



VITAMINS AND MINERALS

Instructors

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Course Description

Vitamins and minerals contribute a significant cost to the total ration costs of dairy cows; however, there is a lack understanding relative to proper level and source that cows need to support optimal health and production. This course seeks to develop an understanding of the necessity for proper decision making when selecting levels and sources of vitamins and minerals in dairy premixes. This course will provide knowledge on essentials of vitamin and mineral functions, current recommendations and practices for amounts and sources of vitamins and minerals, and potential consequences of undersupply or oversupply of vitamins and minerals to help the student make informed decisions on the inclusion of vitamins and minerals in dairy rations. The course also will include interviews with industry experts regarding aspects of selecting and including vitamin and mineral supplements.

Course Objectives

Provide students with knowledge and understanding necessary to make decisions regarding inclusion of vitamins, minerals and additives that maximize profitability of dairy cows by:

- Informing students of essential functions of vitamin and minerals required by ruminants.
- Reviewing scientific basis and current recommendations for vitamin and mineral supplementation.
- Discussing current practices for the amounts and sources of supplemental vitamins and minerals.
- Discussing practical applications of including vitamins and minerals in the ration.

Learning Outcomes

Students will know the reasons and recommendations for inclusion of each the vitamins and minerals required by dairy cows. Students also will have an appreciation of factors to consider in sources and formulations of vitamin and mineral supplements. Students will be equipped with knowledge to make reasonable cost to benefit assumptions for vitamin and mineral supplements on a given farm.

Recommended Materials and Readings

- National Research Council. 2001. *Nutrient Requirements of Dairy Cattle: Seventh Revised Edition, 2001*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/9825>. – Specifically chapters 6 & 7.
- Weiss, W. P. 2017. A 100-Year Review: From ascorbic acid to zinc-Mineral and vitamin nutrition of dairy cows. *J Dairy Sci* 100(12):10045-10060.
- Goff, J. P. 2018. Invited review: Mineral absorption mechanisms, mineral interactions that affect acid-base antioxidant status, and diet considerations to improve mineral status. *J Dairy Sci* 101:2763-2813.

Course Format and Expectations

Lectures and Readings: The course will be delivered via the Canvas course system. The major course topics will be separated into 6 separate modules according to the schedule below. Within each module there will be a series of recorded lectures that are approximately 15-20 minutes each. There will be a short assessment that you will be required to complete after completion of each lecture. There also will be recommended readings and exercises to complete each module. You will be required to complete the module before moving to the next.

Weekly Discussions: A valuable component of the course is the weekly one-hour discussions that will be held via Zoom. The major objective of the discussions is to help the students develop a practical working knowledge of the lecture and reading materials. Therefore, students should be prepared for the discussion by watching lectures and reading ahead of time and come up with questions relevant to application of the course content. Questions from practical field experience are strongly encouraged. To also facilitate discussion, the instructors will post two or three questions in Canvas ahead of time that you should come prepared to discuss. It is expected that some students may not be able to attend the discussions because of time zone or work schedule conflicts. Students are encouraged to submit questions via the appropriate week discussion board in advance if they cannot attend the discussion.

Course Schedule

Module	Topic	Instructor	Lectures	Readings & Activities
1	Introduction	Arthington & Nelson	VM&A 1-2	Weiss 2017
2	Macrominerals	Arthington	VM&A 3-10	NRC Ch.6
3	Trace minerals	Arthington	VM&A 11-18	
4	Fat-soluble vitamins	Nelson	VM&A 19-30	NRC Ch.7
5	Water-soluble vitamins	Nelson	VM&A 31-34	
6	Industrial aspects & practical considerations		VM&A 35-36	

Grading Policy

Pass/Fail – A cumulative score of 70% or greater is required to pass.

Scores are based on assessments (75%) and participation in weekly discussions (25%).

Assessments: Short assessments will be take place after each lecture followed by a final assessment at the end of the course. Each of the assessments will be conducted via the Canvas course system and will consist of fill in the blank, T/F, or multiple choice style of questions.

Participation: Weekly discussions will be held via Zoom to discuss readings and lectures. Considering that students may not be available for the weekly scheduled meetings because of time zone or work schedule conflicts students may submit discussion questions in leu of attending the virtual meeting.

Honesty and Conduct Policy

Students in the course are expected to adhere to the University of Florida honesty policy. UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of

behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Students in this course also are expected to treat each other with fairness and respect. Harassment or rude behavior towards the instructors and other students will not be tolerated.

The instructors have the right to dismiss a student from the course for violation of the Honesty and Conduct Policy.

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.