

Forage levels in finishing diets

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It is often assumed that roughage is included in finishing diets simply to maintain rumen function and animal health. Added roughage can also improve feed mixing and bunk management (helps minimize separation of fine particles), and enhances chewing and rumination (enhances digestibility and buffering). **Adding roughage to finishing diets also increases dry matter intake and frequently increases gains.** However, energy from roughage typically costs more than energy from grains so cost of dietary energy increases as more roughage is included in the diet. Maintaining the proper level of roughage in a finishing diet is an important factor in maintaining optimum performance, animal health, and cost of production.

Research summarized by Fred Owens (DuPont Specialty Grains) considered 43 cattle finishing trials in which more than one level of roughage was fed, and roughage levels were less than 35% of the diet. Although the trials only considered corn-based diets, the principles also apply to barley-based diets.

Table 1. Results of Owens summary: Levels of roughage to obtain maximum response

	<u>Alfalfa</u>		<u>Corn silage</u>	
	<u>whole corn</u>	<u>Rolled corn</u>	<u>whole corn</u>	<u>Rolled corn</u>
DMI -	There was a linear increase with increasing levels of both types of roughage			
MEI	17	19	23	25
ADG	10	16	39	16
FE -	There was a linear and quadratic increase in feed/gain with increasing levels of roughage			

DMI=dry matter intake; MEI=metabolizable energy intake; ADG=average daily gain; FE=feed efficiency (feed/gain).

The summary showed that increasing roughage levels increased dry matter intake. Even though increasing roughage levels reduced metabolizable energy (ME) concentration of the diet, the increased intake more than compensated for the reduction in ME concentration. Higher levels of corn silage required to achieve maximum energy intake and ADG may reflect the lower roughage value of corn silage (well developed corn silage is about 50% grain) compared to alfalfa. Increased requirement for roughage to achieve maximum energy intake and ADG for rolled corn compared to whole corn is expected for both roughages. It is not understood why less corn silage was required to achieve maximum ADG for rolled corn than for whole corn.

The optimum level of roughage to feed depends on how you charge for feed and yardage. If you charge more for yardage than you charge through feed mark up, it is in the cattle owners best interest if maximum rate of gain is pursued (feed more roughage; cattle would gain faster, they will be in the feedlot fewer days, he would therefore pay less yardage). If the cattle owner spends more money on feed mark up than on yardage, it is in his best interest if the feedlot feeds less roughage so feed efficiency is maximized.

This summary did not define the type of cattle used in each trial. For example, it is quite possible that calves fed a finishing diet for 170 days would respond differently to increased forage levels than yearlings fed a finishing diet for 110 days.

The following scenarios illustrate how changing roughage levels can affect COG given changes in DMI and ADG.

feed markup	yardage	% silage (DM basis)	DMI	ADG	FE	COG
0%	\$0.35	8	21.1	3.5	6.1	57.5
0%	\$0.35	15	23.9	3.8	6.3	57.5
\$10/tonne	\$0.14	8	21.1	3.5	6.1	56.2
\$10/tonne	\$0.14	15	23.9	3.8	6.3	56.7

In this example, we can see that if we are making our money off yardage, we can increase our forage levels without affecting COG. If we are making money on feed markup (increasing feed costs), increasing forage levels increase COG due to reduced feed efficiency.

Take home message

Optimum forage levels in finishing diets will depend on yardage and commodity pricing. Many feedlots may benefit from increasing forage levels at specific times. Consider increasing use of forage at the start and end of the feeding period. Use adequate forage to ensure a safe step-up protocol early in the feeding period. Ensuring a smooth transition onto the finishing diet will help cattle maintain health and performance. Use increased forage late in the feeding period to stimulate intakes when they are declining. Focus on the mid period (majority of time in feedlot) to reduce forage use and focus on improved feed efficiency.