



Department of Animal Resources

College of Agricultural Engineering Sciences

Salahaddin University-Erbil

Subject: The importance of minerals and vitamins in ruminant reproduction

Course Book (Year 4)

Lecturers name: Dr.Abdulqader A. Hussein - Assistant Professor

Dr Edres Abdulla Hamadamen Marzane Lecturer

Academic Year: 2023/2024

Course Book

1. Course name	Autumn/First Semester
2. Lecturer in charge	Dr.Abdulqader A. Hussein & Dr Edres Abdulla Hamadamen Marzane
3. Department/ College	Animal Resources/ Agricultural Engineering Sciences.
4. Contact	e-mail : abdulqader.hussein@su.edu.krd Tel: 0750 4623947) edres.hamadamen@su.edu.krd Tel: 07504627152
5. Time (in hours) per week	Theory: 2
6. Office hours	Available each day after 08:30 AM.
7. Course code	
8. Teacher's academic Dr.Abdulqader A. Hussein & Dr Edres Abdulla Hamadamen Marzane	<p style="text-align: center;"><u>PERSONAL DATA Dr Abdugader</u></p> <ul style="list-style-type: none"> • Date of Birth:1983 • Nationality: Iraqi-Kurdish. • Marital Status: Married. <p style="text-align: center;"><u>EDUCATION</u></p> <ul style="list-style-type: none"> • 2004-2005 BSc in Animal Resources, Uni. of Salahaddin-Erbil. • 2005-2007 Demonstrator at Animal Resources Dept., Uni. of Salahaddin-Erbil. • 2007-2010 MSc in Wool Science & Technology, Uni. of Peoples Friendship University of Russia. • 2010-2014 Assit. lecturer at Animal Resources Dept., Uni. of Salahaddin-Erbil. • 2014-2017 PhD in Animal Nutrition, University of Harper-Adams. • 2017- Present Lecturer in Animal Nutrition, Uni. of Salahaddin-Erbil. <p style="text-align: center;"><u>PERSONAL DATA Dr Edres</u></p> <ul style="list-style-type: none"> • Date of Birth:1972 • Nationality: Iraqi-Kurdish. • Marital Status: Married. <p style="text-align: center;"><u>EDUCATION</u></p> <ul style="list-style-type: none"> • 1999-2000 BSc in Animal Resources, Uni. of Salahaddin-Erbil. • 2005-2006 Demonstrator at Animal Resources Dept., Uni. of Salahaddin-Erbil.

	<ul style="list-style-type: none"> • 2007-2010 MSc in Reproductive Physiology and Artificial Insemination. Uni. of Salahaddin-Erbil. • 2019-2022 PhD in in Animal Resources- Reproductive Physiology and Artificial Insemination. Uni. of Salahaddin-Erbil.
9. Keywords	Ruminant animal reproduction, Macro minerals, Micro minerals, Vitamins, Imbalances, Deficiency, and Toxicity.
<p>10. Course overview</p> <p>Reproductive well-being and performance of farm animals is largely dependent on their nutritional status, which is often less than optimum in developing tropical countries. More often than not, they are malnourished, particularly with regards to macro and micro nutrients. These micronutrients are involved in such functions as intracellular detoxification of free radicals, synthesis of reproductive steroids and other hormones, carbohydrate and protein and nucleic acid metabolism, their deficiencies and or excesses may impair spermatogenesis and libido in the male, fertility, embryonic development and survival, post-partum recovery activities, milk production and offspring development and survival. A plea was made for intensified research efforts, farmer education and quality control of vitamin–mineral pre-mixes, in order to improve micronutrient nutrition, and, consequently, the reproductive performance and overall productivity of farm animals in developing tropical countries.</p> <p>Poor nutrition on the other hand, will not only reduce performance below genetic potential, but also exacerbate detrimental environmental effects. Moreover, nutritional factors more than all others, readily lend themselves to manipulations to ensure positive outcomes. Hence, there is a need to pay particular attention to the interactions between nutrition and reproduction particularly in the tropics, where, for a variety of reasons, nutritional inadequacies in terms of quantitative feed intake and qualitative nutrient imbalances remain prevalent. Failure to properly understand these interactions in order to minimize the negative, and enhance the positive impacts will adversely affect livestock production efficiency, since this depends largely on reproductive performance.</p> <p>In general, poor nutrition caused by inadequate, excess or imbalanced nutrient intake may adversely affect the various stages of the reproductive event, going from delayed puberty, reduced ovulation and lower conception rates, through high embryonic and foetal losses to excessively long post-partum anoestrus, poor lactation, high perinatal mortality and poor neonatal performance. It is only recently that attention has also been paid to similar potential effects of micronutrients intake, those elements needed in relatively minute amounts in the diet ~ 1 ppm. and by the body $\sim 1\%$. This subject will also therefore focus primarily on a review of the role and effects of vitamin A, vitamin E, selenium, copper, molybdenum and zinc, on reproductive events in farm animals.</p>	

11. Course objective

This course is to deal with relationship and the role of minerals and vitamins in ruminant reproduction, chemical elements may be essentially divided in the following three groups:

1. Essential minerals, with high concentrations and crucial functions present in semen: Na, K, Cl, Ca, Mg, P, S.
2. Trace elements, which are critical to maintain proper functions of biomolecules, but are required in relatively low amounts, as their elevated concentrations may have a toxic impact on the sperm development, structure or function: Fe, Cu, Mn, Se, Zn, Co, I, Mo.
3. Heavy metals, which do not have any detectable biological roles in ejaculates. On the contrary, many authors have reported heavy metal-associated detrimental effects on semen quality and fertility rates either by a direct impact on the testicular function or mediated via hormonal imbalances or toxicant-induced oxidative stress. Male fertility-associated toxicity has been observed especially in the case of Pb, Hg, Cd, As and Al.
4. The role of vitamins also taken to consideration and their effectiveness such as vitamin A, vitamin E, selenium, copper, molybdenum and zinc, on reproductive events in farm animals.

12. Student's obligation

The role of students & their obligations throughout the academic Semester will be: the attendance, scientific discussion, completion of all tests, exams, reports.

13. Forms of teaching

Power point & Data show, Hand out papers.

14. Assessment scheme

- Time of exam: Quiz = 10 Minutes. Monthly = 1 hour. Final = 2 hours.
- The distribution of degrees:
 - Pre-final exam:** 50% (theoretical)+
 - Final exam:** 50% (theoretical) =
 - Final mark (100%).**
- Date: 1st month exam = 7th week.
2nd month exam = last week of the semester.

15. Student learning outcome:

At the end of course graduates should have a knowledge on the effect of macro and micro minerals and vitamins with their great impact on animal's reproductive physiology and its imbalance causes various problems leading to lowered reproductive efficiency. Adequate minerals supplementation is one of the strategy that required as most of the roughages, greens, concentrate and even most of commercial feeds are deficient in trace mineral

elements. The best recommendation at present is to provide a feeding program for productive animals which is balanced for all minerals and meets all known requirements.

Graduates should utilize all the above knowledge to take care of ruminant reproduction in order to improve animal health and production. Thus will be worthwhile for the future development of the farmers in the region to avoid losses that caused by mineral or vitamin imbalances and treatment animals.

16. Course Reading List and References:

1. Talukdar, D.J., Talukdar, P. and Ahmed, K., 2016. Minerals and its impact on fertility of livestock: A review. *Agricultural Reviews*, 37(4), pp.333-337.
2. Smith, O.B. and Akinbamijo, O.O., 2000. Micronutrients and reproduction in farm animals. *Animal reproduction science*, 60, pp.549-560.
3. Ahuja, A. and Parmar, D., 2017. Role of minerals in reproductive health of dairy cattle: a review. *Int. J. Livest. Res*, 7(10), pp.16-26.
4. Bindari, Y.R., Shrestha, S., Shrestha, N. and Gaire, T.N., 2013. Effects of nutrition on reproduction-A review. *Advances in Applied Science Research*, 4(1), pp.421-429.
5. Pagrut, N. and Ganguly, S., 2018. Importance of trace elements in animal reproduction: a review. *International journal of pharmaceutical research and bioscience*, 7(3), pp.11-17.

17. Theoretical Topics:

Lecturer's name

Syllabus:

Lecturer's name: Dr. Abdulqader A. Hussein & Dr Edres Abdulla Hamadamen Marzane
(2 hrs)

week	course description	Aim
1-2-3-4	Role of deficiencies or excesses of macro minerals on reproduction	To highlight on essential minerals, with high concentrations and crucial functions present in semen: Na, K, Cl, Ca, Mg, P, S.

5-6-7-8	Role of deficiencies or excesses of micro minerals on reproduction	To declare trace elements, which are critical to maintain proper functions of biomolecules, but are required in relatively low amounts, as their elevated concentrations may have a toxic impact on the sperm development, structure or function: Fe, Cu, Mn, Se, Zn, Co, I, Mo.
9-10	Role of heavy minerals on reproduction	To describe heavy metals, which do not have any detectable biological roles in ejaculates. On the contrary, many authors have reported heavy metal-associated detrimental effects on semen quality and fertility rates either by a direct impact on the testicular function or mediated via hormonal imbalances or toxicant-induced oxidative stress. Male fertility-associated toxicity has been observed especially in the case of Pb, Hg, Cd, As and Al.
11-12-13	Disorders caused by deficiencies or excesses of vitamins	To light on the role of vitamins also taken to consideration and their effectiveness such as vitamin A, vitamin E, selenium, copper, molybdenum and zinc, on reproductive events in farm animals.

19. Examinations:

Samples of questions & answers (Theory):

Q 1/ Explain/ why/justify/ Give the reason(s) for following terms.

Q 2/ Define/what is the following terms?

Q3 / Numerate the followings?

Q4 / Complete the following blanks

Q5 / Put true or false for the following statements.

20. Extra notes:

Advice: understanding the question = half the answer.

21. Peer review