

13 Opportunities to enhance performance and efficiency through nutrient synchrony in concentrate-fed ruminants. N. A. Cole*, *USDA-ARS-CPRL, Bushland, TX.*

Synchronization of the ruminal degradation of carbohydrates and CP is projected to increase ruminal microbial protein synthesis, and improve N use efficiency. Attempts to synchronize the fermentation of dietary carbohydrates and CP have met with mixed results, suggesting that either ruminal nutrient synchrony is not important, or that N recycling to the rumen can offset a lack of synchrony. We hypothesized that in high-concentrate diets N utilization could be improved by synchronizing the supply of nutrients in one segment of the gut with those in another segment (i.e., synchronize a ruminal N deficiency with a lower gut N excess, etc.) via oscillating the dietary CP between deficient and adequate concentrations. With corn-based diets and oil-seed based natural protein supplements, N retention has been greater in lambs or steers fed oscillating CP concentrations (at 48-h intervals) than in animals fed a constant CP percentage. Effects of

oscillating CP on cattle performance have been variable, and may depend upon the fermentability of the carbohydrate source (e.g., forage vs. grain, grain processing). In agreement with our hypothesis, Archibeque et al. (2007) reported that net portal uptake of urea was greater in lambs fed oscillating CP than in lambs fed constant CP concentrations. Nutrient intakes also need to be synchronized with the animal's requirements. One method to adjust nutrient intake with requirements is via phase-feeding. Results of studies with dry-rolled corn-based diets indicate that dietary CP concentrations can be decreased late in the feeding period with no adverse effects on animal performance; however, results of studies using steam-flaked corn-based diets are less consistent, possibly due to differences in the aggressiveness of the implant program used. In conclusion, ruminal nutrient synchrony is theoretically a sound principle; however, it seems that N recycling may mitigate effects of asynchrony. Thus, methodologies that increase N recycling and(or) increase the utilization of recycled N may benefit animal performance and the environment.

Key Words: Beef Cattle, Nutrients, Synchrony

Animal Behavior & Well-Being - Livestock and Poultry I

14 Does flavored sow's milk matched with the same flavored post-weaning feed improve performance, reduce post-weaning aggression, and establish an odor preference in piglets? N. Krebs* and J. J. McGlone, *Texas Tech University, Lubbock.*

Odor conditioning has been shown in utero and post-partum in rodents. The objective of this study was to determine the effects of post-partum conditioning of piglets to onion given in the sow diet (and through the milk) on behavior and performance of piglets weaned onto onion-flavored feed. Sows (n = 24) and piglets (N = 96) were assigned (N = 12 experimental units/treatment) to treatments: onion (ON), added to the sows' diet before and after parturition (during lactation), or control diet (CON). Before weaning, the ON and CON piglets were tested in a Y-maze for 1 minute to determine if they were attracted to onion smell. Pigs were more attracted to the left side than the right side (Preference Index: 55% ± 4.03 vs 38.6 ± 4.28) but there was no effect of the odor treatment (P > 0.05). At weaning, ON and CON pigs were kept in treatment groups and given an onion-flavored diet. Aggressive behavior was recorded by 5 min scan samples over 24h after weaning. Performance was recorded for 4 weeks post-weaning. Pigs on the east side (EA) of the room (regardless of the treatment) fought less than the pigs that were on the west side (WE) (3.13 % of the time based on 5 min scan samples over 24h ± 0.84 vs 6.43 % ± 1.10). CON pigs had a greater percentage time engaged in aggressive behaviors (P < 0.05) than the ON pigs (5.99 % of the time over 24h ± 0.767 vs 3.64 % ± 0.767). The weight at d 0 (day of weaning) significantly (P < 0.0001) affected the weight at d 1, 7, 14, 21, and 28 after weaning. Weight gain and feed efficiency were calculated. Treatments did not influence (P > 0.10) pig performance, although the treatment by barn-side interaction (P < 0.05) may have masked main effects. Odor conditioning had no effect on ON preference in a Y-maze, or on post-weaning performance, but odor conditioning reduced piglet post-weaning aggressive behavior.

Key Words: Pigs, Conditioning, Behavior

15 Sex differences in the septal-hypothalamo-pituitary-adrenal axis and distribution of arginine vasotocin and corticotropin releasing neurons in the domestic fowl. F. N. Madison*, A. Jurkevich, and W. J. Kuenzel, *University of Arkansas, Fayetteville.*

Stress is a common stimulus faced by birds in the poultry industry and a better insight into a bird's response to a stressor could lead to improvements in productivity and well-being. In domestic fowl, males have been shown to have higher corticosterone (CORT) levels in response to acute stressors and to be more fearful than females. This suggests that males are more responsive to stress. Sexually dimorphic regions of the brain have been found in a few avian species, yet little is known about sex differences in the septo-hypothalamic region of the brain of the chicken, nor in the neuroendocrine release of stress hormones. We studied sex-related responses to intracerebroventricular injections of neuropeptides. Our past studies showed that male birds had significantly lower basal levels of plasma CORT than females, however males injected with arginine vasotocin (AVT) and corticotropin releasing hormone (CRH) had higher plasma CORT release than females (148% and 90% greater increase at peak response, respectively). Immunocytochemical studies were performed on sexually mature male and female chickens to determine the distribution of AVT and CRH anatomical profiles within the septo-hypothalamic region. Sexually dimorphic differences were observed in the medial bed nucleus of stria terminalis (BSTM), lateral septum (SL), and paraventricular nucleus (PVN). Co-localization of AVT and CRH neurons and fibers were present in the BSTM and SL of males, not females. There were more CRH perikarya in the PVN of female birds compared to males. A significant number of CRH fibers formed baskets around AVT neurons in the supraoptic nucleus of both males and females. Our results demonstrate that females have a higher number of CRH neurons in the PVN, higher baseline levels of plasma CORT, but are less responsive to ICV injections of CRH. Supported in part by NSF grant #IBN 01111006 and NRI grant #2005-35203-15850 from USDA, CSREES.

Key Words: Stress Response, Corticosterone, BSTM and PVN