Name of Department: Animal Genetics & Breeding

Profile (In Brief): Department of Animal Genetics and Breeding is actively involved in teaching and research (Basic and Applied) since its inception. Research is being carried out in all branches of genetics – Quantitative and Population genetics, Biochemical genetics, Cytogenetics and Molecular genetics.

Faculties:

Sr. No.	Name with photograph	Designation	Phone (O)	Cell No	Inter Com No.	E-Mail
1	Dr. D.N.Rank 	Professor & Head	02692-261201	+919429664418	921	dnrank@aau.in dnrank@gmail.com
2	Dr. R.S.Joshi 	Professor	02692-261201	+919428479711	921	rsjoshi106@aau.in rsjoshi106@gmail.com
3	Dr. A.C.Patel 	Assistant Professor	02692-261201	+919429407557	921	aashishvet@aau.in aashishvet@gmail.com

Major Activities:

I. Teaching

A. UG Courses

Old Course

CODE	COURSE TITLE	CREDITS
AGB-211	Livestock & Poultry Breeding System	2+1

New Course

CODE	COURSE TITLE	CREDITS
AGB	Animal Genetics & Breeding	3+1

B. PG Courses

CODE	COURSE TITLE	CREDITS
AGB 601	Animal Cytogenetics And Immunogenetics	2+1
AGB 602	Molecular Genetics In Animal Breeding	2+1
AGB 603	Population And Quantitative Genetics In Animal Breeding	2+1
AGB 604	Selection Methods And Breeding Systems	3+1
AGB 605	Biometrical Techniques In Animal Breeding	3+1
AGB 606	Conservation Of Animal Genetic Resources	2+0
AGB 607	Cattle And Buffalo Breeding	2+1
AGB 608	Small Farm Animal Breeding (Sheep, Goat, Swine And Rabbit)	2+0
AGB 609	Poultry Breeding	2+1
AGB 610	Laboratory Animal Breeding	1+0
AGB 691	Master's Seminar	1+0
AGB 699	Master's Research	2+0
AGB 701	Recent Advances In Animal Genetics	2+0
AGB 702	Recent Trends In Animal Breeding	2+0
AGB 703	Advances In Biometrical Genetics	2+1
AGB 704	Advances In Selection Methodology	2+1
AGB 705	Bioinformatics In Animal Genetics And Breeding	2+0
AGB 706	Advances In Molecular Cytogenetics	2+0
AGB 707	Utilisation of Non-Additive Genetic Variance In Farm Animals	2+1
AGB 791	Doctoral Seminar I	1+0
AGB 792	Doctoral Seminar II	11+0
AGB 799	Doctoral Research	45

II. Research

A. Research Projects Completed (No., Title, Agency, Period, Budget Outlay, PI/Co-I)

Sr. no.	Title of Scheme and B.H	Agency	Period	Budget Outlay	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	32,98,000	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	21,41,000	Dr. J. V. Solanki
5	Parentage Verification of Progeny Tested Daughters	Other Agency	2007-09	4,00,000	Dr. D. N. Rank
6	Molecular Characterization of lesser known livestock population of Gujarat	NGO (Sahjeevan Trust)	One Year (2015-16)	8.25 lakh	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 Lakh	Dr. D. N. Rank

B. Research Projects On going (No., Title, Agency, Period, Budget Outlay, PI/Co-I)

Sr. no.	Title of Scheme and B.H. No	Agency	Period	Budget Rs. In Lakh	P.I
1	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
2	Cytogenetics and Cell Culture Studies in Cattle and Buffaloes	AAU	AAU Plan Scheme continued in XIIth Year plan	38.26 Lakh	Dr. D. N. Rank
3	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

4	Study on Correlated Response to Selection in Patanwadi and Cross breed sheep (B.H. 6374)	AAU	AAU Non Plan Scheme continued in XIIth Year plan	Consolidated budget	Dr. A.M.Thaker /Dr. D. N. Rank
5	Study on Correlated Response to Selection in Experimental Flock of Poultry (B.H. 6374).	AAU	AAU Non Plan Scheme continued in XIIth Year plan	Consolidated budget	Dr. A.M.Thaker /Dr. D. N. Rank
6	Study on pattern of inheritance of haemoglobin, transferrin and K ion types and their associations with production traits in cattle and sheep (B.H. 5301).	AAU	AAU Non Plan Scheme continued in XIIth Year plan	Consolidated budget	Dr. A.M.Thaker /Dr. D. N. Rank

C. Number of M.V.Sc. & Ph.D. degrees awarded

70- M.V.Sc. Degree 14- Ph.D. Degree

D. Research Publications (No.)

Publications	**No.**
Books/ Book Chapter	01
International Journal:	50
National Journal:	64
Popular Articles:	8
Scientific Recommendations:	13

E. Research Recommendations

Recommendations made for Scientific Community.

Sr. No.	**Recommendation made**
1	Based on Molecular Characterization of Sheep Breeds of Gujarat using FAO Recommended set of 25 Microsatellite Markers, Dumba (Dumma) Sheep are Genetically Distinct from Patanwadi and Marwari Sheep. Hence, Dumba Sheep should be Recognized as a Distinct Breed of Sheep
2	Four Multiplex PCR Panels Comprising of Fluorescent Dye Labeled 29 Microsatellite Markers (Recommended by FAO) Developed for Genetic Characterization of Indigenous Goat Breeds can be used under given PCR condition for Genotyping on Automated DNA Sequencer
3	Four Multiplex PCR Panels Comprising of Fluorescent Dye Labeled 25 Microsatellite Markers (Recommended by FAO) Developed for Genetic Characterization of Indigenous Sheep Breeds can be used under given PCR condition for Genotyping on Automated DNA Sequencer
4	A Single Multiplex PCR Panel Comprising of Fluorescent Dye Labeled 11 Microsatellite Markers Developed for Parentage Verification in Mehsana Buffalo

	Breed can be used under a given PCR condition for Genotyping on Automated DNA Sequencer
5	Mehsana buffalo is monomorphic with respect to NmuCI RFLP at PPARGC1A, Hinf I RFLP at PIT1, SfaNI RFLP at PI, HphI RFLP at Leptin genes with B allele fixed at these loci.
6	Two SNPs in Exon 8 of GHR gene (G1961T and T1972C) have significant and favourable association with milk fat% in Jaffarabadi and Mehsana buffalo, where allele T and allele C respectively have 5avourable effects.
7	Three novel SNPs one each in Promoter (C287A), Intron-1 (A321G) and Exon-3 (A498T) in Leptin gene are discovered in Jaffarabadi and Mehsana buffalo.
8	An SNP (C310T) in intron 1 of Leptin gene has significant association with milk fat% in Jaffarabadi buffalo. Allele C was found to have favourable effect.
9	Seven new SNPs discovered in Pit 1 gene of buffalo, one in Exon 1 (T264A), three in Intron-1 (C461T, G472A and C603G), one in Exon 2 (C720T) and two in Intron 2 (T771C and G772A) have no association with the milk yield and milk fat %.
10	For development of coloured meat purpose chicken crosses suitable for rural farming, New Hampshire can be used as male line and Australorp as female line as New Hampshire crosses gained significantly higher weight (1253 g) at 8 weeks age whereas, Australorp has produced significantly higher egg numbers (80) upto 18-40 weeks with 55 g egg weight at 40 weeks age.
11	Effect of IGF-II genotypes on feed consumption and egg production in Bantamized White LeghornAt IGF-II locus, AA genotype (NlaIII RFLP) has lower body weight and better feed conversion efficiency than AB and BB genotypes with egg number, egg weight and AFE at par in Bantamized White Leghorn birds suggesting A allele having favourable effect on feed conversion efficiency.
12	Effect of O CX-32 genotypes on egg production in Bantamized White Leg Ho At OCX-32 ex2 and ex4 loci, AB and BB genotypes (HpyCH4IV and NcoI RFLP) has significant and favourable association with egg production without affecting egg weight as compared to AA genotype in Bantamized White Leghorn birds suggesting B alleles at both loci has favourable effect on egg production.
13	Developing egg purpose crosses for backyard poultry farming For development of crossbred chicken suitable for rural poultry farming using Australorp, Naked neck and Rhode Island Red as male and White Leghorn as female parents, Naked neck and Rhode Island Red crossbred have shown significantly better egg number, egg mass, feed efficiency in term of feed consumption per egg, per kg egg and per dozen egg and return over feed cost up to 40 weeks of age as compared to Australorp crossbred.

III. Extension

A. 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 12th June to 2nd July, 2001.

B. Seminar/Symposia/Conference/Workshop organized

Sr. No	Title of seminar / Conference	Organizing Secretary
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 D N Rank
3	National Symposium on "Challenges to Domestic Animal Biodiversity & Action Plan for it's 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
5	Released of country's first "National code of Practices for Management of Dairy Animals in India" developed by World Animal Protection (WPA) in association of National Dairy Research Institute (NDRI) on 10th October, 2014.	Dr D N Rank

C. Diagnostic Services / Clinical Camps/Farmers' advisory services/Ambulatory Clinics/Vaccination camps: -----NA-----

D. NSS Camps/ Krishi Mahotsav/ Pashupalan Shibirs/Radio-TV Talks Delivered/Exhibitions/Farmers' meet-day/Kisan Call Center/Field Visits:

Dr. D.N.Rank participtated in Krishi-Mahotsav during 2006-08.
Dr. R.S.Joshi participtated in Krishi-Mahotsav during 2010-15.
Dr. R.S.Joshi delivered Three TV talks during 2002 in ETV gujarati.
Dr. A. C.Patel participtated in Krishi-Mahotsav during 2012-15.

E. Expert services to State Government/Co-op. dairies/Other agencies /NGOs:

- Dr. D.N.Rank as a member of management committee of Sabarmati Ashram Gaushala, Bidaj.

- Dr. D.N.Rank as a member of Breeding value estimation committee of National Dairy Development Board (NDDB), Anand.
- Dr. D.N.Rank as a member of State level committee on Animal Genetic Resources, Gov. of Gujarat.
- Dr. D.N.Rank as a member Food Safty committee, Gov. of Gujarat.
- Dr. D.N.Rank as a member of Breeding panel of Sardar Krushinagar Dantiwada Agricultural University (SDAU), Sardarkrushinagar.
- Dr. D.N.Rank as a member of Biodiversity Committee of AAU, Anand
- Dr. D.N.Rank as a member of Advisory Committee of Sahjeevan Trust, Bhuj.
- Dr. D.N.Rank as a member of DBT task force committee, New Delhi.
- Dr. D.N.Rank as a member of UGC accreditation team for IVRI.
- Dr. D.N.Rank as a member of Quniquennial Review Team (QRT) of NBAGR, Karnal
- Dr. D.N.Rank as a member of expert committee for UGC accreditation of Lala Lajpat Rai University of Veterinary and Animal Sciences, Hissar
- Dr. R.S.Joshi as Co-ordinator of Veterinary Emergency Response Unit (VERU) of Western Zone of India.
- Dr. R.S.Joshi as Secretary of Alumni Association of Veterinary college, Anand.
- Dr. R.S.Joshi as a member of Board of Faculty, Veterinary College, AAU, Anand.

F. No. of Publications of Popular articles /Books /Booklets /Pamphlets /Leaflets/ Souvenir/Compendium/ chapters/ Lab Manuals / Training Manuals etc.

Types of Publication	Numbers
Popular Articles	15
Pamphlets/ Leaflets	6
Souvenir / Compendium	5
Lab Manuals/ Training manuals	10

Achievements:

A. Awards/Honours/Recognitions/Appreciations:

Dr. D.N.Rank

1. Hari Om Ashram Prerit Professor J .P Trivedi Award by The Gujarat Association for Agricultural Scientist (GAAS) during 1987- 88.
2. Best paper award by XIIth Gujarat science congress during year 1997.
3. The Bisnu-Sudama Memorial Award by Indian Veterinary Association for best research article in the Indian Veterinary Journal, during 2000.
4. P.K.Pani award for Best paper published in the Indian Journal of Poultry Science during 2003.
5. Ayurvet award for Best paper published in the Indian Journal of Poultry Science during 2004.

Dr. R.S.Joshi

1. Recipient of National Merit Scholarship award during year 1982-87 by Govt. of India.
2. Recipient of Council of Scientific and Industrial Research Senior Research Fellowship award during year 1994 - 97 by CSIR, Pusa, New Delhi.
3. Recipient of Prof. J. P. Trivedi award sponsored by Hari Om Ashram as a co-author for generation of Random Bred Control Population which has been selected as a National Control Population in year 1995 by Gujarat Association for Agriculture Scientist (GAAS).

B. Assignments as Subject Expert / Member (Selection Committee/Advisory Board):

C. Advanced Instrumentation / Lab Facilities:

Department is fully equipped with advanced instruments viz. PCR, Real time PCR, Gel Documentation System, Auto karyotyping system with advance microscope, Co_2 Incubator, Nano drop, Capillary Sequencer etc.

D. Patents filed / Technology Developed: Nil

E. Other Recognitions (SRC/NSS/AGRESCO Convener/Hostel Rector etc.)

Dr. D.N.Rank acted as AGRESCO Convener during 2011-2013.

Dr. R.S.Joshi acted as Assistant Hostel rector during 2013-2015

Dr. A.C.Patel as Assistant Hostel Rector since Feb. 2015-2018

F. Recognition of New Horse Breed, Kachchhi-Sindhi

Gujarat is rich in livestock biodiversity contributing to 19 breeds out of total 160 livestock breeds in the country. Gujarat has been known for its war horses and Kachchh was the hub for export-import of horses even before British era. War without horse was unthinkable in the past. Sindhi horses are famous for 'Rewal Chal'. Its home-tract Sindh has gone to Pakistan after independence. However, Kachchh as well as in Rajasthan being adjoing to Sindh its descendants are reared in Kachchh locally known as Kachchhi or Kachchhi Sindhi horses. This population was not recognized as distinct indigenous breed of India till recently. Other breeds of horses in the country include Kathiawadi, Marawadi, Spiti, Zanskari, Bhutia, Manipuri.

Government of Gujarat entrusted phenotypic characterization of this unrecognized breed to Sahjeevan trust and genetic characterization to AAU, Anand. All the morphometric features were recorded by Sahjeevan Trust. While genetic characterization work was carried out at Department of Animal Genetics and Breeding, Veterinary College using an internationally accepted protocol of microsatellite typing. Both agencies submitted a joint proposal for recognition and registration of this breed to NBAGR

(Government of India) through Department of Animal Husbandry, Government of Gujarat. The project of characterization was initiated in 2014 and completed in 2016, covering 375 out of total estimated population of 3136 horses.

Finally, the breed is recognized as a new indigenous breed of horse and formally declared as seventh indigenous breed and is granted accession no. INDIA_HORSE_0417_KACHCHHISINDHI_07007.

The department has earlier completed genetic characterization of already recognized breeds like Gir, Kankrej, Deoni (Maharashtra), Malvi, Nirmari, Gaulao, and Kankatha (M.P.) cattle, Jaffarabadi, Mehsani and Surti buffalo, Zalawadi, Gohilwadi and Surti goat, Patanwadi and Marawadi sheep, Kathiawadi and Marawadi horses, Kachchhi, Kharai camel, Ankleshwar, Kadaknath (M.P.) and Assel (Chhatisgarh) fowl. However, Kachchhi-Sindhi is the first breed that was not yet recognized. Due to joint efforts, the breed is now recognized as 3rd horse breed of Gujarat and 7th of India. It is the 20th indigenous livestock breed of Gujarat and 161st of the country.

The department has already submitted joint proposal with Sahjeevan Trust for recognition of new breeds viz. Dumma sheep, Kahmi goat, Gujarat Malvi cattle, Halari donkey which soon be declared as new breeds of indigenous livestock giving the state top position in the country having highest number of indigenous livestock breeds.

Future Thrust Areas:

- Research for increasing yield and minimizing production risks through molecular genetics
- Generate facilities for gene mapping and genetic manipulation for improving the qualitative and quantitative traits.