

PROSPECTS OF MITHUN REARING AS VIABLE COMPONENT OF LIVESTOCK PRODUCTION SYSTEM OF NORTH EAST HILL REGION

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Introduction

The North East region of our country is comprised of eight states viz. Assam, Arunachal Pradesh, Manipur, Mizoram, Meghalaya, Nagaland, Sikkim and Tripura and covers around 2,62,379 sq. km of land area of Indian subcontinent. This region is unique geographically, representing the zone of transition between Indian, Indo-Malayan, Indo-Chinese regions as well as meeting place of the Himalayan mountains with the Peninsular India (Rao, 1994). Under this geographic background, there is a unique bovine species called 'Mithun' (*Bos frontalis*) which are available only in four (Arunachal Pradesh, Nagaland, Manipur and Mizoram) out of eight North East States and play a rather unique role in terms of social customs among the mostly tribal inhabitants of these hilly terrains rather than part of livestock production system. That Mithun is still not a part of livestock production system can be easily identified from the fact that there is no State owned Mithun farm in Nagaland, Manipur and Mizoram and only one in Arunachal Pradesh. This animals though domesticated are still reared in the wild under traditional practices with almost no human input except occasional salt lick. At the same time, changing social practices among the tribal population who are the custodians of this unique bovines, are responsible for somewhat decreasing importance of Mithun among the younger generation of the society over the years. Mithun is often referred to as the 'ship of highland' and is a good example of integration of agro-ecology, subsistence livelihood, culture and livestock rearing. These animals are of special importance in the hills, at an altitude above 2000 msl. They are also considered as almost sacred in view of their ability to survive those harsh conditions and multiple use (Rangnekar, 2006)

Table1: Distribution of Mithun population in India

| State | 1997 | 2003 |
|-------------------|------------------|------------------|
| Arunachal Pradesh | 1,24,194 (70.2%) | 1,92,000 (69.1%) |
| Nagaland | 33,445 (18.9%) | 40,452 (14.4%) |
| Manipur | 16,660 (9.4%) | 20,000 (7.2%) |
| Mizoram | 2,594 (1.5%) | 2,000 (0.7%) |
| Jammu & Kashmir | - | 24,000 (8.6%) |
| Total | 1,76,893 | 2,78,000 |

(figure in parenthesis indicate percentage)

North East Hill Physiography

The NE states with approximately 5.63% of geographical area of India are characterized with mostly hilly terrains and rugged mountains interspersed with deep gorges and flat valleys in the foothills and extreme climate. Remoteness of the area is more inaccessible due to poor road infrastructure, dense forest, resulting in sparse population. The average annual rainfall of the region ranges 2000-4000 mm. This region is divided into four major geographic divisions viz. Assam valley, the Assam Himalayas, Meghalaya hills and the Eastern Highlands (Mishra and Misra). Assam valley is 80-129 km wide and 725 km long, with the mighty Brahmaputra crossing the middle of the valley. The Assam Himalayas comprised of the Mishmi hills, Abor hills, Mikir hills, and Dafla hills of Arunachal Pradesh. The Meghalaya hills or the Shillong Plateau is situated in the south of Assam valley and comprised of the Garo hills, Khasi hills, Jaintia hills, Mikir hills and North Cachher hills. The Eastern Highlands consist of the Patkai hills, Naga hills, Barail hills, highland of Manipur and Mizo hills. Manipur lies on the east of Barail range, Tripura lies in the western side of Mizo hills, and Nagaland is situated between Manipur and Arunachal Pradesh, running more or less parallel to the left bank of the Brahmaputra.

Some facts about Indian Livestock Production

- Livestock sector plays a crucial role in rural economy and livelihood. This is one sector where poor contributes to the growth directly instead of getting benefit from growth generated elsewhere.
- Livestock production in India, is mostly practiced as a supplementary with agriculture and as a whole is essentially not organized unlike the industrial sector developed during the last five decades or so and even though livestock plays an important role in providing livelihood to millions of Indian, mostly small, marginal and landless farmers, is still remained a backyard system.
- The contribution of livestock alone accounts for nearly 30% of total agriculture output and valued around 6% of national GDP during 2003-04 (Ramdas and Ghotge, 2006). In spite of this enormous importance, Indian

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livestock scenario has been changing in terms of number, composition, density, management practices and ownership.

- There are other problems associated viz. large scale shrinkage of grazing land, pastures and forest cover; neglect of traditional managerial system of livestock keeping; mechanization of agriculture practices reducing importance of bullocks and male animals and decreased availability of quality feed and fodder due to more importance to cash crops and cereals for human need pushed the livestock production to the wall, adversely affecting millions of livestock farmers to the brink of poverty.
- India has the largest livestock population in the world. Distributed over 100 million households in approximately 600,000 villages, Indian farmers stock animals as varied as the little known Yak and Mithun to the seemingly insignificant backyard poultry.
- According to the live stock census of 2003 the country had 485 million livestock population and 489 million poultry population, being the first in cattle and buffalo population, second in respect of goat and third in respect of sheep population in the world. India has 57% of the world's buffalo and 16% of the world's cattle population.
- This sector plays a vital role in providing nutritive food, rich in animal protein to the general public and in supplementing family incomes and generating gainful employment in the rural sector, particularly among the landless, small, marginal farmers and women.
- In India, the livestock production and agriculture are intrinsically linked, each one being dependent on the other and both crucial for the overall food security of the people.
- It is an important livelihood activity for most of the farmers, being a dependable "bank on hooves" in times of need.
- **Percentage Contribution of Livestock Sector to Agriculture and National GDP.
(at 1993-94 prices)**

| Year | Percent Contribution of Livestock sector to | |
|-----------|---|--------------|
| | Agriculture GDP | National GDP |
| 1999-00 | 24.39 | 5.59 |
| 2000-01 | 25.92 | 5.67 |
| 2001-02 | 25.91 | 5.70 |
| 2002-03 | 29.27 | 5.70 |
| 2003-04 | 27.26 | 5.40 |
| 2004-05 * | 24.90* | 4.70* |

- The importance of livestock in India's economy can be gauged from the fact that 90 million farming families rear over 90 million milch animals.
- Livestock provides a large share of draught power, with about half the cattle population and 25 percent of the buffalo population being used to cultivate 60 million hectare of cropland. The contribution is roughly estimated to be to the tune of Rs.10, 000 crores per year besides saving approximately six million tones of petroleum worth Rs. 6,000 crores.
- Draught animal power is still relevant and useful due to the fact that it is suitable to the needs of the farmers with small land holding and the areas where mechanized implements can not be brought to use.
- Another important contribution of livestock is the production of dung, which is an important organic manure. On an average, 800 million tones of manure is produced. Of this, some 300 million tones are burnt as fuel and the balanced used as manure.
- The growth in agriculture sector over the years has been fluctuating significantly depending upon the monsoon and other climatic factors. Livestock sector on the contrary has shown a steady growth and thus providing stability to the overall family income.

Growth Rate in Gross Domestic Product (in percent) (At 1993-94 Prices)

| Year | Agriculture and allied sector | Livestock Sector |
|----------|-------------------------------|------------------|
| 1994-95 | 5.08 | 5.49 |
| 1995-96 | -1.13 | 4.33 |
| 1996-97 | 10.10 | 4.19 |
| 1997-98 | -2.82 | 2.01 |
| 1998-99 | 6.87 | 4.61 |
| 1999-00 | -0.11 | 3.42 |
| 2000-01 | -0.40 | 5.87 |
| 2001-02 | 6.46 | 6.40 |
| 2002-03 | -7.99 | 3.95 |
| 2003-04 | 10.31 | 2.73 |
| 2004-05* | 0.70 | 4.31 |

* At 1999-2000 prices

- In India, the livestock continues to be raised on crop residues and agricultural bi-products.
- The area under cultivated fodder production is limited only to 4.60% of the total cultivable land. The schemes and programmes relating to feed, fodder and pasture development in the country are quite limited.
- Market opportunities have opened up for the livestock sector following the economic liberalization. But the sector's ability to capitalize on new market opportunity is constrained by the availability and quality of support services.
- At present, Government is the main provider of these services. The quality of the services is however not satisfactory and these services are not available at the doorsteps of the producers.

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- The present structure of livestock improvement is based on fixed model of a Veterinary Hospital/Dispensary being the key nodal structure at the ground level from where services and goods are currently distributed. There is a need to restructure service delivery mechanism to become conducive to the requirement of the rural livestock producers.
- Lack of credit for livestock production has been a major problem. Public sector lending is abysmally very low.
- Modernization of meat sector is to be taken up. The establishment of rural based abattoirs in animal tracts would reduce the need for transportation of live animal to urban areas for slaughter. In addition, modern Abattoirs/Meat Processing Plants would be supported to promote export.
- Despite the importance of livestock sector in the Indian economy, government policy for the sector has suffered from the lack of clear and strong thrust and focus. One of the indicators of priority to a sector could be judged from budgetary allocation under various plan periods to the sector.
- The allocation to animal husbandry and dairying as percentage of total plan outlay varied from 0.98% during the Fourth Plan to about 0.18% during Ninth Plan compared to sector's contribution to the national GDP of over 5 percent.
- The Plan investments made so far do not commensurate with its contribution and future potential for growth and development.

Earnings from livestock in India

- The Livestock sector is an important source of foreign exchange
- Export earnings from livestock products rose from Rs.1500.93 crores in 2001-02 to 2253.33 crores during 2004-05.
- Meat and poultry products accounted for 83 percent of total export earning (Rs. 1,720 crore). Export of milk and milk products accounted for 17 percent of the export of livestock products..

Livestock Production in North East Region vis-à-vis Mithun

The 2003 Livestock Census have revealed that we have livestock population of about 485 million, out of which 283 million are bovines and the rest are mainly sheep, goats, pigs and other animals. Out of this 283 millions of bovines, Mithun account for 2.78 million confined mostly in four North East States. While indigenous cattle declined by 10.20% during 1997-2003 in India, Mithun population was increased by a huge 57.10% during the same period and a surely a positive side for its conservation and further genetic improvement needs. The census data establishes that there is a shift towards high milk yielding animals. The number of high yielding cattle and buffaloes is increasing and there is decline in the population of indigenous cattle.

Table1: Livestock population ('000) in four North East states (Livestock Census, 2003)

| Livestock | Arunachal Pradesh | | Nagaland | | Manipur | | Mizoram | |
|--------------------------|-------------------|-----------------|----------|-----------------|---------|---------------|---------|----------------|
| | 1997 | 2003 | 1997 | 2003 | 1997 | 2003 | 1997 | 2003 |
| Crossbred cattle | 11 | 13 | 154 | 243 | 69 | 69 | 8 | 9 |
| Indigenous cattle | 441 | 445 | 230 | 208 | 439 | 349 | 26 | 27 |
| Total cattle | 452 | 458 | 384 | 451 | 508 | 418 | 34 | 36 |
| Mithun | 124 | 192 | 33 | 40 | 17 | 20 | 3 | 2 |
| Buffaloes | 12 | 11 | 36 | 34 | 95 | 77 | 5 | 6 |
| Yak | 13 | 9 | - | - | - | - | - | - |
| Total bovines | 601 | 670 | 453 | 525 | 620 | 515 | 42 | 44 |
| Sheep | 27 | 19 | 2 | 4 | 8 | 6 | 0 | 1 |
| Goat | 154 | 231 | 161 | 175 | 33 | 33 | 14 | 17 |
| Pigs | 249 | 330 | 571 | 644 | 388 | 415 | 163 | 218 |
| Others | 6 | 7 | 1 | 1 | 2 | 2 | 2 | 2 |
| Total Livestock | 1037 | 1257 (21.22) | 1188 | 1349 (13.55) | 1051 | 971 (7.61) | 221 | 282 (27.60) |

*Figures in parenthesis indicate %increase/decrease

Even though Mithun population increased in Arunachal Pradesh and Nagaland, there is only marginal increase in Manipur and actually declined in Mizoram. In Mizoram, existence of Mithun is almost threatened and there is urgent need for conservation of this species.

The main livestock production in the North East Region comprised of mostly pig farming and to some extent dairy farming. In recent years, other alternative livestock avenues which are initiated include rabbit farming, poultry and duckery. All the four State Govt. of Arunachal Pradesh, Nagaland, Manipur and Mizoram has emphasized on the dairy development in the state with the establishment of district level milk cooperatives in the line of Amul. The State Govt has adopted various strategies for mass production of meat, milk and eggs in the State through people's participation and other allied sectors as per road map devised which can be listed below:

1. To attain self sufficiency in animal proteins viz. meat, milk and eggs in the State
2. Quantification of livestock and poultry per household
3. Revival and improvement of the traditional backyard livestock and poultry farming
4. Strengthening of the existing livestock and poultry breeding farms
5. Conservation and development of indigenous animals, including Mithun.
6. Intensifying specialized commercial farming in the states through entrepreneurship development and self employment generation schemes
7. Intensification of fodder development
8. Mass immunization programmes for disease control.
9. Development of marketing network in the states

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10. Strengthening of veterinary field training institute.

In spite of this, there is not much emphasis on Mithun rearing or developing Mithun rearing in the line of commercial Mithun farming so far in any of these four NE states. This may be due to the fact that traditional system of Mithun rearing is based on ownership, keeping the animals under forest pastures without much input and bringing back the desired animal only during some festivals for sacrificial purpose. In this tradition, Mithun is used only for meat purpose, and the tribals hardly use Mithun for milk, draught or any other purposes so far. Under this prevailing customs of the North East region, Mithun has hardly any significance as a viable livestock production system so far.

The future improvement and development of livestock for agriculture is dependent upon the availability of the genetic variation of the population. The animal genetic resources available throughout the world are in a dramatic state of decline. Mithun (*Bos frontalis*) is a rare species mainly confined in North-Eastern Hills region (NEHR) of India is also comes under the same state of decline. The conservation scientist has recognized the increasing loss of identifiable diversity in mithun genetic resources. Conservation of Mithun will only be successful if it combines with genetic improvement of the Mithun population. Hence, there is urgent need for genetic improvement of Mithun which can be carried out by planning a suitable breeding programme and implementing at the earliest.

Strategy for Mithun breeding and production system

In their own habitat in North East hills of India, Mithun herds move around in jungles throughout the year and breed naturally by the herd bulls. The owners have no role to play what so ever in breeding of the Mithuns, which mate randomly without any human intervention. The strategies for breeding of Mithun should be centred on conservation of this precious and unique animal. Mithuns are primarily reared for meat. Nevertheless, evidences are there that Mithun and Mithun × cattle hybrids are also used for milk and draught purposes. Breeding of this species artificially will be a real challenge as these animals are exclusively maintained under free-grazing condition in forests. Therefore, a practical approach towards improvement programme of this species is the introduction of superior male into those herds. For the purpose, superior males and females may be maintained in station condition under good management. Intensive selection for better growth performance and other related parameters should be the prime objectives of the breeding farms. The superior males produced in the breeding farms can be introduced into the field herds at the ratio of 10:1 (female: male) for natural mating. However, artificial insemination and testing of bulls through multiple ovulation and embryo transfer can be implemented in the nucleus herds depending on the available facilities for efficient production of superior animals.

Mithun is a unique and valuable bovine species of the NE Hill Region of India. This species could be an essential component of the sustainable animal production system of the region. Therefore, it is suggested to avoid any kind of interspecies hybridization between mithun and cattle for any purpose. The primary aim of any future breeding should be the conservation and preservation of this unique species. Any indiscriminate cross breeding or species hybridization may lead to a great loss of its innate genetic potentiality and valuable genes. Although A.I. in mithun is being standardized in National Research Centre on Mithun, Nagaland, it is yet to be applied at field level and hence natural service is going to stay in the near future for mithun breeding. In order to avoid inbreeding in the isolates or small herds in a particular locality, exchange of Mithun bulls or introduction of new bulls in the herds are advocated. In fact Mithun breeding can be carried out using bulls on community basis (Das, 2008).

Arunachal Pradesh, has some experience of crossing of mithun with domestic cattle (Brown Swiss breed) in station condition. However, no record on the performance and other characteristics of the crossbreds/hybrids are readily available for making a base to advocate a crossbreeding/species hybridization programme. Inter-species breeding of Mithun with indigenous cattle has been going on in an unplanned manner in certain pockets of Arunachal Pradesh to produce progenies of some economic importance. Considering the economic importance of such inter-species bred progenies in the state, an attempt was made by the state Animal Husbandry & Veterinary department to execute such a breeding programme in Regional Hill Cattle Breeding Farm at Kamki of West Kameng district under a North East Council sponsored project during the year 1987-88. In this breeding programme, the progenies produced from Brown Swiss crossed with female Mithuns became most attractive to the local people because of attaining higher birth weight and vigour by the hybrids. The Mithun × Siri cattle crossbred males in Bhutan were reported to be very good draught animal and the females produce reasonable amount of milk with very high percentage of fat (10.5 percent). Breeding of Mithun and cattle crosses in villages of Arunachal Pradesh, known as Temen, and Mithun and Bala crosses by the herdsman may be further investigated for their possible exploitation and economic use as it has been observed that some amount of farmers' preference is there for such animals for their use as draught animal. For the purpose, experimental breeding can be carried out only under station condition in collaboration with the elite mithun owners before making any recommendation.

Aim of Mithun breeding programmes

- The primary aim of the breeding programme should be to increase the meat and milk production and the per capita availability of milk/meat through the increase in number and improving the quality of Mithun
- To bring all the breedable age female under breeding programme by making available breeding facilities like bulls for natural service and introduction of artificial insemination in Mithun.
- To increase the breedable females under coverage of quality bull service/artificial Insemination.

Steps to be taken for scientific Mithun production

1. Establishment of Mithun breeding farms in the native tract of Mithun
2. Selection and introduction of quality bulls with high genetic merit in the Institute level
3. Introduction of AI facility in Mithun and establishment of semen stations
4. Training on estrus detection, synchronization and fixed time insemination to the field veterinarians and artificial insemination workers.
5. Regular supply of frozen semen and liquid nitrogen free or at reasonable cost to the Mithun owners

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6. Introducing good quality community bull in Mithun rearing pockets.
7. Conservation of different strains of Mithun.
8. Establishment of milk recording and analyzing laboratory, where daily morning mithun milk can be recorded and evaluated.
9. Establishment of elite nuclear herd(s) for different strains of Mithun for their conservation and genetic improvement

Strategies for integrating Mithun with livestock production

Some of the steps which should be taken for a successful integration of Mithun with livestock system of the North East Hill region may be –

- Participatory mode of Mithun farming - Involvement of Mithun owners and village community in the decision making process and creating awareness about the benefit of modern Mithun rearing and farming.
- Establishment of Mithun farms with availability of feeds, programmes of selection, having breeding, reproductive technologies and other input services at the farmers' door. Embryo Transfer (ET) and Open Nucleus Breeding System (ONBS) shall be an integrated part of breed improvement.
- Government support to establish Mithun farms to organize these activities and to provide fiscal and policy support to help development of small scale Mithun sector under the ambit of cooperative/private organised sector and quality assurance programmes.
- Feed and fodder - Efforts would be made to enhance availability of fodder and feed
- Integration of livestock and fodder system - Non-conventional animal feed resources has to be exploited to make available protein and energy for livestock feeding.
- Animal health - Prevention and control of infectious diseases being a community welfare activity, shall continue to remain totally the State's responsibility.
- Animal product processing and quality control - Slaughter houses should be located keeping in view environmental angle and logistic support. Modern abattoirs shall be encouraged for production of quality meat.
- Incentives to Mithun rearers - for rearing healthy Mithun calves, free health check up, supply of mineral mix, salt licks
- The insurance coverage for such exigencies should be encouraged particularly for owners below the poverty line.
- Value addition both for internal consumption and exports should be encouraged for commercialization..
- All concession given to agriculture sector e.g. tax rebate, low tariff rates for water and electricity etc. shall also be made available to animal husbandry sector in order to have competitive export price of livestock products.
- Export of breeding material of valuable indigenous germ plasm shall be restricted and critically reviewed periodically.
- Information system on Mithun - Database on Mithun have to be strengthened. There are large data gaps. Steps need to be taken to generate and disseminate the required information for proper planning and programme implementation.
- Different awareness camp, farmers training, workshop, etc for the mithun owners, unemployed youths and women farmers time to time
- Creation of marketing network for value added Mithun meat, milk and their by-products for commercial success.

Conclusion

Even though North East Hills are the natural habitat of Mithun, they are mostly confined in some selected pockets of this region. For example, Nagaland having the highest population density of Mithun, only harbors this animal in some selected pockets of Phek, Zunheboto, Tuensang, Kohima, Kiphore, Peren, Mon and Longleng districts. This animal occupies an historical importance among the tribal society of North East Region. Possession of large number of Mithun has been regarded as a social status and superiority of the person in the village. However, commercial exploitation of this animal has not been started either a number of reasons starting from its limited availability, inaccessibility of their remote terrains, lack of local entrepreneurs or underdevelopment of the whole NE region to which Mithun is a part of ecosystem. However, there is good prospects of commercial exploitation of this unique bovine by utilizing its important economic traits of meat, milk and hides through selection and breeding, and establishing modern Mithun farming system in the line of other livestock units. Scientific knowledge of livestock production have to be imparted to the Mithun owners and their keepers. The State Govt has to take initiatives in this regard along with the village community leaders and the NGO's working in the villages could play a crucial role. National Research Centre of Mithun (ICAR) having the requisite scientific experience, could show the path and can be a role model to start with the venture of sustainable Mithun farming.

Mithun rearing is already a viable practices of the North East Hills and it can be judged from the fact that this animal is intrinsically related with the tribal society from time immemorial and still in sufficient number which can be further exploited. However, commercialization of Mithun in the form of dairy cattle or beef cattle farming is neither advocated nor feasible due to its unique habitat, social customs and limited availability. In spite of that, Mithun can be better exploited within its geographical habitat of NE Hills through following certain measures and coordinated approach of all the stake holders (State Govt, NGOs, cooperatives, local entrepreneurs, village communities and Mithun owners/farmers).

A sustainable and financially viable Mithun farming, which will generate wealth and self-employment through entrepreneurship, is the need of the day. This would require creating an environment in which Mithun owners will increase investment to improve productivity and building participatory institutions. This will allow the farmers to get vertically integrated with processors of livestock products and input suppliers/service providers