

An Initiative towards the Conservation and Development of Indian Cattle Breeds

Aruna Kumara V.K. and Anand A.S., *Krishbi Prayoga Parivara, "Srinivasa", Analekoppa Extension, Sagara – 577 401, Shimoga district, Karnataka*
Email: aruna_kpp@yahoo.com

Abstract

India has a rich biodiversity, which also includes the cattle population. Owing to the "White Revolution" and extensive crossbreeding programmes in India, the native cattle breed population has decreased and some breeds are facing extinction. At the same time, the values, knowledge, ethnoveterinary practices, healers and the local biodiversity associated with these breeds are not being given proper attention. The culture of dairying has become the dairy business.

Most farmers in the dairy business do not find it an economically viable proposition. The external dependency for food, concentrate, fodder and health protection is increasing. Farmers are in search of alternatives. Hence, Krishbi Prayoga Parivara (KPP) started looking at the importance of Indian cattle breeds and their relevance today.

KPP carried out a literature survey, visited villages, talked to experienced farmers, social workers and veterinarians. On the basis of this, KPP brought out a small publication on Indian cattle breeds, which inspired a number of farmers to start conserving and developing native cattle breeds. A mega project named "Kamadugha" has been initiated by Sri Sri Raghaveshwara Swamiji of Sri Ramachandrapura Mutt at Hosanagara of Shimoga district to conserve and develop Indian breeds.

This paper briefly introduces Indian cattle breeds, and discusses their importance, the cultural values associated with them, the Ayurvedic properties of various cow products and the importance of cow products in agriculture and for human health.

India is blessed with a rich biodiversity. There is also a diverse livestock population. There are 30 indigenous cattle breeds, 12 buffalo breeds, 20 breeds of goat, 40 breeds of sheep, 6 breeds of horse, 8 breeds of camel, 3 breeds of pig and 18 breeds of poultry. Quite a large number of farming families including marginal and small farmers and, landless labourers use livestock for varied purposes to sustain their livelihood.

Indian farmers keep cattle and other animals as a source of milk, manure and fuel and also for ploughing and carting. Apart from this, farmers respect the cow as Gomatha, and it has a rich cultural significance for them. Livestock has contributed significantly to the development of agriculture in India and is still contributing much to agriculture. However, because of the "Green Revolution" and "White Revolution" in India, the situation is changing significantly. Over the years, the population of indigenous cattle has declined (Table 1).

Table 1. Trends in cattle population in India

Category	Cattle population [millions]				Annual growth rate [%]		
	1987	1992	1997	2003*	1987–92	1992–97	1997–03
Indigenous	188.28	189.37	178.78	156.87	+1.06	-1.12	-2.04
Crossbred	11.59	15.21	20.10	22.07	6.25	6.43	1.63
Total	199.69	204.58	198.88	178.94	+0.49	-0.56	-1.68

* Provisional data

The overall annual growth rate in the cattle population from 1992–2003 was -1.14%. The annual growth rates for indigenous and crossbred cattle were -1.56 and +5.65, respectively. As per the provisional 17th Indian livestock census 2003, in 2003 there were only 156.85 million indigenous cattle as compared with 178.78 million and 189.37 million in 1997 and 1992, respectively. Conversely, the population of crossbred cattle has increased from 15.21 million in 1992 to 22.07 million in 2003 (Gandhi and Singh, 2006).

The situation in different states is similar to the overall status in the country. In Karnataka, there has been a marked reduction in the number of indigenous breeds. Some of the known Indian breeds are on the verge of extinction. The number of Krishna valley breed cattle has come down by 97.96% and that of the Deoni breed has come down by 72.22%. The number of Hallikar breed has come down by 39.97%, Kilari breed by 30.89% and Malenadu gidda breed by 24.96% (The Hindu, April 16, 2005). At the same time, the population of crossbreeds has increased by 41%. In the Shimoga district, in 2003, the population of indigenous cattle was 48,718 and that of crossbreeds was 56,588. In short, indigenous breeds comprise only 46.26% of the total cattle population. This situation is alarming. The diverse genetic base is becoming narrow, which is a threat to sustainable agriculture. If the population becomes uniform, its vulnerability to pests and disease will increase.

The village scenario

Krishi Prayoga Pariwara (KPP) is working in villages of the Shimoga, Chickmagalur and Uttara Kannada districts of Karnataka, especially in the Western Ghats. The example of the situation in Hulegaru village of Shimoga district is considered. Here, in April 2005, the population of crossbreeds was 46 and that of indigenous cattle was 100. The farmers feel that keeping crossbreeds is not a good proposition since there are many difficulties associated with them. The difficulties as expressed by farmers are

1. Crossbred animals are often prone to disease and pests. Hence, veterinary care becomes a priority and the cost associated with veterinary care for crossbreeds is relatively high compared with that for native breeds.
2. Crossbred animals require a higher quantity and quality of concentrate and fodder. Farmers have to grow fodder crops on their limited agricultural land, which involves no small investment in terms of fodder seeds, manure, labour etc. The

requirement of a higher quantity of concentrates also demands explicit expenditures. Thus, crossbreed animal rearing is capital intensive.

3. The risk of mortality is higher in crossbreeds compared with indigenous breeds. Hence, if a crossbred animal dies, farmers will incur a loss of around Rs.5000–1000, depending on the milk yield of the animal, which is very high compared with the risk involved in rearing indigenous breeds.
4. The average milk yield of crossbreeds is only around 5–6 l/day, which is an economically unviable quantity. At the same time, proven milch breeds of India also produce similar quantities of milk. Selected local animals of Malenadu gidda have a milk yield close to this figure.

Considering the above difficulties, the option of rearing crossbred animals is not an economically viable proposition.

Apart from the above disadvantages of crossbreeds, the introduction of these breeds has also brought about some changes in villages. The crossbreeding programme called for mass castration of native non-descriptive inefficient bulls. At the same time, farmers were also attracted by the insemination programme readily available on their doorstep. This has resulted in the loss of bulls of native breeds since rearing a bull is very costly. The changed pattern in the tenancy system and the cropping system has also resulted in farmers giving less importance to the rearing of bulls of native breeds. At present, the loss of selected bulls has meant that there is no option other than to go in for crossbreeding. Local cattle are more resistant to local pests, diseases and are adjusted to the local environment. Whenever these cattle are affected by disease or pests, local ethnoveterinary practitioners can manage them using the herbs that are grown locally in farms or are available in forests. Introduction of crossbreeds has lessened the importance of local healers. The knowledge of these healers is vanishing along with them. The knowledge of using locally available bioresources and its importance is also eroding significantly.

R. S. Gandhi and S. Singh (2006) noted in their article that crossbreeding in India has led to

1. A departure from the accepted breeding policy framework for indigenous breeds, resulting in the erosion of indigenous genetic resources as animals of native defined milch breeds were not used for crossbreeding.
2. Ingression of many infectious diseases like infectious bovine rhinotracheitis (IBR) and Bluetongue from temperate regions, which were not prevalent in tropical countries.
3. Cattle with a higher susceptibility to diseases prevalent in tropical environments like foot and mouth disease, mastitis and tick-borne diseases.
4. Higher incidence of reproductive disorders like anoestrous and repeat breeding in crossbred cattle.
5. Higher cost of maintenance and sustenance *vis a vis* feeding and veterinary services.

Thus, even though the introduction of the crossbreeding programme in India has resulted in increased milk production over the years, from 20 million tons in 1970 to 91.5 million tons in 2004, it has led to a number of drawbacks. The villagers are looking for better alternatives.

Hence, KPP started to look at the problem in detail. It carried out a detailed literature survey looking into the strengths and weaknesses of indigenous cattle breeds and crossbreeds, breeding policies over the years, the cultural significance of cattle to rural families and the use of animal products in agriculture and for maintaining human health. KPP had a series of interactions with farmers in its project area and with local successful dairy farmers, local veterinary healers, veterinary doctors, veterinary scientists, academicians, policy makers etc. The findings were presented in a small booklet called “*Namma Kamadhenu*”, which was distributed to various stakeholders.

Indian cattle breeds

There are around 30 descriptive or recognized cattle breeds in India according to the latest calendar of the Indian Council of Agricultural Research (ICAR) on “Cattle Breeds of India”, published by the National Bureau of Animal Genetic Resources (NBAGR). They are *Amritmahal, Hallikar, Deoni, Khilari, Krishna valley, Ongole, Punganur, Vechur, Baragur, Kangayam, Bachaur, Dangi, Kenkatha, Kherigar, Mahi, Nagori, Nimari, Ponwar, Siri, Gir, Red Sindhi, Sabival, Gaolao, Haryana, Kankerej, Mewati, Rath, Tharparkar* etc. Out of these, *Vechur, Punganur, Bachaur, Krishna valley* etc. are on the verge of extinction. These breeds were developed over millennia for varied purposes like milking and agricultural purposes, under varied agroclimatic conditions. These breeds are well adapted to local conditions, have good pest and disease resistance and are adjusted to local feed and fodder. Most of these breeds have also played a very important role in major battles during the struggle for independence.

Indian breeds are *Bos indicus* cattle and are characterized by a large hump over the top of the shoulder and neck. Spinal processes below the hump are extended, and there is considerable muscular tissue covering the processes. The other characteristics of these cattle are their horns, which usually curve upward and are sometimes tilted to the rear; their ears, which are generally large and pendulous and the throatlatch and dewlap, which have a large amount of excess skin. They also have more highly developed sweat glands than European cattle (*Bos taurus*) and so can perspire more freely. Indian cattle produce an oily secretion from their sebaceous glands, which has a distinctive odour and is reported to assist in repelling insects. The hair, coat, pigmentation, ability to sweat, loose skin and internal body heat are some of the unique characteristics of Indian cattle that help them to survive adverse climatic conditions.

Apart from the descriptive breeds, there are a number of non-descriptive breeds in India. It should be noted here that continuous efforts have been made over the years to develop these descriptive breeds. As an example, the *Amritmahal* breed of Karnataka is considered.

Amruthmahal

Amruthmahal is a special breed of Karnataka and has a history of over 500 years. The credit for developing this breed goes to the Ambassador of Vijayanagara Kingdom in Srirangapatna near Mysore in the 16th century. After him, Mysore Odeyar (King of Mysore) further developed this breed for milk and for the security of the state. His Excellency Chikdevaraj Odeyar developed special pasture lands for grazing the breed. It was then known as “*Bennechavadi*”. It was further developed during the Hyder Ali

and Tippu Sultan period. Tippu renamed the breed "*Amruthmahal*". After that, it came under British rule. Mummadi Krishnaraja Odeyar developed this breed once again in 1866. At present, the Karnataka Government has an Amruthmahal Conservation Centre at Ajjampura in Chickmagalur district.

The bullocks of this breed are very active with sharp eyes. The bullocks can pull carts continuously for 14 hours. Records say a bullock pair can pull a one-ton load continuously for 8 to 10 hours. The bullocks were involved in various armies of Hyder Ali, Tippu Sultan and Mysore Odeyar. These bullocks played a major role in the victories of these Kings. A number of British reports also highlight the importance of these bullocks in those days.

Now the population of this breed is very small. The Government has around 2000 animals of this breed and there are a few with farmers. Selected milk breeds of Amruthmahal yield 4–6 litres of milk per day. So, concentrated efforts should be made to conserve and develop this breed once again.

Vechur

Vechur is a native breed of Kerala. It originated in a village called *Vechur* in the Vaikom taluk of the Kottayam district of South Kerala. The heavy rainfall and the hot humid climate of the area led to the natural selection of a small animal. *Vechur* bulls with their small size and light weight but with their strong stature are suitable for ploughing marshy paddy fields. The popularity of the *Vechur* cows lay in the fact that their milk production was relatively high compared with that of other local cows. The Travancore State Manual of 1940 by T.K. Velu Pillai made a special mention of *Vechur* cows. The extremely small size of the cows, their low feed requirement, their good adaptability and high disease resistance are traits very much favoured by farmers. The milk of *Vechur* cows was considered as having a high medicinal value and was extensively used in the Ayurvedic system of medicine.

Massive crossbreeding programmes taken up by the Kerala government since the 1950s have transformed the local animals in the State to crossbreeds. Local bulls were not permitted to be retained as per the Kerala Livestock Act, 1961. The Act stated that "No person should keep a bull for breeding if it attains a particular age except with license and other terms and conditions unless certified to be castrated". The Act covers the entire male cattle population that has reached breeding age, whether they are retained for breeding purposes or not. But bulls dedicated to the temples were exempt from the provisions of the Act. Thus, the Siva Temple of Vaikom has played a role in averting the extinction of the breed.

The World Watch List of Domestic Animal Diversity, published by the FAO, has listed *Vechur* cattle under the category of Critical Breeds, meaning nearly extinct. The credit for bringing *Vechur* cattle from the brink of extinction goes to a conservation programme undertaken by the Kerala Agriculture University (KAU). Subsequent to studies conducted by the KAU, *Vechur* cattle are now recognized as the smallest cattle in the world. Before the *Vechur* caught the attention of the scientific community, a Mexican cow measuring 1 m in height was considered to be the smallest. The maximum height of a *Vechur* cow is 91 cm. This diminutive cow, weighing on an average 107 kg, can give an average yield of 3 litres of milk per day, which is the yield of the Mexican cow too. Thus, considering its body weight, the *Vechur* cow has the maximum milk yield in the world.

Detailed characterization studies of *Vechur* cattle have been taken up by the KAU. The acrocentric nature of the Y-chromosome establishes that *Vechur* cattle belong to the Zebu species of cattle (*Bos indicus*), which is different from European cattle (*Bos taurus*) as they have a metacentric Y-chromosome. Calf mortality has been found to be almost nil in *Vechur* cattle under farm conditions. It has also been observed by the scientists of the KAU that these dwarf animals are quite resistant to foot and mouth disease and mastitis, two diseases that play havoc with hybrid cows in Kerala. Compared with crossbred cows, significantly lower incidences of respiratory infections have been reported in *Vechur* cattle. The gene(s) responsible for these qualities is India's insurance for the future. The animal breeders of tomorrow may require this gene to save Indian cattle wealth from total liquidation by pests and germs.

Milk analyses carried out in the KAU now support the empirical findings of unknown Ayurvedic physicians. The percentage of fat and total solids in the milk of *Vechur* cows is high compared with that in the milk of crossbred cows. But a more significant aspect is the size of the fat globules. The mean size of a fat globule in the milk of the *Vechur* cow (3.21 microns) is higher than that of the goat (2.60 microns), but considerably smaller than that of crossbred cows (4.87 microns) and of Murrah buffalos (5.85 microns). The small size of the fat globules means that there is a high phospholipid content because of the greater surface area. Phospholipids are important in the development of brain and nerve tissues, and they also play a vital role in the absorption and digestion of fat.

Since the milk of the *Vechur* cow has got a higher proportion of small fat globules and saturated fatty acids, it can be therapeutically useful in cases of malabsorption syndrome. Thus, the milk of the *Vechur* cow and the products made from that milk are suitable for infants and the sick. In general, *Vechur* cattle are an ideal choice for farmers who cannot afford sophisticated dairy management practices but want just enough milk for home consumption. (Courtesy: *Vechur* Conservation Trust website and a feature by Sri Uthaman published in <http://pib.nic.in/>)

Other Indian breeds have been developed in different parts of India and are used for either milk or draught purposes or sometimes for both. India had good milch breeds like the *Gir*, *Red Sindhi*, *Hariyana*, and *Sabival*. The *Gir* used to give 1600 kg milk per 300-day lactation period, whereas the *Sabival* used to give 2700 to 3200 kg milk per lactation period. The best yield on record for the *Red Sindhi* is 5400 kg and that for the *Sabival* is around 4500 kg. India had good draught animals like the *Hallikar*, *Krishna valley*, *Dangi*, *Malvi* etc. *Tharparkar* is a special breed of cattle that can cross the Thar dessert by walking continuously for more than 24 hrs. *Nagori* is also another breed that is well suited to desert areas. Unfortunately, the policy makers did not recognize these qualities during the crossbreeding programme. The ultimate aim of the programme was only to improve milk production. Other traits like adaptability to local feed and fodder, total fat and SNF content of the milk, resistance to disease and pests, other special qualities etc. should also have been considered in crossbreeding. It is also noteworthy that the chemical composition of the milk of indigenous breeds significantly differs from that of Holstein Friesian (HF) or Jersey (Table 2).

Table 2. Chemical composition of milk

Composition [%]	Indigenous	HF	Jersey
Fat	4.5–4.6	3.4	4.5
Protein	3.1–3.45	3.22	3.42
Total solids	12–14	12.26	13.5
Caesin	2.4–3	2.4	2.7
Lactose	4.8–5.1	4.87	4.93
Ash	0.66–0.74	0.68	0.71
B-lactoglobulin	0.3	0.25	0.25
Sterols	0.2–0.3	0.3–0.4	0.3–0.4

The above table shows that the milk of indigenous breeds has a better or comparable fat, protein and total solids content and caesin, lactose and ash percentage. The beta lactoglobulin, which improves resistance in humans, percentage is better and the sterol (cholesterol lanosterols) content is less. Thus, quality-wise, indigenous breeds have an edge over crossbreeds.

Malenadu gidda is a non-descriptive breed in a KPP area in the Western Ghats of Karnataka. Farmers remember that selective cows of this breed used to give 3 litres of milk per day. The breed is very well suited to this hilly tract and high rainfall area. It is also a small sized animal. The animal is resistant to foot and mouth disease and mastitis. Efforts have to be made to characterize this breed and also to selectively breed it.

Cultural significance

The cow is considered as *Gomatha* and is worshipped every day. Hindu farmers will not allow the animal to be slaughtered and will not eat beef. Farmers consider cattle sacred and have an emotional attachment to them. The cattle population is the wealth of the family. The higher the population of cattle, the wealthier the farm family.

Cow products like cow urine, cow dung, milk, ghee and curd are used in most rituals including birth and death ceremonies performed by these Hindu families. Farmers use *Dharoshma*, or unpasteurized, milk during the daily worship of family deities and used to consume it because they considered it sacred. This custom is slowly disappearing since it is dangerous to consume the unpasteurized milk of crossbreeds because it could carry infectious microbes like that of tuberculosis. During *Grubapraवेशam*, a lactating cow along with its calf is the first to be taken into the house. *Godana* (gifting a cow) is one of the most sacred activities of a family. *Godana* is also associated with a number of Hindu rituals. People still mostly use the

native breeds for all rituals and are more emotionally attached to these rather than to crossbreeds.

Cow products are also used for local health practices. There is a local practice of giving cow urine on Thursdays and Sundays to small children who have the habit of regular excess saliva secretion. Traditionally, small children are bathed with buffalo dung. People with lice in their hair used to bathe in cow urine.

However, the emotional attachment to the cow has altered slightly after the introduction of crossbreeds. Farmers and others have started to look at cattle solely in terms of the monetary aspects of milk production. Associating with the animals as a part of their life has slowly turned into a way of earning income by selling milk. Cost and profit calculations with respect to only milk production in cattle rearing have resulted in a higher acceptance of crossbreeds than the native breeds. Because of this loss of emotional attachment, sacred feelings are slowly disappearing and this also has influenced the rural lifestyle. Hence, there is a need to educate farmers and raise awareness among them on all aspects of indigenous breeds and their importance for their own sustenance and for the nation.

Properties of animal products as seen in Ayurvedic texts

There are a number of Ayurvedic texts that refer to the qualities and use of animal products. *Charaka sambita*, *Sushruta sambita*, *Astanga sangraha*, *Astanga bridaya*, *Dhanvanthari nighantu*, *Bhavaprakasha* etc. have a number of references to these products. For example, they have references to

Cow's milk

- *Madhura, vata – pitta nashaka, guru, raktha vikara nashaka.*
- The milk of black and red cows is vatha shamaka, yellow pittashamaka. And that of white cows is *kaphakaraka* and is *guru* (heavy to digest).
- The milk of a cow with a very young calf or of a cow with no calf is *tridoshakaraka*.
- The milk of a cow that eats less feed and fodder is *guru*. It improves strength and vitality.
- Milk should not be eaten along with fish, meat and radish.

Buffalo milk

Buffalo milk is sweeter than cow's milk: *Shukrala, nidradayaka, kapha vardhaka* and *sheetala*.

Curd from cow's milk

Curd made from cow's milk is madhura and sour in taste: *snigda, agnideepaka, brudya, vatanashaka, malarodbaka* etc.

Curd from buffalo milk

Curd made from buffalo milk is madhura in taste: *kaphakaraka, vata – pittanashaka, shukrala, shramanivaraka.*

Buttermilk made from cow's milk

Tridosha nivaraka, agnideepaka, ruchikaraka, buddivardhaka, udararoga nashaka.

Buffalo buttermilk

Kaphakaraka, pleeha roganashaka, athisarabara.

Cow dung

Cow dung is *rakshoghna*, bitter and *ogaru* in taste and is used especially to treat *kapha* diseases and is also useful in controlling skin diseases.

Cow urine

Katu, pitta rasayuktha, laghu, Aanideepaka, pittakaraka, kapha-vatanashaka. Cow urine is used to treat diseases of the stomach.

The series of references on various animal products and by-products shows that Ayurvedic scholars found these products useful in the treatment of many human diseases and disorders. This was a useful low-cost local resource that helped the local community maintain their health using indigenous knowledge. Pundit Sri Revashankar Sharma of Rajasthan prepares a number of medicines using cow products. To name a few, *Gomuthrasava* for leucoderma, *Gomuthra arka* for decreasing blood cholesterol, *Gomuthra ghanavati* for blood pressure, stomach disorders etc. Farmers used to prepare tooth powder from cow dung flakes. Recently, there are many articles on the use of cow urine to treat cancer. "Ahimsak Kheti", a Hindi monthly on organic agriculture, has reported a case, giving all clinical details, of cancer being cured with gomuthra (1999).

Animal products are widely used in agriculture for varied reasons. One of the major uses of animal products, which helps in the maintenance of soil fertility, is as farmyard manure or as compost. This is a major component of organic farming. There are number local techniques for spraying cow urine to improve crop growth and yield. But till date, very few systematic efforts have been made to validate these techniques. Now, we have a short term project under the Compas programme for this purpose. There will be a few results at the end of this year, 2006. A study conducted recently by the students of a college in Shimoga showed the antimicrobial properties of cow urine.

So, indigenous breeds are important owing to their contribution to various aspects of rural life. An effort to convey this message to Indian farmers was made through the publication of a booklet titled "*Namma Kamadhenu*". This has kindled the spirit of many farmers to take a fresh look at Indian indigenous breeds. A mega project called "Kamadugha" has been undertaken by Sri Sri Raghaveshwara Bharathi Swamiji of Ramachandrapura Mutt at Hosanagara, Shimoga district. The main aim of the project is to conserve and develop Indian cattle breeds. They have undertaken a mass campaign programme in the state and have conducted a 64-day *Goyathra* – spreading the message of the importance of the cow and indigenous breeds to life in India. The Mutt has a conservation centre where 23 Indian breeds are reared. There is a *Gavya Chikitsalaya* where patients are treated with cow products, and records are regularly maintained. There is also a unit producing cow-based products used specially

for maintaining health. The project educates people on the current scenario, the Indian way of looking at cows, the differences between indigenous cattle and crossbreeds and, the need of the day, the conservation and development of these breeds suitably in their own areas.

Apart from this, there are a number of efforts in various parts of the country to conserve and improve local indigenous breeds. Even the 10th Five Year Plan of the country (2002–07) stresses on the need for conservation of local breeds. The NBAGR, Karnal is working on the conservation and development of indigenous breeds.

Future tasks

Looking at the drawbacks of the present crossbreeding programme and the importance of indigenous breeds to all aspects of the life of rural people, a proper breeding policy should be evolved. The policy should aim to

1. Increase milk production but with broad a genetic base that takes into consideration traits like adaptability of breed to local conditions, resistance to pests and diseases, capacity to convert available feed and fodder, any other special characteristics etc.
2. Identify, select and produce bulls of indigenous breeds, taking into consideration all the traits listed above.
3. Characterize and evaluate some of the non-descriptive breeds of the country that are efficient in milk production and have all the other associated positive characteristics.
4. Make available at all artificial insemination centres the semen of proven indigenous breeds.
5. Carry out research work on the use of animal products in agriculture and in healthcare.

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