

Farm	No. Cows	DIM	Milk kg	Body Wt. kg	Wither Ht. cm	Length to Pins cm	DMI kg	Physi- cal Effect Fiber %	Physi- cal Effect NDF, %
1	58	100	49.5	652	...	...	25.7	...	...
2	80	266	46.4	657	...	...	25.5	76.1	26.9
3	119	125	50.5	604	143	95	26.5	67.9	24.2
4	109	132	49.1	670	143	102	25.0	71.1	25.2
5	87	117	49.1	657	142	99	22.8	60.0	21.0
6	128	91	45.5	654	142	97	27.1	44.2	15.2
7	98	135	41.6	668	141	102	26.7	52.0	17.5

**Key Words:** Milk Production, Intake, Body Characteristics

## ASAS/ADSA Teaching Undergraduate and Graduate Education and PSA Extension and Instruction: Teaching I

**507 Poultry science student recruitment through teacher and counselor education.** R.J. Lien, J.B. Hess\*, R.A. Voitle, J.P. Blake, D.E. Conner, and W.D. Berry, *Auburn University, Auburn, AL 36849-5416.*

University poultry science student recruitment is vital to the long-term success of the poultry industry and the survival of university poultry science programs. Conservative estimates indicate that universities in the Southern U.S. are only able to fill 20-30% of the annual regional need for poultry science graduates in the poultry industry. Efforts by the U.S. Poultry and Egg Association and university poultry science programs are attempting to spread the message of job opportunities to potential high school and junior college students. Auburn University's Poultry Science Department instituted a Teacher/Counselor Education Program in 1995 in an attempt to reach more prospective students. Initial efforts were targeted at teachers and guidance counselors that had placed students with Poultry Science in the past. Subsequent efforts have drawn participants from state-wide mailings to all high school science and agribusiness teachers and counselors, and advertisements in counselor and science teacher association newsletters. Enrollment for the 1.5-day course (all expenses paid on campus) has averaged 20/year, with the majority of participants attending from schools in areas of poultry concentration. Continuing education credits are offered. Topics covered include Alabama and U.S. poultry industries, educational opportunities, departmental and college scholarships, job opportunities and veterinary school options. Average enrollments in the department have been 40% higher since the inception of this program.

**Key Words:** Student Recruitment, Undergraduate Teaching, Continuing Education

**508 A paradigm to increase student enrollment in animal science courses and fulfill educational expectations.** Darrel J. Kesler\*<sup>1</sup>, <sup>1</sup>*Department of Animal Sciences, University of Illinois.*

Projections that intensification of animal production is decreasing the need for animal scientists that could lead to the demise of the animal science profession (Cheeke, *J. Anim. Sci.* 77:2031; Letters to the Editor, *J. Anim. Sci.* 78:1691) have either generated concern, with little action, or are rejected. In an attempt to avoid the projection, I have developed and implemented a paradigm to increase student enrollment in animal science courses and the fulfill educational expectations of our new generation of animal science students. The first step was to reinvent an existing course, now titled Biology of Reproduction (AnSci/Biol 231). This involved changing a more traditional farm animal reproduction course to be more inclusive of all species, including humans (Kesler, *NACTA J.* 44[3]:11). The course was designed to fulfill general education requirements in natural sciences and was cross-listed in Biology. The second phase was the creation of a discovery course (AnSci 110), Life with Animals and Biotechnology, that approached the discipline in a non-traditional manner (Kesler, *J. Anim. Sci.* 75:273). It began as a 1-credit hour course but has been revised to a 3-credit hour course that fulfills general education requirements in natural sciences. The third phase involved instruction on nontraditional animal careers. Although this phase is incomplete, a traditional spring trip course was modified the past two spring semesters where students were introduced to biomedical industries with animal related careers. Student enrollment in AnSci 110 and 231 increased ( $r=.99$ ;  $P<.01$ ) from 66 in year 1 to 212 in year 7. Course quality evaluation ratings also increased ( $r=.94$ ;  $P<.01$ ) and

paralleled ( $r=.95$ ;  $P<.01$ ) the increase in enrollment. Although the average class size (department enrollment 4 classes) also increased, course enrollment in AnSci 110 and 231 increased at a greater rate (3.5 times greater) increasing instructional units credited to animal science. The major reason for the increase was non-majors (41% of the students were non-majors this past year;  $r=.98$  [ $P<.01$ ]; non-majors were primarily from outside the college) enrolling in the course. Therefore, animal science can remain as a viable discipline; however, revision may be appropriate even if the pessimistic projection is wrong.

**Key Words:** Teaching, Course Enrollment, Undergraduate Education

**509 A model for choosing instructional strategies to support distance education students.** A.M. Shorridge and J.L. Emmert\*, *University of Arkansas.*

The Department of Poultry Science at the University of Arkansas has developed web-based distance education courses in poultry science that include Broiler and Turkey Production and Breeder and Layer Management. Although the use of the Internet to teach university curricula is commonplace, few guidelines have been published to support course authors as they attempt to move their teaching out of the traditional classroom and into cyberspace. In an effort assure the quality of the courseware produced for this project we conducted an examination of current instructional design models, distance education and learning theories, the use of media in education, and available web-based distance education courses. The results indicated that most university level courses currently offered are limited in that they are not grounded upon an appropriate learning theory that is able to provide interactive instructional strategies. Results also indicated that the interactive component of web-based distance courseware could be increased substantially by the use of concept mapping within a human constructivist framework. Our next objective was to evaluate the integration of concept mapping into web-based distance education courseware as a tool to increase interactivity and learning outcomes. Students in traditional poultry production courses were provided with videotaped concept mapping instructions similar to what would be available on the Internet. Concept mapping assignments were then given before and after course modules were presented to allow comparison of pre- and post-maps. A blend of qualitative methods, including document analysis, observation, concept mapping and interviewing were used to probe a real-life context within a unique case orientation. This study also made use of data triangulation and investigator triangulation to establish credibility of the findings. Data indicate that concept mapping may be utilized successfully within web-based distance education courseware as a tool to enhance interactivity and establish effective pedagogy.

**Key Words:** Distance education, poultry production, concept mapping

**510 Technology enhanced instruction: Incorporating Internet activities into a poultry products course.** T. J. Buttles\*<sup>1</sup> and B. S. Walters<sup>2</sup>, <sup>1</sup>*University of Minnesota, St. Paul, MN,* <sup>2</sup>*University of Wisconsin - River Falls, River Falls, WI.*

The Internet is changing many aspects of our culture, including classroom instruction. Internet tools and resources have been added to the list of instructional methods available to teachers. Several different types of Internet based activities have been incorporated into the poultry products technology course offered as part of the Midwest Poultry

Consortium sponsored Undergraduate Poultry Science Center of Excellence summer program. Students were required to find and critique poultry products related articles on the Internet as well as in print media. Students also used the Internet to submit selected assignments. WebCT, a package of web based course tools, was also utilized as part of the instruction in this course. Computer based instruction modules were developed for a small portion of the course content. These modules supplemented classroom and lab instruction, allowing students to control the speed and direction of instruction. Links to Internet resources were embedded into the lessons, with several lessons requiring students to visit specific websites to complete the activities. Several quizzes were also given with WebCT. This form of delivery allowed students to take the quiz when they felt ready for it and also provided immediate feedback on the answers to objective type questions. WebCT was also used to provide electronic backup copies of the syllabus and assignment sheets that students could access at any time. Finally, WebCT was used to provide students with access their individual grades. The instructors were able to put the grades into the WebCT system immediately following the completion of the course, as compared to the several weeks it took for official grades to make it into the campus system. Overall, these Internet activities provided an additional way for students to learn course material, be assessed on their learning, and interact with course instructors. While they will never replace even a majority of the classroom and laboratory instruction in this course, Internet activities did provide one more tool for instructors to try and provide appropriate learning activities for a diverse range of students.

**Key Words:** Instruction, Teaching, Internet, Midwest Poultry Consortium

**511 Assessment of students' access of world wide web course material posting in small class size.** M. A. Wattiaux\* and K. Kanwar, *University of Wisconsin, Madison*.

Our objective was to use the student-tracking feature of an electronic course delivery package (Webct) to monitor students' access of course-related material posted on the world wide web and to correlate web usage with final grade. The study was conducted in a two-credit ruminant nutrition course including 19 juniors or seniors and four graduate students. At the beginning of the semester, the posted material included a 700-word glossary and three modules. Each module included 15-20 slides with instructor/s notes, a study guide and assignments. Weekly additions to the site included primarily lecture slides (without instructor/s notes or study guide) and assignments. Students' access to the web was recommended, but optional because course modules were covered in lectures and discussion sessions. Number of HTML pages accessed by each student was recorded weekly. Seventy-eight percent of the students accessed the site for the first time within two days of its announcement, but one student did not access the site until 20 days into the semester. The first three modules were covered by the end of the first two weeks of class, and the average number of hits per student (HPS) was then 96 (range 0 to 243). Henceforth, HPS declined sharply and averaged 6.8 (range 0 to 13) per week over the remaining part of the semester. Discrete events associated with a rise in weekly HPS included taking time in class to show the web (week 5; HPS = 12) and posting of the previous year/s mid-term exam (week 10; HPS = 13). Posting of lecture slides alone did not attract students' attention. At the end of the semester, total HPS averaged 177 (range 30 to 658). Non-parametric, Spearman correlation indicated that HPS after the first week of class was a good predictor of HPS at the end of class ( $r = .88, P < .001$ ). There was no correlation ( $r = .27, P > .05$ ) between total HPS and final grade. In small class size, students' intrinsic motivation for the course may be a major determinant of web usage.

**Key Words:** Instructional technology, Undergraduate learning, Internet

**512 Use of Trans Texas Video Network for graduate education between Texas A&M University System and Texas Tech University.** L. W. Greene\*<sup>1</sup> and C. R. Richardson<sup>2</sup>, <sup>1</sup>Texas A&M University System, Amarillo, <sup>2</sup>Texas Tech University, Lubbock.

A minerals and vitamins animal nutrition lecture class was developed and taught to students in the Texas A&M University (TAMU) System and Texas Tech University (TTU) for three consecutive yr via Trans Texas Videoconference Network (TTVN). The TTVN is an interactive media for lecture delivery. TTVN is a statewide videoconferencing system at TAMUS locations, TTU and other state agency offices. The

system provides a two-way multipoint digital video conferencing and data transmission service. Universities, extension services, public service agencies and research organizations fund the system. The class has been taught at TAMU-College Station (yr 1, 2), WTAMU-Canyon (yr 1, 2, 3), TTU-Lubbock (yr 1, 2, 3), TAMU-AREC-Amarillo (yr 1, 2, 3) and TAMU-Kingsville (yr 2). Student enrollment for yr 1, 2 and 3 was 26, 20 and 9, respectively. Students enroll and obtain credit for the class at their home institution. The mineral section originates from TAMU, Agricultural Research and Extension Center, Amarillo (Greene) and the vitamin section originates from TTU at Lubbock (Richardson). Each section of the class consists of 12 to 13, 80 to 90 min lectures. Lecture notes and related course information were developed with the same style and form, and published on the internet. Students are graded based upon their performance on written test and term papers. Grades from each section are weighted equally for calculation of final grades. Open-book exams and papers are e-mailed by the students to the instructor for grading. A proctor (local faculty member) is assigned at each location to supervise closed-book exams, and mailing exams to the instructor. Outside of class, students communicate with instructors, and turn in term papers and open-book exams via e-mail. Questions and answers are also handled during interactive class time on TTVN. This class provides students at several locations the opportunity of taking a minerals and vitamins animal nutrition class.

**Key Words:** mineral/vitamin nutrition, classroom instruction, distance education

**513 Teaching Animal Nutrition online.** P.A. Schoknecht\*<sup>1</sup> and H.D. Hafs<sup>2</sup>, <sup>1</sup>University of Richmond, <sup>2</sup>Rutgers, The State University of New Jersey.

Web-based distance education has the potential to expand course offerings and/or conserve teaching resources. During the Fall of 2000, the lecture (3 credits) of Rutgers Animal Nutrition was offered online (instructor in VA) to 94 students in NJ. Students also attended a resident laboratory section (1 credit). The distribution of grades was comparable to the previous 3 years when the same instructor taught the course in residence, suggesting that student learning was not impaired. A survey completed by 85 students provided the following data. Online learning was entirely new for 98% of the students and the course was required for 92%. 93% of the students felt they had sufficient access to both a computer and an Internet connection, with 39% of those living in networked university housing, 26% using a modem, 21% using both a modem and university computer labs and 14% using only the computer labs. While 70% of the students felt they had too little interaction with the instructor, only 52% of the students ever emailed the instructor outside of the required homework assignments and only 24% of those emails pertained to course material. When given the opportunity to post questions to a website, students posted none. Instructor postings were read by only about 10 students unless the posting had to do with an exam. The aspects of the online course that students liked the most were that they were able to work at their own pace (36%), did not have to attend lecture (22%), had detailed notes (16%), and the studying was interactive (16%). On the other hand, they missed interactions with the instructor (50%), felt they had problems learning (28%), and had computer problems (22%). The majority of students were not prepared for the self-discipline and initiative required for an online course. In overview, despite the difficulties, students not only learned animal nutrition effectively they also learned about self-directed studying and time management. While many students were uncomfortable, they may have been well-served by being forced to learn these skills, as 75% reported they are now better prepared to take future online courses.

**Key Words:** Distance Education, Undergraduate Education, Web-based Teaching

**514 Development of a capstone course in dairy herd management.** D. K. Combs\*, G. E. Shook, and M. C. Wiltbank, *University of Wisconsin-Madison*.

During the last 8 years we have developed a three credit course that is designed around troubleshooting nutrition, genetics, reproduction, and milk quality on commercial dairy farms. Early in the semester, class-room activities center on discussion and case studies that utilize principles of Total Quality Management (TQM) to assess processes and critical control points on dairy farms. In the first month, pairs of students are teamed with a nutrition consultant who identifies a farm for

the students. Farms are selected by the consultant and faculty based on availability of records, interest of the dairy producer, and nature of the management issues likely to be encountered. The students and consultant form a working team, and make the initial farm visit together. Students arrange subsequent farm visits directly with the producer. By mid semester, students present a written report and an oral presentation to the class that gives an in-depth evaluation of each of the four disciplines for the farm they are working on. The consultant, fellow students, and faculty critique the student's farm evaluation. Discussion after the mid-term presentation helps students select a key issue that appears to be most limiting on their farm. Issues addressed by students have included: nutritional metabolic disorders, forage quality, business plans for anticipated expansions, reducing somatic cell counts, and reducing calving intervals. At the end of the semester, the students generate a letter to the producer and give a final oral presentation to the class, producer, and faculty that analyzes critical data on the current situation, possible new strategies, and estimated economic consequences. The consultant, producer, fellow students, and faculty evaluate the presentation and plan. Consultants involved with the course have been enthusiastic about participating again. Detailed student evaluations of the course have been very positive. The TQM approach has helped to focus students on actual data and production processes rather than stereotyped solutions. The use of a team of students, consultants, and farmers to bring current farm cases back to the class has allowed more in-depth analysis of multiple farms than visits to farms by the entire class.

**Key Words:** Teaching, Dairy management, Total quality management

**515 Practical Broiler Production - A hands-on approach to student learning.** J. C. Hermes\*<sup>1</sup>, <sup>1</sup>*Oregon State University, Corvallis, OR.*

Classroom teaching in a lecture format has been the traditional method of teaching of undergraduate students. This method is used for most of an undergraduate's credit load for courses as diverse as American History, English Literature, Biochemistry, Genetics, and Poultry production. To enhance student learning, some courses have a laboratory section which may or may not be required. In some instances, laboratories may or may not give students a sense of the "real world" with real questions to investigate or they may be simply show and tell. We know that students learn best by doing, and many students prefer a hands-on approach to learning compared to the traditional lecture format. To address student interest we have developed "Practical Broiler Production," a completely hands-on course to teach not only the science but also the art of producing poultry meat.

Beginning with a student suggestion, we began a completely hands-on educational experience for our students. Partnering with local industry groups, companies, and individual broiler producers, donations of money and equipment were raised to retrofit an underused poultry research building into a typical broiler house. With the generous support of Foster Farms, our facility is currently a contract producer of about 4600 broilers each term. Students are the growers, making management decisions and learning in the "real world", an experience that can be compared with an industry internship. It is our hope that because of the hands-on nature of this course, our students will be better prepared to move from their academic experience into industry by increasing their credibility with company representatives and producers.

**Key Words:** Teaching, Broiler production, Hands-on education

**516 Oregon State University's Steer-A-Year program: integrating classroom learning and hands on experience.** C. J. Ackerman\*, D.W. Weber, and R. L. Dickson, *Oregon State University, Corvallis, OR.*

The Steer-A-Year course is designed to provide classroom and hands-on experience, industry-student interaction, and student group problem-solving opportunities. It is a cooperative agreement between the Department of Animal Sciences and the Oregon Cattlemen and Cattlewomen's Associations. Steers are donated to the program by beef producers, fed a high concentrate ration to a target BW and condition, and marketed as either carcass or retail beef. After feed and management expenses are deducted, the Department of Animal Sciences distributes one-half of the profit towards beef facilities improvements and the other half is distributed to the donor's choice of either the Oregon Cattlemen or Cattlewomen's Association. Approximately 30 steers have been donated to the program annually each of the past eight years. The donor receives

regular updates regarding steer performance during the feeding period and carcass data following harvest of the animal. Students and instructors feed and manage the steers. The instructor uses classroom time to provide information to enable students to make informed management decisions. Officers are elected from within the class each term. Student officers are responsible for ensuring that cattle are managed and fed appropriately and they lead the class in putting together and sending out regular producer updates. A facet of the class that is evolving is in the area of processing and marketing. Steers are sold locally through the Animal Sciences Meats Lab. Students are encouraged to participate in a separate course in which they process the steers into retail product. In this manner, students in the project have the opportunity to be involved in procurement, management, processing, and marketing. The course is challenging for the instructor as it requires management of lecture material, cattle health and feeding, producer and employee rapport, and student participation to ensure annual success of the program in terms of student learning and public relations. The course is very well received by students, most of whom have labeled it as a great learning experience.

**Key Words:** Cattle, Beef, Finishing

**517 Quantification of learning in animal nutrition: An assessment of teaching.** R. S. Kensinger\*, *Penn State University.*

Institutions of higher education are in an era of greater scrutiny with regard to the use of public funds. Teaching programs in Universities should be both creative and rigorous in nature. In order to achieve this goal, there is a need to develop methods that better quantify the quality of instruction. A method of evaluation was used to evaluate teaching of an introductory course in animal nutrition. The method used a simple examination that was given, unannounced, on both the first and last day of class. The examination included only 20 questions, required less than 10 minutes to complete, and was used to evaluate acquisition of information. All students were informed that the exam had no bearing on their grade for the class. Over 400 students have participated in use of this evaluation tool. Mean class performance on pre-exams has been 7.1/20 compared to mean of 13.4/20 on the post-exam ( $P < .01$ ) demonstrating significant acquisition of information. Data from this exercise show that previous knowledge is important, as there were significant positive correlations between pre-examination score and final class average ( $r = .416$  to  $.543$ , depending upon the semester,  $P < .01$ ). Furthermore post-examination score was a very good predictor of final class average, as correlations range from  $.660$  to  $.678$  (all  $P < .01$ ). The few students (about 1%) who did not show significant improvement were characterized by poor attendance, or problems with their attitude about the course; which had been documented prior to completion of the semester. It was concluded that this simple tool could be used to quantify learning in the classroom. It could be useful to evaluate instructional approaches used by the instructor. It places the emphasis on the student rather than the instructor, and it has demonstrated that learning is an incremental process.

**Key Words:** Teaching, Evaluation, Animal nutrition

**518 An integrative approach to teaching advanced undergraduate non-ruminant animal nutrition.** N. L. Trottier\* and J. Perez-Laspiur, *Michigan State University.*

With the growing number of undergraduate students in the animal science field, it is becoming increasingly challenging to teach courses that supply both theoretical and applied based knowledge. In addition, it is a concern of both faculty and industry that animal science students graduating with a nutrition emphasis may not possess sufficient applied based knowledge across farm animal species. A non-ruminant animal nutrition course for advanced undergraduate students has been developed at Michigan State University to enhance application in nutritional diversity. While 75% of the students have equine interests, the course covers three major species categories, i.e. swine, poultry, and equine, with equal emphasis. Each laboratory (lab) category utilizes the same lab format. Week one is devoted to teaching and discussing feed ingredients and nutrient requirements for the species in question via the web based National Research Council. The second week focuses on teaching diet formulation using manual techniques, computer based programs and models. The lab practicum (prac) is conducted during the third and fourth week. Students learn to allocate animals to different experimental

diets, collect biological samples, and record data. During the fifth week, a group discussion of the results is conducted. Students are responsible for retrieving the lab information and the compiled data from the web prior to participating in the discussion. The swine lab consists of evaluating the effect of fat supplementation on lactational performance and milk composition in lactating sows. The objective of the poultry lab is to evaluate the effect of feeding diets deficient methionine concentration on egg production in laying hens. The poultry lab prac is conducted over a 10-day period. The equine lab consists of testing the effect of feeding a legume hay versus a grass hay on the nitrogen balance of the horse. Students work in groups of four, and rotate every 6 hours over a 5-day collection period. Students are required to submit a complete report for each lab category. The lab report is written following a guideline provided on the web. Reports must integrate the knowledge gained from diet formulation and lab prac results, and theory learned in class.

**Key Words:** Nutrition, Laboratory, Teaching

**519 Utilization of small-group special species projects to facilitate undergraduate applied animal nutrition learning experiences.** J.R. Carpenter\*, *University of Hawai'i at Manoa, Honolulu, HI USA.*

Over the past five years, the use of a small group "Special Species Project" has been adopted as a major learning component for our undergraduate applied animal nutrition course. This philosophy was adopted to assist students in: 1) addressing the desired CTAHR graduation competencies, 2) fulfilling their writing intensive course requirements, 3)

## PSA Environment and Management: Composite Group

**520 Interaction of feeding program and space on broiler breeder egg production.** J. Brake\*, *North Carolina State University, Raleigh, NC USA.*

Broiler breeder pullets (Cobb 500 FS) were placed in 12 pens, each of which contained 12 Kuhl DH-4 38 cm (15-inch) diameter feeders. There were 19 pullets per pan in all pens to 14 weeks of age. Density was 6.9 birds per square meter. Pullets were randomly removed from all pens at 14 weeks of age to achieve either 15 or 18 pullets per pan to 22 weeks of age. This gave densities of 5.4 or 6.4 birds per square meter. During the rearing period pullets were fed on either a Low, Medium, or High program that provided 24,240 kcal ME and 1296 g CP, 26,020 kcal ME and 1391 g CP, or 27,780 kcal ME and 1485 g CP, respectively, at 21 weeks of age. With the exception of space, feeding and management were identical among the treatments following movement to breeding quarters and photostimulation at 22 weeks of age. Early egg production responded positively in a dose-related manner to feeding program but no overall difference was observed due to space. Inspection of the interaction revealed little effect of space on the High or Low programs but an obvious improvement in egg production due to more space on the Medium program. These data suggest that space has little effect when all pullets are nutrient deficient (Low) or nutrient replete (High) but has a measurable effect on egg production when cumulative nutrition is marginal.

**Key Words:** Feeder Space, Floor Space, Density

**521 Early protein intake influences long term egg production by broiler breeder hens.** R.J. Lien\*, J.B. Hess, and W.D. Berry, *Auburn University, Auburn, AL.*

A total of 800 Cobb 500 strain broiler breeder hens provided either high or low protein intake to 4 wk of age were subsequently provided equal allotments of the same feeds through 65 wk to determine long term effects on egg production. Feeds containing 2860 Kcal ME/kg and either 19(high) or 15%(low) CP were provided *ad libitum* to 2 wk, in limited daily allotments to 3 wk, and in limited allotments on 4 of 7 d/wk during wk 4. Allotments were adjusted so total feed intake to 4 wk was 0.95 kg/bird in both trts. This resulted in total CP intakes to 4 wk of 142g (low) and 180g (high). Equal allotments of a 15% CP developer feed were provided both groups on 4 of 7 d/wk from 4 to 21 wk and daily from 21 to 23 wk. A photoschedule of 8h L:16h D was provided to 21 wk and 15h L:9h D was provided from 21 to 65 wk. Peak feed allotments of 159 g/hen/d were provided from 29 to 32 wk. Allotments were then decreased 4.0 g/hen/wk for 2 wk, and 0.9 g/hen/wk thereafter. At

developing their interpersonal and communication skills by working in small groups of 2 or 3, 4) developing research and problem-solving abilities, 5) applying principles of ration balancing, 6) enhancing computer skills and use of computers in diet formulation, and 7) improving public speaking skills. Because of the intensity of the course and the small class size (only 20 students), it has been very successful during the brief time it has been implemented. The class has encompassed the following species: equine, bovine, ovine, caprine, avian, porcine, canine, feline (both companion and exotic), marine mammals (dolphin and monk seal), and various aquatic species (both carnivorous and herbivorous fish and crustaceans). Since the students are involved in species assignment, there is genuine interest, increased energy, enthusiasm, and the desire to learn. So many undergraduates are raised in urban settings, lacking the practical experiences and exposure to animal production and companion/zoo-related industries, their feeding programs and specialized equipment/facilities. Students contact industry and community representatives and become aware of the diversity of animal nutrition as a career. In the course, students are also exposed to critical review of scientific journal articles and the use of the internet, popular press, and other sources of information as resources. They frequently express appreciation for the practical application of principles and special skills learned in previous lectures/labs. Although much of the effort is guided, there still is flexibility for the students to complete requirements within the semester time constraints. Challenges of the course will also be discussed.

**Key Words:** Small group active-learning, Applied animal nutrition, Instruction

4 wk, BW of high and low CP trts were 577 and 540 g, respectively. However, BW of the 2 trts did not differ from 9 to 65 wk. At 65 wk, mean BW was 3.87 kg. Feed consumption rate was greater in the high trt at 4, 6 and 8, but not 10 wk. Bone in breast wt, shank and keel length, and carcass moisture, CP and ash were all greater in the high trt at 4 wk. Fat pad wt and carcass fat were greater in the low trt at 4 wk. There were no differences in carcass composition at 21 or 30 wk. Uniformity was greater in the high trt at 4 wk; however, no differences were seen at 21, 25 or 30 wk. Age at onset of lay did not differ between trt. Total egg production/hen at 65 wk were 157 and 141 in the high and low treatments, respectively. Egg production did not differ between trt from 25 to 35 wk. However, from 36 to 45, 46 to 55, and 56 to 65 wk, egg production/hen in the low trt was reduced by approximately 4, 5 and 5 eggs, respectively. Egg wt and specific gravities did not differ between trt. Increased early CP intake had no measureable long term effects on BW or carcass composition, but resulted in greater post-peak and total egg production by breeder hens.

**Key Words:** Broiler Breeder, Protein Intake, Egg Production

**522 Body weight management and performance of broiler breeder males.** Wallace Berry\*<sup>1</sup>, Pingbo Liu<sup>1</sup>, Haitao Li<sup>1</sup>, and Alex Peterson<sup>1</sup>, <sup>1</sup>*Auburn University Department of Poultry Science.*

Complex feeding programs for broiler breeders require intensive management. Underestimation of feed allotments can permanently damaging fertility. To avoid this, males are often allowed to become too large. One possible strategy to reduce these risks is to restrict growth early to keep the birds below the usual body weight targets while still allowing growth. This would provide an increased margin of error between actual growth and the desired growth targets. To test this strategy, male chicks in the Small group were full fed standard 22% broiler starter until they reached 1.2 lbs average body weight. Chicks in the Large group were full fed starter until they reached 1.9 lbs body weight. When the chicks in each group reached target body weight, they were switched to a 12% protein rearing diet and fed to maintain positive growth rates and body weight divergence through week 21. At 21 weeks of age, the male birds were placed with females in pens in a curtain sided, slat/litter breeder house. The ratio of females to males was 10:1. Lighting schedule was arranged to provide 14 hours of light with an increase of 15 minutes of light each week to a maximum of 16 hours light. Body weights were measured every 4 weeks. Weekly fertility was monitored by breakout of eggs following 7 days of incubation. Every fourth week eggs were incubated to