

synchronization regime as T1; and Treatment 4 (T4) received the same diet as T3 and the synchronization regime as T2. A hundred percent of estrus onset for all treatments, but there were differences in beginning of estrus between T4 and T2 with an average time of 50.4 ± 1.83 and 40 ± 2 h, respectively, while for T1 and T3 the average time was 46 ± 2.10 and 49.8 ± 2.88 h ($P > 0.05$). Beginning of estrus was affected for feed restriction, and restricted ewes (T3 and T4) showed estrus later (50.06 ± 1.68 h) compared to not restricted (T1 and T2) ewes (43.09 ± 1.52 h, $P < 0.05$). Duration of estrus was longer in T2 (45.8 ± 2.80 h) compared to T3 (34 ± 1.86), and for T1 and T4 there were 38.7 ± 1.37 and 41.3 ± 2.15 h, respectively ($P > 0.05$). In treatments pre-synchronized with PGF_{2α} (T2 and T4) duration of estrus was longer

compared with not pre-synchronized, with 43.6 ± 1.80 h and 36.6 ± 1.17 h respectively ($P < 0.05$), while feed restriction did not affect duration of estrus ($P > 0.05$). We conclude that feed restriction affects beginning of estrus, while pre-synchronization prolongs duration of estrus.

Key Words: PGF_{2α}, Ewes, FGA

T273 Please see abstract # 281.

T274 Please see abstract # 287.

Production, Management & the Environment - Livestock and Poultry II

T275 Human resource management and dairy employee organizational commitment. R. E. Stup*, *The Pennsylvania State University, University Park.*

The purpose of this research was to gather information about human resource management (HRM) practices used on dairy farms and effects these practices had on employees' feelings of commitment toward the farm. HRM practices included in the study were selection, benefits, training, performance feedback, communication systems, standard operating procedures, and employee participation. Organizational commitment is the strength of an employee's attachment to the organization where he is employed. Employees committed to the organization are less likely to leave for another job and are more likely to perform at high levels. There are three dimensions of organizational commitment: affective commitment is a feeling of emotional attachment, normative commitment is a feeling of obligation, and continuance commitment is a feeling that the costs of leaving are too high or it is too much trouble to go somewhere else. In February 2005 a survey was sent to owners and employees of dairies with herd sizes of 250 or larger in the Northeast. A total of 131 owners and 201 employees responded. Farm-level response rate was 14.8%. The following HRM practices were significantly ($p < .05$) correlated with affective commitment: level of off-farm training, adequacy of initial training, adequacy of continuing training, satisfaction with training, informal feedback was provided, satisfaction with feedback, satisfaction with performance reviews, and employee participation. Normative commitment was significantly ($p < .05$) correlated with: adequacy of initial training, adequacy of continuing training, satisfaction with training, informal feedback was provided, satisfaction with feedback, satisfaction with performance reviews, employee participation. Further analysis with stepwise multiple regression found satisfaction with feedback, employee participation, and satisfaction with performance reviews were predictive of affective commitment. The same three HRM variables predicted normative commitment as well. The results suggest that managers should focus on feedback and employee participation to build employee commitment.

Key Words: Human Resources, Employee Commitment, Labor

T276 The amount of concentrate offered in automated milking systems does not influence the frequency of visits of dairy cattle consuming high levels of corn silage. A. Bach*^{1,2}, C. Iglesias³, M.

Devant², and A. Ferrer², ¹ICREA, Barcelona, Spain, ²IRTA-Unitat de Remugants, Barcelona, Spain, ³SEMEGA, Girona, Spain.

The objective of this study was to evaluate whether the amount of concentrate offered in an automatic milking systems (AMS) would modify milking frequency, feeding behavior, and milk production. One hundred and fifteen lactating cows were used in a cross-over design with 2 periods of 90 d each and two treatments: LC (up to 3 kg/d of concentrate at the AMS) or HC (up to 8 kg/d of concentrate at the AMS). Cows were evenly distributed in 2 symmetrical pens, each containing 1 AMS and about 50 cows at any given time. All cows received the same total ration (28% corn silage; 1.67 Mcal of NEI/kg; 16.5% CP, DM basis) but a different proportion of concentrate from this ration was offered at the AMS depending on treatment. The concentrate at the AMS had the same composition in both treatments. Cows were fetched when time elapsed since last milking was greater than 12 h. The amount of concentrate offered at the AMS was proportional to the time elapsed since last visit (125 g/h and 333 g/h for LC and HC, respectively). Milk production (32.5 ± 0.89 kg/d), total number of daily milkings (2.7 ± 0.07 /d), number of cows fetched (1.2 ± 0.02 /d), or number of voluntary milkings (1.5 ± 0.09 /d) were not affected by treatments. The consumption of basal ration was greater ($P < 0.05$) in LC (19.0 ± 0.26 of DM/d) than in HC (14.2 ± 0.27 kg of DM/d), but this difference was compensated by a greater ($P < 0.05$) consumption of concentrate at the AMS in HC (6.8 ± 0.02 kg of DM/d) than LC (2.6 ± 0.02 kg of DM/d) cows. Therefore, total DMI was unaffected. The eating rate of the basal ration was greater ($P < 0.05$) in LC (113.2 ± 0.23 g of DM/min) than in HC (80.7 ± 0.21 g of DM/min), but the total amount of time that cows devoted to eat was similar between treatments (171.7 ± 5.11 min/d). Offering high amounts of concentrate to the AMS feeding a basal ration rich in corn silage is not an effective method to diminishing cow fetching and increasing number of daily milkings and milk production.

Key Words: Automatic Milking, Concentrate

T277 Effects of dam's dry period length on calf. M. T. Kuhn*, J. L. Hutchison, and H. D. Norman, *Animal Improvement Programs Laboratory, Beltsville, MD.*

Recommendations for shortened dry periods have become increasingly common in recent years. While considerable research has been done to determine effects on cow performance, research to determine what,

if any, effect shortened dry periods have on the calf being carried is quite limited, in spite of the fact that in utero weight gain of the calf increases at an increasing rate during gestation, with more than half of fetal weight gain occurring during the last 2 months of gestation. Field data were utilized in this research to compare calving ease (CE) scores and stillbirth (SB) rates across 16 days dry (DD) categories. Heifer ages at first breeding (AFB) were also compared across dam DD categories and the raw percentage of heifers with a first calving was also calculated for each category. The linear, fixed effects model for analysis of CE and SB included herd-year of calving, year-state-month of calving, parity, sex of calf, and DD category. Parity and sex of calf were dropped from this model for analysis of calves' AFB. A total of 454,091 CE, 163,175 SB, and 24,125 AFB records were included for analysis. The number of records for AFB was much smaller because only about 29% of US herds have heifer breedings recorded in the national database and storage of heifer breedings only began in 2003. Although differences were small, CE scores did tend to be lower for dry periods of 0 to 45 d than for 46 to 65 DD, suggesting that calves may be smaller with shorter dry periods. Stillbirths were 1.3% higher for dry periods of 30 d or less, compared to DD between 61 and 65 d. There was no evidence to support an effect on AFB for heifers surviving to breeding age; subclass sample sizes, however, were small and further investigation of this trait may be warranted when more data is available. Simple averages indicated that heifers born after dry periods of 45 d or less survived to first calving 12% less often than heifers born after dry periods of 56 to 70 d. Further research on survival to first calving, adjusting for extraneous effects, is warranted. Results to date indicate a small, but real, negative impact on the calf for dry periods less than 45 d.

Key Words: Days Dry, Survival

T278 An analysis of the relationship between wash water quality and bulk tank milk quality on Ontario dairy farms. N. R. Perkins^{*1}, D. F. Kelton¹, K. E. Leslie¹, K. J. Hand², G. MacNaughton³, and O. Berke¹, ¹University of Guelph, Ontario, Canada, ²CanWest DHI, Guelph, Ontario, Canada, ³Dairy Farmers of Ontario, Mississauga, Ontario, Canada.

The objective of the study was to identify areas of high risk of wash water contamination and to investigate the relationship between bacteria contaminated wash water and elevated Bactoscan bacteria counts in raw milk. Water quality analysis was conducted by the Dairy Farmers of Ontario on all of the 5000 farms in the province on an annual basis, during 2003 and 2004. These water quality data, matched with bacteria counts (Bactoscan determinations) in raw milk during the same time period, were evaluated using linear regression to evaluate the relationship between water contamination and bacteria counts in raw milk. After controlling for potential confounders, the data was used to determine whether the presence of coliform and/or *E.coli* bacteria in the water was associated with an elevated Bactoscan level in raw milk. In addition to regression analysis, the first water quality sample was utilized in a spatial analysis to quantify the prevalence of water contamination and to identify any geographic case cluster formations within the data. An *E.coli* case farm and similarly, a coliform case was any farm that had >0 of the respective bacteria within the water sample. The significant ($p < 0.05$) factors associated with Bactoscan levels in raw bulk tank milk in the linear regression analysis included: the presence of *E.coli* bacteria in wash water, an interaction between average herd monthly somatic cell count (SCC)

and season, and an interaction between total monthly milk production and average herd monthly SCC. The spatial analysis performed separately for coliforms and *E.coli* identified one cluster of coliform cases and three clusters of *E.coli* cases in southern Ontario. The prevalence of bacteria in wash water is a concern within Ontario, since pasteurization does not kill all bacteria within raw milk. Therefore, milking equipment should be properly cleaned and sanitized in order to ensure the production of a high quality, safe milk product.

Key Words: Raw Milk, Wash Water, Bacteria

T279 Body weight of Holstein heifers as measured by heart girth tape and electronic scale: A comparison. J. E. Wohlt^{*1}, C. E. Reich¹, and J. Ferguson², ¹Rutgers University, New Brunswick, NJ, ²University of Pennsylvania, Kennett Square.

Holstein heifers, 3 to 18 mo, were weighed once monthly (June, July, August, September 2006; $n = 128/\text{mo}$, total $n = 514$) first by tape (Weight-By-Breed, NASCO) and then on an electronic scale (Allflex Technologies). This comparison was necessary as a 2 y growth database on heifer body weight had been generated using a tape. Data were analyzed by ANOVA using GLM procedures with method and month main effects in the model and pen as a covariant. Body weight was 11 kg greater ($P < 0.01$) by scale than tape: 279 vs. 270, 260 vs. 251, 275 vs. 258, 285 vs. 276; respectively by month. The frequency that scale weights were greater than tape weights was constant by month: 74, 70, 76, and 69%; respectively. Method was also evaluated for different levels of body weight: 45.4 kg increments for heifers weighing 91 to 499 kg. Scale weights differed from tape weights only when heifers exceeded 227 kg. Tape and scale weights were significantly ($P < 0.01$) correlated: $y = 1.0689x - 7.8$, $R^2 = 0.98$. Growth rate, determined by regression analysis, did not differ when heifer body weight was measured by tape or scale (0.81 vs. 0.82 kg/d). All producers should be monitoring heifer growth. Many methods are available and selection of a method should be appropriate for available facilities, labor and time constraints. If method of weighing changes, then comparisons should be done and correction factors applied to assess body weight data.

Key Words: Dairy Heifer, Tape Weight, Scale Weight

T280 Dairy farm sustainability: The economic component indicators. D. L. Larochelle^{*}, D. P. Parent, G. A. Allard, and D. P. Pellerin, Laval University, Quebec, Quebec, Canada.

Over the last two decades, the number of dairy farms has declined dramatically and the viability of the family farm has been questioned. A comprehensive research project has been set to evaluate the sustainability of Quebec dairy farms based on their economic, environmental and social components. The objective of the present study was to develop indicators to evaluate the economic sustainability. To identify these indicators, experts working in various areas such as animal production, farm management and financial institutions have been consulted using the Delphi method. This method uses a qualitative sequential approach: each expert submits his own indicators which are later debated in a focus group; the chosen indicators are then classified and ranked and for each indicator, different threshold levels are established by the group to determine the score values.

Indicators are selected based on their sensitivity to predict the economic component of dairy farm sustainability considering the availability and easiness with which the data can be collected and analyzed. From the 139 indicators initially submitted, eight were selected and grouped in five categories. For a total score of 100 points, their weights are:

A- Technical management (/20): 1- Milk yield (L/cow/year). (/8) and, 2- Milk from forage (L/cow/year), (/12)

B- Economic viability (/25): 3- Security margin (Net return surplus on gross income, %), (/15) and, 4- Total farm debt per hectolitre (\$/hL), (/10)

C- Expense control (/30): 5- Operational expenses on gross income (%), (/20) and, 6- Machinery expenses per hectolitre (\$/hL), (/10)

D- Labor efficiency (/15): 7- Milk per full time worker (FTW), (L/FTW), (/15)

E- Self-sufficiency (/10): 8- Self-sufficiency of forage usage on farm (%), (/10)

The overall score for a given farm is obtained by adding the individual score for each indicator and farms can be compared for their economic sustainability. This new tool will help to evaluate the sustainability of dairy farms at a given point in time and it becomes possible to follow their evolution over the years.

Key Words: Sustainability, Indicators, Farms

T281 A comparison of body temperature measures between Holstein and Gir × Holstein cows in relation to environment and stage of the estrous cycle. S. Dray*, A. Harris, R. Farrar, G. Grissett, S. Laird, and S. Willard, *Mississippi State University, Mississippi State.*

Gir × Holstein (G×H) cows have higher body surface and lower rectal temperatures (RT) than Holstein (HOL) cows under heat-stressed conditions. However the influence of coat color and stage of the estrous cycle on body temperatures (BT) have not been evaluated, therefore our objective was to compare BT responses of HOL vs. G×H cows in relation to these parameters (coat color and estrous cycle) during summer heat stress. Non-lactating HOL [n=5 white (WH); n=6 black (BH)] and G×H [n=7 dark (DK); n=4 light (LT)] cows were fitted with the HeatWatch estrus detection system, and an intravaginal temperature (VT; °C) probe inserted to acquire VT (5 min intervals; July-Sept). Cows received two injections of PGF₂α 11 d apart to synchronize estrus (d -10 and 0). From d -10 to d 46 (56 d), measurement periods were conducted weekly (three times AM and five times PM weekly) and included: ambient temperature (AMBT; °C), temperature-humidity index (THI), rectal temperature (RT; °C), respiration rate (RR; breaths per min), digital infrared thermography of the eye (maximum eye temperature; MAX-EYE, °C), and a blood sample (serum) for progesterone (P4) by RIA. Cow BT was analyzed in relation to environmental measures and stage of the estrous cycle [luteal (LUT) vs. follicular (FOL) phases]. Environmental AMBT differed (P<0.01) AM vs. PM, with THI ranging from 69.8 to 90.6. Dark (DK) and LT G×H cows did not differ (P>0.10) in BT AM or PM. During AM, BH were similar (P>0.10) to WH, but differed (P<0.05) in PM. Body temperature of HOL cows increased (VT and MAX-EYE; P<0.05) from AM to PM, while G×H cows decreased (VT; P<0.05) or increased only slightly (MAX-EYE; P<0.10) depending on the BT measure. Holstein cows had a greater (P<0.05) increase in RR from AM to PM than G×H cows. Body temperature did not differ (P>0.10) between

breeds within LUT and FOL. Rectal temperature and MAX-EYE did not differ (P>0.10) between LUT and FOL, while VT was greater (P<0.05) during LUT than FOL. In summary, non-lactating HOL and G×H cows were similar in BT measures during the estrous cycle and in the AM. In the PM, HOL cows exhibited higher BT and RR (affected by coat color) than G×H cows.

Key Words: Gir × Holstein, Body Temperature, Environment

T282 Evaluation of the pedometer system efficiency. R. M. Santos*¹, J. L. M. Vasconcelos², and S. Soriano³, ¹UFU, Uberlândia, MG, ²FMVZ-UNESP, Botucatu, SP, ³Fazenda Colorado, Araras, SP, Brazil.

Detection aids which measure changes in activity, mucus conductivity, number of mounts or temperature can be used to improve estrous detection. The pedometer systems register the number of steps an animal takes. As cows in estrus are restless and move around more, an increased pedometer reading may indicate estrus, but high percentage of false positive reactions have been reported. The objective of this study was to evaluate the pedometer system efficiency by using ultrasound examinations weekly. Cycling and not pregnant lactating Holstein cows (n = 89) producing 40.3 ± 8.84 kg milk/d and with more than 40 DPP, housed in a free-stall barn with concrete flooring received a pedometer (pedometers were strapped on the left front leg of each cow and pedometer measurements were recorded three times a day) on day of parturition. The cyclicity was determined by the presence of a corpus luteum (CL) on day 0 of the experiment. During the study (28 days) ovaries were scanned by ultrasound (Aloka-500; 7.5 MHz) once a week, to detect CL regression, ovulation and CL development. Correct pedometer detection was considered when the pedometer system detects the cow in estrous and the original CL regress and a new CL was formed. The false negative was considered when the CL regress but the cow was not detected in estrous by the pedometer system. The false positive was considered when cow was detected in estrous by the pedometer system but the CL did not regress. During the 28 days of experiment the pedometer system appointed 95 heats, 81 (85.3%) were correctly detected and 14 (14.7%) were false positive. Eight heats were not appointed (false negative) by the pedometer system (8.9%; 8/89) during the experimental period. The overall efficiency was 78.6% (81/103). In conclusion, the pedometer system can detect estrus with high efficiency and could be used as a tool for improving service rates.

Key Words: Estrous Detection, Pedometer, Dairy Cow

T283 Effect of nitrogen intake, straw and days of storage on pH, temperature and ammonia emission from dairy cow manure. M. J. Aguerre*¹, M. A. Wattiaux¹, and T. Hunt², ¹University of Wisconsin, Madison, ²University of Wisconsin, Platteville.

An experiment was conducted to determine the effects of nitrogen intake and wheat straw addition on NH₃-N emission during manure storage. Two groups of cows (160 vs. 260 DIM) producing 36 and 27 kg/c/d of milk were assigned diets with 17 and 15% CP (DM basis), leading to high nitrogen (HN) and low nitrogen (LN) intakes, respectively. Manure collected from the barn floor was thoroughly mixed, diluted with water to 10% DM, loaded in 200 L barrels (186

kg) with or without addition of chopped straw (22 g/kg of undiluted manure) and stored in a partially temperature-controlled environment. Manure temperature and pH were recorded and NH₃-N emitted for a 2-hr period was captured in an acid trap on days 0, 3, 6, 12, 28, and 56. Data were analyzed as a randomized complete block with a 2×2 factorial arrangement of treatments and three replications (one in May and two in October). Concentration of NH₃-N in manure at day 0 was 80.0 and 53.8 mg/dl for HN and LN treatment, respectively; but was not influenced by straw addition. There was no significant effect of straw and no interactions for the reported measurements. Mean manure pH was significantly higher for HN than LN treatment (see Table). Temperature increased but pH decreased with days of storage. On average NH₃-N emission was reduced by 46% on LN relative to HN treatment. Emission of NH₃-N was highest at day 0, declined to reach a nadir at day 6, and increased numerically thereafter. At day 56 NH₃-N emission was still 44% of day 0 emission. In this trial, NH₃-N emission was correlated with manure pH ($r=+0.57$, $n=72$), but not with temperature.

Table 1.

Item	Treatment		Day ¹							P-value ² N Intake
	LN	HN	0	3	6	12	28	56		
pH	6.42	6.80	8.15 ^a	6.83 ^b	6.61 ^c	6.20 ^d	5.96 ^e	5.94 ^e	<0.01	
Temp, °C	17.0	17.0	15.7 ^b	16.2 ^b	15.4 ^b	17.9 ^{ab}	17.6 ^{ab}	19.6 ^a	0.97	
NH ₃ -N, g/m ² /h	1.13	1.99	2.61 ^a	1.49 ^b	1.12 ^c	1.51 ^{bc}	1.46 ^{bc}	1.16 ^{bc}	0.05	

^{1, 2} Means within a row with different superscript differ ($P<0.05$). Days of storage P value was <0.01 , 0.03 and <0.01 for pH, temperature and NH₃-N emission, respectively.

Key Words: Ammonia, Emission, Manure

T284 Dairy manure estrogens with advanced treatments. Z. Zhao*, K. F. Knowlton, N. G. Love, and Y. Fang, *Virginia Polytechnic Institute and State University, Blacksburg.*

In the last few decades, environmental estrogens have raised great concern and interest for their potent endocrine disrupting effects. The objective of this study was to quantify dairy manure estrogens with intensive treatments. In experiment one, 17beta-estradiol (E2) and estriol (E3) were measured in a full-scale manure handling system at Virginia Tech dairy center. This system employs a mechanical separator to separate manure liquids from solids, a short retention time anaerobic settling basin to remove further solids, and three aerated tanks in sequence. The third tank effluent is reused to flush the barn, or applied to crop lands via irrigation. The main slurry from the barn, separator effluent, settling basin effluent, effluent of the first two tanks, and flush water (the third tank effluent) were collected monthly from July 2005 to June 2006. In experiment two, E2 and E3 were determined in the influent and effluent (monthly from August 2005 to April 2006) of an anaerobic digester on a commercial dairy farm. All samples were extracted first with chloroform and NaOH and then with toluene to the base phase after neutralization with acetic acid. E2 and E3 concentrations were assayed via ELISA (Assay Designs, MI). In experiment one, there was a significant difference for both E2 and E3 among sampling locations ($P<0.01$). Mechanical separation did not affect E2 or E3 content (763.0 and 470.1 pg/ml, respectively), but flush water had a significantly lower E2 (361.0 vs. 880.9 pg/ml, $P<0.01$) and E3 (167.4 vs. 636.8 pg/ml, $P<0.01$) compared to the main slurry. In

experiment two, E2 (15.9 vs. 9.86 ng/ml, $P<0.05$) and E3 (7.88 vs. 5.79 ng/ml, $P<0.10$) were decreased after anaerobic digestion compared to the influent. In conclusion, both manure treatments reduced potential E2 and E3 loading to the environment. A mass-balance analysis of estrogen flow will help understand better what happened to estrogens within the treatment system.

Key Words: Dairy Manure, Estrogens, ELISA

T285 The impact of intake water temperatures on reticular temperatures of lactating dairy cows. J. M. Bewley*¹, D. C. Batson², M. W. Grott¹, and M. M. Schutz¹, ¹*Purdue University, West Lafayette, IN*, ²*MaGiiX Inc., Post Falls, ID.*

Automatic temperature recording may allow early detection of disease, estrus, heat stress, and the onset of calving. The MaGiiX™ Cattle Temperature Monitoring System (CTMS, MaGiiX Inc., Post Falls, ID) utilizes a passive bolus equipped with a temperature sensor, a stationary panel reader to query the bolus, and software to collect, analyze, and view data. The biologically inert bolus resides in the cow's reticulum and is queried each time the cow passes the reader. A potential limitation to collection of reticular temperatures is the impact of water temperature and consumption on observed temperatures. A replicated 3×3 Latin Square study was conducted at the Purdue Dairy Research and Education Center to assess the impact of water intake on reticular temperatures using the CTMS. Nine high-producing, mid-lactation 2nd parity cows with low SCC, were selected for this trial conducted on January 16, 17 and 19, 2007. Prior to administering a water treatment, access to feed and water was restricted for at least 2 hours. Baseline reticular (RT) temperatures were established from 3 measurements prior to water intake. Each cow received 25.2 kg of water at one of 3 different temperatures on each day. Water temperatures were Hot (34.3°C (±1.0)), Warm (18.2°C (±0.4)), or Cold (7.6°C (±0.4)) and all 3 temperatures were given to 3 cows on each day. Following water intake, RT and RC were collected every 10-15 minutes for 3 hours. The RT for each treatment followed a consistent pattern: an initial dramatic drop in RT followed by a gradual rise toward baseline. However, at the end of the 3 hour collection period RT had not returned to the baseline (-0.34°C ±0.19). Regression was performed with PROC GLM to assess the impact of water treatment on maximum drop (D) in RT ($R^2=0.91$). Treatment ($P<0.001$) and day ($P=0.037$) affected D, while a cow effect ($P=0.163$) did not. LSMeans for D were 8.4°C (±0.4), 6.9°C (±0.4), 2.2°C (±0.4), for cold, warm, and hot, respectively.

Key Words: Temperature Monitoring, Reticular Temperature, Water Intake

T286 Predicting cow health and estrus status by measuring change in water intake in dairy cows. J. M. Lukas* and J. K. Reneau, *University of Minnesota, St Paul.*

Recent studies in swine have investigated the potential of early disease diagnosis by measuring water intake in growing pigs. Little research has been done on measuring water intake in dairy cows or the change in water intake due to disease. The following study attempts to explore the possibility of early disease and estrus detection by monitoring water intake in dairy cows. Daily readings from 41 water meters placed

in the tie stall St Paul Dairy Barn at the University of Minnesota were collected from September 2005 until July 2006. Each water meter measured the water intake from one water cup. Two cows were assigned to each water cup. All treatments administered to the cows along with breeding and calving dates were also recorded and used to create an event list with event class and corresponding event date for each of the 41 groups of two cows assigned to an individual water cup. Events were grouped into the following classes: bred, calved, mastitis, fever, hypocalcaemia, ketosis, feet and other. Average days in milk for each water cup group were calculated for each day of the study period. The average difference in days in milk within the water cup group was 10.5 days (s.e. 1.54). The water intake data was matched with the mean days in milk and merged with the event list dataset. Each event was also assigned to seven days preceding and seven days following the actual occurrence of an event. Proc mixed procedure of SAS was used to identify events significantly changing water intake with event classes entered as fixed and mean days in milk entered as a random effect. Only average days in milk 0 through 150 were considered in the analysis. Hypocalcaemia was associated with significantly increased water intake while occurrence of fever was associated with a tendency (p-value 0.09). Event classes bred, fresh and other were associated with a significant decrease in water intake (p-values <0.05). Monitoring water intake can help in earlier disease diagnosis and has the potential of predicting change in cow health and estrus status.

Key Words: Water Intake, Estrus Detection, Disease Detection

T287 Factors affecting group sizes within herd and group milk volume compared to total herd volume of milk. R. C. Goodling*, K. E. Griswold, and T. J. Beck, *The Pennsylvania State University Cooperative Extension, University Park.*

The percent of cows within herd for days in milk (DIM) cow groups or lactation cow groups and the groups contribution to the total herd milk volume was investigated with 2005 DHIA data from 3953 Pennsylvania dairy herds comprised of 2,800,559 Holstein cow test day records. Data were analyzed using the UNIVARIATE and MIXED procedures of SAS version 9.1. The contribution potential of a cow group to the total herd milk volume was estimated as the difference between the percent of the total herd milk volume produced by a defined group of cows and the percent of the total number of lactating cows represented by that group of cows. For example, if cows from 41 to 100 DIM represented 25% of the lactating cows and produced 30% of the total herd milk volume, then their contribution potential would be + 5%. The statistical model included the fixed effects of DIM group, herd size group, and average daily milk yield group. Milking frequency and bST use were excluded from the analysis. DIM groupings were 1 to 40, 41 to 100, 101 to 200, 201 to 300, and 300+. Herd size groupings were < 50 cows, 51 to 99 cows, 100 to 199 cows, and ≥ 200 cows. Average daily milk yield groupings were < 27.2, 27.2 to 31.8, 31.8 to 36.3, and >36.3 kg per cow per day. Contribution potential was affected (P<0.0001) by DIM group with 1.0, 3.6, 2.5, -2.4, and -4.9% for 1 to 40, 41 to 100, 101 to 200, 201 to 300, and 300+ DIM, respectively. Interactions of DIM group and herd size groups or average daily milk yield groups were also significant (P<0.0001). These significant interactions were seen for both percent of herd group and percent milk contribution.

Key Words: Daily Milk Production, Herd Size, Days in Milk

T288 Milking parlor employee management on Wisconsin dairy farms. K. J. Hohmann and P. L. Ruegg*, *University of Wisconsin, Madison.*

The objective of this study was to evaluate milking parlor employee management practices on dairy farms that had previously participated in a team based milk quality improvement program. A mail survey was sent to farms that had registered for the Milk Money program before June 1, 2005 (n = 326) and a 44% response rate (n = 142) was achieved. Responder herds contained 226 cows (20 to 1200), produced 33 kg/cow/day (18 to 45) and had bulk tank SCC of 245,000 cells/ml (17,000 to 900,000). Most farms milked twice (58%) or three times (40%) a day in parlors (55%) or stall barns (36%). Of responder farms, 72% indicated that they trained milking technicians but most trained only when hired (42%) as compared to monthly training (16%), other (14%) or never (28%). Job descriptions were provided for employees on 31% of farms. Spanish was the first language for employees on 52% of farms. Most responders with Spanish-speaking employees spoke no Spanish (24%) or knew only a few words of Spanish (61%) but a few responders indicated that they could speak some Spanish (14%). Communication problems were apparent on farms with Spanish-speaking employees as 39% never used interpreters, while 6%, 14% and 41% used interpreters yearly, monthly or several times per year, respectively. Twenty-nine percent (n = 32) of 111 producers indicated that employee management was their greatest milk quality challenge. Farms that listed employee management as their greatest milk quality challenge were 5.8 times more likely to employ Spanish-speaking persons (P<0.001), 3.3 times more likely to provide job descriptions (P<0.01) and 15.5 times more likely to train milking technicians (P<0.01) as compared to farms that did not list this concern. This data suggests that employee management remains a challenge for farms that desire to produce high quality milk because of communication issues but that these farms are more active in employee management by training and providing job descriptions.

Key Words: Employee-Management, Dairy, Milking

T289 Bluegrass straw as a partial replacement for alfalfa hay in dairy rations. E. M. O'Rourke*, J. J. Michal, and R. L. Kincaid, *Washington State University, Pullman.*

The objectives were to determine the potential of bluegrass straw (BGS) as a partial replacement of alfalfa hay in dairy rations, and if the BGS affected P absorption. Thirty multiparous Holstein cows were assigned to a randomized complete design and fed one of three levels of bluegrass straw (0, 10 and 15% of TMR, DMB). NDF concentrations were 35, 39 and 39% DM for the 0, 10 and 15% BGS diets respectively. Cows were fed their respective treatment diet for 62 d with the first 12 d serving as an adaptation period. Individual feed intakes and milk yields were recorded daily. Samples of blood, milk, and feces were collected on d 1, 37, and 62. At the start of the study, cows averaged 219 ± 15.6 DIM, 661 ± 13 kg BW, and 41.1 ± 1.5 kg daily milk yield. Average DMI (25.4 ± 0.2 kg/d) and milk yield (35.2 ± 0.4 kg/d) were not affected by treatment but declined with time (P ≤ 0.01). Similarly, milk composition was not affected by dietary treatment but also was affected by time. The concentrations of P in the diets were 0.40, 0.40, and 0.39% DM and P intakes were 142.5, 140.5, and 136.2 g/d, respectively, similar (P ≤ 0.1) among treatments. Inclusion of BGS into the TMR did not affect the concentrations of P in feces (0.63, 0.61 and 0.66% P, DM), P digestibility, estimated using ADL as an internal

marker, nor was plasma inorganic P affected. In conclusion, up to 15% BGS was included in a TMR fed to late lactation cows without affecting performance. However, the inclusion of BGS into the TMR had no effect on P absorption as indicated by fecal P and plasma inorganic P.

Key Words: Bluegrass Straw, Phosphorus, Feces

T290 Scrotal circumference in performance tested bulls: Prediction of measures at 365 days of age from measures at 240 days of age. J. E. Decker*, P. Luna, A. M. Encinias, and M. G. Thomas, *New Mexico State University, Las Cruces.*

Bulls must achieve scrotal circumference (SC) of 30 cm by 365 days of age to pass a breeding soundness exam (BSE). At the Tucumcari Bull Test Station in New Mexico, from 1983 to 2006, SC was measured at the delivery of bulls and at the end of a 112-d test on 2514 bulls of 22 breeds. Bulls that had a final SC greater than 30 cm (n=2418) by 365 days of age had an initial SC of 25.3 ± 0.06 cm, and 96 bulls that had a final SC less than 30 cm had an initial SC of 21.8 ± 0.28 cm. Initial SC was measured at approximately 240 days of age and daily gain of SC was 0.08 ± 0.0005 cm. Objective of this research was to estimate a 240-d SC culling level (i.e., initial SC) for bulls to achieve 365-d SC of 30 cm. Associations between 240-d and 365-d SC were evaluated with correlation and multi-variance regression. The lower 95% confidence limit was plotted and probabilities of reaching 30 cm by 365 days of age were estimated for a minimum SC value (i.e., initial SC of a bull test). These probabilities were standardized and calculated using normal distribution. A correlation of 0.52 ($P < 0.01$) was detected between 240 and 365-d SC. Initial SC, year, sire and breed were significant ($P < 0.01$) sources of variation in a mixed prediction model of 365-d SC. Plotting of the lower 95% confidence limit of the predicted 365-d SC regression line suggested a 240-d SC of 22.5 cm as a culling level to achieve 365-d SC of 30 cm; whereas the probability estimated ($P < 0.01$) by standard-normal distribution revealed that 21 cm was needed to achieve 365-d SC of 30 cm. In these data, if a culling level of 21 cm was imposed for 240-d SC, 138 or 5.7% of the 2418 bulls achieving 30 cm by 365 days of age would have been unnecessarily culled, and 63 or 65.6% of the 96 bulls with SC less than 30 cm at 365 days of age would not have been culled. Herein, a limited number of bulls failed a BSE due to SC (n = 96; 3.8%). Because of moderate associations and the large percentage of bulls that would have been culled or selected incorrectly, results suggest that SC at 240 days of age is a weak predictor of SC at 365 days of age.

Key Words: Bulls, Scrotal Circumference, Prediction

T291 Estimation of no-return costs for different cattle identification systems in California. G. Caja*^{1,2}, F. Haque², J. W. Oltjen², L. J. Butler², J. L. Evans³, and V. J. Velez³, ¹*Universitat Autònoma de Barcelona, Bellaterra, Spain*, ²*University of California, Davis, CA*, ³*California Department of Food and Agriculture, Sacramento, CA.*

Cost of National Animal Identification System (NAIS) compliance at the producer level is a concern among livestock stakeholders in the US. The uncertain feelings expressed by stakeholders serve to frustrate and deter them from NAIS. Little information on cost values of different

identification (ID) systems is currently available in the US and abroad, and complete and reliable estimations are required to evaluate their impact to the livestock industry across different segments. Changes in the price of devices and labor alter dramatically the estimated cost values for each ID system. A simulation model, based on a spreadsheet analysis of no-return costs for a Californian environment (UCD-CDFA Direct cost calculator, v. 2.2) was built up for different cattle scenarios (beef cow herd, 10 to 10,000 cows; feedlot, 10 to 100,000 steers; dairy cow herd, 100 to 10,000 cows). Conventional (plastic ear tag, hot and freeze branding, tattooing), electronic (ear tag, bolus, collar) and fingerprinting (retinal scan, DNA biopsying) ID systems were compared. Market prices of ID devices (\$0 to \$65) and reading equipment (\$0 to \$2,500); expected losses or unreadable rates for each ID device (0.5 to 15%); labor costs according to static or dynamic reading systems for \$15/h salary; and, equipment amortization of 3 yr, were used. Total cost (\$/animal and yr) of different ID systems varied markedly according to number of animals, number of readings per year and animal life span. Flat changes in total cost were calculated by sensitivity analysis for most ID systems when animals were >50. Case-study results for a herd of 500 beef cows, 7 yr life span, read 5 times/yr under static conditions, showed wide annual cost ranges according to ID system: conventional (\$2.4 to \$10.8/animal), electronic (\$2.9 to \$30.2/animal) and fingerprinting (\$5.6 to \$63.9/animal). Case-study values for a 500 steer growing-finishing operation, 2 yr life span, read 1 time/yr, were: conventional (\$1.3 to \$3.2/animal), electronic (\$2.6 to \$36.7/animal) and fingerprinting (\$2.7 to \$21.6/animal). Electronic ID systems were in many cases a cost competitive option.

Key Words: Animal Identification, Identification Cost, Cattle

T292 Analysis of birth weight, weaning weight, and pre-weaning gain in Simmental, Zebu and Simmental × Zebu calves on tropical pastures. J. C. Martinez-Gonzalez*¹, A. Azuara-Martinez², F. A. Lucero-Magana¹, E. G. Cienfuegos-Rivas¹, and S. P. Castillo-Rodriguez¹, ¹*Agronomia y Ciencias, Universidad Autonoma de Tamaulipas, Ciudad Victoria, Tamaulipas, Mexico*, ²*Direccion General de Educacion Tecnologica Agropecuaria, Ciudad Victoria, Tamaulipas, Mexico.*

The productive performance of pure bred Simmental, Zebu and Simmental × Zebu calves were evaluated by analyzing 947 beef cattle records with birth weight (BW), weaning weight adjusted to 205d (WW) and pre-weaning gain (PWG) data. The climate of the region is tropical sub-humid with an average annual temperature and precipitation of 23.6°C and 935.1 mm respectively. Cows were fed mainly on pasture with occasional supplementation in the critical months of the year. Calves were weighed at birth and at weaning (average weaning age 205 days). The data were analyzed by general linear models procedures, using a fixed effect model which included the effects of genotype, year and birth season, sex of the calf and parity number of cow on BW, WW and PWG. The general means ± standard error for BW, WW and PWG were 35.18 ± 6.63 , 193.91 ± 38.13 and 0.772 ± 0.179 kg, respectively. The year of birth and parity number affected ($P < 0.01$) BW, WW and PWG. Birth season was an important source of variation ($P < 0.05$) on WW and PWG. Genotype was affected ($P < 0.01$) WW and PWG. The pure bred Simmental calves showed the lighter weights. It was concluded that, Simmental × Zebu calves can be an alternative for beef cattle production in tropical areas.

Key Words: Beef Cattle, Simmental, Weight

T293 Economic strategies for stocking rate and supplementation of stockers grazing rye-ryegrass pastures. F. M. Rouquette, Jr.*¹ and L. Ortega², ¹Texas A&M University System Agricultural Research & Extension Center, Overton, ²Agronomy Department, University of Zulia, Venezuela, Zulia, Venezuela.

Increasing stocking rates to maximize gain per unit land area, and use of supplements to substitute for forage availability and increase ADG are management strategies used by stocker operators to increase economic return. The objective of this stocking rate (SR) x supplement (SUP) study was to quantify ADG and gain per ha as a database for assessing economic returns with variable input costs of fertilizer, supplement, and purchase-selling price of stocker cattle grazing 'Maton' rye and 'TAM-90' annual ryegrass. Two pasture replicates of 3.7 (LO), 5.2 (ME), and 7.2 (HI) hd/ha (270 kg initial BW/hd) received a daily, hand-fed ration of 98% cracked corn plus Rumensin 80 at 0 (PAS), 0.4% BW (.4 SUP), and 0.8% BW (.8 SUP). The 150-day ADG ranged from 1.5 kg/d for stockers at LO SR plus .8 SUP to .5 kg/d for stockers at HI SR and PAS ($P < .01$), with respective gain/ha at 1130 kg/ha and 560 kg/ha. Based on actual input costs and animal prices at time of the winter pasture grazing in 2004-2005, respective animal plus pasture costs/kg gain for LO, ME, and HI SR were \$.68, \$.79, and \$1.39/kg for PAS; \$.73, \$.73, and \$.99/kg for .4 SUP; and \$.84, \$.77, and \$1.06/kg for .8 SUP. With initial purchase price of \$2.77/kg for steers and \$2.53/kg for heifers, the break-even selling price ranged from about \$1.83/kg on all LO SR regardless of SUP to \$2.10/kg on all HI SR plus SUP and \$2.38/kg on HI SR without SUP. The net returns ranged from \$622/ha for ME SR and .8 SUP to -\$131/ha for HI SR and PAS. The differential returns/ha among SR and SUP strategies showed that an additional \$753/ha was obtained by decreasing SR from HI to ME plus SUP at .8% BW. Using .8 SUP at HI SR increased ADG by .45 kg/hd, over PAS, and showed an additional \$385/ha advantage due to SUP. Increasing costs of nitrogen fertilizer and corn reduced net returns/ha but had less effect than reduced animal prices and reduced purchase-sell margin.

Key Words: Ryegrass, Stocking Rate, Supplementation

T294 Development of a model for noninvasive evaluation of energy profiles in beef cows. J. F. Odhiambo*, E. E. Felton, R. Helmondollar, J. Y. Pritchard, P. I. Osborne, and R. A. Dailey, West Virginia University, Morgantown.

Body condition scores (BCS) indicate body energy reserves. However, variations among scorers and regional scoring systems prompted examination of utility of other non-invasive techniques. Spring-calving cross-bred Angus and Hereford cows ($n = 150$) were evaluated using body weight measurements, BCS, and ribfat and rumpfat ultrasonic scans. Cows were assigned randomly within age to two treatments, early or normal weaning 45 days apart to provide a range of energy states. Data were collected at early weaning, normal weaning, precalving, postcalving and breeding using an electronic weighing system and BCS evaluation by a single observer. Images were collected by positioning the 5.0 MHz transducer directly above the interface of the Biceps femoris and Gluteus medius (rumpfat) and at 75% of the distance from the medial to lateral end of the 12th to 13th intercostal space (ribfat). Data were examined by repeated measures for a split plot design using PROC MIXED procedures of SAS with treatment, age, and treatment x age in the main plot and period and its interactions in the subplot. Although ribfat ($P = 0.001$) and rumpfat ($P = 0.01$) differed between treatments, cow weight and BCS did not. Age was linearly related to weight ($P = 0.0001$), BCS ($P = 0.001$), ribfat ($P = 0.002$), and rumpfat ($P = 0.001$). Age x treatment effects were significant ($P = 0.04, 0.001, 0.005$ and 0.02 for weight, BCS, ribfat and rumpfat, respectively). Age x treatment x period effect was highly significant for rumpfat ($P = 0.0001$) followed by ribfat ($P = 0.01$) and weight ($P = 0.05$) but not BCS ($P = 0.5$). Rumpfat was highly correlated to ribfat ($r = 0.83$), to BCS ($r = 0.65$), to weight ($r = 0.60$) and fairly correlated to age, $r = 0.27$ ($P = 0.0001$). In conclusion, rumpfat provided a more sensitive measure for energy profiles than cow weight, while BCS was least effective. Because rumpfat and ribfat were highly correlated, assessing effects of both variables was counterproductive in evaluating energy status.

Key Words: BCS, Weight, Rumpfat

Ruminant Nutrition II

T295 Effects of waste products from plant materials on *in vitro* rumen fermentation. D. Tedesco*, S. Stella, L. Garavaglia, C. Barbieri, and S. Galletti, University of Milan, Italy.

The industrial processing of fruits, vegetables and the extraction of phyto-therapeutic compounds from plants produce many tons of organic wastes that could include valuable compounds (e.g. pectin, poly-phenols, flavonoids). The objectives of the present study were to evaluate specific post-processing derivative waste products from plant residues (SAFEWASTES, EU project n. 513949) on rumen microbial fermentation by batch incubator system. The *in vitro* batch culture was carried out with rumen fluid withdrawn from three rumen-fistulated non-lactating dairy cows. The rumen fluid was added to a mineral salt buffer, mixed in a bottle warmed at 39°C, purged with anaerobic grade N₂/CO₂ (80/20, v/v) and standardized at pH 6.8 ± 0.1 . 100 mL of solution were placed in glass bottles supplied with a substrate for microbial growth (0.8 g/100mL alfalfa hay and 0.2 g/100mL corn meal). In this study, a total of 52 SAFEWASTES by-products were tested at three different concentrations. Each test was evaluated in

duplicate. The bottles were incubated in a water shaking bath at 39°C for 24 h. The pH was determined at 0, 4, 9, 24h of incubation. At 0 and 9h of incubation the production of VFA and of ammonia N were determined. Total Bacterial Count (TBC) was evaluated at 0h and after 24h of incubation. Statistical analysis was performed using PROC MIXED of SAS. None of the tested substances negatively affected rumen microbial fermentation. TBC value remained stable after 24h of incubation. Among the 52 tested substances, one caused a significant decrease ($P < 0.05$) in ammonia N production in all the concentrations tested. Considering VFA production, an increase in acetic acid yield ($P < 0.05$) was observed following incubation with two SAFEWASTES by-products. These *in vitro* results permitted to identify the substances that will be further evaluated in the *in vivo* trials. Furthermore, if positive physiological functions will be evidenced in other studies (e.g. as anti-inflammatory, immunostimulant), these substances could potentially have a use as feed additives.

Key Words: Waste Products From Plant Materials, VFA, Rumen Fermentation