

Pre-Feasibility Study

DAIRY FARM

(200 Cows)



Small and Medium Enterprises Development Authority

Ministry of Industries & Production

Government of Pakistan

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DISCLAIMER

The purpose and scope of this information memorandum is to introduce the subject matter and provide a general idea and information on the said area. All the material included in this document is based on data/information gathered from various sources and is based on certain assumptions. Although, due care and diligence has been taken to compile this document, the contained information may vary due to any change in any of the concerned factors, and the actual results may differ substantially from the presented information. SMEDA does not assume any liability for any financial or other loss resulting from this memorandum in consequence of undertaking this activity. The prospective user of this memorandum is encouraged to carry out additional diligence and gather any information he/she feels necessary for making an informed decision.

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1 INTRODUCTION TO SMEDA

The Small and Medium Enterprise Development Authority (SMEDA) was established with the objective to provide fresh impetus to the economy through the launch of an aggressive SME support program.

Since its inception in October 1998, SMEDA had adopted a sectoral SME development approach. A few priority sectors were selected on the criterion of SME presence. In depth research was conducted and comprehensive development plans were formulated after identification of impediments and retardants. The all-encompassing sectoral development strategy involved recommending changes in the regulatory environment by taking into consideration other important aspects including finance, marketing, technology and human resource development.

SMEDA has so far successfully formulated strategies for sectors including, fruits and vegetables, marble and granite, gems and jewelry, marine fisheries, leather and footwear, textiles, surgical instruments, transport and dairy. Whereas the task of SME development at a broader scale still requires more coverage and enhanced reach in terms of SMEDA's areas of operation.

Along with the sectoral focus a broad spectrum of business development services is also offered to the SMEs by SMEDA. These services include identification of viable business opportunities for potential SME investors. In order to facilitate these investors, SMEDA provides business guidance through its help desk services as well as development of project specific documents. These documents consist of information required to make well-researched investment decisions. Pre-feasibility studies and business plan development are some of the services provided to enhance the capacity of individual SMEs to exploit viable business opportunities in a better way.

This document is in the continuation of this effort to enable potential investors to make well-informed investment decisions.

2 PURPOSE OF THE DOCUMENT

The objective of the pre-feasibility study is primarily to facilitate potential entrepreneurs to facilitate investment and provide an overview about dairy and livestock farming. The project pre-feasibility may form the basis of an important investment decision and in order to serve this objective, the document covers various aspects of dairy and livestock concept development, start-up, production, finance and business management. The document also provides sectoral information, brief on government policies and international scenario, which have some bearing on the project itself.

This particular pre-feasibility is regarding "Dairy Farm" which comes under "Agriculture and Livestock" sector. Before studying the whole document one must consider following critical aspects, which form the basis of any investment decision.



3 CRUCIAL FACTORS & STEPS IN DECISION MAKING FOR INVESTMENT

Dairy production is all-inclusive activity, related to animal care, reproduction, feeding, and management. It is defined as all those aspects and activities relating to rising of dairy animals during their various phases of life to get wholesome milk. Before making the decision, whether to invest in the dairy and livestock farming or not, one should carefully analyze the associated risk factors. A SWOT analysis can help in analyzing these factors, which can play important role in making the decision.

3.1 Strengths

- Back bone and main stay of economy. Provides raw material for food & Leather industry.
- Major source of food, i.e. Milk & Meat
- Source of Farmyard Manure (FYM).
- Sizeable foreign exchanges earning through exports.
- Wide scope of Milk Production, ranking 5th in the world.
- Ample human resource employment sector.
- Stationed, Permanently located secured loaning sector.
- Huge demand and supply gap in dairy sector

3.2 Weaknesses

- Lack of appropriate knowledge, research extension
- Lack of commercially viable breeds of animal
- Lack of education and initiative in farmer, traditional approach due to lack of skills and management.
- Unorganized sector, unaware of basic farm management practices.
- Remote area, lack of farm to market approach & transportation.
- Non-availability of communication services.
- Lack of farm/ market infra structures & marketing information.
- Lack of record keeping on farm.
- No or low application of research work and pedigree record keeping.
- Management of dairy farm is a challenging job.
- Nutrition is still a problem hampering the livestock productivity in general and milk production in particular
- Enormous production losses due to endemic diseases every year.

3.3 Opportunities

- Govt. of Pakistan & Sate Bank of Pakistan priority sector.
- Dairy products needs are 30% higher than supply.
- Ample opportunities are available in the Banking Sector.
- Commercially viable sector with great credit potential and absorption capacity.
- Vast range of area of operation, more needs and scope of development.
- Value added dairy products are in demand.



- Massive migration of labor to cities can be checked / stopped.
- Corporate financing will become a niche in lending market.
- Cooperatives can play a big role for development in dairy sector like India, Australia and United States

3.4 Threats

- Implementation of WTO will result in open & competitive commodity pricing.
- Due to fear of default, banker community has reluctance for lending loans.
- High risks of diseases in live stock.
- Defective and unorganized markets.
- Imbalance between prices of inputs & outputs.
- Rising trend of cost of production with higher rate of interest as compared to profit ratio.
- Lack of media projection, non-recognition of problems and monopoly of multinationals.
- Lack of community organizations and out dated farm practices.
- Lack of coordination towards common causes & goals.
- Lack of awareness about economics, demand & supply in market.
- Low saving, low holding capacity. Increasing level of poverty.
- Non-availability of subsidy, tax holidays.

4 MARKET POTENTIAL

Livestock plays an important role in the economy of the country. Livestock sector contributed approximately 51.8 percent of the agriculture value added and 11.3 percent to national GDP during 2008-09. Gross value addition of livestock at current cost factor has increased from Rs. 1052 billion (2007-08) to Rs. 1287 billion (2008-09) showing an increase of 22.3 %. The value of livestock is 6.1% more than the combined value of major and minor crops. Government gives high priority to its development and is focused on private sector led development of livestock. Underpinning the importance of livestock, the government has placed livestock on national development agenda. It has formulated “Livestock Development Policy” and “Poultry Development Policy”. Both policies are aimed at private sector led development of livestock with Government providing enabling environment. The policies would provide a frame work for accelerated development of livestock.

To spearhead the development efforts through private sector, fully autonomous private sector-led, “Livestock and Dairy Development Board” and “Pakistan Dairy Development Company” have been established. These companies are serving as platform for investment in livestock sector. Apart from provincial Government programs, the federal government has substantially increased public sector investment in livestock sector and has initiated mega projects to the tune of Rs. 7.1 billion for strengthening livestock services for improved disease diagnosis & control; milk and meat production; breed improvement; animal husbandry and management practices in the country. The livestock population for the last three years is given below:



Livestock Population (Million No.)			
Species	2006-07¹	2007-08¹	2008-09¹
Cattle	30.7	31.8	33.0
Buffalo	28.2	29.0	29.9
Sheep	26.8	27.1	27.4
Goat	55.2	56.7	58.3
Camels	0.9	1.0	1.0
Horses	0.3	0.3	0.4
Asses	4.3	4.4	4.5
Mules	0.2	0.2	0.2

¹: Estimated Figure based on inter census growth rate of Livestock Census 1996 & 2006

In view of the importance of livestock in the economy as well as in the life of a common man, the Government is trying by all means to fix priorities to increase production of milk, meat and poultry to meet rising domestic demand of ever increasing population and produce exportable surplus as well. The major products of livestock are milk and meat. The major products of livestock are milk and meat, the production of which for last three years is given below:

Milk and Meat Production				
Species	Units	2006-07¹	2007-08¹	2008-09¹
Milk (Gross Production)	000 tons	40,872	42,191	43,562
Cow	"	13,913	14,437	14,982
Buffalo	"	25,465	26,231	27,028
Sheep ²	"	35	35	36
Goat	"	682	700	719
Camel ²	"	777	787	798
Milk (Human Consumption)³	000 tons	32,996	34,064	35,160
Cow	"	11,130	11,550	11,985
Buffalo	"	20,372	20,991	21,622
Sheep	"	35	35	36
Goat	"	682	700	719
Camel	"	777	787	798
Meat⁴	000 tons	2,618	2,727	2,515
Beef	"	1,498	1,549	1,601
Mutton	"	566	578	590
Poultry meat	"	554	601	652

Source: Ministry of Livestock and Dairy Development

Note:

1. The figures for milk and meat production for the years 2006-07, 2007-08 and 2008-09 are calculated by applying production parameters to the projected population of 2006-07, 2007-08 and 2008-09 based on the inter census growth rate of livestock census 1996-2006.
2. The figures for the Milk production for the year 2006-07, 2007-08 and 2008-09 are calculated after adding the production of milk from camel and sheep to the figures reported in the livestock census 2006.
3. Milk for human consumption is derived by subtracting 20% (15% wastage in transportation and 5% in calving) of the gross milk production of cows and Buffalo.
4. The figures for meat production are of red meat and do not include the edible offals.

4.1. White Revolution¹

Under the White Revolution Scheme, two Strategic Partnership Agreements have been executed between ZTBL and M/S Nestle Pakistan Limited and M/s Pakistan Dairy Development Company. Under this participatory approach, dairy sector would be modernized with a view to increase milk supply, mitigate poverty and improve the living standard of the rural population. The Bank has earmarked funds to the tune of Rs. 5,000 million for financing of 50,000 animals (imported cows) during the five years period (2007-2011).

M/s. Nestle Pakistan would help to select and identify good clients for the Bank to improve quality breed of foreign and local dairy animals. Technical guidance would be provided to the farmers through Nestle Veterinary Doctors. The Company would purchase milk through its network and make weekly payment of milk sale to the Bank for the adjustment of loan. M/s Pakistan Dairy Development Company will also help the Bank in the selection of clients and processing of loan cases. Initially the scheme will be for modernization of 5,000 farms during 5 years period involving Rs 700 million. Under the scheme 1,000 farms would be covered on yearly basis. There would be maximum loan limit of Rs 1.0 million per borrower/party.

4.2. High domestic demand

Pakistan: 165 million people, high milk consuming tradition

- Irrigable land in Pakistan –20 million hectares
- Fodder cultivated in 2.8 million hectares, i.e. only 14%
- Fodder yield very low -24 Tones/hectare (Australia approx 70 Tones/hectare)
- Largest irrigation network in the world
- Animal herd 47million heads, though average size 3 head
- Cheap farm labor, though unskilled

5 MARKET ENTRY TIMINGS

The demand of milk in summer is high as compared to winter. That's why the animals in summer are sold at a bit higher prices as compared to winter. So the proposed business can be started before the onset of summer season.

5.1. Proposed Business Legal Status

The proposed legal structure of the business entity is either sole proprietorship or partnership. Although selection totally depends upon the choice of the entrepreneur but this financial feasibility is based on Sole Proprietorship.

5.2. Proposed Capacity

The feasibility study suggests an initial herd size of 200 Cows, which is economical to justify the overhead cost. The farm size will increase to approximately 1,000 cows within

¹ Source: Economic Survey 2007-08



10 years. Herd mix of 100% cows is recommended to get the maximum milk production round the year.

5.3. Project Investment

The total cost of the project is Rs. 84,733,585, out of which the capital cost of the project is Rs. 73,664,530 for purchasing the animals and constructing the building and the rest is used to meet the working capital requirement.

Table 5-1 Project Costs (Rs)

Account Head	Total Cost (Rs)
Capital Cost	
Land (3 acres)	3,000,000
Building/Infrastructure	21,870,100
Animals	40,000,000
Machinery & equipment	7,573,680
Furniture and Fixtures	80,000
Office vehicles	615,000
Office equipment	75,750
Pre-operating costs	450,000
Total Capital Cost	73,664,530
Working Capital	
Raw material Inventory	10,989,055
Cash in hand	80,000
Total Working Capital	11,069,055
Total Project Cost	84,733,585

The proposed pre-feasibility is based on the assumption of 50:50 debt equity ratio. However this composition of debt and equity can be changed as per the requirement of the investor.

Table 5-2 Project Financing

Debt	50%	42,366,793
Equity	50%	42,366,793
Total project Investment		84,733,586

Table 5-3 Project Economics

Viability	Project
IRR (%)	51%
NPV (Rs)	302,893,451
Pay Back Period (year)	3.40



5.4. Proposed Location

The development of urban or peri-urban commercial dairy farms is something new in livestock production. Metropolitan cities like Lahore, Karachi, Multan, Rawalpindi, etc are the major markets of milk. Hence, dairy farms established in peri urban areas of these cities fulfill the daily need of these cities.

5.5. Key Success Factors/Practical Tips for Success

Commercial dairy farmers depend on land, labor and animals as the major resources. The thrust in modern dairy farming is on the increased use of capital and management. Successful dairy farming harnesses all available resources into productive and profitable unit. Dairy farming is highly complex as it includes breeding, management, feeding, housing, disease control and hygienic production of milk on farm. The judicious use of means and resources to achieve clearly defined goals is the key success factor in modern dairy farming i.e. the art of maximization and optimal utilization of resources and means for maximizing productivity and profits.

The low yielder animals are uneconomical less than the annual average to keep, hence these should be culled. The over all genetic improvement of all the dairy animals is necessary for improved milk production. It involves milking records at equal intervals, selection of bull from high producing mothers, progeny testing of breeding bull and then making extensive use of these bulls by well-organized Artificial Insemination (AI) program.

Feeding dairy animals on nutritious and high yielding hybrid varieties of forages can be adopted. The surplus forage should be preserved as silage or hay.

Other farm management practices include feeding for growth, lactation, pregnancy or maintenance, hygienic milk production, comfortable and ventilated barns, spraying/wallowing of animals in summer, timely detection of heat, mating, with selected bull or AI service. If animals are bred within the 60-90 days of calving provided with clean surroundings, drinking water and feed according to the requirements, the over all performance of herd can be improved.

Timely vaccination against BVD, Black Quarter, Foot and Mouth Disease, Brucellosis along with the prevention of mastitis and parasitic control will also improve the over all performance of dairy herd.

Hygienic milk can be produced by the clean and healthy animals through milking parlor.

6 SECTOR & INDUSTRY ANALYSIS

6.1 Major Players

Dairy farming is not an organized sector in Pakistan. More than 90% of farming is done on subsistence level. There are very few progressive farmers, which are running the business of dairy farming in a professional manner. Milk processing was started in late



1970s, which is still facing challenges due to competition with the unprocessed milk. The processed milk has captured only 4% of the total milk market. Processed milk is not the consumer's preference due to high price differential. There are 28 milk-processing plants in the country, which were installed in mid 1980s to promote usage of processed milk. Most of these milk plants are closed due to lack of professional management, inadequate milk supply and poor marketing campaign of the processed milk.

Table 6-1 Milk Processing Plants currently in operation

Project	Products	Location
Noon Pakistan	Milk powder/ butter	Bhalwal-Sargodha
Nestle Milkpak	UHT milk /Ghee	Sheikupura & Kabir Wala
Prime Dairies	Pasteurized milk/yogurt	Manga-Lahore
Idara-e-Kisan (Halla)	Pasteurization milk/UHT	Pattoki/ Lahore
Chaudhry Dairy	UHT milk, milk powder	Bhai Pheru
Millack foods	Millack	Lahore- Jhang
Dairy Lnad	Pasteurization milk	Karachi
Engro foods Limited	Olper Milk	Sukkar, Sahiuwal
ShakarGunj Foods	Good Milk	Jhang
Alturhem Milk	Prema Milk	Lahore
JK Dairies	Fresh Farm milk	Rahim yar khan
Doctor Dairies	Anmol Milk	Karachi
Gourmet Foods	Fresh Milk	Lahore

7 MARKET INFORMATION

7.1 Sector Characteristics

The size of this sector is still growing. Commercial Dairy farms have been set up in peri urban areas. Few of the commercial dairy farms are:

1. Sar Sabz Dairy Farm, Okara
2. Wahdath Dairies, Bhagtawal, Sargodha
3. Dairy Land, Dhab-e- Je- Karachi
4. Ever Fresh – Bhera, Motorway
5. Nestle, Dairy Farm, Skheki- Motorway
6. J.K Dairies, Rahim yar khan
7. Sweet water Dairy
8. CSK Dairies Kasur
9. Engro Dairies, Sukhur
10. Royal Dairies, Badian Road Lahore
11. Sapphire Dairies, Raiwaing , Lahore
12. Dr. Abul Hasan Dairy, Jhang
13. Mr. Babar Butt,, Orange Dairies, Sialkot



7.2 Target Customers

Following are some of the target clients for a dairy farmer.

1. Milk processors
2. Self processing needs 40,000 liters
3. Dairy Companies
4. Milk collection companies
5. Contractors

The cost of production per liter of raw milk should be lower than its sale price so that farmer could feel it economical.

8 FARM INPUTS

8.1 Land

8.1.1. Land Requirement

About 3.0 acres of land will be purchased for building a dairy farm project of animals starting from 200 animals and at a target herd size of 1,000 animals in a period of 10 years. Land cost per acre in the neighboring areas of Lahore, Multan & Faisalabad would be at least Rs 1,000,000 per acre. Majority of this land would be used for building sheds for the animals to protect them from severity of the weather. The area for fodder production can be acquired on lease, however in this pre-feasibility it is assumed that the fodder will be purchased and stored when it is available in abundance at low price. However, agriculture land for fodder production can be acquired with an annual rent of Rs. 10,000 per acre in the peri-urban areas of Lahore, Multan & Faisalabad. It is assumed that around 0.33 acres of land would be required per animal for fodder production.

Table 8-1 Land Requirements (for target size of around 1,000 animals)

Description	Area (Acres)
Shed along with free stalls for Cows	1.57
Cage for Calves (up to 15 days)	0.08
Calves shed (15 days - 1 year)	0.16
Shed for Heifers (older then one year)	0.35
Stores for fodder, concentrate & machine room	0.01
Utensils & milk storage	0.01
Servant Room, Wash room	0.01
Bunker silage	0.77
Total Land Requirement	2.96

8.1.2. Suitable Locations

Peri urban and rural areas in the neighboring areas of Lahore, Karachi, Islamabad, Faisalabad & Multan etc. where water, electricity is available to irrigate the crops are suitable locations for establishing a dairy farm.



8.2 Animal Housing

Sheds of the animals would be airy with protection of the animals from extreme temperatures and strong winds. The animal housing should be facilitated with drinking water for animals. There should be proper drainage system to keep hygiene at the farm. It consists of a built up animal shed, a brick soling paddock for animals, calving pens in which pregnant animals are kept separated from other animals before calving, one room for milk storage, one room for storing farm equipment and one for compound feed storage.

The animals can be dehorned, as they are easier to handle in barns and cause less accidental injury to neighboring animals, handlers, walls, and trees.

Table 8-2 Space Requirement per Animal

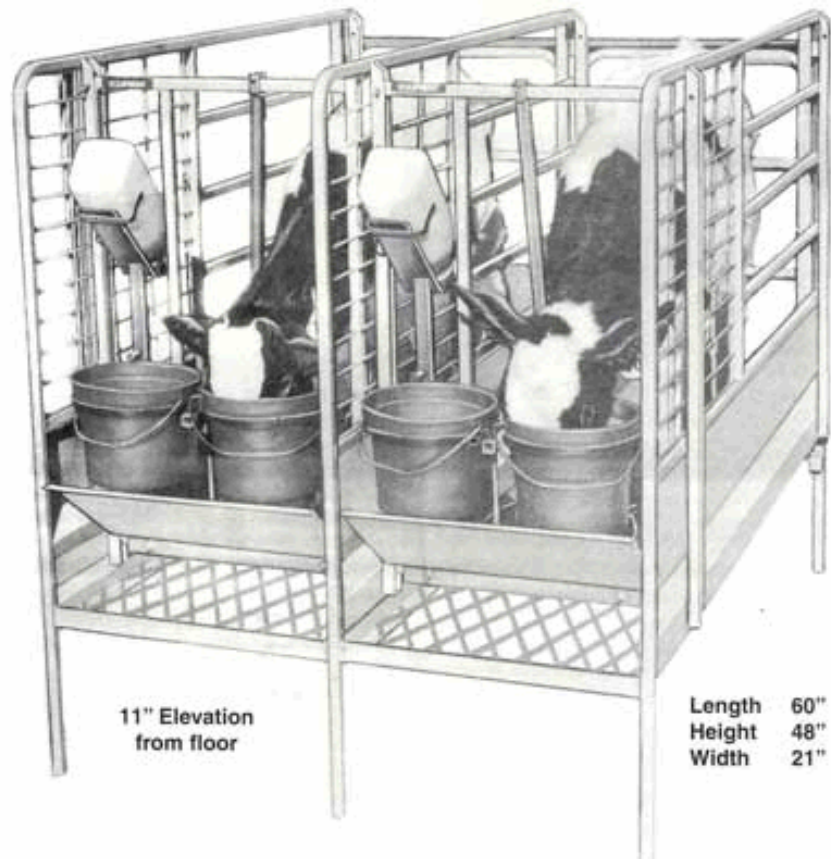
Description	Sq ft
Shed along with free stalls for Cows	100
Cage for Calves (up to 15 days)	9
Calves shed (15 days - 1 year)	18
Shed for Heifers (older then one year)	56
Stores for fodder, concentrate & machine room	400
Utensils & milk storage	480
Servant Room, Wash room	400
Silage bunker	25

Table 8-3 Total Infrastructure Cost

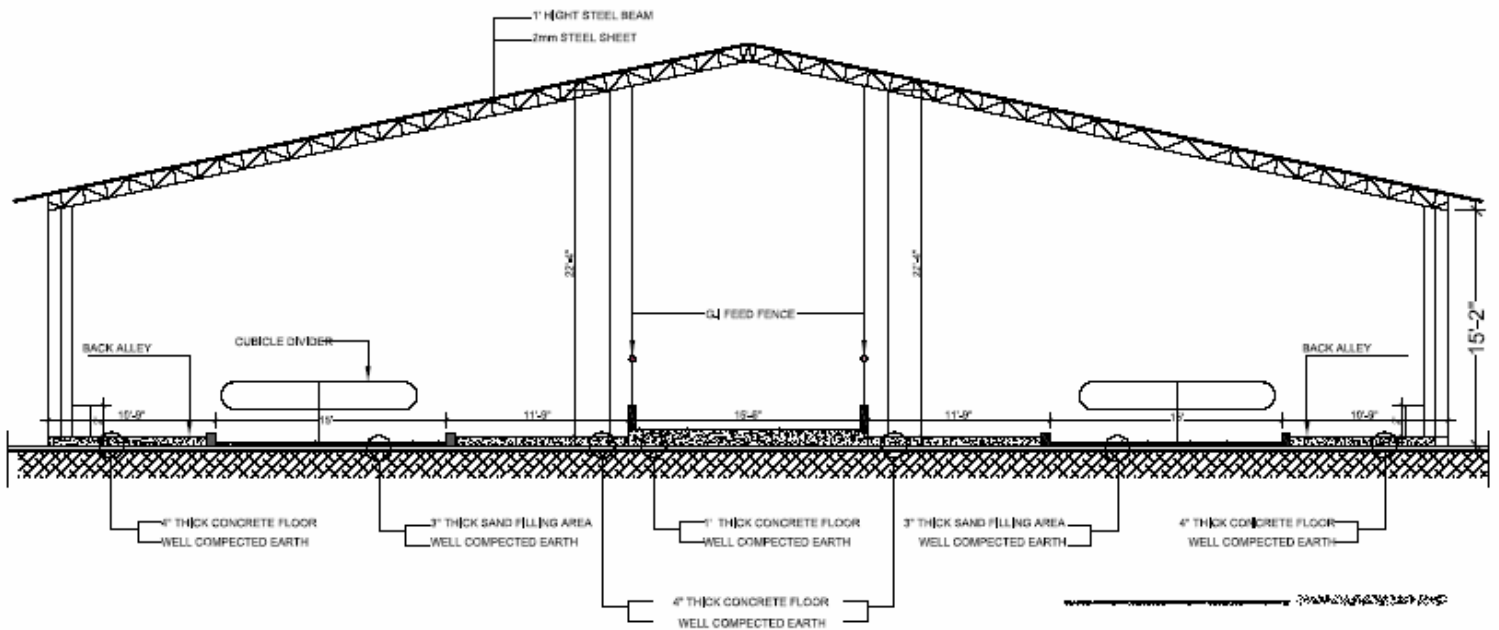
Description	Sq.ft	Rate/Sq.ft	Total Cost
Shed along with free stalls for Cows**	20,400	600	12,240,000
Cage for Calves (up to 15 days)*	1,584	521	825,000
Calves shed (15 days - 1 year)	3,168	600	1,900,800
Shed for Heifers (older then one year)	4,928	600	2,956,800
Stores for fodder, concentrate & machine room	400	500	200,000
Utensils & milk storage	480	500	240,000
Servant Room, Wash room	400	500	200,000
Silage bunker	11,025	300	3,307,500
Total Infrastructure Cost	42,385		21,870,100



***Picture of Calf Cage**



****Shed Cross Section**



8.3 Farm Machinery

The pre-feasibility suggests, hiring tractor for land preparation to grow fodder crops. Only few farm equipment like fodder chopper, water pumps, milk utensils will be purchased.

Table 8-4 Farm Equipment Cost

Description	Unit Cost Rs.	Animals per equipment	Total Cost Rs.
Maize Cutter	450,000	300	450,000
Milking machine (milking parlour)	3,823,680	300	3,823,680
Milk Cooling Unit - 2300 Ltr	700,000	150	1,400,000
Generator (25 KVA)	500,000	1	500,000
Submercible pump	350,000	1	350,000
Tractor	600,000	1,000	600,000
Heavy Duty Ventilation Fans	300,000	300	300,000
Trolly	150,000	500	150,000
Total Cost (Rs)			7,573,680

8.4 Herd Mix

The ideal mixed herd should consist of 100% cows for the viability of a farm. The cows are comparatively high yielder as compared to buffaloes.

8.4.1. Breeds of Cross bred and Exotic (*Bos taurus*)

The Holstein cow originated in Europe. The major historical development of this breed occurred in Netherland and more specifically in the two northern provinces of North Holland and Friesland. Holsteins are most quickly recognized by their distinctive color markings and outstanding milk production. Holsteins are large, stylish animals with color patterns of black and white or red and white. Holstein heifers can be bred at 15 months of age, when they weigh about 325-400 kgs body weight between 24 and 27 months of age. Holstein gestation is approximately nine months. The normal productive life of a Holstein is Nine years.

It has now been extensively tested in the tropical and sub-tropical areas of Australia. Milk quality is good - protein level is 3.4 percent and butterfat is approximately four percent. These animals are available at an average price of \$2,400 per animal HOSTEIN. The photos of different breeds are given in annexure 4.

8.5 Animal Markets

Animal markets (mandies), Government and private livestock farms are the main sources for purchasing milk animals. There are different contractors available in the markets that help locating the proper animals. These contractors work on commission basis and the commission rate charged may vary from 1-2% of the animal price. Preferably, the Australia and U.S.A are the best international markets for the production of cows. For cross herd and for imported animal Austrex, Elders, Wellard and Garsa Livestock



8.6 Feed

8.6.1. Ration for Dairy Animals

The ration is allowance of nutritionally balanced feed in 24 hours. It includes dry matter and concentrate to increase animal productivity. Wheat straw² is also used as dry roughage along with green fodder. About 1 kg of Total mix ration on dry matter (TMR) is required for the production of 2 liters of milk. These feed ingredients when mixed according to feed formula will provide adequate energy according to energy and protein requirements of animal in production.

Table 8-5 Dry matter for Cow Feed

Dry matter description	% of Total	Unit Cost Rs./Kg
Silage	53%	5
Concentrate*	47%	18

* The concentrate feed price is Rs 18 per kg if purchased from market.

8.6.2. Mineral Mixture

This is used as a feed supplement. It includes a mix of minerals (magnesium, iron, sodium and salts). Mineral mixtures are good source of energy and increase the animal productivity to give milk.

8.6.3. Fodder Crop

Fodder is grown at the land, which is acquired on lease or owned by the entrepreneur. Due to increased demand, improved forage crops such as multi-cut oats, berseem, lucerne, Sorghum- Sudan grass hybrids, mott grass, sorghum, maize and millet have been developed. These have become very popular in irrigated areas such as Kasur, Sheikhpura, Gujranwala, Faisalabad, Sargodha, and Renala Khurd (Punjab), Nowshera, Charsada, Mardan, and Peshawar (North West Frontier Province), and Hyderabad, Sukkur, Larkana and Nawabshah in Sindh for peri-urban dairies. The fodder yield (except multi cut Mott Grass which yield 100-150 tones/ acre in 4 to 6 cuttings per year) varies between 10 tons to 40 tons per acre depending upon the fertility of land, quality of seed and application of fertilizer.

Table 8-6 Types of Dry & Green roughage

Dry Roughage	Green Roughage	
	Summer Fodder	Winter Fodder
Wheat Straw	Maize	Barseem
Rice Straw	Sorghum	Alfalfa (Lucerne)
Oat Straw	Millet	Oats
Maize/Sorghum Stubble	Mott Grass	Rye Grass

² A byproduct of wheat harvesting used as dry roughage for livestock and dairy animals



Sugarcane Baggass	Sadabahar	Sugarcane tops
Cotton Seed Hulls	Guar	
Corn Cobs		

(Reference: Livestock & Dairy Development Department, Lahore)

(Reference: FAO Statistical Databases)

8.6.4. Daily Fodder Requirement

There is no fixed fodder requirement for the animals but a rule of thumb says that an animal needs daily fodder equal to 9%-10% of its body weight (3% of live body weight on Dry Matter Basis). According to estimates, consumes 50-55 kg fodder daily while cow consumes about 40-45 kg.

8.6.5. Wheat Straw (Bhusa or Turi)

Wheat straw is major, typical, and very popular dry roughage. It is always chaffed, and is the main or even only major dry roughage used on almost all the dairies. Traditional threshing methods break the straw into short pieces, *bhoosa*, and modern mechanical threshers have been designed to break the straw. In all urban dairies visited wheat straw was bought at Rs. 2 per kilo (80 Rs per mond) or even more; in the harvest season, however, in places where it is produced, it is available at Rs. 0.40 per kilo.

Table 8-7 Daily Feed Requirement of Cow & Calf

Animal	Daily Requirement (kg)	Cost/kg	Amount
Cow			
Dry	11	5	55
Concentrate	8	18	144
Total			199
Calf older than 1 year			
Dry	7	5	35
Concentrate	2.5	18	45
Total			80
Calf younger than 1 year			
Dry	3	5	15
Concentrate	2	18	36
Total			51

8.7 Medication

8.6.1. Vaccination & Medicine

Vaccination & medicine is required to prevent any disease outbreak in the animal herd. Each new animal will be vaccinated before entering the farm. It will cost Rs. 2,000 for each cow per year. Vaccines are produced at Veterinary Research Institute, Ghazi Road, Lahore. The vaccines are provided to the Government Farms and Hospitals on payment.



Farmers can also obtain these vaccines on payment according to prescribed schedule from the Institute. Technical guidance is also provided to the farmers. Farmers can have their animals vaccinated from the field Veterinary Hospitals and Centers.

8.6.2. Artificial Insemination (AI) Charges

Artificial Insemination (AI) charges will be Rs 5,000 per cow per year. On average each cow will be requiring approx. 2.5 doze of insemination. Some of the companies dealing in imported semen are as follows:

- i) Altaf and Co. 0300-8446592, Gulberg II, Lahore
- ii) ProFarm 0302-8480255, Maratab Ali road, Lahore

8.6.3. Labor Requirement

For a dairy enterprise, manpower is required for performing different animal husbandry practices at the farm e.g. feeding, watering, milking and care of animals etc. One skilled person can handle 25 milk animals easily. Eight farm workers are recommended for handling 200-animals. A supervisor cum farm manager can be hired to supervise all the farm activities. The supervisor with B.Sc. (Honors) degree in Animal Husbandry (AH) and an additional requirement of MBA may be hired as a farm manager so that he can handle the farm practices, administration & account matters at the dairy farm.

Table 8-8 Labor Requirements

Description	No.	Salary/month/Person	Annual Salary (Rs)
Farm Manager	1	35,000	420,000
Technician	1	15,000	180,000
Workers	8	7,000	672,000
Tractor Driver	1	7,000	84,000
Total Labor Cost	11		1,356,000

9 FARM OUTPUT

9.1. Lactation Period

The lactation period is the period during which the animals yield milk. These animals are called wet animals. Generally the lactation period of cows is 305 days. For calculation, the feasibility has taken 80% of the total number of cows as wet cows. The calving interval in cow has 13 months. The average milk yield of cow is estimated at $20 \times 305 = 6100$ liters per lactation.

9.2. Milk Composition

Buffalo milk contains less water, more total solids, more fat, slightly more lactose, and more protein than cow's milk. Cow's milk contains 12-14% total solids and the butterfat content is usually between 3% and 5%. Phospholipids are lower but cholesterol and saturated fatty acids are lower in cow's milk.



Normally the protein in cow's milk contains less casein and slightly less albumin and globulin. The mineral content of cow's milk is nearly the same as that of buffalo milk except for phosphorus, which occurs in roughly twice the amount in buffalo milk.

Cow's milk enriches the yellow pigment carotene, precursor for vitamin A, and its yellowness is frequently used to differentiate it from buffalo's milk in the market. Despite the absence of carotene, the vitamin A content in buffalo milk is almost as high as that of cow's milk. Apparently the buffalo converts the carotene in its diet directly to vitamin A. The two milks are similar in B complex vitamins and vitamin C, but buffalo milk tends to be lower in riboflavin.

9.3. Breeding Stock Development

The proposed farmer will raise breeding stock containing future dairy animals at his own farm by selecting good offspring of high producers. Instead of breeding bull the Insemination will be done Artificial Insemination of imported Semen of breeding bulls. The first generation (F₁) will be capable of giving milk after 2 years in cows.

9.4. Increase in Milk Yield

The milk yield will be improved as a result of appropriate breeding systems discussed earlier. Low yielding animals are sold in the market. On an average, cows are productive for 9 to 10 years.

9.5. Sale Price

In this feasibility study, it is assumed that all the milk will be sold to milk processing companies, house holds & milk shops etc. @ Rs. 36/liter.

9.6. Evening Milk

Milk can be stored in a milk chiller on 14.5% TS at the farm if milk collection is not possible in the evening.

9.7. Farm Revenues

Farm revenue will increase with the passage of time, as the milk production will increase with the growth in herd size as well as its quality.

9.8. Male Calves

Male calves will be sold at the farm sooner after birth for Rs 10,000 per animal. They can also be reared in separately for beef production.

10 USEFUL TERMINOLOGIES

Breed

Animals that, through selection and breeding, have come to resemble one another and pass those traits uniformly to their offspring.



Feedstuffs

Any substance of nutritive and biological value used in production of compound feed.

Compound feed

Any ground mixture of ingredients intended for feeding the animals. It includes a concentrate mixture accordingly to formula.

Dehorning

The process of removal of horns (in adult animal) or horn buds (in young calves). The process may be done by mechanical or chemical means.

Heifer

The term refers to young female bovine that reaches puberty age and is ready to breed.

Home Mixed Feed

Feed prepared on farm.

Oil seed Cake

Mass resulting from the processing of seeds, which is rich in protein and is used as a source of feed for livestock, e.g. cottonseed cake, maize oil cake etc.

Ration

Amount of balance feed in 24 hours



11 FINANCIAL ANALYSIS

11.1 Income Statement

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue	42,507,520	56,594,120	82,061,008	105,760,628	134,530,849	173,770,599	226,301,735	297,867,615	395,025,021	527,219,074
Cost of goods sold	23,604,110	23,665,248	25,412,394	29,530,652	35,884,379	45,029,534	57,387,128	73,393,124	94,495,053	121,751,010
Gross Profit	18,903,410	32,928,872	56,648,614	76,229,976	98,646,470	128,741,065	168,914,608	224,474,491	300,529,968	405,468,064
<i>General administration & selling expenses</i>										
Administration expense	1,356,000	1,488,022	1,734,051	2,013,882	2,453,574	3,761,802	4,421,420	5,334,786	6,560,729	9,331,647
Rental expense	-	-	-	-	-	-	-	-	-	-
Office expenses (stationary, etc.)	27,120	29,760	34,681	40,278	49,071	75,236	88,428	106,696	131,215	186,633
Professional fees (legal, audit, etc.)	208,138	273,181	389,217	503,693	641,789	830,401	1,083,838	1,428,823	1,899,566	2,539,402
Depreciation expense	1,678,738	1,678,738	1,678,738	2,833,419	2,833,419	2,833,419	5,408,570	5,418,836	5,418,836	7,498,498
Amortization expense	90,000	90,000	90,000	90,000	90,000	-	-	-	-	-
Subtotal	3,359,996	3,559,702	3,926,688	5,481,272	6,067,853	7,500,858	11,002,257	12,289,141	14,010,345	19,556,180
Operating Income	15,543,414	29,369,170	52,721,927	70,748,704	92,578,617	121,240,207	157,912,351	212,185,350	286,519,623	385,911,884
Other income	117,324	827,507	2,903,373	6,636,588	12,059,395	20,256,447	32,131,509	48,257,270	70,184,498	106,017,309
Gain / (loss) on sale of assets	-	-	-	-	-	-	18,938	-	-	10,009,549
Earnings Before Interest & Taxes	15,660,738	30,196,677	55,625,300	77,385,292	104,638,013	141,496,655	190,062,798	260,442,620	356,704,120	501,938,742
Interest expense	6,428,030	5,401,802	4,201,261	2,796,797	1,153,773	-	-	-	-	-
Earnings Before Tax	9,232,708	24,794,875	51,424,039	74,588,495	103,484,240	141,496,655	190,062,798	260,442,620	356,704,120	501,938,742
Taxable earnings for the year	9,232,708	24,794,875	51,424,039	74,588,495	103,484,240	141,496,655	190,062,798	260,442,620	356,704,120	501,938,742
Tax	2,308,177	6,198,719	12,856,010	18,647,124	25,871,060	35,374,164	47,515,700	65,110,655	89,176,030	125,484,685
NET PROFIT/(LOSS) AFTER TAX	6,924,531	18,596,157	38,568,029	55,941,372	77,613,180	106,122,491	142,547,099	195,331,965	267,528,090	376,454,056



11.2 Balance Sheet Statement

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Assets											
<i>Current assets</i>											
Cash & Bank	80,000	2,266,477	14,283,662	43,783,798	88,947,963	152,239,944	252,889,005	389,741,181	575,404,221	828,285,736	1,292,060,445
Raw material inventory	10,989,055	11,469,561	12,764,757	15,348,333	19,391,440	25,335,515	33,626,989	44,715,106	59,787,493	79,837,530	-
Total Current Assets	11,069,055	13,736,038	27,048,419	59,132,132	108,339,403	177,575,459	286,515,994	434,456,288	635,191,714	908,123,265	1,292,060,445
<i>Fixed assets</i>											
Land	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
Building/Infrastructure	21,870,100	20,776,595	19,683,090	31,081,907	29,363,786	27,645,665	62,965,926	59,395,885	55,825,845	77,268,960	72,448,262
Net value of animals	40,000,000	41,600,000	49,848,000	56,799,000	66,585,000	78,274,000	93,121,000	111,711,850	135,175,500	164,593,604	800,000
Machinery & equipment	7,573,680	7,068,768	6,563,856	14,009,912	12,974,936	11,939,959	21,753,455	19,995,247	18,237,039	28,913,893	26,326,680
Total Fixed Assets	73,214,530	73,135,792	79,705,053	105,420,605	112,373,186	121,228,767	181,129,202	194,459,098	212,503,912	273,951,396	102,659,294
<i>Intangible assets</i>											
Pre-operation costs	450,000	360,000	270,000	180,000	90,000	-	-	-	-	-	-
Total Intangible Assets	450,000	360,000	270,000	180,000	90,000	-	-	-	-	-	-
TOTAL ASSETS	84,733,585	87,231,830	107,023,472	164,732,736	220,802,589	298,804,226	467,645,196	628,915,385	847,695,626	1,182,074,661	1,394,719,739
Liabilities & Shareholders' Equity											
<i>Other liabilities</i>											
Long term debt	42,366,793	36,325,131	29,257,242	20,988,812	11,315,918	-	-	-	-	-	-
Total Long Term Liabilities	42,366,793	36,340,506	29,287,992	21,034,937	11,377,418	76,875	61,500	46,125	30,750	15,375	-
<i>Shareholders' equity</i>											
Paid-up capital	42,366,793	42,366,793	42,366,793	62,810,083	62,810,083	62,810,083	110,696,937	110,844,552	110,844,552	148,292,769	148,292,769
Gain/ (Loss) on revaluation of anim	-	1,600,000	9,848,000	16,799,000	26,585,000	38,274,000	53,121,000	71,711,850	95,175,500	124,593,604	(39,200,000)
Retained earnings	-	6,924,531	25,520,688	64,088,717	120,030,088	197,643,268	303,765,759	446,312,858	641,644,823	909,172,913	1,285,626,970
Total Equity	42,366,793	50,891,323	77,735,480	143,697,799	209,425,171	298,727,351	467,583,696	628,869,260	847,664,876	1,182,059,286	1,394,719,739
TOTAL CAPITAL AND LIABILITI	84,733,585	87,231,830	107,023,472	164,732,736	220,802,589	298,804,226	467,645,196	628,915,385	847,695,626	1,182,074,661	1,394,719,739

11.3 Cash Flow Statement

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
<i>Operating activities</i>											
Net profit	-	6,924,531	18,596,157	38,568,029	55,941,372	77,613,180	106,122,491	142,547,099	195,331,965	267,528,090	376,454,056
Add: depreciation expense	-	1,678,738	1,678,738	1,678,738	2,833,419	2,833,419	2,833,419	5,408,570	5,418,836	5,418,836	7,498,498
amortization expense	-	90,000	90,000	90,000	90,000	90,000	-	-	-	-	-
Deferred income tax	-	15,375	15,375	15,375	15,375	15,375	(15,375)	(15,375)	(15,375)	(15,375)	(15,375)
Raw material inventory	(10,989,055)	(480,506)	(1,295,196)	(2,583,576)	(4,043,107)	(5,944,075)	(8,291,475)	(11,088,117)	(15,072,387)	(20,050,037)	79,837,530
Cash provided by operations	(10,989,055)	8,228,138	19,085,074	37,768,566	54,837,059	74,607,899	100,649,061	136,852,176	185,663,040	252,881,515	463,774,709
<i>Financing activities</i>											
Change in long term debt	42,366,793	(6,041,661)	(7,067,889)	(8,268,430)	(9,672,894)	(11,315,918)	-	-	-	-	-
Lease principal repayment	-	-	-	-	-	-	-	-	-	-	-
Issuance of shares	42,366,793	-	-	20,443,290	-	-	47,886,855	147,615	-	37,448,216	-
Cash provided by / (used for) financing	84,733,585	(6,041,661)	(7,067,889)	12,174,860	(9,672,894)	(11,315,918)	47,886,855	147,615	-	37,448,216	-
<i>Investing activities</i>											
Capital expenditure	(73,664,530)	-	-	(20,443,290)	-	-	(47,886,855)	(147,615)	-	(37,448,216)	-
Cash (used for) / provided by investing	(73,664,530)	-	-	(20,443,290)	-	-	(47,886,855)	(147,615)	-	(37,448,216)	-
NET CASH	80,000	2,186,477	12,017,185	29,500,136	45,164,165	63,291,981	100,649,061	136,852,176	185,663,040	252,881,515	463,774,709



11.4 Revenue Assumptions

Sales

Selling Assumptions

	Year-1	Unit	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8	Year-9	Year-10
Milk/Cow/Day		20 Ltrs.	25	30	30	30	30	30	30	30	30
Wet Cows as % Total no. of Cows		80%									
No. of Days in Year		365 Days									
Sale Price of developed progeny											
Cow		200,000 Rs.									
Female calf(cow) older then one year		50,000									
Sale Price/Culled cow		60,000 Rs.									
Sale Price/Low yeilder cow		100,000 Rs.									
Sale Price/Male calf		10,000 Rs.									

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
	1	2	3	4	5	6	7	8	9	10	11
Animals											
Average # of cows	198	189	204	240	278	327	388	465	562	683	836
# of lactating cows	158	151	163	192	222	262	310	372	450	546	669
# of calve	176	164	143	127	140	170	215	264	323	388	472
Calve older than one year (Cows)/Heifer	0	88	80	99	113	133	156	187	223	273	331
Total animals older then one year	198	277	284	339	391	460	544	652	785	956	1167
Total Animals	374	441	428	466	531	631	759	916	1109	1343	1640
Animals Sold During the Year											
# of culled cows sold	-	-	26	30	32	34	35	36	36	38	41
# of low yielders (cows)	-	10	12	13	16	19	22	27	32	40	48
# of Male Calve sold	88	82	72	63	70	85	107	132	162	194	236
Total Animals Sold	88	92	110	107	118	138	167	198	237	281	336



Production of milk (Itrs)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Cows	3,168	3,780	4,896	5,760	6,672	7,848	9,312	11,160	13,488	16,392
Milk for calve	704	656	573	507	561	682	859	1,056	1,294	1,551
Net Annual milk production	899,360	1,140,260	1,577,800	1,917,236	2,230,384	2,615,692	3,085,403	3,688,011	4,450,974	5,416,870
Revenue from Sale of Milk (Rs.)										
Daily	114,048	149,688	213,270	275,996	351,665	455,014	593,884	782,917	1,040,858	1,391,453
Annual	41,627,520	54,636,120	77,843,462	100,738,598	128,357,764	166,080,172	216,767,637	285,764,552	379,913,218	507,880,428
Other Revenue (Rs.)										
Sale of Culled Cows	-	-	1,584,000	1,794,000	1,929,600	2,058,000	2,083,200	2,145,960	2,189,580	2,277,561
Sale of Low Yielder Cow	-	960,000	1,185,000	1,345,000	1,585,000	1,865,000	2,225,000	2,745,000	3,243,250	3,984,838
Sale of Calves	880,000	820,000	716,575	634,125	701,700	852,150	1,073,550	1,319,825	1,616,938	1,939,075
	880,000	1,958,000	4,217,546	5,022,029	6,173,085	7,690,427	9,534,098	12,103,063	15,111,803	19,338,646
Total Annual Revenue	42,507,520	56,594,120	82,061,008	105,760,628	134,530,849	173,770,599	226,301,735	297,867,615	395,025,021	527,219,074



12 ANNEXURE - 1

Table 12-1: Vital Statistics of Cattles

Parameters	
Rectal Temperature	101.5 degrees F (38.5 degree C)
Heart Rate	60-70 beats/minute
Respiratory Rate	30 breaths/minute

Table 12-2: Traits of Farm Animals

Parameters	Cattle
Age at puberty	15-18 months
Estrous duration	17 hrs
Estrous cycle length	21 days
Gestation length	305+_5 days
Dry period	2-3 months
Service period	2-3 months
Age at first calving	2 to 2.5 yr.
Calving interval	13 months

Table 12-3: Common Diseases of Livestock

Infectious Diseases			
Disease	Symptoms	Preventive measures	Medication
Anthrax	Fever, grinding of teeth, release of blackish blood from natural openings, which doesn't clot.	Vaccination in February. Dead animal should be buried in 6 feet deep pit without any postmortem.	Antibiotic therapy
Foot and mouth Disease	Excessive salivation, Pustules on lips, tongue and between the cleft of hooves, staggering gait weakness due to inability of ingestion.	FMD vaccine after every 4 months especially before the onset of rainy season.	FMD Serum, cleaning of pustules by potassium permanganate solution, cleaning of hooves by phenyl solution
Non Contagious Diseases			
Indigestion	Loss of appetite, watering from mouth, stiffening of rumen, bloating, severe pain in stomach		5 grams Stomach powder (mixed in feed or dissolved in water) twice a day
Bloating (air trapped in stomach)	Difficult breathing due to air trapped in stomach, animal may die due to suffocation	Avoid grazing early in morning especially on fodder with dewdrops.	Mustard (Sarson) oil & turpentine oil mixed with chloral hydrate mixed in drinking water.
Dysentery	Diarrhea, smelling feces, weakness	Avoid excessive intake of milk especially in newborn kids. Avoid wheat straw or stiff	Calcium carbonate, magnesium carbonate and bismuth carbonate dissolved in water OR entox tablets OR



		feed during dysentery	nimkol with sulfademedine (4-5 cc). Offer rice groule to affected animals
Internal Parasites			
Liver flukes	Weakness, off feed, jaundice in severe cases, swelling on joints	No grazing around stagnant water	Zanil or Carbon tetra chloride OR nilzan plus, oral administration
Round Worms	Weakness, diarrhea, anemia, hair fall from body coat	Fecal samples should be examined for roundworms.	Systemax or rental, oral administration
Ectoparasites			
Flies/ ticks/ maggots	Irritation on body coat, sometimes holes in skin, loss of hair from body coat	Cleanliness in sheds, Spray of DDT in shed	Apply sulfur oil, tetmasol or ecoflax on wounds and dipping of whole herd with a 0.15 % solution of negavan.

Table 12-4: Vaccination Schedule

Name of Disease	Name of Vaccine	Qty administered (ml)	Time for Vaccination	Duration of Immunity	Preventive Measures
Foot & Mouth Disease (FMD)	Foot & Mouth Vaccine	5 ml	Start of spring	4 months	Should be given 4 months prior to the expected symptoms of disease.
Anthrax	Anthrax spore vaccine	0.5 ml	March-April or monsoon season	One year	Every year vaccination should be done every year.
Rabies (Bowla Pun)	Anti rabies vaccine	10 ml	According to need	One year	Vaccine should be used right after preparation.
Hemorrhagic Septicemia (HS)	HS vaccine	5-10 ml	Start of Spring	4 months	Should be given 4 months prior to the expected symptoms of disease.



13 ANNEXURE - 2

Table 13-1: Calving Register

Sr. no	Dam No.	Sire No.	Date of calving	Sex of calf	Wt. of calf	Remarks
1.						
2.						

Table 13-2: Disposal of Death

Sr. no	Animal/Dam	No.	Date of birth	Sex	Mode	Cost	Remarks
1.							
2.							

Table 13-3: Reproduction/Insemination/Pregnancy Diagnosis/Follow up/Treatment

Sr. no	Animal No.	Date of last calving	No. of services	Last date of service	Sire No.	Result	Remarks
1.							
2.							

Table 13-4: Daily Milk Production

Sr. no	No. of animals	Milk prod.	Milk sold	Income from sale	Day's wet average	Herd average	Remarks
a. Morning							
b. Evening							

Table 13-5: Details of Purchase / Sale of product/byproduct (Feed and fodder's, medicines, ingredients, animal, etc.)

Sr. no	Particulars	Quantity	Per unit rate	Total cost	Remarks
1.					
2.					

Table 13-6: Calving & Calf Disposal

Sr. no	Date of birth	Dam No.	Sire No.	Sex of calf	Wt. of calf at birth	Disposal Date	Remarks

Table 13-7: Reproduction Performa

Brand No.....Date of birth.....Dam No.....Date of 1st heat.....

History sheet-----

Sr. no	Particulars	1 st calving	2nd calving	3rd calving	4th calving	5th calving
1.	Service (Date/Sire No.)					



Table 13-8: Conception Record

Date of Pregnancy Diagnosis-----Result-----Date of conception---

Expected date of calving-----Actual date of calving-----Sex of
calf-----

Table 13-9: Reproductive Health

Disorder-----Treatment-----Follow-up-----

Table 13-10: Individual Milking Record

Sr. no	Order of calving	Cow No.	Date of calving	Weekly recording		Date when dried	Days in milk	Total milk yield
				Morning	Evening			

Table 13-11: Herd Health Register

Date	Animal	History	Symptoms	Diagnosis	Treatment	Detail of vaccination or hygiene	Cost of treatment

Table 13-12: Monthly Expenses & Income Report

Sr. no	Particulars	Quantity	Rate (per unit)	Total cost

Table 13-13: Periodical Weighing Register

Sr. no	Tattoo No. (Dam's)	Brand No. (Animal)	Date of birth	Wt. at weeks	Wt. at months	Wt. at Service/ Calving	Remarks
				0,1,2...11,12	3,6,9,12,18,24		



14 ANNEXURE - 3

Table 14-1: Contacts of Different Livestock Breeders

S. No	Name	Contacts	Farm
1	Jamil Memon	Mob.0300-8260274	Karachi
2	Dr. Abbas	Mob. 0300-3224477	Landi Cattle colony. Karachi
3	Ali Ahmed	Mob: 0321-8451910	Badian road Lahore
4	Mr. Azhar	Mob. 0300-8417414	Raiwind raod lahore
5	Ch. Rasikh elahi	Mob. 042-5845904	Koldi abu baker, Kasur
6	Dr. abul Hassan	Mob. 0333-6729967	Bahkker road, Jhang
7	Mr. Ahmed saeed	Mob. 0300-4000751	Sweet water farms, Lahore
8	Mr. Jahangir tareen	Mob. 0300-8465528	J.K Dairies, Rahim yar khan
9	Mr, Sarfraz Rehman	Mob. 0300-2024463	Engro Foods, Karachi

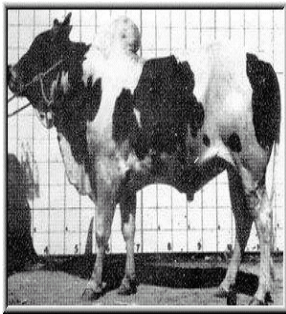
Table 14-2: Vaccination program for dairy herds.

Animal description	Time for Vaccination	Vaccination Detail
Heifers	Three to four months of age	Clostridial group vaccine at three to four months of age, or earlier depending on risk
	Five to six months of age	<ul style="list-style-type: none"> • IBR, BVD, PI-3, BRSV • Haemophilus • Clostridial group • Leptospirosis (5 strain) • Worm • Grub and lice treatment in early fall, repeat as needed
	Pre-breeding	<ul style="list-style-type: none"> • IBR, BVD, PI-3, BRSV • Leptospirosis (5 strain)
	Pre-calving	<ul style="list-style-type: none"> • Rotavirus, Coronavirus, E. coli twice, at six and three weeks prior to calving
Adult Cows		Cows are generally vaccinated for leptospirosis and the virus diseases during the early lactation period, approximately five weeks prior to breeding. Some veterinarians prefer to vaccinate during the dry period, although modified Live virus vaccines are not used at this time

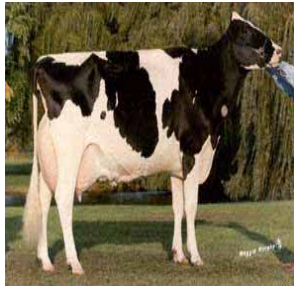


15 ANNEXURE - 4
Different Breeds of Cows

Australian Friesian Sahiwal



Holstein



provided by Hoard's Dairyman

Jersey



provided by Hoard's Dairyman

