



Continuing Education Article

Re-designing Smallholder Dairy Production in Pakistan

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INTRODUCTION

Pakistan is endowed with a large livestock population well adapted to the local environmental conditions. The national herd consists of 33.0 million heads of cattle, 29.9 million buffaloes, 27.4 million sheep, 58.3 million goats and 1.0 million camels. Livestock produce approximately 43.562 million tons of milk, making Pakistan the 3rd largest milk producer country in the world. Livestock also produce 1.601 million tons of beef, 0.590 million tons of mutton, 41.54 thousand tons of wool, 21.99 thousand tons of hair and 57.937 million skins and hides (Government of Pakistan, 2009).

In Pakistan, the main contribution of milk comes from buffaloes, which produce 62.0% of the total milk supply. In fact, traditionally buffaloes have been raised as dairy animal and cattle as draught animal. Currently, cattle produce 34.4% of the milk supply, while the remaining is contributed by camels, goats and sheep (Government of Pakistan, 2009). Buffalo milk contains higher butter fat (6 to 8%), is rich in taste and is preferred by majority of the people.

MILK PRODUCERS IN PAKISTAN

Milk is mainly produced by the smallholders in the country. Profile of total herd of cattle and buffaloes (the main dairy animals of the country) is given in Table 1. Herd size includes animals of all ages and sexes. Table 1 also depicts distribution of milking animals in different herd sizes.

The data clearly depict that most of the households (>93%) raising cattle and buffaloes in the country are smallholders (<10 animals). Similarly, most of the animals (67.6% cattle and 71.4% buffaloes) are raised in smallholder production system. A total of 8.42 million families raise 26.79 million cattle and buffaloes for milk

production in the country (Livestock Census, 2006). Most of these milch animals (65.3%) are with families who keep one to six milking animals. These smallholders constitute 91.4% of total families raising cattle and buffaloes. Larger herds (>30 milking animals per farm) constitute only 0.3% of holdings and are 29,293 in number. These holdings have 9.4% of total milk producing cattle and buffaloes.

MILK AND MILK PRODUCTS FOR SUSTAINABLE LIVELIHOOD

Macro-picture

Milk is the single largest commodity in the livestock and agriculture sectors in terms of value. The total value of the milk (Rs. 1307 billion) exceeds the combined value (Rs. 1013 billion) of major cash crops (cotton, wheat, rice, maize and sugarcane) in the country (Table 2).

Sale of milk by the farmers brings daily cash to them. If it is assumed that only 50% of milk produced in the country is marketed (the remaining 50% is consumed at home), the cash flow to the rural economy due to sale of milk comes to be Rs 653.430 billions annually or Rs. 1.790 billion daily.

Benefits at household level

Smallholder dairy production has a number of benefits to the poor families who raise these animals. Availability of highly nutritious products for home consumption by the family is a major advantage for these resource-poor and mal-nourished people. Milk and milk products supply much needed quality proteins, minerals and vitamins to the family. Poor rural-dwellers without livestock suffer more from nutritional deficiencies than those having livestock, as they cannot afford to purchase the dairy products and these deficiencies are usually more pronounced in children and women.

Table 1: Herd profile of total and milking cattle and buffaloes in Pakistan*

Herd size	Total animals			Milking animals		
	Households	Buffalo	Households	Cattle	Buffalo	Cattle
1-2	2545 (42.5)	4.293 (15.7)	2668 (43.1)	4405 (14.9)	3788 (27.9)	3533 (26.8)
3-4	1655 (27.6)	5.770 (21.1)	1700 (27.5)	5.939 (20.1)	3284 (24.1)	3072 (23.3)
5-6	801 (13.4)	4.364 (16.0)	836 (13.5)	4.556 (15.4)	1975 (14.5)	1863 (14.1)
7-10	626 (10.4)	5.096 (18.6)	619 (10.0)	5.063 (17.2)	1880 (13.8)	1783 (13.5)
11-15	218 (3.6)	2.734 (10.0)	207 (3.4)	2.598 (8.8)	883 (6.5)	802 (6.1)
16-20	75 (1.3)	1.331 (4.9)	70 (1.1)	1.234 (4.2)	363 (2.7)	346 (2.6)
21-30	44 (0.7)	1.081 (4.0)	46 (0.7)	1.132 (3.8)	338 (2.5)	354 (2.7)
31-50	20 (0.3)	0.764 (2.8)	24 (0.4)	0.923 (3.1)	344 (2.5)	381 (2.9)
>50	12 (0.2)	1.902 (6.9)	18 (0.3)	3.708 (12.5)	749 (5.5)	1055 (8.0)
Total	5996 (100.0)	27.335(100)	6188 (100)	29.558 (100)	13604 (100)	13189 (100)

*Adopted from Livestock Census (2006); Values in the parentheses indicate percentages.

Table 2: Market value of different agricultural commodities (2008-09)*

Commodity	Production (2008-9)	Per unit Value (rupees)	Total value (billion rupees)
Cotton	11.819 million bales	14,238 / bale	168.279
Wheat	23.421 million tons	23,125 / ton	541.611
Rice	6.952 million tons	19,208 / ton	133.534
Maize	4.036 million tons	13,125 / ton	52.973
Sugarcane	50.045 million tons	2,325 / ton	116.355
Milk	43.562 million tons	30,000 / ton	1306.860
Meat	2.843 million tons	150,000 / ton	426,450

*Adopted from Govt. of Pakistan (2008-2009) and sources in Ministry of Food and Agriculture.

Smallholder families earn additional income from sale of milk and it is in fact continuous source of cash flow on daily/weekly basis. Thus, day to day family expenditure is met from the income from sale of milk, while income from sale of crops is seasonal (Afzal, 2003). Livestock also add value to crop production, they are an important source of diversification and reduce the risk associated with crop failure particularly in rain-fed crop production. Dairy animals ensure better utilization of land, family labour and farm by-products. Livestock manure is used as fertilizer and is very important for the crop productivity, as it not only provides essential nutrients but also enhances effect of inorganic fertilizers by adding organic matter into the soils. The use of livestock dung as fuel is also very common in villages without gas, as the poor masses cannot afford to buy fuel wood. The animals also provide social security for the rural people and are source of financing sudden or periodic expenditures like hospitalization, marriage or school fee (Afzal, 2006).

Smallholders dairying as source of empowerment

Smallholders dairying can serve as empowerment for the rural people particularly women. Women contribute significantly in smallholders dairying, particularly in feeding and management of animals, milking and in some cases milk marketing. This results in involvement of women in economic activities resulting in their empowerment. Similarly, smallholder dairying provides opportunities for the rural people and even landless people to get involved into economic activities. Milk producer groups or dairy associations if present provide opportunities for the poor to get involved in the democratic process (Henriksen, 2009). Empirical evidence has suggested that strong producer organizations, particularly of milk, also empower the community in other aspects of life.

Smallholders dairying as a stimulus to the development of rural economy

Smallholders dairying provides employment opportunities in the rural non-farm economy. Evidence suggests that each 20 litres of milk produced per day generates one full time wage employment. It also generates jobs indirectly related to milk production. Similarly, dairying also provides justification for rural investment like roads and communication by increasing the economic activity and bringing benefits to a larger population. Moreover, it results in transfer of money from urban to rural areas, thus strengthening rural-urban linkages. The money brought to farmers on daily or weekly basis through the sale of milk increases local spending by these farmers, stimulating local monetary economy in the rural areas (Henriksen, 2009).

IMPROVING SMALLHOLDERS DAIRYING

The major challenge in developing smallholders dairying is improving profitability of the system. This can be achieved by improving milk marketing and increasing production per unit animal(s). Strategic interventions needed to achieve this goal are given below:

Establishment of milk producers organizations

Two major issues of smallholder milk producers are access to market and technical knowledge and resource availability. As they have small quantity of milk to sell, they are not in a position to bargain for the fair price of their produce. Similarly, bringing technical and behavioural changes in the large population of smallholders is a major challenge for any government and non-government organization. The evidence has shown that organizing smallholders milk producers into groups or associations can bring many advantages to the

producers themselves and also effectively improve the transfer of technical knowledge and skills. The main advantages of organizing smallholders milk producers into groups (Afzal, 2007a, Henriksen, 2009) include: i) Better price for the producers, ii) Better access to technical information, iii) Easy management of market outlet, iv) Improved credit facilitation, v) Enhanced advocacy, vi) Political empowerment, vii) Easy access to improved breeding services, viii) Better delivery of animal health services, ix) Improved supply of advisory services x) Cheaper supply of quality inputs and xi) Exchange of experience.

Thus, establishment of producers organizations is in fact, the basic necessity for the smallholder dairy development in the country. Social mobilization of communities *per se* or for some other purpose like credit distribution may not be useful. Milk producers group formation may be started around milk marketing in the first place, so that immediate benefits could be seen and realized by the participants and then other technical input, supplies and credit could be added. Anand Project in Indian Gujrat, Idara-e-Kissan (Hala Brand) and LDDB milk producers groups experience in Pakistan have amply shown the success of this intervention.

Livestock feeding, fodder production and preservation

Adequate and balanced feed is essential for obtaining maximum milk yield from the animal and this is probably the most neglected area in smallholder dairy production system in Pakistan. Both quality and quantity of the feed and fodder are important for getting good milk yield from dairy animals (Afzal, 2007b).

General feeding practice by smallholder dairy producers is offering animals with seasonal fodder (partial grazing is also common) and concentrate consisting of soaked cottonseed cakes and wheat bran (or bread waste) mixed with wheat straw. This does not offer a balanced nutrient supply to the lactating animals and thus the animal is not able to yield milk according to its genetic potential.

Fodder is the cheapest source of nutrients for animals. In Pakistan, 5 commonly used fodders are Oats and Berseem in winter and Maize, Sorghum and Millet in summer. Berseem is rich in protein but low in energy, while all other fodders are deficient in proteins but are good source of energy. Thus, concentrate feed formulation should be complementing the nutrient availability from the fodder. Nutrient availability also depends upon the stage of growth of the fodder. Generally, most fodders have higher protein contents in early stage of their life (except fodder biomass) and the contents of indigestible nutrients increase as the plant matures. Furthermore, minerals should be given to dairy animals for optimum productive and reproductive performance. This could be done either by offering mineral mixture daily in the concentrate ration or mineral blocks could be placed in mangers for the animals to lick at their will.

Good quality fodder in sufficient quantity is usually available to the dairy animals in smallholders set up for about 4 months in a year i.e. mid February to mid-April and then July-August. For the rest of the year, either quantity or quality is an issue. The fodder deficiency becomes particularly acute in May-June and November-

December. This situation is compounded by the cut and carry system of fodder smallholders normally follow. The situation could be improved significantly following silage and hay making at the producer level organizations.

Dairy animals

Dairy animals are the most important assets of the landless milk producers. Animals vary in their genetic potential for milk production. Thus, good quality animals with higher genetic potential should be maintained by the smallholder dairy producers.

Beside nutrition and genetic potential, the management of the animal is important for good milk yield. The animal should be provided proper, comfortable and clean housing with facilities for free access to clean water and feed round the clock. Animal should be protected from extreme weather particularly in hot summer, as it adversely affects feeding and milk production. Animals should be rebred within 3-4 months following parturition to obtain optimum milk yield. If the animal does not come in heat by 4th month following parturition, the farmer should consult the Veterinarian. To obtain better milk yield in the next generation (daughter), the breeding should be done through Artificial Insemination (AI) with semen from a proven bull. If AI is not available or semen quality is questionable, natural breeding with a good pedigreed bull may be undertaken.

Milking equipment and milk collection centres

Milk is an excellent food for humans and the same is true for bacteria also. The unprocessed and un-chilled raw milk has very short shelf life and usually gets sour within 4 to 6 hours due to bacterial growth. Clean milk production, handling and transport are thus very important. While it is essential that animal, particularly its udder and teats are cleaned before milking and milkman washes its own hands, cleaning of utensils used in milking, storage and transport are of utmost importance in clean milk production and supply. Various utensils are used for the purpose but buckets and cans are more commonly used. Seamless utensils are easy to clean and should preferably be used.

Establishment of milk collection centres at the community has fuelled the formation of milk producers groups at many sites (Afzal, 2007a; Afzal, 2008). The producers get an easy access to the milk chilling facility extending its shelf-life and since milk is collected at one site in sufficient quantity, the buyer is normally willing to pay higher price. Thus, farmers get higher return from the sale of milk. Furthermore, these centres can also work as hub of other input/output supply depots. Fodder seed, fertilizer, feed and small equipments can also be sold from this place. The success of these centres lies in how these centres are managed. If these centres are managed by the communities and returns from these centres are passed back to the producers, this could be a major success, which again requires strong and participating communities of milk producers (Afzal, 2008).

Imparting technical knowledge and skills focusing on women

Knowledge and skills are the basics for improving the efficiency of the system. Improving knowledge and skills

of the producers has long lasting positive effect on the smallholders dairying. The farmer has to understand the principles of economical milk production to optimize the factors affecting milk production in the country. Updating farmers' knowledge and skills requires regular interaction with them and this can be better achieved through producers' associations. The knowledge and skill developments should cover right from selecting / buying a good animal to good management practices for improving its productive and reproductive performance, rearing calves and replacement heifers and protecting animals from diseases. The marketing knowledge and skills for the livestock and livestock products should also be an integral part of imparting skills. While devising training programmes, one should keep in mind that "Seeing is believing" and "Farmers do not have ears, they only have eyes."

Women participation in dairy farming in the rural areas is crucial in Pakistan (Afzal, 2007b). Many organizations aiming at improving the smallholders dairying fail to appreciate this fact and ignore the women in their training and skill development programmes. Women normally cannot leave their home and families for a few days to participate in training programmes and usually require female trainers for effective communication. These factors add another dimension to women training and should be taken care of. Better strategy for women training would be arranging sessions (preferably 2 to 4 hours a day) in the villages by the women trainers. In dairy farming, women training should particularly focus on calf raising, rearing replacement heifers, feeding for milk production, basic sanitation and disease prevention, as these chores are mainly carried out by women.

GOVERNMENT SUPPORT

Government support for smallholder dairy development is necessary to ensure that it is not excluded from the economic development and this investment can be classified as public good (Afzal, 2007b). Main areas of government support for the development of smallholder dairy include:

- a. Developing and implementing framework and programmes which support sustainable establishment of milk producer associations.
- b. Regulatory framework for prohibition of exploitation of smallholder producers by middlemen/private sector.
- c. Provision of veterinary services aims at controlling, preventing and eradicating main transboundary infectious livestock diseases.
- d. Livestock production advisory service on management, feeding, disease prevention, clean milk production and farm economics and marketing.
- e. Provision of superior germplasm particularly bulls for artificial insemination or natural breeding and breeding services through public-private partnership, preferably through producers associations.
- f. Trainings and skill development programmes for smallholders in improved livestock production technologies as well as producers associations in management and accounting.
- g. Research and development for improving efficiency of smallholders production system.
- h. Road and other communication infrastructure for the producers to have access to proper market information and ability to deliver their produce to the market.

Smallholder dairy producers usually produce milk at lower cost than large commercial dairy farmers. They can be even more efficient if they could be organized into producers associations. This will not only reduce poverty in the rural areas but will also increase milk production, resulting in a vibrant dairy industry in the country.

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