

Dairy husbandry: the contribution of different species to the earnings of small farmers

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[Received on: Feb 23, 2003; Accepted on: Mar 3, 2023]

Abstract

Dairy husbandry has excellent potential for ensuring food security for small farmers in India. However, this sector has been facing various challenges, such as a poor genetic base, a scarcity of feed resources and inadequate health care services. Genetic breeding to produce a higher milk yield plays a very significant role in increasing the profitability of dairy animals. Indian farmers presently have options to maintain different types of milking animals, such as nondescript cows with a very low milk yield of 1–2 kg milk per day, cows of recognized indigenous breeds, with the average daily milk yield ranging between 2 and 6 kg/day, crossbred cows with 6–8 kg/day, or buffaloes of nondescript or recognized breeds, with an average milk yield of 3–6 kg/day. Although the average milk yield is a reliable parameter for the selection of dairy animals, farmers are either compelled by their ability to invest in high-milking animals or influenced by the information available to these types of animals about their ability to adapt to local climatic conditions, their ability to tolerate heat stress and diseases, and the quality of milk before making their choice. However, in the absence of valid facts, many farmers end up making the wrong choice of animals and fail to optimize their income. This paper reviews the merits of different types of milking animals to enable them to make the proper choice.

Key words: Buffalo verses cow, Comparative benefits, Comparative milk yields, Crossbred cows, Quality of milk.

Dairy husbandry: supplementary income for small farmers

Dairy husbandry has been an important source of income for most of the small farmers in India. Traditionally, small farmers have been maintaining cattle more to support agriculture through manure, bullock power and milk for home consumption, while buffaloes are

maintained by wealthy farmers in fertile agricultural areas. In the absence of good infrastructure for breeding, health care, milk processing and marketing services, it has been difficult to increase milk production in spite of the growing demand. Hence, these livestock have been in a state of neglect, resulting in severe genetic erosion of precious Indian cattle breeds across the country.

In 1951, India had 155.3 million cattle, including 54.4 million adult females, which yielded 7.3 MT of milk and 43.4 million buffaloes, including 21 million adult females, which yielded 9.7 MT of milk. Over 80 per cent cattle were nondescript, with an average yield of 150 litres of milk per annum. The annual growth in the dairy sector was less than 1 per cent. For the increasing number of small landholders, crop production alone was not adequate to earn their livelihood and maintaining bullocks for tilling was uneconomical. Hence, the strategy was to promote dairy husbandry for supplementary income. During the 1960s, to improve the progeny of these nondescript cattle, cross-breeding with international dairy breeds was considered a better option, as upgrading with native breeds would have taken several generations to enhance milk production. This programme of cross-breeding nondescript cattle gave a boost to the dairy husbandry programme. Simultaneously, conservation of native breeds was also given due importance. In 40 years, i.e., from 1960 to 2009-10, dairy husbandry in India was a significant success story, with annual milk production increasing by 6.85 times to attain 116.425 MT and benefiting over 105 million rural households.

Baseless narratives on cattle breeds

The programme of upgrading the progeny of nondescript cattle through cross-breeding enabled poor farmers to produce superior progeny without heavy investment and earn their livelihood with only 2–3 cows. During the period 2005–2016, the dairy husbandry sector registered a growth rate of 63 per cent. However, in 2012, the dairy sector in India was hit by a rumour that A1-type milk produced by exotic

breeds of cattle and crossbreds with exotic blood can cause several deadly diseases like diabetes type 1, coronary heart disease, autism, schizophrenia, and sudden infant death syndrome (SIDS). This report was merely based on some international reports published in the 1990s and the book ‘Devil in the Milk’, published in New Zealand in 2007, although the European Food Safety Authority (EFSA) in 2009 rejected these claims due to a lack of evidence and stated that both A1 and A2 types of milk were equally safe. This baseless adverse report on A1-type milk gave a boost to certain lobbyists who had been advocating a ban on the use of exotic breeds in India. These groups simultaneously sent various narratives about the nutraceutical and medicinal value of milk, ghee, urine and dung from different native cattle breeds. This created major confusion among cattle owners across the country and many farmers were directionless about the economics of different dairy animals (Hegde, 2019). To make matters worse, neither the government agencies nor the scientific institutions in the country made any attempt to enlighten the public about reality and the need to ignore these unscientific facts. However, a declaration made by the Department of Animal Husbandry, Government of India, in 2021 that ‘the adverse reports circulated earlier against A1 type milk were baseless and both A1 and A2 types of milk were safe’ provided some comfort to dairy farmers as well as to milk consumers. However, issues such as the advantages of Indian native breeds versus crossbred cows, comparative economics and the quality of milk from different breeds and species still remain unclear among most of the farmers, while government agencies continue to encourage the farmers to maintain native breeds of cattle.

Suitability of different species and breeds of livestock for milk production

Presently, dairy farmers have to take several factors into consideration while selecting dairy animals from different breeds of cattle and buffalo. The options available for them are either cows or buffaloes and among cows, there are different breeds of native cattle or crossbreds of different exotic breeds with different blood levels. Among buffalo breeds, there are several good breeds that originated in different regions. For small farmers, although the primary consideration for maintaining an animal is higher income, other factors such as adaptability to the local ecosystem and feed resources, tolerance to diseases, demand for milk and ease in trading and disposal of unproductive animals will also influence the choice of animals for milk production.

Economics of Different Bovine Breeds:

Table 1 presents the average daily milk yield of different livestock species. During the year 2020–21, the average daily milk yield has been highest in exotic cows [9.15 kg], followed by crossbred cows [7.22 kg], indigenous breeds of buffaloes [6.41 kg] and nondescript buffaloes [4.13 kg], while the nondescript cattle yielded the lowest quantity of milk [2.71 kg]. During the year 2020–21, buffaloes contributed 45 percent of the total milk as against 49 percent in 2015–16, whereas crossbred cows contributed 28 percent to the total milk production. This confirms that the rate of increase in species-wise milk production has been highest in crossbred cows during the last five years, while the contribution of milk from native cattle has been stable at 20 percent (GOI, 2022).

Table 1. Species-wise average daily milk yield for different species of livestock in India

Sr. No.	Species	% of Total Milk Production 2015-16	Yield Kg/day	
			2015-16	2020-21
1	Buffalo indigenous	35	5.76	6.41
2	Buffalo non-descript	14	3.80	4.13
3	Cow indigenous	11	3.41	3.34
4	Cow non-descript	9	2.16	2.71
5	Cow cross-bred	26	7.33	7.22
6	Cow exotic	1	11.21	9.15
7	Goat	3	0.45	0.47

Source: Government of India (2017, 2022)

It has also been reported that the lactation yield of Indian breeds of cows has increased from 913 kg/lactation in 2013-14 to 993 kg in 2020-21, whereas the yield of buffaloes during the same period has increased from 1792 kg to 2061 kg (GOI, 2022). This data indicates that the productivity improvement

has been higher in buffaloes than in indigenous breeds of cattle, while the productivity of crossbred cows has been stable at 2165 kg/lactation. It can also be observed that the average milk yield of buffalo has reached very close to the

average yield of crossbred cows, with the potential to compete with each other.

The economics of different types of crossbred cows and buffaloes have been studied in different regions of the country. In a study conducted by BAIF, the net income from crossbred cows per annum was Rs. 25039, while the net returns from Gir and nondescript cows were Rs. 15115 and Rs. 6335 per year, respectively [personal communication]. In Rajasthan, the net returns from Holstein Friesian crossbred cows were highest at Rs. 56116 per year as compared to Rs. 30101 from Jersey cross, Rs. 13550 from buffalo and Rs. 5098

from local cows, as presented in Table 2. In Western Maharashtra, the net average income from crossbred cows was Rs. 37,767 as compared to Rs. 20,029 per year from Pandharapuri buffalo [Hile *et al.* 2018]. Hence, crossbred cows had higher economic benefits than cows of native breeds and buffaloes. Among the buffaloes, Murrah has been the most popular breed, widely accepted for upgrading the nondescript buffaloes and even for crossing with other local breeds. Jaffrabadi and Surti breeds of buffalo were also popular in Western India because of their high butterfat content in milk and lower feed requirements, respectively.

Table 2. Comparative performance of cows and buffaloes in Rajasthan

Bovine Category	Net Returns Rs./ Year/Head	Cost of Milk Production Rs./Lit	Return Rs./Lit
Local cow	5098	20.40	2.26
H. F. Cross	56116	11.86	10.55
Jersey Cross	30101	14.86	7.57
Buffalo	13550	21.19	4.40

Source: Kumawat *et al.* 2016

Among crossbred cows, HF crosses have been yielding more than the crossbreds of Jersey and other exotic breeds. Among the crossbreds, daughters born to indigenous dams with a genetic background of milch and dual-purpose breeds have been performing better than those born to nondescript or draught breeds. Among the milch breeds of cattle, Sahiwal and Gir were more popular, mostly because of their higher milk yields. As the population of these breeds is larger than that of many other breeds (Table 3), animals of these breeds can be easily procured in the market. The population of the other two milk

breeds, namely Tharparkar and Red Sindhi, is very small and hence, it is difficult to procure good animals from the market except in their home tracts. There are five dual-purpose breeds that yield in the range of 1000 and 1500 kg/lactation and these breeds are popular mostly in their home tracts. The economics of dual-purpose and draught breeds are not clear because of lower milk yields and a heavy reduction in the usage of bullocks for tillage purposes, which has come down from over 55 percent to less than 8 per cent farmers over the last 30 years. Hence, farmers wanting to own native breeds of cattle are ignorant as to

how to select suitable cattle for enhancing their income. Presently, the farmers wanting to maintain cows of indigenous breeds have been procuring cows of popular milk breeds such as Gir and Sahiwal at a very high cost and have not been able to obtain the expected results. Farmers maintaining dual-purpose or low-yielding draught breeds are being advised

to conserve them as pure breeds, which certainly is not a viable income-generating activity in the present context. The Government of India has also not issued any guidelines about the economic management of draught breeds of cattle and it is not fair to expect innocent farmers to take on the burden of conserving them.

Table 3. Population of cattle of indigenous milch and dual-purpose breeds

Sl. No.	Breed Name	Pure [lakh]	Graded [lakh]	Total [lakh]	% of Total Descript breeds
Milch Breeds [Milk Yield above 1500 kg]					
1	Gir	13.802	37.328	51.130	3.38
2	Sahiwal	10.195	37.900	45.623	3.23
3	Tharparkar	1.973	5.352	7.325	0.48
4	Red Sindhi	0.596	4.977	5.574	0.37
Dual Purpose [Milk yield 1000 -1500 kg]					
1	Kankrej	19.451	10.832	30.383	2.00
2	Haryana	16.392	46.408	62.800	4.15
3	Rathi	8.659	3.716	12.375	0.82
4	Ongole	1.159	5.186	6.345	0.42
5	Dangi	1.194	0.744	1.938	0.13
Indigenous Breed Cattle		178.490	200.703	379.192	25.06
Non-Descript				1132.531	74.92
Total Indigenous Cattle		178.490	207.703	1511.723	100

Source: GOI (2013)

In the last five years, many farmers have shifted from cross-bred cows to native breeds of cattle, mainly because of the publicity surrounding the utility of their milk and urine for medicinal uses and their superior quality. Although scientific studies have reported that the chemical composition of milk, particularly the phytochemicals present in milk and urine,

is completely dependent on the feed they consume, irrespective of the breed, certain groups are making tall claims about their medicinal value without any valid proof. With regard to the nutritional value of milk, cow's milk was considered superior to buffalo's milk because of its high butterfat content, which is heavy for digestion, as presented in Table 4. However, buffalo

milk, with its high protein and calcium content and low cholesterol, can be healthier than cow milk if 3–4 per cent fat is removed by using a cream separator without affecting the other qualities. Another advantage for buffalo owners is the easy disposal of uneconomical animals. Farmers in many regions have already been facing the problem of selling their cattle

which has forced them to shift from cows to buffaloes for milk production. With higher price realization for buffalo milk and increasing milk yield, farmers are seeing brighter prospects in buffalo husbandry over cattle, although crossbred cows with higher milk production and a lower cost of production are more economical in most parts of the country.

Table 4. Comparative nutritive value of milk

Traits	Cow	Buffalo	Goat
Total solids, %	13.10	16.30	12.48
Fat, %	4.30	7.90	3.8
Protein, %	3.60	4.20	2.9
Lactose, %	4.80	5.00	4.08
Tocopherol, mg/g	0.31	0.33	
Cholesterol, mg/g	14.00	8.00	11.00
Calcium, mg/100 g	165	264	134
Phosphorus, mg/100 g	213	268	
Magnesium, mg/100 g	23.0	30.0	
Potassium, mg/100 mg	185.0	107.0	204
Sodium, mg/100 g	73	65	50
Vitamin A (+ Carotene) IU/gm fat	30.30	33.00	39.0
Vitamin C, mg/100 g	1.90	6.70	2.0

Source: Dhanda (2006)

Goat milk is another source of milk, contributing 3 percent to the annual milk production in the country. While the national average yield of goats is 0.47 kg per day, the Surti breed has the highest average yield of 2.5 kg per day, followed by Zalawadi (2.02 kg per day), Kutchi (1.84 kg per day), and Gohilwadi (1.71 kg per day). However, dual-purpose breeds like Jamnapari, Beetal, Sangamneri and Sirohi are also popular among goat keepers. Although adequate data on dairy goat

husbandry is not available, preference may be given to goats with a higher milk yield to generate additional income from milk along with meat production.

Policy support required to improve the income of dairy farmers

As dairy farmers are ignorant about many technical aspects of managing different species of dairy animals, scientists and the government have to provide correct technical information and suitable policy

support. Following are the important issues that need to be addressed to strengthen the dairy husbandry sector in the country:

- **Suitable Breeding Policy and Advocacy:** While giving priority to the conservation of Indian breeds for improving the progeny of nondescript cattle, farmers may be given the choice to adopt cross-breeding or upgrading with native breeds by explaining the economics of these cows. Ideally, crossbreeding for the first progeny and backcrossing the crossbred cows with any elite Indian dairy breed can produce

superior cows with high milk yield and good Indian stress tolerance qualities, like Gir cows in Brazil. The policy regarding conservation of draught breeds and permitting low-yielding cows to be bred with any elite Indian or exotic breed may also be explored. A user-friendly knowledge portal may be established to provide authentic information on good husbandry services and the performance of different breeds of livestock and the medicinal value of milk, ghee, urine, etc. with valid proof.

Table 5. Average milk yield of different breeds of goats

Breed	Habitat	Body Wt. (Kg)		Milk
		Male	Fem.	Kg/day
Dual-purpose breeds (milk and meat)				
Barbari	Agra, Mathura, Etah in U.P.	37.9	22.6	0.71
Beetal	Gurdaspur, Amritsar in Punjab	59.1	35.0	0.95
Gohilwadi	Bhavnagar, Amreli in Gujarat	37.1	36.0	1.71
Jakhrana	Alwar in Rajasthan	57.8	44.5	0.99
Jamunapari	Etawah in U.P.	44.7	38.0	1.06
Kutchi	Kutch district in Gujarat	43.5	39.3	1.84
Malabari	Kozhikode and Kannur in Kerala	39.0	31.1	0.31
Marwari	Western Rajasthan	33.2	25.9	0.53
Mehsana	Mehsana, Banaskantha in Gujarat	37.1	32.4	1.32
Sirohi	Sirohi and Ajmer in Rajasthan	50.4	22.6	0.41
Surti	Surat and Vadodara in Gujarat	29.5	32.1	2.50
Zalawadi	Surendranagar, Rajkot in Gujarat	38.8	33.0	2.02
Sangamneri	Ahmednagar in Maharashtra	38.4	29.0	0.82
Berari	Vidarbha region in Maharashtra	36.0	33.0	1.00

Source: Hegde (2020)

- **Reproduction and Health Care Services:** As male cattle are not useful to small farmers, the modern technology of using sexed semen should be encouraged to produce only female calves. Several laboratories have

already started producing sexed semen in India, but farmers are reluctant to pay a higher price for the semen. Therefore, till the farmers are convinced to pay the real cost, the government may consider subsidization of the cost of sexed semen

and making it available to farmers at Rs. 200–250 per dose during the next 3-5 years.

- Infertile cows and buffaloes cause huge losses to farmers. However, most farmers neglect this aspect. Thus, programmes like infertility camps followed by oestrous synchronization campaigns at village and block levels may be promoted to bring all the cows into the breeding cycle. Cattle health and production are often neglected by farmers due to the non-availability of veterinary services at their doorsteps. Schemes for promoting self-employed para-vets should be launched with training and credit facilities for those who can work under the supervision of veterinarians from the government or local dairy. With modern tools and diagnostic kits, para-vets may be allowed to carry out diagnostic and minor vet-care services, as farmers have great difficulty availing themselves of the services of veterinarians.
- **Shifting Dairy Husbandry to a Priority Sector:** Dairy development should be considered a priority sector to obtain the required loan at a lower rate. Funds should be made available for the purchase of animals and equipment as well. Soft loans should also be made available to new entrepreneurs who are interested in developing start-ups in the livestock sector, such as those providing critical services for the processing and marketing of dairy products and livestock. To motivate small dairy farmers and transfer new technologies, suitable farmers' organizations should be formed as cooperatives or farmers' producer companies at the village or block level that can establish efficient value chains.

- **Promotion of *Goshalas*:** Block Level *Goshalas* should be promoted by engaging farmers' organizations and civil society organizations that are interested in producing organic manure and using cow urine and dung for plant protection to boost organic farming. Suitable breeding and management support may be provided to transform these units into income- and employment-generating units for the local population. These units can collect unwanted animals from farmers to reduce their burden. The *Goshalas* may be encouraged to produce superior-quality farmyard manure by using locally available biomass as bedding material in the cattle sheds and mixing it with dung slurry and suitable microbes to improve the manure quality while reducing the gestation period.

Conclusion

From the available data about the performance of different milking species and breeds and the preferences of small farmers, it can be concluded that crossbred cows have been very popular among small farmers because they were able to produce highly productive cows by breeding their uneconomic, nondescript cows without any capital investment. Crossbred cows have been widely adapted to diverse ecosystems and millions of small farmers and even landless families with 2-3 such high-yielding cows have been able to come out of poverty. However, in the recent past, there has been a gradual shift from cattle to buffalo husbandry because of significant improvements in milk yield, a higher price for milk and ease in disposing of uneconomical animals. Greater awareness about the nutritional benefits of buffalo

milk can further increase the popularity of buffaloes in the country.

In an effort to conserve native breeds of cattle, there has been an aggressive campaign urging farmers to maintain Indian native breeds by highlighting various benefits and special uses of milk and urine without scientific validation. In response to these recommendations, many farmers have started replacing crossbred cows and buffaloes with Indian breeds of cattle, which is bound to result in a significant reduction in income in due course. Therefore, it is necessary to develop a suitable policy to conserve precious native breeds involving government institutions instead of shifting the burden on farmers. There is also good scope to promote dairy goats under the goat development programme across the country.

As dairy husbandry has a proven track record, its potential can be fully harnessed by promoting farmer-friendly policies to ensure employment generation and food security for small farmers across the country, particularly in regions with a higher rate of poverty.

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