Chapter 26

Use of DDGS in Sheep and Goat Diets

Introduction

While limited studies have been conducted to evaluate the effects of feeding DDGS to sheep and goats compared with other species, DDGS is an economical and excellent feed ingredient in diets for sheep and goats. The high fiber and low starch content of DDGS provides diet formulation flexibility and allows it to safely partially replace a portion of the forage or grain in diets with reduced risk of rumen acidosis compared to feeding grain-based diets (Held, 2006a,b).

Gestating and Lactating Ewes

Ely et al. (1991) fed 20 crossbred ewes with twin lambs from 14 to 56 days post-partum on fescue-hay based diets to provide 75 to 85% of the NRC requirements for protein and energy, a forage to concentrate ratio of 2:1, and diets were supplemented with soybean meal or DDGS. Ewes fed the DDGS supplemented diets lost less weight during lactation, but produced less total milk than soybean meal supplemented ewes. Ewes fed at 75% of the recommended nutrient intake level lost more body weight, but milk production was not affected compared to feeding a diet at 85% of NRC requirements for energy and protein. Lambs from ewes fed the soybean meal supplemented diet, or the 85% of recommended nutrient intake level had improved average daily gain. Neither the soybean meal nor DDGS supplements affected daily milk DM, crude protein, ash, or lactose content. However, ewes fed the DDGS supplemented diet produced 16.5% more milk fat per day. Lambs from ewes fed the soybean meal supplemented or the 85% level of recommended nutrient intake used milk nutrients more efficiently than lambs nursing ewes fed the DDGS supplemented diets or the 75% of the requirement diet. Ewes fed the soybean meal diet had greater DM and crude protein digestibility than ewes fed the DDGS diet.

More recently, when DDGS was used instead of soybean meal as a protein supplement in lactating ewe diets, no differences were observed in ewe body condition score and suckling lamb weight gain (Held, 2006a). A lactation study evaluating the use of DDGS to replace 2/3 of the corn (25% of the diet) resulted in a 12% improvement in reared lamb growth for ewes nursing triplets, but there were no effects for ewes nursing twin and single lambs (Held, 2006a). A possible reason for the comparative differences between soybean meal and DDGS supplementation in Ely et al. (1991) and Held (2006a) reports may be due to differences in dietary nutrient levels fed and the quality of the DDGS sources used.

Radunz et al. (2011) compared ewe and lamb performance of 3 winter-feeding gestation systems to crossbred ewes, haylage, limit-fed corn, or limit-fed DDGS. At parturition, ewe body weight was heaviest for those fed DDGS, lowest for those fed haylage, and intermediate for those fed corn. Ewes fed corn and DDGS had greater body condition scores at parturition than those fed haylage, and at weaning, ewes fed DDGS had greater body condition scores than

those fed corn or haylage rations. Body weight of lambs at birth tended to be heavier from ewes fed corn and DDGS compared to ewes fed haylage, but there was no effect of ewe gestation diet on lamb weaning weight. Body composition of lambs at birth, ewe milk production, as well as preweaning lamb growth rate and mortality were not affected by feeding program. Feeding DDGS reduced feed costs, but ewes had an increased incidence of ketosis prior to parturition. These researchers then evaluated feedlot performance, glucose tolerance, and carcass compositions of lambs weaned from ewes fed the 3 winter-feeding programs.(Radunz et al., 2011b). Their results showed that the type of mid- to late-gestation ewe diet fed affects maternal plasma insulin concentration. Lambs from ewes fed DDGS tended to have greater insulin response than those from ewes fed corn or haylage diets. This difference in insulin resistance was associated with alternations in fat deposition affecting primarily internal fat. However, these changes in carcass composition likely have small practical significance, but provide evidence that changes in maternal metabolism due to winterfeeding system may have long-term impacts on progeny growth and body composition.

Growing-Finishing Lambs

Protein and amino acid utilization of DDGS has been evaluated in growing lambs and results from two studies indicate that it is an excellent protein source. Waller et al., (1980) conducted a lamb metabolism trial to evaluate the effects of feeding combinations of proteins that are slowly degraded in the rumen with urea. Combinations of urea and distillers dried grains (DDG) or DDGS were used to replace urea as sources of supplemental protein and did not significantly affect dry matter or N digestibility of the diets. Archibeque et al. (2008) demonstrated that feeding DDGS improves amino acid nutrition of lambs consuming moderate quality forages.

Schauer et al. (2008) fed 240 Rambouillet wether and ewe lambs (31.7 kg BW) diets containing alfalfa hay, soybean meal, barley, and a trace mineral supplement, and DDGS replaced barley and soybean meal at 0, 20, 40, and 60% of the diet on a DM basis. Sulfur concentrations of diets were 0.22, 0.32, 0.47, and 0.55% for the 0, 20, 40, and 60% DDGS diets, respectively. Thiamin was included at a level of 142 mg/hd/d (DM basis) in all rations for the prevention of polioencephalomalacia. Rations were mixed, ground, and provided *ad libitum*. Lambs were harvested after the 111 d feeding trial and carcass data collected. Final weight, ADG, G:F, mortality, hot-carcass weight, leg score, carcass conformation score, fat depth, body wall thickness, ribeye area, quality and yield grade, and boneless closely trimmed retail cuts were not affected by DDGS inclusion rate, and feed intake increased linearly as level of DDGS inclusion increased. These results suggest that feeding high dietary levels of DDGS results in acceptable lamb performance with no negative effects on carcass traits.

Gutierrez et al. (2009) fed Suffolk lambs 3 dietary levels of DDGS (0, 15, or 30%, DM basis). Feed intake was similar among DDGS levels, but body weight gain was reduced when lambs were fed the 30% DDGS diet (0.221 kg/d) compared with feeding the 0 and 15% DDGS diets

(0.284 and 0.285 kg/d, respectively), suggesting that a much lower DDGS feeding level (15%) be used for lambs compared to the feeding recommendations by Schauer et al. (2008).

McKeown et al. (2010) showed that DDGS from corn, wheat or triticale can replace a mixture of barley grain and canola meal at 20% of diet dry matter without adversely affecting dry matter intake, growth rate, or carcass characteristics of growing lambs, but wheat DDGS may reduce feed:gain and triticale DDGS may improve the fatty acid profile of carcass fat. Felix et al. (2012) fed diets containing 0, 20, 40, or 60% DDGS to growing lambs and concluded that DDGS can be fed to sheep at up to 60% of the diet dry matter without affecting dry matter intake, but higher dietary inclusion rates may decrease ADG. They also observed that feeding high inclusion rates of DDGS may affect marbling score and reduce hot carcass weight. Therefore, they recommended that feeding diets containing 20% DDGS of dry matter is optimal. In contrast, Van Emon et al. (2011) showed results that indicate that DDGS can be included in the diets of finishing lambs at levels up to 50% of dry matter intake without negatively affecting growth performance, carcass quality, and metabolite concentrations.

Huls et al. (2006) conducted a study to determine the effects of replacing soybean meal and a portion of the corn with DDGS on growth performance, carcass characteristics, and the incidence of acidosis, bloat, or urinary calculi in wethers fed a high-grain finishing diet with soyhulls as the only source of dietary fiber. Diets were balanced to have similar CP (14.6%), ME (3.4 Mcal/kg), and calcium:phosphorus (2:1) and pelleted. Average daily gain, dry matter intake, gain:feed, and carcass characteristics were not different between dietary treatments, and no symptoms of acidosis, bloat, or urinary calculi were observed. These results suggest that DDGS is an acceptable substitute for soybean meal and a portion of the corn in finishing lamb diets where soybean hulls are the only source of fiber.

Sewell et al. (2009) fed various crop residues (i.e. wheat straw, corn stover, switchgrass, corn fiber and wheat chaff) that were either thermochemically processed or not, in combination with DDGS and showed that nutrient digestibility of these crop residues was improved by thermochemically processing, and these processed crop residues can be fed in combination with DDGS to partially replace corn in ruminant diets.

McEachern et al. (2009) reported results which indicate that DDGS can replace all of the cottonseed meal in lamb finishing diets without negatively growth rate, feed conversion, wool characteristics, and can potentially reduce feed cost/kg of gain. Whitney and Lupton (2010) showed that cottonseed hulls are a good roughage source for lamb finishing diets containing 40% DDG.

Conclusions

Dried distillers grains with solubles can be an excellent protein and energy supplement for ewes and growing-finishing lambs to replace a portion of the corn and soybean meal in the diet. The higher fiber content of DDGS compared to corn and soybean meal may be effective in preventing acidosis in growing-finishing lambs fed high grain diets. Sulfur content should be monitored and managed, especially when feeding high levels of DDGS with moderate to high sulfur levels to avoid polioencephalomalacia. Differences in performance among the limited feeding studies suggest the quality of the DDGS source being fed may be important in order to

achieve optimal performance. Conservatively, adding DDGS at a level of 20% of growing-finishing lamb diets and 25% of lactating ewe diets will provide good performance results, although high inclusion rates may also result in acceptable performance.

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