



Effect of forage inclusion strategy on finishing beef cattle performance and liver abscesses

FEEDING STRATEGIES TO REDUCE LIVER ABSCESSSES

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Background: In feedlots, finishing rations usually contain a high proportion of grain and a low proportion of forage. This maximizes efficiency of weight gain and feed conversion in the finishing phase, but also increases the risk of digestive disorders such as acidosis and liver abscesses.

While the exact mechanism of liver abscess formation is unknown, it is hypothesized that prolonged periods of acidosis weakens the gut barrier, allowing the bacteria responsible for liver abscesses to enter the blood stream and colonize the liver. The 2016 Canadian Beef Quality Audit estimates that discounts due to liver abscesses cost the industry \$61.2 million per year.

Prevention of liver abscesses is currently achieved through the use of antibiotics like tylosin or chlortetracycline in feed along with feedbunk management practices to reduce acidosis. It has been well established that increasing the amount of forage in a ration can prevent liver abscess formation; however, this comes at a significant reduction in feed efficiency, growth rate, and cost of gain.

Objectives:

1. Develop feeding strategies that can reduce the need for in-feed antibiotics to control the incidence of liver abscesses

2. Evaluate different forage inclusion strategies in finishing diets on cattle performance, rumen microbiota and fermentation, and liver abscess incidence rates

What they did: 360 steers were assigned to one of four dietary treatments for the finishing study, which was divided into four, 42-day periods (about 168 days total). One group was fed 7.5% barley silage on a dry matter (DM) basis with tylosin, another 7.5% DM barley silage without tylosin, the third were fed decreasing barley silage concentrations every 42 days (first two feeding periods) and then held static at the lowest level for the last 84 days (last two feeding periods) at 15%, 9%, 3%, and 3% DM, respectively without tylosin, and the last group was held at a static barley silage concentration for the first 84 days (first two feeding periods) and then the concentration increased every 42 days thereafter (last two periods) for a silage concentration of 3%, 3%, 9%, 15% DM, respectively, also without tylosin. Each diet contained the same total proportion of silage over the entire feeding study (7.5% DM) but varied the timing of when that silage was provided at higher or lower concentrations.

Rumen fermentation and pH, along with rumen microbial population and blood sample analysis was assessed in a subset of each group of steers. All steers were measured for performance, carcass characteristics, and liver abscesses.

An economic analysis of each dietary treatment was also conducted

What they found: The steers on the increasing silage concentration diet had lower average daily gain by 0.24 lbs/day, resulting in lower overall body weight gain, final body weight, and carcass weight compared to the steers on the static 7.5% DM barley silage plus tylosin

diet (standard practice), but no differences were found amongst the other diets in steer performance.

Carcass quality measurements (dressing percentage, ribeye area, marbling score, quality grade, etc.) was unaffected by the silage concentration, except that steers on the increasing silage concentration diet had lower backfat and yield score compared to the steers on the static 7.5% DM barley silage without tylosin diet.

In terms of liver abscesses, no differences were found in overall percentage of total liver abscesses, or severe liver abscesses (A+ on the [Elanco scoring system](#)). However, the percentage of steers with minor abscesses (A on the Elanco scoring system) decreased by about 10% to 51.8% for steers on the static 7.5% DM barley silage plus tylosin diet, as would be expected. Steers fed a decreasing concentration of barley silage throughout the feeding period also had a 10% lower incidence of minor abscesses (51.8%) compared to the other diets.

It was about \$15/steer more expensive to feed diets with tylosin than those without. However, the cost of gain was lowest for both the static 7.5% DM barley silage plus tylosin and the decreasing concentration of barley silage diets at \$2.73, compared to \$2.80 for the steers on the increasing concentration of barley silage.

What it Means: Given the economic costs associated with liver abscesses and continued public scrutiny over the use of antibiotics in beef production, the industry is keen to find ways to reduce the incidence of liver abscesses.

Liver abscess rates in smaller pen research studies are often much higher than we see in commercial operations. While it's not entirely clear why this occurs, it does provide an opportunity to accurately assess the effectiveness of different mitigation strategies at a lower cost than a very large commercial scale trial.

Providing higher concentrations of barley silage in the early finishing phase and then slowly decreasing the silage component of the diet throughout the feeding period has the potential to decrease the incidence of minor liver abscesses to a similar degree as feeding tylosin, and without negatively impacting growth performance, carcass quality, or cost of gain.

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