



Mithun Digest

NATIONAL RESEARCH CENTRE ON MITHUN

Vol. 5 No. 1

January - June, 2008

INSTITUTIONAL ACTIVITIES

Republic Day Celebration

The Republic Day was celebrated on 26 January 2008 in the Institute in solemn manner with



full enthusiasm where all the staff members and the children present in the campus had actively participated in the celebration. The CRPF personnel posted in the neighbourhood gave the Salute to the Tricolor during the occasion.

Refresher's Course in Biotechnology

DBT sponsored Refresher's course on 'Biotechnological intervention for improving animal production and health with special reference to Mithun' was organized in the Institute during 18 Feb to 9 March, 2008. The course was formally inaugurated by Hon'ble DDG (AS), Dr. K. M. Bujarbaruah.



Short Training Programme

A training programme on 'Hygienic meat production and processing' was organized in the Institute in collaboration with IGNOU, New Delhi during 18-20 March, 2008. This training evoked an enthusiastic response from the participants including local entrepreneurs and students from Nagaland.



Institute Management Committee (IMC) Meeting

The meeting of the IMC of the Institute was held on 28 March 2008 under the chairmanship of Dr. C. Rajkhowa, Director. The IMC deliberated on various important issues pertaining to the Institute, reviewed the progress and suggested some valuable steps for the future course of action.





Brain Storming Session

An intensive brain storming session on 'Refining the research and developing an economic breeding policy suitable for Mithun' was held in the Institute during 29-30 March, 2008. Dr. B.K. Joshi, Director, NBAGR; Dr. Dharmeshwar Das. Jt. Director, IVRI; Prof. B. C. Bhowmick, Agriculture Economics, AAU and Dr. Sanjeev Kumar, PS, CARI deliberated on the issues and a number of priority researchable area on Mithun could be chalked out.



RESEARCH ACTIVITIES

Animal Genetics and Breeding

Genetic Studies on Mithun

Lymphocyte culture technique for studying the metaphase chromosome was standardized for Mithun. The metaphase spreads were observed under the microscope, photographed for further studying the chromosome morphology and biometry in male and female.

The cell spreads were screened for good metaphase that is used for preparing karyotype. The chromosome length was measured with the Image Pro (6.0) software and photograph was taken from Nikon microscope (90i) and karyotype was prepared for the male and female Mithun. It was found that normal diploid number of Mithun is

58XX and 58XY for female and male, respectively. The first pair of autosome in Mithun is submetacentric and rests of 27 pair of autosomes are acrocentric. Among the sex chromosomes, X chromosome is submetacentric while the Y chromosome is the smallest submetacentric in Mithun.

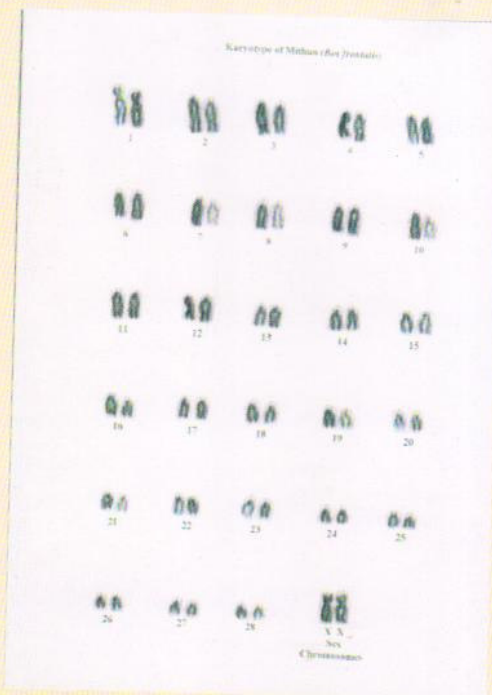


Fig. Karyotype of female Mithun chromosome

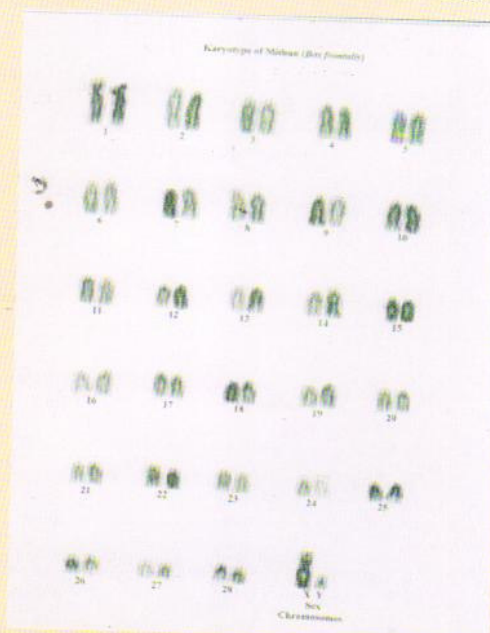


Fig. Karyotype of male Mithun chromosome

Genetic Characterization of Kappa Casein Gene (CSN3) of Mithun

Efforts have been initiated to characterize Mithun kappa casein gene and in this endeavour, primers based on homologous bovine species has been attempted successfully and a 270 bp region of parts of exon 3 and intron 3 of Mithun kappa casein gene has been amplified.

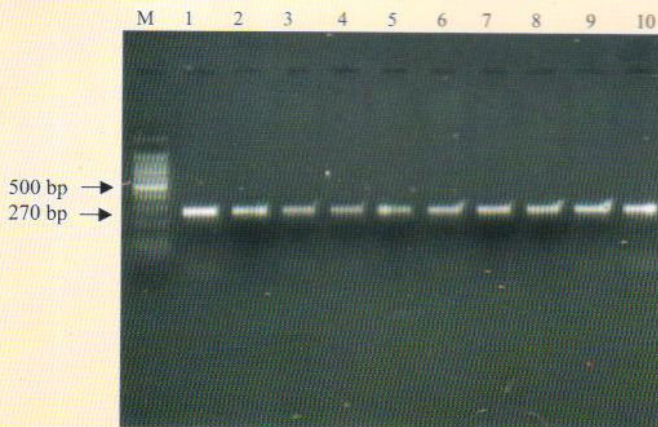


Fig. Ethidium bromide stained Agarose gel of PCR amplified region of Mithun CSN3 gene. Lane M: 100 bp DNA ladder; Lane 1-10: PCR amplified 270 bp products

Animal Nutrition

Performance of mithun (*Bos frontalis*) reared in captivity and fed mixed tree leaves and straw based ration.

North East region is covered with forest and tree leaves/shrubs are available in plenty for feeding of Mithun. Rice straw is the major crop residue available in NE region. So feeding of mixed tree leaves and paddy straw along with concentrate mixture is the best option for feeding of Mithun in captivity. The tree leaves consists of temechiedie (*Ficus hirta*), Pedu (*Debrogesia longifolia*), thenha (*Litsea sps*), thumero (*Legroestromea spaciosa*).

Mixed tree leaves/shrubs and paddy straw (2:1 ratio on fresh basis) along with concentrate mixture when fed to the growing animals as per as per the requirement of NRC (2001) for dairy cattle the animals attained 602 gm ADG in male and 554 gm in female animals with DMI/100kg body weight was 2.74 for male and 2.71 for female animals. The DCP and TDN percentage of the diet was 8.97 and 60.31 for male and 8.25, 59.63 for female mithun. The digestible coefficients of animals for DM and CP were 58.08 and 61.35 for male and 57.97 and 56.32 for female respectively. There was no significant difference in digestibility of DM, OM, EE, CF and NFE between male and female mithun except CP, NDF and ADF which was higher in male mithun compared to female. The pH, TVFA (meq/L), NH₃N (mg/100ml) of rumen liquor were 6.27, 132.5 and 12.03 for male and 6.25, 127.8 and 20.20 for female mithun respectively. The NH₃N level of rumen liquor in male animal is significantly less compared to female animals. The serum biochemical parameters like serum total protein, albumin and globulin varied from 5.95, 2.50 and 3.45 g/dl for male and 5.80, 2.84, 2.97 g/dl for female respectively. The values of total protein, albumin and globulin of serum did not differ significantly between male and female animals. The present study indicated that mithun can be reared in captivity on tree leaves and straw along with concentrate mixture. There was also difference in the performance of male and female mithun for the above period.



A mithun under experiment

Comparison of excreta from mithun (*Bos frontalis*) and local cattle (*Tho Tho*) in Nagaland

The excreta (faeces and urine) of mithun and Tho-tho cattle were compared for supply of organic fertilizer in Nagaland. As per the observation, the excretion of faeces in mithun was more than the excretion of faeces in tho-tho cattle ($P < 0.05$). However, the faeces of tho-tho cattle contained less water (more DM) compared to the faeces of mithun ($P < 0.05$). The chemical composition of faeces for nitrogen, crude protein, EE, CF, TA and NFE of mithun and local cattle did not differ significantly. Mithun produced more urine than tho-tho cattle. ($P < 0.05$). However, the nitrogen % of urine in both the species were almost same. So per animal basis, mithun supplied more excreta as organic fertilizer to the soil than Tho-tho cattle in Nagaland.

Effect of feeding paddy straw, concentrate and *Lagerstroemia speciosa* tree leaves based ration (feed blocks) on nutrient intake and utilization in adult male mithun.

Lagerstroemia speciosa tree leaves could be potential source of nitrogen for Mithuns in NEH region. Four experimental rations (feed blocks) have been formulated on *Lagerstroemia speciosa* based ration and fed to mithun under confined condition. The results suggest that the *Lagerstroemia speciosa* can safely be

incorporated in ration up to 30 percent for feeding of mithun under semi-intensive or intensive system.



Effect of feeding bakers yeast (*Sacharomyces cerevisiae*) in Mithun on roughage based diet.

Effect of feeding bakers yeast (*Sacharomyces cerevisiae*), a probiotic for mithun on roughage based diet was studied and it was found that the ADG of animals in treated group (containing probiotic) increased significantly compared to control group (without probiotic). The intake of both concentrate and roughage in treated group increased significantly compared to control group. The FCR was improved in animals fed with yeast.

Animal Physiology

Mother-neonate bonding: Use of Oxytocin Intranasal Spray

Oxytocin is believed to promote social attachment and affiliation in laboratory animals and humans. It was hypothesized that oxytocin might also promote proceptive behaviours – such as mother-offspring bonding – in Mithun. A randomised design was used to compare maternal behaviour in a group of postpartum primiparous Mithun heifers that received a single dose of intranasal oxytocin at 5 hour post blocking the release of endogenous oxytocin with that of heifers in a control group that received saline.

The effect of epidural anaesthesia on the release of oxytocin and subsequent manifestation of maternal

behaviour in primiparous mithun heifers during delivery. Epidural anaesthesia with lignocaine HCl (n=8) blocked the release of oxytocin and reduced the expression of maternal behaviours like sniffing, licking and suckling in cows administered epidurally with lignocaine HCl (EPI) than saline group (SAL; n=7). During the five hours period of observation following delivery, maternal-offspring bond could not establish in the EPI group. We hypothesised that oxytocin administration to these cows could establish the bond between the cow and calf. Our experiment with administration of intranasal oxytocin increases considerably the maternal behaviour (7 of 8 animals; 87.5%) in those where oxytocin release were blocked with epidural lignocaine HCl. These cows approached their respective calf and exhibited full maternal behaviour including licking, sniffing, suckling and approach behaviours.

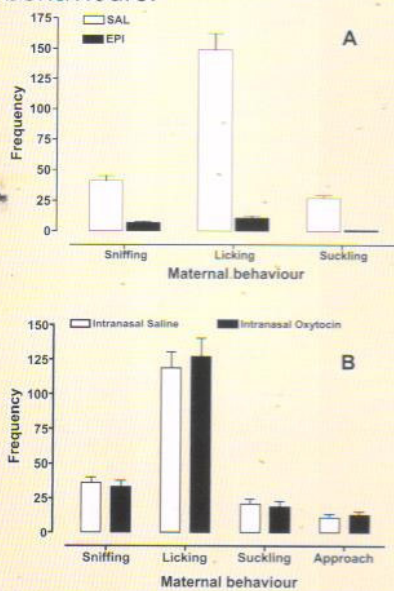


Fig. Effects of epidural anaesthesia and intranasal oxytocin on maternal behaviour in postpartum heifers. Panel A: Frequencies of sniffing, licking and suckling behaviours were recorded for 5-hour after delivery in SAL (saline; n=7) and EPI (epidural anaesthesia; n=8) heifers (experiment 1). Maternal behaviour like sniffing ($P=0.0002$), licking ($P=0.00001$) and suckling ($P=0.0001$) reduced significantly. Panel B: SAL and EPI heifers of experiment 1 were administered either with intranasal saline or oxytocin and frequencies of various maternal behaviour like sniffing, licking, suckling and approach were recorded for 3-hour following administration. Maternal behaviour resumed in 87.5% EPI heifers. Maternal behaviour in intranasal saline and oxytocin heifers was statistically identical.

Livestock Production and Management

PCR amplification of 16S rDNA of mithun rumen bacteria

Fibrobacter succinogenes that ferments starch and cellulose and *Streptococcus bovis* that ferments starch have been amplified (16S rDNA) successfully through PCR from total bacterial genomic DNA purified from mithun rumen fluid. The 16S rDNA fragments of Methanogenic Archaeon, *Fibrobacter succinogenes* and *Streptococcus bovis* that available in mithun rumen have been sequenced and phylogenetic analyses have been done.

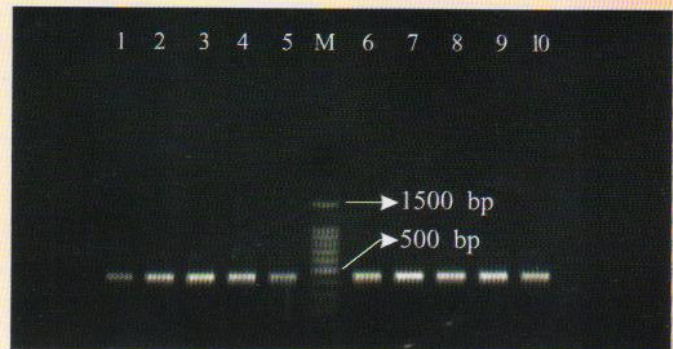


Fig. Agarose gel showing PCR amplification of *Fibrobacter succinogenes* (445 bp amplicon) from the total bacterial DNA isolated from mithun rumen fluid. Lane M: 100 bp marker; Lane 1-2: animal-1; Lane 3-4: animal-2; Lane 5-6: animal-3; Lane 7-8: animal-4; Lane 9-10: animal-5.

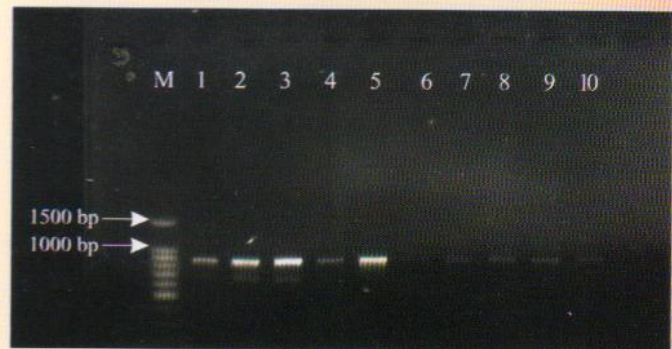


Fig. Agarose gel showing PCR amplification of *Streptococcus bovis* (855 bp amplicon) from the total bacterial DNA isolated from mithun rumen fluid. Lane M: 100 bp marker; Lane 1-2: animal-1; Lane 3-4: animal-2; Lane 5-6: animal-3; Lane 7-8: animal-4; Lane 9-10: animal-5.

Identification of whey proteins in mithun milk

To identify different whey protein fractions, the whey separated from mithun and crossbred cow milk have been subjected to dialysis followed by SDS-PAGE electrophoresis along with protein markers. Seven whey protein bands (A, B, C, D, E, F and G) were detected in both mithun and crossbred cow milk (figure 3). Molecular weights of the different whey protein fractions have been found to be similar in both mithun and crossbred cattle. The estimated molecular weights of seven whey protein fractions are 150- kDa (A), 80- kDa (B), 66- kDa (C), 55- kDa (D), 19- kDa (E), 14-kDa (F) and 10-kDa (G). The protein fractions with molecular weight of 150-kDa (A), 80-kDa (B), 66- kDa (C), 19- kDa (E) and 14- kDa (F) are likely to be immunoglobulin, lactoferrin/lactoperoxidase, BSA and β -lactoglobulin.

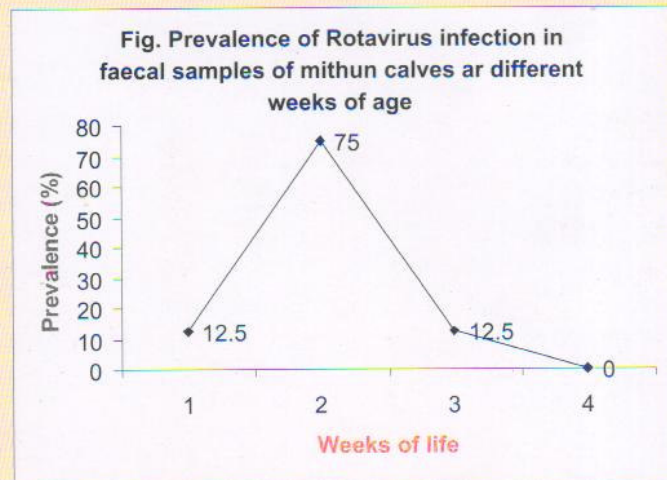


Fig. SDS-PAGE pattern of protein marker (lane 1), crossbred cattle milk whey proteins (lane 2) and mithun milk whey proteins (lane 3)

Animal Health

- Rotaviral RNA was isolated in diarrhoeic faecal samples of Mithun calves by gel electrophoresis.
- 33 *E. coli* strains belonging to 22 serogroups were isolated from total 58 samples (samples from various origin mainly faecal samples) from Mithun calves. Out of the 33 *E. coli* strains, three were untypeable and two were rough. The various serogroups (based on 'O' antigen) of *E. coli*

recorded in Mithun calves are O1, O2, O4, O9, O13, O25, O26, O30, O36, O49, O55, O56, O68, O69, O80, O141, O146, O149, O156, O158, O166 and O168. The predominant *E. coli* serogroups recorded in Mithun calves are O4, O26, O149 and O168.



- Heat stable (ST) and Heat Labile (LT) enterotoxin genes of *E. coli* (in diarrhoeic faecal samples of mithun calves) was detected by polymerase chain reaction (PCR)

PERSONALIA

1. Ms. Aloli Rengma joined the post of Sr. Clerk in this Institute on 29.03.08 on transfer from NRC on Pig, Guwahati.
2. Dr. A. Dhali (Scientist-SS) and Dr. K. Khate (T7-8) have visited the Central Institute of Agricultural Engineering, Bhopal and initiated the research activities for estimating draught capability of Mithun during 6-8 April, 2008.
3. Dr. A. Mech (Scientist) has successfully completed her Doctoral Dissertation "Factors Affecting Plateau in Milk Productivity of Crossbred Cattle" and awarded PhD degree on 03.05.2008 by National Dairy Research Institute, Karnal.

OTHER ACTIVITIES

Sports

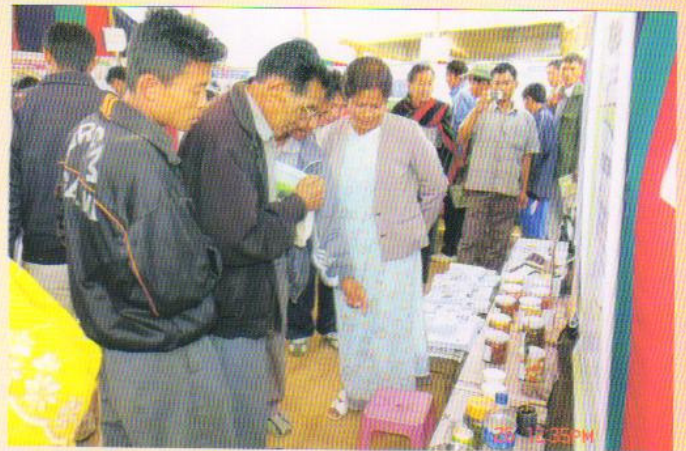
The Institute sports team comprising 17 members participated in the ICAR Eastern Zonal Sports meet

at CIFRI, Barrackpore during 4-8 Feb 2008. It was a matter of great pride that this team won overall 2nd position out of 15 teams participated in the tournament and won 12 medals (eight gold, three silver and one bronze) including the prestigious football gold medal in team event. All these activities has brought laurels in the sports arena, and kept the flag of this Institute flying high.



Kisan Mela

A Kisan Mela was organized at the Porba centre on 26 March 2008. Members from six adjoining villages along with Chakhesang Women Welfare Society (NGO) Pfutsero, State Agriculture Department and State Veterinary Department took part in the programme. The Mela was inaugurated by Mr. Rakhuse a veteran and prosperous tea grower of Porba village. Crop, flower, fruit and handloom competition were also organized in the mela and farmers were awarded for their products to encourage their skill. A live Mithun show was a special attraction in the *mela*.



Showcasing value added products prepared by the Institute



A view of the Kisan Mela

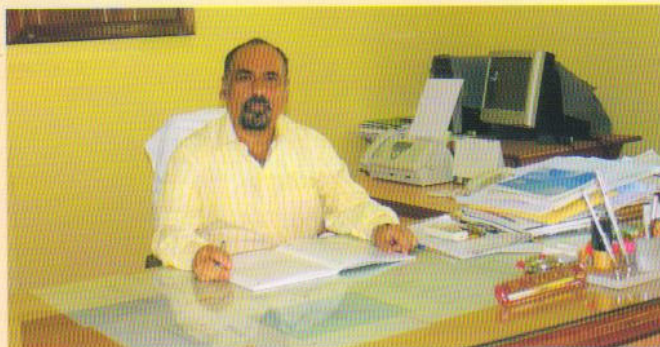
From The Director's Desk

The NRC on Mithun located in Medziphema area of Nagaland is catering the research and extension need of Mithun rearers in North East Hill Region. During the last couple of years this Institute could generate different appropriate technologies for the benefits of Mithun rearers. Due to this, the Institute has come to the limelight in the Mithun rearing areas of the region.

The work related to karyotyping of Mithun chromosomes has given us some answers related to the number of chromosomes, their morphology and its difference with cattle during the process of evolution. The work related to characterization of rumen methanogenic bacteria is the work in the right direction, which will lead us to understand the rumen environment.

The identification of whey protein will throw some light in regard to nutritional as well as medicinal property of Mithun milk, which may add value to the Mithun milk in the market.

The training, popular lecture and refreshers course sponsored by IGNOU and DBT, respectively has helped us to transmit the recent advances in the field of Mithun husbandry to the college students,



local entrepreneurs, academicians as well as extension workers. This will definitely help to upgrade the skill of human resources.

The Kisan Mela organized by the Institute in Porba center was a unique one. Overwhelming support of the farming Community of the area in organizing the Mela depicted the motivation of tribal farmers towards modern agriculture.

One of our Scientist Dr. Mohan Mondal has been selected by the Dept. of Science and Technology, Govt. of India for awarding individual research project to be undertaken in the Institute as a young Scientist. I congratulate him for his success. I want also to congratulate all the Scientists, Technicals, and Administrative as well as contractual staff for their whole hearted support to bring in success to our Institute.

I pray to God Almighty to give us strength and wisdom to do better for the cause of this unique animal.

(C. Rajkhowa)

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