

**M78 Preliminary study of daily gain in central station-tested Nelore bulls.** J.A.C. Pereira\*<sup>1</sup> and J. E. Chavez<sup>2</sup>,  
<sup>1</sup>Gabriel Rene Moreno University, <sup>2</sup>ASOCEBU.

The objectives of the study were 1) to investigate a method to base the selection of Nelore bulls on their growth performance in a grassing system under subtropical conditions, and 2) to determine the preferable trait to be used as a selection criterion in a central evaluation station. Each year approximately 1,500 weaned, young bulls were available to be tested. This number was restricted due to the physical limitations of the station. Therefore, each year, a pre - classification of the bulls was performed. Only young bulls with weaning weights above the herd average and acceptable conformation were selected. In this study data was collected on 130 young sires from different farms over four consecutive years. They were kept on pasture before and during the test (280 days). All the animals were managed under a rotational grazing system. The only *ad libitum* supplementation was mineral salt. During the test period the animals were weighted every 28 days. Six traits were measured; Birth Weight (BW), Beginning Weight at Test (BGT), Age in Days at the beginning of the Test (ADT), Daily Gain from birth to the beginning of the test (DG1), Daily Gain during the test (DG2) and the Final Weight at the test (FW). Harvey's least square program was used to analyze the data. The model used was the pre determined "model 1" of fixed effects. The results showed that BW, DG1 and FW were significantly different among farms and were not used as selection criteria. It is proposed to select bulls using their DG2 value, which is a preferable selection criterion because it was not affected by farm. The results also indicated that Nelore bulls might have great potential to be selected under grazing systems. The adjusted daily gain measured in the four consecutive years ranged between 0.658 and 0.726 grams per day. Further research should be performed including other effects such as dam's parity, in order to estimate the genetic performance more accurately. In addition, a new approach (testing on farms) should be investigated in order to include all the young bulls weaned each year.

**Key Words:** Grazing systems, Nelore, Daily gain

**M79 Setting up the Gelbvieh multiple breed evaluation.** A. Legarra\*<sup>1</sup>, T. Strabel<sup>2</sup>, J. K. Bertrand<sup>1</sup>, and I. Misztal<sup>1</sup>,  
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The Multiple Breed Evaluation for the Gelbvieh breed was developed, generally following ideas applied first in the Simmental evaluation by Cornell University. The main challenges for genetic evaluation were related to assumptions of grouping breeds to form super-breeds and fixing the (arbitrary) accuracy of the priors for heterosis and breed of founder genetic group effects. The data set did not allow for a correct estimation of all these effects, so priors were taken from literature. Genetic difference between Gelbvieh and Angus breed of founder priors were 26.5 (var=7.48E-05) and -3.7 (var=0.11E-05) kg for weaning weight and yearling gain respectively. Some results of the evaluation were strongly

affected by the priors, although results for Gelbvieh as the main breed stayed basically the same. Gametic trends for Gelbvieh were: 0.34 and 0.33 kg/year for weaning weight and 0.43 and 0.44 kg/year for yearling gain with or without priors, respectively. For Angus, trends were non-linear and about 0.10 and 0.32 kg/year for weaning weight and 0.71 and 0.67 for yearling gain with or without priors, respectively. As the number of pure-bred Angus animals in data was very low (97 out of 666,513) it seems that gametic trends for Angus were a mixture of the evolution of Angus genes in the Gelbvieh population and the original Angus population. Differences between Gelbvieh and Angus gametic average breeding value for year 1995 were 0.87 and 9.91 kg for weaning weight and -3.64 and -4.04 kg for yearling gain with and without priors, respectively. The results from the study indicate that estimation of genetic differences between breeds in current pure-breed associations data banks is very dependent on the weight given to the prior literature values relative to the data. More understanding on how results are influenced by priors and data is needed.

**Key Words:** Gelbvieh, Multiple breed evaluation, Genetic evaluation

**M80 Differences in growth trajectories in seven beef breeds.** J. Bohmanova\*<sup>1</sup>, I. Misztal<sup>1</sup>, and J. Pribyl<sup>2</sup>, <sup>1</sup>University of Georgia, Athens, GA, <sup>2</sup>Research Institute of Animal Production, Prague, Czech Republic.

The objective of this study was to estimate average breed growth curves and assess differences in growth performance between breeds and sexes. A total of 140,503 weight records from birth to 360 days on 60,284 animals provided by Czech Beef Breeders Association were used to compare growth of Charolais (14,340), Simmental (10,382), Angus (9,622), Limousin (6, 046), Hereford (16,362), Blond D' Aquitaine (2,020) and Piedmontese (1,512). Effects included in the model of analysis were herd, year and dam age class and regression on orthogonal polynomials nested within sex. Adjusted mean weight from birth to 360 days was estimated for heifers and bulls. All computations were by breed. Charolais bulls and heifers had the highest birth weights with 41 kg and 39 kg, respectively. Hereford bulls and heifers had the lowest birth weights with 30 kg and 29 kg, respectively. Simmental and Charolais were the fastest growing breeds, with bulls from these breeds weighing 484 kg and 467 kg at 360 days of age, respectively. Herefords had the slowest growth of all breeds. Simmental, Charolais, Angus and Blonde D' Aquitaine bulls had similar growth trajectories. Sex differences in body weight at 240 days of age ranged from 33 kg in Blond D' Aquitaine to 18 kg in Hereford. Growth of heifers slowed down considerably after 240 days of age. Angus and Piedmontese heifers stopped growing at 330 days. Bulls grew linearly till 270 days of age, after which their growth accelerated considerably. This increased growth after 270 days of age can be explained by an increasing proportion of records coming from bulls raised in test stations.

**Key Words:** Beef cattle, Growth, Breed differences

**Swine: Impact of Weight and Sex on Meat Quality, Effect of Age Management on Biochemical Parameters, Disinfectant, Gilt Selection and Sow Longevity**

**M81 Economic evaluation of sow longevity using data from commercial herds.** S. L. Rodriguez-Zas\*<sup>1</sup>, B. R. Southey<sup>1</sup>, R. Knox<sup>1</sup>, J. F. Connor<sup>2</sup>, J. F. Lowe<sup>2</sup>, and B. Roskamp<sup>2</sup>,  
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Sow longevity and lifetime production are critical determinants of the profitability of pork production systems. A study was conducted to assess the impact of genetic line on multiple indicators of sow longevity and production traits. Records from more than 100,000 sows in 32 US commercial herds across five years were analyzed using survival and mixed effect repeatability models. The variation among genetic lines was evaluated in biologic and economic units using the net present value per sow. Explanatory variables included herd, year of entry into the herd and genetic line. Significant differences in sow longevity and production traits were observed between genetic lines. Since the economic magnitude of the effect of sow longevity primarily depended on the discount rate and net income per litter per sow, all genetic lines were assumed to differ in the median longevity. Hence, the results from the economic analysis apply to the average sow from each genetic line. Assuming zero

discount rate per parity, the genetic line with longer herd life showed greater profit than genetic lines with the shorter herd life. Under these conditions and assuming a \$10 net income per litter, no genetic line was profitable. Assuming a \$50 net income per litter, the difference in net present value per sow between the highest and lowest lines for longevity was \$52.39 and the difference between the highest two lines for longevity was \$13.94. Assuming a \$10 net income per litter, the difference between the highest and lowest lines for longevity was \$10.48 per sow and the difference between the highest two lines for longevity was \$2.79 per sow. The difference in net present value between genetic lines was considerably reduced with increasing discount rates and was reversed with high discount rates and low net income per litter. The significant differences in sow longevity among genetic lines were not translated into substantial economic differences for the range of discount rates considered. Results from this economic analysis indicate that the manipulation of the genetic line composition of a herd is an important factor in the achievement of a profitable swine production.

**Key Words:** Economic, Survival, Swine

**M82 Gilt selection based on age at first estrus and breeding herd efficiency.** J. L. Patterson<sup>\*1</sup>, G. R. Foxcroft<sup>2</sup>, M. J. Pettitt<sup>1</sup>, and E. Beltranena<sup>1</sup>, <sup>1</sup>Prairie Swine Centre, Inc., Saskatoon, SK, <sup>2</sup>Swine Research & Technology Centre, University of Alberta, Edmonton, AB.

The impact of gilt selection based on age at first estrus on breeding herd performance was determined in 509 C22 and L42 (PIC Canada) gilts given direct daily contact with vasectomized boars from 140.1 ± 5.1 d of age and classified with respect to age at first estrus (Early: EP, 148.0 ± 0.5; Intermediate: IP, 159.8 ± 0.4; Late: LP, 175.7 ± 0.5 d; or Non-Responsive by 180 d: NR; P<0.05). For gilts in estrus by 180 d, breeding at third estrus resulted in differences in body weight at breeding (EP: 130 ± 2; IP: 143 ± 2; and LP: 153 ± 2 kg; P<0.01). Breeding rate (percentage of gilts on inventory eventually bred) was lowest for NR gilts (EP: 96.2; IP: 91.3; LP: 90.3; and NR: 72.3 %; P<0.01). Age at first estrus did not affect farrowing rate of gilts bred (EP: 92.0; IP: 93.6; LP: 92.1; and NR: 86.2 %; P≥0.05) or pigs born alive (EP: 10.0 ± 0.4; IP: 10.5 ± 0.3; LP: 10.3 ± 0.4; and NR: 9.7 ± 0.5; P≥0.05), but did affect pigs born dead (EP: 0.48 ± 0.17; IP: 0.45 ± 0.14; LP: 1.10 ± 0.17; and NR: 0.46 ± 0.21; P<0.01). Preliminary data from weaned, parity 1 sows indicate no significant effects on weaning-to-estrus interval (EP: 5.2 ± 0.6; IP: 6.0 ± 0.5; LP: 4.9 ± 0.6; and NR: 7.1 ± 0.8 d; P≥0.05) or percent sows rebred after weaning (EP: 91.7; IP: 80.6; LP: 83.6; and NR: 80.0 %; P≥0.05). However, estimates of cumulative non-productive days (NPD) per gilt originally on inventory, inclusive of NPD due to gilts and sows culled by d 18 after weaning, were EP, 37; IP, 60; LP, 80 and NR, 80 d. Corresponding estimates of NPD per pig born in the first litter were EP, 4.3; IP, 6.8; LP, 9.7 and NR, 13.0 d. These data indicate important differences in production efficiency related to selection on age at first estrus. Considered together with increased costs of higher replacement rates, costs of time spent on unproductive heat checks and increased breeding costs per pig born, our data suggest substantial savings can be realized by identifying late-cyclic and non-cyclic gilts at an early age.

**Key Words:** Gilts, Puberty, Productivity

**M83 Reproductive survival of exotic sows in the humid tropics of Samoa.** C. Okere\* and A. O. Ajuyah, *The University of the South Pacific*.

Reproductive records from the International Fund for Agricultural Development (IFAD) pig project and the Swine Research Unit at the School of Agriculture, University of the South Pacific, Alafua Campus, Samoa involving 26 (Large White and Duroc) sows and 152 litters up to the 8<sup>th</sup> parity were analyzed for breed and parity effects. For both Large White and Duroc sows, overall mean values for litter traits were (113.8±2.2 vs. 115.0±1.05 days) for gestation length; (10.5±2.2 vs. 9.2±2.3) for litter size; (8.8±2.4 vs. 8.3±1.71 kg) for litter birth weight; (1.34± 0.1 kg vs. 1.34±0.14 kg) for piglet birth weight; (8.1±1.95 vs. 6.7±1.03) for number weaned and (72.5±17.6 vs. 66.7±11.6 kg) for litter weaning weight respectively. Differences between breeds were significant (P≤0.05) only for the mean weaning weights in the first parity and in litter size between the 3<sup>rd</sup> and 8<sup>th</sup> parities. There was a tendency for Large White sows to have slightly more weaned piglets in their first and subsequent parities than Duroc sows. Taken together, these results suggest a greater reproductive adaptability for Large White sows to the humid tropical conditions in Samoa.

**Key Words:** Reproductive survival, Pigs, Samoa

**M84 Use of the DF-200 HF decontamination foam in swine farrowing facilities.** K Christensen\* and J. D. Thomas, *New Mexico State University*.

DF-200 HF, a Sandia National Laboratories product developed to be both fire extinguishment foam and a decontaminant, was chosen to be applied on used, empty swine farrowing facilities to determine ability of the foam to eliminate bacteria. Before the decontaminate foam was applied, samples were obtained from 10 specific areas of empty farrowing crates by using moistened swabs, swabbing an area, and transferring the sample onto the plates. The plates were then placed into an incubator at 32 C for approximately 19 h. These plates exhibited rapid growth with numerous colonies of unknown bacteria. After initial sampling, the decontaminant foam was thoroughly applied to all surface areas. After a drying period of 1 h, the surface areas were rinsed with

cold water to remove the foam residue. Samples taken after decontamination showed an extreme decrease in plate count numbers and in the types of colonies grown. While the majority of the samples taken post-treatment had no bacterial growth, there were some samples which did produce viable colonies. Colonies were isolated from these plates and identified using API identification strips (Biomerieux). Specific bacteria identified included *Staphylococcus hyicus*, *Aeromonas salmonicida ssp salmonicida*, *Chromobacterium violaceum* and *Pseudomonas fluorescens/putida*. It is believed these bacteria survived the decontamination foam because they were in areas high in organic matter. The ability of the foam to effectively penetrate organic matter is unknown. Thorough removal of all organic matter prior to decontamination may be necessary for complete elimination of bacteria. If proven to be cost effective, DF-200 HF decontamination foam could be a viable means for sanitizing farrowing crates.

**Key Words:** Decontamination, Foam, DF-200

**M85 Fat content of corn, animal plasma and fish and soybean meals is the main single parameter affecting retention of aromatic compounds typical of a strawberry flavor.** I. Perez-Portabella, C. Ibañez, C. Puyuelo, R. Fontanillas, J. Sola, I. Blanco, and E. Roura\*, *Lucta, S.A, Barcelona, Spain*.

Flavoring compounds used in feeds interact with the feedstuffs to such extent that flavor performance may differ if feed ingredient formulation changes. Earlier studies have shown that content of crude protein, starch and crude fat of feedstuffs account for most of the interactions with flavoring compounds. In the current study, corn, soybean, blood plasma and fish meal were flavored with a strawberry aroma in powder form, and the release of selected aromatic compounds at 0, 7 and 21 d post-application of an accelerated stability test was traced and quantified by Head Space-Solid Phase Microextraction and Gas Chromatography-Mass Spectrometry. The selected aromatic compounds were ethylbutyrate (bp760=121C, MW=116.16), isoamyl valerianate (bp760=191C, MW=172.27) and alpha-ionone (bp760=250C, MW=192.30) and were chosen to represent very high, high and medium volatilities, respectively. The feedstuffs content of crude fat, crude protein, starch, moisture, crude fiber, Fe, Cu, Zn and total ash were evaluated and correlated with aromatic compound losses expressed as a percentage of initial values. Regardless of the feed ingredient, at d 7 no trace of ethylbutyrate could be found, therefore linear correlations were very low (R<sup>2</sup> ≤ 0.20). Losses of isoamyl valerianate were highly correlated linearly with crude fat content at d 7 (Y=-6.0036X+92.528, R<sup>2</sup>= 0.9438) and 21 (Y=-1.8303X+101.35, R<sup>2</sup>= 0.9549), indicating that the higher the fat content, the slower the aromatic compound release. Furthermore, alpha-ionone release, showed only a medium correlation with fat content at d 7 (R<sup>2</sup>= 0.7857) and very low at d 21 (R<sup>2</sup> ≤ 0.20). Overall, retention of all analyzed aromatic compounds revealed that the higher the fat content of the feedstuffs, the lower the losses (d 7: Y=-3,5744X+94,922, R<sup>2</sup>= 0.9485; d 21: Y=-0,37017X+99,478, R<sup>2</sup>= 0.9079).

**Key Words:** Feedstuffs, Crude fat, Strawberry flavor

**M86 Effect of feeding management and feeding time on urea nitrogen levels in swine research.** I. Moreira<sup>\*1</sup>, M. Kutschenko<sup>1</sup>, A. Fraga<sup>2</sup>, E. Sakaguti<sup>1</sup>, G. Oliveira<sup>1</sup>, and D. Souza<sup>1</sup>, <sup>1</sup>Universidade Estadual de Maringá-Maringá-PR/BRAZIL, <sup>2</sup>UNESP-Jaboticabal-SP/BRAZIL.

Two experiments were conducted to evaluate the effect of feed management ("ad libitum" or fasting before bleeding) on the plasma urea nitrogen (PUN). All pigs (n = 30) were bled on the last (seventh) day of the experiments. Initial body weight was 46.1 kg in Exp 1 and 50.8 kg in Exp 2. Pigs were allotted in a 3 × 2 × 2 factorial arrangement of treatments (three protein concentrations in the Exp 1 or three lysine concentrations in Exp 2, two feed management schemes and two bleeding times) in a randomized complete block design conducted in 10 replicates. The three protein-lysine levels were 13.9-0.71, 16.4-0.83 and 18.9-0.95 %. The two feed management schemes were "ad libitum" or 12 h fasting (20:00 p.m. to 8:00 a.m.) before bleeding. After fasting, pigs were fed for 1 h, followed by 5.5 h of fasting and then bleed. The two bleeding times were in the morning (8:00 a.m.) and in the afternoon (2:30 p.m.). Results of PUN determinations were submitted to ANOVA and polynomial regression analysis. The ANOVA results showed higher PUN when bleeding in the afternoon, compared to the

morning, in both experiments. There were no differences on PUN values due to feed management schemes. There were no interactions. The coefficients of variation (CV) were similar for both bleeding times (Exp 1=22.9 and 22.2; Exp 2=24.2 and 24.5). The lowest CV found in the Exp 1 was for fasting (21.7) and the higher was for "ad libitum" (23.6). This result was inverted in the Exp 2, where "ad libitum" (21.1) was lower and fasting (27.9) was higher. These results show that fasting does not result in more accurate PUN values compared to "ad libitum" feeding, in detecting differences between dietary protein treatments for the growing pig. However, in Exp 2, "ad libitum" was more accurate when three lysine concentrations were fed. Because PUN was higher when pigs were bled in the afternoon, time of bleeding should be considered when PUN is measured.

**Key Words:** Methodology, PUN, Amino acid

**M87 Evaluation of various factors affecting pigs blood (plasma or serum) urea nitrogen value.** I. Moreira\*<sup>1</sup>, M. Kutschenko<sup>1</sup>, A. Fraga<sup>2</sup>, G. Oliveira<sup>1</sup>, E. Sakaguti<sup>1</sup>, and I. Sartori<sup>1</sup>, <sup>1</sup>Universidade Estadual de Maringá-Maring-PR/BRAZIL, <sup>2</sup>UNESP/Jaboticabal-SP/BRAZIL.

A performance trial was conducted using 24 growing pigs (Initial BW = 23.7 kg) to study the effects of various factors on blood urea (BU) value. Pigs were allotted in a complete randomized design with a 3×2×2×2 factorial arrangement (three crude protein levels (CP): 13.6, 16.0 and 18.4 %; two blood fractions (BF): serum or plasma; two feeding systems (FS): "ad libitum" (AF) or a 12 hours fast (from 20:00 p.m. to 8:00 a.m.) followed by 1 h of feeding and then 5 h of fasting again before bleeding (FF); two floor types (FT): compact floor (CF) or shallow pool (SP) and two bleeding places (BP): "sinus orbital" or vena cava). Initially, all pigs were bled to measure the base line BU. A total of 96 samples were analyzed. There was an effect ( $P \leq 0.05$ ) of FT, increasing linear effect of CP levels and of baseline on BU. None of the other factors (BF, FS or BP) were significant ( $P \leq 0.05$ ). There was an interaction ( $P = 0.054$ ) between FT and the linear effect of CP levels. There was no interaction ( $P \geq 0.05$ ) between any other factors. However, there were different linear regression coefficients for CF ( $b = 1.7799$ ) and SP ( $P = 2.4389$ ). The two smallest CVs were for CF (20.5) and AF (21.1) and the two highest were for SP (27.6) and AF (25.3). It was concluded that choosing which feeding system, bleeding place and blood fractions, depends on researchers choice. However, shallow pool flooring should be avoided when intending to measure blood urea nitrogen in pigs.

**Key Words:** Methodology, PUN, Protein

**M88 Serum enzyme profile and biochemical constituents of blood in cross-bred pigs during growth.** G. DilipKumar\*<sup>1</sup> and P. E. Prasad<sup>2</sup>, <sup>1</sup>Washington state University, <sup>2</sup>A.N.G.R. Agricultural University.

Biochemical changes taking place during different stages of growth have been attributed to the changes in the activities of certain enzymes and biochemical constituents which have clinical importance in assessment of their growth, health, nutritional status, diagnosis and prognosis of metabolic disorders. The present research has been undertaken to study the enzymes-AST, ALT, ALP, LDH and certain biochemical constituents like glucose, total proteins, albumin, globulin and urea concentrations of blood in crossbred growing pigs. The level of AST, ALT, ALP, LDH enzymes in serum decreased significantly ( $p < 0.01$ ) as the age of piglets increased from 60 days to 120 days. However, the AST and ALP level at 90 days age are not significantly different from 120 days age. The level of glucose at 90 and 120 days was significantly lower compared to 60 days age. The total serum protein and albumin concentrations significantly ( $p > 0.01$ ) increased as the age of the piglets increased. The serum urea concentration of the growing piglets did not differ significantly as age advanced.

**Key Words:** Crossbred pigs, Enzymes, Blood constituents

**M89 The effect of exogenous leptin on immunological parameters in growing pigs.** T. E. Weber\* and M. E. Spurlock, Purdue University, West Lafayette, IN.

To determine the effects of exogenous leptin on measures of cellular and humoral immunity, leptin was administered twice daily as an intramuscular injection to barrows ( $n = 15$ ; mean BW 63.4 kg) at a dose of 0.025

mg kg<sup>-1</sup> for a period of 35 days. In addition, there was a control group that was injected with vehicle and allowed ad-libitum access to feed, and a third group that was injected with vehicle and had their feed intake restricted to that of the group injected with leptin. All of the barrows were injected intramuscularly with 1 mg of Limulus haemocyanin (LH) emulsified in incomplete Freund's adjuvant on days 0 and 14 of the experiment. Blood samples were collected on days 0, 7, 14, 21, and 35 for analysis of serum antibodies to LH (IgG1 and IgG2) and for the whole blood proliferative response to LH and to concanavalin A (Con A). Leptin reduced ( $P < 0.05$ ) average daily feed intake by 20.7 % as compared to the control group. All pigs developed an antibody response (IgG1 and IgG2) to LH by day 14. Pigs injected with exogenous leptin had lower ( $P < 0.05$ ) serum IgG1 against LH on days 21 and 35 than did the control or limit-fed group. There was no effect ( $P > 0.05$ ) of leptin on serum IgG2 concentrations. Leptin had no effect ( $P > 0.05$ ) on the proliferative response to Con A or LH at any time point. For in vitro experiments, blood was collected from healthy pigs and peripheral blood mononuclear cells (PBMCs) were isolated to test the effect of leptin (0 or 100 nm) on the blastogenic response to Con A (5 g/mL) and interferon- $\gamma$  (IFN- $\gamma$ ) production, and to determine whether these cells express the long form of the leptin receptor (Ob-Rb). Leptin had no effect on blastogenesis or IFN- $\gamma$  production in the stimulated PBMCs. However, expression of Ob-Rb in these cells was confirmed at the mRNA level, and the relative mRNA abundance was down-regulated ( $P < 0.05$ ) in response to Con A. These data indicate that leptin modifies antibody isotypes in the pig, and that the long form of the leptin receptor is regulated in response to some immunogens.

**Key Words:** Leptin, Pig, Immune system

**M90 Evaluation of migratory distance and readability of passive transponders injected in different body sites of Iberian pigs.** M. Hernandez-Jover\*, G. Caja, X. Alabern, P. Virtudes, D. Garin, and B. Farriol, Universitat Autònoma de Barcelona, Spain.

A total of 189 half duplex passive injectable transponders (PIT) of two different sizes (31.5×3.8 mm,  $n = 106$ ; and, 23×3.8 mm,  $n = 83$ ; Tiris, Almelo, Holland) were used to identify 48 castrated Iberian pigs, in order to evaluate the effects of s.c. injections in different body sites (ear base, EB; ciliary arc, CA; armpit, AR; and, shinbone, SH). Pigs were randomly allotted into two groups (24 pigs each) and injected (four PIT per pig) at 4 mo of age. One group was kept indoors in intensive conditions and slaughtered at 9 mo of age (80 kg BW), whereas the other was kept outdoors in extensive conditions and slaughtered at 15 mo of age (120 kg BW). Readability of PIT (readable/injected) was checked weekly by using two types of handheld readers (Gesreader I, Gesimpex, Spain; and, Hokofarm, Insentec, Holland). Migration distance was measured by the X-Ray method (Caja et al., 1998; *Livest. Prod. Sci.* 55:279). Injection point was marked with a surgery clamp and pigs radiographed at 0, 7, 15, 30, 45, 90 and 180 d post-injection. Management system did not affect PIT performances. Readability did not vary by PIT size but was greater ( $P < 0.05$ ) for EB (93.6%) than other injection sites (CA, 59.6%; AR, 79.2%; and, SH, 74.5%). Only values in AR and SH did not differ. Up to 80% of unreadable PIT occurred during the first month in all injection sites. Migration distances were in all cases shorter than needle length (60 × 4.8 mm) and varied according to PIT size and injection site ( $P < 0.05$ ), and averaged: EB, 8.9 1.6; CA, 3.7 0.8; AR, 20.5 3.4; and, SH, 16.7 8.6 mm. Difficulties of PIT location at slaughter were very variable and no significant effects were reported in recovery time from the carcass (EB, 78; CA, 107; AR, 166; and, SH, 105 s). No recovery time was compatible with the average speed of swine commercial abattoirs. We conclude that no subcutaneous injection is recommended in the electronic identification of pigs for any of the body sites evaluated.

**Key Words:** Transponder, Migration, Electronic identification

**M91 Sex effect on performance and carcass quality of heavy pigs.** J. Peinado\*<sup>1</sup>, A. Fuentetaja<sup>2</sup>, M. A. Latorre<sup>3</sup>, G. G. Mateos<sup>3</sup>, and P. Medel<sup>1</sup>, <sup>1</sup>Imasde Agropecuaria, S.L., Spain, <sup>2</sup>COPESE, S.A., Spain, <sup>3</sup>Universidad Politécnica de Madrid, Spain.

A total of 150 Pietrain\*Large White x Landrace\*Large White pigs of 23.3 ± 1.6 kg of initial BW was used to study the influence of sex (castrated males, CM; castrated females, CF; entire females, EF) on

productive performance and carcass quality. Each treatment was replicated five times (10 pigs housed together). Males were castrated at birth and females at 75 d of age, and all the pigs were slaughtered at 120 kg BW. Feeding program was common for all the pigs and consisted of three commercial diets offered *ad libitum* (2.3 Mcal NE/kg and 0.97 % lys from 30 to 65 kg BW, 2.4 Mcal NE/kg and 0.70 % lys from 65 to 95 kg BW, and 2.4 Mcal NE/kg and 0.67 % lys from 95 kg BW to slaughter). From 30 to 65 kg BW, CF grew slower than CM, with EF showing an intermediate value (782, 710, and 761 g/d for CM, CF, and EF, respectively;  $P < 0.05$ ). However, from 65 to 95 kg BW, there was a compensatory growth and CF tended to grow faster than EF ( $P < 0.10$ ). For the whole period, growth rate, feed intake, and feed conversion were 830, 836, and 783 g/d ( $P < 0.10$ ); 2,507, 2,330, and 2,176 g/d ( $P < 0.05$ ); and 3.02, 2.79, and 2.78 g/g ( $P < 0.05$ ) for CM, CF, and EF, respectively. Castrated females had more backfat (24.5, 22.4, and 25.2 mm for CF, EF, and CM, respectively;  $P < 0.05$ ) and fat thickness at *Gluteus medius* than EF (22.7, 19.7, and 21.1 mm for CF, EF, and CM, respectively;  $P < 0.05$ ). Besides, the percentage of pigs with a fat thickness equal or greater than 20 mm at the *Gluteus medius* was 72, 53, and 72 % for CF, EF, and CM respectively. In addition, loin yield was greater for EF than for CM (6.9, 6.7, and 6.6 % for EF, CF and CM, respectively;  $P < 0.05$ ). It is concluded that castration of females improves productive traits and that castrates of both sexes produce carcasses that are adequate for the production of heavy pigs destined to the dry-cured ham and loin industry.

**Key Words:** Pigs performance, Castration, Carcass quality

**M92 Effect of sex, castration, and slaughter weight on pork quality.** J. Peinado<sup>1</sup>, J. Guirao<sup>2</sup>, M. Nieto<sup>3</sup>, G. G. Mateos<sup>4</sup>, and P. Medel<sup>1</sup>, <sup>1</sup>Imasde Agropecuaria, S.L., Spain, <sup>2</sup>Estación Tecnológica de la Carne de Guijuelo, Spain, <sup>3</sup>COPESE, S.A., Spain, <sup>4</sup>Universidad Politécnica de Madrid, Spain.

A total of 240 Pietrain\*Large White x Landrace\*Large White pigs of  $60.5 \pm 6.2$  kg of initial BW were used to study the influence of sex and slaughter weight (SW) on meat quality. A completely randomized design was used, with six treatments arranged factorially with three sexes (castrated males, CM; castrated females, CF; entire females, EF) and two SW (114 kg; 122 kg). Each treatment was replicated four times (ten pigs housed together). Males were castrated at birth and females at 75 d of age. Pigs had free access to a feed based on barley, wheat, and soybean meal and were sacrificed in a commercial slaughterhouse following routine procedures. At 45 min postmortem, *longissimus* muscle samples were obtained at the last rib level from five pigs per each replicate and stored at 20°C until further analysis. Crude protein of loins was higher for EF than for CM (23.5, 23.0, and 23.3 % for EF, CM, and CF, respectively;  $P < 0.05$ ). Castrated males and females had more intramuscular fat than EF (5.3 vs 4.3 %;  $P < 0.05$ ). Protein and fat content of the loin were not affected by SW. Defrosting losses were greater for EF and CF than for CM (10.10, 10.05, and 8.25 %;  $P < 0.05$ ), but no differences were found for dripping or cooking losses. Shear force tended to be higher for older pigs than for younger pigs (Warner-Bratzler values of 5.99 and 5.52 kp, respectively;  $P < 0.10$ ). Meat from females had greater L\* (48.04 vs 45.64;  $P < 0.05$ ) and b\* (9.85 vs 8.86, respectively;  $P < 0.05$ ) values than meat from males but meat color was not affected by SW. Subcutaneous fat from EF had higher percentage of linoleic acid than subcutaneous fat from CM, with CF in an intermediate position (14.65, 13.50, and 12.75 % for EF, CF, and CM, respectively;  $P < 0.05$ ). It is concluded that castration of both males and females improves quality of meat over EF. Therefore, castrated animals are preferred for production of heavy pigs destined to the dry-cured ham and loin industry.

**Key Words:** Pork quality, Sex, Slaughter weight

**M93 Influence of sex and castration of males and females on performance and carcass quality of pigs.** J. Peinado<sup>1</sup>, G. G. Mateos<sup>2</sup>, A. Fuentetaja<sup>3</sup>, J. Snchez<sup>1</sup>, and P. Medel<sup>1</sup>, <sup>1</sup>Imasde Agropecuaria, S.L., Spain, <sup>2</sup>Universidad Politécnica de Madrid, Spain, <sup>3</sup>COPESE, S.A., Spain.

A total of 200 Pietrain\*Large White x Landrace\*Large White pigs of  $23.3 \pm 1.4$  kg of initial BW was used to study the influence of sex and castration (castrated females, CF; entire females, EF; castrated males, CM; entire males, EM) on productive performance. Each treatment was replicated five times (10 pigs housed together). Males were castrated at birth and females at 75 d of age. All pigs, except CM, were slaughtered

at 105 kg BW and the effect of treatment on carcass quality was studied. The feeding program was common for all treatments and consisted of three diets: 2.3 Mcal NE/kg and 0.97 % lys from 30 to 65 kg BW, 2.4 Mcal NE/kg and 0.70 % lys from 65 to 95 kg BW, and 2.4 Mcal NE/kg and 0.67 % lys from 95 to 105 kg BW. Performance of females was penalised by castration in the first 15 d period following surgery, but the pigs recovered and showed a compensatory growth at the end of the trial. Castrates of both sexes grew faster (877, 868, 813, and 807 g/d for CM, CF, EM, and EF, respectively;  $P < 0.05$ ) and tended to have poorer feed conversion (2.62, 2.55, 2.46, and 2.50 g/g for CM, CF, EM, and EF respectively;  $P < 0.10$ ) than entire males. Females had more carcass yield and fat thickness at *Gluteus medius* than entire males (75.1, 75.1, and 74.5 %, and 16.42, 16.58, and 14.87 mm for CF, EF, and EM, respectively;  $P < 0.05$ ). Ham and loin yields were greater for EF than for EM, with intermediate values for CF (26.63, 26.12, and 26.54 % and 6.87, 6.59, and 6.82 % for ham and loin yields in EF, EM, and CF, respectively;  $P < 0.05$ ). In conclusion, castrated pigs, both males and females grew faster and tended to have poorer feed conversion than entire pigs. Percentage of carcass fat was greater for castrated than for entire pigs.

**Key Words:** Pig performance, Sex, Carcass quality

**M94 Effect of sex, castration and slaughter weight on pig performance and carcass.** P. G. Lawlor<sup>1</sup>, P. B. Lynch<sup>1</sup>, J. Kerry<sup>2</sup>, and P. Allen<sup>3</sup>, <sup>1</sup>Teagasc, Moorepark, Fermoy, Co. Cork, Ireland, <sup>2</sup>Dept. of Food Technology, University College, Cork, Ireland, <sup>3</sup>National Food Centre, Ashtown, Dublin 15, Ireland.

The aim of this study was to examine the effect of sex and slaughter weight on performance and carcass in pigs of a lean genotype. Ninety single sex pairs of pigs (Meatline Landrace sire on Landrace X Large White sows) were used in a 3 (sex) X 5 (slaughter weight) factorial design with 6 pairs per treatment. The experimental period was from weaning (mean = 26 days; 7 kg) to slaughter. Sexes were boar (B), castrate (C) and gilt (G), and the slaughter weights were 80, 90, 100, 110 and 120 kg liveweight. All pigs were fed the same diets based on wheat, barley and soybean meal *ad libitum* as dry pellets. Nutrient content of the diets were 14.5 MJ/kg digestible energy (DE) and 13.0 g/kg total lysine (LYS) from weaning to 15 kg; 14.1 MJ/kg DE and 13.0 g/kg LYS from 15 to 30 kg and 13.5 MJ/kg DE and 11.0 g/kg LYS from 30 kg to slaughter. Sex X slaughter weight interaction effects were not significant (NS;  $P > 0.05$ ). Daily weight gain and feed conversion ratio (FCR) were 748, 756 and 712 g (s.e. 10, NS) and 2.28, 2.49 and 2.46 (s.e. 0.03;  $P < 0.01$ ) for B, C and G, respectively. Backfat depth, muscle depth and carcass lean meat content (by Hennessy Grading Probe) were 12.2, 13.5 and 12.4 mm (s.e. 0.4;  $P < 0.05$ ); 55.9, 57.0 and 58.0 mm (s.e. 1.1; NS) and 579, 582 and 591 g/kg (s.e. 6, NS) for B, C and G, respectively. Daily weight gain and feed conversion ratio (FCR) for slaughter weights were 715, 737, 756, 737 and 748 g (s.e. 14, Linear effect (Lin) -  $P = 0.09$ ; Quadratic effect (Quad) -  $P = 0.09$ ) and 2.24, 2.39, 2.41, 2.48 and 2.55 (s.e. 0.04; Lin -  $P < 0.01$ ) for 80, 90, 100, 110 and 120 kg, respectively. Backfat depth, muscle depth and carcass lean meat content were 11.2, 11.9, 13.0, 13.8 and 13.5 mm (s.e. 0.5; Lin -  $P < 0.01$ ; Quad -  $P = 0.09$ ); 52.1, 55.3, 58.4, 62.4 and 57.8 mm (s.e. 1.4; Lin -  $P < 0.01$ ; Quad -  $P < 0.01$ ) and, 55.3, 585, 588, 587, 592 and 568 g/kg (s.e. 7, Lin -  $P = 0.11$ ; Quad -  $P < 0.05$ ) respectively.

**Key Words:** Castration, Slaughter weight, Carcass

**M95 Effects of feeding blends of grains naturally-contaminated with *Fusarium* mycotoxins on antibody-mediated immune response and brain neurochemistry in starter pigs.** H.V.L.N. Swamy<sup>1</sup>, T. K. Smith<sup>1</sup>, E. J. MacDonald<sup>2</sup>, N. A. Karrow<sup>1</sup>, and H. J. Boermans<sup>1</sup>, <sup>1</sup>University of Guelph, Guelph, ON, Canada, <sup>2</sup>University of Kuopio, Kuopio, Finland.

An experiment was conducted in starter pigs to: (1) determine the effect of feeding blends of grains naturally-contaminated with *Fusarium* mycotoxins on antibody titers to sheep red blood cells (SRBC) and brain neurochemistry, (2) to delineate direct and indirect effects of *Fusarium* mycotoxins on antibody titers to SRBC and (3) to test the efficacy of a polymeric glucomannan mycotoxin adsorbent (GMP, MTB-100, Alltech Inc.) in preventing *Fusarium* mycotoxins. A total of 150 starter pigs (initial weight of 9.3 kg) were fed 5 diets (6 pens of 5 pigs per diet) for 21 days. Diets included: (1) control (2) a blend

of 17 blend of 24.5 group for comparison with the group fed 24.5 of contaminated grains in the diet increased linearly the ratio of hypothalamic 3,4-dihydroxyphenylacetic acid to dopamine (DA) concentrations and cortex 5-hydroxytryptamine (5HT) concentrations, while hypothalamic norepinephrine and tryptophan, and pons DA and homovanillic acid concentrations were linearly decreased. Hypothalamic and pons 5-hydroxyindoleacetic acid to 5HT ratios responded quadratically to the inclusion of contaminated grains. The feeding of contaminated grains

did not alter primary antibody response to SRBC but further studies on the secondary antibody response are warranted. It was concluded that the major effect of feeding *Fusarium* mycotoxin-contaminated grains to pigs is to alter brain neurochemistry.

**Key Words:** Antibody-mediated immune response, *Fusarium* mycotoxins, Neurochemistry

## Nonruminant Nutrition

**M96 Effect of dietary supplementation of 1% L-glutamine on the intestinal morphology of early weaned piglets 14d and challenged with transmissible gastroenteritis virus.** H. Herrera\*<sup>1</sup>, A. G. Borbolla<sup>1</sup>, H. Ramirez<sup>1</sup>, and G. Mariscal<sup>2</sup>, <sup>1</sup>Universidad Nacional Autonoma de Mexico, <sup>2</sup>INIFAP CENID Fisiología.

The aim of this work was to determine the effect of dietary supplementation of L-glutamine (Gln) on villous height (VH) and crypt depth (CD) in three portions of the small intestine of piglets weaned at 14d and challenged with the transmissible gastroenteritis virus (TGV) after d4 of weaned (W). Weaned pigs (35) of 14d of age and weight of 4.660.2 Kg were used in this study. Thirty pigs were randomly assigned to two different treatments (tx): 1) 0% Gln and 2) 1% of Gln supplemented (1% Gln) and housed in 6 pens (3 pens of 5 animals per treatment), in facilities appropriate for the animal's age. The 5 remaining piglets were slaughtered on 0d (14d of age) to obtain VH and CD as baseline measures. Both groups received the same diet and a daily oral dose of water or 1% of crystalline L-Gln according to the amount of feed consumed the previous day. Feed intake was registered in a daily basis. On d4 after weaning, the piglets were oro-nasally inoculated with  $1 \times 10^6$  infective doses of TGV. On d5, 14 and 21, 5 pigs by tx were slaughtered with pentobarbital to measure VH and CD. The samples were included in paraffin for a later histological evaluation. Ten villous samples of each intestine portion were measured with a graduated ocular (1mm/100). Comparisons were made in time between animals in the same treatment versus the baseline measures. Of each pig, 10 cm of the middle jejunum was sampled to isolate the virus and blood serum to detect antibodies with a Kit ELISA. In the jejunum of all the inoculated pigs the TGV was isolated but antibodies were not detected. In the duodenum of the 1% Gln group, the VH was smaller ( $P < 0.05$ ) at 5d than 0d (450 vs. 258, 389 and 409 m for 0,5,14 and 2d W). In jejunum the tx 1% Gln showed an atrophy of 61 and 33% ( $P < 0.05$ ) the 5 and 14 vs 0d (456 vs 177, 303 and 445 m), while tx 0% Gln the atrophy it was of 36% ( $P < 0.05$ ) in the 5 and 14 d (456 vs 288, 287 and 527 m). Atrophy in ileum for tx 1%Gln were 24 and 18% ( $P < 0.05$ ) the 5 and 14 d (268 vs. 202, 219 and 297 m), and in tx 0% it was 30 and 16% ( $P < 0.05$ ) in the same period (268 vs. 187 and 225 and 265 m). The supplementation of 1% Gln doesn't prevent the atrophy of the villous during the first five days of viral challenge, but it accelerates the recovery of the intestinal damage caused by the virus and the effect of the weaning.

**Key Words:** Glutamine, Wean, Small intestine

**M97 Effects of levels of organic acid complex and lactose in starter diet on growth performance and intestinal environments of weaned pigs.** Y. W. Shin\*, J. G. Kim, Y. H. Park, and K. Y. Whang, Korea university, Seoul, Korea.

A  $2 \times 3$  factorial experiment in a randomized complete block design was conducted to evaluate the effects of lactose and organic acid complex consisted of butyrate, formate, lactate and phosphoric acid on growth performance and intestinal environments for 21 d after weaning. A total of 360 weaned pigs were used. The dietary treatments were: 1) high level of lactose (HL) + 0% organic acids, 2) HL + 0.15% organic acids, 3) HL + 0.30% organic acids, 4) low level of lactose (LL) + 0% organic acids, 5) LL + 0.15% organic acids and 6) LL + 0.30% organic acids. Feed intake and body weight of pigs were measured at d 0, d 7 and d 21. Five pigs per treatment were sacrificed at d 0, d 3, d 7 and d 21 for sampling of intestinal digesta, ileal tissues and blood. The ADG and ADFI were numerically higher in treatment 2 than other treatments. Feed efficiency in treatment 3 tended to be higher than other treatments during the entire experimental period. But no significant difference was observed. Pigs fed diets containing organic acid complex and high level

of lactose showed better performance, in general, but it was not significantly different. The digesta pH was not different among treatments at d 3 and d 7. At d 21, treatment 3 had a higher pH of jejunal digesta ( $P < 0.1$ ). Treatments 3 and 2 also showed a higher leukocyte counts at d 3 and d 21 than other treatments, respectively ( $P < 0.1$  and  $P < 0.05$ ). In gastrointestinal microbiology, there was no favorable effect of organic acids and lactose supplementation except decreased number of coliform bacteria in treatment 3 at d 21 ( $P < 0.1$ ). Villus height and crypt depth were not different among treatments but villus height: crypt depth ratio was higher in treatments 2 and 5 at d 7 ( $P < 0.1$ ). These results suggest that organic acid complex and lactose have no interactive effect on growth and intestinal environments in weaned pigs.

**Key Words:** Pigs, Organic acid, Lactose

**M98 Bone mineral content gain is reduced in weaned pigs fed diets with low-buffer capacity and organic acids.** G. Biagi\*<sup>1</sup>, A. Piva<sup>1</sup>, T. D. Hill<sup>2</sup>, D. K. Schneider<sup>2</sup>, and T. D. Crenshaw<sup>2</sup>, <sup>1</sup>University of Bologna, Italy, <sup>2</sup>University of Wisconsin, Madison, WI.

Consumer preferences continue to pressure reliance on sub-therapeutic use of antibiotics in swine diets. Current experiments were designed to evaluate diet buffer capacity and use of organic acids for their potential to maintain growth and bone status during the most problematic period of nutritional management, immediately after weaning. Three trials were conducted using either all 6 (Trial 1) or a subset (Trial 2 and 3) of 6 dietary treatments. Treatments were: 1) Control, complex diet with plasma protein and carbadox; 2) Plant protein, high-buffer diet; 3) Plant protein, low-buffer diet; 4) Diet 3 + 1% citric acid; 5) Diet 3 + 1% fumaric acid; 6) Diet 3 + 0.2% Tetracid 500 (a protected combination of organic acids, JEFAGRO Technologies Inc.). No antibiotics were added to Diets 2 through 6. Reduced buffer capacity involved shifts in sources (tricalcium phosphate and calcium sulfate) and concentrations of Ca and P (0.75% Ca, 0.81% P, diet 2; 0.50%Ca, 0.65% P, diet 3) previously shown to reduce undesired gut microbes. In trial 1, 96 pigs (PIC Cambrough X Line 19) were weaned (3 wk) and randomly allotted to diet groups for a 6 wk trial (Phase I, 6 diets, 14 d; Phase II, 6 diets, 14 d; Phase III, common diet, 14 d). In Phase I, pigs fed Control diets gained faster and more efficiently ( $P < 0.01$ ) than those fed other diets, but no differences were detected ( $P > 0.10$ ) in growth or efficiency among groups during Phase II or III. Duration of Trials 2 and 3 were 28 d and only diets 2, 3, 5 and 6 were included. On d 0 and 28 of Trials 2 and 3, 30 barrows were scanned by dual energy x-ray absorptiometry (DXA), and bone mineral content gain (BMC) was calculated. Pigs fed low-buffer diets and organic acids had 50% lower ( $P < 0.01$ ) daily BMC gain (adjusted for differences in weight gain) over 28 d (10.8, 6.2, 4.8, and 5.6 g BMC/kg weight gain for pigs fed diets 2, 3, 5 and 6 respectively). The long-term consequences of feeding low-buffer diets and organic acids were not assessed in these trials.

**Key Words:** Bone, Buffer, Antibiotics

**M99 Effects of feeding antibiotics versus mannanoligosaccharides on the growth performance of weaning pigs.** J. Pulliam\*, R. Clift, S. Chattin, and A. G. Mathew, The University of Tennessee, Knoxville TN USA.

To compare effects of the Carbadox and a mannanoligosaccharide product on performance, a total of 48 crossbred (Yorkshire  $\times$  Landrace  $\times$  Duroc) pigs were weaned at approximately 21 days of age and blocked by gender, genetics, and weight. Pigs were randomly assigned to one of 4 treatments with each treatment consisting of 3 pens and 4 pigs per pen. Treatments included 55 mg Carbadox/kg of feed, 0.4% Bio-Mos<sup>®</sup> (mannanoligosaccharide) in the feed, a rotation of the above two treatments,