



BEEF CATTLE RESEARCH UPDATE

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Does Feeding Distiller's Grains in Feedlot Diets Reduce the Incidence of Acidosis or Alter the Efficacy of Monensin and Tylosin?

The use of distiller's grains by feedlots is rapidly increasing due to the rapid expansion of the ethanol industry. Replacing grain (starch) in the diet with roughage generally reduces the incidence of subacute acidosis and the incidence and severity of liver abscesses. Distiller's grains contain little starch since most of the starch in the grain is converted to ethanol. Since corn is about two-thirds starch, removing the starch causes the remaining nutrients in distiller's grains to increase by about 3-fold compared with corn. Protein increases from about 10 to 30%, fat from 4 to 12%, and neutral detergent fiber (NDF) from 12 to 36%. The removal of starch and increase in NDF in distiller's grains suggests that the incidence of subacute acidosis should be reduced with the feeding of this by-product. However, recent research suggests that feeding distiller's grains actually reduces rumen pH (more acidic). In a Nebraska trial, ruminally-fistulated steers were fed diets based on dry-rolled (DRC), high-moisture (HMC) or steam-flaked corn (SFC) and contained either 0 or 40% wet distiller's grains with solubles (WDGS).¹ These researchers reported that the maximum ruminal pH was less and the amount of time that ruminal pH was below 5.3 was greater for steers fed WDGS (a pH of 5.0 to 5.5 is generally regarded as subacute acidosis). In a Kansas trial, cannulated Holstein steers were fed either 0 or 25% dried distiller's grains with solubles (DDGS) in SFC based diets.² In this trial, feeding DDGS decreased ruminal pH. In another Kansas trial, cannulated Holstein steers were fed either 0 or 25% DDGS in either DRC or SFC based diets.³ Ruminal lactic acid concentrations were increased with DDGS feeding and the increase tended to be greater with SFC based diets.

Monensin (Rumensin[®], Elanco Animal Health) and tylosin (Tylan[®], Elanco Animal Health) are commonly fed to finishing cattle. Monensin improves feed efficiency of cattle and is commonly used as a management tool to modulate feed intake and thus help control acidosis.⁴ Nebraska research has indicated that the use of monensin elevates and stabilizes ruminal pH, especially at higher levels of feed intake variation.^{5,6} This modulation of feed intake and stabilization of ruminal pH should reduce the incidence of acidosis in feedlot cattle. Tylosin is fed to reduce the incidence of liver abscesses.

A recent Nebraska trial evaluated the effects of monensin and tylosin in DRC/HMC (1:1 ratio) based feedlot diets containing 25% corn WDGS.⁷ In this trial, 800 crossbred steers (initial weight of 725 lb) were fed one of five treatments over a 150 day feeding period. The treatments were: 1) Corn + RT – no WDGS with 33.3 g/ton monensin and 90 mg/hd/day tylosin, 2) DG – WDGS with no monensin and tylosin, 3) DG + R – WDGS and 33.3 g/ton monensin and no tylosin, 4) DG + RT – WDGS with 33.3 g/ton monensin and 90 mg/hd/day tylosin, and 5) DG + High RT - WDGS with 44.4 g/ton monensin and 90 mg/hd/day tylosin. The performance results from this trial are shown in Table 1. Steers fed 25% WDGS with monensin and tylosin gained 6.7% faster and were 6.9% more efficient than steers fed corn plus monensin and tylosin. Based on this improvement in efficiency, the WDGS had about 28% greater feeding value than the DRC/HMC combination (6.9% improvement in efficiency divided by 25% WDGS). Feeding monensin in the WDGS diet increased gain efficiency (gain to feed ratio) by 3.1% (0.167 vs 0.162 for DG + R and DG, respectively). Feeding monensin plus tylosin increased gain efficiency by 4.9% (0.170 vs 0.162 for DG + RT and DG, respectively). No differences in performance were observed when monensin was fed at 44.4 g/ton vs 33.3 g/ton. The feeding of WDGS did not control liver abscesses. However, the incidence of total liver abscesses and severe liver abscesses (A+) was significantly reduced when tylosin was fed. In

conclusion, this study indicated that feeding monensin and tylosin improved performance in DRC/HMC based feedlot diets containing 25% WDGS.

Table 1. Effect of monensin and tylosin in feedlot diets containing WDGS.

Item	Corn + RT	DG	DG + R	DG + RT	DG + High RT
DMI, lb	23.5 ^{abc}	23.9 ^a	23.6 ^{ac}	23.4 ^{bc}	23.0 ^b
ADG, lb	3.72 ^a	3.87 ^b	3.93 ^b	3.97 ^b	3.87 ^b
Gain/Feed	0.159 ^a	0.162 ^b	0.167 ^b	0.170 ^b	0.168 ^b
Liver Abscesses					
Total, %	17.0 ^a	42.4 ^b	40.8 ^b	8.3 ^a	8.9 ^a
A+, %	4.4 ^a	16.5 ^b	19.1 ^b	3.8 ^a	7.0 ^a

^{abc}Means within a row with unlike superscripts differ ($P < 0.05$).

A recent Kansas study evaluated the effects of monensin and tylosin in SFC based diets containing corn WDGS over a 150 day finishing period.⁸ In this study, 371 crossbred yearling heifers (initial weight of 658 lb) were fed diets containing either 0 or 25% WDGS with either no added antibiotics, 300 mg of monensin daily, or 300 mg of monensin plus 90 mg of tylosin daily. Heifers fed 25% WDGS gained 8.5% slower and were 7.1% less efficient than heifers fed no WDGS. Based on this reduction in efficiency, the WDGS had about 28% less feeding value than the SFC. In addition, heifers fed SFC had heavier carcasses, a greater dressing percentage, larger ribeyes, and more marbling than heifers fed WDGS. Similar to the results observed in the Nebraska trial, feeding WDGS had no effect on the incidence of liver abscesses. The use of monensin or monensin plus tylosin had no effect on growth performance or carcass characteristics. The incidence of total liver abscesses was not altered by the presence of tylosin. However, tylosin addition tended to decrease the incidence of severe liver abscesses in diets containing only SFC but not in diets containing WDGS. These researchers concluded that monensin and tylosin may not be as effective when used in SFC based diets with 25% WDGS.

In summary, all of these data suggest that feeding distiller's grain does not reduce the incidence of subacute acidosis or liver abscesses. Feeding monensin and tylosin in dry-rolled/high-moisture corn based diets containing wet distiller's grains with solubles enhances performance and reduces the incidence of liver abscesses. The Kansas study suggests that monensin and tylosin may not be as effective in a steam-flaked corn based diet containing wet distiller's grains with solubles. However, additional research is needed.

Cattle Disposition vs Feed Efficiency in Growing Bulls

Previous Iowa⁹, Colorado¹⁰ and Texas¹¹ research has shown that calmer or more docile cattle gain faster than more aggressive or temperamental cattle. The Iowa research used a subjective disposition score to determine cattle temperament (Beef Improvement Federation Six Point Scoring System: 1 = very docile and 6 = very aggressive). In the Colorado research, cattle were temperament rated using a subjective numerical scale (chute score) during routine weighing and processing (scores of 1 to 5: 1 = calm, no movement and 5 = rearing, twisting, or violently struggling). The Texas researchers measured exit velocity from a squeeze chute (used motion sensors six feet apart to measure exit velocity) as an objective measure of cattle disposition. Texas A&M University and Brazilian researchers recently compared two objective measures of cattle temperament (EV, Exit velocity and EB, Escape Behavior) with a subjective measure of temperament (CS, Chute Score: 1 = quite to 5 = excited).¹² The relationship between these three measurements of temperament and growth and feed efficiency traits in growing bulls (initial weight of 748 lb) were evaluated in this study. In this study, 53 bulls (25 Brahmans, 13 Angus, and 15 Brangus) were fed 84 days at a commercial test facility equipped with a GrowSafe[®] feeding system. The measurements of temperament were determined at the start of the feeding period. Exit Velocity was measured as the rate of distance traveled (meters/second) while exiting from a confined area. Escape Behavior was determined by measurements of frequency and intensity of movements using a tri-axial accelerometer for 15 seconds while the animal was unrestrained in a chute. Measures of

efficiency used in this study were feed conversion rate (FCR) and residual feed intake (RFI). RFI is defined as the difference between an animal's actual feed intake and its expected intake based on body weight and growth rate. A negative RFI value is better and indicates a more efficient animal.

These researchers reported that exit velocity tended to be negatively correlated with average daily gain, dry matter intake and feed conversion rate but no relationship with residual feed intake was noted. These negative correlations indicate that as exit velocity increased (more aggressive cattle) that performance decreased. The objective chute score tended to correlate (positively) with residual feed intake but not with other performance or efficiency traits.

It was also reported that correlations between temperament and performance traits differed across breeds. For Brangus bulls, all three measures of temperament (EV, EB, and CS) tended to be negatively related to daily gain and CS was negatively related to dry matter intake and feed conversion rate. For Brahman bulls, EV tended to be negatively correlated with daily gain but was not correlated with intake. However, there were no correlations between temperament and efficiency traits in Angus bulls. In conclusion, these results agree with the previous research indicating that more aggressive cattle perform poorer than docile cattle, especially in the Brahman and Brangus bulls. These results also suggest that EB and EV are useful objective measurements of cattle temperament.

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