



LIST OF TECHNOLOGY



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1. Area Specific Mineral Mixture (*uthimin*)

Introduction

Availability of minerals to animals in appropriate quantity is a pre-requisite for better health and production. The minerals should be in optimum concentration in the feed resources we feed to the animals. The minerals are liable to form bonds and negatively interact more than any other nutrient substances. Absorption of minerals highly variable with the dietary nutrient content. Mithun is mostly thrives on forest based foliages. Most of the foliages contained high Ca, Mg, K, Fe, Mn and Zn relative to requirements (NRC 1997). The high levels of Fe interfere with Cu absorption and metabolism. Higher Mg interferes the absorption and metabolism of Ca. The bio-availability of the Ca from the foliages is less than 30% compared to the inorganic form (70%). The Na was deficient compared to the required range in all the foliages. Mithuns display salt-hunger behavior extensively under free-grazing condition, which might be due to the deficiency of Na in the foliages and disturbance in other minerals absorption and metabolism due to their interaction. The Ca:P ratio was much wider in all foliages, which may create problem with vitamin D metabolism (ARC, 1984). Therefore, basing on the mineral content of the foliages and their bio-availability and requirement, the following mineral mixture was computed to feed the mithun to improve the performance.

Reasons for developing the technology:

- Leaching of minerals from soil due to heavy rainfall in NEH region
- Craving for salts in mithun
- Fodder plants deficient in Na (93.65%), Cu (21.69%), P (13.5%), Mg (2.65%) and Zn (0.53%)

Technology description:

- Analyzed mineral contents of soil, fodders and serum
- Compounded mineral mixture as per the deficiency
- Mixing and packing
- Used in Institute Farm
- Field Trial has been conducted for reproductive augmentation



Benefits over conventional/Traditional practice: It is a area specific mineral mixture fortified with all mineral contents to required for physiological, improve body weight gain and reproductive purpose.

Status of commercialization: Ready for commercialization

2.Feed Block for Mithun

Complete feed block developed for better growth and production reduced dustiness, improved palatability as well as digestibility of nutrients, thereby increased the productivity in mithun for higher income. The feed blocks were made from locally available feed ingredients. Three leaves, straw and concentrate feed were mixed together and pressed by using feed block making machine. Similarly, feed blocks were also made from paddy straw and spent gains (a breweries industry by-product) with high moisture content (75-80%). Simultaneously, methods have also been developed for drying high moisture content by products (spent grain/fodders more efficiently during rainy season). Performance of mithun was found to be good with average daily growth (ADG) of 500 g in tree leaves based feed blocks and 553.6 g from spent grain based feed blocks as against ADG of 396.2 g in control feeding.

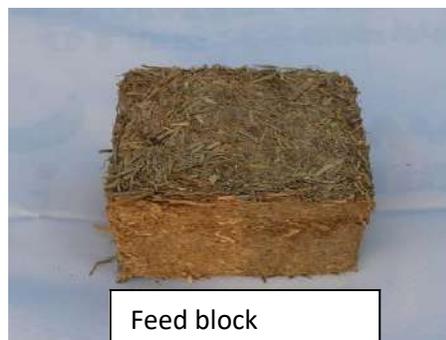
Process for Drying Agro-industrial Byproduct and using it as a component of mithun feed Block

Agro-industrial byproducts:

- Brewer's spent grain
- Wet cake

Reasons for developing the technology:

- Rich in nutrient contents
Brewer's spent grain: CP– 30%
Wet cake: CP– 40%
- High moisture content (\approx 75%)
- Highly perishable due to microbial growth



- Cheap (\approx Rs. 4/kg)

Technology description:

Materials required:

- Agro-industrial byproducts
- Paddy straw / Dried tree leaves/hay
- Polyhouse with racks
- Mixer
- Feed block machine

Advantages:

- No additional binder required
- Storage for 1 year without deterioration of quality (moisture <15%)
- Weight – 3.2 kg
- Crude protein–15%, Digestible energy–3.05 kcal/kg
- 3 blocks are sufficient for a 300 kg mithun

Benefits over conventional/Traditional practice:

- Easy in transport and storage
- Suitable for feeding in intensive, semi-intensive, and free-range system
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Status of commercialization: Ready for commercialization

3.Mineral Block for mithun

Reasons for developing the technology:

- Spoilage of mineral mixture due to spreading over the rocks/boulders
- Controlled release of minerals during licking
- Reducing competition among the animals.

Technology description:

Materials and Methods:

- Mineral mixture (Price – Rs. 136/kg versus Rs. 185/ kg)
- Developed Binder: Locally available (Rs. 1.35/kg mineral mixture)
- Pressing machine/device to give the shape of the block (Rs. 35,000/-)
- Dryer (R.s 1.5 lakh)



Mineral block

Benefits over conventional/Traditional practice:

- Easy in transport and storage
- Suitable for feeding in intensive, semi-intensive, and free-range system

Status of commercialization: Ready for commercialization

4. Semi-intensive model for rearing mithun

Introduction:

Mithun is traditionally being reared under a free-range forest ecosystem in which the animals are left loose in the community forest without providing shelter and any supplementary feeding except occasional salt. Animals are looked after by one or two herdsman. The animals are exposed to harsh weather conditions and wild carnivores; there is a lot of mortality due to diseases and particularly to newborn calves due to attacks from wild carnivores. During winters, due to scarcity of trees leaves, and grasses in the forest, trespassing of mithun into agricultural land is reported which is the main cause of conflict between mithun owners and agriculture farmers. Some of the villagers have even stopped rearing of mithun due to this conflict. Moreover, decreasing forest coverage in the region is also a concern for the conservation and propagation of mithun in the region. Therefore, ICAR-NRC on Mithun has developed an alternative rearing system for mithun under a semi-intensive rearing system and the same has already been practiced successfully in the Institute Mithun Farm for the last two decades.

Semi-intensive system:

Under the 'semi-intensive system, mithuns are provided with a night shelter. The animals are let loose for grazing during the day and by evening, animals are brought back to the shelter and can be fed with supplements like fodder grass, paddy straw with little concentrate. The supervision of individual animals, additional feeding, watering, and medication can be done during the late afternoon or early morning. The biggest advantage of this system is that the animals can be monitored by the owner regularly for growth, reproduction, health care, and breeding.

From 2016-17 to 2020-21 under the Tribal Sub Plan (TSP), the Institute has established 26 semi-intensive mithun rearing model under field conditions. The following images show the



Farm setting

Farmers' field

Benefits over conventional/Traditional practice:

- Easy for managing and monitoring of the animal .
- Controlled feeding, breeding and housing.

5.Portable Meat dryer

Introduction:

Food drying is a method of preserving meats, fruit and vegetables that have been practiced since antiquity. Smoked meat is heterocyclic amines (HCAs) and polycyclic aromatic hydrocarbons (PAHs), both known carcinogens. Smoked meat contains nitrates and nitrites, byproducts of the smoking process. The concern is that nitrites and nitrates can be converted in the body to N-nitroso compounds, which have been shown to cause stomach cancer in lab animals. Smoked meats often contain a considerable amount of sodium. Heart and Diabetes Risks. The driers heating element, fans and vents simultaneously work to direct hot air over the food, accelerate surface evaporation and warm the food causing moisture to be also released from its interior. This process continues until the food is dried to substantially lower water content.

The novelty of the developed device is quick drying (3 stage heating) and storage of meat, no accumulation of carbon shoot, fungal growth and degradation by maggot and portable structure and eco-friendly.



Meat dryer

Benefits over conventional/Traditional practice:

1. Quick drying (3 stage heating) and storage of meat
2. No accumulation of carbon shoot, fungal growth and degradation by maggot
3. Portable structure and eco friendly
4. Hygienic collection of lard for use in traditional cooking
5. Maximum 5 kg meat drying provision
6. Additional benefit of room heating during the winter season.

Status of commercialization: Ready for commercialization

6. Humane chicken killing cone

Introduction:

As commonly practiced, a chicken/duck is killed by twisting of the neck or hitting the back with hard objects. This would prolonged struggle, painful to the bird and traumatic resulting in death. Neck cutting/halal is not practiced. We must have the necessary skills and knowledge to complete the task quickly, confidently and without causing the bird any avoidable pain, distress or suffering. The killing cone is designed with an objective of humane killing of birds to reduced time and pain in the process of slaughter. The principle applied is neck dislocation with rapture of spinal cord stops breathing and disrupts blood flow to the brain by rupturing the blood vessels.

Novelty of the developed device are Portable and easy to handle, quick and humane killing, less exposure to dander's, external parasites and debris , commercial utility in small slaughter houses and at home, adjustable with the size of the bird and cost effective.



Humane Chicken Killing cone

Benefits over conventional/Traditional practice:

1. Portable and easy to handle
2. Quick and humane killing
3. Less exposure to dander's , external parasites and debries
4. Commercial utility in small slaughter houses and at home
5. Adjustable with the size of the bird
6. Cost effective

Status of commercialization: Ready for commercialization

7.Poultry Maize Feeder for Backyard Chicken

Introduction:

As a traditional practice, a major share of maize harvest is preserved for backyard poultry. The maize at preserved by hanging the cobs by a string onto the ceiling close to the fireplace or in the loggia. Once in the morning and evening, cobs are shelled with hand and broadcasted in the backyard to feed the birds. Due to peck behavior in the poultry birds, the male and dominant birds gets a major share of the feed.

- a) Fungal growth in maize especially in summer exposes the birds to mycotoxins. Feeding of maize grains contaminated with mycotoxin exposes the backyard birds to infectious diseases.
- b) Unavailability and expensive commercial feeder and drinker. Not suitable for backyard birds
- c) Broadcasting of maize and other grains leads to uneven availability of feed ingredients to the stock
- d) The developed “DeSave Maize dispenser for backyard chicken” addresses all these problems catering to the overall need of the chicken owners particularly backyard farmers.
- e) **The novelty of the developed device are** Portable, durable, affordable and eco-friendly, Provision wholesome water in two drinkers, easy medication and supplementation, and cost-effective (One feeder/10 birds)



Poultry Maize feeder

Benefits over conventional/Traditional practice:

- ◆ Regular exposure of the shelled maize to sunlight and air, hinders fungal growth
- ◆ Regular shelling of maize can be done away with.
- ◆ Visual assessment of quantity of maize through the marked side bars.
- ◆ Self dispensing while pecking for the grain
- ◆ Funnel for easy pouring of the grain
- ◆ Reduces birds fighting and aggressive pecking behaviour
- ◆ Provision wholesome water in two drinkers
- ◆ Easy medication and supplementation
- ◆ Cost effective(One feeder/12-15 birds)
- ◆ Portable, easy to handle and ecofriendly

Status of commercialization: Ready for commercialization

8. Portable Mineral Block Dispenser with Adjustable Height

Introduction

In free-range pasture mineral deficiency occurs due to:

- Keeping the dispenser in a place where animals are not grazing
- Difficulty in shifting the dispenser due to bigger in size and fixed in a place
- Competition among the animals
- Unlimited access to mineral mixture due to excess or unlimited supplement
- Spoilage of mineral mixture or block due to rain
- Mismatch of the height at which dispenser is set and animal size



Front view

Top view

Description:

The developed device has several features combined into one single unit, catering to the need of livestock owners, for supplementation of mineral mixture to animals. Following features have been provided in the developed device:

- Portable, durable, affordable device
- Less competition among animals: Setting more number of the dispensers
- Protection of mineral supplements from drenching with rain
- Respite from supplementation of minerals on daily basis
- Setting of the dispenser on a quadripod, with height adjustment facility, in pasture in free range system or in farm condition
- The tripod is attached with foot-rest, to facilitate the animals like goat, gazelle, etc. for licking mineral-blocks with bipedal stance.

Benefits over conventional/Traditional practice:

- Controlled mineral supplementation in free range system (less wastage)

Status of commercialization: Ready for commercialization

9. DeSave Portable Mineral Block Dispenser for Animals**Introduction:**

Supplemental feeding to animals in free range forest ecosystem is a difficult proposition on daily basis. Besides other nutrients, deficiency/imbalance of minerals has profound effect on animal health in free range system. ICAR-NRC on Mithun, Medziphema has developed area specific mineral mixture and prepared blocks for slow and controlled release by licking. Mineral blocks are also often hygroscopic and loose its compactness due to consistent exposure to rain and humidity.

Description:

The developed device has several features combined into one single unit, catering to the need of livestock owners, for supplementation of mineral mixture to animals.



Following features have been provided in the developed device:

- Portable, durable, affordable
- Protection of mineral supplements from drenching with rain
- Respite from supplementation of minerals on daily basis
- Setting of the dispenser on the trunk or branches of the tree in the forest or on poles in pasture in free range system or in farm condition



Desave Mineral block dispenser

Benefits over conventional/Traditional practice:

- Controlled mineral supplementation in free range system .

Status of commercialization: Ready for commercialization

10. Ectoparasite Expeller cum Drug Applicator

Introduction

- Mithun, cattle, horse, sheep, goat and pig are affected by wide range of arthropod ectoparasites and nuisance pests.
- Ectoparasites cause significant losses and severely compromises animal welfare.
- Tick, mite, lice, flies, leach, etc inhabit in the hair surface and outer layers of skin and feed on host tissue, blood and associated secretions.
- Ectoparasite invokes inflammatory response with intense itching and pain.
- As a local solution to a local problem, Manual Ectoparasite Expeller cum Drug Applicator is designed to ward off ectoparasites and minimize the economic impact of the farmer.
- Principle of this device are application of commercial spot-on topical products/drugs paralyses and loosens their grip of the ectoparasite on the skin. The associated comb aid in mechanical removal the adult populations.

Technology Details

- Portable structure, durable, affordable and farmer friendly.
- Applicable in wide range of large and small ruminants including equine and swine.
- Ward off exfoliated skin, hair and increase blood circulation of skin.
- Easy method of topical application of ectoparasitidal drugs like permethrin, cipermethrin, etc.
- Easy removal of adult ticks & lice that feed on blood and skin tissues from body surface.
- Effortless removal of adult ticks, lice and leach in poorly accessible areas like dewlap, brisket, sheet, perineal regions, inner aspect of fore and hind limbs and udder.



Fig 3: Use of Manual Ectoparasite Expeller cum



Fig 6: Sponge roll and comb of Manual Ectoparasite Expeller cum

Benefits over conventional/Traditional practice:

- Excellent for pouring of chemical for the treatment of ectoparasite in animals

Status of commercialization: Ready for commercialization

11.Mithun Semen cryo-preservation

Artificial insemination (AI) by cryopreserved spermatozoa is the first generation biotechnological technique that has contributed intensely in genetic improvement. It is the best

alternative for the long-range distribution of high-quality genetic material. The extended semen is packed and sealed into a 0.25 ml straw and cooled up to 5°C by keeping them in a cold handling cabinet for 90 min. Once the temperature reaches to 5°C, the semen straws were equilibrated for 4 h and by a conventional freezing system. Thawing is done at 37 °C for 30-sec yielding >50% progressive motility.

12. Value-added mithun meat products

Technologies for emulsion meat products, smoked meat products and traditional meat products have been demonstrated & showcased to Mithun farmers and local entrepreneurs.

Sl. No.	Name of Technology	Description
1	Emulsion meat products	A variety of mithun meat products such as nuggets, patties, sausages, slices, meatballs could be produced.
2	Traditional meat products	Processing technology for traditional meat products like mithun meat pickle, mithun momo, smoked mithun meat with suitable packaging technology for preserving its quality and shelf have been developed.



13. Value-added mithun milk products



14. Mithun Mitra Mobile App

The Mithun – Mitra Mobile app is an initiative of ICAR-NRC on Mithun to create awareness and promote among the mithun farmers as well as other stakeholders scientific mithun husbandry for diversified use of mithun as a source of meat, milk, hide and draught power. The app serves as a single-window delivery system for information on mithun viz. semi-intensive mithun rearing system, feeding, breeding, management and various aspects of scientific mithun husbandry that are readily available offline on the app. One unique feature of the app is its registration interface, wherein the mithun farmers can register their mithun rearing societies with the institute database.



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