

# Cattle Breeds and Demand for Milk in Kathmandu Valley

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Kathmandu valley, which has an area of 218 square mile, is the most representative urban center in Nepal. The most important towns in Kathmandu valley are Kathmandu, Patan and Bhadgaun.

According to the latest census<sup>1)</sup>, Nepal possesses a total area of 54,717 square mile and a population of 11.6 million. Out of the total population of Nepal, 5 per cent live in Kathmandu valley. This shows a density as high as 2,000 persons per square mile. Especially the urban density of the city of Kathmandu has yearly increased and is now over 50,000 persons per square mile. Because of the increase in population density and the number of tourists in Kathmandu, the demand for milk is yearly increasing.

In the present report, the authors described the results obtained from investigation about cattle breeds and demand for milk in Kathmandu valley.

This investigation is a part of the authors' investigation in Nepal which was carried out in both 1978<sup>2)</sup> and 1979.

## Investigation

### 1. Cows and buffaloes in Kathmandu valley.

Nepal is one of the countries in the world, where buffaloes and cows are domesticated in large number. In Kathmandu valley, very limited number of breeds of cows and buffaloes was observed. The most dominant species are Jersey, Local Siri and Swamp buffalo.

Jersey is the synthetic English breed. It is cross of several breeds. It varies in color from light red to black and from white-spotted to solid in marking. Generally, Jersey cow has a very docile disposition and responds readily to good treatment. For this reason she is highly prized as a family cow.

Local Siri cow, of which origin is supposed to be Bhutan, is mostly distributed in hilly regions of Nepal. Its color is black and white or reddish white. It has massive rigid body, small head, square cut and thick coat to be able to survive in cold climate. Horns are sharp, ears are relatively small, and the hump covered with tuft of hair at the top. The legs and tail are short. The comparative study of Jersey cows, Local Siri cows and their cross was shown in Table 1<sup>3)</sup>.

Table 1. Comparison of lactation between Jersey cow and Local Siri cow.

Breed	No. of calving	Average total milk yield (liters)	Lactation (days)	Lactation stops (days)	Milk per day (liters)	Age of 1st calving	Average fat in milk (%)
Jersey	17	1763	420	74	4.3	2yrs-21days	4.6
Local Siri cow	25	510	277	133	1.8	3yrs	5.1
Jersey-50% Local Siri cow-50%	14	1127	296	94	3.8	2yrs-7mos-25days	4.8
Jersey-75% Local Siri cow-25%	4	1659	421	132	4.0	2yrs-11mos-15days	4.8

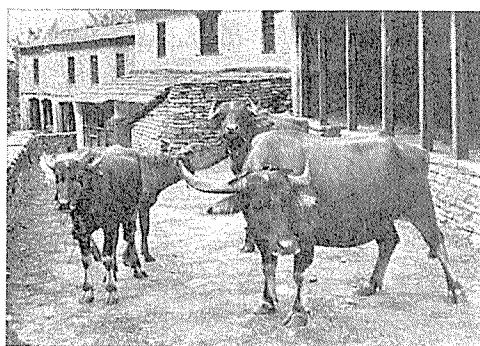


Fig. 1. Swamp type buffalo.

Domestic buffaloes of Nepal are of Swamp type. Swamp buffaloes are heavy-bodied and stocky built, the body is short, and belly is large. The forehead is flat, the eyes prominent, the face short and the muzzle wide. The neck is comparatively long, withers and croup are prominent (Fig. 1).

Estimation of the number of domestic buffaloes in Nepal varies widely. The FAO figures for 1978 were 386,000 for buffaloes, and 655,000 for cows<sup>4)</sup>.

The buffalo population seems to be increasing gradually. Table 2 shows the domestic buffalo population of the world, numbering over 130 million. As can be seen from Table 2, Nepal comes sixth in the world with more than 3.8 million.

The number of buffalo in Kathmandu valley is estimated to be about one million. It goes without saying the buffalo breeding in Nepal is very important for the national upgrading policy. To cope with this policy, the government livestock stations in the Tarai and in Kathmandu valley have been used as focal points for breeding units.

Buffaloes provide milk, meat and agricultural power in Nepal. Buffaloes produce about twice as much milk as cows in Nepal. Native Nepalese buffaloes yield per head around 500 kg of milk in a lactation period of eight to ten months.

As in dairy cows, the most variable constituent of buffalo milk is its butter fat content which depends on a number of factors such as breed, individuality of animals, plane of nutrition, weather and season, stage of lactation and age etc. Table 3 shows the average value and range of variation in the butter fat content of buffalo milk. The average butter fat in buffalo milk ranges between 7 and 9 percent.

## 2. Collection and processing of milk.

Milk collection has always been subjected to change but this development has been one of the most fundamental in the history of the dairy industry. It has had a significant effect on the size of farms as well as haulage units. It has also changed the method of collection and handling.

In Kathmandu valley, relatively small amount of milk is collected to milk centers of the Dairy Development Cooperation (D. D. C.) located in various places along

Table 2. World distribution of buffaloes.

	(Thousand head)
ASIA	
Burma	1883
China	30110
India	60767
Indonesia	2823
Lao	1072
Malaysia	285
Nepal	3860
Philippines	5050
Sri Lanka	736
Thailand	5784
Viet Nam	2330
Others	2238
OCEANIA	
Australia	200
EUROPE	
Burgaria	68
Italy	81
Romania	206
Others	78
NEAR EAST	
Egypt	2280
Iran	130
Iraq	332
Pakistan	10563
Turkey	1022
U. S. S. R.	427
SOUTH AMERICA	166
CARIBBEAN	7
WORLD TOTAL	132498

Table 3. Fat content of buffalo milk.

Type, Breed	Country	Fat content (%)	Source
River type	India	7.9	Juma and Alsfar (1970) <sup>5)</sup>
	Brazil	7.6	Barbosa do Nascimento et al. (1970) <sup>6)</sup>
	U. S. S. R.	8.1	Agabeile et al. (1971) <sup>7)</sup>
Swamp type	Thailand	9.19	Buranamanas (1963) <sup>8)</sup>
	Philippines	10.2	Rigor (1959) <sup>9)</sup>
	Nepal	7.8	The authors (1979)*

\*The same volume of 70% ethyl alcohol was added to milk sample immediately after the milk was collected. Fat content in the milk sample was estimated after one week when the authors took the sample back to Japan.

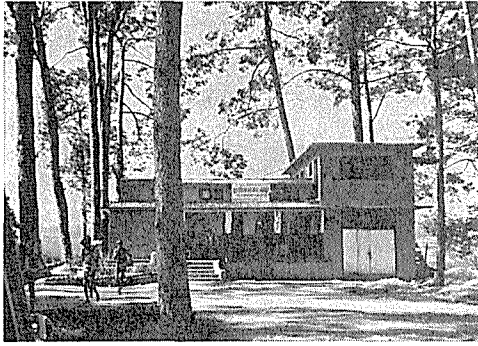


Fig. 2. Milk collection center in Bhadgaun.

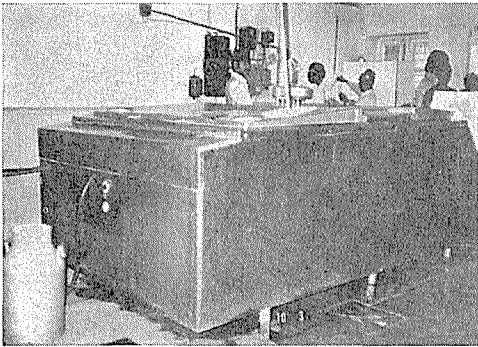


Fig. 3. Refrigerated bulk storage tank in a milk collection center.

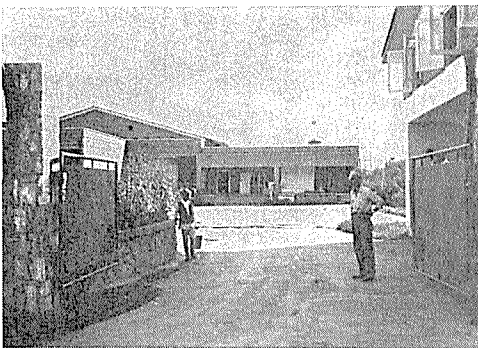


Fig. 4. Milk plant of Dairy Development Cooperation in Kathmandu.

moterable roads (Fig. 2). On the other hand, greatly larger amount of milk is sold directly to consumers including hotels and restaurants or to retail milk shops in the towns of Kathmandu valley as explain later.

Generally speaking, cattle-keeping in Nepal is undesiable from a higenic point of view, but so is the widespread practice of keeping cattle very close to human dwellings in every town or vil-lage. A hygienic problem exist in the bacteriological quality of produced milk during transportation to the receiving milk centers. However, sufficient care is taken to keep the milk sanitary con-dition after milk is collected to milk centers.

Mechanically refrigerated bulk sto-rage tanks have gained in popularity and used in recent years. Properly desi-gned tanks cool the milk collected rap-idly to 7 C or lower, and automatically maintained this temperature during the stored period (Fig. 3). The refrigerated and stored milk is transported with a tank lorry to a milk plant which is in Balaju, the suburbs of Kathmandu (Fig. 4). This plant is founded by D. D. C. in 1968. To this plant are daily colle-cted 12,000 liters of milk. The milk collected is weighted. Here the cans are washed and prepared for return to the farmers. The milk is then pumped into five storage tanks (5,000 liters each) from which it passes through filters before it is defatted to 2.6 percent and pasteurized. Pasteurization of milk is accomplished by means of tubular hea-

ters with steam as a heating medium in pasteurizing tanks (Alfa Laval), provided with a recording thermometer. After heating at 75 C for 15 minutes, the milk is cooled promptly over surface coolers. From the coolers the milk passes directly to bottle fillers. Here the milk is delivered into 500 ml bottles which are capped by machinery or into 500 ml vinyl bags (Fig. 5). From the bottles the milk passes to a refrigerator which it is stored until delivered.

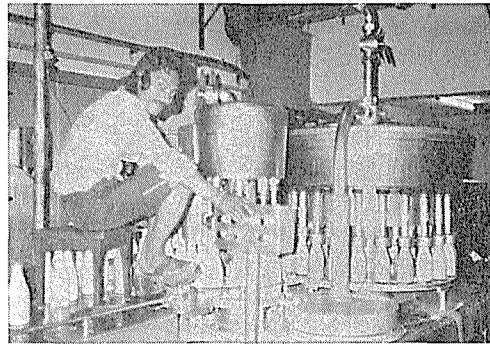


Fig. 5. Milk is delivered into 500ml bottles.

The presence of coliform bacteria in pasteurized milk is daily checked as a matter of routine.

### 3. Marketing of milk.

As described above, there exist two supply sources of milk in Kathmandu valley, namely D.D.C. and milkmen<sup>10)</sup>. Table 4 shows their sharer in the institutional

Table 4. Share of institutional market commanded by the various suppliers.

	(liters)				
	Milkman	%	DDC*	%	Total
Hotels	6000	4.8	3550	25.9	10150
Restaurants	41667	33.7	1203	8.8	42670
Restaurants & Bars	1800	1.5	—	0	1800
Milk & Tea Stalls	58879	47.6	8911	65.3	67790
Sweet Houses	15360	12.4	—	0	15360
	123706	100.0	13664	100.0	137770

\*DDC : The Dairy Development Cooperation (on a per month basis)

market in Kathmandu valley. It is clear from Table 4 that about 90 percent of milk consumed through the institutions has been supplied by milkmen and about 10 percent is supplied by D.D.C. At present, the demand for milk in Kathmandu valley is increasing because of the increase in population, increase in the number of tourists, income increase, and spread of health and nutritional education. In addition, Kathmandu valley contains three of the major cities of Nepal and certainly the biggest simple market within the country. Numbers of hotels, restaurants, milk and tea stalls, and sweet houses in Kathmandu valley are shown in Table 5.

Table 6 shows the average quantity of milk transacted by the various types of

Table 5. Number of institutions in Kathmandu valley.

	Kathmandu	Lalitpur	Bhaktapur	Total number
Hotels	27	—	—	27
Restaurants	97	—	4	101
Restaurants & Bars	10	—	—	10
Sweet Houses	30	10	3	43
Milk & Tea Stalls	110	30	45	145
	274	40	52	326

Table 6. Monthly quantity of milk transacted and the corresponding percentage of consumers.

	Quantity (liters)	Percentage of consumers
Hotels	10150	5.7
Restaurants	42870	37.3
Restaurants & Bars	1800	1.2
Milk & Tea Stalls	67790	44.1
Sweet Houses	15360	11.7
	137970	100.0

institutions on a monthly basis<sup>10)</sup>. From this Table it is noted that larger amount of milk is consumed through milk and tea stalls, and restaurants.

#### 4. The Dairy Development Cooperation and its mission to prosperity of dairy industry in Nepal.

In Nepal the dairy industry ranks high in importance. The economic value of the dairy industry reaches beyond the wealth produced from milk and milk products. Experience has shown that the maturity obtained by keeping a dairy herd is a practical method to maintain soil fertility.

The Dairy Development Section of the Department of Agricultural Research and Education which was established in 1967 has contributed not only for milk marketing but also for this purpose.

Milk marketing by D. D. C. is represented by the diagram shown at the top of the following page<sup>10)</sup> (Fig. 6. ).

At present, there are 36 milk collection centers in Kathmandu valley. Milk collected is bought by the collection units on the basis of fat unit present in milk (Fig. 7). Currently, one liter of milk containing 5 percent of fat costs Rs 1.85 (¥ 35).

The number of cattle, buffaloes, sheep, goats and pigs in Nepal greatly exceeds the number of these animals in Japan. In spite of such superiority in the number

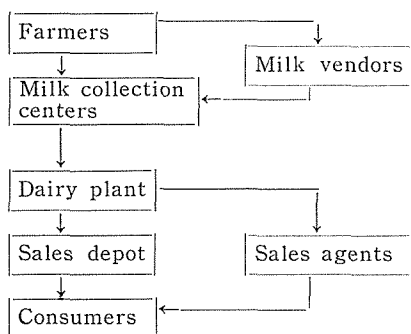


Fig. 6 Milk marketing system by D.D.C.

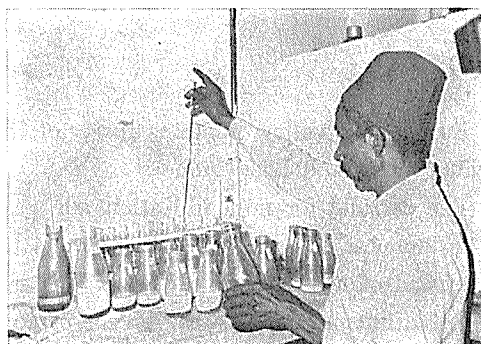


Fig. 7. Fat estimation at a milk collection center.

of these domestic animals in Nepal to those in Japan, the amounts of both milk and meat are extremely lower in Nepal<sup>2)</sup>. FAO, particularly through its Dairy Branch, is undertaking broad new programs based on the premise that more cheese and fermented milk are needed in developing countries, as are fresh milk and milk powder. In this respect, the contribution of D.D.C. for the development of dairy industry in Nepal is particularly important and D.D.C. is the support and driving force of dairy industry in the future Nepal.

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### Summary

Kathmandu valley contains three of the major cities of Nepal, that is, Kathmandu, Patan and Bhadgaun.

The demand for milk in Kathmandu valley has recently been increasing because of the increase in population, increase in the number of tourists, income increases, and spread of health and nutritional education.

In Kathmandu valley, the breeds of cows and buffaloes are very limited. Jersey, Local Siri and Swamp buffalo are most dominant species, and the number of Swamp buffalo is increasing due to her superiority in milk production. Milk produced is collected and distributed directly to consumers by milkmen or to a milk plant in Kathmandu city which is conducted by the Dairy Development Cooperation (D. D. C.). At present, the amount of milk dealt by milkmen is overwhelmingly large.

The development of dairy industry in Nepal has ranked high in importance. In this respect, D. D. C. is the support and driving force of dairy industry in the future Nepal.

### Literatures

- 1) Shaha, R. "An introduction to Nepal" : Ratna Postak Bhandar, 1-19 pp. (1975).
- 2) Tokita, F. and Hosono, A. J. Fac. Agric. Shinshu Univ., **16** : 29-41 (1979).
- 3) Sakya, S. R. and Thapa, V. K. "An introduction to Biology of Nepal" : Curriculum Development Centre, Tribhuvan Univ., 137p. (1977).
- 4) Mahadevan, P. World Animal Rev., **25** : 2-12 (1978).
- 5) Juma, K. H. and Alsafar, T. Trop. Agric., **47** : 171-173 (1970).
- 6) Barbosa do Nascimento, C. N., Guimardes, J.M.A.B. and Gondim, A. G. Estudos Bubalinos, Belem, **1** : 36 (1970).
- 7) Agabeile, A. A., Guseinov, I. A. and Serdyuk, V. S. Zhvotnovodstvo, Mosk., **33** : 61-63 (1971).
- 8) Buranamanas, P. "A survey of buffalo in Thailand" : Fac. Vet. Sci., Kasetsart Univ., 35p. (1963).
- 9) Rigor, T. V., Silverio, V. G. and Leon, B. S. Philipp. J. Anim. Ind., **20** : 15-18 (1959).
- 10) Singh, G. M. "Some Aspects of Milk Marketing in The Kathmandu Valley" : Ministry of Food, Agriculture and Irrigation (H.M.G. of Nepal). 1-16pp. (1976).



## カトマンズ盆地における乳牛の種類と牛乳の需要

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### 要 約

ネパール全人口の5%が住むカトマンズ盆地はカトマンズ・パタン・バドガオンの古都を擁するこの国最大の都市圏である。近年、人口の増加に加え、観光客の激増、国民所得とミルク栄養に関する知識の向上によって、牛乳の需要は年毎に高まっている。

この地域で飼育されている乳牛は Jersey, Local Siri および Buffalo の3種に主に限られ、泌乳量の多い Buffalo がその飼育頭数を増す傾向にある。生産された牛乳の販売には生産者から直接消費者へ販売される方法と官営の Dairy Development Cooperation (D. D. C.) が買取り、加工して市販する方法とがあるが、現状では前者による流通量が圧倒的に多い。しかし、ネパールにおける酪農ならびに乳業の今後の振興に対し D. D. C. の果す役割が大きいことは言うまでもない。