वार्षिक रिर्पोट
Annual Report
2018-19

भाकृअनुप–राष्ट्रीय मिथुन अनुसंधान केन्द्र

मेड्जीफेमा, नागालैन्ड–797 106, भारत

ICAR-NATIONAL RESEARCH CENTRE ON MITHUN

Medziphema, Nagaland- 797106, India

www.nrcmithun.res.in

LOCATION AND TRAVEL INFORMATION

MAIN STATION

ICAR-NRC on Mithun is a research organization is working under aegis of Indian Council of Agricultural Research (Department of Agriculture Research and Education, Ministry of Agriculture and Farmers Welfare. Our Institute is located at Medziphema, Dimapur District, Nagaland with the latitude of 25,757231N and longitude of 93,842366E.

Approximate Distances of ICAR-NRC on Mithun from Important places:

Guwahati: 290 km (Road)

Jorhat: 150 km (Road)

Silchar: 310 km (Road)

Dibrugarh: 300 km (Road), 57 km (Rail) and 212 km (Air)

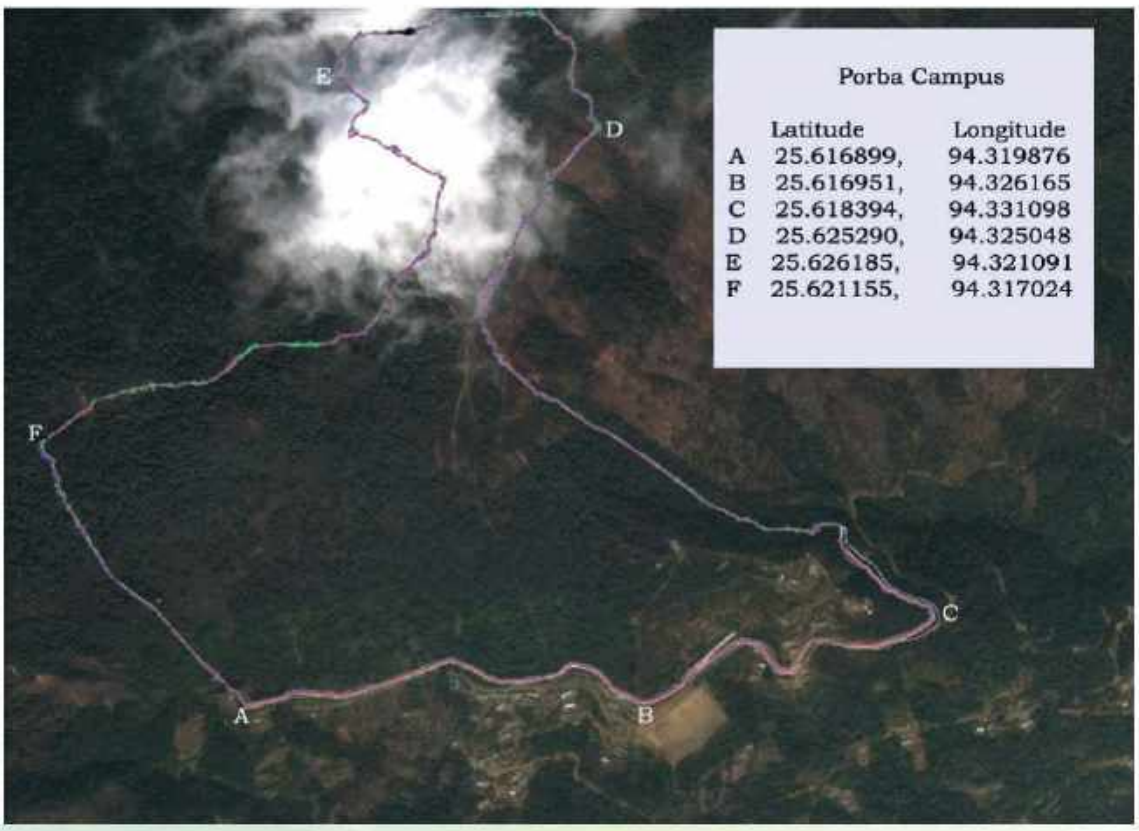
Delhi: 2198 km (Rail) and 1661 km (Air)

Kolkata 1280 km (Rail) and 657 km (Air)

Imphal: 201 km (Road)

PORBA CAMPUS

The campus is located at Porba village of Phek District of Nagaland which is approximately 125 km from the main campus, Medziphema, 81 km from Kohima and 150 km from Dimapur. Krishi Vigyan Kendra (KVK), Phek of the Institute is located at the campus.



वार्षिक प्रतिवेदन
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भाकृअनुप-राष्ट्रीय मिथुन अनुसंधान केन्द्र
मेड्जीफेमा, नागालैन्ड-797 106 भारत

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CONTENTS

प्रस्तावना I PREFACE

ICAR-National Research Centre on mithun, Nagaland has been working for the continual improvement of the unique bovine species of North-Eastern states, mithun (*Bos frontalis*), since 1988. Mithun is a valued animal and the symbolic representative of peace and communal harmony and is closely associated with the socio-economic, religious and cultural life of the tribal people of the mithun rearing states viz., Arunachal Pradesh, Nagaland, Manipur, and Mizoram.

Being a unique and valuable bovine species of North-Eastern Hill region of India, mithun could be an essential component of the sustainable animal production system of the region. This animal can be exploited and developed as very good meat animals besides improvement of their milk production potentiality. Higher butter fat percentage of milk provides avenues for the production of value-added milk products to fetch a high price. Good quality leather can also be processed from mithun hide. However, the potential of this animal can only be exploited by incorporating and integrating the scientific animal husbandry practices to the presently practiced traditional mithun rearing under a free-range forest ecosystem.

In our endeavour to strive for excellence in the mandated areas of research, we have undertaken 10 IRC projects, two ICAR Network projects and one externally funded project. Animal Genetics & Breeding section has been studying the genetic architecture of mithun using genome analysis tools and recently published a manuscript reporting the characterization and genetic diversity in mithun population of the country. The Scientists of Animal Nutrition demonstrated the supplementation of wet cake up to the level of 30% in rice husk-straw based ration. A detailed study on mithun rumen microbiome is also initiated. Unlike other bovine species, identification of estrous in mithun is not very easy. The scientists of Animal Physiology and Reproduction section have taken a lead in characterizing cervical mucus and reproductive behavior of mithun. Analyzing the retrospective data of nearly 15 years, the LPM section has shown that the body weight gains reached a plateau by five years. The LPT section studied the carcass characteristics and amino acid profiles of mithun meat.

The Technology Transfer and creating awareness is a priority. During the year, under Tribal Sub-Plan (TSP), several programmes including the establishment of the semi-intensive unit, mithun *mela*-cum-technology awareness programme, bull exchange, farmers training and exposure visits were organized in benefitting 1548 farmers. KVK-Phek, the only KVK under the Institute, carried out 89 training programmes benefiting 1914 farmers. Apart from these activities, the KVK also undertook 211 extension activities benefiting 2294 farmers.

The Institute aims to improve technical competency of the students, faculties and other extension personnel by imparting new skill and knowledge. Under the DBT-sponsored Biotech Hub and BTISnet programme, students and faculties of various educational institutes were given hands on training in molecular biology technology and bioinformatics. Training programmes were organized for the farmers and unemployed youths

and to attract them to take up mithun farming as an alternative livelihood.

Our active collaboration developed over the years with the Central Agriculture University, Imphal and its constituent colleges, particularly the newly established Colleges of Veterinary Sciences & Animal Husbandry, Jalukie, Nagaland; Colleges of Veterinary Sciences & Animal Husbandry, Selesih, Mizoram, and College of Horticulture & Forestry, Pasighat, Arunachal Pradesh has been of good help to our efforts in mithun propagation and conservation. Support and collaboration received from, Assam Rifles, Directorates of Veterinary Services & AH of mithun rearing states, ATMA, ATARI-Zone II and III, NABARD, College of Veterinary Science, AAU, Khanapara and other ICAR institutes of the region is noteworthy.

The Institute is highly indebted to the various visiting dignitaries and academicians for their encouragement, candid suggestions, and valuable inputs. The members of the several committees including the Institute Management Committee (IMC) and Research Advisory Council (RAC) who have guided us throughout in planning and executing the activities of the Institute are humbly acknowledged.

The progress and development of the Institute wouldn't have been possible without the constant support, guidance and blessings of Dr. Trilochan Mohapatra, Hon'ble Secretary DARE and DG, ICAR; Dr. J. K. Jena, DDG (Fisheries &Animal Science; Dr. R. S Gandhi, ADG (AP&B); Dr. Ashok Kumar, ADG (AH). I offer my deep sense of gratitude to all of them. The help and advice rendered by Dr. Vineet Bhasin, PS (Animal Genetics and Breeding) are well acknowledged with gratitude.

Last but not the least let me acknowledge the support and untiring efforts of all the staffs of the Institutes who are putting in all hours of pain and sweat to achieve our target to conserve, improve and propagate this magnificent species, Mithun.

"Jai Hind!"

(Abhijit Mitra)

कार्यकारी सारांश I EXECUTIVE SUMMARY

This section depicts various research activities of the Institute carried out during the preceding year in a summarized form

ANIMAL GENETICS AND BREEDING

- Phylogenetic analysis of whole mitochondrial genome sequence revealed a common origin of mithun and gaur (*Bos gaurus*) from an ancient and extinct *Bos species*.

ANIMAL NUTRITION

- Supplementation of wet cake on rice husk-straw based ration showed significantly higher dry matter intake and dry matter digestibility.
- A locally available feed ingredient used successfully as an organic binder for the preparation of feed block that could be stored till 45 days without any fungal growth.

ANIMAL PHYSIOLOGY & REPRODUCTION SECTION

- Normal estrus of mithun is characterized by scanty cervical mucus discharge having clear appearance and moderate to thick consistency.
- Estrus behavioural expression viz, bellowing, mounting over herdsmate, swelling of vulva and chin resting are absent during estrus in mithun but reddening of vulval mucosa and uterine tonicity are observed.

LIVESTOCK PRODUCTION AND MANAGEMENT

- In mithun body weight gains reached plateau by 4 years of age and remained stagnant from 5 years onwards.

LIVESTOCK PRODUCT TECHNOLOGY

- Carcass characteristics of mithun: Dressing percentage of Mithun 50.84±1.03, hide 7.59±0.31, head and horn 6.20±0.17 hoof and feet 2.13±0.14. The degree of marbling in mithun 12th rib cross-section was slight to small marbling.

ANIMAL HEALTH

- Aqueous extracts of tulsi leaves (*Ocimum sanctum*), garlic rhizome (*Allium sativum*), cucumber juice (Cucumis sativus), ginger rhizome (*Zingiber officinale*), neem leaves (*Azadirachta indica*) and bahaktita flowers (*Phlogacanthus thyrisformis*) were not effective against both aquatic and land leeches. However, tobacco leaves (*Nicotinia tobacum*) extract (@1%) was effective against land leech.

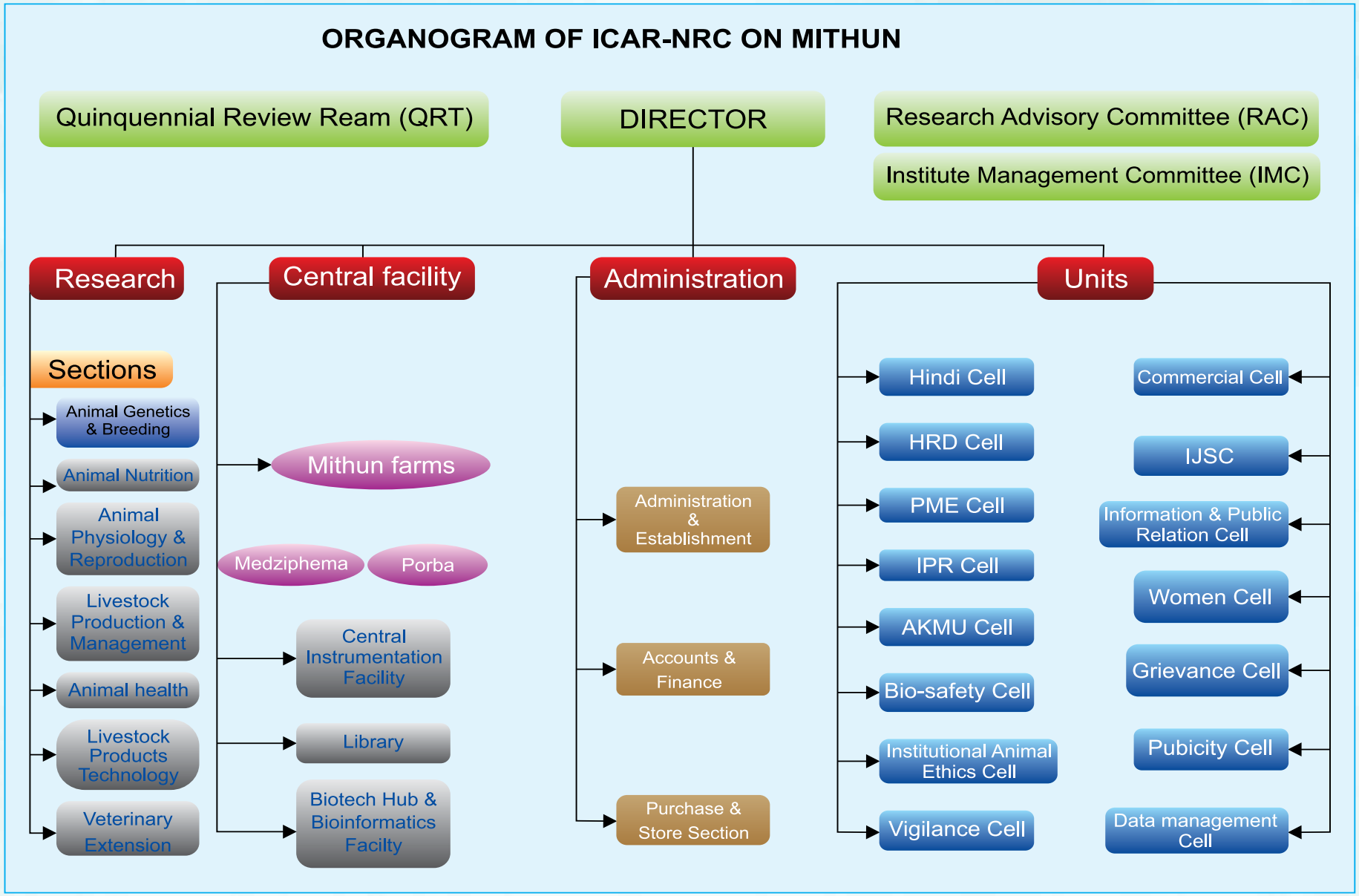
EXTENSION ACTIVITIES

- Under Tribal Sub-Plan (TSP) the Institute organized several programmes including the establishment of semi-intensive unit, mithun mela and technology awareness, farmers training programme cum exposure visits, bull exchange and input distribution in Nagaland, Manipur and Arunachal Pradesh benefiting 1548 farmers

KRISHI VIGYAN KENDRA, PHEK

- Carried out 89 training programmes benefiting 1914 farmers
- Conducted 4 vocational training for farmers, rural youth and extension personnel of the district attended by 43 participants
- Carried out 211 extension activities benefiting 2294 farmers
- Conducted sponsored training programmes for 18 days attended by 77 participants

ORGANOGRAM OF ICAR-NRC ON MITHUN



INTRODUCTION

The Institute

ICAR-National Research Centre on Mithun, established in the year 1988, being the only research organization in the world, is exclusively working for the continual improvement and conservation of mithun (*Bos frontalis*). During the last 30 years, the Institute has not only generated invaluable scientific data towards the understanding of this unique species but also the developed several packages of practices and technologies. Conservation efforts including taming of mithun and demonstrating an alternative system of semi-intensive rearing of mithun like other bovine species resulted in the complete domestication of the species. Popularization efforts led to the adoption of scientific rearing of mithun by the tribal communities of North Eastern Region (NER) with better returns. Some of the salient achievements of the Institute are:

- Genetic and molecular characterization of different mithun populations and delineating evolutionary relationship of mithun with gaur (*Bos gaurus*).
- Protocol for collection and freezing of semen, estrus synchronization and AI in mithun, and its successful implementation in the Institute farm and farmers' fields.
- Protocol for collection and cryopreservation of embryo in mithun leading to the birth of the world's first embryo transfer mithun calf from a cryopreserved embryo "Mohan"
- Area-specific mineral mixture and feed block using locally available trees/shrubs and industrial by-products
- Chemical and nutritional evaluation of 260 feed resources (e.g., tree leaves/ shrubs/grasses) for incorporation in the total mixed ration (TMR).
- Supplementation of spent grain and wheat bran/ rice bran in the diet of mithun increased dry matter and gross energy intake
- Methods for drying high moisture content agro-industrial by-products (wet cake) and successful incorporation in paddy straw based feed blocks
- Determination of age by dentition pattern of mithun under field conditions

- Surveillance of important parasitic, bacterial, and viral diseases in mithun and development of control measures
- Diversified use of mithun:
  - value-added milk products (paneer, lassi, dahi and rasgolla),
  - meat (meat block, patties, nugget and meat powder),
  - skins and hides (leather jacket, ladies bag, shoe, wallet, portfolio bag)
  - Draftability
- Semi-intensive system of rearing of mithun as a farming system model

Geographical Distribution and Population Status of Mithun

Mithun is distributed within a limited geographical boundary. It is mainly found in the North-Eastern Region of India viz., Arunachal Pradesh, Mizoram, Nagaland, and Manipur. It is also found in Myanmar, China, Bangladesh and Bhutan. It is difficult to ascertain the world total population of mithun as no systematic population record is available in mithun inhabited areas except in India. According to the 19th Livestock Census (2012), out of 298264 total population of mithun in India, 249000 mithuns are available in Arunachal Pradesh, followed by 34871 in Nagaland, 10131 in Manipur and 3287 in Mizoram. Apart from these, a small number of mithuns were also reported from Himachal Pradesh (988) and Jammu & Kashmir (57).

Mithun is traditionally reared under a forest ecosystem and can easily thrive at an elevation of 300–3000 m above sea level. Several factors including inbreeding, indiscriminate slaughter, cross-breeding with cattle and habitat destruction due to local agricultural practices (*Jhum* cultivation), are responsible for poor or slow population growth of mithun. However, considering the social as well as economic importance, this animal species deserves a special attention for the conservation, improvement, and propagation.

In the following sections, a brief account of the research work and extension activates undertaken by the Institute, and man-power, funding status, ongoing projects, and other information during the period of 2018-19 is presented.

Hon'ble Governor, Nagaland, Shri P. B. Acharya visiting the Exhibition Stall during the conference on "Startups and MSMEs in Food Processing" at ICAR-NRC on Mithun, Medziphema on 23rd July, 2018

VISION, MISSION, MANDATE

ln'; / VISION

किसानों के बेहतर पोषण एवं सामाजिक–आर्थिक सहायता हेतु उच्च गुणवत्ता के मिथुन जननद्रव्य की परिरक्षा, संरक्षण एवं प्रसारण तथा संघारणीय उत्पादन प्रणाली का विकास।

To preserve, conserve and propagate superior quality mithun germplasm for a sustainable production system and subsequent utilization for better nutritional and socioeconomic support to the farmers.

/;; / MISSION

प्रजनन एवं स्वास्थ्य हेतु वैज्ञानिक प्रबंधन एवं निरूपण, आहार पद्वति तथा जैव प्रौद्योगिकी का प्रयोग एवं मिथुन पालकों के हित हेतु आर्थिक रूप से व्यवहार्य एवं संधारणीय प्रौद्योगिकी का विकास।

Formulation and adoption of scientific management, feeding practices and advanced bio-techniques for reproduction and health with an ultimate objective to develop economically viable and sustainable technologies for the benefit of the farming communities rearing mithun.

vf/kn'k / MANDATE

- देश में उपलब्ध मिथुन के जननद्रव्य की पहचान, मूल्यांकन एवम गुणवर्णन करना।
- Identification, evaluation and characterization of mithun germplasm availanle in the country.
- दुग्ध एवं मांस उत्पादन के लिए मिथुन का गुणवर्धन एवम संरक्षण करना।
- Conservation and improvement of mithun for meat and milk.
- मिथुन सूचना केन्द्र के संग्रह के रूप में कार्य करना।
- To act as repository of information on mithun

ORGANIZATINAL SETUP

STAFF POSITION as on 31.03.2019

Category	Sanctioned Strength	In Position	Vacant
RMP	01	01	0
Principal Scientist	02	01	01
Senior Scientist	04	01	01
Scientist	12	10	02
ACTO (T-6)	03	02	01
Technician (T-1)	02	02	0
A.O.	01	0	01
A.A.O.	02	01	01
AF&AO	01	01	0
Assistant	04	02	02
UDC	01	01	
PA	01	0	01
Stenographer Gr.III	01	01	0
LDC	04	03	01
SSS	08	05	03

Hon'ble Governor, Nagaland, Shri P. B. Acharya visiting Institute exhibition stalls on 8th May, 2018

IN-CHARGE AND MEMBERS OF DIFFERENT CELL

A.O. & Head of the Office	Ms Aloli Rengma Dr. (Ms) Saroj Toppo
D.D.O. Cell	Ms Aloli Rengma Dr. J. K. Chamuah Dr. S. S. Hanah
Cashier	Ms Achuno Solo, LDC Sh. Surjit Kumar
Establishment/Administration	Ms Aloli Rengma Sh. Th. Dipal Meitei
Store	Ms Aloli Rengma Dr. Kobu Khate Sh. Th. Dipal Meitei
AF & AO	Sh. Utpal Ghosh Dr. S. S. Hanah Dr. Kezhavitou Vupru
Estate I (Security and all other not included in Estate I & II)	Dr. Kezhavitou Vupru Dr. Kobu Khate Sh. K. M. Chusi
Estate II (Pump House)	Dr. Kobu Khate Dr. Kezhavitou Vupru
Estate III (Office, Campus Lawn & Garden maintenance)	Ms Aloli Rengma Sh. K. M. Chusi
Farm	Dr.Kobu Khate Dr. S.S. Hanah
Guest House	Sh. Th. Dipal Meitei Dr. S. S. Hanah
Library	Dr. (Ms) Saroj Toppo Dr. (Ms) Lalchamliani
AKMU/ITMU/Innovation/IPR	Dr. J. K. Chamuah Dr. S. S. Hanah

Bio-Safety Cell	Dr. J. K. Chamuah
Data Cell	Dr. J. K. Chamuah Dr. M. H. Khan
Hindi Cell	Dr. (Ms) Saroj Toppo Dr. M. H. Khan Sh. Surjit Kumar
PME Cell	Dr. M. H. Khan Dr. (Ms) Lalchamliani
RTI/Information and Public Relation Cell	Dr. M. H. Khan Dr. Kobu Khate
Sports Cell	Dr. S. S. Hanah Dr. (Ms) Lalchamliani
TSP activities	Dr. M. H. Khan
Vehicle Cell I (All office vehicles including Generators)	Sh. Th. Dipal Meitei Sh. Surjit Kumar
Vehicle Cell II (Tractors)	Dr. Kobu Khate Dr. Kezhavitou Vupru
HRD Nodal Officer	Dr. S. Mukherjee Dr. (Ms) Saroj Toppo
Seminar & Meeting Hall	Dr. (Ms) Lalchamliani Dr. (Ms) Saroj Toppo
Swachh Bharat Mission	Dr. Kobu Khate
Extension Cell	Dr. S. S. Hanah
CIF Lab	Dr. N. Haque

Institute Management Committee (IMC)

Position	Name an Designation
Chairman, (Director, ICAR-NRC on Mithun)	Dr. Abhijit Mitra
Member (A representative of the State Govt. concerned with the research in the Institute nominated by President, ICAR)	Director, Dept. of Veterinary & Animal Husbandry, Govt. of Nagaland, Kohima
Member (A representative of the State Govt. concerned with the research in the institute nominated by President, ICAR)	Director, Dept. of Veterinary & Animal Husbandry, Govt. of Manipur
Member (A representative of the Agricultural University under the jurisdiction nominated by President, ICAR)	Dean, College of Veterinary Sciences & A. H., CAU, Jalukie, Peren District, Nagaland
Member Four Scientists of Council's Institutes to be nominated by the DG	Dr. S. M. Deb, Former Director, ICAR-NRC on Yak, Arunachal Pradesh Dr. Madan Kumar Tamuli, Former Principal Scientist, ICAR-NRC on Pig, Guwahati. Dr. D. J. Rajkhowa, Joint Director, ICAR Research Complex for NEH Region, Nagaland Centre, Medziphema Dr. N. Haque, Principal Scientist, ICAR-NRC on Mithun, Medziphema, Nagaland.
Members (Two non-official persons representative of Agricultural Rural interest nominated by the President, ICAR)	Dr. M. Chandemo Lotha, Dimapur Sh. Akok Walling, Mokokchung

Position	Name an Designation
Member (Concerned ADG)	Dr. R. S. Gandhi, ADG (AP&B), ICAR Krishi Bhavan, New Delhi.
Member (The Financial Advisor of the Council or DARE or the Accounts Officer of the same or another Institute)	Sh. Prabhat Kumar Nayak AF&AO of ICAR-NRC on Pig, Guwahati
Member Secretary (Assistant Administrative Officer)	Ms. Aloli Rengma, AAO, ICAR-NRC on Mithun, Medziphema, Nagaland

11th Research Advisory Committee (RAC) w.e.f. 01.02.2016

Chairman (An eminent scientist from outside the ICAR system nominated by the DG, ICAR)	Dr. Dharmeshwar. Das, Former Joint Director (Academic), IVRI- IVRI, Izatnagar, UP
Members (4-5 external experts, ex-retired scientist of ICAR representing the major areas of the research development programme nominated by the DG, ICAR)	Dr. Kusumakar Sharma, Former ADG (Education), ICAR, Krishi Bhavan, New Delhi Dr. A. Aziz, Prof & Head, Animal Genetic & Breeding, AAU, Khanapara-22, Assam Dr. K. K Baruah, Former Director, ICAR–NRC on Yak, Dirang, Arunachal Pradesh Dr. Apurba Chakravarty, Director Research, AAU, Khanapara, Assam Dr. R.S. Gandhi, ADG (AP&B), ICAR, Krishi Bhavan, New Delhi-110001
Member (Director of the Institute)	Dr. Abhijit Mitra, Director, ICAR-NRC on Mithun, Medziphema, Nagaland
Member (Two non-official persons representative Agricultural Rural interest to be nominated by the President, ICAR)	Shri. Jaangsillung Gonmei, Progressive Farmer, Ragailong, Dimapur Shri. Lachit Kachari, Amaluma Village, Progressive Farmer, Dimapur
Member Secretary	Dr. Nazrul Haque, Principal Scientist, ICAR-NRC on Mithun, Medziphema, Nagaland.

12th Research Advisoy Committee (RAC) w.e.f. 18.12.2018

Chairman (An eminent scientist from outside the ICAR system nominated by the DG, ICAR)	Dr. A. K. Misra, Former Vice- Chancellor, Govind Ballabh Pant University of Agriculture and Technology, Uttarakhand.
Members (4-5 external experts, ex-retired scientist of ICAR representing the major areas of the research development programme nominated by the DG, ICAR)	Dr. N. Kondaiah, former Director, ICAR-NRC on Meat, Hyderabad. Dr. R. N. Goswami, Former Dean, College of Veterinary Science, AAU, Khanapara Dr. Probodh Borah, Coordinator, BIF & Head, Dept. of Animal Biotechnology, College of Veterinary Science, AAU, Khanapara Dr. J. R. Rao, Former Principal Scientist & Head, Division of Parasitology, IVRI, Izatnagar, UP
Member (Director of the Institute)	Dr. Abhijit Mitra, Director, ICAR-NRC on Mithun, Medziphema, Nagaland
Member (Two non-official persons representative Agricultural Rural interest to be nominated by the President, ICAR)	Dr. M. Chandemo Lotha, Dimapur Sh. Akok Walling, Mokokchung
Member Secretary	Dr. M. H. Khan, Principal Scientist, ICAR-NRC on Mithun, Medziphema, Nagaland.

Institute Research Committee (IRC)

Position	Name and Designation
Chairman	Dr. Abhijit Mitra, Director, ICAR-NRC on Mithun
Members	All the Scientists of ICAR-NRC on Mithun
Member Secretary	Dr. Nazrul Haque, Principal Scientist, ICAR-NRC on Mithun, Medziphema, Nagaland

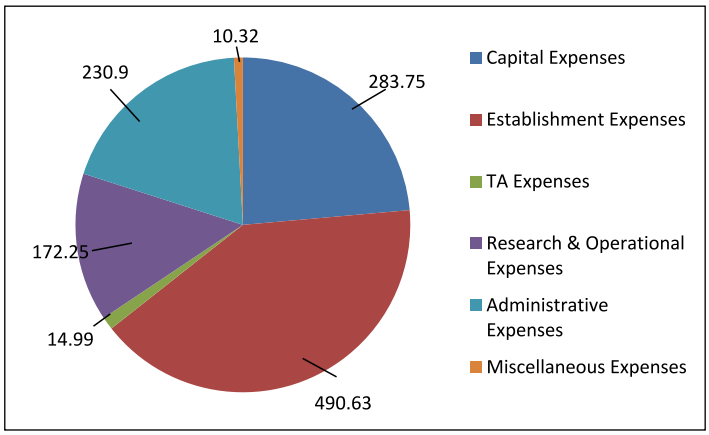
Quinnquennial Review Team (QRT)

Position	Name and Designation
Chairman	Dr. S. P. S Ahlawat, Former Director, IVRI and Former Vice-Chancellor, Vikram University, Ujjain, 42, Surender Nagar, Phase-I, Jansath Road, Muzaffarnagar-251001.
Member	Dr. K. S. Risam, Director of Extension, SKUAST, Jammu & Kashmir
Member	Dr. N. Kondaiah, Former Director, ICAR-NRC on Meat, Hyderabad
Member	Dr. J. R. Rao, Former Principal Scientist & Head, Department of Parasitology, IVRI; 302, Emerald, My Home Jewel, Madinaguda, Hyderabad-500049 (A.P)
Member	Dr. Dyal Singh Chawla, Former Principal Scientist &I/C, CIRB Nabha; H. No.136, Street No.4. Sidhu Colony, Bhadson Road, Patiala (Punjab)- 147001
Member	Dr. S. V. S Verma, Former Principal Scientist & Head CARI Izatnagar; 139, Yasoda Kunj, Mavana Road, Meerut-250001
Member Secretary	Dr. Meraj Haider Khan, Principal Scientist, ICAR-NRC on Mithun, Medziphema, Nagaland

FINANCIAL STATEMENT 2018-19

Sl. No.	Head	Allocation	Expenditure
A	GRANT IN AID-CAPITAL		
1	Works	234.78	234.78
	Equipments	20.43	20.44
2	Information Technology	2.56	2.56
3	Library Books and Journals	0.76	0.76
	Vehicles & Vessels	14.17	14.16
4	Livestock	2.25	2.20
	Furniture & fixtures	8.84	8.83
Total- Grant in Aid Capital		**283.79**	**283.75**
B	Establishment Expenses (Salaries)		
	Establishment Charges	442.07	442.06
	Wages	48.56	48.56
Total - Establishment Expenses (Salaries)		**490.63**	**490.62**
C	Grant in Aid General		
1	Pension & Other Retirement Benefits	18.06	18.06
2	Traveling Allowance	14.99	14.99
3	Research Expenses & Operational Expenses		
i	A. Research Expenses	50.74	50.74
ii	B. Operational Expenses	121.51	121.51
Total- Research Expenses & Operational Expenses		**172.25**	**172.25**
4	Administrative expenses :		
i	Infrastructure	36.75	36.75
ii	Communication	0.42	0.42
iii	Repair & Maintenance		
	i. Equipments, Vehicles & Others	11.72	11.72
	ii. Office building	49.82	49.82
	iii.Residential building	33.03	33.03
iv	Minor Works	4.95	4.95
v	Others (excluding TA)	94.20	94.21
Total- Administrative expenses		**230.89**	**230.90**
5	Miscellaneous Expenses		
i	HRD	4.20	4.20
ii	Publicity & Exhibitions	2.98	2.89
ii	Guest House – Maintenance	3.22	3.22
Total - Miscellaneous Expenses		**10.40**	**10.32**
	Total-Grants in Aid General	446.59	446.51
	Grand total(Capital + Establishment + General)	1221.02	1220.88
	Loans and Advances	36	34.1

Institute Grant Expenditure during F.Y 2018-19
(Figures in Lakhs)



Institute Grant Expenditure during F.Y 2018-19 (Figures in Lakhs)

List of Civil Works Initiated During 2018-19

Sl. No.	Name of the Work	Sanctioned amount (Rs)
Original Work		
1.	Construction of Experimental Shed at Medziphema Mithun Farm	25,98,800/-
2.	Construction of Borewell one each at ICAR-NRC Mithun residential campus and Mithun Farm	34,52,400/-
3.	Construction of Bull Shed at Medziphema Mithun Farm	34,52,400/-
4.	Construction of Abattoir/ Slaughterhouse at Medziphema Mithun Farm	9364900/-
5.	Construction of Semen Collection & Processing Lab with Bull Exerciser	2199015/-

ADMINISTRATIVE REFORMS

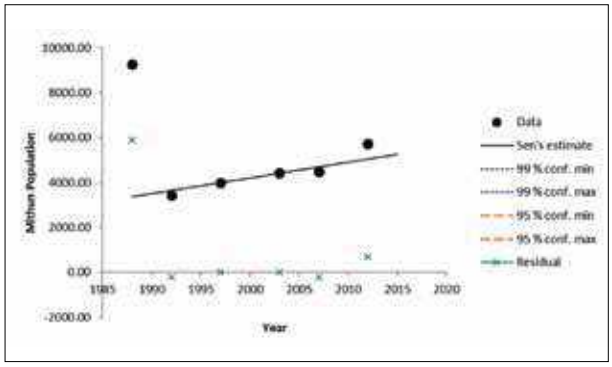
- Public Financial Management System (PFMS): Implemented since August 2017. During the current fincancial year, 679 transactions were made.
- Cashless transactions through Swipe Machine and Easy Pay Card: Number of transaction- 105
- MIS-FMS: During 2018-19, 1410 bills have been prepared through MIS-FMS
- E-Procurement and GeM implemented: It was started since March 2017. During 2018-19, 70 orders have been placed though GeM and 10 tenders has been placed through CPP Portal.

Mithun in its natural habitat

RESEARCH ACHIEVEMENTS

Effects of forest coverage and climatic factors on trends of mithun population

Under the National Mission for Sustaining the Himalayan Ecosystem (NMSHE) project, various data on mithun population status, climatic factors, and area of forest coverage over the years (1988-2915) were collected to analyze to study the effects of these biotic and abiotic factors on mithun population in three districts (viz., Kohima, Phek, and Tuensung) of Nagaland.



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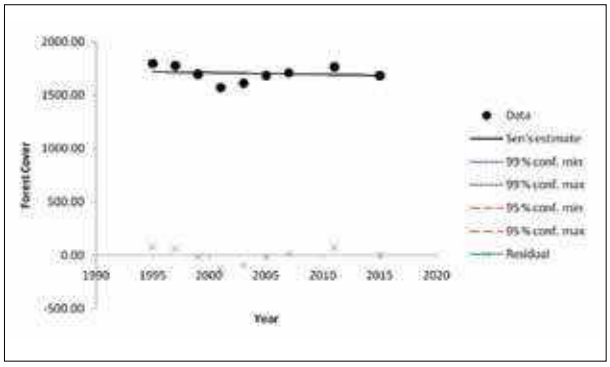

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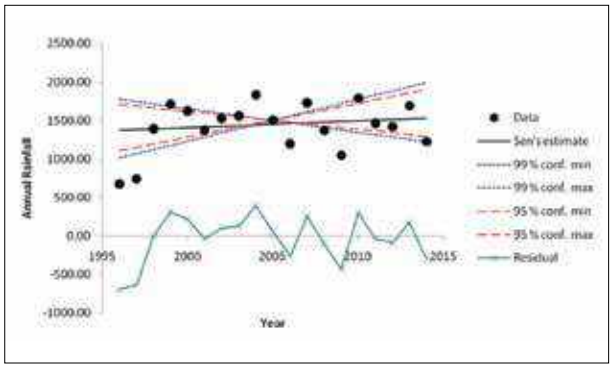

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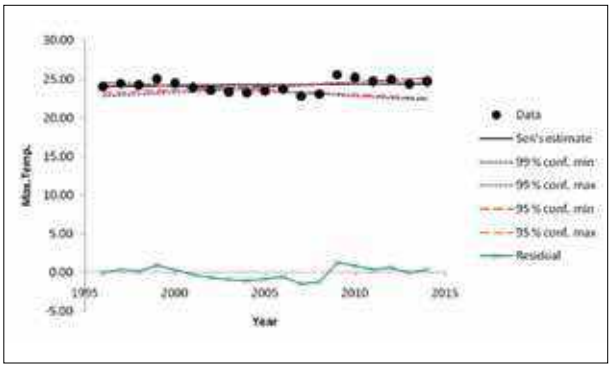
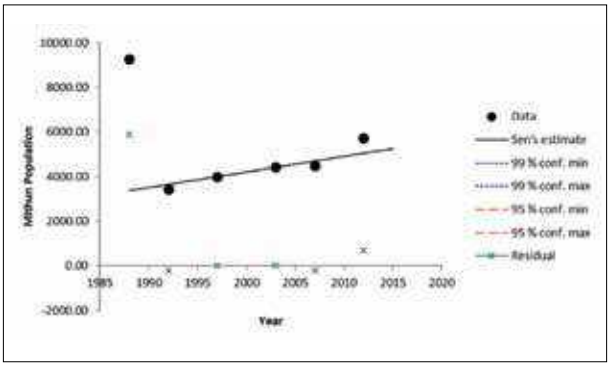


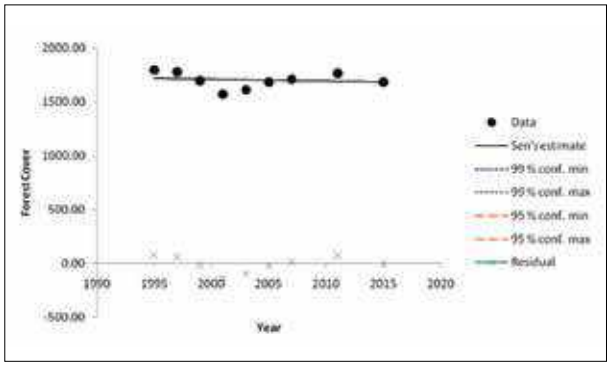
(D)

A. Trends of mithun population in Kohima district, B. Trend of forest coverage in Kohima district, C. Trend of annual rainfall in Kohima district, D. Trend of maximum temperature in Kohima district over the years

The forest coverage in all the three districts showed an overall downwards but a non-significant trend. The trends of annual rainfall and maximum temperature fluctuated over the years. The trendline of mithun population was slightly downward in Kohima and Tuensung, but was upward in Phek district. However, none of these trends were statistically significant.



(A)



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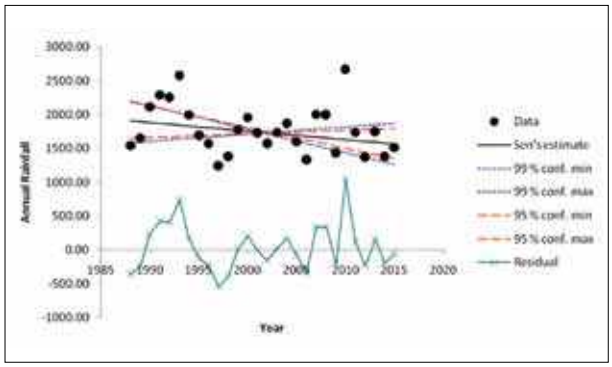

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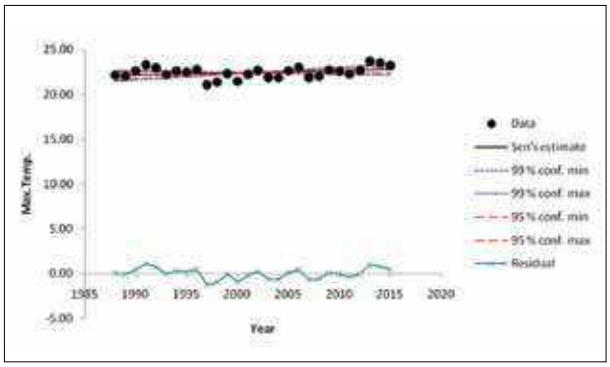


(D)

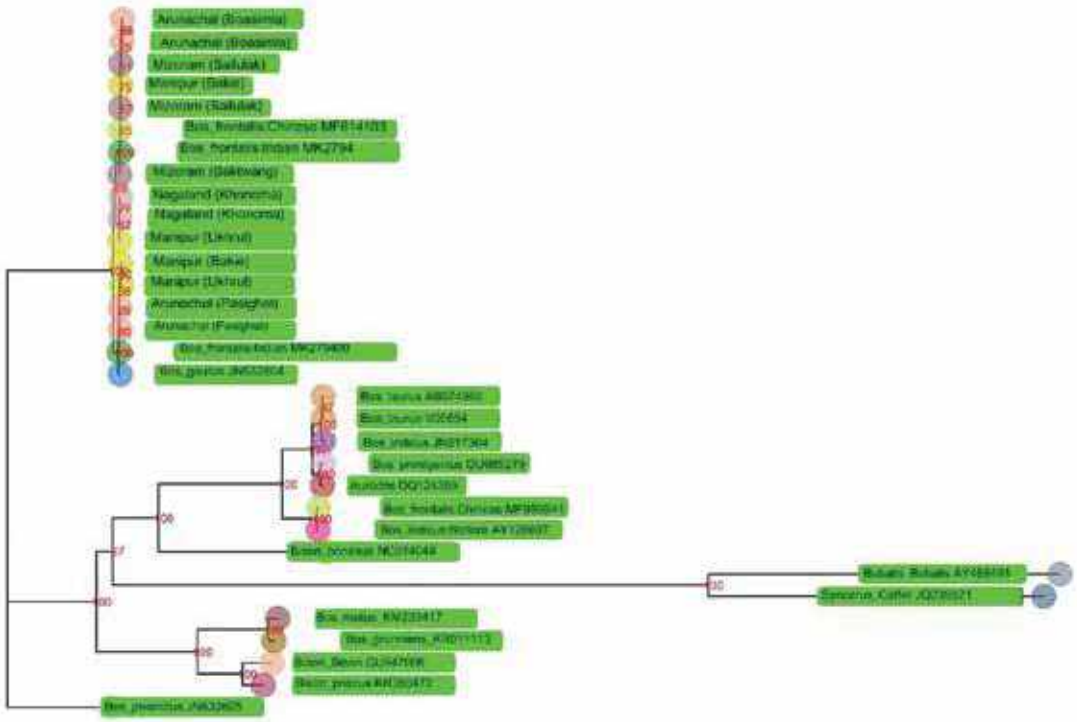
A. Trend of mithun population in Phek district, B. Trend of forest coverage in Phek district, C. Trend of annual rainfall in Phek district, D. Trend of maximum temperature in Phek district over the years

Genetic characterization of mithun (*Bos frontalis*) population through mitochondrial genome sequencing

Mithun is a unique bovine species found in the NEH region of India under free-range ecosystem and reared mainly for meat purpose. The origin of mithun and its phylogenetic status within the bovine species is still not clear. Three major hypotheses about the origin of mithun include: that it is a domesticated gaur, or it is hybrid descent from crossing bull gaur and zebu cow or that it is an independent species descended from a wild Indian bovine which is now extinct.

In order to trace the origin of mithun, whole mitochondrial genome sequencing of mithun (n=16) was taken up and a consensus assembly of mitochondrial genome of mithun (≈17 kb) was constructed.

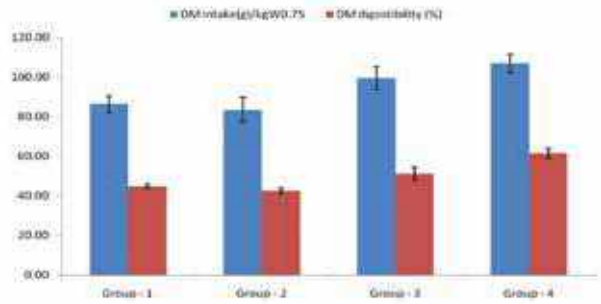
Phylogenetic analysis of mithun mitochondrial genome including those of other available *Bos* species demonstrated the inclusion of mithun and gaur (*Bos gaurus*) in the same cladogram (Figure) suggesting their common origin from the same ancient *Bos* species which might be extinct now. Further work is in progress.



The phylogenetic analysis and cladogram. Indian Buffalo *(Bubalis bubalis)* and African wild buffalo *(Syncerus caffer)* are shown as outliers.

The effect of supplementation of wet cake on rice husk–straw based ration in mithun

Rice husk and straw is commonly used as a cheaper and easily available alternative in the ration of large ruminants to meet the dry matter requirement. However, both the rice husk and straw are not only nutritively poor but affects the dry matter intake and overall nutritive value of the ration. A feeding trial was carried out to determine the effect of supplementation of wet cake (a maize grain-based by-product from distillery) to rice husk–straw based ration on dry matter intake and digestibility in mithun. Adult male mithun (n=16), weighing 419.4 ±8.98 kg, were randomly divided into four groups. Animals in Group 1 were fed with *ad lib* rice husk-and-straw (2.5:1) based ration. The animals in groups 2, 3 and 4 were fed in similar ration except that it was supplemented with wet cake @ of 20, 30 and 40% on dry matter basis, respectively. The results of the study revealed a linear increase (P=0.001) in dry matter intake and digestibility with the supplementation of wet cake (see Figure), which can be easily incorporated in the rice husk-straw based ration up to the level of 40%.



Dry matter intake and digestibility in rice husk-and-straw based diet in mithun

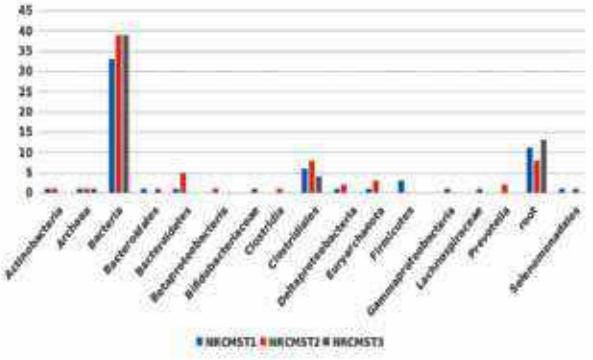
Use of locally available binder for the preparation of paddy straw based animal feed blocks

Molasses, bentonite, plaster of Paris (hydrated $CaSO_4$) are commonly used for making feed blocks. However, these binding agents are either hazardous to health or not available in remotely located hilly areas of NEH region. Therefore, efforts are made to develop an alternative biological binder using locally available plant extracts and/or feed ingredients. A locally available feed ingredient was suitably processed and used up to 10% as a binder for preparation of paddy straw based feed blocks using graded levels of concentrate mixture (0 to 33%). There was no visible fungal growth until 45 days of storage.

Feed blocks prepared using organic binder

Profiling gut microbiome of mithun

Rumen microbes are essential for key metabolic processes, viz. the breakdown of indigestible dietary fibers to short-chain fatty acids, biosynthesis of amino acids, vitamins, and production of neurotransmitters and hormones. The microbial populations available in mithun are largely unexplored due to difficulty in culturing. The recent advance in metagenomic tools like next-generation sequencing technology



Composition of microbiome of mithun's rumen

has enabled to analyze microbial DNA without the prior isolation and cultivation of individual species and is a powerful technique for studying microbial communities in natural habitat. The aim of the present study was to understand the diversity and density of the mithun microbiota. Samples of rumen contents were collected directly from the intact rumen of three adult mithuns after slaughter. DNA was isolated from rumen contents and subsequently sequenced using Next Generation Sequencing. The density and diversity of microbiota observed in rumen liquor of mithun are presented (see figure). Further bioinformatics analysis is in progress.

ANIMAL PHYSIOLOGY AND REPRODUCTION

Characterization of cervical mucus and reproductive behavior of mithun cows

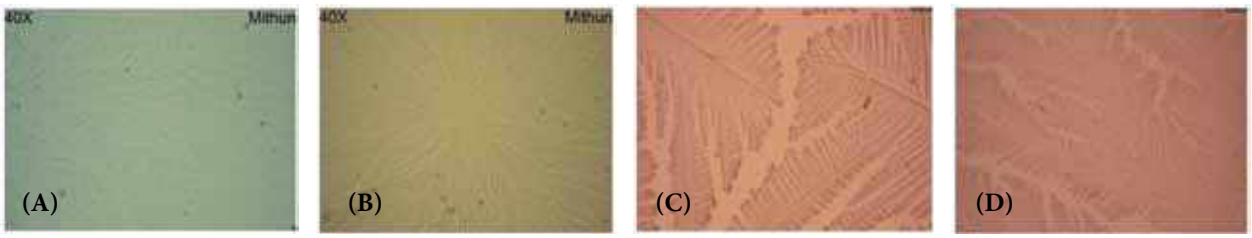
The colour, appearance, pH and electrical conductivity along with other rheological properties like Spinnbarkeit value, flow elasticity, viscosity and arborization pattern are the most important properties of cervical mucus in relation to fertility. These properties vary with endocrinological status of the reproductive cycle and directly associated with the estrogen:progesterone ratio and fertility status of dairy animals, information of which is scanty in mithun.

The occurrence of crystallization (arborisation) is common to all types of mucus. But the degrees of crystallization/arborisation pattern in cervical mucus varies under influence of two ovarian hormones (estrogen and progesterone). While estrogen controls the progress of crystallization, progesterone diminishes the formation of arborisation pattern. Thus it can be quite useful in predicting the onset of estrus, different stages of estrus and ovulation time in mithun. Therefore, the present investigation was aimed to study the physico-chemical properties of cervical mucus during the estrous cycle in induced and normal animals, which will aid in detecting estrus in mithun.

It was found that estrus in mithun was characterized by scanty discharge of cervical mucus having a clear appearance and a moderate to thick consistency in the control group of animals. On the other hand, induced estrus was characterized by a moderate to scanty discharge with a clear appearance and varying degree of consistency. The Spinnbarkeit value was seen higher in induced estrus mithun, indicating the animals were in estrus.

Estrus behavior in mithun

Estrus behaviour of mithun is not studied extensively unlike cattle. Therefore, a study was conducted to assess the reproductive behaviour in two groups of mithun, one group synchronized with GnRH and prostaglandin and a control group (non-synchronized). Results showed that unlike other bovine species, some of the estrus behaviour like bellowing, mounting over herds-mate, swelling of vulva and chin resting by the bull were completely absent in mithun. On the other hand, few physiological changes during estrus like reddening of vulval mucosa and uterine tonicity were prominently observed. An estrus intensity score card was also prepared depending upon the intensity of visual behaviour signs, physiological changes and bull response.



A, B: Atypical arborisation (fern) pattern of cervical mucus; C, D: Typical arborisation (fern) pattern of cervical mucus in mithun cows

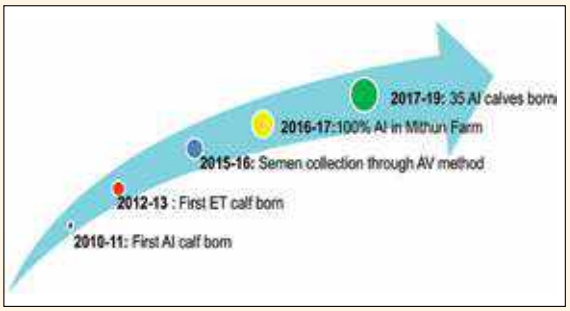
The fern pattern of cervical mucus varied at different stages of estrus in mithun, which is due to changing levels of sex hormones. During mid-estrus, a clear typical fern pattern of cervical mucus with venations and sub-venations are seen, whereas non-estrus mithuns showed atypical fern pattern.

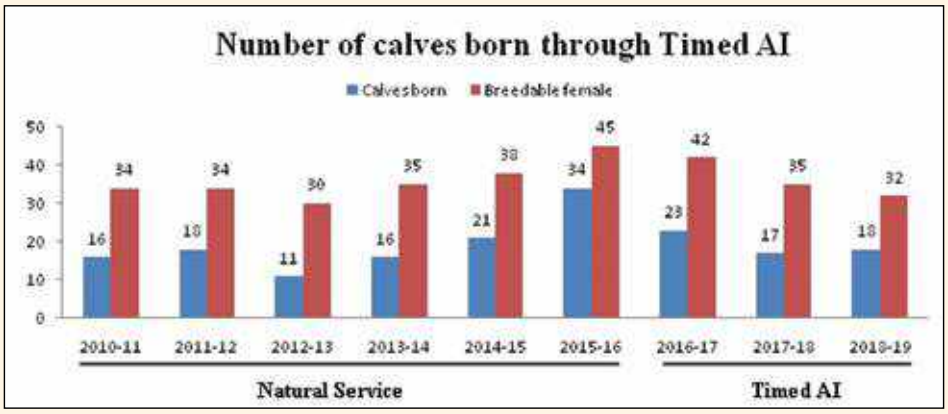
100% Implementation of Timed A.I. in Mithun: A Success Story

Artificial Insemination (AI) is a simple and most effective biotechnological tool for genetic improvement of livestocks. But the implementation of AI in mithun is difficult primarily due to the shy nature of mithun bull and silent or less pronounced estrous sign in mithun female which makes semen collection and identification estrus mithun cows a tiresome task.

During 2016-17, ICAR-NRC on Mithun initiated semen collection from mithun bull using artificial vagina (AV) method. After rigorous training of mithun bulls, it has become possible to collect semen from mithun bulls. A team of scientists of Animal Physiology and Reproduction section developed a protocol for the freezing of mithun semen using controlled bio-freezer. Semen samples are being collected regularly from mithun bulls and stored as frozen straw. Recently, we also introduced the electro-ejaculation technique for the collection of semen from the aged bull.

In the Institute's Mithun Farm, estrus synchronization and timed AI has been implemented since 2016-17. Till date, we produced 53 AI calves with an overall conception rate of 60 %.





LIVESTOCK PRODUCTION AND MANAGEMENT

Growth and reproductive performance of mithun in different seasons

A study was taken up to investigate the effect of genetic as well as non-genetic factors influencing the growth performance of mithun. All the available historical data, involving (Parity Record: 2000 –2017 and Birth Weight Record: 2013-2017),were analyzed to find out the age at first heat (AFH), average weight at first heat (AWFH), age at first calving (AFC) and maximum birth weight and calving at different seasons. The salient observations from the retrospective study are presented below:

- Age at first heat: 937.90±28.51 days
- Average weight at first heat: 200.83±7.36 kg
- Age at first calving: 1274.81±29.01 days
- Herd average calving interval (days): 465.95±17.68
- Season of calving: Maximum calving takes place in winter followed by autumn
- Birth weight in kg: Winter (18.93±0.42), Spring (18.95±0.68), Summer (19.60±0.55) and Autumn (20.03±0.33kg).

The monthly live weight is recorded to find out the growth performance of farm animal. Following are the average daily gain (ADG) for different categories of animals.

Average daily gain (g/d) of calves.

Sex	Male (mean±SE)	Female (mean±SE)
ADG (up to 4 months)*	182±3.23[a] (N=9)	147±4.711[b] (N=7)
ADG (up to 8 months) *	200±6.36[a](N=3)	166±8.50[b] (N=4)
ADG (up to 12 months)	194±1.58 (N=3)	176±11.21 (N=4)

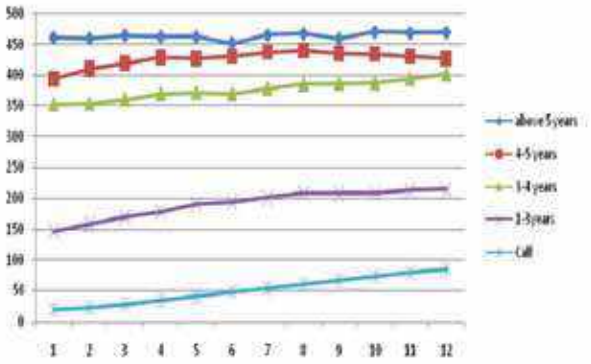
*a, b; Value with different superscripts differ significantly (P≤0.05)

Average daily gain (g/d) of grower and adult (present study)

Male	Grower (1 to 3 years) (mean ±SE) (N=12)	Adult (4 years) (mean±SE) (N=15)	Adult (5 years) (mean±SE) (N=7)
ADG (g/d)*	197.72±11.24[a]	142.28±15.02[b]	98.63±25.01[c]

*a, b, c; Value with different superscripts differ significantly (P≤0.05)

Growth curve of different categories of mithun

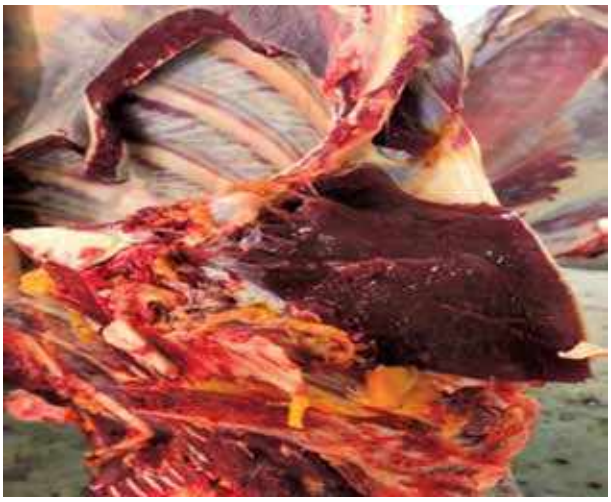


Carcass characteristics of mithun

A study was conducted to determine the carcass characteristics of male mithun up to 7 years of age. Male mithun (n=8) of age 3-7 years, live weight 416.88±27.65 kg with good body condition, maintained under similar housing, feeding and other managemental conditions, were sacrificed by traditional halal method at Municipal Council abattoir, Dimapur. Bleeding, dressing and evisceration were done following the standard procedures. The average dressing percentage of the slaughtered animals was 50.84±1.03. Mithun meat is dark red in colour, fat is yellow and firm in consistency. The degree of marbling (intramuscular fat) in mithun at 12th rib cross-section was slight to small, which was judged by visual appraisal (USDA marble scoring guide).

The marbling patterns observed in the mithun carcass is presented below:

A study was conducted to determine the amino acid profile of mithun meat. Histidine and methionine content varied significantly (P≤ 0.05) with the age. Among the essential amino acids, lysine and leucine were the most abundant while glutamic acid and aspartic acid were the highest non-essential amino acids.



Slight marbling observed in *longissimus dorsi* muscle on the 12th rib of male mithun carcass

Small marbling observed in *longissimus dorsi* muscle on the 12th rib of male mithun carcass

ANIMAL HEALTH

Evaluation of *in vitro* efficacy of selected herbs against leech

Leech infestation is a menace for the livestock including mithun and is regarded as one of the greatest nuisances faced by the mithun of this north eastern hilly region of India. In the market, there are some chemicals available which are either very costly or not suitable for large scale use. In the literature and tribal knowledge base, some plants are known to either repell or kill leech. In the present investigation *in vitro* efficacy of different crude herbal plant extracts and chemicals were tested against land leech infestation. Among the herbs, crude aqueous extract of tulsi leaves (*Ocimum sanctum*), garlic rhizome (*Allium sativum*), cucumber juice (*Cucumis sativus*), ginger rhizome (*Zingiber officinale*), neem leaves (*Azadirachta indica*), tobacco leaves (*Nicotiana tobacum*) and bahaktita flowers (*Phlogacanthus thyrisformis*) were determined. However, neem (@50%), tulsi (30%), garlic (10-30%) and tobacco (1%) could kill land leech within 38, 34 and 24 minutes suggesting the highest efficacy of tobacco against land leech.

Among the chemical drugs, cypermethrin and Amitraz (12.5% w/v) were used at the recommended doses following standard protocol. The killing time with cypermethrin were observed to be 14.25 minutes at 1% concentration and 4.75 minutes with Amitraz at 12.5% w/v for land leech. To compare the efficacy, different physiological solutions namely PBS 1X and NSS 1X were used and had no effect on leech mortality. Further study is in progress.

Leech infected animal

Leech recovered from animals

TRANSFER OF TECHNOLOGY

MITHUN MEAT MILK MONEY MARRIAGE

EXTENSION ACTIVITIES

Under Tribal Sub-Plan (TSP), a total of 10 programmes were organized by ICAR-NRC on Mithun in all the four mithun inhabited states *viz.,* Arunachal Pradesh, Manipur, Mizoram and Nagaland. The various programmes organized included distribution of mithun heifers, distribution of bull, farmers' training programme cum exposure visit, distribution of piglets, mithun mela cum technology exhibition programme, stakeholders' meeting and establishment of semi-intensive mithun rearing unit. A total of 1548 mithun farmers were benefitted from the programmes.

Bull Exchange Programme

Under the traditional free-range system of rearing, female mithun are generally mated with a dominant bull over a long period of time resulting in inbreeding. As a result, the population suffers from the delayed age of puberty and maturity, longer inter-calving, reduced adult body weight, and reduced body size. To avoid this, the Institute as part of its bull exchange programme for genetic improvement of mithun population, distributed two bulls in Poilwa village, Peren district, Nagaland on the 5th April, 2018.

Distribution of Mithun Heifers

Efforts have been made to reintroduce mithun where mithun rearing either has been stopped or having lesser number of mithun populations. Five numbers of mithun heifers were distributed in Gidemi village Phek district, Nagaland on 5th April, 2018. A total of 25 mithun farmers benefitted from this programme.

Farmers' Training Programme cum Exposure Visit

A farmers' training programme cum exposure visit was organized from 31st May to 2nd June, 2018. A total of 55 farmers from different parts of Nagaland participated in the programme. The main objective of the programme was to create awareness about scientific mithun husbandry.

During the training, the participants witnessed the scientific rearing of mithun under semi-intensive system in the Institute's farm. The participants were given theoretical as well as hands-on training on various subjects including breeding, restraining and identification, artificial insemination (AI), housing management, draught capability, feeding and minerals supplementation, prospects of processed mithun meat, health and preventive measures.

Interactive Meeting with Officials of Animal Husbandry and Veterinary Department

A meeting with officials of Department of Animal Husbandry and Veterinary, Government of Manipur was organized in Imphal, Manipur on the 5th February, 2019. A total of nine officials participated in the meeting along with the Scientists of ICAR-NRC on Mithun.

Stakeholders' meeting

A stakeholders' meeting with officials of Department of Animal Husbandry and Veterinary, Government of Manipur was organized in Imphal, Manipur on the 5th February, 2019. A total of nine officials participated in the meeting along with the Scientists of ICAR-NRC on Mithun.

Establishment of Semi-Intensive Mithun Rearing Unit

The traditional belief that mithun can only be reared under a free-range ecosystem, has deprived the understanding and judgement of the mithun farmers about the drawbacks of the traditional mithun rearing system. The advantage of minimum investment and labor requirement of the traditional system is often discounted by the infeasibility of the implementation of scientific interventions including record keeping, controlled breeding, and health care. Also, the denudation in the designated mithun forest area due to *jhum* cultivation and other anthropological activities is a strong cry for an alternate system for management of these

unique bovines. Considering these drawbacks of the traditional rearing system, the Institute have developed a semi-intensive model and has been working unabated to advocate adoption of this model to the mithun farmers.

ARUNACHAL PRADESH : As part of the Institute initiative to promote semi-intensive rearing of mithun 90 rolls of barbed wires, 70 CGI sheets, 10 pairs of gumboot, 10 raincoats and one trevis were handed over to Ledum Village Secretary on 12th February, 2019. Under the semi-intensive system, mithuns are provided with a night shelter and let loose for grazing during the day. Supervision and monitoring by the owner can be done during the late afternoon or early morning.

NAGALAND: To promote and popularize semi-intensive mithun rearing and for scientific interventions, a semi-intensive mithun unit was established at Pungro village, Kiphire district of Nagaland. The Institute provided five mithun heifers to start the unit. Other inputs like barbed wire for fencing approximately five kilometres forest area, CGI sheet for the construction of low-cost mithun shed and animal handling crate were also provided on 29th November, 2018. Synchronization and natural mating was also carried out in the established mithun rearing unit.

MANIPUR: On 4th February, 2019 a semi-intensive mithun rearing was established at Machi village, Tengnoupal district of Manipur. Inputs like 90 rolls of barbed wires, 70 CGI sheets, 10 pairs of gumboot, 10 raincoats and one trevis were handed over to the mithun rearing society of the village for the construction of low-cost mithun sheds.

ICAR-NRC on Mithun showcasing technologies at Machi village, Tengnoupal district , Manipur on 4th February, 2019

INITIATIVES FOR *IN SITU* CONSERVATION OF MITHUN

Mithun are traditionally being reared under zero input, free range forest based system in which the animals are left loose in the community forest without providing shelter or any supplementary feeding. Animals are looked after by one or two herdsman. Since, the animals are exposed to harsh weather conditions and wild carnivores; there are lot of mortality due to diseases and particularly to newborn calves due to attack from wild carnivores. During winters, due to scarcity of trees leaves and grasses in the forest, trespassing of mithun into agricultural land are reported which is the main cause of conflict between mithun owners and agriculture farmers. Some of villages stopped rearing of mithun due to this conflict. Moreover, decreasing forest coverage in the region is also a concern for conservation and propagation of mithun in the region. Therefore, it is imperative to find out an alternative rearing system.

ICAR-NRC on Mithun has developed an alternative package of practices for mithun under semi-intensive rearing system and the same has already been practiced successfully in the Institute Mithun Farm since last two decades. From 2016 onwards, we started implementing the semi-intensive model under field condition. Under 'semi-intensive' system, mithuns are provided with a night shelter. The animals are let loose for grazing during the day. In the evening, animals are brought back to the shelter and may 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 and health care, and breeding.

Since 2016-17 to 2018-19, ICAR-NRC on Mithun established 13 number of semi-intensive mithun rearing model under field condition across all mithun rearing states. List of semi-intensive models developed in different villages is gives as under:

Name of the State	Name of the village & Dist	Year of establishment
Arunachal Pradesh	Boasimla, Lower Subensari Dist.	2017-18
	Miren village, East Siang Dist.	2017-18
	Ledum village, East Siang Dist.	2018-19
Manipur	KVK Hengbung, Senapati Dist.	2016-17
	Machi village, Tengnoupal Dist	2018-19
Mizoram	Sahia Dist	2017-18
	Chamapi Dist.	2017-18
Nagaland	Yimchung, Longleng	2017-18
	Gidemi village, Phek	2017-18
	Tobu, Mon	2017-18
	Tening, Paren	2017-18
	Pungro, Kiphire	2018-19

Distribution of Piglets

Piglets were distributed as a part of the TSP programme to increase the income of the farmers in Hazadisa, Ganeshnagar and Alamanta villages, Dimapur district, Nagaland on 27th October, 2018. A piglet each was handed over to 30 farmers.

MITHUN *MELA*-CUM-TECHNOLOGY AWARENESS PROGRAMME

Mithun *melas* are organized time to time in mithum inhabiting areas to develop interest among the rural youths for scientific rearing as a potential means of livelihood. The technologies developed by the Institute are showcased during the *mela*. Besides this several competitions are organized to adjudge the best mithun bulls, cows and heifers out of those animals gathered by local farmers.

List of mithun *mela* organized during 2018-19

Sl. No.	Place of Activity	Date	Beneficiaries
1.	Mithun *mela*-cum-technology exhibition programme in Ledum village, East-Siang district, Arunachal Pradesh	12.02.2019	350
2.	Mithun *mela*-cum-technology exhibition programme in Machi village, Tengnoupal district Manipur	04.02.2019	325
3.	Mithun *mela*-cum-technology exhibition programme in Pungro village, Kiphire district, Nagaland	29.11.2018	350

LEDUM, EAST SIANG, ARUNACHAL PRADESH

One day Mithun *mela*-cum-technology Awareness Programme was organized in Ledum Village, East-Siang District, Arunachal Pradesh on 12th February, 2019. The programme was jointly organized by ICAR-NRC on Mithun, under the Tribal Sub-Plan in collaboration with Department of Veterinary and Animal Husbandry, Government of Arunachal Pradesh along with Ledum Village Authority.

Hon'ble MLA Shri. Tatung Jamoh was the Chief Guest of the programme. Shri. Tapong Talog, Ex-Director, Department of Education, Government of Arunachal Pradesh; DVO Pasighat, Dr. Taggo, Circle Officer of Bilet Block Smt Oni Padun, and GB, Ledum Village Shri Tayam Dupak, also graced the programme.

The Mela was attended by 400 farmers. The farmers brought more than 100 mithuns to the mela sites which were vaccinated against FMD and BQ. Several competitions were organized to adjudge the best mithun bulls, mithun cows and mithun heifers. The cash prizes and certificates were given to the winners. A stall was put up showcasing the technologies and package of practices developed by the Institute. The villages also put up several stalls to display there produces and handicrafts. In order to promote semi-intensive mithun rearing several inputs including barbed-wire, CGI sheet, gum

boots, rain coats, and trevis were also handed over to the Mithun Rearing Society of the village.

In the afternoon, an interactive session, the Scientist-Farmer meet was also organized. During the interaction, the need of regular vaccination, supplementation with the mineral mixture, use of good bulls and conservation of the biggest bulls for breeding purpose, diversified use of mithun as a source of meat, milk, leather as well draft were elaborated.

MACHI, TENGNOUPAL, MANIPUR

On the 4th February, 2019, a Mithun Mela cum Technology Awareness programme was organized at Bungtungsee Kung, Machi Village, Tengnoupal District, Manipur in collaboration with Apunba Imagi Machashing. The program was graced by Prof M. Premjit Singh, Hon'ble Vice-Chancellor, Central Agricultural University, Imphal and Dr L Chaoba Singh, Director, Department of Veterinary and Animal Husbandry, Government of Manipur. The programme was attended by more than 200 farmers. The programme was followed by a Scientist-Farmers interaction where the farmers got an opportunity to ask the experts regarding mithun rearing. A stall was put up showcasing the technologies and package of practices developed by the Institute. Several competitions were organized to adjudge the best mithun bulls, mithun cows and mithun heifers. The cash prizes and certificates were given to the winners.

PUNGRO, KIPHIRE, NAGALAND

On 29th November, 2018, one-day Technology Awareness-cum-Mithun Mela was organized at Pungro Village, Kiphire, the lone aspirational district of Nagaland, in collaboration with the Chief Veterinary Officer, Kiphire, KVK- Kiphire and North East Initiative Development Agency (NEIDA), Kiphire. Shri. Mohammad Ali Shihab, IAS, DC, Kiphire, graced the occasion as the Chief Guest.

More than 300 farmers of five selected villages of Pungro Sub-division namely Pungro, Phuvkiu, Fakim, Penkim, and Salomi village participated in the programme. Awards for the best mithun bull, heifer and calf were also presented during the programme. It was followed by Farmers-Scientist interaction where the participating farmers actively interacted with the scientists from ICAR-NRC on Mithun. Stalls were also put up by ICAR-NRC on Mithun, NEIDA, Veterinary Department and SHG's, where technologies relating to mithun were showcased. Microchip-based identification was also demonstrated where a unique identification number given to a mithun would avoid the conflict between the mithun farmers. A total of 350 rolls of barbed wires, 35 bundles of CGI sheets, 5 numbers of trevis/controlling crates, 25 pairs of gum boots, 25 numbers of rain coats, 500 numbers of ear tags, markers and applicators and mineral mixtures and medicines were distributed to the mithun farmers of five selected villages.

PROGRAMME PARTICIPATED

The Institute actively participated in the various Kisan Melas, Agri-Fairs and other farmers' oriented programmes organized by other institutions. These programmes provided a platform to showcase the activities, research achievements and technologies developed by the Institute to the farmers.

Sensitization Programme for Enhancing Farm Income and Livelihood Security in Nagaland

ICAR- NRC on Mithun participated in the Sensitization Programme for Enhancing Farm Income and Livelihood Security in Nagaland at ICAR-Research Complex for North East Hill Region, Nagaland Centre on the 24th November, 2019. The programme was graced by Shri. P B Acharya, Hon'ble Governor of Nagaland. The stall showcasing the various technologies developed by the Institute was visited by 28 farmers and extension functionaries attending the programme.

CAU Regional AGRI FAIR, Imphal

ICAR- NRC on Mithun participated in the three-day Regional AGRI FAIR 2018-19 under the theme "Agripreneurship for Attracting Rural Youth to Agriculture" organized by Central Agricultural University (CAU) celebrating Silver Jubilee from January 11-13, 2019 at Imphal. Manipur assembly speaker Yumnam Khemchand inaugurated the mega event in presence of the Chancellor Dr. S. Ayyappan of the CAU, Vice-Chancellor Prof M. Premjit Singh and three former Vice-Chancellors of the university. The technologies and packages of practices developed by the Institute including value added products developed from mithun milk, meat and hide were displayed in the Institute's stall. A total of 206 delegates, students and farmers visited the stall.

Dr. S. Ayyappan, Former DG, ICAR and other dignitaries visiting the stall

XIV Agricultural Science Congress

The Institute participated in the XIV Agricultural Science Congress (ASC) organized by the National Academy of Agricultural Science (NAAS) and ICAR - Indian Agricultural Research Institute from 20-23rd February, 2019 in the premises of the NAAS, Complex in New Delhi. The theme for the ASC was "Innovations for Agricultural Transformation". Shri Radha Mohan Singh, Hon'ble Union Minister of Agriculture & Farmers' Welfare inaugurated the programme.

Dr. Trilochan Mohapatra, DG, ICAR; Prof. Panjab Singh, President, NAAS; Dr. J. K. Jena, DDG (FS & AS) visiting ICAR-NRC on Mithun stall

To create awareness and educate people about mithun, a stall was set up showcasing the different activities carried out by the Institute. Dr. Trilochan Mohapatra, Secretary, Department of Agricultural Research and Education (DARE) and Director General (DG), Indian Council of Agricultural Research (ICAR); Prof. Panjab Singh, President, NAAS; Dr. J. K. Jena, DDG (FS & AS) including many dignitaries visited the stall. A total of 62 scientists professors, students, farmers and research scholars visited the stall. On the concluding day, the mithun statue exhibited on the stall was presented to the NAAS for display at its museum.

International Seminar on Animal Agriculture for Doubling Farmers' Income, College of Veterinary Science, AAU, Guwahati

In order to popularize mithun and showcase the various technologies developed and activities carried out by the Institute, a stall was put up in College of Veterinary Science, Assam Agriculture University, Khanapara, Guwahati during International Seminar on "Animal Agriculture for Doubling Farmers' Income: Technology, Policy and Strategy Options" from 27 - 28th February 2019. A total of 48 delegates, farmers, students, research scholars, professors and teachers visited the stall. Many dignitaries Dr. Kamal Malla Bujarbaruah, VC, AAU and Dr. H. Rahman, Representative South Asia, ILRI visited the stall.

ACHIEVEMENTS OF KRISHI VIGYAN KENDRA PHEK, PORBA

Krishi Vigyan Kendra Phek was established in Porba village by the Indian Council of Agricultural Research (ICAR) under the aegis of ICAR-NRC on Mithun, Medziphema, Nagaland in 2003 to augment the knowledge of farmers of the district with the latest technologies with the aim of reducing the time lag between technology generation and its transfer to the farmers' field for increasing production and achieving sustainability. The mandates of Krishi Vigyan Kendra are imparting trainings, conducting on-farm testing (OFT), demonstrating proven technologies of agriculture and allied sectors and organizing various extension activities for the farmers, rural youth and extension personnel of the district. The activities carried out during 2018-19 are given below.

Training and extension activities conducted during 2018-19

Training programmes					Extension Activities			
Number of Courses			Number of Participants		Number of Activities		Number of Participants	
Clientele	Targets	Achievement	Targets	Achievement	Targets	Achievement	Targets	Achievement
Farmers	49	56	1205	1284	191	402	1745	3683
Rural youth	18	26	370	533	NA	NA	NA	NA
Extension Functionaries	4	7	70	97	NA	NA	NA	NA
Total	**71**	**89**	**1645**	**1914**	**191**	**402**	**1745**	**3683**

Vocational training programmes conducted during 2018-19

Thematic area	Date (Duration)	Training Title	Participants		
			Male	Female	Total
Value addition	21 to 24th November 2018 (4 days)	Post- harvest technology in soybean	0	13	13
Post harvest management	27 to 30th November 2018 (4 days)	Post- harvest management in fruits and vegetables	0	10	10
Insect Pest and Disease Management	5 to 8th November 2018 (4 days)	Insect-pest and disease management in cole crops	2	8	10
Vermicomposting and Vermiculture	17 to 20th July 2018 (4 days)	Importance of vermicomposting, vermiculture, film show on vermicomposting	2	8	10

Sponsored training programmes conducted during 2018-19

Date (From- To)	Duration (days)	Title of training	No. of Participants			Sponsoring Agency	Amount of fund received (Rs.)
			M	F	T		
14 to 20th March 2019	7 days	Organic agriculture	18	8	26	MANAGE, Hyderabad	42000
18 to 23rd March 2019	6 days	Protected cultivation of high value vegetables	11	15	26		42000
18 to 23rd March 2019	6 days	Scientific poultry management	15	10	25		42000
	19 days		44	33	77		126000

On Farm Trials (OFT) and Front Line Demonstrations (FLD) conducted during 2018-19

Discipline	On Farm Trials			Frontline Demonstrations		
	Crop / Enterprise	No. of technology	No of trials	Crop / Enterprise	No. of technology	No. of demonstration
Agronomy	Paddy, maize potato, field pea	3	12	Soybean, field pea, potato	3	120
Horticulture	Tomato, Lemon *Moringa*	3	9	King chilli, onion, mushroom	3	33
Soil Science	Cabbage, ginger	2	8	Potato, vermicomposting	2	6
Plant Protection	Cabbage, brinjal	2	6	Paddy, king chilly	2	13
Animal Science	Mithun, poultry	3	38	Poultry, piggery	2	20
	Total	**13**	**73**		**12**	**192**

Under NICRA project at Thipuzumi, K. Basa and Phusachodu village, 14 numbers of training programmes were conducted for practicing farmers. Altogether 143 female and 168 male farmers participated in the capacity building programme. Demonstrations were conducted on mulching in persimmon, french bean, potato, king chilli, mushroom, field pea, soybean, biofertilizer in potato, poultry bird Srinidhi and Khaki Campbell.

'***Mera Gaon Mera Gaurav***' a farmer-oriented programme initiated by GOI under which two training programmes were conducted in Thetsumi, Chizami and Dzulhami villages benefitting 50 farmers

Mulching in Persimmon fruit at Thipuzu village

Demonstration on Potato var Kufri Jyoti at Thipuzu village

Demonstration on improved production technology of Kiwi fruit

Demonstration on Improved production of Poultry farming

Agronomy

Under Agronomy, 12 numbers of 'On Farm Trials' were conducted to assess the SRI technology in paddy variety Abhishek, performance of maize variety MM 1107 and intercropping of potato field pea at farmers field. 120 numbers of front line demonstrations for popularization of soybean variety RKS 18, field pea variety Rachna and potato variety Kufri Kanchan were conducted in different villages of Phek district.

OFT on assessment of potato variety Kufri Kanchan and field pea variety Rachna intercropping

OFT on varietal evaluation of paddy variety Abhishek under SRI technology

FLD on popularization of soybean variety RKS 18

OFT on varietal evaluation of maize variety MM 1107

FLD on popularization of field pea variety Rachna.

Soil Science

In Soil Science, trials were conducted to assess the effect of organic nutrient management in local ginger and cabbage. Six trials were conducted in farmers' field in different villages. 23 numbers of demonstrations were conducted under FLD programme for popularization of vermicomposting technology and biofertilizer application in potato variety Kufri Girdhari benefiting 23 farmers.

OFT on assessment of organic nutrient management in local ginger

OFT on effect of organic management in cabbage

FLD on tuber treatment of potato with biofertilizer

FLD on low-cost HDPE Vermicomposting at farmers' field

KVK Phek is also engaged in analysis of soil and water sample of farmers from different villages and distribution of soil health cards.

Soil sample analysis / Soil Health Cards (SHCs)

Sl. No.	Samples tested/Analysed	Sample (No.)	Farmer beneficiaries	Village covered
1.	Soil sample	260	540	5
2.	Water sample	10	10	2
	Total	270	550	7

Horticulture

Under Horticulture, three on farm trials were conducted on tomato variety Arka Rakshak, Assam lemon and Moringa in different villages of Phek district benefiting 9 farmers. Front line demonstrations on onion variety (Agrifound Dark Red), oyster mushroom production and protected cultivation of King chilly was organized, benefiting 33 farmers.

OFT on performance of tomato variety Arka Rakshak at dates of transplanting. March transplanted crop recorded highest yield of 22t/ha compared to July and October transplanted crop.

FLD on popularization of onion variety Agrifound Dark Red was conducted at Porba, Yorba and K. Basa benefiting 25 farmers. The highest yield recorded was 22.64 t/ha

FLD on popularization of protected cultivation technology of King chilly

FLD on popularization of oyster mushroom production at Gidemi village

Plant Protection

Crop production is highly influenced by the occurrence of pest and diseases. Under Plant Protection, on farm trials were conducted on organic management of fruit and shoot borer in brinjal variety Arka Anand and aphid management of cabbage using tobacco leaf extract. Altogether six trails were conducted in farmers' field.

Front line demonstrations on popularization of trichocards for stem borer management in paddy and use of tobacco leaf extract for management of sucking pest of King chilly were conducted in two villages benefiting 13 farmers.

OFT on organic management of fruit and shoot borer in brinjal variety Arka Anand

FLD on popularization of trichocards for stem borer management in paddy.

FLD on sucking pest management using tobacco leaf extract in King chilli.

Animal Science

Under Animal Science division, two on farm trials were conducted on mineral supplementation in mithun and De-Save maize/feed dispensers for poultry benefiting 22 farmers. Two FLD programs were also conducted for popularizing White Pekin ducks and iron dextran administration in new born piglet benefiting 20 farmers.

OFT on evaluation of reproductive performance of mithun herd by mineral supplementation (lick-blocks) using lick block dispenser.

OFT on evaluation of De-Save poultry feed dispenser

FLD on popularization of White Pekin duck under Phek district

FLD on popularization of iron dextran administration in new born piglets

Extension Activities and Celebration of Important Days

Web-casting of Hon'ble Prime Minister with SHG members and women groups

Vocational training on value addition of Soya milk

Awareness on *Swachhata* at Gidemi village

Kisan Mela-Farmers Scientist Interaction Sponsored by ATMA, Phek

Parthenium awareness week observed at KVK office, Phek

Celebration of World Soil Day at Chizami

Promoting Onion Production in district Phek: A Success Story

Phek district is located in the southeastern part of Nagaland, bounded by Myanmar in the east. It is endowed with sub-tropical to temperate climate occupying an area of 2026 sqkm. The district consists of undulating hilly terrain with altitude ranging from 540 m MSL to 2133 m MSL. Major crops grown in the district are paddy, maize, millets and local cultivars of pulses. Different vegetables such as cabbage, potato, chow-chow, means, mustard leaf, spring onion, etc. are cultivated on large scale and marketed throughout the state. Onion being an important vegetable crop is priced between Rs. 40-50/- throughout the year in the region. With the changing living style, onion has become an important ingredient in Naga food habit, however, commercial onion cultivation in Phek district as well as in Nagaland is negligible. Hence, Krishi Vigyan Kendra, Phek conducted Front line demonstration in order to popularize onion cultivation in the region. Farmers from Porba and Yorba village were trained on the onion cultivation technology. Seeds of variety Agrifound Dark Red were distributed to 25 farmers during the month of September-October, 2018 and seedlings were transplanted during November covering an area of 0.5 hectare. Harvesting commenced from April onwards based on the altitudes. The results of the demonstrations revealed that onion can be successfully cultivated under Phek condition with a highest yield of 24.6 t/ha in Yorba village followed 17.8 t/ha in Porba village, respectively. The average yield/ha was recorded to be 21.10 t/ha. The observations of the demonstration on onion variety recorded are given below:

Data on Parameters	Onion var. Agrifound Dark Red
Plant height (cm)	44.50
Stem girth (cm)	3.58
Bulb diameter (cm)	5.62
Bulb length (cm)	4.58
Bul weight (g)	68.43
Average Yield (t/ha)	21.10
Net return (Rs/ha)	7,16,444
B:C Ratio	3.64

Duck Farming a Successful Enterprise

Ms. Vevohulu Churhah hails from an agricultural family at Rukizu, Pfutsero, Phek district, Nagaland. She spent her early childhood assisting her mother in agricultural field for growing field crops and vegetables. Pursuing her education at the same time, she graduated in the year 2010 in the field of arts and literature. She worked as an accountant in a private school till 2016. She decided to venture out with a dream of becoming a successful agripreneur. She set up a piggery unit with 9 breeding sow and one boar jointly with a friend of her the little financial resource. A freak of fate, all her pigs were wiped out by an epidemic of classical swine fever. In January 2018, she approached KVK, ICAR-NRC on Mithun, Porba, Phek for guidance and technical assistance. In March 2018, she undertook duckery project with 200 ducklings Khaki Campbell from KVK after attending a scientific duck farming training organized by the KVK-Phek. The ducklings were provided under NABARD sponsored programme and implemented by the KVK. With proper feeding, housing and health care, the duck matured and started laying from August 2018 that paved a way of generating income for her. During 2018, she earned Rs. 56000.00. The eggs are sold out like hot cakes @ Rs 10/- each. The eggs find a regular space in the tiffin of the school goers in the locality. Still continuing with the enterprise, she has a plan to further expand the enterprise considering the demand. KVK Phek has also trained her in proper cleaning, grading and packaging of eggs to get premium price in the market. A lowcost polyhouse was also provided by KVK to her to grow offseason vegetables tomato and Kingchilli earned Rs. 2,500 in previous year.

Miss Vevohulu Churhah in her duck farm

Marketing of duck eggs

LINKAGES AND COLLABORATION

State Vety & AH Depts.
Nagaland,
Arunachal Pradesh,
Manipur, Mizoram

ICAR HQ

NGOs
SHGs
Mithun Farmers' Club

SAUs - WBUAFS,
CoVS (AAU), MAFSU

Nagaland University
CAU (Imphal)

Public & Private
R&D Organizations
CCMB, IIT

Doordashan
All India Radio
Electronic &
Print Media

ICAR Institutes
ICAR Res. Complex,
IVRI, NDRI, NBAGR

Banking Institutions
NABARD, SBI

KVKs of NEH Region

ICAR HQ

Security Agencies
Assam Rifles, CRPF

ONGOING RESEARCH PROJECTS

A. INSTITUTIONAL (IRC) PROJECTS

Name of the project/Project Number	PI	Co-Pi	Start Date	End Date
Profiling gut microbiome of mithun	Dr. Saroj Toppo	Dr. Nazrul Haque Dr. Sabyasachi Mukherjee Dr. Abhijit Mitra	May 2017	Dec. 2019
Characterization of physiochemical properties of cervical mucus with reference to estrus behaviour and endocrine profile in mithun	Dr. M. H. Khan	Dr. S. S. Hanah Dr. K. Vupru Dr. Vikram R.	May 2018	Dec.2019
Genetic improvement of growth performance of mithun (*Bos frontalis*)	Dr. S. S. Hanah	Dr. S. Mukherjee Dr. M.H. Khan Dr. S. Toppo Dr. N. Haque Dr. J. K. Chamuah Dr. Lalchamliani Dr. Kobu Khate Dr. K. Vupru	May 2017	April 2020
Phyto-formulation for effective control against leech infestation in mithun (*Bos frontalis*)	Dr. J. K. Chamuah	Dr. S.S. Hanah Dr. K. Vupru Dr. Vivek Joshi Dr. H. Lalzampuia	June 2017	Dec. 2019
Genetic characterization of mithun populations through mitochondrial genome sequencing	Dr. Sabyasachi Mukherjee	Dr. S. S. Hanah Dr. Kobu Khate Dr. Kezhavituo Vupru Dr. A. Mitra	June 2017	March 2019

B. EXTERNALLY FUNDED PROJECT

Name of the project/Project Number	Funding Agency	Start Date	End Date	Total Cost (Rs. In Lakhs)
National Mission on Sustainable Himalayan Ecosystem (NMSHE)	DBT	March 2015	March 2020	90.58

C. ICAR-NETWORK PROJECT

Name of the project/Project Number	Funding Agency	Start Date	End Date	Total Cost (Rs. In Lakhs)
AICRP on FMD	ICAR	July 2014	July 2019	4.00
Maize production in NEH region for sustainable livestock production	ICAR	Dec 2018	Nov 2020	14.42

D. INFRASTRUCTURE PROJECTS

Name of the project/Project Number	Funding Agency	Start Date	End Date	Total Cost (Rs. In Lakhs)
Establishment of bioinformatics infrastructure facility for biology teaching through bioinformatics (BIF-BTBI) under the BTISnet: Dr Nazrul Haque	DBT	March, 2011	Continued	18.00
Establishment of institutional level biotech hub (IBT hubs) by DBT under special programme for North-Eastern states of India: Dr Sabyasachi Mukherjee	DBT	October, 2011	Continued	5.49

PUBLICATION

Papers in peer reviewed Journal

- Mukherjee A, Mukherjee S, Dhakal R, Mech M, Longkumer I, Haque N, Khate K, Vupru K, Jamir Y, Pongen P, Rajkhowa C, Mitra A, Guldbrandtsen B and Sahana G. (2018). High density genotyping reveals genomic characterization, population structure and genetic diversity of Indian mithun (*Bos frontalis*). *Scientific Reports*,
- Singh R K, Asangla H K, Bharali R and Borkotoky D. (2018). Zabo: A time-tested integrated farming system practiced by Chakhesang tribe of Nagaland. *Indian Journal of Hill farming* **31**(1):188-192
- Singh R K, Chaurasia, R K and Borkotoky D. (2018). Morphometric attributes of Nagaland long hair goat of Zunheboto District, Nagaland. *Journal of Krishi Vigyan.* **7**(1): 154-157

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- Lalchamliani, Hanah S S, Chamuah J K, Vupru K, and Khate K. (2018). Scope of livestock products for income generation. ***In***: Model Training Course on Recent Advances in Natural Resource Management for Doubling Farmers Income under Changing Climate Scenario organized by ICAR-NRC on Mithun, Medziphema, Nagaland from 28th August to 4th September, pp 49-51.
- Mukherjee S and Longkumer I. (2018). Animal genetic diversity and its conservation**.** ***In***: Compendium of Model Training Course on Recent Advances in Natural Resource Management for Doubling Farmers Income under Changing Climate Scenario, organized by ICAR-NRC on Mithun, Medziphema, Nagaland from 28th August to 4th September, pp.107-110
- Chamuah JK, Amenti, Lalchamliani and Hanah S S. (2018) Effect of Scenario organized by ICAR-NRC on Mithun, Medziphema, Nagaland from 28th August to 4th September, 2018. Pp 167-172

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- Mitra A, Toppo S, Haque N, Mukherjee S, Khan M H, Chamuah J K, Hanah S S and Lalchamliani (2018). "*Recent Advances in Natural Resource Management for Doubling Farmers Income under Changing Climatic Scenario*", Organized by ICAR NRC on Mithun, Medziphema, sponsored by the Directorate of Extension Education, Ministry of Agriculture & Farmers' Welfare, Govt. of India.

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- Chamuah J K, Amenti, Borkotoky D, Ezung E and Lalchamliani (2018). Pathological study of Mecistocirrus digitatus infection in naturally infested Phere (Cross of Mithun and cattle). In: National symposium on "Innovative Biotechnological Approaches for Improving Animal Health and Productivity " held at Medziphema, Dimapur, Nagaland during 13th – 15th December
- Chamuah J K, Borkotoky D, Jacob S S, Khate K, Dutta P R, Lalchamliani, Raina O K and Mitra A. (2018). "Genetic characterization and detection of pathological alteration of fasciolosis in mithun (Bos frontalis)" for the XXVII National Congress of Veterinary Parasitology and National Symposium on "Technologies for Sustainable Parasite Control and Redressal of Detection Methods Directed for Upliftment of Rural Economy", organized by College of Veterinary and Animal Science, Udaipur, Rajasthan.

- Haque, N., Das, K. C., Mondal, M., Prasad, N. and Toppo Saroj (2018). Effect of supplementation of spent grain in Congo Signal grass based diet on energy utilization in mithun. In: 25th Annual Convention of ISVIB and National Conference, VIBCON-2018 on Innovative Biotechnological Approaches for Improving Animal Health and Productivity, organized by ICAR-NRC on Mithun, Medziphema, Nagaland from 13-15th December, 2018. Abst No. FBB-O-02, pp. 49-50.
- Lalchamliani, Hanah S S, Chamuah J K and Mitra A. (2018). Carcass characteristics and meat quality of mithun (Bos frontalis). ***In***: Proc. 8th Conference of Indian Meat Science Association and International Symposium on Technological Innovations in Muscle Food Processing for Nutritional Security, Quality and Safety. organized by West Bengal University of Animal and Fisheries Sciences, Kolkatta, from 22-24 Nov, 2018 pp 380.
- Mitra A (2018) Manipulating Gene: A smart way to improve muscle mass. Lead Paper ***In***: International Symposium (VIII-IMSACON 2018) on "Technological Innovations in Muscles Food Processing for Nutritional Security, Quality and Safety" at College of Veterinary Sciences, West Bengal University of Animal and Fishery Sciences 37, Sarani, Kolkata on 22- 24 November.
- Mitra A (2018) 'Mithun (Bos frontalis), a unique bioresource of Arunachal Pradesh: an alternative sustainable means of livelihood". Policy Paper presented in the State Conclave on "Perspective Planning for Resurgent Agriculture & Allied Sector in Arunachal Pradesh" at Itanagar, Arunachal Pradesh on 18-19 May.
- Mitra A (2018) Transgenic Livestock Research - Present Scenario and Future Prospect. Lead Paper presented ***In***: 17th Convocation of National Academy of Veterinary Sciences and Scientific Seminar on "Livestock Sector towards One health, Food Security and Safety" College of Veterinary Sciences, OUAT, Bhubaneswar at on 19-20 December.
- Mitra A (2019) Targeting male germ cells for producing transgenic livestocks: An attractive alternative. Lead paper presented ***In***: Technical Session VI: "Policy's issues on Doubling Farmer's Income through Animal Agriculture" of International Seminar on "Animal Agriculture for Doubling Farmers' Income: Technology, Policy and Strategy Options" at College of Veterinary Sciences, AAU, Khanapara, Guwahati. 27- 28 February.
- Mitra A and Pramod KR (2018) Making transgenic Goat using testes-mediated gene transfer (TMGT). Lead Paper ***In***: Asian Regional Conference on Goats (ARCG-2018) at Amity University Rajasthan, Jaipur on 22-23 October.
- Mukherjee S and Longkumer I. (2018). Importance of proper breeding management of mithun. ***In***: Farmers' Training programme on Scientific Care and Management of Mithun, ICAR-NRCM, Nagaland, 31 May – 02 June, 2018.
- Mukherjee S, Mukherjee A, Longkumer I, Haque N, Vupru K, Khate K, and Mitra A. (2019). Genomic characterization of mithun populations revealed genetic homogeneity. ***In***: XVI SOCDAB National Symposium on "Animal Genetic Resources for Food and Social Security", ICAR-NBAGR, 7-8 February, 2019
- Mukherjee S, Mukherjee A, Mech M, Longkumer I, Haque N, Vupru K, Khate K, Jamir Y, Mitra A and Sahana G. (2018). Genomic Characterization and Bio-Diversity of Indian Mithun (Bos frontalis). International Conference on Genomics Analysis and Technology Conference (GATC 2018), Guwahati, 7-9 January 2018.
- Mukherjee S, Mukherjee A, Mech M, Longkumer I. (2019) ***In***: 34th National Training Programme on "Tools for genetic improvement of Animal Welfare and Productivity", under the aegis of Centre of Advanced Faculty Training (AG&B) at Animal Genetics & Breeding Division, ICAR-National Dairy Research Institute, Karnal (Haryana), 25 Feb –17 March, 2019.

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- Singh V, Yasotha T, Kumar A, Chamuah J K, Rajkhowa C, Borkotoky D and Mitra A. (2018). Prevalence and Pathology of Mycoplasma bovis in mithun in North East India. ***In***: Proc. National Symposium on "Innovative Biotechnological Approaches for Improving Animal Health and Productivity" held at Medziphema, Dimapur, Nagaland during 13th – 15th December.

Hands-on training workshop on "Spreading biotechnology awareness among science graduates of NEH Region" (15 -17th March, 2019)

AWARDS AND RECOGNITION

- Dr. Abhijit Mitra, conferred with **Fellow of National Academy of Veterinary Science (India)** during 17th Convocation of National Academy of Veterinary Sciences on December 19-20 2018 held in CoVS, OUAT, Bhubaneswar
- Dr. Abhijit Mitra served as Nodal officer of Krishi Kalyan Abhiyan (KKA) implemented by the Ministry of Agriculture & Farmers' Welfare, Dept. of Agriculture, Cooperation & Farmers' Welfare, GoI. The programme has been implemented in two phases, KKA-1 (from 1st June 2018 to 31st July 2018) and KKA-2 (2nd October to 25th December 2018), in 50 selected villages of District Kiphire, the only Aspiration District of Nagaland.

TRAINING AND CAPACITY BUILDING

TRAINING UNDER DOE, MINISTRY OF AGRICULTURE AND FARMERS' WELFARE

Model Training Course (MTC) on Natural Resource Management

Eight days model training course on 'Recent advances in natural resource management for doubling farmers' income under changing climate scenario' was organized at the Institute from the 28th August to 4th September, 2018 at ICAR-NRC on Mithun. The objective of the training course was to sensitize and to impart capacity building of the extension functionaries about the importance and management of natural resources. The MTC was sponsored by Directorate of Extension (DOE), Ministry of Agriculture & Farmers Welfare and organized by ICAR-NRC on Mithun. A total of 19 extension officials from the Department of Agriculture, Veterinary & Animal Husbandry, KVKs and ATMAs of Nagaland, Manipur and Gujarat participated in the training. A selected team of highly qualified resource persons and trainers from academia and research institutes like ICAR-IARI, New Delhi, ICAR-RCNEHR, Nagaland Centre, and ICAR-NIAP, New Delhi shared their expertise with the participants. During the training program, 22 lectures were delivered on natural resource management of water, soil, horticulture along with fish and livestock management.

TRAINING UNDER DBT BIOTECH HUB

Hands-on Training on Spreading Biotechnology Awareness

A three days Hands-on training programme on "Spreading Biotechnology Awareness among Science Graduates in the NEH Region" was organized on 15th March 2019 in the Institute under DBT Biotech Hub. This training programme was attended by the faculty as well as large number of graduate students from Patkai Christian College, Dimapur and imparted by Scientists of the Institute. The main objective of the training programme was to bring the awareness of biotechnology knowledge among the science students of NEH region as envisaged by Department of Biotechnology and ICAR-NRC on Mithun.

Hands-on Training on Biotech Awareness and Advanced Biotechniques for Analysis of Molecular Genetics Data

Hands-on training programme on "Biotech Awareness and Advanced Biotechniques for Analysis of Molecular Genetics Data for Post-Graduate Students of NEH Region" was organized in the Institute under DBT Biotech Hub from 22-23rd March 2019. The training was attended by the Scientists, Staff as well as Faculty and large number of Science students (PhD) from SASRD, Nagaland University, Medziphema. Skilled and specialized training on various aspects on biotechnological techniques were imparted to the trainees by Scientists of the Institute. A written test was also conducted to evaluate the trainees. The main objective of the training programme was to biotechnology awareness and to give brief exposure of bioinformatics tools available for data analysis work to the PhD students of NEH region.

WORKSHOP UNDER ITMU

One Day Workshop on Motivation

ICAR-NRC on Mithun organized one day workshop on "Motivation for the Innovative Scientific Research Towards the Development" was organized on the 19th March, 2019 under the National Agricultural Innovation Fund (NAIF) Project. Miss Nuneseno Chase, Manager, Learning and Development and Talent Management, Youth-Net, was the resource person for the said event. Scientist from ICAR Research Complex for NEH Region, Nagaland centre as well as all the staffs of ICAR- NRC on Mithun participated in the workshop. A total of 40 staffs participated in the programme.

CONFERENCES ORGANIZED

Conference on "Startups and MSMEs in Food Processing"

ASSOCHAM (The Associated Chambers of Commerce and Industry of India) with the collaboration of Ministry of Food Processing Industries, Government of India organized a Conference on "Startups and Micro Small and Medium Enterprises (MSMEs) in Food Processing" in the partnership with ICAR-NRC on Mithun, Medziphema, Department of Industries and Commerce, Government of Nagaland, SIDBI and NABARD. The programme was inaugurated by Shri Padmanabha Acharya, Hon'ble Governor of Nagaland on 23rd July, 2018. Dr. Om S Tyagi, Assistant Secretary General, ASSOCHAM, Smt. Lithrongla G Chishi, IAS, Commissioner and Secretary, Department of Industries and Commerce, Government of Nagaland and Shri S Hrangkhol, AGM, NABARD graced the occasion. The conference was attended by farmers, agri-startups and financial institutions. The speakers of the conference were from various government and non-governmental institutions.

Silver Jubilee Convention and National Conference of Indian Society for Veterinary Immunology and Bacteriology and National Conference, Vibcon-2018

The Indian Society for Veterinary Immunology & Biotechnology (ISVIB) in collaboration with ICAR-NRC on Mithun, Nagaland organized the XXV Annual Convention and National Conference on "Innovative Biotechnological Approaches for Improving Animal Health and Productivity" at ICAR-NRC on Mithun, Medziphema, Dimapur, Nagaland from 13 to 15th December, 2018. Governor of Nagaland P. B. Acharya graced the occasion as the Chief Guest for the Silver Jubilee Convention. Professor A. Thangavelu, Secretary ISVIB and Professor MVC, TANUVAS, Chennai, Dr. R. K. Singh, President ISVIB and Director ICAR-IVRI, Bareilly, Professor Premjit Singh, VC Imphal and Dr. C Balachandra, VC Chennai, graced the occasion.

A total of 9 sessions was conducted during the conference.

Session I: Dr. Richard P. Masillamony Oration Award Lecture by Dr. C. Balachandran on "Triangle' of Translational Veterinary Medicine: Nano-, Immuno-, and Bio-technologies"

Session II: Molecular diagnostic

Session III: Food Biotechnology and Bioinformatics

Session IV: Poster presentation

Session V: Emerging diseases

Session VI: Production and Reproduction Biotechnology

Session VII: Vaccines and Immuno-Therapeutic

Session VIII: Improvement of Animal Productivity of North East Hilly Region

Session IX: The Award session.

During the conference, the Society recognized the outstanding contributions of individuals in the field of Veterinary Immunology and Biotechnology and conferred various awards to outstanding Scientists. The coveted awards included: ISVIB Young Scientist Award (age below 35 years), ISVIB Mid-career Scientist Award (age between 36-50 years), GADVASU Woman Scientist Award, Lingard Memorial and Burnett Team Award. A total of 164 participants attended the conference.

The convention was a unique opportunity to the academicians, scientists, and students pursuing research on diverse aspects of Veterinary Immunology and Biotechnology to share their research findings with the assemblage of professionals and experts.

GLIMPSES OF VIBCON-2018

Hon'ble Governor, Nagaland Shri P. B. Acharya inaugurating VIBCON-2018

Releasing the VIBCON-2018 Compendium


ICAR-NATIONAL RESEARCH CENTRE ON MITHUN


SILVER JUBILEE CONVENTION

Students Facilitated by the Institute

S. No	Name of the Student	University	Programme
1	Ms Khaidem Archana	Department of LPM, SASRD, Nagaland University	Ph.D
2	Ms Tsarila Z. T. Sangtam	Department of LPM, SASRD, Nagaland University	Ph.D
3	Vineichuno Kuotsu	Department of Biotechnology, SET, Nagaland University	Summer Training B.Tech, Biotechnology
4	Aviboli Zhimomi	Department of Horticulture, SASRD, Nagaland University	PhD
5	Homseng Chowlu	Department of LPM, SASRD, Nagaland University	PhD
6	Nellisha Moyon	Department of Horticulture, SASRD, Nagaland University	PhD

Memorandum of Understanding (MoU) Signed

A MoU has been signed between ICAR-NRC on Mithun, Medziphema, Nagaland and Faculty of Veterinary Science, Assam Agricultural University (AAU), Khanapara, Guwahati for facilitating students' training/postgraduate research.

Participation in Conference/Training/ Workshop attended

Name of Conferences, Seminars, Workshop and Training	Name of the Staffs
(A) Scientist	
Attended ICAR sponsored 21 days Summer School on "Innovation in Livestock Sector for Doubling Farmers Income: Strategies and Opportunities in Meat Value Chain" was held at ICAR-NRC on Meat on 25th July to 14th August, 2018.	Dr. Lalchamliani Changte
Attended a training programme on Poultry, organized by ICAR-Project Directorate on Poultry Research was held at Hyderabad, India during at 22nd October to 5th November, 2018	Dr. Debojyoti Borkotoky
Attended training programme on "Development of Agri-Entrepreneurship in NEH Region-A way for Doubling the Farmers' Income" was held at ICAR-NEH Region Nagaland Centre, Medziphema from 27th November to 6th December 2018	Dr. Hannah K. Asangla
Workshop for the Vigilance Officers w.e.f 31st October to 1st November, 2018 was held at ICAR-NAARM, Hyderabad.	Dr. M.H. Khan
Attended Annual Review Meeting of NICRA, held at ICAR (RC) NEH Region Barapani from 25-26th April 2018.	Dr. Debojyoti Borkotoky
Attended International Conference on "Agricultural Extension and Advisory Services: Innovation to Impact", held at MANAGE, Hyderabad, on February 12-14th, 2019	Mr. Kamni Paia Biam
Training Program on "Socio Economic Impact Assessment of Research Programmes", held at ICAR-NAARM, Hyderabad, 25-27th Oct 2018.	Dr. S. Mukherjee
Attended "International Seminar on Animal Agriculture for Doubling Farmers Income : Technology, Policy and Strategy Options" held at College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati, 27 -28th February, 2019.	Dr. J.K. Chamuah
(B) Administration	
Workshop cum awareness programme on "Pension and Retirement Benefit" organized by ICAR-Central Inland Fisheries Research Institute, held at Barrackpore during 03-04th September, 2018.	Mr. Surjit Kumar

DISTINGUISHED VISITORS

- Shri R. Khing, Advisor, Veterinary and Animal Husbandry, Government of Nagaland visited on 2nd June, 2018.
- Dr. Chandan Rajkhowa, former Director of the institute, visited on 2nd June, 2018.
- Shri M. K Mero, Principal Secretary, Department of Veterinary & Animal Husbandry, Govt of Nagaland visited on 2nd June,2018
- Sri Padmanabha Balakrishna Acharya, Honourable Governor, Government of Nagaland visited on 23rd July, 2018.
- Smt. Lithrongla G. Chishi, Commissioner & Secy. Industries & Commerce, Govt. of Nagaland visited on 23rd July, 2018.
- Dr. Vishal Nath, Director ICAR on Litchi, Muzaffarpur, Bihar visited on 5th August, 2018
- Prof. Gaya Prasad, Vice Chancellor, Sardar Vallabhai Patel University of Agriculture & Technology,Modipuram,Meerut,UP visited on 29th December, 2018.
- Prof. A.K. Misra , former Vice- Chancellor G.B Pant University of Agriculture and Technology Pantnagar visited on 28th January, 2019
- Dr. A. K. Singh, DDG (Horticulture & Crop Science) visited on 8th March, 2019.

PERSONNEL

INSTITUTE STAFF as on 31st March 2019

Cadre Name	Name	Designation
RMP	Dr. Abhijit Mitra	Director
Scientific	Dr. Nazrul Haque	Principal Scientist
	Dr. (Ms.) Saroj Toppo	Principal Scientist
	Dr. Sabyasachi Mukherjee	Principal Scientist
	Dr. Meraj Haider Khan	Principal Scientist
	Dr. Jayanta Kumar Chamuah	Scientist
	Dr. Sapunii Stephen Hanah	Scientist
	Dr. Lalchamliani	Scientist
	Dr. H. Lalzampuia	Scientist
	Dr.(Ms) Laishram Sunitibala Devi	Scientist
	Dr. Vivek Joshi	Scientist
	Mr. Kamni Paia Biam	Scientist
	Dr. Vikram R.	Scientist
Technical	Dr. Kezhavituo Vüprü	CTO Animal Science (T-9)
	Dr. Kobu Khate	CTO Animal Science (T-9)
	Mr. Rokongulie Krose	Senior Technician (T-3)
	Mr. Vizekrol Kikhi	Senior Technician (Driver, T-2)
Administration	Ms. Aloli Rengma	AAO
	Mr. Utpal Ghosh	AFAO
	Mr. Th. Dipal Meitei	Assistant
	Mr. Surjit Kumar	Assistant
	Ms. Achüno Solo	UDC
	Ms. Vikhobeinuo Kiso	Stenographer Gr.III
	Ms Sentisangla Pongener	LDC
	Ms Arenla Ozukum	LDC
	Mr. Shatrughan Verma	LDC
Supporting	Mr. Zakahi	SSS
	Mr. Vezato	SSS
	Mr. Povetso	SSS
	Mr. Thupuvoyi	SSS
	Mr. Vezhocho	SSS
Staff of KVK	Dr. D. Borkotoky	STO (Animal Science) (T-6)
	Ms. Hannah K. Assangla	ACTO (Agronomy) (T-7-8)
	Ms. T. Esther Longkumer	ACTO (Soil Science) (T-7-8)
	Mr. Rinku Bharali	ACTO (Horticulture) (T-7-8)
	Ms. Liza Barua Bharali	ACTO (Plant Protection) (T-7-8)
	Mr. Nukusa T. Vadeo	Technical Officer (Computer Science) (T-5)
	Mr. Kenisetuo Chücha	Farm Manager (Technical Assistant, T-4)
	Mr. K. M. Chusi	Assistant
	Ms. R. Imsennaro Longchar	Jr. Steno cum Computer Operator
	Mr. Bodan Ch. Kachari	Technical Asstt. (Driver cum Mechanic, T-3)
	Mr. Vevo	SSS
	Mr. Shetsonyi Puro	SSS

PERSONALIA

Joining

Sl. No.	Name	Designation	Subject	Date of Joining	
Scientists					
1	Dr. (Ms) Laishram Sunitibala Devi	Scientist	Livestock Production & Management	09.10.2018	
2	Dr. Vivek Joshi	Scientist	Veterinary Medicine	09.10.2018	
3	Dr. Vikram R.	Scientist	Animal Reproduction & Gynaecology	09.10.2018	
4	Dr. Lalzampuia Hlawndo	Scientist	Veterinary Microbiology	09.10.2018	
5	Sh. Kamni Paia Biam	Scientist	Agricultural Extension	09.10.2018	

Sl. No.	Name	Designation	Subject	Date of Joining	
Administrative					
1	Ms. Sentisangla Pongener	Lower Division Clerk	-	22.10.2018	
2	Ms. Arenla Ozukum	Lower Division Clerk	-	23.10.2018	
Finance					
1	Mr. Utpal Ghosh	AF&AO	-	15.06.2018	

Promotion

Sl.No	Name	Designation	Date of joining	
1	Ms Achuno Solo	UDC (Upper Division Clerk)	07.07.2018	
2	Mr. Shatrughan Verma	LDC (Lower Division Clerk)	20.03.2019	

Bidding Adieu to Shri Safal Chetri, AF&AO on 3rd April, 2018 who joined ICMR-Regional Medical Research Centre for North East, Dibrugarh as Administrative officer

MAIN STATION

Animal Genetics and Breeding Section

This section is engaged in the research activities on identification, evaluation, characterization and conservation mithun germplasm. Complete cytogenetic analysis including karyotyping and different chromosomal bandings (C-banding and R-Banding) carried out in the section revealed that the normal diploid number of mithun was 58 XX and 58 XY for male and female, respectively. In order to find out the karyotypic evolution of mithun, FISH technique was used on the metaphase chromosome of mithun as well as wild ancestral species, Gaur. Besides, several economically important genes including kappa casein, leptin, and growth hormones were also characterized. In the recent past, this section also carried out the microsatellite based characterization of different mithun population and muscle transcriptome analysis. Presently, whole genome sequencing of mithun for the construction of a draft genome assembly and genomic characterization of mithun using bovine HDchip estimating population diversity parameters in farm and field mithun population is underway.

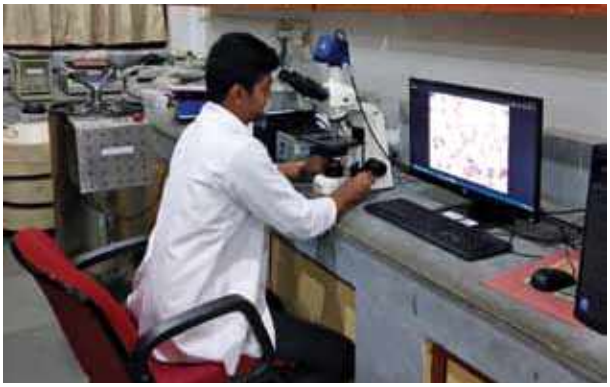
Animal Nutrition

Identification, nutritional evaluation and preservation of locally available feeds and fodders, and determination of nutrient requirements and feed efficiency of mithun are the central areas of research. Barring few, most of the forages that were analyzed for their nutrient content, can serve as good source of protein and energy for mithun and contained phenolic compounds within the limit. Nutrient management by evaluation of various feed ingredients, using suitable technique for its preservation with minimization of nutrient losses are also given due importance. Preservation of feeds and fodders in the form of feed blocks is a unique technique through which desirable feeds in balanced form could be offered to animals as per their requirements. Aattempts have been made for developing suitable binders for feed blocks using locally available feed ingredients instead of inorganic binders. Assessing the macro- as well as

the micro-mineral contents of soil, feeds & fodders, and the serum of mithun, an area specific mineral mixture entitled with the trade mark 'µthimin' has been developed. Methods have been developed for preparation of mineral blocks and serving it to the animals in forest condition using mineral dispenser fabricated by this Institute.

Animal Physiology and Reproduction

Conservation and propagation of mithun germplasm and augmentation of fertility are the core area of research. Artificial Insemination (AI) protocol standardized by the section and is being used successfully under farm as well as in field condition. Successfully developed superovulation and ETT protocol for mithun and produced first embryo transfer calf 'BHARAT' on 27th March 2012. This section hosted one Post Doctorate, five Doctorate and four Post Graduate Scholars in last 5 five years. Currently, research on standardization of cryopreservation protocol using controlled freezing technique, improvement in the quality of the cryopreserved semen using additives and selection of bulls for breeding purpose through breeding soundness evaluation and endocrine profiling is under progress. Estrus synchronization with timed AI and early induction of puberty in pre-pubertal heifers through the administration of neuropeptide 'kisspeptin" has been standardized. Studies are also being carried out to compare the reproductive efficiency of bulls during different seasons. Since, August 2016, artificial insemination (AI) has been introduced in the Mithun Farm of Medziphema.



Livestock Production and Management

This section has generated information on growth performance of mithun under semi-

intensive rearing system. At present there are two on-going projects focusing on genetic improvement and developing weaning strategies in mithun.

Livestock Products Technology

Mithun is traditionally reared as a meat animal and is generally sacrificed for a feast on religious and social occasions. However, the potential of mithun as a meat animal is yet to be exploited. Further, even though, mithun produces only 1 to 1.5 liter of milk, but its nutraceutical value is yet to be determined. One of the mandates of the Institute is to conserve and improve mithun for meat and milk. Accordingly, conducting research in the frontier areas of meat science and to develop value added products from mithun milk and meat are the core area of research of this section. Preliminary studies have been carried out to study the proximate analysis of mithun meat and milk. Several value-added Mithun meat and milk products developed in the Institute have been showcased in farmers' fields, food festivals and agriculture fare. A technology to process the skin of mithun, which is also a delicacy among certain tribes, as leather has also been developed. Presently, this section is developing appropriate and relevant processing technologies for different value added mithun meat products for improving palatability and enhancing shelf life.

Animal Health

This section has generated valuable information on the epidemiology of various diseases of mithun in the North-Eastern hilly region of India. During the past two decades, periodic studies conducted at the Institute and the field level survey indicated that mithun are also susceptible to a wide variety of diseases including viral, bacterial, fungal and parasitic diseases. Many diseases have been recorded in clinical form while others have been recorded in seroprevalence studies conducted in the Institute farm as well as in the field level survey in mithun inhabiting states. This section also prioritized on to developing safe, environment-friendly alternative therapeutics for animal health care by screening rich floral biodiversity of NEH. The section is engaged in providing the health care services to the Institute mithun farms at Medziphema and Porba as well as advanced diagnostic services to Department of Veterinary & AH, Govt. of Nagaland.

Institutional Level Biotech Hubs

The Institutional Level Biotech Hub was established during 2011-12 under the special scheme for North Easter Region of India by Department of Biotechnology, Government of India. Since inception, the Hub has conducted 15 hands-on trainings, eight outreach programmes and delivered the eight invited lectures in Undergraduate (UG) and Post-graduate (PG) institutions in the area of molecular biology and Biotechnology. Till date,

more than 1500 UG and PG students have been benefitted.

Bioinformatics Infrastructure Facility

The institutional Level Biotech Hub was established in the year 2012 under the special scheme for North East India by Department of Biotechnology, Government of India. The Institute bioinformatics centre is equipped with 100 Mbps internet facility, high and medium end server and 10 computers. The center is regularly organizing hands on training to the under& post-graduate scholars of various institution viz., School of Engineering and Technology and Management (SETAM), Nagaland University, Patkai Christian College, Dimapur and School of Agricultural Sciences and Rural Development (SASRD), Medziphema, Nagaland.

Central Biotech Infrastructure Facility

The facility was created with the special grant from Department of Biotechnology, Government of India in 2012. This state of the art facility is equipped with the modern instruments for carrying out research in the area of molecular biology, reproductive physiology, and ethnomedicine. The facility is having Real Time-PCR, Gradient PCR, Nanodrop, Biological safety cabinet (Class II), Ultracentrifuge, Nucleic acid Extractor, Gel Doc, Western Blot and SDS-PAGE apparatus, Bioanalyzer, Ultrasonicator, CO_2 incubator, Clean Work Station, High-Performance Thin-Layer Chromatography (HPTLC), Computer Assisted Semen Analyzer (CASA), refrigerated centrifuge and deep freezers (- 40 degree C and - 80 degree C). The facility is extended for use to all the research scholars of NEH and Department of Veterinary & AH, Govt. of Nagaland.

Mithun Farm, Medziphema

Management Practices

The mithun in the Institute farm are reared under semi-intensive as well as intensive systems. Three hectors of farm land are under fodder cultivation where Congo signal, Hybrid Napier, Maize and some fodder trees are grown. Preventive measures for prevalent diseases for mithun like FMD, BQ and HS are taken by vaccinating the animals. Till 2018-19, the farm had a total herd size of 111 mithun comprising of 53 males and 58 females.

New Initiatives

- Traditionally, mithun are reared under free range of forest eco-system where regular care was not possible for which many mithun used to die from epidemic diseases, predators and many environmental factors. Institute has introduced Semi-intensive system with some refinement as a model farm for rearing of mithun.

Young Stock		Adult		Total	
Male	Female	Male	Female	Male	Female
14	11	39	47	53	58

Utilization of Mithun as Draught Animal

Mithun can be used as a valuable draught animal by the farmers in the remote hilly slopes where traditional draught animals are not available. It strong well built body and sure-footedness makes it an excellent specimen for plowing in the hills. However, in doing so the mithuns must be conditioned and trained. At the Institute Farm, young mithuns (age less than two years) were selected and trained successfully for work and are under regular training for estimating its draught capability. Preliminary estimation of the power of the trained mithun bulls has been done based on the draft and walking speed of the animals.

राजभाषा अनुभाग

प्रत्येक वर्ष की तरह भारतीय कृषि परिषद – राष्ट्रीय मिथुन अनुसंधान केन्द्र में 14 से 21 सितंबर 2018 के दौरान हिन्दी सप्ताह का आयोजन किया गया । हिन्दी को जन सम्पर्क भाषा बनाने के प्रयास तहत् प्रतिदिन एक शब्द हिन्दी का लिखकर जनसाधारण अवलोकन हेतु निर्दिष्ट स्थान पर प्रदर्शित किया गया। हिन्दी सप्ताह के दौरान विभिन्न प्रतियोगिता जैसे तात्कालिक भाषण, टिप्पणी एवं प्रारूप लेखन, हिन्दी अनुवाद, स्मरण शक्ति, निबंध लेखन एवं चित्राकला अंताक्षरी, इत्यादि का आयोजन किया गया जिसमें संस्थान के समस्त अधिकारी एवं कर्मचारीगण तथा स्कूल के बालक बालिकाओं ने प्रतिभागी बनकर हिन्दी के प्रति अपनी रूचि दिखाई।

21 सितंबर 2018 को हिन्दी सप्ताह का समापन समारोह एवं पुरस्कार वितरण समारोह आयोजित किया गया । इस अवसर पर साहित्य और शिक्षा में पदमश्री सामन 2018 पदमश्री पियोंग तेजेन जामीर को मुख्य अतिथि के रूप में आमंत्रित किया गया । राजभाषा हिंदी के प्रति उनके प्रेम, जुनून और सेवा के लिए भारतीय कृषि परिषद की राष्ट्रीय मिथुन संस्थान ने उनको बधाई देते हुए प्रस्तुति पत्र प्रदान किया । संस्थान के निदेशक डॉ. अभिजित मित्र, हिन्दी प्रकोष्ठ प्रभारी , अधिकारियों एवं कर्मचारियों आदि के उपस्थिति में मुख्य अतिथि द्वारा विभिन्न प्रतियोगिताओं के विजेताओं को पुस्कार प्रदान किया गया ।

Hindi Cell

Like every year, this year ICAR-National Research Centre on Mithun celebrated 'Hindi Week' from 14-21st September, 2018. In an attempt to make Hindi a language for public relations, everyday a Hindi word was displayed on a designated place for the observation of common people. During Hindi week, several events like instant speech, commentary and sketching, Hindi translation, memory power,

essay writing, painting and antakshari, etc. were organized in which all officers and staff members of the Institute and school children participated to show their interest towards Hindi. On 21st September 2018, the closing ceremony of Hindi Week and prize distribution ceremony were concerted. This occasion was graced by Padma Sri Piyong Temjen Jamir, a noted Hindi scholar and litterateur from Nagaland. ICAR-NRC on Mithun congratulated and presented a recital letter to him for his love and passion for the promotion of Hindi language and social work. The winners of various competitions were awarded by Chief Guest in the presence of the Director of the Institute, Dr. Abhijit Mitra, Incharge Hindi Cell, officers and staff members etc.

LIBRARY

Knowledge is free at the Library, Just bring your container.

The Institute is maintaining a small academic library to meet the needs of working groups specific on Agriculture and Animal Husbandry and allied sectors. Storing relevant printed intellectual documents and simultaneously upgraded by addition of new books as and when required. Daily News papers and magazines are procured and displayed for readers to provide the culture of reading along with information dissemination and holistic development. Facility is being availed by employees of the Institute, researchers, students from nearby institutions and others directly or indirectly associated with the Institute. Researchers have online access through Consortium of e-Resources in Agriculture (CeRA) for scientific journals.

Sl. No.	Particulars	Period (2018-19)	Total
1	Books	55	2044
2	Journals a) Indian b) International	 - -	 55 07
3	Abstract CD a) Agris CD b) Vet CD c) Beast CD d) Resource CD e) Medline f) Miscellaneous	 - - - - - -	 13 23 08 01 21 17
5	Annual Report/ Research Highlights/ Technical Bulletin	2	2
6	Others publications /Compendium / Proceedings	5	19
7	Thesis	1	13
8	Annual Reports of other Institute	58	502

ITMU

The Institute Technology Management Unit has been constituted in the Institute with the aim to promote development of infrastructural facilities for registration of intellectual property by facilitating the improvement of legal, institutional and administrative framework assists and facilitates owners of intellectual property and to conduct training and capacity building activities for scientist and other research workers. The ITMU unit of NRC on Mithun has initiated filing of Patents, Trade mark and Geographical Indication. This cell works in consultation with other scientific, technical and administrative staff for smooth functioning of unit

AKMU

This cell provides the IT based facility to the Institute. It is equipped with networking devices and 24 hours uninterrupted power backup system. Presently the cell is responsible for distributing internet connectivity to all the sections and officers, individual computer systems with colour and black and white printing and scanning facilities. This section is also maintaining the website of the Institute.

REGIONAL STATION

PORBA, PHEK DISTRICT

The regional research station of NRC on Mithun is located at Porba village of Phek district, Nagalnd. It is 125 km away from ICAR-NRC on Mithun, Medziphema. The Scientists from the Headquarters used to visit the station from time to time to collect biological samples for research purposes, organizing health cum vaccination camps and other extension activities. The station has mithun farm with herd strength of 58 and one laboratory equipped with primary samples processing facility. The station has adopted more than 10 villages namely Porba, Gidemi, Pholami, Upper Khomi and Middle Khomi, Mesulomi, Enhulumi, Sakrba, Losami, Thevopisu where regular animal health cum vaccination camp are being organized and disease diagnostic service are routinely provided. This campus is also having Krishi Vigyan Kendra (KVK-Phek) of Institute, housed in this campus.

MISCELLANY

INSTITUTIONAL ACTIVITIES

Quinnquennial Review Team Meeting

Meeting for finalization of QRT report was held in Medziphema on 2nd April, 2018 in the presence Dr. S. P. S Ahlawat, Chairman QRT and Dr. J. R. Rao, Member, Dr. S. Mukherjee, Member Secretary and Dr. Abhijit Mitra, Director of the Institute. Final meeting of the QRT was held on 2nd May, 2018 in New Delhi in the presence of all the members. Final report of QRT was submitted to DG, ICAR on 13th June, 2018.

11th RAC Meeting

The RAC of the Institute consisted of Dr. Dharmeswar Das, as Chairman, Dr. R. S. Gandhi, ADG (AP & B), ICAR, New Delhi, Dr. Kusumakar Sharma, former ADG, Dr. K. K. Baruah, ex-director, NRC on Yak, Dr. A. Chakravarty, Director Research, C. V. Sc, Khanapara, IMC member Jaangsillung Gonmei, IMC member Lachit Kachari as members. and all the scientists of the Institute. The 11th RAC meeting of the Institute was held on the 21st April, 2018.

Institute Management Committee Meeting

Two IMC meetings were conducted during the period under report on the 21st April, 2018 and 29th October, 2018. The meeting was chaired by Dr. Abhijit Mitra, Director of the Institute in the presence of Dr. S. M. Deb, Former Director, ICAR-NRC on Yak, Arunachal Pradesh, Dr. Madan Kumar Tamuli, Former Principal Scientist, ICAR-NRC on Pig, Guwahati, Dr. D. J. Rajkhowa, Joint Director, ICAR Research Complex for NEH Region, Nagaland Centre, Medziphema, Dr. N. Haque, Principal Scientist, ICAR-NRC on Mithun, Medziphema, Nagaland and Ms. Aloli Rengma, AAO, ICAR-NRC on Mithun, Medziphema, Nagaland.

IRC Meeting

The IRC meeting was held on 08th May, 2018 and started with a welcome address by the Director, ICAR-NRC on Mithun. Dr. Vineet Bhasin, Principal Scientist, ICAR Headquarters, in his opening remarks suggested that the Scientists should follow the recommendations of the RAC in letter and spirit and should take up the projects keeping in view of the mandate of the Institute for the betterment of the rare species, which is the pride of the nation in general and North East India, in particular. The Director of the Institute stressed that all the present and future projects are to be completed as per the approved technical program within a given time frame.

Celebration of International Yoga Day

The International Yoga Day was celebrated on the 21st June, 2018 at NRC on Mithun by organizing a Yoga camp at NRCM campus. All the office staff and families participated in the camp.

30th Foundation Day of ICAR-NRC on Mithun

The Institute celebrated its 30th Foundation day on the 2nd June, 2018. Shri R. Khing, Advisor, Veterinary and Animal Husbandry, Government of Nagaland was the Chief Guest of the Foundation Day. Shri M. K Mero, Principal Secretary, Department of Veterinary & Animal Husbandry, Govt of Nagaland and Dr. Chandan Rajkhowa, former Director of ICAR-NRC on Mithun were the Guest of Honor of the Foundation Day meeting.

Celebration of Independence Day

The ICAR-NRC on Mithun, Medziphema, Nagaland celebrated the 73rd Independence Day at the Institute campus on 15th August 2018. Dr. Abhijit Mitra, Director, unfurled the tricolor in the morning with the singing of National Anthem. The Director encouraged all the staffs to work with a purpose and remain ever vigilant for safeguarding the reputation of the Institute in particular and nation in general. All the staffs, children and family members participated in the celebration.

Visit of School Students

- Students of UKG from Shalom Public School (SPS) Chumukedima visited ICAR –NRC on Mithun and ICAR Nagaland Centre, Medziphema on August 29th as part of their extracurricular activities, led by teacher Ketholeno. While visiting the laboratories, students had an opportunity to interact with some of the Scientists and they also witnessed scientific rearing of mithun under semi-intensive and intensive systems in the Institute's farm.
- 60 students of grade 7th from Hope Academy, Dimapur visited ICAR-NRC on Mithun on 19th Feb 2019 as a part of their exposure trip accompanied by their 3 faculties, Mrs Seema Jha, Ms Ashi Jamir and Mr Imlitemjen.

7th grade students from Hope Academy, Dimapur at ICAR –NRC on Mithun

Celebration of Mahila Kisan Diwas

On the occasion of Mahila Kisan Diwas, a programme was organized by NRC on Mithun Medziphema on the 15th October, 2018. A total of 26 women participants belonging to 8 different villages and 4 tribes took part in aforesaid event. Mahila Kisan Diwas was celebrated to spread awareness among rural women about agriculture and animal husbandry. The important issues related to cultivation, harvesting, soil preparation, seed availability and storage were discussed with the participants. The various events like quiz, drawing competition and group discussion were conducted and prizes were distributed to winners. All the scientists and staff members of NRC on Mithun graced the occasion.

Vigilance Awareness Week

ICAR-NRC on Mithun observed Vigilance Awareness Week from 29th October to 3rd November, 2018. The theme of the Vigilance Awareness Week for this year was "Eradicate Corruption: Build a New India". The programme began in the office on 29th October, 2018 at 15.00 hrs. Inaugural programme was chaired by Dr. R. S. Gandhi, DDG (AGB), ICAR, New Delhi. Former Director, NRC on Yak, Dr. S. M. Deb was also present on this occasion as a special guest. The anticorruption pledge was administered by Dr. R. S. Gandhi. The topic of the essay writing was "Building New India by Eradicating Corruption". A total of 46 school children and 25 staffs participated in drawing, essay and slogan writing events. Winners of various events were awarded with gifts and certificates.

Celebration of 72th Republic Day

The 72nd Republic Day was celebrated in the Institute on 26th January, 2019. Dr. Abhijit Mitra, Director, ICAR-NRC on Mithun unfurled the tricolor in the morning with the singing of National Anthem. The Director advised and encouraged all the staffs to work with a purpose, maintain honesty, integrity and reputation of the Institute in particular and nation in general. The children and family members also took an active part in the celebration.

12th RAC Meeting

ICAR-NRC on Mithun conducted its 12th RAC Meeting on the 28th January, 2019. Dr. Abhijit Mitra, the Director, ICAR-NRC on Mithun, presented a brief account of achievement of the Institute as whole. The new RAC chairman, Dr. A. K. Mishra, appreciated the efforts made by the Institute and emphasized the need of prioritization of the research areas. The committee members have also visited the Mithun Farm at Medziphema and took an account of the farm activities. The meeting was attended by RAC Chairman Dr. A. K. Mishra, Dr. R. S. Gandhi, ADG (AP&B), ICAR, New Delhi, Dr. J.R. Rao, Former, Head, Divison of Parasitology, ICAR-Indian Veterinary Research Institute, Dr. N. Kondiah, former Director, ICAR-NRC on Meat, Hyderabad, Dr. R. N. Goswami, ex-Dean, College of Veterinary Science, Khanapara, Dr. Prabodh Bora, Head, Department of Animal Biotechnology, College of Veterinary Science, Khanapara, Shri Akok Walling (Local member) and all the scientists of the Institute.

Celebration of International Women's Day

The staff members of the Institute assembled and observed International Women's day on 8th March 2019. Theme for this year, "Think Equal, Build Smart, Innovate Change" and the slogan "Better for Balance, Better the World" was displayed wide publicity. The Hon'ble PM addressed on this occasion was telecasted live and made available to the viewers.

GLIMPSES OF OUR PREVIOUS ANNUAL REPORTS

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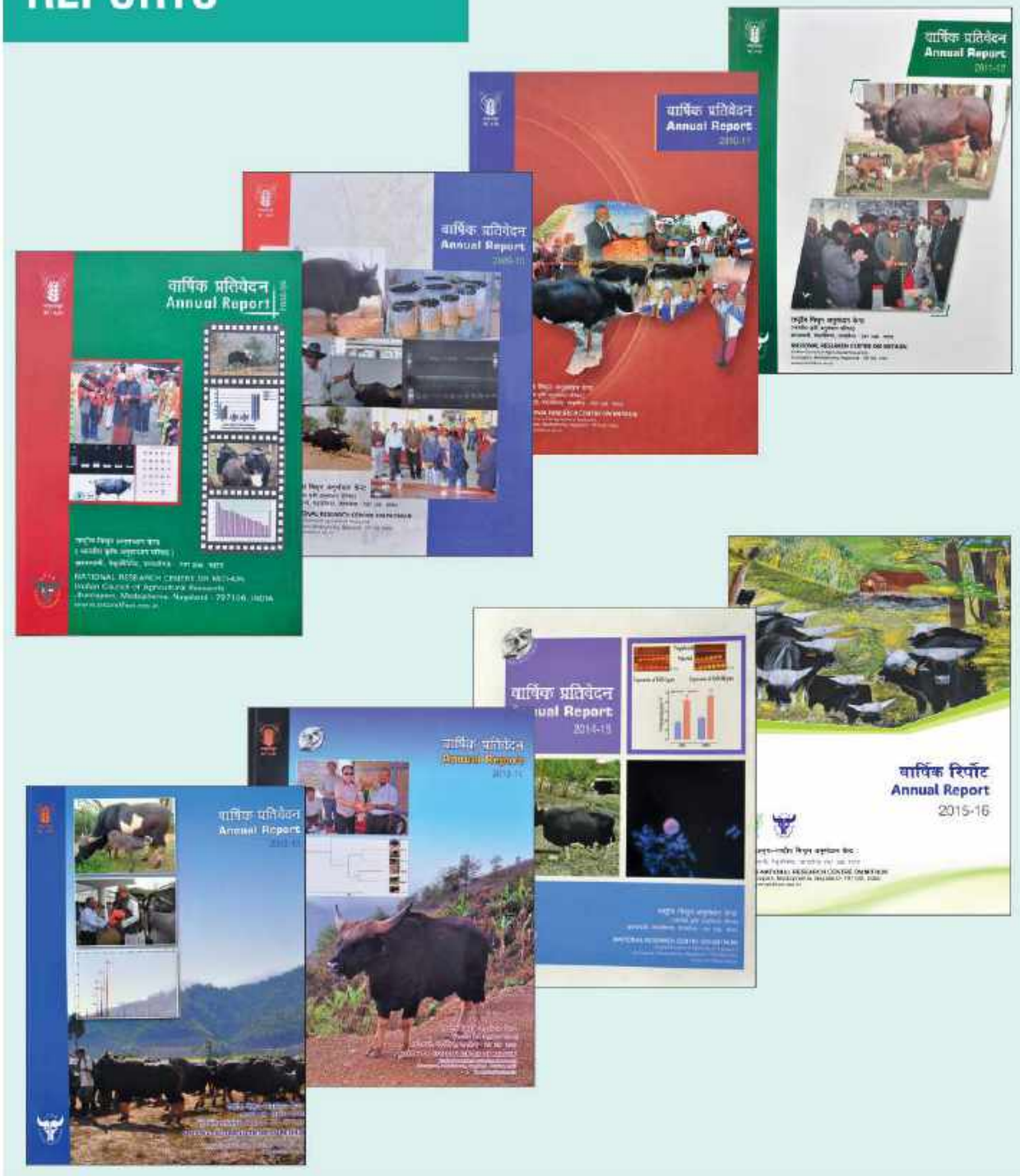

Disclaimer

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