The value of oats in ruminant diets

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Oats have long been known to be good as part of the diet of ruminant livestock. Ruminants, such as cattle and sheep, benefit from the use of microbes in their rumen to help ferment fibrous feeds, and they can make use of the energy in the whole grain of the husked oat. Energy values for husked oats (ranging between 12 and 14 MJ digestible energy per kg dry matter [DM]) tend to be lower than barley (about 15 MJ digestible energy/kg DM, another feed grain used extensively in livestock diets). Lignin is an indigestible component of the cell wall of plants, and is present in high concentrations in the husk of oats. Higher lignin concentrations make the oat grain less digestible for ruminants, which means less energy is provided by feeds (including oats) with high lignin contents, and recent IBERS oat-breeding objectives have aimed to reduce the lignin content of oat grains to make them more digestible.

The protein contents of oats and barley are roughly similar, at about 10-12% of DM, although the fat content of oats, tends to be much higher than that of barley. The fatty acid content of oats varies greatly, depending on the variety of the oat: naked or husked, spring or winter grown. The high oil concentration of some oat varieties limits the proportion of oats that can be fed to cattle and sheep, but the fatty acid profile of oats is such that ruminant products – meat and milk – from oat-based diets may have a fatty acid profile that is beneficial to human health when consumed. High oil concentrations in feed has a toxic effect on rumen microbes, which reduces the effective digestion of that feed, particularly the fibre components. Although the amount of oats used in livestock feeds is generally no more than about 30% of the complete diet due to their nutritional composition, the relatively high costs of production, particularly of naked oats, limits their use when used in least-cost formulations. The higher fibre content of oats, compared with other cereal grains, coupled with a generally lower starch content, means that the risk of rumen disorders (such as acidosis) is lower when oat grains are fed to ruminants.

Methane, a potent greenhouse gas, is produced insignificant quantities during the fermentation of feeds in ruminant guts, and it is well known that an increase in the fat content of feeds can help reduce the amount of methane that cattle and sheep produce. Using in vitro and in vivo studies, recent work at IBERS has shown the methane production by rumen microbes was reduced as the fat content of oat grains increased. This suggests that oats, which have a lower nutrient requirement for their growth than some other grains, may also be useful in reducing the environmental impact of livestock production.

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