

Mithun Digest

NATIONAL RESEARCH CENTRE ON MITHUN

Vol. 3. No. 2

July - Dec, 2006

INSTITUTIONAL ACTIVITIES

Independence Day Celebration

The Institute had celebrated the 60th Independence Day with full enthusiasm where all the staff members participated along with their family members.



Celebration of Independence Day at the institute

Hindi Week Celebration

The Hindi week was observed jointly by the staff of ICAR Research complex for NEH region, Nagaland centre and NRC on Mithun (ICAR) in the Institute from 14th to 21st September, 2006. The events like essay writing, extempore speech, debate, noting and drafting, singing and drawing were organized on the occasion. All the staff members of both the institutes participated actively and prizes were distributed to the winners of different events in various categories

MITHUN CALF BORN THROUGH ARTIFICIAL INSEMINATION

National Research Centre on Mithun, Jharnapani has successfully come up with a technique for preservation of semen and artificial insemination in mithun.

Scientists of this centre had successfully collected semen from healthy mithun bull, evaluated for its quality and extended the volume and dose of semen with suitable buffer and preserved the semen at refrigeration (5°C) and subzero temperature (-196°C) in liquid nitrogen.

The first mithun calf in India through artificial insemination was born on 8th August'2006 in this institute.



Mithun calf born through Artificial insemination at the institute farm



RESEARCH ACTIVITIES

Animal Nutrition

Studies conducted to assess the nutritive value, nutrient utilization, body weight gain and rumen fermentation pattern in mithun calves fed on *Borrena hirticulata* / *Ficus hirta*, Paddy straw and concentrate based TMR ($TMR_1 + TMR_2$) revealed that the mean value of dry matter intake DMI (Kg/d) and feed efficiency (Feed: gain) was significantly higher in TMR_1 than TMR_2 fed group. The body weight gain (kg/d or g/d) was found to be significantly higher in animals fed with TMR_1 . The apparent digestibility of the nutrient did not differ between both the groups except that the dry matter (DM) digestibility was significantly higher in TMR_1 . Intake of digestible crude protein (DCP) and total digestible nutrients (TDN) g/kg W^{0.75} did not show marked difference among the groups.

The diurnal variation of pH was similar in both the treatments giving lower value at 2 h of post feeding. However, the pH-decrease was larger ($P > 0.05$) for TMR_2 that was of FH + Paddy straw and concentrate. The pH range (5.98-7.19) observed under both the treatments. The mean values of total VFA concentration in each treatment ranged from 45-100 and 42-105 mM for TMR_1 and TMR_2 respectively with lower values at 0 h of feeding and higher value at 10 h post feeding. However the VFA concentration was also higher ($P > 0.05$) on TMR_2 than on TMR_1 . Rumen NH_3 -N concentration peaked at 2 h of post feeding in both the treatments. The NH_3 -N was marginally higher ($P > 0.05$) in TMR_2 than on diet TMR_1 . Rumen total-N was higher in TMR_2 ($P < 0.01$) than on TMR_1 . The highest

concentration of total-N was determined in the SRL of TMR_2 fed animals.

Studies also revealed that the perennial tree leaves like *Ficus hirta* and herb like *Borrena hirticulata* can be incorporated up to 30 percent of total mixed ration without adverse effects on nutrient utilization and growth performance. However, the *Borrena hirticulata* based ration (TMR_1) showed marginal advantage over *Ficus hirta* based (TMR_2) in terms of nutrients efficiency and growth. The rumen fermentation pattern showed an established trend in both the treatments but TMR_1 fed animals proved to be more stable as is evident from the efficiency of nutrient utilization and growth in animals fed on this



Preparation of feed blocks for mithun at the institute farm



Mithuns are fed with feed blocks

Livestock Production & Management

Studies on secretion pattern of LH, FSH, Estradiol, Progesterone and PGFM around the time of estrus in mithun revealed that all the experimental animals were ovulated followed by the functional CL development. The P4 concentrations were fluctuated throughout the period of estrus irrespective of the expression of standing heat. However, the average plasma P4 concentration was found significantly ($p < 0.05$) lower on the day of estrus in both the cases. In animals that expressed standing heat, a non-significant transient increase in the plasma P4 concentration was observed before the onset of standing heat.

The LH and FSH concentrations were fluctuated throughout the period of estrus irrespective of the expression of standing heat. During the study, the multiple rises in LH and FSH concentrations above the basal level in spike like fashion were observed throughout the estrus period irrespective of the occurrence of standing heat. In the animals both without and with standing heat, a non-significant gradual decline in the average daily LH concentration was observed following estrus. Whereas, a non-significant gradual decline in the average FSH concentration following estrus was observed in animals without standing heat. In contrast, the average FSH concentration was found significantly ($p < 0.01$) higher on day 1 and then decreased gradually in animals that expressed standing heat. The amplitudes of highest LH and FSH concentrations and the intervals from estrus onset to these highest concentrations did not differ significantly in animals without or with standing heat. In animals that expressed standing heat, a significant ($p < 0.05$) increase in the LH and FSH concentrations was observed at around the time of

standing heat onset. During the study, a non-significant gradual decline in the average number and amplitude of LH and FSH peaks and area under LH and FSH curves was observed irrespective of the expression of standing heat. average daily E2 concentration was observed till day 2 following estrus onset irrespective of the occurrence of standing heat.

When samples were collected at 1 h interval during the period, 42 h prior to estrus to 12 h post estrus, a clear pulsatile pattern of PGFM (Mean \pm SE) secretion was observed. The peak ($p < 0.01$) PGFM level (592.0 ± 13.5 pg/ml) was observed at 31 h prior to estrus. The lowest PGFM level (100.0 ± 6.2) was observed at the onset of estrus. During the period 16 h prior to estrus to 12 h post estrus, the PGFM level did not differ significantly and fluctuated around the basal level (100.0 ± 6.2 to 138.0 ± 10.1 pg/ml).

It is concluded from the study that the frequent short-duration low-amplitude surges of LH and FSH are probably crucial for the final maturation of the ovulatory follicle and subsequent ovulation in mithun. The results of the present investigation are suggestive of a probable differential control mechanism for LH and FSH secretion during estrus in mithun.

Animal Physiology:

The long post-partum period (94 ± 13 days) causes huge economic loss to the mithun rearers in the country. Induction of postpartum oestrus immediately after uterine involution (around day 45 postpartum) in postpartum mithun cows is therefore important to economize the mithun farming in terms of early occurrence of postpartum heat, successful insemination and conception thereby increased reproductive lifespan of the cows. Furthermore,

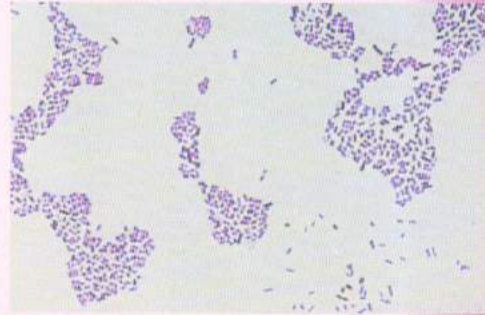
synchronization of oestrus and subsequent fixed-time insemination in postpartum cows will not only help to get all calves at a time but also better management of animals as well as labours thereby economic mithun farming. An effort was made to induce postpartum oestrus as soon as uterine involution and fixed-time insemination in mithun cows using CIDR that contains 1.38 grams of progesterone in molded silicone over a flexible nylon spine (diagram A). CIDR was inserted using an applicator (diagrams B & C) on day 45 to 50 postpartum (day 0= day of insert) in 27 mithun cows. Synthetic analog of prostaglandin F_{2α} (Iliren ® Tiaprost trometamol) was administered @ 0.69 mg/animal on day 7 and CIDR was removed on day 8. All the animals came in oestrus within 42 to 53 h following Iliren ® administration. Seven animals were inseminated artificially using mithun semen (Diagram D) on day 10 morning-evening schedule (fixed-time insemination). Six animals (86%) were conceived. Use of CIDR therefore not only induced oestrus in postpartum anoestrus mithun cows but also increased around 45 days of reproductive life span in mithun cows.



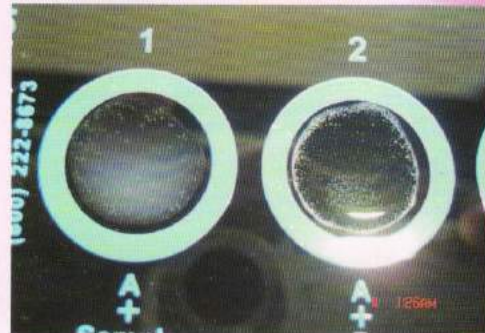
Animal Health

A total of 167 faecal samples (diarrhoeic = 92, non-diarrhoeic = 75), 77 samples from respiratory tract (nasal swab) and 9 tissue samples were collected for bacterial isolation, identification and antimicrobial sensitivity test. Ten different species of microorganisms were isolated from 92 diarrhoeic samples. Mixed infection with 2-3 different types of species were generally recorded in these samples. *E. coli* (77.17%), *C. freundii* (19.56%), *Proteus mirabilis* (17.39%), *C. koseri* (13.04%) and *K. pneumoniae* (10.86%) were the most frequent, followed by *Staphylococcus sp.* (5.43%), *Enterococci* (3.26%), *Enterobacter aerogenes* (2.17%), *Alkaligenes dispar* (2.17%) and *Providencia sp.* (2.17%). Twelve different species of microorganisms were isolated from 75 non-diarrhoeic samples. Predominant organisms found in non-diarrhoeic samples were *E. coli* (78.66%), *K. pneumoniae* (24.00%), *Proteus vulgaris* (24.00%), *Staphylococcus sp.* (24.00%), *Shigella dysenteriae* (20.00%) and *Enterococci* (20.00%). Other agents less frequently observed were *Proteus mirabilis* (16.00%), *C. freundii* (14.66%), *E. aerogenes* (14.66%), *K. aerogenes* (14.66%), *Alkaligenes dispar* (10.66%) and *Providencia sp.* (6.66%). The microorganisms isolated from 5 calves with apparent respiratory signs were *Staphylococcus sp.* (100.00%), *Streptococcus sp.* (60.00%) and *Pseudomonas aeruginosa* (40.00%). The microorganisms isolated from calves without any apparent signs of respiratory tract infection were *E. aerogenes* (20.83%), *K. aerogenes* (18.05%), *Staphylococcus sp.* (18.05%), *Proteus vulgaris* (15.27%), *Alkaligenes dispar* (11.11%), *E. liquefaciens* (11.11%), *C. freundii* (8.33%), *K.*

pneumoniae (8.33%), *C. koseri* (6.94%), *Proteus mirabilis* (6.94%) and *Pasteurella pseudotuberculosis* (1.38%).



Staphylococcus sp. under microscope



Positive for K⁺ *E. coli* (1) and positive control (2)



Haemorrhages in the intestine of a mithun calf that die of *E. coli* infection

EXTENSION ACTIVITIES

A village camp was conducted at Khonoma village under Kohima district of Nagaland where technical assistance in the form of health check up of free-range mithuns, and deworming were provided to the mithun rearers besides making the mithun farmers aware about the common diseases of mithun and their care and management.



Village camp at Khonoma village for providing technical assistance to the mithun farmers

DISTINGUISHED VISITORS

Visit of institute mithun farm by Dr. S. P. Tiwari, DDG (Education), ICAR, New Delhi along with Dr. S. N. Puri, Vice chancellor, Central Agricultural University, Manipur and some other Vice chancellors from different State Agricultural Universities of the country.

Professor, K. Kannan, Vice chancellor, Nagaland University visited the institute on 6th October '2006 and interacted with the scientists of the institute to know the ongoing research activities of the institute.

Mr. Nalong Mize, Advisor to the Chief Minister, Arunachal Pradesh visited the institute on 10th August '2006.

Mr. L.K. Joshi, Secretary (Personnel), Government of India visited the institute on 3rd November '2006.

Mr. S. L. Govindwar, Advisor, Department of Biotechnology, Government of India, New Delhi, along with other members visited the institute on 13th November '2006.

Students from College of Veterinary Science, Mizoram, CAU along with teaching faculty visited the institute and institute farm on 19th October '2006.



Visit of institute farm by Dr. S. P. Tiwari, DDG (Education), ICAR, New Delhi along with other Vice chancellors from different SAUs of the country



Interactions of Professor, K. Kannan, Vice chancellor, Nagaland University with the Research staffs of NRCM



Interactions of DBT team with the research group of the institute on ongoing research activities of the institute



Visit of laboratories of the institute by DBT team from New Delhi



Visit of the institute and institute farm by the students from College of Veterinary Science,

PERSONALIA

Dr. (Mrs) Anupama Mukherjee, Senior Scientist (AGB) has attended a short term training programme on "Genome Analysis Techniques in Farm Animals" held at IVRI w.e.f. 21st Nov to 11th Dec'2006.

Dr. S. Rajkhowa, Scientist (Sr. Scale), VM has attended a Winter School on Global Challenges in Vaccinology and Control of Animal diseases- Strategies, Approach and Blueprint at Madras Veterinary College w.e.f. December 1-21, 2006.

Dr. K.C. Das, Sr. Scientist (Animal Nutrition), Dr. (Mrs) Anupama Mukherjee, Sr. Scientist (AGB) and Dr. K.K. Baruah, PS (Animal Physiology) have joined the institute on 31st July, 23rd August and 16th October'2006, respectively.

From The Director's Desk



Though the multifarious utility of this unique species (*Bos frontalis*) in the hilly agricultural system is well recognized, still there are some areas where further studies are needed to have complete information on this magnificent species of Asian origin so that this vulnerable species can be better conserved, scientifically managed and propagate in the nature in a sustainable way.


The studies carried out by the scientist in the field of production and management is really very informative and will definitely be of practical help for the mithun rearers. Standardization of protocol for cryopreservation of mithun semen and birth of two mithun calves out of artificial insemination is an important achievement which will give a new direction to the breeding programme of mithun in the field situation. I must congratulate the group of scientists for this outstanding achievement.

The studies conducted on rumen fermentation pattern in mithuns fed on forage and concentrate based diet is very useful which will help in formulating economically profitable low cost ration for mithuns by incorporating locally available fodders of high quality.

Induction of postpartum oestrus immediately after uterine involution (around day 45 postpartum) in postpartum mithun cows is an important step to economize the mithun farming in terms of early occurrence of postpartum heat, successful insemination and conception thereby increased reproductive lifespan of the mithun cows. Studies carried out on this aspect by the scientists of animal physiology are really very encouraging and will be of great help to the mithun farmers in near future.

Successful identification of pathogenic *Escherichia coli* from diarrhoeic mithun calves and their subsequent molecular characterization will definitely help in better understanding of epidemiology of calf diarrhoea as well as the role of these organisms in mithun calf mortality.

I must offer my sincere thanks to all the scientists and other staff for their untiring effort for solving the problem faced by farming community engaged in Mithun rearing in spite of certain limitation.


(C. Rajkhowa)

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Designed & Printed at	:	saraighat offset press, Bamunimaidam, Guwahati - 21