



Constraints and Way Forward for Boosting Income from Dairy Farming in India: A Review

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

For a sustainable livelihood model of farming under Indian conditions, dairying becomes an inevitable part along with crop production. Dairy farming has been a continuous source of income to the farmers which help them in their socioeconomic development. Increased quantity and quality of milk always fetches good returns to the farmers. Hence, it becomes the priority of almost all the farmers to extract more and more milk from the animals which may sometimes pushes them into faulty husbandry practices which ultimately lead to loss of income and loss of health of animals. Nonetheless, dairy production in India has boosted many folds as shown by increased livestock population and production scenario in the country. However, under Indian conditions, for enhancing the income from dairy farming certain constraints have to be layout and correspondingly firm solutions have to be made. Constraints such as poor availability of high producing Germplasm, rapidly decreasing availability of feed and fodder resources, poor husbandry practices, reproductive and other health problems among several other problems hinder the income obtained from dairy farming to the farmers. In addition to the much needed solutions of such constraints, there needs for the reforming government policies for overall development of dairying in India. This article discusses on such probable constraints and their solutions in concise yet informative way so that wholesome development of income through dairy industry may be achieved.

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1. INTRODUCTION

Optimum milk quality and quantity has been the prime focus of dairy industry in India [1,2,3]. In India, livestock is the most essential component of the rural population's economic and social lives [4,5]. Dairy farming is the most common and profitable livestock business [6,7]. Animal husbandry, dairying, and aquaculture all make a substantial contribution to the country's and nation's socioeconomic development (The livestock sector accounts for around 6% of GDP, while agriculture accounts for 25% of GDP [2]. Dairy farming is the most common and profitable livestock business. Smallholder dairy farmers of India consider dairying as their main source of income. Dairy farming is the main source of revenue for India's smallholder dairy farmers [8]. India produces far more milk than the United States, which is the world's second-largest producer [9]. The milk production in India is about 198 MT and per capita availability was 406 gram reported in the year 2019- 2020 [10]. The dominance of buffaloes and crossbred cows in milch animal stock has altered, with indigenous cows gradually disappearing. The only approach to increase the production potential of dairy cows is to make proven technology available for widespread adoption and to build the necessary infrastructure. Milk is the single commodity which fetches more money than that by selling a cereal crops individually. This tells the scope of dairy business in the country. There are many obstacles in blooming of dairy business in the country which needs to be attended with great priority basis.

Review works done to layout probable constraints, to the author's knowledge, is not present or very limited. Therefore this article framed with an aim to discuss those constraints which hinder dairy business income to the farmers and proposes easy solutions to boost up this venture to increase the profit of dairy farmers.

2. CONSTRAINT IN DAIRY FARMING

2.1 Lack of Good Quality Animals

India has highest livestock population in the world having total Livestock population is 535.78 million in the country [11]. Indigenous/Non-descript animals are more in number however their production capacity is generally very less as

compare to that of crossbreed or exotic animals. The reason behind this is mainly due to the unavailability or less of indigenous/exotic bulls of high genetic merit [12].

2.2 Scarcity of Feeds and Fodders, Feed Preparation Technologies

Unbalanced nutrition is one of the key causes of lower productivity in most developing countries, such as India [13,14]. Low availability of quality green fodder and dry fodder, lack of proper nutrients and unavailability of green fodder which is hugely required for commercial dairy farming. In field situations, some workers have reported a simultaneous shortfall as well as an excess of both protein and energy [15], particularly in the un-organised sector. High price of concentrate mixture, and feed and fodder further add up to this issue [16]. The country is currently facing a net deficit of 35.6% of green fodder, 26% of dry-crop residues and 41% of concentrate feed components [17].

2.3 Traditional System of Animal Husbandry and Stray Cattle Management

High cost of raw material for dairy animal shed and inadequate housing is becoming a burden and hurdle for new dairy farmers to enter into this venture. Lack of proper knowledge of milk production economics makes this business more complex [18,19]. Often dairy farmers are cheated by uneven rise or dip in the price of input and output resources. Lack of knowledge of record keeping and waste disposal practices adds furthermore to dairy farming issues. Lack of scientific management is many times a common problem as extension services of the nation is not working up to considerable levels [20-23].

2.4 Lack of Skills and Resources

Repeat breeding and infertility in cattle are the two most burning problems of animal husbandry sector in the nation which is often not taken care upon. Poor conception rate of artificial insemination (AI) which may be attributed to poor heat detection, poor insemination timing, lack of maintenance of freezing chain, etc. [24]. Non-availability of timely treatment facilities and lack of knowledge of common contagious diseases, their prevention and control measures is also a big problem of the country. Vaccines do

not work up to their full potentials as we lack proper procurement and storage facilities. Farmers also have misconception that this might harm their animals.

2.5 Decrease Availability of Land and Resources

Some literatures have revealed that only 4% of total cultivable land of the nation is under fodder production. It is a fact that with rapid increase in the population of human, availability of land for feeds and fodder are becoming scarce which is further posing negative pressure over economy from dairy farming [25,26,27]. Major problem is the decrease of common pastoral land which existed earlier where farmers were free to graze their animals. That practice allowed considerable nutrients to the animals with no additional costs [28,29].

2.6 Lack of Farm Inputs and Market Due to Connectivity Issues

Most of the dairy farms are present away from the periphery of market chain areas deep inside the villages. Connectivity of those small or the large dairy farms to the market is a challenging task for both the farmers and the governments.

2.7 Poor Institutional Structures for Procurement of Milk

Most of the government institutions are busy with their research works in this field however, very less may be considered fully devoted to ground level work for the dairy farmers. Middlemen often increase the selling price of the milk but the farmers generally receive only pennies of what the middleman earn from the customers. Hence, there is a high need for setting up the regulatory authorities to check up the malpractices in dairy businesses.

2.8 Drastic Climatic Change

Predominant climatic condition of India is tropical. More than 25% area of India suffers through thermal humidity index (THI) more than 85 during summers which poses severe heat stress to dairy animals [30,31,32]. High producing animals suffer more than lower producing animals. Rapid decrease in milk production is encountered when these animals is exposed to severe heat stress. Dairy animals remain in their thermal comfort zone when THI is

65-72, however, above that they are exposed to heat stress conditions. A loss of more than 100 kg/animal/year have been encountered when animals experience [33]. As per estimation, more than 5000 crores of Indian rupees are lost just due to this climatic effect [34]. Nevertheless, with strategized housing and feeding, majorly, this loss can be overcome [35-40,32]. A simple of strategic feeding may be providing energy feeds during cooler parts of the days and low energy diets such as straws, stovers, etc. during hot periods of days. This method will relieve animals from extra heat stress. Supplementation of herbs may also help in relieving animals from unwanted heat stress conditions [41]. Similarly the provision of fresh clean water may help animals to relieve from heat stress conditions. Whereas in housing management, simple roofing modifications, ventilation management and bedding management or cool water fogging/misting/wallowing/sprinkling/splashing management may be done to provide thermal comfort to the animals in order to minimize adverse effects of drastic climate change for the animals [37,42,39,32].

2.9 Way Forward for Boosting Income through Dairy Farming

Proper management of breeding, feeding, health care- day to day routine and heeding (culling of unwanted circumstances from the farm) is a rough plan to get success in increased earning through dairy farming. Regular, training of farmers, introduction of improved breeds of animals, improved methods of rearing animals, proper housing [43,44], improved market infrastructure, enhanced extension services along with upgraded government policies would provide wholesome growth of dairy sector and hence the income from dairy farming will enhance many folds [45-48]. A pictorial representation of strategies for improving income of dairy farmers is provided in Fig. 1.

2.10 Breeding Management

Milk from indigenous milch breeds (Sahiwal, Gir, Red Sindhi, Tharparkar) is in great demand now days. Our milch breeds are well adapted to the harsh climatic condition and provide satisfactory amount of milk during the days when other cross breed or exotic (eg. HF, Jersey, Brown swiss, etc.) ones may not. Disease resistance capacity of indigenous breeds is far better than those of crossbreed or exotic animals [49].

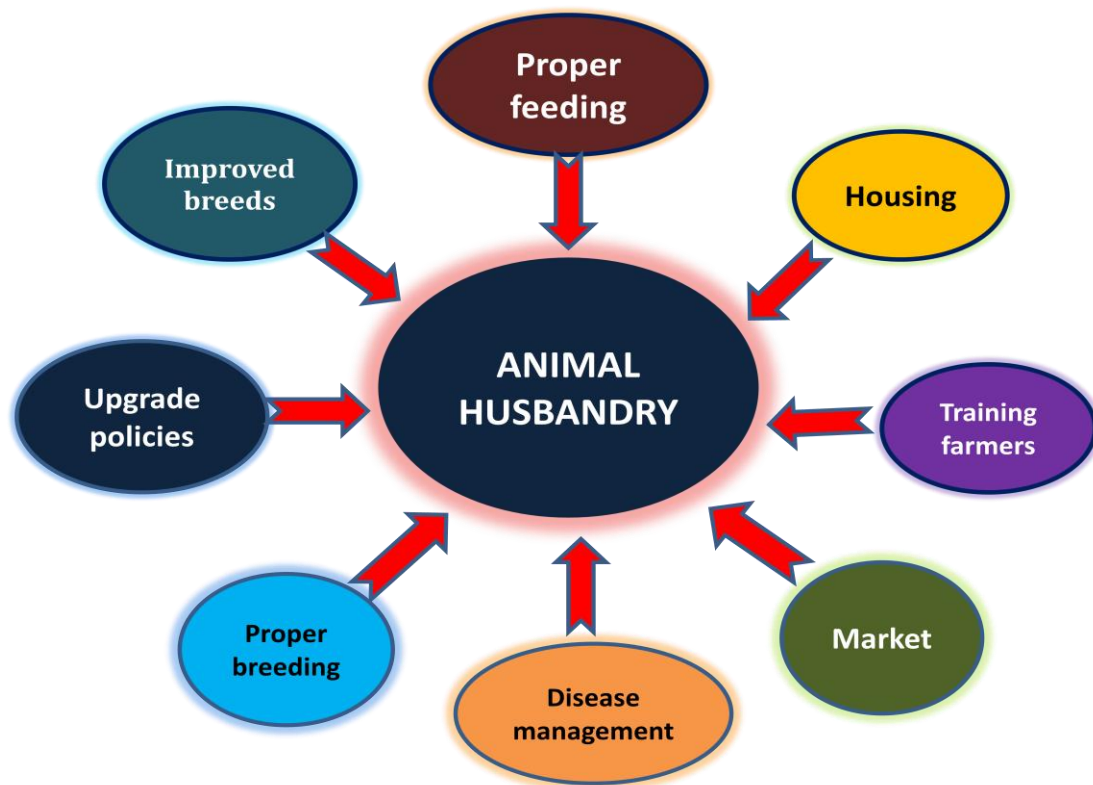


Fig. 1. A pictorial representation of strategies for improving income of dairy farmers

Major drivers of dairy industry in India are Buffalo and Cattle contributing 49% and 48% respectively. However, goat milk contributes 3% to total milk pool of the country. Selective breeding of pure milch breed cows may be recommended whereas for non-descript breeding, it may be cross-breeding or up-grading method of breeding. On the other hand, for buffalo selective breeding may be recommended and for non-descript buffaloes, grading up with Murrah buffalo may be recommended [50-54]. Artificial insemination technology has boosted up the reproduction of dairy animals in the country as it removes burden of costly keeping of burden of male animals [55,56,57]. But, hard side of the story is that AI coverage of India is low to around 28-30% of dairy animals. Nevertheless, this may be attributed to several reasons including poor heat detection, improper timing of insemination, etc. More AI centre should be made in more numbers where semen of superior Germplasms may be obtained by the farmers at genuine rates. Veterinary and para-veterinary staffs should be placed in right proportions in an area per number of animals so that they may work in efficient way rather pushing them for very hard works which a human body may not perform with considerable efficiency.

2.11 Feeding Management

Though it may not be denied that there is huge shortage of available feed and fodders for dairy animals in the country and whole world, but improved storage and preservation technology of feeds and fodders may solve this problem up to a considerable level [3,32,58,59,60].

Silage, hay, bailing process may help in storing and preserving the feeds and fodder resources to make it available throughout the year.

Other practices of feeding may include feeding of animals as per their body weight as a thumb rule to provide them with sufficient nutrition. Feeds and other materials useful for feeding animals may be procured in advance by the farmers and stored and concentrate mixture may be prepared whenever needed. Own made concentrate and feeds will be economical which will help to curb the extra feeding cost that would have been incurred due to purchasing of high cost feeds.

Feeding urea-molasses block prepared many apex institutions of nation in the field of dairying as National Dairy Research Institute, Karnal may help to provide good amount of minerals needed

by the animals. It may be more helpful for the animals which are entering into transition period i.e. 21 days before and after calving period, where mineral needs are more. Additionally it's been suggested that 20% more feeding should be done to the animals which enters into its 3rd trimester of gestation period which usually is of 280 days. During lactation period, animals producing more than 5kg/day milk may be offered 1 kg extra per 2.5kg milk production per animal as a thumb rule. Good amount of greens should be ensured to the animals which will be nutritious and will help in cutting the cost of milk production [61,62]. Additionally, herbal feed supplements may be done as prescribed during transitional period for improved performances of dairy animals [41].

2.12 Health Management

Diseases like FMD, Rinderpest, IBR, Tuberculosis, Paratuberculosis, Brucellosis, and Haemorrhagic Septicaemia, Dermatitis, Theileriosis, Babesiosis, Anaplasma are common in dairy animals [63]. Tuberculosis, Brucellosis and Anthrax are zoonotic diseases. Due to poor sanitary conditions and under nutrition conditions, the animals become susceptible to infections and disease. Lack of veterinary services adds up more severe adverse effects from such diseases. Due to unhygienic management and inadequate nutrition the animals become susceptible to infections and disease [64]. Due to tropical conditions, exotic and crossbreed animals suffer more adversely through heat stress as compared to indigenous dairy animals for production, reproduction and health performances (Das et al., 2018); [65]. Dutta et al. [66] reported that mastitis is higher in crossbreed cattle (12.4%) than indigenous breeds (8.9%). Noticeably, under Indian conditions, mastitis causes loss of about INR 5000 Crores [67]. Nonetheless, it is an encouraging point that mastitis may be controlled and prevented through proper nutrition, health, sanitary and improved husbandry practices [68,69]. Due to favorable conditions for the breeding and growth of parasites, high worm load cases have been observed in rainy seasons particularly, due tropical conditions [70].

2.13 Extension of Innovative Animal Husbandry Methodologies

Dissemination of prompt informations regarding improved husbandry practices would help in achieving the target of improving the income of

farmers through dairy farming. If we take the example of concentrate feeding more than 40% dry matter of total ration of the animal may have adverse effects on the health and ultimately to the overall production of animals. Hence just having consideration that, high concentrate feeding will fetch more money might be deleterious for dairy farming. In order to overcome that problem it may be suggested that, a ratio of 80: to 70: 30 by fodder: concentrate for good producers will be beneficial. Similarly many examples of good dairy practices may be taken like using teat dips before and after milking, regular cleaning of animals and surroundings may be recommended to avoid the losses through health problems and poor milk quality. Hence, it will be apt to say that dissemination of enhanced husbandry practices will boost up the profit margin for milk production.

2.14 Improved Storage and Market Infrastructure

AMUL model in Gujarat showed to the whole nation that co-operative farming may be more helpful for enhancing the income of the farmers as this method cuts the cost due to possibility of middleman. In that system, health facilities, feeds, marketing are provided to the farmers for their milk. Likewise, for other parts also similar model may be practiced.

Major players of milk in several states are private or co-operative dairies. They have the infrastructure to store the milk of around million kilograms for weeks without much deteriorating the quality of it. However, sadly the common farmers lack this facility; they have to strive hard to sell their milk or milk products. Recently a very cost effective milk refrigerating device was developed by a researcher at NDRI; Karnal may be a good option for the farmers provided this technology reaches to them at budget price which may increase the shelf life of milk to a considerable level. Market distributions may be done based upon the population of particular area or distance wise.

2.15 Enhanced Government Policies and Trainings for the Farmers

Through its various institutions, government conducts various researches to layout its policies be it for dairy farming [71]. Government policies should be upgraded whenever needed at regular intervals after ground level investigations [72,73,74]. It may not be denied that policies and

trainings provided by the government agencies have helped dairy farming a lot. Policies like cross-breeding, key village scheme, national dairy bovine breeding programme, operation flood 1, 2 and 3; national livestock mission, etc. supported dairy farmers to a great level. However, there is always a scope for improvement. Major benefits of these schemes are taken up by the big farmers; such policies should be made which may easily reach to major dairy farmer community to benefit them.

Government may recruit a balanced number of animal scientists, veterinarians, para-veterinarians, skilled herdsman, etc. on regular intervals to improve the efficiency of the dairy farming. It may be anticipated that this practice will certainly provide better health and other facilities to the farmers at affordable prices.

2.16 Liberal Rules on Ban of Slaughtering Animals

Many researchers suggest that slaughtering of animals should be allowed which are unproductive or have reached to non-producing age. Animals always serve as insurance for the farmers, whenever the farmer is in his hard times; he may sell his animals for slaughtering and receive considerable money and can recover from their miserable times. If the farmers will be allowed to get their animals slaughter when they become un-productive, they may earn considerable money from it which will indirectly pay them as a growing charge for raising heifers to a fully fledged producing animals. Or else, in coming days the small scale dairy farming sector will shrink and the game will be in hands of private players. Hence, it will be beneficial if the governments of different states or be it central government make the policies, in consultation with ground level experts & scientists, to allow the farmers to sell those non-producing animals for slaughtering.

3. CONCLUSION

Dairy farming has been backbone of Indian farmers. Considerable income may be obtained from dairy business of the country. Regular, training of farmers, introduction of improved breeds of animals, improved methods of rearing animals, proper housing, improved market infrastructure, enhanced extension services along with upgraded government policies would provide wholesome growth of dairy sector and hence the income from dairy farming will enhance many folds.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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