
Set-up of Profitable Small Dairy Farming in India

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ABSTRACT

Dairy farming in India has been prevalent from the times immemorial. It is generally viewed as family business that has been passed down from generations to generations. One of the foremost dairy farming *persona* was Gopal – Shri Krishna. In India, dairy farming and agriculture go hand in hand. The farmers rear cows and buffalo along with their full time agriculture business, to make some extra bucks. As the time passed, this so-called family business found its way into a new era of dairy farming that was much more organized, technologically advanced and as a result much more profitable. However, in earlier times, the hard fact is that instead of being an asset to the farmers/dairy farmers, it has started turning into a loss making business for them. Low productivity and High cost of milch animals, their upkeep, their vaccination, lack of fodder management, and higher number of manpower hours being put into the care of the animals started affecting the dairy farming business in the country. Most of the dairy farmers began to shirk away from the business and those who continued faced difficulties in surviving and reared cows only to satisfy home requirement of milk and submitting extra milk produce to Milk Collection Centers. “White Revolution” in India changed the landscape of Dairy Farming and Milk Production in India in 1970s.

Keywords: Dairy Farming, North India, Milk Collection Centers.

Introduction

India’s livestock sector is one of the largest in the world. Total livestock population in India is 535.78 million. Contribution of cattle is 192.49 million and buffalo is 109.85 million. India is producing about 198 million tons of milk annually (2020). India ranks first in milk production in the world. About 20.5 million people depend upon livestock for their livelihood. About two third rural community get its livelihood from the livestock. Livestock contributed 16 percent to the income of small farm households as against an average of 14 percent for all rural households. It also provides employment to about 8.8 per cent of the population in India. India has vast livestock resources. Livestock sector contributes about 4.11 percent of total GDP (Gross Domestic Products) and 25.6 percent of total Agriculture GDP (19th Livestock Census, 2012). Milk plays an important essential food for human life, since babyhood to end of elderly life. Milk is an important source of food for neonatal life. Apart from energy, it provides passive immunity to young ones in the form of colostrums, which protect the babies from pathogens.

Milk contains all the vital nutrients almost in balanced proportion. Milk is a rich source of calcium, magnesium, selenium, riboflavin, vitamin B12 and pantothenic acid (vitamin B5), hence play a key role in maintaining our health and wellness. Due to increasing population of the country, the demand of dairy base product will be increase. However, nearly 33% of the gross Domestic population from agriculture and has 66% of economically active population, engaged in agriculture. The share of livestock product is estimated at 21% of total agriculture sector. There is strong recognition about the fact that dairying could play a more constructive

role in promoting rural welfare and reducing poverty. There is need of enhancement in proper milk production system because India is having large production by mass people landless and marginal farmers, so we cannot avoid present mass production system, the system may be alter into advanced system by making community dairy farming system. However, mini and micro dairies are rapidly growing nearby urban areas.

The quality control of raw milk in rural settings is a quite challenging and has to be taken up, if we want Indian Dairy products acceptable globally. In Indian scenario, the dairying is a good source of income for small/marginal rural farmers and landless labourers, hence co-operative to community dairy farming system is a better choice. The manure produced from dung is rich in organic matter and helpful in improvement of soil fertility and ultimately in increasing the crop yield.

The Gobar gas produced from the dung may also be used as fuel for domestic purposes as cooking, running generators to produce electricity, which may be used for various purposes like drawing water from well. The agricultural by-products, residues and surplus fodder are efficiently utilized as feed for the animals. Most of the times, agriculture is seasonal, hence dairy farming is a good employment opportunity round the year. Development of Mini and micro dairy hubs linking smallholder farmers to the industry, by making all cluster villages cattle is to brought into Bulk Milk Cooler (BMC)/CC collection point, where AMCU station operate automatic milking machines, immediate cooling and transport by tanker to process plant. Now a days, there are so many companies like AMUL, Parag, Verka, Nestle, Ashmi etc.

Problems of Dairy Farming in India

In India, the major constraints in dairy farming are low milk productivity in animals, poor animal health services, lack of proper data on dairy sector, weak organized retailing and established cold chain, large unorganized market sector (80%), poor raw milk quality and lack of good dairy practices. Besides these, weak financial and policy support for dairy industry and low efficiency dairy plants and inappropriate milk collection system are also a hurdle in growth of dairy industry. Like any other business/ organization, dairy farming is also having certain challenges. The major challenges of this sector are high infrastructure and feeding cost for farmers. Most of the farmers don't serious about the total expenditure and profit from this business. They don't count the value of green food grown by themselves with their crops. Breeding is another important factor for economic milk production. But the farmers are generally unaware about this due to ignorance, poor extension education programmes by the government. Thus, for establishing the dairy farm in economic way, there is utmost requirement of hardwork, proper care and management of animals. In India, one of the family members generally the homemaker of the family is responsible for caring the animals. But in commercial dairy farming, there is requirement of experienced professionals. If one take care of these constraints, then he may be able to run the commercial dairy farm in profit by continuously visiting the other dairies establishment run by public and private sectors.

Livestock Development Initiative by Government

Central and state governments have launched various livestock development programmes in the country by implementing the modern technologies in animal breeding, reproductive management and healthcare management. Many research organizations like National Dairy

Research Institute (NDRI), Karnal, Indian Veterinary Research Institute (IVRI), Izatnagar, Central Institute of Research on Buffaloes (CIRB), Hisar, Central Institute of Research on Cattle (CIRC), Meerut, Central Institute of Research on Goats (CIRG), Mathura and various state agriculture/veterinary Universities (SAUs/SVUs) are devoted to sustainable basic and advance research in the concerned field. Government is also focusing on the possibilities of production and use of sexed semen in small holders' dairy production system. CIRC and CIRB are continuously working on indigenous breed improvement for Sahiwal, Gir, Crossbred (Frieswal) cattle; Murrah and Nili Ravi buffalo breeds. However, for sustainable development in dairy sector, there is an acute need of development and implementation of suitable farm level policies keeping in view the ensuring socio-economic dynamics and the existing competitive resource advantages. A strong effort is desired in linking the milk producers to the organized supply chain to ensure stable milk prices within the reach of consumers. The Indian dairying is maintaining its milk production growth at an even rate to meet its domestic needs but with the faster economic development, it has to be in better way to cope with increasing demands. There are challenges in small holder dairy farming, which can be solved by increasing the productivity and linking the production with the consumer demand. Wholehearted efforts are required in the areas of nutritional management, improved breeding and animal health care systems, financial inclusion, dedicated extension services for dairy farmers and development of procurement infrastructure with ICT support. Capacity building of small livestock owners, particularly women, and promotion of collective farming is essential for development efficient value chains. One of the major constraints has been the feed prices which are quite high relative to the milk prices. There is great opportunity to exploit the world markets provided India is able to take care of its constraints and strengthen its value chain to deliver quality milk.

Future demand drive in Dairy Business

Due to migration of population in urban area and less interest in animal rearing, a large rural market gap and quantity of available milk for processing will increase day by day. Fast growing economy and diversification, large market and investment will provide golden opportunity. Moreover, increasing income of consumers, changing life style and preference for milk and milk products, a greater number of adult consumers, untapped indigenous milk products market and exports are also increasing. On the other hand, there are some challenges for low-cost human resource and employment generation for rural population. India needs to immediate focus on this sector related issues like food safety, unhygienic practices by farmers at farm. Injudicious use of medicines particularly antibiotics on milch animals should also be controlled. Unfriendly WTO regime and Imports from other countries also a factor and we have need to manage through better govt. policies.

Extending Scope for Commercial/Corporate Dairy Farming in India

One of the emerging trends in India is commercial dairy farms in the urban and peri-urban areas of the metros and big cities. These dairies mainly cater to the needs of the urban consumers in the form of liquid raw milk. Thus, there is ample scope of organized & modernized dairy farming. Commercial dairy farming is much different from villagers who rear few cows. Later does not employ labor, cultivates most of the green fodder needs on his own land with own labor, does not have to pay bank interest and above all invest too low in infrastructure facilities. Though a profitable business venture dairy farming in India requires hard work, proper planning, active and very alerts managers and supervisors. We all have heard many success stories in dairy farming. In today's technological world there have been

many advances in modern dairy farming. Everything from feed for dairy cows to milk processing equipment has added tremendous scope to the dairy farming industry.

Main Objective of Model Dairy Farming

The main objective is safe and quality milk produced from healthy animals using good management practices that are sustainable from an animal welfare, social, economic and environmental perspective.

Why Commercial Dairy Farming?

Beside the employment benefit, so many factor directly provides excellent opportunity to start this business as given below:

- Opportunity for export of milk and milk products
- Organized and well-planned project.
- Better management and operations of project.
- Better climate control.
- Cost effective.
- Healthy and happy animals.
- More production with better hygiene.
- Better return to investment and profits.
- Opportunity for export of milk and milk products
- Free antibiotics milk which is suitable for infants to elderly people
- Safe, Health and hygiene of milk will increase the shelf life of milk

Considerable Advance Practices of a Model Dairy Farming

At a model dairy farm, animal health, milking, hygiene, nutrition (feed & water), animal welfare, environment, socioeconomic management *etc.* are the major practices, which should be followed properly for sustainability of the farm.

a) Uniqueness in Management System

- 1) Animals need to be healthy and an effective health care programme should be in place.
- 2) Milk should be stored under hygienic conditions.
- 3) Provides feed and water in suitable quantity and of good quality.
- 4) Animals should be kept according to the following simple principles:
 - ✓ Freedom from hunger, thirst, discomfort, pain, injury and disease
 - ✓ Freedom from fear to engage in relatively normal patterns of animal behavior
 - ✓ Milk production should be environmentally sustainable and cause minimal damage to the surrounding environment
 - ✓ Human resource and financial management ensure the sustainability of the enterprise
 - ✓ Arrangement for animal waste (Urine, dung, water etc.)
 - ✓ Record keeping and modern application *e.g.* Milking, chilling and reproduction management.

b) Care and Management

Taking good care is the key to every livestock farming business. So, the animals present in dairy farm should be taken care off. As prevention is better than cure, so the vaccination against economically important diseases like Foot-and-mouth disease, Haemorrhagic septicaemia *etc.* is utmost important. Provide them nutritious food and clean water regularly.

The emergency and routine medicines should be stocked at dairy farms for immediate first-hand support. With the increase in milk production, the dairy farming will be a profitable business.

c) Breeds

There are numerous indigenous (Indian) and highly productive foreign (exotic) breeds available in dairy animals, which can be chosen for establishment of dairy. Both the cows and buffaloes can be raised together in separate rows under the same shed. The fat percentage of Cow's milk (4%) is lower than that of buffaloes milk (6%). By market survey, the demand of milk can be identified.

For profitable commercial dairy production Murrah, Surti, Mehasani, Jaffrabadi, Badhawari etc. are common and popular buffalo milch breeds, while Gir, Sahiwal, Red Sindhi, Tharparkar are popular cow breed. Highly productive exotic breeds like Holstein Friesian and Jersey etc. or their crosses like Karan Fries and Frieswal etc. may also be reared for high milk yield. All those breeds are suitable for farming in the Indian weather. Always keep in mind the market demand, while choosing breeds for dairy farming business.

d) Feeding

Feeding of good and high-quality nutritious feed is important for ensuring proper growth and good health of the animals. So, always try to feed them sufficient amount of nutritious feed. Green fodder is very necessary for the animal. It provides water along with vital nutrients to the animals and ultimately increase the milk production in animals.

Green fodder also reduces the need of concentrate feeding in animals thus also helps in reducing the feed cost. Concentrate feeding also help in maintaining the good health and milk production in animals. As a thumb rule, dairy animals require 2.5 kg of concentrate as maintenance. For milk production 400gms of concentrate per litre of milk in cow, while 500gms per litre of milk in buffaloes is additional requirement for lactating animals.

If the animal is pregnant then add 2.5 kg of concentrate for maintaining the pregnancy. If possible, try to make a grazing place for your animals, this will be helpful for the exercise of animals. Along with nutritious foods, always provide them sufficient amount (*ad libitum*) of clean and fresh water. Dairy animals need more water than other animals. Generally, a milk producing animal needs five liters of water for producing one liter milk. So, always serve them sufficient amount of clean and fresh water.

e) Reproduction

Reproduction is directly related to milk production in animals. Thus, to improve or develop the condition and production of cow or buffaloes it should meet reproduction with a proper plan. The bulls used for breeding or the semen should be of good pedigree in terms of milk production. Timely, breeding of the dairy animals with good quality semen is required for maintain the milk production in a dairy farm.

f) Milking

Dairy animals should be milked twice a day *i.e.*, once in dawn and another in evening. Before milking, the teats, udder and hand of the milker should be cleaned properly with fresh water

along with potassium permanganate solution or any other good antiseptic. For high yielders (>10 litres of mil per day per animal), milking machine may be used to collect milk.

g) Housing

The need for livestock housing is important from the point of animal health, welfare and comfort, hygiene, efficient and economical use of labour. A suitable and comfortable housing is essential to make best use of the efficient environment. Generally, 40 square feet inside shed and 80 square feet open space is required per dairy animal.

In small scale dairy farm (20 animals), 3000 square feet land area is sufficient enough, while for medium scale dairies (100 animals), 13,000 to 15,000 square feet space is required. However, ensure availability of all types of essential facilities in the house includes proper ventilation, sufficient flow of fresh and clean air, sufficient space etc. (Table 1).

Goal of ideal housing: The goal of housing is to protect the animal from adverse environmental conditions such as cold winds, rain and direct sun light. Proper housing contributes animal comfort, good sanitation and efficient farm work.

Calf pen: This is meant for housing young calves separately. It can be located either at the end or on the side of the milking barn. This facilitates taking calves to their dams quickly. If there are large numbers of calves, the separate unit of calf shed should be arranged and located nearer to the milking shed. Calf pens should be well ventilated, well lighted, clean, dry, adequately bedded using soft material. It is better to rear calves in individual calf pens. If room for individual pens is not available calves must be tied properly for 15 to 20 minutes after feeding.

Keeping Farm Record

Records are useful in analysing the profit or loss of dairy. Records of herd, calves, birth and death record, breeding, milk records, feeding register, sales and treatments records are necessary. For proper management, first of all set the targets.

Key Drivers of Stainability of Model Dairy Farming

Sustainable dairy farm management practices are critical for ensuring the profitability of dairy farms. This will help in keeping low cost of quality milk production and providing milk to consumers. The following key drivers impact the sustainability of dairy farms and are essential for making it globally competitive.

- Sincerely care of breed improvement
- Good soil and forage management
- Good young stock management
- Good nutrition and feed management
- Timely disease prevention and control
- Good reproductive system and timely heat detection
- Staff skill development training
- Proper farm waste management
- Value addition of milk
- Market and entrepreneurship skill

Feed and Fodder Management

Feed is one of the critical components in ensuring good milk yield and also constitutes approximately 60% to 70% of the operating expenses. With the shrinking of agriculture lands and pastures, availability of good quality feed and fodder for animals is becoming a challenge. There is 34% current deficit level of green fodder and concentrates. The alternate strategies to fill this deficit is maximization of the usage of crop residues and leguminous forages, promotion of balanced feed rations, integrated watershed development, approaches for encouraging fodder production and training to farmers in hay and silage.

Breeding and Health Care Management

Lack of awareness amongst the dairy farmers in India on technical skills regarding breeding practices including record keeping and progeny testing is the key deterrent for improving herd quality. It can be addressed through expansion of artificial insemination (AI) network and extension services provided by research institutions, SAUs/SVUs through their Krishi Vigyan Kendras and involvement of private sectors. Breeding services using superior quality, disease free germplasm with artificial insemination will be helpful in addressing dressing these issues. Timely diagnosis and treatment of diseases and use of preventive measures such as vaccines will be helpful for better livestock health that will further improve quantity and quality of milk.

Skills Requirement for Dairy Farm Business /Entrepreneurship

Dairy farming is much more complex and needs to be managed scientifically. Dairy farmer/ manager managing such dairy farm requires broad knowledge, wide variety of multi-tasking skills and keen business acumen.

Requirement of Multiple Skill Activities of Dairy Farmer (Manager)

To a dairy farmer/ manager, should spend 50 percent of time in Management of the Dairy herd and remaining time in supervising employees, ration preparation and feeding, raising of replacements, milking, upkeep of facilities, grounds and equipment's, pasture and herd management etc. He should also spend 30 percent of his time in herd Health and reproduction like treatment and care of sick animals, managing dystokia with the help of veterinarian heat detection and breeding of animals. Another important task is replacement of employees, who are sick or on leave. He should also spend 20 percent of his time in Office Work and procurement and record keeping like herd health, production, reproduction inventories, monthly inventories, order supplies, repairing the damaged infrastructure

Knowledge and Skills Required

A commercial dairy farmer/ manager should be well educated in farm operations and trained in providing first aid treatment of general illness and injuries. He should have sound knowledgeable in dairy animal feeding schedule, farm operations, record keeping, motivational and communications skills etc.

Skill of Feeder

Feeder should spend 70- 80 percent his work time in feeding and caring for all the livestock. Keep the animal areas, lots and barns clean and free from manure and extraneous objects. Dung is very dangerous in dairy animals. The dirty animal shed attracts the pathogen and flies that will lead to diseases in dairy animals. Check all lots at least five times per day (dry

cow, heifer and calf areas) to be certain cattle are not under stress due to weather conditions. Allow the production of a high quality product and promote animal well-being and comfort.

Feeding Responsibilities

Check all animals on a timely basis (three to four times per day) to be certain they are receiving adequate feed and *ad libitum* water. Feed cows and calves in a timely manner. All the equipment at dairy farm should be maintained as prescribed by manufacturer's suggestions. If there is any difficulty in working order of any farm equipments, then report to the concerned person or dairy manager directly. Regular testing of feed and fodder for nutrient testing should be done in good laboratory. Be certain all pastures and fencing are maintained, if not repair these items as per need.

Treatment

It should be done on top priority under the supervision of veterinarian. Routine deworming and vaccinations of animals is necessary for maintain the sound health of animals. Assist in any special projects or routine maintenance of farmstead in coordination with the manager.

Skill of Milker

He should spend 70 percent to 80 percent work time to perform the duties of milking and related activities for lactating cows.

Milking Responsibilities and Procedures

Prepare milking equipment's, buckets and bulk tank for milking. Then, bring the dairy animals for milking or help other employees bring in cows if needed or requested. Wear gloves when milking to help prevent spread of mastitis-causing organisms. Always follow the recommended pre-milking preparation like washing of teats and udder of animals, hands of milkers before milking. Milking should be performed in an orderly, proper and consistent manner. If the animals are under treatment and as per drugs prescribed, there is some withdrawal period, then it should be properly followed so that the milk from treated animal is not put into the bulk tank. Milk from mastitis animals or suffering from zoonotic diseases should not be mixed with bulk tank. If the milker found any case of mastitis, then immediately report to concerned staff engaged in animal health, so that proper treatment can be started as early as possible. After completion of milking, keep all the machinery and equipments sanitized as per the manufacturer's specification and Grade A Standards of the Public Milk Ordinance.

Milking Related Activities

The other milking related activities like bring in and out the cattle to milking shed, maintain milk records, animal identification by tags and other activities as directed by farm manager, is also required. These responsibilities may include, but are not limited to the following responsibilities:

- Care of springers and animals at the time of calving
- Feeding and care of calves
- Feeding, cleaning and care of milking herd
- Maintenance of free-stalls
- Heat detection, Artificial Insemination
- Record keeping
- Cleaning and maintenance of office building

- Maintenance of grounds, pasture, fences
- Maintenance of vacuum pumps

Selection of site for Dairy Farming

Farmers should consider greatly for selection of sites to build the dairy farms with new structures. He should be aware of location of the dairy farms such as nearby neighbours and public areas, environmental issues like water quality, odours and flies, litter management, electrical supply *etc.* and laws and regulations that affect farming operations.

Criteria for Site Selection

Some of the parameters like soil type, elevation, topography, sunlight, protection from wind, marketing, durability, labour, accessibility and surrounding etc should be considered before the establishment and construction of a new dairy farm.

Summer Management at Model Dairy Farm

Due to high ambient temperature, productivity and efficiency of dairy animals goes down drastically during the summer season particularly in northern parts of India. This will become more important in case of buffaloes.

Heat Stress

This type of stress occurs in animals when there is imbalance between heat production (thermogenesis) within the body (gain) and heat dissipation (thermolysis) from the body *i.e.* impaired thermoregulation. Increase in environmental temperature may cause increased gain in comparison to heat loss from the body and ultimately cause heat stress. Heat is also produced within the animal body due to metabolism (production of milk, eggs, meat, offspring etc). This heat stress will affect the high yielders that that of low yielders. Hence utmost considerations must be taken to protect the high yielders from heat stress.

Signs of Heat Stress

The common clinical signs of heat stress are restlessness, lethargy, reduced appetite, (to minimize metabolic heat production), increased thirst and more crowding around the water tanks, decreased activity, crowding under shade, usually more animals remain standing rather than lying down, increased respiration, body temperature, sweating and panting to lose more heat. Other common signs are increased salivation, reduction in heart rate and maintenance requirement may increase by 20-30% in animals under heat stress.

Tips for Summer Management

Animal shelter should be constructed in east west orientation so as to avoid maximum solar radiation during summer.

Nutrition

Offer the high amount of feed during the cooler period of the day such as early morning or late evening. Feeding 60 to 70 percent of the ration between 8 pm and 8 am has successfully increased milk production during hot weather. Feeding bypass protein (fish meal) and bypass fats and reducing the amount of fiber in the diet is helpful in minimizing the metabolic heat production. Soaking of concentrate in equal amount water for 20-30 minutes helps in better utilization of nutrients and reduces dustiness in concentrates. Supplementation buffer sodium

bicarbonate and magnesium oxide help to maintain rumen pH in summer season. Feeding of antioxidants like vitamin A D and E, Zinc etc reduce heat stress and prevent mastitis

Water

Always provide unrestricted access to cool, fresh and clean water to dairy animals especially during summer season.

Heat Stress Alleviation

High producing cows required more attention. There are so many tools to overcome this problem through shades, fans, fog misters and sprinklers are used to alleviate heat stress. High velocity blast fans mounted on side walls can also help in reducing heat stress during July to September.

Fogger System

Sprinkling water with air draft or wind from fan on heat stress vulnerable animals helps to decrease their body temperature and respiratory activity.

Other Managemental strategies: Avoid transporting livestock in hot weather. Reduce biting flies' populations (with improved sanitation, repellents and traps) which tend to cause cattle to bunch together. Reduce parlor walking distance. Reduce time in holding area. Improve ventilation. In areas of extreme heat, it is even more important for cows to give birth in good body condition because after parturition their dry matter intake will be lowered by heat stress, as well as the usual low intake immediately after calving.

Under these conditions dairy farmers must go for artificial insemination rather than using natural service of heat stressed bulls. Teat dipping with germicidal dips is recommended. Handling cattle can elevate their body temperature by as much as 3.5°F. Therefore, avoid unnecessary handling of animals during intense heat.

Winter Management at Model Dairy Farm

Production performance of the animal will also be affected when it is too cool because increased proportion of energy will be consumed in maintaining the body temperature and productivity depends on the ability of the animal to keep normal and stable body temperature.

Protective Measures to Prevent the effect of Cold Stress

Increase Barn Temperature

Calves are more susceptible for winter. Supply of heat during winter will be helpful in keeping the calf healthy, less chances of calf pneumonia, diarrhoea and reducing the calf mortality. Reduce humidity to ensure better ventilation, preventing excessive moisture in sheds, roof dripping and ground freezing phenomenon.

Ventilation should be carried in afternoon. Less water should be used in winter barn to wash the ground and dry cleaning should be followed. In the afternoon sunlight cattle should be kept out of the barn. Bedding should also be provided to animals for their protection from the cold floor. Waterers or water tanks should not be frozen. Provide lukewarm water to the animals for drinking purpose. Cold weather increases feed needs of cows. Hay provides more heat during digestion than concentrate feeds.

Cows need Dry, Drought-free Resting Area

During winters, provision of dry, clean bedding keeps the animal dry and insulates the udder against cold temperatures and pathogens. Having dry teats when the cow leaves the parlor is important. One way to lessen the risk is to dip the teats, allow the dip of about 30 seconds and then blot dry using a paper towel. Protect the animal from frostbite. Such practice helpful in mastitis control also.

Effect of Cold Stress on Calves

Calves born in winter and early spring as well as wet and cold calves are more prone to cold stress or hypothermia. Precipitation adds to the negative effect on calf survival when temperature drops, so it is important to combat cold stress (hypothermia) in newborn calves.

Signs of Cold Stress: Rectal temperature is the most accurate method of determining if a calf is experiencing hypothermia.

- 1) Mild hypothermia- Body temperature drops below 100°F; Severe hypothermia- Body temperature drops below 94°F.
- 2) Vital organs are cold and impaired brain function results.
- 3) Calf shivers to increase heat production and shunt blood from body extremities to the body core.

Protective Measures

These include warm water bath, warm air or heat lamps and warm blankets. Blankets are most useful for calves less than 3 weeks of age that are not yet eating grain. Warm blankets should not be so hot that they cause skin burns or sweating during the day. Thick, dry straw or sawdust at resting area should be provided for better insulation. Wind drafts must be avoided because they encourage heat loss. Young dairy calves have very little stored fat they can use for warming themselves. So, extra energy by feeding fat rich diet is necessary to cope with cold stress. Additional amount of feed (starter, milk replacer, or milk) that a calf would need to eat to compensate for extra energy used to keep warm during cold weather. Repeated changes in the calf's diet should not be done. Calves less than 3 weeks of age require extra energy, thus increase the amount of milk or milk replacer to provide extra energy. Calves that are eating starter, especially those over 3 weeks of age and can more easily cover their increased energy needs by voluntarily eating more grain is beneficial in terms of generating heat. In cold weather, provision of warm water three times per day for a minimum of 30 minutes each time in order to ensure calves have ample opportunity to drink.

Closing air inlets restricts the ventilation rate and causes moisture to accumulate in the shed. As moisture accumulates, it will begin to condense on cold surfaces, and if the surfaces are below freezing, frost will form. In severe cold weather and during blizzard conditions, air inlets can be partially closed to reduce airflow blowing into the barn.

The minimum inlet opening during severe cold weather is one-half inch for each 10 feet of building width. (There should be an inlet on each long side of the building.). When normal winter weather conditions return, eave inlets should be reopened to the standard one inch per 10 feet of building width on both sides of the building. Of course, eave inlet adjustments are much easier if the inlets have been designed to be adjusted. Boards on hinges are the most common type of adjustable eave inlet.

Other Routine Management Practices at Model Dairy Farm

In a dairy farm, the primary objective is to produce the quality milk and sell the same with profit. Therefore, routinely some activities or operations are carried out to meet this primary object.

Weaning

Weaning is defined as the separation of young calves from their mother after birth. In dairy animals, weaning may be followed either just after birth called as weaning at birth or zero-day weaning, or after colostrum period *i.e.* 3-4 days after birth. Weaner calves are fed milk @8-10% of their body weight.

Milking Practices

Milking is the most important daily routine activity in dairy farm. Milking is done commonly twice in most dairy farm morning and evening. However, if milk productivity of animal and labour availability is more then go for three times milking per day *i.e.* early morning, at noon and evening in high yielders keeping the duration of milking interval equal. Milking should be conducted gently, quietly, quickly, cleanly, completely and at regular intervals.

Feeding

Feeding activity is most important daily routine operation and proper understanding of nutrient requirement and feeding management will reduce the expenses. Dairy animals are generally allowed for free access to roughages but measured amount of concentrate is given based on body weight for maintenance, milk yield, milk fat percent, pregnancy and growth. The roughage and concentrate are generally given separately; during milking only, concentrate is given.

The daily requirement of dairy cattle and buffaloes are calculated based on daily dry matter intake. Cattle generally eat @2-2.5 kg dry matter per 100 kg body weight. As a thumb rule up to 4-5 litre milk yield no concentrate is needed if sufficient green fodder is available. If a cow giving 10 litre milk with approximately 400 kg body weight, then give 20-25 kg greens, 3-4 kg dry fodder and 5 kg concentrate.

Exercise in Dairy Animals

In conventional housing management where animals are tied throughout the day and night, exercise is compulsory. Exercise should be recommended daily at least once during morning just after milking for ½ to 1 hour.

Washing

Washing in dairy animals is generally followed to remove the dirt and loose hairs before milking for clean milk production. Washing of flank, udder and tail are washed with clean water followed by drying with a clean towel/cloth.

Weighing

Young growing calves are commonly weighed at weekly interval as their growth is much faster than the Adults. However, in adult animal weighing is followed at fortnight intervals or monthly interval depending on the labour availability. Regular weighing of dairy animals is essential for the optimal dairy farm management.

Marking/Identification

Marking of animals soon after birth for easy identification is important managerial practice in dairy farm. In cattle and buffaloes ear tagging is done using either self-piercing or non-piercing plastic or non-rusting tags. Under branding, hot iron branding using hot branding iron or cold branding using branding iron dipped in liquid nitrogen is vogue. Now-a-days for easy and automatic identification, electronic identification of animal is done using either electronic ear tag or neck collar.

Debudding and Dehorning

Debudding is the process of removing horn bud in young calves before its attachment to skull within 3-5 days after birth. On the other hand, dehorning is the removal of horn after it has attached to the skull in older calves. However, in most dairy farm debudding is practiced instead of dehorning as later is more painful and difficult. *Chemical dehorning*- Dehorning may be practiced by chemical cauterization using caustic soda, caustic potash or silver nitrate sticks. Debudding may be done mechanically using red hot iron or electrical dehorner pressing on the horn bud. *Electrical dehorning*- Electrical dehorning is best as it requires only 10 minutes and less hazardous compared to chemical or hot iron method.

Grooming

Grooming or brushing of body hair coat is an important daily farm activity, which keeps the body of animals clean and healthy. For grooming blunted type brush is used, if not available then use coarse rope made from paddy straw, coconut coir or dried grass. In India, grooming generally practiced before milking along with washing to improve the clean milk production.

Castration

Castration is the unsexing of both male and female, and during castration there is removal of testis and ovaries, respectively. However, surgical removal of testes produces pain to the animals. Moreover, castration with burdizzo castrator is most commonly used bloodless castration, where the testicles are not removed rather the spermatic cord is crushed and separated from each testicle.

Burdizzo Castration Method

Castration is generally preferred at young age preferably within 1 year. Castration should be performed during cold season and strictly avoided in rainy season.

Hoof Trimming

Hoof trimming is a routine procedure in dairy farm which corrects the hoof problems or lameness and extent the productive life of cows. The foot trimming in animals practiced at 6-month interval and cut only the extra grown hoof otherwise if excess than causes pain and bleeding.

Record Keeping

Record keeping is an important daily farm activity, helpful for the evaluation of individual performance of cow and economic assessment of dairy farm as a whole. Daily farm record data entry is a challenge with rewards. The different types of record maintained in a dairy farm are birth register, body weight register, herd register, production register (milk yield register) death and disposal register, feed and fodder register, breeding register, treatment register, health care register, expenditure and income register, labour records etc.

Calves Feeding Management

Reticulo-rumen is non-functional in calves and hence feeding of calves should be treated as non-ruminant and they are not equipped to utilize cellulose. The calves cannot utilize roughages containing higher amount of cellulose. To encourage the early development of rumen and reticulum the calves should be fed with good quality leguminous hay and other roughages. Urea should not be included in calves ration because the calves have little capacity to utilize non-protein nitrogenous compounds. B complex vitamins also are dietary essential for calves in addition to vitamin A and D.

Clean Milk Production at Farm

Clean milk production following good hygienic practices is an essential pre requisite for obtaining whole some and superior milk quality. Clean milk may be defined as “Milk drawn from the udder of healthy animals, which is collected in clean dry milking pails and free from extraneous matters like dust, dirt, flies, hay, manure etc. Clean milk has a normal composition, possesses a natural milk flavor with low bacterial count and is safe for human consumption”. There are many advantages of clean production like prevention of milk spoilage in short period. Increase the quality and shelf life of the milk and its products. It controls the spread of infectious disease through milk.

Steps for Clean Milk Production

- 1) **Animal shed and environment:** The floor of the milk shed should be swept with clean water, and disinfected with one-percent bleaching powder solution to arrest cross contamination and spreading of undesirable odours.
- 2) **Animal:** The animal itself is one of the most significant sources of contamination, care and management of the animal and its health is therefore the starting point for clean milk production. Milk from diseased animals should be kept separate and disposed of safely. Animals suffering from any contagious disease, including mastitis, should be segregated from the healthy ones.
- 3) **Milking method:** In hand milking, the danger of contamination coming from the milker’s hand is higher as compared with machine milking. The milker should therefore be free from contagious diseases. Nails should be well trimmed; she/he should wear clean clothes and should wash her/his hands with soap and water before milking, then dry with a clean towel. In modern dairy farms, the milking is done with the help of milking machine in very hygienic way without hand touch. The operation of milking is very fast and the quality of milk also superior.
- 4) **Utensil cleaning:** Utensil must be thoroughly cleaned with water followed by hot water rinsing. Dirty milking equipment is one of the main sources of infection of milk. About 15 minutes before milking, milking equipment should be rinsed with a sanitizing solution.
- 5) **Personnel hygiene:** The Milk handlers need to wash their hands thoroughly with cleaned water followed by hot water rinsing or sanitization with sanitizing agent to avoid physical and biological contamination.
- 6) **Milk handling and testing:** Milk needs to be handled hygienically without spillages, while transferring. Milk needs to be filtered in order to be free of dust and foreign particles. All the filled milk cans are to be kept in organized way in very clean and hygienic way in a shade without direct exposure to Sunlight. The milk is susceptible to get deteriorated and develop oxidized flavours, if kept exposed to direct sunlight. The milk samples to be drawn using an appropriate and cleaned sample device as per the quality control guidelines.

- 7) **Transportation of milk:** The Milk cans to be transported in a covered/protected hygienic milk vans.

Management and Utilization of Dairy Farm Waste

Animal manure is rich in nitrogen, phosphorus and potassium. Manure has several beneficial effects on soil properties, in addition to providing supplemental nutrients for crop growth. Composting is a sustainable waste farm management practice that converts a large volume of accumulated organic waste into a usable product. When organic wastes are broken down by microorganisms in a heat-generating process, waste volume is reduced by almost 50%, many pathogens and weed seeds are destroyed, and a useful, potentially marketable product is produced. Major component of dairy farm waste are cattle manure, spoiled hay and feed, bedding of animal etc. There are various techniques used like composting, biogas production (anaerobic fermentation), aerobic oxidation in ditches/Lagoons/lakes, direct application in field. Use as fish feed in fish ponds and growing algae (diluted slurry) at a farm.

Composting

In composting pile of solid waste is collected in pit 1.5 m deep and 3×4-meter dimension or large as per requirement (3 cubic meter/adult animal units) as per (Allnutt design described by R.G. Linton). This design has two pits with walls on all three sides covered on top with temporary roof to prevent desiccation, and alternative filing and emptying has been suggested. The front side should have a gutter which should be filled with cresol and water to control fly breeding and the front side should have a vertical sliding shutter to prevent debris falling into the gutter. The manure should be dumped and well packed in each compartment separately. While one is filled and packed, fermentation and decomposition occurs in the other which was filled earlier. The manure should be turned periodically to ensure uniform decomposition; this also enhances the destruction of larvae of parasites that are normally present in the dung. During composting frequent mixing of waste is required. The manure from other livestock farms like sheep, goat, pig and poultry can be decomposed in the similar manner. After piling within 24 hours temperature rises to 50°C and within 3-8 days it reaches to 70°C. Thereafter it falls to 50°C. C: N ratio and moisture are important in this process.

Biogas Production (Anaerobic Fermentation)

In this process organic matter is converted into volatile fatty acids which is in turn by the action of anaerobic bacteria (methanogenic bacteria) is converted to CH₄ and CO₂. The slurry is valuable product for using in fields.

Aerobic Oxidation

Slurry can be disposed by keeping it in shallow ditches, lagoon, and lakes. BOD (Biological oxygen demand) per acre is generally 20 for proper oxidation. Large areas are required and periodically solid sludge has to be removed. Upper water is used for irrigation after mixing with fresh water or directly also.

Liquid Form by Means of Lagoon

Lagoon is a body of water like a small pond where in liquid manure is discharged and digested by bacterial action. In this method fertility value of manure is wasted but helps in saving of equipment and labor which may compensate the loss. Pens are scraped and washed daily with water under pressure 75 lbs./sq” inch and 500 gallons water per hour. This is run into lagoon which should hold at least one week accumulation of manure @ 20 kg/cow/day.

Vaccine and Vaccination Practices

- 1) **Vaccine Purchase-** Consultation with veterinarian before purchasing vaccine is helpful in determining the vaccine required in dairy farm. Check expiration dates, cold chain of the vaccine at the time of purchase or receiving the vaccine... Purchase vaccine in small-dose vials to minimize wastage.
- 2) **Storage of Vaccination-** Read and follow label instructions. Discard any vaccine that freezes or expired. Store vaccine that will expire first near the front of the refrigerator and use it first. Do not overstock vaccine and most important is train employees, family members and others on proper vaccine handling.
- 3) **Handling of Vaccine at Field Level-** Pre-cool the cooler for at least 1 hour prior to placing the vaccine inside. Use enough ice or cold packs to maintain a steady temperature, 35-45°F. Take enough vaccine for the morning or for afternoon, not for both. Keep the cooler out of sunlight. Identify any leftover unopened bottles of vaccine and use them first the next time. Do not use the same vaccine gun for different vaccines. Do not mix modified live vaccines if won't be able to use them within 1-2 hours reconstituting them. Discard bottle of killed vaccines that have been opened for more than 2 days because vaccine can be contaminated by repeated introduction of air and needles.
- 4) **Injection of Vaccine-** Give injections in front of the shoulder in the middle neck region. Avoid giving injections in the nuchal ligament of the neck region. Remove air from syringes or guns prior to injecting vaccine. Use the correct gauge and length of needle as specified by the label. Change needles every time before filling the syringe or vaccine gun. Change needles that become blurred, bent, or broken. Never straighten and reuse a broken needle. Space multiple injections 4 inches apart on the animal to avoid mixing different products. Use a new needle each time syringes are filled.
- 5) **Disposal of Vaccine-** Follow if any disposable instructions provided on the label. Do not place the unused vaccines on water sources. Unused or empty vaccine container should be banned either through burn barrels or incinerators.

Deworming Schedule for Dairy Animals

Regular deworming of animals is required in dairy farm. The various worms like trematodes, cestodes and nematodes are common in dairy animals under the field conditions. Therefore, follow the below mentioned schedule:

- 1) **For Round worms (nematodes):** First dose at 10 days of age and thereafter at monthly interval up to 6 months. Thrice a year in animals above 6 months of age
- 2) **For Liver Flukes (trematodes):** Twice a year in prevalent area (before and after monsoon)
- 3) **For Tape worms (cestodes):** Twice a year (January and June in prevalent herds)

Calf Rearing System

Calf rearing section is very important nursery at dairy farm. Calf rearing system varies with the facilities available at dairy farm. They may be reared indoors or outdoors or semi-intensive system. In humid tropics, it may be desirable to keep the calves indoor in day time and outdoor at night. This will reduce parasitic infection also. Thus, it is advantageous to keep new born calf in individual pen for the first 3-4 weeks of age. Calves that are running in batches often suckle or lick each other after feeding and it is a good practice to keep them in their pens for some time after milk feeding. Hair swallowed by the calves after suckling each other often forms a hard ball in the abomasum and this is a constant cause of digestive

disturbances and death. Cleaning the mouth of the calves after each milk feeding is a sanitary practice. The calf pens should provide comfort and easy cleaning.

Management Practice up to Six Months Age of Calves

Clean nostrils and mouth of calf after birth, which helps the calf to breathe better and help in preventing the future breathing problems. Allow the mother to lick the calf clean which promotes circulation within the calf's body and prepares the calf to stand up and walk. Tie the naval cord with a thread at a distance of around 2 inches from the base and cut the remaining cord with a clean instrument. Dip the navel (a simple smearing will not serve the purpose) in 7% or higher tincture of iodine solution and repeat after 12 hours. (Do not use teat dip or weaker iodine solutions). A poorly maintained navel is the gateway to *E. coli* and other pathogens particularly causing navel ill or joint ill..

Scientific Principle and Management of New-born Calf:

A new born calf should be given 2 litres of colostrum within the first 2 hours of birth and 1-2 litres (based on size) within 12 hours of birth. Many calves do not nurse adequate amounts of colostrum from their dams within the first few hours of life, and thus they may not receive adequate immunity. Feeding colostrum after 24 hours of birth may not help the calf to ward off infections. A calf must receive adequate colostrum to protect it from diseases for the first three months of its life. Colostrum is the calf's "passport to life". Hand-feeding new-born calves are therefore recommended so that the farmer is sure about the amount of colostrum an individual calf receives. Provide fresh, clean water all times, particularly when milk feeding is induced discontinued. If muconium (first faecal matter) is not voided out, mild enema by dissolving soap in a litre of warm water should be given.

- 1) **Weaning:** If weaning at birth is followed, care should be taken to see that adequate colostrum is fed for the first 3-4 days. If weaning is practised 4 days after calving, then further ration has to be fed as per the schedule described.
- 2) **Health Management:** De-worming should be done within 10-14 days of age subsequently on a monthly basis upto the 6 months. When the animal is 3 months old, consult the veterinarian for vaccination.
- 3) **Calf Pen:** Calf pen should be close to cow shed. Pen should provide sunlight; good ventilation floor should not be slippery. After 6-8 weeks, calves may be grouped according to age, sex etc. The feed boxes and watering equipment should be provided in the pen.
- 4) **Identification Mark-** Giving of identification mark which is necessary for keeping proper records, proper, feeding, better ore and management. There are following methods as given below:
 - **Branding:** brandings are mainly two types as Cold Branding and Hot Iron Branding. There are uses a metal instrument to burn or freeze a mark on the animal's hide.
 - **Ear Tagging:** Use special pliers to attach pieces with numbers on them and easy to read from the front view in herd.
 - **Tattooing:** Uses a special tool to put inked numbers in an animal's skin. This is Permanent, Simple and relatively painless. But hard to read from a distance.

- 5) **Dehorning the calves-** Dehorning or disbudding: Disbudding is carried out either by the use of hot iron, caustic sticks and electrical dehorning cone. Both the buds are destroyed at the early age (within 3 to 10 days).
- 6) **Castration-** Castration of bull calf: At age of 2-3 months, bull calves should be castrated suitably. Bloodless method of castration are Burdizzo, Elastrator, Calicrate bander, Short-scrotumed, Chemical castration.
 - **Burdizzo method of castration-** Restrain the animal, Do one at a time, Push testes down into scrotum and over to the side. Place the lips of the instrument over the cord 1/2 the distance between the testes and abdomen. Push handles together until the cord is crushed.
 - **Elastrator method of castration:** Restrain the animal, Place the rubber band over the prongs, Spread the rubber band and push both testes down through it, Release the band above the testes, check later for the scrotum to fall off and disinfect.
 - **Invasive method of castration:** Restrain the animal, Examine the calf to see if testes have descended in to the scrotum, disinfect equipment, hands, and scrotum, Grab the end of the scrotum with one hand and pull down. Cut off the lower 1/3 of the scrotum, Pull testicles down one at a time/scrape if necessary. Trim excess fat and membrane carefully, Disinfect the area again, Incision method is performed much the same way, but make an incision on each side of the scrotum first, then pull down each testicle through the incision.
- 7) **Record keeping:** Add record keeping of new-born care, when calf was moved from calving area, navel dipped, fed colostrum, which provided care.

Green Fodder Production at Farm

Production of fodder plays a major role in feed of milch animals, thereby providing required nutrients for milk production and health of the dairy animals. Green fodder production provides the better option of feed buying alternative for farmers who are planning to go for dairy farming. It provides best way of nutrients for animals and has beneficial effects on their growth and health. It also reduces the cost of animal feeding. The green fodder can be utilized for making the silage. Most of the fodder varieties are perennial, thus can get more fodder cultivation for each year. Cultivation and maintenance cost is low compared to other feed ingredients. According to various agro-climatic zones there are so many cropping system in our country. Therefore, we need area specific fodder crop rotation.

Entrepreneurship

Entrepreneurship is major part of any business because farmers can produce but cannot sale their produce properly. Therefore, the focus on marketing the product is very important. Dairy farmers must have knowledge about the dairy project reports, availability of bank loan, insurance facilities of animals and marketing management etc. Above all he/she should have idea about the retail marketing of milk and its products after value addition.

Cattle Insurance

It can be applicable to indigenious, cross breed and exotic cattle owned by/ belonging to private owners or financed by the various financial institutions *i.e.* bank-, military dairy farms, Co-operative/Corporate dairies etc. Cattle means and Include - Milch cows and Buffaloes, Calves/Heifers, Stud Bulls, Bullocks/He buffaloes and Mithuns.

Age Group

- a) Milch cows 2 years or age at first calving to 10 years
 - b) Milch Buffaloes 3 years or age at first calving to 12 years
 - c) Stud bulls 3 years or earlier age at sexual maturity to 8 years
 - d) Bullocks/He buffaloes 3 years to 12 years
 - e) Calves/Heifers 4 months upto date of 1st calving
- (No relaxation in upper age-limits is allowed)

Valuation

Valuation based on market value as on date and place and to be decided on the basis of recommendations of the local veterinary surgeon.

Scope of Cover

The policy shall give indemnity only for death of cattle due to:

- 1) Accident (inclusive of fire lighting, flood/inundation, cyclones, tornado, tempest, storm, hurricane, famine) or any other fortuitous circumstances (Fortuitous means accidental in origin).
- 2) Diseases (Inclusive of Rinderpest, Black Quarter Haemorrhagic Septicemia, Foot and mouth disease subject to vaccination against these diseases).
- 3) Surgical operations.
- 4) Strike, Riot and Civil Commotion risk & Terrorism
- 5) Earthquake

Exclusion

- 1) Theft or clandestine sale, missing of insured animal.
- 2) Malicious or willful injury or neglect/ intentional slaughter.
- 3) Transport by air or sea or beyond 80 km by rail or road.
- 4) Partial disablement of any type, whether permanent or temporary.
- 5) Accident happened/Diseases contracted prior to commencement of risk.
- 6) War & allied perils.

Marketing

Marketing: Marketing of dairy products is not a problem in India. There is huge demand of these products throughout the year in India. One can easily find the suitable market for selling these products in almost every place of the country. The activities involved in transporting products from producers to consumers includes product exchange, physical and auxiliary activities. These activities can be further divided into buying and selling as exchange activities; storage, transport, processing and standardizing as physical activities; and financing, risk-bearing and market intelligence as auxiliary activities.

Marketing Chain: The flow of commodities from producers to consumers that brings in economic agents, who perform complementary functions with the aim of satisfying both producers and consumers.

Marketing Node: Any point in the marketing chain where an exchange and/or transformation of a dairy product takes place. A marketing chain may link both formal and informal market agents.

Marketing Agents: Individuals, groups of individuals or organizations that facilitate the flow of dairy products from producers to consumers through various activities, such as production, purchasing, processing and selling. Examples of market agents include farmers selling dairy products, retailers, wholesalers, dairy cooperatives, importers and exporters.

Milk Producers: Rural subsistence farmers, rural market-oriented farmers, commercial dairy farmers and urban and periurban milk producers.

Emerging Dairy markets

- 1) Food Service Institutional Market – It is growing at double the rate of consumer market.
- 2) Defence Market – An important growing market for quality products at reasonable prices.
- 3) Ingredients Market – A boom is forecast in the market of dairy products used as raw material in pharmaceutical and allied industries
- 4) Parlour Market – The increasing away-from-home consumption trend opens new vistas for ready-to-serve dairy products which would ride take credit on the fast food revolution sweeping the urban India

Challenges for Marketing of Milk

- 1) Majority of the market is still unorganized
- 2) Acceptability of the consumer base
- 3) Less penetration to the rural market
- 4) Lack of transparent milk pricing system

Solution to Overcome the Challenges for Dairy Marketing

- 1) **Dairy Cooperatives:** One of the most successful producer organizations is the Indian dairy cooperative, which was started in 2005 and has had a network of more than 100,000 village level dairy cooperatives with 12.3 million members. National Dairy Development Board (NDDB) covers 1,40,227 village level societies and 14 million farm families of which 4 million are women. It has a daily procurement of 22 million litres of milk. With the contribution of Amul Pattern of dairy cooperatives, India has progressed from a milk-deficit country to the largest milk-producing country, globally. In this model, millions of days of employment have been generated for the rural poor and this further improved their socio-economic conditions.
- 2) **Contract Farming:** Contract farming has a potential to help the small and marginal farmers overcome constraints in accessing inputs, credit, extension and marketing. The problem of the higher cost of contracting with small producers is overcome by contracting with a single person in the village often an agent who acts as an intermediary between the processor and producers. The country's dairy sector is dominated by small holders, and contracting with a large number of them involves transaction costs for the processors. The processors do not have much choice but to take milk from smallholder producers.
- 3) **Self Help Groups and Group Approach:** The women's self-help group (SHG) movement particularly SHG-bank linkage programme has spread all over the country. These programme's interventions and processes have resulted in a sustained process of women member's empowerment. The real power of the SHG-bank linkage model (SBL model) lies in the economies of scale created by Self Help Group (SHG) Federations (comprising 150–200 SHGs each). This is evident, for example, in bulk purchase of inputs (seeds, fertilisers etc.) and marketing of outputs (crops, vegetables, milk, NTFPs

etc). Government of India has now started National Rural Livelihoods Mission (NRLM) in 2011. There is a clear understanding that the SBL programme can only be successful if it is tied up with livelihood programmes such as improved agriculture, dairying, marketing etc.

4) **Retail Milk Market:** The retail milk market in India is mostly unorganized. There is no supply chain management perspective. An overwhelming proportion of the Rs 4,00,000 crore retail market is unorganized. In fact, only a Rs. 20,000 crore segment of the market is organized.

- **Retailers:** Milk shops, peri-urban farmers, rural subsistence and market-oriented farmers and retail shops.
- **Unorganized milk retail chain:** Milk producers directly supply milk to the consumer or through a marketing channel. Milk producers supply milk to the consumers through the intermediaries like middle men.
- **Organized milk retail chain:** Milk producers supply their milk to primary cooperative society, which further supplies to secondary cooperative. The milk after processing, reaches consumers via marketing channel either directly or through apex cooperative. Industry based milk retailing opportunities are also available in our country and growing at faster rate.

CONCLUSION

Hence, farmer choose organized milk retail or industry-based retailing chain for improving their status as well as Indian economy

Value Added Milk Product

Value added dairy products: Dairy farmers can add value to their milk by processing and marketing their own products, such as cheeses, yogurt, butter, ice cream, and flavoured milk. Many consumers are willing to pay a premium for locally produced, high-quality and farmstead dairy products. India's demand for milk and its value-added products is increasing twice as fast as the production of milk. The market is also witnessing a consumer shift towards healthier products such as UHT milk, probiotic drinks, processed cheese, curd, butter, milk and ghee etc.

Classification of Indian Traditional Dairy Products

- 1) **Heat and acid coagulated milk products:** *Paneer* is an unaged, acid-set, non-melting farmer cheese made by curdling heated milk with lemon juice or other non-rennet food acid, and then removing the whey by pressing result into a dry unit. *Chhena* is like paneer, except some whey is left and the mixture is beaten thoroughly until it becomes soft, of smooth consistency and soft but firm *Sandesh* is a confection made from chhena mixed with sugar then grilled lightly to caramelize, but removed from heat and molded into a ball or some other shape. *Rasagolla* is confection made from mixture of chhena and semolina rolled into a ball and boiled in sugar syrup.
- 2) **Fat rich dairy product:** *Ghee* - Ghee is prepared by simmering butter, which is churned from cream (traditionally made by churning yogurt), skimming any impurities from the surface, and then pouring and retaining the clear, still liquid fat, while discarding the solid residue that settled on the bottom. *Malai* - It is made by heating non-homogenized whole milk to about 80°C (180°F) for about one hour and then allowing to cool. A thick

yellowish layer of fat and coagulated proteins forms on the surface, which is skimmed off. The process is usually repeated to remove most of the fat.

- 3) **Cultured Dairy Products:** Yogurt and Dahi are dairy foods that are used and consumed widely. A notable difference between these two is that yogurt is prepared by pasteurizing milk, whereas Dahi is prepared by boiling milk, then cooling it to room temperature, and finally adding the previous day's mild acidic curd to it. Mishti doi is dahi (Indian Yogurt) mixed with sugar. Shirkhand is strained yogurt mixed with sugar, and often flavourings such as cardamom, saffron, or fruit.
- 4) **Heat Desiccated Products:** Kulfi is made from slowly freezing sweetened condensed milk. In comparison to ice Cream, kulfi is not whipped or otherwise aerated. Khoa or Mawa is made by reducing milk in an open pan over heat. Rabri is a sweet, condensed-milk-based dish made by boiling the milk on low heat for a long time until it becomes dense and changes its color to pinkish. Sugar, spices and nuts are added to it for giving it flavor. It is chilled and served as dessert. Basundi is a sweetened condensed milk made by boiling milk on low heat until the milk is reduced by half.

First Aid Facilities at Model Dairy Farm

- 1) **First Aid:** First aid includes any emergency care given to an injured or ill patient before medical assistance arrives. Due to the often-hazardous nature of farming and isolation, all the people working on the farm should be trained in basic first aid.
- 2) **Basic Supplies:** Basic supplies to this first-hand kit include: adhesive medical tape, antibiotic ointment, antiseptic solution, gauze in assorted sizes, bandages including elastic wraps, cotton balls, instant cold packs, duct tape, plastic bags for disposal of contaminated items, sterile eye wash, thermometer, scissors (for cutting bandages or clothing), tweezers, soap or instant hand sanitizer, latex gloves and a first-aid manual.
- 3) **Emergency Contacts:** A card inside an emergency kit should include numbers for an ambulance, hospital or fire department and have written directions on how to get back to the farmstead, field or work area. Numbers for poison control and emergency road service should also be included.
- 4) **Additional Safety Measures:** Check the farm safety kits every three months to make sure supplies are not expired and that they fit the current season. Safety kits are important tools to have on the farm, but additional training could also be beneficial in responding to emergencies. Consider getting training in first aid or other important topics to assist when first responders can't be on the scene immediately.
- 5) **Individual Needs:** Make sure the kit includes personal medications and medical information for those who require special attention. Drugs to treat allergic reactions and any other personal medications that don't require refrigeration should be included. The name and a phone number of the family doctor should also be included.

Tentative Plan for Starting a Dairy Unit of Five Cattle

The tentative plan for starting a dairy unit of five cattle based on the following assumptions.

- 1) Land for the construction of shed is available. Moreover, bank loan will be taken for the construction of shed and purchase of animal. A part of working capital will also be borrowed from the bank to start with.
- 2) The animals purchased will be freshly calved in 2nd and /or 3rd lactation having a female calf at its heel.
- 3) Replacement of raising heifers on the farm rather than purchasing.
- 4) The amount of loan borrowed will be 75 per cent of the total @10% per annum.
- 5) There shall be adequate and timely availability of veterinary aid and breeding facilities, green /dry fodders and concentrates, etc.
- 6) Prices of inputs and outputs vary seasonally. These have been assumed at averages.

Top Ten Dairy Companies in India

- 1) **Amul Industries Pvt Ltd:** Amul Industries Pvt Ltd was founded in the year 1946 and its headquarter is located in Anand, Gujarat, India. It is one of the top dairy companies in India. It is offering a product range includes paneer, butter, cheese, ghee, ice-cream, chocolate, milk powders etc. The leading dairy company is managed by the co-operative body, the Gujarat Co-operative Milk Marketing Federation Ltd. It is one of the leading food brands in India. Amul apart from being Asia`s largest milk brand is a vehicle for economic and social development through which farmers manage their own resources. Amul is also developing wide range of products to meet future demand, including calcium fortified milk, flavoured yoghurt, frozen yoghurt, sugar free ice-cream and pro-biotic products.
- 2) **Andhra Pradesh Dairy Development Cooperative Federation Limited:** Andhra Pradesh Dairy Development Cooperative Federation Ltd is one of the leading dairy companies in India. It is offering a wide range of products prepared from milk. Its product range includes curd, butter milk, ghee, paneer, doodh peda, and butter. The leading dairy company is also growing product range to meet the changing customer needs. It has the huge share in the daily use of dairy products.
- 3) **Karnataka Co-operative Milk Federation:** Karnataka Co-operative Milk Federation is one of the top dairy companies in India. It is offering a range of products like paneer, curds, pedha and milk. The entire system works through the chain of farmers. The company has reached into even rural areas of Karnataka. It is known for its quality products that it distributes into even remote areas.
- 4) **Kwality Ltd:** The company was started in the year 1992 as Kwality Dairy. It is one of top private sector dairy companies in India. It is offering a range of innovative products and currently enjoy the huge presence in Northern India. It has the manufacturing unit in leading Indian states. It is committed to fulfilling all quality standards. It is one of the top companies in the Institutional segment.
- 5) **Mehsana District Co-operative Milk Producers Union Ltd (Dudhsagar Dairy):** The company was founded in the year 1963 with headquarter in located in Gujrat. It is one of the top dairies in Asia. It is the member of state level Gujarat Co-operative Milk Marketing Federation.
- 6) **Mother Dairy Fruit and Vegetable Pvt Ltd:** Mother Dairy Fruit & Vegetable Pvt Ltd was founded in the year 1974 with its headquarter in Noida, Uttar Pradesh. It is offering the wide range of products including ice-cream, ghee, paneer, pickles and many other products under the one umbrella brand Mother Dairy Fruit & Vegetable Pvt Ltd. In starting phase, the company was mainly focused on Delhi and NCR. Later on, it has spread its business into other cities.

- 7) **Schreiber Dynamix Dairies Pvt Ltd:** Schreiber Dynamix Dairies Pvt Ltd was started in the year 1945. It is headquartered in Green Bay. It is producing cream cheese, yogurt, process cheese.
- 8) **Tamilnadu Co-operative Milk Producers Federation Ltd:** It is one of the top dairy companies in India, currently located in Tamil Nadu.
- 9) **The Kerala Cooperative Milk Marketing Federation Ltd (Milma):** The company was founded in the year 1980 and headquartered in Thiruvananthapuram. The company product range includes milk products and cattle feeds.
- 10) **The Orissa State Cooperative Milk Producers Federation Ltd:** The Orissa State Cooperative Milk Producers Federation Ltd was founded in the year 1985. Company's product range includes milk & milk products, horticulture products, kandhamal organic products, cattle feed. Its headquarter is located in Bhubaneswar, Orissa.

Table 3: Largest Milk Producers in India

S. No.	Dairy Industry	Production ('000 litres per day)
1	AMUL	2500
2	OMFED, Odisha	1950
3	AP Dairy Development Cooperative Federation Ltd	1500
4	Haryana Dairy Development Cooperative Federation Ltd	1450
5	Dynamix Dairy Industries Ltd., Maharashtra	1000
6	Mother Dairy, Delhi	1000
7	Vasundhara Dairy, Nagpur	1000
8	Dudhsagar Dairy, Gujarat	950
9	Hatsun Agro, Chennai	800

Some Other Private Dairy Industries are:

- 1) Kwality Dairy Ltd.
- 2) Amrut Industries Ltd.
- 3) Anmol Dairy Ltd
- 4) Britannia Industries Ltd
- 5) G R B Dairy Foods Pvt Ltd
- 6) Haryana Milk Foods Ltd
- 7) Indian Dairy Specialities Ltd
- 8) Industrial Progressive (India) Ltd
- 9) Mahaan Foods Ltd
- 10) Milkfood Ltd
- 11) Nikumbh Dairy Products Ltd
- 12) Ashmi Milk

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