



CENTRE OF ADVANCED FACULTY TRAINING
ANIMAL GENETICS & BREEDING
DAIRY CATTLE BREEDING DIVISION, NDRI,
KARNAL

Introduction:

Animal Genetics and Breeding division, earlier known as Dairy Cattle Breeding (DCB) division was among the very first departments established at NDRI. Presently, the division is a part of production group in NDRI, Karnal. The division has mandates on Research, Teaching and Extension in the area of Animal Genetics & Breeding. The division is continuing the research under the programme “Genetic improvement of milch animals through identification and dissemination of superior germplasm by application of emerging reproductive and molecular technologies”. The division is being entrusted with the responsibility of developing Human Resource in the area of Animal Genetics & Breeding, and also imparting National and International trainings and consultancy. AG&B division is involved in the development of superior germplasm and its dissemination to farmers and stakeholders involved in dairy development in the country.

The division is involved in conducting research in the areas of Animal Genetics including Molecular Genetics, Animal Breeding, and Animal Genomics. The main thrust areas in research include genetic improvement of indigenous milch cattle breeds (Sahiwal, Tharparkar, Gir), HF crossbred cattle, and Murrah buffaloes. The genetic improvement is being attempted through selection and progeny testing programme for faster multiplication of superior germplasm. In Murrah buffaloes both institutional herd and field progeny testing unit are working at NDRI, Karnal since 1993-94 and 2002-03, respectively. In order to improve the growth, production and reproduction performances of dairy animals, the department has developed various animal breeding research methodologies for selection of elite animals. In the recent past, the department is working for developing a genomic based selection and breeding strategies.

The Center for Advanced Faculty Training (CAFT) in Animal Genetics and Breeding was established during eighth plan in this division, and its activities are being continued to strengthening research, teaching and imparting training to scientists/ teachers from State Agricultural and Veterinary Universities, Research Institutes and in advanced areas of Animal Genetics and Breeding. The centre was earlier known as Centre for Advanced Studies (CAS). A total of 35 National Training Programmes have so far been organized (till 2019) under the aegis of CAFT in the Division. The division has the state-of-the-art structures for

research facilities consists of Advanced Animal Breeding and Buffalo breeding labs with latest software facilities, Molecular Genetics Labs, Livestock Record Cell. The division has 9 Scientists, 3 Technical assistant, one Administrative and one Supporting staffs. The divisional Library, teaching and training infrastructure have also been strengthened under CAFT. The Divisional Library has 427 books, 272 M.V.Sc and 128 Ph.D theses.

The department has following infrastructure facilities / labs:

- ✓ Animal Breeding Lab
- ✓ Buffalo Breeding Lab
- ✓ Class Room
- ✓ Divisional Library
- ✓ DNA Bank
- ✓ Livestock Record Room
- ✓ Molecular Genetics Lab
- ✓ Seminar room

Faculty: Name & Designation: (as on 15.01.2020)

1. Dr. S. M. Deb, Principal Scientist & Head (Director CAFT)
2. Dr. I. D. Gupta, Principal Scientist
3. Dr. (Ms.) Archana Verma, Principal Scientist
4. Dr. (Mrs.) Anupama Mukherjee, Principal Scientist
5. Dr. S. Mukherjee, Principal Scientist
6. Dr. Vikas Vohra, Principal Scientist
7. Dr. Gopal Rawane, Senior Scientist
8. Dr. S. K. Rathi, Scientist
9. Dr. Rani Alex, Scientist

Technical assistants (as on 15.01.2020)

1. Sandeep Kumar, STA
2. Meenu, T-3
3. Mukesh Onkar, T-3

Administrative (as on 15.01.2020)

Mr. Deepak Kumar, UDC

Supportive Staff (as on 15.01.2020)

Mr. Mahinder Singh, SSS

Human Resource Development:

Particulars of Short Courses / Training program for HRD conducted during period 2017-2020

<i>S. No.</i>	<i>Name of the Program</i>	<i>Period</i>	<i>No. of Participants</i>		
			<i>Internal</i>	<i>External</i>	<i>Total</i>
1	Skill Development for Sustainable Livestock Productivity in the Genomic Era	6 th to 26 th March 2017 (21 days)	1	18	19
2	Tools for genetic improvement of Animal Welfare and Productivity	25 th Feb to 17 th March 2019 (21 days)	1	17	18
3	Phenomics and Genomic Evaluation of Dairy Animals for Sustainable Production	2 nd to 22 nd Jan 2020 (21 days)	0	20	20

Infrastructure development (equipment etc.) :

Gradient PCR machine, Refrigerated Centrifuge and minor lab equipment.

Renovation of Lecture Room/ Laboratories : Nil.

Library upgraded

: CAFT cum Divisional Library was upgraded.

Awards/Recognitions:

2017

- Dr Vikas Vohra received Outstanding Achievement Award-2017, for meritorious and significant contribution made in Agriculture and Allied Sciences by Society for Bioinformatics and Biological Sciences (SBBS) – SUKAST (Jammu)
- Dr Vikas Vohra received Best Oral Presentation award for paper presented entitled “Bovine leptin gene is associated with lactation persistency in crossbred cattle” at XIII National Conference of Indian Society of Animal Genetics and Breeding on Challenges in Quantitative Genetics for Improvement of Indigenous Animal Genetic Resources (AnGR). ICAR-Indian Veterinary Research Institute, Izatnagar-243122, Bareilly (UP) during 19-20 January 2017
- Dr Vikas Vohra received Best Oral Presentation award for paper presented entitled “Fifth monthly test day fat yield depicts maximum heritability estimate in Murrah buffaloes” XIII National Conference of Indian Society of Animal Genetics and Breeding on Challenges in Quantitative Genetics for Improvement of Indigenous Animal Genetic Resources (AnGR). Organized by ICAR-Indian Veterinary Research Institute, Izatnagar-243122, Bareilly (UP) during 19-20 January 2017
- Dr Vikas Vohra received best poster award for paper entitled “Lesser known sheep population of Northern and Western India” presented at National seminar on Improvement of small ruminant production system for livelihood security”. Organised by Indian Society for Sheep and Goat Production in collaboration with ICAR-CSWRI Avikanagar and ICAR-CIRG Makhdoom during 9-10 March 2017.

2018

- Singh R, Kumar L S, Gurao A, Mishra SK, Niranjana SK, Vohra V. Dash SK and Kataria RS, received Prof. KN Sharma, Memorial Award (2018) for Best Research Paper entitled “STR markers based genetic diversity evaluation of Chilika buffalo of Odisha state” Published in the Journal of livestock biodiversity 8(1): 29-35
- Dr Vikas Vohra received Best Oral presentation award at International Seminar on Recent Trends and Experimental Approaches in Science, Technology, Nature and Management (Society for Science and Nature) 23-24 Dec., 2018 at FDDI, Jodhpur

2019

- Dr. Vikas Vohra and co-workers, received Best Oral Presentation Award (2019) during XVI National Symposium on Animal Genetic Resources for Food and Social Security (Society for Conservation of Domestic Animal Biodiversity) 7-8 February, 2019 organized by ICAR-National Bureau of Animal Genetic Resources, Karnal - 132001, Haryana
- Shabhat Mumtaz received Young Scientist Award (2019) to paper entitled “Population structure and genetic diversity of Sahiwal dairy cattle in organized herd through pedigree analysis” by Mumtaz, S. and Mukherjee, A. presented at XVI National Symposium held at NBAGR, Karnal on 7 - 8th February, 2019.

Publications:

Research publications:

2017

- Bangar Y C, Lawar V S, Nimase R G, Gowane G, Pachpute S T and Nimbalkar C A. (2017) Estimates of covariance components and genetic parameter for growth traits in Deccani sheep. *The BioScan*, 12(2):913-917
- Dash S K, Gupta A K, Singh A, Kumar V, Shivahre P R and Singh M. (2017) Logistic regression analysis for prediction of stayability of Karan Fries crossbred cattle. *Indian Journal of Dairy Science*. 70(2):247-250
- Gowane GR, Akram N, Prince L L L, Prakash V and Kumar A. (2017) Ovar-MHC Polymorphism in Malpura and Avikalin Sheep Vaccinated for Peste des Petits Ruminants (PPR) Virus. *Animal Biotechnology*, 28(4):306-314
- Gowane GR, Akram N, Prince L L L, Prakash V and Kumar A. (2017) Genetic appraisal of serological response post vaccination against enterotoxaemia (ET) in Malpura and Avikalin sheep. *Tropical animal health and production*. 49(4):867-873
- Jain V, Patel B, Umar F P, AjithaKumar H M, Gurjer S K, Gupta I D and Verma A. (2017) Identification of Single Nucleotide Polymorphism in Protein Phosphatase 1 Regulatory Subunit 11 (PPP1R11) gene in Murrah bulls. *Veterinary World* 10 (2):244-248
- Kumar M, Ratwan P, Das R, Chopra A and Vohra V. (2017) Allelic diversity of butyrophilin (BTN1A1) gene in Indian bovines. *Indonesian Journal of Biotechnology*. 22(2):92-97
- Mishra A K, Vohra V, Raja K N, Singh S and Singh Y. (2017) Principal component analysis of biometric traits to explain body conformation in Kajali sheep of Punjab, India. *Indian Journal of Animal Sciences*. 87(1):93-98
- Mumtaz S, Mukherjee A, Abdul R, Parveen K, Joshi P, Yadav A K and Gupta A K. (2017) Association of single nucleotide polymorphisms of PPP1R11 gene with conception rate in Karan Fries bull. *Indian Journal of Animal Research*. 52:1548-1551
- Rathee S K, Gupta, A K, Raja T V and Chakravarty A K. (2017) Factors influencing production and reproductive performance of Frieswal cattle maintained at organized farm conditions. *Indian Journal of Animal Sciences*, 87(11):1350-1357
- Singh S, Mishra AK, Vohra V, Raja KN, Singh Y, Singh KM, Ganguly I And Arora R. (2017) Microsatellite based genetic diversity estimation in Kajali sheep and its phylogenetic relationship with other indigenous sheep breeds. *Indian Journal of Animal Sciences*. 87(9):1097-1101
- Shivahre P R, Gupta A K, Panmei A, Chakravarty A K, Bhakat M, Dash S K, Sahoo S K, Kumar V, and Singh M. (2017). Effect of nongenetic factors on semen production characteristics of Murrah buffalo bulls at organized semen station. *Buffalo Bulletin*, 36(1):115-122
- Upadhyay A, Chakravarty A K, Gupta A K, Selvan A S and Singh A P. (2017) Impact of environmental factors on milk constituents and yield traits in Murrah buffaloes. *Indian Journal of Animal Sciences*, 87(7):912-918
- Valsalan J, Gupta A K, Chakravarty A K and Mir M A. (2017) Estimation of genetic parameters for milk composition traits in indian murrah buffaloes. *Advances in Animal and Veterinary Sciences*. 5(5):229-233
- Vohra V, Chopra A, and Chakravarty A K. (2017) Prediction of lactation persistency in crossbred cattle using genotype profile of lactation curve traits. *Indian Journal of Animal Sciences*. 87(1):97-104

- Vohra V, Singh M, Das R, Chopra A and Kataria R S. (2017) Multivariate analysis of biometric traits and their shared variance in Chhattisgarhi buffalo. *Indian Journal of Animal Sciences*. 87 (7):864-870
- Vohra V, Singh M, Mukherjee K and Kataria R S. (2017) Identification and characterization of Chhattisgarhi buffalo population in India. *Indian Journal of Animal Sciences*. 87(2):182-185
- Vohra V, Sodhi M, Niranjana S K, Mishra A K, Chopra A, Kumar M and Joshi A K. (2017) Characterization of rare migratory cattle and evaluation of its phylogeny using short-tandem-repeat-based markers. *Journal of Applied Animal Research*. 45(1):355-363
- Yousuf S, Singh A, Gupta A K, Singh M, Dash S and Mir M A. (2017) Comparison of genetic parameters of first lactation 305 day milk yield using single versus multi-trait animal models in Murrah buffaloes. *Indian Journal of Dairy Science*, 70(6):741-744

2018

- Behera R, Chakravarty A K, Kashyap N, Bharti, Rai S, Mandal A, Singh A and Gupta A K. (2018) Identification of most suitable temperature humidity index model for daily milk yield of Murrah buffaloes in subtropical climatic condition of India. *Indian Journal of Animal Sciences*, 88(7):834-837
- Behera R, Chakravarty A K, Sahu A, Kashyap N, Rai S, Dash S, Upadhyaya A, Singh A and Gupta A K. (2018) Identification of critical heat stress zone for energy corrected milk yield in Murrah buffaloes using temperature humidity index under subtropical climatic conditions. *Indian Journal of Animal Sciences*, 88(7):838-841
- Chitra A, Jain A, Kumar M, Ratwan P and Gupta A K. (2018) Effect of genetic and non-genetic factors on milk yield and milk composition traits in Murrah buffaloes. *Indian Journal of Animal Research*. 52(2):304-308
- Dash S K, Gupta A K, Manoj M, Kumar V, Shivhare P R and Valsalan J. (2018) Analysis of lifetime performance in Karan Fries Cattle. *Indian Journal of Animal Research*, 52(5):761-767
- Dash S K, Gupta A K, Singh A, Chakravarty A K, Singh M and Kumar V. (2018) Performance appraisal and genetic parameter estimation of all lactation traits in Karan Fries cattle. *Indian Journal of Animal Research*, 52(1):7-12.
- Gowane G R, Akram N, Misra S S, Prakash V and Kumar A. (2018) Genetic diversity of Cahi DRB and DQB1 genes in Sirohi goat. *Journal of Genetics*, 97(2):483-492
- Gowane G R, Prince L L L, Paswan C, Sharma R C and Naqvi S M K. (2018) Migration pattern of Desi sheep of Gujarat – a note. *Journal of Livestock Biodiversity*. 8(1):16-19
- Gowane G R, Swarnkar C P, Prince L L L and Kumar A. (2018) Genetic parameters for neonatal mortality in lambs at semi-arid region of Rajasthan India. *Livestock Science*, 210:85-92
- Jain V, Patel B, Gupta I D and Verma A. (2018) Exploration of genetic polymorphism in targeted region of Protein Phosphatase 1 Regulatory subunit 11 (PPP1R11) in Murrah bulls. *Indian Journal of Animal Research*. 52: 1409-1412
- Jyoti, Akram N, Kumar R, Kashyap S K, Kumar A and Gowane G R. (2018) Variability of Myostatin gene and its association with growth traits in Malpura sheep. *Indian Journal of Small Ruminants*. 24(2):230-238
- Kour A, Chakravarty A K, Gupta A K and Raina V. (2018) Identification of genetic marker for CSN3 gene in Karan Fries (Holstein Friesian crossbred) population. *Indian Journal of Animal Sciences*, 88(7):808-811
- Kumar A, Mandal A, Gupta A K, Karunakaran M, Das S K and Dutta T K. (2018) Genetic

- analysis of fertility traits in Jersey crossbred cows. *Indian Journal of Animal Research*. 52(8):1113-18
- Mohan G, Gowane G R, Kumar A and Chakravarty A K. (2018) Replacement rate and its components in Malpura sheep in an organized farm of Rajasthan. *Indian Journal of Small Ruminants*. 24(2):221-224
- Mukherjee A, Mukherjee S, Dhakal R, Mech M, Longkumer I, Haque N, Vupru K, Khate K, Jamir I Y, Pongen P, Rajkhowa C, Mitra A, Guldbbrandtsen B and Sahana G. (2018) High Density Genotyping reveals Genomic Characterization Population Structure Genetic Diversity of Indian Mithun (*Bos frontalis*). *Scientific Reports*. 8(1):10316
- Parveen K, Gupta A K, Gandhi R S, Chakravarty A K and Mumtaz S. (2018) Genetic analysis of trends in production traits of Sahiwal cows over years using blup with animal model. *Indian Journal of Dairy Science*, 71(4):396-403
- Parveen K, Gupta A K, Gandhi R S, Chakravarty A K and Mumtaz S. (2018) Genetic analysis of trends in production and reproduction traits over years using regression methods in Sahiwal cows. *Indian Journal of Animal Sciences*, 88(3):84-91
- Parveen K, Gupta A K, Gandhi R S, Kalim O and Mumtaz S. (2018) Effect of temperature humidity index on milk production performance of Sahiwal cows. *Indian Journal of Dairy Science*, 71(5):478-482
- Poonam R, Chakravarty A K, Kumar M, Gupta A K, Lathwal S S and Malhotra R. (2018) Production performance and estimation of genetic parameters of production traits in Sahiwal cattle. *Indian Journal of Animal Sciences*, 71(6):592-597
- Sharma A K, Bhatt M, Sankar M, Mohapatra J K, Dash B B, Gowane G R, Saravanan S, Ranjan R and Pattnaik B. (2018) Kinetics of Interferon gamma and Interleukin-21 response following foot and mouth disease virus infection. *Microbial Pathogenesis*. 125:20-25
- Singh R, Lavakumar S, Gurao A, Mishra S K, Niranjana S K, Vohra V, Dash S K and Kataria R S. (2018) STR Marker based genetic diversity evaluation of Chilika buffalo of Odisha State. *Journal of livestock biodiversity*. 8(1): 29-35
- Singh R, Niranjana S K, Rajesh C, Mishra S K, Vohra V, Dash S K, Misra D and Kataria R S. (2018) Cytogenetic characterization of Kalahandi and Paralakhemundi buffaloes of Odisha state confirms their riverine status. *Indian Journal of Dairy Science*. 71(3): 279-283
- Singh R, Rajesh C, Mishra S K, Gurao A, Vohra V, Niranjana S K and Kataria R S. (2018) Comparative expression profiling of heat-stress tolerance associated HSP60 and GLUT-1 genes in Indian buffaloes. *Indian Journal of Dairy Science*. 71(2):183-186
- Sourabh S, Verma A, Gupta I D and Kumar B. (2018) Novel SNPs in DGAT1 gene and their association with milk traits in Murrah buffaloes. *Indian Journal of Dairy Science*. 71(2):187-192
- Vohra V. (2018) Genomic selection and its significance in Indian dairying. *Indian Journal of Dairy Science*. 71(6): 539-545

2019

- Ali S S, Kuralkar S V, Ingawale M V, Waghmare S P, Manwar S J, Kataria R S and Vohra V. (2019) Phenotypic characterization, management and socio-economic impact of Purnathadi buffaloes. *Indian Journal of Animal Sciences*. 89(10):1161-1166
- Chauhan I S, Misra S S, Kumar A and Gowane G R. (2019) Survival analysis of mortality in pre-weaning kids of Sirohi goat. *Animal*. 13(12):2896-2902
- Gowane G R, Kumar A and Nimbkar C. (2019). Challenges and opportunities to livestock

- breeding programmes in India. *Journal of Animal Breeding and Genetics*. 136(5):329-338
- Gowane G R, Lee S H, Clark S, Moghaddar N, Al-Mamun H A and van der Werf J H J. (2019) Effect of selection and selective genotyping for creation of reference on bias and accuracy of genomic prediction. *Journal of Animal Breeding and Genetics*. 136(5):390-407
- Gowane G R, Swarnkar C P, Misra S S, Kumar R, Kumar A and Prince L L L. (2019) Genetic parameter estimates for fecal egg counts and their relationship with growth in Avikalin and Malpura sheep. *Animal*. 13(9):1788-1796
- Lavakumar S, Singh R, Niranjana S K, Mishra S K, Kumar P, Vohra V, Dash S K and Kataria R S. (2019) Cytogenetic characterization of Sambalpuri and Manda buffaloes of Odisha. *Indian Journal of Animal Sciences*. 89(1): 53-56
- Mahala S, Saini S, Kumar A, Prince L L L and Gowane G R. (2019) Effect of non-genetic factors on growth traits of Avikalin sheep. *Small Ruminant Research*. 174:47-52
- Mallick P K, Chauhan I S, Gowane G R, Thirumurgan P, Murali G and Kumar A. (2019) Average daily gain and klieber ratio in Bharat merino sheep. *Indian Journal of Small Ruminants*. 25:151-155
- Mishra S K, Dubey P K, Dhiman A, Dubey S, Verma D, Kaushik A C, Singh R, Niranjana S K, Vohra V, Mehrara K L and Kataria R S. (2019) Sequence-based structural analysis and evaluation of polymorphism in buffalo Nod-like receptor-1 gene. *3 Biotech*. 9(1): 26
- Mishra S K, Dubey P K, Goyal S, Singh S, Niranjana S K, Vohra V, Mukesh M and Kataria R S. (2019) Identification of novel polymorphism in buffalo stanniocalcin-1 gene and its expression analysis in mammary gland under different stages of lactation. *Journal of Genetics*. 98:38
- Mukherjee A, Mukherjee S, Longkumer I, Mech M, Haque N, Vupru K, Khate K and Rajkhowa C. (2019) Genomic Characterization of Mithun (*Bos frontalis*) Populations using High Density SNP array. *Indian Journal of Genetics and Plant Breeding*. 79(1):
- Mukherjee S, Mukherjee A, Jasrotia R S, Jaiswal S, Iquebal M A, Longkumer I, Mech M, Vupru K, Khate K, Rajkhowa C, Rai A and Kumar D. (2019) Muscle transcriptome signature and gene regulatory network analysis in two divergent lines of a hilly bovine species Mithun (*Bos frontalis*). *Genomics*. 112(1):252-262
- Mumtaz S and Mukherjee A. (2019) Incidence of Inbreeding and its Influence on Performance Traits in Sahiwal Cattle. *Journal of Livestock Biodiversity*. 9(1):36-40
- Nehra A K, Gowane G R, Kuriyal A, Chaurasiya A, Kumar R, Bhinsara D B, Parthasarathi B C, Bhawana K, Khare R K, Prasad A, Chandra D and Sankar M. (2019) Immune response against subclinical haemonchosis in Himalayan hill goats. *Veterinary Parasitology*. 267:47-53
- Pandey M, Raja K N, Yousuf S and Gupta A K. (2019) Effect of non-genetic factors on First Lactation 305 days and Lifetime Milk Yield in Sahiwal cattle. *Indian Journal of Dairy Science*, 72(1): 89-92
- Ratwan P; Chakravarty A K, Kumar M and Gupta A K. (2019) Genetic analysis of reproductive traits of Sahiwal cattle. *Indian Journal of Animal Sciences*. 89(9):961-965
- Ratwan P; Chakravarty A K, Kumar M, Sharma N, Kour A and Gupta A K. (2019) Assessment of expected genetic gain in average daily milk yield in different milk productivity groups on simulating selection intensity in Sahiwal cattle. *Indian Journal of Animal Sciences*. 89(7):100-102
- Saikia J, Verma A, Gupta I D, Singh S and Hazarika D. (2019) Identification of genetic

- variants in HSF1 gene and their association with heat tolerance in Murrah buffaloes. *Indian Journal of Animal Sciences*. 89(10): 1099–1103
- Singh K V, Dixit S P, Sharma A, Vohra V, Kant N, Dangi P S and Kumar R. (2019) Differentiating characteristics among three new goat populations from north India. *Indian Journal of Animal Sciences*. 89(7):746-751
- Singh N P, Vohra V, Das R, Verma U, Tantia M S and Kataria R S. (2019) Elucidating the genetic diversity using SSR based markers in Gojri buffalo. *Indian Journal of Animal Sciences*. 89(5):522-527
- Sharma R, Ahlawat S, Sharma H, Kulkarni V S, Kataria R S, Vohra V and Tantia M S. (2019) Microsatellite based Genetic Diversity and Mutation-Drift Equilibrium in Dharwadi Buffalo (*Bubalus bubalis*) of India. *Agricultural Research*. 8(4):553–558
- Swarnkar C P, Gowane G R, Prince L L L and Sonawane G G. (2019) Risk factor analysis for neonatal lamb mortality in Malpura sheep. *Indian Journal of Animal Sciences*. 89(6):640-644
- Gowane G R, Akram N, Misra S S, Chopra A, Sharma R C and Kumar A. (2020). The breeding structure for the small ruminant resources in India. *Tropical Animal Health and Production*. [Epub ahead of print]

Books/ Proceedings/ Manuals:

S. No.	Title	Authors	Year	Published by
1.	Skill Development for Sustainable Livestock Productivity in the Genomic Era	Anupama Mukherjee, M. Bhakat, A.K. Gupta & A.K. Chakravarty	2017	CAFT (AG&B), ICAR-NDRI, Karnal
2.	Tools for Genetic Improvement of Animal Welfare and Productivity	Anupama Mukherjee, M. Bhakat, A.K. Gupta & S.M. Deb	2019	CAFT (AG&B), ICAR-NDRI, Karnal
3.	Phenomics and Genomic Evaluation of Dairy Animals for Sustainable Production	Vikas Vohra, Anupama Mukherjee, Sudarshan Kumar & S.M. Deb	2020	CAFT (AG&B), ICAR-NDRI, Karnal

Financial Statement:*Expenditure under CAFT during period 2017-2020*

Head	2016-17	2017-18*	2018-19	2019-20**
Operating cost of Training	371235.00	Nil	425517.00	656500.00
Recurring Contingency	279071.00	46749.0	315992.00	400000.00
T.A.	-	Nil	3200.0	50000.00
Library	-	Nil	-	35000.00
Works (minor repairs /renovation)	Nil	Nil	Nil	Nil
Equipment	Nil	Nil	485625.00	Nil
Total	650306.00	46749.0	1230334.00	1141500.00

* No training programme was conducted during 2017-18.

** Total sanctioned amount is shown under different heads in the column 2019-20. The preparations of the programme are in progress and the final expenditure statement will be submitted at the end of the financial year 2019-20.

(S. M. Deb)
Principal Scientist & Head
Director CAFT (AG&B)