

Smallholder Dairy Farming in the Mountains: Potential for Operation Flood in Uttaranchal, India

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Introduction

In the hills and mountains of Uttaranchal State, smallholder dairy farming is one of the most important activities in the mixed crop-livestock farming systems. Livestock are the best means of converting local vegetative biomass into useful products and work, and of diversification into products of higher economic value, such as dairy products. Production from smallholder dairies is making an increasing contribution to the economy of rural mountain areas. Over the years, this has been the driving force behind the transformation of the rural hill economy, as reflected in the strengthening of milk marketing, dairy cooperatives, the increasing number of milk collection centres and chilling centres, an impressive increase in milk production, and city milk sales (Tulachan and Neupane 1999; Singh 2002).

Given the specific geographical, socioeconomic, and environmental circumstances of the region, large dairy units are generally inappropriate and hill farmers have seldom opted for them. Smallholders' small dairy farms, on the other hand, are appropriate, manageable, and can conform to mountains' specificities. Smallholder dairy production is therefore a potential area for development intervention in the region. This paper attempts to characterise smallholder dairy production systems and explore the potential opportunities to improve mountain livelihoods. The evidence presented is based on secondary data and rapid appraisal of two milk-shed areas of Nainital and Almora districts of the state.

Smallholder Dairy Farms vs Large Dairy Farms

The conventional technical approach to dairy development relies on three components: crossbreeding of indigenous cows with specialised exotic dairy cattle, mainly the Jersey breed and artificial insemination; cultivation of fodder crops, especially legumes, and high use of concentrates; and health coverage involving modern veterinary medicine. This approach, however, depends heavily on investment and capital and only farmers who are already better off can afford it. This approach supports large, intensive dairy farms.

The indiscriminate application of the conventional technical approach in Indian Himalayan regions such as Uttaranchal would impose a higher dependency on imported inputs at farm, local, and national levels (dairy genetic stock – semen as well as live animals – depends entirely on imports). Smallholders cannot afford to spare any piece of their land to cultivate leguminous fodder, and instead must nurture their dairy animals on limited, fragmented, and scattered land. Some basic features of the two types of dairy farms are shown in Table 1.

Table 1: General features of smallholder dairy and large/ intensive dairy farms

	Smallholder Dairy	Large/ Intensive Dairy
Breed	Local/crossbred	Crossbred
Mating	Local bull, mostly while grazing	Artificial insemination, or exotic bull
Feed/feeding	Non-farm (CPR) fodder, crop residues, food waste, grazing, and stall-feeding	Cultivated fodder, concentrate (foodgrains and cakes), mineral mixture etc.; stall-feeding
Milking	Female family members	Paid skilled labour or mechanical
Daily care	Women and children	Paid labour at a dairy farm
Use of milk	Domestic consumption, sale of surplus milk	Sale in the market
Use of male calves	Ploughing and other agricultural work	No use
Linkages with farming system	Strong linkages; waste is used as soil nutrient	No linkage; wastes cause pollution
Treatment of sick animals	Family care and herbal medicines	Vet care and modern drugs

Trends in Milk Production

With a gradual emphasis on the dairy sector, milk production in the Uttarakhand hills has increased from 419,000 tonnes in 1979-80 to 715,000 tonnes in 1999-2000, a rise of 71%. Although milk production from cows increased only 19%, buffalo milk production increased by 111%. Buffaloes contribute more than 60% of the total milk production. However, the milk-yield increase per cow (73%) has been far higher than that per buffalo (45%). This is attributable to institutional policies focusing on cows rather than buffaloes.

Urban Consumption Pattern of Dairy Products

Consumption of milk per capita per day increases as the income of a family increases. The average per capita per day consumption in the urban areas was 321 ml. This figure was higher for Nainital (342 ml) than for Almora (300 ml) (Table 2).

Table 2: Per capita daily milk consumption (ml) in two urban centres

Family Category	Almora	Nainital	Average
Low-income	150	125	138
Mid-income	350	400	375
High-income	400	500	450
Average	300	342	321

Undoubtedly, liquid milk is the most wanted dairy product, comprising about 90% (by weight) of all dairy products. The least preferred dairy item in the region is cheese, which is seldom consumed by low- and mid-income families. The consumption level of all dairy items was directly proportional to income level. On average, all urban households spent a little over 8% of their total monthly income on dairy products. The low-income families spent a larger share of their income on dairy products.

Rural Consumption Pattern of Dairy Products

About 32% of the total milk consumed per month was consumed directly by family members. Most milk (about 45%) was consumed in tea. The remaining 24% was consumed after conversion into other dairy products. Average figures showing consumption patterns for milk were quite uniform between the two areas, but the average consumption of milk

Table 3: Milk consumption in rural hill areas

Villages in the milk shed	Family size (no.*)	Milk retained at home (l/month)	Per capita daily consumption (ml)	Different uses of milk (litres/month)			
				Directly consumed by		Used in tea	Used as other dairy products
				Adults	Children		
Almora	3.83	39.15	336	3.26	9.79	15.91	10.19
Nainital	3.40	35.03	339	2.66	7.96	17.52	6.90
Average	3.62	37.09	337	2.95	8.88	16.72	8.55

* Only those living in the family permanently and regular consumers of the milk produced at a farm were considered in calculating family size. Persons living and working away from their families, who make up a sizeable proportion of the rural population, were not counted in analysing the milk consumption in rural areas.

and other dairy products was significantly higher in the Almora villages than in the Nainital villages (Table 3).

Comparing urban and rural per capita milk consumption, the situation at milk producers' households, contrary to the popular belief, was no better than elsewhere. Although a dairy farm family took more milk than a low-income family in an urban area, its daily milk consumption status was poorer than the medium and high-income categories of the families in urban areas. Nevertheless, on average, it was on par with the milk consumption of an urban family.

Smallholder Dairy Development: A Perspective

Livestock and natural resource base: existing potential

The evidence suggests an increasing trend in milk production, marketing, and consumption rates. The natural resource base that includes vast areas under the common property resource (CPR) regime, the huge population of dairy animals and their unique and highly adapted breeds, and diverse animal production systems hold the key to dairy development in the region. Due to the valuable self-containment feature of the farming systems in the region, almost all inputs regarded as indispensable for dairy development processes grow within the system itself. Smallholder dairy farmers, especially owing to the natural resource base they have access to, have bright prospects for economic development.

The main problem the region's dairy sector faces is the low productivity of dairy herd and production systems. Both the large populations of dairy animals and the rich natural repositories of quality fodder remain under-exploited by the dairy sector. Institutional interventions should focus on three aspects of dairy production: crossbreeding, health care, and fodder production. Smallholders are not participating in the process, and therefore institutional strategies have had little impact on the transformation of dairy production systems. The only significant impact has been on the marketing sector.

Dairy development that focuses on the natural and livestock resource base will be the most appropriate strategy for the smallholder-based community of the region. Inadequate supply of feed to dairy animals is one of the major constraints to dairy production in the region. Milk yields of both cows and buffaloes could be increased by feeding them adequate amounts of green fodder obtainable from CPRs, especially the forests.

Livestock resource base

Cows and buffaloes are the only two recognised dairy species in Uttaranchal. However, smallholders and pastoralists in the high mountain areas own a large number of goats and sheep that are seldom used for dairy production. Some selective breeds of these that could be used primarily for dairy purposes need to be identified.

Unlike in some other Himalayan areas, yaks are not utilised in Uttaranchal. This multipurpose animal is highly suitable for high Himalayan areas. Moreover, yak is a regular breeder, may live up to 40 years, and may give birth to 20 or even more offspring (Negi 1990). Prospects for exploiting yak for dairy and other purposes in the high Himalayan areas of Uttaranchal need to be explored.

Natural resource management

The hills and mountains of Uttaranchal have large areas of under or uncultivated land covered with forests, grasslands, scrub (poor forest cover), and perpetual snows. A large area under forests and grasslands comprises CPRs. This natural resource base endowed with a diversity of fodder-yielding plants is the best bet for dairy development in the region. Natural resource management, in fact, is the most important issue relating to dairy development in Uttaranchal. An efficient natural resource management system could increase milk production an estimated two-and-a-half times.

Technological options

Maintaining diversified crop production with an emphasis on minor crops, cereal-leguminous mixed cropping, cultivation of forage crops, annual-perennial links, high grain vis-à-vis stalk crop cultivation, and variability in crop maturity (Jodha and Shrestha 1990) would be more promising for smallholder dairy production systems in the hills.

Agroforestry systems are not only environmentally friendly but also contribute to the fodder supplies necessary for sustained dairy production. Some more suitable indigenous trees and shrubs that yield fodder of high nutritive value and digestibility also need to be identified and incorporated into the agroforestry systems.

Seasonality of fodder supplies coupled with an acute shortage of fodder and low rates of concentrate feeding severely constrain smallholder dairy production systems. We must formulate balanced systems incorporating local feed resources and assess them on farm. Long-term testing of the impact and feasibility of these feed technologies on smallholders' farms is also necessary.

Applying breeding techniques aimed at reducing first-calving age, increasing lactation length and productivity, and decreasing the dry period (and taking advantage of modern veterinary advances to control prevalent problems like parasite infestation, infertility, etc.) are yet another relevant area for intervention.

Reviving and strengthening cost-effective and well-proven ethno-veterinary practices as part of animal health management will be a novel approach for an inaccessible and poverty-

ridden region that is rich in indigenous knowledge like Uttaranchal. This exciting possibility should be researched in the context of modern medicine.

Institutional intervention

Present institutional policies and programmes are not aimed at conservation or management of natural indigenous livestock resource bases. Market-oriented production is necessary to ensure income opportunities for smallholder dairy farmers. However, any market-oriented dairy system should focus on conservation of the resource base for its sustainability. Protection of communities' ownership of CPRs and people's participation in the management (conservation and utilisation) are important factors influencing the sustainability of dairy production systems.

Dealing with specific local breeds, especially of cattle, might help in advocating an appropriate, participatory, and mountain-perspective-based breeding policy ensuring conservation of local breeds of unique and superb traits. Implementation of such a breeding policy could be instrumental in improving dairy systems in the region.

Integrated management of animal health involving both traditional and modern systems of treatment that provides adequate health coverage to all animals, addressing particularly the inherent problem of inaccessibility of mountain areas, would be a cost-effective and accessible system for smallholder dairy farmers.

The cooperative system of milk marketing based on the Anand Pattern is an appropriate one for market-oriented dairy farming in mountain areas. Efforts should be made to link even remote villages with the Milk Union.

Quality assurance of dairy products in the informal market and the rules and regulations to be imposed on milk suppliers are issues of great public interest. Continuous exposure of small dairy farmers to dairy-related education and training, provision of credit, a dynamic and efficient marketing system, remunerative prices for production, together with awareness about health and hygiene among consumers, can create a dairy revolution in the mountain region.

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