CHAMPION Feed Services Ltd.

Feeding Fats and Oils in Feedlot Diets

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Take Home Message

- ✓ Fats and oils have been added to rations to reduce the health stress of eating dusty and/or very finely processed feeds, to reduce the incidence of bloat or to increase energy density in the ration.
- ✓ The addition of fat does not appear to be necessary in properly processed barley rations for feedlot animals.

Consider Feed Fats a Valuable Source of Energy

Historically feed fats were used mainly in poultry and swine diets. More recently dairy diets requiring added energy, in a form other than starch, helped demonstrate the value of fats in ruminant diets. Cereal grain/roughage based feedlot rations usually contain adequate energy to supply the animals maintenance and growth needs. Fats and oils have been added to rations to reduce the health stress of eating dusty and/or very finely processed feeds, to reduce the incidence of bloat, or to increase the energy density in the ration. When the price of grain is low, it has been more economical to add more grain or other feeds to increase energy in the ration. However if the price of grain is high, fat addition may be economical for increasing energy and thus performance. When frost damaged canola or canola fines (screenings) are available, these feeds may be used to increase the energy density of diet at an economical price. Both contain high levels of oil.

Fats and oils, contain about 2.25 times as much digestible energy as the carbohydrates in grain. They are very concentrated sources of energy when added to animal feeds to increase the energy density of the ration. Adding fats and oils will reduce the dustiness of feeds, and reduce 'fines' in pelleted diets, adding desirable characteristics which have value. Fats and oils can improve a ration by improving palatability.

Fat supplements may consist of oilseeds that contain 20 to 45% oil, or pure fats made up of either animal fats or vegetable fats. The difference between fats and oils is based on the physical form at room temperature: fats are solids and oils are liquids.

Fat and oil sources that are available for use in feedlot rations are listed in Table 1.

Table 1. Fat Products.

Animal Fat	includes rendered fats from beef or pork by-products (tallow & grease).
Poultry Fat	includes fats from 100% poultry offal.
Mixed Feed Grade Animal Fat	blends of tallow, grease, poultry fat and restaurant grease.
Feed Grade Vegetable Fat	Vegetable oil (canola oil, soybean oil), acidulated vegetable soap stocks and other refinery by-products.
Oilseeds (Fats not Extracted)	Whole canola seeds -either frozen or canola screenings used as 'slow release' fat sources. Process through hammer mill or roll to improve utilization of energy.

Beef tallow, mixed fat and grease are the major sources of fat fed to ruminant animals in North America. Grease is an animal fat that solidifies at a lower temperature than tallow. The sources of animal fat include slaughterhouse waste, trimmings and fat from rendering plants. Restaurant grease may consist of animal fats or vegetable-based oils. Oils are generally of vegetable origin. Some common edible vegetable fats are soybean, canola and sunflower. Most edible oils are used for human consumption as cooking and salad oils, or margarine and are usually too expensive for use in animal feeding.

Table 2. Nutritional Energy Content of Selected Feedstuffs Dry Matter Basis (NRC, Nutrient Requirements of Beef Cattle, 1996)

Ingredient	TDN[1] (%)	DE[2] (Mcal/kg)	NEm[3] (Mcal/kg)	NEg[4] (Mcal/kg)	Dry Matter (%)
Fat, animal	177	7.30	6.00	4.50	99.2
Oil, vegetable	177	7.80	4.75	3.51	99.8
Barley, grain	83	3.84	2.06	1.40	88.1
Barley Silage	64	2.65	1.31	.74	37.1
Wheat, grain	88	3.88	2.18	1.5	90.2

[1]Total Digestible Nutrients; [2]Digestible Energy;
[3]Net Energy for maintenance; [4]Net Energy for gain

Problems Associated with Using Fats and Oils

Fats and oils are subject to oxidation which is responsible for the development of rancidity. Rancid fat products have an objectionable odour and decrease the palatability of a feed. Vegetable oils are more prone to rancidity than tallow and other animal fats. Rancidity can be prevented or slowed by adding antioxidants. Vitamin E is the major natural antioxidant and various synthetic antioxidants are used to prevent rancidity in fats and oils. Excess fat or oil, exceeding 6 to 8% of the ration's dry matter, can inhibit fibre digestion in the rumen. Digestive disturbances, diarrhea and reduced feed intake may occur if excessive levels of fat are fed. Another problem with feeding fats or oils in Alberta is keeping the fat or oil warm enough during the winter to prevent it from freezing. A tallow tank would be required at the feedlot and during winter it would have be kept warm to allow the mixing of tallow into the ration.

Use of Fats in Feedlot Rations

When commercial feed fats are used to increase energy in feedlot diets they are usually added at the rate of 2 to 5 percent of the diet's total dry matter. Total fat levels exceeding 6 to 8 percent can cause digestive disturbances, diarrhea and reduce feed intake. The negative effects of fat on the rumen can be partially overcome by adding limestone. Calcium forms insoluble calcium soaps with the fatty acids and prevents them from inhibiting the rumen microbes. The calcium soap exits the rumen and is digested in the small intestine.

In addition to the energy value of fats, the control of dust arising from finely ground components of the ration such as finely ground forages or grain is an important use factor. Reducing the dustiness of the ration and the binding of fine feed particles will reduce respiratory health problems. When fats are used as a dust control agent, they generally added at approximately 1% of the dry matter, which is a low rate compared to the levels used to increase energy. Fats may also be added to dry rations to reduce bloat incidence, working both as a dispersing agent and by binding fines to larger feed particles.

Research on Feeding Fats and Oils

Various researchers have conducted feeding trials using fats and oils in diets. The results indicate that when fat is fed at rates up to 5% of the dry matter; that dry matter intake decreased, with an improvement in average daily gain, and feed efficiency and carcass characteristics for animals that are of dairy genetics, large frame animals or Brahma crosses. The results are not consistent when British crossbred animals are fed fat. Feeding trials indicate a trend for them to consume more feed and to be less efficient. Growth performance has shown an improvement when 3.5% to 4% fat was added to feedlot diets consisting of high moisture corn or milo. In Alberta, feedlot rations consist mainly of barley silage and barley and/or wheat grain. Engstrom, et.al. (**2**) conducted a feeding trial in Alberta, using barley based diets to test the effect of adding 0%, 2% and 4% fat, in the form of canola oil, to the rations of large frame exotic crossbred steers. During the first 56 days on feed, average daily gain increased by 9.8% with the addition of 4% fat. However over the entire feeding period 4% fat improved average daily gain by only 3.8% and this difference was only a trend. The addition of fat had no effect on dry matter intake, feed to gain ratio or carcass traits. The improvement in the rate of gain was marginal and one would have to consider the cost of the fat, the extra labour involved in adding fat to the diet and that the improvement average daily gain may not be consistent.

Do We Need Fat in Feedlot Rations?

If a barley based ration is fed to feedlot animals the addition of fat does not appear necessary. Barley based rations usually contain adequate levels of energy to meet the animals maintenance and growth requirements. A good knowledge of the genetic background of feeder cattle can be important in the selection of the ration to be fed. If dairy steers are fed, addition of fat may improve average daily gain, feed efficiency and carcass quality.

The easiest method of adding fat or oil to the diet may be by mixing rolled canola seed or canola fines (screenings) into the ration to supply extra energy. Canola fines or frozen canola seed can be added at 18 to 20 per cent of the diet, but remember that protein as well as energy is being added. Canola seed containing up to 65% frozen seeds, can contain

3.7 to 4.0 Mcal/kg of digestible energy, 12 to 18% crude protein and oil content can range from 20% to 35%. Frozen canola seeds or canola fines should be analysed for protein and fat (oil) content before formulating a ration.

If animal fats or vegetable oils are used, check to make sure that they are treated with antioxidants to prevent the development of oxidative rancidity which can destroy vitamins and cause rancid smelling feed. Animal fats and oils can be added by slowly pouring the fat or oil on top of the feed in the hammer mill or by using a small pump and spray nozzle attached to the auger to spray the oil on the feed as it passes by the nozzle. The level of fat or oil added to a feedlot ration can be up to 5% of the ration's total dry matter.

References

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