

× 4 latin square, balanced for carryover effects. The isoenergetic diets contained 16.0, 17.3, 18.8, and 19.5% CP as a percent of DM, and the rumen degradable (RDP) and rumen undegradable protein (RUP) concentrations were arranged in a factorial design (10.0 and 12.5% RDP and 5.6 and 8.1% RUP as a percent of DM). There was no effect ($P>0.05$) of CP concentration on rate (g/d) of urea recycling, urea transferred to the GIT, or urea returning to the blood from the GIT. Of the urea transferred to the GIT, the proportion utilized by the microbes was also unaffected by CP concentration. Analysis of the RUP and RDP factorial identified tendencies for greater urea transfer (g/d) to the GIT with the low RDP diets ($P=0.08$), and for greater return of recycled urea to the blood (g/d; $P=0.10$). The blood urea N (BUN; mg/dL) was lowest for the low RDP diets but low BUN did not decrease transfer of urea to the GIT. As a proportion of urea transferred to the GIT there was more returned to the blood ($P=0.05$) with the high RUP diets, and a tendency ($P=0.11$) for more urea utilization by the rumen microbes with the low RUP diets. There was no difference in the liters of blood cleared of urea by the kidney per day per kg body weight indicating that any regulation of recycling is not at the kidney. We did not observe ruminal urea transporter (bUT-B2) expression changes. The rate of transfer of urea across the rumen wall appeared to be independent of rumen and blood urea concentrations, thereby increasing the proportion of BUN and rumen ammonia N (RAN) transferred when low protein diets decrease the BUN and RAN concentrations.

Key Words: Urea Recycling, Rumen Degradable Protein, Rumen Undegradable Protein

993 Nitrogen excretion and utilization efficiency in dairy sheep fed diets with different dietary energy contents. V. Giovanetti¹, M. Decandia¹, F. Boe², E. Zerbini³, A. Cannas², and G. Molle^{*1}, ¹*Istituto Zootecnico e Caseario della Sardegna, Olmedo, Sardinia, Italy*, ²*Dipartimento di Scienze Zootecniche, Università di Sassari, Sassari, Sardinia, Italy*, ³*Cargill Animal Nutrition, Spessa, Italy*.

The aim of this study was to evaluate a) the effect of different dietary energy content on fecal N excretion (FNE), urinary N excretion (UNE)

and N utilization efficiency (NUE), and b) the relationships between milk urea N (MUN) and the above variables in Sarda dairy ewes. Two experiments were carried out using mid lactating (E1) and late lactating (E2) dairy ewes (n=5 per treatment), kept in metabolic cages and fed 8 pelleted diets with different main ingredients: Corn Meal (CM), Wheat Middlings (WM), Corn Flaked (CF), Barley Meal (BM), Corn Cobs (CC), Beet Pulp (BP), Alfalfa (AA) and Soybean Hulls (SH). The diets ranged from low (1.26-1.53 Mcal/kg DM) to high (1.72-1.84 Mcal/kg DM) NEL contents, and had high CP concentration (on average 18.4 % DM). The lowest energy diet (AA) showed a trend to higher N excretion and MUN and lower NUE (Table 1). Pooling all data, a close positive relationship was found between UNE and MUN ($R^2=0.94$), while FNE was positively related to NDF and negatively to NFC ($R^2=0.82$ for both). A negative relationship between MUN and NUE was also found ($R^2=0.58$). It is concluded that diets with a high energy content can reduce overall N excretion and increase NUE in dairy sheep. In addition, MUN can be effectively used to predict urinary nitrogen excretion and NUE.

Table 1.

Diets	CM	WM	CF	BM	CC	BP	AA	SH
NEL Mcal/kg DM	1.79	1.72	1.84	1.72	1.53	1.76	1.26	1.47
FNE g/d	E1 9.6 ^d	10.8 ^{cd}	11.5 ^{cd}	10.9 ^{cd}	20.3 ^{ab}	14.5 ^{bcd}	16.4 ^{bc}	23.8 ^a
	E2 6.1 ^c	nd	8.1 ^{bc}	12.2 ^{ab}	18.0 ^a	16.5 ^a	16.5 ^a	16.5 ^a
UNE g/d	E1 16.5 ^{bc}	17.5 ^{bc}	14.3 ^c	15.5 ^{bc}	24.9 ^{ab}	16.3 ^{bc}	29.5 ^a	22.2 ^{ac}
	E2 17.9 ^b	nd	17.8 ^b	22.0 ^b	22.0 ^b	21.4 ^b	38.0 ^a	24.3 ^b
MUN mg/dl	E1 15.6 ^c	18.1 ^{bc}	15.6 ^c	16.9 ^{bc}	22.6 ^{ab}	16.2 ^{bc}	26.7 ^a	20.3 ^{ac}
	E2 17.6 ^c	nd	17.9 ^c	21.5 ^{bc}	21.0 ^{bc}	18.1 ^c	34.0 ^a	26.2 ^b
NUE %	E1 18.5 ^{ac}	21.9 ^{ab}	23.9 ^a	21.7 ^{ab}	13.8 ^{cd}	21.3 ^{ab}	12.6 ^d	16.9 ^{bd}
	E2 20.3	nd	16.2	16.9	10.7	14.1	9.7	15.1

a, b, c, d: within rows differ ($P<0.05$).

Key Words: N Utilization, Milk Urea, Sheep

Teaching/Undergraduate & Graduate Education: Swine Teaching

994 Enrollment in swine classes at 49 four-year institutions during academic years 1998-99 to 2005-06. D. E. Reese*, K. M. Eskridge, and D. A. Travnicek, *University of Nebraska, Lincoln*.

Concern over enrollment decline in swine classes (SC) at some institutions was discussed at a North Central Region Animal Science department head meeting in 2003. The lack of quantifiable nation-wide enrollment information prompted an effort to collect SC enrollment data from 49, four-year US institutions. Enrollment data was obtained for each institute's SC beginning with the 1998-1999 academic year (AY) though 2005-2006. If no enrollment was reported, follow-up contact was made to discern whether 1) the SC was offered but not taught due to low enrollment (LE), 2) the SC was not offered (NO), 3) the SC was scheduled not to be offered (SNO), or 4) no SC existed.

Regression analyses were performed with AY as the independent variable to test if the slope was zero for number of students enrolled, percent of SC that were taught (SCT), percent of institutions experiencing LE, percent of institutions experiencing NO, percent of institutions experiencing SNO, and percent of institutions teaching a SC with < 10 students enrolled. Forty-one institutions had a SC during 1998-99 to 2002-03; forty had a SC from 2003-04. The number of SC ranged from 43 to 46 depending on the AY. Enrollment in SC and the percent of SC that were taught decreased from 1998-99 to 2005-06 (see table). More institutions that had a SC did not offer their SC in 2005-06 vs. 1998-99, while those teaching their SC with < 10 students was stable. These results demonstrate that low enrollment and course offering issues exist with SC at many institutions.

Table 1. Swine class enrollment and offerings

AY	No. students	SCT,%	LE,%	NO,%	SNO,%	<10 students,%
98-99	914	84	2	2	7	20
99-00	893	80	7	2	5	32
00-01	839	85	7	0	10	39
01-02	778	74	17	2	10	24
02-03	679	67	12	12	12	29
03-04	662	71	13	8	13	30
04-05	668	68	10	8	18	33
05-06	808	73	8	10	13	20
Slope:	-29.7 ^b	-2.1 ^b	0.7	1.4 ^b	1.4 ^a	-0.2

^aP<0.01, ^bP<0.05.

Key Words: Swine, Teaching, Enrollment

995 Regionalization of teaching efforts? - Midwest Poultry Consortium experience. M. M. Beck*¹ and B. C. Wentworth², ¹Clemson University, Clemson, SC, ²University of Wisconsin, Madison.

In 1993, faced with declining poultry programs at Midwestern universities and decreasing numbers of graduates with training in poultry science, a group of poultry producers, processors, and allied industry executives formed the Midwest Poultry Consortium (MPC) for the express purpose of supporting a regional teaching program. Faculty and administrators at the University of Wisconsin were instrumental in the development and implementation of the Midwest Poultry Science Undergraduate Center of Excellence (COE), to which initially 13 universities contributed funds and committed faculty time. With a representative of each university in attendance (the Coordinating Council) in 1995, a two-summer, six-course academic program was developed. Industry members of the MPC pledged their assistance and assurance in securing internships for students before and/or after the classes. Funding obtained from MPC members provides student travel to and from Madison, dorm room costs, in-state tuition, and course supplies and materials; and travel, a per diem, and accommodations in the UW Extension hotel for faculty. Faculty salary is not covered. Credits transfer back to home institutions. Nineteen students attended the 1st COE in Madison, WI, in 1996; ten years later, some 188 students have attended COE classes. A 2005 survey of students through 2004, with a response rate of 58%, showed that ~58% of respondents had completed all six courses; 64% had had at least one internship. Of those 1996-2000 COE participants currently employed in the poultry industry, the average salary is \$46K (range \$20K-\$95K) in contrast to \$39K (range \$15K-\$75K) for those not employed in the industry. Faculty participation has been remarkably constant and industry support has not wavered. A strength of the program is the very tight camaraderie that develops among the students and that continues as they move into industry positions in the poultry industry. In 2001, the Midwest Poultry Research Program was initiated to address issues of importance to the Midwest poultry industry.

Key Words: Regionalization, Teaching, Midwest Poultry Consortium

996 Regionalization of swine teaching efforts. D. J. Meisinger*, US Pork Center of Excellence, Ames, IA.

The mission of the US Pork Center of Excellence (USPCE) is to add value to the pork industry by facilitating research and learning for U.S. pork producers through national collaboration. The USPCE is bringing states together in a collaborative mode to accomplish many things in research, teaching and extension. Regionalizing swine teaching is definitely within the purview of the USPCE strategy. The first tool of the Center is the Pork Information Gateway (PIG), a virtual library of resources for pork producers and educators. Another tool available only to educators is PIGMAP or the PIG media asset portal which contains a large number of images. PIG will provide a convenient repository for all teaching materials allowing educators involved in teaching swine classes an opportunity to draw upon a wealth of material as they prepare lesson plans. The images would be a great addition to this body of material as well. Another related program being proposed by the USPCE is the concept of regional swine schools. These schools would provide for specific student centered instruction in pork production at central locations allowing the students to return to their respective universities to conclude their education. Much of the curricula developed for these schools would be made available to all swine class instructors through the PIG website to enhance their ability to teach modern pork industry practices, strategies and philosophies. The USPCE is poised to offer swine class instructors an opportunity to draw upon many resources as they prepare their lesson plans and build their curricula. This concept of assembling all the materials critical to preparing young people for future careers in the pork industry is sound and should be supported.

Key Words: Swine Teaching, Swine Curricula, Swine Instruction

997 Student perceptions of and enrollment in swine management courses at North Carolina State University. W. L. Flowers*, North Carolina State University, Raleigh.

The Department of Animal Science has surveyed incoming freshmen and graduating seniors for the past 10 years. None of the incoming freshmen (n=140 per year) have an interest in swine. In contrast, 10 to 15% of the graduating seniors (n=100) list swine as their primary species of interest or indicate they have accepted a position in the swine industry. Exposure to pigs early during a student's academic program and a senior-level management course that focuses on problem-solving appear to be two factors that foster this change. Both courses are taught by the same instructor. All freshmen are required to take the introductory animal science course. This course has two laboratories that focus on swine. One is a behavior laboratory, which is the first scheduled laboratory. Students participate in quantifying behavioral interactions between sows and piglets. During a subsequent laboratory, students assist sows during farrowing and obtain blood samples from weaned pigs. Course evaluations indicate that the laboratories dealing with swine are the student's favorite. Access to sows and piglets and participating in events in which students felt they contributed to the animal's well being are the two common reasons given. The senior-level management course is a departmental elective with enrollment capped at 30 students. Examinations require students to work in groups to solve simulated problems. Students have to analyze production records and identify problems. For each problem, they are required to gather information that will help them explain its cause(s). They have to rely on their own observations of the farm; data that they collect such as ventilation efficiency, feed intake, or semen quality; data that

they can request such as feed analyses, necropsy reports, or serology profiles; and questions they can ask of the employees. Previous exposure to swine in the introductory course and the interactive nature of the examinations consistently rank as the main reasons students enroll in the senior-level swine management course.

Key Words: Swine, Teaching

998 A survey of student demographics enrolled in a distance education swine production class. R. D. Goodband* and B. C. Minshal, *Kansas State University, Manhattan.*

Kansas State University is one of the few universities where enrollment in its swine production class, Swine Science, ASI 535, has gradually increased over the past 5 years. While enrollment in the on-campus class has remained steady at approximately 22 students in both fall and spring semesters, the gradual increase in student numbers has been a result of the introduction of a distance education, internet-based class. The on-campus and distance education classes are virtually identical in course content, with the exception that the distance class does not have a laboratory. As a substitute for laboratories, a DVD with video footage of some of the on-farm activities is distributed. Also, the distance education class is designed for students to work at their own pace. Since spring of 2002, there have been 221 students who have taken the on-campus class (57% of students in the fall semester and 43% in the spring), whereas 64 students have taken the distance education class which is offered in fall (25%), spring (45%) and summer (30%) semesters. Of these distance education students, 37% are male and 63% female. Sixty seven percent are KS residents and 33% from other states. Of students enrolled, 56% are also full-time KSU students concurrently enrolled in on-campus classes. The other 44% are only taking classes from KSU via distance education (not enrolled in any on-campus classes). In the spring and fall semesters, 44% are on-campus students and 54% are not. However in the summer semester, 84% are full time KSU students. This suggests that on-campus students want to take classes during the summer semester when traditional animal science classes are typically not offered. It may also suggest a trend in more students wanting to take classes year round compared with the traditional fall/spring semester system. Distance education classes appear to offer scheduling flexibility, especially during the summer semester for students to complete their degree programs.

Key Words: Distance Education, Swine Production, Teaching

999 Teaching swine production as a capstone experience in the writing intensive curriculum. T. J. Safranski*, *University of Missouri, Columbia.*

From 1998-2006 the senior level Swine Production course at the University of Missouri was taught by the same instructor as a Capstone Experience in the Writing Intensive (WI) curriculum. For WI status assignments are reviewed and meet guidelines set by the Campus Writing Board to ensure rigor and include revision and critical thinking. Writing skills are learned using the 'writing across the curriculum' concept, with students required to take one lower level WI class and one upper level WI class within their major. One writing class is required. Completion of one Capstone Experience is also required. Departmental guidelines require students complete two production courses choosing among Swine, Beef, Dairy, Poultry and Horse; four of the five are WI; all are Capstone. Swine Production was cancelled once with enrollment of six (1999). Otherwise enrollment ranged from 11 (2001) to 46 (2004) and averaged 26.1 students. Although assignments evolve, in 2006 there were 14 assignments, seven of which involved multiple drafts. Four of these seven involved developing a five year plan for a commercial farm working in instructor-assigned teams. Papers total a minimum of 33 pages of writing; most students write more. Many papers are short and used to force students to consider issues prior to class discussion. Normally less than 15% of students are enrolled specifically to meet the WI requirement. Student evaluations indicate the writing is not perceived as excessive. The most common complaint is coordinating teams, although the Farm Plan is also normally rated among the two best assignments of the class. Besides writing, other activities students often praise include the required one or two day field trips to commercial farms and an optional job shadowing experience. Rarely have more than 20% of students been to a swine farm. Teams prepare a 10 minute seminar on their field trip experience and present to the rest of the class. Incorporation of writing into a senior level Swine Production course may enhance student learning. It requires significant time investment for grading by the instructor.

Key Words: Swine Production, Teaching, Writing