

**Name of Department: Animal Genetics & Breeding**

**Faculty Information:**

<b>Sr. No.</b>	<b>Name</b>	<b>Designation</b>	<b>Email Address</b>	<b>Contact No.</b>	<b>Joining year</b>	<b>Qualification</b>	<b>Experience</b>	<b>Publications</b>
1	Dr. R.S.Joshi	Professor and Head	<a href="mailto:rsjoshi106@gmail.com">rsjoshi106@gmail.com</a>	9428479711	1987	Ph.D.	33	68 Research Paper+ 8 book Chapter +61 Popular Article
2	Dr. A.C.Patel	Assistant Professor	<a href="mailto:aashishvet@gmail.com">aashishvet@gmail.com</a>	6352709188	2012	Ph.D.	9	41 Research Paper+ 3 book Chapter +15 Popular Article

## **Department of Animal Genetics & Breeding**

### **About the department**

- Department of Animal Genetics & Breeding was established in 1st August 1967
- Department of Animal Genetics & Breeding is actively involved in teaching, research and extension since its inception.
- Department being carried out research in all branches of genetics – Quantitative and Population genetics, Biochemical genetics, Cytogenetics and Molecular genetics.
- The department is known at national level for its contribution in molecular characterization of indigenous livestock breeds of India viz., Gir, Kankrej, Dagri, Malvi, Nimari, Kankantha, Gaolao, Dangi, Khillar cattle breeds, Jaffarabadi, Mehsani Buffalo buffalo breeds, Gohilwadi, Zalawadi, Surti, Kahmi goat breeds, Patanwadi, Marwadi, Panchali sheep breeds, Kathiawadi, Marwadi, Kachchhi Sindhi horse breeds, Kachchi, Kharai camel breeds, Halari, Kachchhi donkey breeds and Arvalli chicken breed.
- The department is actively engaged in Molecular characterization of livestock & Poultry breeds, Parentage verification, Chromosome Analysis (Numerical & Structural), Genome sequencing, A1/A2 Genotyping, Screening of genetic diseases, Gender Purity testing of sexed semen.
- Recently, department has done molecular characterization and national registration of various livestock breeds viz., Kathiawari horse, Kachchhi-Sindhi horse, Panchali sheep, Kahmi goat, Halari donkey, Dagri cattle and Kachchhi donkey.
- Department has carried out Whole genome sequencing of Gir cattle first time in India, Exome sequencing of Jaffarabadi, Mehsani, Surati, Banni buffalo breeds and also carried out Cloning, Characterization and functional screening of industrially important novel cellulose encoding genes from the bovine rumen microbial community using metagenomics approach.

### **Major Research Areas are as follows:**

- Molecular characterization of livestock & Poultry breeds
- Parentage verification
- Chromosome Analysis (Numerical & Structural)
- Genome sequencing
- A1/A2 Genotyping
- Screening of genetic diseases
- Gender Purity testing of sexed semen

### A. Research Projects Completed

Sr. no.	Title of Scheme and B.H	Agency	Period	Budget Outlay (in Lakh)	P.I
1	NBAGR – Network Project on Animal Genetics Resources, Core Laboratory Project, Anand	NBAGR (ICAR)	1995-2014	250.95	Dr. D. N. Rank
2	Molecular Characterization of Kathiawari Breed of Horse in Gujarat	GOG	2010-2012	20.00	Dr. D. N. Rank
3	Genetic Survey of Zalawadi Breed of Goat in Gujarat	GOG	1998-2001	32.98	Dr. P.H.Vataliya
4	Genetic Aspects of Very Low Density Lipoprotein (VLDL) and its Associations with Important Economic traits in Egg Type Chicken.	GOG	1996-1999	21.41	Dr. J. V. Solanki
5	Parentage Verification of Progeny Tested Daughters	Other Agency	2007-09	4.00	Dr. D. N. Rank
6	Molecular Characterization of lesser known livestock population of Gujarat	NGO (Sahjeevan Trust)	One Year (2015-16)	8.25	Dr. D. N. Rank
7	Genome Sequencing for the breeds of Gir cattle and Jaffarabadi buffaloes (B.H.18499).	GOG (GLDB)	Three Years (2014-17)	318.98	Dr. D. N. Rank
8	Cloning, Characterization and functional screening of industrially important novel cellulose encoding genes from the bovine rumen microbial community using metagenomics approach.	DBT (GOI)	2016-19 (Three Years Project)	77.35 lakh	Dr. D. N. Rank (Co- PI)
9	Screening for polymorphism (s) in the selected candidate genes involved in the pathogenesis of Steroid resistance nephrotic syndrome	GSBTM	Three Years (2017-2020)	11.55 Lakh	Dr. D. N. Rank (Co- PI)

### B. Research Projects On going

<b>Sr. no.</b>	<b>Title of Scheme and B.H. No</b>	<b>Agency</b>	<b>Period</b>	<b>Budget Rs. In Lakh</b>	<b>P.I</b>
1	Establishing Genomic Selection Network for Dairy Cattle and Buffalo Breeds in Gujarat	GSBTM	Five Years	1294.00	Dr. A. C. Patel
2	Cytogenetics and Cell Culture Studies in Cattle and Buffaloes	AAU	Plan Scheme continued	38.26	Dr. R. S. Joshi
3	Study on Correlated Response to Selection in Patanwadi and Cross breed sheep (B.H. 6374)	KU	Plan Scheme continued	Consolidated budget	Dr. P. H. Tank /Dr. R. S. Joshi
4	Study on Correlated Response to Selection in Experimental Flock of Poultry (B.H. 6374).	KU	AAU Non Plan Scheme continued	Consolidated budget	Dr. P H Tank / Dr. R. S. Joshi

## Major Achievements by Department of Animal Genetics & Breeding

- Molecular characterization and national registration of various livestock breeds viz., Kathiawari horse, Kachchhi-Sindhi horse, Panchali sheep, Kahmi goat, Halari donkey, Dagri cattle and Kachchhi donkey.
- Department has also carried out molecular characterization of various livestock breeds of India.
  1. Gir, Kankrej, Dagri, Malvi, Nimari, Kankantha, Gaolao, Dangi, Khillar cattle
  2. Jaffarabadi, Mehsani Buffalo
  3. Gohilwadi, Zalawadi, Surti, Kahmi goat
  4. Patanwadi, Marwadi, Panchali sheep
  5. Kathiawadi, Marwadi, Kachchhi Sindhi horse
  6. Kachchi, Kharai camel
  7. Halari, Kachchhi donkey
  8. Arvalli chicken
- Carried out Whole genome sequencing of Gir cattle
- Exome sequencing of Jaffarabadi, Mehsani, Surati, Banni buffalo breeds.
- Carried out Cloning, Characterization and functional screening of industrially important novel cellulose encoding genes from the bovine rumen microbial community using metagenomics approach.
- Compared breeding values of progeny tested sires and pedigreed selected sires and observed that the present policy of bull selection based on dam's yield being followed at semen stations is prone to error. Hence, it is recommended to select replacement bulls based on breeding values instead of dam's yield and relevant changes need to be made in present minimum standard protocol of frozen semen production.
- Developed facilities for diagnostic services for
  1. Genetic diseases testing: More than 2000 blood samples tested for genetic diseases viz. Bovine leukocyte adhesion deficiency (BLAD), factor XI deficiency (FXID), Bovine citrullinaemia (BC), Deficiency of uridine monophosphate synthase (DUMPS) and Complex vertebral malformation (CVM) etc.
  2. Karyotyping (Chromosomal Abnormality Testing): More than 600 animals karyotyped for diagnosis of gross structural and numerical chromosomal abnormalities.
  3. A1A2 Typing: More than 2000 blood/semen samples are genotyped for A1 and A2 allele of milk protein Beta-casein (CSN2) using PCR-RFLP and KASP assay.
  4. Parentage Verification for identification of true biological sire of calves borned in the field
  5. Gender Purity testing of sexed semen

## List of Research Publications:

### 1. Published Papers:

#### 2022

1. Kuntal S. Shah, Ghanshyam C. Mandali, Neha Rao, Ashish C. Patel, Ronak P. Panchal (2022). Epidemiology and Hemato-Biochemical Changes in Mange Infested Goats. *Ind J Vet Sci and Biotech*: 10.21887/ijvsbt.18.2.27.

#### 2021

2. D. D. Patel, A. C Patel, D F Chaudhari, R S Joshi and D N Rank (2021). Phenotypic characterization of Dagri cattle of Gujarat. *Indian Journal of Animal Sciences* 91 (7): 547-553.
3. Pandya, G.M., Joshi C.G., Rank D.N., Kharadi V.B., Vataliya P.H., Desai P. & Solanki J.V. (2021). Sustainability of milk production in Surti buffalo on an organized farm. *Buffalo Bulletin*, 40(1): 161-165.

#### 2020

4. Patel, A.C., Parikh, R C, Macwan, Shefali, Tank, P.H., Maradia, M.G. & Rank, D.N. (2020). Genetic characterization of horse breeds (*Equus caballus*) of Western India. *Indian Journal of Animal Sciences*, 90 (3), 81–84.
5. Patel A.C., Nilesh Nayee, Sujit Saha, Swapnil Gajjar & Rank D.N. (2020). Comparison of daughter's performance of progeny tested sires with pedigree selected sires in Holstein Friesian crossbred cattle. *Indian Journal of Animal Science*, 90 (4): 592–598

#### 2019

6. Dadheech T., Jakhesara, S., Chauhan, P.S., Pandit, R., Hinsu, A., Kunjadiya, A., ...& Rank, D.N. (2019). Draft genome analysis of lignocellulolytic enzymes producing *Aspergillus terreus* with structural insight of  $\beta$ -glucosidases through molecular docking approach. *International journal of biological macromolecules*, 125, 181-190.
7. Patel. Ashwini, Sanjay, P., Amipara, G.J., Lunagariya, P.M., Parmar, D.J. & Rank, D.N. (2019). Prediction of Body Weight based on Body Measurements in Crossbred Cattle. *Int. J. Curr. Microbiol. App. Science*, 8 (3), 1597-1611.
8. Parmar, G.S., Mistry, K.N., Rank, D.N. & Gang, S. (2019). In silico Analysis of nsSNPs in the Human ACTN4 Gene associated with a Steroid-Resistant Nephrotic Syndrome. *Research & Reviews: A Journal of Health Professions*, 8 (3), 43-52.
9. Badgujar, N.V., Mistry, K.N., Rank, D.N. & Joshi, C.G.,. (2019). Cytotoxic effect of methanolic extracts and partially purified fractions of some medicinal plants used in traditional medication. *NISCAIR-CSIR, India*.
10. Rajpura, N.R., Rajpura, G.C., Mandali, N., Rao & Patel, A.C. (2019). Study on Clinico-Haematol-Biochemical Alterations in Goats Suffering from Trichostrongylosis in Anand District of Gujarat. *The Indian Journal of Veterinary Sciences and Biotechnology*, 15 (02), 10-13.
11. Panchal, Dhara., Kakati, Parineeta., Joshi, R. S., Patel, A. C., .....& Rank, D N.(2019). Effect of Alternative Milk Recording Strategies on Genetic Evaluation of Sires of Holstein Friesian Crossbred Cattle. *International Journal of Livestock Research* 9 (8), 203-213.
12. Patel, Ashish, C., Patel, Chitra., Zala, Hinal, Sheikh, Yasin., Tripti, Dadheech., Shah, S. V. & Rank, D. N. (2019). Genotyping of Indigenous Cattle Breeds and their Exotic Crosses for  $\beta$  -

Casein Milk Type using PCR-RFLP and Sequencing. *International Journal of Livestock Research* 9 (5), 249-259.

13. Patel, Ashish. C & Joshi, C. G. (2019). Deoxyribonucleic Acid as a Tool for Digital Information Storage: An Overview. *The Indian Journal of Veterinary Sciences and Biotechnology* 15 (1), 1-8.

#### 2018

14. Pandit, R. J., Hinsu, A. T., Patel, N. V., Koringa, P. G., Jakhesara, S. J., Thakkar, J. R., ..... Rank, D. N., & Joshi, C. G. (2018). Microbial diversity and community composition of caecal microbiota in commercial and indigenous *Indian chickens determined using 16s rDNA amplico. sequencing* *Microbiome* 6 (1), 115.
15. Dadheech, T., Shah, R., Pandit, R., Hinsu, ., Chauhan, P. S., Jakhesara, S., ... & Rank. D. N.(2018). Cloning, molecular modeling and characterization of acidic cellulase from buffalo rumen and its applicability in saccharification of lignocellulosic biomass. *International journal of biological macromolecules* 113, 73-81.
16. Badgujar, N.V., Mistry, K., Rank, D.N. & Joshi, C.G. (2018). Screening of antiproliferative activity mediated through apoptosis pathway in human non-small lung cancer A-549 cells by active compounds present in medicinal plants. *Asian Pacific Journal of Tropical Medicine* 11 (12), 666.
17. Jakhesara, S., Dadheech, T., Shah, R., Pandit, R., Hinsu, A., Kunjadiya, A. ...and Rank, D. N., (2018) Characterization, cloning, expression and molecular modelling of acidic cellulase from Indian buffalo rumen. *Abstracts of Papers of The American Chemical Society*. 256.
18. Singh, P.K., Mistry, K.N., Chiramana, H., Rank, D.N. & Joshi, C.G. (2018). Exploring the deleterious SNPs in XRCC4 gene using computational approach and studying their association with breast cancer in the population of West India. *Gene* 655, 13-19.
19. Kundu, Sumana., Patel, Shil.S., Joshi, A.C., Gajjar, R.S., , Bali, S.G., Rank, P., & D.N. (2018). Comparison of Sire Evaluation Methods in Frieswal Cattle at Different Military Dairy Farms of Maharashtra. *International J. of Livestock Research*, 8 (3) : 256-282.
20. Kundu, S., Shil, S., Patel, A.C., Joshi, R.S., Bali, P. & Rank D. N. (2018). Genetic Evaluation of Sires Used in Frieswal Herd at Different Military Dairy Farms in India. *International J. of Livestock Research*, 8 (4) : 43-57.
21. Patil, Snehal., D. Savaliya, F. P., Patel, A. B., Paleja, H. I., Joshi, R.S. Hirani, N. D., Sahasnani, Manisha., & Khanna, K. (2018). Genetic studies on egg production traits in IWN and IWP strains of White Leghorn chicken. *Indian Journal of Poultry Science*, 53(3) : 247
22. Patel, D. B., Raval, S.K., Mandali, G.C., Patel, A.C. & Pande, A.M. (2018). Nephroprotective Effect of Herbal Extracts of Bryophyllum calyrium and Solanum xanthocarpum on Induced Urolithiasis in Wistar Rats: Haemato-Biochemical Evaluation. *Indian Journal of Veterinary Sciences & Biotechnology*, 13 (3).
23. Lunagariya, P.M., Shah, S.V., Devalia, B.R., Patel, A.C., & Pandya, P. R. (2018). An In vitro Dose Optimization of Exogenous Fibrolytic Enzymes in Total Mixed Ration for Crossbred Cows. *International Journal of Current Microbiology and Applied Sciences*, 7 (10)
24. Kundu, Sumana., Sharadindu Shil, Patel, A. C. □ Joshi, R. S., Gajjar, S. G. □ ..... & Rank □ D N. (2018). Comparison of Sire Evaluation Methods in Frieswal Cattle at Different Military Dairy Farms of Maharashtra. *International Journal of Livestock Research* 8 (3), 265-282.

#### 2017

25. Singh, P.K., Mistry, K. N., Chiramana, H, Rank, D. N. & Joshi, C.G. (2017). Association of damaging nsSNPs of XRCC1 with breast cancer. *Meta Gene*, 14, 147-151.
26. Badgujar, N. V., Mistry, K. N., Rank, D. N. & Joshi, C. G. (2017). Antiproliferative Activity of Crude Extract and Different Fractions of *Butea monosperma* Against Lung Cancer Cell Line. *Indian Journal of Pharmaceutical Sciences* 80 (5), 875-882.
27. Jadhav, P. V., Patel, N. A., Tarate, S. B. & Rank, D. N. (2017). Screening of sheep breeds of Gujarat for FECXB and FECXL fecundity mutations. *Indian Journal of Small Ruminants (The)* 23 (2), 253-256.
28. Kakati, Parineeta., Panchal, Dhara, Patel, A. C., Bahuguna, P. K., Joshi, R. S. & Rank, D.N. (2017). Genetic Parameters of Production and Reproduction Traits and Factors affecting it in Frieswal Cattle. *International J. of Livestock Research*, 7 (7) : 190-199.
29. Parineeta Kakati., Patel, A. C., Gajjar, S., Bahuguna, P. K., Joshi, R. S. & Rank, D.N. (2017) Comparison of sire evaluation methods for lactation yield, lactation length and calving interval in Frieswal cattle. *Indian J. Dairy Science*, 70(6) : 755-762.
30. Patel, A B, Khanna, K., Savaliya, F.P., Paleja, H. I., Joshi, R.S. & Hirani, N.D. (2017). Effect of enzyme supplementation on egg production performance of two strains of White Leghorn chicken. *Indian Journal of Poultry Science* (2017) 52(2): 178-18.3
31. Vihol, P D, Patel, J H, Patel, J M, Dabas, V S, Kalyani, I H, Chaudhari, C F & Patel, A C, ... (2017). Identification of Pathogenic *Leptospira* spp. Carrier Goats Using Polymerase Chain Reaction (PCR). *Int. J. Curr. Microbiol. App. Sci* 6 (12), 2174-2183.
32. Lunagariya, P. M., Shah, S. V., Patel, A C., Shekh, M. A. & Pandya, P. R. (2017). Effect of Exogenous Fibrolytic Enzymes on Milk and Components Yield as Well as on Feed Efficiency and Body Weight in Holstein Friesian x Kankrej Crossbred Cows After Peak ...
33. Bilwal, A. K., Mandali, G. C. & Patel, A. C., (2017). Hematological Changes in Dogs Affected with Canine Babesiosis. *Indian Journal of Veterinary Sciences & Biotechnology*. 12 (3).
34. Patel, Y. G., Trivedi, M. M., Naurial, D. S. & Patel, A. C., (2017). A Study on Relationships between Somatic Cell Count (SCC) and Some Udder Traits in Crossbred Dairy Cows. *Trends in Bioscience*. 10 (22), 4418-4420.

## 2016

35. Patel, Bhumit K., Patel, A. C., Patel, S. B., Joshi, R. S. & Rank, D. N. (2016). Breeding value estimation using test day records in Murrah graded buffaloes. *Indian J. of Veterinary & Animal Sc. Research*, Vol 45 : 574-580.
36. Lunagariya, J. K., Vyas, P. M., Chaudhary, H. U., Patel, Patel, D. D. & Patel, A.C. (2016). Impact of bypass fat fld on milk yield, adoption, constrains faced and suggestion of dairy farmers of Ahmedabad district of Gujarat. *International Journal of Current Research* 8 (11).
37. Hadiya, K. K., Dhami, A. J., Patel, J. A., Lunagariya, P. M. & Patel, A.C. (2016). Follicular dynamics during estrous cycle in postpubertal and postpartum gir cattle. *The Indian Journal of Animal Reproduction* 37 (1).
38. Bhatt, R., Patel, A. C., Jisha, T. K., Macwan, S., Thaker, R. & Rank, D.N. (2016). Sex determination in ratite and non ratite birds by molecular method. *The Indian Journal of Animal Sciences* 86 (2).
39. Patel, Bhumit K., Patel, Ashish C., Patel, S. B., Joshi, R. S., & Rank, D. N., (2016). Breeding value estimation using test day records in Murrah graded buffaloes. *Indian Journal of Veterinary and Animal Sciences Research*. 45 (2).



40. Patel, A. C., (2016). Estimation of genetic parameters for test day records of Murrah graded buffaloes. *Indian Journal of Dairy Science* 69 (1).

#### 2015

41. Parasharya, B.M., Rank, D. N., Harper, D. M, Crosa, G., Zaccara, S. & Patel, N., (2015). Long-distance dispersal capability of Lesser Flamingo *Phoeniconaias minor* between India and Africa: genetic inferences for future conservation plans. *Ostrich*, 86 (3), 221-229.
42. Kumari, R., Rank, D.N., Kumar, S., Joshi, C. G. & Lal, S.V., (2015). Real time PCR-an approach to detect meat adulteration. *Buffalo Bull* .34 (1), 124-129.
43. Pandya, G.M., Joshi, C.G., Rank,D.N., Kharadi, V.B., Bramkshtri, B.P. & Vataliya, P.H., (2015). Genetic analysis of body weight traits of Surti buffalo. *Buff Bulletin*, 34, 189-195.
44. Chaudhari, P.N., Upadhyay, M.R., Patel,A. C., Patel, S.B. & Rank, D. N. (2015). A comparison of different methods of sire evaluation for production and reproduction traits of Murrah graded buffaloes. *Indian Journal of Dairy Science*. 68 (3), 259-265.
45. Upadhyay, M. R., Patel, A. B., Subramanian, R.B., Shah, T. M., Jakhesara, S. J., ....& Rank,D. N., (2015). Single nucleotide variant detection in Jaffrabadi buffalo (*Bubalus bubalis*) using high-throughput targeted sequencing. *Frontiers in Life Science* 8 (2), 192-199.
46. Saiyed, M. A., Joshi, R. S. Savaliya F. P., Patel A. B., Mishra R. K. & Bhagora N. J. (2015). Study on inclusion of probiotic, prebiotic and its combination in broiler diet and their effect on carcass characteristics and economics of commercial broilers. *Vet. World*, 8(2): 225-231.
47. Meshram, Anushree., Joshi, R. S., Savaliya, F. P., Hirani, N. D. & Patel, A. B. (2015). Genetic evaluation of various economic traits using partial and full record in two strains of white leghorn chicken.
48. Sarvaiya, V. N., Sadariya, K. A., Pancha, P. G., Thaker, A. M. & Patel, A. C., (2015). *Evaluation of antigout activity of Phyllanthus emblica fruit extracts on potassium oxonate-induced gout rat model*. *Veterinary world* 8 (10), 1230.
49. Patel, A. C., Jisha, T. K., Upadhyay, D., Parikh, R., Upadhyay, M., Thaker, R., Das, S., & Rank, D. N., (2015). Molecular characterization of camel breeds of Gujarat using microsatellite markers. *Livestock Science* 181, 85-88.
50. Chaudhari, P. N., Upadhyay, M. R., Patel, A. C., Patel, S. B., & Rank, D. N., (2015). A comparison of different methods of sire evaluation for production and reproduction traits of Murrah graded buffaloes. *Indian Journal of Dairy Science*. 68 (3) 259-265.
51. Patel, A. C., (2015). Study on persistancy of Milk Production in Holstein Friesian Cattle on an organized farm. *International Journal of Applied and Pure Science and Agriculture*. 1 (4).
52. Brahmabhatt, N. N., Patel, P. V., Hasnani, J. J., Pandya S. S. & Patel A C. (2015). Study on haematological changes occurred in *Ancylostoma* spp. Infected dogs at Anand district, Gujarat, india. *Life Sciences Leaflets* 69.

#### 2014

53. Singh, K. M., Shah, T. M., Reddy,B., Deshpande, S., Rank, D. N. & Joshi, C. G., (2014). Taxonomic and gene-centric metagenomics of the fecal microbiome of low and high feed conversion ratio (FCR) broilers. *Journal of applied genetics* 55 (1), 145-154.
54. D Manisha, Rank, D. N., Vataliya, P. H. & Joshi, C. G., (2014). Study of leptin gene polymorphism in Mehsana buffaloes (*Bubalus bubalis*).*Buffalo Bulletin*. 33 (1), 115-119.
55. Jawale, C. V., Shabir, N., Bhong, C. D., Tripathi, A. K., Hiren, P. & Rank, D. N. (2014). Characterization of SNPs in Oxidised Low Density Lipoprotein Receptor 1 (OLR1) gene in Mehsana and Banni breeds of buffalo. *Biomedical Research*.

56. Shabir, N., Jawale, C. V., Chikan, N. A., Bhong, C. D., Rank, D. N. & Joshi, C. G. (2014). Identification of transition bias in oxidized low density lipoprotein receptor 1 gene in buffalo. *Veterinary World*, 7 (3), 135.
57. Savaliya, F. P., Patel, A.B., Mishra, R. K., Joshi, R.S. & Hirani, N.D. (2014). Inheritance and association among various economic traits of two strains of White Leghorn. *Indian J. Poul. Sc.*, 49(2): 147-151.
58. Meshram, Anushree Y., Joshi, R. S., Savaliya, F.P. & Singh, A.P. (2014). Estimates of genetic parameters for various traits in two strains of White Leghorn Chicken. *Indian J. Field Vet.*, 10 (2): 67 – 70.
59. Qadri, Firdaus, Savaliya, F. P. & Joshi, R. S. (2014). Genetic study on important economic traits in two strains of WLH chicken. *Indian J. Poul. Sci.* 48 (2): 149 – 153.
60. Podchawar, Kundan., Savaliya, F. P. & Joshi, R. S. (2014). Study on performance of three crossbreds chicken suitable for rural farming. *Indian J. Poul. Sci.*, 48 (2): 215 - 218.
61. Saiyad, M. A., Joshi, R. S., Savaliya, F. P., Patel, A. B., Mishra, R. K. & Bhagora, N. J. (2014). Study on inclusion of Probiotic, Prebiotic and its combination in broiler diet and their effect on growth performance of commercial broilers. *I. J. Vet. Sc. & Biotech.*, 10 (3): 4 - 6.
62. Chaudhari, D. V., Dhami, A. J. & Patel, A. C., (2014). Norms and interrelationships of quality attributes of fresh, refrigerated and cryopreserved buffalo semen. *Indian Journal of Field Veterinarians (The)* 10 (2), 93-99.
63. Ghasura, R. S., Quazi, J., Sheikh, A. S., Aswar, B. K., Charan, R. & Patel, A. C., (2014). Entrepreneurship of poultry farmers and its determinants. *Indian Journal of Field Veterinarians. (The)* 9 (3), 52-54.

### 2013

64. Tripathi, A. K., Ramani, U. V., Patel, A. K., Rank, D. N. & Joshi, C. G. (2013). Short hairpin RNA-induced myostatin gene silencing in caprine myoblast cells in vitro. *Applied biochemistry and biotechnology*. 169 (2), 688-694.
65. Shah, T. M., Patel, J. S., Bhong, C. D., Doiphode, A., Umrikar, U. D., Parmar, S. S., ... & Rank, D. N., (2013). Evaluation of genetic diversity and population structure of west-central Indian cattle breeds. *Animal genetics*. 44 (4), 442-445.
66. Singh, K. M., Tripathi, A. K., Pandya, P. R., Parnerkar, S., Rank, D. N. & Kothari, R. K. (2013). Use of real-time PCR technique in determination of major fibrolytic and non fibrolytic bacteria present in Indian Surti buffaloes (*Bubalus bubalis*). *Pol J Microbiol* 62 (2), 195-200.
67. Mehta, H. H., Patel, A. K., Nandasana, K. N., Ramani, U. V., Koringa, P. G., Shah, R. G., ... & Rank, D. N., (2013). Histology and histomorphology of hormone treated surati buffalo udder tissue. *American Journal of Animal and Veterinary Sciences*. 8 (2), 66-72.
- C. Manisha, Rank, D. N., Vataliya, P. H. & Joshi, C. G., (2013). Oxidized low density lipoprotein receptor 1 (OLR1) gene polymorphism in Mehsana buffaloes (*Bubalus bubalis*). *Buffalo Bulletin*. 32 (4), 260-264.
68. Sacravarty, G., Vadodaria, V. P., Rank, D. N., Brahmkshtri, B. P. & Vataliya, P. H., (2013). Study of prolactin gene using PCR-RFLP and PCR-SSCP in Mehsani buffaloes. *Buffalo Journal*. 29 (1), 105-111.
69. Mehta, H. H., Patel, A. K., Nandasana, K. N., Ramani, U. V., Koringa, P. G., Shah, R. G. & Rank, D. N., (2013). The effect of hormone treatment on dry Surati buffalo mammary gland. *International Journal of Pharma and Bio Sciences*. 4 (1).

70. D, Manisha, Rank, D. N., Vataliya, P. H. & Joshi, C. G., (2013). A study of protease inhibitor gene polymorphism in Mehsana buffalo (*Bubalus bubalis*). *Buffalo Bulletin* 32 (2), 126-130.
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#### **Refresher Training Courses / Summer-Winter Schools conducted:**

- Summer School on “Recent advances in Cytogenetic and Molecular Genetic Techniques their application in Animal Breeding Programmes” during 12<sup>th</sup> June to 2<sup>nd</sup> July, 2001.
- Advanced training in Animal Management, Biotechnology and Animal Breeding during 7<sup>th</sup> to 16<sup>th</sup> March, 2005.
- Advanced training in Animal Management, Biotechnology and Animal Breeding during March, 2006.
- 2nd Multi-institutional teacher’s training programme in molecular biology and bioinformatics in 2008.
- Pre-conference workshop on techniques for detection of polymorphism in drug metabolizing enzymes and drug transporters in 2009.
- Genome Sequencer Awareness Workshop in 2010
- National Symposium on “Challenges to Domestic Animal Biodiversity & Action Plan for its Management and Utilization” in 2010
- A Short Course on “Whole Genome Sequencing in Animal and Plant Research” in 2011
- First Short Course On “Metagenomics: Role of Next Generation Sequencing and Bioinformatics” in 2012
- Second Short Course On “Metagenomics: Role of Next Generation Sequencing and Bioinformatics” in 2013
- Computational aspects for NGS data analysis: A sojourn from lab to field in 2014
- Third Short Course On “Metagenomics: Role of Next Generation Sequencing and Bioinformatics” in 2014
- Fourth Short Course On “Metagenomics: Role of Next Generation Sequencing and Bioinformatics” in 2015

- Fifth Short Course On “Metagenomics: Role of Next Generation Sequencing and Bioinformatics” in 2016.
- One Week hands on training on “Basic Molecular Techniques” organized by Department of Animal Genetics and Breeding, College of veterinary Science and Animal Husbandry, KU, Anand during 5-10 September, 2022.

#### **Seminar/Symposia/Conference/Workshop organized**

<b>Sr. No</b>	<b>Title of seminar / Conference</b>	<b>Organizing Secretary</b>
1.	National Seminar on “Genetics Applied to Livestock Production” held during 23- 25 Oct. 1989, Silver Jubilee Celebrations, Veterinary College, GAU, Anand.	Dr R K Shukla
2.	National Seminar on “biotechnology: A Tool for sustainable Agricultural Production”. 5-6 Jan, 2004.	Dr J V Solanki
3	National Symposium on “Challenges to Domestic Animal Biodiversity & Action Plan for its Management and Utilization” organized by Department of Animal Genetics and Breeding and Society for conservation of Domestic Animal Biodiversity at College of veterinary Science and Animal Husbandry, AAU, Anand during 10-11 February, 2010.	Dr D N Rank
4	Swarnim Gujarat Major Horse Show: 1-3 Jan. 2011	Dr D N Rank