Buffalo as a social animal for humanity

S.K Ranjhan

Hind Agro Industries Limited

Corresponding Author: S.K Ranjhan. Hind Agro Industries Limited, Okhla Industrial Area, New Delhi - 110020, India

INTRODUCTION - Livestock is one of the important socio-economic resources for alleviation of poverty and raising the standard of living of teeming millions in the rural areas. Buffalo rearing jibes well in the social agenda because it is a triple purpose animal providing milk, meat and draught. Food security along with employment and shelter is the major concern of all the countries of the world. It is the guarantee to political stability and economic well being of the people of Asia, where food insecurity is one of the major causes of poverty. The last green revolution made substantial contribution towards improvement of livelihood of the poor. However, with the rising population and decline in per capita agricultural land available, it is predicted that the crop production alone will no longer be able to provide sufficient livelihood opportunities to the rural poor. Therefore, livestock offers immense potential for livelihood. In most of the Asian countries, livestock accounts for about 25% to the agricultural gross domestic products.

The importance of buffalo in South Asia, can be gauged by the fact that it is increasing faster than cattle, although in some East and Southeast Asian countries buffalo population has declined rapidly, which is a matter of concern. The primary importance of buffalo is more for milk in South Asia and, secondarily for meat production. Therefore, its role for food security in South Asia is well established. The price of buffalo meat is much cheaper than chevon, mutton, pork and poultry and is therefore a cheaper source of protein to the weaker section of the society. Because of its competitive prices and better blending characteristic it forms a major ingredient in corn beef, hotdogs and other value added products.

The meat from buffalo is mostly produced when they are retired from their productive life. Paradoxically, even the males are also not basically reared for meat production by the farmers and are allowed to die to save the milk from the dam for disposal in the market. In India, every year, about 8 million such male calves are removed from the buffalo production system due to intentional killing by the farmers to save dam’s milk due to non remunerative cost of raising male animals, thus incurring a loss of about US $ 15 million per annum. These calves could otherwise be salvaged for meat production, which will not only improve the economic condition of the farmers but would also provide quality meat for domestic consumption at competitive prices and also for export market. Raising these male calves will generate additional employment.

Buffalo dairy industry in India

India is the largest producer of milk producing 96 million tonnes (2005 – 06) growing at the rate of 5% annually. It contributes Rs. 1,15,970 crores (US $ 25,771 million) accounting 66% from the livestock sector (Rs. 1,73,350 crores). India contributes 14.7% of the total meat produced globally. It has become possible by the combined efforts of millions of far-
Farmers mostly small and marginal farmers and landless labourers. Dairy sector provides employment to 8.5 million people of which 71% are women. The major stakeholders in dairying are the subsistence farmers. It is, therefore, difficult for them to adopt technology driven commercial dairy development model being practised in developed countries. These farmers do not receive any subsidy in terms of productivity as is being practised in most of the developed countries. In India, crop-livestock integration is both the way of life and means to livelihood. Dairy, livestock and meat are intimately related.

The whole gamut of activities that go for rearing the buffaloes and getting production from them is a small farmer buffalo production system which is geared towards earning livelihood in producing milk and when retired, are used for meat production. Males are also used for draft and meat production. The dynamics of the small farmer buffalo production system, are as follows:

| Milk                          | Meat                                    | Draft                          | Dung                         |
|-------------------------------|-----------------------------------------|--------------------------------|------------------------------|
| - Females                     | - Males and retired females for meat production + other slaughter house byproducts | - Male/Females are used for own draft requirements. | - For manure and fuel |
| - Liquid milk for home consumption and sale to co-operatives/milk distributors |                                             |                                |                              |

The buffalo production system provides employment to large number of farmers on a part and full time basis, namely, grazing, milking, dung disposal, milk collection and distribution, milk processing etc. The whole gamut has a socio-economic agenda attached to the production.

**Processing of milk**
Most of the dairy plants are world class processing all the value added products, like milk powder, cheese, butter, *ghee* (cooking oil) etc. About 10 - 15% of total milk production is processed in the Dairy Plants, rest of 85 – 90% of milk is sold in the traditional market where a part of it is used for production of traditional products like *khoa* and Indian desserts.

**Export of dairy products**
In view of large domestic demand, only a part of milk products are exported totalling about Rs. 100 crores US $ 22 million).

**Meat industry in India**
Meat production is estimated at 6.09 million tonnes, standing fifth in rank in the world’s meat production. Buffalo in India contributes about 30% of total meat production. The contribution by cattle, sheep, goats, pigs and poultry is 31%, 5%, 10%, 10% and 13%, respectively. The trends in livestock population, slaughter rate (number slaughtered as percentage of population), carcass weight and meat production in India in 2004 are shown in Table 1 (FAO, 2005, DAH&D, GOI, 2004).

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Production of meat

The meat meant for export has to pass through stringent inspection of ante-mortem/post-mortem examination as per the MMPO (1993) Govt. of India. The approved dressed carcass is chilled for 24 hours to bring down the pH below 6. Thereafter, it is deboned and deglazed. The meat is then packed into different cuts and frozen at -40º Celsius. The frozen meat is stored in cold storage for export.

There is very little processing of the meat. The meat produced for the domestic market is sold as hot meat. Goat/sheep meat is marketed in villages by slaughtering one or two animals once in a week or on special occasions by a group of people joining together and sharing the cost of the meat so obtained.

Export of meat

India’s international trade in livestock and livestock products is mainly in live animals (17%), meat and meat products (82%), dairy products and eggs (1%). At the global level, India’s export and import accounts for only 0.17% of each. Meat and meat products have dominated the exports from livestock.

The major export of meat is buffaloes, which is shown in Table 2. It may be seen that export

### Table 1. Trends in Livestock Production and meat Production in India - 2004

| Livestock Species | Population in (Million) | Animal Slaughtered (Million) | Percent Slaughtered (%) | Carcass weight (kg) | Meat production (million Tonnes) | Share in total meat production (%) |
|-------------------|--------------------------|-------------------------------|--------------------------|---------------------|-------------------------------|----------------------------------|
| Cattle            | 189.1                    | 14.2                          | 7.9                      | 103                 | 1.49                          | 31.1                             |
| Buffalo           | 96.0                     | 10.3                          | 10.0                     | 138                 | 1.58                          | 30.5                             |
| Sheep             | 40.1                     | 19.2                          | 47.9                     | 12                  | 0.25                          | 4.9                              |
| Goats             | 124.0                    | 47.0                          | 37.9                     | 10                  | 0.57                          | 10.0                             |
| Pigs              | 18.0                     | 16.0                          | 88.9                     | 31                  | 0.60                          | 10.0                             |
| Poultry           | 1106.0                   | 604.0                         | 73.6                     | 0.8                 | 1.60                          | 13.4                             |
| **Total**         |                          |                               |                          |                     | 6.09                          | 100                              |

Source: Department of Animal Husbandry & Dairying, GOI, FAO-2004

| Year   | Total Meat Produced | Buffalo Meat Produced | Total Meat Export | Export Percentage |
|--------|---------------------|-----------------------|-------------------|-------------------|
| 2001-02| 8425000             | 1421000               | 240989            | 17%               |
| 2002-03| 9622000             | 1428000               | 295456            | 21%               |
| 2003-04| 5898000             | 1443000               | 338940            | 20%               |
| 2004-05| 5922000             | 1471000               | 302280            | 20%               |
| 2005-06| 60912000            | 1582000               | 449013            | 29%               |

Source: DGFT (2006)
of buffalo meat has increased significantly in the last three years. The export of buffalo meat in 1997-98 was only 176,328 MT, which had increased to 450,000 MT valued at Rs. 2650 crores (US $ 500 million).

| Top Importing Countries of Indian Buffalo Meat. Quantities and Values |
|---------------------------------------------------------------|
|                                                               |
|                                                              |
| **2003-04** | **2004-05** | **2005-06** |
| ------------ | ------------ | ------------ |
| Qty Tons.   | Rs. million | Qty Tons.   | Rs. million | Qty Tons.   | Rs. million |
| Malaysia    | 80,442      | 3,723       | 65,529      | 3,559       | 82,337      | 4,994       |
| Philippines | 49,202      | 2,085       | 35,625      | 1,789       | 48,918      | 2,693       |
| Angola      | 30,494      | 1,156       | 24,686      | 1,197       | 39,57       | 2,185       |
| Jordan      | 36,759      | 1,642       | 20,092      | 1,098       | 39,044      | 2,198       |
| Saudi Arabia| 997         | 89          | 23,941      | 1,336       | 36,757      | 2,281       |
| Kuwait      | 11,099      | 619         | 14,227      | 821         | 34,108      | 2,162       |
| U.A.E.      | 20,694      | 1,094       | 19,099      | 1,068       | 33,098      | 2,028       |
| Iran        | 7,878       | 334         | 7,877       | 389         | 16,986      | 750         |
| Georgia     | 21,726      | 853         | 9,349       | 489         | 13,948      | 722         |
| Vietnam     | 577         | 40          | 2,216       | 130         | 11,917      | 732         |
| Congo       | 4,993       | 188         | 6,609       | 296         | 10,994      | 570         |
| Oman        | 8,81        | 455         | 7,534       | 461         | 10,819      | 689         |
| Grand Total | 343,817     | 15,368      | 306,971     | 16,156      | 459,937     | 26,296      |

Source: DGFT (2006)

| Table 4. Export of Sheep / Goat Meat from India (MT) |
|-----------------------------------------------------|
| **Country** | **2002-2003** | **2003-2004** | **2004-2005** |
|------------|---------------|---------------|---------------|
| Bahrain    | 78.8          | 127           | 120           |
| Jordan     | 37.5          | 1124          | 39            |
| Kuwait     | 13.8          | 126           | 126           |
| Oman       | 672.4         | 1541          | 392           |
| Qatar      | 464.2         | 936           | 1278          |
| Saudi Arabia| 27.7         | 1587          | 4002          |
| UAE        | 3340.0        | 4351          | 2739          |
| Others     | -             | -             | -             |
| TOTAL      | 4,973-00      | 16,03         | 8,767         |

Source: APEDA (2005)

> Average Price Rs. 89/kg
> Average Growth – 45%
Meat quality and safety measures

Most of the export-oriented meat processing plants in India follow world class sanitary and phytosanitary (SPS) measures given in the OIE guidelines, a referral institution of WTO. These plants are certified for HACCP (Hazard Analysis Critical Control Points), ISO-9002 and SGS, meeting the OIE norms. These measures are for meat safety, which starts right at the primary production level either with the farmers raising between 5 - 20 animals or in the feedlot. The identification and traceability of the animals from production source to the abattoir is fully maintained. It is ensured that animals have been raised under disease free conditions given in List ‘A’ of OIE.

In the HACCP, the Critical Control Points (CCP) are closely monitored right from reception of the animals (procured from disease free areas) at the plant, ante-mortem examination, post mortem examination, chilling of carcasses at 0 - 4º Celsius for 24 hours to bring pH level below 7, freezing of deboned meat at -35º Celsius to -40º Celsius for 10 - 12 hours and storage at -18º Celsius. All these measures preclude the possibility of transferring any contagious/ infectious/zoonotic disease to the importing countries.

The in-house quality laboratories in the plants ensure the absence of Salmonella, Listeria and permissible limits of E-Coli, Coliform bacteria.

Almost all the export-oriented plants follow the safety specifications given by the Meat and Meat Product Order of 1993 issued by the Directorate of Marketing and Inspection, Government of India. In addition, the measures recommended in Codex Alimentarius (Joint FAO/WHO Committee) are also being implemented.

Meat production and employment

Large number of people are employed in meat and allied industries namely, trade of live animals, slaughter house, leather Industry, bone processing industry, glue, gelatin etc.

Buffalo rearing for milk and meat production to alleviate poverty

Social agenda:contractual Co-operative farming - Animal Rearing Project (ARP)

The milk and meat Industries in India have undergone tremendous changes during the last one decade (1990-2000) where modern state-of-the-art fully integrated Eco-friendly Dairy Plants and state-of-the-art Meat Processing plants have been established. These new establishments are the state-of-the-art mechanized abattoir-cum-meat processing plants following world class sanitary and phytosanitary (SPS) measures. They practice the animal welfare measures right from transport, resting to the humane slaughter in their premises.

With the coming of the Codex Alimentarius for production of animal food where safety measures are to be adopted right from the primary production level to the table to ensure safe and hygienic milk and meat to the consumers, a strong need has been felt to establish a production base around each modern abattoir / dairy plants to produce quality disease-free animals as per the sanitary and phytosanitary (SPS) requirements of O.I.E. In one of the such establishments, namely, Hind Livestock Development Foundation (HLDF) a model backward integration with 160,000 farmers raising more than half a million buffaloes in 7,200 villages under semi-contractual farming system in 8 districts of Western Uttar Pradesh, are provided services at the farm gate.

The Project was started in September 1995, by the Hind Livestock Development Foundation (HLDF), an NGO, under the auspices of Hind Group of Companies. The main purpose of the
Project was to provide improved animal rearing practices to the farmers under disease-free conditions to produce quality animals for calf production. These services are provided by a team of committed veterinarians and Para-Vets working in the HLDF at the farmers' door. It was envisioned then that by improving the animal husbandry practices, there will be increase in milk, growth and reproduction. Further, it will also provide the marketing facilities to the farmers to improve their economic lot. The salient features of service-to-the-farmer are:

**Strategy**

The Project is providing the following services to the farmers at their doorstep and through network of veterinary hospitals:

1. Animal Health: Vaccination, de-worming, first aid treatment.
2. Animal production: Animal feeding, breeding and housing;
3. Extension Management: Seminars, sterility camps etc.
4. Marketing: Male animals to the plant.
5. Veterinary Hospitals: Provision of the above services also from the HLDF hospitals.

**Animal Production Services**

Animal production and health services are provided at the farmers' door for feeding, and breeding and animal health of buffaloes. The initial survey conducted by the Foundation in Aligarh District, UP, India, had shown the deficiency of calcium (more in lactating buffaloes), copper, zinc, sodium chloride in the practical feeding of the buffaloes which were affecting their growth, milk production and reproduction. Before the inception of the ARP, it was found that the incidence of milk fever was high and so was the mortality in young calves. The farmers were not feeding colostrum (first 3 days' milk after calving), resulting in high mortality in calves. Consequently, the Foundation has prepared a cheap, but effective mineral mixture costing about Rs. 7.00 per kg (US$ 0.05) as against the other commercial brands costing around Rs. 45.00 per kg (US $ 1), that too by compensating all the deficient minerals and made available to the farmers. Following is the composition of Mineral Mixture being marketed by HLDF:

- Calcium Carbonate 47.00%
- Sodium Chloride 49.00%
- Zinc Sulphate 0.50%
- Copper Sulphate 0.50%
- Di-calcium Phosphate 3.00%

The above mixture is fed @ 20g to 50g per day depending upon the physiological age of the animals and stage of lactation.

The farmers are advised in economic feeding of the animals, which are reared on natural feeds. The animals are never fed on meat-cum-bone meal and growth promoters, which are banned by the Government of India.

The Mineral Mixture being produced by the Foundation and fed to the animals has reduced the incidence of milk fever, which is very common in buffaloes and has increased the milk production by 15-20%. It has further increased the reproductive efficiency by increased calf crop. In breeding, artificial insemination with elite murrah buffalo semen is provided to the buffaloes at the farmer's door on subsidized cost.
Extension Services
To create awareness amongst the farmers on rearing the animals in hygienic and eco-friendly environment, village seminars have become a regular feature as a part of the Extension Services. Improved management practices are being imparted to the farmers. Leaflets are being printed in Hindi language, which provide farmers with simple technologies for adoption, like feeding of colostrum, housing, feeding green fodder, schedule of vaccinations, de-worming, breeding etc.

Achievements
The benchmark surveys conducted in the initial few months of the start of the Project in 1995 had revealed a mortality of 80% in the male calves and 60% in female buffalo calves. The main causes were attributed to poor rearing practices adopted by the farmers. After four years of sustained operation of the Project, education on hygiene, sanitation, feeding of colostrum to the newly born calf etc., the average mortality rate had come down to a mere 10% and in many villages, there has been no mortality at all in the calves. Now it ranges between 7-8% in buffalo calves. Similarly, milk production has increased by 15%; reproductive efficiency has improved by 12% and growth has also increased in the calves, leading to improved living conditions of small and marginal farmers of Aligarh and surrounding districts. The male calves, which were earlier sold to the butcher at Rs. 250.00 (US$ 5.00) per animal at the age of one year of (weight 120-130 kg), are now sold to the Hind Agro Industries Limited (HAIL) plant at Rs. 2500-3000 (US $ 60.00) per animal at the age of 13-15 months weighting 150 – 200 kg per animal.

Feedlot - Intensive feeding for meat production
In India intensive feeding of male buffalo calves for meat production was never visualized and was considered as a taboo. Intensive feeding has however, been started for the first time in a commercial feedlot for quality meat production since last 5 years (1999-2004). In a Village Demonstration farm with HAIL, a commercial feedlot to house 5000 male calves has been established. The facilities include environmentally controlled animal houses with slatted floors where urine and dung are collected in the Keller and are regularly pumped out for spraying in the forage field. The feedlot has its own feed compounding feed mill and about 100 acre farm to cultivate green fodder. The male calves at the age of 8-10 months are purchased from the farmers and are quarantined for 15 days during which vaccinations and de-worming are provided. Thereafter, they are brought to the main farm and are fed on high protein / high-energy diet to put on an additional weight of 120 Kg in 4 months to produce quality meat. The composition of feed is as follows:

Composition of the feed (pelleted)

| Ingredient       | Percentage |
|------------------|------------|
| Straw            | 50%        |
| Rape Seed        | 30%        |
| Bran             | 5%         |
| Urea             | 2%         |
| Molasses         | 10%        |
| Mineral Mix      | 1%         |
| Salt             | 2%         |
The above mixture is pelleted and contains above 18% crude protein equivalent and 60% TDN. Each animal is fed 2.5 - 3.0 kg of pellets; 3 kg spent brewer’s grains and 2-kg whole sugar cane/ sorghum per day. This above ration provide 20% crude protein and 65% TDN with a dry matter intake of 4.0 to 5.0 kg per animal per day. The above composition of the feed can be changed as per the local availability of feed resources.

Performance of the animals
The murrah Calves grow at the rate of 900 to 1000 gm per head per day with feed conversion ratio of 5.0: 1. The cost of 1 kg live weight gain comes to around Rs. 25.00 (US$ 0.5) per kg live weight gain (Feed cost Rs.20.00 + overhead cost Rs.5.00 per day). The dressing percentage of such animals is around 65%. A 250-kg live animal produces a carcass of about 150-kg fetching a price of Rs.65.00 to 90.00 (US$ 1.5 to 2.0) per kg in the wet market internationally. The quality of the buffalo meat is excellent, as it is lean, tender and juicy. It is no exaggeration that buffalo is black gold. The other plus points are that there is identification, certification of origin and traceability which are essential tools for accomplishing control of diseases, to improve production standards and to offer consumers a more transparent and reliable market. These are the hallmark in Codex Alimentarius. They are never fed on antibiotics, hormones and growth promoters. It must not be forgotten in the globalization of meat trade, that the expansion of animal production will lead to the global warming and indiscriminate medication, increase the risk for human being. These factors would also disrupt the existing eco balance.

Draft
About 8 – 10% of the male produced are utilized as draft animals. Buffalo males have efficient work capacity and finally for pulling carts and rice cultivation. Though buffaloes are slow in movement than cattle, but can pull heavier loads. The usual load carrying capacity of buffalo is 1.5 – 2 tonnes continuously for 3 – 4 hours during summer time, and 6 – 8 hours in a day during winter time.

Manure
An average of about 5 tonnes of dung is produced per animal annually. A population of about 96 million animals will produce 480 tonnes of dung of which 50% goes for fuel consumption and remaining 50% goes for manure. Disposal of dung also generates employment. Bio-gas plants at the small hold farmers level have been established in many States where gas is used as fuel for cooking and even for lighting purposes. In large dairy farms Bio-methanation plants have been established to produce electricity which is supplied with the power grid.

Employment generation
In India about 40 million people are engaged in Dairy Sector and 30 million in meat sector namely, trade of live animals, production and distribution of milk, slaughter of animals, hides, bones, casings, horns, hooves etc. Leather is an important byproduct. It has successfully been harnessed for social welfare, which has brought visible benefits to large number of people, especially living on the periphery of Indian Economy. Leather, like any other product is derived from slaughtered and fallen animals. The slaughtered animals must
come from disease free and healthy animals reared on scientific lines in Eco-friendly environment in order to get quality byproducts. Leather industry is directly related with the meat industry. It is potential source of employment. Buffalo is a social animal for the rural poor in Asia including India.

**Conclusions**

Package of practices and technologies to raise buffaloes for milk and meat production are available for adoptions in a small hold production system as well as commercial production system. What is needed is the coordinated effort by Government, NGO’s and the Corporate sector to promote the production base with the smallhold farmers to ensure improvement of their economic condition by adopting these technologies.

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