



Flax Revival Benefits Producers

As the availability of flaxseed increases, beef researchers take a serious look at its advantages.

by Ed Haag

Until recently, flax was a declining niche crop confined to the central northern tier states, primarily North Dakota. But a growing interest in the health benefits of its oil, coupled with its emerging role as a viable, low-input, high-return crop easily integrated into popular rotation systems, has changed all that.

Flax production jumped 78% to 945,000 acres between 2004 and 2005 and is expected to remain steady or increase during the next several years. This is good news for the beef industry. Researchers from Kansas State University (K-State) have determined that including ground or rolled flaxseed in a calf's backgrounding ration will assist in controlling some inflammatory conditions common to cattle managed in confinement while helping produce a high-quality end product.

"It appears that a balance of fatty acids in the diet, such as the kind found in flax, does have a beneficial effect on animal health," says Jim Drouillard, K-State beef nutritionist. "This applies, in particular, to bovine respiratory diseases (BRDs)."

Additionally, other flax studies conducted by K-State researchers have detected strong correlations between flax and carcass quality and flax and omega-3 levels in the meat. Omega-3s have been identified by the scientific community as "good" fatty acids because they've been found to lower the risk of cardiovascular disease and stroke in humans. In recent years, omega-3 fatty acids have been associated with pasture-finished beef.

Improved calf health

Much of the flax research conducted by K-State has focused on its role as a nutritional supplement for postweaning or receiving calves. As Drouillard

explains, disease susceptibility in these animals accounts for an extraordinarily high toll in deaths, treatment costs, reduced weight gain due to sickness and carcass discounts. The U.S. Department of Agriculture (USDA) estimates that BRD, a lung ailment in postweaning cattle, costs the beef industry approximately \$800 million a year.

"When we feed these animals ground or rolled flax in their ration, they appear healthier than those that receive other fat supplements," he says. "If they do come down with a respiratory infection, their

response to antibiotics is better, and they are more likely to recover."

One study conducted by K-State compared the retreatment rates in receiving calves that were fed three different supplementary fat sources: flax, soy and tallow. Cattle fed flax had a 19.3% retreatment rate, while those on soy had a 27.7% retreatment rate and those on tallow a 31.3% retreatment rate.

Another study comparing the death rate among the calves consuming those same supplements showed a 3.48% mortality rate for tallow-fed animals, a 1.92% rate for the soy-fed cattle and a 1.83% rate for those fed flax.

Drouillard attributes this difference to the presence of omega-3 fatty acids in the flax. There is an absence of these acids in the other two fat supplements. Research evidence suggests that these polyunsaturated fatty acids have the ability to enhance the immune system, suppress infections and reduce inflammation. In BRD, gram-negative bacteria are responsible for fever and inflamed lung tissue that can lead to chronic and sometimes fatal conditions.

"We found that the balance of these fatty acids in the diet appears to have some relevance to animal health," Drouillard says, adding that the K-State research has shown that flax consumption by infected animals slows the production of tumor necrosis factor alpha (TNF α), an inflammation-causing substance that is responsible for the development of BRD and other respiratory disorders.

He believes that the need to feed postweaning calves a ration containing omega-3s is precipitated by the dramatic change in a calf's diet when it is moved from a range environment to a confinement site.

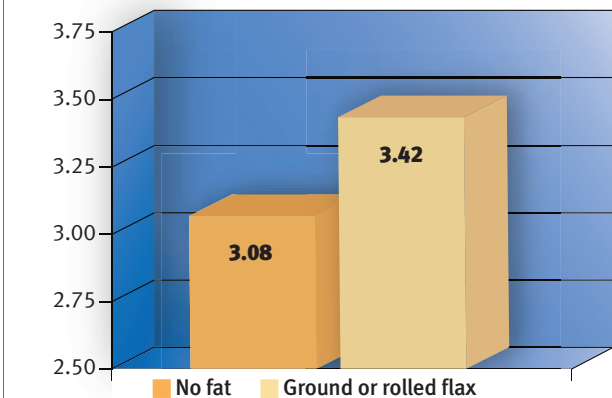
"We take green grass out of their diet, which is a good source of the omega-3 fatty acids, and we replace it with dry grass, silage and grain, which are



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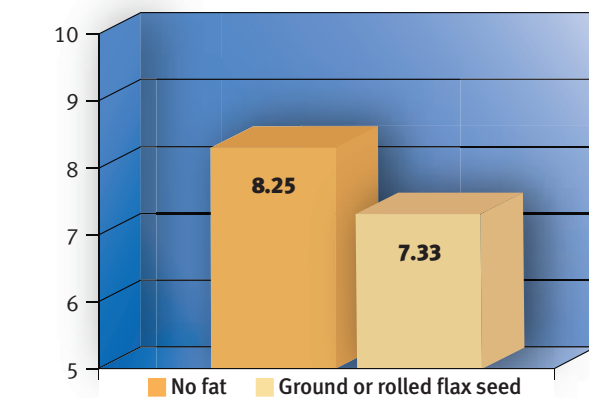
► According to K-State's Jim Drouillard, a side benefit to feeding flax is an increase in marbling, resulting in increased financial returns to calf owners.

Fig. 1: Comparison of avg. daily gain, lb., of cattle fed either no fat or ground or rolled flaxseed



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Fig. 2: Comparison of feed conversion, lb. of feed per 1 lb. of gain, of cattle fed either no fat or ground or rolled flaxseed



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essentially devoid of those fats,” Drouillard says.

The K-State studies determined the effects of feeding flax on the health of postweaning calves by feeding them a diet that included flaxseed for 35 to 42 days after they arrived in the feedlot. In a recent study focusing on the health effects of feeding varying rates of flax in a calf’s ration — 0%, 2%, 4% and 6% — Drouillard has observed a linear improvement in health.

“We are finding that the more flax we include in the diet, the better the response,” he says.

He adds that K-State research shows that flax-fed animals had a 0.1- to 0.2-pound (lb.)-per-head-per-day weight gain advantage over tallow-fed calves.

Drouillard cautions that K-State’s research also indicates an optimum improvement level of 10% flax as it relates to overall dry matter (DM). “After that, we are simply adding too much fat to the diet, and we start to depress the health response.”

Improved performance

While K-State has focused on the role of flax in reducing lung inflammation in calves during the receiving period, North Dakota State University (NDSU) has evaluated the effects of feeding flax on the overall performance of calves in a feedlot environment.

Vern Anderson, NDSU researcher in Carrington, along with Greg Lardy, a beef Extension specialist with NDSU in Fargo, has determined that flax is a high-fat, high-protein ingredient that improves animal performance, especially at the end of the final feeding cycle. “In our studies, the real advantage to feeding flax is in the finishing period, when the extra nutrient density of the diet gives performance a nice kick,” Anderson says.

He notes that in order for this to occur,

the flax must undergo some processing and be available in the right proportion in the overall ration.

“We are convinced that 8% of the dry-matter intake (DMI) is the level we need to achieve to get a good bump in weight gain,” he says. “We also feel that it is important that the flax be ground or rolled before being added to the ration.”

NDSU studies consistently show adding ground or rolled flaxseed to rations with no added fat source improved weight gain by 10% and feed efficiency by more than 12%. It was also determined in a follow-up study that cattle fed ground or rolled flaxseed gained $\frac{1}{3}$ lb. more per day (3.42 lb. vs. 3.08 lb.) on nearly 1 lb. per day less feed (7.33 lb. vs. 8.25 lb.) vs. those fed similar rations with no fat source (see Figs. 1 and 2).

In addition to studying the performance-related benefits of flax, NDSU researchers are investigating its potential role in fertility.

“We are currently looking at how flax consumption affects reproduction,” Anderson says. “This is primarily for the dairy industry, but it could easily apply to beef cattle.”

He points out that this research is in the preliminary stages, but anecdotal evidence is promising.

Better marbling

For Drouillard, another research-detected side benefit to feeding flax is how it affects marbling. “This does not happen in every incidence, but it has happened enough times to get our attention,” he says. “We have done a number of these studies, and in most we have noted some improvement in marbling in the flax-fed animals.”

In a number of K-State studies, this improvement manifested itself in both the overall carcass quality and in financial returns to calf owners. When flax-fed cattle were compared to the control groups, the flax-fed animals had between 10% and 30% more USDA Choice carcasses than those fed with other fat sources. This translated to a \$6- to \$18-per-head sales premium for the flax-fed calves when the Choice-Select spread was \$8 per hundredweight (cwt.).

K-State researchers saw the greatest carcass benefits in animals whose diet

CONTINUED ON PAGE 152



► Flax needs to be ground or rolled before adding it to the ration, says NDSU researcher Vern Anderson.

contained up to 10% flaxseed for the first six weeks after being received at the feedlot.

The question of shelf life

One question to arise from feeding flax in the finishing stages is how it affects shelf life. Drouillard admits that the omega-3 fatty acids found in flax can reduce the length of time a cut of meat can be displayed before it begins to discolor.

“When we feed flax without taking preventative measures, that fat in the tissue is predisposed to oxidation, which in turn accelerates the browning process in the meat,” he says.

Drouillard adds that the problem is easily remedied by also feeding vitamin E — a known antioxidant — at the same time as feeding the flax. “When we feed vitamin E [2,000 international units (IUs) per day], that problem completely goes away,” he says. “In fact, when we feed flax and vitamin E in combination, we get better shelf life than we do feeding the vitamin E alone.”

Flax vs. grass

One of the primary marketing tools used to promote grass-fed beef is the higher levels of omega-3 fatty acids found in the meat of grass-finished animals vs. grain-finished animals. These fatty acids have been shown to lower the risk of cardiovascular disease and stroke, and they are also rich in phytoestrogens, which help prevent breast, endometrium and prostate cancers. Fatty acids also contain soluble and insoluble fiber, which lower cholesterol, regulate blood sugar and protect against colon cancer.

Drouillard’s research shows that his flax-fed beef can compete directly with grass-fed beef in the production of omega-3s.

“We can achieve much higher levels of omega-3s than you find in grass-fed beef by feeding flax to concentrate these fatty acids in that animal. We are talking about two to three times higher,” he says, adding that in all systems, animals must be fed omega-3-rich feed right up until harvest to maintain the beneficial fatty-acid levels. “Once you take the flax out of the diet, the omega-3 fatty acids start to purge themselves out of the tissue.”

Although Anderson says he believes flax-enriched cattle feed will remain a niche product restricted primarily to the North Central Plains where it is grown, he is also convinced that it does have an important role to play in the industry. With the 10% improvement in average daily gain (ADG) when flax-fed animals were compared in a research environment to animals receiving a similar ration and no flax, that view is difficult to dispute.

“When we crunch the numbers and get equal feed costs per unit of gain, the value of flax when compared to the value of corn and other available commodities, it pencils out to \$8 per bushel (bu.),” he says. “That is considerably higher than the current price.”

Based on the most recent research, it is recommended that flax be fed at a rate of 1.5 lb. to 1.6 lb. per head per day in receiving or backgrounding rations, and 1.75 lb. to 1.80 lb. per day in finishing rations. Flax must be ground or rolled to generate optimum performance.

