

time an ovulatory-like LH surge would have been expected. These data indicate that acute inhibition of GnRH-induced LH secretion is mediated by a nongenomic action of estradiol directly on gonadotropes. *Supported by NRI grant No. 2005-35203-15376 from the USDA-CSREES.*

Key Words: estrogen receptors, nongenomic, luteinizing hormone

563 Actions of androgens in regulating sexual differentiation of the sheep brain and consequent effects on sexual behavior. C. E. Roselli*^{1,2} and F. Stormshak², ¹*Oregon Health and Science University, Portland*, ²*Oregon State University, Corvallis*.

During a critical period in early life, the male-typical mammalian brain develops via direct actions of testicular testosterone, while the female-typical brain develops in the absence of significant exposure to testosterone. Many sex-specific behaviors and neuroendocrine functions that will later be expressed in adults are programmed during this time. In our laboratory the domestic ram is used to study the early programming of the neural mechanisms underlying same sex partner preference. As many as 8% of domestic rams are sexually attracted to other rams (male-oriented) in contrast to the majority of rams that are

attracted to estrous ewes (female-oriented). Male-oriented rams thus express a female-typical sexual attraction that may have arisen from atypically low exposure to testosterone during early fetal life. To test this hypothesis we compared the structure of the preoptic area/anterior hypothalamus among female-oriented rams, male-oriented rams and ewes. We found that sexual partner preferences correlate with the volume of the ovine sexual dimorphic nucleus (oSDN) and the number of aromatase-expressing neurons it contains. We also studied the ontogeny of the oSDN and found that it develops prenatally under the influence of testosterone arguing that the circuitry for sexual attraction is assembled prior to birth. The high level of aromatase mRNA in neurons of the oSDN raised the question of whether local aromatization of testosterone to estradiol is required to masculinize brain structure and sexual attraction. Prenatal treatment with an aromatase inhibitor did not alter the expression of male-typical behaviors, including sexual preference for females or neuroendocrine responses; nor did it reduce the size of oSDN in genetic males. These results argue that male-typical sexual differentiation of the sheep brain does not depend on locally synthesized estradiol, but rather is programmed through androgen receptor mechanisms. *Supported by NIH grant R01 RR014270.*

Key Words: sexual partner preference, sexual differentiation, sexually dimorphic nucleus

Production, Management and the Environment: General

564 Heat stress does not alter immune status of Holstein calves but slick genotype confers reduced immune function. J. W. Bubolz*, S. Tao, B. C. do Amaral, M. J. Hayen, T. A. Olson, and G. E. Dahl, *University of Florida, Gainesville*.

Environmental factors such as photoperiod and heat stress influence health and hormone secretion in dairy cattle. Genetic background may also modulate immune status in cattle. The objective of the present study was to test the hypothesis that heat stress depressed immune function in cattle. A second objective was to examine the affect of the *Slick hair* gene on immune status. Calves defined as slick-haired possess a dominant gene of Senepol origin that when expressed produces a very short, sleek coat. Slick (n=4) and wild-type (n=4) calves were kept in controlled-temperature chambers for a period of 9 weeks. Calves were exposed to heat stress and neutral thermal conditions with a 1 week pre-treatment acclimation and 2 week recovery period between temperature treatments in a 2x2 cross-over design. Dry matter intake (DMI), water intake and infrared (IR) skin temperature were measured daily. Jugular blood samples were collected weekly and evaluated for lymphocyte proliferation, neutrophil phagocytosis and neutrophil oxidative burst activity. Relative to thermoneutral conditions, heat stress increased AM (35.0 vs. 30.6°C; P < 0.001) and PM skin temperatures (36.8 vs. 31.6°C; P < 0.001). Calves under heat stress increased daily water consumption (29.2 vs. 17.8 L; P < 0.04) and decreased DMI as percentage of body weight (2.29 vs. 3.83%; P < 0.001) compared with the thermoneutral period. Relative to thermoneutral treatment, no difference in any immune variable was observed during heat stress. However, neutrophils from wild type calves had greater phagocytic (P < 0.01) and oxidative burst (P < 0.07) activity compared with slick-haired calves. In addition, lymphocytes from wild type calves had greater proliferation relative to slick calves (P < 0.05). Results indicate that wild type calves had improved immune status compared to slick-haired calves regardless of environmental temperatures. Immune status of slick-haired calves was depressed relative to wild type, but heat stress did not influence immune status of Holstein calves in controlled-temperature chambers.

Key Words: slick-haired calves, heat stress, immune status

565 Clinical stopping rules in sequential field trials. D. B. Nielsen* and C. Enevoldsen, *Faculty of Life Sciences, Department of Large Animal Clinical Sciences, University of Copenhagen, Denmark*.

Trials performed by field veterinarians can be integrated in health programs in large dairy herds to enhance treatment efficiency. The objectives of this study were to identify the requirements to trial designs if they were to be accepted and performed non-subsidized by veterinarians in commercial herds and, by means of simulation, to illustrate a potentially useful design. Semi-structured research interviews of 12 veterinarians working within a similar type of health program were conducted. The veterinarians elaborated on their experience, present methods and future needs for evaluation of efficiency of metritis treatments (as a general disease model). Qualitative analysis was performed to identify coherent meanings across interviews. We performed a simulation of a sequential design (double triangular test with 'Christmas tree correction') with the PEST 4 program[®]. This design can potentially reduce the sample size by early stopping based on interim analysis of an important parameter and adjustable significance levels. The interviews showed that all the interviewed veterinarians preferred to evaluate efficiency by means of production parameters like milk production and fertility. However, the majority of the veterinarians emphasized that clinical cure (e.g., no need for follow-up treatment) imposed a constraint. They expressed unwillingness to perform trials without the possibility to apply early stopping in case of clinically significant adverse effects. The simulation (10,000 runs, alpha 0.05, power 0.8) showed that if an existing difference in probability of follow-up treatment was 0.3 in favor of the conventional treatment, a sample size of 54 cows (SD 19) would result in early stopping of the trial (fixed sample size of 72 cows). The simulation indicated 79% probability of showing inferiority of the experimental treatment and 21% probability of showing no difference between treatments. We conclude that implementation of scientifically acceptable production-oriented field trials could be accepted by field veterinarians as integrated parts of a health program if the designs include possibilities for early stopping based on valid statistical evaluations of clinical cure.

Key Words: field trial, stopping rules

566 Modeling cow body shape for objective estimation of body condition score from digital images. G. Azzaro¹, M. Caccamo^{*1}, J. D. Ferguson², S. Battiato³, G. M. Farinella³, G. C. Guarnera³, G. Puglisi³, and G. Licitra^{1,4}, ¹CoRFiLaC, Regione Siciliana, Ragusa, Italy, ²University of Pennsylvania, Kennett Square, ³IPLAB, University of Catania, Italy, ⁴D.A.C.P.A., University of Catania, Italy.

Body Condition Score (BCS) is considered an important tool for management of dairy cattle. The feasibility of estimating the BCS from digital images has been demonstrated in recent works. Regression machines have been successfully employed for automatic BCS estimation, taking into account information of the overall shape or information extracted on anatomical points of the shape. Despite the progress in this research area, such studies have not addressed the problem of modeling the shape of body cows to build a robust descriptor for automatic BCS estimation. Moreover, a benchmark dataset for quantitative evaluation and comparison of different methods for automatic estimation of BCS from images is still missing. The main objective of this study was to develop a technique able to describe the shape of body cows in a reconstructive way. Shapes of cows are reconstructed by using a linear combination of basis shapes obtained through robust principal component analysis used to model the variability of the shapes of cows within a large set of examples. In this manner, cows body shape was described considering the different variability from the average shape. The method produced a compact description of the shape to be used for automatic estimation of BCS through kernel regression approach. A benchmark dataset useful for dairy cattle research purpose, available through the Internet, was also built. The images used to build the benchmark dataset were taken by using 2 cameras placed above an exit alley from the milking robot. The cameras were positioned at 3m from the ground and in such a position to allow capturing images of the dorsal area and of the rear of cows. The BCS of each cow was estimated on site by 2 technicians and properly associated to the cows' images by means of a software tool developed ad-hoc, used for anatomical point annotation and labeling. The benchmark dataset contained images with associated BCS, anatomical points, and shapes. It was used for quantitative evaluation. Preliminary results showed that the proposed model was robust in terms of cow body shape description and accurate in terms of BSC estimation.

Key Words: body condition score, digital imaging, body shape

567 Effects of calf bedding acidification on microbial content and fly larvae density. M. S. Calvo^{*}, T. L. Armitage, Y. E. Pan, A. Gerry, J. McGarvey, and F. M. Mitloehner, *University of California, Davis.*

Environmental stressors, such as high fly density, can impact calf well-being. Past studies have demonstrated that microbes provide nutrients to growing larvae, which are necessary for the development and survival of the adult fly. Sodium bisulfate (SBS) is an acidifier that reduces the pH of its surrounding environment, which potentially creates a medium that neither microbes nor larvae can thrive in. Two studies were conducted to investigate the application of SBS to rice hull bedding in calf hutches to reduce both fly larvae density and microbial content. A completely randomized design with four SBS treatment levels and four replications was used. Exp. 1 tested the effects of SBS on larvae density and Exp. 2 the effects of acidification on microbial levels. In Exp. 1, SBS was applied to 16 one-liter calf bedding samples, each containing 2500 house fly (*Musca domestica* L.) eggs and calf slurry. The control (CON) bedding with 0 g of SBS was compared to three treatment applications with 8.9, 17.7, and 26.5 g of SBS. Total larvae counts were reduced in all SBS treatments vs. CON ($P < 0.05$), but the three SBS treatments were similar to each other. CON showed greater live larvae counts (P

< 0.05), but the three SBS treatments were similar to each other. In Exp. 2, the same SBS treatments as before were applied to calf bedding samples containing calf slurry and analyzed for survival of total aerobic bacteria counts. A correlation was observed between time and SBS treatment: an increase in both frequency and amount of SBS decreased microbial counts ($P < 0.001$). The results of these studies demonstrate the effectiveness of acidification on larvae density and microbial levels, which could have a profound impact on reducing adult fly populations and thereby pest related stress in calves.

Key Words: calf, larvae, welfare

568 Effect of a plant extract on cutaneous inflammation in growing chicks challenged with phytohemagglutinin. J. C. Garcia-Lopez^{*}, G. Alvarez-Fuentes, Y. Jazzo-Pineda, J. M. Pinos-Rodriguez, B. E. Balderad-Gonzalez, and H. I. Contreras-Treviño, *Universidad Autonoma De San Luis Potosi, San Luis Potosi, SLP, Mexico.*

Recently a strong interest has arisen to study natural alternatives to counteract poultry backyard diseases, in rural areas where chick performance is severe affected by different diseases. Several issues have been investigated, such is the case of plants that have showed some bactericidal activity, the aim of this study was to test the effect of *Chrysactinia mexicana* extract on Cutaneous Baphophil Hypersensitivity (CBH) response by measuring wing-web inflammation of chicks challenged with Phytohemagglutinin (PHA). 120 Cobb day old chicks were used in a complete randomized design with the following treatments: control (T1), control + PHA (T2); control + *C. Mexicana* + PHA (T3). The plant extract dose used was 20mg /ml per day per bird via esophagus. At 14 d post-hatch birds in treatment 2 and 3 were injected into the wing web with PHA 100 ug/bird, birds were examined by measuring wing web thickness (mm) in the injected wing and the uninjected wing with low pressure digital calipers at 3, 6, 12, 24 and 48 h postinjection. Chick performance was evaluated by feed intake, weight gain and feed conversion ratio. There were no differences ($P > 0.05$) in chick performance variables. Inflammation of wing web was different ($P < 0.05$) during all the different times of measure, between T2 and T3 with the highest values of thickness for birds challenged without plant extract, birds treated with plant extract and challenged with PHA had lower thickness values. It is concluded that the use of the plant extract *C. mexicana* may have some anti inflammatory activity due to its secondary metabolites and could be a good tool to treat some poultry backyard diseases in rural areas, more studies are warranted to elucidate the possible role of this and other plants to treat poultry diseases.

Key Words: chick, plant extract, inflammation

569 Nutritional value of fresh cocoa husk mucilage as a sole feed for African giant land snail (*Archachatina marginata*). R. A. Hamzat^{*1} and J. Babayemi², ¹Ochaja Research Station, Cocoa Research Institute of Nigeria, Egume, Kogi State, Nigeria, ²Department of Animal Science, University of Ibadan, Ibadan, Oyo State, Nigeria.

The advocate for large-scale afforestation in Nigeria has led to the production of vast quantities of tree crop by-products, which are becoming a nuisance in our plantations. One of such by-products is cocoa husk mucilage (CHM). CHM is the succulent part of the cocoa husk (CH). African giant land snails (AGLS) are known to feed on plant materials and many crop by-products thereby converting the inedible by-products to the edible snail meat. This premier investigation was aimed at evaluat-

ing the potential of cocoa husk mucilage (CHM) as an alternative feed resource to AGLS. 144 AGLS with weight ranging from 20g-45g were used for this study. The experimental snails were allotted into 4 treatments and 3 replicates. Treatments included; 100% PPF (fresh pawpaw leaf) (control), 100% ORP (fresh orange pulp), 100% KNT (fresh kolanut testa) and 100% CHM. This experiment was designed to be completely randomized. Results from the performance assessment of experimental snails showed significant differences ($P < 0.05$) in average total weight gain, average total shell length increment, average total shell width increment, average total aperture radius increment. The values of average total weight gain, total average shell length increment, total average shell width increment and total average aperture radius increment were ranked as follows: PPF>CHM>KNT>ORP; PPF>CHM>ORP>KNT; CHM>PPF>ORP>KNT and PPF>ORP>CHM>KNT respectively. Results of carcass analysis showed the dressing percentage of snails fed PPF as 38.46%, ORP 36.9%, KNT, 27.16% and CHM, 33.68%. Statistical analysis showed significant differences ($P < 0.05$) in scores for flavour, tenderness and overall acceptability. Average scores for overall acceptability were 7.4 for PPF, 6.9 for ORP, 5.5 for KNT and 6.1 for CHM. Values can therefore be ranked as PPF>ORP>CHM>KNT. Although the cocoa-husk mucilage had lower yield in terms of carcass than PPF and ORP, the study revealed no detrimental effect on nutrient composition of the meat samples. It could therefore be inferred that the use of cocoa husk mucilage in feeding AGL snails enhanced performance.

Key Words: fresh cocoa husk mucilage, sole feed, African giant land snails

570 Acclimation to salinity and survival of Lahontan cutthroat trout *Oncorhynchus clarki henshawi*. J. P. Bigelow^{*1,2}, W. M. Rauw², and L. Gomez-Raya², ¹U.S. Fish and Wildlife Service, Lahontan National Fish Hatchery Complex, Reno, NV, ²University of Nevada, Reno.

The goal of this study was to assess the effect of acclimation to salinity on survival of Lahontan cutthroat trout reared at the Lahontan National

Fish Hatchery on well water (pH=7.8; Total Dissolved Solids (TDS)=292 mg/L) and challenged with Walker Lake water (pH=9.6; TDS=17,800 mg/L). Six-month-old fish (N=2,400) were assigned to three treatments comprised of 4 replicates (tanks). Fish were acclimated for 0, 3, or 8 days by increasing the ratio of lake water to hatchery water on a daily basis. Blood was collected from fish (n=12) in each of the three tanks in the 3 and 8 day treatments prior to and after acclimation to determine plasma osmolarity (mmoles/Kg). After acclimation, a subsample (n=76) from each tank was challenged with 100% lake water for one week. Mortalities were monitored at two-hour intervals. Fish fork lengths and weights were determined at time of death or at the end of the challenge if they survived. A mixed model was used to estimate the effect of acclimation time on survival time (in hours). Other independent variables were: Fulton's Body condition factor (covariate), fork length (covariate), and tank (random effect nested within acclimation treatment). The effects of acclimation treatment, condition factor and fork length were significant with P-values of 0.048, 0.035, and <0.0001. The least square means for survival at 0, 3 and 8 acclimatizing days were 7.95±5.70, 8.06±5.69, and 28.55±5.70 hours, respectively. Only fish acclimated for 8 days survived the entire challenge experiment, but at a low rate (2.3%). A linear model using plasma osmolarity as dependent variable and acclimation time (fixed), tank (random and nested within acclimation treatment), time of blood collection (fixed), and acclimation time by blood collection time interaction (fixed) as independent variables revealed only significant results for the interaction term (P-value=0.044). Osmolarity (before and after acclimation) increased in fish acclimatizing 3 days (from 251.07 to 262.65 mmoles/Kg) but decreased in fish acclimatizing 8 days (from 258.08 to 244.01 mmoles/Kg). Implications of the results for fish repopulation are discussed.

Key Words: Lahontan cutthroat trout, salinity acclimation

Ruminant Nutrition: Dairy Calves

571 Effects of fat concentration of a high protein milk replacer on calf performance and digestion. T. M. Hill*, H. G. Bateman II, J. M. Aldrich, and R. L. Schlotterbeck, *Akey, Lewisburg, OH.*

Fat concentration was varied (14, 17, 20, and 23%; all units on DM basis) in a 27% CP milk replacer (MR) fed at 660 g DM/calf daily to achieve CP to ME ratios from 52 to 57 g CP/Mcal ME. The hypothesis was that high fat concentrations would reduce intake of starter, digestibility, and ADG. Forty-eight Holstein calves (initially 42.4 ± 1.5 kg BW, 2 to 3 d of age) were fed the MR (12 calves/treatment) and were weaned after 28 d. Measurements were continued from d 28 to 56. A 20% CP starter and water was fed ad libitum all 56 d of the trial. Measurements of digestion were made using chromic oxide as a marker in the MR and starter from fecal samples collected on d 19 to 23 from 4 calves/treatment. Selected serum constituents were measured on d 21. Calves were housed individually in pens bedded with straw within a naturally ventilated barn with no added heat between January and March. The barn temperature based on hourly measurements was 2°C. Data were analyzed as a completely randomized design using polynomial contrasts to separate differences in the means. Significance was declared at $P < 0.05$. Pre-weaning apparent digestibility of OM, fat, Ca, and P and serum amylase concentration were linearly reduced as fat increased from 14

to 23% in a 27% CP milk replacer powder fed at 0.660 kg DM/calf daily. Pre-weaning starter intake responded quadratically to fat, being lowest at 14 and 23% fat. A reduction in digestibility and starter intake contributed to less ADG at the higher fat concentrations in the MR. A 27% CP, 17% fat MR with 55 g CP/Mcal ME optimized ADG when fat concentration was varied from 14 to 23%.

Key Words: fat, digestion, calf

572 Effects of free-access feeding and milk replacer acidification on calf performance and development of digestive anatomy. C. G. Todd^{*1}, T. J. DeVries², K. E. Leslie¹, J. M. Sargeant¹, N. G. Anderson³, and S. T. Millman⁴, ¹Department of Population Medicine, University of Guelph, Guelph, ON, Canada, ²Department of Animal Poultry Science, University of Guelph, Kemptville Campus, Kemptville, ON, Canada, ³Ontario Ministry of Agriculture, Food and Rural Affairs, Fergus, ON, Canada, ⁴Veterinary Diagnostic and Production Animal Medicine, Iowa State University, Ames.

The aim of this research was to examine the effects of free-access feeding and milk replacer acidification on calf performance and development of