



ICAR-CIRB

भाकृअनुप - केन्द्रीय भैंस अनुसंधान संस्थान, हिसार
ICAR-Central Institute for Research on Buffaloes, Hisar
(ISO 9001:2015 certified institution for "Improved Buffalo Germplasm Production")



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FROM THE DIRECTOR'S DESK

As a gentle, submissive, unnoticed and somewhat less credited livestock, buffalo remains an invaluable asset to the farmers, and thus the Nation. During the year 2021-22, around 110 million buffaloes contributed half of the total milk (around 210 MT) produced in India. The buffaloes outperform cows in quality and quantity of milk with less input cost. ICAR-CIRB takes proud in being part of endeavours aimed at understanding, improving, conserving and propagating this superior dairy animal for a nutritionally secure India. ICAR-CIRB newsletter is institute effort to sensitize the readers about the happenings in research, extension and related activities.



The Central Institute for Research on Buffaloes, established in 1985, has made good academic investments in multi-disciplinary team approach for achieving success in buffalo production systems. In its continuing quest to advance understanding of buffalo biology, ICAR-CIRB has made noteworthy accomplishments in areas related to assisted reproduction, efficient nutrient utilization, and extension technologies. The scientists have crystallized some of the unique, ingenious and farmer friendly tools through continued research endeavours in conjunction with other centers of excellence in the country. The Murrah & Nili-Ravi buffaloes maintained at the Hisar & Nabha campus, respectively are the best performing herd and most sought-after germplasm locally, nationally and internationally.

I take this opportunity to gratefully acknowledge the reassurances, care, impetus and directions from Dr. Himanshu Pathak, our worthy Secretary Department of Agricultural Research and Education, and Director General, ICAR and Dr. Joykrushna Jena, Deputy Director General (Animal Sciences) for the progress of the Institute. The whole CIRB team deserves my sincere gratitude for their wholehearted support and cooperation at all times. I hope that this newsletter will strengthen the linkages with all stakeholders including farmers, scientific community and development agencies.

Dr. TK Datta
Director, ICAR-CIRB

Research Insights

ASSESSING PREGNANEDIOL GLUCURONIDE (PDG) FOR REPRODUCTIVE SUCCESS IN BUFFALOES

R Chaudhary, Suman, SK Phulia, RK Sharma, S Singh and AK Balhara

Excretion of steroid hormones in urine and faeces present a good opportunity for study of ovarian functions. From the diagnostic point of view, urine is an ideal choice of sample - secreted in large amounts, non-invasive collection, good keeping qualities and innumerable biomolecules in raw form. Progesterone, (P4), the primary pregestational hormone produced by corpus luteum and placenta in some species. Studies in the bovine estrous cycle indicate that the milk or serum progesterone concentrations reach a maximum value 13-14 days after estrus, and if the animal is pregnant, these continue to remain elevated up to day 21 after fertilization and beyond. These high levels of progesterone in serum or milk between days 18 and 24 after insemination form the basis of establishment of pregnancy in cattle. High progesterone concentrations during this period are not the specific indicators of pregnancy due to variations in duration of the estrous cycle as well as the incidence of early or late embryonic mortality. Progesterone metabolism occurs mainly in liver, enzymes located in brain, skin, and various extra-hepatic tissues in body. It is metabolised to 35 different unconjugated metabolites.

Pregnanediol glucuronide (PDG) is one of the common urinary metabolite of progesterone found in wide range of species. In bovine species, it is considered a major metabolite of the parent steroid P4. Estimation of progesterone metabolite can be alternate approach for assessing serum progesterone levels. Fig. 1 (a and b) describe general pathways and chemical structures of progesterone metabolites in mammals.

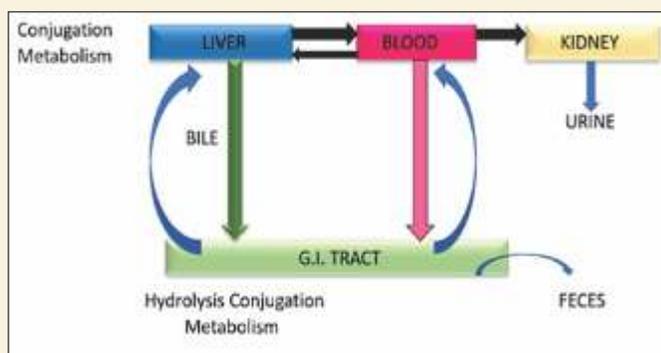


Fig. 1 (a) General pathway of metabolism in animals

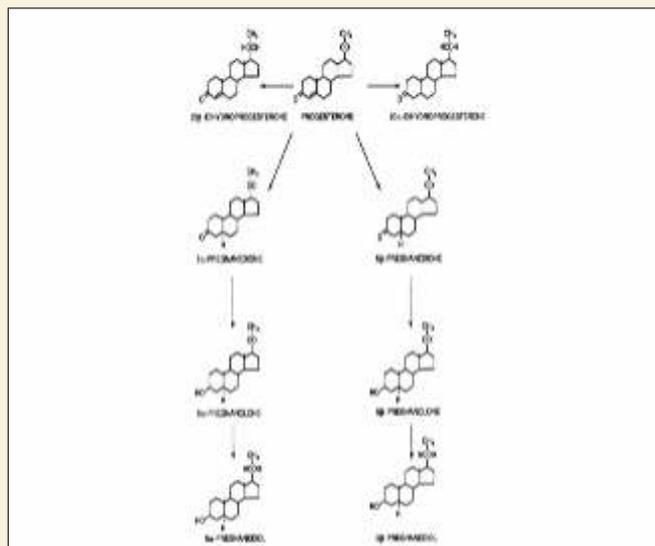


Fig 1 (b) Progesterone metabolites in mammalian urine

To explore different aspects of progesterone biology in buffaloes, approximately 50- 100 ml of normal micturated urine samples were collected, from adult breeding buffaloes (n=40) on day 0,7,14,21,28,35 and 42 post-insemination. Competitive ELISA on these samples revealed that the progesterone metabolite PDG in urine can be detected during estrus and early pregnancy. The detectable levels fall gradually in non-pregnant buffaloes day 14 post estrus indicating luteal regression. However, the concentrations significantly increased in the pregnant buffaloes with progression of pregnancy accounting for the presence of persistent corpus luteum (Fig. 2). Further investigations are required to establish PDG as a diagnostic biomarker for reproductive events in buffaloes.

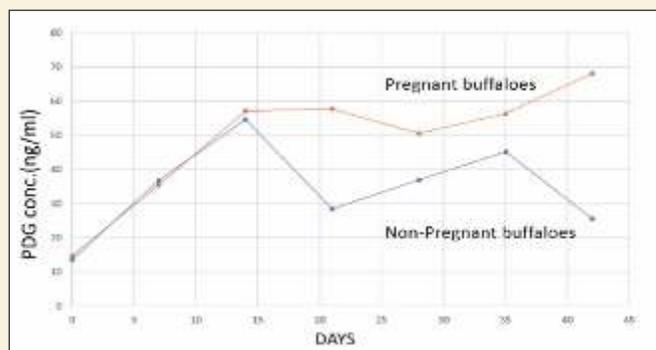


Fig.2 Variations in PDG concentration (ng/ml) in pregnant and non-pregnant buffaloes

MASTITIS DETECTION USING INFRARED THERMOGRAPHY (IRT)

R Chaudhary, Suman, SK Phulia, RK Sharma, S Singh and AK Balhara

Earliest detection is key to minimize losses due to mastitis. Infrared thermography (IRT) is one such technology that has recently got attention of researchers for different applications. It has been proposed as a diagnostic tool for assessment of physio-pathological events in animal's body. It is a modern, non-invasive, non-contact technique which does not require sedation and avoids travelling stress to the animal. Thermal imaging is very sensitive in detecting temperature differences even less than 0.05°C, which is 40 times more sensitive than the human hand. It shows the animal's physiological state by graphically mapping skin surface temperature in response to changes in blood flow and allows early detection of lesions before they are clinically visible.

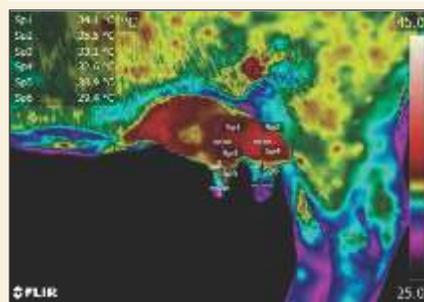
Although, thermal camera remains expensive and lack specificity regarding the etiology, thermography does

provide valuable facts for the presence of pathology. Living tissues transfer more heat related with blood stream than do dead tissues. Inflammation resulting from vasodilation, increased blood flow, pain (hypersensitivity), swelling, and hyperthermia are major signs in the early stage of infection. Skin surface temperature replicates the underlying flow and tissue metabolism, under the control of the autonomic nervous system in mammary gland. Thus, mapping skin surface temperature using IRT may evaluate udder health status.

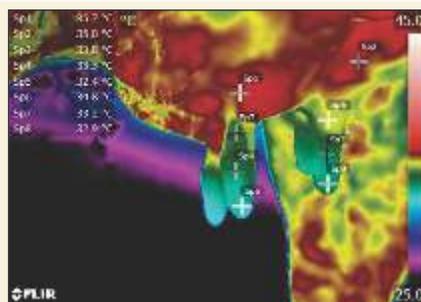
Udder Skin Surface Temperature (USST)

Studies conducted at the Central Institute for Research on Buffaloes indicated that the Udder Skin Surface Temperature (USST) of all quarters and teats of subclinical mastitis affected animals was higher than normal animals. A comparative picture of IRT in relation to different udder health conditions is given in Table 1 and Fig 3.

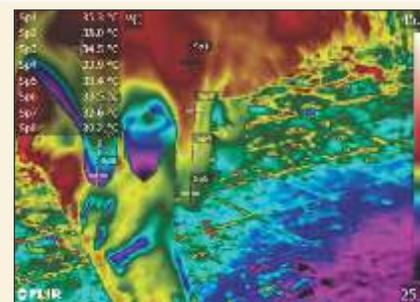
USST (°C) (Temperature measured at base of quarter)	Preliminary Interpretation on basis of IRT	CMT Score	Somatic Cell Count (SCC) (in lakhs)
< 33.5	Healthy Quarter	N(Negative)	0-200,000
33.5-34.0	Subclinical Mastitis	T (Trace)	200,000-400,000
34.1 -34.8	Subclinical Mastitis	1	400,000-1,200,000
34.8-35.5	Serious Mastitis Infection	2	1,200,000-5,000,000
> 35.6	Serious Mastitis Infection	3	Over 5,000,000



Thermogram of normal healthy animal with full udder (just before milking)
Note: Milk synthesizing tissue in udder is most vascular area and therefore highest temperature on udder. Teat base should have lowest skin surface temperature. All teats will similar colour pattern and low temperature as compared to udder.



Thermogram of animal with complete milking
Note: After complete milking, the healthy teats will have low temperature and udder also falls by 1-2 °C. All teats will similar colour pattern and low temperature as compared to udder.



Thermogram of animal with incomplete milking
Note: Incomplete milking will have irregular colour patterns over teats. Teats in completely milked quarters will have low temperature as compared to partially milked quarters.

Fig 3: Thermographic images indicating different conductions related to milking status in buffaloes

GENOME EDITING IN LIVESTOCK FOR TRAIT-SPECIFIC MODIFICATION

M Punetha, D Kumar and PS Yadav

Genome editing is a type of genetic manipulation to change the genetic makeup of cells using highly specific enzymes, such as programmable nucleases and enable the targeted modification of selected DNA sequences and expression of genes. Recently developed genome editing technologies facilitated the introduction of targeted modifications and production of genetically engineered livestock. These technological advancements significantly improved the productivity of livestock for agriculture purposes, and strengthen the field of biomedicine by providing animal models that can be more accurately represent human disease.

Among all gene editing technologies, the CRISPR (clustered regularly interspaced short palindromic repeats) and Cas9 (CRISPR-associated protein 9) systems emerged as most efficient, accurate, repeatable

and straightforward genome editing technology. Several studies demonstrated that the CRISPR/ Cas9 system has been applied to obtain mutant farm animals for several genes of productive or biomedical interest. ICAR-CIRB also initiated to use CRISPR/Cas technology for generation of gene edited embryos and animals. Currently, we are working on knock out of OCT4 and Myostatin gene using CRISPR. Myostatin (MSTN), also known as growth/differentiation factor-8 (GDF-8), is a member of the TGF- β superfamily that is expressed almost exclusively in skeletal muscle tissue, where it plays a pivotal role as a negative regulator of muscle growth and development. Mutations of MSTN gene can cause a "double-muscle" feature. ICAR-CIRB has initiated studies on MSTN and knock-out OCT4 for investigating their roles in buffalo embryogenesis. The work flow for genome editing has been described in Fig. 4

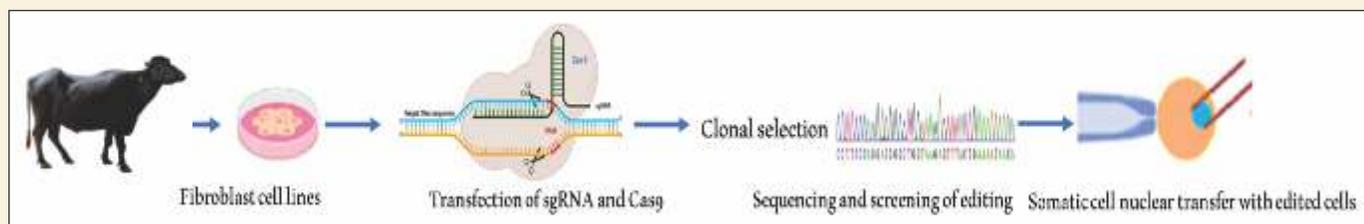


Fig. 4 Genome editing in livestock

CRYOPRESERVATION OF BUFFALO FIBROBLASTS

M Punetha, D Kumar and PS Yadav

Cryopreservation is a long-term storage technique, which is mainly used for preserving and maintaining viability of the biological samples for a longer duration. Creating cryobanks of somatic cells is considered an auxiliary instrument for the preservation and improvement of the gene pool of farm animals. The current viable options for preservation of biodiversity include whole ovary and testicular cryopreservation, embryo or oocyte freezing and vitrification, semen cryopreservation, stem cell cryopreservation, genomic libraries and somatic cells cryopreservation. Among these, somatic cells cryopreservation is advantageous due to abundant and easy collection of tissue biopsies of animals. Tissue

biopsies can be obtained in remote areas, easy to culture and have potential to multiply useful for DNA/RNA extraction, protein isolation, nuclear donor for SCNT, generation of induced pluripotent stem cells, etc.

Buffaloes' adaptability to wider range of climates and excellent feed conversion efficiency make them ideal livestock for India. The rich biological diversity of this species is progressively being eroded due to unplanned breeding. Except in few organized farms, which maintain small herds of pure breed, there is almost unrestricted interbreeding among different breeds and there is a marked decline in the availability of unique animals conforming to the attributes of defined breeds, particularly in their native

breeding tracts. Preliminary surveys conducted by the ICAR-National Bureau of Animal Genetic Resources (NBAGR) in the breeding tracts of various breeds of buffaloes indicate that some buffalo breeds need urgent attention for conservation due to their vulnerable status such as Bhadawari and Toda.

ICAR-CIRB has initiated a well-planned cryo-conservation programme of buffalo somatic cells which

can play a key part in maintaining genetic variability within a given livestock population and essentially prevent its complete extinction. In this direction, somatic cells of breeds of buffalo Murrah, Nili-Ravi, Bhadawari and Surti are being cryopreserved at ICAR-CIRB (Fig. 5 a and b). These cells will serve as an important research material to meet the future demands of buffalo based production systems.



Fig. 5 (a) Collection of tissue sample

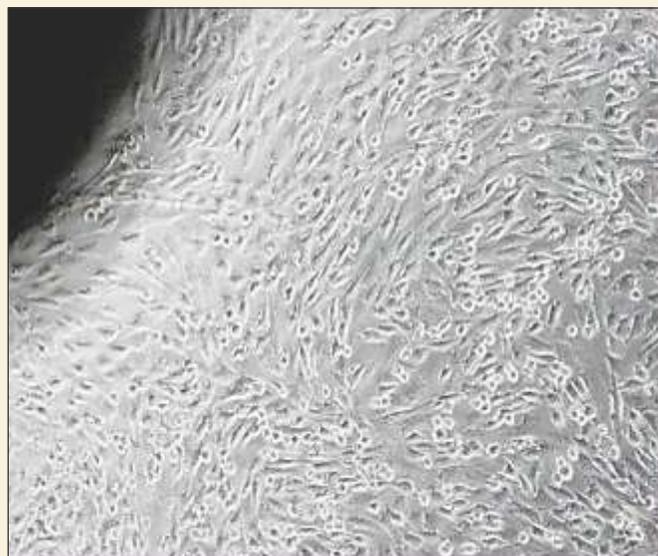


Fig. 5 (b) Sprouting of fibroblasts from tissue explant

CAN WE REDUCE SPERM DOSE FOR ARTIFICIAL INSEMINATION IN BUFFALO?

A Jerome, P Kumar, RK Sharma, M Gururaj and S Singh

In India, buffaloes play a significant role in dairy industry with contribution of 45 per cent to the total milk production. India has the world's largest buffalo population with 109.85 million headcounts with share of 20.45 per cent to total livestock population. Among descriptor type the most popular breeds are Murrah (44.39%) followed by Surti (3.58%), Mehsana (3.33%), Jaffarabadi (1.68%) and Bhadawari (1.61%). As per National Dairy Plan (NDP-I), about 50 per cent breeding population will be covered under AI from existing 35 per cent. To accomplish this target, the requirement of semen doses would be 140 million frozen semen doses annually. There is scarcity of genetically superior and tested bulls in the country to meet this extra demand. As remedy to the problem, an attempt was made to study the effect of dilution (16 million and 12 million /straw as compared to 20 million/straw) on the

structural and functional properties of buffalo sperm. From the various *in vitro* tests, it was deduced that dilution to 16 and 12 million sperm/ straw did not affect the structural and functional properties of buffalo sperm (Fig. 6).

Moreover, dilution to three different sperm doses i.e. 20, 16 and 12 million sperm/straw did not show any significant difference in conception rates under field condition in buffaloes. While estimating the economics of production of these three different doses, it was deduced that cost of production was lowest for 12 million dosage and the net profit was highest for the semen dose with 12 million spermatozoa in comparison to 16 and 20 million spermatozoa. Thus, reduction in spermatozoa per semen straw can be an effective strategy to enhance the semen production and reduce the cost of semen production in buffalo species.

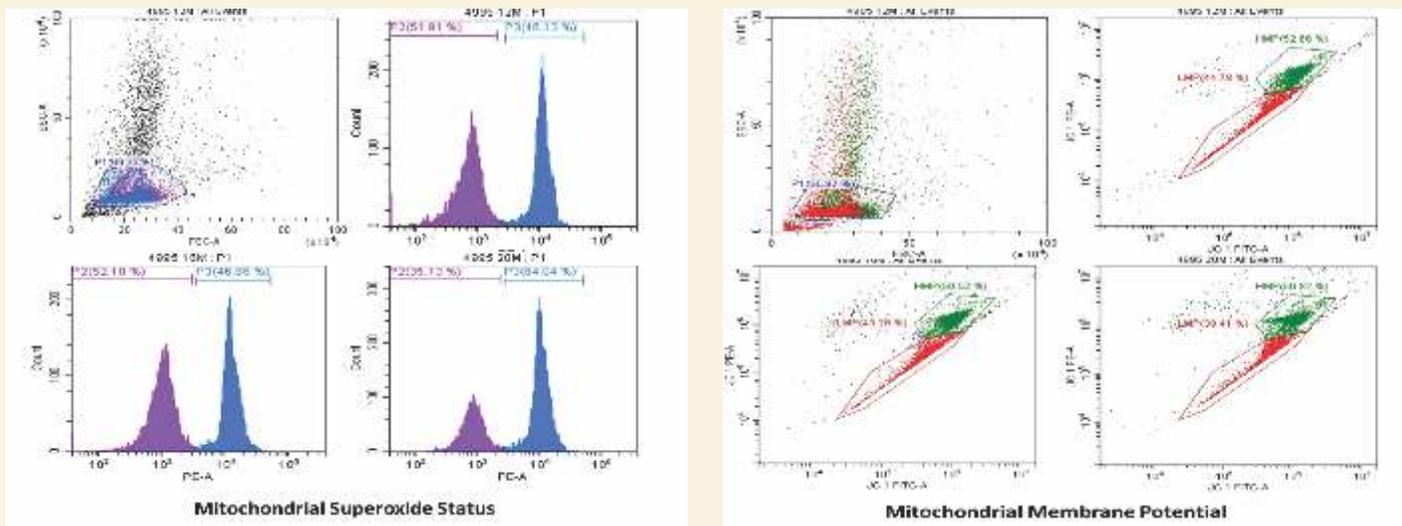


Fig. 6 : No difference observed in Mitochondrial Membrane Potential and Mitochondrial Superoxide Status in three different sperm doses.

PHYTOGENIC FEED ADDITIVE BLEND IMPROVES RUMEN FUNCTION: REDUCES ENTERIC METHANE PRODUCTION AND ENHANCES T-VACCENIC ACID

A Dey, RK Singh, S Thakur and PC Lailer

An experiment conducted to examine the effects of supplementing phytogetic feed additives blend consisting of active phytochemicals [*@ 54.6 g/h/d (Cinnamomum verm: Sapindus mukorossi: Ficus bengalensis:: 15:5:1)*] on *in vivo* methane production, feed fermentation and ruminal fatty acids composition in fistulated buffalo steers. The supplementation was done along with basal ration for 30 days and various parameters were investigated at the beginning and termination of the study. Methane concentration (%) in exhaled air was reduced ($p < 0.05$)

after supplementation, without affecting other rumen fermentation parameters (Table 2). Rumen fluid fatty acid profile (mg/ 100g of FAME) revealed enhanced *t-vaccenic* acid, a precursor of conjugated linoleic acid without affecting major fatty acids concentrations. The study revealed that phytogetic feed additive blend containing active phytochemicals could be an alternate to be used as feed additive to reduce enteric methane production and enhance human health promoting conjugated linoleic acid (CLA) content in animal products.

Table 2. Effects of phytogetic feed additive blend supplementation on rumen fermentation characteristics in Murrah buffalo steers

Attributes	Initial (Zero day)	Final(30th day)	SEM	P value
pH	6.58±0.28	6.77±0.03	0.16	0.06
Ammonia- N (mg/dL)	16.33±1.62	13.07±0.81	0.87	<0.001
Total- N (mg/dL)	126.00±7.00	121.33±4.04	2.33	0.37
<i>Volatile fatty acids concentrations (mM/100ml)</i>				
Acetate	5.35±0.13	5.41±0.03	0.15	0.12
Propionate	1.16±0.02	1.44±0.03	0.02	<0.001
Butyrate	0.64±0.05	0.59±0.01	0.03	0.26
A:P ratio	4.60±0.20	3.75±0.14	0.15	0.04
Methane Conc (%) in Exhaled air	687.84±75.28	384.86±34.02	44.61	<0.001

A POTENTIAL USE OF CYAMOPSIS TETRAGONOLOBA SEEDS (GUAR) AS A LOW COST ANTI-METHANOGENIC FEED ADDITIVE

S Yadav and A Boora

This study aimed to evaluate the potential use of *Cyamopsis tetragonoloba* seeds (Guar) as a low cost anti-methanogenic feed additive. Ruminal fluid was obtained from old year old murrah calves, from treatment group (gradual feeding of 500 gm Guar as a feed additive in addition to basal concentrate mixture, table 3) and six from control group. The samples of each group were pooled. We standardized a procedure that combines Guanidinium thiocyanate followed by phenol:chloroform extraction with subsequent cleaning of DNA using Qiagen Stool kit to obtain PCR-quality genomic microbial DNA from rumen content (Fig. 7a). This method gave a yield of 2246.58 - 2784.80 ng/ μ l genomic microbial DNA. Quantitative PCR (qPCR) assays targeting archaeal, bacterial 16S ribosomal RNA (rRNA) genes and *Ruminococcus albus* gene were performed (Fig.7b). Archeal microbial population

decreases significantly by gradual feeding of 500 gm Guar as a feed additive in addition to basal concentrate mixture. No change in bacterial population was found by qPCR (Table 4 & 5). Results show that there is a potential use of *Cyamopsis tetragonoloba* seeds (Guar) as a low cost anti-methanogenic feed additive without detrimental effect on growth of animal.

Table 3 : Chemical composition of Guar (in %)

Ingredient	Percentage (%)
i. Dry matter	89.77
ii. Crude protein	29.61
iii. Crude fibre	11.65
iv. Ether extract	03.53
v. Acid insoluble ash	03.64
vi. Neutral detergent fibre	27.11
vii. Acid detergent fibre	13.40

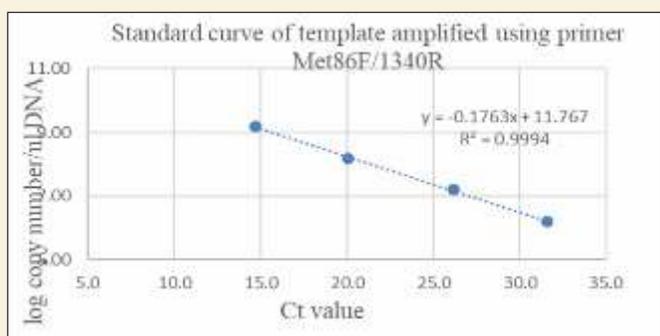


Fig. 7a : Standardization of methodology to collect rumen fluid collection through oral stomach tubing (OST) method

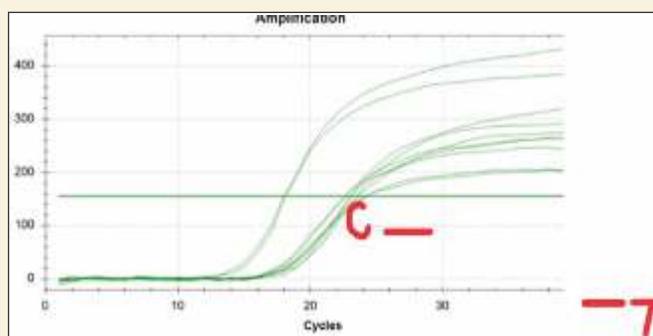


Fig. 7b : Standard curve using Archeal 16S rDNA gene amplification

Table 4 : qPCR-based quantification of Archeal microbial groups in control and treatment group (log copy number/ μ l of DNA)

Control group		Treatment group					
Sample 1	2	Sample 1	2	3	4	5	6
8.57	8.59	7.57	7.81	7.72	7.75	7.74	7.71

Table 5 : Analysis of qPCR microbial population data

Attributes	Control	Treatment	SEM	P value
Archeal	8.58 ^a	7.72 ^b	0.40	< 0.001
Bacterial	9.10	9.09	0.57	0.25
<i>Ruminococcus albus</i>	9.93	9.04	0.57	0.09

Buffalo Health & Welfare

ANTIBACTERIAL RESISTANCE : A GLOBAL EMERGENCY

SK Khurana

Multidrug resistant organisms (MROs) cause serious diseases and have been identified a major public health problem. Important examples of bacterial resistance are Methicillin-resistant *Staphylococcus aureus* (MRSA), Extended-spectrum β -lactamases (ESBLs), Multidrug-resistant *Mycobacterium tuberculosis* (MDR-TB), Extensively drug-resistant TB (XDR TB), Totally drug-resistant tuberculosis (TDR-TB), Vancomycin-resistant *Enterococcus* (VRE) and Carbapenem-resistant enterobacteriaceae (CRE).

Extended-Spectrum β -lactamase producing Gram-negative bacteria are capable of hydrolyzing penicillins, cephalosporins and monobactams (aztreonam). ESBL producing isolates are *Klebsiella pneumoniae* and *E. coli*. Resistance in *Klebsiella pneumoniae* to a last resort treatment (carbapenem antibiotics) has spread world over. *K. pneumoniae* is a major cause of hospital-acquired infections such as pneumonia, bloodstream infections, and infections in newborns and ICU patients. Resistance in *E. coli* to fluoroquinolone antibiotics used for the treatment of urinary tract infections is widespread.

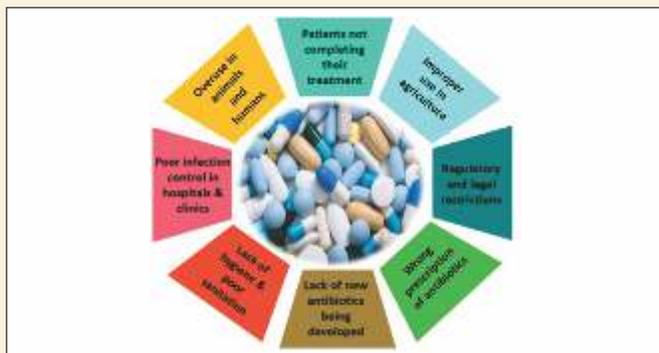


Fig. 8a : Causes of antibiotic resistance

Enterococci bacteria live in our intestines and on our skin, usually without causing problems. But if they become resistant to antibiotics, they can cause serious infections. Carbapenem-resistant enterobacteriaceae (CRE) is a family of gram-negative bacteria that are immune to the carbapenem class of antibiotics. Food industry has been identified as a potential source of antibiotic-resistant *Enterobacteriaceae*. Antibiotic-resistant bacteria are deposited into water systems through animal feces, especially in areas where many animals are kept in large-scale confinements. New Delhi Metallo- β -lactamase-1 (NDM-1) is an enzyme (carbapenemase) that makes bacteria resistant to a broad range of β -lactam antibiotics. Colistin is the last resort treatment for life-threatening infections caused by Enterobacteriaceae which are resistant to carbapenems. Fig 8a lists important cause of antibiotic resistance along with timeline (Fig 8b).

Developing new antibiotics alone will not tackle resistance. There needs to be a drastic change in the way antibiotics are prescribed and used. The key is 'use only when required' and complete recommended course.

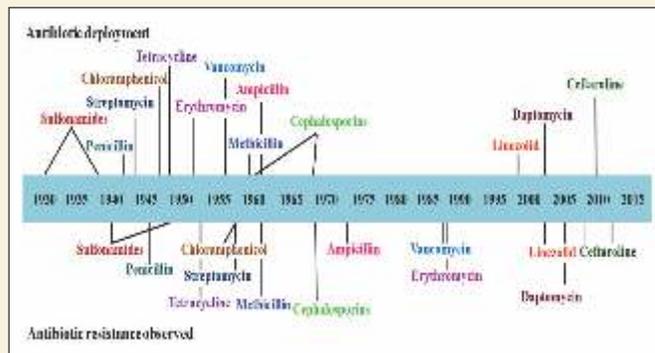


Fig. 8b : Timeline of antibiotic resistance

ENDOPARASITIC INFECTION IN BUFFALOES AND ITS CONTROL

S Kumar

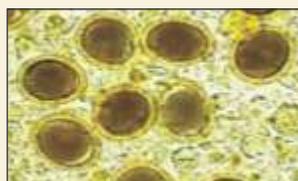
Gastrointestinal helminthic parasitism may cause economic losses to the owner by producing illness, loss of appetite, weakness, decreased feed efficiency and reduced weight gain in buffaloes. Among the gastrointestinal parasites which parasitise buffaloes. In

nematode *Toxocara vitulorum* is the most important. The other important nematode parasites found in buffaloes are *Strongyloids* spp, *Mecistocirrus digitatus*, *Haemonchus* spp., *Cooperia* spp., *Oesophagostomum* spp. and *Bunostomum* spp.

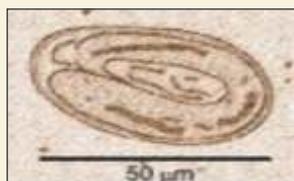
Endoparasite	Important findings in buffaloes
<i>Toxocara vitulorum</i>	<ul style="list-style-type: none"> • More common in calves • Emaciation, diarrhoea with foul-smelling yellowish faeces, and breath with butyric odour. Diarrhoea followed by constipation in buffalo calf is major clinical sign.
<i>Strongyloides</i> species	<ul style="list-style-type: none"> • Infection of the host is mainly by skin penetration • Larvae reach lungs then to small intestine <i>via</i> tracheo-oesophageal route
<i>Bunostomum</i> species	<ul style="list-style-type: none"> • Infection of the host occurs through the mouth or skin. • Larvae reach the intestine via the tracheoesophageal route • Young stock aged 3-18 months are more susceptible
<i>Fasciola gigantica</i>	<ul style="list-style-type: none"> • Most important fluke which inhabit the bile duct of buffaloes
<i>Schistosoma nasale</i>	<ul style="list-style-type: none"> • Elongate, unisexual blood fluke, inhabit the veins of the nasal mucosa • Cauliflower-like growth or granuloma in the nasal cavity, associated with a “snoring” sound and profuse mucopurulent discharge
<i>Moniezia</i>	<ul style="list-style-type: none"> • Common cestodes found in the small intestine of buffaloes. • Associated with diarrhea and ill-thrift in young calves; segments visible in faeces



Toxocara vitulorum



Toxocara vitulorum egg.



S. pappilosus egg



Bunostomum spp egg



Haemonchus egg



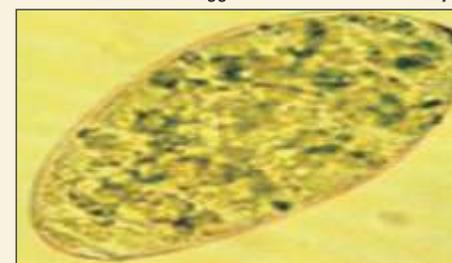
Cooperia egg



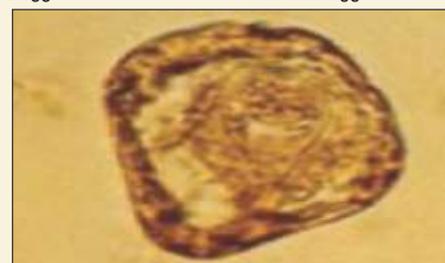
Fasciola egg



F. gigantica



Amphistome egg



Moniezia spp egg



F.gigantica and *Gigantocotyle*



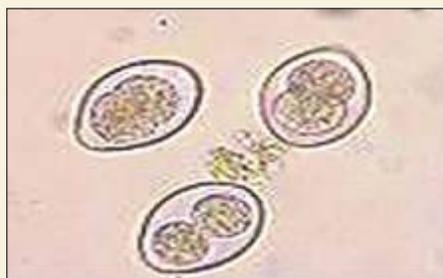
Moniezia species infection in Ruminant small intestine in buffalo



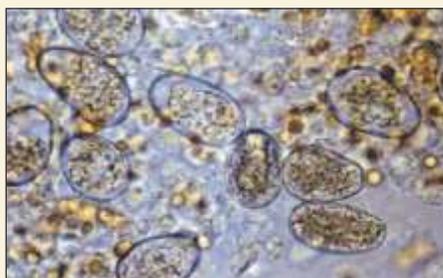
explanatum liver



Coccidiosis in calf intestine



Oocysts of Eimeria spp.



Control of gastrointestinal parasitism in buffaloes:

- Raise buffaloes in hygienic and clean surrounding, and give balanced feed. Clean the manger and water tanks regularly so that eggs of parasites are not transmitted to healthy buffaloes.
- Destroy all type of intermediate hosts of parasite (snail, cockroach, beetles, and other insects) in the feeding area.
- Keep the bedding and litter dry to prevent spread of Eimeria spp.
- Deworming of calves should be started within 15 days of their birth. Anthelmintics like Piperazine, Albendazole, Fenbendazole, Triclabendazole, etc. at regular interval as quite effective. Praziquental, anthiomalin etc. can be given for control of other parasitic infection like cestodes and Schistosomiasis.
- Adopt strict bio-security measures and avoid contact of wild animals with dairy buffaloes.
- Examine the faecal samples regularly for presence of eggs of parasites and start of treatment accordingly.

Technology Interventions

RESMI- A COMPOSITE FEED ADDITIVE FOR REDUCING ENTERIC METHANE EMISSION AND IMPROVING ANIMAL PERFORMANCE:

A Dey, SS Paul, SS Dahiya, AK Balhara, A Jerome, BS Punia and Y M Chanu

A composite feed additive has been developed consisting of methane inhibitors and alternate hydrogen sinks for reducing methane emission and improvement in fibre utilization by ruminants (Fig. 9a & 9b). Supplementation of the composite feed additive can reduce methane emission significantly by reducing number of methanogenic archaea in rumen and promoting growth of alternate hydrogen utilizers like sulphate reducing bacteria. The feed additive stimulates rumen ecosystem by increasing microbial

fibrolytic activity and thus increase fibre digestion, reduces rate of ammonia production in rumen with concomitant improvement in feed utilization and performance of buffaloes resulting in increase in growth rate by 10%, feed conversion efficiency by 15% and milk production by 10.42%. An Indian Patent (Patent No. 388717) has been granted on 08.02.2022 on “Composite Feed Additive for Reducing Methane Emission and Improving Fibre Utilization in Ruminants”.



Fig.9a : Composite feed additive developed at CIRB, Hisar



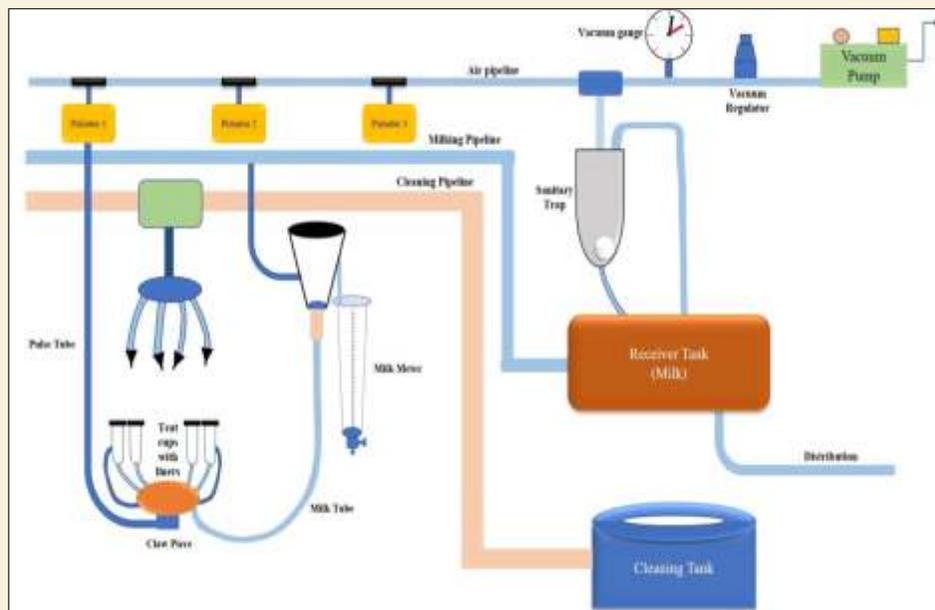
Fig. 9b : Composite feed additive fed to buffalo calves

MACHINE MILKING OF BUFFALOES – A PRACTICAL PERSPECTIVE

FC Tuteja, MH Jan, N Paul and AS Habbu

Milking machine is an automated power driven system in which animals mostly cattle and buffaloes are milked under the influence of vacuum. The milking machine has several components for vacuum production and control,

pulse generation, milking units to collect milk, milking pipeline system to transport milk to the collection tank, and cleaning and sanitizing system.



A vacuum-based milking machine with 12 cluster units was installed at ICAR-CIRB sub-campus Nabha in January 2016. The machine is fitted with customized teat cups to fit the buffalo teats.

Pros and Cons of machine milking

Pros: The pipeline milking machine enables farmers to keep more animals. A large herd of animals can be milked with minimal labour and time, thereby augmenting the profits. In addition, milk is not exposed to the outside, thereby preventing entry of hair, dung, and microbial load.

Milking of all the 4 quarters is accomplished simultaneously in 5 minutes, while hand milking takes around 10 minutes.

Cons: Aberrations and fluctuations in vacuum and pulsations often result in pathological changes such as teat end congestion and hyperkeratosis. Teats with high degree of hyperkeratosis have higher incidence of intramammary infections. Rising of vacuum beyond permissible level results in shorter milking time teat damage and increase in teat tissue thickness.

Production Performance : Farm & Network Project on Buffalo Improvement (NPBI)

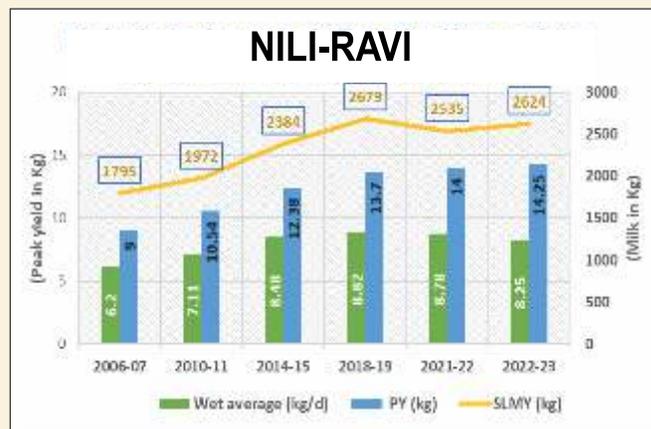
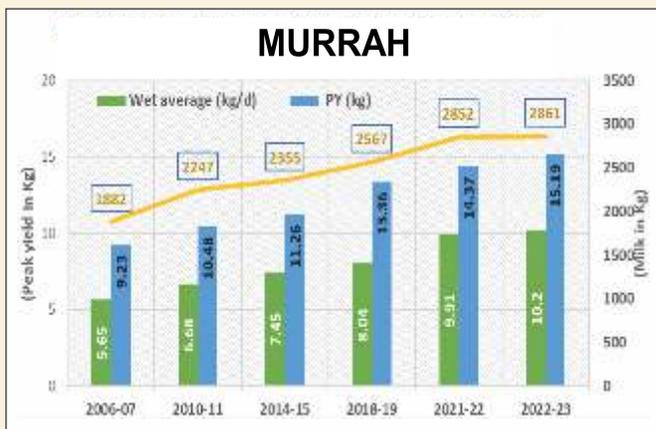
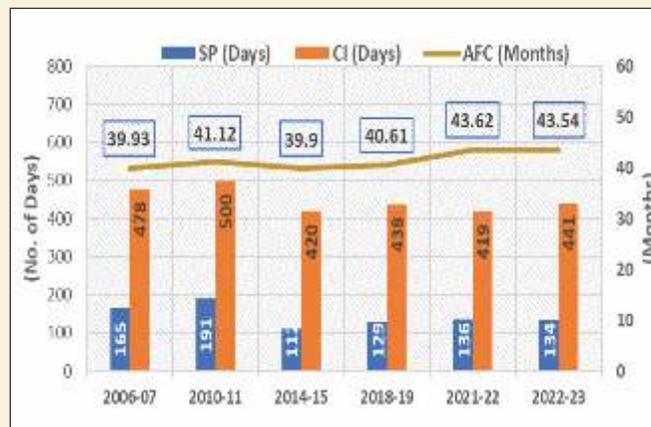
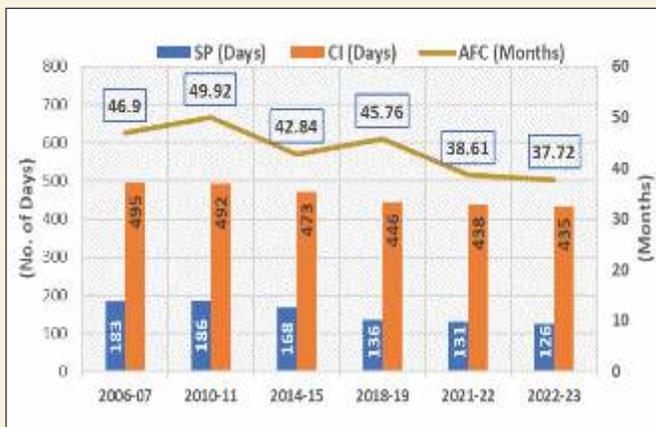
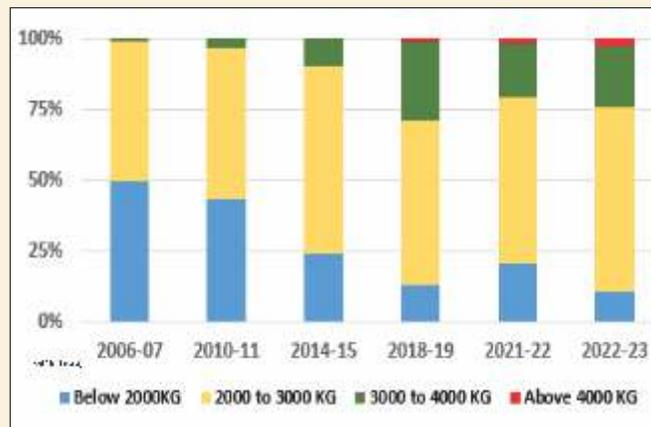
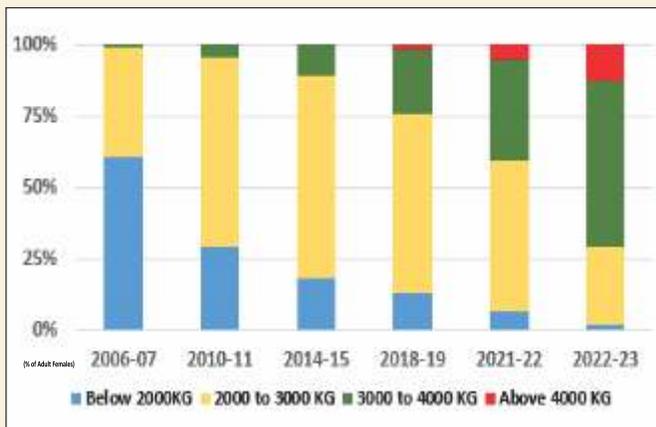


ANIMAL FARM

Institute maintains a high pedigree herd of over 500 Murrah & Nili-Ravi buffaloes at Hisar and Nabha, respectively. During the period (July to December, 2022), a total of 2,39,100 kg of milk was produced with a wet average of 10.18 kg per day per buffalo and 7.06 kg per day per buffalo of herd average from Murrah at Hisar. Similarly, at Nabha a total of 1,42,527 kg of milk was produced with 7.71 kg and 4.96 kg of wet and herd average of Nili-Ravi buffalo, respectively.

AGRICULTURAL FARM

Institute at main campus has a total area of 780 acres at Hisar, out of which about 50% of land is arable and under fodder cultivation. During the period, about 50 acres of sorghum, 30 acres of berseem & chaineese cabbage, 30 acres of berseem & oats, 57 acres of oats, 20 acres of chinese cabbage, 8 acres of mustard, 51 acres of wheat, 20 acres of barley were sown. In the same period, about 14385.05 quintal of green fodder was harvested. The sub campus Nabha has 516 acres of high fertile land. About 150 acres of wheat, 65.75 acres of barley, 69 acres of oats, 60 acres of berseem, oats and sarson, 44.5 acres of maize & bajra, 5 acres of jowar & bajra and 70 acres of mustard were sown. About 29089.50 quintals of green fodder was harvested during the period.


Productivity

Fertility

% Improvement


Breeds in Focus

BHADAWARI: BREED OF HIGH MILK FAT

B P Kushwaha, D Upadhyay and S Singh

Bhadawari buffaloes are known for high fat content (approximately 14%) in the milk. Name of this breed originated from the erstwhile “Bhadawar” estate with breeding tract in Agra, Etawah, Bhind and Morena districts. These are medium size buffaloes with average milk yield of 1450 kg per lactation. They are copper in colour with wedge-shaped body. They have comparatively small and light head and two white lines at the lower side of the neck, which is a distinct feature of these animals. Their horns are curled slightly outwards, parallel to the neck with the tips curled upwards. The udder is pink in colour with medium sized teats. The adult male weigh around 450 kg while female weigh around 400 kg. These buffaloes are adapted to the harsh conditions of the ravines with undulating topography, thorny and scanty bushes, climatic stress and draught conditions. They can easily tolerate the extreme weather conditions in the ravines where maximum temperature goes up to 48°C. The mortality rate is low as compared to other buffalo breeds. The increasing trends of Bhadawari population have been observed in 18th, 19th and 20th livestock census. One of the major instruments behind this revival in the Bhadawari population is Network Project on Bhadawari Buffaloes at ICAR- IGFRI, Jhansi started in the year 2001 with the objectives of evaluation,

improvement and conservation of the breed in its native area. Under the project Bhadawari nucleus herd was established. Since inception more than 50 bulls/bull calves have been supplied to different development agencies under the project - more than 14 lakh semen doses frozen and more than 11 lakh doses sold/ disseminated. Breeding bulls (45 number) were also supplied for natural service in the remote villages where AI facilities are not easily available. Artificial insemination as well as awareness program kishan gosthis, health camps and field visits helped dairy farmers to adopt Bhadawari breed. The efforts made under the project already started bringing the encouraging results in the form of revival of Bhadawari population as evident in recent livestock census. Sustained efforts over few more decades will certainly restore this unique breed of buffalo for posterity.

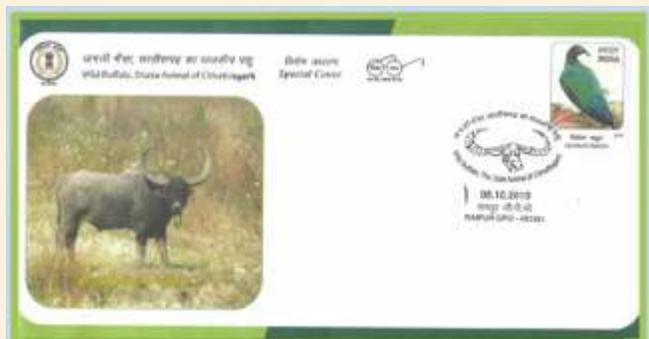
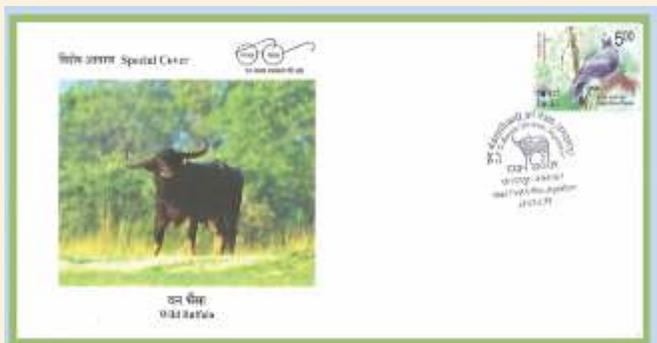


ASIATIC WILD WATER BUFFALO (*BUBALUS ARNEE*)

AK Balhara, S Balhara and TK Datta

The Asiatic wild buffalo (local name Van Bhainsa) are a record-breaking species – their horns spread up to 2m, exceeding in size the horns of any other living bovid. The animal is the state animal of Chattisgarh (photo courtesy MoEF&CC). The population of these buffaloes in India can be divided into two circuits, Central India and Northeast. Although an estimated population of around 4000 exists in the northeast, an alarming decline

has been witnessed in the Central India circuit. Currently, not more than 50 buffaloes exist in the central Indian landscape, restricted to two pockets in Chhattisgarh and a small area in bordering Maharashtra. The wild buffalo is the progenitor of domestic buffalo. The species is an endangered species as per IUCN Red List and a Schedule 1 species as per the Wildlife (Protection) Act, 1972.



Special cover released by Chattisgarh State Govt. in the year 2019

Events at CIRB



CIRB foundation day celebration

ICAR-CIRB celebrated 38th foundation day on 1 February 2022 in hybrid mode. Dr. B N Tripathi, DDG (Animal Science), ICAR, New Delhi was chief guest and Dr. M S Chauhan, Director, ICAR-NDRI, Karnal and Dr. V K Saxena,



ADG (AP&B) ICAR, New Delhi was guest of the Honour in the program. On the occasion Kisan Gosthi on successful buffalo husbandry for raising farmer's income was organised. About 200 dairy farmers were participated in the Kisan Gosthi.



25th Research Advisory Committee (RAC) meeting

Institute organised 25th Research Advisory committee meeting was held at Main Campus, Hisar. The RAC Chairman Dr. U K Mishra and other members were present on the occasion.



Shri. Mahohar Lal Khattar, Chief Minister of Haryana visited CIRB



Dr. Kamal Gupta, Urban Development minister (GoH) interacting with CIRB scientists



Guest lectures by external expert under Azadi Ka Amrit Mahotsav

CIRB Among Farmers

During the period, the Institute organized a total of 6 training programs on scientific buffalo husbandry practices at Hisar & Nabha campus. About 238 dairy farmers, rural youths and dairy women participated in the training. One day Kisan Gosthi was held at the main campus Hisar for the dairy farmers. About 60 dairy farmers from Rajasthan participated. Institute participated in pashu palan mela organised at GADVASU, Ludhiana, Punjab and Krishi Mela at Morena district, Madhya Pradesh to exhibit & demonstrate ICAR-CIRB technologies for the benefits of the end users.

CIRB organizes extension activities mainly under SCSP scheme, TSP scheme, MGMG program and Aspirational district program to uplift the socio-economic status of the resource poor farmers. During 2015, as a part of TSP program institute adopted four villages viz. Bhainson Ka Namla, Tulsiyon ka Namla, Roba ad Chatpur under Kherar

Gram Panchayat, Tehsil Salumber, Udaipur district, Rajasthan. Three more villages namely Kewalpur (V) Badisadri tehsil, Chittorgarh district, Mawal (V) & Mungthala (V) of Abu Road Tehsil, Sirohi district of Rajasthan were adopted in March 2022.

The main objective of the adoption of the villages were sensitization of dairy farmers about scientific buffalo husbandry practices through demonstrations, training programs, kisan gosthis and animal health checkup camps. With help of Rajasthan state animal husbandry department, the institute has provided 4500 doses of elite Murrah frozen semen for distribution in the field and four bulls for natural service during 2015 to March 2022. Calves born out of insemination from the CIRB semen have good acceptance among villages and are the most sought-after dairy animals. The dairy farmers look at these animals as good milk yielders with an early age of conception.



Participation in Krishi Mela at Morena (MP)



Kisan Gosthi at CIRB, Hisar



Scientific Buffalo Husbandry Training at CIRB



Scientific Buffalo Husbandry Training at Nuh, Aspirational District Haryana

