



## From Director's desk .....

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*"If conservation of natural resources goes wrong, nothing else will go right"*

-M.S. Swaminathan

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It is my privilege to present the first issue of the 13<sup>th</sup> volume of Bureau's Newsletter to our readers which chronicles the achievements of NBAGR in the area of identification, evaluation, characterization, conservation and utilization of mega biodiversity of livestock and poultry genetic resources of the country. Phenotypic characterization of Konkan cattle through field survey and molecular characterization of Nagaland long hair goats and Bargur buffalo based on microsatellite and mitochondrial markers, respectively were carried out during this period. Somatic cells of double humped camel were generated and cell lines were cryopreserved for future use. These cells represent an excellent approach for *ex-situ* conservation of our precious livestock germplasm.

It is well known that adaptation to vivid climatic and traditional management conditions have endowed the indigenous breeds with better disease resistance and heat tolerance. In this direction, transcriptome analysis of peripheral blood mononuclear cells from high altitude adapted Ladakhi cows and tropically adapted Sahiwal cows was carried out using Agilent 44K expression microarray chips which delineated that several biological pathways were significantly affected in the two categories. Gene Bank at NBAGR was strengthened by addition of 9,500 frozen semen doses of different cattle breeds. Another feather in our cap was registration of nine new breeds of indigenous farm animals taking the total tally of registered breeds to 160.

Important meetings such as RAC and IRC were held in time which provided a platform to

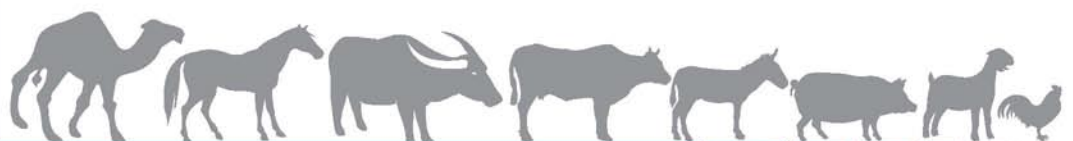
discuss ongoing projects and to formulate new research programmes within the mandate of the Bureau. Skill upgradation of technical and skilled support staff was also carried out through trainings sponsored under the HRD programme of ICAR.

Foundation Day lecture by Dr Gaya Prasad, Vice-Chancellor, SVBPUAT, Meerut was an enriching experience for the staff and students of the Bureau. I feel privileged to acknowledge the active participation of the scientists in *Mera Gaon Mera Gaurav* programme. During these six months, research findings of the scientists were published in reputed peer-reviewed journals. I wish to place on record my best wishes for their personal and institutional achievements. I am sure with their untiring efforts and cooperation, NBAGR shall be able to scale new heights in future.

I hope the current issue of the Bureau's newsletter will give you a glimpse of the efforts being made for characterization and documentation of our livestock diversity. Suggestions for improvement are welcome on the Director's desk.



(Arjava Sharma)





## SECTORAL NEWS

### Nine New Breeds of Indigenous Farm Animals Registered by ICAR-NBAGR

Breed Registration Committee in its meeting on June 21, 2016 at New Delhi approved registration of nine new breeds of livestock and poultry. This includes one breed of cattle, two breeds each of goat and sheep, three breeds of pig, and one breed of chicken. After including these newly registered breeds, total number of indigenous breeds now in the country is 160, which include 40 for cattle, 13 for buffalo, 26 for goat, 42 for sheep, 6 for horses & ponies, 9 for camel, 6 for pig, 1 for donkey and 17 for chicken.

### NEW BREEDS REGISTERED

Species	Breed	Home Tract	Accession number
Cattle	Badri	Uttarakhand	INDIA_CATTLE_2400_BADRI_03040
Goat	Teressa	Andaman & Nicobar	INDIA_GOAT_3300_TERESSA_06025
	Kodi Adu	Tamil Nadu	INDIA_GOAT_1800_KODIADU_06026
Sheep	Chevaadu	Tamil Nadu	INDIA_SHEEP_1800_CHEVAADU_14041
	Kendrapada	Odisha	INDIA_SHEEP_1500_KENDRAPADA_14042
Pig	Tenyi Vo	Nagaland	INDIA_PIG_1400_TENYIVO_09004
	Nicobari	Andaman & Nicobar	INDIA_PIG_3300_NICOBARI_09005
	Doom	Assam	INDIA_PIG_0200_DOOM_09006
Chicken	Kaunayen	Manipur	INDIA_CHICKEN_1200_KAUNAYEN_12017



#### Badri cattle

These are indigenous cattle available in hilly areas of Uttarakhand. Badri cattle are small in size having long legs and varied body colours – black, brown, red, white or grey. Hooves and muzzle are black or brown in colour. Hump is prominent. Udder is small in size, tucked up with the body. These are well adapted to the hilly terrain and climatic conditions and comparatively more resistant to diseases. Estimated population is approximately 16 lakhs.



#### Teressa goat

It is an indigenous goat germplasm maintained by tribal farmers of Nicobar group of islands. These goats are generally tall, sturdy, brownish or dark tan or black or white in colour with white and black patches. Black hairs are present on dorsal midline up to the tail. Muzzle, eyelids and hooves are black in color. There is a peculiar white patch/line starting from inner canthus of both eyes or from eye brows and extending up to nostrils or mouth. Tail is medium to long. Horns are large with flat base. Adult body weight varies from 50 to 79 kg. Estimated population is about 7,721.



#### Kodi Adu goat

Kodi Adu goats are native to Thoothukudi and Ramanathapuram districts of Tamil Nadu. These are tall, long, lean and leggy animals with compact body. Based on body colour, they are classified into two colour varieties. Chem-Porai goats are white in colour with varying degree of reddish brown colour and intensity, whereas, Karum-Porai goats are white in colour with varying extent of splashes of black colour. They are reared mainly for meat. Population of these goats is about 1,67,000.



### Chevaadu sheep

Chevaadu sheep are found in Tirunelveli district of Tamil Nadu. Animals are small to medium in size. Two colour variants viz. light brown and dark brown or tan are present. Body is covered with brown hair. Head is erected and high in disposition. Horns are curved horizontally outward, backward with blunt conical apex having few thick ridges. Horn is light brown in colour. Adult body weight varies from 18 to 39 kg. Estimated population is about 1,58,200.



### Kendrapada sheep

Breeding tract of Kendrapada sheep comprises of six coastal districts of Odisha viz. Kendrapada, Jagatsingpur, Cuttack, Puri, Jajpur and Bhadrak . These sheep are mostly brown in colour. Head, face, belly and legs are bare. Rest of the body is covered with non-lustrous hair. Animals have horizontal ears; short, straight and drooping tail. Button type horns are seen in few males. Adult body weight varies from 24 to 30 kg. Estimated population is about 1,23,000.



### Tenyi Vo pig

These are indigenous pigs reared in Nagaland mainly for pork production. These are pot bellied animals with sagging back and pendulous belly touching the ground in females, straight tail ending with white switch reaching the hock joint. White markings are present on the forehead and ventral body. Tenyi Vo pigs have strong and long tapering snout, small erect ears and bright alert eyes. Adult body weight varies from 35 to 50 kg. Estimated population is about 60,000-70,000.



### Nicobari pig

Nicobari pigs are indigenous pigs of Nicobar islands and are reared by Nicobari tribes since time immemorial. They are sturdy and short with long body and red-brown, black, grey, brown, blackish brown and fawn skin colour. Marked bristle crest (mane) is seen on the back extending from mid head/shoulder to base of the tail. Facial profile varied from flat to concave. Neck is short with very large jowl. The characteristic feature of the tail is absence of curling. They are fast runners. Adult body weight varies from 26 to 61 kg. Estimated population is about 35,000.



### Doom pig

Doom pigs are distributed in Dhubri, Bongaigaon and Kokrajhar districts of Assam state. These are black in colour and have short concave snout. They are large; flat belly type with short erect ears. Top line is straight with long bristles extending up to thoraco-lumber area. Adult body weight varies from 36 to 50 kg. Estimated population is about 3,000.



### Kaunayen chicken

Breeding tract consists of Thoubal, Imphal West, Imphal East and Bishnupur districts in the valley region. Kaunayen birds have elongated body with long neck and long legs. The predominant plumage color is black followed by brown (or red) with or without patches. Hens are generally black, grey, blackish grey or whitish grey with few brown feathers on neck, breast and wings. Cocks generally have shining bluish black feathers on wings, breast, tail and thighs. Comb is red in colour, mainly pea type. Spur is long and sharp in cocks. They are used for cock fighting. Estimated population is approximately 60,000-80,000.





## RESEARCH ACCOMPLISHMENTS

### Phenotypic characterization of Konkan cattle

Konkan cattle are distributed in Thane, Palghar, Raigad, Ratnagiri and Sindhudurg districts of Konkan region of Maharashtra. Visit was taken up in three talukas of Raigad district of Maharashtra state to study indigenous cattle of Konkan region. The herd size varies from 4-20 and animals are kept on low input production system. Breeding of animals is generally through natural mating. To characterize the breed, 11 body measurements and physical traits of 225 animals belonging to different age groups and sex were recorded in Raigad district. A total of 50 farmers were interviewed for general management practices followed for cattle husbandry.

Animals are small in size with compact body. They are hardy and survive well in hot and humid conditions of the coastal area. The coat colour of animals is generally red or black; however, animals of brown and white coat are also available. The colour of eyelid, muzzle and tail is generally black but in some animals carrotty muzzle was also seen. The forehead is small and straight, sometimes slightly concave. The horns are straight in most of the cases and orientation of horn is outward and backward. Udders are small in size, teats are small, cylindrical with pointed/ rounded tips. The hump and dewlap are small to medium in size. The milk production is generally 1-2 litres in a day and is used for consumption of farmers' family. The age at first calving, calving interval and lactation period range from 4.5 to 5 years, 12 to 15 months, 5 to 8 months, respectively. The animals are used for the agricultural operations in the area. Population size of Konkan cattle is adequate in its breeding tract.



*Herd of Konkan cattle*

(Contributed by Dr. PK Singh)

### Genetic variability in Nagaland long hair goats

The study was undertaken to know the genetic variability in Nagaland's long hair goat inhabiting the Zunheboto, Tuensang and Kifry districts of Nagaland. These goats are locally known as *Apu-Asu-Ne* and are reared mainly for meat, coarse fiber and skin. Their long hair has commercial value and is used for beautification of garments, ornaments and weaponry.



*Nagaland long hair goat*

Fifty blood samples collected from unrelated animals were analyzed to work out the genetic variability within the population. For this, a battery of 25 selected microsatellite markers was used. The data thus generated was statistically analyzed to find the average number of alleles per locus, heterozygosity, polymorphic information content (PIC) etc. The observed number of alleles across the loci ranged from 2 (ETH225 & OarJMP29) to 9 (ILSTS058) with mean number of alleles per locus as  $5.00 \pm 0.393$ . The observed number was more than the effective number of alleles. The observed heterozygosity values ranged from 0.043 (ETH225) to 0.786 (OMHC1) with an overall mean of  $0.347 \pm 0.040$  whereas expected heterozygosity ranged from 0.045 (OarJMP29) to 0.815 (ILSTS058) with an overall mean of  $0.499 \pm 0.051$ . The observed heterozygosity across the loci was less than expected heterozygosity except for ILSTS059, OarJMP29, ILSTS34, ILSTS022 and RM088. The decreased heterozygosity pointed towards the reduction of genetic diversity in the population. The population indicated departure from Hardy-Weinberg Equilibrium as chi-square value for most of the loci were significantly different ( $P < 0.05$ ). The difference between the observed and expected

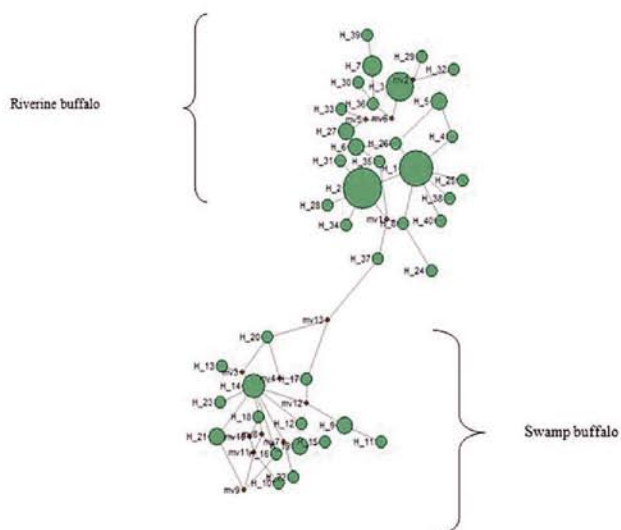


heterozygosity can also be attributed to the non-random mating among the individuals and possibility of inbreeding. This was also reflected by the positive  $F_{IS}$  ( $0.258 \pm 0.063$ ) which varied from  $-0.467$  (ILSTS022) to  $0.776$  (ETH225). The polymorphic information content value of markers ranged from  $0.045$  (OarJMP29) to  $0.815$  (ILSTS058) with an overall value of  $0.494 \pm 0.052$  revealing their usefulness in determining the genetic diversity. Shannon's information index varying from  $0.110$  to  $1.811$  with mean value of  $1.006 \pm 0.105$  also supported the usefulness of primers used. A normal 'L' shaped distribution of mode-shift test, suggested the absence of bottleneck i.e. the reduction in the effective population size of Nagaland goats.

(Contributed by Dr. NK Verma)

### Mitochondrial D-Loop analysis of Bargur buffalo

Ten random samples of Bargur buffalo were PCR amplified and sequenced for mt D-Loop hyper variable segment. The haplotypes obtained were compared with Assamese,



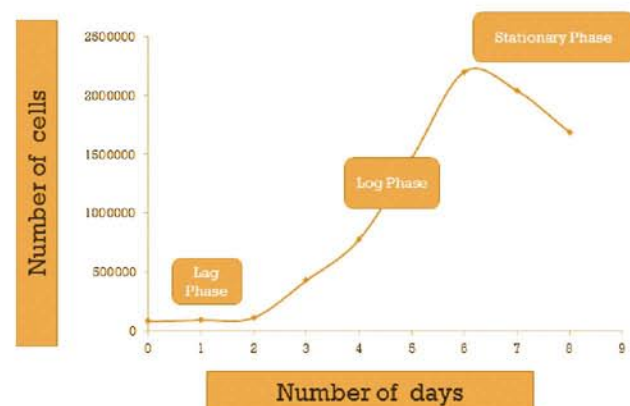
Manipuri, Marathwada, Murrah, South Kanara and Toda buffaloes. A total of 40 haplotypes were observed with an overall haplotype diversity of  $0.9524$  and nucleotide diversity  $0.03894$ . Three unique haplotypes were observed in Bargur buffalo with a haplotype diversity of  $0.9111$  and nucleotide diversity of  $0.01836$ . Median joining network analysis revealed clustering of Bargur buffalo with the riverine group.

(Contributed by Dr Raja KN)

### Somatic cell banking of double humped camel

Ear marginal tissue samples from six bactrian camels were used to set up explant culture using fibroblast specific medium (HiFibroXL™) with 20% FBS. First fibroblast-like cells were observed after 17 days of explant culture. The cells showed typical fusiform morphology with centrally located oval nuclei with radiating, flame like or whirlpool like migrating patterns. The fibroblast growth was only around the adhered explants and number of cells migrating around individual explant were not uniform. Primary sub-culturing was done when outgrowth reached up to 30-40% confluency.

Four different commercially available media known to support fibroblast cultures were tested for their growth potential for camel fibroblast. Maximum total cell count with same seeding (80,000 cells) and under similar culture conditions was  $6,75,000$ ,  $3,05,000$ ,  $13,90,000$  and  $10,05,000$  cells/ml for MEM, DMEM+High glucose, DMEM+Ham's F12 (1:1) and fibroblast specific media (HiFibroXL™), respectively. Thus DMEM+Ham's F12 (1:1) with 10% FBS was used in subsequent passages. Five fibroblast cell lines were successfully established in culture. Analysis of the growth of fifth passage culture revealed that the cells followed a typical Sigmoid shape growth curve. Cell lines were frozen in liquid nitrogen at 4<sup>th</sup> to 6<sup>th</sup> passage for longer storage and their use in future. In order to confirm the origin of cells and to identify cross-contamination with non-fibroblast cells, RT-PCR was performed at different passages of individual samples using primers of Cytokeratin19 (CK19) and Osteopontin (OPN). Osteocytes were absent in culture whereas, epithelial cells were identified in first passage only. No cross contamination was



Growth curve of Bactrian fibroblast cells

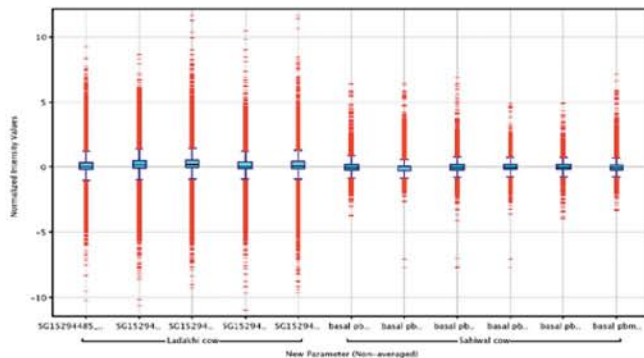


observed in consequent passages. No visible contamination was observed at any of the stage of culture.

(Contributed by Dr Rekha Sharma)

### Transcriptome analysis of PBMCs from high altitude adapted and tropically adapted cows

An effort was made to assess the comparative transcriptome profile of high altitude adapted Ladakhi cows and tropically adapted Sahiwal cows peripheral blood mononuclear cells (PBMCs). This was done in order to identify the genes and pathways involved in high altitude adaptation. Data on 5 Ladakhi PBMCs and 6 Sahiwal PBMCs was generated using Agilent 44K expression microarray chips. Several hundred genes were found to be



*Box whisker plot showing distribution of normalized intensity values between PBMCs of Ladakhi and Sahiwal cows. The entities with intensity values beyond 1.5 times the inter-quartile range are shown in red.*

differentially expressed. Several genes (VEGF, HK, GLUT1, HIF etc.) playing key role in high altitude adaptation showed differential expression between the two cattle types. The higher expression of HIF-1 $\alpha$  and its target genes in PBMCs of Ladakhi cows from hypoxia plays an important role in combating stress and inducing cellular homeostasis by facilitating both oxygen delivery and adaptation to oxygen deprivation. These genes were further validated using qPCR based expression analysis. The analysis revealed higher expression of these genes in PBMCs of high altitude adapted cattle in comparison to cattle adapted to normoxic environment. Several pathways like oxidative phosphorylation, apoptosis, EGFR signaling, TGF beta signaling, TNF alpha signaling and electron transport chain etc. were found to be significantly affected in the PBMCs of high altitude and tropically adapted cattle types.

(Contributed by Dr Manishi Mukesh)

### Sequence characterization and identification of SNPs in beta-casein gene of Indian native cattle

Sequence characterization of complete beta casein gene and its promoter was carried out across Karan Fries, Holstein Friesian and 12 breeds of Indian cattle. The sequence analysis revealed preponderance of A2 allele in Indian cattle (0.932) in comparison to crossbred (0.63) and exotic cattle (0.68). Comparative sequence analysis across animals of native, cross bred and exotic cattle populations revealed 24 SNPs in approximately 3.2 Kb region comprising 5'-flanking, coding and untranslated region of beta casein cluster. Amongst these, several novel SNPs (6/10 in promoter, 5/7 in coding and 3/3 in 3'UTR) were identified. Annotation of regulatory regions for search of putative transcription factors binding sites (TFBSs) from TRANSFAC database revealed 13 TFBSs of different functional classes. Homology of regulatory domains of beta casein among dairy species (cattle, buffalo and goat) revealed divergence at several TFBSs belonging to mammary gland specific transcription factors, hormone receptors, transcriptional activators and nuclear factors. Differences at such important regulatory domains could possibly reflect the species-wise distinctness at functional level. Annotation of untranslated regions for search of putative transcription factors binding sites revealed 2 and 13 TFBSs of different functional classes in 5' and 3' UTR respectively. Among UTRs, 5'UTRs was conserved while in 3'UTR, 2 of the regulatory domains were affected. Linkage disequilibrium (LD) analysis across SNPs in promoter region of beta casein gene revealed 2 haploblocks. The higher level of LD for pairs of markers in casein promoter region suggested low recombination rate for intragenic regions. Two haploblocks were observed for the identified SNPs in coding and untranslated region of  $\beta$ -casein. The strongest LD was found between two SNPs (G139T, A242T) in coding regions.

(Contributed by Dr Monika Sodhi)

### Expression pattern of beta casein mRNA in milk derived somatic and epithelial cells across lactation in native and cross bred cattle

A total of 46 healthy multiparous crossbred (KF) and Indian cattle (Sahiwal) were utilized to study the expression pattern of beta casein gene in mammary somatic cells and mammary epithelium cells, respectively across different stages of lactation. For normalization of transcriptional

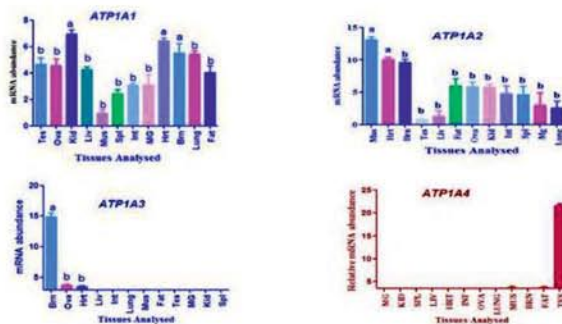


data, four internal control genes GAPDH, RPL4, RPS23, and ACTB were selected. The expression of beta-casein in both MEC derived from Sahiwal and MSC derived from KF followed the same trend with higher expression in early and peak lactation stages than mid and late stages. However, no significant ( $P < 0.05$ ) difference in the expression of A2A2 and A1A2 at different stages of lactation was observed.

(Contributed by Dr Monika Sodhi)

### Expression characteristics of 4 isoforms of Na/K ATPase gene across buffalo tissues

Recently, Na/K ATPase gene has shown to be associated with heat tolerance response in dairy animals. In the present study, an effort was made to study the expression characteristics of all four isoforms viz., alpha1, alpha2, alpha3 and alpha4 (ATP1A1, ATP1A2, ATP1A3 and ATP1A4) of Na/K ATPase gene across 12 different tissues of riverine buffaloes. For normalization of expression data across tissues; UXT, RPS23, RPL4, and RPS9 were identified as panel of stably expressed genes. The data showed ubiquitous and varied expression level of ATP1A1 and ATP1A2 isoforms across mammary gland, kidney, spleen, liver, heart, intestine, ovary, lung, muscle, brain, fat and testis. The ATP1A1 and ATP1A2 transcripts were predominant isoforms in kidney and muscle, respectively, while ATP1A3 and ATP1A4 isoforms were



Expression profile of Na/K ATPase alpha isoforms across different tissues of buffaloes

restricted to brain and testis, respectively. The tissue specific expression of these isoforms indicated their biological and functional heterogeneity in maintaining Na and K homeostasis across different tissues.

(Contributed by Dr Manishi Mukesh)

### Ex situ conservation

Nine thousand five hundred frozen semen doses of

Sr. No.	Species	Breeds	Males	Doses
1	Cattle	23	133	75554
2	Buffalo	12	88	40053
3	Goat	4	47	12084
4	Sheep	1	20	8375
5	Horse	2	7	980
6	Donkey	1	4	240
7	Camel	1	15	928
8	Yak	-	4	460
<b>Total</b>		<b>44</b>	<b>318</b>	<b>1,38,674</b>

different cattle breeds (Bargur, Khillar, Dangi and Rathi) have been procured and stored in Gene Bank for posterity. Presently, about 1,38,674 frozen semen doses from eight species (Cattle, Buffalo, Goat, Sheep, Camel, Horse, Donkey and Yak) are stored in GeneBank. The epididymal sperm banking in Gene Bank has also been initiated and germplasm of Gaddi and Marwari breeds of goat has been preserved.

(Contributed by Dr. RAK Aggarwal)

## PUBLICATIONS

### Research papers

- Ahluwat S, Sharma P, Sharma R, Arora R and De S (2016) Zinc finger domain of the PRDM9 gene on chromosome 1 exhibits high diversity in ruminants but its paralog PRDM7 contains multiple disruptive mutations. *PLOS ONE* 11(5): e0156159.
- Ahluwat S, Sharma P, Sharma R, Arora R, Verma NK, Brahma B, Mishra P and De S (2016) Evidence of positive selection and concerted evolution in the rapidly evolving PRDM9 zinc finger domain in goats and sheep. *Animal Genetics* doi: 10.1111/age.12487.
- Ahluwat S, Sharma R, Roy M, Mandakmale S, Prakash V and Tantia MS (2016) Genotyping of novel SNPs in BMPR1B, BMP15 and GDF9 genes for association with prolificacy in seven Indian goat breeds. *Animal Biotechnology* 27 (3): 199-207.
- Arora R, Kulkarni VS, Jain A and Yadav DK (2016) Yalaga Sheep - A microsatellite based genetic profile. *Indian Journal of Animal Science* 86 (10): 1155-1158.
- Dhingra Behl J, Mishra P, Verma NK, Niranjan SK, Dangi PS, Sharma R and Behl R (2016) Nucleotide polymorphisms in the bovine lymphotoxin A gene and their distribution among *Bos indicus* zebu cattle breeds. *Gene* 579: 82-94.
- Dixit S, Kumar S, Vyas MK, Singh MK, Pathodiya OP,



- Sharma A and Jayakumar S (2016) Characterization of sequence variation in caprine growth hormone gene and its association with milk production traits in two Indian goat breeds. *Journal of Livestock Biodiversity* 6: 25-32.
7. Dixit S, Vyas MK, Kumar S, Singh MK, Pathodiya OP, Sharma A and Jayakumar S (2016) Association of the polymorphisms detected in  $\beta$ -lactoglobulin ( $\beta$ -LG) gene with milk production traits in Sirohi and Jamunapari breed of Indian goats. *Journal of Livestock Biodiversity* 4: 24-29.
  8. Dubey PK, Goyal S, Mishra SK, Arora R, Mukesh M, Niranjana SK, Kathiravan P and Kataria RS (2016) Identification of polymorphism in fatty acid binding protein 3 (FABP3) gene and its association with milk fat traits in riverine buffalo (*Bubalus bubalis*). *Tropical Animal Health and Production* 48(4): 849-53.
  9. Kapila N, Sharma A, Kishore A, Sodhi M, Tripathi PK, Mohanty AK and Mukesh M (2016) Impact of heat stress on cellular and transcriptional adaptation of mammary epithelial cells in riverine buffalo (*Bubalus bubalis*). *PLOS ONE* 11(9): e0157237.
  10. Kaur R, Sharma A, Sodhi M, Sharma VL, Kumari P and Mukesh M (2016). Understanding Na/K ATPase alpha isoforms expression characteristics in heat stressed mammary epithelial cells of riverine buffaloes (*Bubalus Bubalis*). *International Journal of Animal Biotechnology* Vol 6 (online).
  11. Mann S, Shandilya UK, Sodhi M, Kumar P, Bharti VK, Verma P, Sharma A, Mohanty A and Mukesh M (2016) Determination of antioxidant capacity and free radical scavenging activity of milk from native cows (*Bos indicus*), exotic cows (*Bos taurus*), and riverine buffaloes (*Bubalus bubalis*) across different lactation stages. *International Journal of Dairy Science & Processing* 3(4): 66-70.
  12. Singh KM, Singh S, Ganguly I, Ganguly A, Raja KN, Chopra A and Narula HK (2016) Evaluation of Indian sheep breeds of arid zone under heat stress condition. *Small Ruminant Research* 141: 113-117.
  13. Verma NK, Shivahre PR, Aggarwal RAK, Sharma R, Dangi PS and Bhutia NT (2015) Sikkim Black Goats - Characters, management and microsatellite based genetic profile. *Journal of Livestock Biodiversity* 5(1&2): 1-6.
  14. Yadav DK, Arora R and Jain A (2016) Principal component analysis of body measurements based

morphological structure of Madgyal sheep. *Indian Journal of Animal Sciences* 86 (5): 568-571.

### Popular articles

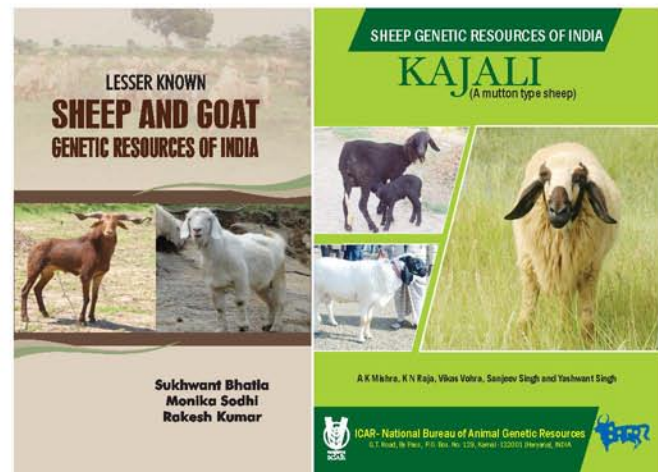
रीना अरोड़ा, राकेश कुमार, अंजू शर्मा, याशिला गिरधर, सोनिका अहलावत एवं रेखा शर्मा (2016) माईटोकोण्ड्रियल डी.एन.ए. – पशुधन प्रजातियों के विकास एवं वंशावली रूप रेखा के लिए एक चिन्हक। पशुधन प्रकाश 7: 80–87.

प्रीति वर्मा, मोनिका सोढ़ी, अंकिता शर्मा, प्रवेश कुमारी एवं मनीषी मुकेश (2016) उच्चतुंगता के वातावरण में पशुधन का शरीरिक एवं आनुवंशिक स्तर पर अनुकूलन। पशुधन प्रकाश 7: 114–118.

अविनाश सिंह, हिमानी शर्मा, रेखा शर्मा, सोनिका अहलावत, रीना अरोड़ा एवं मधूसूदन टांटिया (2016) जैविक पशुधन उत्पादन: भारतीय परिपेक्ष में एक उभरता व्यवसाय। पशुधन प्रकाश 7: 73–77.

### Book/Monograph

Lesser known sheep and goat genetic resources of India by S Bhatia, M Sodhi and R Kumar published by Narendra Publishing House, Delhi. ISBN: 978-93-84337-38-4.



Sheep Genetic Resources of India "Kajali" (a mutton type sheep) by Mishra AK, Raja KN, Vohra V, Singh S and Singh Y.

### Awards

Second best poster award to Ramneek Kaur, Monika Sodhi, Vijay Lakshmi Sharma, Ankita Sharma, Preeti Verma and Manishi Mukesh for the poster entitled "Tissue expression pattern of alpha isoforms of Na<sup>+</sup>/K<sup>+</sup>-ATPase gene in riverine buffaloes (*Bubalus Bubalis*)" in National Conference on Leveraging Biodiversity for Translational Therapeutic Research (March 17-18, 2016) held at Panjab University, Chandigarh).



Dr. PG Nair Award for the year 2016 was conferred upon Dr NK Verma, Head, Animal Genetics Division for his outstanding contributions in the area of characterization and conservation of AnGR.



*Dr NK Verma receiving the award from Dr. Gaya Prasad*

## OTHER ACTIVITIES

### RAC meeting

Research Advisory Committee meeting was held on April 18, 2016 under the chairmanship of Dr. SL Goswami, Vice Chancellor, Banda University of Agriculture & Technology, Banda (UP). Dr Arjava Sharma informed the RAC members about different types of programmes being carried out at NBAGR and also presented future roadmap for research



*RAC meeting in progress*

activities. The achievements made by the Institute were lauded by all RAC members.

### IRC meeting

Institute Research Committee meeting was held on April 27-28, 2016 in which the final reports of completed research

projects were presented by the scientists. A new service project and four new research projects were also discussed and approved.



*Release of the training manual during the inaugural function*

### Trainings organized

An awareness and skill up gradation program on "Intellectual Property Rights and related aspects in the area of agriculture and livestock sector" was organized at ICAR-NBAGR from July 13-15, 2016.

भारतीय कृषि अनुसंधान परिषद के मानव संसाधन विकास कार्यक्रम के अंतर्गत राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो, करनाल में कुशल सहायक स्टाफ हेतु तीन दिवसीय प्रशिक्षण कार्यक्रम (सितम्बर 1-3, 2016) का आयोजन किया गया। करनाल में स्थित भारतीय कृषि अनुसंधान परिषद के 6 संस्थानों के 22 प्रतिभागियों ने इस कार्यक्रम में हिस्सा लिया। इस जागरूकता प्रशिक्षण कार्यक्रम में 13 वक्ताओं द्वारा व्यक्तिगत विकास एवं योग्यता वृद्धि संबंधित बुनियादी विषयों पर व्याख्यान तथा प्रैक्टिकल जानकारी प्रदान की गई। पूरा कार्यक्रम राजभाषा हिंदी में किया गया।



*अग्निशमन उपकरण का व्यवहारिक प्रशिक्षण*

### Independence Day Celebration

On India's 70<sup>th</sup> Independence Day, Dr Arjava Sharma





*Unfurling of the tricolor on Independence Day*

unfurled the tricolor and addressed the members of the Bureau family. In his address, Director appreciated the scientific progress made by the Bureau. He also highlighted the responsibilities of each member towards the nation as a whole and farming community in particular. A cultural program and quiz competition was also organized wherein the staff and their wards participated actively.

### Foundation Day Celebration

ICAR-NBAGR celebrated its 33<sup>rd</sup> Foundation Day on September 21, 2016. Dr Gaya Prasad Vice-Chancellor, SVBPUAT, Meerut was the chief guest on this occasion. Dr GP Singh (Director ICAR-IIWBR) and Shri Gopal Swami Ji were the guests of honour.

### Mera Gaon Mera Gaurav

ICAR-NBAGR in collaboration with ICAR-IARI regional station carried out various extension activities in nearby villages of Karnal under the Mera Gaon Mera Gaurav



*Scientists interacting with farmers*

programme. Livestock keepers and farmers were made aware of good agriculture and animal husbandry practices by scientists from both the institutes. All queries of farmers related to different topics were also addressed.

### Health/infertility Camp

NBAGR in collaboration with State Animal Husbandry Department organised a free Health/infertility Camp at village Narukheri on July 25, 2016. A large number of livestock keepers participated in the camp and discussed various issues related to animal health and management. Importance of mineral supplementation was emphasized and mineral mixture was distributed to the farmers.



*Screening of animal by NBAGR Scientist*

### Distinguished visitors

- The students of medical stream from New Happy Public School, Yamuna Nagar (May 9, 2016)
- A team from Doordarshan Channel (May 31, 2016)
- Secretary (ADF), Ministry of Agriculture & Farmers



*Director extending a floral welcome to Secretary (ADF)*



Welfare, Government of India (June 25, 2016)

- Newly recruited scientists of BAIF (July 22-23, 2016)
- Participants of Training Programme on "Breeding Soundness Examination (BSE) of Bull and Andrological Examination for VO and QCO of Semen Station" of NDRI (August 19, 2016)
- B.V.Sc. & A.H. students from VCRI, Tirunelveli (August 31, 2016)
- M.Sc. Biochemistry (Final year) students from Kurukshetra University (August 31, 2016)

## PERSONALIA

### Promotions

1. Dr. Jayakumar S, Scientist has been promoted to the next higher post of Scientist (S.S) w.e.f. 07.01.2013 vide Council Office Order No. 6-49/2015 dated 16.06.2016
2. Dr. Sonika Ahlawat, Scientist has been promoted to the

next higher post of Scientist (S.S) w.e.f. 15.12.2014 vide Council's Office Order No. 6-49/2015 dated 16.06.2016.

3. Dr. PS Dangi, Assistant Chief Technical Officer has been promoted to the next higher grade of Chief Technical Officer in the pay scale of Rs. 15600 - 39000 + Rs. 7600 GP w. e. f. 01.07.2015 vide this office order No. 5-10/16-Estt/ III.- dated 18.10.2016.

### OBITUARY

Bureau family is saddened by the untimely demise of Sh Sopal who left for heavenly abode on 13.04.2016. He was a very sincere and hard working member of NBAGR. We express our deepest condolences for his family.



Sh Sopal (1961-2016)

## राजभाषा प्रकोष्ठ द्वारा आयोजित विभिन्न कार्यक्रम

### हिन्दी व्याख्यान / कार्यशालाओं का आयोजन

संस्थान में राजभाषा हिंदी के प्रचार प्रसार और संस्थान कर्मियों को राजकीय कार्यों में हिंदी के अधिकाधिक प्रयोग हेतु जागरूक करने के उद्देश्य से संस्थान में तिमाही हिंदी व्याख्यानों एवं कार्यशालाओं का आयोजन किया जाता है। इसी प्रक्रिया में दिनांक 15-04-2016 को "महिला सशक्तिकरण भारतीय समाज के सन्दर्भ में" विषय पर एक हिंदी व्याख्यान का आयोजन किया गया। दिनांक 18-07-2016 को "आयकर विवरणिका भरते समय ध्यान देने योग्य बिंदु" विषय पर

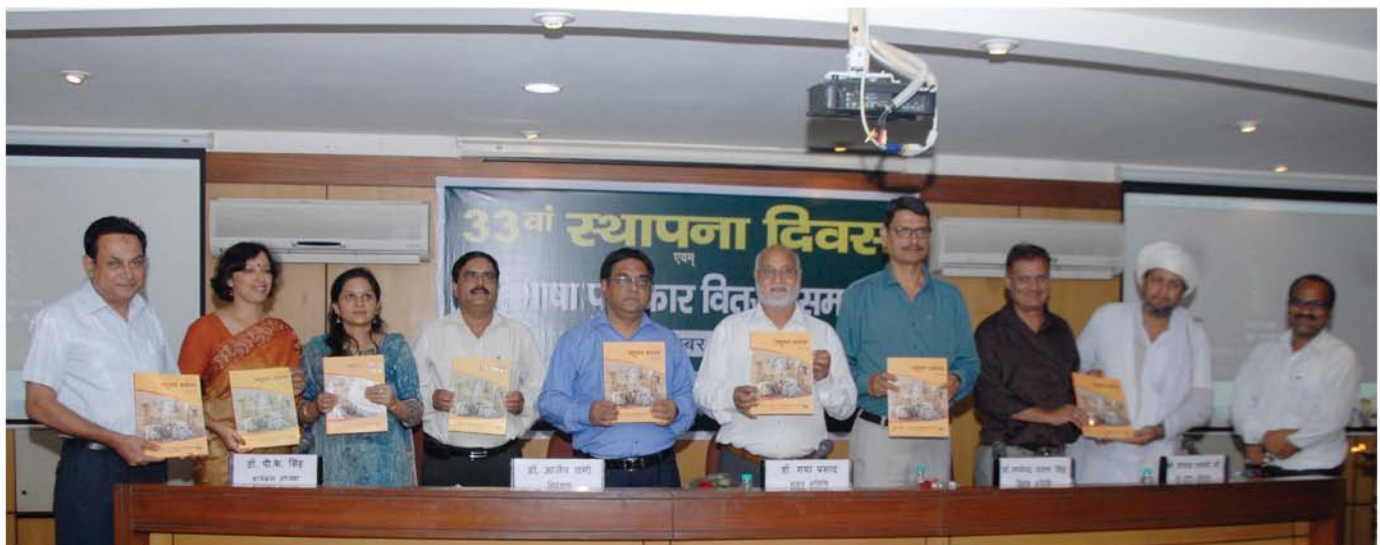
हिंदी भाषा में व्याख्यान कार्यशाला का आयोजन किया गया।

### पशुधन प्रकाश के सप्तम अंक का विमोचन

ब्यूरो के स्थापना दिवस (21-09-2016) के सुअवसर पर पशुधन प्रकाश के सप्तम अंक का विमोचन किया गया।

### हिंदी चेतना पखवाड़ा

प्रत्येक वर्ष की भांति इस वर्ष भी संस्थान में दिनांक 14-09-2016 से 21-09-2016 तक हिंदी पखवाड़े का आयोजन किया गया। इस अवधि में विभिन्न प्रतियोगिताएं जिनमें निबन्ध लेखन, पोस्टर



मुख्य अतिथि द्वारा पशुधन प्रकाश के सप्तम अंक का विमोचन



प्रदर्शनी, मसोदा/टिप्पणी, अनुवाद /शब्दार्थ, पत्र लेखन, हिंदी शब्द खोज, आशु-भाषण, वैज्ञानिकों द्वारा शोध पत्र प्रस्तुतीकरण इत्यादि का आयोजन किया गया। इसके साथ-साथ स्टाफ सदस्यों के द्वारा पिछले वर्ष के दौरान - हिंदी भाषा में किये गए कार्यों का मूल्यांकन नकद पुरस्कारों हेतु किया गया।

## पशुधन प्रकाश के छठे अंक के श्रेष्ठ लेखों को पुरस्कार

दिनांक 21-09-2016 को ब्यूरो के स्थापना दिवस के सुअवसर पर हिंदी पुरस्कार वितरण समारोह का आयोजन किया गया। इस अवसर पर पशुधन प्रकाश के छठे अंक में प्रकाशित तीन श्रेष्ठ लेखों के लेखकों को नकद पुरस्कारों से सम्मानित किया गया।

### पशुधन प्रकाश (वर्ष 2015) के श्रेष्ठ लेख पुरस्कार विजेताओं की सूची

प्रथम पुरस्कार : रेखा शर्मा, सोनिका अहलावत, प्रियंका शर्मा, प्रदीप विज एवं मधु सूदन टांटिया, एनबीएजीआर, करनाल स्वदेशी कुक्कुट जर्मप्लाज्म : कुक्कुट उत्पादन में सुधार के लिए एक परिसंपत्ति

द्वितीय पुरस्कार : अरूण कुमार, सिद्धार्थ मिश्रा, इन्द्रोन चौहान एवं एस.एम.के. नकवी, सी.एस.डब्लू.आर.आई, अविधानगर राजस्थान का गौरव सिरोही बकरी व उसका पालन

तृतीय पुरस्कार : चेतना गंगवार, एस.पी. सिंह, महेश डिगे एवं अनुज कुमार सिंह, सिकरवार, सीआईआरजी, मखदूम भारतीय अर्थव्यवस्था में बकरी का योगदान : उत्पाद व उपोत्पाद

### पशुधन प्रकाश को गणेश शंकर विद्यार्थी पुरस्कार

विशिष्ट उपलब्धि के अंतर्गत इस अवधि के दौरान भारतीय कृषि अनुसन्धान परिषद् द्वारा पशुधन प्रकाश के पांचवे अंक को (2014 वर्ष) गणेश शंकर विद्यार्थी कृषि पत्रिका पुरस्कार के अंतर्गत द्वितीय पुरस्कार से सम्मानित किया गया।



डॉ आर्जव शर्मा एवं डा. अनिल कुमार मिश्र कृषि पत्रिका का पुरस्कार प्राप्त करते हुए।

## Forthcoming Event

Kerala Veterinary & Animal Science University and Society for Conservation of Domestic Animal Biodiversity (SOCDAB), ICAR-NBAGR, Karnal are organizing National Symposium on "Biodynamic Animal Farming for the Management of Livestock Diversity under Changing Global Scenario" and XIV Annual Convention of SOCDAB at College of Veterinary & Animal Sciences, Mannuthy from February 8-10, 2017. All are invited for active participation and contribution towards the theme to make the symposium a grand success.

