

MILK PRODUCTION, MARKETING AND CONSUMPTION PATTERN AT PERI-URBAN DAIRY FARMS IN THE MOUNTAINS: A CASE FROM LOHAGHAT IN UTTARANCHAL

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INTRODUCTION

Dairy farming, one of the most important economic activities in the rural mountain areas of Uttaranchal, is closely intertwined with farming systems. Rural communities fondly relish dairy products. Dairying again is the main purpose of animal husbandry in mountain areas. Apart from ensuring nutrient supplies to the families owning dairy farms, dairying also offers promising employment opportunities and handsome economic returns. In Uttaranchal mountains, dairying is especially a promising economic activity for smallholders who constitute the majority of farming communities in the region.

Smallholder dairy farming is increasingly gaining importance as a source of family income in mountain areas for quite some time (Singh, 2000, 2001, 2002a, 2002b, 2002c; Singh *et al.*, 2001). However, contributions of smallholder dairy farming accrued to the community and farming system are still not well recognized. India's emerging as the top milk producer in the world is largely due to smallholder, rather than intensive, dairy farming linked with the market system.

There may be variables in dairy farms in terms of their management, species of dairy animals, products, inputs, etc. These variables and the overall performance of a dairy farm would largely depend on its location and linkages with market (Singh, 2000, 2001; Singh *et al.*, 2001). In the present study, we have selected dairy farms in the peri-urban area, as they are more likely linked with market system. Cities and towns in mountain areas have swelled due to increased population and rapidly growing tourism. This has led to increased demand and consumption of milk in urban areas. The increasing milk consumption and demand, consequently, has created pressure on rural areas for higher milk production and sale to urban areas. This phenomenon has linked dairy farms in rural areas with the market in the urban consumption areas.

The first dairy farms to be tempted for milk sale in the nearby market place would be those located in the periphery of urban areas. The peri-urban farms would be at special advantage because of greater chances of their relationship with the easily accessible market centre. Higher flow of produced milk, however, is to affect milk consumption pattern at the households owning dairy farms and even in the villages the market system is easily accessible to.

In an earlier study, it has been observed that the highest per capita milk consumption is at the dairy farms not linked with the market system (Singh, 2000). If milk is to flow from rural areas to the urban ones, its availability and consumption rate at the production place will decrease considerably. This ought to affect the health of producer families for whom milk is the only food of animal origin and of exceptionally high nutritive value. The first to be affected by reduced milk consumption are the children for whom milk is the food of high quality protein. This is the inadequately addressed issue. In the planning of dairy development, when milk is being diverted from its production place to the distant market place for want of cash income, its impact on the producers' families should necessarily draw the attention of all those associated with the dairy development processes. With issue-based research and perspective-based approach of development, smallholder dairy farming in mountain areas can be improved significantly. Smallholder dairy development, indeed, holds the key to White Revolution in mountain areas.

MATERIALS AND METHODS

Six mid-altitude villages nestled on the periphery of the township of Lohaghat in the district of Champawat in Uttaranchal were selected for the objective-oriented study. In each village, 20% of the farm households were selected for detailed investigation. Desired information was derived on the pre-structured proformas. Day-to-day visits of the peri-urban dairy farms in the research villages was

undertaken continuously for 45 days, mid-June to July-end, 2003. Data were analysed using simple mathematical calculations.

RESULTS AND DISCUSSION

Livestock population and composition

In a peri-urban village, bovine amongst the livestock, cattle amongst bovine and cows amongst cattle dominated a dairy farm. Cows in milk are more than the dry ones. The dairy economy thus depends on bovine species, that too mainly on cattle (Table 1).

Table 1. Livestock population, composition and size at peri-urban farms in the study villages

| Livestock | Patan | Kaigaon | Chauri | Raikote Kunwar | Motyuraj | Rautali Mara | Overall | Average Size (No. Per Farm) |
|---------------|-------|---------|--------|-------------------|----------|--------------|---------|-----------------------------------|
| Cattle | 253 | 295 | 292 | 290 | 310 | 181 | 271 | 2.76 |
| Cows | 134 | 135 | 135 | 112 | 221 | 86 | 137 | 1.40 |
| In Milk | 105 | 100 | 117 | 86 | 103 | 71 | 97 | 0.98 |
| Dry | 29 | 35 | 18 | 26 | 118 | 15 | 40 | 0.41 |
| Female Calves | 62 | 80 | 104 | 107 | 54 | 71 | 80 | 0.82 |
| Male Calves | 33 | 35 | 40 | 15 | 15 | 5 | 24 | 0.24 |
| Bullocks | 24 | 45 | 13 | 56 | 20 | 19 | 30 | 0.31 |
| Buffaloes | 25 | 5 | - | 67 | 70 | - | 28 | 0.28 |
| In Milk | 15 | - | - | 31 | 30 | - | 13 | 0.13 |
| Dry | 10 | 5 | - | 5 | 35 | - | 9 | 0.09 |
| Female Calves | - | - | - | 31 | 5 | - | 6 | 0.06 |
| Male Calves | - | - | - | - | - | - | - | - |
| Total Bovines | 278 | 300 | 292 | 357 | 380 | 181 | 298 | 3.04 |
| Goats | 81 | 210 | 68 | 118 | 49 | 43 | 95 | 0.96 |
| Sheep | - | - | - | - | - | - | - | - |
| Horses | - | - | 9 | 5 | - | - | 2 | 0.02 |
| Poultry | 15 | - | 68 | - | - | - | 14 | 0.14 |

In the population of bovine, cattle alone comprised 91%. The second place in the population was of buffaloes (9.0%). In cattle population, there were 50% adult cows, out of which 70% were in milk and 30% dry. There were 30% female and 9.0% male calves in cattle population. There were 11% bullocks in the study villages in the peri-urban area.

Amongst buffalo population, 79% were breedable out of which 47% were in milk, and 32% dry. Another 21% of buffaloes constituted female calves. Male buffalo calves in the study villages were virtually absent as they, owing to no role in hill farming systems, are starved to death few days after their birth.

The picture of livestock composition, in fact, is varying from area to area in the mountains of Uttaranchal. The current picture reveals that in the peri-urban areas, farm families tend to rear milch animals in large proportion, as the milk produced can be immediately disposed off in the nearby market and thus is a ready commodity for supplementing family income. The figures obtained are not in conformity with many other findings in the far off villages in the mountains (Singh, 2000; Singh and Tulachan, 2002). The livestock composition in this study well corroborates with that in the Terai area of Uttaranchal where cattle population exceeds than that of buffaloes (Tripathi, 2001 and Singh *et al.*, 2002).

Livestock holding

On an average, there were 3.04 bovine animals per household. Out of this, numbers of cattle per family were 2.76. This constituted 1.4 cows, 0.82 female cow calf, 0.24 male cow calf and 0.31 bullock per household. Out of average household size of cow, there was little less than one cow in

milk and 0.42 dry. Average number of buffaloes was 0.28 per household. Household size of buffalo comprised 0.13 in milk, 0.09 dry, 0.06 female calf. There was, on an average, 0.96 goat and 0.14 poultry bird per household (Table 1). However small, this size is in tune with the characteristics of a smallholder dairy farm in the Indian Central Himalayas (Singh, 2000).

Livestock breeds

Peri-urban dairy farms are characterised by market-oriented milk production. The composition of livestock breeds, therefore, is quite different at these farms than at the farms in other villages far away from urban areas. A glimpse of the peri-urban dairy farms would reveal that there were some 104 crossbred cows out of total cattle population 271 cattle per village. Out of these, 67 crossbred cows were in milk, 37 were dry. Local cows numbered 33 per village, out of which 31 were in milk and 2 dry (Table 2). Crossbred cows, thus, were 76% and local 24% in the adult female cattle at the peri-urban dairy farms.

Table 2. Crossbreds and local breeds of cows at peri-urban dairy farms

| Cow Breed | Patan | | Kaligaon | | Chauri | | Raikote Kunwar | | Motyuraj | | Rautali Mara | | Overall | |
|-----------|-------|----|----------|----|--------|----|----------------|----|----------|----|--------------|---|---------|----|
| | CB | L | CB | L | CB | L | CB | L | CB | L | CB | L | CB | L |
| In Milk | 29 | 76 | 65 | 35 | 86 | 31 | 66 | 20 | 93 | 10 | 61 | 9 | 67 | 31 |
| Dry | 29 | - | 25 | 10 | 18 | - | 26 | - | 113 | 5 | 14 | - | 37 | 2 |

Buffaloes were mostly the admixture of Bhadawari and Terai breeds. Some percentage of the blood of other species was also possible. Since there is no systematic programme of buffalo development unlike that of cattle development, pure breeds of this species are rare.

Milk production at peri-urban dairy farms

Milk production figures at dairy farms in research area are presented in Table 3. On an average, a village produced 541 litres of milk per day. If calculated on annual basis, the average figure of milk production per village came out to be 1,55,976 litres. Judging by the small population size of a village in study area, this figure of milk production appears to be impressive. Average milk production per dairy farm in peri-urban areas was 5.54 litres per day, or about 1,600 litres per year. Variation in milk production figures amongst villages was due to different population size of the milch animals.

Table 3. Milk production at peri-urban dairy farms in study area

| Particulars | Patan | Kaligaon | Chauri | Raikote Kunwar | Motyuraj | Rautali Mara | Overall |
|--------------------------------------|--------|----------|--------|----------------|----------|--------------|----------|
| Milk production Per Village Per Day | 430 | 430 | 652 | 648 | 708 | 377 | 541 |
| Milk production Per Village Per Year | 117213 | 120885 | 187137 | 189725 | 210342 | 110553 | 155975.7 |
| Milk production Per Farm Per Day | 4.89 | 4.3 | 5.57 | 6.35 | 7.22 | 5.71 | 5.54 |
| Milk production Per Farm Per Year | 1116 | 1209 | 1599 | 1860 | 2146 | 1675 | 1600.83 |

Note: Annual milk production is calculated by multiplying total dairy animals in lactation stage by average lactation yield of the animal

Marketing of milk

Of the total milk produced per village per day, 244 litres was marketed and 297 litres retained at home (Table 4). Thus, on an average, 42% of the total milk produced was marketed and 58% retained at home for consumption.

Table 4. Milk marketed and retained at home per day in the peri-urban villages

| Particulars | Patan | Kaligaon | Chauri | Raikote Kunwar | Motyuraj | Rautali Mara | Overall |
|-----------------------------|-------|----------|--------|-------------------|----------|-----------------|---------|
| Milk Production Per Village | 430 | 430 | 652 | 648 | 708 | 377 | 541 |
| Milk Marketed Per Village | 146 | 183 | 337 | 362 | 296 | 141 | 244 |
| Milk Retained Per Village | 284 | 247 | 315 | 286 | 412 | 236 | 297 |
| Milk Production Per Farm | 4.89 | 4.3 | 5.57 | 6.35 | 7.22 | 5.71 | 5.54 |
| Milk Marketed Per Farm | 1.39 | 1.83 | 2.88 | 3.54 | 3.02 | 2.13 | 2.44 |
| Milk Retained Per Farm | 2.70 | 2.47 | 2.69 | 2.80 | 4.20 | 3.57 | 3.07 |

A Farm, on an average sold 2.44 litres of milk per day and retained 3.07 litres for family consumption (Table 4). Marketing of little less than half of the total milk produced at peri-urban farms appears to be a characteristic of the smallholder dairy farms on the outskirts of market area. Several such characteristics of the smallholder dairy farms in mountain areas have been presented by several workers in recent years (Singh, 1999; Tulachan and Neupane, 1999; Singh, 2000; Tulachan *et al.*, 2000; Singh *et al.*, 200; Singh and Vaidya, 2002).

Per capita milk availability

Average daily per capita availability of milk in the study villages came out to be 698 ml. This figure for the peri-urban dairy farms is considerably higher if we compare with those of other villages (Singh, 2000) (Table 5).

Table 5. Per capita availability and surplus/ deficiency of milk in the study villages

| Village | No. of Dairy Farms | Population | Annual Milk Production, litres | | Per Capita Availability Per Day, ml | Surplus (+)/ Deficiency (-), ml |
|----------------|--------------------|------------|--------------------------------|----------|-------------------------------------|---------------------------------|
| | | | Per Village | Per Farm | | |
| Patan | 105 | 584 | 117213 | 1116 | 550 | +300 |
| Kaligaon | 100 | 630 | 120885 | 1209 | 526 | +276 |
| Chauri | 117 | 769 | 187137 | 1599 | 667 | +417 |
| Raikote Kunwar | 102 | 679 | 189725 | 1860 | 765 | +515 |
| Motyuraj | 98 | 573 | 210342 | 2146 | 1005 | +755 |
| Rautali Mara | 66 | 438 | 110553 | 1675 | 692 | +442 |
| Overall | 98 | 613 | 155975.83 | 1600.83 | 698 | +448 |

Marketable surplus

Indian Council of Medical Research (ICMR) recommends a minimum need of 250 ml of milk per capita per day (Singh 1999). On the basis of this criterion, it could be inferred that people at peri-urban dairy farms have milk far more than their daily need. The extra milk, which reflects a marketable surplus, can be disposed in the market. The peri-urban farms, thus, are producing marketable surplus. The average daily per capita surplus of milk production per village was 448 ml (Table 5). None of the sample villages in the peri-urban area showed a deficit in per capita milk availability.

The surplus of milk production at dairy farms is due to the fact that dairy farming in the vicinity of urban areas tends to be market-oriented, for the market is readily available for the disposal of milk. The peri-urban dairy farms take advantage of the facilities available near market area. Milk is the ready source that fetches income on daily basis for fulfilling petty needs of a farm family.

Milk consumption in the mountains and Hills has increased considerably over the years. The cities and the town areas have swelled due to increasing population. Some prominent tourist spots witness unusually high number of tourist arrivals in peak tourist season. Teashops have proliferated in recent years along every road even in rural mountain areas, so much so that these are sometimes referred to as one and the only industry in the mountains, which have also contributed to significant milk consumption in the area.

Flow of milk via different marketing channels

Most of the milk produced at smallholder peri-urban dairy farms was sold through producer-consumer channel. On an average, 192 litres of milk was marketed per day per village through this channel, which was about 79% of the total milk marketed. Milk traders/middlemen were also playing role in milk marketing. Average milk marketed through producer-trader/ middleman-consumer channel per village per day was 39 litres, or only 16% of the total milk marketed. Producer-cooperative-consumer channel of milk marketing was not so active at the peri-urban dairy farms. Only 13 litres of milk per village per day (or merely 5% of the total milk marketed) flowed through this channel (Table 6).

The pattern of milk flow via different marketing channels reveals that peri-urban dairy farms establish direct contact with the consumers, as they are easily accessible to them. The consumers also like to choose their own milk suppliers, for they prefer fresh whole milk (FWM) for which they would prefer direct contacts with the trustworthy producers.

Some farms would opt for selling milk through middlemen/ traders. The traders mostly are the local milk producers who would collect milk from producers in their own village or a nearby village. Flow of milk to market through this channel, however, is meager. These traders mostly supply the milk to tea or sweet shops or hotels in Lohaghat Township. Consumers at families in the town however seldom opt for buying milk from middlemen, for it is taken granted that they would mix water with the milk to increase its volume.

Table 6. Milk flow through different marketing channels in study area

| Village | Total Milk Produced Per Village Per Day, Litres | Milk Marketing through Different Channels | | | Total Milk Marketed |
|----------------|-------------------------------------------------|-------------------------------------------|---------------------------------------------|---------------------------------------|---------------------|
| | | Producer-Consumer Channel | Producer-Trader/ Middleman-Consumer Channel | Producer-Cooperative-Consumer Channel | |
| Patan | 430 | 112 | 34 | - | 146 |
| Kaligaon | 430 | 168 | 15 | - | 183 |
| Chauri | 652 | 306 | 27 | 4 | 337 |
| Raikote Kunwar | 648 | 362 | - | - | 362 |
| Motyuraj | 708 | 76 | 147 | 73 | 296 |
| Rautali Mara | 377 | 127 | 14 | - | 141 |
| Overall | 541 | 192 | 39 | 13 | 244 |

Cooperative system of milk marketing is also active in the mountains. However, milk flow via this channel is merely 5% of the total marketed milk in the peri-urban areas. Producers prefer milk sale through cooperative only when the market place is not easily accessible to them. High market accessibility in peri-urban areas does not make producers rely on cooperative system. Direct sale to consumers or sale through traders is preferred over sale through cooperative for a number of reasons; e.g. i) cooperatives give less remunerative prices of FWM compared to consumers or traders; ii) cooperatives purchase milk on the basis of fat content of milk and therefore milk prices fluctuate on daily basis; iii) cooperatives, unlike traders and consumers, do not provide money as and when needed by the producer suppliers, who, sometimes would also provide money in advance; and iv)

cooperatives also often impose other conditions on their members (the milk producers) such as supply of costly feed the cost of which is deducted from the producers' dues.

Consumption pattern of dairy products

As we have seen earlier, 58% of the total milk production at a dairy farm is retained at home for consumption. Out of this non-marketed milk, an estimated 10% (5% of the total milk production) is consumed by the calves and the rest about 90% is consumed by the family members. The milk consumed in rural areas is the non-purchased, produced at the smallholders' dairy farms. The milk consumed is, obviously, the fresh whole milk (FWM).

A family in rural mountain areas, on an average retains 3.07 litres of milk per day purely for its consumption. Unsold milk per family in the study area is milked in the evening. Morning milk is sold. A few families would mix some evening milk with that of the next morning's and sell in the market.

Average amount of milk retained at peri-urban farms actually amounts to per capita per day milk consumption, which is 492 ml, i.e., 242 ml higher than the recommended amount. Average daily per capita milk consumption figures, however, are varying within villages.

Out of the total milk consumed per day, about 1861 ml (60%) is consumed directly by family members of different age groups. Some milk (771 ml, or 25%) is consumed through tea. The remaining 450 ml (15%) per farm is consumed after being converted into other dairy products (mostly in the form of curd and rarely as yoghurt and ghee).

Of the total milk consumed directly, children below age of five years consume 14% of the total directly consumed FWM. Children between 5-12 years of age consume 18% of FWM, while those between age group of 12-20 take 19% of FWM. Persons between the age group 20-60 years consume as much as 40% of the directly consumed FWM. Aged persons above 60 years also consume some 9% of the FWM. As expected, family persons in the age group of 20-60 years consume major share of FWM, followed by those in the 12-20 years of age, 5-12 years of age, and below five years of age. Aged persons get minimum share of the directly consumed milk at a dairy farm. Some elderly ruralites, even octogenarians, have been seen drinking milk on regular basis. Not all adult persons, however, consume FWM every day. Only some are addicted to milk. Persons of active age group consume more of FWM directly, for it is a must for their physical and mental growth.

Table 7. Milk consumption pattern at peri-urban dairy farms

| Village | Family Size (No.)* | Milk Retained at Home (Litre/ Day) | Different Uses of Milk (ml/ day) | | | | | | |
|----------------|--------------------|------------------------------------|-------------------------------------------|--------|--------|--------|--------|-------------|------------------------------|
| | | | Directly Consumed by Different Age Groups | | | | | Used in Tea | Used as Other Dairy Products |
| | | | <5 | 5-12 | 12-20 | 20-60 | >60 | | |
| Patan | 5.56 | 2.70 | 123 | 304 | 371 | 666 | 38 | 752 | 447 |
| Kaligaon | 6.30 | 2.47 | 260 | 250 | 360 | 570 | 400 | 610 | 380 |
| Chauri | 6.57 | 2.69 | 316 | 256 | 324 | 735 | 59 | 794 | 205 |
| Raikote Kunwar | 6.65 | 2.80 | 303 | 470 | 323 | 490 | 127 | 666 | 401 |
| Motyuraj | 5.84 | 4.20 | 366 | 285 | 367 | 1204 | 214 | 908 | 928 |
| Rautali Mara | 6.63 | 3.57 | 318 | 424 | 333 | 757 | 212 | 893 | 636 |
| Overall | 6.24 | 3.07 | 271.00 | 331.50 | 346.33 | 737.00 | 175.00 | 770.50 | 499.50 |

* Only those who are living at the family permanently and are the regular consumers of the milk produced at a farm have been considered for the family size. Persons living and working away from their families either alone or with their families, who make a sizeable proportion of the rural population, are not counted to analyse the situation of milk consumption in rural areas.

Majority of the adult people consumes milk through tea. Large quantities of milk to be used in tea (use of coffee in rural areas, unlike in the cities, is extremely rare) indicates the importance of this beverage in mountain society. Tea without milk is seldom thought of.

Looking at the milk consumption pattern at peri-urban dairy farms, we find that per capita consumption values per farm are quite satisfactory. Per capita daily milk consumption status at the peri-urban dairy farms, is in excess of the ICMR recommendations. A dairy farm in the vicinity of market place is especially prompted by the milk-marketing facilities (Singh, 2000), but more production of milk also prompts family members for its higher consumption rate, as is evident from this study.

Processing of milk not to be consumed directly at home is different than at a Dairy Processing Plant. First of all, the milk is converted into curd. The curd then is churned using a traditional wooden churning instrument and the butter is separated, which is later on refined into ghee. About half of the butter is consumed and the remaining is refined into ghee at all dairy farms. Almost entire ghee produced at a peri-urban farm is consumed. Practice of selling ghee is rare. Market-oriented dairy farms do not rely on ghee selling. No other dairy products, like paneer, cheese, etc., are prepared at home in rural areas and sold.

CONCLUSION

Peri-urban dairy farming in the mountains is distinguishable from the one in the areas far-flung from market place. It is essentially a market-oriented dairy. Ready market availability prompts smallholders to produce more milk primarily for sale and earn cash income so crucial for their petty needs. This trend, however, leads to the reduction in the milk to be retained at home for consumption by the household members. An increase in milk production will not only contribute to more cash income, but also ensure more amount of milk available for family consumption.

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