



College of Veterinary Science and Animal Husbandry Kamdhenu University, Bhuj (Kutch)



DEPARTMENT OF ANIMAL GENETICS AND BREEDING

About department

The Department of Animal Genetics and Breeding, College of Veterinary Science and Animal Husbandry, Kamdhenu University, Bhuj, is a newly established yet highly significant academic and research unit. Located in the border district of Kutch, the department will address critical challenges at the animal–genetics and breeding interface, with a focus on breeding, genomic selection, cytogenetic, and breed characterization. Kutch, known for its unique biodiversity and possessing the second largest livestock population in Gujarat, offers unparalleled opportunities for research, teaching, and community outreach in Animal Genetics and Breeding. The department commenced its journey on 17th November 2023 with the appointment of Dr. A. R. Ahlawat as the founding faculty member, serving as Professor and Head. Under his leadership, the department envisions the establishment of a state-of-the-art laboratory in line with MSVE 2016 guidelines, ensuring excellence in diagnostics, surveillance, and research. The department will maintain quality in teaching and research. In addition, the department places strong emphasis on extension and outreach activities, creating awareness on breeding, artificial insemination, and genetic disease testing among stakeholders and communities.

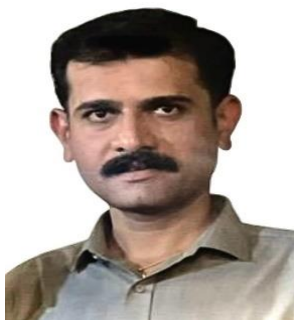
Core Areas of Focus

- Breed characterization
- Selection signatures for livestock breeds of Gujarat
- Selection indices for cattle breeds of Gujarat
- Cytogenetic characterization
- Genomic selection in livestock breeds of Gujarat
- Artificial intelligence

Genome wide association study (GWAS) With its vision and dedication, the Department of Animal Genetics & Breeding aims to emerge as a centre of excellence in teaching, research, and community service, contributing to the sustainable production and development of the Kutch region of Gujarat.

Faculty Details

	Name:	Dr. Anshu Rampal Ahlawat
	Designation:	Professor & Head
	Qualification:	Ph. D.
	Experience:	19 Years
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	Name:	Dr. Nikhil Shantilal Dangar
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	Experience:	12 Years
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	Name:	Dr. Keyurkumar Babulal Savalia
	Designation:	Assistant Professor
	Qualification:	M.V.Sc.
	Experience:	14 Years
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Summary of Publications

Sr. No.	Detail	Numbers
1.	Research Paper (National Journal)	64
2.	Research Paper (International Journal)	32
3.	Short Communications	03
4.	Recommendations	03
5.	Book/ Booklets	05
6.	Chapters in Books	03
7.	Training Manual / Practical Manual	10
8.	Technical Bulletins	00
9.	Review articles in scientific journals	02
10.	Popular articles in vernacular languages	20
11.	Informative leaflets / folders for farmers	06

Research

Sr.No.	Research Activities	Numbers
1.	Research Projects Completed (AGRESCO & VASRC)	21(PI-12, Co-PI-09)
2.	Research Projects Running (AGRESCO & VASRC)	2 (PI-2, Co-PI-0)
3.	Research Projects: As Co-PI	01
4.	Recommendation	03
5.	Research articles	50
6.	Book Chapters	03
7.	Research Abstracts	70
8.	Reviewer of Journal	6
9.	Editorial Board member	2

Extension

Sr.No.	Extension Activities	Numbers
1.	Vernacular Expert Lectures	56
2.	Animal Health Camp	2
3.	Extension literature (Folder & Leaflet)	06
4.	Popular articles	28
5.	TV Talk & Radio Talk	9

Achievements

Sr. No.	Details	Number of Awards
1.	Scientific awards	25
2.	Best vernacular article awards	1
3.	Conference/Training/Seminar-Hosted	10

UG Academics

UG Course (As per VCI MSVE 2016 course curriculum)

Sr. No.	Course offered in Third Professional Year	Credits Hours
1	Animal Genetics & Breeding	3+1

UG Syllabus – Third Professional year

Theory

Unit	Contents
Unit 1	(BIOSTATISTICS AND COMPUTER APPLICATION) Biostatistics: Introduction and importance of statistics and biostatistics, Classification and tabulation of data. Parameter, Statistic and Observation. Graphical and diagrammatic representation of data. Measures of Central tendency (simple and grouped data). Measures of Dispersion (simple and grouped data). Probability and probability distributions: Binomial, Poisson and Normal. Moments, Skewness and Kurtosis. Correlation and Regression. Introduction of sampling methods. Tests of hypothesis- t and Z- tests. Chi-square test. Design of experiment- Completely randomized design (CRD). Randomized block design (RBD). Analysis of variance and F-test of significance. Introduction to Non parametric tests. Computer Application: Introduction to computer languages. Data Base Management. Review of MS-Office and its components (MS-Word, Excel, Power Point and Access). Analysis of data using MS-Excel. Concepts of computer networks, internet & e-mail.
Unit 2	(PRINCIPLES OF ANIMAL AND POPULATION GENETICS) Animal Genetics: History of Genetics. Mitosis vs Meiosis. Chromosome numbers and types in livestock and poultry. Overview of Mendelian principles. Modified Mendelian inheritance. Pleiotropy, Penetrance and expressivity. Multiple alleles; lethals; sex-linked, sex limited and sex influenced inheritance. Sex determination. Linkage, crossing over and construction of linkage map. Mutation, Chromosomal aberrations. Cytogenetics, Extra-chromosomal inheritance. Molecular genetics, nucleic acids-structure and function. Gene concept, DNA and its replication. Introduction to molecular techniques. Population Genetics: Introduction to population genetics; individual vs population. Genetic structure of population: Gene and genotypic frequency. Hardy - Weinberg law and its application. Forces changing gene and genotypic frequencies (eg Mutation, migration, selection and drift). Quantitative vs qualitative genetics; concept of average effect and breeding value. Components of Variance.

	Concept of correlation and interaction between Genotype and Environment. Heritability and Repeatability. Genetic and Phenotypic Correlations.
Unit 3	PRINCIPLES OF ANIMAL BREEDING Livestock and Poultry Breeding: History of Animal Breeding. Classification of breeds. Economic characters of livestock and poultry and their importance. Selection, types of selection, response to selection and factors affecting it. Bases of selection: individual, pedigree, family, sib, progeny and combined, indirect selection. Method of selection, Single and Multi-trait. Classification of mating systems. Inbreeding coefficient and coefficient of relationship. Genetic and phenotypic consequences of inbreeding, inbreeding depression, application of inbreeding. Out breeding and its different forms. Genetic and phenotypic consequences of outbreeding, application of outbreeding, heterosis. Systems of utilization of heterosis; Selection for combining ability (RS and RRS). Breeding strategies for the improvement of dairy cattle and buffalo. Breeding strategies for the improvement of sheep, goat, swine and poultry. Sire evaluation. Open nucleus breeding system (ONBS). Development of new breeds or strains. Current livestock and poultry breeding policies and programmes in the state and country. Methods of conservation- livestock and poultry conservation programmes in the state and country. Application of reproductive and biotechnological tools for genetic improvement of livestock and poultry. Breeding for disease resistance. Breeding of pet, zoo and wild animals: Classification of dog and cat breeds. Pedigree sheet, selection of breeds and major breed traits. Breeding management of dogs and cats. Common pet birds seen in India and their breeding management. Population dynamics and effective population size of wild animals in captivity or zoo or natural habitats. Planned breeding of wild animals. Controlled breeding and assisted reproduction. Breeding for conservation of wild animals.

Practical

Unit	Contents
Unit 1	BIOSTATISTICS AND COMPUTER APPLICATION Collection, compilation and tabulation of data. Estimation of measures of central tendency (mean, median, mode) for simple and grouped data. Estimation of measures of dispersion (Range, standard deviation, standard error, variance, and coefficient of variation) for simple and grouped data. Graphical and diagrammatic representation of data. Estimation of correlation and regression. Simple probability problems, Normal distribution. Tests of significance: t-test, Z – test, Chi-square, F- tests. Completely randomized design (CRD). Randomized block design (RBD). Computer basics and components of computer. Simple operations: internet and e-mail, Entering and saving biological data through MS-Office (MS-Excel)
Unit 2	PRINCIPLES OF ANIMAL AND POPULATION GENETICS Monohybrid, Dihybrid cross and Multiple alleles. Modified Mendelian inheritance and sex-linked inheritance. Linkage and crossing over. Demonstration of Karyotyping in farm animals. Calculation of gene and genotypic frequencies, Testing a population for Hardy-Weinberg equilibrium. Calculation of effects of various forces that change gene frequencies. Computation of population mean, average effect of gene and gene substitution and breeding value. Estimation of repeatability, heritability, genetic and phenotypic correlations.
Unit 3	PRINCIPLES OF ANIMAL BREEDING Computation of selection differential and intensity of selection, Generation interval, expected genetic gain, correlated response, EPA and Most probable producing ability (MPPA). Estimation of inbreeding and relationship coefficient. Estimation of heterosis. Computation of sire indices. Computation of selection index.

Syllabus Distribution for Annual Board Examination:

Examination	PAPERS	UNITS	MAXIMUM MARKS	WEIGHTAGE
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Internal Assessment	First	30 % (Unit 1)	40	10
	Second	60 % (Unit 2)	40	10
	Third	90 % (Unit 3)	40	10
Annual Board	THEORY			
	Paper-I	Unit 1 and 2	100	20
	Paper-II	Unit 3	100	20
	PRACTICAL			
	Paper-I	Unit 1 and 2	60	20
	Paper – II	Unit 3	60	20

PG Academics

Summary of PG student:

Sr. No.	Details	No. of Students passed out	No. of Students presently enrolled
1.	Master	-	-
2.	Doctorate	-	-
3.	Total	-	-

To be started in next academic year (2026-27)

PG Courses

Sr. No.	CODE	COURSE TITLE	CREDITS
1.	AGB 601	ANIMAL CYTOGENETICS AND IMMUNOGENETICS	2+1
2.	AGB 602	MOLECULAR GENETICS IN ANIMAL BREEDING	2+1
3.	AGB 603	POPULATION AND QUANTITATIVE GENETICS IN ANIMAL BREEDING	2+1
4.	AGB 604	SELECTION METHODS AND BREEDING SYSTEMS	3+1
5.	AGB 605	BIOMETRICAL TECHNIQUES IN ANIMAL BREEDING	3+1
6.	AGB 606	CONSERVATION OF ANIMAL GENETIC RESOURCES	2+0
7.	AGB 607	CATTLE AND BUFFALO BREEDING	2+1
8.	AGB 608	SMALL FARM ANIMAL BREEDING (SHEEP, GOAT, SWINE AND RABBIT)	2+0
9.	AGB 609	POULTRY BREEDING	2+1
10.	AGB 610	LABORATORY ANIMAL BREEDING	1+0
11.	AGB 691	MASTER'S SEMINAR	1+0
12.	AGB 699	MASTER'S RESEARCH	20

Ph. D. Courses

Sr. No.	Course code	Title of Course	Credit Hours
1.	AGB 701	RECENT ADVANCES IN ANIMAL GENETICS	2+0
2.	AGB 702	RECENT TRENDS IN ANIMAL BREEDING	2+0
3.	AGB 703	ADVANCES IN BIOMETRICAL GENETICS	2+1
4.	AGB 704	ADVANCES IN SELECTION METHODOLOGY	2+1
5.	AGB 705	BIOINFORMATICS IN ANIMAL GENETICS AND BREEDING	2+0
6.	AGB 706	ADVANCES IN MOLECULAR CYTOGENETICS	2+0

7.	AGB 707	UTILISATION OF NON-ADDITIVE GENETIC VARIANCE IN FARM ANIMALS	2+1
8.	AGB 791	DOCTORAL SEMINAR I	1+0
9.	AGB 792	DOCTORAL SEMINAR II	1+0
10.	AGB 799	DOCTORAL RESEARCH	45

PG Examination Patterns

Sr. No.	Examination	Theory	Practical
1.	Self-study (Assignment/ Presentation)	20	-
2.	Internal tests:- First Test Mid Term Test	10 20	- 50
3.	Semester End Examination	50	50
Total Marks		100	100

Research Area of the Department

1.	Breed characterization
2.	Selection signatures for livestock breeds of Gujarat
3.	Selection indices for cattle breeds of Gujarat
4.	Cytogenetic characterization
5.	Genomic selection in livestock breeds of Gujarat
6.	Artificial intelligence
7.	Genome wide association study (GWAS)

Contact details

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