

Feeding Flavor



Research shows that a change in feedlot diet can enhance beef as a source of healthy omega-3 fatty acids.

Story & photos by *Kasey Miller*

A simple taste test will show that grain-fed and grass-fed beef have different flavors, which appeal to different sets of consumers. Flavor is a huge variable that affects consumer selection and acceptability of beef. However, healthfulness also plays into consumers' choices.

One of the biggest reasons people choose fish over beef is because of omega-3 fatty acids, a good-for-you fatty acid that fish contains in higher quantities. One of grass-fed beef's favorable attributes championed by proponents is that it contains more of the healthy omega-3 fatty acids. Now it's possible to increase omega-3 levels in grain-fed beef, too.

Research at Kansas State University (KSU) presented by Andrea Sexten has found that it is possible to increase the level of omega-3 fatty acids in beef by changing cattle diets. This would allow consumers to get their desired omega-3 fatty

acids without giving up the flavor of beef.

The reason why omega-3 fatty acids are desirable is that they have the potential to act as an anti-inflammatory agent, boost immune response and reduce the risk of cardiovascular disease.

"What we're trying to do is show that we can have an alternative protein source that can be omega-3-enriched and not negatively impact flavor," says Sexten.

Fat equals flavor

The animal's diet has the biggest effect on taste of the end product. Sexten explains that

there are different fats in cattle diets, and they get digested in the rumen differently. For instance, forages are rich in glycolipids and omega-3 fatty acids, grains are high in triglycerides, and fat supplements typically have triglycerides and free fatty acids. These are important because fat affects flavor,



which defines overall acceptability. These fats, during cooking, produce specific flavor compounds.

There is more science behind feeding a ruminant animal and getting the desired flavor effect than one might think. Because there are more bacteria in the rumen than people on the planet, she says that producers are, in fact, feeding the bacteria in the rumen first. Cattle actually digest byproducts of the bacteria and microorganisms, whereas monogastric animals (pigs and poultry) digest the fed fat itself.

"The microorganisms have a major impact on the fat that actually reaches the animal for absorption," Sexten notes.

In cattle (and all ruminants), she explains, hydrolysis and biohydrogenation occur and transform the fat makeup that was fed. Simply put, the fat that entered the rumen through feed transforms and leaves as highly saturated fatty acids due to the bacteria and microorganisms in the rumen.

Due to this complexity of the rumen, Sexten says, "Cattle are not typically fed more than 6% of fat or it will become toxic to the bacterial populations in the rumen and affect the digestibility of other nutrients."

It is possible to feed "rumen-protected fat" which has a covering that protects the fat from being absorbed or transformed by the bacteria in the rumen, though it is generally much more expensive.

Fatty acid profiles

Different consumers have different taste preferences, but health concerns also affect their choices. Sexten's research shows what options are available for producers to cater to different consumers.

The fat profile of traditional (corn-finished) beef generally is about 40%-45% saturated fat, and 45%-50% monounsaturated fat.

"A lot of our consumers think that beef is just loaded with saturated fat, and that's just not the case. The most predominant fatty acid, which makes up the biggest portion of that, actually has no negative impact on human health," she notes. "The ones that do have a negative impact are in much, much lower percentages.

"There is more unsaturated fat than there is saturated fat," she continues. "That's a point to take home."

The fats that get the most attention, she says, are the polyunsaturated fats. These fats can have a positive effect on human health.

In traditional beef, there are about 3%-5% polyunsaturated fats, which include omega-3 fatty acids and conjugated linoleic acid (CLA). Some CLAs act as anticarcinogens, and our primary source of CLA is meat and milk from ruminants.

The fatty acid profile of grass-finished beef, Sexten reports, is about 48% saturated fatty acids, 43% monounsaturated fatty acids (so a higher percentage of saturated fats than in traditional beef, but the total fat content is lower), but considerably higher amounts of polyunsaturated fats.

Comparing the two finishing styles in a study of the concentration of fatty acids in steaks as a percentage of total fatty acids, traditional beef had 0.19% of omega-3s and 0.48% of CLA. Grass-fed beef had 1.07% omega-3s and 0.85% CLA.

Another healthful option

In addition to these two types of finishing, Sexten's research found there is another option for increasing the health benefits of beef. She reported that feeding flax seed raises the omega-3 content in beef considerably. Flax seed is made up of 42% oil and 23% protein. More than 50% of flax seed's fat profile is omega-3 fatty acids.

The increased omega-3 fatty acids in the diet can also help calf performance because of the anti-inflammatory and immune boost responses, especially helpful for calves going into the feedlot.

"We included flax seed at about 10%, saw no negative impact on intake, and actually saw improved performance because intake



► Andrea Sexten, of Kansas State University, explains how fats are digested in the rumen. Typically, cattle are not fed more than 6% fat.

was not reduced and we had that added energy," she adds.

The fatty acid profile of this omega-3-enriched beef is 9% saturated fatty acids and 18% monounsaturated fatty acids. It also had 16% linoleic acid (which is the omega-6 fatty acid), which isn't needed as much for health benefits, but it comes along with omega-3, and the ratio of the two is the important factor. There was 57% omega-3 fatty acids, which made the ratio an ideal 4:1.

"Flax can go to replace the fat in the diet

that you might have already, and we're seeing that we can feed it at a higher level. Part of that is because it has the improved protein," she explains.

When looking at the ratio of omega-6 to omega-3 fatty acids between diets, a steam-flaked corn (SFC) diet showed a 26:1 ratio, a SFC with added tallow showed a 23:1 ratio, and SFC with added flax seed showed a 4:1 ratio.

It is important to remember that there are other factors that affect the flavor of beef, including cooking, length of aging and storage, but diet affects it the most. Sexten added that fatty acid oxidation produces off-flavors, discoloration and creates a reduced shelf life; but vitamin E (an antioxidant) can improve pigment and lipid stability. Vitamin E is naturally high in grass-fed beef, but can be added in a supplement.

Choices are important, and they are not just available to consumers. There are many opportunities, she concluded, to produce and market unique, nutritious and flavorful beef.



Editor's Note: For more information on feeding options, visit www.feedingandfeedstuffs.info. This API topic site is a one-stop site for optimizing producers' feeding programs.