Bulletin No. 3

Empowerment of Dairy Farmers for Enhancing their Income

Training Workshop on
Empowerment of Dairy Farmers for Enhancing their Income

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Use of Feed Additives in Dairy Nutrition

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At present, dairy farming is going through a critical phase as majority of dairy farmers are not satisfied with their net returns. The low milk price realization and high cost of feed ingredients are the major factors. Major contribution of milk in Punjab is still contributed by small & marginal farmers. When surveys are conducted on dairy farms, most of these small farmers are feeding unbalanced rations to their animals. Energy, Protein, Minerals, Vitamins besides Water are the basic needs of an individual animal. If any of the above nutrient is lacking or not in proper ratio, the production and reproduction suffers leading to low returns. The knowledge and affordability are different from farmer to farmer especially medium and large farmers. But needs of an individual animal is always constant depending upon its potential irrespective of its owner.

If the price of milk is beyond the farmer's control at least sincere efforts can be made to balance the ration so that cost of production can be minimized. With the new breeding policies, the production potential of the animal is increasing but unfortunately the increases in demand for various nutrients are not matching. The land is also shrinking due to overgrowing population and so is the area under fodder production. Certain major ingredients like maize, cottonseed cake, mustard cake and soybean meal are becoming dearer. Dairy farmers and nutritionists are forced to look for alternative feed resources to economize the rations and sometimes compromising the quality issues. One other way is to use feed additives which can cause desired animal response in a non nutritive role.

Feed Additive (FAs) is an ingredient or combination of ingredients added to the basic feed mix or parts thereof to fulfil the specific response. A dose of a few mg/kg added to the feed acts as a protection against untoward environmental influences. Response refers to expected performance changes the farmer could expect or anticipate when a feed additive is included. Some examples are listed below:

- Higher milk yield (peak milk and/or milk persistency)
- Increase in milk components (protein and/or fat)
- Greater dry matter intake and increase in digestion rate
- Stimulate rumen microbial synthesis of protein
- Stabilize rumen environment and pH
- Greater volatile fatty acid (VFA) production
- Improve growth (gain and/or feed efficiency)
- Reduce heat stress effects

- Increase reproductive efficiency
- Improve health (such as less ketosis, reduce acidosis, or improve immune response)

One guideline is that an additive should return Rs. 2 or more for each rupee invested to cover nonresponsive cows and field conditions that could minimize the anticipated response. Research is essential to determine if experimentally measured responses can be expected in the field. Studies should be conducted under controlled and unbiased conditions, have statistically analyzed results (to determine whether the differences are repeatable), and have been conducted under experimental designs that would be similar to field situations.

FAs are broadly classified into Nutrient FAs (e.g. amino acids, minerals) and Non Nutritive FAs (e.g. Buffer, Probiotics, Toxin binders). One of the most successful attempts accomplished in the last decade is using FAs such as

- Aid Ingestion – Flavors, Sweeteners
- Aid Digestion - Buffer, Enzymes, Yeast
- Produce Desired Products – Antioxidants, Mold Inhibitors, Pellet Binders
- Alter Metabolism – Antibiotics

Interest in FAs will continue and will be influenced by new research results, advertising, and profit margins. Table 1 outlines additives in different categories with information that will assist in deciding whether an additive should be included. Current status is classified in the following ways:

- Recommended: Include as needed
- Experimental: Additional studies are needed
- Evaluative: Monitor on individual and specific situations
- Not recommended: Lacks economic response to currently use

Table 1: Feed Additive guidelines for dairy cows.

Anionic Salts and Products	
1. Function:	Cause the diet to be more acidic, increasing blood calcium levels by stimulating bone mobilization of calcium and calcium absorption from the small intestine.
2. Level:	Reduce DCAD to –50 meq/kg using chloride sources (calcium chloride, ammonium chloride and hydrochloric acid treated feeds).
3. Cost:	Rs 6 -10 per dry cow per day depending on product used
4. Benefit to Cost Ratio:	5:1
5. Feeding	Feed to dry cows two to three weeks before calving. Adjust dietary calcium

strategy:	levels to 150 grams per day. Raise dietary magnesium levels to 0.4%.
6. Status:	Recommended
Aspergillus oryzae	
1. Function:	Stimulate fiber-digesting bacteria, stabilize rumen pH, and reduce heat stress.
2. Level:	3 grams per day
3. Cost:	Rs 5 -6 per cow per day
4. Benefit to Cost Ratio:	4:1
5. Feeding strategy:	High grain diets, low rumen pH conditions, and under heat stress (cows) and calves receiving a liquid diet.
6. Status:	Evaluative
Biotin	
1. Function:	Improve hooves by reducing heel warts, claw lesions, white line separations, sand cracks, and sole ulcers and increase milk yield through a metabolic route.
2. Level:	10 to 20 milligrams per cow per day for six months to one year
3. Cost:	Rs 5-7 per cow per day
4. Benefit to Cost Ratio:	4:1
5. Feeding strategy:	Herds with chronic foot problems may require supplementation for six months before evaluation, and it is recommended to supplement at 15 months of age.
6. Status:	Recommended
β-carotene	
1. Function:	Improve reproductive performance, immune response, and mastitis control.
2. Level:	200 to 300 mg per day
3. Cost:	Rs 12-15 per cow per day
4. Benefit to Cost Ratio:	Not available
5. Feeding strategy:	In early lactation and during mastitis-prone time periods

6. Status:	Not recommended
Calcium Propionate	
1. Function:	Increase blood glucose and calcium levels.
2. Level:	120 to 225 grams per day per freshly calved cow
3. Cost:	Rs 155 per kg
4. Benefit to Cost Ratio:	Not available
5. Feeding strategy:	Feed seven days prepartum to seven days postpartum or until appetite responds.
6. Status:	Recommended
Protected Choline	
1. Function:	A methyl donor used to minimize fatty liver formation and to improve fat mobilization.
2. Level:	15g per day
3. Cost:	Rs 5-6 per day
4. Benefit to Cost Ratio:	2:1 (when protected)
5. Feeding strategy:	Feed two weeks prepartum to eight weeks postpartrum to cows experiencing ketosis, weight loss, and high milk yield
6. Status:	Recommended (rumen protected)
Enzymes	
1. Function:	Increase fiber digestibility by reducing fiber (cellulase and xylanase enzymes) and DM intake.
2. Level:	Not clearly defined (enzymatic units per unit of feed dry matter).
3. Cost:	Rs 3-5 per cow per day
4. Benefit to Cost Ratio:	2:1
5. Feeding strategy:	Increase fiber digestibility, treated 12 hours before feeding, sprays on product more effective when applied to dry diets, and may be diet specific.

6. Status:	Experimental
Magnesium Oxide	
1. Function:	Alkalinizer (raises rumen pH) and increases uptake of blood metabolites by the mammary gland raising fat test.
2. Level:	35 to 50 grams per day
3. Cost:	Rs 2-3 per day
4. Benefit to Cost Ratio:	Not available
5. Feeding strategy:	With sodium-based buffers (ratio of 2 to 3 parts sodium bicarbonate to 1 part magnesium oxide).
6. Status:	Recommended
Methionine Hydryoxy Analog	
1. Function:	Minimize fatty liver formation, control ketosis, and improve milk fat test.
2. Level:	30g per cow per day
3. Cost:	Rs 260 per kg
4. Benefit to Cost Ratio:	2:1
5. Feeding strategy:	Feed to cows in early lactation receiving high levels of concentrate and limited dietary protein.
6. Status:	Evaluative
Monensin	
1. Function:	Improve feed efficiency for lactating cow, reduce ketosis and displaced abomasums in transition cows by shifting rumen fermentation and microbial selection.
2. Level:	11g to 22g per ton of total ration dry matter consumed (250 to 400 mg/cow /day)
3. Cost:	Rs 2.5 per cow per day
4. Benefit to Cost Ratio:	5:1
5. Feeding	Feed to dry cows (reduce metabolic disorders) and lactating cow (feed

strategy:	efficiency) while monitoring milk components to evaluate optimal levels of monensin.
6. Status:	Recommended
Niacin (B3, Nicotinic Acid, and Nicotinamide)	
1. Function:	Coenzyme systems in biological reactions, improve energy balance in early lactation cows, control ketosis, and stimulate rumen protozoa.
2. Level:	6g per cow (prepartum) and 12g per cow (postpartum) protected.
3. Cost:	Rs 9-12 per day per cow
4. Benefit to Cost Ratio:	6:1 (6 grams level)
5. Feeding strategy:	High producing cows in negative energy balance, heavy dry cows, and ketotic-prone cows fed two weeks prepartum to peak dry matter intake (10 to 12 weeks postpartum).
6. Status:	Evaluative
Probiotics (Bacterial Direct-Fed Microbes)	
1. Function:	Produce metabolic compounds that destroy undesirable organisms, provide enzymes improving nutrient availability, or detoxify harmful metabolites.
2. Level:	Not clearly defined
3. Cost:	Rs 400 per kg
4. Benefit to Cost Ratio:	Not available
5. Feeding strategy:	Feed to calves on liquid diet, transition cows, and during stress conditions.
6. Status:	Evaluative for cows; recommended for milk-fed calves
Propylene Glycol	
1. Function:	Source of blood glucose; stimulate an insulin response, and reducing fat mobilization.
2. Level:	200 to 450 grams per cow per day
3. Cost:	Rs 300 per kg

4. Benefit to Cost Ratio:	Not available
5. Feeding strategy:	Drench cow starting at one week prepartum (preventative role) or after calving when signs of ketosis are observed (treatment role). Feeding is not as effective as drenching.
6. Status:	Recommended
Silage Bacterial Inoculants	
1. Function:	To stimulate silage fermentation, reduce dry matter loss, decrease ensiling temperature, increase feed digestibility, improve forage surface stability, and increase VFA (lactate) production.
2. Level:	100,000 colony forming units (CFU) per gram of wet silage. Recommended bacteria include *Lactobacillus plantarium, Lactobacillus buchneri, Lactobacillus acidilacti, Pediococcus cereviseai, Pediococcus pentacoccus*, and/or *Streptococcus faecium*.
3. Cost:	Rs 150 -180 per treated ton of silage
4. Benefit to Cost Ratio:	3:1 (feed recovery) to 7:1 (milk improvement)
5. Feeding strategy:	Apply to wet silage (over 60% moisture); corn silage, haylage, and high moisture corn; low natural bacteria counts (first and last legume/grass silage and frost damaged corn silage); and under poor fermentation situations.
6. Status:	Recommended
Sodium Bentonite	
1. Function:	A clay mineral used as a binder, shifts VFA patterns, slows rate of passage, and exchanges mineral ions. Field claims to tie up mycotoxins have been reported.
2. Level:	100-200 grams per cow per day for mycotoxin effect
3. Cost:	Rs 25 – 30 per kg
4. Benefit to Cost Ratio:	Not available
5. Feeding strategy:	With high grain diets, loose stool conditions, presence of mold, low fat test, and dirt eating.
6. Status:	Evaluative

Sodium Bicarbonate/Sodium Sesquicarbonate (Buffer)	
1. Function:	Increase dry matter intake and stabilize rumen pH.
2. Level:	0.5 to 0.75% of total ration dry matter intake
3. Cost:	Rs 2.5 to 5.0 per day per cow
4. Benefit to Cost Ratio:	4:1 to 8:1
5. Feeding strategy:	Feed 120 days postpartum with diets that are high in corn silage (over 50%), wet rations (over 55% moisture), lower fiber ration (<19% ADF), little hay (<2.2 kg), finely chopped forage, pelleted grain and heat stress conditions.
6. Status:	Recommended
Yeast Culture and Yeast	
1. Function:	Stimulate fiber-digesting bacteria, stabilize rumen environment, and utilize lactic acid.
2. Level:	10 to 120 g depending on yeast culture concentration.
3. Cost:	Rs 4 to 6 per cow per day
4. Benefit to Cost Ratio:	4:1
5. Feeding strategy:	Two weeks prepartum to 10 weeks postpartum and during off-feed conditions and stress.
6. Status:	Recommended
Yucca Extract	
1. Function:	Decrease urea nitrogen in plasma and milk by binding ammonia to the glycofraction extract of Yucca shidigera plant improving nitrogen efficiency in ruminant animals.
2. Level:	800 milligrams to 9 grams per day (depending on source)
3. Cost:	Rs 4 -6 per cow per day
4. Benefit to Cost Ratio:	Not available
5. Feeding strategy:	To cows with high BUN and MUN levels.

6. Status:	Evaluative
Zinc Methionine	
1. Function:	Improve immune response; harden hooves, and lower somatic cell counts.
2. Level:	7-9 g per day
3. Cost:	Rs 3 – 5 per cow per day
4. Benefit to Cost Ratio:	7:1
5. Feeding strategy:	To cows experiencing foot disorders, high somatic cell counts, and wet environment.
6. Status:	Recommended

Let it be clear that FAs are not a requirement, nor are they a guarantee for high productivity or profitability until basic nutrient needs are met. Dairy farmers or end users should add an additional "3 R's" when selecting FAs i.e. reliability, repeatability & relativity.

Reliability is based on the research database that has been published on a feed additive: The ability to predict that the product can have a positive response of a wide range of feeding; Establish a normal curve of response in various studies; Minimize the risk of not obtaining a positive benefit to cost ratio.

Repeatability represents the statistical data results (mean and standard deviation). Each feed specialist must determine what level of risk he will assume when selecting each feed additive. The bottom line is the probability of a profitable response.

Relativity refers to other products, management changes, or on-farm practices that could replace the feed additive being used.

A second aspect of selection of a feed additive is which commercial product should be purchased. "Me too syndrome" is a term referring to products that have limited research and results, but are marketed on the concept that the products are identical to the industry-based standard.

Economics of Livestock Production System

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Animal Husbandry is an integral part of mixed farming systems that characterizes Indian agriculture and plays a significant role in the rural economy. It is one of the remunerative sectors which provide regular income and employment to the households especially small and marginal farmers. Contribution of livestock sector is evident from the facts that during 2020-21 it contributed 36.99 percent to the total agricultural GDP of the country and continuously improving over the time (Anon, 2021).

Livestock sector in Punjab is growing at high speed. Food consumption and expenditure pattern of population both in rural and urban areas is changing. Higher disposable income has led to increased demand of livestock foods -milk, meat and eggs, as a source of protein in the food basket. Between 1983-2011, the per capita consumption of milk in Punjab increased by 44.3 percent and of meat, fish and eggs by 39.7 per cent. Against this, consumption of both cereals and pulses showed a decline by 20.6 and 15.6%, respectively. The share of animal products in the total food expenditure, between 1983 and 2011, increased from 21.8% to 25.0% in urban areas and from 16.1% to 24.2% in rural areas. suggesting that growth for livestock products is demand driven and expected to be higher in rural areas making livestock farming to be a source of sustained and inclusive growth (Sharma et al., 2008).

In Punjab total livestock population is 69.92 lakh and out of which 65.47 Lakh is bovine population. **Within livestock, milk is major contributor to the value of output; its contribution has been around 82% of the total value of output from livestock for the last two decades. Within milk, contribution of buffalo accounts for around 80 percent of the total value of milk (Rs 426.78 billion appox Egg and meat contributed around 2.89 and 11.70 per cent respectively. This clearly suggests that dairy farming has been and shall continue to be the most important component of livestock farming in Punjab. The share of buffalo milk in Punjab is** more than 56 % as against 45% at National level. Buffalo has been and shall continue to be an important dairy animal.

It is very important to study the economics of livestock production systems. In this article, economics of Dairy, Goat and Pig farming will be discussed.

A. Economics of Dairy Production Systems:

Cattle and buffalo are available across all regions / districts in the State and account for around 93% of total livestock. These are raised for milk under semi-intensive/ intensive system. Although, dairying has been integral part of the farming system since ages,

the structure of dairy production has changed from semi intensive to intensive production system over the years. With the change of breeding policy, crossbreeding received higher focus and crossbred population increased overtime. Buffalo however was and continue to be a major part of dairy production system. The prevailing dairy farm structure in Punjab has been discussed in Table 1. Large part of the milk production, around 70%, comes from small and medium dairy farms with herd size of 2-10 animals, another 25% from large/commercial herds and the rest from domestic (1%) and peri-urban dairies (4%), which are concentrated around big cities.

Table 1: Dairy Farm structure in Punjab

Type of Dairy Farm Structure	Characteristics	Estimated Number of Bovines in each farm structure (In Lakhs)	Estimated milk production (in million tons) in each farm structure
Landless/Domestic farmers	These farmers have low yielding crossbred cattle(average size is 1 to 2) and these animals mostly sold by large farmers to small/medium and ultimately they remain with landless farmers .	3.26	0.13
Smalland Medium Rural Dairy Farms	Farm is of mixed type (Both buffalo and cows on farm). They mainly have less than 10 dairy animals and have low to medium yielding animals. Mostly, They grow their own green fodder.	44.11	9.51
Large/Commercial Dairy Farms	Commercial dairy farms are typically one-species enterprises(crossbred cattle). Commercial buffalo farms are very rare. These farms varying in size from 10 to 500 high-yielding breeds of cows. Indigenous breed commercial farms also do exist in system.	15.0	3.25
Peri Urban Dairy Farms	Periurban dairy farms are located on the periphery of a city/ big town (between approximately 5 and 10 km away from town). They mainly have 20- 100 animals and are mainly held by large landholders. They are in mixed farming (60 per cent crossbred	2.50	0.50

	and 30 per cent buffaloes) and they dont keep animal beyond third lactation.		

For better understanding and appreciation of dairy production system, it is especially important to study its economics. Profitability of dairy farming depends upon the milk yield, price of milk and cost of milk production. A study on economics of milk production undertaken by GADVASU from 2009 to 2015 indicated that milk yield levels less than 11 kg in crossbreds and 8 kg in buffaloes were not profitable under intensive production system. Crossbreds with 7-9 kg milk in small (two animals) and domestic (five animals) category only recovered cost for family labour. Average cost of production per litre of milk was Rs 22.3 for crossbreds and Rs 29.7 for buffaloes. Small dairy units with less than seven animals were not economical. Feed and labour costs was around 80 % of the input cost of milk production and these have substantially gone up over the years. It is important to mention that 70% of domestic and small farmers own 45% of crossbreds and buffaloes and that it would be difficult for them to continue with dairy farming with the rising feed costs. These domestic and small dairy farmers presently are an integral part of small holder agriculture production system and are continuing because of no other option.

Table 2- Economics of Milk production

Particulars	Domestic	Small	Medium	Large	Overall
CATTLE					
Milk yield (Litre)	7.20	9.00	11.94	15.36	10.48
Cost of milk production, Rs/litre/day/farm	25.60	23.80	21.60	19.91	22.32
Dairy Enterprise Profit, (Rs/litre)	-3.12	-1.48	2.92	4.92	1.02
Dairy Enterprise Profit, (Rs/litre) (Excluding labour)	0.47	1.12	4.10	6.10	3.88
BUFFALO					
Milk yield (Litre)	5.95	7.73	8.62	9.66	7.71
Cost of milk production, Rs/litre/day/farm	35.01	33.22	29.91	27.91	29.72
Dairy Enterprise Profit, (Rs/litre)	-4.37	-2.12	3.98	5.99	2.65

Dairy Enterprise Profit, (Rs/litre) (Excluding labour)	-0.02	1.32	5.52	7.32	4.62

After 2015 there are lots of changes in prices of important input costs of dairy.. During the last two years, the prices of all feed items have gone skywards, including transportation and fuel costs. Concentrate Feed cost constitutes two - third of the total feed cost. Between April, 2020 to March, 2022, the price of major ingredients used in concentrate feed like Maize, Mustard Cake, Deoiled Mustard, Soyabean Meal, Cotton Seed, Bypass Fat, DCP, Full Fat Roasted Soya, V.E , Binola and Mgo has risen by **9.94, 59.25, 41.83, 89.94, 18.63, 170.49**,**75.00 ,133.15,100, 48.39 and 25** percent, respectively, which resulted in 22 to 25 percent increase in concentrate feed cost in last two years. Green Fodder prices have also risen in last two years at the rate of 9.7 %. In addition, prices of dry roughages have also gone north putting extra input cost to milk production. Dry Fodder which was costing Rs. 332.42 per quintal in 2020-21 has increased to Rs. 454.56 per quintal in 2021-22. Other than feed cost, the labour and diesel expenses also form important components of cost structure. Apart from a hike in daily wage rates, the diesel price has risen steeply in recent days.The prices announced by Milkfed increased by 7.81 per cent for cow milk and 9.09 per cent for buffalo milk during the last year. This results in curtailment of the profit margins of dairy farmers, rather relegating producers to the brim mounting losses leading to closure of farms. Since dairying is full of drudgery, once a farmer opts out of this enterprise, it is unlikely that he returns to dairying in future. Therefore, it is imperative that there is consonance between the cost of dairy inputs and milk procurement price. In the absence of this, dairy farmers of the state continue to suffer.

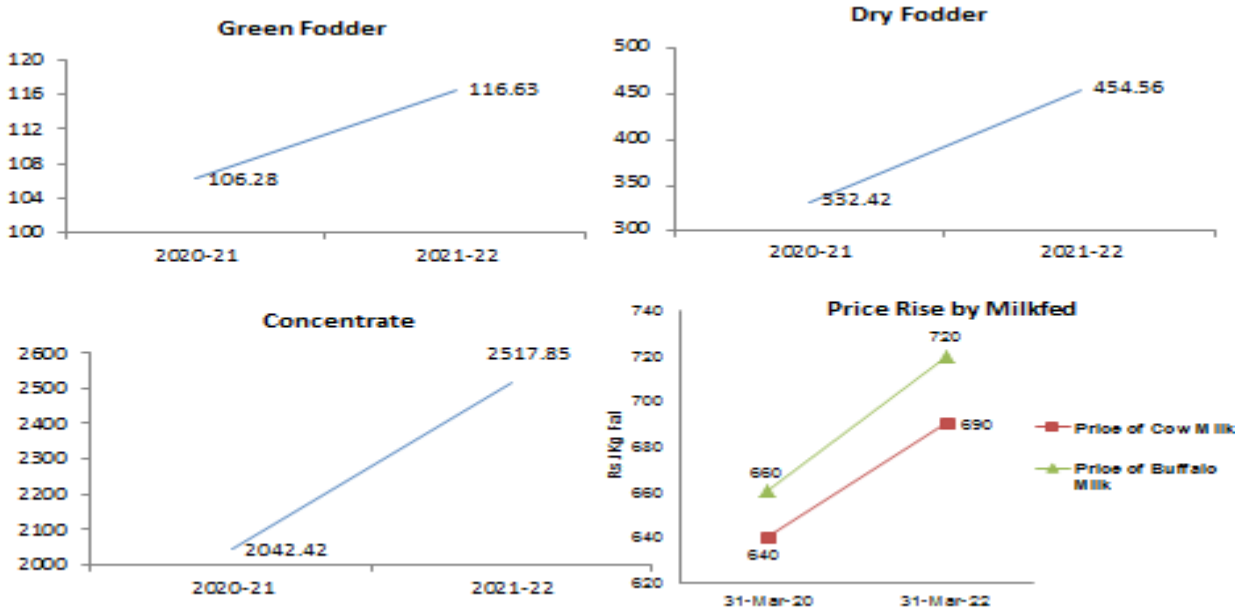

Fig 1: Increase in Feed Prices and Milk Prices from 2020 to 2022

B. Economics of Goat and Pig Production Systems:

Total meat production in Punjab state was 223.74 thousand tonnes during 2020-21 which is 2.54% of the India's meat production. The contribution of meat from buffalo is 89.21 thousand tonnes (39.87%), while goat meat contributed 7.20 thousand tonnes (3.22%), sheep 3.20 thousand tonnes (1.43%), pig 1.73 thousand tonnes (0.77%), poultry 122.40 thousand tonnes (54.71%).

Goat rearing is one of the important agricultural enterprises particularly in rural parts. Goat farming is having enough potential for meat production providing good source of income and employment. Goat farming is a good source of income for resource poor farmers. The goat population in Punjab state has been on continuous decline since last four decades except some rise after 2007. It declined from 8.01 lakh during 1972 to 2.86 lakh during 2007, thereafter it increased by 21.68 % to 3.48 lakh during 2019 which is only 0.23 per cent of the total goat population of India (1488.85 lakh during 2019).

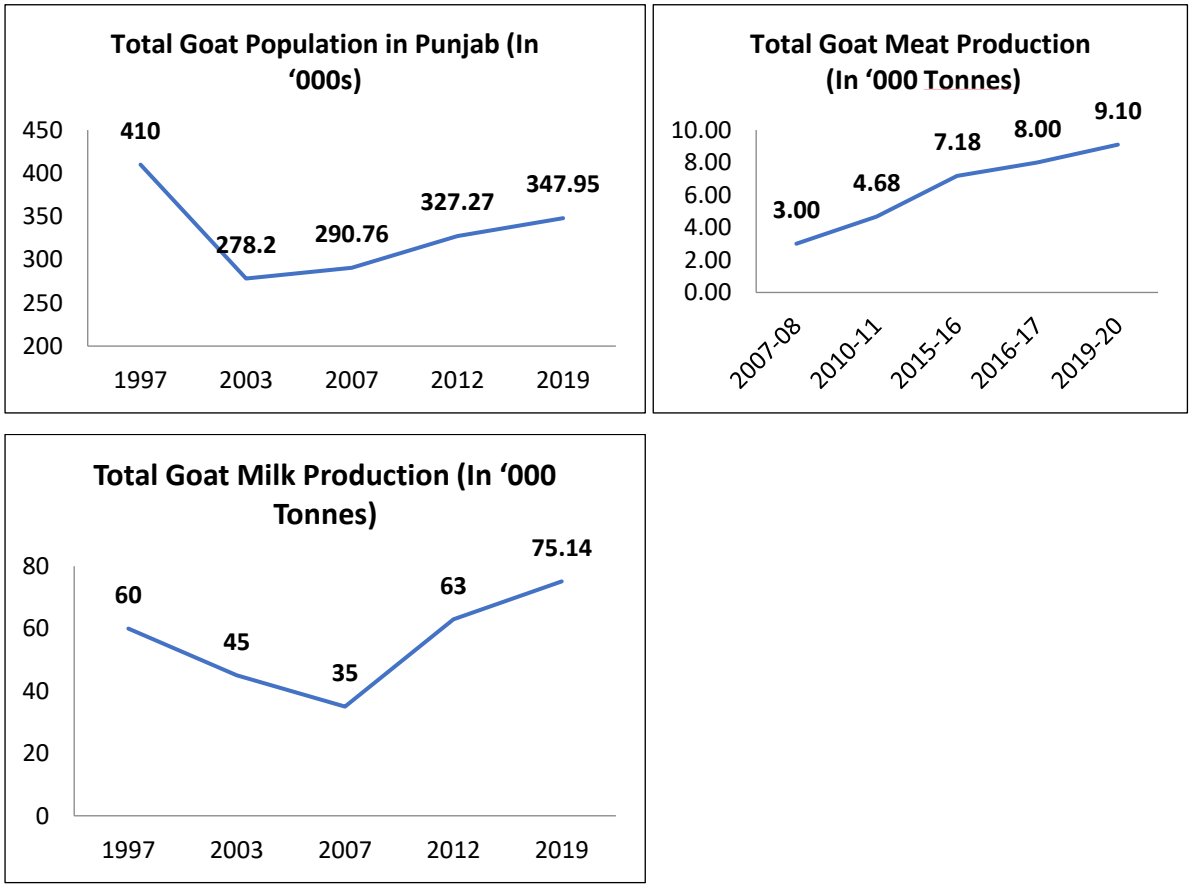

Fig2: Goat population, Meat production and Milk production in Punjab

This table explains the economics of goat farming of units comprising 52 adults. The economics of goat production system is based on the assumptions taken from field conditions.

Table 3: Economics of Goat farming units: 52 adults (50 does + 2 bucks)

A.	Capital investment	Rate (Rs./unit)	Amount (Rs.)
1	**Cost of sheds:**		
i.	Covered area (1875 Sq.ft.)	400	750,000
ii.	One store -cum- milk room - cum-office (200 sq. ft.)	500	100,000
iii.	Open area (3750 sq. ft.)	150	562,500
2	**Cost of animals:**		
i.	Purchase of 50 does	10000	500,000
ii.	Purchase of 2 bucks	12000	24,000
3	**Cost of equipments**	350/adult animal	18,200
	Total		**1,954,700**
B.	**Fixed cost**		
i.	Depreciation on shed		42,500
ii.	Depreciation on equipments		1,820
iii.	Insurance		20,960
iv.	Interest on capital investment		195,470
	Total		**260,750**
C.	**Variable Cost**		
i.	Creep ration (968 kg @ Rs 29.5/kg)		28,556
ii.	Grower ration (5805 kg @ Rs 27.5/kg)		159,638
iii.	Adult ration (8435 kg@ Rs 25.5/kg)		215,093
iv.	Cost of dry fodder (16838kg@ Rs 5.5/kg)		92,609
v.	Green fodder (153863 kg@ Rs 1.2/kg)		184,636
vi.	Labour (@ Rs9000/month)		120,000
vii.	Miscellaneous (Medicine, light, water etc.)		100,000
	Total		**900,531**
	Total (B+C)		**1,161,281**
D.	**Income**		
i.	Sale of milk (10275 litre@ Rs40/litre)		411,000

ii.	sale of 54 buckling	9000	486,000
iii.	sale of 46 Doeing	8500	391,000
iv.	sale of 8 culled animal	7000	56,000
v.	Sale of Manure and gunny bags		35,000
	Total		**1,379,000**
E.	**Net income/year**		**217,719**
	Benefit cost ratio		1.19
	Net profit/goat/month		362.87

Pig farming is having enough potential for meat production providing good source of income and employment. The pig population in Punjab state has not shown any significant increase in the past. It declined from 1.29 lakh during 1977 to 0.25 lakh during 2007, thereafter it increased to 0.53 lakh during 2019 which is only 0.58 per cent of the total pig population of India (90.55 lakh during 2019). The Punjab state produces only 1.73 thousand tonnes of pork i.e. 0.48 per cent of total pork production of India. India is a high growth market and pork has huge potential across hospitality, restaurants and foodservice. Besides, there is ample scope of pig production in Punjab for meeting the demand of north-eastern states. Since regions like north east in the country where around 50 per cent of country's pork is consumed by the way of procuring live pigs from other parts of country. It is estimate that the tune of 1.0 lakh pigs per annum is transported to north east region so here lies a very good opportunity for the Punjab farmers that will not create economic benefits only but employment as well. Further opportunity also exits in pork product processing as well as export to the countries like china.

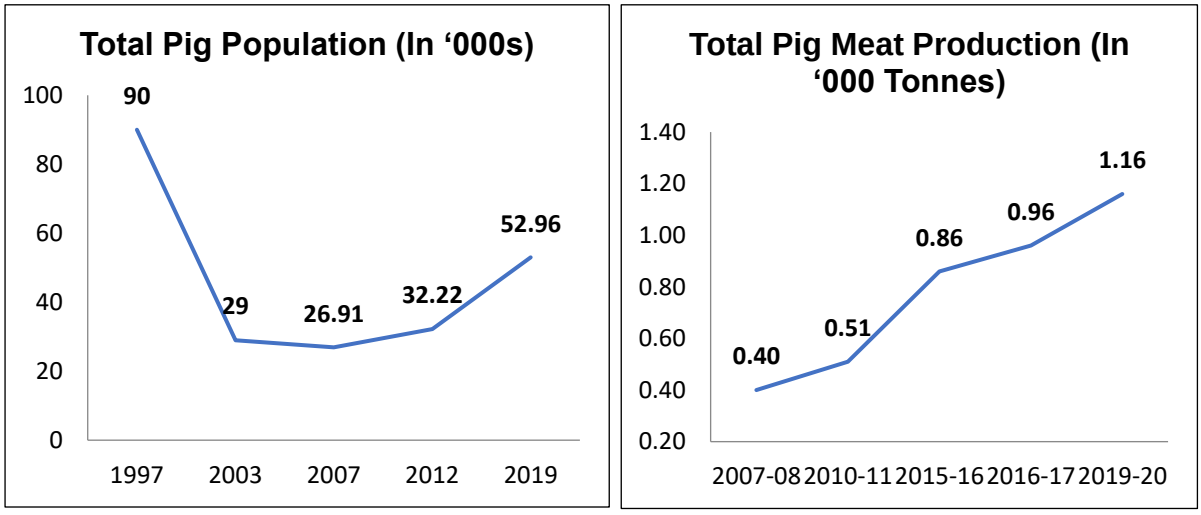

Fig 3: Pig population and Meat production in Punjab

This table explains the economics of pig farming of units comprising 11 adults. The economics of pig production system is based on the assumptions taken from field conditions.

Table 4: Economics of Pig Farming 11 adult (10 Sows + 1 Boar)

A.	Capital investment	Rate (Rs./unit)	Amount (Rs.)
1. Covered Area			
i.	One pen for boar (80 sq.ft.)	400	32000
ii.	Five farrowing pens (100 sq. ft./pen)	400	200000
iii.	Area required for 90 growers (12 sq.ft./head)	400	432000
iv.	Area required for 10 dry sows (18 sq.ft./head)	400	72000
v.	Area required for store (100 sq.ft.)	400	40000
	Total		**776000**
2	**Open area**		
i.	One pen for boar (80 sq.ft.)	200	12000
ii.	Five farrowing pens (100 sq. ft./pen)	200	75000
iii.	Area required for 90 growers (12 sq.ft./head)	200	162000
iv.	Area required for 10 dry sows (18 sq.ft./head)	200	27000
	Total		**276000**
3	Cost of 11 adult animals Rs 12,000/-For Female& Rs 13,000/- for Male		133000
4	Cost of equipments		15000
	Total 1 , 2 , 3 & 4		**1200000**
B.	**Fixed Cost**		
i.	Interest on investment @ 10% per annum		120000
ii.	Depreciation on buildings @ 5% per annum		38800
iii.	Depreciation on equipments @ 10% per annum		1500
iv.	Insurance @ 4% per annum		5320
	Total		**165620**
C.	**Variable costs**		
i.	Cost of feed for adults (96 quintal)	28/kg	268800
ii.	Cost of feed for grower (450 quintal)	28/kg	1260000
iii.	Labour charges	10000/month	120000

iv.	Miscellaneous (veterinary, electricity, water etc.)		100000
	Total		**1748800**
	Total Cost (B+C)		**1914420**
D.	**Returns**		
i.	Sale of 178 Finisher	12000/each	2100400
ii.	Sale of 2 culled animals	12000/each	23600
iii.	Sale of manure/gunny bags		35000
	Total		**2159000**
E.	**Net Income**		**244580**
	Net Income/animal/month		**2038**
	Benefit cost ratio		1.13

A livestock production system in Punjab has evolved from just an agrarian way of life to a professionally managed industry. A large number of rural families in Punjab are engaged in livestock production, for whom this is an important source of secondary income. There is need of government support to this sector. Greater investment is required for mechanization in livestock farming, saving on input and labour costs for increased efficiency, reduced drudgery, improved quality and safety of farm produce, social benefits like pride and health of workers, besides improved animal health and well-being.

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Understanding Farmer Producer Organizations

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Nowadays, an agripreneur has to compete not only with fellow producers but also with big companies and Multinational Corporations. Usually a single farmer is devoid of resources and capability to effectively compete in the given scenario. Therefore, the farmers face uphill task in terms of matching low cast and marketing efforts of big companies. Invariably, the above mentioned challenge emanates from lack of scale on part of individual farmers. Lack of scale not only affects the purchase and production efficiency but also undermines the ability to undertake low cost processing, brand building and wide spread distribution operations. Therefore, there is an urgent need to aggregate the resources and efforts for operating agribusiness. Aggregated strength of farmers can be instrumental in facilitating the smooth conduct of the business. Concept of Farmer Producer Organization (FPO) has emerged as a promising solution in the given context.

Producer Organization is primarily aimed at ensuring better income for the producers through an organization of their own. Small producers do not have the required scale of operations individually (both inputs and produce) to get the benefit of economies of scale. On account of a long chain of intermediaries that connects the producers with the markets the producers receive only a small part of the value that the ultimate consumer pays. By joining hands, the primary producers can avail the benefit of economies of scale. Economies of scale lead to better bargaining power both on the supply side as well as the demand side.

Primary producers may include growers, dairy farmers, artisans etc. Only primary producers can become members of an FPO. FPO can be created by primary producers such as farmers, beekeepers, dairy farmers, planters, fish farmers etc. There are a number of institutions, such as NABARD, SFAC, Government Departments, State Agricultural Universities and Non Government Organizations (NGOs), that support the promotion, incorporation and development FPOs.

Salient features of an FPO are as follows:

- It is incorporated by a group of primary producers.
- It is a registered legal entity.
- Primary producers are the shareholders.
- FPO works for the benefit of its members.
- The ownership of the FPO is held by its members.
- Ownership control always lies with its members.

- FPO is managed by the representatives of the members.

Types of FPOs

There are various options for registering FPOs. These options are listed as follow:

- As Producer Company under The Companies Act, 2013
- Under Cooperative Society Act.
- Under Multi State Cooperative Society Act.
- As Section 8 company under The Companies Act, 2013.
- As a Society under Society Registration Act 1860.
- As a Public Trust under Public Trust Act 1882.

These options vary in terms of operations, regulations and distribution of dividend among members. Keeping in view the sustainability and efficiency, Producer Companies can be considered as the most promising of the given options. Cooperative Societies usually operate with one-dimensional objectives but Producer Companies may attempt to achieve multidimensional business. Cooperative societies work in a limited area of operation but Producer Companies can operate throughout the country. There is no limit on the extent of dividend distribution in case of Producer Companies as the same depends upon the scale business. Similar to a Co-operative Society, each member in Producer Company carries single vote. Registrar Cooperative Societies has the power to veto the decision made by a Cooperative Society. But a Producer Company enjoys full autonomy and its decision cannot be reversed by any outsider. In simple language, a Producer Company is autonomous in terms of operating and expanding its business. There is limited liability of the members of a Producer Company. Therefore, individual assets of the members are protected even in the eventuality of a loss. A producer Company is a hybrid of Private Limited Company and Co-operative society. Members can benefit from co-operation and professional management simultaneously.

As provided by Section 581C of the Companies Act, any one of the following combination can form a Producer Company:

• Any ten or more individuals each of them being a producer

• Any two or more Producer Institutions

• Combination of 10 or more individuals and Producer Institutions

A producer Company has got its own legal existence. It is mandatory that the name of a Producer Company should end with “Producer Company Limited”. At the time of naming a Producer Company the objectives and operations of the company should be considered. A producer company is operated through its members. These members have full control regarding incorporation, running and winding up of the producer company. As per law, minimum authorized capital of a Producer Company is Rs. 5,00,000 and minimum paid up

capital is Rs. 1,00,000. Articles of Association (AoA) and Memorandum of Association (MoA) are filed at the time of incorporating a Producer Company.

Articles of Association is a document that specifies the regulations for a company's operations and defines the company's purpose. The document lays out how tasks are to be accomplished within the organization, including the process for appointing directors and the handling of financial records.

Memorandum of Association is a **legal document** which specifies the company's relationship with its shareholders. It is the most important document of a company as it states the objectives of the company. It also contains the powers of the company within which it can act. While preparing MoA, it is important to include not only the activities to be undertaken by the Producer Company in near future but also the activities that company may intend to undertake in the distant future.

Benefits for Members of FPOs

Generally, the primary producers are skillful in production process but face difficulties in the marketing of the produce. FPOs carry the potential to bridge the gap between the producers and the markets. An FPO plays a vital role in all business processes such as input purchase, production, processing and marketing. Strength of the business bears analogy to strength of a chain. Strength of a chain is determined by its weakest link. Similarly, a poorly performing link in business operations can deal a blow to total business efficiency. Various chain links in business include Purchase Management, Store Management, Financial Management, Production Management, Human Resource Management etc. For robustness of business, all these links need to be strengthened. After strengthening these links, FPOs can capture the available opportunities in the domains of online business, organized retail sector and export markets.

Benefit of FPOs to the members

Members of a Producer Company accumulate a number of benefits. These benefits are discussed as follows:

Income

Producer Organizations can benefit their members by aggregating the demand for the inputs and procuring the inputs at lower prices. Besides, the cost savings resulting from bulk transportation and storage can add to the income of the members. Pooling of resources leads to cost effective production. Pooled efforts also result in access to better market information and markets as well as lower marketing and distribution costs. Aggregated scale of operation also provides new avenues and opportunities for selling the products in new and distant markets. Overall, FPOs can be instrumental in enhancing the revenues and reducing the costs for the members, hence, adding to their incomes.

Non Income

Producer organizations operate as collectives of farmers. These organizations provide a platform for the members to get better access to various government services and welfare schemes. Apart from easy access to credit lines from various public and private financing

agencies, the members can have prioritized access to various initiatives for monetary and non-monetary support from Government schemes. Besides, the participation in FPOs provides opportunities for social networking and connectivity to its members.

Business Planning for FPOs

Planning is considered as the key function of a business manager. It has been rightly pointed out that in business *'If you fail to plan, you are planning to fail'*. A business plan is a written document prepared by the entrepreneur that describes all the relevant internal and external elements and strategies for starting a new venture. It is an integration of functional plans such as marketing, finance, manufacturing, sales and human resources.

Components of a Business Plan

Main components of a business plan are mentioned as follows:

- Executive Summary
- Environmental and Industry Analysis
- Description of FPO
- Customer Value Proposition
- Market Plan
- Assessment of Risk
- Financial Plan
- Annexure

FPOs offer an excellent opportunity for the farmers/agripreneurs to establish direct market linkages. World of business is full of competitive landscapes. Individually farmers/agripreneurs may not have the required skills and resources to capture the consumer minds and markets. Aggregation of the skills and resources is a potent way for dealing with the competition in the market place and sustaining a profitable business. It is important to note that mere creation/incorporation of an FPO may not translate into the desired objectives aimed at enhancing farmers' income. Sustenance and profitable growth are equally desirable in the given context. Effective management and business skills are crucial for achieving the desired ends. Therefore, there is a pertinent need on part of the farmers and agripreneurs to learn and master the basic management and business skills.