The benefits of feeding oil as part of a horse's ration

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Why are fats and oils added to horse feeds?

The main reasons fats or oils are added to horse rations are:

1. To decrease dust;
2. To lubricate and thus lessen wear on feed preparation and mixing equipment;
3. As a binder for pelleting or to assist in preventing fine material, such as added vitamins, minerals or protein supplements, from sifting out;
4. To try and give the horse a glossier hair coat; and
5. To increase the energy density of the diet.

Other benefits to feeding fats or oils in the diet may include:

- Lower lactic acid accumulation in muscles and blood by sparing glycogen use
- Reduced severity of tying-up
- Reduced muscle damage
- Calmer behaviour in horses on typically high grain diets

Increasing the energy in a ration without adding more feed

The purpose of increasing the diet energy density is to increase energy intake and/or decrease the amount of feed needed to provide energy needs in order to increase athletic performance, milk production, reproductive efficiency, or growth rate and/or to maintain or increase body weight during hot humid weather and when energy needs are high.

Any horse that is growing, lactating, or training has an increased energy requirement allowing the young horse to grow optimally and the mature horse to maintain optimum body weight, condition, and reproductive or athletic performance. This increased energy requirement is usually accomplished by an increase in the proportion of grain in the diet, to a maximum of 40-60% by weight of the diet. Any more grain than this will decrease forage (hays, chaffs, pasture) intake too greatly. A decrease in forage intake will:

(a) Increase the risk of founder, colic, diarrhoae and exertional myopathy (tying up).
(b) Decrease the amount of water, electrolytes and energy-providing nutrients present in the intestinal tract, which are quite beneficial for endurance type physical performance.

A low forage diet will also increase the risk of boredom and stable vices in horses not on pasture. ***Fat supplementation can alleviate these detrimental effects of excess grain and inadequate forage intake, yet accomplish the needed and beneficial increase in the diet's energy density.***

Supplemental fats are well utilized by the horse.

Studies show that fats and oils added to the horse's diet are 76 -94% digestible.

Even without increasing the total energy of the diet, having oils or fat in the ration has been shown to increase the amount of dietary energy available for growth, lactation and physical activity (Kane et al., 1979; McCann et al., 1987; Scott et al., 1993). Adding oils to the diet decreases total body heat production, leaving more energy available for maintenance and productive use (Scott et al., 1993). So, dietary fat is utilized by the horse for energy more efficiently than other sources of dietary energy.

Oils provide about 3 times more digestible energy than an equal weight of cereal grain.

Approximately 350ml oil provides the same amount of energy as:

- **1kg Oats or**
- **900g Barley or**
- **835g Corn**

Fats and oils generally cost 2 to 5 times more per unit of weight than cereal grain, but since they provide about 3 times more available energy, they may not be much more expensive on a digestible energy basis.

Are oils only useful for horses doing long-distance activity?

In short the answer to this is no. High-fat diets have been shown to enhance both aerobic (submaximal, long-duration) activity and anaerobic (sprint-type) activity and to delay fatigue. Horses fed a high-fat diet appear to have greater muscle glycogen utilization and no change in their blood glucose concentration during anaerobic activity, whereas during aerobic activity there was less decrease in their blood glucose concentration and there was muscle glycogen sparing (Oldham et al., 1990). Muscle glycogen sparing isn't necessary or desirable for sprint-type anaerobic activity, because with anaerobic activity glucose and glycogen are the primary substrates for energy production, whereas with aerobic activity, glycogen sparing helps delay fatigue.

Studies have shown that horses fed high-fat diets ran faster at a constant heart rate (McMiken, 1986, Oldham et al., 1990), and faster before their plasma lactate concentration began to increase sharply and reached 4mM/L (Custalow et al., 1993, Pagan et al., 1993), than did horses fed non-fat supplemented diets. When thoroughbred horses were fed a fat-supplemented diet, 14 of 15 had faster race times, and when in moderate or moderately high body-fat condition, utilised significantly more glycogen than when in moderately low body-fat condition (Harkins et al., 1992, Scott et al., 1992). ***These studies emphasise the benefit of both fat supplementation and maintaining the horse at moderate to moderately high body-fat condition for maximum Thoroughbred race performance.***

In addition to anaerobic activity, increased muscle glycogen in horses fed high-fat diets has also been shown to be effectively utilised for aerobic or endurance-type activity (Meyers et al., 1989, Oldham et al., 1990). Horses fed a diet with 10.5% added fat were able to trot for about 35 minutes before their heart rate reached 160/min; whereas this heart rate was reached after only 20 minutes in horses fed a diet with no added fat (Rich, 1988). Increased endurance capacity has also been described in trained cyclists (Lambert et al., 1994), sledge dogs (Hammell et al., 1977) and rats (Miller et al., 1984). Cutting horses fed high-fat diet were found to work harder than those fed a conventional diet (Pagan et al., 1987).

The good oils

All oils and fats are readily utilized by the horse to provide the same amount of energy, however there may be a difference in other ingredients they contain and in their palatability.

- Each oil or fat has a blend of different fatty acids (Omega-3, Omega-6) in its triglyceride content and a correct ratio of these is essential
- Oils that contain higher amounts of Omega-3 are considered to provide natural anti-inflammatory compounds and hormone action to improve the function and strength of blood vessels and body cells
- Excessively high intakes of omega-3 fatty acids can imbalance the controlling action of other fatty acids
- In animals, an Omega-3 to Omega-6 fatty acid ratio of 1 part Omega-3 to 5-10 parts Omega-6 is considered beneficial.

Apart from the blended oils sold by feed manufacturers, canola oil is generally suitable in its pure form or blended 50:50 with soyabean or corn oil.

The table below describes the Omega-3 and -6 fatty acid levels in various oil sources.

Oil	% of Fatty Acids in Oil		Comments
	Omega 3	**Omega 6**	
Canola Oil	10	20	Palatable, well accepted, cold pressed is stable, less risk of oxidation
Soyabean Oil	8	54	Reasonably well accepted, some Omega-3, but high content of Omega-6
Corn Oil	2	52	Low Omega-3, not as palatable, more easily oxidised
Sunflower Oil	< 1	66	Palatable. Contains high levels of Omega-6 for coat conditioning but very little Omega-3
Blended Polyunsaturated Cooking Oil	1-5	45-60	Ratios depend on blend of oils. Canola blends contain higher Omega-3 fatty acids

Linseed oil (flaxseed oil) has an Omega-3 fatty acid content of 57%, which provides excess Omega-3 when used in the volume required as an energy supplement. Small amounts of flaxseed oil are used to boost the Omega-3 fatty acid content in blended oils.

How much oil should be added to the feed?

While common horse feeds contain 3 to 6% fat, horses can utilize up to 20% added fat to the total diet and 30% in the grain mix without adverse effects (Hambleton et al., 1990; Ott, 1989). Higher levels may decrease feed palatability and cause loose stools. In addition, lower amounts appear to be optimum for increasing muscle glycogen content. Muscle glycogen content increased with increasing fat up to 10 to 12% of the total diet, but did not increase further or began to decrease with 15 and 20% fat added to the total diet (Hambleton et al., 1990; Myers et al., 1989; Oldham et al., 1990; Pagan et al., 1987). However, horses will normally accept up to one cupful (250ml) oil in each of the morning and evening feeds when added as an energy substitute for grain or as an energy boost to the diet of a hard working horse (Kohnke et al., 1999). This amount of oil (500ml, or 4% of total diet) provides about 12% of the total energy need of a racing or performance horse.

How much fat is in common horse feeds?

Energy feeds	***% Crude Fat***	***Premix feeds***	***% Crude fat***
Oats	6.9	Mitavite Formula 3	12
Corn	4.1	Mitavite XLR8	12
Barley	2.5	Mitavite Sustaina	9
Rice Bran	16.0	Mitavite Athlete Plus	15
		Hygain Release	10
Roughages		Hygain Micrspeed	8
Lucerne hay/chaff	2.3	Hygain Tracktorque	6.5
Oaten hay/chaff	2.3	Hygain Racetorque	6
		Coprice M Pellets	4.6
		Coprice G Pellets	4.5
		Nutririce Allrounder	10

To work out how much fat is in your horse's diet…

- Calculate the fat content of the concentrate part of the ration
- Add the oil component
- Divide by the total weight of feed offered per day and multiply by 100 to determine the percentage

E.g. A horse fed 3kg XLR8, 3kg Oats, 4kg Lucerne hay and 400ml oil per day
XLR8 contains 12% fat, so 12% of 3kg = 12/100 x 3000g = 360g fat
Oats contains 6.9% fat, so 6.9% x 3kg = 6.9/100 x 3000g = 207g fat
Lucerne contains 2.3% fat, so 2.3% x 4kg = 2.3/100 x 4000g = 92g fat

Total fat in ration is 360 + 207 + 92 + 400ml oil = 1059g fat = 1.059kg

Total amount of feed fed is 3kg XLR8 +3kg Oats + 4kg Lucerne hay + 400ml oil per day
= 10.4kg

% fat in diet = 1.059 / 10.4 x 100
= 10.2% fat in diet

Other key points about feeding oils

- Oils should be introduced slowly into the diet (suggest 40 ml increments at 3-4 day intervals) and should be stored in a cool place. Additional fats used to boost the energy density of the ration may not be digested efficiently if large amounts are added before pancreatic lipase enzyme activity can adapt to digest the extra fat.
- Complete metabolic adaptation to a high-fat diet has been shown to be achieved in 11 weeks, but not in 6 weeks (Custalow et al., 1993).
- Oils should be stored in a cool place, preferably in a refrigerator. Cold pressed oils normally contain less rancid fat. Cold pressed canola oil, a monounsaturated fat, is less subject to oxidation and rancidity and horses often find it more palatable than other vegetable oils.
- Fats and oils do not contain any other nutrient other than energy and fatty acids for membrane stability. Where larger volumes of oil are added to a diet in place of concentrates, extra protein, calcium, phosphorus, Vitamin E and possibly other nutrients may need to be replaced, especially in racing and performance horses.

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