

वार्षिक रिपोर्ट ANNUAL REPORT

2015-16



राष्ट्रीय मिथुन अनुसंधान केन्द्र

भारतीय कृषि अनुसंधान परिषद
झरनापानी, मेड्जीफेमा, नागालैन्ड-797 106 भारत

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CREDIT PAGE

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Design & Printed by

M/s Royal Offset Printers
A-89/1, Naraina Industrial Area, Phase-I, New Delhi 110028.

Correct Citation

Annual Report 2015-16

ICAR-National Research Centre on Mithun (NRCM)
Jharnapani, Medziphema, Nagaland- 797106, India
www.nrcmithun.res.in



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प्रस्तावना | PREFACE



मिथुन (बॉस फ्रंटालिस), एक शानदार एवं विशिष्ट गोजातीय प्रजाति है जो केवल भारत के उत्तरी पूर्वी पर्वतीय राज्यों, बंगलादेश के पर्वतीय राज्यों, उत्तरी बर्मा और चीन के युन्नन क्षेत्र में पायी जाती है। विशिष्ट सामाजिक-सांस्कृतिक प्रतिष्ठा के अलावा, मिथुन में क्षेत्र विशेष में जीविका उपलब्ध कराने की भी अद्भुत क्षमता है। भारत में यही एक मवेशी या पशुधन है जिसे दो राज्यों नामतः अरुणाचल प्रदेश और नागालैंड में राज्य पशु का दर्जा प्राप्त है और नागालैंड राज्य के राज्य-चिह्न में चित्रित है।

भा. कृ. अनु. प.- राष्ट्रीय मिथुन अनुसंधान केंद्र, विश्व में एक मात्र अनुसंधान संस्थान है जो इस प्रजाति में निरंतर सुधार और संरक्षण हेतु कार्य कर रहा है। पिछले 25 वर्षों से अधिक समय से संस्थान ने, न केवल इस विशिष्ट प्रजाति की आनुवंशिकी, शरीर क्रिया विज्ञान (कार्यिकी), पुनरुत्पत्ति, उत्पादन क्षमता और स्वास्थ्य की समझ हेतु वैज्ञानिक डाटा को एकत्रित किया बल्कि अनेक पैकेज ऑफ प्राक्टीसेस और प्रौद्योगिकियों का विकास किया-

- मिथुन को सौम्य व पालतू बनाने तथा अन्य गोजातीय पशुओं के समान मिथुन के अर्ध-गहन पालन के वैकल्पिक प्रणाली का निरूपण।
- दांत निकलने के आधार पर आयु का निर्धारण।

Mithun (*Bos frontalis*), the magnificent and unique bovine species, is distributed only in North-Eastern Hilly states of India, hilly districts of Bangladesh, northern Burma and in Yunnan province of China. Besides having a special socio-cultural status, mithun has a tremendous potential for providing livelihoods to the region. It is the only livestock species in India which has the distinction of being regarded as a State Animal of two states viz., Arunachal Pradesh and Nagaland, and is figured in the official state emblem of Nagaland.

ICAR-NRC on Mithun, being the only research organization in the world, is exclusively working for the continual improvement and conservation of the species. During the last more than 25 years, the Institute has not only generated invaluable scientific data towards the understanding of the genetics, physiology, reproduction, production potential and health of this unique species but also developed several packages of practices and technologies:

- Taming of mithun and demonstrating an alternative system of semi-intensive rearing of mithun like other bovine species.
- Determination of age on the basis dentition (dental eruption).

- मिथुन के वीर्य को एकत्रित करना एवं इसका हिमीकरण तथा कृत्रिम वीर्यारोपण। प्रक्षेत्र एवं किसानों के खेतों में सफलतापूर्वक कृत्रिम गर्भाधान द्वारा जनित बछड़ों का उत्पादन।
- विश्व का प्रथम भ्रूण स्थानांतरित मिथुन, मोहन का जन्म।
- स्थानीय रूप से उपलब्ध पेड़/झाड़ियों तथा औद्योगिक उप-उत्पादों के उपयोग से क्षेत्र विशेष खनिज मिश्रण तथा आहार ब्लाक की तैयारी।
- नागालैंड, अरुणाचल प्रदेश, मिजोरम और मणिपुर में उपलब्ध मिथुन के विभिन्न समिष्टियों का आकृतिमूलक एवं भौतिक लक्षणों का वर्णन।
- मिथुन के गुणसूत्र का प्रोफाइलिंग तथा आनुवंशिक चित्रण और इसके वन्य पूर्वज गौर के साथ इसके विकासमूलक संबंधों का आलेखन।
- मिथुन से मूल्य संवर्धित मांस, दूध तथा चर्म उत्पादों का विकास।

इस अज्ञात प्रजाति की बेहतर जानकारी के लिए मौलिक अनुसंधान हेतु हम निरंतर प्रयास कर रहे हैं। वर्ष के दौरान संस्थान ने मौलिक सुविधाओं के विकास, दूरस्त गांवों तक की पहुंच तथा अनुसंधान गतिविधियों के अलावा विभिन्न आउटरीच कार्यक्रमों के संदर्भ में लम्बी दूरी तय की है। अनुसंधान के अधिदेशित क्षेत्रों में उत्कृष्टता प्राप्त करने हेतु हमने संस्थान अनुसंधान परिषद के 10, आईसीएआर-नेटवर्क के दो तथा 8 बाह्य परियोजनाओं पर कार्य किया।

चूंकि मिथुन को प्राथमिक तौर पर मांस के लिए पाला जाता है, अतः अनुवांशिक सुधार के लिए, उच्च संवृद्धि दर को एक वांछित गुण माना जाता है। पशु आनुवंशिकी एवं प्रजनन अनुभाग के वैज्ञानिकों ने दो भिन्न विकास दरों वाले भिन्न वंशक्रमों के लांगिसिमस मांसपेशी के ट्रांसक्रिप्टोम प्रोफाइल का विश्लेषण किया तथा मांसपेशियों के विकास से संबंधित विविध अभिव्यक्ति वाले 297 जींस की पहचान की। इस विशिष्ट प्रजाति की ड्राफ्ट जिनोम एसेम्बली तैयार करने हेतु, मिथुन के सम्पूर्ण जेनोम अनुक्रमण पर एक पायलट परियोजना को प्रारम्भ किया गया और कुल~250 जीबी जेनोम सीकवेन्स डाटा उत्पन्न किया गया जिनका कवरेज ~100X है।

उत्तर पूर्वी पर्वतीय क्षेत्र में शीतकाल के दौरान पशुओं के आहार और चारा की कमी एक समस्या है। औद्योगिक उप-उत्पादों (गीली खली तथा मद्यनिष्कर्षशाला के सूखे खाद्यान्न तथा घुलनशील डीडीजीएस) के उपयोग से धान के पुआल पर आधारित आहार ब्लाक की तैयारी हेतु एक प्रोटोकॉल के विकास हेतु हमारा निरंतर प्रयास है। पशु

- Protocol for collection & freezing of semen and artificial insemination (AI) in mithun. Successfully produced AI calves on the farm as well as in the farmers' field.
- Birth of the world's first embryo transfer (ET) mithun calf, Bharat and Birth of the world's first cryopreserved embryo transfer (ET) mithun calf, Mohan.
- Area-specific mineral mixture and Feed block, using locally available trees/shrubs and industrial by-products.
- Morphometric-cum-physical characterization of different mithun populations available in Nagaland, Arunachal Pradesh, Mizoram, and Manipur.
- Chromosome profiling and genetic characterization of mithun and delineation of its evolutionary relationship with its wild ancestor, Gaur.
- Developing value-added meat, milk and leather products of mithun.

We are continuously striving to conduct basic research for better understanding of this nearly unexplored species. During the year, the Institute has taken a giant leap in terms of infrastructure development, reaching out the farmers in remote villages and various outreach programmes apart from research activities. In order to strive excellence in the mandated areas of research, we have undertaken 10 IRC, two ICAR-Network and eight extramural projects.

Since, mithun is reared primarily as a meat animal; a higher growth rate is regarded as a desirable trait for genetic improvement. The scientists of Animal Genetics & Breeding Section analysed the transcriptome profile of *Longissimus* muscle from two divergent lines, having differential growth rates, and identified 297 differentially expressed genes having an association with the muscle growth. In order to produce a draft genome assembly of this unique species, a pilot project of whole genome sequencing of mithun was initiated and a total ~250 GB genome sequence data having ~100X coverage was generated.

The scarcity of feed and fodder in the NEH region during the winter months is a problem. It has been our continuous endeavor to develop a

पोषण अनुभाग के वैज्ञानिकों ने बिना किसी अतिरिक्त बंधक के उपयोग से आहार ब्लॉक तैयार करने हेतु एक प्रोटोकॉल का विकास किया।

मिथुन बैलों के शर्मिले स्वभाव और मादाओं में कामोन्माद लक्षणों के कम प्रकट होने के कारण, मिथुन से वीर्य को एकत्रित करना तथा कृत्रिम वीर्यारोपण एक जटिल कार्य है। हांलाकि किसी भी आनुवंशिक सुधार कार्यक्रम में कृत्रिम गर्भाधान एक महत्वपूर्ण चरण है। पशु कायिकी एवं पुनरुत्पादन अनुभाग के वैज्ञानिकों का दल नियंत्रित बायो-फ्रीजर के उपयोग से मिथुन वीर्य के हिमीकरण हेतु एक प्रोटोकॉल का विकास किया और सीमेन विस्तारक में मेलाटोनिन डालकर विगलन के पश्चात वीर्य के गुणों में सुधार का निरूपण किया। मिथुन में कामोन्माद स्थिति की पहचान संबंधी समस्या के समाधान के लिए समयबद्ध कृत्रिम गर्भाधान हेतु 'ओवसिंच' प्रोटोकॉल का वैधीकरण किया गया। मिथुन की बछियों में बाहरी तौर पर न्यूरोहार्मोन 'किसपेपटिन' देकर युवावस्था को 3-4 माह पहले लाया जा सकता है।

हम मिथुन के स्वास्थ्य को प्रभावित करने वाले विभिन्न परजीवियों तथा अन्य रोगाणुओं का प्रलेखन एवं पहचान कर रहे हैं। विभिन्न जठरांत्रिय परजीवियों (नामतरु मेसिस्टोसिरिस डिजिटेटस, टोक्सोकारा विटुलोरम) तथा टिक्स (आईक्सोडेस ओवाटस और आई.एक्यूटीटेटार्सस) की पहचान की गई। उत्तर पूर्वी प्रदेश एक जैवविविधता हॉटस्पॉट है और देशी तकनीकी ज्ञान के रूप में सूचनाओं का विपुल भंडार है। स्थानीय रूप से उपलब्ध औषधीय पादपों की वनस्पति संग्रहालय तैयार किया गया। इनके जैवरसायनिक विश्लेषण से स्पष्ट हुआ है कि अधिकांश पादपों में टेरपीनोयड्स, अल्कालोयड्स, फ्लावोनोयड्स तथा फ्लोबोटानिन्स मौजूद हैं जिससे उनके तथाकथित प्रतिउपचायक, प्रतिसूक्ष्मजीवाणुक तथा शोथरोधी गुण ज्ञात होते हैं।

मिथुन पालन एक लाभदायक व्यवसाय है, परन्तु इसका पालन परम्परागत रूप से मांस के लिए मुक्त वनीय संवर्धन प्रणाली के अंतर्गत किया जाता है, जिसमें कोई निवेश नहीं किया जाता है। यद्यपि घटते वनीय क्षेत्र तथा मौजूद अन्य सामाजिक व आर्थिक परिस्थितियों के कारण मिथुन पालन की लोकप्रियता घट रही है। मिथुन को अपने प्राकृतिक आवास में संरक्षित करने हेतु संस्थान मिथुन के मांस, दूध तथा क्षेत्र के आर्थिक विकास के संदर्भ में इसमें छिपी क्षमता के दोहन का निरंतर प्रयास कर रहा है।

संस्थान ने पिछले 28 वर्षों के दौरान अपने मिथुन फार्म में यह निरूपित किया है कि अन्य गोजातीय प्रजातियों की तरह मिथुन का संवर्धन अर्ध-गहन प्रणाली के अंतर्गत

protocol of making paddy straw based feed blocks utilizing the distillery industry by-products (like wet cake and dried distillery grains and soluble; DDGS). The scientists of Animal Nutrition section have developed a protocol for making feed blocks without using any additional binders.

Shy nature of mithun bull and a less pronounced estrous sign of mithun female make semen collection and artificial insemination (AI) in mithun a tiresome task. Nevertheless, AI is an important step for the implementation of any genetic improvement programme. A team of scientists of Animal Physiology and Reproduction section developed a protocol for the freezing of mithun semen using controlled bio-freezer and demonstrated an improvement in the post-thaw semen characteristics by adding melatonin in the semen extender. In order to address the problem of detection of estrus in mithun, successfully validated the 'Ovsynch' protocol for timed AI. Delayed puberty and sexual maturity are also one of the major concerns. The onset of puberty could be augmented by 3-4 months in mithun heifers through the exogenous administration of neurohormone 'kisspeptin'.

We have been documenting and identifying different parasites and other pathogens that are commonly affecting the mithun health. Various gastrointestinal parasites (viz., *Mecistocirrus digitatus*, *Toxocara vitulorum*) and ticks (*Ixodes ovatus* and *I. acutitarsus*) were identified. North-Eastern region is one of the biodiversity hotspots and tremendous amount information available in the form indigenous technical knowledge. An herbarium of locally available medicinal herbs was prepared. The biochemical analysis revealed the presence of terpenoids, alkaloids, flavonoids and phlobotanins in most of these herbs suggesting their putative anti-oxidants, antimicrobial, and anti-inflammatory properties.

Mithun Farming is a profitable venture. But, mithun is traditionally reared as a meat animal under free-range forest rearing system with almost zero input. However, with the ever decreasing trend in the forest cover and other prevalent socio-economic conditions, there is a decrease in the popularity for mithun rearing. In order to conserve the mithun, in its natural habitat, the Institute is constantly striving

किया जा सकता है। यह हमारा नियमित प्रयास है कि इस सूचना को किसानों के प्रक्षेत्रों तक पहुंचाए। वर्ष के दौरान हम ने नागालैंड, मणिपुर तथा अरुणाचल प्रदेश के गांवों में प्रौद्योगिकी अन्तःक्षेपण-एवं-निविष्ट वितरण के 13 कार्यक्रमों का आयोजन किया जिनसे 1600 मिथुन पालकों को लाभ हुआ। हमने मिथुन मेला के नाम से दो किसान मेलाओं का आयोजन एक मणिपुर के सेनापति जिले में तथा एक अरुणाचल प्रदेश के पासीघाट जिले में किया। इन किसान मेलाओं से न केवल मिथुन पालकों को लाभ हुआ बल्कि हमें पालकों से पारस्परिक विचार-विमर्श करने का अवसर प्राप्त हुआ जिससे हमारा अनुभव समृद्ध हुआ। नागालैंड और मणिपुर के मिथुन पालकों के लिए संस्थान के मिथुन फार्म के दौरे की व्यवस्था की गई ताकि उन्हें मिथुन पालन की जानकारी मिल सके। संस्थान ने दिल्ली में आयोजित कृषि उन्नति मेला में मिथुन संवर्धन के सभी राज्यों के पालकों की प्रतिभागिता को प्रायोजित करने हेतु पहल की। संस्थान के एक मात्र कृषि विज्ञान केन्द्र ने प्रक्षेत्रों में छः परीक्षणों, 33 अग्रपंक्ति प्रदर्शनियों तथा 86 किसान प्रशिक्षणों का आयोजन किया जिनसे 2399 किसान लाभान्वित हुए। इसके अतिरिक्त कृषि विज्ञान केन्द्र ने 244 अन्य विस्तार गतिविधियां सम्पन्न की जिनसे 2563 किसान लाभान्वित हुए।

कौशल प्रदान करना संस्थान की महत्वपूर्ण गतिविधि है। जैवप्रौद्योगिकी विभाग द्वारा प्रायोजित बायोटेक हब एण्ड बीटीआईएस नेट प्रोग्राम के अंतर्गत छात्रों और विभिन्न शैक्षणिक संस्थानों के संकाय सदस्यों को आणविक जीव विज्ञान तकनीकों तथा जैवसूचना विज्ञान में व्यावहारिक एवं क्रियाशील प्रशिक्षण दिया गया। किसानों और बेरोजगार युवाओं के लिए प्रशिक्षण कार्यक्रमों का आयोजन किया गया ताकि वैकल्पिक जीविका के लिए मिथुन पालन अपनाने हेतु उन्हें प्रेरित किया जा सके।

हमने केन्द्रीय कृषि विश्वविद्यालय, इम्फाल (CAU Imphal) तथा इसके घटक महाविद्यालयों विशेषकर पशु चिकित्सा एवं पशु पालन महाविद्यालय, सालेसिह, मिजोरम (College of Veterinary Science & A-H] Selesih Mizoram) तथा बागवानी एवं वानिकी महाविद्यालय, पासीघाट, अरुणाचल प्रदेश (College of Horticulture & Forestry] Pasighat] Arunachal Pradesh) से सक्रिय सहयोग विकसित किया। हमें आईसीएआर-आईवीआरआई (ICAR&IVRI) के पूर्वी प्रादेशिक स्टेशन, कोलकाता से मिथुन में एक प्रकोप के समाधान में अधिकाधिक सहयोग प्राप्त हुआ। 37 असम राइफल, मिथुन संवर्धन राज्यों के पशु सेवा एवं पशु पालन निदेशालयों (Directorate of Veterinary Services & AH), एग्रीकल्चरल टेक्नोलॉजी मैनेजमेंट एजेन्सी (ATMA), एग्रीकल्चरल टेक्नोलॉजी

to exploit the potential of mithun as a source of meat, milk, hide and draft power towards the economic development of the region.

For the past 28 years, the Institute has demonstrated in its Mithun Farm, that mithun, like any other bovine species, can be reared under the semi-intensive system. It is our continuous endeavor to take this information to the farmers' field. During the year, we organized 13 *Technology Injection-cum-input distribution programmes* in the villages of Nagaland, Manipur and Arunachal Pradesh benefitting more than 1600 mithun farmers. We organized two Farmer's Fairs- *Mithun Mela*, one each at Senapati district of Manipur and Pasighat at East Siang district of Arunachal Pradesh. These farmers' fairs have not only benefitted the farmers but also given us the opportunity to have an interaction with the farmers and enriching our experiences.

For the farmers of Nagaland and Manipur, we arranged exposure visits to our Institute Mithun Farm. We took an initiative to sponsor the participation of mithun farmers from all the mithun rearing states in the *Krishi Unnati mela* held in Delhi. The KVK-Phek, the only KVK hosted by the Institute, carried out six On-farm trials, 33 front line demonstrations and 86 farmers' training programmes benefitting more than 2399 farmers. In addition, KVK also carried out 244 other extension activities, benefiting 2563 farmers.

Imparting skill is an important activity of the Institute. Under the DBT-sponsored Biotech Hub and BTISnet programmes, students and faculties of various educational Institutes were given hands-on training in molecular biology techniques 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.

We have developed an active collaboration with the Central Agriculture University, Imphal and its constituent colleges, particularly the Colleges of Veterinary Sciences & Animal Husbandry, Selesih, Mizoram and College of Horticulture & Forestry, Pasighat, Arunachal Pradesh. We have received tremendous support from the Scientists of ICAR-IVRI-Eastern Regional Station, Kolkata in resolving one of the outbreaks in mithun. The


एप्लीकेशन रिसर्च इंस्टीट्यूट जोन-3 (ATARI&Zone III), नबार्ड (NABARD) तथा क्षेत्र में स्थित परिषद के अन्य संस्थानों से प्राप्त सहायता और सहयोग स्मरणीय है।

वर्ष के दौरान हम ने कई गणमान्य व्यक्तियों तथा शिक्षाविदों का स्वागत किया जिनके प्रति हम उनके प्रोत्साहन, सुस्पष्ट सुझावों और महत्वपूर्ण इनपुटों के लिए ऋणी हैं। संस्थान प्रबंधन समिति ((आईएमसी), अनुसंधान सलाहकार समिति (आरएसी) सहित विभिन्न समितियों के सदस्यों ने संस्थान की गतिविधियों के लिए मार्गदर्शन दिया।

डॉ. त्रिलोचन महापात्रा, माननीय सचिव, डेयर एवं महानिदेशक, भा.कृ.अनु.प.य डॉ. एस. अय्यप्पन, माननीय पूर्व सचिव, डेयर एवं महानिदेशक, भा.कृ.अनु.प.; डॉ. एच. रहमान, उपमहानिदेशक (पशु विज्ञान); डॉ. के. एम.एल.पाठक, पूर्व उपमहानिदेशक (पशु विज्ञान); डॉ. बी. एस. प्रकाश, सहायक महानिदेशक (एएनएवंपी); डॉ. आर. एस. गांधी, सहायक महानिदेशक (एपी एवं बी); डॉ. अशोक कुमार, सहायक महानिदेशक (पशु पालन) तथा डॉ. गया प्रसाद पूर्व सहायक महानिदेशक (पशु पालन) के प्रोत्साहन, मार्गदर्शन और महत्वपूर्ण सुझावों के बिना संस्थान की प्रगति और विकास सम्भव नहीं हो पाता। मैं उन सभी के प्रति आभारी हूँ।

डॉ. राजन गुप्ता, प्रधान वैज्ञानिक (पशु पोषण), डॉ. विनीत भसीन, प्रधान वैज्ञानिक (पशु आनुवंशिकी एवं प्रजनन), डॉ. नीलम गुप्ता, प्रधान वैज्ञानिक (पशु जैवप्रौद्योगिकी) तथा डॉ. ज्योति मिश्री, प्रधान वैज्ञानिक (पशु पालन) के प्रति भी उनकी सहायता और सुझावों के लिए आभारी हूँ।

भा. कृ. अनु. प.- राष्ट्रिय मिथुन अनुसंधान केंद्र एक छोटा सा संस्थान है जिसकी कुल कार्मिक संख्या 50 से भी कम है जिनमें वैज्ञानिक और तकनीकी अधिकारीगण भी सम्मिलित हैं। यहां मैं अपने सहयोगियों के समर्थन का उल्लेख करता हूँ जिससे यह परिवेश सृजित हुआ है। हम सभी ने मिल कर बड़े सपने देखे हैं और लक्ष्य को प्राप्त करने के लिए अथक प्रयास कर रहे हैं। यह ध्यान रखना महत्वपूर्ण है कि इस अद्भुत प्रजाति मिथुन के संरक्षण, सुधार और व्युत्पत्ति के लिए अनेक चुनौतियां का सामना करना होगा। हम इस उक्ति पर विश्वास करते हैं कि साथ आना प्रारम्भ है; साथ मिलकर रहना प्रगति है, मिलकर कार्य करना सफलता है।

“जय हिन्द”

(अभिजित मित्र)

support and collaboration received from 37 Assam Rifle, Directorates of Veterinary Services & AH of mithun rearing states, ATMA, ATARI-Zone III, NABARD, and other ICAR Institutes of the region are noteworthy.

During the year, we hosted several dignitaries and academicians to whom we are indebted for their encouragement, candid suggestions, and valuable inputs. The members of the several committees including Institute Management Committee (IMC), Research Management Committee (RAC) guided us conducting the activities of the Institute.

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. S. Ayyappan, Hon'ble former Secretary DARE and DG, ICAR; Dr. H. Rahman, DDG (Animal science); Dr. KML Pathak, former DDG (Animal Science); Dr. B. S. Prakash, ADG (AN&P); Dr. R.S Gandhi, ADG (AP&B); Dr. Ashok Kumar, ADG (AH) and Dr Gaya Prasad, former ADG (AH). I offer my deep sense of gratitude to all of them.

The help and advice rendered by Dr. Rajan Gupta, PS (Animal Nutrition), Dr. Vineet Bhasin, PS (Animal Genetics and Breeding), Dr. Neelam Gupta, PS (Animal Biotechnology) and Dr. Jyoti Misri, PS (AH) are also acknowledged with gratitude.

ICAR-NRCM is a very small setup having total staff strength of less than even 50 including a handful of Scientists and Technical officers. Here, it has once again been the support of my colleagues at ICAR-NRCM and that created the environment. Together we have dreamt very high and have been working tirelessly to achieve our target. It is important to note that there are several challenges to overcome to conserve, improve and propagate this magnificent species, Mithun. But we do believe that “Coming together is a beginning; keeping together is progress; working together is a success”.

“Jai Hind!”

(Abhijit Mitra)

कार्यकारी सारांश | EXECUTIVE SUMMARY

यह भाग पिछले एक वर्ष के दौरान संस्थान की विभिन्न अनुसंधान तथा विस्तार गतिविधियों को संक्षिप्त रूप में दर्शाता है।

पशु आनुवंशिकी एवं प्रजनन

- उच्च एवं निम्न विकास दर वाले दो भिन्न वंशक्रमों के मांसपेशी आरएनए (RNA) के अनुक्रमण विश्लेषण (RNA-seq analysis) से भिन्न रूप में अभिव्यक्त 297 जींस चिन्हित हुए हैं।
- 100X व्याप्ति का कुल ~250 जीबी मिथुन जेनोम सीकवेन्स डाटा उत्पन्न किया गया।
- नागालैंड राज्य के मिथुन प्रजातियों के भौतिक एवं आकृतिमूलक गुणों का चित्रण किया गया।

पशु पोषण

- कृषि-औद्योगिक उप-उत्पादों जैसे गीली खली में उच्च नमी को सुखाने तथा धान के पुआल को घटक के रूप में उपयोग करते हुए बिना किसी अतिरिक्त बंधक के आहार ब्लॉक तैयार करने हेतु एक पद्धति का विकास किया गया।
- एक वृद्धि परीक्षण में मिथुन के आहार : वृद्धि अनुपात में व्यापक भिन्नता देखी गई जो 9.93 रू 1 से 33.71 रू 1 के बीच पाई गयी।
- रोल ट्यूब पद्धति के उपयोग से टैनिन अपकर्ष/सहिष्णु जीवाणु के 18 विशुद्ध संवर्धनों को चिन्हित किया गया।

पशु कर्षिकी एवं पुनरुत्पादन

- बायो-फ्रीजर द्वारा नियंत्रित हिमीकरण से विगलन पश्चात मिथुन के वीर्य की गतिशीलता एवं व्यवहार्यता में उल्लेखनीय सुधार (पी<0.05) हुआ है।
- मेटास्टिन (एक सिंथेटिक न्यूरोपेटाइड तथा किसपेपटिन एनालॉग) के इंजेक्शन से मिथुन बछियों की युवावस्था में शीघ्रता आयी।
- हिमीकृत वीर्य से प्रसवोत्तीर मिथुन में कामोन्माद वर्णनात्मकता और कृत्रिम वीर्यारोपण हेतु 'ओवसिंच' (Ovsynch) प्रोटोकाल का वैधीकरण किया गया।
- जैवउत्प्रेरण से मिथुन बैल/प्रौढ़ नर में वृषणियों के परिधीय अंतःस्त्रावी प्रोफाइल, एफएसएच (FSH) तथा एलएच (LH) में उल्लेखनीय परिवर्तन देखे गए।

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

ANIMAL GENETICS AND BREEDING

- RNA-seq analysis of muscle RNA from two divergent lines of mithun, having high and low growth rate, revealed 297 differentially expressed genes.
- Generated a total of ~250 GB mithun genome sequence data having ~100X coverage.
- Characterized the physical and morphometric traits of mithuns of Nagaland State.

ANIMAL NUTRITION

- Developed a method of drying high moisture content agro-industrial by-products like wet cake and for making feed block without using additional binder incorporating paddy straw as a component.
- A growth trial demonstrated a wide variation in Feed: Gain ratio which ranged from 9.93:1 to 33.71:1 in mithun.
- Isolated 18 pure cultures of tannin degrading/ tolerant bacteria using roll tube method.

ANIMAL PHYSIOLOGY & REPRODUCTION

- Controlled freezing using bio-freezer significantly (P<0.05) improved the post-thaw motility and viability of mithun sperm.
- Exogenous administration of Metastin, a synthetic neuropeptide and kisspeptin analogue, resulted in early induction of puberty in pre-pubertal mithun heifers.
- Validated Ovsynch protocol of estrus synchronization and artificial insemination with frozen semen in post partum mithun cows.
- Biostimulation of mithun bull/adult male resulted in significant changes in the peripheral endocrine profile of testosterone, FSH and LH.

- वृषण मानदण्ड एवं वीर्य गुणवत्ता पर आयु तथा ऋतुओं का प्रभाव पाया गया तथा प्रजनन के लिए वसंत और शीतकाल अत्यधिक अनुकूल पाये गये।

पशु स्वास्थ्य

- नागालैंड में पाये जाने वाले के मिथुन में *आईक्सोडेस ओवाटस* (*Ixodes ovatus*) तथा *आईक्सोडेस ओवाटस* (*Ixodes acutitarsus*) की प्रधानता दर्ज की गई।
- हेमॉनकस कंटोरटस (*Haemonchus contortus*) तथा एच. प्लेसेय (*Haemonchus placei*) के अन्य आइसोलेट्स की तुलना में *मेसिस्टोवसिरस डिजिटेटस* (*Mecistocirrus digitatus*) के आईटीएस-2 विश्लेषण में क्रमशः 100% तथा 83% अनुक्रमण समानता देखी गई।
- एमटीटी एस्सेन (MTT assay) के परिणामों से स्पष्ट होता है कि थो-थो (Tho-Tho) मवेशियों की अपेक्षा मिथुन के लिम्फोसाइट्स में प्रचुरोद्भवन क्षमता उल्लेखनीय रूप से अधिक होती है।
- स्थानीय रूप से उपलब्ध तथा उत्तर पूर्वी प्रदेश से एकत्रित जड़ी बूटीयों/औषधीय पादपों के जैवरसायनिक विश्लेषण से स्पष्ट होता है कि इनमें टेरपीनोयड्स, अल्कालोयड्स, फ्लवोनोयड्स तथा फ्लोबोटानिन्सी मौजूद हैं जिससे उनके तथाकथित प्रतिउपचायक, प्रतिसूक्ष्मजीवाणुक तथा शोथरोधी गुण ज्ञात होते हैं।

विस्तार तथा जनजातीय उप-योजनाएं (टीएसपी)

मिथुन प्रवास वाले चारों राज्यों (नामत: अरुणाचल प्रदेश, नागालैंड, मणिपुर तथा मिजोरम) में वर्षभर अनेक कार्यक्रमों (नामत: टेक्नोलॉजी इंजेक्शन, स्वास्थ्य शिविर, जागृति शिविर, किसान मेला) का आयोजन किया गया।

- मिथुन के वैज्ञानिक पालन पर 13 प्रौद्योगिकी अन्तःक्षेपण-एवं-निविष्ट वितरण कार्यक्रमों का आयोजन किया गया, जिनसे 1137 मिथुन पालक लाभान्वित हुए और इन कार्यक्रमों में 714 मिथुन पशुओं में एफएमडी एवं एचएस टिकाकरण एवं ईयर टैगिंग की गयी।
- मणिपुर के सेनापति जिले के कृषि विज्ञान केन्द्र, हेंगबंग में उन्नत जीविका के लिए "मिथुन का वैज्ञानिक पालन" विषय पर तीन दिवसीय प्रशिक्षण कार्यक्रम का आयोजन किया गया जिसमें 51 पालकों ने भाग लिया।

- Testicular parameters and semen quality found to be influenced significantly by age and season. Spring and winter appeared to be the most favorable breeding seasons.

ANIMAL HEALTH

- Recorded the prevalence of *Ixodes ovatus* and *I. acutitarsus* in mithun in Nagaland.
- ITS-2 sequence analysis of *Mecistocirrus digitatus* and *Mecistocirrus digitatus* showed 100% and 83% sequence identity with that of other isolates of *Haemonchus contortus* and *H. placei*, respectively.
- The results of MTT assay revealed a significantly higher proliferation potential of mithun lymphocytes than those of Tho-tho cattle
- The biochemical analysis revealed that most of the locally available herbs, collected from NE region, contained Terpenoids, Alkaloids, Flavonoids and Phlobotanins suggesting their putative anti-oxidants, antimicrobial and anti-inflammatory properties.

EXTENSION AND TRIBAL SUB-PLANS (TSP)

A large numbers of programmes (viz., Technology Injection, Health camps, Awareness camps, Farmers' fair) were organized throughout the year in all the four mithun inhabited states (viz., Arunachal Pradesh, Nagaland, Manipur and Mizoram):

- Organized a total of 13 Technology Injection-cum-Input Distribution programme on scientific mithun husbandry benefiting 1137 mithun farmers and covering 714 mithuns with FMD and HS vaccination and ear tagging.
- Organized one training programme on "Scientific Mithun Husbandry for Livelihood Improvement" for the farmers at KVK, Hengbung, Dist. Senapati, Manipur in which 51 farmers participated.
- Organized two "Mithun mela" in Arunachal Pradesh and Manipur participated by 650 farmers.

- अरुणाचल प्रदेश और मणिपुर में दो “मिथुन मेला” का आयोजन किया गया जिनमें 650 पालकों ने भाग लिया।
- बेरोजगार युवाओं को व्यावसायिक मिथुन पालन की ओर आकर्षित करने हेतु एक्सपोजर विजिट का आयोजन किया गया।

कृषि विज्ञान केन्द्र -फेक, पोर्बा

- छः प्रक्षेत्रों परीक्षण, 33 अग्रपंक्ति प्रदर्शनियां तथा 86 किसान प्रशिक्षण कार्यक्रमों का आयोजन किया गया जिनसे 2399 किसान लाभान्वित हुए।
- ग्रामीण युवाओं के लिए दो व्यावसायिक प्रशिक्षण कार्यक्रमों तथा राज्य सरकार/गैर सरकारी संगठनों के विस्तार कार्यकर्ताओं के लिए दो प्रशिक्षण कार्यक्रमों का आयोजन किया गया जिनमें 30 प्रतिभागियों ने भाग लिया।
- 244 अन्य विस्तार गतिविधियां सम्पन्न की गईं जिनसे 2563 किसान लाभान्वित हुए।

बुनियादी सुविधाओं का विकास

वर्ष के दौरान निम्नलिखित कार्य प्रारम्भ किए गए

मेड्जीफेमा परिसर में

- मेड्जीफेमा परिसर में चराई क्षेत्र में बाड़ लगाना
- दो टाइप-3 आवास का निर्माण
- मेड्जीफेमा फार्म में बाउंड्री फेंसिंग
- किसान छात्रावास सह अतिथि गृह
- केन्द्रीय उपकरण प्रयोगशाला सह संग्रहालय
- जल परिशुद्धिकरण व्यवस्था का उन्नयन

पोर्बा परिसर में

- सड़क पर कोलतार आवरण
- प्रतिधारण भित्ति (Retaining wall)
- पोर्बा फार्म का बाउंड्री फेंसिंग

वित्तीय लेखा जोखा

- योजना: आंवटित कुल रु 775.00 लाख रुपयों में से 768.36 लाख (99.14%) खर्च किया गया।
- गैर-योजना: कुल आंवटन 419.40 लाख रुपयों में से 414.80 लाख (98.90%) खर्च हुआ।
- राजस्व: निर्धारित लक्ष्य 5.33 लाख रुपयों की तुलना में 9.05 लाख रुपयों की राजस्व: उत्पत्ति की गई।

- Exposure Visits conducted for educated unemployed youths to attract them for commercial mithun husbandry.

KVK-Phek, Porba

- Carried out six On-farm trials (OFT), 33 front line demonstration (FLD) and 86 farmers' training benefitting more than 2399 farmers.
- Conducted two vocational training for rural youths and two training programmes for Extension Functionaries of State Govt./NGOs that was attended by 30 participants
- Carried out 244 several other extension activities benefitting 2563 farmers.

Infrastructure development

Following works have been initiated during the year

At Medziphema campus

- Fencing of grazing area in Medziphema Farm
- Type III quarters (2nos)
- Boundary fencing at Medziphema Farm
- Farmers' hostel cum guest house
- CIF lab cum museum
- Up-gradation of water filtration facility

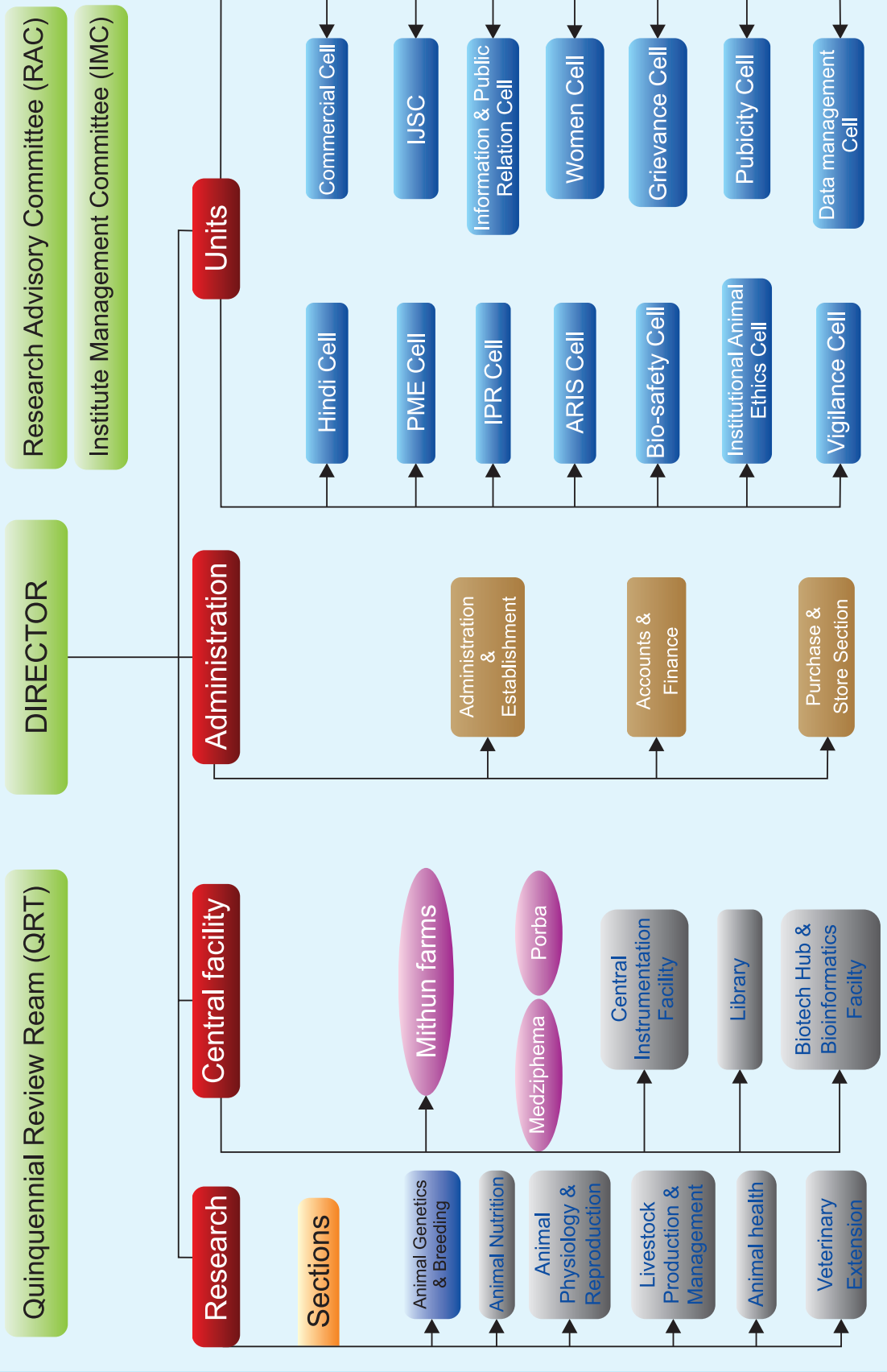
At Porba campus

- Black topping of road
- Retaining wall
- Boundary fencing in Porba Farm

Finance

- Plan: Out of the total allocation of ₹ 775.00 lakhs, incurred an expenditure (99.14 %) of ₹ 768.36 lakhs
- Non Plan: Out of the total allocation of ₹ 419.40 lakhs, incurred an expenditure (98.90 %) of ₹ 414.80 lakhs.
- Revenue: Generated a revenue of ₹ 9.05 lakhs against the target of ₹ 5.33 lakhs.

ORGANOGRAM OF ICAR-NRS ON MITHUN



INTRODUCTION

The Institute

The ICAR-National Research Centre on Mithun was established in June 1988 in the state of Nagaland under the aegis of Indian Council of Agricultural Research to provide impetus on the research work on Mithun (*Bos frontalis*). Mithun, a ruminant species belonging to family Bovidae and assumed to be the domesticated form of wild gaur (*Bos gaurus*) is indigenous to the eastern Himalayas and referred as 'sacrificial ox' of the North-Eastern Region of India. It plays an important role in the traditional and rituals of the vast tribal population of this region.

ICAR-NRC on Mithun has been playing key roles in conservation, breeding and health management of this magnificent species. The scientists of this Institute, in the past 28 years, have generated significant scientific information and developed many farmers' friendly technologies and a package of practices for making mithun husbandry a sustainable commercial venture.

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, Nagaland, Manipur and Mizoram. 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 Livestock Census (2012) of India, 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 forest ecosystem and can easily thrive at elevation between 300 – 3000 mMSL. 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 deserves special attention for the conservation, breeding and propagation.



संदृश्य / Vision

किसानों के बेहतर पोषण एवं सामाजिक-आर्थिक सहायता हेतु उच्च गुणवत्ता के मिथुन जननद्रव्य की परिरक्षा, संरक्षण एवं प्रसारण तथा संधारणीय 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.

ध्येय / Mission

प्रजनन एवं स्वास्थ्य हेतु वैज्ञानिक प्रबंधन एवं निरूपण, आहार पद्धति 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 an economically viable and sustainable technologies for the benefit of the farming communities rearing mithun.

अधिदेश / Mandate

- देश में उपलब्ध मिथुन के जननद्रव्य की पहचान, मूल्यांकन एवम गुणवर्णन करना।
- Identification, evaluation and characterization of mithun germplasm available 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



ORGANIZATIONAL SETUP

STAFF POSITION as on 31.03.2016

Category	Sanctioned Strength	In Position	Vacant
RMP	1	1	0
Principal Scientists	2	1	1
Senior Scientist	5	1	4
Scientist	11	6	5
T6	3	3	0
AO	1	1	0
AAO	2	1	1
AFAO	1	1	0
Assistant	4	3	1
PA	1	-	1
UDC	1	-	1
LDC	4	3	1
Junior Steno	1	1	0
T2	-	-	0
T1	2	2	0
Supporting	8	8	0
Total	48	32	15



IN-CHARGE AND MEMBERS OF DIFFERENT CELLS

Head of Office	Mr. Ajen Lama
ARIS Cell	Dr. Vidya Singh
Bio-Safety Cell	Dr. J. K. Chamuah Dr. Nazrul Haque Dr. Sabyasachi Mukherjee
Commercial Cell	Dr. Vidya Singh
Data Management Cell	Dr. Jayanta Kumar Chamuah
Estates	Dr. Kezhavituo Vüprü
Grievance Redressal Cell	Dr. Nazrul Haque
Guest House	Dr. Naresh Prasad
Hindi Cell	Dr. Akhilesh Kumar
IPR/ITMU Cell	Dr. Nazrul Haque & Dr. Sabyasachi Mukherjee
Institutional Animals Ethics Cell	Dr. Nazrul Haque Dr. Sabyasachi Mukherjee Dr. Kobu Khate Dr. Kezhavituo Vüprü Dr. Jayanta Kumar Chamuah Mr. Aru Khate
Information and Public Relation Cell	Dr. M. H. Khan
Livestock Farm	Dr. Kobu Khate
PME Cell	Dr. Sabyasachi Mukherjee
RFD Cell	Dr. Sabyasachi Mukherjee
Library	Dr. Akhilesh Kumar
Publicity Cell	Dr. Vidya Singh
Right to Information (RTI)	Dr. M. H. Khan
Scientist-in-Charge, Institute Farm	Dr. Nazrul Haque
Sports	Dr. Sabyasachi Mukherjee
Transparency Officer	Dr. Nazrul Haque
TSP activities	Dr. M. H. Khan
Vehicles	Dr. Kezhavituo Vüprü
Vigilance Officer	Dr. M. H. Khan
Women Cell	Dr. (Mrs.) Saroj Toppo Ms. Aloli Rengma Mr. S.P.S. Negi Mrs. Meisiehunuo Mrs. A. Solo Ms. Vikhobeino Kiso

INSTITUTE MANAGEMENT COMMITTEE (IMC)

Position	Name and Designation
Chairman (Director, ICAR-NRC on Mithun)	Dr Abhijit Mitra
Member (Representative of the State Govt. in which the Institute is located to be nominated by President, ICAR)	Director, Dept. of Vety. & AH, Govt. of Nagaland, Kohima
Member (A representative of any other State govt. concerned with the research in the Institute nominated by President of ICAR)	Director, Vety. & Animal Husbandry, Govt. of Mizoram – Member
Member (A representative of the Agricultural University under the jurisdiction nominated by the President, ICAR)	Dr. R. N. Goswami, Dean, Faculty of Vety. Science, Assam Agril. University, Khanapara, Assam
Member (Four scientists of Council's Institutes to be nominated by the DG)	Dr. K.K.Baruah; Principal Scientist, ICAR-NRC on Mithun (presently posted at ICAR-NRC on Pig w.e.f 30.5.2015) Dr. Anubrata Das, Former Director, ICAR-NRC on Pig. Dr. K.K.Baruah, Ex-Director, ICAR-NRC on Yak Dr. (Mrs.) Anupama Mukherjee, Senior Scientist, ICAR-NRC on Mithun (presently posted at ICAR-NDRI w.e.f 17.12.2014)
Member (Two non-official persons representative Agricultural Rural interest to be nominated by the President, ICAR)	Shri. Jaangsilling Gonmei, IMC member and progressive farmer, Dimapur. Shri. Lachit Kachari, Amaluma Village, IMC member and progressive farmer, Dimapur
Member (The Financial Advisor of the Council or DARE or the Accounts Officer of the same or another Institute)	Sh. P. K. Nayak, FAO, ICAR-NRC on Pig.
Member Secretary (Administrative Officer)	Sh. Ajen Lama, AO

Research Advisory Committee

Position	Name and Designation
Chairman (An eminent scientist from outside the ICAR system nominated by the DG, IC)	Dr. Dharmeshwar Das, Former Joint Director, IVRI, Izatnagar, U. P.
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 (HRD), ICAR, Krishi Bhavan, New Delhi. Dr. A. Aziz, Professor & Head, AGB, CVSc, AAU, Guwahati, Assam. Dr. K. K. Baruah, Former Director, ICAR-NRC on Yak, Arunachal Pradesh. Dr. A. Chakravarty, Director Research, CVSc, AAU, Guwahati, Assam
Member (Director of the Institute)	Dr. Abhijit Mitra, ICAR-NRC on Mithun, Nagaland.

Position	Name and Designation
Member (Two persons representing/rural interests on the Management Committee of the for the period of their membership of the Management Committee)	IMC Member & Progressive farmer, Dimapur. Shri. Lachit Kachari, IMC Member & Progressive farmer, Dimapur.
Member Secretary (Senior level scientist of the concerned Institute nominated by the Director)	Dr. Nazrul Haque, Principal Scientist, ICAR-NRC on Mithun, Jharnapani, Nagaland

INSTITUTE RESEARCH COMMITTEE (IRC)

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

FINANCE

STATEMENT DURING (2015-16) | (All figures are in Rupees in lakhs)

Plan

Sl. No.	Head of Account	Revised Estimate	Expenditure Incurred
1	TA	6.00	5.99
2	Contingency	300.00	299.92
3	Equipments	18.00	17.82
4	Works	433.00	433.00
5	Library	1.00	0.88
6	Vehicle	6.00	0.00
7	HRD	2.00	2.00
8	Furniture	1.00	0.80
9	Livestock	0.00	0.00
10	Repair & Maintenance	8.00	7.96
TOTAL		775.00	768.36

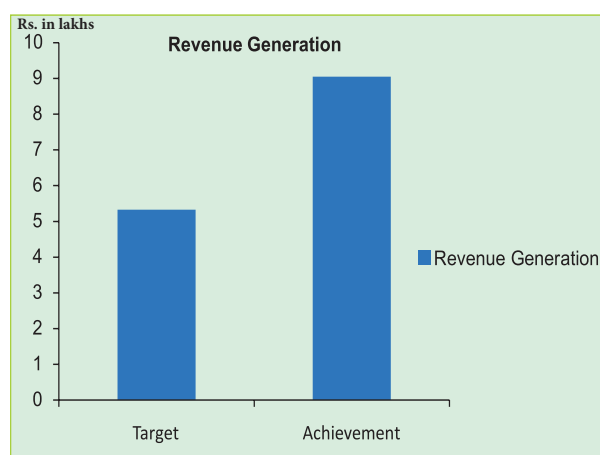
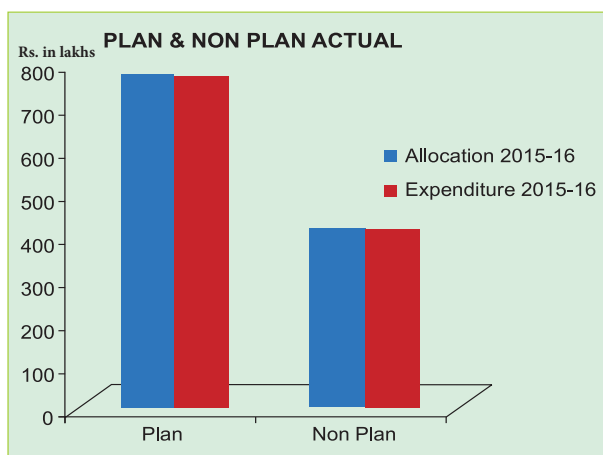
Non-Plan

Sl. No.	Head of Account	Revised Estimate	Expenditure Incurred
1	Esstt. Charges	305.00	301.99
2	Pension & Retirement Benefit	0.00	0.00
3	Wages	38.13	36.99
4	OTA	0.00	0.00
5	Travelling Allowances	6.00	5.94
6	Works	29.40	29.40

Sl. No.	Head of Account	Revised Estimate	Expenditure Incurred
7	Equipment	5.00	4.99
8	Vehicle	10.00	9.66
9	Repair & Maintenance	10.37	10.35
10	Other Mic.	4.50	4.50
11	Research Expenses	2.00	1.99
12	Operational Expenses	9.00	9.00
Total		419.40	414.80
Loans & Advances		2.00	1.23

Resource Generation

Sl.No.	Items	Target	Actual
1.	Sale of farm produces, other sales	5.33	9.05





Panoramic view of Jotsoma village, Kohima , Nagaland

RESEARCH ACHIEVEMENTS





ANIMAL GENETICS AND BREEDING

Muscle Transcriptome Analysis

Mithun is primarily reared as a meat animal and higher growth rate is a desirable trait for genetic improvement. To identify the genes associated with muscle growth potential, the transcriptome of *Longissimus* muscle from two divergent lines, having differential growth rates (viz., high and low) was analyzed using Illumina Genome Analyzer.

A high quality 2,41,738,022 reads having Phred score \geq Q20 and transcripts length ranging from 201 to 31,699bp were obtained (Table 1). The sequencing data are deposited at NCBI (BioProject accessions: PRJNA307305).

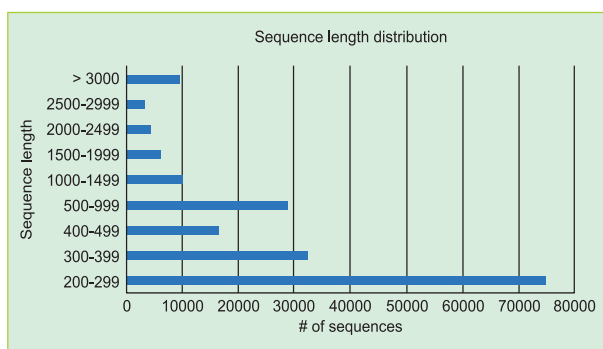


Table 1. *De novo* transcriptome assembly statistics

Total number transcripts	186086
Total number 'genes'	165558
Percent GC	47.79
Contig N50	1635
Median contig length	346
Average contig	770.95
Total assembled bases	143463330

Whole Genome Sequencing of Mithun

With the rapid progress of sequencing technologies and the advent of Next-generation sequencing (NGS) platforms, the whole genome of almost all livestock species is sequenced to discover the underlying genetic architecture and to explore the species diversity, constructing haplotype maps and performing genome-wide association studies. A *de novo* draft assembly of most mammalian genomes

including *taurine* and *indicine* cattle, sheep, horse, giant panda, water buffalo and yak were completed.

Number of contigs	480463	
Total size of contigs	2649186081	
Longest contig	125189	
Shortest contig	113	
Number of contigs > 1k nt	344616	71.7%
Number of contigs > 10 k nt	82599	17.2%
Number of contigs > 100 k nt	14	0.0%
Number of contigs > 1m nt	0	0.0%
Number of contigs > 10 m nt	0	0.0%
Mean contig size	5514	
Median contig size	2812	
NSO contig length	11528	
Contig %A	29.06	
Contig %C	20.94	
Contig %G	20.93	
Contig %T	20.04	
Contig %N	0.03	
Contig %non-ACGTN	0.00	
Number of contig non-ACGTN nt	0	
Percentage of assembly in scaffolded contigs	2.0%	
Percentage of assembly in unscaffolded contigs	98.0%	

Figure 1. Genome Assembly Statistics

Mithun, a unique bovine species of the North Eastern Hilly Region of India, and is primarily reared as a meat animal. However, information on the genetic architecture of mithun is scanty. Therefore, a project was undertaken for whole genome sequencing using Illumina Hiseq 2000 platform (read length 101 bp). A total ~250 GB genome sequence data were generated having ~70X coverage. The bioinformatic analysis estimated that mithun genome size is ~ 3.2 GB having a total of 27731 protein-coding genes. A detailed bioinformatic analysis is in under progress.

Physical Characterization of Mithun of Nagaland

Physical characterization of Nagaland mithun was carried out and the overall means of height at wither, body length, heart girth, face length, tail



Recording of height at wither and other body measurements of mithun at Khonoma

length, neck circumference, neck length, ear length, point of shoulder to pin bone, horn length and, horn circumference in adult males were 135.16 ± 1.16 , 193.50 ± 2.49 , 191.41 ± 2.20 , 48.52 ± 0.45 , 87.95 ± 1.38 , 91.52 ± 1.64 , 43.11 ± 0.80 , 21.59 ± 0.53 , 136.61 ± 1.81 , 85.96 ± 2.04 and 39.45 ± 0.87 cm, respectively.

National Mission for Sustaining the Himalayan Ecosystem (DST funded multi-institutional research project)

District wise mithun population in Nagaland, Arunachal Pradesh, Mizoram and Manipur (19th Livestock Census-2012, GOI) were collected. Meteorological data (viz., maximum and minimum temperature, maximum and minimum relative humidity, rainfall, sunshine hours) of different districts of Nagaland and Arunachal Pradesh were collected for 20 years to map the temperature humidity index.

ANIMAL NUTRITION

In order to mitigate the fodder scarcity during lean season (winter), the brewer's industry waste is being evaluated as alternative feed resource.

Making feed block using locally available feed ingredients and agro-industrial by-products

Paddy straw was treated with water and were mixed with either wet cake or dried distillery grains and soluble (DDGS) to determine its effect on quality of feed block in terms of density and changes in dimension with the passage of time. It was observed that the level of moisture plays an

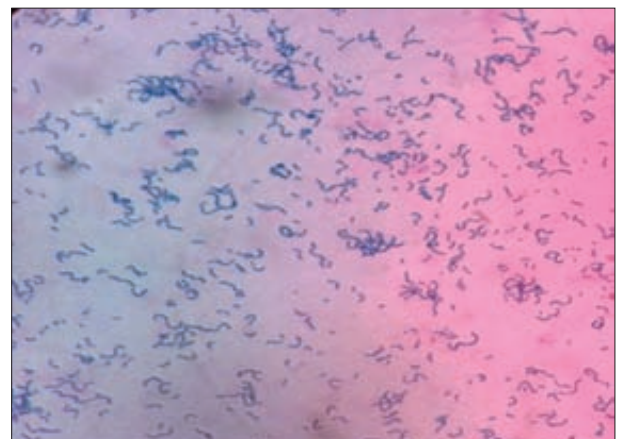


Feed block made of paddy straw and DDGS with optimum combination

important role in the quality of feed block in DDGS incorporated paddy straw based feed blocks.

Veterinary type culture

Rumen liquor was collected from fistulated adult mithun bull, fed on paddy straw, green grass and concentrate mixture. Fecal samples from freely browsing mithun were also collected. From these samples, using roll tube method, pure cultures of tannin degrading/ tolerant bacteria were isolated from these samples and submitted to ICAR-NIANP, Bangalore and ICAR- IVRI, Izatnagar.



Isolated pure culture Gram positive bacteria (cocci).

Feed efficiency of mithun

In order to determine the variation in feed:gain ratio, 38 mithuns with initial live weight 129.3 ± 7.92 kg were fed *ad lib* concentrate mixture (crushed maize 50%, de-oiled mustard cake 30%, wheat bran

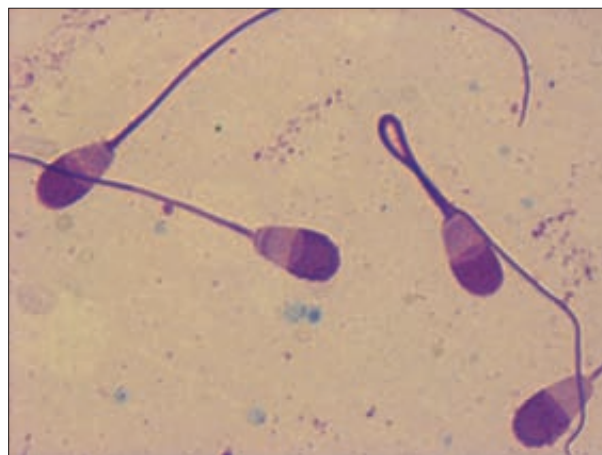
17%, mineral mixture 2% and common salt 1%) and available roughages (viz., paddy straw / tree leaves / Napier) up to three years. The feed:gain ratio varied widely from 9.93:1.00 to 33.71:1.00.

ANIMAL PHYSIOLOGY & REPRODUCTION

Freezing of mithun semen

Artificial insemination (AI), the first generation biotechnological technique, has contributed intensely in genetic improvement. The advantages of AI have been further maximized by cryo-preserving the spermatozoa and allowing the wider dissemination of superior germplasm. However, the success of cryopreservation greatly depends on its protocol. It has been documented that sperm damages emanated during cryopreservation procedures could be mitigated to an extent through improvement in freezing strategies. The optimization of cooling rate prior to sperm cryopreservation seems to be an important step to minimize the deleterious effects of the freezing process.

In the past, mithun semen was frozen using a conventional freezing technique (using static liquid nitrogen vapours) wherein the rates of cooling and freezing could not be controlled. Now, an optimized protocol for controlled freezing of mithun semen is developed. In order to evaluate and compare the efficiency of controlled and conventional freezing techniques, the aliquots of mithun semen samples were frozen independently. The results showed a significantly higher ($p < 0.05$) post-thaw motility

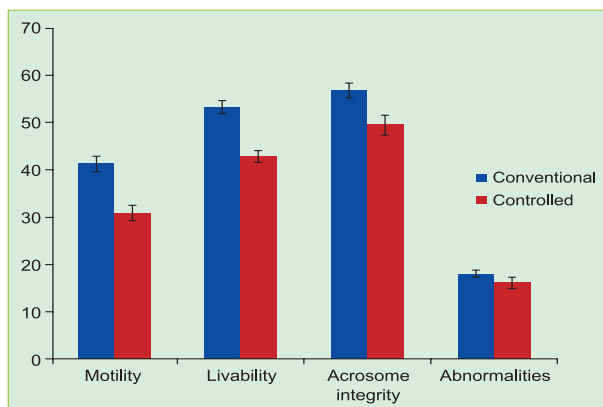


(A) Comparison of post-thaw sperm characteristics of mithun semen frozen with conventional and controlled freezing method
(B) Mithun sperm showing intact acrosome

(41.33 ± 1.60 vs 30.83 ± 1.57), livability (53.33 ± 1.28 vs 42.83 ± 1.13) and acrosome integrity (56.83 ± 1.40 vs 49.50 ± 1.87) of the sperms frozen through controlled freezing technique. Further studies to optimize the rate of cooling and freezing through controlled freezing technique are in progress.

Mithun Semen parameters

Computer Assisted Sperm Analysis (CASA) system yields accurate, objective assessment, repeatable and reliable results on different semen parameters such as motility (MOT), progressive motility (PMOT) and different velocity parameters based on the measurement of individual sperm cells. Spermatozoa kinematic parameters such as PMOT, straight line velocity (VSL), curvilinear velocity (VCL), amplitude of lateral head displacement (ALH), and linearity (LIN) was positively correlated with fertility. A spermatozoon having significantly higher VCL and ALH, indicates that there is a major bending of the midpiece and large ALH. This signifies the hyperactivation of the spermatozoa. Hyperactivation in turn implies high energy state of the spermatozoa, which is essential for sperm



penetration through cervical mucus, *zona pellucida*, fuse with the oocytes, and successful fertilization. In the present study freshly ejaculated semen samples (n=20) were subjected to motility estimation using CASA and correlation studies were conducted. Results showed a positive correlation between progressive sperm motility with VAP (r=0.662) and VSL (r=0.661). Similarly, a strong positive correlation of VAP was found with VSL (r=0.951) and ALH (r=0.723).

Biostimulation of mithun bulls

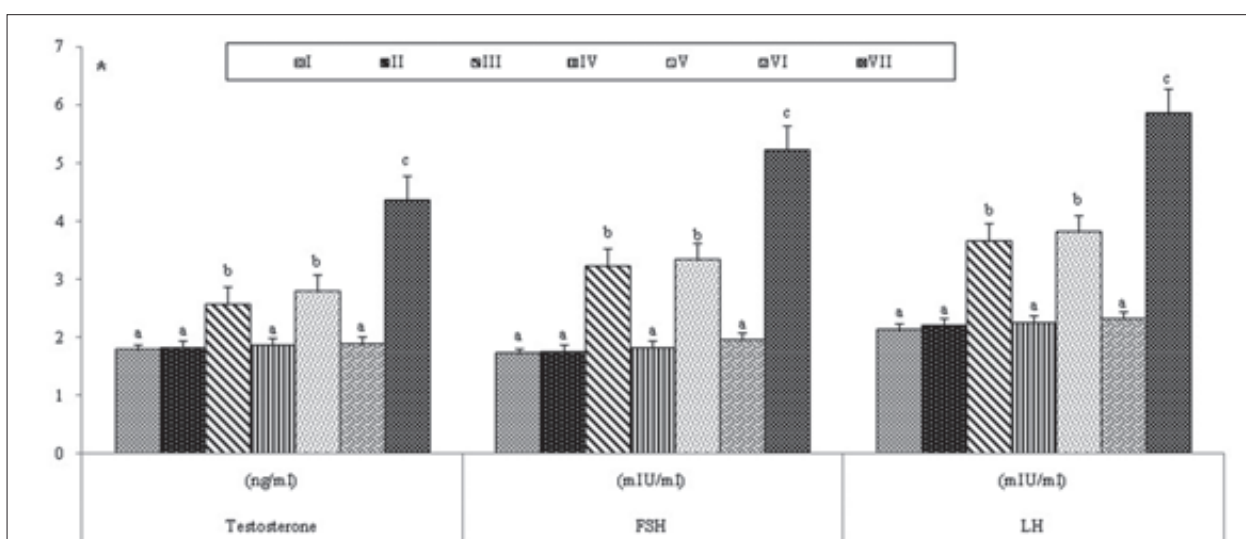
Mithun bulls are known for their shy nature and they do not readily mount even over the estrus

female in a confined condition. Moreover, it is often difficult to identify the female mithun in estrus. Consequently, collection of semen use of artificial vagina is not regarded as a very straight forward. Exposure of bulls/males to the estrus female or its secretion is known to have a beneficial effect on hormone production/ secretion especially testosterone, sexual behavior and semen volume and quality. Therefore, a study was conducted to find out the effect of exposure of male mithun to estrus female as well as urine, dung and sweat of estrus females. A significantly higher (p< 0.05) level of testosterone, FSH and LH was observed in the mithun males those were biostimulated (Figure 7 and 8).

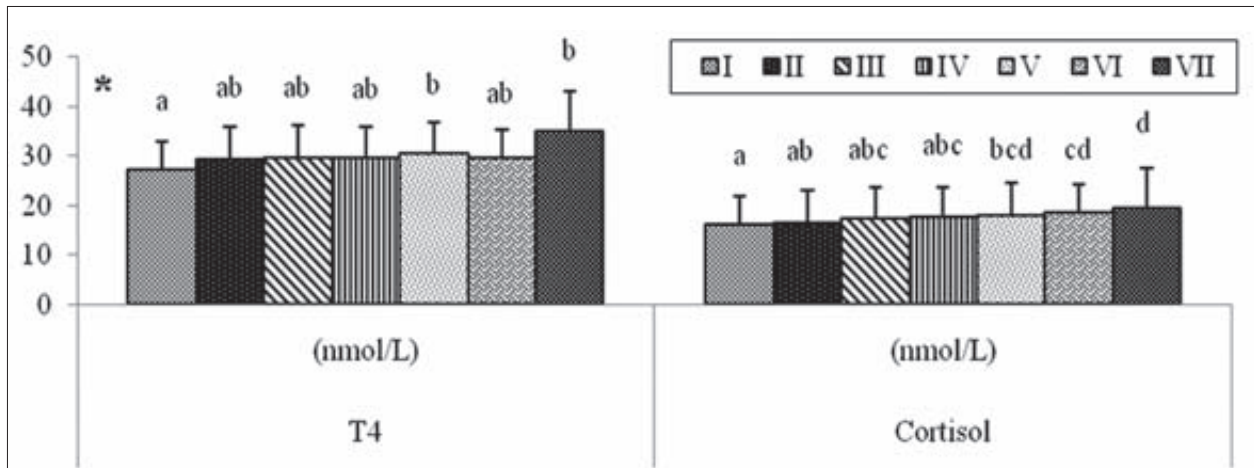
Table 2: Correlation between the motility and velocity parameters of mithun sperm

MOT	MOT	PMOT	VAP	VSL	VCL	ALH	BCF	STR	LIN
PMOT	1	0.48**	0.04	-0.08	0.06	-0.11	-0.18	-0.08	0.09
VAP		1	0.66**	0.66**	0.12	0.30*	-0.18	0.21	0.16
VSL			1	0.95**	0.08	0.72**	-0.16	-0.06	-0.15
VCL				1	0.08	0.67**	-0.20	0.17	0.02
ALH					1	0.17	0.05	0.02	-0.04
BCF						1	0.07	-0.24	-0.36*
STR							1	-0.30*	-0.37**
LIN								1	0.90**

**P<0.01, *P<0.05



Effect of biostimulation on testosterone, FSH and LH in adult mithun bull (* indicates p<0.05). I: Without exposure of female, II: Exposure of urine and dung of non - estrus female, III: Exposure of urine and dung of estrus female, IV: Exposure of sweat of non - estrus female, V: Exposure of sweat of estrus female, VI: Exposure of non - estrus female and VII: Exposure of estrus female



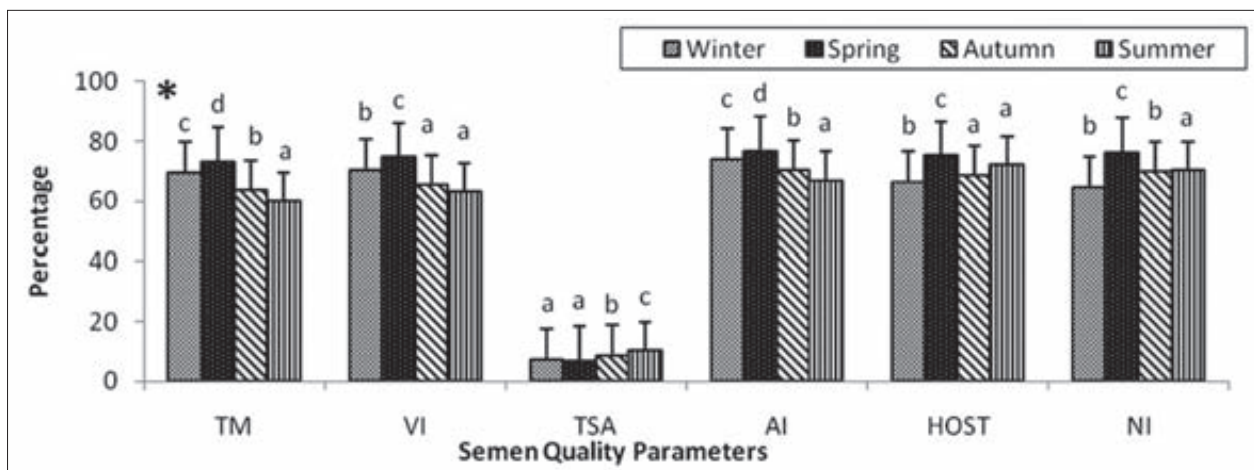
Effect of biostimulation on T4 and cortisol level in adult mithun bull (* indicates $p < 0.05$). I: Without exposure of female, II: Exposure of urine and dung of non - estrus female, III: Exposure of urine and dung of estrus female, IV: Exposure of sweat of non - estrus female, V: Exposure of sweat of estrus female, VI: Exposure of non - estrus female and VII: Exposure of estrus female

Effect of seasons on reproductive performance of mithun bull

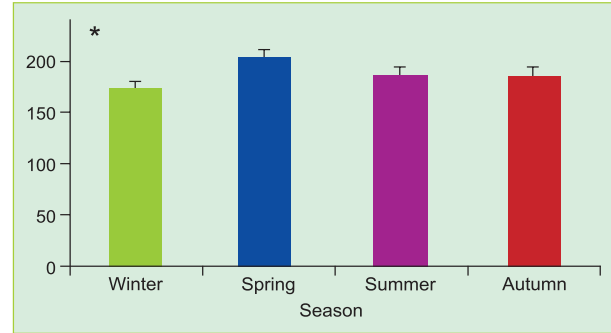
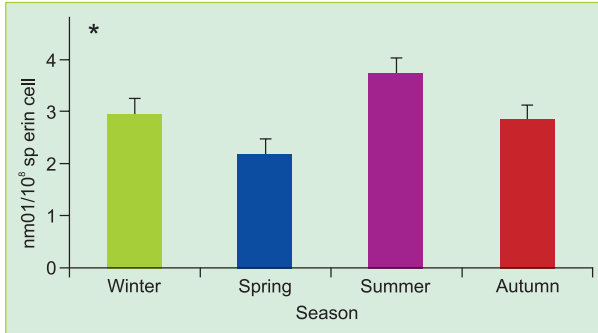
The testicular morphometry and endocrinological profiles of mithun males varied significantly ($p < 0.05$) with the age and seasons. In comparison to summer, a significantly higher scrotal circumference was observed in winter and spring. A significantly higher level of FSH, LH, Testosterone, Thyroxine and IGF-1 were recorded during winter and spring. However, during winter and spring, the level of cortisol was significantly lower. A significant association was observed between hormone profile, testicular and scrotal parameters and age groups in mithun bulls.

Effect of addition of melatonin in semen extender on semen quality

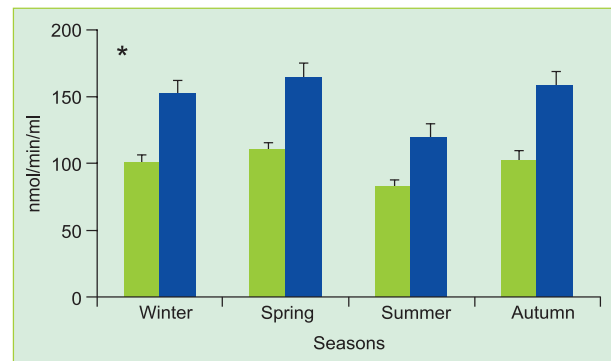
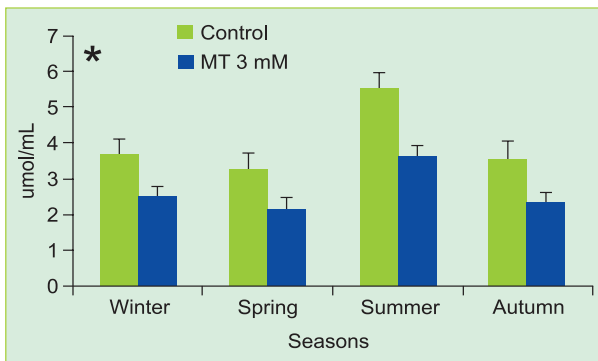
Sperm quality, motility parameters, biochemical and antioxidant profiles of mithun semen differed significantly between the seasons. Spring season was turned out to be the most favorable followed by winter and summer. In order to mitigate the adverse effects of the seasons on semen quality, particularly the summer stress, melatonin in different concentrations were added in the semen extender as an antioxidant. Results revealed that the addition of 3 mM melatonin has a beneficial effect on semen parameters during preservation of mithun semen at refrigerated temperature (at 4°C) as well as in cryopreserved state (Figure 9 -12)



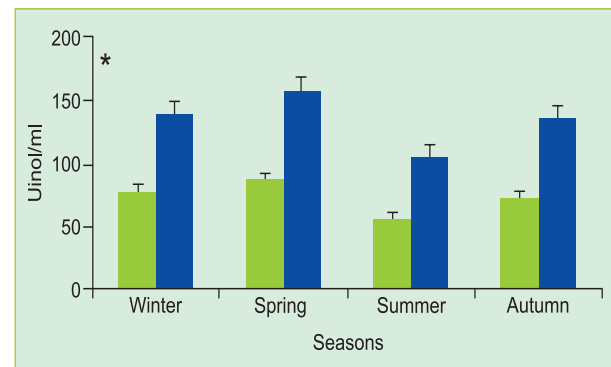
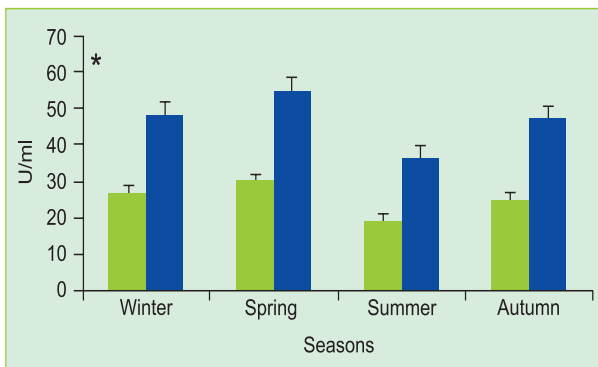
Semen quality parameters at different seasons in mithun (*: $p < 0.05$). TM: Total Motility, VI: Viability, TSA: Total Sperm Abnormality, AI: Acrosomal Integrity, HOST: Hypo-osmotic Swelling Test and NI: Nuclear Integrity



Malondialdehyde production and total antioxidant capacity for different seasons in mithun fresh semen (* between seasons differ significantly, $p < 0.05$)



Malondialdehyde production and catalase activity for different seasons in mithun post thaw semen (* between seasons differ significantly, $p < 0.05$)



Superoxide dismutase and total antioxidant capacity for different seasons in mithun post thaw semen (* between seasons differ significantly, $p < 0.05$)

Exogenous administration of kisspeptin augments the age of puberty

Like other livestock species, mithun also suffers from different reproductive failure including anestrus, late maturity, poor estrus sign/symptom expression, delayed ovulation and long postpartum calving intervals. The age at puberty and first calving mithun are recorded as 27-36 and 40-48 months, respectively. Physiologically, puberty is triggered by the activation of neurons

in the forebrain which produce a neuroendocrine substrate to stimulate GnRH. Basal release of GnRH from the hypothalamus into the hypophyseal portal circulation maintains tonic gonadotropin secretion from the pituitary and resulting in follicular development and steroidogenesis in the ovaries. In the last decade, kisspeptin, a peptide encoded by the *Kiss1* gene, has attracted attention as a key molecule in the regulation of Gonadotrophin releasing hormone (GnRH) / gonadotrophins (LH/FSH) release in many mammalian species including

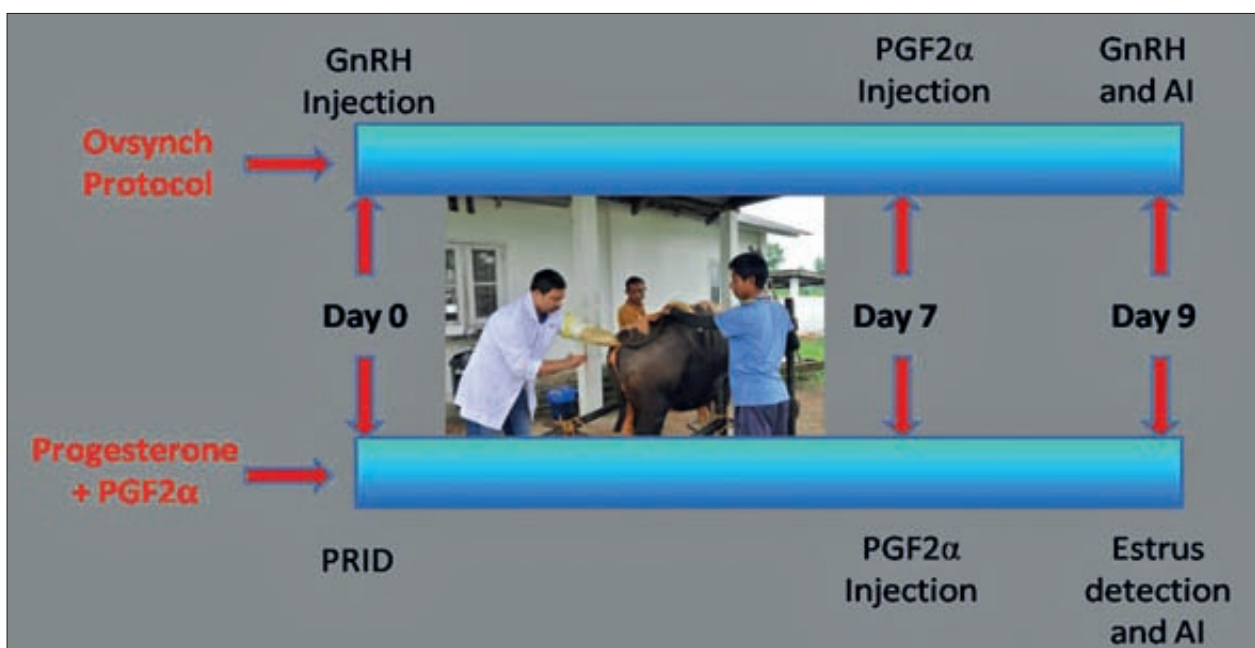
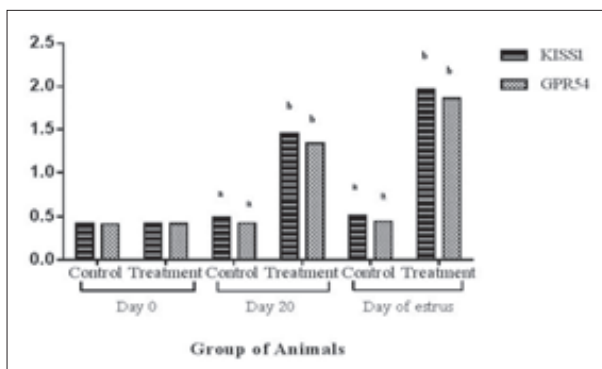
rodents, ruminants and primates. G-protein coupled receptor 54 (GPR54), a member of the rhodopsin family, act as an endogenous receptor of kisspeptin. Both KISS1 and GPR54 genes are predominantly expressed in the hypothalamus. Kisspeptin (Kp), synthesized in the arcuate nucleus and preoptic area of the hypothalamus, is a regulator of GnRH in the hypothalamus. Present study was undertaken to find out the effect of kisspeptin administration on *kiss1* and *GPR54* mRNA expression, plasma endocrine profile, follicular development and onset of estrus in prepubertal mithun heifers. Animals in the treatment group were injected with metastatin up to day 20 while in control group normal saline was injected as a placebo. Results revealed a significant increase in *kiss1* and *GPR54* mRNA expression following metastatin administration as compared to the control. The levels of estradiol 17β and FSH were elevated in the treatment group while no difference was observed in plasma progesterone. An increased

number of medium and large follicles was recorded in the treatment group while in the control group the presence of only small follicles was observed. The animals of the treatment group showed an early ($p < 0.05$) onset of estrus (12.5 ± 6.81 vs. 135 ± 5.15 days) compared to control after cessation of treatment) and exhibited a slightly swollen vulva and hyperemic vaginal mucosa. The results of the present study demonstrated an increased expression of *kiss1* and *GPR54* mRNA, peripheral estradiol and FSH concentration, increased follicular growth and an early onset of estrus in the animals administered with exogenous kisspeptin.

Technology Assessment

Synchronization and timed AI in mithun

Post partum mithun cows were synchronized using either Progesterone releasing intra-vaginal device (PRID) followed by $\text{PGF}2\alpha$ or Ovsynch Protocol (GnRH + $\text{PGF}2\alpha$). Estrus detection was confirmed through rectal palpation as well as through ultrasound scanning of ovaries. The estrous synchronized mithun cows were artificially inseminated with frozen-thawed semen and pregnancy was confirmed after 50 days of insemination. The animals treated with Ovsynch protocol showed a higher ($p < 0.05$) rate of synchronization (83.33 vs. 66.66%). However, there was no significant difference in pregnancy rate between Ovsynch and PRID protocol.



Estrus synchronization and AI in mithun

ANIMAL HEALTH

Mithun like other bovines suffers from infectious and non-infectious diseases. However, scanty information's are available. Therefore, the epidemiological studies on bacterial, viral and parasitic pathogen are the most important focus of animals health section. Further, North-East Region is one of biodiversity hotspot in the world. The tribal people since time immorial are dependent of natural herbs for healthcare of human and animals. The documentation and scientific validation of medicinal properties of herbs will provide safe alternative to animal health care.

Molecular identification of Ixodes ticks of mithun

The environmental conditions of the region greatly favors the survival and reproduction of ecto-endoparasites leading to poor body condition, reduced growth and occasional mortality. To augment the menace of ecto-endoparasites, the identification and characterization of these parasites is of immense importance. The live gross specimens of ticks were collected in the plastic vials containing 70% alcohol from Jotsoma and Khonoma village of Nagaland. The samples were processed in the laboratory with standard procedures. Based on the available morphological keys, the ticks were identified as Ixodes ticks. Accurate identification to the species level, internal transcribed spacer-2 (ITS-2) region was PCR amplified using a primers pair (5'-CTGCGAGACTTGGTGTGAAT-3' and 5'-TATGCTTAAGTTCAGCGGGT-3'), flanking 5.8S and 28S rRNA genes. Genomic DNA of the six tick specimens was isolated with a commercial kit and was used as a template for PCR amplification. In PCR amplification, ITS-2 region of the ticks showed an amplicon of 900 and 1000 bp, suggesting a species difference. Sequence analysis of the amplified region of ITS-2 of the Ixodes tick from Khonoma region showed 100% identity with *Ixodes ovatus* (Accession no. AB280550). However, the amplified region of ITS2 from the ticks of Jotsoma region showed 95% identity with *I. acutitarsus*

(Accession no. AB105168). Accordingly, ticks collected from Khonoma and Jotsoma village were assigned to *I. ovatus* and *I. acutitarsus*, respectively. The morphological features of the tick specimens and sequence analysis of ITS2 region revealed the



PCR amplification of ITS-2 region of *Ixodes ovatus* (lanes 1,2) and *I. acutitarsus* (lanes 3-7). Lane M 100 bp DNA ladder marker

prevalence of both *I. ovatus* and *I. acutitarsus* in the mithun population of the studied region

Molecular characterization of *Mecistocirrus digitatus* and *Toxocara vitulorum* in the mithun

M. digitatus and *T. vitulorum* are common pathogenic nematodes of mithun. The internal transcribed spacer-2 (ITS-2) region and beta tubulin gene of *M. digitatus* were PCR amplified and sequenced. ITS-2 sequence analysis showed 100% identity with other isolates of *M. digitatus* and 83% identity with *Haemonchus contortus* and *H. placei* respectively. Likewise, ITS-1 (590 bp) and ITS-2 (550 bp) sequences of *T. vitulorum* were PCR amplified and sequenced. Sequence analysis of these internal transcribed spacers from five specimens of the parasite from mithun showed no intraspecific variations with *T.vitulorum* isolates of domestic ruminants.

Prevalence and Molecular Epidemiology of bovine Viral Diarrhea (BVD)

Further, the epidemiological studies of infectious disease will provide the insight to disease pathology and will help in institution treatment protocols. A total of 611 samples (345 from cattle, 195 from mithun and 71 from Yak) from

the organized farms and free-ranging animals of Nagaland, Mizoram and Arunachal Pradesh were screened for the presence of BVDV antibodies using commercially available ELISA kit. The seroprevalence was 39.71%, 47.69% and 45% in cattle, mithun and yak, respectively.

Cell-mediated Immune Status of Mithun (*Bos frontalis*) and Tho-tho Cattle (*Bos indicus*)

Mithun is hypothesized as resistant to many diseases. In order to validate the hypothesis, the study of humoral Immune (HI) and cell mediated immune (CMI) status of healthy mithun was conducted and was compared with Tho-tho (*Bos indicus*) cattle. The plasma concentration of Ig G and M was found significantly ($p < 0.05$) higher in Mithun than that of Tho-tho cattle for all the physiological stages suggesting a better HI status of mithun than that of Tho-tho cattle. The CMI status was assessed using Granzyme B, Perforin-1 and MTT assays. Significantly ($p < 0.05$) higher concentration of Granzyme B in Tho-tho cattle than that in mithun during all the physiological stages indicated a better CMI status of the Tho-tho cattle. The lymphocyte proliferation potential, as measured by MTT assay, though did not vary significantly in mithuns of different physiological stages, however, it varied ($p < 0.05$) among the different physiological stages in Tho-tho Cattle. The comparative analysis of lymphocyte proliferation capacity in mithun vs Tho-tho cattle showed that former having significantly

($p < 0.05$) higher lymphocyte proliferation capacity for all the physiological stages.

Chemical Fingerprinting of Medicinal Herbs

North-East Region is biodiversity hotspot. The tribal people since time immorial are dependent of natural herbs for healthcare of human and animals. The documentation and scientific validation of medicinal properties of herbs will provide safe alternative to animal health care. A total of 35 medicinal herbs (viz. Dazo nha /Clementis, Chu Phushe, Phenoche, Rulu, Tridax proumbens, Bouheinia gluca, Alder nepalensis, Ficus prostate, Rubia cardifolia, Fragaria moschata, Rhododendron and Asparagus adscendens) were collected from Porba, Thuvopisu and Medziphema villages of Nagaland. The collected herbs were digitized and an herbarium was prepared. The authentication of the collected herbs is under progress. The chemical fingerprinting of 33 medicinal herbs were completed, which showed a majority of plants contained Terpenoids, Alkaloids, Flavonoids and Phlobotanins suggesting their putative anti-oxidants, antimicrobial, and anti-inflammatory properties in these herbs.

All India Coordinated Project (AICRP) on Foot and Mouth Diseases

FMD outbreaks were recorded in different areas in Dimapur, Kohima and Peren districts of Nagaland. The outbreaks were sampled and screened by Real Time PCR using OIE recommended primers amplifying about 300bp.

Table 3: MTT assay in Mithun and Tho-Tho cattle

Groups	Adult Dry Females	Male	Calf	Lactating
Mithun	0.89 ± 0.23 ^A	0.68 ± 0.20 ^A	0.61 ± 0.09 ^A	0.68 ± 0.35 ^A
Tho-Tho Cattle	0.21 ± 0.01 ^{B,a}	0.12 ± 0.01 ^{B,c}	0.20 ± 0.004 ^{B,a}	0.17 ± 0.01 ^{B,b}

a,b,c: Differ significantly at $P < 0.05$; A,B: Differ significantly at $P < 0.05$



TRANSFER OF TECHNOLOGY



KISAN MELA

Place of Activity/Training	Date	Beneficiaries
Haipi village, Sadar Hills, Dist. Senapati, Manipur	18.02.2016	Mithun mela and Farmer's Awareness programme benefitting 150 farmers
Takilalung Village, Pasighat, Arunachal Pradesh	06.03.2016	Mithun Mela and farmer's Awareness programme benefitting 55 mithuns and 500 farmers

SENAPATI, MANIPUR

On 18th February, 2016, a Mithun Mela was organized at Haipi village, Sadar Hills district of Manipur in collaboration with FEEDS-Krishi Vigyan Kendra (KVK), Hengbung, Senapati, Manipur. KVK-Phek, Porba, Nagaland, ICAR RC, Manipur Centre and KVK-Hengbung, Senapati, Manipur participated in the Mela and displayed their technologies, products and scientific literature. A large number of farmers from Haipi village and other nearby villages participated in the mela.

Mithun were also brought to the mela site. All mithuns were vaccinated against FMD and HS. Farmers were also shown the ear tagging procedure. Certificate and trophies were also given to the best mithun farmer, best trainee participants and best stall. Common veterinary medicines were distributed to all the farmers. Such programmes helped to develop interest among the rural youths for scientific mithun rearing as a potential means of livelihood as well as a mean for regenerating the depleted forest.



Mithun Mela at Haipi Village, Manipur

PASHIGHAT, ARUNACHAL PRADESH

On March 6, 2016, ICAR-National Research Centre on Mithun, Nagaland; Department of Veterinary & Animal Husbandry, Govt. of Arunachal Pradesh, and College of Horticulture & Forestry (CHF), CAU, Pasighat jointly organized 'Mithun Mela-cum-Farmers' Awareness Program' at Takilalung village, Pasighat, Arunachal Pradesh. Mithun is an integral part of socio-economic life and pride of Arunachalees. The mela was attended by more than 500 mithun farmers. Shri Ninong Ering, Member of Parliament (Loksabha), while inaugurating the event emphasized that scientific mithun rearing would not only improve the livelihood of the farmers but also help in rejuvenation of the forest cover. Shri Kaling Moyong, Pasighat MLA graced the occasion. Apart from ICAR-NRC on Mithun and College of Horticulture & Forestry, Dept. of Veterinary and Animal Husbandry, Govt. of Arunachal Pradesh, ICAR-NRC on Pig,

Guwahati, ICAR-IVRI and ICAR-NDRI Regional Stations Kolkata and self-help groups participated and displayed their technology. Fifty eight mithun were brought to the mela ground. All mithuns were ear tagged and vaccinated against FMD and HS. Morphometric parameters were taken and best mithun (male, female and calf) was judged by the committee. One hundred and fifty piglets, a medicine-kit, and "µthimin"- mineral mixture developed at NRCM, were distributed to the beneficiaries.



Mithun Mela at Takilalung village, Arunachal Pradesh

EXTENSION ACTIVITIES

Under Tribal Sub-Plan (TSP), various programmes were organized by ICAR-NRC on Mithun in all the four mithun inhabited states viz., Arunachal Pradesh, Nagaland, Manipur and Mizoram.

- A total of 14 Technology demonstration-cum-Awareness Programmes/Animal Health camps organized covering 619 mithun and benefiting 1659 farmers and 140 school childrens.
- 714 mithuns were vaccinated against FMD and HS, and were ear tagged.
- Inputs were distributed to mithun farmers in the form of common veterinary medicines, mineral mixture, piglets, poultry, rabbit and materials for making temporary mithun shed, and salt lick.
- “Mithun Mela” was organized in Arunachal Pradesh and Manipur in collaboration with College of Horticulture & Forestry, Pasighat and Department of Veterinary & AH, Govt. of Arunachal Pradesh and KVK, Hengbung, Dist. Senapati, Manipur.
- Organized two Exposure Visits for the farmers of Phek district, Nagaland and educated unemployed youths of Senapati district, Manipur for providing first-hand information about the scientific mithun husbandry and attracting them for commercial mithun rearing.
- Training programme on “Scientific Mithun Husbandry for Improving Livelihood” was organized by ICAR-NRC on Mithun for Manipur farmers in collaboration with KVK Hengbung, Dist. Senapati, Manipur benefiting 51 farmers.



TECHNOLOGY INJECTION PROGRAMMES AND OTHER EXTENSION ACTIVITIES

Place of Activity/Training	Date	Beneficiaries
TECHNOLOGY INJECTION/ANIMAL HEALTH CAMP		
Pholami village, Dist. Phek, Nagaland	06.06.2015	Vaccination of 100 nos of mithuns (FMD+HS) benefitting 54 farmers
Jotsoma village Dist. Kohima, Nagaland	26.06. 2015	Vaccination of 60 nos of mithuns (FMD+HS) benefitting 50 farmers
Middle Khomi village, Dist. Phek, Nagaland	13.07. 2015	Vaccination of 51 nos of mithuns (FMD+HS) benefitting 197 farmers
Chinwetnyu village, Dist. Mon, Nagaland	06.08. 2015	Vaccination of 41 nos of mithuns (FMD+HS) benefitting 50 farmers
Porba Dist. Phek , Nagaland	05.10.2015	Vaccination of 145 nos of mithuns (FMD+HS) benefitting 72 farmers
Khonoma village, Dist. Kohima, Nagaland	01.12. 2015	Benefitting 51 farmers
Thevopisu Village, Dist. Phek, Nagaland	28.01.2016 to 29.01.2016	Vaccination of 105 nos of mithuns (FMD+HS) benefitting 52 farmers
Mezoma Village, Dist. Kohima, Nagaland	10.02.2016	Benefitting 64 farmers
Tening Village, Dist. Paren, Nagaland	24.02. 2016	Benefitting 66 farmers and 140 school childrens
Jharnapani and Medziphema village, Dist. Dimapur, Nagaland	27.02. 2016	Benefitting 51 farmers
Khonoma village, Dist. Kohima, Nagaland	12.03. 2016	Vaccination of 21 nos of mithuns (FMD+HS) benefitting 61 farmers
Jharnapani and Medziphema village, Dist. Dimapur, Nagaland	12.03. 2016	Benefitting 61 farmers
Waoshu, Yakor and Sangphur village in Dist. Tuensung, Nagaland	16.03.2016 to 21.03.2016	Benefitting 37 mithuns and 247 farmers
Mezoma village, Dist. Kohima	16.02.2016	Medical cum Veterinary camp jointly organized by ICAR-NRCM & 37 Assam Rifle benefitting 117 farmers
TRAINING ORGANIZED-TWO		
KVK Dist. Senapati, Manipur	16.02. 2016 to 7.02.2016	Training programme benefitting 51 farmers
ICAR-NRC on Mithun, Medziphema	14.03.2016 to 15.03.2016	Famers of Phek District
EXPOSURE VISIT-TWO		
NRC on Mithun	14.03.2016 to 5.03.2016	Exposure visit benefitting 24 farmers of Phek District
NRC on Mithun	21.03.2016 to 22.03.2016	Exposure visit benefitting 30 farmers from Manipur

Health Camp organized in collaboration with 37-Assam Rifles

Under Tribal Sub Plan (TSP), one day Medical-cum-Veterinary camp and Technology dissemination programme was jointly organized

by 37-Assam Rifles and ICAR-National Research Centre on Mithun at Mezoma village of Kohima district on February 16, 2016. The camp provided basic medical and veterinary aids to the remote village which is devoid of these facilities and provided



Medical cum Veterinary Health Camp at Mezoma Village, Nagaland

technical inputs for the overall development of the mithuns as well as their owners. As a part of the event, stationeries were also distributed among 60 school children. A total of 76 villagers were provided with medical aid, while veterinary assistance was provided for 41 animals.

Training programmes on Scientific Mithun Husbandry

Senapati, Manipur

On 16-17th February, 2016 a two days farmers training on **“Scientific Mithun Husbandry for improving Livelihood”** was organized in collaboration with Foundation for Environment and Economic Development Services (FEEDS) and Krishi Vigyan Kendra (KVK) - Sylvan, Hengbung, District Senapati, Manipur. The programme was inaugurated on 16th February, 2016. Shri. Shambhu Singh, Additional Chief Secretary, Govt. of Manipur graced the occasion as a Chief Guest. A total of 51 mithun farmers from different districts

of Manipur including Chandel, Ukhrul, Chura Chand Pur, Senapati and Sadar Hill, participated in the programme. Deliberations were made on scientific rearing of mithun in order to make mithun husbandry more remunerative, economically viable and a sustainable enterprise.

Medziphema, Nagaland

Traditionally mithun is reared under a free range system where the occasional offering of salt is the only contact between mithun and its owner. ICAR-NRC on Mithun, Jharnapani has demonstrated that mithun can be reared under semi-intensive and intensive system without compromising its productivity. Twenty five mithun farmers from Phek district, who adopted mithun farming as an alternative means of livelihood with the Entrepreneur Associates, a nonprofit NGO, visited ICAR-NRC on Mithun, Jharnapani from March, 14-15, 2016. The farmers were learned about the technologies developed by the including feed blocks, area-specific mineral mixture and RFID



Farmers training for scientific mithun husbandry

based animal identification. Dr. B.S.Prakash, ADG (AN&P), ICAR New Delhi, also interacted with the participants.

Programmes Participated

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

the farmers. The hundreds of farmers were also benefitted through these programmes.

Place of Activity/ Training	Date	Resources persons
Yak Mela-2015, Zemithang, Arunachal Pradesh	14.11.2015	Dr. Abhijit Mitra
Kisan Mela-cum Technology Demonstration, Majuli	19.01.2016	Dr. Abhijit Mitra and Dr. Jayanta K Chamuah
Regional Agri- Fair, Aizwal, Mizoram	03.02.16 to 05.02.2016	Dr. Abhijit Mitra; Dr. Sabyasachi Mukherjee and Dr. Akhilesh Kumar
Krishi Unnati Mela, New Delhi	19.03.16 to 21.03.2016	Dr. Naresh Prasad and Dr. Kezhavitou Vupru
Prime Minister Crop Insurance Scheme/ Pradhan Mantri Fasal Beema Yojana", ICAR-RC NEH, Nagaland.	31.03.2016	Dr. Abhijit Mitra

Regional Agri-Fair, Aizwal, Mizoram



Krishi Unnati Mela, New Delhi

A delegation of 11 progressive farmers from Nagaland, Manipur and Arunachal Pradesh, led by a team of Scientists and Technical Officers of the institute participated in three-day “Krishi Unnati Mela” held at IARI, Pusa, New Delhi from March 19-21, 2016. The Prime Minister, Shri Narendra Modi inaugurated the National Fair. The participating farmers were immensely benefited from the live demonstration of agriculture and horticultural crops, animal husbandry, innovative technologies and farm mechanization exhibited by both public and private companies in over 500 stalls. NRC on Mithun also put up a stall displaying

the technologies developed in the Institute for the scientific rearing of mithun and leather products made up of mithun skin.



Participation of ICAR-NRC on Mithun in “Krishi Unnati Mela”, New Delhi

ACHIEVEMENTS OF KRISHI VIGYAN KENDRA PHEK, PORBA

Achievements of KVK Phek during 2015-16

KVK carried out a number of on-Farm Trials (OFT) for technology assessment and refinement in the area of Agronomy, Plant Protection, Soil Science, Animal Science, and Horticulture. KVK Phek also carried out a number of Front Line Demonstrations (FLD) for oil seeds, pulses, maize, other crops and livestock benefitting more than 4000 farmers of Phek district. KVK Phek also imparteda large numbers of training to mithun farmers, village youths, women

and other extension functionaries in various fields of production technology, insect-pest management, vermi-culture, vermi-composting, livestock production and crop production management. Large number of soil and plant samples were also analyzed by KVK Phek during the year to make the farmers aware about nutrient deficiencies in their fields. KVK is also maintaining a small unit of rabbitary and fishery for demonstration and training.

A. On Farm Trial (OFT)

Discipline	Crop / Enterprise	No. of Technology	No. of trials		Status
		Assessed	Target	Achievement	
Agronomy	Maize and cowpea	1	3	3	Completed
	Maize	1	3	3	Completed
Soil Science	Cabbage	1	4	4	Completed
Plant Protection	Brinjal	1	3	3	Completed
Horticulture	Capsicum	1	3	3	Ongoing
Animal Science	Poultry	1	10	10	Completed
Total		6	26	26	

B. Front Line Demonstration (FLD)

Discipline	Crop / Enterprise	No. of Technology	No. of demonstrations		Status
			Target	Achievement	
Agronomy	Paddy	1	3	3	Completed
	Maize	1	3	3	Completed
	Maize and cowpea	1	3	3	Completed
	Groundnut	1	3	2	Completed
	Soybean	1	3	3	Completed
	Pea	1	25	25	Completed
	Potato	1	3	4	Completed
	Linseed	1	25	25	Completed
	Rapeseed	1	75	75	Completed

Discipline	Crop / Enterprise	No. of Technology	No. of demonstrations		Status
			Target	Achievement	
Soil Science	French bean	1	4	4	Completed
	French bean	1	4	4	Completed
	Maize	1	4	4	Completed
	Soybean	1	4	4	Completed
	Groundnut	1	4	4	Completed
	Vermi-compost	1	4	4	On going (1 st Harvest)
	Plant Protection	Paddy	1	10	10
Ginger		1	3	3	Completed
Cabbage		1	3	3	Completed
Cabbage		1	3	3	Completed
Pea		1	3	3	Completed
French Bean		1	3	3	Completed
Horticulture		Radish	1	3	3
	Carrot	1	3	3	Completed
	Cauliflower	1	5	5	Completed
	French Bean	1	3	3	Completed
	Tomato	1	5	5	Completed
	Broccoli	1	3	3	Completed
	Animal Science	Poultry	2	2	1
Piggery		3	3	3	Completed
Poultry		1	1	1	Completed

C. Training Programme

Discipline	No. of courses			Farmers benefitted (Nos.)			Vocational Training
	PF	RY	EF	PF	RY	EF	
Agronomy	13	3	-	255	41	-	-
Soil science	13	6	1	315	135	15	1
Plant Protection	10	7	1	243	167	15	1
Horticulture	15	2	-	282	58	-	-
Animal Science	13	4	-	335	108	-	-
Total	64	22	2	1430	509	30	2

PF: Practicing Farmer, RY: Rural Youth and EF: Extension Functionaries



D. Extension Activities

Extension Activity	Activity		Beneficiaries	
	Target in 2015-16 action plan	Achievement (Nos.)	Target (Nos.) in 2015-16	Achievement (Nos.)
Advisory services	32	51	140	358
Diagnostic visit	60	64	170	231
Film show	6	3	120	58
Scientists visit to farmers fields	75	49	225	137
Animal Health camp	3	4	125	188
Method demonstration	34	16	486	339
Celebration of important days	4	4	550	266
Exposure visits	2	2	45	42
Soil Health camp	1	1	20	22
Awareness camp	-	1	-	32
Extension literature	8	4	-	-
Newspaper coverage	15	13	-	-
Field day	14	18	200	174
Farmers workshop	-	1	-	28
Exhibition	-	1	-	110
Lecture delivered as resource person	-	9	-	283
Farmer-Scientist interaction	-	1	-	50
Awareness cum training programme under PPV & FRA	-	1	-	115
Mela - Cardamom festival	-	1	1	130



E. Farm Production

Item	Product Name	Quantity produced (kg)	Value (Rs.)	Qty supplied and No. of farmers	
				No.	kg.
Vermicompost	Vermicompost	150	1500	3	150
Earthworms	<i>Eisenia fetida</i>	5000 worms	5000	5	5000 worms
Tobacco leaf extract	Tobacco leaf extract	4 bottles	80	2	4 bottles
Wild cherry	Wild cherry	50 nos	500	5	50 nos
Wild apple	Wild apple	50 nos	500	5	50 nos
Tree tomato	Local	5 kg	100	2	5 kg
Fish	Common carp	28.8 kg	5184	24	28.8 kg
Rabbit	New Zealand White	2 pairs	700	2	
Total			13564	48	

F. Status of Soil Testing

Sl. No.	Samples tested/ analyzed	Nos.	Farmer beneficiaries	Village covered
1	Soil sample	78	263	Porba, Gidemi, Sakraba

G. Special programmes financed by State Govt./Other Agencies

Name of the scheme	Activity	Date/ Month of initiation	Funding agency	Amount (Rs.)
NICRA	Training, demonstrations, group discussion, farmer scientist interaction, workshop, etc	11th January 2011	CRIDA, ICAR	30,35,000.00
TSP	Training, demonstrations	2013 - 2014	ICAR	20,00,000.00
DST	Training, demonstrations	1st July 2013	Science and Technology, Nagaland	5,15,600.00
CITH	Training, demonstrations on temperate fruit crops	13TH January 2014	CITH, Srinagar	2,00,000.00



HONOURS, AWARDS AND RECOGNITIONS

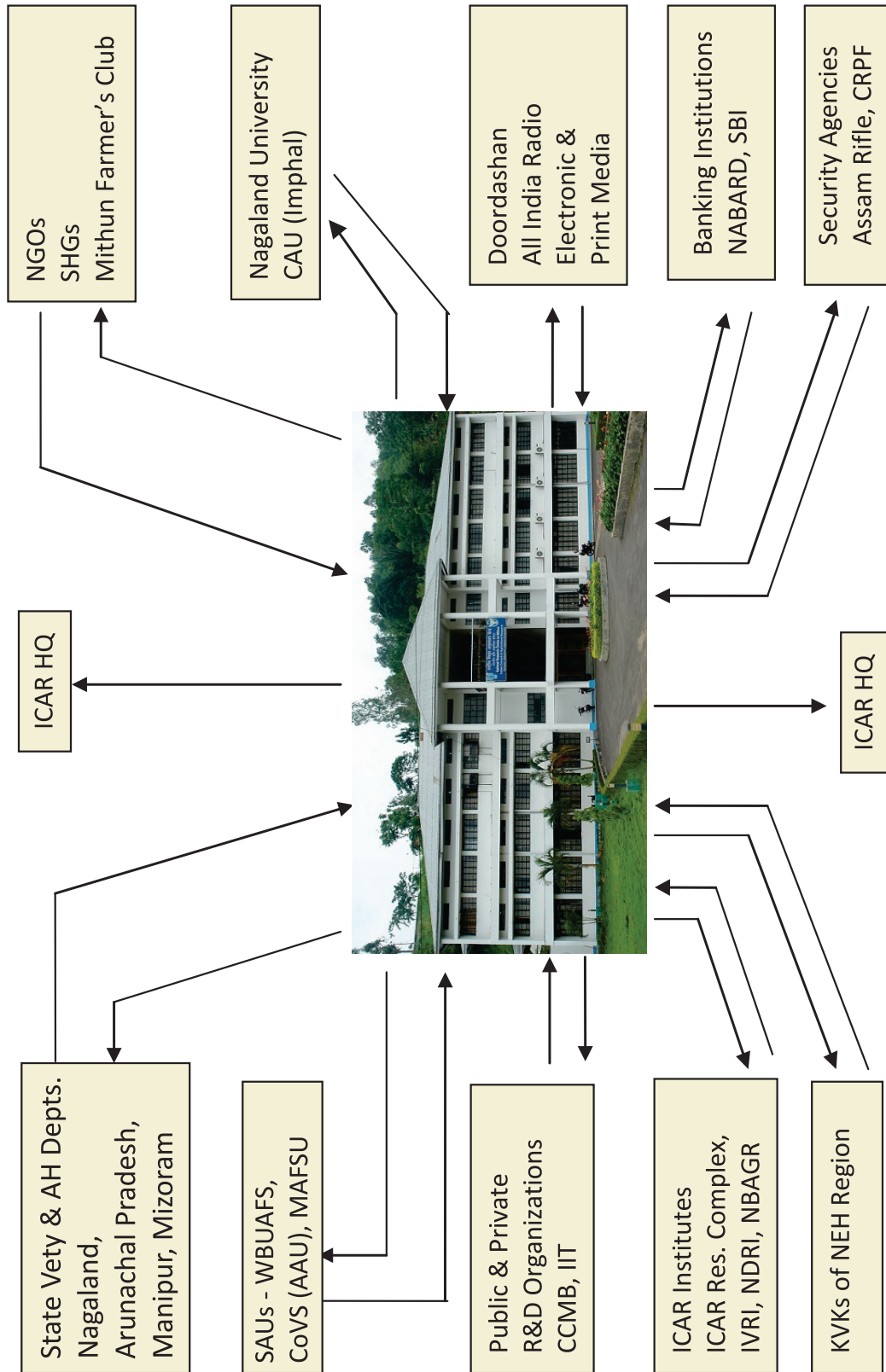
RECOGNITION / HONOURS

- Dr. M. H. Khan selected as an Editorial Board Member of Veterinary Clinical Science Journal.
- Mrs. Liza Barua Bharali received Outstanding Achievement (second prize) in the Video Production Competition during training on 'Video production and scientific documentation' held at ICAR – Zonal Project Directorate, Zone-III, Umium, Meghalaya, 793103.
- Dr. Perumal P. awarded Young Achiever Award – 2015 (SADHNA) by the Society for Advancement of Human and Nature, Nauni, Solan 173 230, Himachal Pradesh, India.
- Dr. Perumal P. included as Honorary Board Members and Life Author of Society for Advancement of Human and Nature (SADHNA), Nauni, Solan 173 230, Himachal Pradesh, India.
- Dr. Akhilesh Kumar received the Letter of Appreciation for reviewing the manuscript submitted to the Indian Journal of Veterinary Medicine for the year 2015.
- Dr. M. H. Khan selected as an Editorial Board Member of Veterinary Clinical Science Journal.
- Dr. Sabyasachi Mukherjee and Dr. Meraj Haider Khan Co-chaired the technical session of 5th Review Meeting of Biotech Hubs of NER held on 9-10th July, 2015 at ICAR-NRC on Mithun, Jharnapani, Nagaland.
- Dr. Jayanta K Chamuah, Dr. Vidya Singh, Dr. Perumal P. and Dr. Akhilesh Kumar acted as rapporteur in technical session of 5th Review Meeting of Biotech Hubs of NER held on 9-10th July, 2015 at ICAR-NRC on Mithun, Jharnapani, Nagaland
- Dr. Abhijit Mitra Co-Chaired the session on "Global role of grassland management in mitigating climate change effects on the environment and human welfare" In: 23rd International Grassland Congress 2015 held on 22nd November 2015, New Delhi.
- Dr. Akhilesh Kumar acted as rapporteur during the technical session on "Farmer-Scientist Interaction" In: Regional Agri-Fair held on 04.02.2016 CVSc, CAU, Aizwal, Mizoram.
- Dr. Abhijit Mitra Chaired the session on "Techniques for identifying and characterizing microbes" In: International Symposium on Microbiome in Health and Disease held on 23rd February 2016 at ICAR-NIANP, Bangalore.
- Dr. Nazrul Haque Chaired the technical session of 5th Review Meeting of Biotech Hubs of NER held on 9-10th July, 2015 at ICAR-NRC on Mithun, Jharnapani, Nagaland.

CHAIR/CO-CHAIR OF NATIONAL AND INTERNATIONAL CONFERENCES

- Dr. Nazrul Haque Chaired the technical session of 5th Review Meeting of Biotech Hubs of NER

LINKAGES AND COLLABORATION



A. ONGOING RESEARCH PROJECTS: INSTITUTIONAL

Name of the Project	PI	Start Date	End Date
Comparative evaluation of humoral and cell-mediated immune response of mithun (<i>Bos frontalis</i>) and Tho-tho cattle	Dr. Akhilesh Kumar	September, 2013	August, 2015
Studies on ectoparasites of mithun (<i>Bos frontalis</i>)	Dr. Jayanta K. Chamuah	January, 2014	December, 2015
Studies on endocrinological profile of mithun (<i>Bos frontalis</i>) bulls for enhancing fertility	Dr. Perumal P	March, 2014	February, 2017
Development of mithun based integrated farming system model for sustainability and livelihood security of small and marginal farmers	Dr. Meraj Haider Khan	April, 2014	March, 2019
Optimization of mithun semen freezing protocol through controlled freezing and minimizing sperm damage	Dr Meraj Haider Khan	April, 2014	March, 2017
Assessment of veterinary service delivery, livestock Disease reporting, surveillance system and preventive and control measures taken in Nagaland for mithun and other livestock.	Dr. Naresh Prasad	November, 2014	June, 2016
Epidemiology and genetic characterization of eimerian sp. in mithun calves (<i>Bos frontalis</i>)	Dr. Jayanta K Chamuah	January, 2015	December, 2016
Chemical fingerprinting and <i>in-vitro</i> testing of some traditional medicinal herbs against bacterial and parasitic diarrhoea in Mithun	Dr. Akhilesh Kumar	March, 2015	February, 2018
Standardization of drying and block making techniques using locally available feed ingredients including agro-industrial by-products	Dr. Nazrul Haque	April, 2015	March, 2017
Study on the expression patterns of TLR and other cytokines in mithun	Dr. Vidya Singh	April, 2015	June, 2016

B. ONGOING RESEARCH PROJECTS: EXTERNALLY FUNDED

Name of the Project	Funding Agency	Start Date	End Date	Total Cost (Rs. In lakhs)
Elucidating the mechanism involved in higher feed efficiency of bovine species by expression of the genes regulating mitochondrial proton leak kinetics: Dr. Nazrul Haque	DBT	November, 2012	October, 2016	64.35
Establishment of bioinformatics infrastructure facility for biology teaching Through bioinformatics (BIF-BTBI) under the BTISnet: Dr. Vidya Singh	DBT	March, 2011	February, 2016	18.00

Name of the Project	Funding Agency	Start Date	End Date	Total Cost (Rs. In lakhs)
Establishment of institutional level biotech hub (IBThubs) by DBT under special programme for North-Eastern states of India: Dr. Akhilesh Kumar	DBT	November, 2011	October, 2016	27.00
Onset of puberty and induction of estrus: Role of Kisspeptin (KiSS1) in bovine species (mithun and cattle): Dr. M.H. Khan.	DBT	March, 2014	March, 2017	67.00
Prevalence and molecular epidemiology of bovine viral diarrhoea (BVD) in ruminants with reference to mithun (<i>Bos frontalis</i>) in North-East states of India: Dr. Vidya Singh.	DBT	September, 2013	August, 2016	73.71
Evaluation of melatonin as a fertility marker in mithun (<i>Bos frontalis</i>) bulls: Effect on circadian rhythm and seasonal variation in semen quality parameters: Dr. Perumal P	DBT	December, 2014	December, 2017	48.79
National mission for sustainable Himalayan ecosystem (NMSHE). Dr. Sabyasachi Mukherjee	DST	March, 2016	March, 2020	90.58
Epidemiology and genetic characterization of important helminth parasites of mithun (<i>Bos frontalis</i>) in North-Eastern hilly region of India: Dr. Jayanta Kumar Chamuah	DBT	April, 2012	October, 2015	51.69

C. ONGOING ICAR-NETWORK PROJECTS

Name of the Project	Funding Agency	Start Date	End Date	Total Cost (Rs. In lakhs)
Veterinary type culture (Network Project): Dr. Nazrul Haque	ICAR	March, 2009	Continued	15.00
All India co-ordinated research project on FMD: Dr. Vidya Singh	ICAR	January, 2014	Continued	15.00

PUBLICATION

RESEARCH PAPER

International

- Chamuah JK, Jacob SJ, Lalkrima H, Sankar M, Banerjee PS and Raina OK. (2015). Molecular characterization of veterinary important trematode and cestode species in the mithun (*Bos frontalis*) from North-East India. *Journal of Helminthology* **7**: 1-6.
- Chamuah JK, Sakhrie A, Lama S, Chandra S, Chigure GM, Bauri RK and Jacob S. (2015). Molecular characterization of *Setaria digitata* from mithun (*Bos frontalis*) *Acta Parasitologica*. **60**: 391-394.
- Khan MH, Nath KC, Deka BC and Kumar S. (2015). Qualitative assessment of sperm during conventional vapour freezing of boar semen. *Livestock Research International* **3**: 14-19.
- Khan MH and Kumar S. (2015). Preservation of liquid boar semen: Effect of genotype, boar and sperm parameters on motility and acrosome integrity. *Veterinary Research International* **3**: 30-34.
- Longkumer I, Mukherjee A, Chandra S, Yeniseti, Mukherjee S. and Mech M. (2015). Complete chromosomal characterization of mithun (*Bos frontalis*). *International Journal of Innovative and Applied Research* **3**: 13- 21.
- Longkumer I, Mukherjee A, Chandra S, Yeniseti, Mukherjee S. and Mech M. (2015). Complete Cytogenetic insight of Tho-Tho cattle. *Journal of Agricultural Science and Technology A* **5**: 277-285.
- Mero UM, Haque N, and Shukla, RN. (2015). Preparation and quality evaluation of probiotics fermented milk drinks from mithun milk. *International Journal of Science, Engineering and Technology*, **3**: 859-862.
- Prakash C, Das P, Kumar BVS, Joseph V, Singh V, Singh AP, Hireanallur Y and Warappa M. (2015). Insertion sequence based molecular

characterization of *Burkholderia mallei* NCTC 3709 Strain. *Natl. Acad. Sci. Lett*, **38**: 99-102.

- Prasad N and Perumal P. (2016). Sources of information in adoption of scientific dairy farming. *Advances in Animal and Veterinary Sciences*, **4**: 1- 6.
- Rajoriya JS, Prasad V, Ramteke SS, Perumal P, Ghosh SK, Mahak S, Megha P. and Srivastava N. (2016). Enriching membrane cholesterol improves stability and cryosurvival of buffalo spermatozoa. *Animal Reproduction Science* **164**: 72-81.
- Srivastava N, Srivastava SK, Ghosh SK, Kumar A, Pande M, Perumal P and Soni YK. (2015). Cholesterol content of bull spermatozoa alters survival at ultra-low temperatures. *International Journal of Veterinary Sciences Research*. **1**: **63-69**.

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- Baruah KK, Mondal M, Dhali A, Mech A, Perumal P. and Das KC. (2015). Semen quality parameters of mithun semen preserved at liquid state (5°C). *Indian Journal of Animal Science*. **85**: 965-967.
- Bharali R, Singh RK, Bharali LB. (2015). Performance of Tomato variety Pusa Rohini (*Solanum lycopersicum*) and current Tomato (*lycopersicon pimpinellifolium*) under Protected condition in Phek district of Nagaland. *Annals of plant and Soil Research*, **17**:158-160
- Borkotoky D, Dutta PR, Chamuah JK and Singh RK. (2015). Performance of Khaki Campbell ducks in the Phek district of Nagaland. *Indian Veterinary Journal*.**92**: 86-88.
- Chamuah JK, Mech A, Perumal P. and Dutta PR (2015).Efficacy of chemical and herbal anthelmintic drug against naturally infested gastrointestinal helminthiasis in mithun (*Bos frontalis*) calves: *Indian Journal of Animal Research*. **49**: 269-272.
- Khan MH, Kumar M. and Singh P. (2016).

Reproductive disorders in dairy cattle under semi-intensive system of rearing in north-eastern India. *Vet. World*, **9**: 512-518.

- Khan MH, Nath KC, Naskar S, Deka BC and Kumar S. (2015). Electron microscopic studies of porcine sperm: changes during freezing and post-thawing. *Indian Journal of Animal Sciences* **85**: 723-728.
- Longkumer TE and Singh RK (2015). Effect of Integrated Nutrient Management on growth, yield and nutrient availability Rajmash in Acid soil of Nagaland. *Indian Journal of Agriculture and Allied Sciences*. **1**: 1-4.
- Perumal P, Khan MH, Chang S, and Sangma CTR. (2015). Effect of walking and summer stress on physiological, hematological and antioxidant profiles in mithun (*Bos frontalis*) bulls. *Indian Journal of Animal Science* (accepted).
- Perumal P, Srivastava SK, Ghosh SK, Baruah KK, Khan MH, Rajoriya JS and Srivastava N. (2016). Effect of low density lipoprotein on replacement of egg yolk in liquid preservation of mithun semen. *Indian Journal of Animal Science*. **86**: 427-430.
- Singh BR, Singh V and Singh RK. (2015). Bacteria associated with conjunctivitis in *Bubalus arnee fulvus* (Swamp Buffalo) in Nagaland. *Advances in Animal and Veterinary Sciences* **3**: 685-688.

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of Indian mithuns (*Bos frontalis*). National Seminar on “Sustaining Hill Agriculture in Changing Climate (SHACC)” in Pragna Bhawan Agartala, Tripura, 5-7 Dec 2015.

- Perumal P, Baruah KK, Khan MH, Chang S and Sangma CTR. (2015). Effect of seasons on parameters of computer assisted sperm analyzer in mithun semen treated with melatonin, preserved in refrigerator temperature. National conference on Physiological approaches for development of climate resilient livestock farming was held in Veterinary College, AAU, Khanapara, Guwahati, Assam, 21-22 January, 2016.
- Perumal P, Khan MH, Baruah KK, Chang S and Sangma CTR. (2015). Effect of melatonin on mobility and velocity parameters of mithun (*Bos frontalis*) semen preserved in refrigerator temperature (5°C). National Conference on Current Challenges and Opportunities in animal reproduction was held in Veterinary College, Bengaluru, Karnataka, 3 – 5th December, 2015.
- Perumal P, Srivastava SK, Baruah KK, Rajoriya JS, and Srivastava N. (2016). Low density lipoprotein on poor quality mithun (*Bos frontalis*) semen preservation. National conference on Physiological approaches for development of climate resilient livestock farming was held in Veterinary College, AAU, Khanapara, Guwahati, Assam, 21-22 January, 2016.
- Sangma, CTR, Savino N, Perumal P, Khan MH, Baruah KK and Chang S. (2015). Chronobiological study of scrotal, testicular, endocrinological and antioxidant profiles of mithun (*Bos frontalis*) bulls in winter and spring seasons. National Conference on Current Challenges and Opportunities in animal reproduction was held in Veterinary College, Bengaluru, Karnataka, 3 – 5th December, 2015.

Books, Manuals, Book chapters

Manuals

- Kumar A, Singh V, and Baruah KK. (2015). Manual on “ Hands-on training in Biotechnological Tools & Techniques” from

15th July to 15th August, 2015. National Research Centre on Mithun, Indian Council of Agricultural Research, Jharnapani, Medziphema – 797 106, Nagaland

- Khan MH, Perumal P, Haque N, Toppo Saroj, Mukherjee S, Prasad N, Chamuah J, Singh V, Kumar A, Hazarika SB and Sinha Papiya. (2016). Training manual on “Scientific Mithun Husbandry for Improving Livelihood” under the aegis of TSP programme, ICAR, New Delhi for the Mithun Farmers of Manipur at Hungbung, Senapati, Manipur from 16th to 18th February, 2016. pp: 1- 120.

Project Report

- Padmakumar V, Haque N, Sirie R, Khate K, Deka R, Rutsa V and Solomon K. (2015). Availability and nutritional value of wild forages as feed for pigs and mithun in Nagaland, India. ILRI Project report. Nairobi, Kenya: International Livestock Research Institute (ILRI). pp.1-63.

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- Kumar A. (2016). Clinical examination and first aid treatment in mithun In: Scientific Mithun Husbandry for Improving Livelihood (16-18th February, 2016). National Research Centre on Mithun, Jharnapani, Medziphema, Nagaland, p86-98.
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- Prasad N and Perumal P. (2015). Communication Behaviour of Livestock farmers, LAP LAMBERT Academic publishing.
- Perumal P, MH Khan, S Chang, S B Hazarika and Sinha Papiya. (2016). Reproduction of Mithun and Artificial Insemination by In: “Scientific Mithun Husbandry for Improving Livelihood” (16-18th February, 2016). National Research Centre on Mithun, Jharnapani, Medziphema, Nagaland. Pp 46-59.
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- Singh V, Kumar A, Chamuah JK, Dutta PR and Borkotoky D. (2016). Diseases of Mithun: An overview and perspective. In: Scientific Mithun Husbandry for Improving Livelihood (16-18th February, 2016). National Research Centre on Mithun, Jharnapani, Medziphema, Nagaland. Pp 68-76.

Documentary

- A short documentary on Helminth parasites of mithun (*Bos frontalis*) in both English and Hindi version and Ectoparasites of mithun (*Bos frontalis*) in both English and Hindi version.

TRAINING AND CAPACITY BUILDING



CONFERENCES/SEMINARS/SYMPOSIA/ WORKSHOPS/TRAINING PROGRAMMES/FIELD DAYS ORGANISED

Workshops/ Symposia

5th Review Monitoring and Mentoring Meeting of Biotech-Hub for NER

The 5th Review Meeting of Coordinators of Biotech Hubs in NER established by Department of Biotechnology, Government of India was organized on 9th -10th July, 2015. The inaugural function was presided over Chief Guest Dr. K. M. Bujarbaruah, Vice Chancellor, AAU, Assam, Guest of Honour Dr. B. Ravindran, Director, Institute of Life Sciences, Bhubaneswar, and Dr. T. Madhan Mohan Advisor, Department of Biotechnology, Govt of India, New



Inauguration of 5th Review Meeting of Coordinators of Biotech Hubs at ICAR-NRC on Mithun

Delhi along with expert committee members and DBT officials. A total of 124 participants from different biotech hubs of NER and all the staffs of ICAR-NRC on Mithun participated in the programme. The progress made by 124 biotech hubs was evaluated by the expert committee.

Workshop on “Prospect of Meat Processing in Nagaland”

On 8th October, 2015, one-day awareness workshop on “Prospects of Meat Processing in Nagaland” sponsored by ICAR-NRC on Meat, Hyderabad was organized at Jharnapani campus of the Institute. The programme was graced by Dr. Abhijit Mitra, Director, ICAR-NRC on Mithun, Dr. V. V. Kulkarni, Director, ICAR-NRC on Meat, Hyderabad and Dr. B. C. Deka, Joint Director, ICAR-RC-NEH, Nagaland Centre. The programme was attended by farmers from different districts of Nagaland, KVK representatives and other





Workshop on Meat Processing

stakeholders associated with meat processing industries. A detailed deliberation was made on the status of meat production and consumption scenario in Nagaland, importance of clean meat production and various value-added meat products.

Interactive session on “*Extension approaches to disseminate potential technologies for Nagaland*”

On 3rd December, 2015 an interactive session on “Extension approaches to disseminate potential technologies for Nagaland” was held at ICAR-NRCM on 3rd December 2015. Dr. Jitendra Chauhan, Technical Advisor to the Union, MOA was the Chief Guest. The programme was also graced by the presence of Prof. K.K.Saharia, Veterinary Extension,

CoVS, Khanapara, members of general body of ICAR, Dr.B.C.Deka, Joint Director, Nagaland Center, Dr. Lallan Ram, Director, CIH, Medziphema. In the afternoon, the dignitaries attended field visit of Molvom village, Dimapur district organized by KVK, Dimapur. The dignitaries also attended a Technology Injection programme at Khonoma Village, Kohima district on 1st December 2015.



Workshop on Meat Processing

Trainings imparted to the students and academia

Place	Date	Topic
NRC on Mithun	15.07.2015 to 14.08.2015	Hands on Training on Molecular Techniques for B. Tech Students of SETAM, Nagaland University.
Dimapur Dist., Nagaland	09.09.2015	Lecture on “Advance Approaches to Animal Disease Diagnosis” in training programme to the state veterinary officials of Dimapur district
SETAM, Dimapur	06.11.2015	Outreach programme for B Tech Biotechnology students in the SETAM and delivered a lecture on Molecular Biology and Bio-informatics
Patkai Christian College, Chumukedima, Dimapur, Nagaland	22.03.2016	Lecture on Basic Aspects of PCR and other Molecular Techniques



Hands on training organized for students on Biotechnology

Participation in Conferences, Workshops, Symposia and Trainings

Name of Conferences, Seminars, workshops and trainings	Name of the Staffs
National Conference on Current Challenges and Opportunities in Animal Reproduction was held in Veterinary College, Bengaluru from 3 – 5 th December, 2015.	Dr. Perumal P
National conference on Physiological approaches for development of climate resilient livestock farming was held in Veterinary College, AAU, Khanapara, Guwahati, Assam from 21-22 January, 2016.	Dr. Perumal P
Seminar on Need for Livestock Policy in context of West Bengal and to make a deliberation to strengthen the demand for a region specific livestock policy at West Bengal Veterinary Council, Kolkata on June 29, 2015	Dr. Abhijit Mitra
National Seminar on KVK inaugurated by Hon'ble Prime Minister Shri Narendra Modi Ji at Patna from 25 -26 July, 2015 .	Dr. Abhijit Mitra
National Seminar on Sustaining Hill Agriculture in Changing Climate (SHACC) in Pragna Bhawan Agartala, Tripura from 5-7 December, 2015.	Dr. Sabyasachi Mukherjee
National Seminar on Integrating Agri-Horticultural and Allied Research for Food and Nutritional Security in the Era of Global Climate Disruption ICAR Research Complex for NEH Region, Manipur Centre from 4-6 March, 2016.	Dr. Nazrul Haque
National Mission for Sustaining Himalayan Ecosystem-Task Force on Himalayan Agriculture (TF-6) launch Workshop at New Delhi on 13 May 2015	Dr. Sabyasachi Mukherjee Dr. Abhijit Mitra
Workshop on Development Roadmap for North Eastern Agro-Climatic Zone at ICAR Research Complex for NEH Region Umiam, Barapani, Meghalaya on 29 th September 2015	Dr. Abhijit Mitra
Workshop on “Development Roadmap for North Eastern Agro-Climatic Zone” at ICAR Research Complex for NEH Region Umiam, Barapani, Meghalaya on 29 September 2015	Dr. Abhijit Mitra
Workshop on Implementation of Official Language in Scientific institutions: Use and Promotion of Hindi organized by Rajbhasha, ICAR at New Delhi on 7 November, 2015.	Dr. Akhilesh Kumar
Workshop and Review Meeting of the Vigilance Officers on at Tirpura Centre, ICAR Resaerch Complex for NEH Region, Lembuchera, Tirpura on 27 November, 2015.	Dr. Meraj Haider Khan
National Workshop on Microbial Genomics and Informatics organized by Department of Biotechnology, at Mizoram University sponsored by State Level Biotech Hub Facility, Department of Biotechnology (DBT), New Delhi from 2-9 December, 2015	Dr. Akhilesh Kumar
Workshop on Pig Breeding Policy for Nagaland organized jointly by ILRI and Govt. of Nagaland, Bamboo Resource Centre, Dimapur, Nagaland on 14 December 2015.	Dr. Sabyasachi Mukherjee and Dr. Meraj Haider Khan
Workshop on Unified Communication Solution in ICAR at CIFRI, Barrackpore on 18 December, 2015.	Mr. Surjit Kumar
Training Programme on Priority Setting, Monitoring and Evaluation (PME) at ICAR-NAARM, Hyderabad from 2-6 June, 2015.	Dr. Sabyasachi Mukherjee and Dr. Akhilesh Kumar
Training on FMS/MIS Payroll Module at IASRI, New Delhi during 24 th -26 th June, 2015.	Mr. Safal Chetri and Mr. K.M. Chusi
Training on Public Procurement' at NIFM, Faridabad from 30 th November to 5 th December 2015.	Mr. Safal Chetri
Training on Team Building and Leadership at ISTM, New Delhi from 1– 3 February, 2016	Mr. Dipal Meiti
Training on Competency Development Programme for HRD Nodal Officers of ICAR at ICAR-NAARM, Hyderabad from 10-12 February, 2016.	Dr. Sabyasachi Mukherjee
Training on “Leadership Development Programme” at NAARM, Hyderabad from 18 -22 August 2015	Dr. Abhijit Mitra

DISTINGUISHED VISITORS

- Sri Padmanabha Balakrishna Acharya, Hon'ble Governor, Government of Nagaland visited on 08.4.2015



- Dr. K. M. Bujarbaruah, Vice Chancellor, Assam Agricultural University, Jorhat visited on 09.07.2015.



- Dr. R.S. Gandhi, ADG (AP&B), ICAR, New Delhi and Dr. Dilip Sharma, Director, ICAR-NRC on Pig, Rani, Guwahati visited on 09.04.2015



- Dr. B. Ravindran, Director, Institute of Life Sciences, Bhubaneswar visited on 09.07.2015.



- Brig. G.S. Bisht, HQ NSG visited on 02.05.2015



- Dr. T. Madhan Mohan, Advisor DBT, New Delhi and Dr. Pawan Sharma, Senior Consultant, NER-BPMC, New Delhi visited on 10.07.2015.



- Dr. N.C. Talukdar, Director, IASST, Guwahati visited the Institute on 10.07.2015
- Sh. Rupin Sharma, AGP (Law), Government of Nagaland visited on 21.09.2015



- Dr. V.V. Kulkarni, Director, ICAR-NRC on Meat, Hyderabad visited on 08.10.2015



- Col. Ananya Boral, Commandant, 37 Assam Rifle visited on 31.10.2015



- Dr. B.B. Mallick, Former Vice-Chancellor, WBUA&FS, Salt Lake, Kolkata visited on 26.11.2015



- Dr. B.S. Prakash, ADG (AN&P), ICAR, New Delhi visited on 14.03.2016



PERSONNEL

INSTITUTE STAFF

(AS ON 31 MARCH 2016)

Cadre Name	Name	Designation
RMP	Dr. Abhijit Mitra	Director
Scientific	Dr. Nazrul Haque	Principal Scientist
	Dr. (Mrs.) Saroj Toppo	Principal Scientist
	Dr. Sabyasachi Mukherjee	Principal Scientist
	Dr. Meraj Haider Khan	Sr. Scientist
	Dr. Naresh Prasad	Scientist
	Dr. Jayanta Kumar Chamuah	Scientist
	Dr. Vidya Singh	Scientist
	Dr. Perumal P	Scientist
	Dr. Akhilesh Kumar	Scientist
Technical	Dr. Kezhavituo Vüprü	ACTO
	Dr. Kobu Khate	ACTO
	Dr. Prakash Ranjan Dutta	ACTO
	Mr. Rokongulie Krose	Senior Technician
	Mr. Vizekrol Kikhi	Driver (T-1)
Administration	Mr. Ajen Lama	AO
	Mr. S.P.S. Negi	AAO
	Mr. Safal Chetri	AFAO
	Mr. Th. Dupal Meitei	Assistant
	Miss. Aloli Rengma	Assistant
	Mr. Surjit Kumar	Assistant
	Mr. K.M. Chüsi	LDC
	Mrs. Achüno Solo	LDC
	Mr. Mahendra Kumar	LDC
	Miss. Vikhobeinuo Kiso	Stenographer Gr.III
	Mr. Shatrughan Verma	SSS
Supporting	Mr. Zakahi	SSS
	Mr. Vezato	SSS
	Mr. Zhophuhu	SSS
	Mr. Povetso	SSS
	Mr. Vecüzo	SSS
	Mr. Thupuvoyi	SSS
	Mr. Vezhocho	SSS
Staff of KVK	Dr. R.K. Singh	Programme Coordinator
	Dr. D. Borkotoky	SMS (Animal Science)
	Mrs.Hannah K. Assangla	SMS (Agronomy)
	Mrs. T. Esther Longkumer	SMS (Soil Science) ACTO
	Mr. Rinku Bharali	SMS (Horticulture) ACTO
	Mrs. Liza Barua Bharali	SMS (Plant Protection)
	Mr. Nukusa T. Vadeo	STO
	Mr. Kenisetuo Chücha	Farm Manager
	Mrs.R. Imsennaro Longchar	Jr. Steno cum Computer Operator
	Mr. Bodan Ch. Kachari	Senior Technician
	Mr. Vevo	SSS
	Mr. Shetsonyi Puro	SSS

PERSONALIA

JOINING



Dr. (Mrs.) Saroj Toppo, Pr. Scientist joined on 18.05.2015



Sh. Ajen Lama joined as Administrative Officer on 02.11.2015

TRANSFER



Dr. K. K. Baruah transferred to ICAR-NRC on
Pig Guwahati on 30.5.2015

PROMOTION



Dr. Prakash Ranjan Dutta promoted from the
post of STO to ACTO
(Asst. Chief Technical Officer) w.e.f. 25.06.2015

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 58XX and 58 XY for male and female. In order to find out 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.



Animal Nutrition Section

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 contents, can serve as good sources of protein and energy for mithun and contained phenolic compounds within the limit. Assessing the macro- as well as micro-mineral contents of soil, feeds and fodders as well as in the serum of mithun, an area specific mineral mixture, entitled with the trademark 'mithimin', was developed. Determining the protein requirement of growing mithun calves, it is suggested that male growing mithun calves can be reared on 80% crude protein requirement of NRC (1989) recommendations meant for growing dairy cattle. The studies on growth rate and feed efficiency are under progress. Recently much emphasis are being given to preserve the feeds and fodders as well as to exploit the locally available agro-industrial byproducts like spent grain from breweries industries and wet cake and dried distillery grains and solubles



(DDGS), in the form of feed blocks. This will help in feeding mithun during scarcity period and economization of mithun rearing systems especially the intensive and semi-intensive rearing.

Animal Physiology and Reproduction

Conservation and propagation of mithun germplasm and augmentation of fertility is 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 two Post Graduate Scholars in last 5 five years. Currently, research on standardization of cryopreservation protocol using controlled freezing technique, improvement in 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 administration of neuropeptide 'kisspeptin' has been standardized.

Animal Health Section

Animal health section has generated valuable information on epidemiology of various diseases including bacterial, viral and parasitic diseases of mithun in north eastern hilly region of India. The efforts have also been given to develop 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 institute mithuns farms at Jahnapani and Porba, mithun farmers of different villages by organizing the Animal Health and Vaccination Camps as well advanced diagnostic services to Department of Veterinary & AH, Govt. of Nagaland.



Veterinary Extension

The Veterinary Extension section is actively engaged in organizing Mithun Mela, Health Camps, exposure visits and training to the farmers. The section is being proved instrumental in transfer and showcasing the institute generated farmers friendly technologies.

Institutional Level Biotech Hubs

The Institutional Level Biotech Hub was established in year 2011 under the special scheme for North East India by Department of Biotechnology, Government of India. Since inception, the Hub has conducted thirteen hands on training, five outreach programmes and delivered the five invited lectures in Undergraduate (UG) and Post graduate (PG) institutions in the area of molecular biology. Till date a total of 1401 UG and PG scholars 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 centre 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. Till date, six hands on trainings were organized benefitting 150 research scholars.



Central Biotech Infrastructure Facility

The facility was created with the special grant from Department of Biotechnology, Government of India in 2012. This state of art facility is equipped with the modern instruments for carrying out research in the area of molecular biology, reproductive physiology, and ethanomedicine. The facility is having RT-PCR, Gradient PCR, Nanodrop, Biological safety cabinet (Class II), Ultracentrifuge, Nucleic acid Extractor, Gel Doc, Western Blot and SDS-PAGE apparatus, Bioanalyzer, UltraSonicator, CO₂ incubator, Clean Work Station, High Performance Thin Layer Chromatography (HPTLC), Computer Assisted Semen Analyzer (CASA), refrigerated centrifuge and deep freezers (-40°C and -80°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

The mithun farm of the campus is having the herd strength of 132. This is not only the major attraction to visitors, but also serves as a model for semi-intensive system of mithun rearing. The farm is supporting to the research projects of institute.

राजभाषा अनुभाग

राष्ट्रीय मिथुन अनुसंधान केन्द्र द्वारा हिन्दी सप्ताह दिनांक 14 से 21 सितंबर 2015 का आयोजन किया गया। इस कार्यक्रम का उद्घाटन दिनांक 14 सितंबर 2015 को माननीय निदेशक डॉ. अभिजित मित्र एवं संस्थान के समस्त अधिकारियों एवं कर्मचारियों की उपस्थिति में दीप प्रज्वलित करके किया गया। इस सप्ताह के दौरान संस्थान में हिन्दी भाषा के प्रचार एवं प्रसार के लिए विभिन्न प्रतियोगिताओं का आयोजन किया गया, जिसमें परिसर के बालक एवं बालिकाओं के लिए भी प्रतियोगिता का आयोजन किया गया। इन सभी प्रतियोगिताओं में न सिर्फ कर्मचारी अपितु अधिकारियों ने भी उत्साह पूर्वक हिस्सा लिया।

संस्थान में हिन्दी सप्ताह के दौरान आयोजित प्रतियोगितायें

क्रम सं	प्रतियोगिता का नाम
1.	तात्कालिक भाषण
2.	परिसर के बालक एवं बालिकाओं के लिए निबंध लेखन, चित्रकला
3.	निबंध लेखन, टिप्पणी एवं प्रारूप लेखन
4.	अंताक्षरी
5.	पुरस्कार वितरण एवं समापन समारोह

हिन्दी सप्ताह के समापन समारोह दिनांक 21 सितम्बर 2015 को साम्मिलित रूप से राष्ट्रीय मि.अनु. केन्द्र एवं उत्तरपूर्वी पर्वतीय क्षेत्र अनुसंधान परिसर, नागालैंड केन्द्र द्वारा किया गया। इस अवसर पर मुख्य अतिथि

श्री रूपिन शर्मा, अतिरिक्त पुलिस महानिदेशक (कानून व्यवस्था) को आमंत्रित किया गया। समापन समारोह का आयोजन संस्थान के निदेशक डॉ. अभिजित मित्र एवं डॉ. अखिलेश कुमार हिन्दी प्रकोष्ठ प्रभारी रा.मि.अनु. केन्द्र एवं डॉ. अनामिका शर्मा, हिन्दी प्रकोष्ठ प्रभारी उत्तरपूर्वी पर्वतीय क्षेत्र अनुसंधान परिसर, नागालैंड केन्द्र के समस्त अधिकारियों एवं कर्मचारियों की उपस्थिति में किया गया। इस अवसर पर डॉ. अभिजित मित्र ने दोनों संस्थानों के सभी प्रतिभागियों को हार्दिक बधाई देते हुए हिन्दी को और अधिक प्रयोग में लाने की प्रतिबद्धता पर बल दिया। श्री माननीय मुख्य अतिथि श्री रूपिन शर्मा जी ने हिन्दी की महत्ता पर प्रकाश डालते हुए, दोनों संस्थानों द्वारा हिन्दी के प्रोत्साहन के लिए किये जा रहे प्रयासों की सराहना की। मुख्य अतिथि ने हिन्दी सप्ताह के दौरान आयोजित विभिन्न प्रतियोगिताओं में विजेताओं को पुरस्कृत किया। अंत में हिन्दी सप्ताह के सफल आयोजन पर सभी को हार्दिक बधाई दी गई।



Valedictory function and prize distribution on Hindi Week

LIBRARY

Libraries store the energy that fuels the imagination. They open up windows to the world and inspire us to explore and achieve, and contribute to improving our quality of life. –Sidney Sheldon

Library not only caters the need of researchers but also help in inculcating the culture of reading, knowledge dissemination and holistic development of all the employees of the Institute. Most importantly, libraries are the places where smart and clear answers to even the most difficult questions may be expected from sheer volumes of information

available. During this financial year 290 printed books were procured in various field of science including the manual of administration and finance. The institute has subscribed 8 foreign and 6 national scientific journals during the period. The institute library also has online access to the full text of CeRA (Consortium of e-resources in Agriculture).

Particulars	Period (2015-16)	Total
Books	290	1971
Journals		
Indian	06	06
International	8	8
Abstract CD		
Agris CD	-	13
Vet CD	-	29
Beast CD	-	08
Resource CD	-	01
Medline	-	20
Miscellaneous	05	24
Annual Report	85	1256
Others publications/Proceedings		
	01	36
	105	1376
Thesis	01	06



Institute Library

REGIONAL STATION (PORBA, PHEK DISTRICT)

The regional research station of NRC on mithun is located at Porba village of Phek district, Nagaland. It is 125Km away from ICAR-NRC on Mithun, Jharnapani, Medzihema. The station has one Assistant Chief Technical Officer cum Station In-charge, one Veterinary Field Assistant and other supporting staff. The scientists from the head quarter 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 camps are being organized and disease diagnostic service are routinely provided. This campus is also having Krishi Vigyan Kendra (KVK-Phek) of institute is also housed in this campus.



Visit of Scientists of institute to Porba campus

MISCELLANY



INSTITUTE MANAGEMENT COMMITTEE (IMC) MEETING



(Civil), Chizami, as a Chief Guest. Speaking on this occasion, Chief Guest stressed on climate change and its impact on the environment and urged all to make judicious use of natural resources.

World Environment Day Celebration

On 5th June 2015, Krishi Vigyan Kendra, Phek , ICAR-NRC on Mithun observed the World Environment Day on the theme “One World, One Environment” at Porba village, Phek district , Nagaland , which was marked by the planting of tree saplings by the dignitaries as well as drawing and elocution competitions among the school students. The programme was attended by villagers, village council members and the students of Porba and Sakraba village, mithun farmers and staff members from ICAR-NRC on Mithun, Jharnapani. The occasion was graced by Sh. TL Kiusumong, SDO



Drawing Competition on World Environment Day , Porba, Phek



Independence day Celebration and inauguration children park



Sub-Divisional Coordination Meeting

On 10th September, 2015, ICAR-NRC on Mithun hosted a sub-divisional coordination meeting. The meeting was presided by Dr. Abhijit Mitra, the Director of the Institute and chaired by Ms. Sarah Jamir, Addl. Deputy Commissioner. The representatives of different government organizations, central government, institutes and universities have attended the meeting.



Swachh Bharat Mission

Swachh Bharat Mission campaign was carried out in the Institute and participated by all the staff members enthusiastically to clean the surroundings



of the residential quarters, farm and the Institute premises on October 2, 2015 in commemoration of Gandhiji's birthday.



Cleanliness Drive at ICAR-NRC on Mithun during Swachh Bharat Mission campaign

Vigilance Awareness Week

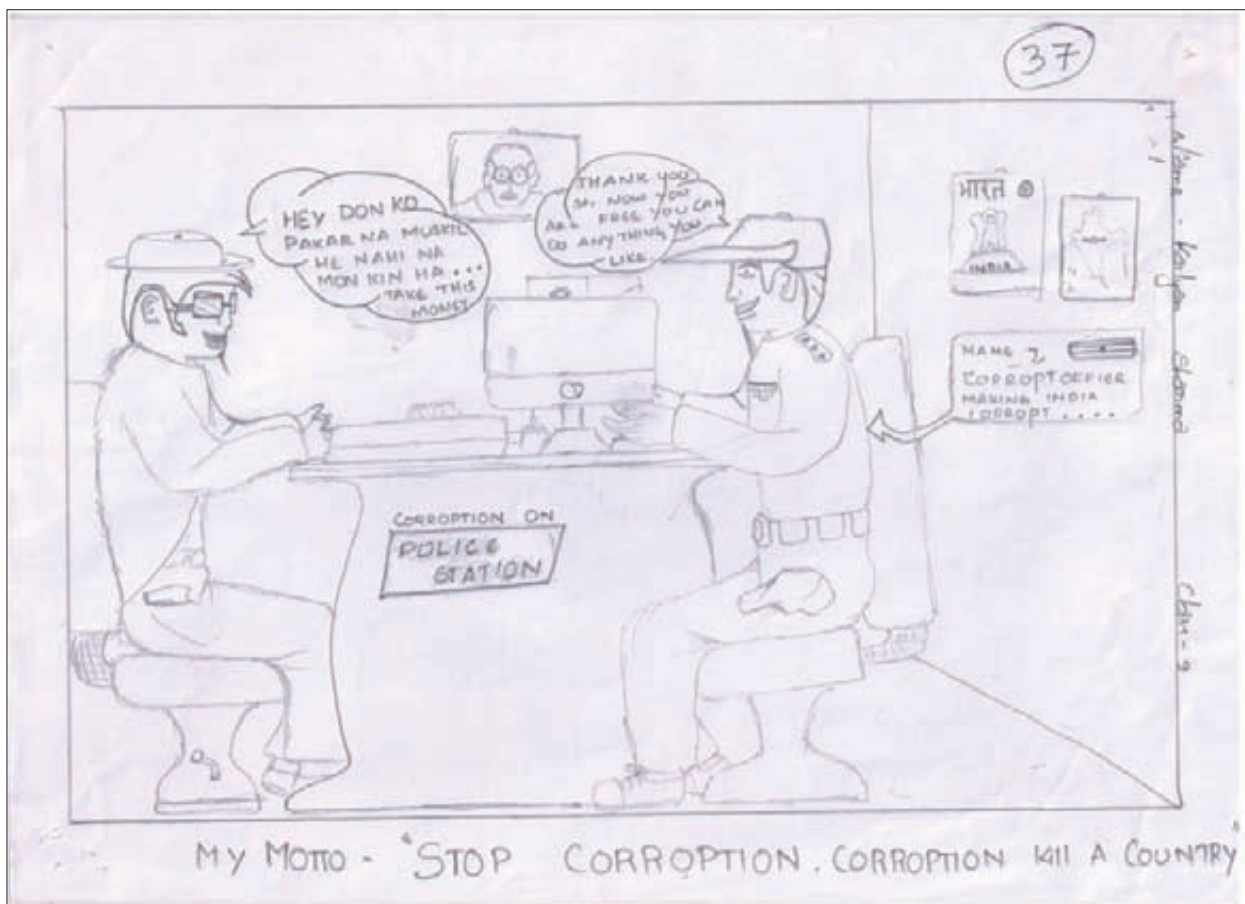
Vigilance Awareness Week was observed from 26th - 31st October, 2015. The theme of the Vigilance Awareness Week was 'Preventive Vigilance as a Tool for Good Governance'. The pledge was administered by Dr. M. H. Khan, Vigilance Officer of the Institute. Various activities such as essay writing, extempore, slogan writing and drawing completions were conducted. On the

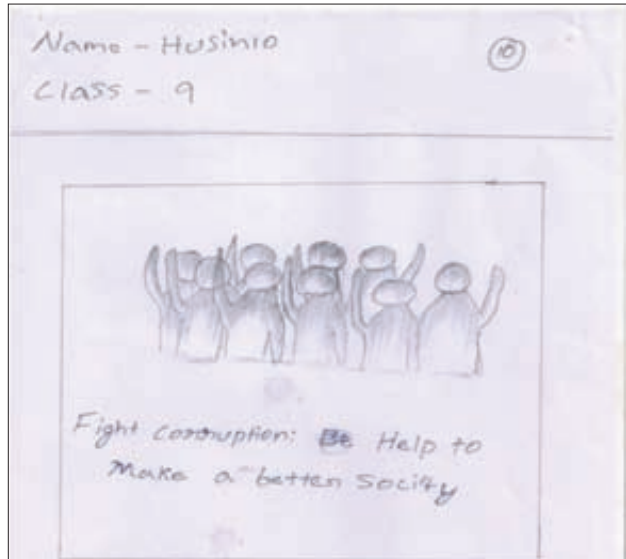
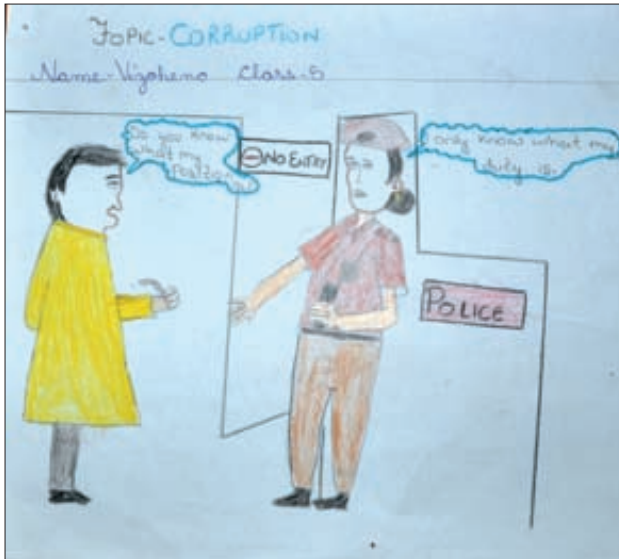


concluding day, Col. Ananya Boral, Commandant, 37 Assam Rifle graced the occasion as a Chief Guest and gave away the prizes and certificates.



Vigilance Awareness Week observance at ICAR-NRC on Mithun





1st, 2nd and 3rd Prizes during Drawing Competition on Vigilance Awareness Week

ICAR ZONAL Sports Meet at IVRI, Bareilly

A team of 13 players lead by Dr. Akhilesh Kumar, Chief-de-Mission participated in Zonal Sports Meet organized by ICAR-Indian Veterinary Research Institute, Izatnagar Bareilly from October

28-31, 2015. The institute team has participated in event of Badminton (Singles/Doubles), Football, Volleyball, Carrom and Basket ball. The institute team played the semifinals in volleyball and bagged the second prize in Basket ball.



Participation in Eastern Zonal Sports Meet at IVRI, Izatnagar

Republic Day Celebration

The 69th Republic Day was celebrated in the institute on 26th January, 2016 in a befitting manner with a pledge to work for the benefit of the motherland. Dr. Abhijit Mitra, Director, ICAR-NRC on Mithun unfurled the tricolour in the morning with the singing of National Anthem. Dr. Abhijit Mitra encouraged all the staffs to work with a purpose and remain ever vigilant for safeguarding the reputation of the institute in particular and the nation in general. The children and family members also took an active part in the celebration.



Celebration of 69th Republic Day at ICAR-NRC on Mithun

Institute Joint Staff Committee (IJSC) Meeting

The first meeting of IJSC was held on 30.04.2015 in which proposals submitted by the Institute staffs were discussed. The important issues such as availability of potable drinking water, school bus facility to childrens, bus facility to Dimapur on second Saturday and children park were accepted and fulfilled. The second meeting of IJSC held at Porba, Phek on 13.05.2016. In this meeting the most important issue of electricity failure was solved by providing 25 KVA generator to the Porba campus.

Composition of IJSC

Chairman	Dr. Abhijit Mitra, Chairman Members
Members (Official Side)	Dr. Nazrul Haque, Principal Scientist Dr. J.K. Chamuah, Scientist Dr. Kezhavituo Vüprü, ACTO Dr. Kobu Khate, ACTO Mr. Safal Chetri, AF&AO Dr. Akhilesh Kumar, Scientist & Secretary
Members (Staff Side)	Mr. S.P.S. Negi, AAO (Member CJSC) Mr. Rokongulie Krose, VFA Mr. Vizekrol Kikhi, T-1 Mr. Vezato, SSS Mr. S. Verma, SSS Mrs. A. Solo, LDC & Secretary

Traditional and indigenous ways of meat preservation – Smoking Traditional and indigenous ways of meat preservation - Salting

A number of indigenous technical knowledge developed by the Naga tribes in the area of their food practices identified are preservation of meat

through smoking, salting and preparation of meat pickles (pickling).



ijiju advocates on saving livestock

NOR reports on World Environ

NAGALAND POST, DIMAPUR
THURSDAY, MARCH 26, 2015

Mithun vaccination camp held in Longleng

Longleng, Department of Animal Husbandry, Longleng, under the auspices of the Nagaland Veterinary University, Longleng, conducted a vaccination camp for mithun in Longleng on March 25. The camp was held in the presence of the District Veterinary Officer, Longleng, and the District Animal Husbandry Officer, Longleng. The camp was held in the presence of the District Veterinary Officer, Longleng, and the District Animal Husbandry Officer, Longleng. The camp was held in the presence of the District Veterinary Officer, Longleng, and the District Animal Husbandry Officer, Longleng.




Dr. P. D. Datta, District Veterinary Officer, Longleng, said that the camp was held to vaccinate the mithun against the disease, which is a major cause of mortality in the mithun. He said that the camp was held in the presence of the District Animal Husbandry Officer, Longleng, and the District Veterinary Officer, Longleng.

KVK programme held at Phe

ICAR: NATIONAL RESEARCH CENTRE ON MITHUN JHARNAPANI, MEDZIPHEMA, NAGALAND-79710
NO. NRC/JRN/2015/3

ICAR National Research Centre on Mithun, Jharnapani, Medziphema, Nagaland-79710, held a programme on March 25. The programme was held in the presence of the District Veterinary Officer, Longleng, and the District Animal Husbandry Officer, Longleng. The programme was held in the presence of the District Veterinary Officer, Longleng, and the District Animal Husbandry Officer, Longleng.



new leash of life for Nagalan

most famous unknown animal

EXPOSURE VISIT CUM TRAINING PROGRAMME HELD AT ICAR-NRC ON MITHUN, JHARNAPANI, MEDZIPHEMA, NAGALAND-79710

ICAR National Research Centre on Mithun, Jharnapani, Medziphema, Nagaland-79710, held an exposure visit cum training programme on March 25. The programme was held in the presence of the District Veterinary Officer, Longleng, and the District Animal Husbandry Officer, Longleng. The programme was held in the presence of the District Veterinary Officer, Longleng, and the District Animal Husbandry Officer, Longleng.



Biotech hubs coordinators hold review meet

5th Review Monitoring cum Mentoring Meeting of Biotech Hubs of NEP

NAGALAND POST, DIMAPUR
THURSDAY, APRIL 2, 2015

Students get insight on bio-tech tools

Cabinet approves Rs.3,900 crore for Krishi Vigyan Kendras

NEW DELHI, APRIL 17

The Union Cabinet chaired by Prime Minister Narendra Modi on Wednesday approved the creation and strengthening of Krishi Vigyan Kendras (KVKs) and setting up new ones with an outlay of Rs.3,900 crore.

The cabinet also approved the creation of 24 new agricultural technology demonstration centres (ATDCs) and support the public, private and voluntary sectors for developing agricultural extension services.

The KVKs are being set up in all districts and some sub-districts.

Students get insight on bio-tech tools

Students at the ICAR-NRC on Mithun, Jharnapani, Medziphema, Nagaland-79710, got an insight on bio-tech tools during an exposure visit cum training programme on March 25. The programme was held in the presence of the District Veterinary Officer, Longleng, and the District Animal Husbandry Officer, Longleng. The programme was held in the presence of the District Veterinary Officer, Longleng, and the District Animal Husbandry Officer, Longleng.

