



Mithun Digest

NATIONAL RESEARCH CENTRE ON MITHUN

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July – December, 2007

INSTITUTIONAL ACTIVITIES

Independence Day Celebration

The Independence Day was celebrated on 15th August 2007 in the Institute in solemn



manner with full enthusiasm where all the staff members and the children of the staff members had actively participated in the celebration. The CRPF personnel posted in the neighbourhood gave the Salute to the Tricolor unfurled by Dr. C. Rajkhowa, Director during the occasion. The children of the staff members participated actively with waving the national flag.

Research Advisory Committee (RAC) Meeting

The meeting of the 1st RAC of the Institute was held during 25-26 October 2007 under the chairmanship of Dr. A. K. Sinha, Dean, Vety.



Science, Birsa Agricultural University, Ranchi. The committee also included Dr. C. S. Prasad, ADG (AN & P); Dr. R. N. Goswami, Dean, College of Vety. Science, Khanapara; Prof. K. K. Baruah, Head, Animal Nutrition, Khanapara; Dr. D. G. Nongkhaw, Shilong and Mr. Y. S. Lotha, Kohima. The RAC deliberated on the various research projects under progress in the Institute and gave their valuable suggestions to the Scientists for the refinement of some of the projects.

Quinquennial Review Team (QRT) Meeting

The first QRT meeting of the Institute was held during 24-25 July 2007 and subsequently on 29-31 October 2007 under the Chairmanship of Dr. V. K. Singh, former Director, CSWRI, Avikanagar. The other members were Dr. Gajraj Singh, Dean, Vety. Faculty, CAU, Aizwal; Prof. K. K. Baruah, Head, Animal Nutrition, AAU, Khanapara; Dr. Babul Sarma, Head, Animal Physiology, Khanapara and Dr. V. B. Sharma, Professor, Nagaland University. The committee assessed the research work being conducted in different disciplines in the Institute through deliberation





by scientists concerned.

RESEARCH ACTIVITIES

Animal Genetics and Breeding

Genetic Studies on Mithun

➤ The project was devised with the aim of preparing a standard karyogram of Mithun as per international standard (ISCNDA, 1991; ISCNDB, 2000), as there is no standard karyotype available so far. The lymphocyte culture was carried out using whole-blood of Mithun collected through heparinized vacutainer tubes. The culture continued for a period of 72 hours, was harvested using standard protocol and metaphase chromosomes were prepared after staining with Giemsa. The normal diploid number was 58XX and 58XY for female and male Mithun, respectively. The first pair of acrosome was submetacentric, followed by 27 pairs of acrocentric chromosomes. The X chromosome was submetacentric like cattle and the Y chromosome of male was the smallest metacentric like *Bos taurus*. The banding study of mithun chromosomes following C- and R-banding techniques is in progress.

➤ In another study, the data related to growth and reproduction parameters of four strains of Mithun kept at Medziphema farm for the period 1998 – 2006 were analyzed using

LSMLMW package (Harvey, 1990). The Least square means of birth weight (BW), maturity weight (MATWT), age at first calving (AFC), calving interval (CI) and service period (SP) were given in the tabular form:

Strain (n)	BW	MATWT	AFC	CI	SP
Arunachal(32)	21.50±4.80	354.0±13.50	777.6±36.01	540.1±10.50	187.7±15.01
Nagaland (17)	19.00±3.60	294.4±13.70	1126.0±13.70	487.4±9.50	419.1±23.88
Mizoram (20)	18.50±2.50	293.3±11.35	1502.2±190.32	1104.2±23.54	398.0±33.04
Manipur (15)	17.00±8.50	225.0±6.60	1498.8±70.90	824.1±21.20	420.5±25.50

Heritability estimate for birth weight, weight at six months, maturity weight and AFC were found to be $0.23±0.78$, $0.33±1.23$, $0.11±0.95$ and $0.21±0.22$, respectively.

Characterization of kappa casein gene of Mithun

Kappa casein gene is responsible for controlling the micelle formation and stabilization of Mithun milk, and influences the manufacturing properties of milk. The technique of isolation of genomic DNA from Mithun blood was standardized and DNA was isolated from eight Mithuns. Four primers were designed using bovine kappa casein exon 3 and 4. Presently, the technique of PCR amplification using Mithun DNA template was being standardized using these primers in our laboratory.

Animal Nutrition

Comparative studies on Mithun & local cattle

Six male local cattle (Tho Tho) and six male Mithun (*Bos frontalis*) of average 1.5 year of age were selected and divided into two groups.

Tophala grass (*Borrena hirticulata*) available locally were mixed with paddy straw (2:1 ratio on fresh basis) and one ration was formulated for both cattle & Mithun (NRC, 2000 for cattle) by which approx 50% of DM requirement was met by conc. and rest by including the tophala grass and straw. Formulated ration were fed to both groups. Feeding experiment was continued for 24 weeks of age. During the experimental period daily DMI and fortnightly body weight gain was recorded. Mithun attained 527g average daily gain where as Tho Tho cattle attained 477g average daily gain. Dry matter (DM) consumption per day was 6.25 kg for Mithun and 5.91 kg for Tho Tho cattle. DMI/100 kg body weight was 2.40 for Mithun and 2.28 for cattle during the last week of feeding period. This shows that growth rate of Mithun is better than local cattle and dry matter (DM) intake is also more in Mithun than local cattle.

Effect of feeding baker's yeast (*Saccharomyces cerevisiae*)

Male mithun (*Bos frontalis*) calves of average body weight 235 kg were divided into 2 groups of 5 animals in each group. The calves of 2 groups were fed as per the requirement (NRC, 2000 for cattle). Approximately 50% of DM requirement was met through concentrate mixture and rest through Tophala grass (*Borrena hirticulata*) available in this region and paddy straw (2:1 ratio on fresh basis). One group of animals was fed with 5 to 6 g of dried Baker's yeast (*Sacharomyces cerevisiae*)

containing 20 billion CFU of *Saccharomyces cerevisiae*/gm while the other group of animals was not fed any yeast. The experiment was continued for 16 weeks of age. The body weight of animals was recorded fortnightly where as DM intake through concentrate and roughage was recorded daily. During this period the animals of control group attained 544g average daily gain (ADG) while the animals of treated group attained 651g average daily gain (ADG). DM intake per day was also more in treated group compared to control. The FCR was improved in animals fed with yeast. There was also profit in feeding the yeast (*Sacharomyces cerevisiae*).

Animal Physiology

Development and validation of estrus synchronization protocol using PGF_{2α}, GnRH- PGF_{2α}-GnRH (Ovsynch) and controlled intravaginal drug (progesterone) releasing device (CIDR)

Estrus synchronization is the manipulation of reproductive process so that female can be bred with normal fertility during a short, predefined interval. It reduces and in some cases eliminates labour of detecting estrus. Synchronization allows increased use of artificial insemination (AI) with use of sires having superior germplasm.. Considering the importance of synchronization of estrus in Mithun an experiment was conducted using PGF_{2α}, GnRH- PGF_{2α}-GnRH (Ovsynch) and controlled intravaginal drug (progesterone) releasing device (CIDR).

a) Estrus synchronization using PGF_{2α}

Two injections of PGF_{2α} were given at 11 days apart in cyclic mithun cows. Animals were observed for signs of estrus after second injection of PGF_{2α} and found that all mithun cows responded to this treatment. The time from onset of estrus to ovulation was 34.72 ± 0.61 hr with a range of 26 to 31 hour in PGF_{2α} treated group compared to 26.92 ± 0.31 hour with a range of 26 to 29 hr in control group.

b) Estrus synchronization using Ovsynch protocol

Cyclic mithun cows irrespective of any day of estrous cycle were subjected to Ovsynch protocol of estrus synchronization. All mithun cows responded to this treatment. The ovulation time and its relation with LH characteristics were recorded. After developing this protocol in mithun, in the next step we went for fixed time artificial insemination following synchronization. A total of 16 animals were inseminated artificially (AI) with the cryopreserved mithun semen, 12 cows were conceived.

c) Estrus synchronization using CIDR

Experiments were conducted to synchronize estrus using CIDR in cyclic and post-partum mithun cows. In both categories of animal, synchronized estrus using CIDR showed more prominent behavioural signs of estrus than spontaneous heat. More interestingly, application of CIDR on day 45-50 after parturition induced first postpartum estrus immediately after uterine involution (day 53-58

post parturition). Unlike other bovine, mithun cows exhibit first postpartum estrus at around day 102±19.6 postpartum. Use of CIDR is therefore advantageous in terms of a) prominent behavioural signs of estrus thus easy detection of estrus and b) increased productive life span of around 50 days.

Advantages of CIDR

- Intensity of estrus more prominent than spontaneous estrus
- Very much useful for early induction of postpartum oestrus.



Animal in estrus after hormone treatment

Superovulatory response of Mithun cows to exogenous FSH

MOET may not only be used for genetic enhancement of mithun (in situ conservation) but also for ex situ conservation of this vulnerable species that can prevent this animal from extinction in near future. Therefore, the present investigation was conducted with an objective to study the superovulatory response of Mithun cows to exogenous FSH treatment.

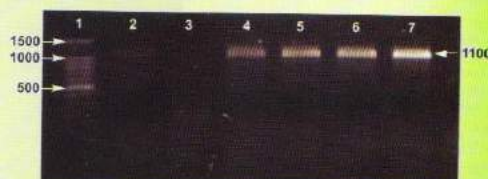
In order to synchronize the estrus, CIDR was inserted into the Mithun cows and on 8th day, CIDR was removed. All the animals exhibited estrus within 48 to 72 hrs of CDRI removal and then superovulated at day 10-13 post estrus using FSH (Folltropin-v-Bovine-400mg) for 4 consecutive days at two divided doses each day. PGF_{2α} (5ml) was administered on day 3 of FSH treatment. The interval between PGF_{2α} treatment and onset of estrus and duration of estrus was 58-70 hrs and 36 – 44 hrs, respectively. The number of palpable corpus luteum and unovulatory follicles were 6-7 and 3-4 /animal.

Livestock Production and Management

PCR amplification of methanogenic archaea available in mithun rumen fluid

The methanogenic archaea available in the mithun rumen fluid was successfully amplified through PCR technique. Total bacterial DNA

was isolated from the mithun rumen fluid. A 1.1 kb fragment of the 16S rDNA of methanogenic archaea was amplified from 100 ng of total rumen bacterial DNA (in 25 µl PCR reaction volume) using the reported primers (1AF: 5'-TCY GKT TGA TCC YGS CRG AG-3'; 1100Ar: 5'-TGG GTC TCG CTC GTT G-3')



Lane 1: 100 bp marker; Lane 2, 4, 5, 6 and 7: 1.1 kb amplicon

Animal Health

The clinically significant bacteria such as *Escherichia coli*, *Clostridium sp.* and *Campylobacter jejuni* were found in 32, 7 and 2 nos. of mithun respectively in the diarrhoeic faecal samples from a total of 57 numbers of samples. Besides these, bacteria such as *Citrobacter freundii*, *Proteus mirabilis*, *Enterobacter aerogenus*, *Alkaligenes dispar* and *Klebsiella pneumoniae* were also isolated from these samples. These organisms were confirmed from their normal colony morphology, smear examination and biochemical characteristics.

Nasal swabs were collected from 43 numbers of mithuns showing respiratory signs like sneezing and mucoid nasal discharge and these samples were subjected to standard bacteriological examination as well as antimicrobial sensitivity test. Out of the 43

samples 32 cases yielded bacteria of clinical significance and from the rest of the samples no bacteria of clinical significance could be isolated. Clinically significant bacteria isolated from mithun with respiratory tract signs are *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Streptococcus sp.* Other bacteria isolated from these samples are *Enterobacter aerogenes*, *Proteus mirabilis*, *Klebsiella aerogenes*, *Citrobacter freundii* and *Proteus vulgaris*.

The antibiotic sensitivity patterns of the clinically important bacteria isolated from mithuns were studied. *E.coli* and *Streptococcus* isolates were found to be most susceptible to gentamicin, *Clostridium* and *Campylobacter* were susceptible to chloramphenicol. *Pseudomonas aeruginosa* were found to be susceptible to chloramphenicol and kanamycin and *Staphylococcus aureus* were found to be most susceptible to streptomycin.

PERSONALIA

1. Dr. S. Mukherjee, Scientist (SS) has joined the Animal Genetics and Breeding Section of this Institute in the forenoon of 05.07.2007 on transfer from Project Directorate on Cattle (ICAR), Meerut.
2. Sri S. P. S. Negi has joined this Institute on 31.08.2007 as Asstt. Administrative Officer on promotion from Central Institute for Research on Goat (ICAR), Makhdoom.
3. Dr. Swaraj Rajkhowa, Scientist (Animal Health) was relieved of his duty in this Institute in the afternoon of 26.09.2007 on transfer to National Research Centre on Pig (ICAR), Guwahati.

PARTICIPATION IN FARMERS' FAIR/AGRI EXPO/HEALTH CAMP

1. Institute participated in the Exhibition arranged for the Indian Animal Industry Expo, Pragati Maidan, New Delhi, 16-18 August, 2007
2. A health camp was conducted at Hmawngkawn village in Serchhip District, Mizoram on 25th August, 2007. The mithun farmers were consulted and trained for maintaining healthy mithun herd. The medicines for the common diseases were also distributed to the farmers free of cost.



A mithun farmer is receiving medicines during the health camp at Hmawngkawn village in Mizoram

AWARDS

Dr. Mohan Mondal, Scientist (Animal Physiology) has brought laurels to this Institute by achieving three prestigious awards as:



1. D.B.T. Innovative Young Biotechnologist Award 2007 given by Sri Kapil Sibalji, Hon'ble Union Minister for Science and Technology, Govt. of India.



2. Indian National Science Academy Medal for Young Scientists 2007 given by the President of the Academy, Dr. R.A. Mashelkar in December 2007.



3. National Academy of Science India (NASI) Platinum Jubilee Award 2007 given by the President, NASI at CFTRI, Mysore in December 2007.

SEMINAR/CONFERENCE/WORKSHOP ATTENDED

Sl. No.	Name & Designation	Name of the Programme	Duration
1	Dr. C. Raikhowa, Director Dr. B. Prakash, AAD IIC Mr. Th. Dipal Meitei, IIC, AFSAO	Special interactive workshop on Administrative and Financial Matters for the ICAR Instts. CRUIAF, Bangalore	2-3 August 2007
2	Dr. C. Raikhowa, Director, Dr. K. C. Das, Sr. Scientist (AN) and Dr. B. Prakash, Scientist (AN)	International Seminar on Growth and Development of Animal Industry in India in Indian Animal Industry Expo, 2007, Pragati Maidan, New Delhi	16-18 August 2007
3	Dr. K. G. Das, Sr. Scientist (AN), Dr. A. Dhali, Scientist (LPhy) and Dr. B. Prakash, Scientist (AN)	International Tropical Animal Nutrition Conference, NDRI, Karnal during	4-7 October 2007
4	Dr. Mohan Mondal, Scientist (AP)	Seminar on "Antimicrobial Drug Resistance and Development of New Antibiotics" at INSA, New Delhi	21-26 November 2007
5	Dr. K.K. Baruah, PS (AP)	Team building Workshop cum Training at NAARM, Hyderabad	12-16 December 2007
6	Ms. A. Saha, Jr. Clerk Mr. K. Mhasikole Chusô, Jr. Clerk	Training on Improving performance and efficiency of administrative and accounts personnel, ICAR, Res. Complex for NE Region, Barapani	18-20 December 2007

STAFF WELFARE ACTIVITIES

☺ Staffs of NRC on Mithun have celebrated the arrival of Goddess Lakshmi in the form of five girl children born to the staff of this Institute during this period.



From The Director's Desk

Mithun (*Bos frontalis*) plays a very important role in maintaining the nutritional requirement of hilly tribal population. This animal has been one of the sources of protein for the poor tribal population of North East Hill Region since time immemorial. Due to its significant role in building the village economy of this region, this animal has a prestigious place in the society.



The NRC on Mithun has been in the service of the poor tribal farmers by addressing the various issues faced by the farming community in the field of mithun rearing.

The work related to molecular characterization of gene in rumen microbes is a work in the right direction. It may lead us even to a stage where we can address the various environmental issues created by livestock farming.

The nutritional trial with various locally available fodder resources from various parts of mithun rearing areas is also a step towards reducing the cost of feed because the feed cost is becoming a hindering factor for remunerative livestock farming in North eastern hilly region.

The successful oestrus synchronization and calf produced through AI after oestrus synchronization is a laudable step reached through tiresome scientific experiment conducted by a group of scientists from physiology. I must congratulate the group for their success. This success may lead us to evolve an effective tool to improve the quality of animals in field condition.

The initiative taken in the field of identification and characterization of target gene like kappa casein is an innovative step towards the understanding of the capability of the animal for milk production.

The KVK, Phek operating from this institute could bring in an awareness among hilly tribes in relation to various agricultural activities. Within a very short period of time, they could bring in some perceptible changes in the mind of farming community of Phek district.

One of our scientist, Dr. Mohan Mondal has been recognized by various scientific bodies through some awards. I must congratulate him for being able to compete with people of excellence in the field of biology to get such national recognition.

I must congratulate each and every scientist, technical, administrative and other contractual staff members including the animal attendants from NRCM as well as its KVK for their dedication and devotion without which, this institute would not have been able to get such a remarkable success.

Let us pray to God to bestow upon us all the knowledge and strength so that we can do best of the best for the poor farming community.

(C. Rajkhowa)

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