PIR MEHR ALI SHAH

ARID AGRICULTURE UNIVERSITY RAWALPINDI

Self Assessment Report

2nd Cycle (Fall 2022- Spring 2024)

M. Phil. Animal Nutrition

DEPARTMENT OF LIVESTOCK PRODUCTION AND MANAGEMENT

Prepared by: Members of Program Self Assessment Team

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INTRODUCTION

Animal Nutrition Section was started in 2005 as a part of The Department of Livestock Production and Management at PMAS-Arid Agriculture University Rawalpindi. The section is offering postgraduate degrees of M.Phil. and Ph.D. in animal nutrition. An extensive scheme of study (consisting of 22 courses) has been developed for post graduate degree program in the field of animal nutrition including all major aspects such as Physiology and Biochemistry of Nutrition, Energy Metabolism, Protein Metabolism, Analytical Techniques in Animal Nutrition, Molecular Nutrition and Nutrigenomics, Nutrition and Gastrointestinal Ecology, Clinical Animal Nutrition and Modern Concepts in Animal Feeding etc. The courses are supported by the latest text books and research publications.

Since its inception, Animal Nutrition Section has significantly contributed in solving research and field problems related to animal nutrition. The Animal Nutrition section is equipping the nutritional professionals with thorough understanding of the science of animal nutrition and enabling them to serve in this very important field in the country. Animal Nutrition Section constitutes on offices and Nutrition Research Laboratories for undergraduate and post graduate students. One special part of the research lab is equipped with all necessary amenities for determination of chemical composition of different feed stuff for livestock & poultry. Along with the academic activities of postgraduate classes (M.Phil. & Ph.D.) and post graduate research activities, the department is now providing the facility of TMR, Concentrate Ration and mineral mixture production to the researchers.

This Self-Assessment Report (SAR) is based on eight criteria. The first criterion outlines the program mission and objectives. Criterion 2 provides information about the curriculum development. Criterion 3 enlists the laboratories and other relevant information. The fourth criterion is pertinent to the information about students' support and advising. The last four criteria provide information about process control, faculty characteristics and institutional facilities and support.

CRITERION 1: PROGRAM MISSION, OBJECTIVES AND OUTCOMES

Standard 1.1 The program must have measurable objectives to support Mission

Mission Statement: Animal Nutrition Section is designed to introduce/capable the student to the basic fundamentals of nutrition and basic nutritional requirements of livestock and poultry. The section is aimed to capable the undergraduate and graduate students to solve the problems related to animal nutrition to get maximum production from animals as well as to recognize and solve nutritional related problems.

A more specific mission of Animal Nutrition Section is to conduct superior research and extend knowledge related to animal nutrition for sustainable animal production system making the future of Pakistan bright trough livestock sector.

Objectives:

- Development of Animal Nutrition Section on modern and innovative lines for teaching and research for the graduate and post-graduate students.
- Development of students into technically competent animal nutritionists through research having well worth in consultation.
- To impart knowledge about current global issues related to animal nutrition.

Main elements of strategic plan to achieve mission and objectives:

- Development of sound teaching system based on experience and vision gathered from literature, reviews, symposia, workshops, etc. for the award of degrees.
- Designing of curricula including core subjects, elective subjects, specialized areas, internship programs and study tours.
- Setting up of well-equipped laboratories for students as per available resources.
- Development of scientific writing and presentation skills assignments and research reports.
- Publication of scientific papers, popular articles, books, etc.
- Arranging study tours to provide knowledge to students about animal nutrition.

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

Table 1. Program Objectives Assessment for M. Phil in Animal Nutrition

S. #	Objective	How Measured	When Measured	Improvement Identified	Improvement Made
1	Development of students into technically competent animal nutritionists having well worth in consultation.	1.Test their knowledge about Animal Nutrition through tests / comprehensive exams 2. Employer survey	1.During the semesters and at the time of written & oral comprehensive exams 2. visits to research and business and research centers	Courses to be updated by inducting new knowledge/ techniques & induct new courses when required	Courses are already updated
2	To impart knowledge about current global issues related to animal nutrition.	Assess knowledge About these aspects through tests / comprehensive	During the semesters and at the time of written & oral comprehensive exams	Courses to be regularly updated by inducting new knowledge on global issues and trends	Courses are already updated

		exams /presentations			
3	To conduct research studies on animal nutrition and nutrition related problems	Assessing the interest of students, quality of their thesis research studies	Before startup of research studies and the completion of thesis research	Students to make presentations and submit reports	Regular presentations are made in the faculty

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

Students of M.Phil. in Animal Nutrition should possess the ability of:

- Identification of problems related to animal nutrition and suggest appropriate solutions
- Preparation of problem based research proposals and use of scientific study techniques.
- Communication skills through presentations, oral discussions, scientific and review articles, etc.
- Scientific writing skills and publication of research papers and popular articles in scientific journals.

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

Table 2. Relationship of Program Objectives with Program Outcomes

Program Objectives	**Program Outcomes**			
	Animal Nutrition Skills	**Developing Research Proposals**	**Communication skills**	**Scientific writing/ publishing**
Education	+++	++	++	++
Research	+++	+++	++	++
Global issues	++	+	+	

+ = Moderately satisfactory ++ = Satisfactory +++ = Highly satisfactory

Program Assessment Results:

Teacher's evaluation

There are three teachers in the discipline of Animal Nutrition namely:

1. Dr. Tanveer Ahmad Professor
2. Dr. Nasir Mukhtar Associate Professor
3. Dr. M. Farooq Iqbal Assistant Professor

The teachers were evaluated by the students at the end of course completion through the peforma-10. Details of teachers performance are given in Figs. 1-5.

AN-701-Fall 2022 (Dr. M. Farooq Iqbal)

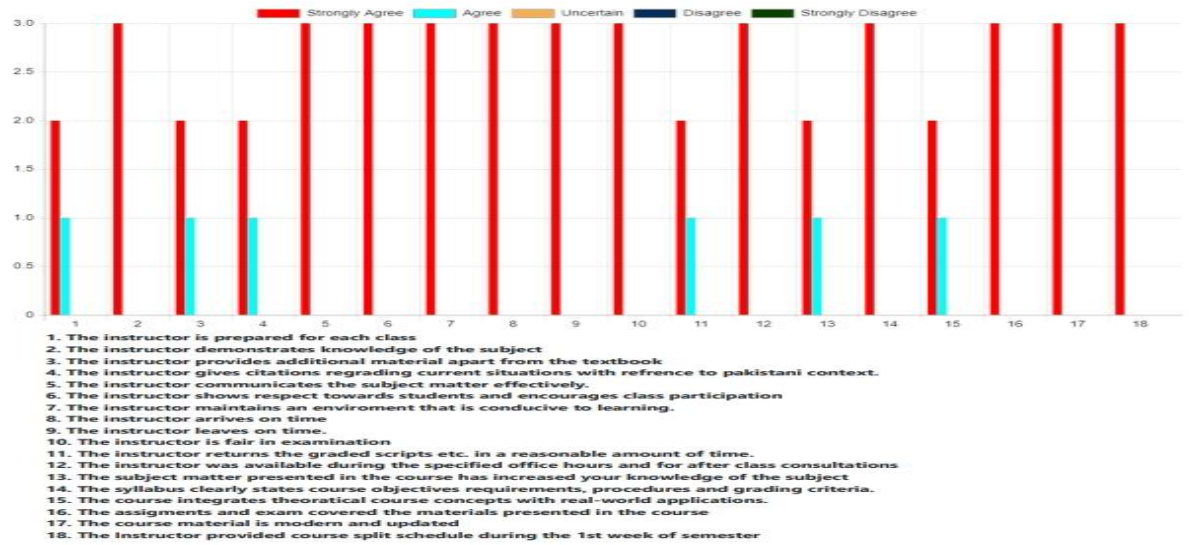

Fig. 1. Evaluation of AN-701 (Fall 2022)

The students were satisfied regarding the instructor's abilities, method of teaching, lecture preparedness, availability, punctuality, behavior and attitude and provision of course material.

AN-705-Fall 2022 (Dr. Nasir Mukhtar)

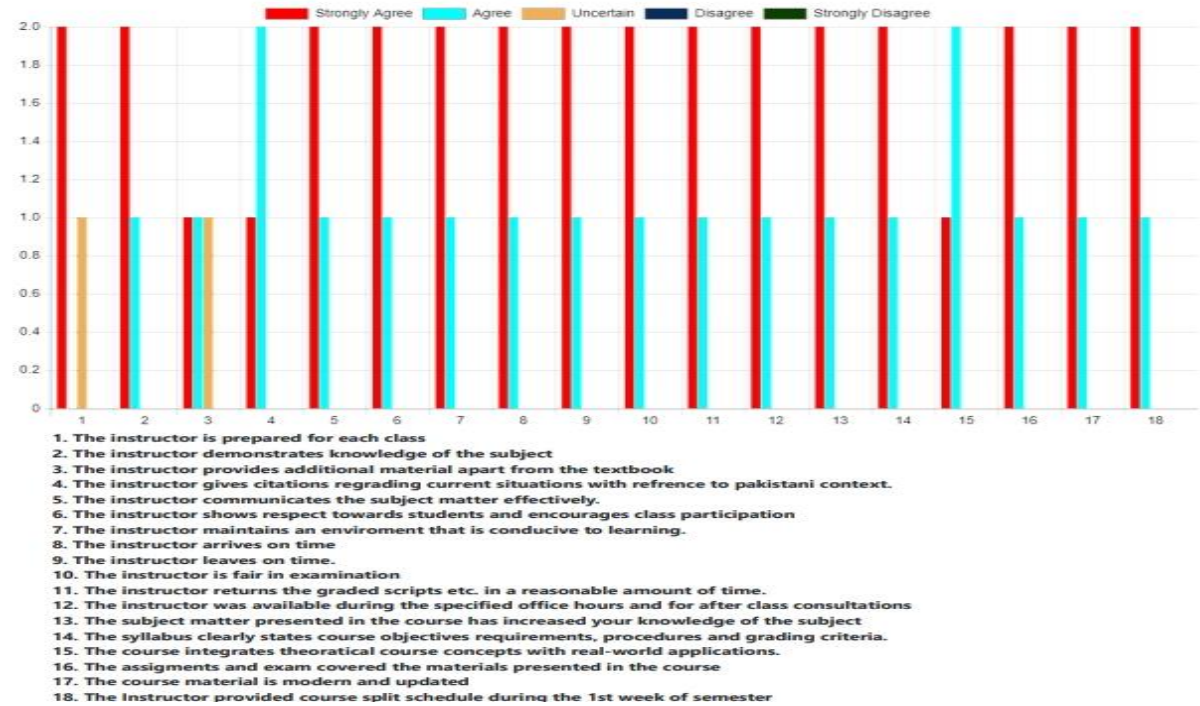

Fig. 2. Evaluation of AN-705 (Fall 2022)

Teacher was able to teach this course in a good manner, with all attributes of preparation, communication skill, participation, including modern concepts, punctuality and behavior, etc.

AN-708-Fall 2022 (Dr. Tanveer Ahmad)

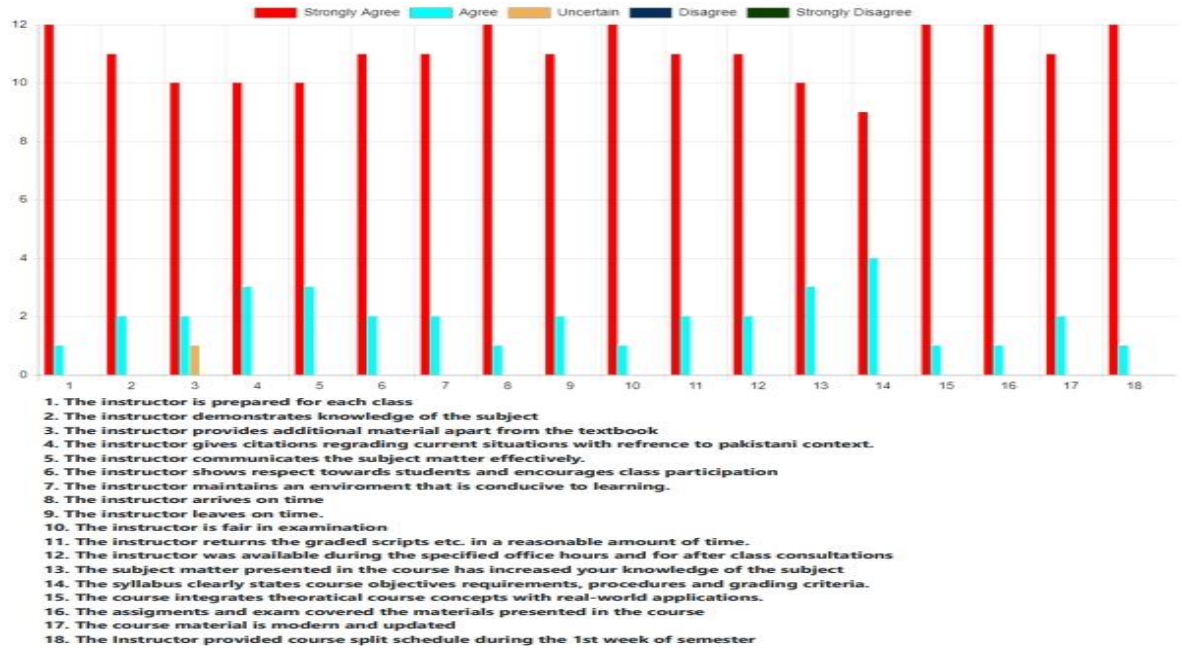

Fig. 3. Evaluation of AN-708 (Fall 2022)

All the students were either strongly agreed or agreed with the entire questions asked in this Performa.

AN-704 Fall 2023 (Dr.M. Farooq Iqbal)

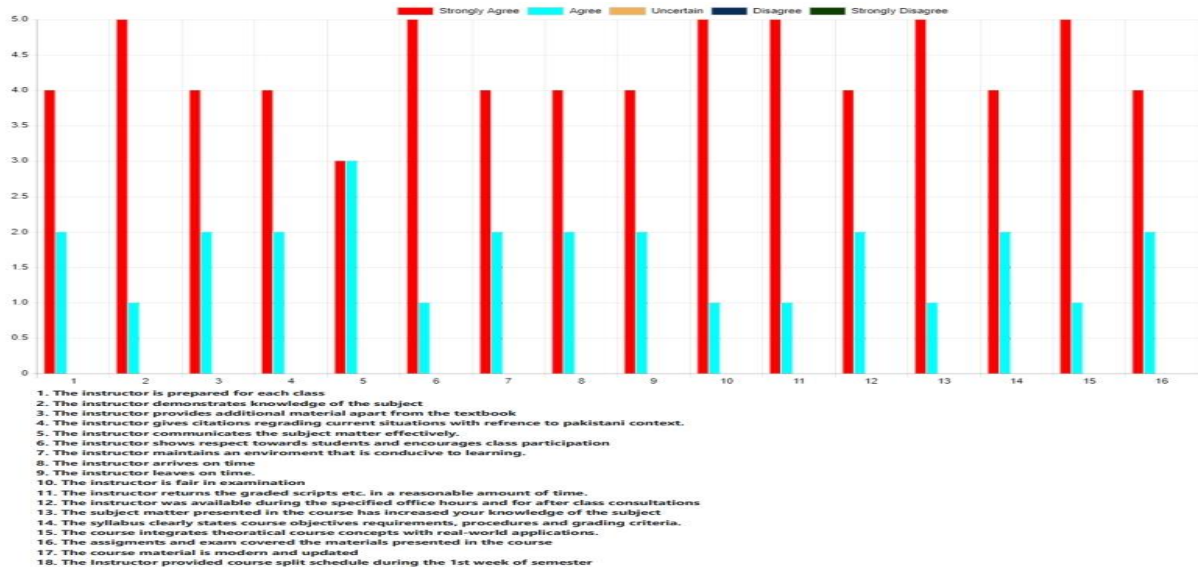

Fig. 4. Evaluation of **AN-704 Fall 2023**

The majority of the students were satisfied regarding the instructor's abilities, method of teaching, lecture preparedness, availability, punctuality, behavior and attitude and provision of course material.

AN-708-Spring 2024 (Dr. Tanveer Ahmad)

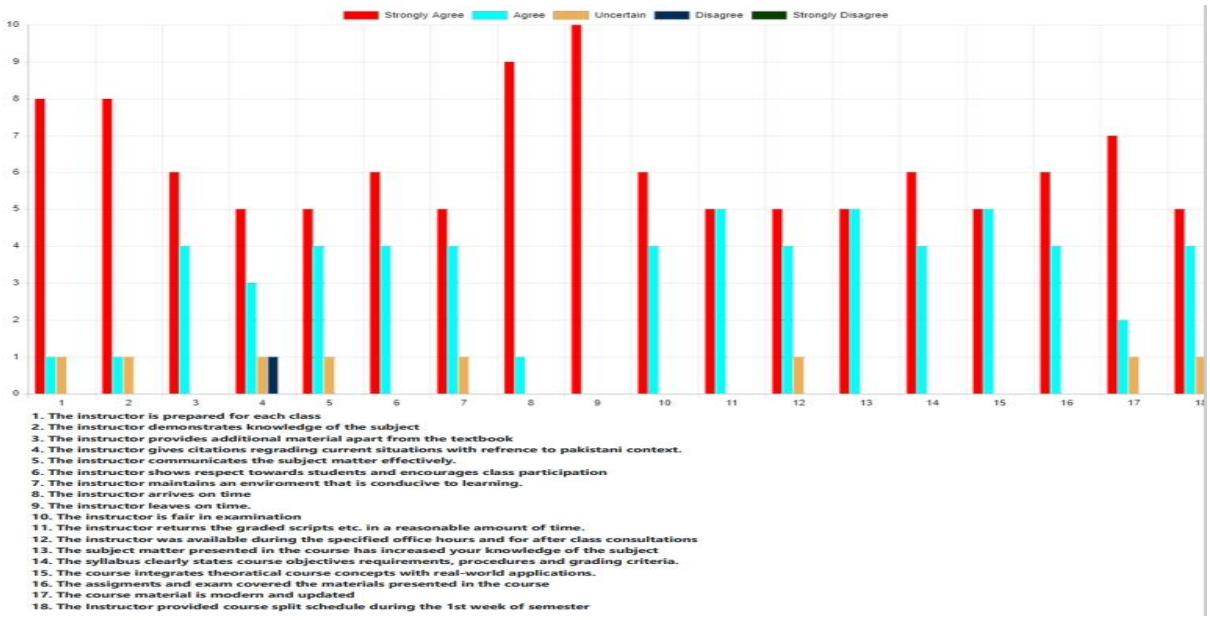

Fig. 5. Evaluation of AN-708 (Spring 2024)

Teacher was able to teach this course in a good manner, with all attributes of preparation, communication skill, participation, including modern concepts, punctuality and behavior, etc.

Course evaluation

Following courses were offered during Fall 2022-Spring 2024 (Table 3 to Table 6).

Table 3. Courses offered in the Fall Semester 2022

Course No.	Course Title	Course No.	Teacher's Name
1.	Physiology and Biochemistry of Nutrition	AN-701	Dr. M. Farooq Iqbal
2.	Mineral Nutrition	AN-705	Dr. Nasir Mukhtar
3.	Research Methods in Animal Nutrition	AN-708	Dr. Tanveer Ahmad

Table 4. Courses offered in the Spring Semester 2023

Course No	Course Title	Course No.	Teacher's Name
1.	Feeds and Feeding	AN-702	Dr. Tanveer Ahamd
2.	Vitamin Nutrition	AN-706	Dr. Nasir Mukhtar
3.	Special Problem	AN-719	Respective Supervisor

Table 5. Courses offered in the Fall Semester 2023

Course No.	Course Title	Course No.	Teacher's name
1.	Physiology and Biochemistry of Nutrition	AN-701	Dr. Tanveer Ahmad
2.	Protein Metabolism	AN-704	Dr. M. Farooq Iqbal
3.	Mineral Nutrition	AN-705	Dr. Nasir Mukhtar
4.	Special Problem	AN-719	Respective Supervisor
5.	Seminar	AN-720	Respective Supervisor

Table 6. Courses offered in the Spring Semester 2024

S. No.	Course Title	Course No.	Teacher
1.	Research Methods in Animal Nutrition	AN-708	Dr. Tanveer Ahmad
2.	Pet Nutrition	AN-712	Dr. M. Farooq Iqbal
3.	Special Problem	AN-719	Respective Supervisor
4.	Seminar	AN-720	Respective Supervisor

The offered courses were evaluated by the students at the end of course completion through performa-1. Details of course evaluation is given below as in Figs. 6-13.

AN-701 (Fall 2022)

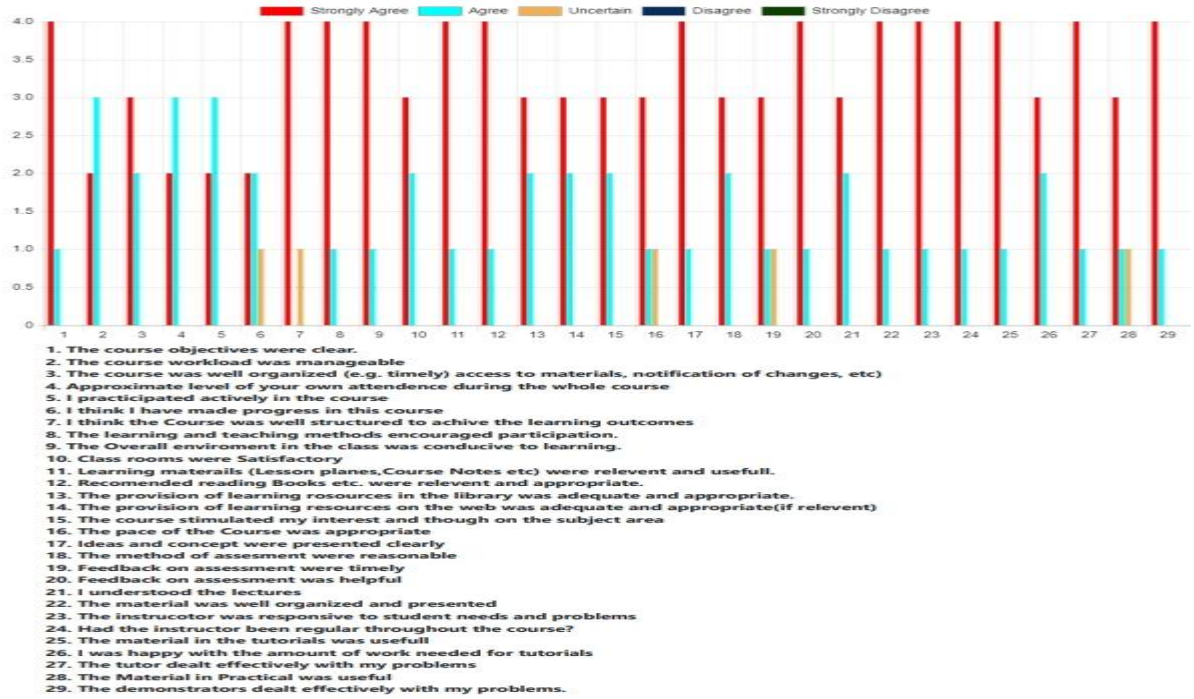

Figure 6. Evaluation of **AN-701 (Fall 2022)**

The students were satisfied with the pace of the course during the semester, provision of learning resources and feedback on assignment timely and helpful. The students thought that the instructor was punctual and was helpful in solving the problems.

AN-705 (Fall 2022)

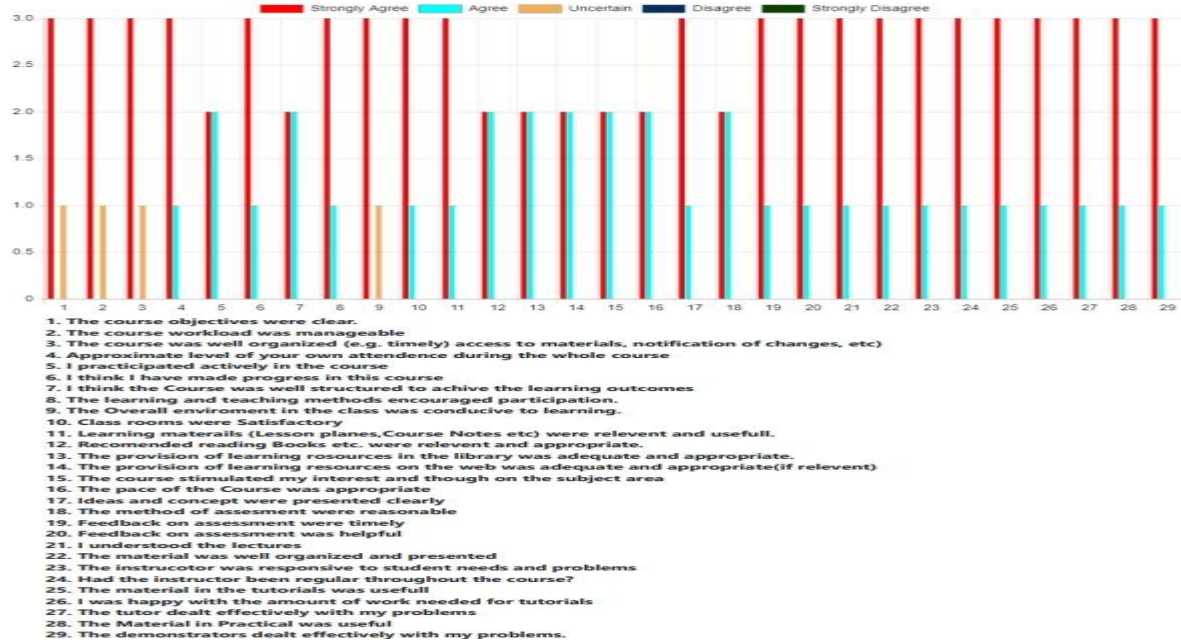

Figure 7 . Evaluation of **AN-705 (Fall 2022)**

Teaching was hardworking, knowledgeable, punctual, well-prepared wants to see research skill in his students.

AN-708 (Fall 2022)

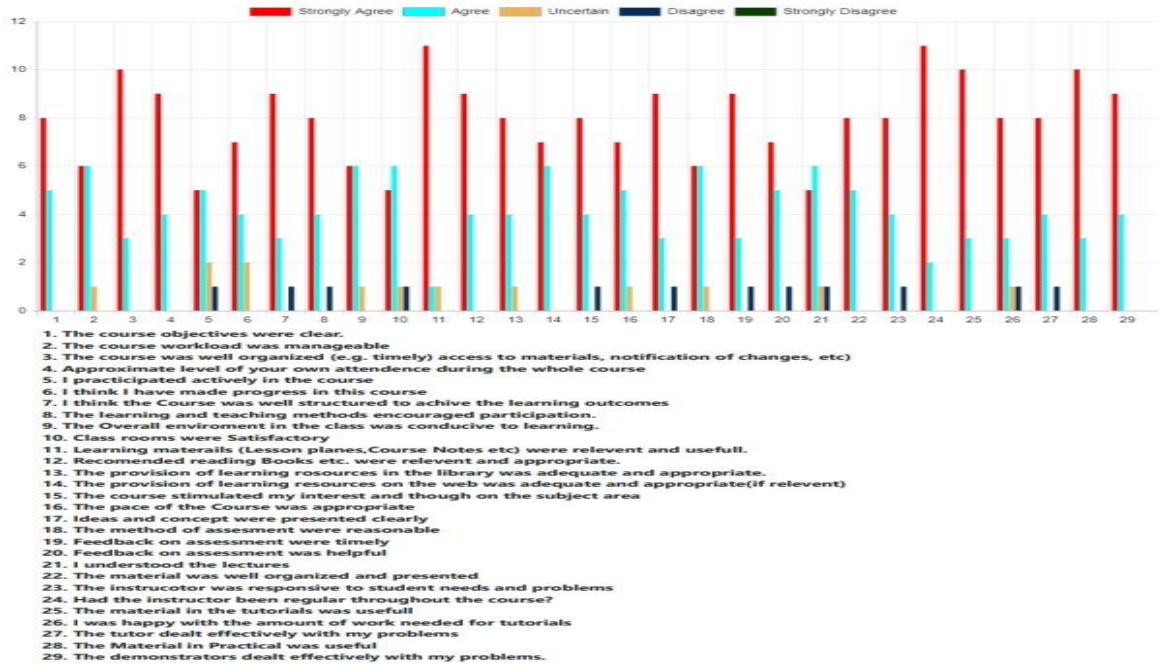

Figure 8. Evaluation of AN-708 (Fall 2022)

Instructor was knowledgeable, punctual, having good teaching skills and well mannered

AN-702 (Spring 2023)

Figure 9. Evaluation of **AN-702 (Spring 2023)**

The students were satisfied with the pace of the course during the semester, provision of learning resources and feedback on assignment timely and helpful. The students thought that the instructor was punctual and was helpful in solving the problems.

AN-706 (Spring 2023)

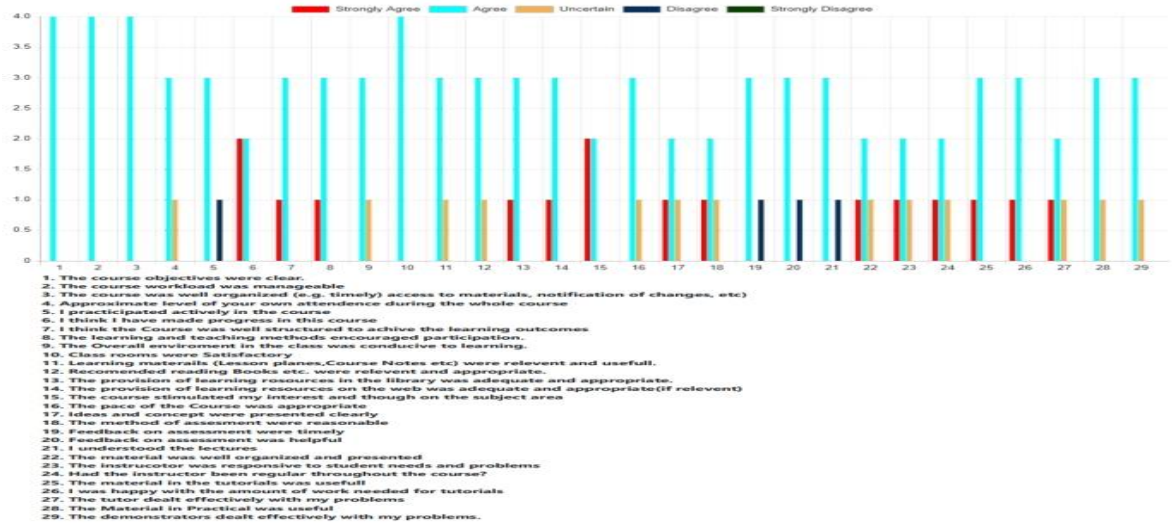

Figure 10. Evaluation of AN-706 (Spring 2023)

Instructor was knowledgeable, punctual, having good teaching skills and well mannered

AN-704 (Fall 2023)

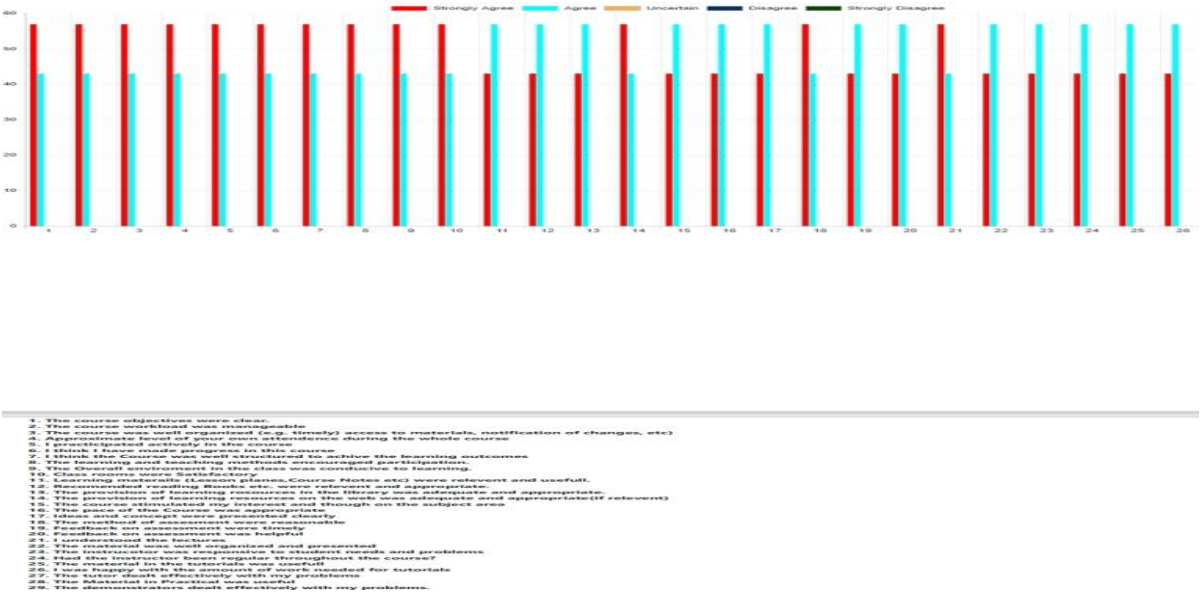

Figure 11. Evaluation of AN-704 (Fall 2023)

The students were satisfied with the pace of the course during the semester, provision of learning resources and feedback on assignment timely and helpful. The students thought that the instructor was punctual and was helpful in solving the problems.

AN 708 (Spring 2024)

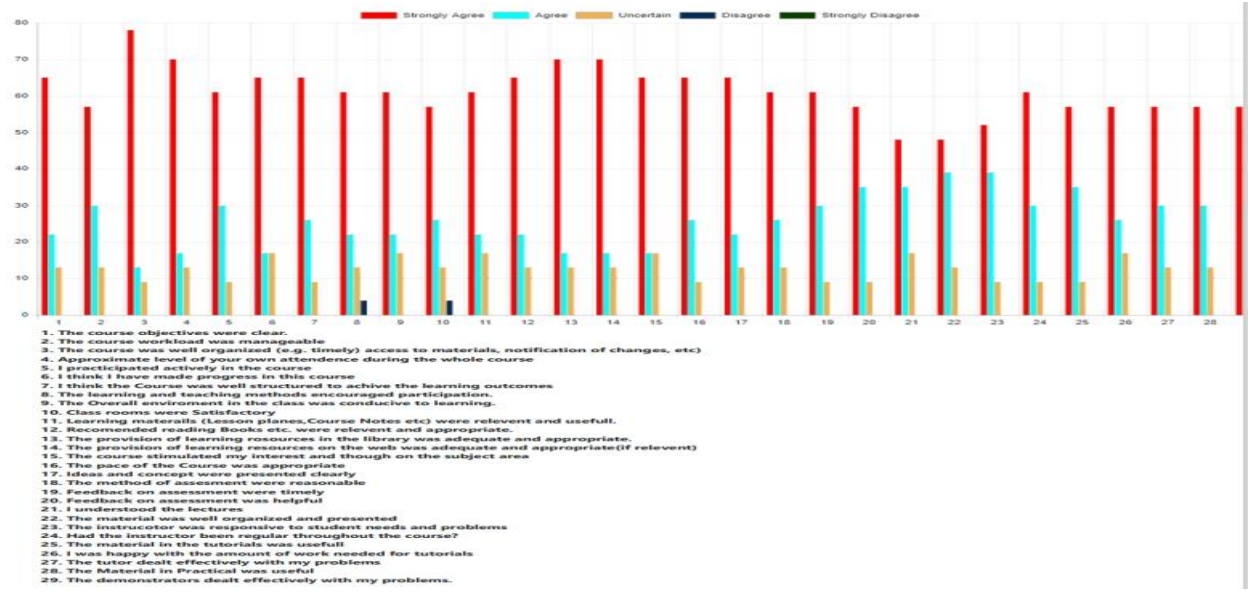

Figure 12 . Evaluation of **AN-708 (Spring 2024)**

Teaching was hardworking, knowledgeable, punctual, well prepared wants to see research skill in his students.

AN-712 (Spring 2024)

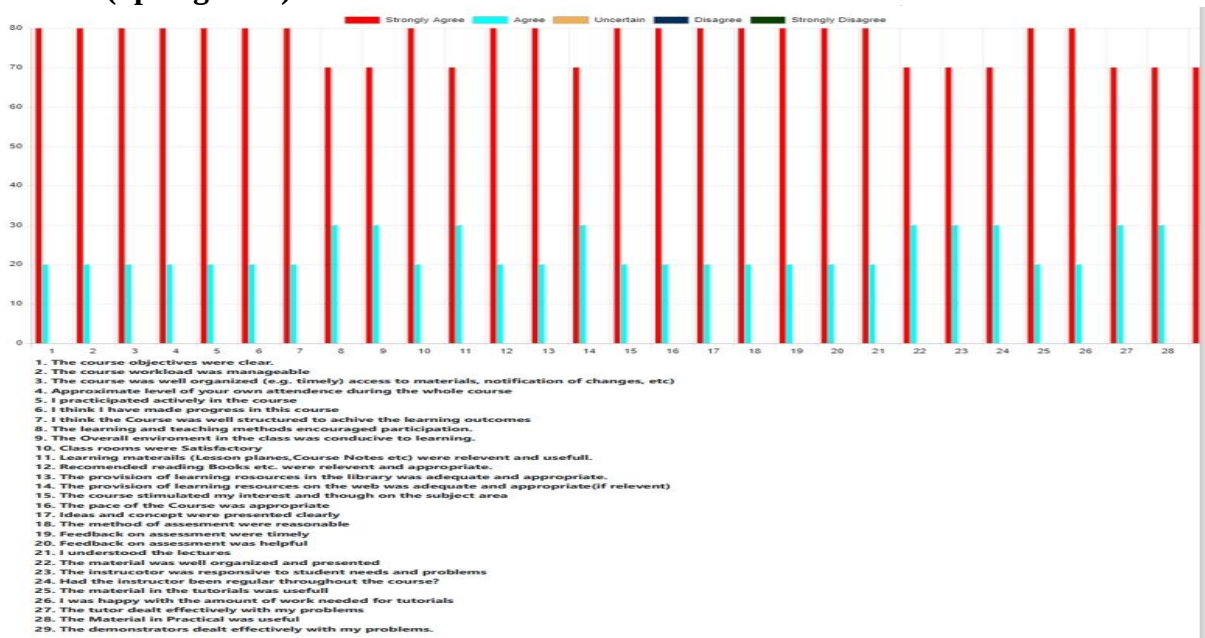

Figure 13. Evaluation of **AN-712 (Spring 2024)**

The students were satisfied with the pace of the course during the semester, provision of learning resources and feedback on assignment timely and helpful. The students thought that the instructor was punctual and was helpful in solving the problems.

Faculty course review report (Performa 2)

Questionnaire for the evaluation of faculty course review was filled and analyzed. It was observed from evaluation that the faculty was satisfied with curriculum. The evaluation was done through mid and final examinations for all courses offered by the department. Some courses were lengthy and teachers suggested dividing them.

Table 7: Faculty course review report

Course code	Title	Credit value	Assessment methods	Comments on curriculum	Any change in future	Semester	Course instructor
AN-701	Physiology and Biochemistry of Nutrition	3(3-0)	Midterm and Final	Interesting and Informative		Fall	Dr. Tanveer Ahmad, Dr. Muhammad Farooq Iqbal
AN-702	Feeds and Feeding	3(2-2)	Midterm and Final	Course was well organized		Spring	Dr. Tanveer Ahmad
AN-704	Protein Metabolism	3(2-2)	Midterm and Final	Course was interesting		Fall	Dr. Muhammad Farooq Iqbal
AN-705	Mineral Nutrition	3(2-2)	Midterm and Final	Course was up to date		Fall	Dr. Nasir Mukhtar
AN-706	Vitamin Nutrition	3(2-2)	Midterm and Final	Relevant and informative		Spring	Dr. Nasir Mukhtar
AN-708	Research Methods in Animal Nutrition	3(2-2)	Midterm and Final	Interesting and Informative		Fall, Spring	Dr. Tanveer Ahmad
AN-712	Pet Nutrition	3(2-2)	Midterm and Final	Good		Spring	Dr. Muhammad Farooq Iqbal

Alumni Survey Results

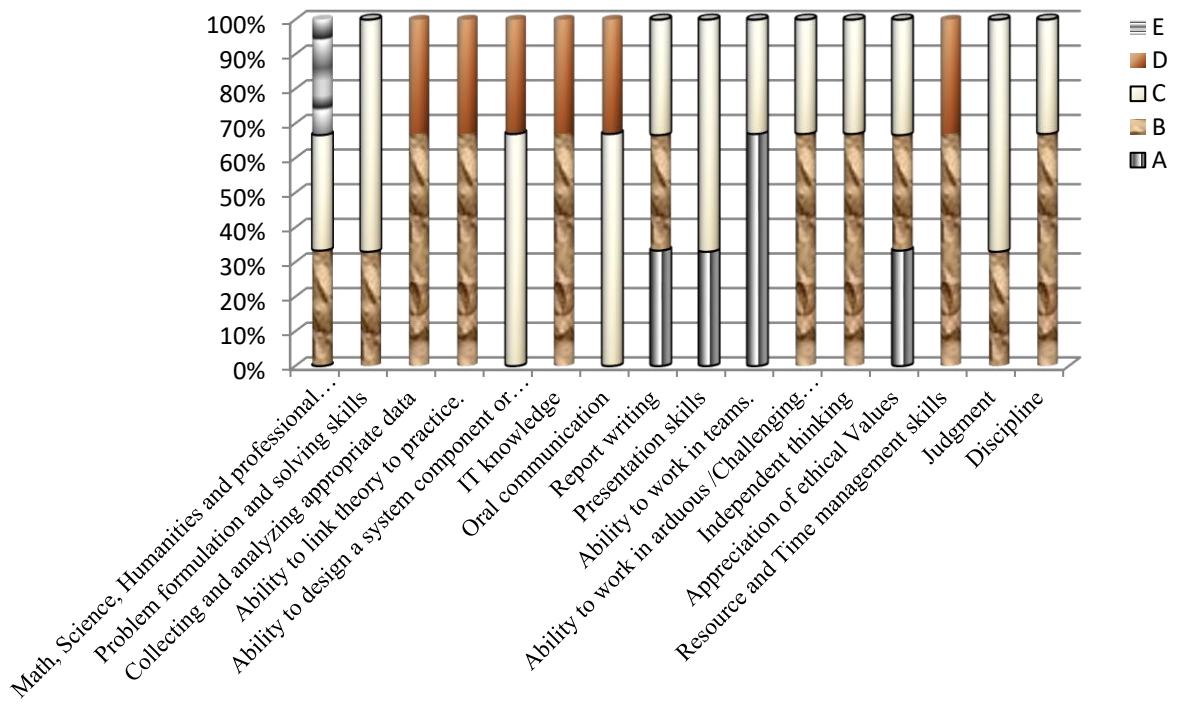

Fig. 14. Responses of Alumni Survey

It has been observed that 33% responded good regarding their abilities to problem formulation work. About 66% has reported excellent on Independent thinking and judgment skills. 67% answered good regarding their abilities to work in team and 33% agreed that department has improved their presentation skills. 67% has shown that their written skills such as report writing are improved /good but 33% responded poor about their oral communication skills.

Employer Survey Performa

The objective of this survey was to obtain employers input on the quality of education, the department is providing and to assess the quality of the academic program. The survey included University graduates employed in different organizations. The results were shown as follows

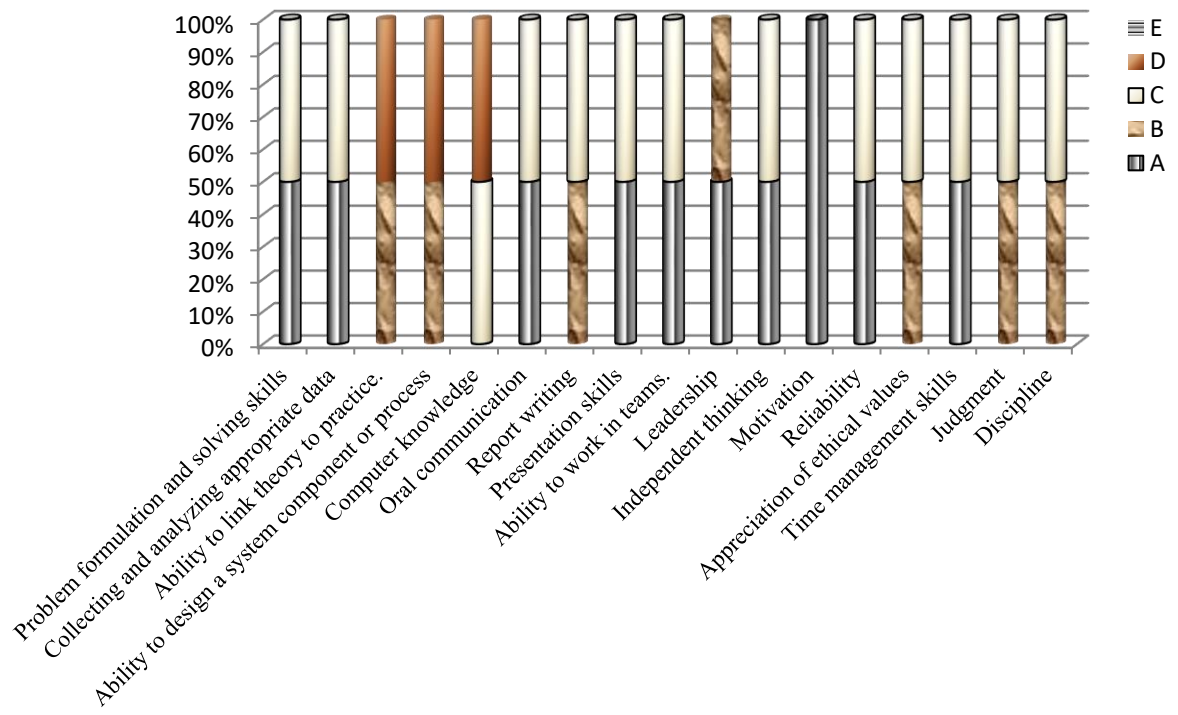

Fig. 15. Responses of Employer Survey

The above graph shows the responses of the employers' ability to link theory to practice are 50% (very good) and 50% responded fair. 50% were answered very good on their independent thinking. 50% were agreed on the improvement of leadership qualities. 30% were responded excellent on interpersonal skills, time management skills, presentation, and oral communication skills

Graduating Student Performa

The objective of this survey was to obtain the input on the quality of education they received in their program and level of preparation they had at the university. The results were shown as follows.

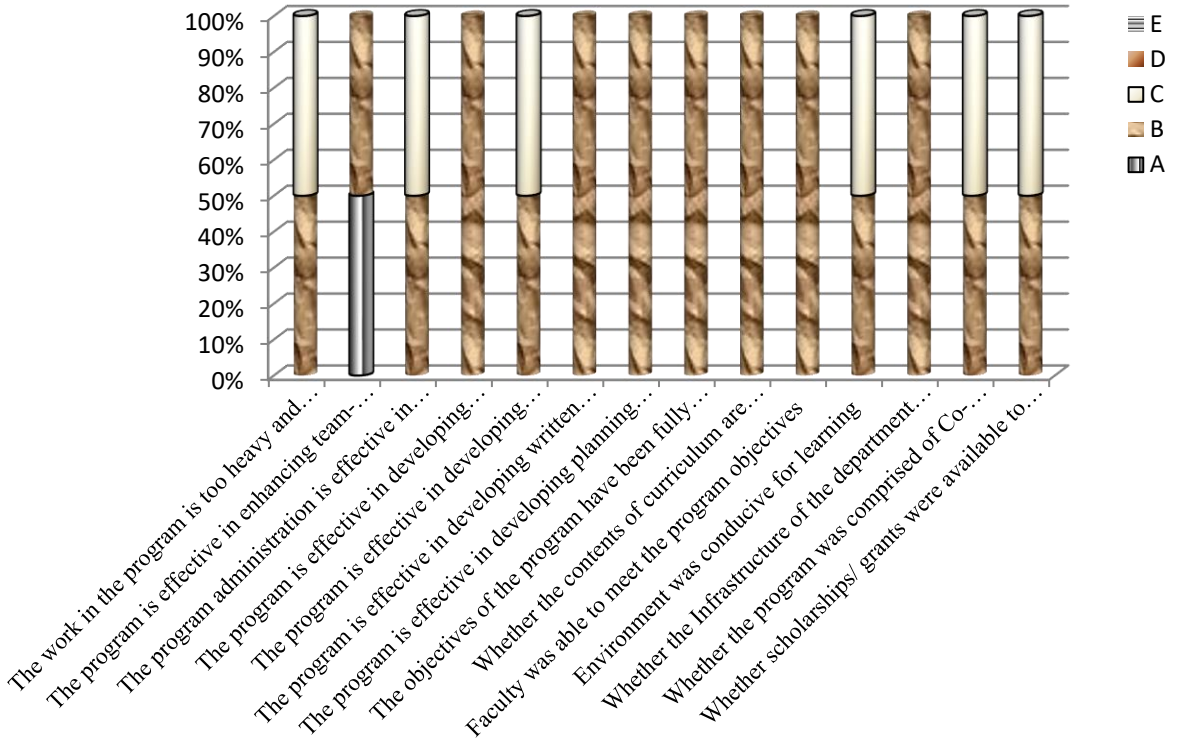

Fig. 16. Responses of graduating students on level of research and other research facilities

The graph shows that 50% of the students were very satisfied that the program was compromised of curriculum and extracurricular activities, 50% were answered that environment in the university was conductive to learning and 50% were uncertain about this. 100% were satisfied that program has developed analytical and problem-solving skills. It is observed that majority of the graduating students have shown positive response in the current program, infrastructure and environment.

Research Student Progress Review Form (Performa 4)

The comments of research students on level of supervision and other research facilities are presented in Fig. 17.

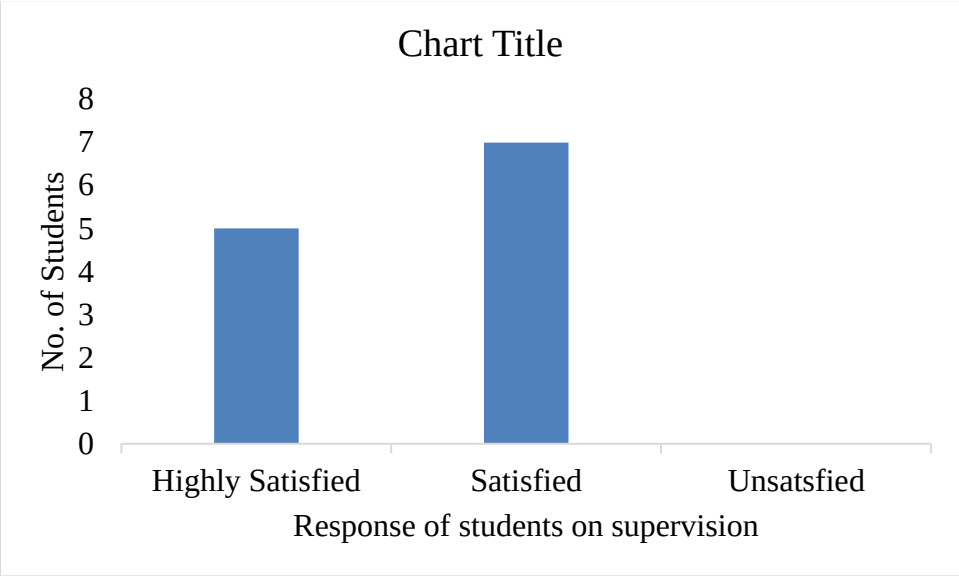

Fig. 17. Responses of research students on level of supervision and other research facilities

Faculty Survey Report

The data were collected from seven faculty members who answered the following responses regarding the different questionnaires. As concerned to job satisfaction level and promotion aspects, the faculty members responded that 67% of faculty members were satisfied and 33% were not very satisfied with their job clarity about promotion process. Most of the faculty members were satisfied with the cooperation received from their colleague, job security and departmental environment. 30% faculty members are not very satisfied from administrative support from the department and their promotion and progress through ranks. As it has already been mentioned, that there is limited number of faculty so more work load was on current teachers and availability of more teachers are required in this regard

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 is having qualified teachers with full acquaintance of their respective subjects, knowledge of research and management techniques for study of animal nutrition.
2. One associate professor with Ph.D. degree from University of Agriculture, Faisalabad, and other foreign qualified assistant. Both faculty members are HEC approved supervisors who can supervise Ph.D. students.
3. All faculty members are involved in research directly or indirectly as supervisor and committee members of post-graduate students.
4. Faculty members are involved in research projects funded from various funding sources.
5. Two laboratories have been established with basic necessary equipment in addition to having equipments to carry out advanced research on animal nutrition.

Weaknesses of the Program

1. There is scarcity of space due to which department is facing difficulty in adjusting postgraduate classes.
2. Working and sitting place for postgraduate students is insufficient.

3. Coordination with federal and provincial departments and other relevant organizations has been developed which needs to be further strengthened for field tours and research studies.

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 8).

Table 8. Performance measures for research activities *(total number)*

Faculty	Publications in Journals	Research & Development Projects
Dr. Tanveer Ahmad	6	01
Dr. Nasir Mukhtar		
Dr. Muhammad Farooq Iqbal	3	02

Future Plans

The Department has planned future research studies to address the issues of animal nutrition. Some of the salient activities are given in the following;

1. Feed habits, diet composition and feed preference of animal species, particularly focusing on ruminants and poultry.
2. Baseline data of different fodder species especially focusing on Pothwar area.
3. To impart quality education in animal nutrition through study tours, audio visual aids along with provision of latest literature, journals, books and internet.
4. To impart training to employees of relevant organizations and NGOs in animal research and management.
5. To develop strong collaboration and linkages with animal nutrition related government departments and NGOs for research.
6. To enhance knowledge and skills of faculty members about latest advancements in animal nutrition research through exchange programs, short trainings and collaborative research projects within and outside Pakistan.

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/file of each employee and students are maintained.

CRITERION 2: CURRICULUM DESIGN AND ORGANIZATION

A. Intent

All courses for M.Phil. were developed by Higher Education Commission of Pakistan. Curriculum and course contents are finally approved by the University Academic Council.

B. Definition of credit hour

One credit hour is one theory lecture or two hours laboratory practical per week. A credit hour carries 20 marks.

C. Degree plan - pre-requisites

DVM/B.Sc. (Hons) Animal Husbandry degree examination (16 years education in aggregate) with a minimum of 50% marks or its equivalent from a recognized institution in related subjects or an equivalent qualification in relevant discipline from a HEC recognized institution. GAT score of 50 is required.

The selection criterion for each course is as follows;

- The course is relevant to the degree program
- It meets the national and international requirements for the degree
- Adequate facilities are available in the department to offer the courses
- The course contents meet the program objectives as highlighted and provided by the Higher Education Commission of Pakistan.

Each course in the program is to be completed for credits specifying the following:
Course title (AN)

- Course objectives and outcome (Given in course breakdown into lectures separately) Catalogue description (yes)
- Text book and reference (Given in course contents)
- Syllabus breakdown in lectures (yes supplied to QEC separately)

  Computer usage: Internet facility is used by faculty members to update their knowledge regarding each course, research studies and recent references. Students also use this facility to solve their problems, assignments and presentations.

  Laboratory facilities are provided to the students for their practical exercise, given in the curricula. Post-graduate students also use laboratories for their theses research where equipment, material and chemicals are provided.

D. Degree requirements

M. Phil. Animal Nutrition

The duration of course for M.Phil. degree shall not be less than four semesters for whole time students and not less than six semesters for part time/partial residents and not more than six and eight semesters, respectively. Each student has to complete 30 credits for the award of degree including 24 credits of course work and 06 of research/thesis/dissertation (not counted towards calculation of CGPA) based on the approved program of research. All students of M.Phil. degree will be required to pass comprehensive examination after qualifying the course work. List of major courses for M. Phil. is given in Table 8.

Table 9. Course Requirements for M. Phil. in Animal Nutrition

Course No.	Course Title	Credit Hours
AN-701	Physiology and Biochemistry of Nutrition	3(3-0)
AN-702	Feeds and Feeding	3(2-2)
AN-704	Protein Metabolism	3(2-2)
AN-705	Mineral Nutrition	3(2-2)
AN-706	Vitamin Nutrition	3(2-2)
AN-708	Research Methods in Animal Nutrition	3(2-2)
AN-712	Pet Nutrition	3(2-2)
AN-719	Special Problem	1(1-0)
AN-720	Seminar	1(1-0)
AN-799	Thesis (for M.Phil)	06(0-20)

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

The curriculum of Department is consistent with the program objectives (table 10).

Table 10: consistency of curriculum with program objectives

Courses	Innovative education	Skilled nutritionist	Global Issues
Major Courses	++ ++	++++	+ +++
Elective Courses	+ + +	++ +	+ + + +
Practical (Field and Lab)	+ +	+ + +	+ + +
Thesis	+ ++	++	+ +

++ = Relevant & satisfactory, + + + =Very relevant & satisfactory,
+ ++ + = highly relevant & highly satisfactory

1. The curriculum fits very well and satisfies the core requirements for the program, as specified by the respective accreditation body.
2. 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

Table 11. 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.

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 COMPUTER FACILITIES

Laboratory Title: Animal Nutrition and Feed Technology Lab
Animal Nutrition Research Lab

Location and Area: Faculty of Veterinary and Animal Sciences, 2nd Floor

Objectives: Laboratories are used by students and faculty for research studies including in-vitro fermentation studies and feed/diet composition analysis studies.

Research work for the graduate and post-graduate students

Adequacy for instructions: Laboratories meet the requirements in terms of equipment, chemicals, furniture and general facilities, however, not spacious enough for demonstration purposes and analysis studies.

Major apparatus: Major equipment available in the Laboratories include; Electric Grinder and Blender, Desiccators with pump, Water purifier with U V Lamp, Refrigerators, Overhead Projector, Projection microscope, with camera, projector & screen), Water Bath Digital, Macro Kjeldahl's digestion and distillation Apparatus, Soxhlet Apparatus, Analytical Balance, Water Distillatory Apparatus, High speed centrifuge 20000 rpm, Mortar and Pestle, Desiccators, Muffle Furnace, Spectrophotometer, Flame Photometer, Magnetic Stirrer, Vortex Mixer, pH meter (Desktop), pH meter (Portable), Weighing balance Large, Electronic Balance

Safety Regulations: Safety measures such as fire extinguishers, first aid kit are not available in the Labs. However, the University maintains a Medical Dispensary for minor 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 Nutrition Manual. A specific manual for feed analysis is prepared by the department.

Standard 3-2. There must be adequate support personnel for instruction and maintenance of laboratory

Laboratories are maintained by one laboratory attendant who assist the students in research studies, practical, cleaning and washing, etc. 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*:* Not available to all the post graduate students.

• **Shortcoming in computing infrastructure:** Computers with internet facilities are available to all faculty members

CRITERION 4. STUDENT SUPPORT AND GUIDANCE

Directorate of Students Affairs of the University organizes support programs, cultural activities for students and guides them in case of any problem. The university staff provides information regarding admission, scholarships, career opportunities, etc. The university arranges orientation programme for new students and guided tours to various departments. However, currently Parent/Teacher association in the university does not exist.

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 must be structured to ensure effective interaction between students, faculty and teaching assistants.

Courses are structured 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 choice.

Students are informed about program requirements through office of chairperson of the department and through personal communication of teachers with them.

The counseling of students is continuous process and students are free to contact relevant teachers whenever they face any professional problem.

Students are also facilitated for interaction withfaculties/scientists in other universities and research organizations whenever they need and there is open option for the students to get membership of professional societies.

CRITERION 5. PROCESS CONTROL

Standard 5-1. The process by which students are admitted to the program must be based on quantities criteria and clearly documented. This process must be periodically evaluated to ensure that it is meeting its objectives.

The process of admission is well established and followed as per rules and criterion set by University for post graduate students of M.Phil.

Admission criteria for M Phil. program: DVM. in relevant field/B.Sc. (Hons) in relevant subjects with GAT score of 50.

All these entries are based on the recommendations of admission committees.

Admission criteria is revised when required before the announcement of admissions.

Standard 5-2. 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.

Registration of students is done once every year at the time of admission. When a student is admitted for each degree, he/she is evaluated through the result of each course for each semester. If the students fulfill the criteria of the University (a specific CGPA after each semester) they are promoted to the next semester.

Students are evaluated through Mid, Final and Practical exams and through written assignments and oral presentations.

In general, the students are registered on competition bases keeping in view the academic and research standards.

Standard 5-3. The process of recruiting and retaining highly qualified faculty members must be in place and clearly documented. Also processes and procedures for faculty evaluation, promotion must be consistent with institution mission statement. These processes must be periodically evaluated to ensure that it is meeting with its objectives.

The University follows the recruitment policy and rules recommended by HEC.

Posts are advertised in national newspapers and university website, and applicants are short-listed on the basis of experience, qualification, publications and other qualities / activities as fixed by the University.

- The candidates are interviewed by the University Selection Board and principal and alternate candidates are selected.
- Selection of candidates is approved by the Syndicate for issuing orders to join within a specified period.

Induction of new candidates depends upon the number of approved vacancies.

Recently, Tenure Track System (TTS) has been introduced by the University which is a good incentive for retaining highly qualified faculty members.

HEC also supports appointment of highly qualified members as foreign faculty professor, national professors and deputes them in various departments.

Standard 5-4. The process and procedures used to ensure that teaching and delivery of course material to the students emphasizes active learning and that course learning outcomes are met. The process must be periodically evaluated to ensure that it is meeting its objectives.

Periodical update of curriculum is done depending upon the requirements, innovations and new knowledge generated.

New courses are developed and included in the curriculum when need arises.

Books on various aspects of animal nutrition are available in the faculty and in University library where internet facilities are also available.

Students also take notes during the classes and photocopies of slides are also provided in addition to printed material.

All efforts are made to impart the course material and knowledge to meet the objectives of 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. This process must be periodically evaluated to ensure that it is meeting its objectives.

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

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

Currently, there are two full-time faculty members which are Ph.D. in animal nutrition. The fields of specialization of faculty members include; forage conservation, digestibility techniques, poultry nutrition and ruminant nutrition (Table 11).

Table 12. Faculty distribution by program area in animal nutrition

S. No.	Area of specialization	Number of faculty members	Number of faculty with Ph.D. degree
1	Poultry nutrition	3	3
2	Ruminant Nutrition	3	3

Standard 6-2. All faculty members must remain current in the discipline and sufficient time must be provided for scholarly activities and professional development. Also, effective programs for faculty development must be in place.

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

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.
- All faculty members got financial support for research projects from HEC and university-funded program specifically designed for junior faculty members.

Standard 6-3. All faculty members should be motivated and have job satisfaction to excel in their profession

The junior faculty is mobilized by timely back up and appreciation by the senior faculty members. Avenues for research funding are provided to them through university research programme. There are programs and processes in place to attract good faculty members e.g. teaching and research awards annually, reasonable teaching load and class size, social activities and better salary package.

Results of the faculty survey

The teachers generally showed satisfaction 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 computer and internet facilities for students
- Opportunities for improving teaching skills and knowledge

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. Two well-equipped laboratories are available in the department.
b. However, more sitting place for postgraduate students with computer and internet facility is desired 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 nutrition sciences.
The faculty under its HEC funded project, has purchased many books in the area of animal nutrition.
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 nutrition 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

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 13.

Table 13. Enrollment in M.Phil. degree program in 2022 and 2023

Year	Number of M.Phil. students
2022	6
2023	8
Total	14

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

The section of animal nutrition within Department of Livestock Production and Management at PMAS-Arid Agriculture University, Rawalpindi was established in 2006 with a mandate to carry out teaching and research in animal nutrition particularly in Pothwar region. There are three faculty members having doctoral degrees and are HEC approved supervisors. The courses have been prepared keeping in view the latest developments in animal nutrition. During the report period, 14 students in M.Phil. were enrolled.

Basic equipment for animal nutrition research has been procured through various funding sources. Two laboratories have been established with basic necessary equipment for animal nutrition research.

Faculty members have got different research projects from different funding agencies. Research studies currently being conducted focus on digestibility, nutritional supplementation, feeding techniques and use of enzymes etc.

Proper steps are taken to guide the students for program 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 program 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. Graduating students also showed their satisfaction over the knowledge being provided and research studies conducted about animal nutrition in the department.

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. Professional and behavioral training of support staff will improve their abilities for enhancing the quality of research and teaching.
3. Advance laboratory equipment are needed to carry out molecular/DNA analysis.
4. Department budget may be increased to fulfill its requirements for purchase of chemicals, glassware and other items required for conducting of research.
5. The department is in dire need of one store room, one library room and two class rooms.
6. Regular provision of transport facility for field visits is highly desired.

Prepared by: Members of Program Self-Assessment Team at LPM, FV&AS

Prof. Dr. Tanveer Ahmad (Coordinator)----------

Dr. Muhammad Farooq Iqbal (Member)----------

Dr. Kashif Ishaq (Member)----------

ANNEXURE

Prof. Dr. Tanveer Ahmad---Faculty Resume 2022-2024

Name	**Dr. Tanveer Ahmad**
Personal	Professor, Animal Nutrition Faculty of Veterinary and Animal Sciences, PMAS- Arid Agriculture University, Rawalpindi. +92-333-5103351 tanveer.ahmad@uaar.edu.pk
Experience	**1. Sept-1998 to 02-Feb-1999 (5 months)** **Veterinary Officer, BPS-17"** at **Govt. Livestock Experiment Station**, Chak Katora, Hasilpur, Distt. Bahawalpur, under the Directorate of Livestock Farms, Punjab, Lahore. **2. December, 1999-to date** Worked on different position at PMAS-Arid Agriculture University, Rawalpindi. • **Lecturer (Animal Sciences):** From 11-12-1999 to 22-9-2006. • **Assistant Professor (Animal Sciences):** From 23-9-2006 to 28-8-2011. • **Associate Professor (Animal Nutrition)**: From 29-8-2011 to to-date.
Honor and Awards	• **STAR LAUREATE** Award 2003 by South Asian Publications. • **STAR MAN** Award 2003 by South Asian Publications. • Awarded **Indigenous Ph.D. Scholarship** (2003) by Higher Education Commission of Pakistan. • **Approved Ph.D. supervisor** by Higher Education Commission, Pakistan. • **Awarded Foreign Post-Doc Fellowship** for year 2006-07 by Higher Education Commission of Pakistan. (One year post doc training from 15-02-2007 to 14-02-2007) • **Assisting Dean and Project Director** Faculty of Veterinary and Animal Sciences since February 2013. • Member **University Ethic Committee**-2014-15
Memberships	• Pakistan Veterinary Medical Council, • Pakistan Association for the Advancement of Sciences • Nutritionist Association of Pakistan
Graduate Students Postdoc, Undergraduat	Four M.Phil Students as a member of supervisory committee.
Service Activity	*Teaching and research* *Teaching* The main activities include teaching and research at graduate and post graduate level. The main courses offered includes: Animal Husbandry, Livestock Housing and Management, Principles of Animal Nutrition, Nutrient Requirements of Farm Animals and Poultry, Poultry and Ruminant Nutrition, and Feed Evaluation, Formulation and Processing Technology.

Brief statement of research interest	• **Animal Nutrition** (Enzyme Production and its application in poultry. Electrolytes feeding in broilers. Aminoacid nutrition of broilers). • **Animal Welfare** (Feeding strategies for ameliorating the adverse effect of hot season) • **Feeding systems** (Evaluation of small ruminants feeding and management systems in semi-arid regions of Pakistan.
Publications	1. Faiza Kamal, Muhammad Shahzad, **Tanveer Ahmad**, Zaheer Ahmed, Rasool Bakhash Tareend , Rabiya Naza , Ali Ahmad.**2017**. Antihyperlipidemic effect of Pistacia khinjuk. **Biomedicine & Pharmacotherapy**. 96:695-699. (2.759). https://doi.org/10.1016/j.biopha.2017.10.061. 2. Abdullah A. Saeed, Mansur A. Sandhu, Muhammad S. Khiljia, Muhammad S. Yousaf, Habib U. Rehman, Zafar I. Tanvir, and **Tanveer Ahmad**. **2017**. Effects of dietary chromium supplementation on muscle and bone mineral interaction in broiler chicken. **Journal of Trace Elements in Medicine and Biology**. 42:25–29 (2.55) 3. Javid Iqbal, Nasir Mukhtar, Zaib Ur Rehman, Sohail Hassan Khan, **Tanveer Ahmad**, Muhammad Safdar Anjum, Riaz Hussain Pasha, and Sajid Umar. **2017.** Effects of egg weight on the egg quality, chick quality and broiler performance at the later stages of production (60 week) of th e broiler breeders. **J. Appl. Poult. Res. 26:183-191. http://dx.doi.org/10.3382/japr/pfw061** 4. Javid Iqbal, Sohail Hassan Khan, Nasir Mukhtar, **Tanveer Ahmed** and Riaz Ahmed Pasha. **2016**. Effects of egg size (weight) and age on hatching performance and chick quality of broiler breeder. **Journal of Applied Animal Research**. 44(1) :54-64. DOI: 10.1080/09712119.2014.987294. (0.218). 5. Muhammad Younas, Kashif Ishaq, Muhammad Yaqoob and Tanveer Ahmad. **2013**. Virtues of the Milk from Water Buffalo. **Buffalo Bulletin** Vol.32 (Special Issue 2): 857-865 6. Ijaz Ahmad, Muhammad Fiaz, Muhammad Nauman Manzoor, **Tanveer Ahmad**, Muhammad Yaqoob and Ik Hwan Jo. **2013**. Comparative growth performance of calves of different cattle breeds under a feedlot fattening system. **Journal of Animal Science and Technology**. 55(6):539-543. 7. Tabinda Khawaja, Sohail Hassan Khan, Nasir Mukhtar, Abida Parveen and **Tanveer Ahmed**. **2013.** Comparative study of growth performance, meat quality and hematological parameters of three-way crossbred chickens with reciprocal F1 crossbred chickens in a subtropical environment. **J. Applied Anim. Res**. 41: 300-308. DOI: http://dx.doi.org/10.1080/09712119.2013.782869 (0.218).
Other Research or Creative accomplishments	**Nil**

Selected Professional Presentations	• Ahmad. T. 2014. Developing Better Feed and Fodder to Overcome Malnutrition in Livestock. In Natl. Conf. on "Nutrigenomics: A new science for better productivity of Livestock" held on 26th March 2014 at Univ. Vet & Anim Sci. Lahore, Pakistan. • **Ahmad, T**, M. Sarwar, Sohail Hasan Khan, J. Ansari and Farooq Iqbal. **2015**. Effect of varying dietary electrolyte balance on the performance of broilers reared under sub-tropical summer conditions. Intl. Pout. Nutr. Conf. organized *by* Univ. of Vet. & Anim. Sci., at PC Lahore on 3-4 November 2015. Pg. No. 37. • **Ahmad, T**, **2016**. Genetics of Feed Efficiency. Intl.. Conf. organized *by* Univ. of Vet. & Anim. Sci., Lahore on 30-31 May 2016. • **Ahmad, T**, **2017.** Diet Role in the growth of male broilers. 7th Intl Conf. on Biotechnology and Bioengineering and 2017 Intl Conf on Agric. And Food Sciences, Organized *by* Virtual Univ. Lahore on 25-26 October 2017.

Dr. Nasir Mukhtar---Faculty Resume 2022-2024

Name	**Dr. Nasir Mukhtar**					
Personal	Associate Professor of Animal Nutrition Faculty of Veterinary and Animal Sciences, PMAS- Arid Agriculture University, Rawalpindi. +92-300-7200074 nmukhtar@uaar.edu.pk					
Experience	Associate Professor	Teaching and Research	30-07-2022	To date	Faculty of Vet. & Animal Sciences, PMAS Arid Agriculture University Rawalpindi-Pakistan	
	Visiting Scientist	Research	2013	2014	Roslin Institute/ Royal (Duck) School of Vet Studies University of Edinburgh Scotland UK	
	Assistant Professor (Poultry Science)	Teaching and Research	19-01-2011	29-07-2022	Department of Poultry Science Faculty of Vet. & Animal Sciences, PMAS Arid Agriculture University Rawalpindi-Pakistan	
	Assistant Professor (Poultry Science)	Teaching and Research	7-7-2010-	18-01-2011	Department of Poultry Science Faculty of Vet. & Animal Sciences. PMAS Arid Agriculture University Rawalpindi-Pakistan (HEC)	
	Assistant Professor	Teaching and Research	30-6-2010	6-7-2010	Department of Poultry Production University of Veterinary & Animals Sciences Lahore-Pakistan	
	Research Associate	Research	16-6-2008	15-12-2009	Institute of Animal Nutrition & Feed Technology, University of Agriculture Faisalabad Pakistan	

	Technical Manager	Technical Services to Broiler breeder, layer and broiler farmers and Analysis of poultry market	01-4-2005	14-3-2008	Asia Poultry Feeds (Pvt) Multan Pakistan	
	Technical Manager	Technical Services	23-5-2004	30-3-2005	Usman Associate (Pvt)- Animal Health Islamabad	
	Technical Officer	Technical Services to Broiler breeder, layer and broiler farmers and Analysis of poultry market	9-9-2002	21-5-2004	Ani Poultry Feeds (Pvt) Ltd Lahore	
	Technical advisor	Technical Services to Broiler breeder, layer and broiler farmers and Analysis of poultry market	17-4-2001	8-8-2002	Punjnad Poultry Feeds (Pvt) Ltd Lahore, https://www.punjnadfeeds.com/ **info@punjnadfeeds.com +92 (42) 35961021-28**	
	Technical officer	Technical Services to Broiler breeder, layer and broiler farmers	13-3-2000	15-4-2001	Anima Nutritional Product (Pvt) Islamabad http://www.animanutritionalproducts.enic.pk/ 51-4441502	

		and Analysis of poultry market			
Honor and Awards	• Gold Medal awarded by WPSA –PB in recognition of meritorious services toward Pakistan Poultry Industry and Society • Gold Medal awarded by US Soybean Export Council USA • Gold Medal awarded by Pakistan Poultry Association • Gold Medal awarded by SB Eggs (SB Poultry) • Gold Medal Awarded by Kohsar University Murree Pakistan • Gold Medal awarded by WPSA –PB in recognition of meritorious services toward the organization of Pakistan Poultry Industry Symposium as Chief Organizer at Bangkok Thailand • Gold Medal awarded by POULTA INC USA (A Silicon Valley bas Company) • Gold Medal awarded by WPSA **Junior Vice President** - Asia Pacific Federation of The World Poultry Science Association **Secretary General |** The World's Poultry Science Association (WPSA)|Pakistan Branch **Secretary General |** The World's Poultry Science Association (WPSA) |UAE Branch **Global Group Leader** |WPSA-Working Group | Small-Scale Family Poultry Farming **Associated member** to the committee set up by WPSA for Organization and Support to Federations and Branches **Member Editorial Board** |World Poultry Science Journal | Impact Factor 3.9 **Editor in Chief** |WPSA-Pakistan Newsletter **Director |** Poultry Advisory Board | Poultry Professional Society **Guest Editor | Special Issue in Poultry Science |** Advancing the safe Artificial Insemination in Broiler Breeders" From Reproduction to Hatchability. **Guest Editor | Special Issue in Frontier in Animal Science |** Optimizing Gut Health with Phytogenics and Phycogenics in Antimicrobial Stewardship.			
Memberships	• World Poultry Science Association • Pakistan Veterinary Medical Council, • British Society of Animal Science • Poultry professional Society • Pakistan Zollogy Society • Sustainable and Development Society Japan				
Graduate Students Postdoc, Undergraduate Students Honour Students (co-	Supervisor of 3 PhD and 3 MPhil Students Three M.Phil Students as a member of supervisory committee.				

Dr. Muhammad Farooq Iqbal -----Faculty Resume 2022-24

<table>
<tr><td>Name</td><td>Muhammad Farooq Iqbal</td></tr>
<tr><td>Personal</td><td>Department: Livestock Production and Management
Date of Appointment: 27-12-2011
Email Address: mfmalik@uaar.edu.pk
Contact No :) +92-312-5488836</td></tr>
<tr><td>Experience</td><td>
<table>
<tr><td>Designation</td><td>Institute</td><td>No. of Years</td></tr>
<tr><td>Assistant Professor (IPFP)</td><td>PMAS-Arid Agriculture University Rawalpindi</td><td>01</td></tr>
<tr><td>Assistant Professor (contract)</td><td>PMAS-Arid Agriculture University Rawalpindi</td><td>1.5</td></tr>
<tr><td>Assistant Professor (regular)</td><td>PMAS-Arid Agriculture University Rawalpindi</td><td>13</td></tr>
</table>
</td></tr>
<tr><td>Honors& Awards</td><td>Overseas Scholarship from Higher Education Commission, Pakistan, 2005-2009
2nd position in District Chakwal, Pakistan in SSC Examination
Gold Medal in SSC Examination awarded by Deputy Commissioner, Chakwal, Pakistan
Approved Ph.D. supervisor by Higher Education Commission, Pakistan.</td></tr>
<tr><td>Memberships</td><td>Pakistan Veterinary Medical Council</td></tr>
<tr><td>Graduate students postdocs undergraduate students Honors Students</td><td>Graduated:
As a supervisor: 5
As a member: 7
In progress:
As a supervisor: 5
As a member: 5</td></tr>
<tr><td>Service activity</td><td>Research and teaching and administrative office work as per assigned</td></tr>
<tr><td>Brief statement of research infesters</td><td>• Animal Nutrition (Evaluation of Non-nutritive Feed Additives and their use as functional food ingredients, Modulation of feed additives bioavailability at the level of intestinal metabolism for better performance, Interaction of intestinal flora and that of the feed, Immunological aspects of animal nutrition)
• Molecular Nutrition (Nutrigenomics)
• Environmental protection (Feeding strategies for environmental protection)</td></tr>
<tr><td>Research grants and Contracts</td><td>In Progress
• “Determination of dendritic cells (DCs) stimulating antigen of chicken occidian and their application in the development of coccidiosis vaccines in Chickens” (As Co-PI) funded by NSFC and PSF is under progress.
Total Funds: 52 million</td></tr>
</table>

	Completed "Ostrich farming in Pakistan: Novel and key nutritional solutions to accelerate profitability" (As PI) funded by HEC was completed in 2023. **Total Funds: 2.4 million**
Publications	1. Shad, A.A., Ahmad. T., Iqbal, M.F., Asad, M.J., Nazir, S., Mahmood, R.T. and Wajeeha, A.W. 2024. Production, Partial Purification and Characterization of Protease through Response Surface Methodology by Bacillus subtilis K-5. Brazilian Archives of Biology and Technology. https://doi.org/10.1590/1678-4324-2024210355. 2. Hassan, S.H., Andrabi, S.M.H., Iqbal, M.F., Nawaz, M., Khan, A., Yaqoob, M., Ahmed, Z. and Naseer, Z. 2024. Effect of physiological state on meat quality: an insight from buffalo. University of Sindh Journal of Animal Sciences. 8(1); 1-6. 3. Abulaiti, A., Naseer, Z., Ahmed, Z., Liu, W., Pang, X., Iqbal, M.F and Shujuan, W. 2023. Dietary Supplementation of Capsaicin Enhances Productive and Reproductive Efficiency of Chinese Crossbred Buffaloes in Low Breeding Season. Animals. 13 (1), 118. https://doi.org/10.3390/ani13010118 4. Farooq, M.U., Ishaq, I., Khan, M.I, Iqbal, M.F, Ahmad, T., Akbar, J., Asim Fraz, J., Naeem, S. and Latif, A. 2023. Restricted Feeding and Re-Alimentation: An Approach to Improve Growth Performance of Beetal Kids Under High-Input Feeding System. Sarhad Journal of Agriculture. 39 (4) 781-786. 5. Ahmed, I., Rajput, N., laghari, I.H., Iqbal, M.F, ahmed, Z., Mukhtar, N. 2023. Investigating the impact of in-ovo mineral supplementation on post-hatch growth and development in broiler chickens. PJMLS. 6 (3), 209-218. 6. Batool, R., Iqbal, M. F., Tunio, M.T., Kamran, M, Hasan, M., Yaqoob, M., Manzoor, Z., Ishaq, K and Yasoob, T.B. 2022. Study of multiple attributes of traditional and commercial yoghurts traded for human consumption in district rawalpindi. Pakistan Journal of Science. 74 (4) :271-275. 7. Sikandar. A, Zaneb. Nasir, H, A., Rehman, A., Kashif, M., Shah, M., Luqman, Z., Din, S., Iqbal, M. F., Khan, I., Irshad, I. 2022. Effect of Bacillus subtilis on the microarchitectural development of the immune system in Salmonellachallenged broiler chickens. Veterinarni Medicina. 67 (01): 28–37 8. Shad, A.A., Ahmad. T., Iqbal, M.F. and Asad, M.J. 2022. Effects of a Novel Protease from Bacillus Subtilis K-5 in Low Protein Corn Distiller Dried Grains with Solubles (cDDGS) Based Diets on Performance and Nutrients Digestibility in Broiler Chickens. Brazilian Journal of Poultry Science. https://doi.org/10.1590/1806-9061-2021-1542

	9. Mehboob, Elahi, M., Iqbal, M.F., Tunio, M.T., Kamran, M., Shah, A.A., Irshad, I., Bhatti, T.R. and Khan, Q.A. Interactive influence of nutrient density and feeding pattern on production performance of broiler breeders. 2022. Advancement in Life Sciences. 09 (03): 295–302
Other Research or Creative accomplishments	**Nil**