

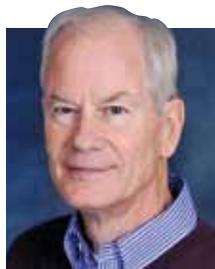


A return to the hay, starter debate

Recent studies have touted the benefits of hay inclusion in calf diets. But does hay or a well-formed texturized starter provide better gains and rumen development?

by A. F. Kertz

THERE is an old adage about history repeating itself. That seems to be particularly true when the subject is not well known or understood. Today, this phenomenon seems to be occurring in the realm of calf starters and feeding supplemental hay. In the 1940s, Ralston Purina's calf feeding studies found that feeding



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hay retarded functional rumen development. Feeding a texturized calf starter though proved to be beneficial.

In the fall of 1973, Dick Warner commented in a presentation that: Hay has long been regarded as a "sacred cow" of calf feeding. Early suggestions to eliminate hay from a neonatal calf diet by a prominent feed company were labeled by many as heretical and a commercial ploy to sell more calf starter. These researchers, who promoted starter diets, may have been ahead of their time.

Early research promotes hay-free diets

In the 1950s and 1960s, Warner and his graduate students did a number of studies which established that volatile fatty acids (VFA) produced from rumen fermentation stimulated rumen papillae development and function. Butyric and propionic were the best at stimulating papillae development. Acetic acid was the poorest.

A range of problems exist with feeding hay to young preweaned calves:

- Hay's VFA fermentation pattern is opposite of that most conducive to rumen papillae development.
- With a slow fermentation rate, hay must stay in the rumen longer.
- It boosts gut contents and distorts true body weight gain.
- Due to its effects on gut fill, hay can reduce intake.

The reason Warner made those comments in

1973 is because one of his graduate students, John Porter, had done several trials in which calf starters had either high or lower fiber content, or where starter was pelleted or texturized. While there were some differences between high versus low fiber starters, the major differences were seen between pelleted and texturized starters.

Porter's key results promoting texturized versus pelleted calf starters were:

- Boosted calf starter intake and daily gain.
- Rumination began at an earlier age.
- More time was spent ruminating.
- There was a higher rumen pH with more rumen papillae length and muscle/mucosa.
- 5 to 15 percent greater digestibilities of dry matter and fiber.

Texturized starters foster rumination

In 2007, I was reviewing the calf operation on a large dairy in Turkey. While there, I had an "aha!" moment. Of the 200 calves on that dairy, I only found a few that were ruminating. Calves were being fed a pelleted calf starter with no hay.

As a scientist, I ask myself what is the biology at play, and does it make sense? Calves were marginally ruminal acidotic due to a lack of particle size in the pelleted starter. Consequently, there was less rumination and saliva produced to buffer the acidotic rumen fermentation. This results in poorer performance in essentially all parameters noted in the table. Some producers say, well, I provide hay to be "safe." But results from Penn State show nega-

Comparison of pelleted and texturized starters		
	Pelleted	Texturized
Daily gain, 5-8 wk, lbs.	1.12	1.41
Daily gain, 0-8 wk, lbs.	.70	.90
Starter intake, 5-8 wk, lbs.	86	112
Starter intake, 0-8 wk, lbs.	105	134
First wk ruminating	6.0	3.7
% of time ruminating	8.7	21.0
Rumen pH	5.0	5.4
Papillae length, cm	2.9	3.5
% muscle/mucosa	36	53
Digestibilities, %		
Dry matter	71.3	76.3
Acid detergent fiber	28.8	43.2
Neutral detergent fiber	39.7	51.9

EARLY SUGGESTIONS TO ELIMINATE HAY FROM DIETS were regarded as a ploy to sell starter products. A well-formed starter, though, provides the best combination of gain, efficiency, and rumen development.

tive effects on rumen papillae development when hay is fed with a texturized starter.

A step backward

Last year, a calf study was published in the *Journal of Dairy Science* which purported to show that "Hay intake improves performance and rumen development of calves fed higher quantities of milk." But the devil was in the details. The calf starter fed was described as "texturized" because its composition was 57.5 percent concentrate pellet, 14 percent flatted barley, 13 percent flatted oats, 10 percent steamed corn, and 3.5 percent molasses.

But all of the grains were processed. This is necessary for barley so that it does not pass through the calf largely intact. Due to its size, density, and shape whole barley is not processed well by calves. Other grains do not need processing because calves are able to chew and ruminate them well during their first 2 to 3 months of age. Chopped orchardgrass hay was also available in addition to the "texturized" calf starter. This was the treatment diet compared to a calf starter-only diet as the control.

During weeks 6 to 10, starter intake was similar for both treatments. But total intake was greater when hay intake was added to starter intake. From graphs presented with the study, I estimated that hay intake was 20 to 25 percent of total starter intake during weeks 6 to 10. Between groups, there were no treatment differences in height and frame size measurements.

Five male calves on each diet were sacrificed and had body weights taken. Without rumen digesta, calves on the hay treatment weighed 11 pounds less. Rumen/reticulum tissue weights for treatment calves were 20 percent greater without digesta and a whopping 59 percent greater with digesta! Furthermore, rumen pH was only 5.06 without hay and 5.49 when hay was made available.

Clearly, the starter was not adequately texturized and resulted in marginal rumen acidosis. And, since body weights were somewhat similar between control and treatment calves, the greater gut fill in calves fed hay actually resulted in lower true body daily gain. Another calf study was cited by the authors of the previous study as showing greater intake, body weight gain, and feed efficiency when hay was fed. But there were no measures of height, frame size, or gut fill taken. Thus, the cited results are not only confounded, but misleading.

In a January 2012 *Journal of Dairy Science* article, calves were fed a pelleted starter alone as a control. Then, one of six different chopped hays or straws was added. Not surprisingly, all added forage treatment calves gained more body weight than the pelleted control starter. But again, there were no measures of height, frame, or gut fill to determine the proportion of daily gain from gut fill. And without rumen pH measurements, we don't know the extent of ruminal acidosis present in the control calves fed pelleted starter without forage.

Starter, not hay for the best results

So what does all of this mean? Feeding hay is not the solution. A better physical form starter is the answer. A good, well-texturized calf starter will result in the best combination of true body weight gain, feed efficiency, and functional rumen development. This also means that these calves are able to transition better into the first postweaning group and process the small amount of forage (5 to 10 percent) in that ration.