

**PIR MEHR ALI SHAH
ARID AGRICULTURE UNIVERSITY
RAWALPINDI**



**Self Assessment Report
1st Cycle (Fall 2016- Spring 2018)
M. Phil. Animal Breeding and Genetics**

**DEPARTMENT OF ANIMAL BREEDING AND
GENETICS**

Prepared by: Members of Program Self Assessment Team

Dr. Muhammad Moaeen-ud-Din	(Coordinator)
Dr. Ghulam Bilal	(Member)
Hafiz Muhammad Waheed	(Member)

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INTRODUCTION

The aim of self-assessment report for program of the M. Phil. Animal Breeding and Genetics is to improve quality of education and warrant high academic standards. It is an important tool for academic quality assurance and provides feedback for faculty and administration to initiate necessary actions to be taken for future improvement. The M. Phil. Animal Breeding and Genetics is only M. Phil. program offered under the umbrella of Department Animal Breeding and Genetics.

Department of Animal Breeding and Genetics was a section of Department of Livestock Production & Management since the inception of Faculty of Veterinary & Animal Sciences in 2006 till June 30, 2018 when syndicate approved the establishment of Department in its 80th meeting. Earlier the foundation of Department was laid when on December 17, 2015; Laboratories of Animal Breeding & Genetics were inaugurated that included Molecular Genetics Lab and Functional Genomics Lab.

Livestock sector plays a vibrant role in national economy of Pakistan as depicted by its highest contribution 58.9% in Agriculture value addition during 2017-18 which was greater than cumulative share of all other agriculture commodities. Livestock sector not only provides valuable food items like meat, milk and eggs, etc. but also provides employment and involved in poverty alleviation as well as foreign exchange earnings. This sector is also great source of livelihood for the rural poor community in country.

The Department of Animal Breeding and Genetics has qualified staff having three faculty members; one Associate Professor, one Assistant Professor and 1 lecturer, whereas 2 of them are Higher Education Commission approved supervisors for post-grad students. The faculty members are also actively involved in conducting research on dairy, beef and small goat/sheep genetics & breeding. Training workshop for faculty members and post-graduate students regarding Genomic selection was also conducted during March-2017.

The Department of Animal Breeding and Genetics has well equipped Molecular Genetics Laboratory, Functional Genomics Laboratory, Cyto-Genetics/Cell Culture Laboratory and Computational Genetics and Genomics Laboratory fulfilling the requirements for post-grad research not only for Department of Animal Breeding and Genetics students but also post-graduate students from other departments like Biochemistry, Biotechnology, Zoology/Botany and Agriculture disciplines. These laboratories have the facilities for DNA extraction, DNA Quantification, DNA Quality measure, PCR protocol, Gel electrophoresis, Cell culture, handling and analyzing large data phenotypic and genomic aspects. The enrolled students in M. Phil Animal Breeding and Genetics have full opportunities for conducting research on various quantitative or molecular genetics issues of large or small ruminants.

An extensive scheme of study (consisting of 18 courses) has been developed while following HEC guideline for M. Phil. degree programme in the field of Animal Breeding and Genetics including all major aspects such as Concepts of Genetics, Population and Quantitative Genetics, Molecular Genetics and Genetic Engineering in Farm animals, Selection Methods and Breeding Systems in Farm Animals, Biometrical Techniques in Animal Breeding, Statistical Genetics and R Programming, Theory of Inbreeding, Poultry Genetics and Breeding, Fish Genetics and Breeding, Companion Animals Genetics and Breeding, Cytogenetics and Immunogenetics, Bioinformatics and Genomics, Theory of Epigenetics, Genetic Conservation of Wild and Farm Animals, Advances in

population and Quantitative Genetics, Advances in Animal Molecular Genetics, Farm Animal Breeding Plans and Genetics of Fitness Traits in Farm Animals. The courses are supported by latest text books and research publications.

SECTION 1:

Components of Self-Assessment Process:

This Self-Assessment Report has been prepared based on following eight criteria as described in Self-Assessment Manual.

Criterion-1: Program Mission, Objectives and Outcomes

Mission Statement: To train young Veterinary and Animal Sciences graduates through innovative knowledge and research in the field of Animal Breeding and Genetics

Standard 1-1: Documented Measurable Objectives

1. To produce a crop of animal breeding and genetics experts equipped with innovative knowledge.
2. To impart training for conducting research studies on various qualitative or molecular genetics aspects of different livestock species.
3. To generate knowledge through research that would be helpful in tackling livestock breeding and genetics issues.

Expected Outcomes

1. The future plan of animal breeding and genetics programs to integrate science, practice, and innovation to serve the immediate needs of animal industries. Moreover, the plan is to direct programs that will provide new knowledge and information to confront the challenges in the future. Degree holders can join government and private sector of livestock production and research stations, molecular genetics laboratories and research institutes and public and private sector universities.
2. The commitment is to educate and prepare students for productive and gratifying careers in animal breeding & genetics, veterinary medicine and the diverse areas of animal breeding business and industry.
3. Graduates of our program are knowledgeable about sustainable animal breeding practices that also ensure animal production, genetic control of diseases and well-being and stewardship of natural resources.

Main Elements of Strategic Plan to Achieve Mission and Objectives

1. Development of sound teaching system on the experience and vision gathered from world reviews, literature, innovations, proceedings, and symposia etc

2. Planning and conducting post-graduate research with reports and theses
3. Setting up of well-equipped research laboratories depending on the available resources.
4. Publication of scientific papers, books, manuals etc.
5. Designing and constantly updating the curricula involving core subjects, elective subjects and specialized areas and study tours.
6. Implementation of research projects funded by the universities and other national and international agencies.
7. Development of linkages with National and International research and development organizations to faster research.

The assessment of the program objectives through different criteria is presented in Table 1.

Table 1. Program Objectives Assessment for M. Phil. Animal Breeding and Genetics

S. No.	Objectives	How measured	When measured	Improvement identified	Improvement made
1	To produce a crop of animal breeding and genetics experts equipped with innovative knowledge	Based on meetings and Discussions with stakeholders/breeders about issues and problems faced by animal production and genetic in the country	Regular Feature	Conducting training workshop by involving various faculty members and post-graduate students to increase interaction and sharing views	MoUs signed with various national and international organizations like Sahiwal Breeders Association, Buffalo Breeders Association, Iowa State University and LIC Newzealand
2	To impart training for conducting research studies on various quatitative or molecular genetics aspects of different livestock species.	Through teacher-student's conversations and laboratory work	Throughtout semester	Discussion on various research progresses at world level in the field and development of future plans	Regular meeting at Supervisor level and getting student progress reports at Department level.
3	To generate knowledge through research that would be helpful in tackling livestock breeding and genetics	Research publications and research funding	Contineuous activity	Seeking more funding and equipment for research	Research projects funded by national and international funding agencies are in progress and further

	issues.				research proposals are submitted
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Standard 1-2: The program must have documented outcomes for graduating students. It must be documented that the outcomes support the program objectives and that graduating students are capable of performing these outcomes.

Program Learning Outcomes

Degree of skills and capabilities that will reflect on student's performance as animal geneticist and breeding scientists:

1. Students shall possess discipline specific knowledge in major areas of study including Population Genetics, Molecular Genetics and Computational Genetics.
2. Students shall have the ability to identify and resolve the problems related to livestock breeding and genetic basis of inheritance by designing an appropriate line of action to the identified issue(s).
3. Students shall possess the ability to professionally trained individuals in animal genetics and animal biology.
4. Students shall be able to optimize farm recording and have skills to use computer software(s) for efficient livestock breeding management.
5. Students shall have an assistance for producers and agribusinesses for breeding of livestock for sustainable genetic improvement.
6. Students shall be aware of information to support the contributions of animals to society.
7. Students shall get scientific background knowledge of technology to produce desirable, safe, and nutritious animal-derived foods.

The relationship between program outcomes and objectives are given in Table 2.

Table 2. Relationship between program objectives and program outcomes

Program objectives	Outcomes						
	1	2	3	4	5	6	7
1	+++	+	++	++	++	++	++
2	++	++	+++	+++	++	++	++
3	++	+++	++	++	++	++	++

+ = Moderately satisfactory, ++ = Satisfactory, +++ = Highly satisfactory, Blank cell= No contribution

PROGRAMME OUTCOME MEASUREMENT

Following actions have been taken on the basis of program assessment results.

Actions taken based on the Results of Program Assessment:

- The foremost strength of the Program is the accessibility of highly qualified teachers with full association of their particular subjects.
- The curricula are being updated by including more applied and professionally sound courses.
- The establishment of fully equipped Molecular Genetics, Functional Genomics and Computational Genetics and Genomics lab is considered to be extremely imperative if we desire to convey real education equipped with advanced molecular genetics and animal genomic selection wisdom.
- MoUs with national livestock breeder's societies and renowned international institutes/labs have been made to strengthening the students with latest animal genetics and breeding protocols.

Skills and Capabilities Reflected in performance as Animal Genetics and Breeding professionals:

- Students develop capacity to apply knowledge of animal breeding and genetics and to work as experts, to build confidence and communicate effectively in writing, oral and expression to use recent tools, techniques and skills for their profession, formulate and intend the experiments and to work efficiently in a team, to handle data analysis problems and develop ability to recognize future requirements.

Limitations Detected:

- The animal's selection decisions and livestock genomic selection largely rely on sound animal performance recording and every aspect of animal's phenotype. The latest modern technology and equipments are intensively required.
- Protocols of animals testing for genetically transmitting diseases and producing unrequired products is still not finalized.
- Latest literature, reviews, journals and books from the authentic scientists are hardly available. Highly trained faculty is always needed in the department. There is a need for short foreign training to faculty members also.

Program Assessment Results:

For programme's evaluation, especially from view point of achievements of objectives, assessment was made through prescribed proforma provided by the Quality Enhancement Cell (QEC) of Pir Mehr Ali Shah, Arid Agriculture University.

Survey of Graduating Students, Alumni Survey and Employer Survey

The evaluation of contents for enrolled courses and assessment of teachers who taught these respective courses by the students are summarized and given in subsequent figures. The views of passed out students and survey of former students from the department of ABG is not possible yet, as all of the students are still enrolled in post-graduate program and submitted their M. Phil thesis for evaluation during Spring-19.

Table 3: Courses offered and evaluated for M. Phil for Fall 2016 to Spring 2018

Course #	Course Title	Semester	Credit Hours
ABG-701	Advanced concepts in genetics	FALL-16	3(2-2)
ABG-702	Population and quantitative genetics	FALL-16	4(3-2)
ABG-703	Molecular genetics and genetic engineering in farm animals	FALL-16	4(3-2)
ABG-712	Bioinformatics and genomics	FALL-16	3(2-2)
ABG-705	Biometrical techniques in animal breeding	SPRING-17	3(2-2)
ABG-706	Statistical genetics and R programming	SPRING-17	3(1-4)
ABG-713	Theory of epigenetics	SPRING-17	3(2-2)
ABG-719	Special problem	FALL-16	1(1-0)
ABG-720	Seminar	FALL-17	1(1-0)

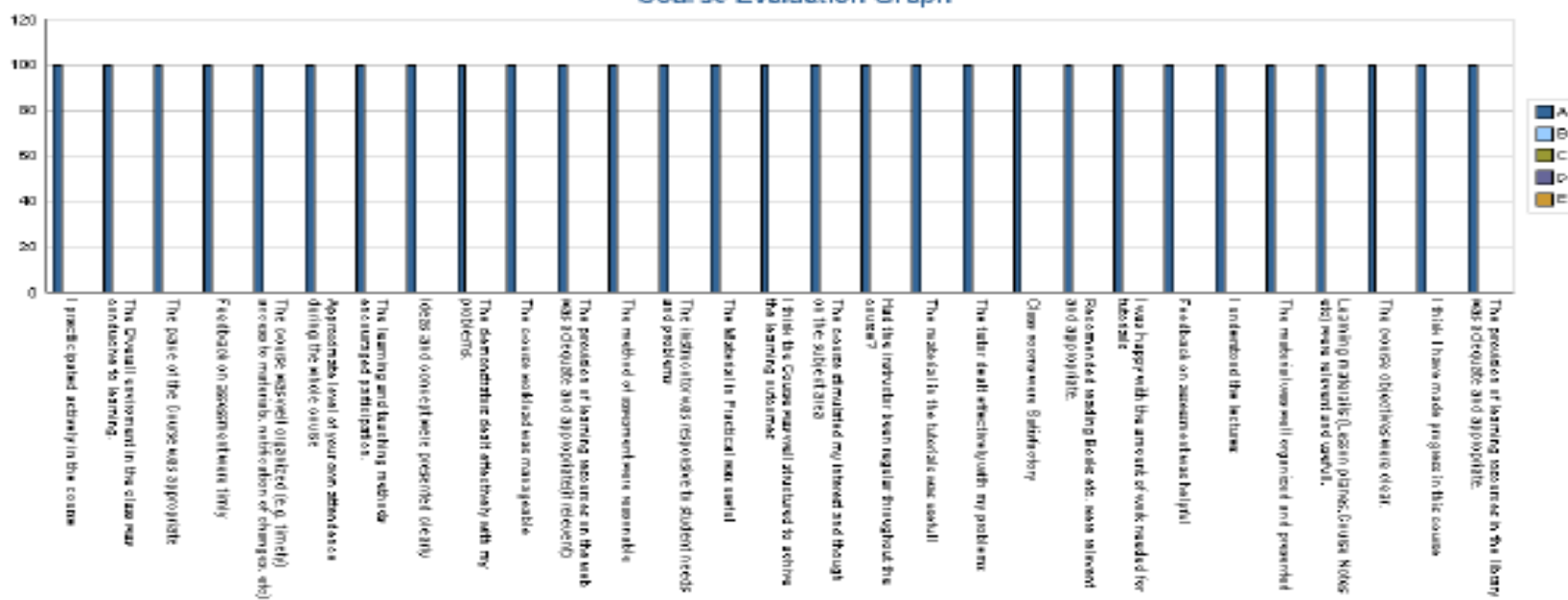


**Pir Mehr Ali Shah
Arid Agriculture University
Performa 1**

Print Date: Jul. 31, 2019

Session Name: FALL-16
 Teacher Name: Ghulam Bilal
 Course Name: Advanced concepts in genetics
 Section: A M/R: M Semester# 1
 Class: M.Phil(Animal Breeding and Genetics)

Course Evaluation Graph



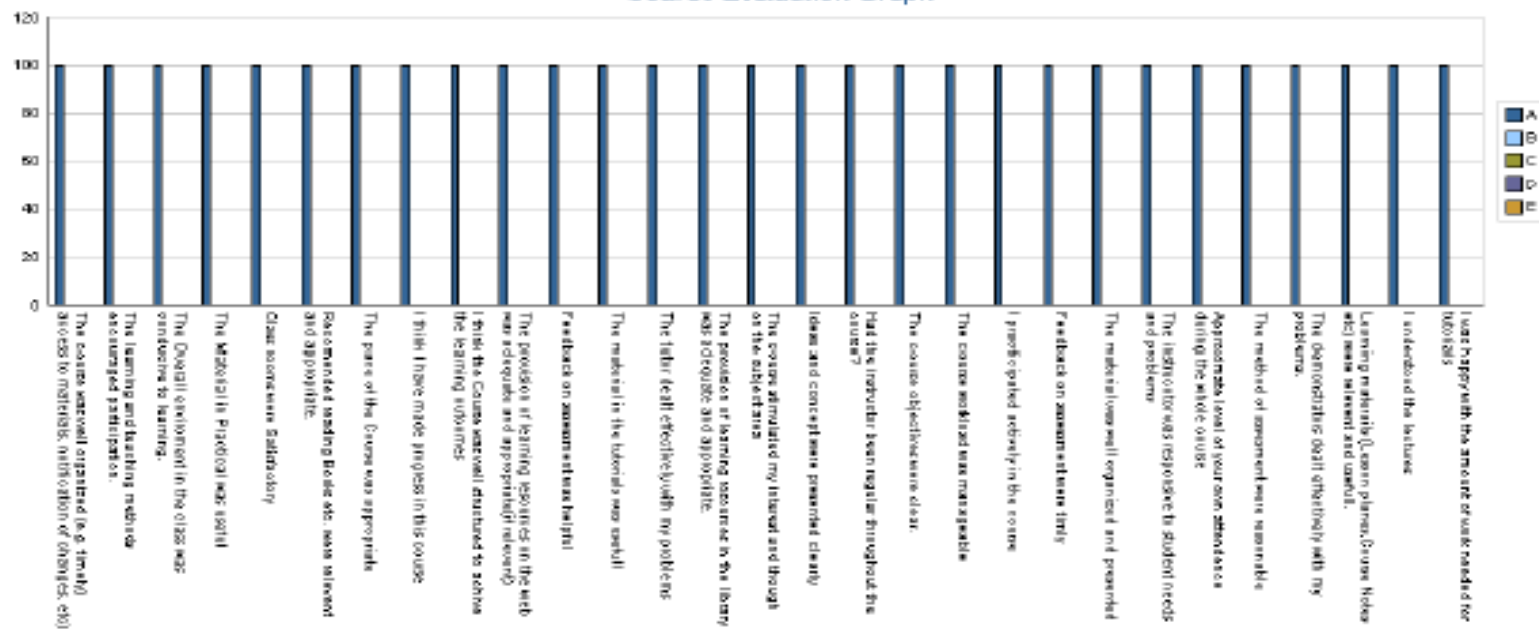


**Pir Mehr Ali Shah
Arid Agriculture University
Performa 1**

Print Date: Jul 31, 2019

Session Name: FALL-16
 Teacher Name: Ghulam Bilal
 Course Name: Population and quantitative genetics
 Section: A M/R: M Semester#: 1
 Class: M.Phil(Animal Breeding and Genetics)

Course Evaluation Graph





Pir Mehr Ali Shah Arid Agriculture University

Performa 1

Print Date: Jul 31, 2019

Session Name: FALL-16

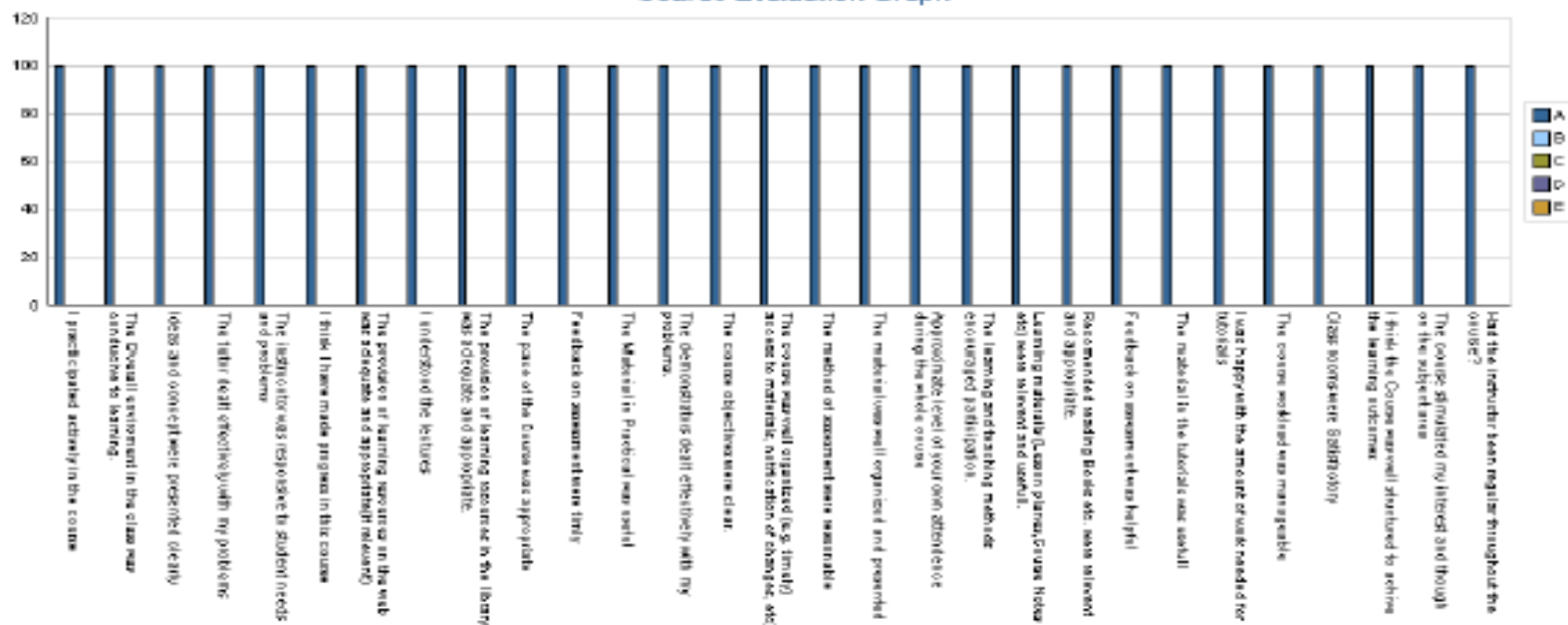
Teacher Name: Muhammad Moazzam-ud-Din

Course Name: Molecular genetics & genetic engineering in farm animals

Section: A M/R: M Semester# 1

Class: M.Phil(Animal Breeding and Genetics)

Course Evaluation Graph





Pir Mehr Ali Shah Arid Agriculture University

Performa 1

Print Date: Aug. 1, 2019

Session Name: SPRING-17

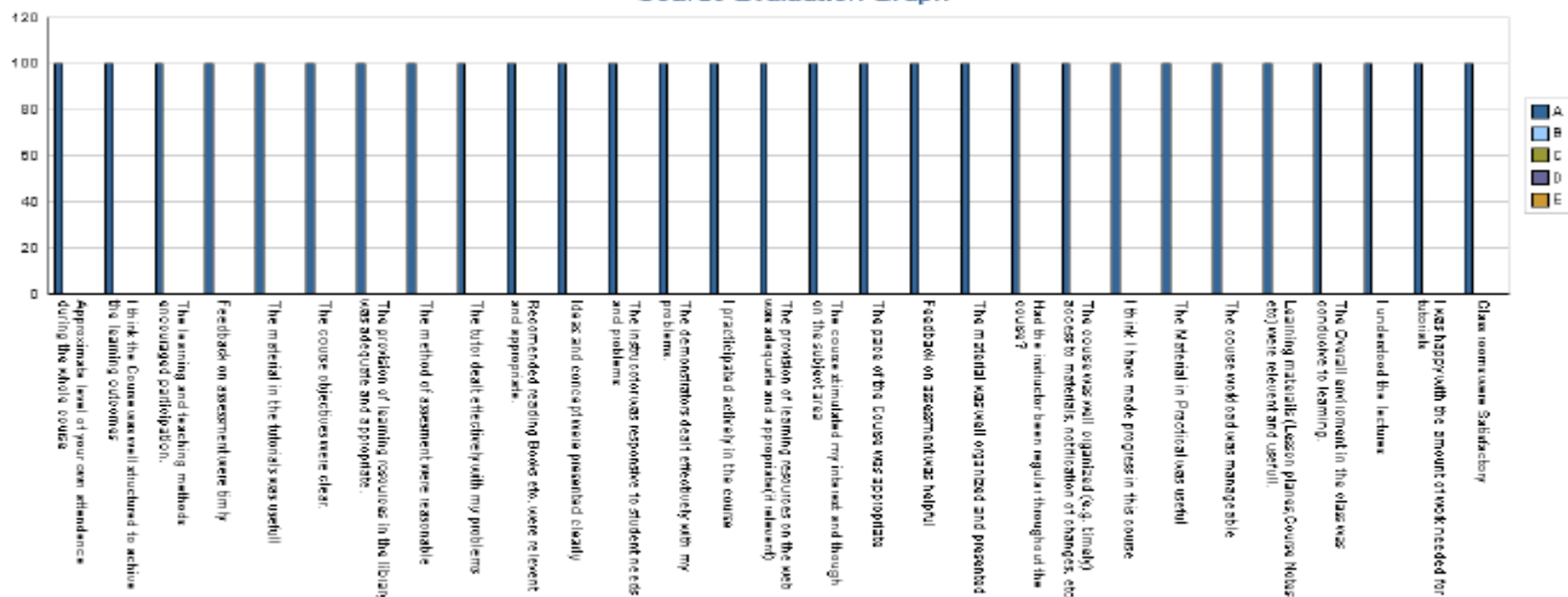
Teacher Name: Ghulam Bilal

Course Name: Biometrical Techniques In Animal Breeding

Section: A M/E: M Semester# 2

Class: M.Phil (Animal Breeding and Genetics)

Course Evaluation Graph





Pir Mehr Ali Shah Arid Agriculture University

Performa 1

Print Date: Aug. 1, 2019

Session Name: SPRING-17

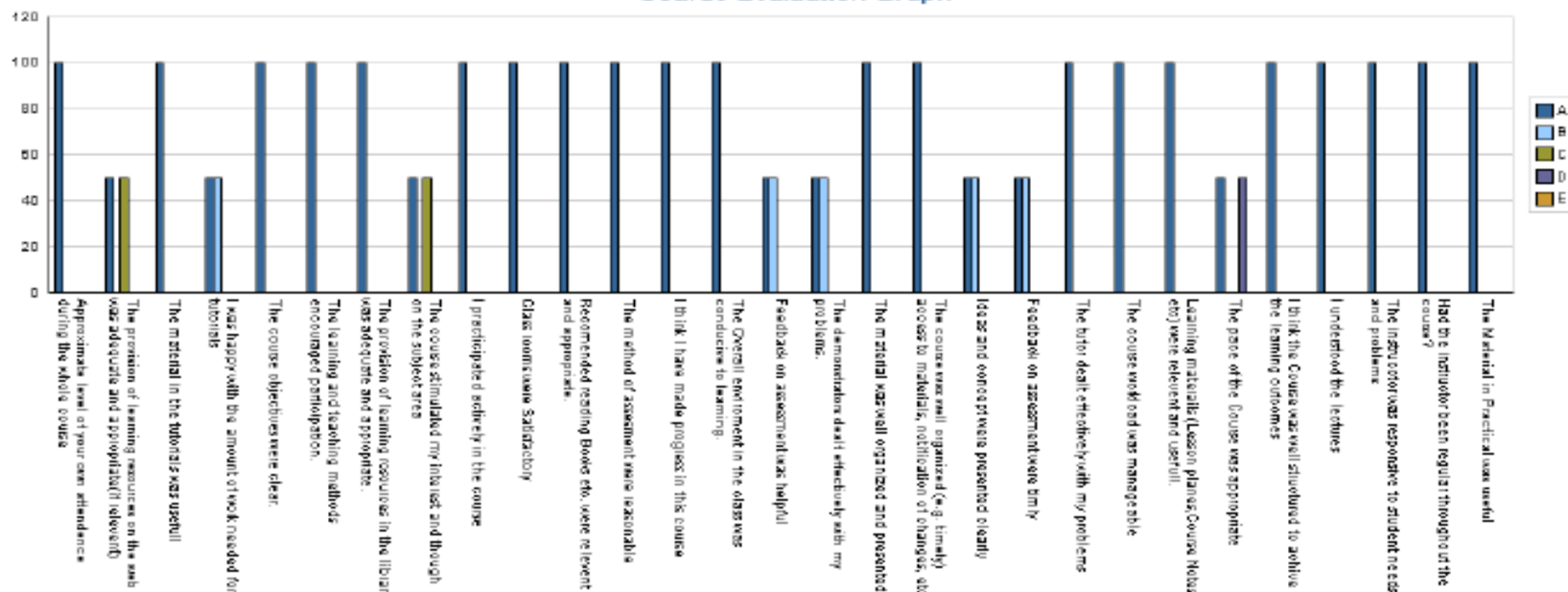
Teacher Name: Ghulam Bilal

Course Name: Statistical Genetics And R Programming

Section: A M/E: M Semester# 2

Class: M.Phil(Animal Breeding and Genetics)

Course Evaluation Graph





**Pir Mehr Ali Shah
Arid Agriculture University
Performa 1**

Print Date: Jul. 31, 2019

Session Name: FALL-16

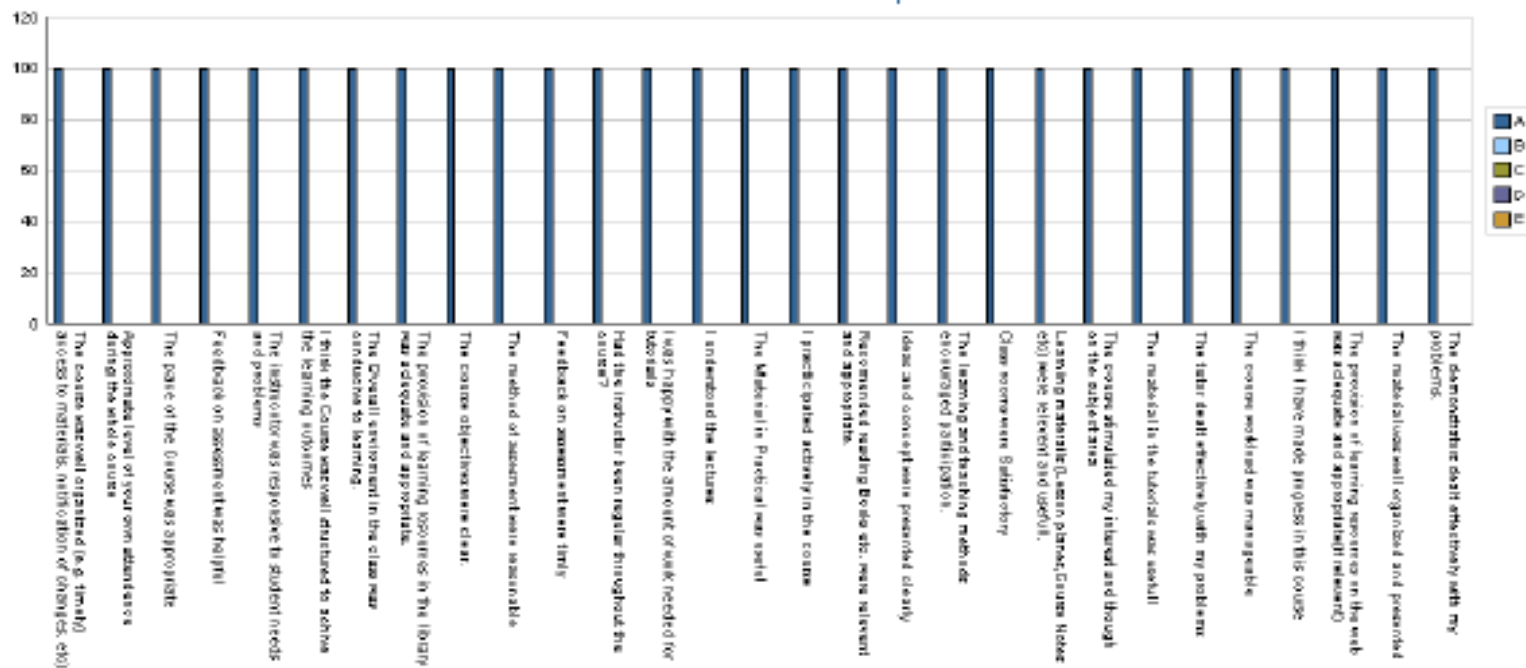
Teacher Name: Muhammad Moseen-ud-Din

Course Name: Bioinformatics and genomics

Section: A **M/R:** M **Semester#** 1

Class: M.Phil(Animal Breeding and Genetics)

Course Evaluation Graph





Pir Mehr Ali Shah Arid Agriculture University

Performa 1

Print Date: Aug. 1, 2019

Session Name: SPRING-17

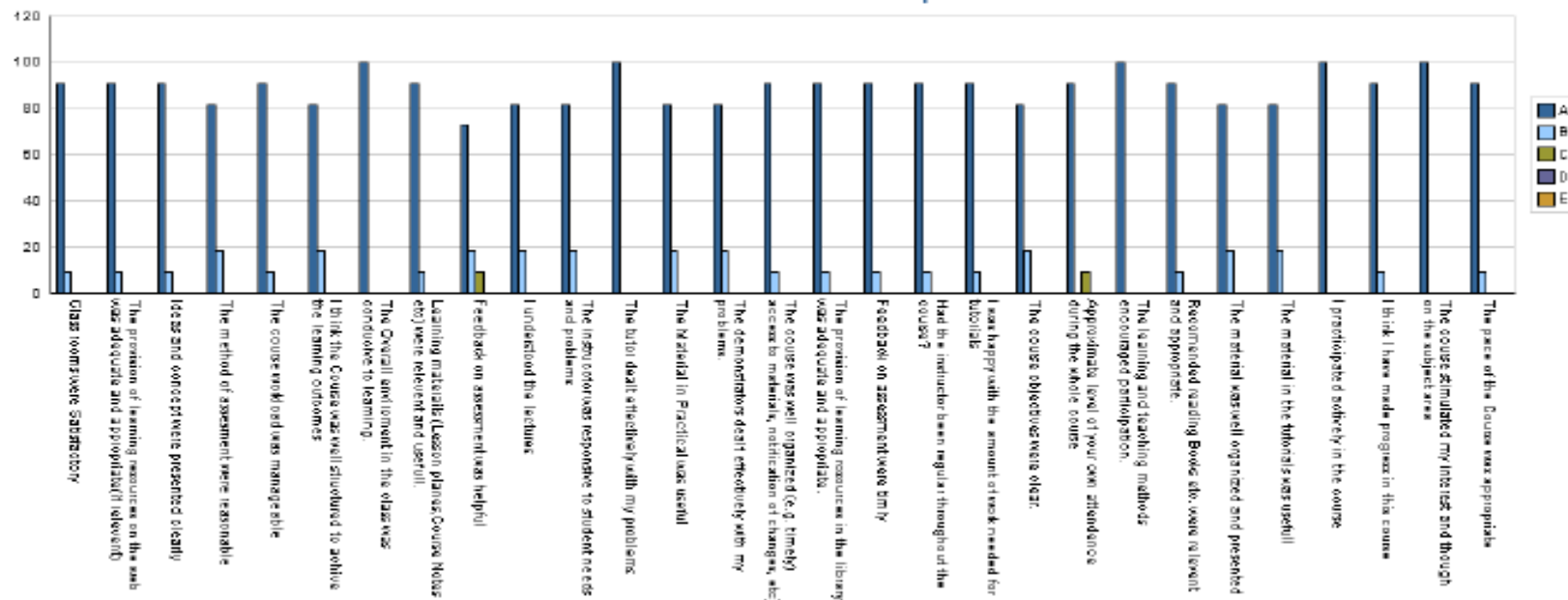
Teacher Name: Muhammad Moaen-ud-Din

Course Name: Theory Of Epigenetics

Section: A M/E: M Semester# 2

Class: M.Phil (Animal Breeding and Genetics)

Course Evaluation Graph





Pir Mehr Ali Shah Arid Agriculture University

Performa 1

Print Date: Aug. 1, 2019

Session Name: FALL-16

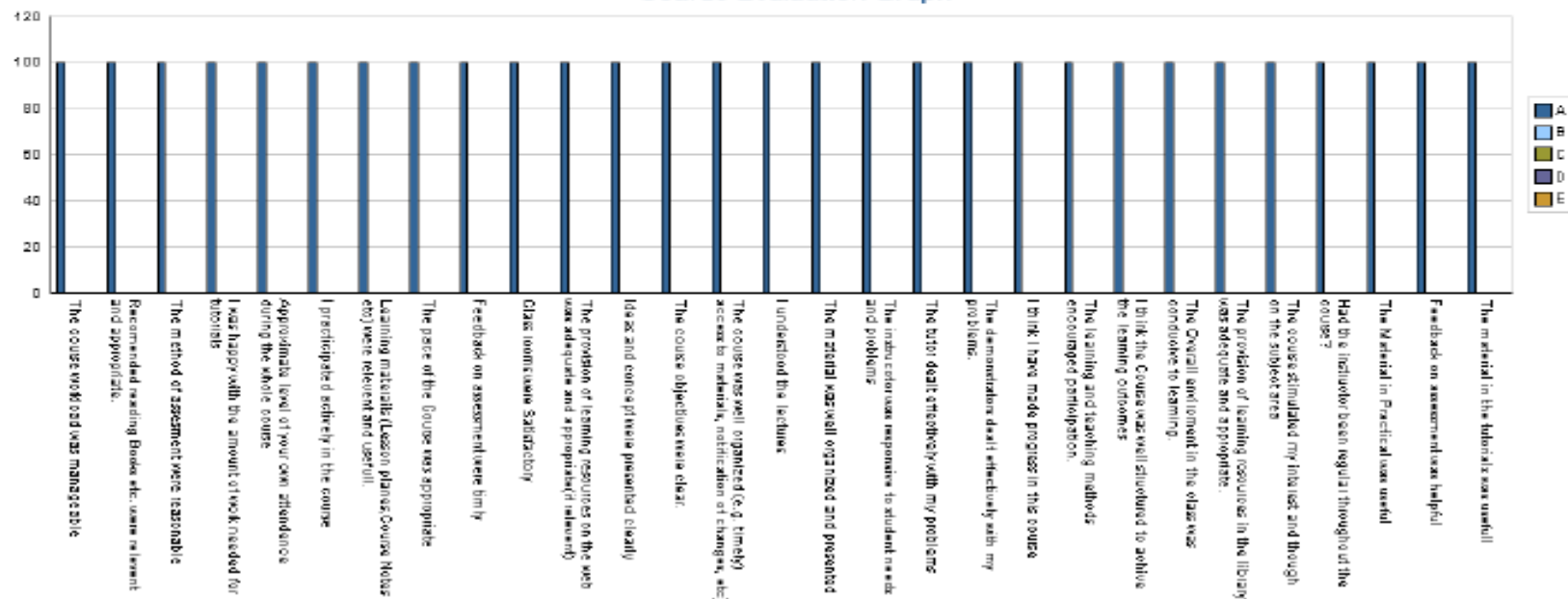
Teacher Name: Ghulam Bilal

Course Name: Special Problem

Section: A M/E: M Semester# 1

Class: M.Phil(Animal Breeding and Genetics)

Course Evaluation Graph





Pir Mehr Ali Shah Arid Agriculture University

Performa 1

Print Date: Aug. 1, 2019

Session Name: SPRING-19

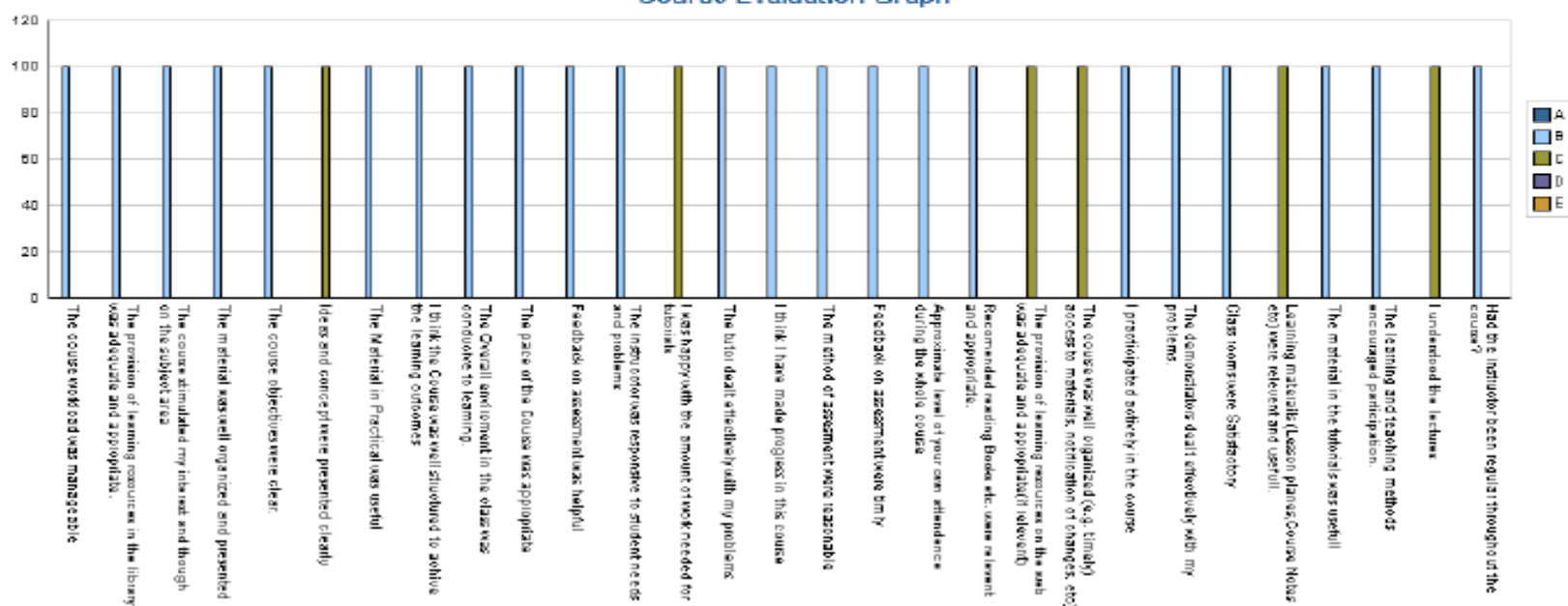
Teacher Name: Muhammad Moeen-ud-Din

Course Name: Thesis M.Phil.

Section: B M/E: M Semester# 6

Class: M.Phil (Animal Breeding and Genetics)

Course Evaluation Graph





Pir Mehr Ali Shah Arid Agriculture University

Performa 1

Print Date: Aug. 1, 2019

Session Name: SPRING-19

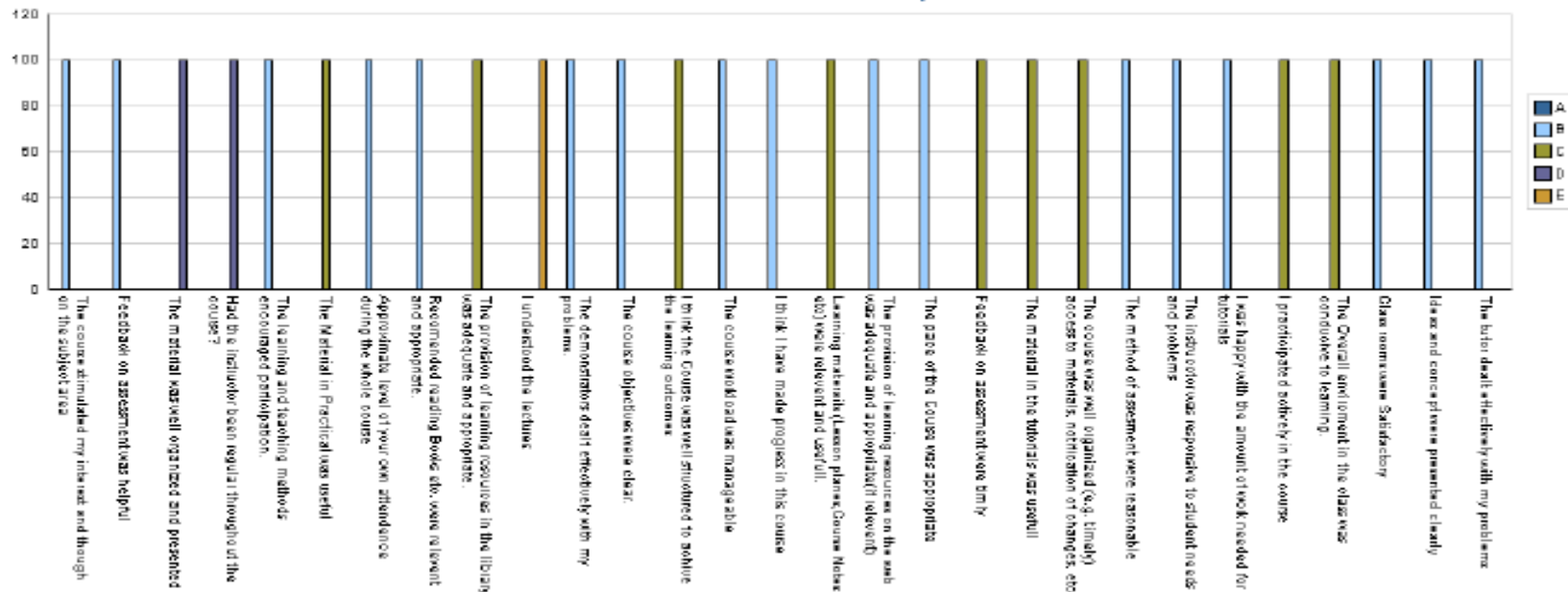
Teacher Name: Ghulam Bilal

Course Name: Thesis M.Phil.

Section: A M/E: M Semester# 6

Class: M.Phil(Animal Breeding and Genetics)

Course Evaluation Graph





**Pir Mehr Ali Shah
Arid Agriculture University
Performa 10**

Print Date: Jul. 31, 2019

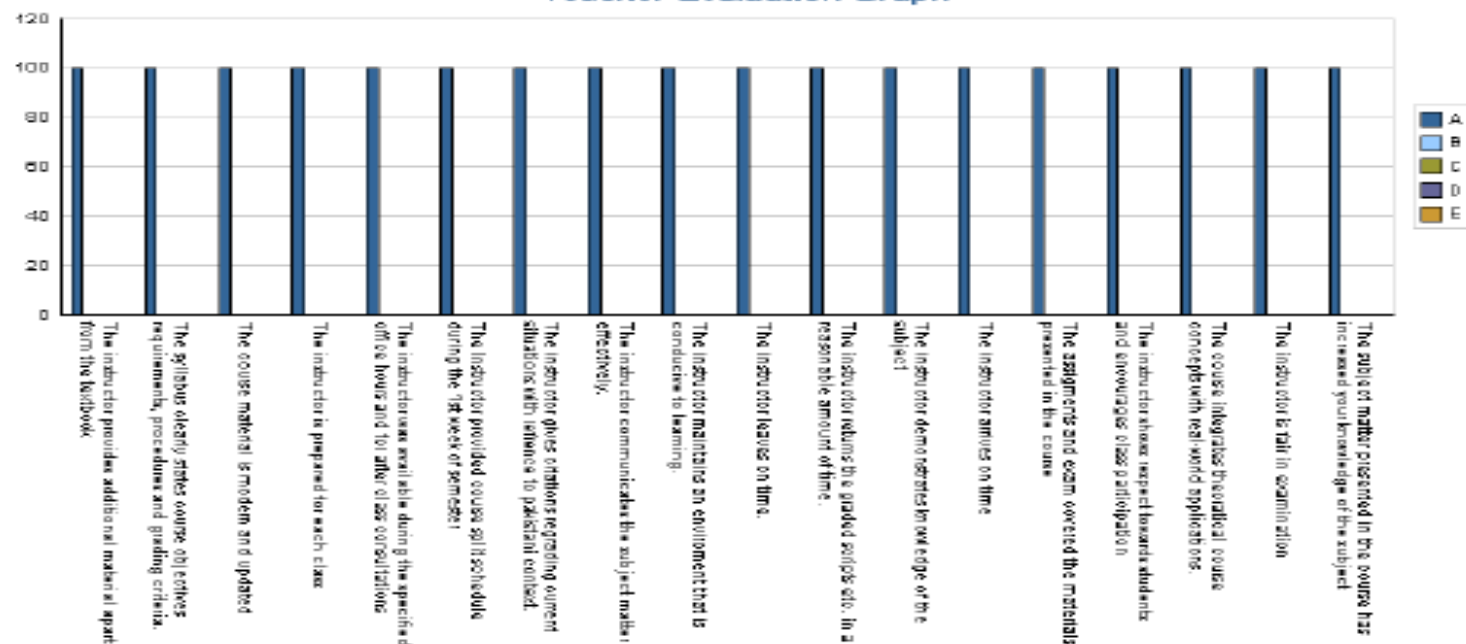
Session Name: FALL-16

Teacher Name: Ghulam Bilal

Course Name: Advanced concepts in genetics

Section: A **M/E:** M **Semester#:** 1

Teacher Evaluation Graph





Pir Mehr Ali Shah Arid Agriculture University

Performa 10

Print Date: Jul. 31, 2019

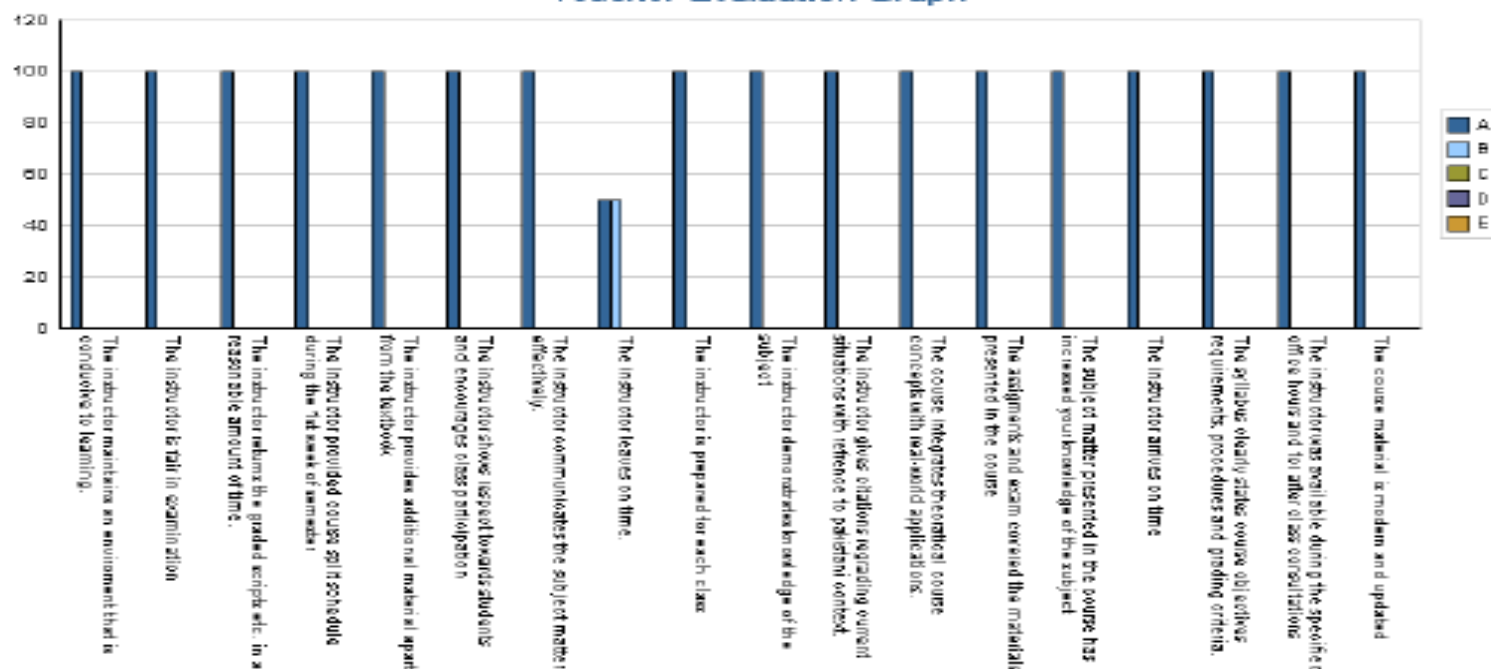
Session Name: FALL-16

Teacher Name: Ghulam Bilal

Course Name: Population and quantitative genetics

Section: A M/E: M Semester#: 1

Teacher Evaluation Graph





**Pir Mehr Ali Shah
Arid Agriculture University
Performa 10**

Print Date: Jul. 31, 2019

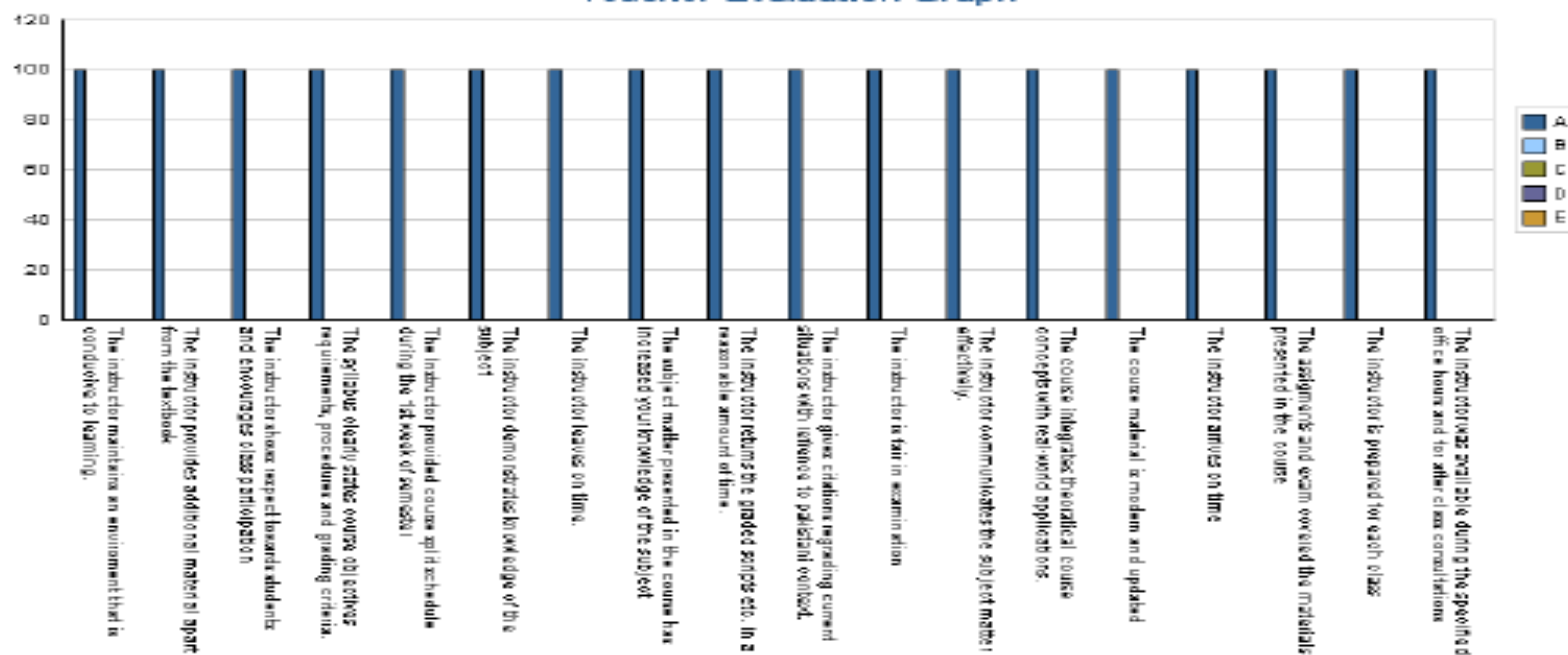
Session Name: FALL-16

Teacher Name: Muhammad Moazzen-ud-Din

Course Name: Molecular genetics & genetic engineering in farm animals

Section: A **M/E:** M **Semester#:** 1

Teacher Evaluation Graph





**Pir Mehr Ali Shah
Arid Agriculture University
Performa 10**

Print Date: Jul. 31, 2019

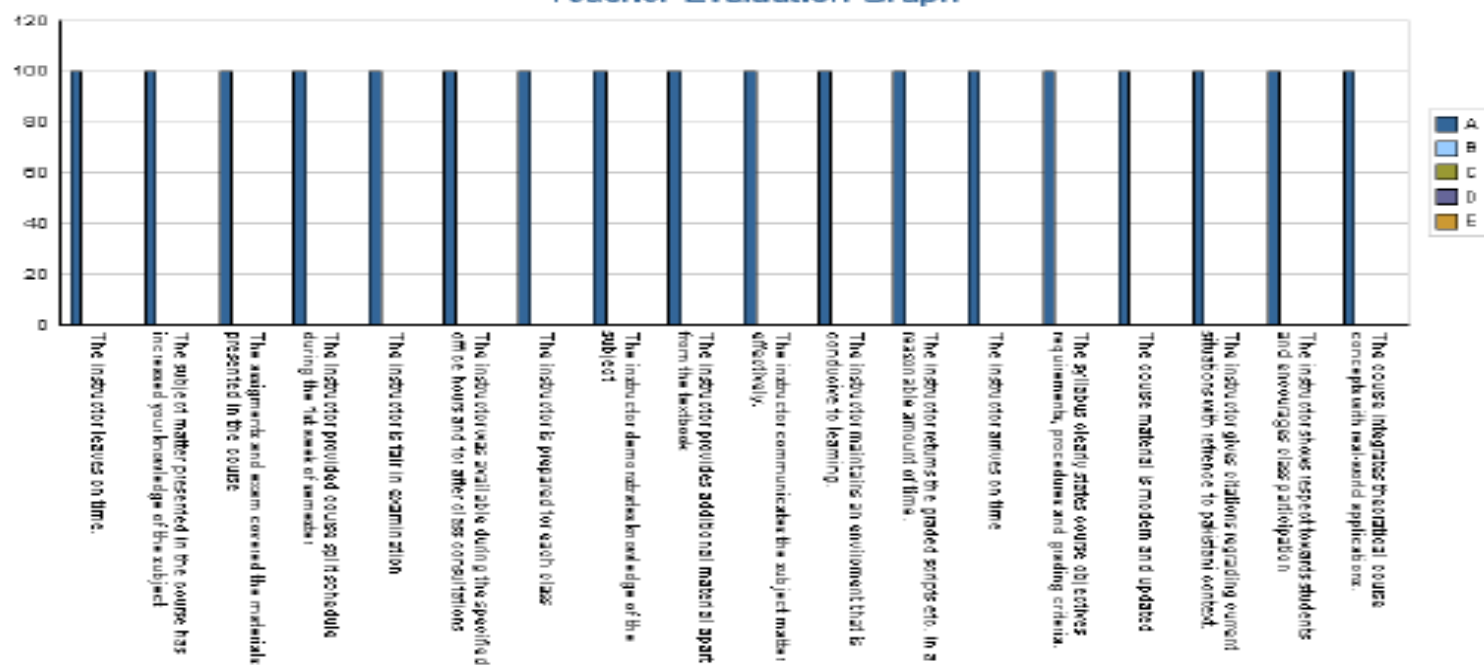
Session Name: FALL-16

Teacher Name: Muhammad Moeen-ud-Din

Course Name: Bioinformatics and genomics

Section: A **M/E:** M **Semester#:** 1

Teacher Evaluation Graph



Alumni Survey Results

This program was started in Fall 2016 and no student has completed his degree uptill now. So alumni survey was not conducted during this period.

Graduating student Survey Results

This program was started in Fall 2016 and no student was graduated uptill now. So survey was not conducted during this period.

Standard 1-3: The results of program's assessment and the extent to which they are used to improve the program must be documented

Regular assessment process will be continued and the results will be incorporated accordingly. Following are the strengths and weaknesses of the program identified.

Strengths of the Program

1. The department has trained teachers with full consociate of their respective subjects, knowledge of research and modern quantitative and molecular/functional genomics techniques for study of animal breeding and genetics.
2. One Associate Professor with Ph.D. degree from Huazhong Agricultural University, China, 2008 in Animal Breeding & Genetics, and other PhD qualified is Assistant Professor with Ph.D. degree from McGill University, Canada, 2012 in Animal Breeding and Genetics. Both faculty members are HEC approved supervisors who can supervise Ph.D. students also. While one faculty member is permanent lecturer and have M.Phil in Animal Breeding and Genetics degree and his Ph.D. degree in Animal Breeding and Genetics from University of Agriculture, Faisalabad is in progress and will be notified this year hopefully.
3. All Ph.D holder faculty members are involved in research directly or indirectly as supervisor and committee members of post-graduate students.
4. All Ph.D holder faculty members are involved in research projects funded from various nationally and internationally funding agencies.
5. Four research labs have been established with basic and upto date necessary equipments in addition to having equipments to carry out advanced research on every aspect of animal breeding and genetics.

Weaknesses of the Program

1. There is insufficient number of faculty members due to which this program is in hault position from HEC.
2. Working and sitting place for postgraduate students is insufficient.

Standard 1-4: The department must assess its overall performance periodically using quantifiable measures.

The evaluation process indicated high efficiency of system and satisfactory impact of outcomes (Table 4).

Table 4: Performance measures for research activities (*total number*)

Faculty	Designation	Publications in Journals	Research & Development Projects
Dr. Muhammad Moaen-ud-Din	Asso. Prof.	60	02
Dr. Ghulam Bilal	Assis. Prof.	15	02
Mr. Hafiz Muhammad Waheed	Lecturer	06	Nil

Future Plans

The Department has planned future research studies to address the issues of Animal Breeding and Genetics. Some of the salient activities are given in the following;

1. Post-graduate degree program other than Animal Breeding and Genetics related to livestock genomics i.e. Bioinformatics and Molecular Genetics in coordination with National Center for Livestock Breeding, Genetics & Genomics (NCLBG&G).
2. Devising breeding objectives for different livestock species in coordination with NCLBG&G, L&DD and industry/breeders.
3. Implementation of genomic selection program for Sahiwal cattle in coordination with NCLBG&G, L&DD and industry/breeders
4. Establishment of state herd for Sahiwal cattle at KRF Koont
5. MoUs with international livestock genetics institutes
6. Establishing DRF recording system for Sahiwal cattle recording

Faculty satisfaction regarding the administrative services

Office matters/files are disposed regularly and so far no complaint has been received from higher administrative authorities. Proper records/files of each employee and student are maintained.

FACULTY COURSE REVIEW REPORT

Faculty course review report was filled by each course teacher at the end of course. The results are summarized in following table.

Table 5: Faculty Course Review Report

Course number	Curriculum (Comments)	Assessment (Comments)	Enhancement (Comments)	Outline Changes
ABG-701	Needs to increase working place in Lab	Satisfied	Not proposed	No
ABG-702	Contents are fine	Satisfied	Not proposed	No
ABG-703	Course is well designed	NA	Not proposed	NIL
ABG-705	Contents are fine	Satisfied	Not proposed	No
ABG-706	Course is well designed	Satisfied	More Computers required	No
ABG-712	Contents are fine	Satisfied	Not proposed	No
ABG-713	Course is well designed	Satisfied	Not proposed	NIL

Criterion 2: Curriculum Design and Organization

Criterion 2: Curriculum Design and Organization

Degree title: MASTER OF PHILOSOPHY (Animal Breeding and Genetics)

All the courses for degree program were developed by a curriculum committee of Pakistan Veterinary and Medical Council (PVMC) and Department Board of Studies. The committee consists of experts and learned professors, subject-matter specialists from other universities and research organization from Pakistan. Curriculum for the M.Phil is revised/ updated through different bodies, when needed. At department level, Board of Studies, which is comprised of senior faculty members, is responsible for updating the curriculum. This body is authorised to formulate syllabus and course contents. The Chairman of the Department in this regard acts as a Convener. The courses are then sent to the Board of Faculty for approval. The Dean of the Faculty, being Convener of this body, conduct meeting. As per university rules, courses after the approval from the Faculty Board, are placed before the University Academic Council for final approval.

Criteria for M.Phil (Animal Breeding and Genetics) Admission

DVM/B.Sc. (Hons) AH (4 or 5 year degree program and accredited by PVMC)

Definition of Credit Hour

A student must complete a definite number of credit hours. One credit hour is one theory lecture or two hours laboratory (practical/week). One credit hour carries 20 marks. The semester is of 16-18 weeks.

Degree Plan

The M.Phil (Animal Breeding and Genetics) degree program is organized by the department of Animal Breeding and Genetics at FV&AS.

Minimum Requirements for the Award of Degree:

- (i) The duration of the Course for the M.Phil Degree shall not be less than 4 semesters for whole-time students and six semester for part-time students/partial residents, and not more than six and eight semesters, respectively
- (ii) A candidate admitted to the course, in partial residence, is required to be a resident at the University during the first two semesters.
- (iii) The requirement to be completed by each student for the award of degree shall be 40 credits. These credits will include 30 credits of course work and 10 credits of research thesis/dissertation (not to be counted towards CGPA) based on the approved programme of research. This requirement is excluding the credits required for rectifying course deficiency, if any.
- (iv) Nearly two third of the credits for the course work shall be in the major field of study, and one-third in the minor field of study. The minor fields shall not exceed three.

- (v) All students in M.Phil degree will be required to pass the Comprehensive Examination after qualifying the course work.
- (vi) The recommendation of HEC regarding compulsory requirement of minimum 124 credit Hours for admission in M.Phil/MS is adopted.

The Following courses shall be compulsory:-

Statistics shall be compulsory for M.Phil students in all disciplines. All the approved specialized course bearing course code of 7XX series can be offered to the students, keeping in view the course work previously taken at Postgraduate level of studies and their requirement of the specialization/thesis.

Admission to Course

- i. For M.Phil in Animal Breeding and Genetics, candidates must have passed DVM/B.Sc. (Hons) AH (4 or 5 year degree program and accredited by PVMC) in aggregate with 45% marks or its equivalent from a recognized institution or equivalent qualification in relevant discipline from HEC recognized institution.
- ii. For admission in M.Phil/MS, GAT (General) with 50% marks is compulsory.
- iii. Candidates must possess a valid, GAT result before admission.
- iv. Admission will be on open merit basis and merit will be calculated on the basis of marks obtained in the last Highest Relevant Degree.

Admission Authority:-

- (i) The admission to the course will be made by the Director Advanced Studies on the recommendations of the selections committee to be constituted by the Vice Chancellor.
- (ii) The selection committee shall consider the applications for admission and formulate its recommendations, according to the prescribed formula approved by the Academic Council, and submit it to the Director Advanced Studies.
- (iii) The Director Advanced Studies may refuse admission to the course without assigning any reason.
- (iv) The admission of a candidate to the course shall be provisional in the first instance and shall be confirmed only when he/she has:-
 - a) shown satisfactory progress in course work and thesis research;
 - b) rectified the course deficiencies, if any.

Credits:

- (i) Ordinarily a whole time student shall not be enrolled for more than 18 and less than 10 credits in a semester except during the last semester. These credits will include the credits earned in respect of deficiency courses.
- (ii) A part time student shall not take more than three courses in a semester.
- (iii) Out of the total number of credits required for M.Phil program two credits shall be earned through seminars and not more than one credit through Special Problem.
- (iv) The Director Advanced Studies and Research Board (ASRB) may, on the recommendations of Board of Studies, count towards the requirements of the course the credits earned by

a student at an other recognized institution subject to maximum of 65 percent of the minimum credits requirements laid down in these regulations provided that:

- a. The courses for which credit is claimed are identical with ore similar to the course, included in the programme approved for him.
 - b. The credits allowed for which Seminars and Special Problem shall not exceed the limit laid down in this regulation.
 - c. The courses for which credits are claimed have not been used for any other degree.
- (v) Provided that the above conditions may be relaxed by the Vice Chancellor on the recommendation of the Director Advanced Studies and the concerned Board of Study.

Supervisory Committee:-

- (i) Each student will have a Supervisory Committee to advise him/her in his/her Programme of studies and research.
- (ii) The Supervisory Committee shall consist of at least three members of the Faculty, two from major field and one from related field of study. If necessary an outstanding specialist in a major or minor field of study is available outside the University he/she may be appointed as member/co-supervisor in the supervisory committee.
- (iii) One of the teacher/ members from the major field shall act as supervisor on the recommendations of the Chairperson or Board of Studies.
- (iv) The committees and titles will be approved by the respective Deans and notified by the Director (Advanced Studies). However, the synopsis will be approved by the Director (Advanced Studies).

Academic Standing:-

- (i) Grade Point Average:
 - (a) Maximum grade point average 4.00
 - (b) Minimum grade point average for obtaining M.Phil 2.50
- (ii) To remain on the rolls of the University a student shall be required to maintain the following GPA/CGPA in each semester.

Semester	CGPA
1 st	1.50
2 nd	1.75
3 rd	2.00
4 th	2.50

- (iii) A student, who obtains CGPA of 2.00 or above but less than 2.50, upon the completion of entire approved course work or minimum residency, may be allowed to repeat the courses of the previous semesters in which he/ she had obtained the lowest grades in

order to improve the CGPA so as to obtain the minimum of 2.50 within the maximum time allowed for the award of degree, failing which he/ she shall cease to be on the roll.

- (iv) A student will be required to repeat those courses of the previous semesters in which he/ she had failed at the first available opportunity, provided that his/her maximum workload, including the courses being repeated by him/her will not exceed the normal workload.
- (v) A student shall be entitled to submit thesis of examination after he/she has passed all the final examination in the approved courses and comprehensive examinations provided he/she has also fulfilled the residential requirements.
- (vi) The thesis shall be prepared and presented in the manner laid in the instructions approved by Advanced Studies and Research Board.

Evaluation:

- a. There shall be 10 credit hours allocated for the thesis which shall not be counted towards calculation of CGPA
- b. A board of examiners comprising members of the Supervisory Committee and one external shall evaluate the thesis.
- c. The external examiner shall be appointed by the Vice-Chancellor from the persons proposed by the Advanced Studies and Research Board out of the panel of names recommended by the Board of studies or any other expert in the major field of research.
- d. At least three members of the Board of Examiners of whom one must be an external examiner, shall for the purpose of evaluating the thesis, hold a viva- voce examination.
- e. The date, time and venue of thesis examination must be notified at least one week before the commencement.
- f. The Controller of Examination shall get the thesis evaluated within three months after the date of its submission/resubmission in his office. Any delay beyond three months must be brought to the notice of the Vice-Chancellor.
- g. All the members of Supervisory Committee present shall sign the thesis after the viva-voce examination after making necessary corrections and incorporating therein any suggestions by the Board of Examiners. The Board of Examiners in the letter grades as Pass/Fail shall evaluate the thesis.
- h. All the members of the Board of Examiners present shall sign the result sheet prescribed for this purpose at the end of the examination. The major supervisor will submit the results to the Controller of Examinations within 24 hours.
 - i) In case of disagreement among the examiners regarding the acceptance of the thesis, it shall be referred to another external examiner appointed by the Vice Chancellor whose decision shall be final.
 - ii) If a candidate fails in the thesis examination, he/she may enroll again and submit a revised thesis on payment of the prescribed examination fee but he/she shall not be entitled to resubmit his/her thesis before the expiry of six months after the

date of the declaration of the result of the last thesis examination. He/she can avail this chance only once.

Thesis Research – 799:-

- (i) The subject approved for thesis research shall remain valid only for 6 semesters from the date of admission of the candidate to the course.
- (ii) A student admitted to the degree in partial residence shall undertake research work in a laboratory or institute approved by the Syndicate on the recommendations of the Academic Council and Advanced Studies & Research Board.

Comprehensive Examination:-

- (i) Comprehensive examination will consist of a written part followed by an oral part and cover both the major and minor field of studies after the completion of course work.
- (ii) The examination will be taken by the student on the dates to be decided by the Department and notified by the Controller of Examinations.
- (iii) Each department shall have its own committee of three members including Chairman of the Department who will also be the Chairman of the Examination Committee. In addition, the Director Advanced Studies or his nominee shall be the ex-officio member of the committee. One member will be nominated by the Vice Chancellor on the recommendations of the respective department and Director Advanced Studies. The committee shall be constituted for one year at the start of each academic year.
- (iv) Comprehensive examination will be qualifying and the examination committee will separately evaluate the student on his/her performance in written and oral parts of the examination.
- (v) If a student fails to qualify in the comprehensive examination, he/she will be eligible to reappear, once only in the comprehensive examination within the time given for the degree.

Scheme of studies and Course contents of M.Phil/Ph.D. Animal Breeding and Genetics courses

The following is the list of major courses offered to M.Phil Animal Breeding and Genetics students.

Table 6: List of Course of M.Phil/Ph.D. in Animal Breeding and Genetics

CODE	Course Title(s)	Credit hours
ABG-701	Advanced concepts in genetics	3(2-2)
ABG-702	Population and quantitative genetics	4(3-2)
ABG-703	Molecular genetics & genetic engineering in farm animals	4(3-2)
ABG-704	Selection methods and breeding systems in farm animals	2(2-0)
ABG-705	Biometrical techniques in animal breeding	3(2-2)
ABG-706	Statistical genetics and R programming	3(1-4)
ABG-707	Theory of inbreeding	2(2-0)
ABG-708	Poultry genetics and breeding	3(2-2)
ABG-709	Fish genetics and breeding	3(2-2)
ABG-710	Companion animals breeding & genetics	3(3-0)
ABG-711	Cytogenetics and immunogenetics	3(2-2)
ABG-712	Bioinformatics and genomics	3(2-2)
ABG-713	Theory of epigenetics	3(2-2)
ABG-714	Genetic conservation of wild and farm animal	3(3-0)
ABG-715	Advances in population and quantitative genetics	3(3-0)
ABG-716	Advances in animal molecular genetics	3(2-2)
ABG-717	Farm animal breeding plans	3(2-2)
ABG-718	Genetics of fitness traits in farm animals	3(2-2)
ABG-719	Special Problem	1(1-0)
ABG-720	Seminar-1	1(1-0)
	Seminar-2	1(1-0)
ABG-799	Thesis M.Phil.	10(0-20)
ABG-799	Thesis Ph.D.	50(0-100)

Standard 2-1: The curriculum must be consistent and support the program's Documented objectives.

- ✓ The curriculum is designed according to HEC criteria. The Curriculum also accomplishes with the general requirements of the degree and is finely revised.
- ✓ The curriculum fits very well and satisfies the core requirements for the program, as specified by the respective accreditation body.

- ✓ The curriculum satisfied the general arts and professional and other discipline required for the program according to demands and requirements set by the Higher Education Commission.

Standard 2-2: The curriculum supports the programs documented Objectives

The syllabus fits very well and assures the core requirements for the program's documented goals.

Standard 2-3: Theoretical background, problem analysis and solution design must be stressed within the program's core material

This is responded in below lines.

Table 7: Courses representing theoretical background, problem analysis and solution design

Elements	Courses
i) Theoretical Background	All courses offered by the Department
ii) Problem Analysis	All courses of the Department Elective courses Thesis
iii) Solution Design	All courses of the Department Elective courses Thesis

Standard 2-4: The curriculum satisfied the core requirement laid down by accreditation bodies

Yes

Standard 2-5: The curriculum satisfied the major requirement laid down by HEC

The syllabus satisfies the major requirement laid down by HEC.

Standard 2-6: Information technology component of the curriculum must be integrated throughout the program

During curriculum development, all aspects of information technology were considered and after a critical analysis, relevant aspects were integrated into the program.

Standard 2-7: Oral and written communication skills of the student must be developed and applied in the program.

There is comprehensive exam for all the students. Which is consisted of written and oral exams and all the student has to pass this 65% after completion of course work.

One seminar of one credit hour is compulsory for students.

Special problem (one credit hour) is offered to the students which require writing a comprehensive report on a topic and presenting it in the class.

Assignments are given to all students in each course on specific titles relevant to the course which are presented orally and given as written assignments by the students which improve their oral and written communication skills.

CRITERION 3: LABORATORIES AND COMPUTING FACILITIES

CRITERION 3: LABORATORIES AND COMPUTING FACILITIES

Laboratory Title:

Molecular Genetics laboratory

Objectives

The laboratory is utilized for practical purposes and demonstrations to the graduates and M.Phil students in their preliminary and major courses.

Location and Area:

Faculty of Veterinary and Animal Sciences, 2nd Floor.

Adequacy for instruction:

Laboratory meets the requirements in terms of equipment, chemicals, furniture and general facilities, however, not spacious enough for demonstration purposes.

Table 8: Equipment Available:

S. No	Lab Equipment	Quantity
1	Refrigerated Centrifuge (Hermle)	1
2	Centrifuge Machine (Hermle)	1
3	Water Bath	1
4	Deep Freezer (Waves)	1
5	Fridge (Orient)	1
6	Automatic voltage Regulator (Lenoxx)	1
7	Automatic voltage Stabilizer	1
8	Hot Air Oven (Midea)	1
9	Corning Stirrer	1
10	Mini Centrifuge (ExtraGene)	1
11	Weighing Balance (Ohaus)	1
12	Vortex Machine (GR Biotek)	
13	Autoclave	1
14	Drier (Memmert)	1
15	Water Distillation Apparatus	1
16	Microscopes (Nikon)	15
17	Stools	33
18	Chair	1
19	Table	1
20	Pipettes 0.5-10 uL	1
21	Pipettes 100-1000 uL	1
22	Pipettes 20-200 uL	1
23	Pipettes 1-5 mL	1
24	Stop Watch	1
25	Mitosis Slides	4
26	Meiosis Slides	13
27	Air Conditionar	1
28	Routers for Centrifuge machine	4
29	Dustbin	2

Laboratory Title:

Functional Genomics Laboratory

Objectives

The laboratory is utilized for practical purposes and demonstrations to the graduates and M.Phil/Ph.D. students in their preliminary and major courses.

Location and Area:

Faculty of Veterinary and Animal Sciences, 1st Floor.

Adequacy for instruction:

Laboratory meets the requirements in terms of equipment, chemicals, furniture and general facilities, however, not spacious enough for demonstration purposes.

Table 9: Equipment Available:

S. No	Lab Equipment	Quantity
1	UltraLow Temp. Refrigerator (Panasonic)	1
2	Fridge (Dawlance)	1
3	Uv-VIZ Spectrophotometer Q5000	1
4	Vortex Mixer (Vision Scientific co. ltd	1
5	Mini Centrifuge (Sclogex)	1
6	Thermocycler (Applied Biosystems)	1
7	Thermocycler (MultiGene Optimax)	1
8	Hot Air Oven (Dawlance)	1
9	Gel Doc System Syngene with hp Laptop and hybrid Graphic Printer	1
10	Gel electrophoresis Chamber with Power supply	1
11	Pipette 0.5-10 uL	3
12	Pipette 20-200 uL	2
13	Pipette 0.2-02 uL	2
14	Pipette 10-100 uL	2
15	Pipette 1-05 mL	1
16	Pipette 5-50 uL	1
17	Pipetter Iamate (Multiple pipette)	1
18	Battery ESS104	1
19	UPS 220 V-Meter	1
20	RT_ PCR (Agilent Technologies) with Hp Laptop	1
21	Laminar Flow Cabinet (Isocide)	1
22	Stools	6
23	Chair	2
24	Table	1
25	Extensions Installed	2
26	Beakers 2000 mL	1
27	Beakers 1000 mL	2
28	Power supply for GEL (Physiology)	1
29	Power supply (Mini 300)	1
30	Vertical GEL Electrophoresis	2
31	Power Station (Homage)	1
32	Dustbin	1

Laboratory Title:

Cytogenetics/Cell Culture laboratory

Objectives

The laboratory is utilized for practical purposes and demonstrations to the graduates and M.Phil students in their preliminary and major courses.

Location and Area:

Faculty of Veterinary and Animal Sciences, Ground Floor.

Adequacy for instruction:

Laboratory meets the requirements in terms of equipment, chemicals, furniture and general facilities, however, not spacious enough for demonstration purposes.

Table 10: Equipment Available:

S. No	Lab Equipment	Quantity
1	Incubator (Memmert)	1
2	Orbital Shaker Incubator ES-20 BioSan	1
3	Safety Cabin Hood	1
4	Stools	5
5	Chair	1
06	Table	5
07	Pipettes 10-100 uL	2
08	Pipettes 20-200 uL	1
09	Pipettes 0.5 uL-10 uL	1
10	Air Conditionar (GreenAir)	1
11	Siprit Lamp	1
12	Shaker incubator Irmaco Germany	1
13	Dust Bins	2
14	Refrigerator (Dawlance)	1
15	Automatic voltage regulator	1
16	Water Bath	1
17	Stand	1
18	CO2 Incubator (Sanyo)	1
19	CO2 Cylinder Regulator	2
20	Air Conditioner (Green Air)	1
21	Steel Cabinet	1
22	Tabletop Centrifuge	1
23	Table	1
24	Stool	1
25	Chairs	2
26	Extension Installed	1
27	UV Light	1

Laboratory Title:

Computational Genetics & genomics Laboratory

Objectives

The laboratory is utilized for practical purposes and demonstrations to the graduates and M.Phil/Ph.D students in their preliminary and major courses.

Location and Area:

Faculty of Veterinary and Animal Sciences, 1st Floor.

Adequacy for instruction:

Laboratory meets the requirements in terms of equipment, chemicals, furniture and general facilities, however, not spacious enough for demonstration purposes.

Table 11: Equipment Available:

Sr. No.	Equipment	Quantity
1	Complete PC Core-i7 Dell with key board and mouse	2
2	TP-Link	1
3	D-Link	1
4	Computer Tables	5
5	Computer Chairs	3
6	Lab stools	2

Safety Regulations:

No precautionary measures are available in case of incidents like fire (extinguisher), minor hazards and accidents, injuries (First Aid Kit). However, the university maintains a Medical Dispensary for such incidents.

Standard 3.1: Laboratory manuals/documentation/instructions for experiments must be available and readily accessible to faculty and students

The manuals used in the laboratories of the department are internationally accepted manuals, e.g. Animal Breeding and Genetics Manual..

Standard 3.2: There must be adequate support personnel for instruction and maintenance of laboratory

Laboratories are maintained by Post-graduate students as there is no laboratory assistant or attendant in the department who can assist the students in research studies, practical, cleaning and washing, etc. Post-graduate students are instructed for Lab. work by respective faculty members.

Standard-3.3: The University computing infrastructure and facilities must be adequate to support program's objectives

Computing Facilities Support: Computer facilities are accessible to all Faculty members and the M.Phil students.

Safety arrangements: In case of emergency, there are no suitable safety arrangement and safety maps. The department is located on the 1st floor; there is no emergency exit for the lab and classroom. No fire extinguishers have been fixed in any laboratory. No first aid kits/ facilities are presented in the laboratory/ department.

CRITERION 4: STUDENT SUPPORT AND ADVISING

CRITERION 4: STUDENT SUPPORT AND ADVISING

The faculty of the department of Animal Breeding and Genetics has always been of great source of inspiration and support for the students. The teachers are always there for any kind of assistance to the students in any respect of life. To meet this criterion, the department confirms all the relevant standards.

Standard 4-1: Courses must be offered with sufficient frequency and number for students to complete the program in a timely manner

Courses are taught as per strategy and guidance provided by HEC. Subject courses are offered as per scheme of study of the department after approval of Academic Council of the university. Courses are offered by faculty trained in the relevant subject and as per their availability. Elective courses and minor courses are offered as per policy of HEC and University.

Standard 4-2: Courses in the major area of study must be structured to ensure effective interaction between students, faculty and teaching assistants.

Courses are planned and decided among the faculty members in the departmental board of study meeting. Courses to be offered are decided before the commencement of semester and the faculty members interact frequently among themselves and with students. Students are encouraged to ask question, give comments and take part in the discussions in the class.

Emphasis is given on effective interaction between the students and between students and teachers.

Standard 4-3: Guidance on how to complete the program must be Available to all students and access to qualified advising must be available to make course decisions and career choices.

Several steps have been taken to provide students guidance such as:

- The university offers a number of student supporting programs regarding admission, scholarship schemes, etc.
- The department arranges orientations, study tours and a range of cultural activities accordingly.
- Weekly laboratory meeting are arranged by the respective supervisors.
- The teachers prove to be a big parental support for the students and are helpful in solving students' problems, however currently there is no parent teacher association.
- The office of head of the department updates the students about the program requirement. Director, Student Affairs are appointed by university who is ready to help the students for tutorial and counseling for extracurricular activities. However there is no counseling cell in the department.
- Realizing the need for exploring job opportunities for the university graduates, Directorate of placement bureau has been established.

Weaknesses:

- Student advisory committee should be formed at the departmental level.
- Intra university departmental seminars should be conducted for the students for communications

CRITERION 5: PROCESS CONTROL

CRITERION 5: PROCESS CONTROL

The department smears quality control at consequent stages by which main tasks are carried out. As the student concerns with the department right after the admission, the phase starts from his admission and registration till the completion of the academic years and even after that. It is the department's duty to uphold quality control in each phase of the educational life of the student for which some norms should be met.

Standard 5-1: The process by which students are admitted to the program must be based on quantitative and qualitative criteria

- ✓ The applications of the candidates are accepted within the due date of admission announced by the university in an advertisement in the newspapers. Number of seats available in the discipline is approved by the Academic council.
- ✓ For M.Phil in Animal Breeding and Genetics, candidates must have passed DVM/B.Sc. (Hons) AH (4 or 5 year degree program and accredited by PVMC) in aggregate with 45% marks or its equivalent from a recognized institution or equivalent qualification in relevant discipline from HEC recognized institution.
- ✓ For admission in M.Phil/MS, GAT (General) with 50% marks is compulsory.
- ✓ Candidates must possess a valid, GAT result before admission.
- ✓ Admission will be on open merit basis and merit will be calculated on the basis of marks obtained in the last Highest Relevant Degree.

Standard 5-2: The process by which students are admitted to the program must be clearly documented. This process must be periodically evaluated to ensure that it is meeting its objectives

- ✓ At the completion of the admission process, the students names are forwarded to the registrar office for proper recordkeeping in the specific discipline and registration numbers are assigned to the students.
- ✓ The Mid, Final and Practical exams, assignments and different research proposals are the ways by which the students are evaluated. The subject quizzes are also supportive for the assessment of competences of students.
- ✓ The students are promoted to the next semester on the behalf of assessment, which is done through the result of respective semester, if the students fulfill criteria of the university. A comprehensive examination followed by a viva voice is held for M.Phil students by the end of course work. The students passing the exam are considered recommendable to award the degree.

Standard 5-3: The process by which students are registered in the program and monitoring of students progress to ensure timely completion of the program must be documented. This process must be periodically evaluated to ensure that it is meeting its objectives

- ✓ Recruitment strategy followed the university is commended by HEC induction of all posts is done as per rule. Vacant and newly generated posts are publicized in the national newspapers; requests are collected by the registrar office.
- ✓ Call letters are issued to the short listed applicants on the basis of their experiences, qualification, publications and other qualities / activities as fixed by the university.

- ✓ The candidates are interviewed by the university selection Board. The candidates having any previous experience, publications or any additional qualification are entertained. Principal and alternate candidate are selected on merit.
- ✓ Syndicate meeting is held for further orders such as when to issue appointment letters to the employees.
- ✓ Induction of new candidates rests on the number of approved vacancies. Standard set by HEC are considered.
- ✓ At present, no procedure exists for retaining highly qualified faculty members, though, the revised pay scales of structures is really attractive.
- ✓ HEC also provisions appointment of highly qualified members as foreign faculty professor, National Professors and allots them various departments of the university.

Standard 5-4: This process must be periodically evaluated to ensure that it is meeting its objectives.

- As stated earlier that the department of Animal Breeding and Genetics has outstanding teachers who teach the students with the vision of conveying true knowledge.
- The teachers explain in a responsive way, review and apprise the syllabus as needed. The students are educated with the aid of overheads, slides, pictures etc. Though the subject books from the authentic authors are hardly available in the library but their economical Asian versions are available in the markets. Teachers also offer the students with photo state copies of some significant books, articles and notes. Teachers formulate their lectures from the books and updated knowledge accessible and deliver them to students. Students are also provided with few research assignments, which, the teachers know that they can go through with the help of literature and internet facility available in the university library.
- Seminars are also being conducted at small level so that to encourage and guide the students to do research. One seminar has been scheduled at departmental level. The advanced knowledge is very essential. With the new and diversified fields, new courses are being set and included in the curriculum.

Standard 5-5: The process that ensures that graduates have completed the requirements of the program must be based on standards, effective and clearly documented procedures.

- In the examination system of the University, the following are clearly mentioned;
- The evaluation procedure consists of quizzes, mid and final examinations, practical, assignments, reports and oral presentations.
- The controller of examinations announces the dates of examinations. After each semester, the controller office notifies results of the exams.
- The minimum passing marks for each course is 40% for M.Phil. in theory and practical, separately.
- In theory, division of each component of examination is as under:

Mid Examination	30%
Assignments	10%
Final Examination	60%

Grade points are as follows

Marks	Grade	Grade point	Remarks
80-100 %	A	4	Excellent
65-79 %	B	3	Good
50-64 %	C	2	Satisfactory
40-49 %	D	1	Pass
Below 40 %	F	0	Fail

Gold medals are awarded to the students who secure highest cumulative marks in each department. Degrees are awarded to the students in the convocation which is held every year.

CRITERION 6: FACULTY

CRITERION 6: FACULTY

Standard 6-1: There must be enough full time faculty who are committed to the program to provide adequate coverage of the program areas/courses with continuity and stability

Table 12: Faculty Distribution by Faculty Specialization

S. No.	Name	Position	Qualification	Specialization
1	Dr. Muhammad Moaen-ud-Din	Associate Professor	PhD	Functional Genomics, Genomic Selection and Epigenetics
2	Dr. Ghulam Bilal	Assistant Professor	PhD	Quantitative and Statistical Genetics and Genomics, Genetics related to Milk Fat and Protein Quality
3	Mr. Hafiz Muhammad Waheed	Lecturer	M.Phil	Molecular Genetics and Functional Genomics

The department faculty currently consists of one Associate Professor, one Assistant Professor and one Lecturer. However, the department is in short of teaching faculty.

Standard 6-2: The interests and qualifications of all faculty members must be sufficient to teach all courses, plan, modify and update courses and curricula.

In each semester courses are offered according to work load of faculty members. Division of students for supervision is made on the basis of faculty expertise/research interests

Standard 6-3: All faculty members must have a level of competence that would normally be obtained through graduate work in the discipline. The majority of the faculty must hold a Ph.D in the discipline

Meanwhile, three regular faculty members have been serving the department. As stated earlier, any faculty member if interested in any research or learning refining platform is fully and instantaneously supported.

Existing faculty development programs at department and university level

Faculty members attended conferences/workshops/seminars outside and within university. Laboratory, library and internet facilities are available for scholarly work and academic improvement. Support for attending conferences lead to enhancement of research initiatives.

The department sustains brilliant working environment for the faculty members. There is complete cooperation amongst them. Teachers are being evaluated by the graduates to attain the input on the quality of education university is providing and the results are nourishing. Teachers of the department are keenly involved in imparting quality education. Up to now, the faculty members of the department have collaborated in each step taken by the university to

achieve the program objectives. They are fully devoted for the betterment of the quality education and departmental competence.

Results of the faculty survey

The teachers generally showed contentment over most of parameters. However, level of monitoring, cooperation with colleagues and the cooperation of teachers needs to be improved. Faculty members are not very satisfied from their promotion and progress through ranks. As there is limited number of faculty so more work load was on current teachers and availability of more teachers are required in this regard.

Best Program Features:

- Supervision of students for research Cooperation from colleagues
- Conducive environment at the department Teaching and research together
- Funds for research projects

Programs that could improve your motivation:

- More equipment and chemical facilities for students
- Opportunities for improving teaching skills and knowledge

CRITERION 7: INSTITUTIONAL FACILITIES

CRITERION 7: INSTITUTIONAL FACILITIES

Standard 7-1: The institution must have the infrastructure to support new trends in learning such as e-learning. Supportive Infrastructure and Facilities in learning

- a. Four well-equipped laboratories are available in the department.
- b. Departmental labs are bigger with more sitting place for postgraduate students with computer and internet facility is available to make working/research/study environment conducive for higher learning.

Standard 7-2: The library must possess an up-to-date technical collection relevant to the program and must be adequately staffed with professional personnel.

Central library has been recently up-graded with provision of computer and internet facility to the post-graduate students.

The department is regularly suggesting to the central library for provision of new books related to Animal Genetics, Animal Breeding and Molecular Genetics.

The faculty under its HEC funded project has purchased many books in the area of animal breeding and genetics.

Only a small number of scientific journals are available in the central library; even Pakistani Journals are not available. Provision of major journals related to animal production, Genetics and Breeding is highly desired for research and scientific/technical writing.

Standard 7-3: Class-rooms must be adequately equipped and offices must be adequate to enable faculty to carry out their responsibilities.

There are no adequate classrooms for all classes. Sometimes classes are taken in the laboratories. This makes Lab. space insufficient for practical and research use by the students.

CRITERION 8: INSTITUTIONAL SUPPORT

CRITERION 8: INSTITUTIONAL SUPPORT

The university administration is making all possible efforts for strengthening the existing departments by attracting highly qualified faculty and by getting financial support through R&D Project.

Standard 8-1: There must be sufficient support and financial resources to attract and retain high quality faculty and provide the means for them to maintain competence as teachers and scholars.

There is no proper maintenance/documentation and attractive investment of GPF deducted from salary of the employees. Similarly, no benefit/welfare from BF deduction is available to the faculty except a meager benefit for faculty children's education at university level. Similarly, little attention is being paid for faculty residential facilities at university campus and majority of faculty members remain on waiting list for a long period. Transport facility is not frequently and easily available for field works/touring. Department budget is too low to meet expenses. However, the department can get stationery and other office use items from central stores of university by submitting special request.

Technical Staff: Civil Works and internet networking departments are very slow in response.

Financial and accounting departments are also slow in their delivery.

Office equipment: Sufficient office equipment is available to meet the current teaching and research activities of the department.

Standard 8-2: There must be an adequate number of high quality graduate students, research assistants and Ph.D. students.

The admission of M.Phil. students is held once a year. A strict merit policy is applied for admission and GAT for M.Phil. Detail of students enrolled during last two years is given in Table 10.

Table 13:. Enrollment in M.Phil.degree program in 2016-17

Year	Number of M.Phil. students
2016	2
2017	0
Total	2

Standard 8-3: Financial resources must be provided to acquire and maintain Library holdings, laboratories and computing facilities.

An amount of about Rs. 50,000/- per annum is provided to the department which is too low to maintain and run the departmental activities.

SUMMARY AND CONCLUSIONS

SUMMARY AND CONCLUSIONS

The department of Animal Breeding and Genetics at PMAS-Arid Agriculture University, Rawalpindi was established in 2018 with a mandate to carry out teaching and research in Animal Breeding and Genetics particularly for the genetic improvement of local breeds found in Pothwar region. There are three faculty members with two having doctoral degrees and one having M.Phil degree while former two are HEC approved supervisors. The courses have been prepared keeping in view the latest developments in Animal Breeding and Genetics. During the report period, 02 students in M. Phil.were enrolled. The department has published 16 research papers during the period under report.

Basic equipment for Animal Breeding and Genetics research has been procured through various funding sources. Four laboratories have been established with basic necessary equipment for animal breeding and genetics research. Young faculty members have got 4 research projects from different national and international funding agencies. Research studies currently being conducted focus on Status of A1/A2 Type Milk Protein Among Pakistani Milch Animals, Factors Affecting Beef Production Traits in Dhanni Cattle, Emancipating Phenotypic and Genotypic Variations among Punjab Goat Breeds Using SNP Chip, etc.

Proper steps are taken to guide the students for programme requirements, communication, meetings, study tours, students-teacher interaction, etc. They are well informed of relevant scientific societies, job opportunities and other such activities. University and HEC rules and guidelines are followed for process control covering admission, registration, recruiting policy, courses and delivery of material, academic requirements, performance and grading.

Curriculum design, development and organization is based upon approved criteria. Pre-requisites are fully observed, examinations are conducted as per schedule, academic schemes are prepared and courses for each semester are developed. Their efficacy was found to range between satisfactory to highly satisfactory. Self assessment report has shown programme outcomes as satisfactory. Teachers' evaluation and course evaluation by the students' revealed highly satisfactory standards. Faculty survey results were variable but with overall satisfactory rating.

Performance of the department could be improved considering the following points.

1. There is need for refresher courses for teachers pertaining to teaching methodology, education psychology, research and developments and evaluation of students.
2. Induct of new faculty
3. Induction of laboratory support staff
4. Professional and behavioral training of support staff will improve their abilities for enhancing the quality of research and teaching.
5. Department budget may be increased to fulfill its requirements for purchase of chemicals, glassware and other items required for conducting of research.
6. The department is in dire need of one library room and two class rooms.
7. Procurement and update of animals facilities at URF, Koont
8. Regular provision of transport facility for field visits is highly desired.

Prepared by: Members of Program Self Assessment Teams at ABG, FV&AS

Dr. Muhammad Moaeen-ud-Din (Coordinator) _____

Dr. Ghulam Bilal (Member) _____

Hafiz Muhammad Waheed (Member) _____

ANNEXURES

Faculty Resume

CURRICULUM VITAE

Name: Muhammad Moaeen-ud-Din

Date of Birth: March 13, 1979 (Pakistan)

Qualification: Ph.D., Post-Doc

Discipline: Animal Genetics, Breeding and Reproduction Science

Research Area: Molecular Genetics

ORCID: orcid.org/0000-0002-1428-1849

ResearcherID: J-1766-2015



Awards: 2

Ongoing Research Projects: 4

University Teaching Experience: ~15 Years

Trainings done: 5

Memberships: 4

Address:

Dept. of Animal Breeding & Genetics, Faculty of Veterinary & Animal Science, PMAS-Arid Agriculture University, Rawalpindi, Shamsabad, Murree Road Rawalpindi (46300)

✉ drmoinawan@gmail.com, m.moaeenuddin@aur.edu.pk ☎ +92-51-9292239 📱 +92-3438702053

QUALIFICATION:

Qualification	Year	Institute
Ph.D. Animal Genetics, Breeding & Reproduction Science	2008	Huazhong Agricultural University, China
M.Sc. (Hons) Livestock Management	2002	University of Agriculture, Faisalabad, Pakistan
B.Sc. (Hons) Animal Husbandry	2000	University of Agriculture, Faisalabad, Pakistan

INTERNATIONAL TRAVEL

S No.	Country	Visited	Purpose
1	Hamilton, New Zealand	July 15, 2019 to July 22, 2019	Livestock Improvement Corporation for Collaboration of NCLBG&G
2	Canada, Vancouver	July 5, 2018 to July 17, 2018	ASAS-CSAS Annual Meeting & Trade Show Vancouver
3	USA, Ames Iowa State University, Iowa State	September 19, 2016 to October 6, 2016	Visit on project PAK-USAID project
4	USA, Kansas, Kansas State	July 19, 2014 to July 28, 2014	Attended Joint Annual Meeting
5	New Zealand, Auckland	July 4, 2011 to August 7, 2011	Work purpose on work visa
6	China, Nanjing	October 1, 2009 to August 21, 2011	Post-doctorate
7	China, Wuhan	June 5, 2005 to July 25, 2008	Ph.D. studies

PROJECTS:

DEVELOPMENTAL PROJECTS SUBMITTED			
#	Project Title	Funding agency	Total Funds
1	PC-1 Establishment of National Center for Livestock Breeding Genetics & Genomics	HEC	Rs. 799.192 Mill.
Total			Rs. 799.192 Mill.
RESEARCH PROJECTS			
Submitted/Under Review			
#	Project Title	Funded agency	Total Funds
1	Collaborative Research for Genetic Improvement Balochi Sheep of Balochistan	HEC	Rs. 7.44 Mill.
2	Collaborative research to initiate efficient and sustainable beef cattle production through genetics and genomics in Pakistan	HEC	Rs. 15.71 Mill.
Total			Rs. 23.150 Mill.
#	Ongoing/Pipeline	Funded by	Total Funds
1	Development of breed identification marker for Pakistani dairy cattle breeds	NSLP-PSF	Rs. 4.42 Mill.
2	Collaborative Research for Genetic Conservation and Improvement of Pakistani Goats	USAID	Rs. 59.02 Mill.
3	Development of genetic evaluation model for Dhanni cattle as potential beef cattle in Potohar region of Punjab	NSLP-PSF	Rs. 3.19 Mill.
4	Development of breeding objective for desirable milk protein quality of dairy animals	HEC	Rs. 3.544 Mill.
Total			Rs. 70.174 Mill.

EXPERIENCE:

Position	Duties	Institute	Duration
Administrative and Financial Experience			
Central Project Director	Financial & Administrative	National Center for Livestock Breeding, Genetics & Genomics, PMAS-Arid Agriculture University, Rawalpindi	July 18, 2018 to Date
Chairman	Financial & Administrative	National Center for Livestock Breeding, Genetics & Genomics, PMAS-Arid Agriculture University, Rawalpindi	July 18, 2018 to Date
Scientific Director	Financial & Administrative	National Center for Livestock Breeding, Genetics & Genomics, PMAS-Arid Agriculture University, Rawalpindi	July 18, 2018 to Date
Chairman	Financial & Administrative	Dept. of Animal Breeding & Genetics, Faculty of Veterinary & Animal Sciences, PMAS-Arid Agriculture University, Rawalpindi	September 28, 2018 to Date
National Project Coordinator	Financial & Administrative	National Center for Livestock Breeding, Genetics & Genomics, PMAS-Arid Agriculture University, Rawalpindi	June 5-12 2018
Director General	Financial & Administrative	National Center for Livestock Breeding, Genetics & Genomics, PMAS-Arid Agriculture University, Rawalpindi	June 5-12 2018
Principal Investigator (PAK-USAID Project)	Financial & Administrative	Faculty of Veterinary & Animal Sciences, PMAS-Arid Agriculture University, Rawalpindi	April 7, 2013 to Date
Principal Investigator (PSF-NSLP Project)	Financial & Administrative	Faculty of Veterinary & Animal Sciences, PMAS-Arid Agriculture University, Rawalpindi	September 26, 2013 to January 6, 2018

Academic Experience			
Associate Professor	Research and teaching	PMAS-Arid Agriculture University, Rawalpindi	10-12-2015 to “to date”
Assistant Professor	Research and teaching	PMAS-Arid Agriculture University, Rawalpindi	2-1-2012 to 10-12-2015
Post-doc	Research and teaching	Southeast University, China	1-7-2011 to 31-12-2011
Post-doc	Research and teaching	Nanjing Agricultural University, China	20-8-2009 to 1-7-2011
Assistant Professor	Research and teaching	University of Veterinary & Animal Sciences, Lahore, Pakistan	28-7-2008 to 20-8-2009
Lecturer	Research and teaching	University of Veterinary & Animal Sciences, Lahore, Pakistan	24-4-2004 to 28-7-2008
House Officer	Routine research farm duties	Livestock & Dairy Development Department, Lahore	1-8-2002 to 30-6-2003

STUDENTS SUPERVISED:

S#	Name	Thesis Title	Degree	Status
1	Sumaira Jabeen	Evolution of HPA genes, promoters and their expression profile	M.Phil. Biotechnology	Co-Supervisor
2	Ume Habiba	Evolution of MRGX2 genes among species	M.Phil. Biotechnology	Co-Supervisor

LIST OF PUBLICATIONS:

NATIONAL

	No.	Impact Factor
Conferences:	1	-
Journals:	9	5.340

INTERNATIONAL

Conferences:	31	50.486
Journals:	19	23.172
	60	78.998

S #	Papers	IF
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NATIONAL

Conferences

1.	M.N. Manzoor, M. Suleman, G. Bilal, T. Aziz, M. Younas, A. Zahoor, M. Moaen-ud-Din . 2013. Effect of different local feeding regimes on milk quality of Hilly camel in Pothowar region of Pakistan. 12/2013; In proceeding of: International Camel Conference, At The Islamia University Bahawalpur, Pakistan.	--
1	Total	152
		.65
		6--

Journal Papers

1.	Ali Zurwan, Muhammad Moaen-ud-Din , Ghulam Bilal, Zia-ur-Rehman and Muhammad Sajjad Khan. 2017. Estimation of Genetic Parameters for Persistency of Lactation in Sahiwal Dairy Cattle. Pakistan J. Zool., vol. 49(3): 877-882.	0.4 91
2.	M. Moaen-ud-Din and G. Bilal M.S. Khan. 2017. Effects of breed, various environmental and maternal factors on growth traits in cattle. The J. Anim. Plant Sci. 27(5):	0.3

		81
3.	M. Moaen-ud-Din , G. Bilal and M.S. Khan. 2014. Genomic Selection of Sahiwal Cattle. Pakistan Journal of Agricultural Sciences. 51(3), 697-702.	1.2 40
4.	Masroor Ellahi Babar, Muhammad Moaen-ud-Din , Ahmed Ali, Nosheen Malik, Asif Nadeem and R. Jabeen. 2009. Potential and the Scope of Marker Assisted Selection for Buffalo in Pakistan. Pakistan J. Zool. Suppl. Ser., No.9, pp. 435-440.	0.3 38
5.	Muhammad Moaen-ud-Din , Nosheen Malik, Li Guo Yang, Ruqian Zhao, Masroor Ellahi Babar Nisar Ahmad, Muhammad Abdullah, and Ahmad Ali. 2009. Somatostatin Transfection Down-Regulates Hormone Secretion and Gene Expression Related to Growth and Fertility. Pakistan J. Zool. Suppl. Ser., No.9, pp. 0-0, 2009.	0.3 38
6.	M. Moaen-ud-Din , N. Ahmad, A. Iqbal and M. Abdullah. 2006. Evaluation of different formulas for weight estimation in beetal, teddi and crossbred (beetal x teddi) goats. J. Anim. Pl. Sci. 16(3-4):	0.6 38
7.	Moaen ud-Din , M., K.Z. Gondal and W. Akbar. 2004. Effect of Butter Milk (Lassi) feeding as milk replacer on health of Sahiwal calves. JAPS, 14(1-2): 29-31.	0.6 38
8.	Moaen ud-Din , M., M. Younas and W. Akbar. 2004. Effect of Butter Milk (Lassi) feeding as milk replacer on growth performance of Sahiwal calves. JAPS, 14(1-2): 32-34.	0.6 38
9.	M. Moaen-ud-Din , M. Abdullah, K. Javed, and N. Ahmad. 2004. Feeding Behavior of Camel under Stall Feeding. J. Anim. Pl. Sci. 14(3-4). 74-76.	0.6 38
9	Total	5.3 40

INTERNATIONAL

Conferences

- 1) A Ghaffar, M Moaen-ud-Din, G Bilal; 525 Use of AFLP markers to ascertain Red Sindhi cattle identity for genetic improvement program., *Journal of Animal Science*, Volume 96, Issue suppl_3, 7 December 2018, Pages 508–509, <https://doi.org/10.1093/jas/sky404.1112>. 1.714
- 2) M Moaen-ud-Din, G Bilal, J Reecy, M Khan, Z Khuto; 33 Breed, age and sex factors influencing body weight and measurements in Azad Jammu and Kashmir goat breeds., *Journal of Animal Science*, Volume 96, Issue suppl_3, 7 December 2018, Pages 451–452, <https://doi.org/10.1093/jas/sky404.985> 1.714

- 3) R Muner, G Bilal, M Moaeen-ud-Din, J Reecy, M Khan; 36 Morphometric measurements and body weight is determined by breed, age and sex among Punjab goat breeds of Pakistan., *Journal of Animal Science*, Volume 96, Issue suppl_3, 7 December 2018, Pages 453, <https://doi.org/10.1093/jas/sky404.988> 1.714
- 4) R Muner, G Bilal, M Moaeen-ud-Din, J Reecy, M Khan; PSVI-35 Productive and reproductive performances of goat breeds in Punjab Pakistan., *Journal of Animal Science*, Volume 96, Issue suppl_3, 7 December 2018, Pages 465, <https://doi.org/10.1093/jas/sky404.1016> 1.714
- 5) G Bilal, M Moaeen-ud-Din, M Khan, J Reecy; WPSI-5 A study of productive and reproductive parameters in goat breeds of Northern Areas of Pakistan., *Journal of Animal Science*, Volume 96, Issue suppl_3, 7 December 2018, Pages 512–513, <https://doi.org/10.1093/jas/sky404.1121> 1.714
- 6) M Khan, G Bilal, M Moaeen-ud-Din, J Reecy; 472 Status of goat farming in Sindh with special reference to feeding, breeding and health care., *Journal of Animal Science*, Volume 96, Issue suppl_3, 7 December 2018, Pages 257–258, <https://doi.org/10.1093/jas/sky404.564> 1.714
- 7) G Bilal, M Moaeen-ud-Din, M Khan, J Reecy; 474 Productive and reproductive performance of Goat Breeds of Sindh., *Journal of Animal Science*, Volume 96, Issue suppl_3, 7 December 2018, Pages 258–259, <https://doi.org/10.1093/jas/sky404.566> 1.714
- 8) M Moaeen-ud-Din, G Bilal, J Reecy, M Khan, Z Khuto; 32 Variation among breeds for productive and reproductive performances in Azad Jammu & Kashmir goat population., *Journal of Animal Science*, Volume 96, Issue suppl_3, 7 December 2018, Pages 451, <https://doi.org/10.1093/jas/sky404.984> 1.714
- 9) M Moaeen-ud-Din, H Waheed, G Bilal, J Reecy, M Khan; 37 Estimation of Beetal goat live-weight for all types of age classes in field and farm conditions through linear body measurements., *Journal of Animal Science*, Volume 96, Issue suppl_3, 7 December 2018, Pages 453–454, <https://doi.org/10.1093/jas/sky404.989> 1.714
- 10) M Moaeen-ud-Din, G Bilal, J Reecy, M Khan; PSXVII-23 Effect of breed, age and sex on body weight and various body measurements in goat breeds of Northern Areas, Pakistan., *Journal of Animal Science*, Volume 96, Issue suppl_3, 7 December 2018, Pages 145, <https://doi.org/10.1093/jas/sky404.316> 1.714
- 11) H Waheed, M Moaeen-ud-Din, G Bilal, J Reecy, M Khan, M Saif-ur-Rehman, M Asim; 308 Meat production potential of Beetal goat under farm and field conditions of Punjab, Pakistan., *Journal of Animal Science*, Volume 96, Issue suppl_3, 7 December 2018, Pages 117, <https://doi.org/10.1093/jas/sky404.257> 1.714

- 12) G Bilal, M Moaen-ud-Din, M Khan, J Reecy; PSVII-24 Goat production management system in ice caped northern areas of Pakistan., *Journal of Animal Science*, Volume 96, Issue suppl_3, 7 December 2018, Pages 377, <https://doi.org/10.1093/jas/sky404.827> 1.714
- 13) M Moaen-ud-Din, G Bilal, J Reecy, M Khan; PSVII-31 Management and production practices adopted by goat farmers in Punjab province of Pakistan., *Journal of Animal Science*, Volume 96, Issue suppl_3, 7 December 2018, Pages 379, <https://doi.org/10.1093/jas/sky404.832> 1.714
- 14) Muhammad Moaen-ud-Din and Ghulam Bilal. 2018. Development of AFLP breed identification markers for Pakistani Cholistani cattle. [Accepted for poster presentation at ADSA Annual Meeting, Knoxville, Tennessee, USA June 24-27, 2018] *J. Dairy Sci.* 101 (Suppl. 2) : 236. 2.564
- 15) Ghulam Bilal and Muhammad Moaen-ud Din. 2018. Allele frequency of β -casein gene in local dairy animals of Pakistan. [Accepted for poster presentation at ADSA Annual Meeting, Knoxville, Tennessee, USA June 24-27, 2018] *J. Dairy Sci.* 101 (Suppl. 2) : 41 2.564
- 16) Muhammad Moaen-ud Din, Ghulam Bilal, Raja Danish Muner, Nauman Wahid. 2018. A resolution to breed identification of Pakistani Sahiwal cattle. [Accepted for poster presentation at ADSA Annual Meeting, Knoxville, Tennessee, USA June 24-27, 2018] *J. Dairy Sci.* 101 (Suppl. 2) : 40. 2.564
- 17) **M. Moaen-ud-Din**, G. Bilal¹, J.M. Reecy, M.S. Khan and Saddaf Razzaq. 2016. Morphometric measurements and body weight affected by breed, age and sex in Sindh goat breeds population of Pakistan. Joint Annual Meeting (JAM), 2016 held during July 19-23, 2016, Salt Lake City Utah, USA 2.564
- 18) A. Talenti, F. Bertolini, S. Frattini, A. Elbeltagy, G. Pagnacco, B. Coizet, A. M. Aboul-Naga, J. M. Reecy, **M. Moaen-ud-Din**, M. F. Rothschild, P. Crepaldi and the Italian Goat Consortium. 2016. Initial genomic characterization of Italian, Egyptian and Pakistani goat breeds. Proceeding of Veterinary and Animal Science Days 2016, 8th-10th June, Milan, Italy 0
- 19) G. Bilal, and **M. Moaen-ud-Din**. 2016. Do buffaloes have better milk fat profile than cows? Where does the evidence stand in 2016? Joint Annual Meeting (JAM), 2016 held during July 19-23, 2016, Salt Lake City Utah, USA 2.564
- 20) G. Bilal, **M. Moaen-ud-Din**, and A. Zurwan. 2016. Growth Potential of Dhanni cattle under rainfed conditions of Punjab, Pakistan. Joint Annual Meeting (JAM), 2016 held during July 19-23, 2016, Salt Lake City Utah, USA 2.564
- 21) **M. Moaen-ud-Din**, G. Bilal, M. Yaqoob. 2015. Allelic diversity of productive, reproductive & fertility traits genes of buffalo and cattle. International Conference on Agricultural, Food and Animal Sciences, July 29-30, 2015, Zurich, Switzerland. 0
- 22) Ghulam Bilal, **Muhammad Moaen-ud-Din**, Muhammad Waseem, Naveed Ullah, James Reecy, Muhammad Khan, Muhammad Yaqoob. 2015. A survey of management practices adopted by goat breeders in Azad Jammu and Kashmir (AJK), Pakistan. 2.564

	ASAS-ADSA®-CSAS Joint Annual Meeting, USA	
23)	M. Moaen-ud-Din and G. Bilal. 2014. Buffalo and cattle sequence diversity and molecular evolution. 2014 ASAS-ADSA®-CSAS Joint Annual Meeting held in Kansas City, Missouri, July 20-24, 2014.	2.564
24)	M. Moaen-ud-Din , G. Bilal and M. S. Khan. 2014. Genomic Selection of Nili-Ravi Buffalo. 2014 ASAS-ADSA®-CSAS Joint Annual Meeting held in Kansas City, Missouri, July 20-24, 2014.	2.564
25)	G. Bilal, M. Moaen-ud-Din , M. Aqeel, A. Ijaz, M. S. Khan, M. Y. Gondal, K. M. Khan, M. Mukhtar and M. N. Manzoor. 2014. Effects of breed, sex, parity, birth year and birth season on body weight traits for five local cattle breeds and crossbreds in arid region of Punjab, Pakistan. 2014 ASAS-ADSA®-CSAS Joint Annual Meeting held in Kansas City, Missouri, July 20-24, 2014.	2.564
26)	M. Moaen-ud-Din , G. Bilal, and H. M. Waheed. 2013. Genomic Selection of Sahiwal Cattle: A Developing Country Perspective. J. Anim. Sci. Vol. 91, E-Suppl. 2/J. Dairy Sci. Vol. 96, E-Suppl.	2.564
27)	M. Moaen-ud-Din . 2013. Buffalo Genome Research: Recent Advances and Future Prospective. 10 th World Buffalo Congress. May 6-8, 2013, Phuket, Thailand.	0
28)	Muhammad Moaen-ud-Din , Nosheen Malik, and Ruqian Zhao. 2012. Ontogeny of mRNA expression of somatostatin and its receptors in chicken embryos in association with methylation status of their promoters. International Society for Animal Genetics, July 15–20, 2012, Cairns, Australia	0
29)	M. Moaen-ud-Din and Yang LiGuo. 2008. Buffalo: A Dairy Animal of Pakistan. China Dairy Husbandry Forum, April 16-17, 2008, Shanghai, China.	0
30)	Moaen-ud-Din, M. and Y. Ligu. 2005. Dairy Industry of Pakistan: Prospects and Problems. 20 th Forum on Reproductive Technology. China Dairy Industry Association.	
31)	Moaen-ud-Din, M. and Y. Ligu. 2005. Minerals in Calf Nutrition. 3rd International symposium on All Aspects of plant and Animal Boron Nutrition. Sep 9-13, 2005. Huazhong Agricultural University, Wuhan, P.R. China.	0
31	Total	50.486

Journal Papers

1.	Malik, M. H., M. Moaen-ud-Din , and G. Bilal, A. Ghaffar, R. D. Muner, G. K. Raja and W. A. Khan. 2018. Development of amplified fragment length polymorphism (AFLP) markers for the identification of Cholistani cattle. Arch. Anim. Breed., 61, 387–394.	0.100
2.	Talenti A, Bertolini F, Williams J, Moaen-ud-Din M , Frattini S, Coizet B, Pagnacco G, Reecy J, Rothschild MF, Crepaldi P and Italian Goat Consortium. 2017. Genomic analysis suggests KITLG is responsible for a roan pattern in two Pakistani goat breeds. J Hered. 2017 Oct 28. doi: 10.1093/jhered/esx093.	2.432
3.	M. Moaen-ud-Din and G. Bilal. 2016. Genomic selection of Nili-Ravi buffalo: A choice for buffalo breeders. 35 (4): 605-615.	0.067

4. **M. Moaen-ud-Din**, G. Bilal¹ and James M. Reecy. 2015. Evolution of hypothalamus-pituitary growth axis among fish, amphibian, birds and mammals. *Genetika*, Vol. 47, No.2, 635-647. 0.460
5. **Muhammad Moaen-ud-Din**. 2014. Buffalo genome research. *Animal Science Papers and Reports*. 32: 3, 187-199. 0.918
6. **M. Moaen-ud-Din** and G. Bilal. 2014. Sequence diversity and molecular evolutionary rates between buffalo and cattle. *Journal of Animal Breeding & Genetics*. doi: 10.1111/jbg.12100 1.654
7. Nosheen Malik, **Muhammad Moaen-ud-Din** and Ruqian Zhao. 2013. Ontogeny of mRNA expression of somatostatin and its receptors in chicken embryos in association with methylation status of their promoters. *J of Comparative Physiology & Biochemistry B*, 165(4): 260-70. 1.923
8. **Muhammad Moaen-ud-Din** and Li Guo Yang. 2009. Evolutionary History of the Somatostatin and its Receptors in Mammals. *Journal of Genetics*, 88:41-53. 1.086
9. **M. Moaen-ud-Din**, Nosheen Malik, Ahmad Ali, Yang Li Guo and Masroor Ellahi Babar. 2009. Cortistatin vaccination – a solution to growth hormone deficiency. *J of Medical Hypothesis*. 1.416
10. **Muhammad Moaen-ud-Din** and Li Guo Yang. 2009. Can somatostatin alter fertility genes expression, oocytes maturation and embryo development? *Journal of Animal Biotechnology*. 20: 3, 144-150. 0.927
11. Li-Ying Geng, Ming Fang, Fei Jiang, **Muhammad Moaen-ud-Din**, Li-Guo Yang. 2008. Effect of overexpression of inhibin α (1-32) fragment on bovine granulosa cell proliferation, apoptosis, steroidogenesis, and development of co-cultured oocytes. *Theriogenology*. 70: 35-45. 2.073
12. Aixin Liang, Shaoxian Cao, Li Han, Yanfeng Yao, **M. Moaen-ud-Din**, Liguang Yang. 2008. Construction and evaluation of the eukaryotic expression plasmid encoding two copies of somatostatin gene fused with hepatitis B surface antigen gene S. *Vaccine*. 26: 2935-41. 3.766
13. Khairy MA Zoheir, Nermin El Halwany, Xiang Li, **Moaen-ud-Din** and Li-Guo Yang. 2008. Long term in vitro culture of bovine preantral follicles by using different culture media. *Journal of Biological Sciences*. 1-6. 0.000
14. **M. Moaen-ud-Din**, L.G. Yang, S.L. Chen, Z.R. Zhang, J.Z. Xiao, Q.Y. Wen and M. Dai. 2007. Reproductive Performance of Matou Goat under Sub-tropical monsoonal 1.115

Climate of Central China. J Trop Anim Health & Prod. DOI 10.1007/s11250-007-9043-z

15.	Yuan J F, M. Moaen-ud-Din , Gong Y Z, Peng X L, Yang L G, Feng Y P, Liu J, Hu B, Affara N A, Jafe O, and Zhang S J. 2007. Identification of mutations of zona pellucida glycoprotein (ZP3) and its association with pig reproductive traits. Journal of Animal Breeding and Genetics. 124:144-149.	1.654
16.	J. F. Yuan, O. Jafer, N. A. Affara, Y. Z. Gong, Y. P. Feng, J. liu, M. Moaen-ud-Din , W. M. Li, and S. J. Zhang. 2007. Association of Four New SNPs in Follicle-stimulating Hormone Receptor (<i>FSHR</i>) and Zona Pellucida Glycoprotein (<i>ZP3</i>) with Reproductive Traits. Animal 1: 1249-1253 Cambridge University Press.	1.784
17.	Zoheir Khairy M A, Xiang Li, M Moaen-ud-Din , Liu Yun, Yang Li-Guo. 2007. Isolation and cloning of cDNA for both IGF-1 R and FSHR genes from mature bovine oocytes of using a few numbers of cells. International Journal of Biotechnology & Biochemistry. 3,1.	0.000
18.	Li Han, D.G. Mao, D.K. Zhang, A.X. Liang, M.Fang, Muhammad Moaen-ud-Din , L.G. Yang. 2007. Development and evaluation of a novel DNA vaccine expressing inhibin α (1–32) fragment for improving the fertility in rats and sheep. Animal Reproduction Science. 109: 251-265.	1.897
19.	Moaen-ud-Din M and Babar M E 2006: Livestock farming in peri-urban areas of Faisalabad, Pakistan. Livestock Research for Rural Development. Volume 18, Article #12. Retrieved August 15, 2008, from http://www.cipav.org.co/lrrd/lrrd18/1/moae18012.htm	0.000
19	Total	23.272
60	G Total	78.998

PRESENTATIONS ON NATIONAL & INTERNATIONAL FORUMS:

A. ORAL PRESENTATIONS:

- 1) **M. Moaen-ud-Din** and G. Bilal. 2014. Buffalo and cattle sequence diversity and molecular evolution. 2014 ASAS-ADSA®-CSAS Joint Annual Meeting held in Kansas City, Missouri, July 20-24, 2014.
- 2) **M. Moaen-ud-Din**, G. Bilal and M. S. Khan. 2014. Genomic Selection of Nili-Ravi Buffalo. 2014 ASAS-ADSA®-CSAS Joint Annual Meeting held in Kansas City, Missouri, July 20-24, 2014.
- 3) **Muhammad Moaen-ud-Din**, Nosheen Malik, and Ruqian Zhao. 2012. Ontogeny of mRNA expression of somatostatin and its receptors in chicken embryos in association

with methylation status of their promoters. International Society for Animal Genetics, July 15–20, 2012, Cairns, Australia.

- 4) **Moaeen-ud-Din, M.** 2008. PHYLOGENETIC HISTORY OF SOMATOSTATIN IN MAMMALS. 9th Biennial Conference of the PSBMB Agriculture University, Rawalpindi, Pakistan.
- 5) **Muhammad Moaeen-ud-Din.** 2008. TRANSGENIC LIVESTOCK: PROBLEMS AND PROSPECTS. A workshop on Techniques in Transgenics the Science of Future. Department of Molecular Biology and Biotechnology, UVAS, Lahore

B. POSTER PRESENTATIONS:

- 1) **Moaeen-ud-Din, M.** and Y. Ligu. 2005. Minerals in Calf Nutrition. 3rd International symposium on All Aspects of plant and Animal Boron Nutrition. Sep 9-13, 2005. Huazhong Agricultural University, Wuhan, P.R. China.

CONFERENCES ATTENDED:

- 1) CSAS Joint Annual Meeting held in Kansas City, Missouri, July 20-24, 2014
- 2) International Conference on “Urban, Peri-urban Agriculture, Employment and Value Chain Management. Oct 18-22, 2011, University of Agriculture, Faisalabad.
- 3) 3rd Forum on Animal Husbandry Practices. 2008. Shanghai, PR China held by China Dairy Association
- 4) 20th Forum on Reproductive Technology. August 2005. Xin Hua Hotel, Changsa, Hunan, PR China held by China Dairy Industry Association.
- 5) International Nutrition Conference 2004. December 1-2, 2004. Lahore, Pakistan.

SYMPOSIUMS ATTENDED:

- 1) 3rd International symposium on All Aspects of plant and Animal Boron Nutrition. Sep 9-13, 2005. Huazhong Agricultural University, Wuhan, P.R. China.
- 2) International Symposium on Animal Welfare. May6-9, Nanjing Agricultural University, Nanjing, China.

AWARDS

- 1) Research productivity award 2013 PCST, Islamabad
- 2) Research productivity award 2014 PCST, Islamabad

HONORS

1. Invited scientist in "Stakeholder consultative workshop on findings of Small Ruminants Rapid Assessment studies at Islamabad". 1-12 May 2015 at Islamabad Hotel, Islamabad, organized by AIP – Livestock under ILRI & ICARDA.
2. Invited for lecture on "Genetic diversity in goats and its implication for farmers" at NHCS, Lahore
3. Invited lecture on "progeny testing program vs genomic selection (choice for buffalo)" at BRI, Pattoki, February 15, 2014.
4. Development of modules in molecular genetics & genomics under British Council – INSPIRE Transnational Educational Partnership Programme. March 19, 2015.
5. HEC Approved Supervisor
6. HEC PhD Scholar

7. Merit Scholarship holder M.Sc.
8. Merit Scholarship holder B.Sc.
9. Merit Scholarship holder F.Sc.

TRAININGS

- 1) **GC Faisalabad, NCC**, 25-9-1994 to 02-10-1995
- 2) **The 3rd Virtual Training Workshop on Bioinformatics** during March 25 and May 24, 2009
- 3) **3 Months Diploma** in “Computer Soft-Ware Application including MS-WORD, SPSS, MINITAB, PHYLIP, MEGA4 and PHOTOEDITOR & MOVIE EDITOR etc.”
- 4) **EU Asia Link Project Short Course** (Jan 12-24, 2004) on; “**Livestock Ecology, Sustainable Land Use and Livestock Systems**”, Organized by Agriculture University, Faisalabad, Pakistan & Humboldt University, Berlin, Germany.
- 5) **International workshop on Pakistan DAGRIS**. Nov 14-18, 2012. University of Agriculture, Faridabad. Organized by Agriculture University, Faisalabad, Pakistan & International Livestock Research Institute, Nairobi, Kenya.

MEMBERSHIP

1. American Dairy Science Association
2. Pakistan Veterinary Medical Council
3. Animal Genome Research Community
4. Reproductive Biology and Genetics Society, Singapore
5. Functional Annotation of Animal Genome (FAANG)

Curriculum Vitae

Department of Animal Breeding and Genetics, Faculty of Veterinary and Animal Sciences,
PMAS Arid Agriculture University Rawalpindi 46300 Pakistan

Phone: 051-9292139 Mobile: 0092-333-9926030 E-mail: ghulam.bilal@uaar.edu.pk

ORCID_ID: orcid.org/0000-0002-4637-9744

Dr. Ghulam Bilal

Career Objectives

To excel in my field through hard work, honesty and diligence

Personal Data

Place of Birth: Faisalabad, Punjab, Pakistan

Age: 37 Years

Marital Status: Married

Languages: Urdu, English, Punjabi, French(basic)

Education

[2008-2012] PhD Animal Science (Animal Breeding and Genetics),
McGill University, Montreal, Quebec, Canada

[2004-2007] M.Sc. (Hons.) Animal Breeding and Genetics,
University of Agriculture, Faisalabad, Pakistan

[2000-2004] B.Sc. (Hons.) Animal Husbandry,
University of Agriculture Faisalabad, Pakistan

Work Experience

- 1) Scientific Director/Director-II of National Centre for Livestock Breeding Genetic sand Genomics, PMAS-Arid Agriculture University Rawalpindi, Pakistan from November 19, 2018 till to date. [08 months]
- 2) Assistant Professor of Animal Breeding and Genetics at the Faculty of Veterinary and Animal Sciences, PMAS-Arid Agriculture University Rawalpindi, Pakistan from December 2012 till to date. [75 months]
- 3) Worked as Graduate Student Assistant at the Dept. of Animal Science, McGill University, Montreal, Quebec, Canada from September 2008 to December 2008 and then from January to July 2011. [11 months]
- 4) Worked as Lecturer in Animal Breeding & Genetics at the University College of Veterinary & Animal Sciences, The Islamic University of Bahawalpur, Pakistan from June 2007 to August 2008. [15 months]
- 5) Worked as a Research Fellow in the Agriculture Linkages Program (ALP) project titled "Development of milk recording and genetic evaluation models in Sahiwal cattle" at the Department of Animal Breeding and Genetics, University of Agriculture Faisalabad, Pakistan from January 2005 to June 2005. [06 months]

Teaching Assignments

Postgraduate Courses

1. Advanced Concepts in Genetics
2. Population and Quantitative Genetics
3. Biometrical Techniques in Animal Breeding
4. Statistical Genetics and R programming
5. Postgraduate Seminar

Undergraduate Courses

6. Animal Breeding and Genetics
7. Introduction to Animal Breeding and Genetics
8. Principle of Genetics & Population Genetics
9. Animal Breeding Plans and Policies
10. Animal Husbandry
11. Introduction to Livestock Management
12. Equine and Camel Production
13. Beef Production
14. Small Ruminant Production
15. Sheep and Goat Production
16. Internship Supervision(DVM)
17. Internship Presentation Coordinator (DVM, 2019)

Publications

Peer-Reviewed Conference/Meeting Abstracts

- 1) A Ghaffar, M Moaeen-ud-Din, **G Bilal**.2018. Use of AFLP markers to ascertain Red Sindhi cattle identity for genetic improvement program., JOURNAL OF ANIMAL SCIENCE, Volume 96, Issue suppl_3, 7 December 2018, Pages 508–509, <https://doi.org/10.1093/jas/sky404.1112>.

- 2) M Moaen-ud-Din, **G Bilal**, J Reecy, M Khan, Z Khuto.2018. Breed, age and sex factors influencing body weight and measurements in Azad Jammu and Kashmir goat breeds., JOURNAL OF ANIMAL SCIENCE, Volume 96, Issue suppl_3, 7 December 2018, Pages 451–452, <https://doi.org/10.1093/jas/sky404.985>
- 3) R Muner, **G Bilal**, M Moaen-ud-Din, J Reecy, M Khan.2018. Morphometric measurements and body weight is determined by breed, age and sex among Punjab goat breeds of Pakistan., JOURNAL OF ANIMAL SCIENCE, Volume 96, Issue suppl_3, 7 December 2018, Pages 453, <https://doi.org/10.1093/jas/sky404.988>
- 4) R Muner, **G Bilal**, M Moaen-ud-Din, J Reecy, M Khan. 2018. Productive and reproductive performances of goat breeds in Punjab Pakistan., JOURNAL OF ANIMAL SCIENCE, Volume 96, Issue suppl_3, 7 December 2018, Pages 465, <https://doi.org/10.1093/jas/sky404.1016>
- 5) **G Bilal**, M Moaen-ud-Din, M Khan, J Reecy. 2018. A study of productive and reproductive parameters in goat breeds of Northern Areas of Pakistan., JOURNAL OF ANIMAL SCIENCE, Volume 96, Issue suppl_3, 7 December 2018, Pages 512–5103, <https://doi.org/10.1093/jas/sky404.1121>
- 6) M Khan, **G Bilal**, M Moaen-ud-Din, J Reecy. 2018. Status of goat farming in Sindh with special reference to feeding, breeding and health care., JOURNAL OF ANIMAL SCIENCE, Volume 96, Issue suppl_3, 7 December 2018, Pages 257–258, <https://doi.org/10.1093/jas/sky404.564>
- 7) **G Bilal**, M Moaen-ud-Din, M Khan, J Reecy. 2018. Productive and reproductive performance of Goat Breeds of Sindh., JOURNAL OF ANIMAL SCIENCE, Volume 96, Issue suppl_3, 7 December 2018, Pages 258–259, <https://doi.org/10.1093/jas/sky404.566>
- 8) M Moaen-ud-Din, **G Bilal**, J Reecy, M Khan, Z Khuto. 2018. Variation among breeds for productive and reproductive performances in Azad Jammu & Kashmir goat population., JOURNAL OF ANIMAL SCIENCE, Volume 96, Issue suppl_3, 7 December 2018, Pages 451, <https://doi.org/10.1093/jas/sky404.984>
- 9) M Moaen-ud-Din, H Waheed, **G Bilal**, J Reecy, M Khan. 2018. Estimation of Beetal goat live-weight for all types of age classes in field and farm conditions through linear body measurements., JOURNAL OF ANIMAL SCIENCE, Volume 96, Issue suppl_3, 7 December 2018, Pages 453–454, <https://doi.org/10.1093/jas/sky404.989>
- 10) M Moaen-ud-Din, **G Bilal**, J Reecy, M Khan. 2018. Effect of breed, age and sex on body weight and various body measurements in goat breeds of Northern Areas, Pakistan., JOURNAL OF ANIMAL SCIENCE, Volume 96, Issue suppl_3, 7 December 2018, Pages 145, <https://doi.org/10.1093/jas/sky404.316>
- 11) H Waheed, M Moaen-ud-Din, **G Bilal**, J Reecy, M Khan, M Saif-ur-Rehman, M Asim. 2018. Meat production potential of Beetal goat

- under farm and field conditions of Punjab, Pakistan., JOURNAL OF ANIMAL SCIENCE, Volume 96, Issue suppl_3, 7 December 2018, Pages 117, <https://doi.org/10.1093/jas/sky404.257>
- 12) **G Bilal**, M Moaeen-ud-Din, M Khan, J Reecy. 2018. Goat production management system in ice caped northern areas of Pakistan., JOURNAL OF ANIMAL SCIENCE, Volume 96, Issue suppl_3, 7 December 2018, Pages 377, <https://doi.org/10.1093/jas/sky404.827>
 - 13) M Moaeen-ud-Din, **G Bilal**, J Reecy, M Khan. 2018. Management and production practices adopted by goat farmers in Punjab province of Pakistan., JOURNAL OF ANIMAL SCIENCE, Volume 96, Issue suppl_3, 7 December 2018, Pages 379, <https://doi.org/10.1093/jas/sky404.832>
 - 14) Muhammad Moaeen-ud-Din and **Ghulam Bilal**. 2018. Development of AFLP breed identification markers for Pakistani Cholistani cattle. [Poster presentation at ADSA Annual Meeting, Knoxville, Tennessee, USA June 24-27, 2018] J. Dairy Sci. 101 (Suppl. 2) : 236.
 - 15) Ghulam Bilal and Muhammad Moaeen-ud Din. 2018. Allele frequency of β -casein gene in local dairy animals of Pakistan. [Accepted for poster presentation at ADSA Annual Meeting, Knoxville, Tennessee, USA June 24-27, 2018] J. Dairy Sci. 101 (Suppl. 2) : 41.
 - 16) Muhammad Moaeen-ud Din, **Ghulam Bilal**, Raja Danish Muner, Nauman Wahid. 2018. A resolution to breed identification of Pakistani Sahiwal cattle. [Accepted for poster presentation at ADSA Annual Meeting, Knoxville, Tennessee, USA June 24-27, 2018] J. Dairy Sci. 101 (Suppl. 2) : 40.
 - 17) **G. Bilal**, M. Moaeen-ud-Din, A. Zurwan. 2016. Growth Potential of Dhanni cattle under rainfed conditions of Punjab, Pakistan. [Accepted for oral presentation at ADSA®-ASAS Joint Annual Meeting, Salt Lake City, UT, USA July 19-23, 2016]. J. Anim. Sci. 94(E-Suppl. 5), 131. <https://doi.org/10.2527/jam2016-0274>.
 - 18) M. Moaeen-ud-Din, **G. Bilal**, J. M. Reecy, M. S. Khan and S. Razzaq. 2016. Morphometric measurements and body weight affected by breed, age, and sex in the Sindh goat breed populations of Pakistan. [Accepted for oral presentation at ADSA®-ASAS Joint Annual Meeting, Salt Lake City, UT, USA July 19-23, 2016] J. Anim. Sci. 94(E-Suppl. 5), 838. <https://doi.org/10.2527/jam2016-1720>.
 - 19) **G. Bilal** and M. Moaeen-ud-Din. 2016. Do buffaloes have better milk fat profile than cows? Where does the evidence stand in 2016?. [Accepted for poster presentation at ADSA®-ASAS Joint Annual Meeting, Salt Lake City, UT, USA July 19-23, 2016.] J. Anim. Sci. 94(E-Suppl. 5), 401. <https://doi.org/10.2527/jam2016-0834>.
 - 20) M. Moaeen-ud-Din, **G. Bilal** and M. Yaqoob. 2015. Allelic diversity of productive, reproductive and fertility traits genes of buffalo and cattle. 17th International Conference on Agricultural, Food and Animal Sciences. Zurich, Switzerland during July 29-30, 2015. Published at

International Journal of Agricultural and Biosystems Engineering 9(7), 26997. <https://waset.org/abstracts/agricultural-and-biosystems-engineering/26997>.

- 21) **G. Bilal**, M. Moaen-ud-Din, M. Waseem, N. Ullah, J. M. Reecy, M. S. Khan and M. Yaqoob. 2015. A survey of management practices adopted by goat breeders in Azad Jammu and Kashmir (AJK), Pakistan. [Accepted for oral presentation at ADSA®-ASAS Joint Annual Meeting, Orlando, Florida, USA July 12-16, 2015.] Published at *J. Anim. Sci.* 93(E-Suppl. 3), 816.
- 22) M. Moaen-ud-Din and **G. Bilal**. 2014. Buffalo and cattle sequence diversity and molecular evolution. [Accepted for oral presentation at ADSA®-ASAS-CSAS Joint Annual Meeting, Kansas City, Missouri, USA July 20-24, 2014.] *J. Anim. Sci.* 92(E-Suppl. 2) 89.
- 23) M. Moaen-ud-Din, **G. Bilal**, and M. S. Khan. 2014. Genomic Selection of Nili-Ravi Buffalo. [Accepted for oral presentation at ADSA®-ASAS-CSAS Joint Annual Meeting, Kansas City, Missouri, USA July 20-24, 2014.] *J. Dairy Sci.* 97(E-Suppl. 1), 86.
- 24) **G. Bilal**, M. Moaen-ud-Din, M. Aqeel, A. Ijaz, M. S. Khan, M. Y. Gondal, K. M. Khan, M. Mukhtar and M. N. Manzoor. 2014. Effects of breed, sex, parity, birth year and birth season on body weight traits for five local cattle breeds and crossbreds in arid region of Punjab, Pakistan. [Accepted for poster presentation at ADSA®-ASAS-CSAS Joint Annual Meeting, Kansas city, Missouri, USA July 20-24, 2014.] *J. Anim. Sci.* 92(E-Suppl. 2), 459.
- 25) **G. Bilal**, R. I. Cue and J. F. Hayes. 2013. Genetic correlations between feed intake and type traits in dairy cattle. [Accepted for oral presentation at ADSA®-ASAS Joint Annual Meeting, Indianapolis, Indiana, July 8-12, 2013.] *J. Dairy Sci.* 96(E-Suppl. 1), 388.
- 26) M. Moaen-ud-Din, **G. Bilal**, and H. M. Waheed. 2013. Genomic Selection of Sahiwal Cattle: A Developing Country Perspective. [Accepted for oral presentation at ADSA®-ASAS Joint Annual Meeting, Indianapolis, Indiana, July 8-12, 2013.] *J. Dairy Sci.* 96(E-Suppl. 1): 442.
- 27) **G. Bilal**, R. I. Cue, A. F. Mustafa and J. F. Hayes. 2012. Genetic relationships among health related fatty acids in milk of Canadian Holsteins. [Accepted for oral presentation at ADSA®-AMPA-ASAS-CSAS-WSASAS Joint Annual Meeting, Phoenix, Arizona, July 15-19, 2012.] *J. Dairy Sci.* 95(Suppl. 3), 226.

Publications in Peer-Reviewed Journals

- 1) Malik, M. H., M. Moaen-ud-Din, and **G. Bilal**, A. Ghaffar, R. D. Muner, G. K. Raja and W. A. Khan. 2018. Development of amplified fragment length polymorphism (AFLP) markers for the identification of Cholistani cattle.

Arch. Anim. Breed., 61, 387–394.

- 2) Moaeen-ud-Din, M. and **G. Bilal**. 2017. Effects of breed, various environmental and maternal factors on growth traits in cattle. J. Animal & Plant Sci. 27(5): 1415-1419.
- 3) Zurwan, A., M. Moaeen-ud-Din, **G. Bilal**, Z. Rehman, M. S. Khan. 2017. Estimation of Genetic Parameters for Persistency of Lactation in Sahiwal Dairy Cattle. Pak. J. Zoology 49(3):877-882.
- 4) Moaeen-ud-Din, M. and **G. Bilal**. 2016. Genomic selection of Nili-Ravi buffalo: A choice for buffalo breeders. Buffalo Bulletin 35(4):605-615.
- 5) **Bilal, G.**, R. I. Cue, and J. F. Hayes. 2016. Genetic and phenotypic associations of type traits and body condition score with dry matter intake, milk yield and number of breedings in first lactation Canadian Holstein Cows. Can. J. Anim. Sci. 96(3): 434-447.
- 6) Moaeen-ud-Din, M., **Bilal, G.**, and J. M. Reecy. 2015. Evolution of hypothalamus-pituitary growth axis among fish, amphibian, birds and mammals. Genetika. 47(2):665-677.
- 7) Moaeen-ud-Din, M. and **Bilal, G.** 2015. Sequence diversity and molecular evolutionary rates between buffalo and cattle. J. Anim. Breed. Genet. 132(1):74-84.
- 8) **Bilal, G.**, R. I. Cue, A. F. Mustafa, and J. F. Hayes. 2014. Effects of parity, age at calving and stage of lactation on fatty acid composition of milk in Canadian Holsteins. Can. J Anim. Sci. 94: 401- 410.
- 9) M. Moaeen-ud-Din, **G. Bilal** and M.S. Khan. 2014. Short communication: Potential of Genomic selection in Sahiwal cattle. Pak. J. Agri. Sci. 51(3): 695-700.
- 10) **Bilal, G.**, R. I. Cue, A. F. Mustafa, and J. F. Hayes. 2014. Genetic parameters of individual fatty acids in milk of Canadian Holsteins. J Dairy Sci. 97: 1150–1156.
- 11) **Bilal, G.**, R. I. Cue, A. F. Mustafa, and J. F. Hayes. 2012. Estimates of heritabilities and genetic correlations among milk fatty acid unsaturation indices in Canadian Holsteins. J Dairy Sci. 95:7367-7371.
- 12) **Bilal, G.** and M. S. Khan. 2009. Use of test-day milk yield for genetic evaluation in dairy cattle: A Review. Pakistan Vet. J. 29: 35-41.
- 13) **Bilal, G.**, M. S. Khan, I. R. Bajwa and M. Shafiq. 2008. Genetic control of test-day milk yield in Sahiwal cattle. Pakistan Vet. J. 28: 21-24.
- 14) M. S. Khan, **G. Bilal**, I. R. Bajwa, Z. Rehman and S. Ahmad. 2008. Estimation of breeding values of Sahiwal cattle using test day milk yields. Pakistan Vet. J. 28: 131-135.
- 15) M. Yaqoob, F. Shahzad, M. Aslam, M. Younas and **G. Bilal**. 2009. Production performance of Dera Din Panah goat under desert range conditions in Pakistan. Trop. Anim. Health Prod. 41:1413-19.

Research Projects (Total Funds = 10.79 Million PKR)

- 1) Development of genetic evaluation model for Dhanni cattle as potential beef cattle in Potohar region of Punjab, funded by Pakistan Science Foundation, Islamabad, Pakistan (3.10 million Rs, 3 years) as Principal Investigator.
- 2) Development of breeding objective for desirable milk protein quality of dairy animals, funded by Higher Education Commission (HEC), Islamabad, Pakistan (3.27 million, 2 years) as Principal Investigator.
- 3) Development of breed identification markers for Pakistani dairy cattle breeds, funded by Pakistan Science Foundation, Islamabad, Pakistan (4.42 million Rs, 3 years) as Co-Principal Investigator.

Development Project (s) (Total Funds = 756.192 Million PKR)

- 1) Establishment of National Centre for Livestock Breeding, Genetics and Genomics at Pir Mehr Ali Shah Arid Agriculture University Rawalpindi, funded by Planning Commission of Pakistan through HEC (799.192 million Rs, 3 years) **as Focal Person** [approved on 29.03.2018 in CDWP meeting]. Accessible at [<https://nation.com.pk/03-Apr-2018/cdwp-approves-national-centre-for-livestock-breeding-at-arid-university>] and [<https://pakobserver.net/cdwp-approves-national-centre-for-livestock-breeding/>] and [http://www.uaar.edu.pk/news-detail.php?news_id=349]

Administrative Experience

- 1) Scientific Director/Director-II of National Centre for Livestock Breeding Genetic sand Genomics w.e.f. November, 19, 2018 till to date.
- 2) Secretary, Scientific Committee of National Centre for Livestock Breeding Genetic sand Genomics w.e.f. November, 19, 2018 till to date.
- 3) Secretary, Investment Committee for Endowment Fund of NCLBG&G w.e.f. February 18, 2019.
- 4) Secretary, Department of Animal Breeding and Genetics w.e.f. October 2018 till to date.
- 5) Secretary, Department of Livestock Production and Management (June 2015

to September 2018)

6) In Charge, Computer Lab, Faculty of Veterinary and Animal Sciences

Seminars, Workshops, Conferences, Trainings and Consultative Meetings

- 1) Participated in Launch Conference titled "National Academy of Higher Education (NAHE)" at HEC Islamabad on June 12, 2019
- 2) Participated as resource person in International Biotechnology Brainstorming Workshop On Animal Genomics organised by the PARC in collaboration with ILRI at NARC, Islamabad on September 11, 2018.
- 3) Participation as resource person/speaker (talk titled " Selection of Dairy Breeds ") in the 1st National Training Workshop on " Commercial Dairy Farming" organised by Department of Livestock Production and Management at Pak-Korea Capacity Building Center, PMAS-Arid Agriculture University Rawalpindi on May 3-4, 2018.
- 4) Participated as Livestock Judge at the Animal Beauty Show/Competition organised by CVH, Dhoke Gujran, Rawalpindi on February 27, 2018.
- 5) Participation as invited speaker (talk titled "Application of genomic selection for improving beef production potential of local cattle") in International Conference on "Omics for Animal Sciences: opportunities and challenges" during February 20-21, 2018 at UVAS, Lahore.
- 6) Participation as invited speaker (talk titled " Importance of Progeny Testing Programme and Conservation of Dhanni Breed of Cattle ") in Capacity Building Training of Veterinary Officers /Veterinary Assistants under Development project "Conservation, Propagation and Development of Dhanni, Lohani & Dajal Breeds of cattle in Punjab", at BLPRI, Kheri Murat, Attock on May 24, 2017.
- 7) Participation as invited speaker (talk titled " Potential of genomic selection in poultry breed development") in National Seminar on "Development of dual purpose chicken breed for rural poultry sector of Pakistan" at NARC, Islamabad on May 15, 2017.
- 8) Participated as trainee Livestock Judge in "Sahiwal Cattle Show " organised by Research Center for Conservation of Sahiwal Cattle (RCCSC), Livestock and Dairy Development Department, Punjab, Pakistan on April 06, 2017.
- 9) International Workshop on "Goat Breeding and Marketing in Genomics Era" organised by Laboratories of Animal Breeding and Genetics, PMAS-Arid Agriculture University Rawalpindi on March 6-7, 2017.
- 10) International Training Workshop on "Genomic Selection" organised by Laboratories of Animal Breeding and Genetics, PMAS-Arid Agriculture University Rawalpindi on March 8-9, 2017.
- 11) Workshop on "Micro-Teaching: Becoming a Reflective Teacher" during

January 30 to February 03, 2017 at Faculty Development Academy, CIIT, Islamabad.

- 12) Consultative meeting with Secretary Livestock and Dairy Development Department on "Production of Genomic Bulls for dairy cattle and buffalo in Punjab, Pakistan" on November 15, 2016 at Lahore Pakistan.
- 13) National Workshop on "Organic Food and Health: Avenues of Innovation and Entrepreneurship" on June 02, 2016 at PCST, Islamabad.
- 14) International Seminar on "Improvement and Development of the Korean Livestock Industry by Saemaul Undong & Quarantine and Inspection of Animal Products" on 25th February, 2016 at FV&AS, PMAS-Arid Agriculture University Rawalpindi.
- 15) Consultative workshop on "Goat Breeding in Pakistan" organised by Laboratories of Animal Breeding and Genetics, PMAS-Arid Agriculture University Rawalpindi on December 17, 2015.
- 16) Certificate Program in Public Procurement delivered on Massive Open Online Course offered by South Asia Regional Procurement Services, The World Bank, 1818H Street, NW, Washington, DC, 20433, USA.
- 17) Workshop on "Breeding and Genetics" on October 07, 2013 at University of Veterinary and Animal Sciences, Lahore, Pakistan organised by David McGill, a PhD student at Charles Stuart University, Australia under Agriculture Sector Linkages Program (ASLP) Dairy Project.
- 18) National Workshop on "Country-Domestic Animal Genetic Resources Information System (C-DAGRIS) Training in Pakistan" during November 15-17, 2012 at University of Agriculture Faisalabad, Pakistan.
- 19) Macdonald Innovations for Teaching Improvement (MITI) "Graduate Teaching Workshop" on December 3 and 5, 2008 at McGill University, Montreal, Quebec, Canada.
- 20) Learning Innovation Division, Higher Education Commission workshop on "Application of Statistics in Agriculture Research" during April 08-10, 2008 held at The Islamia University of Bahawalpur, Pakistan.
- 21) HEC-BC JHEL Program II National Workshop on "Genetic Resources and Molecular Techniques in Livestock Production" during March 20-22, 2008 at University of Agriculture, Faisalabad, Pakistan.
- 22) EU Asia Link Project Short Course on "Livestock Ecology, Sustainable Land Use and Livestock Systems" during January 12-24, 2004 at University of Agriculture, Faisalabad, Pakistan.

International Conferences/Delegate Visits

- 1) Visited Livestock Improvement Corporation (LIC) and Dairy NZ at Hamilton, New Zealand as part of 3-member delegate to sign MoU and extend collaboration on behalf of National Center for Livestock Breeding Genetics and Genomics (NCLBG&G) at PMAS-Arid Agriculture University, Rawalpindi
- 2) 2012. ADSA-CSAS-ASAS Joint Annual Meeting during July 15-19, 2012

at Phoenix, Arizona, USA. 3) 2009. ADSA-CSAS-ASAS Joint Annual Meeting during July 12-16, 2009 at Montreal, Quebec, Canada.
Honours and Awards
1) Research Productivity Award by Pakistan Council for Science and Technology (PCST, Islamabad, Pakistan) for the Year 2014-2015. 2) Honour of being the most productive scientist of PMAS-Arid Agriculture University, Rawalpindi during 2014-15 as notified by Pakistan Council for Science and Technology (PCST), Islamabad, Pakistan.
Academic Achievements
1) Winner of Graduate Research Enhancement and Travel (GREAT) award from McGill University Canada for oral presentation of research paper at Joint Annual Meeting, Phoenix, Arizona USA in July 2012 2) Winner of Provost Graduate Fellowship from McGill University, Montreal, Canada during 2008 3) Winner of McGill International Doctoral Award (MIDA) by McGill University Montreal Quebec Canada from September 2008 to August 2012 4) Winner of PhD Scholarship from the PMAS Arid Agriculture University, Rawalpindi, Pakistan under faculty development program from September 2008 to August 2012 5) Winner of University Merit Scholarship from the University of Agriculture, Faisalabad, Pakistan during 2004 to 2007. 6) Winner of Internal Merit Scholarship from the University of Agriculture Faisalabad during 2001 to 2004.
Reviewer of Scientific Journals
1) BMC Genetics 2) BMC Genomics

3) BMC Research Notes 4) European Scientific Journal 5) Italian Journal of Animal Science 6) Journal of Animal and Plant Sciences 7) Journal of Dairy Science 8) Livestock Science 9) Reproductive Biology 10) Tropical Animal Health and Production
Membership of Learned Societies
1. Member of American Dairy Science Association (ADSA), Champaign, IL, USA (2009-2014). 2. Editorial Board Member of Journal of Animal and Plant Sciences (JAPS), University of Veterinary and Animal Sciences, Lahore, Pakistan 3. Lifelong Registered Member of Pakistan Veterinary Medical Council, Islamabad, Pakistan 4. Lifelong Registered Teaching Faculty of Pakistan Veterinary Medical Council, Islamabad, Pakistan 5. Lifelong Registered Member of Pakistan Association for the Advancement of Science, Lahore, Pakistan 6. Member of McGill Alumni Association (MAA) Montreal, Quebec, Canada
Referees
1) Dr. John Flannan Hayes (PhD advisor) at the Department of Animal Science, McGill University, Montreal, Quebec, Canada email:- john.f.hayes@mcgill.ca Address:- Room MS1-081, Macdonald-Stewart Building, 21,111 Lakeshore Road, Ste. Anne de Bellevue, Quebec H9X 3V9, Canada Tel.: 514-398-7804, Fax: 514-398-7964 2) Dr. Muhammad Sajjad Khan (M.Phil Advisor), Dean, Faculty of V Animal Husbandry, University of Agriculture Faisalabad 38000 Pakistan email:- drsajjad2@yahoo.com Address:- Dean, Faculty of Animal Husbandry, University of Agriculture Faisalabad 38000 Pakistan Tel: 0092-41-9200161-71 Ext. 3202 Fax: 92-41-2625191 Cell:- 0092-346-7440332

CV

Department of Animal Breeding and Genetics, Faculty of Veterinary and Animal Sciences,
PMAS Arid Agriculture University Rawalpindi 46300 Pakistan

Phone: 051-9292139 Mobile: 0092-345-7867392 E-mail: hafizwaheed1610@gmail.com

Hafiz Muhammad Waheed

Career Objectives

To excel in my field through hard work, honesty and diligence

Personal Data

Place of Birth: Faisalabad, Punjab, Pakistan

Age: 41 Years

Marital Status: Married

Languages: Urdu, English, Punjabi,

Education

[2014-2019] PhD Scholar (Animal Breeding and Genetics), Result awaiting University of Agriculture, Faisalabad
[2004-2006] M.Sc. (Hons.) Animal Breeding and Genetics, University of Agriculture, Faisalabad, Pakistan
[2000-2004] B.Sc. (Hons.) Animal Husbandry, University of Agriculture Faisalabad, Pakistan
Work Experience
1) Worked as Lecturer (Animal Breeding and Genetics), Faculty of Veterinary & Animal Sciences PMAS-Arid Agriculture University Rawalpindi, Pakistan from February 07, 2008 to till date. [11 years and 6 months] 2) Worked as Instructor (Training & Coordination) at Buffalo Research Institute, Pattoki (L&DD, Govt. of Punjab, Pakistan) from November 24, 2006 to February 04, 2008 [14 months]
Teaching Assignments
<u>Undergraduate Courses</u>
Animal Breeding and Genetics Introduction to Animal Breeding and Genetics Principle of Genetics & Population Genetics Animal Breeding Plans and Policies Animal Husbandry Poultry Housing and Management Introduction to Livestock Management Equine and Camel Production Small Ruminant Production Sheep and Goat Production

Internship Supervision(DVM) Internship Oral examination Member (DVM, 2019)
Publications
<u>Peer-Reviewed Conference/Meeting Abstracts</u> ➤ M Moaeen-ud-Din, H Waheed, G Bilal, J Reecy, M Khan. 2018. Estimation of Beetal goat live-weight for all types of age classes in field and farm conditions through linear body measurements., JOURNAL OF ANIMAL SCIENCE, Volume 96, Issue suppl_3, 7 December 2018, Pages 453–454, https://doi.org/10.1093/jas/sky404.989 ➤ H Waheed, M Moaeen-ud-Din, G Bilal, J Reecy, M Khan, M Saif-ur-Rehman, M Asim. 2018. Meat production potential of Beetal goat under farm and field conditions of Punjab, Pakistan., JOURNAL OF ANIMAL SCIENCE, Volume 96, Issue suppl_3, 7 December 2018, Pages 117, https://doi.org/10.1093/jas/sky404.257 ➤ M. Moaeen-ud-Din, G. Bilal, and H. M. Waheed. 2013. Genomic Selection of Sahiwal Cattle: A Developing Country Perspective. [Accepted for oral presentation at ADSA®-ASAS Joint Annual Meeting, Indianapolis, Indiana, July 8-12, 2013.] <i>J. Dairy Sci.</i> 96(E-Suppl. 1): 442. ➤ Hassan, M., M. N. Khan, M. Mushtaq, Z. Iqbal, A A. Farooq, M, S. Sajid and H. M. Waheed, 2007. Prevalence of Warble Fly Infestation in Buffalo in Chakwal, Punjab. [Accepted for oral presentation at 8th World Buffalo Congress, Rome, Italy 19-22 October, 2007] <i>Ital. J. Anim. Sci.</i> vol.6, (Suppl.2), 942-944. <u>Publications in Peer-Reviewed Journals</u> ➤ Waheed, H.M, S. Ali, M.S. Khan, M.S. Rehman and G. Abbas. 2015. Molecular Genetic Variations among Some Punjab Sheep Breeds Using RAPD Analysis. <i>Advances in Zoology and Botany</i> 3(1): 1-5 ➤ Hassan, M., M. N. Khan, M. Abubakar, H. M. Waheed, Z. Iqbal and M. Hussain, 2010. Bovine hypodermosis—a global aspect. <i>Trop Anim Health Prod</i> (2010) 42:1615–1625
Administrative Experience In Charge, Departmental Labs, Department of Animal Breeding and Genetics, Faculty of Veterinary and Animal Sciences, PMAS Arid Agriculture University, Rawalpindi [March 2019 to date] Member Admission Committee, Faculty of Veterinary and Animal Sciences, PMAS Arid Agriculture University, Rawalpindi [2012-13, 2013-14 and 2019-2020] Member Migration Committee, Faculty of Veterinary and Animal Sciences,

PMAS Arid Agriculture University, Rawalpindi [2011-12, 2012-13 and 2013-14] In Charge, Farm/Feed Mill Store, Buffalo Research Institute, Pattoki (L&DD, Govt. of Punjab, Pakistan [December 2006 to January 2008]
Seminars, Workshops, Conferences, Trainings and Consultative Meetings
➤ International Training Workshop on "Genomic Selection" organised by Laboratories of Animal Breeding and Genetics, PMAS-Arid Agriculture University Rawalpindi on March 8-9, 2017. ➤ National Workshop on "Country-Domestic Animal Genetic Resources Information System (C-DAGRIS) Training in Pakistan" during November 15-17, 2012 at University of Agriculture Faisalabad, Pakistan. ➤ HEC-BC JHEL Program II National Workshop on "Genetic Resources and Molecular Techniques in Livestock Production" during March 20-22, 2008 at University of Agriculture, Faisalabad, Pakistan. ➤ EU Asia Link Project Short Course on "Livestock Ecology, Sustainable Land Use and Livestock Systems" during January 12-24, 2004 at University of Agriculture, Faisalabad, Pakistan.
Membership of Learned Societies
➤ Lifelong Registered Member of Pakistan Veterinary Medical Council, Islamabad, Pakistan ➤ Lifelong Registered Teaching Faculty of Pakistan Veterinary Medical Council, Islamabad, Pakistan
Referees
Dr. Muhammad Sajjad Khan (PhD Supervisor), Dean, Faculty of Animal Husbandry, University of Agriculture Faisalabad 38000 Pakistan email:- drsajjad2@yahoo.com Address:- Dean, Faculty of Animal Husbandry, University of Agriculture Faisalabad 38000 Pakistan Tel: 0092-41-9200161-71 Ext. 3202 Fax: 92-41-2625191 Cell:- 0092-346-7440332