

Teaching

292 Teaching an applied swine nutrition and feeding management course using WebCT. G.C. Shurson*, J.S. Knott, M.J. Spiehs, B.J. Rae, and J.A. Renteria, *University of Minnesota, St. Paul, MN.*

We developed a Web-based applied swine nutrition and feeding management course for undergraduate and graduate students in animal science. The course is managed through WebCT at the University of Minnesota at <http://webct.umn.edu>, and is designed to be completed in fifteen weeks (6 to 8 hrs/wk). Each of the 39 lessons is primarily text-based, but most lessons have illustrations, graphs, data tables, and/or photos that help the student visualize key points. At the end of each lesson, there are several study questions for the student to use in reviewing key points of the lesson. These questions are also helpful for students preparing for each of the five exams. Exams are taken "on-line" during designated times mutually agreed upon by the students and instructor. Along with the exams, there are 14 problem sets related to practical nutritional decisions that can be printed, completed, and resubmitted electronically to the instructor for comments and grading. Students are able to download swine diet formulation software from the course Web

site for use in completing many of the problem sets. The course Web site features a chat room where students can ask questions of the instructor and other students, and the responses can be viewed by all who are enrolled in the course. In addition, students can track their exam and problem set scores, and their current course grade on the Web site. The course is also linked to all of the major feed industry Web sites to allow easy access for students who are interested in learning more about career opportunities in the feed industry. Using a Web-based course offers unique opportunities and challenges for both the instructor and the students compared to using more traditional learning environments. When students were asked if they were satisfied taking this course on the Web, 29% were very dissatisfied, 14% were dissatisfied, 14% were uncertain, and 43% were satisfied. Some of the major reasons for students being dissatisfied with this Web-based learning environment included spending too much time learning to use the technology, inadequate computer skills, and lack of adequate computer hardware and software on their personal computers.

Key Words: Teaching, Web-based, Nutrition

Undergraduate Student Competitive Research Papers

293 Development of a multiplex microsatellite marker panel for whole genome scans in sheep. B. Mote*¹ and B. Freking², ¹*University of Nebraska, Lincoln*, ²*USDA, ARS, U.S. Meat Animal Research Center.*

A primary objective of genome scans is to estimate the location of genes influencing a trait of interest using uniformly spaced informative genetic markers. Initial scans are typically conducted with an intermarker distance of approximately 20 cM. The sheep genome is reported to span 3500 cM for 26 autosomes and 130 cM for the female map of chromosome X. Multiplex amplification reactions decrease costs and time to conduct whole genome scan studies, but panels of markers which amplify together are not readily available for sheep. Microsatellite markers available from published ovine genetic maps were first sorted by annealing temperature and average product size, then arranged into groups of three primer pairs for amplification tests. Markers from chromosome 18 were excluded due to previous extensive mapping efforts associated with callipyge research in the population of interest. A total of 155 multiplex amplification reactions, with 465 unique primer pairs, were tested on sheep genomic DNA resulting in 57 successful duplex and 18 successful triplex marker sets. The current marker sets flank 2865 cM of the sheep genome. Seventeen chromosomes have been sufficiently covered to achieve the initial scan objective. With a targeted goal of 208 uniformly spaced markers, these results have reduced the number of reactions and gel lanes needed per animal from 208 to 115, or 55% of the previous number of marker reactions and gel lanes necessary for complete coverage. Average heterozygosity of the parental generation of the target resource population was 65.2%. It may be necessary to fill in gaps with additional markers where marker informativeness is low. This panel of markers can be a valuable resource for the sheep gene mapping community.

Key Words: Sheep, Microsatellites, Multiplex

294 Flocculation of swine manure: influence of flocculant, rate of addition, and diet. L. Flatow*¹ and W. Powers¹, ¹*Iowa State University.*

Manure was collected from growing pigs fed one of 11 diets varying in total and available phosphorus content. Reduced phosphorus diets were amended with feed additives intended to improve availability of phytate phosphorus. Diets were replicated over three feeding periods resulting in collection of 33 manure samples. During the course of the three feeding periods average pig weight increased from 22 kg to 48 kg. Actual dry matter and phosphorus content of each collected manure sample were determined. Ten g of each collected manure sample was diluted to a final volume of 1 L, producing a solution with average solids content of 0.24% total solids, and poured into Imhoff cones. Five flocculants plus a control were added, at each of three concentrations, to the diluted mixtures and allowed to settle for 10 minutes followed by a second

10-minute settling period. Volume of settled material was recorded following each settling period. At the end of the second settling period (20 min total settling) supernatant was poured off and frozen for future phosphorus analysis, and settled solids were weighed and dried for total solids determination. Mass of solids settled was measured. Mass of phosphorus settled was calculated as the differences between the P content in the 10 g originally added to the Imhoff cone and the g P in the supernatant. Results indicated that $Al_2(SO_4)_3$ and $FeCl_3$ were the most effective flocculants. Little improvement was observed when the flocculant was added at a concentration of 625 mg/L compared to 250 mg/L. Both flocculants recovered over 85% of solids and over 70% of the phosphorus. Addition of $Al_2(SO_4)_3$ at a concentration of 625 mg/L increased phosphorus removal to 90%. Diet and feeding period were significant influences on results. As the pigs aged, manure phosphorus was more soluble, possibly explaining the observation that less phosphorus was settled in feeding period 3 compared to phosphorus settled in feeding periods 1 and 2. Removal efficiency of total solids and phosphorus with flocculation was predicted quite well using developed equations ($r^2 = 0.86$ and 0.84 , respectively). As producers consider nutrient management options, feed-to-field strategies should be implemented.

Key Words: Manure, Flocculation, Phosphorus

295 Effects of manure storage time and filling scheme on odor and headspace analysis using simulated manure storage pits. S. Bastyr* and W. Powers, *Iowa State University.*

Dilute swine manure, approximately 11% dry matter, was stored in constructed 2-L vessels for up to 91 d. Initiation of vessels was staggered to allow for simultaneous evaluation of manure stored for varying time periods. Vessels were filled, in duplicate, under two filling schemes; either filled completely on d 0 (SF) or filled over the course of 10 wk by adding 200 ml per wk (WF). On d 70, 34 vessels were operational. Once weekly, cotton swatches were placed in each vessel cap overnight for evaluation by human panelists using triangular forced-choice methodology. Each panelist assigned an odor score, on a scale of 1-10, to identified swatches ($n=3736$). Headspace contents of each vessel were analyzed, weekly, by gas chromatography (GC-MS) and with a Cyranose 320 32-sensor electronic nose. Vessel contents were sampled for compositional analysis when each vessel was terminated. Results indicate that odor score was affected by days stored ($P=0.002$), increasing until approximately d 42 before leveling off, and filling mode ($P=0.008$). An interaction between filling mode and days stored was significant; swatches from the WF vessels had lower scores than swatches from the SF vessels until approximately d 49. Of the 32 analytes quantified using GC-MS, dimethyl disulfide and 4-methylphenol were best correlated to odor. Correlations were, however, low ($r < 0.30$). A prediction equation from headspace concentrations of analytes produced an r^2 value of 0.18. The odor predictive capability of the electronic nose was similar ($r^2 = 0.20$). Given panelist variation, it is likely that the predictive capability of any