

Mithun (*Bos frontalis*) farming

Potential, threats and conservation strategies

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Mithun is a massive semi-domesticated rare ruminant species mainly reared for meat. This strongly built hill animal of Southeast Asia plays an important role in the socio-economic and cultural life of the local population. In India, Mithun meat is considered to be more tender and superior over the meat of any other species. Due to gradual denudation of forests (natural habitat of Mithun) and commercialization of agricultural activities, the natural habitat of Mithun is decreasing. Further, present free ranging Mithun rearing system permits grazing of limited number of Mithun in a particular hill pocket without migration to other locations resulting a considerable inbreeding in this species. Due to frequent inbreeding and slaughter of best Mithun bull during ceremonial functions or any other auspicious occasion, make this species vulnerable. Looking into the tremendous socio-economic and cultural importance of Mithun in the life of the tribal population, initiatives were taken to conserve and popularize economic Mithun farming under semi-intensive condition with controlled breeding. Present article deals with origin, habitat, scientific rearing of Mithun including feeding, health care and breeding management and potential of Mithun for socio-economic development of tribal population. Initiatives taken up by ICAR-NRC on Mithun for conservation of Mithun and further strategies and action plan for propagation of Mithun is highlighted.

Keywords: *Bos frontalis*, Jhum, Mithun, Semi-intensive unit, Tribal, North-East India

MITHUN (*Bos frontalis*) is a magnificent bovine species which has originated at Indo-Myanmar border somewhere 8,000 years ago.

It is the most important bovine species and essential part of tribal indigenous people of North-East India. In India, Mithun is distributed in four North eastern states, viz. Arunachal Pradesh, Manipur, Mizoram, and Nagaland. Mithun is also found in Bhutan, Bangladesh, Myanmar, Western Yunan province of China and Malaysia in less numbers. In India, it is associated with the folklore and culture. Mithun is considered as sign of prosperity, status among the society, peace and harmony among the tribes of North East India. It is well adapted to a wide range of altitude ranging from 300 to 300° m MSL which represents

sub tropical and sub temperate zone with high humidity and rainfall.

Origin of Mithun

Mithun is considered to have originated on the Assam-Mayanmar border; however, it cannot be said with certainty when they were domesticated. It is not known whether mithun originated from the Gaur (*Bos gaurus*) or these two are different species of wild oxen. It has also been postulated by some workers that Mithun has resulted from a cross between a Gaur and domestic cattle with banteng blood, or Zebu's in ancient times. There are two major hypotheses on the origin of the Mithun namely: (i) They were directly domesticated from wild Gaur and (ii) They were a hybrid descendant from crossing of wild Gaur and domestic cattle, either *B.*

indicus or *B. taurus*.

Habitat

Topography

The topography of Mithun rearing area is mostly rugged and mountainous. The landforms comprise of numerous deep gorges and narrow V-shaped valleys. The topographical variation of the area plays an important role in the distribution pattern of mithun. The geographical extension of the area from low altitude plains to high altitude areas largely influences the Mithun habitat. The lower and middle altitude areas with evergreen subtropical forest are suitable for Mithun habitat whereas the higher altitudinal zones with alpine vegetation and snow cover during winter seasons are unsuitable. The

mithun is domesticated in an altitude between 300-3,000 m MSL in the hills to the north and south of the valley of Assam. Thus, Mithun is mostly found in the hilly belt of the area which gradually descends southward until it culminates into the plains of Assam.

Water and salt availability

Water is the mainstay of all the animals living on this planet. Water is most essential element of all living animals. So for the survival of the Mithun is concerned, water is equally important for its life. Mithun stays in and around where there are perennial fresh rivers but when the rivers dried up during dry season, they move from one region to another in search of fresh water. It is seen that Mithun is hygienic animals as it drink only fresh water and avoid taking water puddles in and around road, muddy stagnant water and urinate defecated water of human excreta.

Mithun drinks plenty of water because it licks salt and eats coarse leaves of vegetation. The dark skin absorbs more sunlight leading to consumption of at least 4-5 liters water every day on a sunny day. Mithun drinks more water during the summer but during the rainy days they can consume water from the leaves and stay for many days together in the dense forests. During the winter, Mithun stay nearby the river banks because the plants of the mountainous region shed leaves and dried up. They spent mostly in and around the streams, rivulets, marshes and places where water is available.

Habituated rendezvous water sources are known as the water-salt lick spots. It is a deposit of mineral salt used by animals to supplement nutrition, ensuring enough mineral in the diet. Most of the Mithun gather at the habituate water spots to drink water as well as lick the salt during May-October. They are seen mostly in and around such water sources most of the time. The salt lick spots generally originate from the salt rocks. Fighting or struggle for drinking water and licking salt are common in such locations. The salt lick sources composed of minerals like Sodium chloride (NaCl),

Calcium (Ca), Zinc (Zn), Phosphorous (P), Magnesium (Mg), Sulphur (S), Selenium, etc. These minerals contain nutrient which help in muscle and bone growth of animals.

Requirement of sodium

Minerals play an important role in productive and reproductive performance of animals and their deficiency may affect the digestive, physiological and biosynthetic process of body thereby affect the animal performance. In many parts of India, animal productivity has become limited because of deficiency or imbalances of both macro and micro minerals. In the hilly areas of North east region, leaching of minerals by rain water is a common phenomenon especially during rainy season. So soils are deficient in some important mineral elements, reducing the level of minerals in the vegetation. Salt licking behaviour by animal is a way to meet the requirement of minerals. Most of the foliage contain adequate Ca and K (<1%), P (0.12–0.4%), Mg (<0.17%) and trace elements (Cu, Fe, Mn, Zn) but their Na content is invariably low. Na deficiency in all the foliages could be the reason why animal shows salt hunger behaviour that are reared in natural habitat in contrast to those kept under semi-intensive system. Mithun owners generally offer common salt to Mithun fortnightly or monthly basis. This is an important tool to call Mithun from the forest and to domesticate them. To call Mithun from forest, the owner of the animals sometimes produces a sound out of a musical instrument prepared by horn, and hearing the sound, Mithun comes from forest in search of common salt.

Morphological features

In appearance and size, Mithun look somewhat like domesticated cattle or buffalo. Body is strongly build which varies from medium to larger. Males are bigger and stronger than female. Mithun is similar in appearance to Gaur except in size and horn. The size is smaller and the horns are more or less straight unlike

Gaur. The animal has a huge head, deep massive body, short and sturdy limbs. The forehead is broad and concave. Unlike other bovine species, Mithun has no hump. Instead, a prominent dorsal ridge is present. Bull has an exuberance of flesh immediately over the shoulder. It has broad ears and small dewlap. Length of ears ranges around 9-10" in adults. Legs and tail are shorter than those of cows. Horns are more or less straight and are either black and white. Horns of young ones are smooth and polished but in adults, horns are rugged and indented at the base. Length of the horns in adult ranges from 14-15 cm. Neck is short and length varies from 20-21 cm in adults. Its average body weight ranging from 400-500 kg in 4 to 5 years, it has different colours mostly black and white and maximum life span is about 15 years, produce one calf in a year. Mithun is herbivorous animal eating more than 200 types of grasses, tree leaves, herbs and shrubs in the forest. Currently, farmers rear this animal under free-grazing system in forests.

The coat colour of adult Mithun is mostly dark brown to black with white-stockinged legs similar to that of wild Gaur; however, some animals have white patches and a few lack the stocking pattern. Gaur (*Bos gaurus*) also known as the Indian bison, is the wild ancestor of the Mithun.

Difference between Mithun (*Bos frontalis*) and Gaur (*Bos gaurus*)

- Mithun is smaller with proportionately shorter limbs and stands much lower at the wither.
- Head of Mithun is shorter and broader, with a perfectly flat forehead and a straight line between the base of the horns.
- The extremities in Mithun are much farther apart than in the Gaur.
- Female Mithun is much smaller than the bull with very little developed or no dewlap.
- Skin colour of the head and body in mithun is blackish-brown in both sexes and lower portion of the limbs are white. The fore head is grey coloured.

Socio-economic importance of mithun

Mithun has an important role in the socio-economic, cultural and religious life of tribal people. It is one of the underutilized animals that has tremendous potential especially meat production. This animal is basically raised as a ceremonial and sacrificial animal for meat during festival, religious function and social ceremonies by tribal people. The animal is considered as a sign of prosperity and superiority of an individual in tribal society. The animals are also offered as the price of bride by the bridegroom's family to the bride's family however due to unavailability of Mithun, bridegroom family paid in term of money which the decay tribal's beautiful culture. The currency value of Mithun varies from one region to other, and it is used in exchange of land. Mithun is also employed in payment for ransom, tribute, and fine the bride price. Mithun meat is highly preferred and well relished as traditional delicacy among the tribal people, as its meat is more tender and superior over any other meat. Higher growth rate (450-600) g/day and high adult body weight (400-600 kg) with high dressing percentage of 58-62% compare to those of cattle and buffalo make Mithun a better meat producing animal in North East India. They can attain body weight of 350-550 Kg by the age of 4-5 years.

Livelihood of the people of North-East India is mainly agricultural and livestock based. Development of an organized system for production and marketing Mithun meat may change the socio-economic scenario of the region. Earlier Mithun milk was not considered as a part of food habit of the tribal people but during last few years people started using milk and milk products due to change in food habit. Mithun milk is highly nutritious; it produces 1-2.5 lt of milk per day. Mithun milk is very rich in fat, protein and SNF. 1 lt of mithun milk has calorific value almost equals to 2 lt of cow milk. Mithun milk is highly suitable for making different dairy product like lassi, curd, ghee, barfi, rasgulla, etc. One litre of mithun milk yields about 400-450 g of high quality paneer.

Mithun meat is in high demand due to its high quality and delicacy but due to less population of mithun, demand from local market is yet to be fulfilled. However, productivity may be increased through scientific rearing and community farming and ever increasing demand of meat and meat products may be fulfilled with more availability of meat and meat product from mithun. Additionally, mithun farmers get more income from high quality hides and manures. Upliftment of socio-economic status of farmers can be attained through Mithun farming. Looking at the diversity of this animal in terms of utility, adaptability, quality of meat, thrive on coarse fodders, and grazing on steep hills, there is ample of scope for improvement.

Mithun rearing an alternative for jhuming

Main source of livelihood of tribal's of North-East India is jhuming cultivation. Shifting cultivation is thought to be one of the major contributing factors for decreasing forest in the region. Jhum is generally practiced by all tribal population that accounts about 80% of mithun farmers. In this system of cultivation, there is rotation in land use between long fallow periods with forest, followed by short cropping phase. With the increase of human population, the fallow period of 1-3 years jhuming may not survive in long term due to increasing population, thereby less availability of forests to shorten the jhum cycle. Hence, bringing about continuous deterioration of soil fertilities and ecological balances.

To maintain biodiversity, forest conservation is an important step and Mithun farming being a component of forest based production system, needs to be strengthened by incorporating some other component with it to make it a viable and sustainable forest based integrated farming. For this we need to develop water bodies for Mithun to drink in the forest and it can be utilized as fish culture. The forest area can be explored for orchid and other valuable timber and fodder trees for supporting the poor farmers with

sustainable income. Conservation of biodiversity will largely depend on creating condition to revert traditional long fallow jhuming cycle through finding suitable alternative to jhuming, or a combination of both. Intensive plantation programme of nutritious fodder and edible trees will have to be taken up for generous feeding of the mithun. Government must also take the initiative for discouraging jhum cultivation and popularize integrated Mithun farming as an alternative to jhuming cultivation which would also directly or indirectly prevent global warming. Mithun is generally reared in semi domesticated condition in the jungle. They keep them under free grazing conditions in the jungles with zero expenditure on feeding and management. No housing and concentrate feed is required because they can fully depend on natural forages and green vegetation which are abundantly available in the jungles. So far, nothing much has been done for large scale development of Mithun. If attention is given towards the development of this massive neglected animal, it can become income generative and alternative to the jhuming cultivation.

Tribals cannot produce crops sufficient for sustenance for their families due to decreased soil fertility following deforestation, erosion of soil and increased population etc. As they could not depend on jhum (slash and burn) cultivation, they are now looking for an alternative means for earning their livelihood. Meanwhile, many farmers started animal husbandry like pig, cattle and Mithun rearing as self employment and for earning alternative livelihood. The fully grown adult mithun (4-5 years of age) cost about ₹ 50,000-80,000 per animal which is more than the average annual income of the farmers. One female Mithun can produce an average of 10 calves in her fertile life span of about 15 years.

Threats to Mithun farming

In spite of the wide scope for Mithun rearing and its economic viability, Mithun rearing was not popularized and it is declining for the

following reasons:

- Lack of proper planning and development programme which hindered production of better germplasm for propagation and improvement of indigenous Mithuns.
- Lack of awareness of farmers regarding the profitability of Mithun rearing and over emphasizing on jhum cultivation.
- Lack of purchasing power and capital fund of villagers to purchase mithun for breeding.
- Massive deforestation which has been going on over the years due to population pressure.

Introduction of scientific Mithun rearing system in India

Farmers rear Mithun under free-grazing condition in the forest area without any additional housing or feeding facilities. Occasionally, farmers bring back the female Mithun just before parturition and send it back to the forest following parturition. However, it is suggested that even under a free-range system, a temporary housing structure using locally available materials can be constructed in some strategic locations in the Mithun rearing area. Mithun can be trained to come to the shed at a particular time every day by providing little bit of concentrate salt. This helps farmers to supervise, provide additional feeding and medication to the animal. Besides, farmers get an opportunity to look after the individual animal regularly for any kind of discrepancy or disorder. If farmers opt for semi-intensive system of rearing they should go for housing structures with feeding and watering provisions and they can also tie the animals at night once they come back from the forest after grazing. The supervision of individual animal, additional feeding, watering and medication can be done in late evening or early morning.

Feeding

Mithun thrives on the jungle forages, tree fodders, shrubs, herbs and other natural vegetations. Farmers do not provide any additional feeding. Though the animal is owned by farmers, it is kept

under natural forest in a semi-wild condition. However, farmers occasionally provide common salt, especially at the time of restraining for some purposes. Each individual owner can identify his Mithun even though they do not bear any identification marks and similarly each Mithun knows its owner which is reflected in the fact that Mithun approaches its owner periodically for salt. In some places, Mithun owners developed their own identification system by making a cut mark on Mithun ears. In other words, the owner do not have to invest anything in his Mithun as they are simply let loose in the forest which constitutes around 50% of total land area of the region. Owners generally keep Mithun in community herd in fenced hilly jungle area and village councils assign Mithun grazers to take care of their animals.

As Mithun entirely depends on the locally available jungle fodders, special care should be taken in terms of mineral supplementation for better performance. In steep hilly slope, the leaching of mineral elements is a common phenomenon especially during rainy season. Therefore, in a particular hilly grazing gradient the soil will be deficient in some important mineral elements. In that case, the vegetation of that particular area will also be deficient in some of the mineral elements, which may induce mineral deficiency. The only option to correct this situation is mineral supplementation. However, the salt licking behaviour as well as drinking of mineral water sources in the hills is the natural way to meet the requirement of minerals in these animals. During the lean season, when availability of jungle fodders goes down, additional concentrate supplementation may be required. It is advisable that during the flush season when abundant fodders are available in the jungle, salt and mineral mixture together may be fed additionally to the animal to avoid mineral deficiency. Whereas, during lean season additional concentrate feed (15% CP and 70% TDN) fortified with salt and mineral mixture (1-2 kg per animal daily up to 2 years and 2-4 kg per animal daily

above 2 years) may be offered to maintain optimum performances. For lactating Mithun, as it produces less quantity of milk, no additional feeding is required. In free-range Mithun, these feed supplements may be provided to the animals in the shed constructed in strategic location in the grazing area. Whereas, for animals under semi intensive system, the feed supplements may be provided in the shed in late evening or early morning whenever the animals are tied. It has been found that the drinking water requirement for Mithun is approximately 9% and 12% of body weight, during winter and summer, respectively. Therefore, provision of adequate drinking water according to this specification is highly essential.

Breeding management

Like cattle, Mithun is a poly-estrus animal. The healthy adult female Mithun show repeated estrus cycles at an interval of 19-23 days unless it is pregnant. Mithun breeds throughout the year and no definite breeding season is observed in this species. The length of gestation period, service period and calving interval in mithun varies from 270-290 days, 50-100 days and 350-400 days, respectively. The age at puberty and age at first calving varies from 27-36 months and 40-48 months, respectively. The mithun bulls become mature to breed at 3-4 years of age. Under free-range system, a practical approach for selective breeding in Mithun is the introduction of superior and tested bulls (1 bull for 10 breedable females) in the herd and simultaneous culling of the unwanted bulls from the herd. Efforts should be made to replace breeding bulls preferably once in five years to avoid inbreeding depression. Under semi intensive system, female can be detected in heat to be bred with superior bulls either through natural service or artificial insemination.

The expression of estrus behaviour is silent in Mithun. Unlike cattle, it is difficult to detect heat in Mithun through visual observations. Among all the behavioural signs of estrus, the mounting of Mithun bull over estrus cow is the best indicator of estrus

followed by standing of estrus cow to be mounted by Mithun bull. Congestion of vulval mucous membrane and swelling of vulva are also important signs of estrus in mithun cows. In contrast, other signs like mucous discharge, restlessness and alertness, tail raising, frequent urination and loss of appetite were found to be less prominent estrus signs in Mithun cows. Bellowing is not generally observed in Mithun during estrus. The genital organ of Mithun cows during estrus reveals relaxed and open os externa of cervix, turgid uterus and ovaries having palpable follicles. However, it is suggested to use healthy Mithun bulls to detect heat. Fern pattern of cervical mucus is the best indicator for standing heat.

Common diseases in mithun

Like other bovine species, Mithun reared in semi-intensive system suffers from various infectious diseases like tuberculosis, paratuberculosis, brucellosis, foot and mouth disease (FMD), infectious bovine rhinotracheitis (IBR), and bovine viral diarrhoea which has tremendous detrimental effect on profitable Mithun husbandry practices. Regular deworming, vaccination and treatment of ailing animal is required to be undertaken to keep the animals healthy. Leech infestation is common in Mithun. Death may occur due to leech infestation in Mithun, other non infectious diseases like tympany, debility, anemia, tick infestation are very commonly observed and needs proper attention and supplementation to overcome these ailments. Mithun is endangered species and scientific rearing and research is required to be to

undertaken to increase socio-economic status of tribal people in hilly areas of Northeastern region by increasing the production potential and performance of the animals. Further more emphasis should be undertaken to start with semi-intensive type of housing system by adopting better managerial practices in Mithun rearing.

Conservation strategies

- To conserve and promote the germplasm of semi domesticated Mithun in their natural habitat with the maximum participation of village based farmers for socio-economic development.
- To domesticate free range Mithun by grooming, patting, salt feeding, milking, etc. and making it economic animal for production of milk and meat.
- To produce maximum numbers of improved breeding stock of Mithun for distribution to increased farmers for rearing.
- Motivate the farmers for taking up large scale Mithun rearing for replacement of jhuming cultivation which is unprofitable and destructive to the forest will help in a big way to maintain ecological balance as well.
- To organize awareness campaigns and impart training to the farmers on economic rearing and management of Mithun.
- To establish as many as possible semi-intensive Mithun rearing units in the forest adjacent to the village where Mithuns are reared on free range conditions in a limited fenced area.
- Establishment of large Mithun breeding centres and germplasm conservation centers by the State government.

- Large scale genetic improvement of Mithun population through artificial insemination.
- Mithun can be a part of integrated farming system wherein Mithun dung can be utilized as input for fish pond and biogas plant. It can also be used a draught animal.
- As the Mithun is one of the best meat purpose breeds, its large scale production/ multiplication may be an alternative means to boost the meat production in the country.
- Providing bank loan for purchase of mithun and developing insurance schemes for Mithun will be a boost for Mithun husbandry.

Action plan for Mithun improvement

- Plantation of nutritious grasses, herbs, shrubs and edible trees for feeding to the animals.
- Formation of village based Mithun rearer's co-operative society which will be linked up with district and state level Mithun readers federation.
- Improvement of marketing facilities and maintenance of uniform selling rate of Mithun and its products.
- Routine vaccination of Mithun against common diseases like FMD, HS&BQ etc. and proper risk coverage under livestock insurance policy.
- Holding of awareness campaigns for scientific rearing of Mithun and organization of local farmers training.
- Creating database of Mithun farmers and Mithun societies at Government Research organization.

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