Four rumen fistulated Holstein calves (BW 132.3 ± 1.61 kg) fed high concentrate diets (10 to 90, forage to concentrate ratio) were assigned to a 4 x 4 Latin square design to investigate the effects of nonstructural carbohydrate (barley or corn) and protein (soybean meal or sunflower meal) sources on ruminal fermentation and animal performance. The following 2 x 2 factorial arrangement of treatments (13.7% CP, 2.8 Mcal ME/kg DM) was used: 1) Barley-Soybean meal; 2) Barley-Sunflower meal; 3) Corn-Soybean meal and 4) Corn-Sunflower meal. Data were analyzed using the PROC MIXED procedure of SAS, main factors being nonstructural carbohydrate source, protein source and their interaction.

Rabbit Species

Trial 2 involved 24 rabbit. Performance, diet digestibility and cecal pH and VFA concentrations were determined. All data were subjected to ANOVA. Average daily gain and FCR did not differ between treatments. ADG was 41.7g and 44.1g for the MOS treatment vs. 42.7g and 43.9g for the OTC treatment in trial 1 and 2, respectively (NS; 4.2 and 2.9). Average feed intake in trial 2 was 3.05 in trial 1 and 3.50 kg of feed in trial 2 and was not affected by treatment. Composition of the soft feces did not differ among treatments. Diets did affect purine derivatives excretion. Allantoin and uric acid excretion did not differ between treatments; however, rabbits fed MOS did excrete significantly less hippoxanit and xantin.

**M225** Minimum dry period length to maximize performance. M. J. VanBaale*, M. J. Hutcheson, and H. D. Norman, Animal Improvement Programs Laboratory, Agricultural Research Service, USDA, Beltsville, MD.

The objective of this research was to find the minimum dry period length while maintaining performance in the subsequent lactation. The number of days dry, month of calving in the subsequent lactation, linear and quadratic effects of the last somatic cell score in the previous lactation, linear and quadratic effects of previous days open, and linear and quadratic effects of the last somatic cell score in the previous lactation, and linear and quadratic effects of the last somatic cell score in the previous lactation were included in the model to look at the effect of dry period length on actual milk yield in the subsequent lactation, adjusted for producing ability. Data included Holstein cows first calving from 1997 to 1999. There were 64,100 records with a second lactation, 28,376 with a third lactation, and 11,997 with a fourth lactation. Peak yield during the following lactation occurred at a dry period length of 45 to 60 days for parities 2, 3, and 4. A difference in milk production of +33, +50, and -16 kg between 50 to 60 and 61 to 70 days dry was not significant for lactations 2, 3, and 4, respectively. A dry period of 70 days resulted in 622 and 727 kg decrease in milk production for lactations 2, 3, and 4, respectively. Although peak yield in subsequent lactation occurred between 45 and 60 days, the rate of increase from zero to 45 days was not linear. Cows that were dry from zero to 35 days following first, second, and third lactations showed an average decrease of 1111, 491, and 1802 kg in second, third, and fourth lactations, respectively. In contrast, cows that were dry from 35 to 45 days had an average loss of only 280, 172, and 182 kg in lactations two, three, and four, respectively. Further research will determine optimum dry period length for lifetime yield, somatic cell score, female fertility, fat and protein percentages, and productive life.

**M226** Effect of photoperiod on milk production in lactating dairy cows. M. J. VanBaale*, D. V. Armstrong1, R. M. Mattingly2, and J. B. Fiscali1, 2 The University of Arizona, Tucson, 2Fiscali Dairy Farm, Modesto, CA.

Ninety-eight multiparous and 60 primiparous Holstein animals were utilized in an extended lighting trial to investigate photoperiods impact on milk yield. After parturition all animals were housed in one pen until 20 DIM under normal daylight/nightlight conditions. On d 21, animals were randomly assigned into two treatment groups receiving supplemental light (SL) or normal daylight and darkness (NL). There were four groups of multiparous cows; two were assigned to SL and two to NL. There were only two groups of primiparous animals that were assigned to SL or NL. While in freestalls both multiparous and primiparous cows in the SL groups were exposed to 17h of natural light and SL above 15 foot candle (FC) and 7h of light below 5 FC in the freestall area. The light exposure for the NL groups followed the normal sunrise-sunset pattern common for the north 40th parallel of sunrise 0530 to 0730 and sunset 1700 to 1900, an average of 12h of light and darkness. Light intensity was measured every two wks at 2200 to 2300 at two points in the freestall barn (feed manger and outside lane at animal head level) and in the milking parlor holding pen (front, middle, and back). Diets for both treatments were balanced for 52 kg milk/d. There was no difference (P = 0.48) observed between primiparous animals assigned to SL (32.9 kg/d) or NL (32.7 kg/d) treatments. Multiparous cows in...
SL groups produced more (P < 0.05) milk (49.4 kg/d) than the multi-
parous groups on the NL treatments (46.5 kg/d). Average pen DMI for
multiparous (29.3 vs. 28.4 kg/d) and primiparous (23.4 vs. 22.4 kg/d)
animals exposed to SL or NL were not measurably different. Exposure
to increased lighting enhanced milk production in multiparous cows but
cow with no effect on primiparous animals. Values were similar for the
multiparous group exposed to increased day length; however, milk
yield was improved. Since no physiological measurements were obtained
it is not known what contributed to the increase in milk yield, but in-
creased lighting is an effective management practice that can be used
to improve milk production on high producing dairy herds in the San
Joaquin Valley of California.

Key Words: Photoperiod, Lactating, Dairy Cows

M227 Reasons and timing of cows leaving dairy herds in Florida and Georgia. B. L. Butler* and A. de Vries,
Department of Animal Sciences, University of Florida, Gainesville.

Our objectives were to determine the reasons and timing of cows leav-
ing dairy herds in Florida and Georgia. DHIA records for individual
cows (n = 105, 112 and 120, respectively). Data were analyzed by regression.

M230 Evaluation of alternative body measurements for growing heifers. D. M. Lefebvre*, B. Gosselin, and R. Lacroix,
PATLQ - Quebec DHI Ste-Anne-de-Bellevue, Quebec, Canada.

The objective of this study was to validate the use of the Hipometer®
and other body measurements to evaluate dairy replacement growth.
Measurements were made on 969 heifers (896 Holsteins, 71 Ayrshires)
from 27 Quebec dairy herds. Body weight (BW) was measured using a
portable electronic scale. Body weight predictions from hip width (HW)
were made using a Hipometer. Additional measurements included heart
girth (HG) taken with a flexible metal tape, height at the withers (HW)
and at the hip (HH) using a measuring stick with a crossbar, and body
condition score BCS (1-5 scale). BW predictions from HG (HGW) were
also calculated using a polynomial equation in use at PATLQ (559.18 -
22.841 * HG + 0.365 * HG² - 2.725 * 10⁻³ * HG³ + 1.04 * 10⁻⁵ * HG⁴ -
1.526 * 10⁻⁸ * HG⁵). Age and breed of the heifer were also measured.
Average age of measured heifers was 11.75 ± 7.15 months (Mean ± SD),
ranging from 9 to 30.5 months and BW was 334 ± 176 kg, ranging from
29 to 769. BW was 120 ± 18 cm (range 69-152 cm) and HH was 125 ± 18 cm (range 75-156 cm). BW was closely associated with
BW: HW = 0.9875 BW + 4.9795; r² = 0.9675, SD = 31.7 but
yielded greater variation than HG-predicted weight: HGW = 1.0392
BW = 2.3935 + r² = 0.9834, SD = 23.7. A new second-degree polynomial
equation for predicting BW from HG was developed but only yielded
maximum improvement in precision (BW = 58.5 - 2.09 * HG + 0.024 * HG²,
+ 0.9843, SD = 22.03). HW is the commonly used measurement
to evaluate skeletal growth but HH is easier to obtain, is less subject to

Key Words: Automatic Milking System, Dairy Cows, Milk Yield

M229 Relationship between international body condition scoring systems. J. R. Roche†, P. G. Dillon‡, C. R. Stockdale§, L. Baumgard¶, K. Macdonald*, and M. VanBaelé*,
1 Dexcel, Hamilton, New Zealand, 2 Tegasc Moorepark, Fermoy, Co. Cork, Ireland, 3 Primary Industries Research Victoria, Kyabram, Victo-
ria, Australia, 4 The University of Arizona, Tucson.

Managing body reserves is critical for farm management, and requires
an accurate assessment of the cow’s ‘condition’. BW alone is not a good
indicator of body reserves, as cows of a specific weight may be tall and
thin or short and fat. Therefore measuring BCS and changes in BCS of
dairy cattle have become essential tools in both farm management and
research. The subjective appraisal of body fat stores has been rational-
ized into numerical BCS systems, but there are many scales in use. In
the United States and Europe, 5-point scales are in operation, while an
8-point scale is utilized in Australia and New Zealand uses a 10-point
scale. In New Zealand and Ireland, BCS is assessed by palpating indi-
vidual body parts, while in Australia and the United States the same
body parts are visually evaluated. Even though the anatomical regions
considered most important are similar in all systems, to date no attempt
has been made to relate and compare these systems, making extrapo-
lation and transfer of research findings difficult between systems,
and dependent on simple mathematical conversions. The New Zealand 10-
point scale was compared to the scoring systems in the U.S., Ireland
and Australia by trained assessors. Cows were assessed visually in the
U.S. and Australia, and in Ireland by palpating key areas of the cow’s body
(n = 105, 112 and 120, respectively). Data were analyzed by regression.
Positive linear relationships (P < 0.001) were found between the New
Zealand 10-point and the U.S. 5-point BCS scale (USA = 1.5 + 0.32NZ;
r² = 0.54; Residual S.D. = 0.34), the European 5-point scale (IRE =
0.81 + 0.40NZ; r² = 0.72; Residual S.D. = 0.16) and the Australian
8-point system of scoring (AUS = 2.2 + 0.54NZ; r² = 0.61; Residual
S.D. = 0.48). The recorded scores converged as the degree of emaci-
ation increased. Results are useful for extrapolating research findings
from different countries.

Key Words: Body Condition Score, Dairy Cows

M228 Effect of automatic milking systems on milk yield in Italian conditions. M. Speroni, G. Pirlo*, and S. Lolli,
Animal Production Research Institute via Porcellasio, Cremona, Italy.

Automatic milking systems (AMS) are expected to increase milk yield
because of the higher number of daily milkings in comparison with the
conventional milking systems. Many factors can influence the number
of milkings per day per cow. Two of them are parity and environmental
conditions which affect animals activity. Most of the studies on AMS
have been carried out in Northern Europe and they do not consider the
extreme conditions of the Southern Europe, where the summer is very
hot and humid. The aim of this experiment was to compare milk yield
of cows reared in identical condition and milked by AMS or by milking
parlour (MP) in a typical Italian dairy herd located in the Po Valley.
From November 2002 to November 2003, 26 primiparous and 10 pluri-
parous cows were milked with an AMS (DeLaval VMS®), at the same
time on the other side of the barn 31 primiparous and 10 pluri-
parous cows were milked twice a day in a MP (8+8 herring-bone). A selection
gate allowed cows to access to the AMS only if interval from last milking
was >5 h. Cows in the MP had milking intervals of 11 h and 13 h between
milkings respectively. Groups were fed the same TMR. Milk yield was recorded
one day a week at each milking; temperature and humidity were recorded
hourly and used to calculate temperature and humidity index (THI).
Summer 2003 was particularly hot and THI constantly exceeded 72 be-
tween June and September. In the AMS, milking frequency (MF) was
significantly higher (P < 0.001) in primiparous than in pluriparous cows.
In winter and autumn, MF was 2.67±0.03 and in spring and summer it
was 2.51±0.05. Effect of season on MF (P < 0.005) was higher in primi-
parous than in pluriparous. Pluri-parous cows of AMS yielded 6.68±0.83
kg/d of milk more (P < 0.001) than MP pluriparous cows. There was
no difference in milk yield between AMS and MP primiparous cows.
The negative effect of hot season (P < 0.001) was higher for AMS cows
than for MP cows. In conclusion AMS increased milk yield in both
primiparous cows had some difficulties adapting to AMS. Both primiparous
and pluriparous milked with AMS were more sensitive to high THI than
cows milked with MP

Key Words: Automatic Milking System, Dairy Cows, Milk Yield

Culling Reasons, Herd Size, Seasonality
be influenced by the posture of the heifer being measured and is used by breed associations to evaluate stature for type classification. HH was closely associated with HW, HH = 7.13 + 0.9795 * HW, r² = 0.984, SD = 2.3 cm. These results suggest that the Hipometer is an acceptable method for evaluating BW but adjustments are required for comparisons to references.

**Key Words:** Dairy Heifer Growth

**M231** Effect of bedding materials and modified rubber free-stall bases on stall usage by lactating dairy cows, R. Panivivat¹, E. B. Kegley¹, D. W. Kellogg¹, J. A. Pennington², and Z. B. Johnson¹, 1Department of Animal Science, University of Arkansas, Fayetteville, 2University of Arkansas Cooperative Extension Service, Little Rock, AR.

Two studies were conducted to observe cow preference for using stalls bedded with different materials. In the first experiment, a 2 x 3 factorial arrangement of treatments, commercially available rubber free-stall bases that filled the entire stall were compared to handmade modified rubber bases that filled only the rear half of the stalls, in conjunction with three types of bedding materials (rice hulls, sand, or a base of sand covered with rice hulls [combination]). Thirty-six stalls were equipped with either the full base or the modified base and stalls were filled with the three types of bedding from August 8 to 29, 2001. Cows were observed beginning 3-h post-milking, four times at 30 min intervals on d 7, 14, 21, and 31. Cows used the stalls equipped with the full bases (56% usage) more than the modified bases (44%; frequency procedure [P < 0.05]). Cows preferred the combination (61%) to the sand (52%), or the rice hulls (41%; P < 0.001). Using the GENMOD procedure, there was a type of base by material interaction (P < 0.05); stalls bedded with the combination were used 4.6 times more likely (P < 0.01) with the full base than with the modified base. In the second study, 36 stalls were equipped with the full bases and were bedded with the same three types of material from November 19 to December 19. Cows preferred the sand (72%) to the combination (69%), or the rice hulls (66%; P < 0.001). Bacterial counts in the bedding were determined on d 30, 31, and 38. There were material by day interactions (P < 0.05) for gram-negative, coliform, and Streptococcus bacteria counts. Bacterial counts were greatest initially in rice hulls and lowest in sand; by d 38 counts were similar for all materials. Cows preferred stalls equipped with the commercially available free-stall bases that filled the entire stall. Cows also preferred stalls bedded with sand or the combination of materials rather than with rice hulls.

**Key Words:** Cow Preference, Bedding Material, Free-Stall Base

**M232** Use of ambient and physiological markers to predict production changes in dairy cows resulting from acute heat challenge. J. D. Sampson*, D. E. Spiers, J. N. Spain, R. P. Rhoads, and M. Ellersieck, University of Missouri, Columbia.

It is well known that cows reduce production during summer months with either acute or chronic exposure to heat stress (HS). An ambient indicator of heat stress (i.e., temperature-humidity index; THI) is traditionally used to predict milk yield (MY) of heat-stressed cows. More recently, a strain index (PSI) has been developed for humans using physiological markers (i.e., rectal temperature, heart rate) to determine HS impact (Morn et al., Am. J. Physiol. 275: R129-134, 1998). The objective of this study was to measure effects of acute HS on milk production in Holstein dairy cows to identify ambient and physiological parameters that could be used to develop a similar strain index. Multiparous Holsteins (61±8 d postpartum) were acclimated to thermoneutral (TN) conditions (19±1°C, 55% RH) for 1 week, followed by TN or HS (29±1°C, 50% RH) exposure for 24 (n=48), 48 (n=4) or 96 (n=2) hrs. Individual daily milk yield (MY; 0400 and 1600 hr) and feed intake (FI) were recorded. Respiration rate (RR), skin temperature (Tsk) and rectal temperature (Tre) were measured every 4 hrs. Both MY and FI of HS cows decreased (P<0.05) within 48 hrs from 34.5 to 28.2 kg and 40.2 to 24.5 kg, respectively. Likewise, Tre increased 0.5°C at 24 hrs and 1.7°C at 96 hrs of HS (P<0.05). Multivariate linear analyses were performed to determine best predictors of production and thermal status. Only correlation coefficients (r) for HS alone were used for comparisons since these values were higher than the combination TN and HS values. MY was linearly correlated with FI (r = 0.79), followed by Tre and change in Tre (r = -0.75). There was a close relationship between RR and Tre using either actual values (r = 0.89) or change from baseline (r = 0.91). Skin temperature was a reliable predictor of RR (r=0.91) and Tre (r=0.88). These data suggest that thermal status is a reliable predictor of production and should be used in different combinations when developing a PSI for the dairy cow.

**Key Words:** Heat Stress, Performance, Index

**M233** Investigating effects of heat stress on milk production and composition of Iranian Holstein dairy cattle. A. Naserian*, B. Saremi, and F. Karavan, Animal Science Department, Ferdowsi University of Mashhad.

Dairy farms are developing so fast in recent years at north of Iran. This area has a special climate condition (High temperature and humidity during May-October). It’s so important to investigate effects of this climate on the performance of cows. The objective of this study was to investigate the effects of temperature and humidity of the weather via an Index (THI), which is calculated from the following equation: [Temperature°F - (0.55-0.55×Humidity%)×(Temperature°F-58)] on milk production and composition of Iranian Holstein dairy cattle in this area. Treatments consider as THI <52 (T2) THI between 52-62 (T3) THI between 62-72 (T4) THI between 72-82 (T5) THI>82. Data were obtained from Gorgan dairy farm (700 heads), which is located at line coast of Caspian Sea at north of Iran (Golestane state). Cows were kept in open shed system and milked three times a day and rations were offered as a TMR. Study was conducted between years 2000-2004 and cows were fed according to NRC 1998 and 2001. Measured data were: 1) Mean daily milk for each cow adjusted to Fat 4% (MDM4), 2) Total milk production (TM), 3) Total milk production adjusted to fat 4% (TM4), 4) Fat% (Fat), 5) Maximum daily temperature (MaxT), 6) Daily humidity (Humid). Data were analyzed using General Linear Model procedures of SAS v6.12 to evaluate differences among experimental groups. The design was completely randomized. Means were compared with Duncan test. Data showed that there is a significant difference between MDM4, TM, TM4 and Fat by year and month of recording: at 2003-2004 and between December-May all of milk production and composition were improved (p<0.01), which are because of improvement of management of the herd and lack existence of heat stress between mentioned months, respectively. Results showed that all measured factors were reduced significantly by increase in THI (P<0.05) (Table1). The results of this study showed that investment for dairy industry in this area is possibly unaccepted.

**Table 1:** Effect of heat stress on milk production and composition of Holstein dairy cattle

<table>
<thead>
<tr>
<th>THI</th>
<th>MDM4 Kg</th>
<th>TM Kg</th>
<th>TM4 Kg</th>
<th>Fat%</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>3.53</td>
<td></td>
<td></td>
<td></td>
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<td>52</td>
<td>4.54</td>
<td></td>
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<tr>
<td>62</td>
<td>4.66</td>
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<tr>
<td>72</td>
<td>4.45</td>
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</tr>
<tr>
<td>82</td>
<td>4.33</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEM</td>
<td>0.004</td>
<td>12.69</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Different words at columns show significant differences between treatments.

**Key Words:** Heat Stress, Dairy Cattle, Milk Production
total of 60 Single Comb White Leghorn hens were used for this study. At the end of the 2nd laying cycle (approximately 120 wk of age), hens were euthanized using carbon dioxide gas, and the right tibia and femur were collected. The bones were divided into three treatment groups: fresh, dry, and fat-free dry. Fresh weight, bone volume, dried weight, ash weight, ash concentration, and bone-breaking strength were evaluated. There were no significant differences in fresh weight, bone volume, dried weight, ash weight, and ash concentration of tibia and femur among the treatments. However, fresh tibia (24.13 kg) had a greater bone-breaking strength compared to the dried (9.90 kg) and fat-free dried bones (7.41 kg) (P<0.05). The bone-breaking strength (20.97 kg) of fresh femur was also significantly higher than the dried (9.22 kg) and fat-free dried femurs (6.94 kg). The bone-breaking strength of the fresh bone was highly correlated with dried weight, ash weight, and ash concentration whereas that of the fat-free dried bone was poorly correlated with the other bone parameters. The results indicate that fresh bone gives better bone-breaking strength correlated to the other bone parameters than dry or fat-free dry preparation.

Key Words: Bone-Breaking Strength, Bone Parameters, Bone Preparation

M235 Interrelationships of traits measured on male Angora goats during a central performance test. F. A. Pfenfester, C. J. Lupton, and D. F. Waldron, Texas Agricultural Experiment Station, College Station, TX, Texas A&M University System, San Angelo.

A pooled correlation analysis was conducted to estimate the phenotypic relationships between traits measured, calculated, or scored on yearling Angora male goats (n = 462) that had participated in a central performance test (1997-2003). These annual tests were initiated in 1967 to evaluate goats from different herds at a central location for growth, mohair production, and fiber characteristics, and to help breeders identify genetically superior animals. Correlation analyses had been reported earlier (1981 to 1984 data) when selection emphasis was primarily on mohair production. With changes in economic emphasis and the size and structure of the Angora goat industry over the past ten years, it is of interest to re-estimate these correlations. Characteristics measured or scored included initial and final body weights (IW and FW), average daily gain (ADG), scrotal circumference, grease fleece weight (GFW), clean fleece weight (CFW), average fiber diameter (AFD) and variability (SDFD), clean yield (CY), med (M), kemp (K), average staple length, face cover score, neck cover score, and fleece character score. Previously reported significant correlations (r = 0.3, P < 0.01) between FW and the fleece weights were not present (r < 0.1, P > 0.05) in this analysis. Conversely, significant but antagonistic correlations (r = -0.15, P < 0.01) between ADG and the fleece weights and CY and AFD (r = 0.18, P < 0.01) were present in the current analysis but had not been reported previously (r < 0.05). The magnitude of the favorable correlation between FW and AFD (r = 0.47) and the antagonistic relationships between GPW and CY (r = -0.23), GPW and AFD (r = 0.50), and CFNW and AFD (r = 0.57) were similar in both studies. Three previously unreported correlations are noteworthy: AFD and M (r = 0.40), M and K (r = 0.60), and ADG and SDFD (r = 0.16). The newly calculated correlation coefficients are expected to assist breeders to better understand the consequences of selecting for individual traits.

Key Words: Angora Goat, Mohair, Central Performance Test


A meta-analysis of the main factors affecting finishing average daily gain (FADG; kg/day), intramuscular fat percentage (IMF), 12/13th rib fat (BF; cm), longissimus muscle area at the 12/13th rib (LA12) (cm²), and kidney fat percentage (KPFH) at harvest were assessed. Twenty-six papers from 1990 to 2003 were evaluated where consistent IMF data was a key selection criterion. Twenty experiments from 16 papers were selected and used in the analysis. Over 80 variables were entered into a data base and additional variables were created as the data were coded for analysis. In total 93 variables were available for analysis, e.g. sample sizes (n), pen numbers and s.d. for each carcass characteristic. Three categories were developed to distinguish: (1) end point at harvest (i.e. age, weight or fat depth); (2) experimental unit, pen or individual animal (ExpUnit); and (3) weight class (WtClass) (e.g. adjusted for carcass weight). The data were analyzed using the mixed model procedure in SAS with n as the weighting variable. The terms in the model were paper, system (feedlot or pasture), implant (Yes or No), breed (8 categories), End Point, ExpUnit, WtClass, Weaning age, Days on feed before harvest (DOF), Final Age and Carcass wt. All terms were fitted as fixed effects except for paper which was fitted as random; weaning age, days on feed, final age and carcass weight were covariates. Non-significant terms were deleted from the model and the three most significant, determined by the F statistic, are reported. Residual variances of papers were 12.4, 5.6 and 4% for FADG; IMF; BF, KPFH and REA respectively. The most significant variables in order were: system, DOF and Carcass wt for FADG; System, Carcass wt and End Point for IMF; Carcass wt, Breed and WtClass for BF; Carcass wt, WtClass and End Point for KPFH; and Carcass wt, Breed and Weaning age for REA. These analyses will provide valuable inputs to an ongoing program for modeling beef cattle growth and carcass quality.

Key Words: Cattle, Meta-Analysis, Carcass Characteristics


We evaluated the effects of early weaning calves from cows that had twins on cow and calf performance, compared to cows weaned single calves or normal weaned single calves. During the spring of 2003, cows that gave birth to twins simultaneous to cows calving to one individual single calf were assigned based on days postpartum and calf sex to one of three management systems: 1) cows with twins were maintained together until both calves were weaned from the cow at 81 ± 2.5 d (TWIN; n = 7), 2) cows with a single calf were maintained together until the calf was early-weaned at 76 ± 3.4 d (SE) with a single calf were maintained together until the calf was weaned at 202 ± 3.4 d (SL; n = 8). At early-weaning calves assigned to the TWIN and SE systems were exposed to a step-up feeding procedure until they consumed an 85% concentrate diet consisting of corn and soybean meal, with access to grass hay. Body weight (BW) and body condition score (BCS) of cows and BW of calves were recorded every 28 d. The MIXED model of SAS was used to analyze all data as repeated measures. At 60 d prior to calving BW and BCS of cows did not differ. At Calving the percentage change in BW and BCS was greater (P < 0.05) for SE (0% ± 2.0% for BW change and BCS, respectively) and SL (6% ± 5.6% for BW change and BCS, respectively) than TWIN (-12% and 3% ± 4.0% for BW change and BCS, respectively) cows. At 44 ± 7.2, and 100 BW and BCS was greater (P < 0.05) for SE and SL than TWIN cows, whereas at d 128 to 204 BW and BCS for TWIN cows was similar to SE and SL. Average BW of calves at birth was greater (P < 0.01) for SE (42.3 ± 8.6 kg) and SL (42.2 ± 8.1 kg) calves than individual TWIN (30.8 ± 6.5 kg) calves. From birth to d 204 ADG was greater (P < 0.05) for SE (0.98 ± 0.06 kg) and SL (1.05 ± 0.06 kg) than individual TWIN (0.83 ± 0.04) calves; however, total weight per cow weaned was greater (P < 0.05) for TWIN (406 ± 13 kg) than SL (253 ± 12 kg) and SE (241 ± 12) systems. We conclude that weaning cows by 80 d with twins influenced BW change and BCS in cows. In addition, TWIN cows weaned more total calf-weight per cow than their single counterparts.

Key Words: Beef Cows, Twinning, Early Weaning

M238 Acute phase protein response to weaning and transport in calves produced by matings of Romosinouan, Angus, and Brahman. J. D. Arthington*, D. G. Riley, C. C. Chase, Jr., W. A. Phillips, and S. W. Coleman, 1 Univ. of Florida, Gainesville, 2 USDA, ARS, Brooksville, FL, 3 USDA, ARS, El Reno, OK.

Objectives were to assess acute phase protein (APP) response in calves due to weaning and transport, and to evaluate breed influence on any detected response. Straightbred and crossbred calves (n = 297) were produced from all possible matings of Romosinouan (R); tropically adapted breed naïve traits were analyzed, Angus (A), and Brahman (B) in central Florida. Calves were weaned at approximately 7 mo of age (September, 2002) and provided a commercial preconditioning concentrate and
free-choice grass hay. Approximately 28 d after weaning, steers (n = 143) were transported 2,200 km to central Oklahoma. As an estimate of inflammation, concentrations of ceruloplasmin, fibrinogen, and haptoglobin were measured in blood samples collected at weaning, 24 and 72 h post-weaning, and on the day of shipping, 24 and 72 h after arrival. Fixed effects were breed type (n = 9 levels: straightbreds [RR, AA, BB]) and crossbreeds [RA, AR, RB, AB, BA] where letters indicate breed of calf sire then dam, respectively, herd, sex (weaning only), and sampling time. Animal was a random effect. Following weaning, the concentration of each APP increased (P < 0.01; 15, 17, and 19% in the interval from weaning to 72 h for ceruloplasmin, fibrinogen, and haptoglobin, respectively). Irrespective of breed of sire, concentration of each APP was less (P < 0.01) in calves derived from B dams (average APP concentration = 21.7 and 23.2 mg/dL, 102 and 124 mg/dL, and 2.9 and 3.3 mg HbB for ceruloplasmin, fibrinogen, and haptoglobin, respectively). Following transportation, concentrations of ceruloplasmin and fibrinogen decreased (P < 0.05; 10 and 17% in the interval from pre-shipping to 72 h after arrival for ceruloplasmin and fibrinogen, respectively). In contrast, average haptoglobin concentration increased 78% for all calves by 24 h following arrival. Increased haptoglobin concentration was most evident as heterotic effects for AR; i.e., crossbred (AR and RA) concentration (2.71 mg HbB) was greater (P < 0.01) than straightbreds (AA and RR) concentration (1.41 mg HbB). These data suggest that certain breed effects impact the APP response to calf weaning and shipping.

Key Words: Acute Phase Proteins, Romsosinnah, Brahman


One hundred and forty-four cross-bred market pigs weighing approximately 110 kg were randomly divided into six groups in a 3 (duration of fasting prior to loading; 0, 12 and 24 h) x 2 (handling stress; minimal vs stimulated handling stress) factorial arrangement of treatments. The effects of fasting prior to loading; 0, 12 and 24 h) x 2 (handling stress; minimal handling stress group. There were no interactions between the effects of fasting and handling stress on plasma concentrations of stress-associated enzymes. Mean plasma glucose concentration, as expected, was less in pigs on plasma concentrations of stress-associated enzymes and carcass quality. D. H. Kim*, J. T. Seo, D. M. Ha, and C. Y. Lee, Regional Animal Industry Research Center, Jinju National University, 150 Chilamdong, Jinju, Korea.

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Key Words: Pig, Stress, Carcass


The objective of this study was to model the economics of a change from confinement to loose-housing of gestating sows using an economic engineering approach. Analysis was conducted with the base case of a 2,200 sow breeding to weaning operation with gestating sows housed in two alternative systems (crates or loose-housed/led from electronic sow feeders). Annual total costs for each system were estimated on the basis of the following assumptions. Building and equipment costs were depreciated over 15 and 10 years, respectively, assuming an interest rate of 7%. Total fixed costs of $1,184,548 and $1,236,786 for a crate and loose-housed system, respectively, which consisted of costs of building ($656,613 and $623,996, respectively), equipment ($299,480 and $375,615, respectively), and ownership (i.e., depreciation, interest, repairs, taxes, and insurance) ($228,255 and $237,175, respectively). Operating costs (i.e., labor, genetics, feed, utilities, transportation, and veterinary and medicine) and sow productivity levels were assumed to be the same for both systems. Total cost for the system based on gestation crates was $1,311/sow/year (at a total floor space allowance of 1.67 m²/sow). The costs of the loose-housed system varied with the floor space allowed per sow. At the same floor space assumed for the conventional crate system (i.e. 1.67 m²/sow), the costs for the two systems were similar ($1,311 vs. $1,334 /sow/year, respectively.) However, costs per sow increased with increasing floor space in the loose-housed system (e.g. 2.04 m²/sow = $1,521; 2.42 m²/sow = $1,701; 2.79 m²/sow = $1,875). In conclusion, the cost to the industry of a move from gestation crates to loose-housed systems will depend on the floor space necessary for successful operation of the loose-housed system.

Key Words: Sows, Housing, Economics

Horse Species


Four mature geldings were used to study the effects of urine handling prior to analysis on Ca and N values. Urine was collected into a clean bucket and then poured through three layers of cheesecloth to remove any hair or debris. The urine was stirred to suspend any precipitate and 5 ml of urine was pipetted into 7-ml vials and the vials were tightly capped. An additional 500 ml of urine was poured into a total collection device (TCD) for later sampling. Urine from each of the 4 horses was blocked by horse and evaluated with twenty-one treatments. Seven combinations of holding time and temperature were examined (frozen immediately, 6 h at 30 C, 6 h at 10 C, 12 h at 30 C, 12 h at 10 C, TCD for 6 h, TCD for 12 h). There were 3 acidification methods evaluated for each combination (no acid, acid added just before freezing, or acid added after urine was thawed). Sample processing was completed within 45 min of collection. Acid was added at a rate of 20 µl of 12 M HCl/ml urine. All samples were frozen at -4 C until analyzed. Differences between treatments were determined by orthogonal contrasts using the mixed model procedure in SAS 8.2. Urinary Ca was higher when acid was added compared to when no acid was added (1.52 mg/ml ± 0.18 vs. 0.59 ± 0.18) regardless of holding time, temperature, or location (P<0.01). The addition of acid prior to freezing tended to result in samples having higher Ca than samples in which acid was added after urine was thawed (P=0.07), though no other variables had an effect. Urine N was unaffected by the addition of acid to the sample (1.04% ± .26 vs. 1.05 ± .26; P=0.22). There was a trend for urine placed in the TCD for either 6 or 12 h to have lower N than urine not placed in the TCD (P=0.06) and urinary N was higher when acid was added after thawing compared to before freezing (1.05% ± 0.01 vs. 1.01 ± 0.01; P<0.01). There was no difference in N based upon holding time (P=0.77). Vials were tightly capped and N was not able to volatilize, which may explain why other differences were not seen. These data suggest that urinary Ca is more sensitive to the addition of acid than urinary N but that urine handling methods do influence results.

Key Words: Horse, Urine Nitrogen, Calcium

M242 The effects of FEB-200 on serum progesterone and cortisol levels of pregnant mares in early gestation grazing on endophyte-infected tall fescue pastures. V. Akay1, R. Stepp2, and P. Karnezos1. *Alltech, Inc., Nicholasville, KY, 2Southern States Cooperative, Inc., Richmond, VA.

Fifty pregnant mares in early gestation from a commercial horse farm in Lexington, KY were used to evaluate the effects of modified gluco-