

**ANS6447 RUMINANT NUTRITION**  
(Section No. 2881)  
**FALL 2016 - 4 credits**

**Course Content/Description**

An advanced ruminant nutrition course designed to familiarize students with the anatomy and physiology of the ruminant digestive system as well as the digestion and metabolism of dietary nutrients for the purposes of growth, pregnancy, and lactation of ruminant animals, mainly bovine. Knowledge and application of information covered in lecture and in assigned readings will be evaluated in hourly exams. Class-time discussion will be encouraged and rewarded. Students will use current software to formulate and evaluate ruminant diets. Commercial feed additives will be assigned to each student who will evaluate and report (oral and written) their efficacy based upon the scientific literature.

**Goals of This Course** (Learning Objectives)

Upon completion of this course, students will have 1) a fundamental understanding and an in depth knowledge of ruminant nutrition and nutritional management of cattle, 2) developed critical thinking skills on experimental design and research techniques in ruminant nutrition, 3) an understanding of how dietary ingredients and nutrients are digested, absorbed, and metabolized in ruminants, 4) an understanding of the role of forestomach microbial fermentation and its implications to the provision of nutrients to the host animal, and 5) an understanding of the nutritional implications on animal health, growth, production, and reproduction. Completion of these goals will enable students to formulate viable hypotheses, plan/conduct experiments, and properly interpret results in ruminant nutrition. Formulation of proper rations for ruminants is an expected outcome of the course.

**Prerequisite**

ANS 5446 Animal Nutrition or approval of the instructors.

**Course Format**

- Two two-period lectures per week.
- Many topics have a key scientific article to read prior to lecture.
- Students will select 1 commercially marketed feed additive to study from the scientific and commercial literature to summarize in written form & a PowerPoint presentation.

**Instructors**

Charles R. Staples	<a href="mailto:chasstap@ufl.edu">chasstap@ufl.edu</a>	392-1958 ext 253
José Eduardo P. Santos	<a href="mailto:jepsantos@ufl.edu">jepsantos@ufl.edu</a>	392-1958 ext 251

Department of Animal Sciences, L.E. "Red" Larson Building, Room 204

**Office Hours**

Open door policy but it is better to call before visiting.

**Schedule and Critical Dates**

Monday and Friday in room 201 "Red" Larson Building, periods 8 and 9 (3:00 to 4:55).  
Weekly topics and critical dates are presented in table on the last page of the syllabus.

### **Membership**

Students are strongly encouraged to join American Dairy Science Association ([www.adsa.org](http://www.adsa.org)) and/or American Society of Animal Science ([www.asas.org](http://www.asas.org)). Cost is \$10/year for graduate students.

### **Suggested Text and Readings**

No textbook is required; however the following books will be used as reference for some lectures:

**The Ruminant Animal – Digestive Physiology and Nutrition.** 1988. D.C. Church (Ed.), Prentice Hall, Englewood Cliffs, NJ.

**Nutritional Ecology of the Ruminant.** 1994. 2<sup>nd</sup> Edition. P.J. Van Soest, Cornell University Press, Ithaca, NY.

**Rumen Microbiology and Its Role in Ruminant Nutrition.** 2002. J.B. Russell. Cornell University. Ithaca, NY.

**Rumen Microbial Ecosystem.** 1997. 2<sup>nd</sup> Edition. P.N. Hobson and C.S. Stewart, eds. Blackie Academic and Professional. London.

**Nutrient Requirements of Beef Cattle.** 1996. 7<sup>th</sup> Rev. Ed. National Research Council. National Academy Press. Washington, DC.

**Nutrient Requirements of Dairy Cattle.** 2001. 7<sup>th</sup> Rev. Ed., National Research Council. National Academy Press. Washington, DC.

**The Veterinary Clinics of North America – Food Animal Practice: Metabolic Disorders of Ruminants.** Vol 16, number 2, July 2000. W.B. Saunders, Philadelphia.

**Selected scientific articles** will be required reading throughout the semester. Examples include the following:

Relling et al. 2011. Effect of feeding fat or intrajugular infusion of glucon-like peptide-1 and cholecystokinin on dry matter intake, digestibility, and digesta rate of passage in growing wethers. *J. Anim. Sci.* 89:168-178.

Wang et al., 2012. Presence of G protein-coupled receptor 43 in rumen epithelium but not in the islets of Langerhans in cattle. *J. Dairy Sci.* 95:1371-1375.

Allen and Bradford. 2012. Control of food intake by metabolism of fuels: a comparison across species. *Proc. Nutr. Society* 71:401-409.

Shirazi-beechey et al. 2011. Intestinal glucose sensing and regulation of glucose absorption: Implications for swine nutrition. *J. Anim. Sci.* 89:1854-1862.

### **Instructional Methods**

This course will be team-taught by 2 faculty members and lectures will be the basis of instruction. Students are expected to read the reading assignments before class to encourage discussion during lectures. Guest lecturers will contribute in areas of their expertise.

**Grading:**

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	Percentage of final grade	Points	Due Date/Date of Exam
1 <sup>st</sup> Exam	15.4%	100	September 19
2 <sup>nd</sup> Exam	15.4%	100	October 24
3 <sup>rd</sup> Exam	15.4%	100	December 5
Final Cumulative Exam	26.9%	175	December 13
Feed additive presentation and paper	15.4%	100	November 18 and 21
Ration formulation	3.8%	25	December 2
Class participation	7.7%	50	All semester
Total	100%	650	

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**Grading scale, %**

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A = 95-100	A- = 90-94.9	B+ = 87 to 89.9	B = 83-86.9	B- = 80-82.9	C+ = 77-79.9
C = 73-76.9	C- = 70-72.9	D+ = 67-69.9	D = 63-66.9	D- = 60-62.9	E < 60

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For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

**Attendance and Make-Up Work**

Attendance will not be taken. Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

**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. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

**Online Course Evaluation Process**

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results>.

## **Academic Honesty**

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: “*We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.*” You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit 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.*”

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>.

## **Services for Students with Disabilities**

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation: 0001 Reid Hall, 352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)

## **Campus Helping Resources**

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university’s counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, [www.counseling.ufl.edu/cwc/](http://www.counseling.ufl.edu/cwc/)*
  - Counseling Services
  - Groups and Workshops
  - Outreach and Consultation
  - Self-Help Library
  - Wellness Coaching
- *Career Resource Center, First Floor JWRU, 392-1601, [www.crc.ufl.edu/](http://www.crc.ufl.edu/)*
- *U Matter We Care, [www.umatter.ufl.edu/](http://www.umatter.ufl.edu/)*

## Tentative Schedule of Topics

### RUMINANT NUTRITION ANS 6447 (Section 2881)

Week	Date	Topic	Instructor
1	22-Aug-16	Importance of the Ruminant; Anatomy of the digestive tract	CS
1	26-Aug-16	Development of pre-stomach	CS
2	29-Aug-16	Motility of the gastrointestinal tract, rumination, salivation	CS
2	2-Sept-16	Ruminal and intestinal microbes	TH
3	5-Sept-16	Labor Day - No Class	
3	9-Sept-16	Kinetics of nutrient digestion in the rumen; VFA absorption, control of rumen fluid pH and osmolarity	JS
4	12-Sept-16	VFA absorption, control of rumen fluid pH and osmolarity; Control of feed intake by ruminants	JS
4	16-Sept-16	Energetics	JS
5	19-Sept-16	<b>FIRST EXAM</b>	
5	23-Sept-16	Nonstructural carbohydrate digestion	JS
6	26-Sept-16	Structural carbohydrate digestion	CS
6	30-Sept-16	N requirements of rumen microbes and microbial efficiency	JS
7	3-Oct-16	Protein sources and digestion in the forestomach; Synergism between protein and carbohydrates	CS
7	7-Oct-16	Lipid metabolism in the rumen	CS
8	10-Oct-16	Digestion, absorption, and metabolism of lipids	CS
8	14-Oct-16	Homecoming - No class	
9	17-Oct-16	Post-absorptive metabolism of energy compounds; Amino acid absorption and post-absorptive metabolism	JS
9	21-Oct-16	Impacts of nutrition on milk composition	JS
10	24-Oct-16	<b>SECOND EXAM</b>	
10	28-Oct-16	Minerals	CS
11	31-Oct-16	Vitamins	CS
11	4-Nov-16	Disorders of the intermediary metabolism (hepatic lipidosis and ketosis)	JS
12	7-Nov-16	Disorders of mineral metabolism (Ca, P and Mg)	JS
12	11-Nov-16	Veteran's Day - No class	
13	14-Nov-16	Disorders of carbohydrate digestion (acidosis, bloat, PEM, DA)	JS
13	18-Nov-16	Feed additive assignment presentation	CS/JS
14	21-Nov-16	Feed additive assignment presentation	CS/JS
14	25-Nov-16	Thanksgiving - No Class	
15	28-Nov-16	Ration Formulation Software Laboratory	CS/JS
15	2-Dec-16	Presentation of Exercise - Ration Formulation Software	CS/JS
16	5-Dec-16	<b>THIRD EXAM</b>	
17	13-Dec-16	<b>FINAL COMPREHENSIVE EXAM</b>	

CS = Charles Staples; JS = José Santos; TH = Timothy Hackmann