

locations (IL, n=48; IN, n=28; MI, n=24; OH, n=24) were weaned at approximately 100 d of age and randomly assigned by age and weight to one of two ionophore treatments with 2 pens/treatment; 1) 150 mg·hd⁻¹·d⁻¹ MON for the initial 100 d on feed, and then 263 mg·hd⁻¹·d⁻¹ MON thereafter, 2) 60 mg·hd⁻¹·d⁻¹ LP for the initial 100 d on feed, and then 105 mg·hd⁻¹·d⁻¹ thereafter. Similar diets were fed at each location (1.41 Mcal/kg NEg with 16% CP for the initial 100 d on feed and 14% CP thereafter). Steers were harvested when average estimated backfat thickness for all cattle at a location was 1.0 cm. No interactions (P>.10) were observed between ionophore treatment and feedlot location. Similarly, no differences (P>.10) were observed between ionophores for feedlot performance, mortality, liver abscess scores or condemned livers. Morbidity rates were not different (P>.10) between treatments (76.7%), but differed (P<.05) across locations (74.0, 100, 33.3, 100%; IL, IN, MI, OH). Carcass traits were not different between treatments (P>.10), but LP tended (P=.07) to increase dressing percentage compared to MON (60.3% vs. 59.7%). For the overall feeding period, location affected (P<.05) ADG, DMI, and G/F (1.30, 1.56, 1.69, 1.64 kg/d ADG; 5.53, 8.11, 7.85, 7.30 kg/d DMI; .23, .18, .21, .22 G/F for IL, IN, MI, and OH, respectively). Carcass quality grades were highest (P<.05) for steers fed at MI, while yield grades were numerically lowest (P<.05) for steers fed at IL. Results of this study indicate that early weaned steers fed high concentrate diets supplemented with either LP or MON will have similar feedlot performance and carcass characteristics. However, high morbidity rates in this study may have influenced performance results.

Key Words: Laidlomycin propionate, Monensin, Early weaned steers

71 Effects of milk replacer feeding rate and concentration on performance and economics in Holstein heifer calves. D. R. Catherman*¹, ¹Strauss Feeds, Watertown, WI.

Eighty four Holstein heifer calves (average 39.9 kg BW) were utilized in a study to evaluate the effects of milk replacer (MR) feeding rate and concentration on performance and economics. Calves were allotted to one of four treatment groups and fed a 20% protein, 20% fat MR as follows: treatment 1, 454 g/d at 12.5% solids; treatment 2, 681 g/d at 12.5% solids; treatment 3, 681 g/d at 18.75% solids; and treatment 4, 1022 g/d at 18.75% solids. Calves were weaned at 35 d and feed intake was recorded for 42 d. Water and starter grain (18% protein, 3% fat) were offered free choice from d 3. Total MR intakes were 13.8, 17.8, 17.7 and 21.0 kg for treatments 1 through 4, respectively. Total starter intakes were 32.2, 27.8, 33.8 and 26.8 kg for treatments 1 through 4. Starter intake tended to decline with increasing MR intake within a concentration, but when increasing concentration within the same feeding rate, starter intake was numerically greater. Weight gains between 0 and 21 d were lower (p<.05) for treatment 1 (7.0 kg) than for treatments 2 (9.8 kg), 3 (9.9 kg) and 4 (10.4 kg). Weight gains from 21 to 42 d were not different and averaged 10.3 kg. Overall weight gains were not different, but tended to be greater with increasing MR feeding rate and concentration (17.7, 18.9, 20.1, and 21.6 kg for treatments 1 through 4). Feed to gain ratios tended to decrease with increasing feeding rate. Feed cost per kg of gain was \$1.51 for treatment 1, \$1.69 for treatment 2 and \$1.67 for treatments 3 and 4, and were not different. Scour scores and cost and number of medical treatments were not different between groups. Based on these data, increasing MR feeding rate tended to increase weight gain. Increasing concentration from 12.5% to 18.75% within the same feeding rate resulted in slightly greater weight gains and a numerically higher starter intake. This may be related to gut fill. The data suggest that increasing concentration of MR is needed when increasing feeding rate.

Key Words: calves, milk replacer, feeding rate

72 University of Missouri Southwest Research Center Pasture-Based Seasonal Dairy. S.A. Hamilton*¹, T.R. Rickard, R.A. Crawford, R.D. Young, B.J. Steevens, and C.W. Davis, ¹University of Missouri.

A demonstration management intensive grazing (MIG) dairy was designed and constructed on the University of Missouri SW Research Center in 1998. The establishment of this MIG dairy was a partnering effort of dairy industry, local producers and the University of Missouri. Objectives of the grass based dairy were to evaluate the viability of a MIG operation, the use of a grass vegetative filter as a means of treating the effluent from the parlor, compare various forage species and demonstrate

a high throughput milking facility. The grazing system consists of 74 acres of improved and non-improved forages. Forty-six heifers (goal of 65) were milked the first year. Heifer breeds were Holsteins, Jerseys, and crossbreds. Local producers donated approximately one third of the heifers with the remainder being purchased. Heifers were bred to freshen in early spring (February-April) and dried off in mid-December. Milk shipped the first year was 10,853 pounds/heifer with average grain consumption of 13.3 pounds/day. Operating profit (not including P&I or capital replacement) was \$714 per heifer and \$444 per acre with cost of production \$9.70/cwt milk. The parlor, a modified New Zealand type double-10 swingline, was selected to demonstrate the simplicity in design and rapid throughput to reduce operator-milking time. Parlor design allows producers to adopt the basic concept and construct according to their needs. Effluent is collected from the parlor and deposited in two 2000-gallon tanks and spread over a two-acre paddock using a travelling gun. Holding pen waste is hand-scraped to a concrete structure. Data collection for the waste is ongoing. An advisory committee of dairy producers and extension specialists provide recommendations on forage species and research/demonstrations to be conducted. Data collected from this station can be very instrumental on the sustainability of the dairy industry in the region. Producer workshops are held to demonstrate forage management practices.

Key Words: Management Intensive Grazing, Dairy, Seasonal

73 Survey of dietary phosphorus levels in TMR-fed dairy herds. S.L. Gunderson*, J.L. Keuning, and K.A. Erb, University of Wisconsin-Extension.

Twenty dairy herds enrolled in the AgSource DHI testing program were selected for a survey of the nutrient levels of high group and dry cow diets. Herds were located in five counties in northeast WI. Herd size ranged from 40 to 1,280 cows, with an average 246 cows. The RHA for milk, fat, and protein ranged from 9,374 to 12,403 kg/yr, 339 to 440 kg/yr, and 273 to 358 kg/yr, respectively. All herds were fed a TMR. Eleven herds were housed in tie-stalls and nine herds were housed in free-stalls. High group and far-off dry cow rations were analyzed by wet chemistry analyses for DM, CP, Ca, P, and K. Special emphasis was placed on dietary P due to the environmental consequences associated with this nutrient. High group P levels ranged from .37% to .50% averaging .46%. Far-off dry cow P levels ranged from .27% to .48% averaging .36%. Average dietary levels of CP%, Ca%, and K% were 18.5, .96, and 1.39, respectively for high group rations and 15.4, 1.00, and 1.62, respectively in the far-off dry cow rations. Fourteen of the herd owners surveyed indicated they were familiar with research showing P levels can be reduced without sacrificing milk and reproductive performance in dairy cows. High group dietary P levels decreased from an average of .52% to .47% in ten of the dairy herds over a two year period from 1998 to 2000.

Key Words: Phosphorus, Dairy cows, Nutrition

74 Illinois Lean Growth Project. Utilizing on-farm field research to develop prescription swine feeding and management regimes. D.J. Jennings*¹, G. Hollis¹, D. Oswald¹, E. Ballard¹, R.K. Knipe¹, D. Seibert¹, A.P. Schinckel², and M.D. Tokach³, ¹University of Illinois, Urbana, ²Purdue University, West Lafayette, Indiana, ³Kansas State University, Manhattan.

As profit margins tighten it becomes imperative that swine producers obtain accurate, farm-specific biological and economic performance data. Management, health, and environment account for large differences in performance, thus producers find value in moving beyond traditional book values for nutritional regimes. The objectives of the Illinois Lean Growth Project (ILGP) are to 1) demonstrate the value of farm specific amino acid levels to optimize biological and economic returns, 2) model farm specific data (ADG, feed intake, composition of gain) interfaced with economic conditions to determine optimum harvest weights, and 3) develop environmentally responsible feeding protocols that minimize urinary and fecal nitrogen excretion by reducing excess dietary nutrients. The ILGP utilizes real-time (B-mode) ultrasound (RTU) to capture farm specific data. RTU measurements can be used to accurately predict composition of growth and lysine:calorie ratios in grow-finish pigs. Determining lysine:calorie ratios ensures the right amount of lysine is provided in diets that vary in energy density. Once accurate data is established it is integrated into a model and used

to generate farm specific decision aids. A biological model for grow-finish pigs was constructed using the STELLA research dynamic modeling software. The model utilizes farm specific data, which interfaces with an adjustable economic model allowing quick access to graphical results. One example of practical use is analyzing net profit along a range of harvest weights while changes occur in cost of feed, sale prices, and overhead. The ILGP more accurately assesses composition of gain, corrects overfeeding of nutrients, and more precisely positions phase feeding. Research suggest a 12% reduction in nitrogen and phosphorus excretion when phase feeding is positioned correctly.

Key Words: Grow-finish model, On-farm, Swine

75 The effects of housing system and physical environment on post-weaning pig performance. M. E. Larson* and M. S. Honeyman, *Iowa State University.*

A series of six trials involving a total of 1,440 nursery pigs (average initial body weight of 6.7 kg) were conducted at two Iowa State University research farms from December 1999 to August 2000. Three small-scale hoop structures (6 × 10.8 m) were divided lengthwise to form two pens (3 × 4.5 m) per building for a total of six pens. Six pens (1.7 × 4 m) in a mechanically ventilated confinement nursery were used for comparison with the bedded hoop structure pens for each 5 wk trial. In each trial, 240 crossbred pigs were weaned 18 to 22 d of age and allotted by weight and litter to six pens found in either the hoop (n=120) or confinement (n=120) nursery facility. During the first 3 trials, heated hovers were placed in each hoop pen to provide additional heat and protection from drafts. Four commercial diets were fed to pigs in both housing systems. The pigs in hoop structures grew 23% slower ($P < .001$) and consumed 23% less feed ($P < .001$) and were less efficient ($P < .001$) than the pigs in confinement during the first 2 wk post-weaning. Both housing systems had similar ADG ($P > .55$), ADFI ($P > .35$) and G/F ($P > .10$) for the last 3 wk of the trial. In all seasons, the ADG and ADFI were decreased for the first 2 wk post-weaning. During the winter, the pigs in hoop structures grew 5% slower, consumed 10% less feed, but were 5% more efficient than the pigs in confinement ($P < .05$). In the spring, the pigs in hoop structures grew 7% slower ($P < .05$), consumed 7% less feed ($P < .05$), and had similar feed efficiencies ($P > .23$) as the pigs in confinement during the 5 wk trial. During the summer, the pigs in hoop structures grew 2% faster, consumed 6% less feed, and were 8% more efficient than the pigs in confinement for the 5 wk trial ($P < .05$). Bedded hoop structures have not been widely studied as a cold nursery facility. It may be beneficial to wean 1 wk later in the colder months when the pigs are heavier. Further trials adjusting bedding, heat source, hovers, feeders and management may improve growth performance.

Key Words: Early Weaned Pigs, Hoop Structures, Growth

76 A two year summary of finishing-pigs' performance in hoop structures and confinement during winter and summer in Iowa. M. S. Honeyman*, J. D. Harmon, M. E. Larson, and A. D. Penner, *Iowa State University.*

Four trials were conducted over two years involving 2,249 pigs. Two summer trials and two winter trials were conducted from June 1998 to May 2000. The objectives were to document the performance of finishing pigs in hoop structures during summer and winter in Iowa, and to compare it with pig performance in confinement. For each trial, three groups of pigs were placed in three (9.1m × 18.3m) cornstalk bedded hoop structures (150 pigs per group). The fourth group was placed in six pens in a mechanically ventilated confinement building with slatted floors (22 pigs/pen). The pigs weighed 15.5 kg at the start of the trials and were fed corn-soy diets until weighing 115-117 kg. The pigs were scanned at 110 kg. Overall, the pigs in hoop structures ate 5% more feed, grew 3% faster and were 3% less efficient than pigs in confinement ($P < .05$). Overall, the pigs in hoop structures had 7% more backfat, 5.5% smaller loineyes ($P < .01$), and lower yield (1.3 percentage units) than pigs in confinement. Bedding use was 93 kg/pig in summer and 107 kg/pig in winter. In summer, pigs in hoop structures ate 3% more feed, grew 5% faster, had 12% more backfat, but did not differ in feed efficiency or loineye size compared to the pigs in confinement. In winter, the pigs in hoop structures ate 7% more feed and feed efficiency was 8% poorer, but there was no difference in growth rate, backfat thickness or loineye size compared to the pigs in confinement. The cold hoop environment encouraged the pigs to consume more feed and probably caused

the pigs to transfer feed energy from growth to maintaining body temperature. Pig mortality was lower in summer (2.8 vs. 3.7%) but higher in winter (5.0 vs. 3.1%) in hoops compared to confinement. Cull pigs were higher in the hoops during both seasons: summer (5.0 vs. 3.1%) and winter (5.7 vs. 2.0%). This may have been due to the larger hoop group size (150 vs. 22). Additional research is needed to improve feed efficiency and leanness of pigs fed in hoop structures.

Key Words: Finishing pig performance, bedded hoop structures, pig leanness

77 Composition and regulation of targeted growth of the neonate: implications for feeding systems and post-weaning management. M.E. Van Amburgh*, J.M. Smith, and J.N. Tikofsky, *Cornell University.*

A series of experiments have been conducted over the last four years to describe the composition and hormonal regulation of growth of Holstein calves from birth to approximately 105 kg bodyweight (BW). Diaz et al. (accepted) conducted a study to evaluate the effect of three different treatment growth rates (560, 973 and 1100 g/d, respectively) on body composition from birth to 105 kg BW, under conditions where protein intake was not limiting growth. Slaughter data from all treatments demonstrated that the energy and protein retained by the calves on this study was higher than would be described by the prediction equations of the 1989 Dairy NRC and average net deposition of CP and fat were 140 and 44, 204 and 154, and 247 and 161 g/d for treatments 1, 2 and 3, respectively. A follow-up study was conducted to evaluate the effect of source of energy on composition of growth under conditions of isocaloric and isonitrogenous intake. Three treatment diets ranged from 14.8 to 30.6% fat and 55.3 to 35.4% lactose, respectively. Intakes were isocaloric ($P = 0.63$) and isonitrogenous ($P = 0.79$) and rates of gain (680 to 710 g/d) were not different ($P = 0.66$). However, empty body fat was greater for calves consuming more fat ($P \leq 0.006$) with no change in the apparent partial efficiency of use of fat ($P = 0.44$) or protein ($P = 0.39$). Data demonstrate changes in body composition independent of growth rate. To better understand regulation of early growth based on age and level of nutrient supply, the ontogeny of the growth hormone (GH)/IGF-1 axis was investigated. Calves were from Diaz et al. study. Expression of the liver specific growth hormone receptor 1A was apparent in calves by 25 days of age weighing 65 kg BW. Based on circulating IGF-1, calves responded to a GH challenge at 65, 85 and 105 kg of BW in a dose dependent manner consistent with nutrient intake. Data from a follow-up study indicated that calves fed conventional rates of milk replacer did not respond in a similar manner and suggest that the GH/IGF-1 axis can be modulated early in life.

Key Words: calves, growth, development

78 Practical heifer rearing for lifetime production. C. Park*, *North Dakota State University.*

The future of the livestock industry (especially dairy) depends largely on a sound rearing program for replacement heifers. The success of feeding and management programs for replacement heifers must not only be measured in terms of efficiency of body growth, but, more importantly, must be assessed by the milk-yield potential of the heifer. The capacity to produce milk in turn is largely influenced by the degree of mammary development. We have studied compensatory growth using a stair-step compensatory nutrition regimen which is a rearing scheme with a unique combination of alternating dietary energy restriction and realimentation (re-feeding) phases. The basic concept of the compensatory nutrition regimen is to exploit the nature of both dietary energy restriction and the compensatory growth phenomenon in concert with one or more hormone-dependent allometric phases of mammary development (i.e., peripuberty through gestation). We have examined various models for developing dairy and beef heifers, gilts, and rats. General observations are that our multi-step feeding regimen improves not only heifer development but also growth of the mammary gland and lifetime lactation performance. While our multi-step feeding program has been proven effective for heifer rearing, a simple one-step gestation model appears to be more adaptable by livestock producers and animal scientists. Furthermore, recent research data strongly suggests that