

Nonruminant Nutrition: Sow Nutrition and Management

82 Composition of porcine colostrum and milk as affected by various production environments. G. Voilqué*, Y. Zhao, and S. W. Kim, *North Carolina State University, Raleigh.*

Colostrum and milk composition can be influenced by production environments to sows. Nutritional effects are well investigated whereas other production environments are not. This study examined the effects of ambient temperature (AT) and gestation housing (GH) on composition of porcine colostrum and milk. Eighty-one sows were randomly assigned to 4 treatments based on a 2×2 factorial arrangement with AT (21.5°C or 27.3°C) and GH (individual crate or small pen) as main factors. All sows received the same diet meeting the requirements. Colostrum (within 24 h after farrowing) and milk (on d 18 of lactation) were obtained from all sows to measure composition of fat, protein, and lactose. Sows in high AT tended to produce colostrum with a lower ($P = 0.08$) protein content (52.9% of DM) than sows in moderate AT (46.5% of DM). However the composition of fat and lactose in colostrum was not affected ($P > 0.10$) by AT. Also AT did not affect ($P > 0.10$) the composition of fat, protein, and lactose in milk. The GH did not affect ($P > 0.10$) the composition of fat, protein, and lactose in colostrum. However sows from individual crates have smaller ($P = 0.02$) protein content (31.6% of DM) in milk compared with sows from small pen (35.6% of DM). An increase of parity from 2 to 6 linearly increased (fat%DM = $3.03 \times \text{parity} + 17.14$, $P = 0.03$ for the slope, $P = 0.01$ for the intercept, $R^2 = 0.09$) fat content in colostrum, whereas other components in colostrum and milk were not affected ($P > 0.10$). Sows body weight at d 109 of gestation, and at d 1 and 18 of lactation did not affect ($P > 0.10$) the composition of colostrum and milk. Lactose content linearly increased ($P = 0.01$, from 20.0 to 30.6% of DM), whereas protein content tended to linearly increase ($P = 0.07$, from 23.0 to 28.8% of DM) as a litter size increased from 8 to 14 piglets at birth. However, litter size at weaning was not related to colostrum and milk composition. The average daily gain of piglets was not related to colostrum and milk composition. In conclusion, colostrum and milk compositions were influenced by AT, GH, parity of sows, and litter size at birth.

Key Words: colostrum, milk, production environment, sows

83 Transitional changes in gestation and lactation serum α -tocopherol, and postpartum colostrum and milk α -tocopherol and fat concentrations in multiparous sows. J. S. Jolliff* and D. C. Mahan, *The Ohio State University, Columbus.*

Because the neonatal pig has low body α -tocopherol and contents, an α -tocopherol source is necessary to prevent deficiency in these young animals. Two observational studies evaluated changes in serum α -tocopherol during late gestation and serum, colostrum, and milk α -tocopherol, along with milk fat, during lactation in multiparous sows. Gestating sows were fed 2.2 kg/d of a fortified corn soybean meal gestation diet with 22 IU of DL- α -tocopheryl acetate added per kg and no added fat. Lactating sows were adjusted to an ad libitum feed intake within 5 d postpartum and fed a fortified corn soybean meal diet containing 1.0% total lysine, 22 IU added dl- α -tocopheryl acetate per kg, and 5% added fat. Study 1 involved a total of 96 bleedings

from 54 sows from 85d postcoitum through weaning (17 d). Serum α -tocopherol concentrations were relatively constant from 85 to 100 d postcoitum but then quadratically declined ($P < 0.01$) until parturition whereupon serum α -tocopherol concentrations linearly increased ($P < 0.01$) through weaning. In study 2, colostrum and milk were collected from 22 sows at 0, 2, 4, 6, 10, 14, 18, 24, 36, 48, 72, 96, 120, 144, and 168 h (7 d) postpartum and analyzed for d- α -tocopherol and fat. Colostrum and milk were collected from all functional glands after an i.m. injection of oxytocin. The α -tocopherol content of colostrum was relatively constant from parturition to 24 h postpartum and then declined until d 5 where it remained relatively constant. This resulted in an overall cubic ($P < 0.01$) response over the 7 d time frame. In contrast, colostrum and milk fat increased quadratically ($P < 0.01$) over time. Together, the results of these 2 studies imply that, during late gestation, serum α -tocopherol was transferred to the mammary tissue for inclusion into colostrum. After parturition, there was an inverse relationship between the α -tocopherol concentrations of colostrum and milk with α -tocopherol declining as lactation progresses.

Key Words: colostrum, milk, sow, vitamin E

84 Effects of dietary vitamin E level and source on sow, milk, and piglet levels of α -tocopherol. N. W. Shelton*¹, J. L. Nelssen¹, M. D. Tokach¹, S. S. Dritz¹, J. M. DeRouchey¹, R. D. Goodband¹, H. Yang², and D. C. Mahan³, ¹*Kansas State University, Manhattan*, ²*ADM Alliance Nutrition, Quincy, IL*, ³*The Ohio State University, Columbus.*

A total of 126 gilts and sows (PIC 1050) and their litters were used to determine the effect of dietary vitamin E level and source on sow plasma, milk, and piglet concentrations of α -tocopherol. The 6 dietary treatments were 2 levels of dl- α -tocopherol acetate (Syn E) at 44 and 66 mg/kg, and 4 levels of d- α -tocopherol acetate (Natural E) at 11, 22, 33, and 44 mg/kg. From breeding to d 69 of gestation, sows were fed 2.0 kg/d of a diet containing 40% DDGS, 0.30 ppm added Se, and no supplemental vitamin E. Vitamin E treatments were fed from d 70 of gestation to weaning. Plasma was collected from sows on d 69 and 100 of gestation, at farrowing, and at weaning. Colostrum and milk samples (weaning) were also collected. Plasma from 3 pigs per litter and heart and liver samples from 1 pig per litter were collected at weaning (19.7 d). All samples from 6 litters per treatment were analyzed for α -tocopherol. Treatment effects were not observed ($P > 0.10$) for lactation feed intake, piglet BW or BW gain, or sow BW measures. As Natural E increased in the diet, sow plasma, colostrum, milk, piglet plasma, and piglet heart concentrations of α -tocopherol increased (linear; $P < 0.03$). Sows fed diets with 44 mg/kg Natural E had increased plasma, colostrum, and piglet plasma α -tocopherol concentrations ($P < 0.03$) compared with sows fed the 44 mg/kg of Syn E. Regression analysis indicated that the relative bioavailability coefficients for Natural E:Syn E ranged from 2.1 to 4.2 for sow and piglet plasma α -tocopherol, 2.9 to 3.0 for colostrum α -tocopherol, 1.6 to 7.3 for milk α -tocopherol, and 1.8 to 7.5 for heart and liver α -tocopherol. Overall, this study shows that the relative bioavailability for Natural E:Syn E varies depending on the response criteria but is greater than the standard value of 1.36 in sows.