RESEARCH NEWS

Functional Profiling of Fertility Related miRNA in Yak:

Yak (Bos grunniens) is a unique bovine species of high altitude and snow bound areas. Yak husbandry is the lifeline of highlanders where the male subfertility is major issue to be addressed which causes huge economic loses. The genetic component of male fertility is complex and also involved microRNA (miRNA) which are very short (20-22nt) non-coding RNA that are found to be involved in male fertility. With these novel idea we have been trying to determine the expression levels of sperm-derived miRNAs which are indicative of yak bulls’ fertility and also to determine the expression levels of sperm-derived miRNA expression between fertile and subfertile sperm of yak. For this experiment fresh ejaculate from three adult yak bulls were collected using an artificial vagina. Using conventional laboratory tests, fresh ejaculates were evaluated for sperm concentration, sperm motion characteristics, and sperm morphological features. A search for miRNAs were conducted from theses sperm sample that might target the male fertility related genes using TargetScan in other species. The small RNAs extracted from the sperm was polyadenylated and reverse transcribed into small RNA cDNAs (srcDNAs) using adapter attached oligo-dT primers (RTQ) to generate small RNA cDNAs (srcDNAs). The srcDNAs were amplified using the miRNA-specific forward primer and adapter-specific universal reverse primer. Based upon the expression levels of the analyzed miRNAs mir19a, 19b, 23a, 23b, 1248, and 1468 was found highly expressed in yak sperm. Thus, our current goal is to identify miRNAs in normal yak sperm to establish a foundation to investigate their likely association with yak bull fertility.

Shifting of breeding season due to Climate Change: A Retrospective Analysis

Yak survives only under limited environmental niches and is supposed to be more vulnerable to climate change. In the present study, analysis of total number of calf born (n=380) from 2001 through 2014 (14 years) in the organized farm showed that there is a shift of breeding season by an average of nearly two months. Maximum birth (95%) occurred between May to November in the farm. A comparison of percentage of birth between the two halves (March to July and August to November) of a year revealed that in earlier years (2001-07) the number of births was skewed toward the first half and in later years (2008-14) the shift was towards the second half of the year. Interestingly, the difference in number of birth between the two halves was much more prominent in terminal years. It was found that peak breeding season of yak in the farm has remarkably shifted from June-July to August - September within a span of 14 years.
Studies on rumen microbes

A total of 112 samples (faeces, saliva and rumen liquor) were collected from yaks in Arunachal Pradesh and rumen microbes were isolated using chopped meat carbohydrate broth (CMC) media and morphology of the organism was studied. Most of the organisms were gram positive. Amongst isolated organisms fourteen isolates were having similarity with *Fibrobacter*. Further investigation revealed that most of the isolates were positive for *avicellase* and *carboxy methyl cellulase* activities.

Conservation of forages through ensiling for improvement of yak production in India

Fig. 1: Conservation of forage through ensiling

To improve yak production in India through feeding of silage an experimental study was conducted involving sixteen yaks of uniform parity and body weights. One group (T1) was fed with complete feed blocks (CFBs); maize stover based), two groups were fed with maize silage (Fig. 1) with or without concentrate (T2 & T3) and fourth group (T4) was solely allowed to graze on the pasture. Body weight loss was seen in group T4 (0.12 ± 0.03 kg per day) only. Further, this was observed that daily milk yield was significantly higher in group T2 (0.94 ± 0.07 litre per day) compared to remaining three groups.

In another separate study a total of fifteen yaks were divided into three different groups and reared for 112 days in different nutritional status. One group (T1) was fed with maize based silage with concentrate mixture *ad libitum*. Second group (T2) was reared on mixed silage (comprised of equal quantity of maize fodder and mixed tree leaves namely maar, salix and blemker) *ad libitum*. Third group (T3) was dependent on paddy straw and concentrate mixtures. The result & indicated that average daily gain and feed conversion efficiency was higher in group T1 compared to other two groups during the 112 days of trial period. From both these trials it was concluded that maize silage, along with supplementation of concentrate, is the best feeding regime to combat winter feeding crisis.

Assessment of work efficiency in different categories of yak

Yak is used as pack animals by the highlanders. But work efficiency of yak has not been evaluated in different seasons scientifically. The work efficiency of yaks were assessed in two different seasons to evaluate effect of temperature variation. During the trial, yaks were made to carry a load, starting with 10% up to 35% of their live body weight and allowed to travel 7 km up and down the valley. During the experimental study the quantifiable parameters namely rectal temperature, pulse rate and respiration rate was recorded. During summer season the quantifiable parameters were the highest when animals carried load up to 20% of their live body weight. On the contrary during winter season there was shift of quantifiable parameters when animals carried 34% of their live body weight. From this study this could be concluded that, during winter season threshold level of yaks to carry load increases which may be attributed towards fall of ambient temperature.
Monitoring of drug residues and environmental pollutants

Survey was conducted in the West Kameng district of Arunachal Pradesh on pesticide use in the agricultural land and veterinary drug use in their livestock. Survey result indicated that 34% farmers used various pesticides for protection of crops and vegetables from different pest and insects. Most of the livestock farmers used anthelmintic for routine deworming of animals.

Gas chromatography (GC) analysis of vegetable samples revealed that out of 119 samples only two were found to be positive for endosulfan. HPLC method was standardized for detection of albendazole residue in meat and meat products of yak. A total of 55 meat samples were analysed. Out of which 9 (16.36%) samples showed presence of albendazole residues (Fig.2 & 3).

**Efficacy of plant extracts as leech repellent**

Leech is a menace to the livestock and human living hilly mountains of North East India. Leech infestation is a major health concern in yak, yak-cattle hybrid and hill cattle in the warmer months of the year. The local people living in these areas traditionally use some specific plants for several generations against leeches. Some plant species used by tribal people of NER were identified and selected for evaluation as leech repellent. A rabbit model was developed for studying the leech repellent activity of these plant species. The rabbits were prepared for the experiment by shaving fur on the abdominal region (Fig. 4). Four numbers of small uniform sized leeches (*Haemadipsa montana*) were applied on the abdomen of all the rabbits and allowed to engorge and drop naturally. The time of engorgement was recorded and bite wounds on the rabbits were treated with iodine ointment and rested until all the wounds had healed completely. Plant extract based ointment of different concentrations were prepared and N, N-diethyl-m-toluamide (DEET) based ointment was taken as standard. The site was prepared and a numbers of terrestrial leeches were allowed to attach and feed on ointment smeared animals. The observation was recorded upto 6 hours and the site was cleaned with 70% ethanol followed by distilled water. Methanolic extracts of *Zanthoxylum* spp., *Artemesia* spp. and aqueous extracts of tobacco showed total repellence to all the leeches applied showing comparable result with that of standard drug (DEET). Methanolic extract of *Solanum* also showed very good protection but at lower concentration it did not show effect.
Sustainability of livelihood security in alpine and sub-temperate alpine districts of Arunachal Pradesh

A livelihood is sustainable when its options are ecologically secure, economically efficient, socially equitable, and sufficiency in infrastructural availability. An assessment of sustainability of livelihood existing in the alpine and sub-temperate alpine districts of Arunachal Pradesh made with the objective to assess the current status of livelihood in these districts. An exclusively Sustainable Livelihood Security Index (SLSI) has been developed considering underline the principle of Human Development Index (HDI) of UNDP by using 24 indicators divided into four sub-indices i.e. Ecologically Security Index (ESI), Economic Efficiency Index (EEI), Socially Equity Index (SEI) and Infrastructural Sufficiency Index (ISI). The mean value of Sustainable Livelihood Security Index (SLSI) was found to be 0.45, indicated the sustainability status of the livelihood is low. In case of sub-indices, it was found that Socially Equitable Index (SEI) was the strongest index across the districts except Kurung Kumey and Anjaw. Mean values of the remaining 3 indices (0.49, 0.33 and 0.47 of Ecologically Security Index (ESI), Economic Efficiency Index (EEI) and Infrastructural Sufficiency Index (ISI), respectively) signified the lower level of sustainability. At the district level, Sustainable Livelihood Security Index (SLSI) value ranged from a very low level of score (0.22) of Kurung Kumey district to a medium sustainability level of 0.60 in Lower Subansiri district. Categorizing the districts based on the ranges of Sustainable Livelihood Security Index (SLSI) as very low (<0.3), low (0.3 to 0.54), medium (0.55 to 0.70) and high (>0.70). Districts namely East Kameng, Papum Pare, Upper Subansiri, West Siang, East Siang, Upper Siang, Lower Dibang Valley and Anjaw were having lower level of sustainability. It was also found that, livelihood is moderately sustainable in the Lower Subansiri, Twang and West Kameng district, but, sustainability was very low in Kurung Kumey district. Therefore, Sustainable Livelihood Security Index (SLSI) is not only highlighting the state of sustainability of livelihood, but, also emphasized the area where necessary policy matters to be intervened for improvement of the livelihood security. Thus, Sustainable Livelihood Security Index (SLSI) may be used as a tool for development planning and to monitor the development process.

EXTENSION AND FIELD DAY

Farming System Research and Extension Programme

Lohit district of Arunachal has been identified by the NABARD as one of the high potential district of North-East region for pig farming. Therefore, a Farming system research and extension programme on 'Fish-cum-pig farming in Lohit district of Arunachal Pradesh' was initiated with the objective of genetic improvement of the locally available breed by introducing improved cross breed and empowerment of the marginalized tribal people. A total ten farmers from the different villages of Lohit district were identified by stakeholder analysis. These ten farmers were trained on 'Integrated fish-cum-pig farming' through a seven days training programme and exposure visit of successful fish-cum pig farm. Total ten Frontline demonstrations on 'Fish-cum-pig culture' were initiated by these ten beneficiaries on the basis of developing a specially designed pig house for five pigs made of locally available resources.
Total 50000 fish fingerlings, 50 cross bred piglets (Hampshire), 36 quintal of pig feed were distributed among these ten beneficiaries.

**Capacity Building Programme**

1. *Women empowerment through value addition of yak products* from July 07-09, 2014


3. *Documentation of yak genetic resources (Characterization of Arunachali Yak)* from September 08-10, 2014

4. *Cold water fisheries management in hilly regime of Arunachal Pradesh* in collaboration with KVK, Dirang, Arunachal Pradesh from November 28 to December 02, 2014 with the help of NFDDB, Dept. of A.H., Dairying & Fisheries, Ministry of Agriculture, Govt. of India.

7. *Handling and management of yaks* for ITBP Jawans from December 08-17, 2014

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**YAK MELA-2014**

The Yak mela-2014 was organised on November 24, 2014 at Chhaghan Grazing Ground and Outdoor Stadium Jang, Twang at an altitude of 11000 ft above mean sea level organized with the help of 46 Infantry Brigade, Indian Army, Veterinary and Animal Husbandry Department, Tawang and Jang Sports Club.

At Chaghan Grazing Ground a livestock competition was organized to encourage yak rearing community in adoption of scientific yak husbandry practices. More than 1000 yak and yak cattle hybrid were gathered in this competition. Shri Leki Dhondup of Marmong village was awarded for his best female yak, Shri Phuntsi Dorjee of Punglo village was awarded for his best Dzomo (Yak-Cattle Hybrid-female) and Shri Kesang Zotzen of Mago village was bestowed for his best yak bull. Exhibition stall by the yak rearing community with their ethnic item and live demonstration of yak milk product preparation were main attraction in the mela at Jang outdoor stadium. Exhibition stall from yak rearing community of Jang was awarded the best exhibition stall. More than 2000 farmers including 300 yak rearers attended this mela from different corners of the Tawang districts and ICAR-NRC on Yak facilitated 100 yak rearers.
with basic amenities like tarpolin, rain coat, gum boot, mineral mixture, milking bucket, concentrate mixture, common salt, blanket, calcium preparation and solar emergency light. During this mela, nomadic yak herdsmen were registered for opening of bank account under the Pardhanmantri Jan DhanYojana and ADHAR card Bank Account with the help of State Bank of India, Jang Branch and district authority.

Shri Pema Khandu, Hon’ble Minister (Urban Development, Tourism and Art & Culture), Government of Arunachal Pradesh inaugurated Yak Mela and gave emphasis on the importance of yak in the economy of the highlanders. Shri Khandu also appreciated the efforts of ICAR-National Research Centre on Yak for promoting and highlighting scientific yak husbandry practice. He also appealed to the scientists to find out the major problems in yak husbandry in consultation with the yak rearers and to give a cost effective solution for these problems.

The KVK West Kameng and Tawang made an exhaustive demonstration of the useful technologies pertaining to high altitude agriculture.

**Technology Showcased and Popularized**

To popularize and showcase the technologies developed at the institute, ICAR-NRC on Yak participated in five exhibitions:

1. Celebration of Independence day at Lopon Stadium, Dirang on August 15, 2014
2. 3\textsuperscript{rd} Interface meeting on improvement of yak husbandry and upliftment of socio-economic status of yak rearers in the country held at Leh, Jammu and Kashmir during September 22-24, 2014
4. Yak mela-2014 held at outdoor stadium Jang, Tawang, Arunachal Pradesh on November 24, 2014

**Technology Demonstration**

1. Organized ten frontline demonstrations on ‘Fish-cum-pig culture’ in different villages of Lohit district of Arunachal Pradesh.

2. Value added yak milk and wool products were demonstrated among the 33 women yak rearers with an aim to their empowerment and two women common interest groups (CIG) for processing and marketing of yak wool products namely 'Sangjaling' and 'Rakitipha' were formed in this regard.

3. Potentiality of 'specially designed concentrate mixture for feeding of yak and yak cattle hybrid' was explained to 25 brokpas of Mandla region and freely distributed 50 kg of specially designed concentrate mixture to each brokpa.

**Distribution of Critical Inputs among the Farmers**

1. Total 50000 fish fingerlings and 50 cross bred piglets (Hampshire) were distributed among farmers of Lohit district for the frontline demonstration of 'fish-cum-pig culture' in Lohit district of Arunachal Pardesh.

2. A total ten specially designed piggery demonstration units (14ft x 7ft) were made by locally available resources and handed over to the 15 tribal farmers of Lohit district.
3. Total 75 quintal of specially formulated pig feed were prepared in collaboration with KVK, Lohit and distributed among the 25 pig farmers of Lohit district for the promotion of scientific pig farming in Lohit district and frontline demonstration of ‘fish-cum-pig farming’.

4. A total of nine farm implements like heavy duty cultivator, heavy duty leveler, motorized spray machine etc were provided to promote farm mechanization among the tribal farmers of Lohit district.

5. Total 100 yak rearers were provided basic amenities for migration like tarpolin, rain coat, gum boot, mineral mixture, milking bucket, concentrate mixture, common salt, blanket, calcium preparation and solar emergency light.

PARTICIPATION

Dr. V.S. Chauhan participated in 21 days Training program on National Training on Stem Cell Biology at the Animal Biotechnology Centre, ICAR-NDRI, Karnal, Haryana during August 5-25, 2014.

Dr. P.J. Das attended V Scientific Workshop on Biotechnology Research in North East India: Present & Future organized by DBT-AAU Centre, AAU, Jorhat during September 18 to 20, 2014.


Mr. Khakan Paul and Mr. G. Srivastava participated in “Gahan hindi karyashala” at Central Training Hindi Institute, Ministry of Home affairs, Department of Official Language, Prithvi Raj Road, New Delhi during November 17-21, 2014.

Dr. S. S. Hanah participated in one day training & awareness workshop on J-Gate @CeRA for North East Region held at NRC on Pig, Raini, Guwahati on November 19, 2014.

Dr. S. S. Hanah participated in 11th Coordination Committee Meeting of All India Coordinated Research Project on Application of Plastics in Agriculture held at ICAR - ICAR Research Complex for NEH Region, Umiam (Barapani) – 793103, Meghalaya during November 20-21, 2014.

Dr. S. M. Deb graced Dairy Mela organized by ICAR-NDRI Eastern Regional Station, Kalyani on December 12, 2014 as Chief Guest.

Dr. A. K. Bera participated in pre-conference workshop on Molecular Pharmacological Techniques in 47th Annual Conference of Indian Pharmacological Society at Department of Pharmacology, 3rd floor, Gauhati Medical College, Bhangagarh, Guwahati, Assam, India on December 27, 2014.

Dr. A. K. Bera participated in 47th Annual Conference of Indian Pharmacological Society at Department of Pharmacology, 3rd floor, Gauhati Medical College, Bhangagarh, Guwahati, Assam, India during December 28-30, 2014.

PUBLICATIONS

Research Paper


4. Biswas S, Mukherjee R, Mahto RP, De UK,


*Published in foreign journals*

Books/Book Chapter/Technical Bulletins/Training Manuals/Popular Articles/Folder


Transmission and Symptoms. Leaflet published during World AIDS Day celebration. ICAR- National Research Centre on Yak, Dirang.


2. Dangi SS, Gupta M, Dangi SK, Chouhan VS, Kumar P, Maurya VP, Singh G, Sarkar M. 2014. Serum HSPs and stress hormones in antioxidants and betaine supplemented goats (Capra hircus) during long-term heat stress adaptation. Published in the compendium of 20th International Congress of Biometeorology held on September 28 – October 1, 2014 at embassy suites Cleveland-Rockside, Cleveland, Ohio, USA.


organized by Crop and Weed Science Society and Bidhan Chandra Krishi Viswavidyalaya, Mohanpur-741252, West Bengal in collaboration with NABARD. Pp. 220.

AWARDS AND RECOGNITION

1. **Dr. S. S. Hanah** awarded PhD Degree in Livestock Production and Management on October 23, 2014 by ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh.

2. **Dr. Vijay Paul** selected to the Post Graduate Faculty of ICAR-National Dairy Research Institute (Deemed University), Karnal in the discipline of Dairy Cattle Physiology.

3. **Dr. Sanjit Maiti** selected to the Post Graduate Faculty of ICAR-National Dairy Research Institute (Deemed University), Karnal in the discipline of Agricultural Extension Education.

PERSONALIA

**New member**

Dr. M. Hussain, Senior Technical Officer joined ICAR-NRC on Yak on November 01, 2014

Shri Tsering Wangchu Sherchokpa, Steno Gr. III joined ICAR-NRC on Yak on October 25, 2014

**Promotion**

Dr. A.K. Bera promoted from Senior Scientist with pay scale Rs. 15,600 - 39,100 + RGP 8000 to Senior Scientist with pay scale Rs. 37,600 - 64,400 + RGP 9000 w.e.f. 01.01.2014

Dr. T. K. Biswas promoted from Scientist with pay scale Rs. 15,600 - 39,100 + RGP 6000 to Scientist with pay scale Rs. 15,600 - 39,100 + RGP 7000 w.e.f. 12.06.12

Shri P. Namje promoted from Senior Technical Assistant to Technical Officer w.e.f. 01.03.13

Mrs. Chogyong Lhamu promoted from Technician (Lab Asst.) to Senior Technician (Lab Asst) w.e.f. 18.11.13

**Transfer**

Dr. P. Chakravarty, Principal Scientist was relieved on 25.07.14 from ICAR-National Research Centre on Yak to join ICAR-National Research Centre on Pig, Rani, Guwahati.

Dr. T. K. Biswas, Scientist was relieved on 10.11.14 from ICAR-National Research Centre on Yak to join Eastern Regional Station of ICAR-Indian Veterinary Research Institute, Kolkata.

Dr. V. S. Chouhan, Scientist was relieved on 29.11.14 from ICAR-National Research Centre on Yak to join ICAR-Indian Veterinary Research Institute, Izatnagar, UP.

FARM NEWS

As on December 31, 2014, the institute farm was having 127 yaks (53 males and 74 females). The highest herd strength between July and December 2014 was 128 yaks (54 males and 74 females) in the month of November 2013. In total twelve calves (7 male and 5 females) were born during the period of July 2014 to December 2014. The highest birth weight of calf was recorded as 21.5 Kg with an average birth weight of 17.16 Kg. Total milk production for six months (July 2014-December, 2014) was 1,675.45 liters with the highest production was observed during the month of July, 2014 (i.e. 358 liters from 14 animals). Eight numbers of trained male yaks were sold to 4th Battalion of ITBP for pack purpose.

SUCCESS STORIES

**Crossbred Pig Farming:**

Pig is a major livestock of Lohit district. Farmers rear local non-descript pigs which are having low body weight gain ability, smaller litter size and higher age at sexual maturity. Crossbred pig, with exotic genetic make up is able to gain more body weight at lesser time and feed, mature earlier and gives larger litter size with regular interval. Hence, crossbred piglets (Hampshire 75% and local 25%) were
introduced to create awareness and demonstrate the potential of crossbred pig among the farmers in rural areas. A women farmer Nang Kot at Solungtoo Village of Namsai circle, Namsai district reared crossbred pig. Crossbred sow mature at 10 months of age and farrowed 13 numbers of piglets. Boar attained average 109.5 kg body weight at 12 months of age. Based on local price of piglet, farmer fetched Rs3000/piglet, total Rs 39000. This is a remarkable achievement for her.

**Production and cultivation of Rabi Sorghum**

Rabi Sorghum is a new crop not only for Namsai district of Arunachal Pradesh but for whole of the North-East region of India. Maize is only cereal as well as fodder crop for Namsai district during winter season. To diversify the cropping system dual purpose (grain+fodder) Rabi sorghum (var-CSV 22) was introduced and demonstrated on farmers' field under OTF at Khowji village of Mahadevpur circle. The variety yielded 208.9 qtls/ha green fodder in the first cut. The variety attain 129.3 cm. plant height at 60 days after sowing that was far better than the conventional maize fodder crop. The variety grew well in the present climatic conditions.

**Cross-breeding through A.I. with improved quality Bull semen**

Artificial Insemination with semen of Jersey cross and Sahiwal was introduced at Namsai district under Frontline Demonstration entitled “Cross-breeding through A.I. with improved quality bull semen” to upgrading the local cattle population. Exotic breed Jersey and indegenous based Sahiwal are well known for its high milk yielding capacity, good draughtability with better survivalibility in agro-climatic zone. The cross with local cattle will improve both the milk yield and draughtability of next generation animal. A total of 17 A.I. were conducted at different places of Namsai district out of which 7 (5 female, 2 male) calves were born at Alubari, Namsai and Mahadevpur areas of the district.

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