

**ANS 6452 – PRINCIPLES OF FORAGE EVALUATION (Spring-2025)**  
(Section No. 02CF)

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**Office hours:** By email appointment; open door policy for urgent enquiries only.

**Course Prerequisites:** ANS 5446 and AGR 4231, or equivalent. It is assumed that students have taken these courses.

**Course Description:** This **three-credit** course aims to describe the science underlying measurement of forage quality and to discuss the pros and cons of different forage evaluation methods. Such assessments are critical to determining the role and choice of ideal forages in livestock rations, the potential productivity levels of livestock fed forage-based diets, possible health problems that may result from intake of forages, and environmental impacts of forages in livestock diets.

**Course Objectives:**

1. To provide a fundamental understanding of the definitions, determinants, and indices of forage quality, and its measurement and prediction.
2. To critically appraise different methods of measuring forage quality.

**Course Website:**

The course website is on the UF e-learning site at <https://lss.at.ufl.edu/>. Log on to the website with your gatorlink username and password. You will find copies of the course outline, syllabus, lectures etc. on the website.

**Course Meeting times**

Class meets Monday & Wednesday, 7th Period (1.55 – 2.45 pm) and 6th period (12.50-1.40 pm) on Thursdays. All classes will be held in-person (Room 102, Animal Sciences Building 459 and online via Zoom. In case of technical glitches on Zoom, we will switch to Microsoft Teams.

**Grading scale**

A	= 95-100%
A-	= 90-94%
B+	= 85-89%
B	= 80-84%
C+	= 75-79%
C	= 70-74%
D+	= 65-69%
D	= 60-64%
E	< 60%

**Final Grade Computation**

Assessment	Points
Assignments	20
Exercise 1	75
Exercise 2	25
Mid Semester Exam-1	90
Mid Semester Exam-2	100
Final Exam	90
<b>Total</b>	<b>400</b>

There will be no grading curve.

**Grades and Grade Points:**

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

**Attendance policy:**

All students are strongly encouraged to attend all lectures. Attendance will be taken intermittently during the semester. Prior notice is required if you will be absent from lectures, laboratories or exams. The decision to move final grades that are one point short of the next grade will be largely based on attendance.

**Late assignments and exam make up policy:** Unless prior permission for late submission is granted, students will lose five percentage points for each day (including weekends) after the deadline for submission of an assignment expires. Students will be allowed to take make up exams for full marks, only when prior approval was given for absence from the originally scheduled exam / assignment.

### **Course textbook**

There is no course textbook. Students may choose to purchase some of the recommended texts below but they do not have to. In addition to those listed below, outside reading assignments may be announced by the instructor. You will be held responsible for all the material covered in lecture as well as that covered in the reading assignments.

### **Recommended references**

In vitro Screening of Plant Resources for Extra-Nutritional Attributes in Ruminants: Nuclear and Related Methodologies. 2010. Vercoe, Philip E.; Makkar, Harinder P.S.; Schlink, Anthony C. (Eds.) XII, 247p.

Harinder P.S. Makkar and Christopher S. McSweeney. 2005. Methods in Gut Microbial Ecology for Ruminants. Springer Publishers.

Measuring Methane Production from Ruminants. 2007. Edited by Harinder P.S. Makkar and Philip E. Vercoe. Springer Publishers.

Estimation of Microbial Protein Supply in Ruminants Using Urinary Purine Derivatives. IAEA-CN-110. Vienna 2003. H.P.S. Makkar and X.B. Chen (eds) 2004. Kluwer Academic Publishers.

Makkar, Harinder P.S. 2003. Quantification of Tannins in Tree and Shrub Foliage. A Laboratory Manual. Springer Publishers.

Barnes R.F., Nelson C.J., Moore, K.J. and Collins, M., 2007. Forages, Volume II. The Science of Grassland Agriculture 6<sup>th</sup> Edition. Blackwell Publishing. SB193. F65 2007

Givens, D.I., Owen, E., Axford, R.F.E. and Omed, H.M., 2000. Forage Evaluation in Ruminant Nutrition. CABI Publishing, Wallingford, UK. SF95 .F6725

t'Mannetje, L. and Jones, R.M., 2000. Field and Laboratory Methods for Grassland and Animal Production Research, CABI Publishing, Wallingford, UK. SB199 .F44

Buxton, D.R., Muck, R.E. and Harrison, J. H., 2003. Silage Science and Technology. Agronomy, 42. American Society of Agronomy Inc, Crop Science Society of America, Inc., Soil Science Society of America, Inc. Madison, Wisconsin, USA. SB195 .S56 2003

D'Mello, J.P.F., 2000. Farm animal metabolism and nutrition, CABI Publishing, Wallingford, UK, 438 pp. SF95 .F32 2000

Fahey, G.C., Jr. (ed.) 1994. Forage quality, evaluation and utilization. Amer. Soc. Agronomy, Madison, WI. SF94.6 .N37

Forbes, J.M. 1995. Voluntary food intake and diet selection in farm animals. CAB Int., Oxon, UK. SF95 .F674 ; SF95 .F674

Minson, D.J. 1990. Forage in ruminant nutrition, Academic Press, San Diego SF95 .M6585

Leaver, J.D., 1982. Herbage intake handbook, British Grassland Society, Reading, UK. SF95 .H471

Wheeler, J.L. and Mochrie, R.D., 1981. Forage evaluation : concepts and techniques. Proceedings of a workshop on Forage evaluation and utilization, an appraisal of concepts and techniques, Armidale, NSW; U.S./Australia Cooperative Science Program. SF95 .F67

Van Soest, P.J., 1994. Nutritional ecology of the ruminant, Comstock Publishers, Ithaca. SF95 .V36 1994

### **Cell phones**

Cell phones should be turned off during classes.

### **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>.

### **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.

### **Campus Helping Resources**

Students experiencing crises or personal problems that interfere with their general wellbeing 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](http://www.counseling.ufl.edu)

Counseling Services

Groups and Workshops

Outreach and Consultation

Self-Help Library

Wellness Coaching

- U Matter We Care, [www.umatter.ufl.edu/](http://www.umatter.ufl.edu/)
- Career Connections Center, First Floor JWRU, 392-1601, <https://career.ufl.edu/>.
- Student Success Initiative, <http://studentsuccess.ufl.edu>.

Student Complaints:

- Residential Course: <https://sccr.dso.ufl.edu/policies/student-honor-code-studentconduct-code/>

Online Course:

<https://distance.ufl.edu/state-authorization->

[status/#student-complaint](#)

## **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,  
<https://disability.ufl.edu/>

## TENTATIVE COURSE OUTLINE

Class meets from 1.55 to 2.45 pm (7<sup>th</sup> period) on Mon and Wed and from 12.50 to 1.40 pm (6<sup>th</sup> period) on Thursdays. All classes will be online.

Topic	Date	Weekday
Introduction, course objectives	1/13/2025	Mon
The importance and variability of forages	1/15/2025	Wed
Representative sampling	1/16/2025	Thu
<b>NO CLASS (Martin Luther King Day)</b>	1/20/2025	Mon
Definition and indices of forage quality	1/22/2025	Wed
Improving forage quality	1/23/2025	Thu
Proximate analysis	1/27/2025	Mon
Structural carbohydrate methods	1/29/2025	Wed
Proximate analysis review -1	1/30/2025	Thu
In vivo digestibility methods (total collection)	2/3/2025	Mon
In vivo digestibility methods 2	2/5/2025	Wed
In-situ degradability methods	2/6/2025	Thu
In vitro digestibility methods	2/10/2025	Mon
Fermentation gas production methods	2/12/2025	Wed
Digestibility paper review -2	2/13/2025	Thu
Estimating the rate of passage	2/17/2025	Mon
<b>Mid-term I</b>	2/19/2025	Wed
Processing	2/20/2025	Thu
uNDF	2/24/2025	Mon
<b>NO CLASS (Ruminant symposium)</b>	2/26/2025	Wed
In vivo digestibility paper review-3	2/27/2025	Thu
Methods of estimating microbial protein synthesis	3/3/2025	Mon
Non-structural carbohydrate methods	3/5/2025	Wed
uNDF paper review-4	3/6/2025	Thu
GMO and livestock	3/10/2025	Mon
Quantifying rumen function	3/12/2025	Wed
Rumen function paper review-5	3/13/2025	Thu
Estimating intake	3/24/2025	Mon
Estimating intake	3/26/2025	Wed
Intake paper review -6	3/27/2025	Thu
Antinutritive factors in feeds	3/31/2025	Mon
General problems of feed analysis	4/2/2025	Wed
<b>Mid-term II</b>	4/3/2025	Thu
Estimating greenhouse gas emissions from ruminants	4/7/2025	Mon
Prediction of nutritive value & accuracy versus precision	4/9/2025	Wed
Greenhouse gas paper review -7	4/10/2025	Thu
Silage fermentation and conservation	4/14/2025	Mon
Particular problems with silage analyses	4/16/2025	Wed

Silage paper review -8	4/17/2025	Thu
Associative effects of feeds (DV)	4/21/2025	Mon
Anti-nutritive factors paper review -9	4/23/2025	Wed
<b>Final exam</b>	<b>4/28/2025</b>	<b>Mon</b>

**Note:** The Final Exam will be comprehensive and cover lectures and manuscripts discussed during the entire semester. Final exam will take place during the normal class period on the date indicated above.