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EFFECT OF DIETS CONTAINING FREE GOSSYPOL ON PREPARTUM AND POSTPARTUM PRODUCTION PARAMETERS IN BRAHMAN COWS AND CALVES

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Background. Due to its high protein content (41%) and relatively low cost, cottonseed meal has been routinely used in livestock rations as a supplemental feed. The extra protein from cottonseed meal supplementation has been reported to increase intake and digestibility of forages, keeping cows in good body condition for producing heavier calves. Cottonseed meal, however, contains a toxic substance known as gossypol. Gossypol has been reported to have severe toxicological effects in monogastric animals, however, the degree to which gossypol may adversely affect ruminants is still under investigation.

The objectives of the present study were to determine the effects of feeding diets containing free gossypol during the prepartum and postpartum periods with respect to cow weight gain, body condition score, milk production, calf weight gain and erythrocyte (red blood cell) fragility. At 90 days prior to expected calving dates, 50 Brahman cows were randomly assigned to one of three treatments: 1) 0 g free gossypol/head/day (FGHD) from soybean meal, 2) 2 g FGHD from soybean meal/cottonseed meal and 3) 4 g FGHD from cottonseed meal. Calves were separated daily at feeding to prevent any consumption of the diets by the calves. Prepartum weights, body condition score and blood samples for erythrocyte fragility determination, as percent hemolysis in a .65% buffered saline solution, were taken on days 0, 28, 56 and 84 (day 0 = day on feed). Postpartum weights, body condition score and blood samples for erythrocyte fragility determination were also taken on days 0 postpartum (i.e., at calving), 28, 56, 84 and 112 postpartum from cows, as well as calf weights and blood samples for erythrocyte fragility analysis. Four-hour milk production was determined on days 28, 56, 84 and 112 postpartum. Treatment differences were determined using repeated measures and least squares means method of the statistical analysis system (SAS).

Research Findings. After 84 days on feed, 4 g FGHD cows had a higher cumulative weight gain prior to calving than control (0 g FGHD) or 2 g FGHD cows. No differences were seen in body condition score prior to calving, before 84 days on feed. However, by day 84 on feed, 4 g FGHD cows had a higher body condition score than 0 g FGHD or 2 g FGHD cows. Cumulative 112 day postpartum weight gain, body condition score and milk production did not differ among treatments. Calf birth weights and cumulative 112 day weight gains were also not affected by dam treatments.

Increasing degrees of erythrocyte fragility is characteristic of animals consuming diets containing free gossypol. Erythrocyte fragility at day 84 on feed prior to calving was greater in 4 g FGHD cows than 0 g FGHD or 2 g FGHD cows. Mean percent hemolysis for the 112 day postpartum period was greatest in the 4 g FGHD cows relative to the 0 g FGHD cows with 2 g FGHD cows being intermediate. Calf erythrocyte fragility did not differ among treatments through day 112 postcalving. Therefore, calf erythrocyte fragility was not affected by free gossypol in maternal rations.

Application. Cottonseed meal may be used as a supplemental feed for many different classes of livestock. In many cases, cottonseed meal may be utilized as the sole source of protein for mature ruminants such as beef cattle. In the present study, cows receiving diets containing cottonseed meal had greater weight gains 90 days prior to calving as well as higher body condition scores relative to controls (0 g FGHD). Calf erythrocytes remained unaffected by maternal ingestion of free gossypol. It does not appear as though diets containing 2 g and 4 g FGHD will impair cow weight gain, body condition score, milk production or calf weight gains. However, erythrocyte fragility, an indicator of gossypol ingestion, was seen in cows receiving 4 g FGHD before parturition and into the postpartum period. Further investigation into the effects of free gossypol on the Brahman cow and calf are ongoing in our laboratory. These studies may contribute to the establishment of safe and effective guidelines for feeding diets containing free gossypol to prepartum and postpartum cows.