× 2 factorial with main effects of piglet origin: 1) control sows, and 2) sows receiving 1 g/kg of MOS during lactation, and dietary treatment: 1) basal diet (control), and 2) basal diet with MOS at 2 g/kg in prestarter and 1 g/kg in starter diets. The experimental design was applied in both the prestarter (28 to 44 d of age) and the starter (44 to 60 d of age) periods. Nutritive value of the diets was 2.5 Mcal NE/kg and 14.8 g/kg lysine for prestarter, and 2.5 Mcal NE/kg and 13.3 g/kg lysine for starter, and were based on barley, corn, and wheat. Data were analyzed as a completely randomized block design with piglet origin and dietary treatment as main effects and weaning weight as a covariate. For the overall period (28 to 60 d of age), piglets coming from sows eating MOS during their lactation period grew more than piglets from control sows independently from their dietary treatment after weaning (339 *vs* 363 g/d; P<0.05). On the other hand, piglets supplemented with MOS tended to have better feed conversion ratio than control piglets independently from their origin (1.50 *vs* 1.39 g feed/g gain; P=0.059). No interactions were detected between main effects for any of the parameters studied. It was concluded that: i) the supplementation of lactation diets with MOS improved growth of piglets during the post-weaning period with independence of dietary treatment within this period, and ii) addition of MOS to post-weaning piglet diets improved feed efficiency.

Key Words: Mannan Oligosaccharides, Lactation, Piglets

254 Impact of spray-dried plasma with or without antimicrobials on nursery pig performance. P. Srichana*[1], A. M. Gaines[1], B. W. Ratliff[1], G. L. Allee[1], J. D. Crenshaw[2], J. M. Campbell[2], J. D. Quigley[2], and L. E. Russell[2], [1]*University of Missouri, Columbia,* [2]*APC Inc., Ankeny, IA.*

An experiment was conducted at a commercial research site to evaluate the impact of spray-dried plasma (SDP) with or without antimicrobials (AM) on nursery pig performance. A total of 792 pigs (TR-4 × C22; 5.66 ± 0.05 kg) were used in a completely randomized block design with 6 replicate pens/treatment and 22 pigs/pen. Growth performance was evaluated during four dietary phases: Phase 1 (d 0-7), Phase 2 (d 7-14), Phase 3 (d 14-28) and Phase 4 (d 28-50). Diets were formulated to contain 1.60% and 1.50% total lysine in phase 1 and 2, respectively and 1.42% and 1.32 % true digestible lysine in phase 3 and 4, respectively. Treatments were as follows: 1) 0% SDP without AM (d 0-50); 2) 0% SDP with AM (d 0-50); 3) SDP (6% Phase 1, 3% Phase 2, 1.5% Phase 3, 0.75% Phase 4) without AM; 4) same as treatment 3 with AM; 5) SDP (6% Phase 1, 3% Phase 2); 6) same as treatment 5 with AM. For diets containing AM, the Phase 1 and 2 diets contained 3000 ppm ZnO and 55 ppm Mecadox, while Phase 3 and 4 diets contained 27.5 ppm Mecadox and 100 ppm $CuSO_4$. In Phase 1, pigs fed SDP and (or) AM had improved ADG (P < 0.05) as compared to pigs not fed SDP. Improvements in ADG were due to improvements in ADFI (P < 0.05). In Phase 2 and 3, pigs fed AM had improved (P < 0.05) ADG, which was due to improvements in ADFI (P < 0.05). In Phase 4, SDP and (or) AM did not improve growth performance. For the combined phases, growth performance was improved only by AM (P < 0.05). Pigs fed AM were 9.5% heavier at the end of the nursery period as compared to pigs not fed AM. There were no differences among treatments for within-pen coefficient of variation for initial or final BW. Collectively, these data indicate that SDP dramatically improves feed intake and weight gain of pigs the first week postweaning, while AM inclusion improves overall nursery performance.

Key Words: Spray-Dried Plasma, Antimicrobial, Pigs

255 Effect of flaxseed fractions and sub-therapeutic antibiotic inclusion on microbial ecology in small intestine of growing pigs. L. F. Smith*[1], R. T. Zijlstra[2], M. D. Drew[1], and A. G. Van Kessel[1], [1]*Department of Animal and Poultry Science, University of Saskatchewan, Saskatoon, SK, Canada,* [2]*Prairie Swine Centre Inc., Saskatoon, SK, Canada.*

Increasing pressure to discontinue the feeding of growth-promoting antibiotics has prompted examination of novel feed ingredients and their effect on intestinal microbial ecology. The impact of antibiotic inclusion, flaxseed, or flaxseed fractions on small intestinal microbial profiles was investigated in growing pigs. Eighteen ileal-cannulated barrows (33.1±2.4 kg) were fed one of six diets (A, basal diet with wheat, peas and soybean meal, 3.40 Mcal/kg DE and 2.65 g dig. lysine/Mcal DE; B, basal diet plus 20% ground flaxseed; C, basal diet plus 18% ground hot-water extracted flaxseed; D, basal diet plus 4% ground flaxseed hulls; E, basal diet plus 8% flaxseed oil; F, basal diet plus 22 mg/kg tylosin phosphate) during each of three 18-d periods in a change-over design for a total of nine observations per treatment. Experimental periods included 16 d for diet acclimatization and ileal contents were collected on d 17 and 18. Diets were provided in a wet mash form at 2.8 x maintenance. Approximately 100 ml of ileal digesta was collected in plastic bags containing N_2 following the AM-feeding. Serial dilutions were prepared in sterile peptone and plated on selective media for enumeration of total aerobes and anaerobes, *Clostridium perfringens*, *Lactobaccillus* spp., *Bifidobacterium* spp., *Streptococcus* spp., and Enterobacteria. Data were analyzed using the repeated measures procedure in SPSS. *Lactobaccillus* spp. plate counts were 7.97, 8.13, 8.52, 7.95, 8.41, and 8.40 log cfu/g for diets A through F respectively, and were increased (*P*#88040.05) by flaxseed hulls, oil, and tylosin. Diet composition did not affect plate counts for any other growth media employed. Inclusion of tylosin increased the number of lactobacilli in pig ileum contents as reported by others. Flaxseed fractions also affected ileal bacterial colonization; however, precise identification of compositional changes will require molecular based analyses.

Key Words: Flaxseed, Antibiotic, Pigs

Production, Management and the Environment: Health and Miscellaneous

256 The use of statistical process control capability indices to estimate subclinical mastitis prevalence and new infection rates. J. Lukas*[1], M. L. Kinsel[2], and J. K. Reneau[1], [1]*University of Minnesota, St. Paul,* [2]*Agricultural Information Management, Ellensburg, WA.*

The objective of this study was to calculate a capability index (Cpk) measuring the capability of a herd to meet a desired SCC standard based on the BTSCC (bulk tank somatic cell count) and determine its correlation with subclinical mastitis prevalence (SM) and new infection rate (NIR) estimates. BTSCC data collected daily or every other day for 12 months (January until December 2003) from 694 Minnesota dairies were used to compute the linear score.The mean of individual values, and the average moving range was used to calculate four different Cpk indexes (Cpk400, Cpk500, Cpk600, Cpk750 based on the 400000, 500000, 600000, 750000 SCC standards, respectively) for each of the herds. The SM and NIR values of 272 herds on the Minnesota DHI program were transformed by natural log, merged by farm name with the Cpk indexes and used to examine the relationship between the calculated Cpk indexes and SM and NIR (dataset three, n=269). One hundred eighty herds from dataset three were randomly selected, linear regression models were developed and validated by taking the SM and NIR values observed for the remaining 89 herds and regressing them against the SMe (estimated subclinical mastitis values) and NIRe (estimated new infection rates) calculated from the four linear regression models that were developed. High R^2 values (0.70, 0.64, 0.58, 0.49 for SM vs Cpk400, Cpk500, Cpk600, Cpk750, respectively) indicated a strong correlation between the BTSCC and herds SM. According to models developed, SM in herds that are able to meet the SCC standard (Cpk ≥ 1), is less or equal to 26%, 30%, 34%, 38% for the 400000, 500000, 600000 and 750000 standard, respectively. The relatively low correlations between NIR and Cpk indexes (R^2=0.34, 0.31, 0.28, 0.24 for NIR vs Cpk400, Cpk500, Cpk600 and Cpk750, respectively) indicate that the single DHI test day estimate of NIR was insufficient to accurately describe NIR dynamics.

Key Words: BTSCC, Subclinical Mastitis Prevalence, Statistical Process Control

257 Evaluation of the DHI hot list as a tool to reduce bulk tank somatic cell counts. J. E. Belsito*, A. de Vries, and R. P. Natzke, *University of Florida, Gainesville.*

Many dairy producers in the Southeast find it difficult to keep their bulk tank somatic cell count (SCC) below the legal limit (750,000 cells/ml) throughout long periods of hot weather. DHI has developed a hot list to assist farmers in identifying high SCC cows in the herd. The hot list identifies the 20 cows that are the greatest contributors of SCC to the

bulk tank on the test day. This list was developed to assist producers in making decisions to cull, treat, withhold milk, or early dry-off to reduce the bulk tank SCC. The objective of this study was to determine the repeatability of cows on the DHI hot list from test day to test day and draw conclusions about its value for the dairy producer. DHI records that have been collected from 1989 (300 cows) to 2001 (500 cows) from one farm tested monthly were analyzed. The herd manager never used the SCC data to make management decisions. The 20 cows on the hot list accounted on average for 46.4% of the cells in the bulk tank (SD 7.7%). Cows on their first test day after calving had a 6.6% (SD 5.7%) chance of being on the list. Second test day cows had an 8.1% (SD 6.2%) chance of being on the hot list while third test day cows had a 7.6% (SD 6.4%) chance. Of the cows that were on the hot list in any given month, 27% (SD 12%) were on the list the following month, 60% (SD 13%) were tested but dropped off the list and 14% (SD 10%) had missing data (not tested). Cows that were not on the hot list had only a 3% (SD 1%) chance of being on the list the following month, 81% (SD 7%) were tested and stayed off the list and 16% (SD 7%) had missing data. If culling decisions were based on the hot list we would expect to observe a higher percentage of cows on the hot list with missing data the following month. We concluded that cows on the hot list did not persistently have the highest SCC in subsequent months. These results indicated that refinement is needed to make the hot list a more valuable tool for the dairy producer.

Key Words: Somatic Cell Count, Hot List, Repeatability

258 Evaluation of the Association between Bulk Tank Somatic Cell Count and Management Practices on U.S. Dairy Operations; Results from the NAHMS Dairy 2002 study. J. E. Lombard[1,2], R. P. Dinsmore[2], J. R. Wenz*[2], and C. Tapp[2], [1]*USDA:APHIS:VS; Centers for Epidemiology and Animal Health, Fort Collins, CO,* [2]*Integrated Livestock Management, Colorado State University, Fort Collins*.

The National Animal Health Monitoring Systems Dairy 2002 study surveyed dairy operations in 21 states representing 82.8% of U.S. dairy operations and 85.5% of U.S. dairy cows. Producers completed two separate interviews between December 2001 and July 2002. Producers were asked to estimate their mean bulk tank somatic cell count (BTSCC) for the three months prior to the second interview. Responses from 916 operations were represented in the analysis. Variables from both interviews having a priori potential for an association with BTSCC were identified and examined by chi-square testing (SAS, PROC FREQ). Variables with $p<0.2$ were used to construct two logistic models using 200,000 and 400,000 BTSCC as cut-offs between groups(SUDAAN, PROC RLOGIST) Significant variables (p value of Wald F statistic <0.10) were retained. Percentage of operations reporting $<$ 200,000; 200-400,000; or $>$ 400,000 BTSCC was 24, 62 and 16 percent, respectively. Operations in the Southeast region of the U.S. were significantly more likely to have higher BTSCC compared to other regions. Higher rolling herd average milk production, having a closed herd and use of shredded newspaper as bedding were associated with lower BTSCC in both models. Milking procedures typically associated with decreased risk of mastitis such as teat disinfection were not retained in either model, except for forestripping prior to milking which was associated with higher BTSCC compared to operations that didnt forestrip any cows. These results of producer reported data suggest our understanding of the association between management practices and BTSCC may be incomplete.

Key Words: Milk, SCC, Management

259 Comparison of paired milk and serum ELISA for diagnosis of Johnes disease in dairy cattle. J. E. Lombard*[1,2], T. Byrem[3], and B. J. McCluskey[1], [1]*USDA:APHIS:VS, Centers for Epidemiology and Animal Health, Fort Collins, CO,* [2]*Integrated Livestock Management, Colorado State University, Fort Collins,* [3]*Antel Biosystems, Inc., Lansing, MI*.

Paired milk and serum samples from 35 dairy herds in 17 states were evaluated for cow level and herd level test agreement. Evaluation of 6,349 paired samples suggested moderate cow level agreement between the milk and serum ELISA with a calculated kappa value of 0.50. At both the cow and herd level, the milk ELISA performed equivalent to the serum ELISA using conventional, radiometric and non-radiometric culture methods as a reference for Johnes disease. Cow level sensitivity (Se) and specificity (Sp) on 21 dairy operations with 2,173 animals were evaluated. The relative cow level Se and Sp of the milk ELISA was 21.2 percent and 98.6 percent, respectively. Cow level relative Se and Sp of the serum ELISA was 23.5 percent and 98.1 percent, respectively. Logistic regression models revealed no association between parity and testing ELISA positive. Milk ELISA tests were more likely to be positive in the first 2 weeks of lactation and then after week 28 of lactation, while cows greater than 45 weeks in lactation were most likely to test positive with the serum ELISA. Milk production at or above herd average was negatively associated with testing ELISA positive. Substantial agreement between ELISA methods at the herd level was found with kappa values greater than 0.6 for comparisons using 1 animal testing positive or greater than 2 percent ELISA prevalence to consider a herd infected. With fecal culture as the reference, point estimates for herd-level Se and Sp for the milk ELISA ranged from 55-83 percent and 67-100 percent, respectively, depending on the ELISA prevalence cutoff. Serum ELISA estimates were similar with Se ranging from 61-83 percent but Sp remained at 33 percent for both prevalence cutoff values. The milk ELISA performed similar to the serum ELISA and has the advantage of decreased labor costs on farms that use DHIA milk testing services.

Key Words: Johne's, Milk ELISA, Diagnostics

260 Financial costs of Johne's disease on U. S. dairy operations. J. E. Lombard*[1,2], B. J. McCluskey[1], S. L. Ott[1], and F. B. Garry[2], [1]*USDA:APHIS:VS;Centers for Epidemiology and Animal Health, Fort Collins, CO,* [2]*Integrated Livestock Management, Colorado State University, Fort Collins*.

Dairy production records from 38 herds in 16 states were evaluated for mature equivalent (ME) 305 day milk, fat and protein production, ME maximum milk, lactation number, days in milk, days open, and average lactation linear score to determine current lactation marginal costs associated with serum ELISA test status for Johnes disease (JD). A mixed effects model was used to account for herd level clustering with production parameters as dependent variables. Significant production losses associated with JD in dairy cattle included decreased milk production in those animals that tested strong positive by serum ELISA, decreased pounds of milk fat production in those animals that tested strong positive and decreased days in milk for the inconclusive and strong positive compared to the negative and positive test group. Lactation milk production was approximately 6000 pounds less for cows that tested strong positive compared to test negative cows, resulting in a $720 decrease in potential gross milk revenue. Information on animal removal from herds was evaluated using logistic regression models. Relative herd milk production, lactation number, body condition score and serum result were covariates in the models. Prior to producer knowledge of test outcome, cattle with elevated antibody levels were not at a significantly increased risk of being removed from the herd after accounting for relative herd milk production. Cattle with strong positive and positive test results were at a significantly increased risk of removal, even after adjusting for relative herd milk production once results were released to herd owners. Based on the results of this financial study, cattle that test strong positive on a serum ELISA test for JD should be considered for removal from the herd.

Key Words: Johne's, Dairy, Economics

261 Financial drivers of profitability in dairy businesses. B. J. Hilty*, L. A. Holden, and J. Hyde, *Pennsylvania State University, University Park*.

Return on assets (ROA) is an important indicator of dairy farm profitability. Although profitability is affected by many factors, ROA is driven by two financial characteristics, financial efficiency and capital efficiency. The operating expense ratio (OER) and asset turnover ratio (ATR) are primary indictors of financial and capital efficiency, respectively. The objective of this study was to identify the primary drivers of profitability of dairy businesses. Financial data from 1998 to 2001 was collected from 46 Pennsylvania dairies through personal interviews. The dairies were nominated for the study by industry professionals. Average herd size of these dairies ranged from 241 cows in 1998 to 273 cows in 2001. Average annual milk production ranged from 20,442 pounds per cow in 1998 to 21,236 pounds per cow in 2001. Average ROA was summarized by herd size and quartile rankings for each year of the study. High profit (HP) dairies were defined as those dairies generating an ROA of 8.0 percent or higher in the year being examined. Although dairies of all sizes were in the HP group, herds greater than 400 cows consistently

generated ROAs greater than 8 percent. High profit herds were classified as capital efficient, financially efficient or a combination of each to varying degrees, with a management matrix. Three of twenty-one HP dairies in 1998 were capital efficient (ATR >.70), while seven were financially efficient (OER< 60%). In 2000, a year of lower milk prices, there were only twelve HP dairies. Of the twelve, two were capital efficient (ATR >.70) and two were financially efficient (OER < 60%). The remaining dairies in both years relied on a combination of capital efficiency and financial efficiency to operate at high profit levels. Several factors that impact financial efficiency, including milk production per cow, feed expense and labor expense, were also examined by profitability group. The HP dairies performed better, numerically, in each area than dairies in the low quartile ranking. High profitability in this non-random farm sample was achieved through various strategies.

Key Words: Dairy, Profitability, Management

262 Economic and environmental feasibility of a continuous four-year lactation model. D. L. Zartman*[1], C. A. Rotz[2], and K. L. Crandall[3], [1]*Ohio State University, Columbus,* [2]*USDA-ARS, University Park, PA,* [3]*DHI Computing Services, Inc., Provo, UT.*

More competitive dairy production systems are needed to improve the sustainability of our dairy industry. To test a perennial lactation concept, a set of 4,259 DHI records demonstrates that about 1% of dairy cows have produced over 20 kg/day for more than four years of continuous lactation. A dairy farm simulation model was used to evaluate the long-term performance, environmental impact, and economics of a conceptual typical dairy farm in Pennsylvania converted to a perennial system. In this system, cows lactated continuously for 4-yrs. Compared to a traditional 100-cow dairy farm with replacement heifers produced on the farm, use of 120 perennial cows with purchased replacements reduced supplemental protein feed purchases 11%, increased annual milk sales 20%, reduced manure production 17%, reduced soil N leaching loss 25%, and increased annual net return to farm management by $14,200 while maintaining a long-term phosphorus balance for the farm. Compared to a traditional 125-cow dairy farm where replacement heifers were purchased, use of 120 perennial cows with purchased replacements reduced supplemental protein feed purchases 12%, reduced annual milk sales 4%, reduced manure production 7%, reduced N leaching loss 7%, and increased the annual net return to farm management by $1,600. The economic feasibility of the perennial cow dairy farm was relatively insensitive to assumptions for herd replacement rate and cow mortality, moderately sensitive to milk and heifer prices, and very sensitive to the milk production maintained by the perennial herd. Thus, a perennial cow system can improve the economic and environmental sustainability of traditional dairy production if a similar level in annual milk production per cow can be maintained.

Key Words: Perennial, Lactation, Long-Term

263 Tracing pigs by using conventional and electronic identification devices. D. Babot[1,2], M. Hernández-Jover*[3], G. Caja[3], C. Santamarina[2], and J. J. Ghirardi[3], [1]*Area de Producció Animal, Centre UdL-IRTA Lleida, Spain,* [2]*Departament de Producció Animal, UdL, Lleida, Spain,* [3]*Universitat Autònoma de Barcelona, Bellaterra, Spain.*

With aim of evaluating the traceability achieved by different identification systems from birth to slaughter, a total of 1,032 pigs were used. Devices were: 1) plastic button ear tags (PET, n = 352); 2) half-duplex (EEH, n = 333) and full-duplex B (EEF, n = 347) electronic button ear tags; and, 3) half-duplex (IPH, 32 mm, n = 340) and full-duplex B (IPF, 34 mm, n = 335) intraperitoneally injected glass encapsulated transponders. Piglets were randomly assigned to treatments and reared under intensive conditions during suckling, growing and fattening periods and harvested in a commercial slaughterhouse. Readability of electronic devices was recorded during the farm period and throughout the harvesting process with full-ISO handheld transceivers. No negative effects or animal health alterations were reported after the identification. No differences (P > 0.05) in losses between devices were observed during fattening (PET, 2.7%; EEH, 3.8%; EEF, 3.8%; IPH, 1.3%; and, IPF, 2.1%), and no electronic failures were recorded except for the EEF (0.7%). Losses obtained during the harvesting process were greater (P < 0.05) for the EEF (5.7%) than the EEH (4.4%) and PET (1.7%), the two last not differing. Electronic failures during harvesting averaged 1.5% for both electronic ear tags. Intraperitoneal transponders were not affected by the harvesting process and 97.1% were recovered at evisceration. The rest (2.9%) were lost on the slaughterhouse ground and no transponders were found in carcasses. Intraperitoneal transponders showed the greatest traceability values (IPH, 98.7%; and, IPF, 97.9%), the last not differing from conventional ear tags (PET, 95.7%). The lowest traceability values were obtained with electronic ear tags (EEH, 90.6%; and, EEF, 88.6%). In conclusion, the intraperitoneal injection seems to be an efficient system for the identification and traceability of pigs in the food chain.

Key Words: Transponders, Traceability, Swine

264 Initial and terminal implant strategy for heavy weaned Canadian calves. K. S. Eng*[1], R. Bectel[2], and D. P. Hutcheson[3], [1]*Eng, Inc. San Antonio, TX,* [2]*Advance Agricultural Testing, Baden, ON, Canada,* [3]*Animal-Agricultural Consulting, Inc., Amarillo, TX.*

With recent implant clearances, a broad range of implant types of Estrogen (E) only or Estrogen-Tremblone Acetate (ETA) combinations and dose rates are available. This trial was designed to evaluate four different initial implants followed by two combination terminal implants. Experimental animals were approximately 400 head of heavy weaned steer calves weighting approximately 300 kg from Saskatchewan Canada. They were allotted at random at the beginning of the trial to pens of 8 head each and there were 6-12 reps per initial implant treatment. During the initial phase, the cattle fed were fed an intermediate energy ration consisting of silage, wet corn gluten, steamflaked corn and premix. The initial phase was terminated at 91 days, the cattle check weighed and re-implanted with a terminal combination implant of either Synovex Choice or Synovex Plus. During the final 112 day feeding period the cattle were fed a high energy ration consisting of the same ingredients and there were 15 pen reps (8 head) in each implant treatment.
The performance results are shown in Table 1. During the initial implant period, cattle receiving Synovex Choice gained more rapidly and tended to converted more efficiently. Calves receiving Synovex C consumed less feed, but had similar conversions. During the final implant phase, cattle receiving Synovex Plus compared to Synovex Choice gained faster and converted more efficiently. Carcass data was not obtained because problems associated with the occurrence of BSE, made it impossible to harvest of the cattle in a timely fashion.

Grow Phase Implant

	Synovex C	Synovex S	Revalor S	Synovex Choice	Probability
Day 0 BW, kg	297.1	304.4	318.0	320.7	NS
Day 91, kg	440.4	450.5	455.4	473.0	NS
ADG kg/day	1.57^{ab}	1.61^{ab}	1.51^{b}	1.67^{a}	0.015
DMI kg/d	10.1^{a}	10.5^{ab}	10.5^{ab}	10.8^{b}	0.115
Feed to Gain	6.43^{ab}	6.55^{ab}	6.97^{b}	6.42^{a}	0.135

Finish Phase Implant

	Synovex Plus	Synovex Choice	
Day 91 BW, kg	460.9^{a}	456.4^{b}	0.09
Day 203 BW,kg	655.9^{a}	630^{b}	0.05
ADG kg/d	1.67^{a}	1.66^{b}	0.05
DMI kg/d	10.7	10.6	NS
Feed to Gain	6.38^{a}	6.65^{b}	0.11

Key Words: Implant, TBA, Estrogen