

amino acid imbalances appear to be conserved in animals ranging from single cell-organisms such as yeast, to invertebrates, to humans. To understand nutritional wisdom, and its implications for maximizing forage use in cattle diets, we must consider how animals learn flavor-feedback associations, including the roles of past experience and the familiar-novel dichotomy, discrimination and generalization, initial conditions, and the many dynamic contingencies that apply when animals learn flavor-feedback associations.

Key Words: Nutritional wisdom, Learning, Foraging

418 Forage intake, digestion and milk production by dairy cows.

R. Shaver*, *University of Wisconsin, Madison.*

Intake by dairy cows is influenced by NDF content and in vitro NDF digestibility (NDFD, % of NDF). Data from the literature suggest that a one-percentage unit increase in NDFD at the same NDF content will increase DMI 0.12 to 0.17 kg/d. Neither NDF content nor NDFD are included in the Dairy NRC (2001) intake prediction equations. The Dairy NRC (2001) summative energy equations are based on fiber digestibility calculated using lignin, but in vitro NDFD measurements can be used directly also. Data from the literature suggest that at production levels of intake, NDFD has minimal impact on net energy content, but impacts net energy intake primarily through effects on DMI. Inclusion of NDFD in nutritional models will thus require a dynamic modeling approach. In vitro NDFD values are highly variable among and within forage types, and this variation will be reviewed. Introduction of low-lignin, brown midrib hybrids for production of corn and sorghum silages has widened the range for NDFD in these forage types. Data from the literature show milk production responses from varying forage NDFD, but trials were conducted primarily with corn or sorghum silages. There have been some recent trials conducted with wheat straw or alfalfa hays that report conflicting lactation

performance results. Intake, digestion and milk production responses to NDFD among and within forage types will be reviewed.

Key Words: Forage, NDFD, Dairy cows

419 Forage feeding in relation to animal and human health. T. R. Dhiman*, *Utah State University, Logan.*

The current strategies of feeding high starch, low forage diets to maximize milk production and yields of milk components in dairy cows have led to higher cull rates, lower reproductive efficiency, lower milk components, and higher veterinary costs. On most dairy farms annual culling rates exceed 30-35% of the herd. About 85% of the cows are culled due to reproduction problems, disease or injury, mastitis or udder problems, feet and legs, or death. High quality forages are the key to achieving a healthy and productive cow. The objective of this presentation is to review the importance of feeding high quality forages or fibrous feeds on animal's life time production, health, reproductive performance and nutritional quality of milk and meat. Milk and meat from animals raised on forages has been shown to have high levels of vitamin E, beta-carotene, conjugated linoleic acid, omega fatty acids and have higher proportions of unsaturated fatty acids compared with milk and meat from animals raised on high grains. The effect of nutritional quality of milk and meat on human health will also be discussed. Consequences of feeding high forage diets on animal productivity will be compared with feeding high grain diets. Feeding strategies to maximize the use of forages while maintaining milk production and milk and meat quality will be suggested based on the review of literature.

Key Words: Forage, Cow, Milk

Teaching/Undergraduate and Graduate Education: Student Engagement: The Classroom and Beyond

420 Using the National Survey of Student Engagement to understand students' experiences in the agricultural and related sciences. T. Nelson Laird*, *Indiana University, Bloomington.*

After defining student engagement and explaining why it is important for undergraduate education, this presentation will draw on data collected through the National Survey of Student Engagement (NSSE) to better understand student engagement in the agricultural and related sciences and how it compares to student engagement in other fields of study. NSSE results suggest that on average agriculture students participate in active and collaborative learning experiences less than students in other fields and that their coursework emphasizes high-order thinking skills (e.g., analyzing and synthesizing course material) less than the coursework of students in other fields. However, agriculture students tend to report slightly greater levels of student-faculty interaction and a greater sense of support from the campus environment. The presentation will conclude with a discussion of implications from the NSSE findings and suggestions for improving student engagement

in agriculture that draws on examples and "best practices" collected from campuses across the country.

Key Words: Student engagement, National Survey of Student Engagement, Disciplinary comparisons

421 Active and collaborative learning. J. Swanson* and J. McClaskey, *Kansas State University, Manhattan.*

Two types of teaching have traditionally dominated the agricultural sciences. The first is learning for the purpose of accumulating knowledge typically measured by student recall of teacher-presented information. The second type of teaching often takes place in a laboratory and is best described as learning by doing. In recent years there has been a revolution in college teaching spawned by discoveries made in the cognitive and neurosciences about learning. The primary pedagogical shift is from the language of teaching students to that of student learning. The development of active and collaborative learning

methodology is a result of understanding the nature of how students perceive and process information. Active learning includes the analysis, judgment, synthesis, and application of knowledge. While active learning builds skill in the use of knowledge, collaborative learning also requires students to learn from each other. Collaborative learning includes problem solving, team work, caring, and interpersonal skills. Both methods can be successfully employed in small or large classes to enhance student learning. We will give examples of how both approaches to learning have been used in an animal science and a professional ethics course.

Key Words: Learning, Active, Collaborative

422 Strategies for engaging students in large classes. W. E. Beal*, *Virginia Polytechnic Institute and State University, Blacksburg, VA.*

Connecting with students, especially freshmen, in a large class (>100) is critical for achieving teaching/learning success. Courses with recitations or labs allow more direct contact between teachers and students and make bonding easier. Developing a bond between the students and the faculty in Introductory Animal and Poultry Science has depended on five strategies: 1) learning students' names; 2) employing undergraduate students as teaching assistants (TA); 3) including weekend field trips; 4) inviting parents to class and 5) incorporating tips on how to succeed at college. Learning names is an obvious method of personalizing a course. Having the faculty and TAs compete in a "naming game" at the beginning of each class period early in the semester also makes the process entertaining to the students. Including undergraduate TAs (2/lab) as teachers allows the lab sections to be divided into multiple learning stations with instruction of small groups simultaneously. Undergraduate TAs also provide an approachable source of assistance. Faculty interaction with students is enhanced by increased familiarity among the students. Overnight field trips to farms, industries and livestock sales events funded by livestock producer groups provide students with an opportunity to become more familiar with their fellow students and to enhance their knowledge. Inviting parents at the annual Parents Weekend to participate in a "mock lab" where the students teach their parents livestock handling skills provides the parents with a link to their son's or daughter's college experience. Taking time from fact-filled lectures to introduce concepts such as: "what to call your professor," or "how and when to dispute grading of an exam" provides students with tips that may make their transition to college more successful. No one strategy is the key. The combined effect of all strategies makes the faculty member more open and engaging to the students.

Key Words: Teaching, Student engagement, Class size

423 Student engagement at a distance using virtual teaching assistants in the classroom and beyond. M. Latour* and K. Orvis, *Purdue University, West Lafayette, IN.*

The way to teach at a distance may include a wide range of media platforms and this can vary depending on the audience. More specifically, our studies suggest that young undergraduates (less than 20 years of age) respond poorly to instruction via teleconference and/or direct Internet instruction, coupled with go-at-your-own-pace. Conversely, the acceptance of teleconference instruction for graduate students is much higher. In order to improve online undergraduate instruction, we implemented the use of Virtual Teaching assistance and for the past 3-years, the response has been outstanding. Therefore, the purpose of this talk will be on the discussion, interaction, comfort

level, perspectives, motivation, and overall satisfaction between students in Virtual Introduction to Animal Science 101 (ANSC101V) versus a traditional face-to-face Introduction to Animal Science 102 (ANSC102) utilizing traditional and virtual teaching assistants. In general, students in ANSC101V rated questions pertaining to discussion, comfort level, student perspectives, and motivation higher when compared to students in ANSC102. However, the level of satisfaction was determined to be not different between the two classes. Because of the high rating and responses by online students, it was determined that virtual teaching assistants contributed greatly to the level of comfort and outcome in the ANSC101V course.

Key Words: Distance, Internet, Teaching

424 Enriching the educational experience through co-curricular activities. T. Klopfenstein*, *University of Nebraska, Lincoln.*

It has been my observation that student success and involvement in co-curricular activities are highly correlated. (Note this is a personal observation and therefore no r is reported.) Further a close relationship with at least one faculty member is related to student success and the overall "college experience". All humans (at least most) desire interaction with small groups of other individuals. One reason given for young people belonging to "gangs" is that it provides them a small group to be a part of. Co-curricular activities are important in providing for that need for college students. Important activities include some of the obvious — clubs and judging teams. However, four other very important activities are internships, undergraduate research projects, jobs within the department and undergraduate teaching assistants. Internships that include some class meetings increase the learning experience, develop group relationships, and develop student-faculty relationships. Most undergraduate research projects are done in a team approach with graduate students, technicians, other undergraduates and faculty which provides important relationships discussed previously. Undergraduate jobs provide similar benefits. Better to hire three students to weigh feed for cattle than to spend the money on an automated feeding system. The opportunity to experience teaching (mentoring) as an upper level student is especially beneficial. So with student success and co-curricular activities, what is cause and what is effect? Are successful students more involved or are they successful because they are involved? Our job is to get them involved.

Key Words: Students, Success, Co-curricular activities

425 The role of academic advising in student engagement. L. C. Martin*, *Oklahoma State University, Stillwater.*

Academic advising provides a unique opportunity to actively engage students in setting academic goals, identifying leadership opportunities, exploring strategies for personal and professional growth, and investigating career options. Traditionally, student engagement has focused on the classroom (active and collaborative learning, analysis and synthesis of course material, and making connections across courses and disciplines). Academic advising, however, has the potential to engage students beyond the boundaries of the traditional classroom environment and can influence the extent to which students participate in enriching educational experiences. Quality advising has been linked to a number of measures of student success including retention, GPA, student involvement, connection to the campus community and to the major, and student satisfaction. While a number of advising models exist (faculty advising, centralized advising ...), some are more effective than others in enhancing student engagement. The impact of academic

advising is further dependent upon whether the advising is prescriptive (advisor-centered) or developmental (student-centered). Students differ in the type of advising they prefer; gender, class rank and major have been shown to influence preference. Too often, the impact of advising has been undervalued and the opportunities to engage students

through advising efforts, underestimated. Effective academic advising strategies should focus on maximizing impact and should result in enriching each student's educational experience.

Key Words: Academic advising, Student engagement