2010

Pre-Feasibility Study on Dairy Farm in Sindh

Sindh Board of Investment
Government of Sindh

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EXECUTIVE SUMMARY

Brief summary of project is as follows.

1. For the establishment of **Dairy Farm in Sindh**, this feasibility has been conducted.

2. The initial cost of the project is **Rs. 124,447,500/-**, including initial capital cost of Rs. 123,170,500 and initial working capital of Rs. 1,277,000/-.

3. Projected Revenues for the project for year 1, year 2, year 3, year 4 and year 5 is Rs. 36.06 million, 50.25 million, 62.7 million, 83.61 million and 107 million respectively.

4. Gross profit for year 1, year 2, year 3, year 4 and year 5 is Rs. 28 million, 40 million, 50.6 million, 68.7 million and 89.5 million respectively.

5. Payback period of the project is approximately 3.6 years.

6. Average Return on Investment is 19.28%.

7. The IRR of the project is 32.23%.

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1 PROJECT BRIEF

The proposed pre-feasibility is for establishment of **Dairy Cattle Farm** with increase per cow milk production through state of the art farm management facilities, efficient and effective utilization of dairy production and deployment of technologically advance infrastructure. The project requires a unique mix of technology and herd composition that will make it possible for investor to achieve economies of scales and attain high rate of return on investment.

1.1 OBJECTIVES

This Pre-feasibility study aims at both financial and socio economic viability with in-depth financial analysis and sustainable socio economic benefits to establish small scale Dairy Cattle Farms in Sindh. The objective of this feasibility is to provide a real time analysis of the market opportunity with factual data that will lead towards overall improvement in dairy sector of economy.

1.2 OPPORTUNITY RATIONALE

Milk is among the most important consumable and marketable commodities of the world with enormous demand in domestic and international market. Buffalo is the main source of milk in domestic dairy industry whereas cow is the main source of milk in international market.

Dairy sector possess potential of additional 3 billion liters of milk with a growth rate faster than any other sector of economy. The scope for export of value added derivatives of milk is also huge especially processed milk market share has increased considerably. Technologically advanced production, processing and storage facilities have made it possible to preserve Milk and its value added products for longer period of time but in Pakistan, only around 3% of total milk production is processed and marketed through formal channels.

Although per animal milk yield in lower than other countries, Pakistan is the 3rd largest milk producing country in the world. Increase in milk production is due to increase in quantity of livestock population

in Pakistan from 716.7 million to 769 million in 2010[1]. It is also required to introduce improved technological methods in dairy farming industry to increase per animal milk production and attain economies of scales.

This provides huge opportunity with minimal competition for farmers to invest in dairy farming and milk processing sectors of the economy.

[1] Economic Survey of Pakistan 2009 - 2010

2 SWOT ANALYSIS

A SWOT analyses for establishing a dairy farm is given below.

Strengths

- Livestock products i.e. Milk & Meat are major source of food.
- Dairy sector is having enormous potential for sizeable earnings
- Pakistan is having wide scope of Milk Production, ranking 3rd in the world
- Dairy sector in Sindh is having low cost of production compare to competitive milk producing countries
- Ample human resource and manpower availability in dairy farming
- Sindhi culture is having long tradition of cattle and livestock rearing
- Large base of cattle for milk production

Weaknesses

- Relatively small dairy cattle milk production market
- Chronic lack of improved, adapted dairy cows
- Unorganized sector, unaware of basic farm management practices including record keeping, farm/ market infrastructures & marketing information
- 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
- Poorly developed cold chain with inadequate number of milk chilling and processing centers
- Lack of education, technical skills, initiative and experience in modern dairy farming
- Adoption of traditional approach
- Post harvest milk losses are very high estimated at 40 kg per capita per year
- Obsolete equipment and technologies

Opportunities

- Increasing demand of value added dairy products
- Local and global dairy products needs are much higher than supply
- Govt. of Sindh & State Bank of Pakistan priority sector
- Commercially viable sector with great credit potential and absorption capacity
- Cooperatives can play a big role for development of dairy sector in Sindh
- Dairy sector provides raw material for food & leather industry

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
- Non-availability of subsidy, tax holidays

3 Livestock Sector Overview

Livestock products constitute huge revenue potential. Livestock sector produces the following products:

- Milk
- Beef
- Mutton
- Poultry Meat
- Wool
- Hair
- Bones
- Fat
- Eggs
- Skins

This sector has shown steady progress in last few years. Detailed livestock growth percentage is shown in table below:

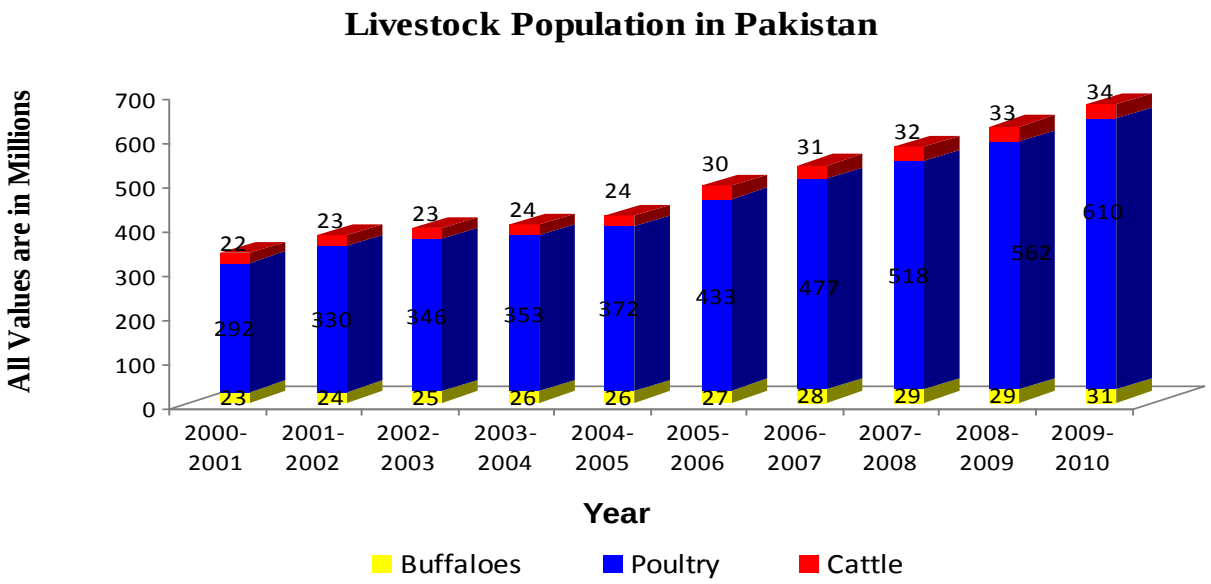
Livestock Growth Percentage	
Year	**Livestock**
2003-04	2.9%
2004-05	2.3%
2005-06	15.8%
2006-07	2.8%
2007-08	4.2%
2008-09	3.5%
2009-10	4.1%

Source: Federal Bureau of Statistics

Livestock population in Pakistan is mainly comprised of Cow, Buffalo, Sheep, Goat, Camel and Poultry. Around 47% of the rural households in Pakistan own livestock and 11% of their income come from livestock."[2] According to Livestock Census 2006, 52% of total cattle population of

[2] Per Capita Meat Consumption Declines by 1.7%, The News, February 20, 2010

Pakistan resides in Punjab, 19.7% in Sindh, 20% in NWFP and 8% in Baluchistan.[3] Detailed comparison of increase in Livestock population in Pakistan is given in graph below:



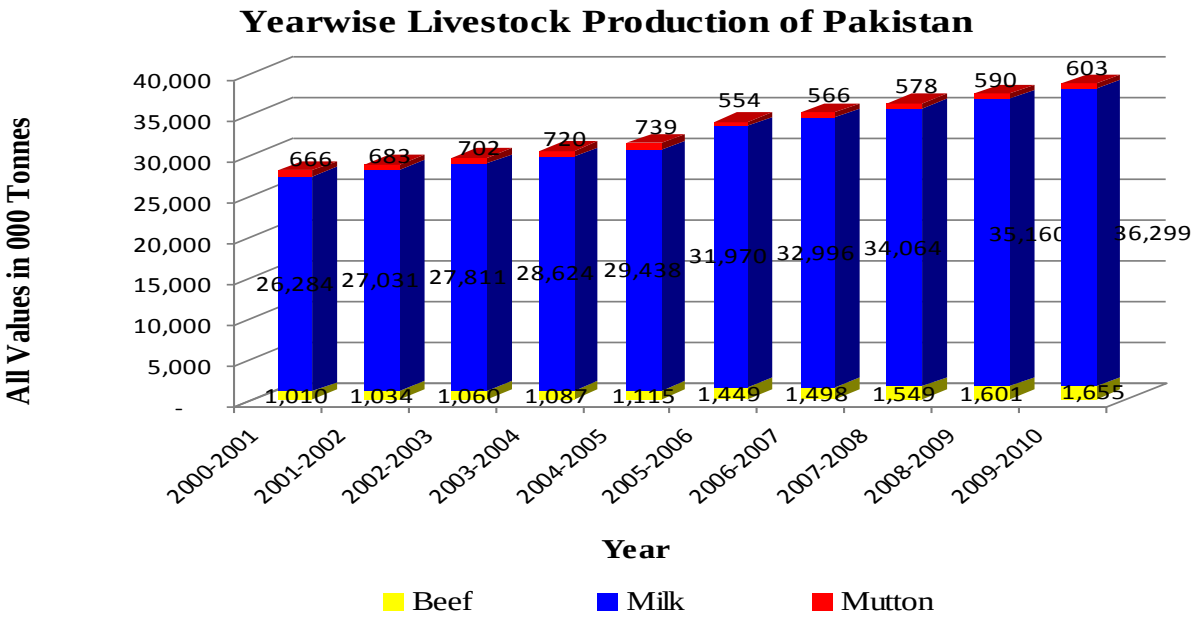
Source: Ministry of Livestock and Dairy Development

In 2009-2010, Livestock sector produces 36,299,000 tonnes of milk, making Pakistan 3rd largest milk producing country in the world. It also produces 1,655,000 tonnes of Beef, 603,000 tonnes of Mutton, 707,000 tonnes of Poultry Meat, 40,000 tonnes of Wool, 22,600 tonnes of Hair, 713,400 tonnes of Bones, 228,100 tonnes of Fat, 56,800 tonnes of Blood, 11,839,000,000 tonnes of Eggs and 47,400,000 tonnes of Skins in 2009-2010.[4]

[3] M. Sajjad Khan, Zia-Ur Rehman , Muqarrab A. Khan and Sohail Ahmad, **Genetic Resources and Diversity in Pakistani Cattle**, Department of Animal Breeding and Genetics, University of Agriculture Faisalabad; Pakistan Vet. J., 2008, 28(2): 95-102.

[4] Ministry of livestock & Dairy Development: Figures are based on Inter census growth rate of Livestock census 1996 & 2006

Year-wise livestock production of Pakistan is given below:



Source: Economic Survey of Pakistan 2010

Livestock accounted for 53.2% of agriculture value added and 11.4% of national GDP during 2009-10.[5] It also comprised of 8.5% of total national export.[6] Gross value addition of livestock at current factor cost has also increased from Rs. 1,304.6 billion (2008-09) to Rs. 1,537.5 billion (2009-10) showing lift of 17.8% as compared to previous year."[7]

3.1 THE PRODUCT: MILK

Raw milk is used to prepare processed milk and various value added products. Some of them are as follows:

- Pasteurized Milk
- UHT Treated Milk
- Condensed Milk
- Skim Milk
- Milk Powder

[5] Economic Advisor's Wing 2008
[6] Pak. J. Agri. Sci., Vol. 45(2),2008
[7] Economic Survey of Pakistan 2009-2010

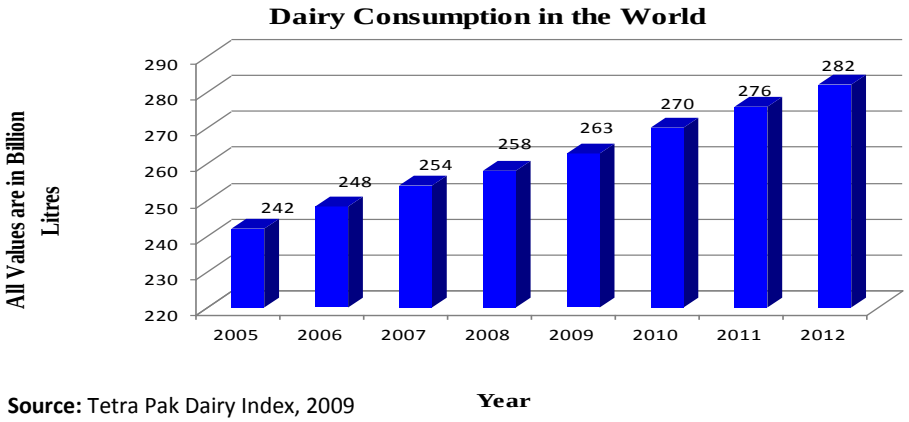
- Ghee
- Liquid butter
- Yogurt
- Ice Cream
- Butter
- Cheese

3.1.1 Market Analysis - Demand & Supply for Milk

Developing Markets contribute greatly in the milk production and consumption markets of the world. Brief overview of local and international market conditions, demand and supply is given below:

Demand for Milk in Domestic and International Market

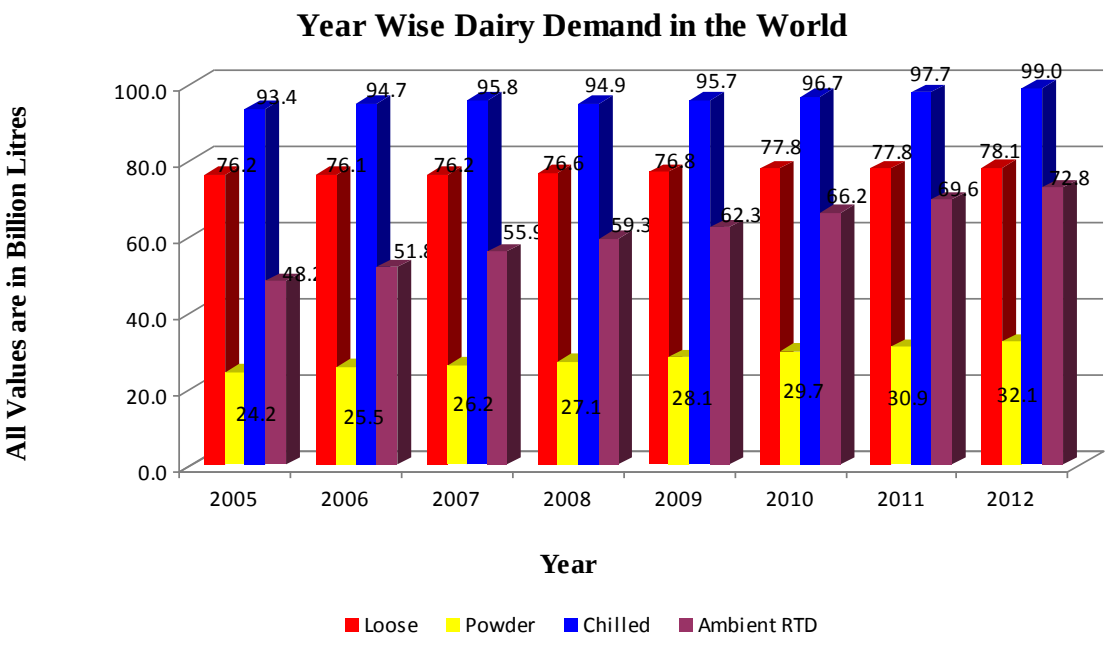
According to Tetra Pak index, global consumption of milk and other liquid dairy products (excluding soy and dairy alternatives) reached an all-time high of 258 billion litres in 2008 whereas including soy milk and other dairy alternatives, such as rice, nut and seed-based milks, consumption becomes 280 billion litres. Projected dairy consumption in 2012 is 282 billion litres.



Source: Tetra Pak Dairy Index, 2009

Worldwide dairy consumption will continue to grow at a compound annual growth rate of 2.2% until 2012.[8] Chilled and Ambient RTD are most valuable milk products in international market.

[8] Tetra Pak Dairy Index, Issue 1 - June 2009



Source: Tetra Pak Dairy Index, 2009

China is the world's leading market in consumption of flavored milk, liquid cultured milk and soy milk with compound annual growth rates over the last three years.

The global average per capita milk consumption is 82.1 kg per annum. Buffalo is the main source of milk in local industry whereas Cow is mainly used for milk production in international market. Top ten per capita cow's milk and cow's milk products consumers are defined in chart below:

Top Ten Per Capita Cow's Milk and Cow's Milk Products Consumers in 2006	
Country	**Milk (In Litres)**
Finland	183.9
Sweden	145.5
Ireland	129.8
Netherlands	122.9
Norway	116.7
Spain	119.1
Switzerland	112.5
United Kingdom	111.2
Australia	106.3
Canada	94.7

In Pakistan, daily human milk consumption in 2009-2010 was 36.29 million tones:

Milk Human Consumption (All values are in 000 tons)			
Item	**2007-08**	**2008-09**	**2009-10**
Milk (Human Consumption)	34,064	35,160	36,299
Cow	11,550	11,985	12,437
Buffalo	20,991	21,622	22,279
Sheep	35	36	36
Goat	700	719	739
Camel	787	798	808

Source: Ministry of Livestock and Dairy Development

Milk and milk equivalents are having second highest level of per capita consumption in Pakistan with almost double of global average i.e. 158.3 kg registering an increase of 2.3 percent. The annual per capita consumption of milk at national level is 190 liters. Province wise per capita consumption is as follows:

Province Wise Per Capita Milk Consumption	
Province	**Per Capita Consumption**
Sindh	246 kg
Punjab	132 Kg
NWFP	86 Kg
Baluchistan	108 Kg

Source: Consultancy Report, October 2007

Supply for Milk in Domestic and International Market

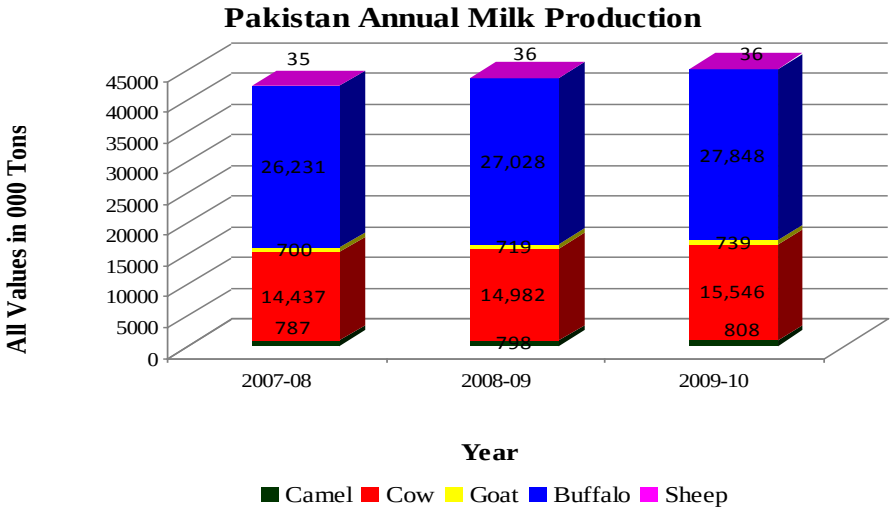
Detailed statistics of world annual milk production is shown below.

World Milk Production		
Rank	**Country**	**Production (billion kg/y)**
1	India	114.4
2	United States	79.3
3	Pakistan	36
4	China	32.5
5	Germany	28.5

6	Russia	28.5
7	Brazil	26.2
8	France	24.2
9	New Zealand	17.3
10	United Kingdom	13.9
11	Ukraine	12.2
12	Poland	12
13	Netherland	11.5
14	Italy	11
15	Turkey	10.6
16	Mexico	10.2
17	Australia	9.6
18	Egypt	8.7
19	Argentina	8.5
20	Canada	8.1

India ranks first in the world, both in total milk production and total milk consumption. In 2008, milk consumption in India was up more than 2.6% from 2007 to nearly 51.5 billion litres. Over the past four years milk consumption in India has risen by a compound annual growth rate of 2.7% with packed milk growing by a compound annual growth rate of 4.7% over the same period."[9] U.S. cows' milk production is the largest of any individual country in the world, with 189.7 billion pounds produced in 2008.

Annual Milk Production in Pakistan is given below:



Source: Ministry of Livestock and Dairy Development

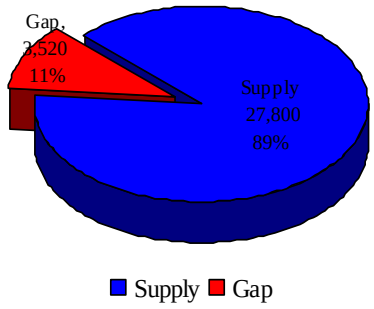
[9] Tetra Pak Dairy Index, Issue 1 - June 2009

Due to high local demand, milk produced in Pakistan is mainly used for local consumption in the form of raw milk. In local market, both demand and supply of milk have shown increasing trend over the last decade. Urban demand for milk in Pakistan is estimated at 9-12 million litres whereas urban supply of milk constitutes only 5% to 15% of the total milk production of the country.

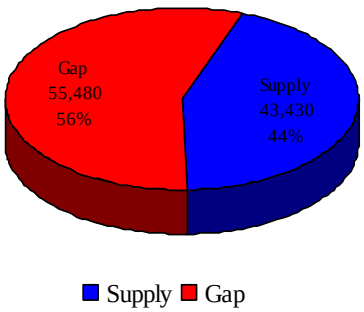
Local demand for milk increases during summers as the consumption of whey (lassi), yogurt, and ice cream rises due to hot weather. Local consumers are price conscious due to rising inflation and high poverty levels. Therefore primary dairy product in domestic market is raw milk. In local market, over 90 percent of the milk is collected and marketed unprocessed through informal channels by a multi tiered layer of intermediaries. Only 3%-5% of total milk production goes into processing industry for value added production.

Although local milk supply is increasing but the Gap between supply and demand has gradually widen over the years. To meet this gap, powdered milk is imported every year. During July 2006 to November 2007, dairy products worth Rs. 2320.42 million ($38.6 million) were imported in Pakistan. The Statistics Division lists the product only as 'Milk and Milk Food for Infants'.[10]

Domestic Milk Supply & Demand Gap in 2003



Domestic Milk Supply & Demand Gap in 2020



Source: Livestock Department, Government of Sindh

[10] Umm e Zia, Consultancy Report, October 2007, CFC/FIGMDP/16FT, Improved Market Access and Smallholder Dairy Farmer, Participation for Sustainable Dairy Development, Lessons Learned Study - Pakistan

3.1.2 COMPETITION - Domestic and International Markets

Milk is a cashable commodity. Dairy market in world provides huge potential for milk value added products. It is extremely important to understand that milk production is not related to milk import in international market because some of high milk producers are high milk consumers as well.

World largest importer of dairy products is Japan whereas New Zealand is the world largest dairy export nation with bulk of international trade in the form of processed dairy products such as milk powder. Internationally global milk supply is contracting due to EU Quota restrictions, climatic changes in New-Zealand/Australia and high rate of growth in Asian milk consumption.

In Pakistan, Dairy sector remains informal and disorganized resulting in fewer profits for the farmers and gap in supply and demand. Huge losses are faced by farmers due to improper transportation and unavailability of interconnected cold chains etc. Dairy farming is common in rural areas of Pakistan therefore major production of milk is from rural areas. Household herd size in rural areas is defined in table below:

Household Herd Size in Pakistan	
Household Percentage	**Animal Count**
51%	1-4
28%	5 to 10
14.23%	11 to 50
6.72%	more than 50

Source: Livestock Census held in 2006

The comparative value of milk in Pakistan is 60% higher than both wheat and cotton together. Gulf has long been an important business partner of Pakistan, importing up to 90 per cent of the country's dairy and agricultural produce.[11] Top 10 dairy companies in the world produced 22.4% of total dairy products supply in the world.[12] Dairy companies are introducing innovative products in organic and functional dairy sector. Low fats and no preservatives products are also getting increase popularity and demand in international market.

[11] Pakistan Veterinary Journal, 2009
[12] IFCN Dairy Report 2009

Currently, there are more than 25 dairy processing plants operating in the country. Some major market players are as follows:

- Nestle Pakistan
- Tetra Pak
- Engro Foods
- Millac Foods
- Noon Pakistan Limited
- Prime Dairies
- ShakarGunj Foods
- Royal Dairy

4 PROJECT COST

Initial cost of the project has been estimated as follows.

Project Cost	
Description	**Total Cost**
Initial Capital Cost	
Land	3,000,000
Building/Infrastructure	63,028,000
Furniture	1,628,500
Animals	35,500,000
Machinery & equipment	17,614,000
Office vehicles	2,200,000
Pre-operating cost	200,000
Total Capital Costs	**123,170,500**
Initial Working Capital	
Administrative Salaries for 3 months	240,000
Labor Salaries for 3 months	144,000
Electricity (for 3 months)	240,000
Gas (for 3 months)	3,000
Petrol (for 3 months)	90,000
Fodder Inventory	60,000
Cash in Hand	500,000
Total Working Capital	1,277,000
Total Project Cost	**124,447,500**

4.1 PROPOSED FINANCING MODEL

The proposed pre-feasibility is based on the assumption of 50:50 debt equity ratios.

Project Financing Model (Debt to Equity Ratio)		
Borrowing	50%	62,223,750
Equity	50%	62,223,750

4.2 PROPOSED LOCATION

The proposition is to establish small scale commercial dairy farms on 5 acres of land. The proposed location of the project is in Bhambore, Thatta in Sindh.

4.2.1 THE LAND

3 acres of Land is leased at Rs. 3,000,000 near Bhambore.

4.3 ANIMAL COST

Initial animal cot is given in table below:

Animal Cost			
Type	**Quantity**	**Per Unit Cost**	**Total Cost Year 0**
Calf (1 year)	10	100,000	1,000,000
Heifer	40	250,000	10,000,000
Cow	70	350,000	24,500,000
Total	**120**		**35,500,000**

4.4 SPACE & INFRASTRUCTURE COST

Space & infrastructure required for the project is as follows:

Space Requirement					
Item	**Sq ft**	**Quantity Required**	**Total Space Required**	**Rate/ Sq ft**	**Total Cost**
Shed along with free stall for cows	100	240	24,000	1,100	26,400,000
Milking Sheds for cows	50	128	6,400	1,100	7,040,000
Cage for Calves (upto 15 days)	20	40	800	700	560,000
Calves shed (15 days - 1 year)	30	50	1,500	400	1,050,000
Servant Room	150	10	1,500	600	900,000
Stores for fodder, concentrate & machine room	200	4	800	500	40,000
Office Room	3000		3000	800	2,400,000
Overhead Water Tank 1000 Gallon			-		300,000
Underground Water Tank 1000 Gallon			-		300,000
Caffing Machines	15	4	60	400	24,000
Utensils & Milk storage	40	4	160	400	64,000
Wash Room	150	5	750	900	675,000
Covered Area			**38,920**		**40,088,000**

Uncovered Area			**91,760**	250	22,940,000
Total land			**130,680** [13]		**63,028,000**

4.5 HUMAN RESOURCE REQUIREMENTS

Human Resource required for the project is as follows.

Human Resource Requirements			
Description	**Qty**	**Salary/Month/Person**	**Annual Salary (Rs)**
Farm Manager	1	30,000	360,000
Technician	1	12,000	144,000
Clerks/Compounder	2	10,000	120,000
Guards	3	7,000	252,000
Farm Labor	6	8,000	576,000

4.6 VEHICLE & TRANSPORTATION REQUIREMENTS

Transportation requirements for the project are as follows.

Initial Vehicle Cost			
Item	**Qty**	**Per Unit**	**Amount**
Car	1	800,000	800,000
Shehzore	1	1,400,000	1,400,000
Total	**2**	**2,200,000**	**2,200,000**

4.7 FURNITURE & EQUIPMENT COST

Furniture & equipment required for the project is given in tables below.

Furniture Cost			
Item	**Quantity**	**Rate**	**Total Cost**
Chains	175	300	52,500
Milking Buckets	50	200	10,000
Electric Caffing Machines with Implements	4	25,000	100,000
Milking Cans	300	1,500	450,000
Office equipments			1,000,000
Water pumps	8	2,000	16,000
Total			**1,628,500**

[13] 1 acres = 43,560 sq feet, 3 acres of land is equals to 130,680 sq ft.

Farm Machinery & Equipment Cost				
Farm Supplies	**Rate**	**Capacity (No. of Animal)**	**Qty**	**Total Cost (Rs)**
Milking machine (Vacuum Line System)	1,800,000		8	14,400,000
Milk Cooling Unit - 1000 Litres	450,000		3	1,350,000
Farm tractor	500,000		1	500,000
Calf feeder	1,200	5	10	12,000
Teat Dip Cup	350		20	7,000
Maize Cutter	200,000	100	2	400,000
Generator	200,000		1	200,000
Tube Well	150,000		1	150,000
Heavy Duty Ventilation Fans	1,500		330	495,000
Testing lab	100,000	500	1	100,000
Total Farm Equipment Cost				**17,614,000**

5 Project Dynamics

5.1 PROPOSED TARGET MARKET

This pre feasibility study suggests that raw milk will be sold on farm gate to following target clients:

- Local people
- Gawalas
- Milk collection companies
- Contractors
- Milk processors
- Dairy Companies

5.2 DAIRY CATTLE BREED SELECTION FOR MILK PRODUCTION

Selection of Cattle breed for farm is extremely important due to the following reasons:

- **Lactation Period:** Lactation period for various breeds differ that will have direct impact on farm revenues.

- **Size of Cow:** Large cows generally produce more milk than small cows, but milk yield does not vary in direct proportion to body weight. Rather, it varies by the 0.7 power of body weight, which is an approximation of the surface area of the cow (metabolic body size). A cow which is twice as large as another usually produces only about 70% instead of 100% more milk.

- **Milk Production Capacity:** Certain breeds produce more milk than others; however, different breeds produce within a range of around 2,000 to over 10,000 kg of milk per annum. Comparative analysis of milk production capacity for various cattle breeds is given below:

Comparative Analyses of Dairy Cattle Breeds		
Breed	**Milk Yield (Kg/Y)[14]**	**Lactation Period**
Ayrshire	6,200	-
Jersey	5,000	310
Guernsey	5,500	305
Brown Swiss	6,180	-
Shorthorns	6,700	305
Australian Friesian Sahiwal	3,000-5000	280
Sahiwal	2,270	300

[14] Milk yield increases (at a decreasing rate) until about the 8th year of age and then decrease at an increasing rate.

Frieswal	4,808	326
Holestein-Friesian	**9000 to15,385**	**365**
Red Sindhi	1900	265
Cholistani	1,188	165
Tharparkar/White Sindhi	1,660	305
Kankrej	1,500	300

5.3 SELECTION OF HERD SIZE & COMPOSITION

- The Pre-feasibility study suggests an initial herd size of 120 animals, which is economical to justify the overhead cost.

- The farm size will increase to about 320 Cattle within 10 years.

- Herds mix of 8% calves, 34% heifer and 58% cows are recommended to get maximum production life and milk production round the year. Combination of herd is selected because mature cows produce about 25% more milk than 2-year-old heifers.

- Thorough studies have been conducted to select dairy breed for the farm. Holstein has been selected as the proposed breed for the project. The Cattle breed for the project have been selected according to target market requirements, better fertility, better adapted to heat-stress and other stressful conditions, along with overall economic performance.

- Detailed herd composition is given in table below:

Herd Composition and Size					
Item	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Calf (4 months -1 year)	10	30	33	35	42
Heifer	40	10	30	33	35
Cow[15]	70	110	120	150	184
Lactating cow[16]	110	120	150	184	218
No of female calves (0-4 months)[17]	51	55	69	85	101
No of male calves (0-4 months)	51	55	69	85	101
Total Animal	222	261	323	388	462
Less Calves Sold	71	78	97	119	141
Total Herd Size	**150**	**184**	**225**	**269**	**321**

[15] Calving Interval is taken as 13 months.
[16] It is a key assumption fro this feasibility that 80% of lactating cow will produces calves after insemination.
[17] Calves sex ratio probability is 50:50

5.4 MILK PRODUCTION & PROPOSED MILKING FREQUENCY

In dairy farming, dairy cow is the milk producing machine Dairy cows produce milk when they give birth to calves. It is extremely important to understand dairy cow lifecycle because it has direct impact on revenues.

- A cow will produce large amounts of milk over its lifetime.
- Production levels peak at around 70 days after calving.
- The cow is then bred. Production declines steadily afterwards, until, at about 305 days after calving, the cow is 'dried off', and milking ceases.
- About sixty days later, one year after the birth of her previous calf, a cow will calve again. High production cows are more difficult to breed at a one year interval. 13 or 14 month cycles are more appropriate for high production cows.
- Local farmers milked cows twice a day. The long interval between milking might not be optimal for the welfare of high yielding cow. It points to a need for increasing the milking frequency to 3 times per day. Therefore in the proposed project, animals are milked thrice a day.
- Year wise projected milk production is given below:

Milk Production							
Year	**Item**	**Milk in Litres Per Day**	**Milk in Litres Per Month**	**Milk in Litres Per Year**	**Total Milk Production Per Year**	**Milk Used by Calves[18]**	**Milk for Sale**
Year 1	Heifer	1,200	36,000	144,000	774,000	48,738	725,262
	Cow[19]	2,100	63,000	630,000			
Year 2	Heifer	300	9,000	36,000	1,026,000	53,169	972,831
	Cow	3,300	99,000	990,000			
Year 3	Heifer	914	27,415	109,662	1,189,662	66,666	1,122,996
	Cow	3,600	108,000	1,080,000			
Year 4	Heifer	997	29,908	29,908	1,473,785	81,390	1,392,395
	Cow	4,514	135,415	135,454			
Year 5	Heifer	1,042	31,250	124,999	1,778,230	96,774	1,681,455
	Cow	5,511	165,323	1,653,231			

[18] A day old calf can only drink around 2 litres of milk per day; at 8 weeks, a calf will only be consuming around 6 litres per day. In dairy farms, most young stock subsists on commercial milk replacer after few days of their birth due to economic advantages. Milk replacer is feed based on dried milk powder and reconstituted using hot water. Milk replacer is cheaper than cow milk.

[19] Per day milk production per cow is taken as 30 litres.

5.5 FEED COST

Dairy cattle will feed on protein sources (concentrate) along with plenty of green fodder. According to estimates cow consumes about 40-45 kg of fodder daily. Feed cost for proposed project is given below:

Grass/Hay					
Grass/ Hay	**Cost Per Cow Per Day**	**Qty**	**Amount Per Day**	**Amount Per Month**	**Amount Per Year**
Year 1	50	120	6,000	180,000	2,160,000
Year 2	54	150	8,050	241,491	2,897,889
Year 3	57	184	10,515	315,464	3,785,568
Year 4	61	218	13,378	401,350	4,816,202
Year 5	66	261	17,093	512,793	6,153,512

Concentrate					
Concentrate	**Cost Per Cow Per Day[20]**	**Rate (In Rs)**	**Total Per Day**	**Total Per Month**	**Total Per Year**
Year 1	70	120	8,400	252,000	2,520,000
Year 2	75	150	11,270	338,087	3,380,871
Year 3	80	184	14,722	441,650	4,416,496
Year 4	86	218	18,730	561,890	5,618,903
Year 5	92	261	23,930	717,910	7,179,098

Total Feed Cost	
Year	**Amount**
Year 1	4,680,000
Year 2	6,278,760
Year 3	8,202,064
Year 4	10,435,105
Year 5	13,332,610

5.6 VACCINATION AND ARTIFICIAL INSEMINATION COST

Vaccination Cost for a single cow would be Rs 1500/- whereas cost of artificial insemination is estimated at Rs 4000/- per cow. Detailed table for vaccination and artificial insemination is given below:

[20] 7% Inflation Rate is taken for cost estimation

Vaccination and Artificial Insemination Cost			
Year	**Vaccination Cost [21]**	**Artificial Insemination (AI)[22]**	**Total Cost**
Year 1	332,308	440,000	772,308
Year 2	391,846	480,000	871,846
Year 3	483,870	601,846	1,085,716
Year 4	581,964	734,769	1,316,734
Year 5	693,627	873,657	1,567,284

5.7 THE PRICE

- In Pakistan, milk is mainly consumed in two ways i.e. loose and packed. Price for both varies greatly because packed milk goes through more stages of production and price of milk increases by one rupee per litre at every stage of sale.

- Growing demand for dairy products in Asia is driving global milk prices. The world milk price ranged between 13.8 and 46.2 US-$/100 kg milk in the period 1996-2009.

- The historical high in 2007 was followed by a rapid decrease of the milk prices, returning to below 20 US-$/100 kg at the beginning of 2009.[23]

- This prefeasibility suggests that milk will be sold at the farm or may be directly sold in the urban market. The milk price varies according to its quality and the season. Cow milk is sold at Rs. 42 per liter at the farm gate. Detailed proposed pricing for this project is depicted in Table below:

Price [24]					
Item	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Farm gate price per liter milk	42	45	48	51	55
Per unit price of male calves	50,000	53,500	57,245	61,252	65,540
Per unit price of female calves	50,000	53,500	57,245	61,252	65,540

[21] Per Cow vaccination Cost is estimated as Rs. 1500/-
[22] Per Cow Artificial Insemination cost is estimated as Rs. 4000/-
[23] IFCN Dairy Report 2009
[24] Inflation Rate per year is taken as 7% for price determination.

Annexure L

All Values are in Rs

Projected P/L Account for Next 5 Years							
S No	**Particulars**	**Details**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
A	Sales	L-1	**36,061,846**	**50,256,748**	**62,771,260**	**83,618,414**	**107,807,905**
B	Less Cost of Goods Sold	L-2	7,828,308	9,746,926	12,125,242	14,853,263	18,290,292
C	**Gross Profit**		**28,233,538**	**40,509,822**	**50,646,018**	**68,765,151**	**89,517,612**
D	Less Operating Costs						
	Administrative Expense	L-3	10,523,750	10,589,270	10,659,376	10,734,390	10,814,655
E	**Operating Profit**		17,709,788	29,920,552	39,986,642	58,030,760	78,702,957
F	Less Financial Charges	L-4	2,277,853	2,762,654	3,352,771	4,071,235	4,946,127
G	**Net Profit Before Tax**		**15,431,936**	**27,157,897**	**36,633,871**	**53,959,525**	**73,756,830**
J	Provision for Income Tax		5,401,178	9,505,264	12,821,855	18,885,834	25,814,891
K	**Net Profit/Loss After Taxes**		**10,030,758**	**17,652,633**	**23,812,016**	**35,073,691**	**47,941,940**

Annexure M – Balance Sheet

Item	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Current Asset						
Cash & Bank	1,217,000	18,483,656	42,988,447	73,053,767	113,654,825	166,224,592
Inventory	60,000	234,000	313,938	410,103	521,755	666,631
Pre-Operating Expense	200,000	160,000	120,000	80,000	40,000	-
Animal	35,500,000	35,500,000	39,050,000	42,955,000	47,250,500	51,975,550
surplus of animals						
Net Value of Animals	35,500,000	35,500,000	39,050,000	42,955,000	47,250,500	51,975,550
Total Current Assets	**36,977,000**	**54,377,656**	**82,472,385**	**116,498,870**	**161,467,080**	**218,866,772**
Fixed Asset						
Land	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000
Furniture	1,628,500	1,465,650	1,302,800	1,139,950	977,100	814,250
Building/Infrastructure	63,028,000	56,725,200	50,422,400	44,119,600	37,816,800	31,514,000
Machinery & Equipment	17,614,000	14,971,900	12,329,800	9,687,700	7,045,600	4,403,500
Vehicle	2,200,000	1,760,000	1,320,000	880,000	440,000	-
Total Fixed Assets	**87,470,500**	**77,922,750**	**68,375,000**	**58,827,250**	**49,279,500**	**39,731,750**
Total Assets	**124,447,500**	**132,300,406**	**150,847,385**	**175,326,120**	**210,746,580**	**258,598,522**
Liabilities & Shareholders' Equity						
Current liabilities	-	12,252,258	11,774,457	11,191,830	10,481,380	9,615,064
Accounts payable	-	-	-	-	-	-
Total Current Liabilities	**-**	**12,252,258**	**11,774,457**	**11,191,830**	**10,481,380**	**9,615,064**
Long Term Debt	62,223,750	60,045,897	57,390,243	54,151,962	50,203,231	45,388,184
Shareholders' equity						
Paid-up capital	62,223,750	62,223,750	72,254,508	93,457,142	121,174,158	160,543,349
Gain/ (Loss) on revaluation of animals	-	-	3,550,000	3,905,000	4,295,500	4,725,050
Retained Earnings		10,030,758	17,652,633	23,812,016	35,073,691	47,941,940
Total Equity	**62,223,750**	**72,254,508**	**93,457,142**	**121,174,158**	**160,543,349**	**213,210,338**
TOTAL CAPITAL AND LIABILITIES	**124,447,500**	**132,300,406**	**150,847,385**	**175,326,120**	**210,746,580**	**258,598,522**

Annexure N – Projected Cash Flow

Item	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Operating activities						
Net profit	-	10,030,758	17,652,633	23,812,016	35,073,691	47,941,940
Add: Depreciation expense	-	9,547,750	9,547,750	9,547,750	9,547,750	9,547,750
Amortization expense	-	40,000	40,000	40,000	40,000	40,000
Raw material inventory	(60,000)	(174,000)	(79,938)	(96,165)	(111,652)	(144,875)
Cash provided by operations	**(60,000)**	**19,444,508**	**27,160,445**	**33,303,601**	**44,549,789**	**57,384,814**
Financing activities						
Change in long term debt	62,223,750	(2,177,853)	(2,655,654)	(3,238,281)	(3,948,731)	(4,815,047)
Change in short term debt						
Add: land lease expense	0	0	0	0	0	0
Land lease payment	0	0	0	0	0	0
Issuance of shares	62,223,750	0	0	0	0	0
Cash provided by / (used for) financing activities	**124,447,500**	**(2,177,853)**	**(2,655,654)**	**(3,238,281)**	**(3,948,731)**	**(4,815,047)**
Investing activities						
Capital expenditure	(123,170,500)					
Cash (used for) / provided by investing activities	**(123,170,500)**					
NET CASH	1,217,000	17,266,656	24,504,791	30,065,320	40,601,058	52,569,767
Cash balance brought forward	1,217,000	1,217,000	18,483,656	42,988,447	73,053,767	113,654,825
Cash available for appropriation		18,483,656	42,988,447	73,053,767	113,654,825	166,224,592
Dividend	0	0	0	0	0	0
Cash carried forward	**1,217,000**	**18,483,656**	**42,988,447**	**73,053,767**	**113,654,825**	**166,224,592**

Annexure R - AVAILABLE LOCAL CATTLE BREEDS

Pakistan is home tract of some of the finest breeds of cattle. All the indigenous cattle of Pakistan belong to zebu (humped type) cattle (Bos Indicus). There are 15 recognized breeds of cattle in the country which constitute 43% of the total cattle population.[25]

Brief introduction of available local Cattle breeds in the region is given below for herd selection.

1. **SAHIWAL:**

1.1. Mainly found in Punjab
1.2. Milk yield Under village condition is 1350 kgs whereas under commercial farms is 2100 kgs
1.3. Age at first calving -32-36 months
1.4. Calving interval – 15 month

2. **THARPARKAR:**

2.1. Mainly found in Tharparkar and surrounding areas

3. **RED SINDHI:**

3.1. Mainly available in Punjab
3.2. Milk yield Under village condition is 1100 kgs whereas under commercial farms is 1900 kgs

4. **KANKREJ:**

4.1. Mainly found in Southwestern part of Tharparkar
4.2. Milk yield Under village condition is 1300 kgs whereas under commercial farms is 3600 kgs
4.3. Age at first calving -36 to 42 months
4.4. Calving interval – 15 to 16 months

[25] Genetic Resources and Diversity in Pakistani Cattle, 2008

Annexure S - AVAILABLE FOREIGN CATTLE BREEDS

1. HOLSTEIN FRIESIAN:-

1.1. This breed is from Holland
1.2. Holsteins are black and white, and each has a unique pattern.
1.3. It can perform well in coastal and delta areas.
1.4. A Holstein calf weighs 80-110 lbs. at birth.
1.5. A mature Holstein cow weighs 1,300-1,500 lbs.
1.6. Milk yield - 7200-9000 kgs
1.7. This is by far the best diary breed among exotic cattle regarding milk yield. On an average it gives 25 litres of milk per day whereas a cross breed H.F. cow gives 10 - 15 litres per day.

2. JERSEYS:

2.1. Jerseys vary from dark brown or fawn, and sometimes are splashed with white.
2.2. Well acclimatized especially in the hot and humid areas
2.3. A Jersey calf weighs around 60 lbs. at birth.
2.4. A mature Jersey cow weighs 900-1,000 lbs.
2.5. Cows are milked for an average of 3-4 years
2.6. Age at first calving is 26-30 months
2.7. Calving interval is 13-14 months
2.8. Dairy milk yield is found to be 20 litres whereas cross bred jersey, cow gives 8-10 litres per day.

3. BROWN SWISS:

3.1. Produces the second largest quantity of milk per annum, around 9000kg.
3.2. The milk contains on average 4% butterfat and 3.5% protein, making their milk excellent for production of cheese.
3.3. The Brown Swiss is known for a long gestation period, immense size, large furry ears, and an extremely docile (though some would say lethargic) temperament.
3.4. It is quite a resilient breed of cattle; they are hardy and capable of subsisting with little care or feed.
3.5. They are resistant to the heat, cold and many other common cattle problems.

4. AYRSHIRE COW:

4.1. The average mature Ayrshire cow weighs 1000-1300 pounds.
4.2. They are known for low somatic cell counts, ability to convert grass into milk efficiently, and hardiness.
4.3. The breed's strong points are desired traits of easy calving and longevity.

5. GUERNSEY:

5.1. The milk of these cows is known for their rich quality.
5.2. The beta carotene present in Guernsey cows makes their milk slightly golden in color.
5.3. Weight of an adult Guernsey cow is around 1000 pounds.
5.4. Farmers prefer this cow for qualities like high efficiency of milk production, longevity, and lesser problems related to calving.
5.5. Guernsey's produce their high quality milk while consuming 20 to 30 percent less feed per pound of milk produced than larger dairy breeds.

5.6. They are also known for having a lower projected calving interval and have a younger average age of first calf heifers than the larger breeds.
5.7. The productive life of Guernsey cows is lowest.