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EFFECT OF COTTONSEED MEAL CONSUMPTION ON PERFORMANCE OF FEMALE FALLOW DEER

S. L. Mapel, D. A. Neuendorff, A. W. Lewis, and R. D. Randel

Background. Whole cottonseed and cottonseed meal are commonly used as animal feedstuffs, providing a low cost source of protein and energy. However, cottonseed products are limited as an animal feedstuff due to the toxic nature of gossypol. Gossypol is a chemical produced by the pigment glands of the cotton plants and is generally concentrated in the seeds. Gossypol content of cottonseed is generally reduced during processing. Free gossypol content varies depending on the processing method. Average free gossypol content resulting from the direct solvent, expeller, and expander solvent methods of processing are 0.30%, 0.04%, and 0.10%, respectively. Ruminant animals (i.e. sheep, goats, cattle, and deer) are generally more resistant to gossypol poisoning than single stomach animals (i.e. pigs). However, research has demonstrated too large a quantity of free gossypol can be harmful to ruminants. Body weight loss, anemia, infertility, and death are a few symptoms of gossypol poisoning in ruminants. In 2001, research conducted at the Texas A&M University Agricultural Research and Extension Center, Overton, TX showed that feeding free choice whole cottonseed (2 lb per animal per day; $10.0 \text{ g free gossypol animal}^{-1} \text{ day}^{-1}$) negatively impacted body weight, body condition, antler mass, and testosterone concentrations of fallow bucks. In recent years there has been an increase in the use of cottonseed products in the supplemental feeding of both wild and farmed deer populations. Further research was necessary to determine the effects as well as safe levels of free gossypol consumption in female deer.

The objective of this study was to evaluate the effect of cottonseed meal (0.09% free gossypol) consumption on body weight, body condition, pregnancy rate, and progesterone concentrations in fallow does.

Research Findings. Sixty-six fallow deer were separated into three groups containing 22 animals (20 does, 2 bucks). Each group was housed on 2 acre Coastal bermudagrass pastures and fed daily. The soybean meal group was fed 0.79 lb of soybean meal per animal per day (Table 1). The low cottonseed meal group was fed 0.39 lb of soybean meal and 0.50 lb of cottonseed meal per animal per day (Table 1). The high cottonseed meal group was fed 1.00 lb of cottonseed meal per animal per day (Table 1). The diet of each group varied in respect to the amount of gossypol it contained (Table 2). Beginning 8/14/03, body weight, body condition score, and blood samples were collected weekly until 11/20/03. Marking harnesses were placed

on bucks prior to the breeding season and heat marks were used to determine breeding dates. Ultrasonography was used for pregnancy determination.

Fallow deer are seasonal breeding animals that generally lose weight through the fall and winter. All animals lost weight from 8/14/03 to 11/20/03. The soybean meal group lost less weight than either of the cottonseed meal groups (Table 2). Final body weights were 2% higher for the soybean meal group. Body condition scores did not differ among groups. Conception rates were 100% for all groups. Time to re-breeding did not differ among groups. Progesterone concentrations in the high cottonseed meal group were reduced as compared to the soybean meal group and low cottonseed meal group. Within groups, does with heavier body weights at weaning had shorter times to re-breeding than lighter does.

Application. It appears that cottonseed meal can be of value for the supplementation of fallow deer and likely other deer species as well. However, careful consideration must be given to the amount of gossypol consumed to avoid harmful effects. Daily free gossypol intake of fallow deer should be limited to no more than 0.41 grams per animal.

Table 1. Dry matter feed supplementation by group.

Treatment	Supplement	^a As fed amt (lb/an/day)	Protein (g)	TDN (g)
SBMG	SBM	0.79	144.9	255.0
CSML	SBM	0.39	68.6	127.5
	CSM	0.50	67.5	131.5
	Total	0.89	136.1	259.0
CSMH	CSM	1.00	135.0	262.9

^aReported in “as fed amounts”, pounds per animal per day.

Table 2. Free gossypol intake, average daily gain, and average body condition score of fallow does.

Treatment	Free Gossypol		^a ADG (lb)	^b Avg BCS
	$\text{g}\cdot\text{an}^{-1}\cdot\text{d}^{-1}$	$\text{mg}\cdot\text{kg}^{-1}(\text{BW})$		
SBMG	0.00	0.00	-0.11	5.3
CSML	0.20	3.95	-0.16	5.2
CSMH	0.41	8.10	-0.17	5.3

^aAverage daily gain (ADG) from 8/14/03 to 11/20/03 was greater ($P<.01$) for SBMG than CSML or CSMH.

^bNo difference ($P>.1$) detected in Average Body Condition Score (BCS) (Scale 1-10) from 8/14/03 to 11/20/03