.

4.9.4 Problems faced during Transportation Stage –

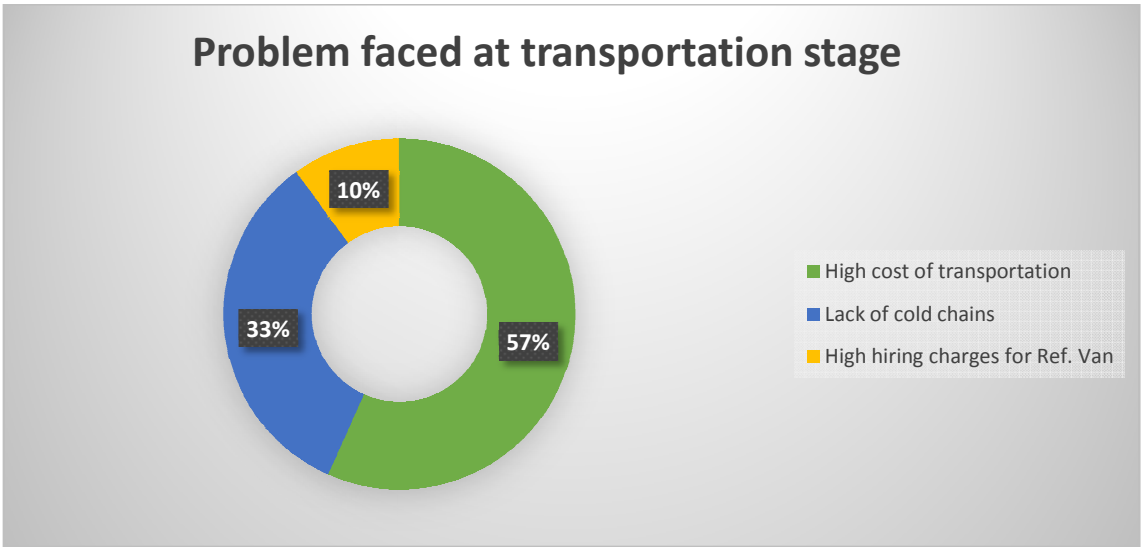


Exhibit 4.8 Problems during Transportation stage

During transportation, major problem faced by 57% of the farmers came out to be high cost of transportation. Lack of cold chains in the area is another major problem because milk is highly perishable crop. In Uttarakhand almost all of the cold chains are for Apple. Lack of refer vans cause damage during transit because of perisible nature of milk.

4.9.5 Problems faced during Marketing stage-

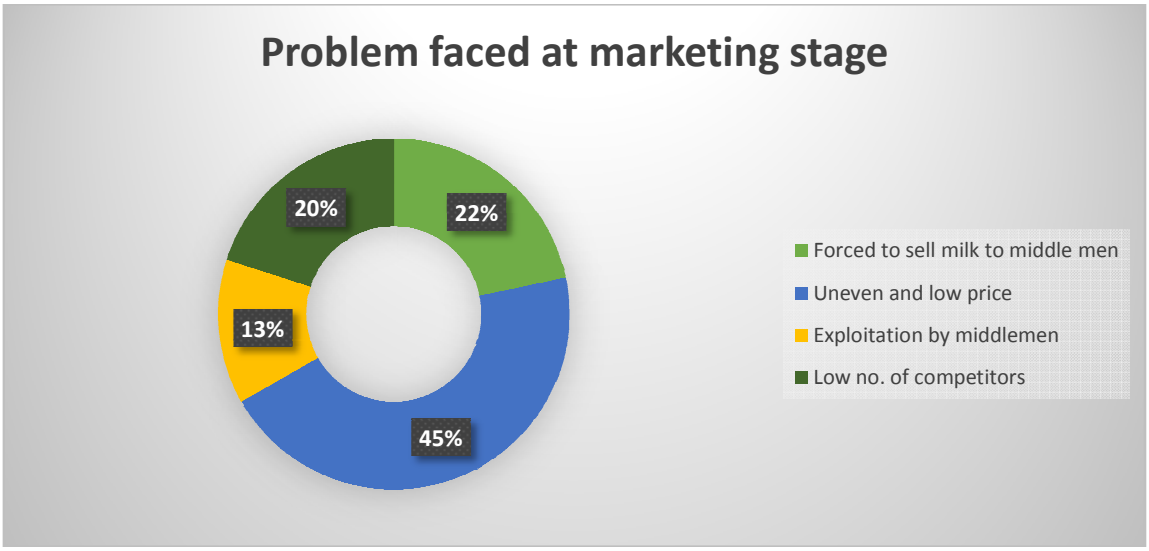


Exhibit 4.8 – Problems during Marketing stage

During marketing stage, 45% of the farmers face the problem of uneven and un-remunerative prices. Some middlemen also exploit farmers in the wholesale market by using unethical means during auctioning. Large number of intermediaries also add to the total cost paid by the consumer.

4.10 Strategy for improving the efficiency of litchi marketing

Exhibit 4.10- Recommended Supply chain

5. RECOMMENDATIONS FOR ACTION

There is always a huge difference in between price paid by consumers and received by farmers so following recommendations based on findings can short this difference and leads a better price realization for producer and good quality produce to consumers:

1. **Cooperative model:** There should be a co-operative society model of producers that can be channeled by a company like Mother Dairy, AMUL, PARAS or other processing companies. For example, company may have a collection center in kiccha or Udham singh nagar where fresh milk can be collected from nearby villages and this model can be institutionalized for improving milk supply chain.

2. **Infrastructure development:** One of the major problems encountered is the road transport and far areas connectivity in Udham singh nagar, the problem becomes worse in heavy traffic and bad weather. So there should be an initiative for development of **Cold storage at the colletion center in villages & Refrigerated Vans/trucks** for longer shelf life, milk chiled at 4 degree Celsius, increases its shelf life by 24 hours.

3. **Awareness and information:** An institution or portal should be developed and established to get the real time information of price, market, demand and quantity as well as availability of produce which can help both producer and consumers in a manner by providing advantages both in case of product and price.

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QUESTIONNAIRE

NAME- …… OCCUPATION- ……

PLACE- ……..... CONTACT NO-…….

S.no	Particulars	Problems	Response				
			Strongly disagree	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**
1.	**Purchasing Stage**	Availability of breed in local area					
		Sources to buy cattle (local fair, animal center)					
		Logistic facility for transportation of cattle					
		Cattle purchase own purpose					
		Cattle milk use for dairy purpose					
		Reliability of cattle result as promised by seller					
		High prices of cattle					
2.	**Production Stage**	Regular check up by doctor					
		Availability of green fodder					
		Proper cleaning of cattle					
		Use of mineral mixture in diet					
		Concrete floor for cattle					
		Mud floor for cattle					
		Use to fan in high temp.					
		Availability of doctor in locality					
		Availability of medical store in locality					
		Availability of cattle feed					
		Insurance of cattle					

4.	**Storage**	Use of plastic can or bucket					
		Use of aluminum can or bucket					
		Lack of cold storage facilities					
		Proper packaging material					
		Damage due to manual handling during loading and unloading					
5.	**Transportation Stage**	Rough roads					
		Lack of cold chains					
		Lack of dairy in village					
		High cost of transportation					
		High hiring charges for Ref. Van					
6.	**Marketing stage**	Low price during main season					
		Presence of exploitative middlemen in wholesale market					
		Un-remunerative price received by the dairy or milk men					
		Forced sell to milk to milk men due to lack of corporative society.					
		Variation in commission in local/regional wholesale market					
		Lack of producers' syndicate for marketing					
		Large number of intermediaries					

A. PRICE SPREAD

S.NO	INTERMEDIARIES	PURCHASE PRICE	SELLING PRICE	MARGIN%
1.	PRODUCER			
2.	CONTRACTORS			
3.	CORPORATIVE			
4.	DISTRIBUTOR			
5.	RETAILER			
6.	CONSUMER			

B. MARKETING COST

S.No.	Particulars	Grower/PHC	Wholesaler	Retailer	Consumer	Total
1.	Cattle maintenance cost					
2.	Labour charges					
3.	Transportation					
4.	Chilling charges					
5.	Storage charges					
6.	Packaging charges					
7.	Miscellaneous charges					
8.	TOTAL					

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