Department of Animal Resources

College of Agriculture Engineering Sciences

Salahaddin University-Erbil

Subject: *Animal Breeding*

Course Book – *(Year 3)*

Lecturer's name: ***Prof Dr. Yousif M. S. Barzinji***

Mrs. Parizan W. Ibrahim

Mr. Kamaran M. Taha

Academic Year: *2022/2023*

Course Book

1. Course name	**Animal Breeding**
2. Lecturer in charge	**Prof. Dr. Yousif Barzinji & Dr Mohammed Sulaiman**
3. Department/ College	**Animal Resource, Agricultural College**
4. Contact	**e-mail: Yousif.noori@su.edu.krd** **Tel: (optional): 07504556301**
5. Time (in hours) per week	**Theory: 2 hrs**
6. Office hours	**6 hrs**
7. Course code	
8. Teacher's academic profile	**I'm finished my BS.c 1n 1998 in Sulamania University after that in 1999 started as a Repeater in Animal Resource Department at University of Salahaddin in 1999, I got my MS.c in Animal Breeding in 2003 and Ph. D in Animal Breeding /Molecular Genetics at Salahaddin University-Erbil with ICARDA in 2009, I'm now Prof at Department of Animal Resource.**
9. Keywords	**Genetics, Cytogenetic , DNA**

10. Course overview:

The course provides the students with a review of animal breeding. The obtained knowledge and skills constitute an essential part of the qualification of the professionals specializing in agricultural production and related business areas.

Course provides students with: principles of inheritance of qualitative and quantitative traits in animal populations; factors affecting genotype and gene frequencies in population; heritability of body conformation and performance traits; pedigree analyses and principles of estimation of breeding value; selection theory and breeding methods of domestic animals; principles of composition of animal breeding plans and conservation of animal breeding resources.

11. Course objective:

The objectives of this course that the student learns how to use his knowledge in the farm of animal breeding in order to increase the productivity of animals using new roads and a shorter period with higher accuracy.

12. Student's obligation

The students must be presences with this course in all lectures and examinations and it's necessary to made at less one report about this field of the sciences.

13. Forms of teaching

I'm using the data show, power point, white board, and video to learn more about this course.
You can read all my research papers on the researchgeat web site: Assist. Prof. Dr. Yousif M. S. Al- Barzinji

14. Assessment scheme

- Written tests (1 × 10%) = 10%
- Quiz/attendance (5 × 1%) = 05%
- Written final examination (1 × 50%) = 50%

= 65% total theory

- Written tests (1 x 15%) = 15%
- Quiz/attendance and Reports = 5%
- Written 2nd test (1 x 15%) = 15%

= 35% total practical

15. Student learning outcome:

How we can select the best Animal and using them in Breeding program. How to using the other sciences such as Genetics, statistics, cytogenetic, Growth, Feeding, Animal health, Molecular biology, Biochemistry and animal physiology to increase the animal production to improve the local animal production.

16. Course Reading List and References:

1- Waaij, K. O. 2014.Animal breeding and genetics for BSc students. Ageningen University and Research Centre, the Netherlands.

2- Richard M. Bourdon. 2014. Understanding Animal Breeding . Pearson Education Limited.

3- Merlyn K. Nielsen. 1992. Animal breeding. Faculty in Animal Breeding University of Nebraska-Lincoln

17. The Topics:	**Lecturer's name**
• **Genetic Variation: Types of Gene Action** • **Measures of Central Tendency and Variation** • **Gene Frequency Topics** • **Factors Affecting Gene Frequency** • **Genetic Evaluation Models** • **Heritability** • **Repeatability** • **Selection Methods** • **Statistical Tools for Animal Breeding:**	**Prof. Dr. Yousif Al-Barzinji** **Two hrs /week.**

• **Correlation and Regression** • **Heterosis & Breed Differences** • **Pedigree and Relationship** • **Progeny Test** • **Estimating Breeding Values** • **Seed stock Vs Commercial Selection** • **Modern animal breeding** We give examples solutions in practical lectures for all above topics.	Mrs.Parizan Mr. Kamaran
19. Examinations: ***Q1: Define the following words:*** *(20 Marks)* □ *Locus , Grading, Incomplete dominance, Sex-influenced characteristics, line breeding, Quantitative traits, heritability, Selection index, Inbreeding coefficient, Out breeding* □ ***Locus*** □ *Specific location of an allele on a chromosome.* □ ***Grading*** □ *Continuous use of purebred sires of the same breed in a grade herd.By 4th generation, reach purebred levels* □ ***Incomplete dominance*** □ *Phenotype of heterozygote is intermediate between the phenotype of the two of homozygote's* □ ***Sex-influenced characteristics*** □ *The traits were explained in both sex but with difference ratio.* □ ***line breeding*** □ *Animals more closely related than the average of the breed inbreeding is kept low, while a high genetic relationship to an ancestor or line of ancestors is maintained.* □ ***Quantitative traits*** □ *Objectively measured traits, Observations typically exist along a continuum, Example: milk yield, speed, etc.* □ ***Heritability*** □ *The portion of selection differential that is passed from parent to offspring.* □ ***Selection index*** □ *Best methods in selection programs, Recognizes the value of multiple traits with and economic rating related to each trait, Allows for ranking of individuals objectively, Difficult to develop Disadvantages – shifts in economic value of some traits over time, failure to identify defects or weaknesses.*	

- ***Inbreeding coefficient***
- ***Out breeding***
- *Animals not as closely related as the average of the population.*
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- ***Q2:***
  Count the selection methods…and which of them it best methods? *(20 Marks)*
- *There are three methods in selection programs:*
- 1- Tandem Selection
- of one trait at a time Appropriate if rapid change in one trait is needed quickly Can result in loss of genetic progress of other traits Typically, not recommended
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- 2- Independent Culling
- Minimum culling levels for each trait in the selection program Second-most effective type of selection method, but most used Most useful when number of traits in selection is relatively few
- Disadvantage – may cull genetically superior animals for marginal performance of a single trait
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- 3- Selection Index
- Recognizes the value of multiple traits with and economic rating related to each trait Allows for ranking of individuals objectively Difficult to develop. Disadvantages – shifts in economic value of some traits over time, failure to identify defects or weaknesses.
- The 3rd one is a best method because it including the genetic value, economical value and take more than one traits in same times, and rank the animal from the best one to the last one.
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- ***Q3:*** *(20 Marks)*
- ***Gene frequency****: the frequency of a gene is defined as the proportion of the 2n genes represented by a particular allele.*
- The factor affecting gene frequency can numeric as follow:
- 1- Mutation
- 2- Migration
- 3- Selection
- 4- genetic drift
- 5- Balanced between selection and mutation
- 1- Mutation: A mutation is a sudden heritable change in genetic material.
- In any given generation, mutation do not measurably affect gene frequency. However, over many generation, the rate of mutation does influence gene frequency.
- 2- Migration: is the movement of individual from one breeding population to another. The amount change in gene frequency depended on ratio of migrated animals to the original population. If the gene frequency in the both groups equal to another the migration do not have any effected on gene and genotype frequency in next generation.
- $q1= m (qm – qo) + qo$
- $m=n2/(n1+n2)$
- $q=q1-qo$

- q=m(qm-qo)
- Where: m: ratio of migrated individuals
- qm: gene frequency in migrated individuals.
- qo: gene frequency in original population.

3- Selection: prevents some animals from reproducing while allow others to have offspring. Allows breeder to select genetically superior animals.

The migration and selection are the two importance factors are affected the gene frequency because breeder can used them to change the gene and genotype frequency.

- ***Q4: The following ANOVA table represent average daily gain in Kurdish sheep to 6 months of age, coming from mating between 5 Rams with 50 Ewes, each Ram have 10 Ewes, each Ewe have 1 lamb.*** *(20 Marks)*

S.O.V	***Sum of square***	***Mean square***
Between Rams	***7197***	
Within Progenies	***1687***	

Fine the heritability for average daily gain in above population.

20. Extra notes:

Another type of examinations:

21. Peer review پێداچوونەوەی هاوەڵ

This course book has to be reviewed and signed by a peer. The peer approves the contents of your course book by writing few sentences in this section.

(A peer is person who has enough knowledge about the subject you are teaching; he/she has to be a professor, assistant professor, a lecturer or an expert in the field of your subject).

ئەم کۆرسبووکە دەبێت لەلایەن هاوەڵێکی ئەکادیمیەوە سەیر بکرێت و ناوەرۆکی بابەتەکانی کۆرسەکە پەسەند بکات و جەند ووشەیەک بنووسێت لەسەر شیاوی ناوەرۆکی کۆرسەکە و واژووی لەسەر بکات.

هاوەڵ ئەو کەسەیە کە زانیاری هەبێت لەسەر کۆرسەکە و دەبیت پلەی زانستی لە مامۆستا کەمتر نەبێت