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EFFECT OF DIETS CONTAINING FREE GOSSYPOL ON SERUM CA AND P CONCENTRATIONS IN BRAHMAN COWS AND CALVES AND ASSOCIATED CALF METACARPAL MEASUREMENTS

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Background. Cottonseed meal has become one of the most economical sources of livestock feeds due to its relatively low cost and high protein content (45%). However, cottonseed meal, as well as whole cottonseed, contains a substance known as gossypol, which can be toxic to some livestock. The objective of this study was to determine the effect of diets containing free gossypol on serum Ca and P in postpartum Brahman cows and calves and associated calf metacarpal characteristics. Thirty-nine Brahman cows were fed diets containing free gossypol (FG) from 90 days prior to calving to 112 days postpartum (PP). Cows were randomly assigned to one of three treatments: 1) 0 g free gossypol/head/d (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. Postpartum blood samples were taken on day 0-1, 3-4, 7-8, 14-15 and day 84. X-rays of the left metacarpal were taken for all calves within the first 10 days PP. Five bone measurements were recorded from each x-ray. Treatment differences were determined using least squared means method of the Statistical Analysis System (SAS).

Research Findings. No differences were found in Ca between treatments in cows and calves. Phosphorous also did not differ among cows or calves on day 3-4, 7-8 or day 84. However, on day 0-1 and 14-15, 4 g cows had higher P than 0 g or 2 g cows. Calves from dams in the 4 g and 2 g treatments had lower P on day 0-1 than 0 g calves. On day 14-15, 4 g calves had higher P than 0 g calves. Lower Ca:P ratios were found on day 0-1 and 14-15 in 4 g compared to 0 g or 2 g cows. Calf Ca:P ratios did not differ between treatments.

Calf metacarpal bone measurements are summarized in Table 1. Bone measurements indicate that there are effects of FG on size of the medial cortex and treatment X sex interactions affecting the lateral cortex and length and width of the distal physis.

Table 1. Calf metacarpal measurements

TRT	LatC ^{1*}		MedC ²	MedCav ³	DphysisW ⁴		DphysisD ⁵	
	Male	Female			Male	Female	Male	Female
0g	4.9±.37 ^a	3.1±.37 ^c	3.4±.19 ^d	16.8±.47 ^c	46.8±1.5 ^d	43.0±1.5 ^c	25.4±1.9 ^f	29.8±1.9 ^g
2g	3.3±.37 ^b	3.5±.41 ^c	2.7±.20 ^e	17.1±.5 ^c	42.6±1.5 ^e	42.8±1.5 ^c	29.8±1.9 ^{f,d}	29.3±2.1 ^{gh}
4g	3.8±.34 ^b	2.8±.34 ^c	2.8±.17 ^e	17.8±.43 ^c	48.3±1.4 ^d	39.7±1.4 ^c	32.7±1.7 ^d	25.3±1.7 ^h

Superscripts that differ within column: ab P<.006, de P<.06, fd P<.009, gh P<.09.

1 Lateral Cortex (trt x sex, P<.04)

2 Medial Cortex (trt, P<.07)

3 Medullary Cavity (trt, P>.10)

4 Distal Physis width (trt x sex P<.02)

5 Distal Physis depth (trt x sex, P<.02)

*all measurements are in mm

Application. With its relatively low cost and high protein content, cottonseed meal has become widespread as a supplemental feed. However, gossypol in cottonseed meal may affect P concentrations causing lower Ca:P ratios in cows on day 0-1 and 14-15 postpartum. Phosphorous concentrations in 4g calves were found to fluctuate between days 0-1 and 14-15, however no treatment differences in Ca:P ratios were found. Treatment differences in calf metacarpal measurements, shortly after calving, may be due to maternal prepartum consumption of diets containing free gossypol. These results may indicate a need for additional mineral supplementation in prepartum and postpartum cows receiving diets containing free gossypol.

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