Pre-Feasibility Study

DAIRY FARM

(100 Animals)

Small and Medium Enterprise Development Authority

Government of Pakistan

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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

Over the years, the livestock sector has emerged as a leading sub-sector of the agriculture sector in Pakistan. It is important to note that livestock accounts for 52.2 percent of agricultural value added, contributes 11 percent to GDP and affects the lives of 30 – 35 million people in rural areas. Livestock registered a strong growth of 4.30 percent over the last year's impressive growth of 7.5 percent due to increase in the livestock and poultry products. Besides its importance and share in the national economy, the history of livestock rising is embedded in the rural life since inception of our civilization. It is still a sign of prestige for the people associated with agriculture sector. It is an integral part of socio-economic activities of the rural areas and plays a very supportive role in mitigating the effects of poverty by providing essential items of daily use. The live stock population for the last three years is given below:

Livestock Production (Million No)

Species	2005-06*	2006-07#	2007-08#
Cattle	29.6	30.7	31.8
Buffaloes	27.3	28.2	29.0
Sheep	26.5	26.8	27.1
Goat	53.8	55.2	56.7
Camels	0.9	0.9	1.0
Horses	0.3	0.3	0.3
Asses	4.3	4.3	4.4
Mules	0.2	0.2	0.2

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 is milk and meat, the production of milk for last three years is given below[1]:

Milk Production				
Species	Units	2005-06*	2006-07**	2007-08**
Milk (Gross Production)	000 tons	39,596	40,872	42,199
Cow	"	13,407	13,913	14,437
Buffalo	"	24,723	25,465	26,239
Sheep#	"	34	35	35
Goat	"	664	682	700
Camel#	"	767	77	787
Milk (Human Consumption)@	000 tons	31,970	32,996	34,064
Cow	"	10,726	11,130	11,550
Buffalo	"	19,779	20,372	20,991
Sheep	"	34	35	35
Goat	"	664	682	700
Camel		767	777	787

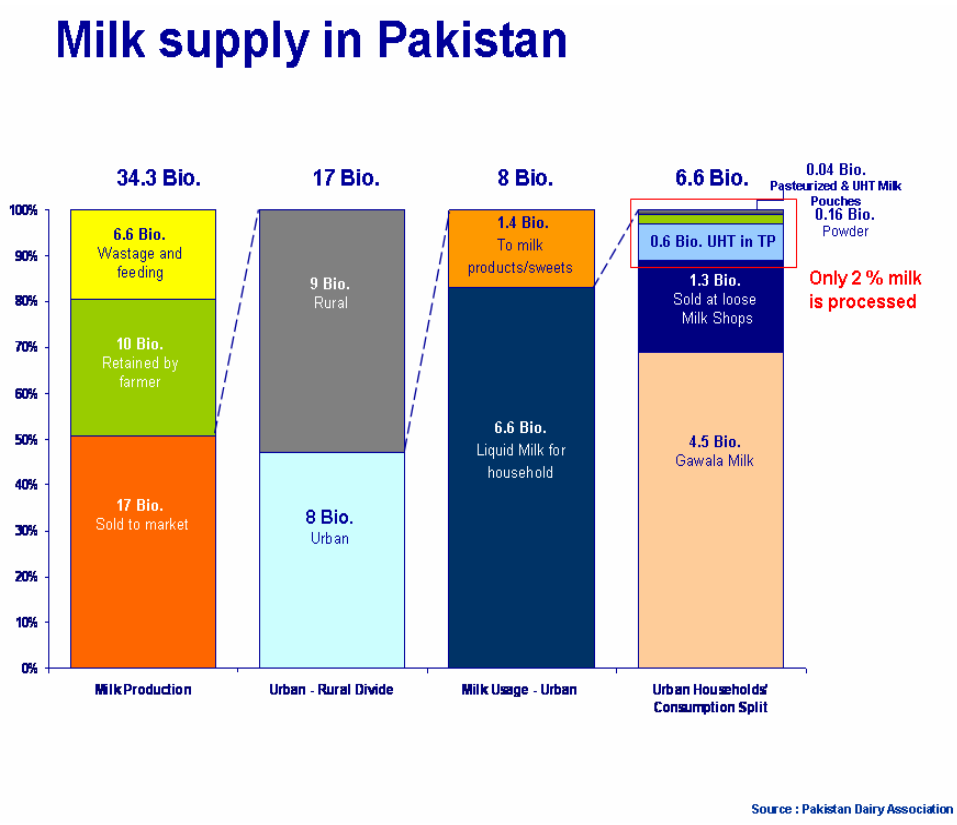
The overall growth in the live stock population can be seen from the following table[2]:

(million numbers)

Fiscal Year	Buffaloes	Cattle	Goats	Sheep	Poultry	Camels	Asses	Horses	Mules
1990-91	17.8	17.7	37.0	26.3	146.9	1.1	3.5	0.4	0.1
1991-92	18.3	17.7	38.7	27.4	156.2	1.1	3.8	0.5	0.1
1992-93	18.7	17.8	40.2	27.7	182.6	1.1	3.8	0.4	0.1
1993-94	19.2	17.8	42.0	28.3	250.0	1.1	3.9	0.4	0.1
1994-95	19.7	17.8	43.8	29.1	318.8	1.1	4.0	0.4	0.1
1995-96	20.3	20.4	41.2	23.5	350.0	0.8	3.6	0.3	0.1
1996-97	20.8	20.8	42.6	23.7	382.0	0.8	3.6	0.3	0.1
1997-98	21.4	21.2	44.2	23.8	276.0	0.8	3.2	0.3	0.1
1998-99	22.0	21.6	45.8	23.9	278.0	0.8	3.8	0.3	0.1
1999-00	22.7	22.0	47.4	24.1	282.0	0.8	3.8	0.3	0.2
2000-01	23.3	22.4	49.1	24.2	292.4	0.8	3.9	0.3	0.2
2001-02	24.0	22.8	50.9	24.4	330.0	0.8	3.9	0.3	0.2
2002-03	24.8	23.3	52.8	24.6	346.1	0.8	4.1	0.3	0.2
2003-04	25.5	23.8	54.7	24.7	352.6	0.7	4.1	0.3	0.2
2004-05	26.3	24.2	56.7	24.9	372.0	0.7	4.2	0.3	0.3
2005-06 *	27.3	29.6	53.8	26.5	433.8	0.9	4.3	0.3	0.2
2006-07 @	28.2	30.7	55.2	26.8	443.2	0.9	4.3	0.3	0.2
2007-08 @	29.0	31.8	56.7	27.1	510.1	1.0	4.4	0.3	0.2

Source: Livestock Division

[1] Economic Survey of Pakistan, 2007-08
[2] Economic Survey of Pakistan, 2007-08



4.1. 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 is high in summer season as compared to the winter. That's why the animals in the 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. At the commencement of the proposed business, it is important that the entrepreneur must have good knowledge of the production and have contacts with the livestock breeders and farmers. The ability to work with the people and animals, and efficient use of resources are important aspects in modern and commercial dairy farming.

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 100 animals, which is economical to justify the overhead cost. The farm size will increase to aprox. 500 animals within 10 years. Herd mixes of 100% cows are recommended to get the maximum milk production round the year.

5.3. Project Investment

The total cost of the project is Rs. 25,628,616, out of which the capital cost of the project is Rs.24,375,270 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	1,000,000
Building/Infrastructure	8,197,930
Animals	10,500,000
Machinery & equipment	3,844,340
Office vehicles	505,000
Pre-operating costs	328,000
Total Capital Costs	**24,375,270**
Working Capital	
Raw material inventory	473,346
Upfront land lease rental	350,000
Land lease for fodder	350,000
Cash	80,000
Total Working Capital	**1,253,346**
Total Investment (Rs)	**25,628,616**

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%	12,814,308
Equity	50%	12,814,308
Total project Investment		**25,628,616**

Table 5-3 Project Economics

Viability	Project
IRR (%)	41%
NPV @17% (Rs)	54,832,286
Pay Back Period (year)	4.06

5.4. Proposed Location

The large cities are the best suitable for dairy farming due to its perishable nature of the product. The major cities include Karachi, Lahore, Faisalabad, Gujranwala and Rawalpindi.

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 judicial 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 then 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 heated, 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 BVP, 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-Sarghodha
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
Royal Dairy.	UHT milk	Karachi
Am-Pak Dairy.	Pasteurization milk	Raiwind-Lahore
Engro foods Limited	Olper Milk	Sukkar, Sahiuwal
ShakarGunj Foods	Good Milk	Jhang

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. Green Sands Livestock Farm, Jhang
3. Muzafarabad Livestock & Dairy Farms, Chishtian, Bahawalnagar.
4. Imam Dairy Farms, Khanewal
5. Arshad Dairy Farm, Fateh Jang, Attock
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, Raiwaind , Lahore
12. Dr. Abul Hasan Dairy, Jhang

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 35 acres of land (for fodder production) is required on lease for a dairy farm project of animals starting from 100 animals and at a target herd size of 500 animals in a period of 10 years. The area of fodder production can be minimized if farmer distributes the land in different fodder plots of different growing seasons in a rotation annually. Majority of this land would be used for growing green fodder for the animals. However, 2 Acres of land would be purchased for the establishment of Dairy Farm for building sheds for the animals to protect them from severity of the weather.

Table 8-1 Land Requirements

Description	Area (Acres)
Shed for cows	0.62
Cage for Calves (upto 15 days)	0.07
Calves shed (15 days - 1 year)	0.14
Shed for Heifers (older then one year)	0.22
Stores for fodder, concentrate & machine room	0.03
Utensils & milk storage	0.01
Servent Room, Wash room	0.08
Total Land Requirement	**1.17**

8.1.2. Land Lease

Lease is a better option for a new investor. Land on lease is available in rural areas. About 35 acres of land (for fodder production) is required on lease for a dairy farm project of animals starting from 100 animals and at a target herd size of aprox. 500 animals in a period of 10 years. The area of fodder production can be minimized if farmer distributes the land in different fodder plots of different growing seasons in a rotation annually. Majority of this land would be used for growing dry matter and concentrate for

the animals. Good agriculture land is available with an annual rent of Rs. 10,000 per acre in the neighboring areas of Lahore and Karachi

8.1.3. Suitable Locations

Land cost per acre in the neighboring areas of Lahore and Karachi would be at least Rs 500,000 per acre. Peri urban and rural areas where water is available to irrigate the crops are suitable locations for establishing a dairy farm.

8.1.4. 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. This means that there will be 100 cows in the herd to start with this project.

8.1.5. Breeds of Cows Local (Bos indicus), Cross bred and Exotic (Bos taurus)

In crossbred cattle, F_1 or F_2 of crosses of Sahiwal x Jersey & Sahiwal x Holstein Fresien are preferred whereas in local breeds, Sahiwal cattle are suitable to start a dairy farm. The Sahiwal is one of the best dairy breeds in Pakistan. It is tick-resistant, heat-tolerant and noted for its high resistance to parasites, both internal and external. Cows much higher milk yields have been recorded. Due to their heat tolerance and high milk production they have been exported to other Asian countries as well as Africa and the Caribbean.

The Red Sindhi originated in the Sindh but due to its hardiness, heat resistance and high milk yields they have spread into many parts of India and at least 33 countries in Asia, Africa, Oceania and the Americas. They are normally a deep, rich red color but this can vary from a yellowish brown to dark brown. Males are darker than females and when mature may be almost black on the extremities, such as the head, feet and tail.

The Tharparkar breed is used for milk production and as draft animals. Tharparkar cattle are found in the areas in the vicinity of Umarkot, Naukot, Dhoro Naro, Chhor, Mithi, Islamkot, Khari Ghulam Shah and Kach. The cows have an average weight of 408 kg.

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.

The Jersey breed originated on the Island of Jersey, a small British island in the English Channel off the coast of France. The breed was known in England as early as 1771 and was regarded very favorably because of its milk and butterfat production. Adaptable to a wide range of climatic and geographical conditions, outstanding Jersey herds are found from Denmark to Australia and New Zealand, from Canada to South America and from South Africa to Japan. They are excellent grazers and perform well in intensive grazing programs. They are more tolerant of heat than the larger breeds. With an average weight

of 350 kgs, the Jersey produces more milk. per kg of body weight than any other breed. The color in Jerseys may vary from a very light gray or mouse color to a very dark fawn or a shade that is almost black. Both the bulls and females are commonly darker about the hips and about the head and shoulders than on the body.
Australian Friesian Sahiwal breed is being developed in Australia by the Queensland Government for use in the tropical areas. The breed was evolved using the Sahiwal from Pakistan, and the Australian Holstein-Friesian. Since the 1960's when research work began on this breed, notable progress has been achieved towards the objective of combining tick resistance and heat tolerance with reliable milk production and fertility. 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 $1500 per animal HOSTEIN. The photos of different breeds are given in annexure 4.

8.2 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

8.3 Animal Housing

Sheds of the animals should 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. Free stalls housing is recommended for the production.

Table 8-2 Space Requirement

Description	Sq ft
Shed along with free stall for cows	100
Cage for Calves (upto 15 days)	20
Calves shed (15 days - 1 year)	40
Shed for Heifers (older then one year)	100
Stores for fodder, concentrate & machine room	3
Utensils & milk storage	1.44
Servant Room, Wash room	10
Total	**274**

Table 8-3 Total Infrastructure Cost

Description	Sq.ft	Rate/Sq.ft	Total Cost
Shed along with free stalls for Cows	10,100	550	5,555,000
Cage for Calves (up to 15 days)	880	150	132,000
Calves shed (15 days - 1 year)	1,760	500	880,000
Shed for Heifers (older then one year)	2,200	500	1,100,000
Stores for fodder, concentrate & machine room	368	300	110,304
Utensils & milk storage	176	300	52,946
Servant Room, Wash room	1,226	300	367,680
Total Infrastructure	**16,710**		**8,197,930**

8.4 Farm Machinery

This pre-feasibility suggests, purchasing 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 Machinery Cost

Farm supplies	Unit	Unit Cost Rs.	Total Cost Rs.
Milking machine (Vacuum Line System)[3]	1	664,125	664,125
Milk Cooling Unit - 1800 Ltr[4]	1	514,500	514,500
Farm tractor	1	500,000	500,000
Total Cost (Rs)			**1,678,625**

Table 8-5 Farm Equipment

Farm supplies	Rate	Capacity (No. of Animal)	Total Cost Rs.
Calf feeder	1,200	5	24,000
Teat Dip Cup	350	10	3,500
Maize Cutter	200,000	100	200,000
Water Pump	12,000	1	12,000
Generator (Peter engine)	200,000	1	200,000
Tube Well	200,000	1	200,000
Cost (Rs)			***639,500***
Miscellaneous Supplies			
Heavy Duty Ventilation Fans[5]	270,270	100	270,270
Testing lab	100,000	500	100,000

[3] Machinery Supplier: Unitech International (Pvt.) Ltd.
[4] Machinery Supplier: Unitech International (Pvt.) Ltd.
[5] Bilal Switchgear Engineering Company (Pvt.) Ltd.

Total Cost (Rs)			***370,270***
Total Farm Equipment Cost			**1,009,770**

8.5 Feed

8.5.1. 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 straw[6] is also used as dry roughage along with green fodder. About 1 kg of concentrate 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 8-6 Dry matter for Cow Feed

Dry matter description	% of Total	Unit Cost Rs./Kg
Silage	67%	2
Concentrate*	33%	16

* The concentrate feed price is Rs 16 per kg if purchased from market.

8.5.2. 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.

8.5.3. 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, Sheikhupura, 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. Details of fodder cultivars released by Research Institutions in Pakistan are given in Annex 3 (Table 13-4). Average forage yields in Pakistan are extremely low compared to yields obtained on research institutes and from well-managed farms and fields. These are very low as compared to their potential, with 22.8 tons per hectare a recent estimate. (*Reference: FAO Statistical Databases)*
Although improved varieties and technology are available, they have been slow to reach the dairy farms. Recent medium scale on-farm work has indicated that yields can be enhanced two to three fold by using available improved varieties and appropriate

[6] *A byproduct of wheat harvesting used as dry roughage for livestock and dairy animals*

agronomic techniques. In an area where land and irrigation are the major limiting factors to enhancing fodder production, intensification is the only way to meet the needs for forage. Intensive and economical forage production per unit area per season would be the best choice. Also efforts should be made to produce and provide sufficient quantities of seed of multicut forage varieties and hybrids like mott grass to commercial dairy farms. 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 8-7 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
Sugarcane Baggass	Sadabahar	Sugarcane tops
Cotton Seed Hulls	Guar	
Corn Cobs		

(Reference: Livestock & Dairy Development Department, Lahore)

(*Reference: FAO Statistical Databases)*

8.5.4. Fodder Production Economics

The comparative economic feasibility of various forage crops produced under various farming systems is shown in Table 8-8.

Table 8-8 Economics of forage production under improved production system per hectare in Pakistan

Item	Forage Crop					
	Maize	**Sorghum**	**S. S hybrid**	**Berseem**	**Lucerne**	**Oats**
Land preparation	938	974	974	875	875	750
Seed & Sowing	1,200	688	2,000	1,250	1,250	1,250
Fertilizer	1,750	1,750	5,000	2,500	2,500	2,250
Irrigation	750	750	1000	1,100	750	500
Land Revenue/rent	1,750	1,750	4,500	6,250	6,250	1,875
Harvesting/Transport	1,875	1,750	3,500	3,000	3,750	3,000
Total expenditure	**8,263**	**7,662**	**13,774**	**14,825**	**15,635**	**9,625**
Yield (Kilos)	**80,000**	**79,750**	**160,000**	**102,500**	**103,750**	**115,000**
Price/kg (Rs)	**1.00**	**1.00**	**1.00**	**1.50**	**1.50**	**1.25**

Variable Costs: *Seeds, fertilizers, land preparation, irrigation, harvesting, Transport etc*

8.5.5. 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, buffalo consumes 50-55 kg fodder daily while cow consumes about 40-45 kg.

8.5.6. 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. Often sources of wheat straw are far from urban dairies of rainfed areas, sometimes in other provinces. 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. In recent years baling units have been installed in central Punjab; bales are transported to major cities, and even to Gilgit, Skardu, and Chitral.

Table 8-9 Daily Feed Requirement of Cow & Calf

Animal	Daily Requirement (kg)	Cost/kg	Amount
Cow			
Dry	9.38	3.00	28.14
Concentrate	4.62	20.00	92.40
Total			**120.54**
Calf older than 1 year			
Dry	6.6	3	19.7
Concentrate	2.2	20	43.8
Total			**63.50**
Calf younger than 1 year			
Dry	2.6	3	7.9
Concentrate	0.9	20	17.5
Total			**25.40**

8.6 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. 1500 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 2,000 per cow per year. On average each cow will be requiring aprox. 2.5 doze of insemination. Some of the companies dealing in imported semen are as follows:

i) Altaf and Co.
ii) Alta Genetics (Sanaam Pharma)
iii) ProFarm

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 mature person can handle 25 milk animals easily. Four farm workers are recommended for handling 100-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) may be hired as a farm manager so that he can handle the farm practices, administration & account matters at the dairy farm.

Table 8-10 Labor Requirements

Description	No.	Salary/month/Person	Annual Salary (Rs)
Farm Manager	1	30,000	360,000
Technician	1	20,000	240,000
Workers	4	7,000	336,000
Total Labor Cost	**6**		**936,000**

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 x 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. It seems thicker than cow's milk because it generally contains more than 16% total solids compared with 12-14% for cow's milk. The butterfat content is usually 6-8%. Cow's milk butterfat content is usually between 3% and 5%. Because of its high butterfat content, buffalo milk has considerably higher energy value than cow's milk. Phospholipids are lower but cholesterol and saturated fatty acids are higher in buffalo milk. Studies have shown that this does not adversely affect the digestibility. Because of the high fat content, the buffalo's total fat yield per lactation compares favorably with that of improved breeds of dairy cattle.

Normally the protein in buffalo's milk contains more casein and slightly more albumin and globulin than cow's milk. The mineral content of buffalo milk is nearly the same as that of cow's milk except for phosphorus, which occurs in roughly twice the amount in buffalo milk. Buffalo milk tends to be lower in salt.

Buffalo milk lacks the yellow pigment carotene, precursor for vitamin A, and its whiteness is frequently used to differentiate it from cow'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 it's 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, both future breeding bull and future dairy animals at his own farm by selecting good off springs of high producers. The first generation (F_1) 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

Near the urban market, the selling price of cow’s milk will be Rs 28 per 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

3 months old male calves will be sold at the farm sooner after birth for Rs 5,000 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

Statement Summaries **SMEDA**

Income Statement

Rs. in actuals

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue	13,060,784	14,951,446	18,527,481	22,946,642	28,981,142	37,930,996	49,833,375	67,231,354	92,869,770	131,166,381
Cost of goods sold	6,266,661	6,554,298	7,049,607	7,818,469	9,166,154	11,177,831	13,822,757	17,524,473	22,619,427	30,043,417
Gross Profit	6,794,123	8,397,149	11,477,874	15,128,173	19,814,988	26,753,165	36,010,618	49,706,880	70,250,343	101,122,964
General administration & selling expenses										
Administration expense	936,000	1,027,130	1,228,286	1,347,874	1,479,105	1,756,780	2,074,505	2,437,445	2,851,394	3,516,674
Rental expense	350,000	385,000	423,500	465,850	512,435	563,679	620,046	682,051	750,256	825,282
Office expenses (stationary, etc.)	18,720	20,543	24,566	26,957	29,582	35,136	41,490	48,749	57,028	70,333
Professional fees (legal, audit, etc.)	64,754	74,152	89,927	111,652	141,252	185,267	243,770	329,807	456,377	645,832
Depreciation expense	844,830	844,830	844,830	1,040,239	1,040,239	1,040,239	2,003,273	2,003,273	2,003,273	2,922,833
Amortization expense	65,600	65,600	65,600	65,600	65,600	-	-	-	-	-
Miscellaneous expense	-	-	-	-	-	-	-	-	-	-
Subtotal	2,279,904	2,417,256	2,676,709	3,058,172	3,268,212	3,581,101	4,983,085	5,501,325	6,118,327	7,980,954
Operating Income	4,514,219	5,979,893	8,801,165	12,070,001	16,546,776	23,172,064	31,027,533	44,205,555	64,132,016	93,142,010
Earnings Before Interest & Taxes	4,578,048	6,142,199	9,186,205	12,870,594	18,013,102	25,814,096	31,027,533	51,339,589	75,034,370	109,751,739
Interest expense	1,944,229	1,633,835	1,270,718	845,922	348,972	-	-	-	-	-
Earnings Before Tax	2,633,819	4,508,364	7,915,487	12,024,672	17,664,131	25,814,096	31,027,533	51,339,589	75,034,370	109,751,739
Taxable earnings for the year	2,287,319	4,050,214	7,396,445	11,393,725	16,893,736	24,829,518	34,277,255	49,695,812	72,827,304	106,746,372
Tax	571,830	1,012,553	1,849,111	2,848,431	4,223,434	6,207,380	8,569,314	12,423,953	18,206,826	26,686,593
NET PROFIT/(LOSS) AFTER TAX	2,061,989	3,495,810	6,066,376	9,176,241	13,440,697	19,606,716	22,458,219	38,915,636	56,827,544	83,065,146
Balance brought forward		2,061,989	5,557,800	11,624,175	20,800,416	34,241,113	53,847,829	76,306,048	115,221,684	172,049,228
Total profit available for appropriation	2,061,989	5,557,800	11,624,175	20,800,416	34,241,113	53,847,829	76,306,048	115,221,684	172,049,228	255,114,374
Dividend	-	-	-	-	-	-	-	-	-	-
Balance carried forward	2,061,989	5,557,800	11,624,175	20,800,416	34,241,113	53,847,829	76,306,048	115,221,684	172,049,228	255,114,374

11.2 Balance Sheet Statement

Statement Summaries **SMEDA**
Balance Sheet

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Assets											
Current assets											
Cash & Bank	430,000	1,165,744	2,891,905	6,734,102	13,280,736	23,377,431	42,673,356	69,882,043	108,468,802	164,090,047	251,153,173
Raw material inventory	473,347	513,780	572,073	657,036	801,901	1,020,102	1,317,562	1,745,460	2,353,002	3,267,857	-
Pre-paid annual land lease	350,000	385,000	423,500	465,850	512,435	563,679	620,046	682,051	750,256	825,282	-
Total Current Assets	1,253,347	2,064,524	3,887,478	7,856,989	14,595,072	24,961,212	44,610,965	72,309,554	111,572,061	168,183,186	251,153,173
Fixed assets											
Land	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Building/Infrastructure	8,197,930	7,788,033	7,378,137	10,839,805	10,236,331	9,632,856	22,330,898	21,062,348	19,793,797	29,049,648	27,254,877
Animals	10,500,000	10,500,000	10,500,000	10,500,000	10,500,000	10,500,000	10,500,000	10,500,000	10,500,000	10,500,000	10,500,000
Revaluation Surplus/ (loss)	-	890,000	1,813,000	2,737,000	4,452,000	6,653,500	9,327,500	13,392,750	18,585,000	25,703,125	-
Net value of animals	10,500,000	11,390,000	12,313,000	13,237,000	14,952,000	17,153,500	19,827,500	23,892,750	29,085,000	36,203,125	10,500,000
Machinery & equipment	3,844,340	3,459,906	3,075,472	2,709,339	2,323,075	1,936,811	4,530,126	3,845,904	3,161,682	6,410,859	5,333,297
Total Fixed Assets	24,047,270	24,092,439	24,170,609	28,139,645	28,814,406	29,975,667	47,890,525	49,952,502	53,141,480	72,714,132	44,088,174
Intangible assets											
Pre-operation costs	328,000	262,400	196,800	131,200	65,600	-	-	-	-	-	-
Training costs	-	-	-	-	-	-	-	-	-	-	-
Total Intangible Assets	328,000	262,400	196,800	131,200	65,600	-	-	-	-	-	-
TOTAL ASSETS	25,628,617	26,419,363	28,254,887	36,127,833	43,475,077	54,936,879	92,501,489	122,262,056	164,713,540	240,897,318	295,241,347
Liabilities & Shareholders' Equity											
Current liabilities											
Accounts payable	-	-	-	-	-	-	-	-	-	-	-
Total Current Liabilities	-	-	-	-	-	-	-	-	-	-	-
Other liabilities											
Long term debt	12,814,308	10,986,941	8,849,179	6,348,300	3,422,625	-	-	-	-	-	-
Total Long Term Liabilities	12,814,308	10,999,566	8,874,429	6,386,175	3,473,125	63,125	50,500	37,875	25,250	12,625	(0)
Shareholders' equity											
Paid-up capital	12,814,308	12,814,308	12,814,308	16,704,175	16,704,175	16,704,175	32,985,271	32,985,271	32,985,271	47,443,071	47,443,071
Gain/ (Loss) on revaluation of anim	-	890,000	1,813,000	2,737,000	4,452,000	6,653,500	9,327,500	13,392,750	18,585,000	25,703,125	-
Retained earnings	-	1,715,489	4,753,150	10,300,484	18,845,777	31,516,079	50,138,218	75,846,160	113,118,019	167,738,497	247,798,276
Total Equity	12,814,308	15,419,798	19,380,458	29,741,658	40,001,952	54,873,754	92,450,989	122,224,181	164,688,290	240,884,693	295,241,347
TOTAL CAPITAL AND LIABILITI	25,628,617	26,419,363	28,254,887	36,127,833	43,475,077	54,936,879	92,501,489	122,262,056	164,713,540	240,897,318	295,241,347

11.3 Cash Flow Statement

Statement Summaries **SMEDA**

Cash Flow Statement

Rs. in actuals

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Operating activities											
Net profit	-	1,715,489	3,037,660	5,547,334	8,545,294	12,670,302	18,622,139	25,707,942	37,271,859	54,620,478	80,059,779
Add: depreciation expense	-	844,830	844,830	844,830	1,040,239	1,040,239	1,040,239	2,003,273	2,003,273	2,003,273	2,922,833
amortization expense	-	65,600	65,600	65,600	65,600	65,600	-	-	-	-	-
Raw material inventory	(473,347)	(40,434)	(58,293)	(84,963)	(144,864)	(218,201)	(297,460)	(427,897)	(607,542)	(914,855)	3,267,857
Cash provided by operations	(473,347)	2,598,111	3,902,423	6,385,426	9,518,893	13,570,565	19,352,292	27,270,692	38,654,964	55,696,271	86,237,844
Financing activities											
Change in long term debt	12,814,308	(1,827,368)	(2,137,762)	(2,500,879)	(2,925,675)	(3,422,625)	-	-	-	-	-
Change in short term debt	-	-	-	-	-	-	-	-	-	-	-
Add: land lease expense	-	350,000	385,000	423,500	465,850	512,435	563,679	620,046	682,051	750,256	825,282
Land lease payment	(350,000)	(385,000)	(423,500)	(465,850)	(512,435)	(563,679)	(620,046)	(682,051)	(750,256)	(825,282)	-
Issuance of shares	12,814,308	-	-	3,889,866	-	-	16,281,097	-	-	14,457,800	-
Cash provided by / (used for) financing	25,278,617	(1,862,368)	(2,176,262)	1,346,637	(2,972,260)	(3,473,869)	16,224,729	(62,005)	(68,205)	14,382,774	825,282
Investing activities											
Capital expenditure	(24,375,270)	-	-	(3,889,866)	-	-	(16,281,097)	-	-	(14,457,800)	-
Cash (used for) / provided by investing	(24,375,270)	-	-	(3,889,866)	-	-	(16,281,097)	-	-	(14,457,800)	-
NET CASH	430,000	735,744	1,726,161	3,842,197	6,546,634	10,096,696	19,295,924	27,208,687	38,586,759	55,621,245	87,063,126
Cash balance brought forward		430,000	1,165,744	2,891,905	6,734,102	13,280,736	23,377,431	42,673,356	69,882,043	108,468,802	164,090,047
Cash available for appropriation	430,000	1,165,744	2,891,905	6,734,102	13,280,736	23,377,431	42,673,356	69,882,043	108,468,802	164,090,047	251,153,173
Dividend	-	-	-	-	-	-	-	-	-	-	-
Cash carried forward	430,000	1,165,744	2,891,905	6,734,102	13,280,736	23,377,431	42,673,356	69,882,043	108,468,802	164,090,047	251,153,173

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
Milk/Cow/Day	16	Ltrs.	17	18	19	20	21	22	23	24
Wet Cows as % Total no. of Cows	80%	%								
No. of Days in Year	365	Days								
Sale Price of developed progeny										
Cow	105,000	Rs.								
Female calf(cow) older then one year	50,000									
Sale Price/Culled cow	30,000	Rs.								
Sale Price/Low yeilder cow	60,000	Rs.								
Sale Price/Male calf	5,000	Rs.								

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
	1	2	3	4	5	6	7	8	9	10
Animals										
Average # of cows	99	97	101	108	118	134	153	180	217	268
# of lactating cows	79	78	81	86	94	107	122	144	174	214
# of calve	44	44	40	38	44	54	69	88	113	150
Calve older than one year (Cows)/Heifer	0	22	22	27	32	41	49	61	77	96
Total animals older then one year	99	119	123	135	150	175	202	241	294	364
Total Animals	143	163	163	173	194	228	271	329	407	514
Animals Sold During the Year										
# of Cow Progeny sold	0	0	0	0	0	0	0	0	0	0
# of culled cows sold	-	-	12	12	13	14	15	14	15	16
# of low yielders (cows)	-	-	-	-	-	-	-	-	-	-
# of Male Calve sold	22	22	20	19	22	27	34	44	56	75
Total Animals Sold	22	22	32	31	35	41	49	59	72	91

Production of milk (ltrs)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Cows	1,267	1,319	1,454	1,642	1,888	2,251	2,693	3,312	4,166	5,360
Buffalos	-	-	-	-	-	-	-	-	-	-
Milk for calve	176	176	160	150	176	215	275	353	450	598
Net Annual milk production	398,288	417,268	472,456	544,288	625,026	743,140	882,351	1,079,889	1,356,413	1,737,984
Revenue from Sale of Milk (Rs.)										
Daily	35,482	36,938	40,723	45,965	52,864	63,034	75,398	92,736	116,659	150,080
Annual	12,950,784	13,482,224	14,863,968	16,777,152	19,295,360	23,007,264	27,520,416	33,848,640	42,580,608	54,779,200
Other Revenue (Rs.)										
Sale of Developed Progeny	-	-	-	-	-	-	-	-	-	-
Sale of Culled Cows	-	-	348,000	369,000	389,400	410,400	437,100	430,800	462,450	474,150
Sale of Culled Buffalos	-	-	-	-	-	-	-	-	-	-
Sale of Low Yielder Cow	-	-	-	-	-	-	-	-	-	-
Sale of Low Yielder Buffalos	-	-	-	-	-	-	-	-	-	-
Sale of Calves	110,000	110,000	100,000	94,000	109,750	134,500	172,125	220,875	281,375	374,000
	110,000	***110,000***	***448,000***	***463,000***	***499,150***	***544,900***	***609,225***	***651,675***	***743,825***	***848,150***
Total Annual Revenue	**13,060,784**	**13,592,224**	**15,311,968**	**17,240,152**	**19,794,510**	**23,552,164**	**28,129,641**	**34,500,315**	**43,324,433**	**55,627,350**
Value of animals	10,290,000	11,180,000	12,103,000	13,027,000	14,742,000	16,943,500	19,617,500	23,682,750	28,875,000	35,993,125

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 feed during dysentery	Calcium carbonate, magnesium carbonate and bismuth carbonate dissolved in water OR entox tablets OR nimkol with sulfademadine (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.	Systamax 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	1st 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----------

Excepted 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 Morning Evening	Date when dried	Days in milk	Total milk yield

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 0,1,2…11,12	Wt. at months 3,6,9,12,18,24	Wt. at Service/ Calving	Remarks

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	• IBR, BVD, PI-3, BRSV • Haemophilus • Clostridial group • Leptospirosis (5 strain) • Worm • Grub and lice treatment in early fall, repeat as needed
	Pre-breeding	• IBR, BVD, PI-3, BRSV • Leptospirosis (5 strain)
	Pre-calving	• 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

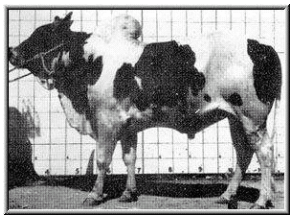
15 ANNEXURE 4

Different Breeds of Buffaloes and Cows

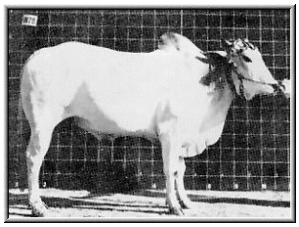
Sahiwal Cows

Red Sindhi Bull

Sahiwal Cow



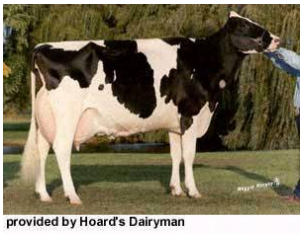
Rojhan



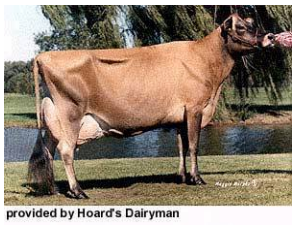
Dhajal

Tharparker

Australian Friesian Sahiwal



Holstein



Jersey