499 Effects of a high rate of gain for increasing lengths of time on body and mammary growth in prepubertal dairy heifers. L. E. Davis*, M. S. Weber Nielsen, L. T. Chapin, J. S. Liesman, and M. J. VandeHaar, *Michigan State University, East Lansing*.

A high rate of gain in dairy heifers for #8805 3 mo is detrimental to prepubertal mammary growth and subsequent milk yield. However, the effects of a high rate of gain for shorter periods have not been reported. Our objective was to compare effects of high (1200 g/d) and low (600 g/d) rates of gain over different lengths of time (0, 3, 6, 12 wk) on body and mammary growth. Heifers (age = 11 wk, n = 64, BW = 107 kg, SE = 1.0) were randomly assigned to 1 of 4 treatments: H0 (low diet fed for 12 wk); H3 (low diet fed for 9 wk followed by high diet for 3 wk); H6 (low diet fed for 6 wk followed by high diet for 6 wk); and H12 (high diet fed for 12 wk). Animals were slaughtered at 23 wk of age. Statistical analysis used the GLM procedure of SAS and tested multiple comparisons using the Bonferroni test. Statistical significance was declared at $P<0.05$. Average daily gain and final live weights were different for all comparisons except H0 versus H3 (H0 = 662, H3 = 660, H6 = 848, H12 = 1124 g/d, SE = 12; H0 = 165, H3 = 166, H6 = 181, H12 = 203 kg, SE = 1). Final withers height was greater for H6 and H12 (H0 = 100, H3 = 100, H6 = 102, H12 = 104 cm; SE = 0.3). Carcass wt were different for all comparisons (H0 = 77, H3 = 82, H6 = 92, H12 = 107 kg; SE = 1). Mammary hemigland mass increased with time on high diet (H0 = 529, H3 = 591, H6 = 768, H12 = 864 g/100 kg carcass wt; SE = 43). Mass of perirenal fat also increased with time on the high diet (H0 = 900, H3 = 1181, H6 = 1608, H12 = 1794 g/100 kg carcass wt; SE = 105). Short-term changes in diet altered growth of body and mammary tissues. Composition analysis of carcass and mammary tissues are ongoing.

Key Words: Growth, Heifer, Mammary

500 Long days that hasten puberty do not reduce lean body growth in heifers. A. G. Rius*[1], P. E. Kendall[1], T. L. Auchtung[1], A. V. Capuco[2], E. E. Connor[2], and G. E. Dahl[1], [1]*University of Illinois, Urbana,* [2]*USDA-ARS, BGFL, Beltsville, MD*.

Photoperiod affects growth and development in many species with long day photoperiod (LDPP; 16L:8D) hastening the onset of puberty and enhancing lean growth in cattle. Appropriate body scale is crucial in heifers at first parturition. However, accelerating prepubertal growth may diminish mammary parenchymal growth. Nutritional factors including metabolizable protein also affect the onset of puberty, body and mammary growth in heifers. Our objective was to determine if LDPP hastens the onset of puberty without limiting skeletal growth, (i.e. height). We also sought to determine if the response to LDPP is limited by protein availability. Holstein heifers (n = 32) were assigned to 1 of 4 treatments in a randomized complete block design and a 2x2 factorial arrangement to assess effects of photoperiod and dietary bypass protein on the onset of puberty and body growth. Treatments were LDPP, short day photoperiod (SDPP; 8L:16D), high or low dietary bypass protein. Blood samples were analyzed for PRL concentration to confirm a photoperiodic response and for progesterone to determine puberty. Body weight (BW), withers height (WH), hip height (HH), and heart girth (HG) were measured every two weeks. After puberty, heifers were housed under natural photoperiod and body measurements were continued to evaluate body growth postpubertally. Heifers exposed to LDPP reached ($P< 0.02$) puberty 20 d earlier than animals on SDPP. Increasing dietary bypass protein did not affect growth of heifers (BW, WH, HH or HG) on either photoperiod treatment. However, heifers previously exposed to SDPP gained 22 kg more ($P< 0.05$) of BW after puberty than did heifers previously exposed to LDPP. These data support the use of photoperiod as a non-invasive technique to hasten skeletal without limiting lean growth and development in heifers.

Key Words: Photoperiod, Growth, Heifer

PSA World Poultry Science Lecture

501 Reducing the carriage of foodborne pathogens by livestock and poultry. M. P. Doyle*, *Center for Food Safety, University of Georgia, Athens*.

Livestock and poultry are frequently asymptomatic carriers of human enteric pathogens. Salmonella, Campylobacter and Escherichia coli O157:H7 can reside in the animal's gastrointestinal tract and be shed in feces that subsequently contaminates food and water. Practical, effective on-farm interventions are needed to provide greater protection of the environment and the food supply. Progress is being made on several fronts in developing useful strategies for pathogen control in animals. Examples include competitive exclusion microorganisms, vaccines, bacteriophages, water/feed treatments, and husbandry practices. Reducing pathogen carriage by animals on the farm can have a major impact on reducing contamination of the environment, water and food, thereby providing greater public health protection.

Key Words: Foodborne Pathogens, Competitive Exclusion, Preharvest Interventions

Animal Behavior & Well Being II

502 Correlating spatial learning, social recognition and aggression in young pigs. J. M. Siegford*, A. S. Souza, J. Jansen, and A. J. Zanella, *Department of Animal Science, Michigan State University, East Lansing*.

We examined cognitive abilities and agonistic behavior in young female pigs to determine whether spatial learning (SL) was correlated with social recognition (SR) and post-mixing aggression. SL and SR require activation of the hippocampus, thus they may be correlated. Therefore, pigs performing well in SL should remember other pigs more easily in SR and might use information of previous social encounters to avoid fights when mixed. SL of pigs was tested twice (d13 and d14) using a modified water maze (WM) in which pigs in a pool of opaque water locate a submerged platform (5 exposures per pig separated by 10min). Good (GP; n=23) and poor performers (PP; n=24) were selected based on latencies from previous WM results for pigs of this age. Using average latencies from exposures 2-5 on both days, criterion for GP was <55s and criterion for PP was >70s. Animals were familiarized at d20 and d21 in arenas divided by flexible netting. SR testing was subsequently carried out at d21 and d22. At d23, all pigs were weaned. On d24, piglets were retested in the WM. Latency continued to decrease, suggesting weaning did not disrupt memory of the WM task, but no difference in latency was seen between GP and PP ($F_{1,47}$=0.04; p=0.84). At d25, pigs were mixed in groups of 6 GPs (n=4) or PPs (n=4) and duration and number of fights were monitored for 1 day. Pre-mixing familiarization led to a decrease in post-mixing fights ($F_{1,43}$= 4.75; p=0.03; 7.26±1.49 vs. 4.46±0.69). In the first 3 hours post-mixing, unfamiliar PPs fought more than other groups ($F_{1,43}$=14.33; p<0.001; 13.67±2.32 vs. 5.22±2.22), suggesting a correlation between SL and post-mixing aggression. Duration of fights was affected by interaction of day with familiarity ($F_{1,43}$=4.61; p=0.04) and time of day with WM performance ($F_{1,43}$=4.41; p=0.04). Additional animals are being tested to strengthen findings, which suggest familiar pigs and possibly GP fight less. Protocols could be developed to familiarize litters to reduce post-mixing aggression in production.

Key Words: Behavior, Welfare, Learning

503 Acute stress impairs spatial learning and social recognition in early-weaned pigs. A. S. Souza*, K. Laughlin, J. M. Siegford, and A. J. Zanella, *Department of Animal Science, Michigan State University, East Lansing*.

We investigated whether weaning age and social isolation disrupt spatial learning (SL) and/or social recognition (SR) in newly-weaned pigs. Female pigs were early-weaned at d11-12 (EW; n=48) or conventional-weaned at d23 (CW;n=48) and social isolation (SI) for 15 minutes occurred immediately before testing each pig once in either SL or SR. We assessed SL using a modified water maze, in which pigs in a pool of opaque water and must locate a submerged platform. The latency to reach the platform from a pre-determined release point was recorded