Increasing the utilisation of grain when fed whole to ruminants

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Abstract

Feeding grain whole to cattle generally results in a lower digestibility than that obtained with processed grain. If this problem could be overcome, feeding with whole grain would reduce processing costs, and the slower rate of starch digestion in the rumen could improve fibre digestion with potential beneficial effects on intake and animal production.

Two strategies are available to increase the digestibility of whole grain. The first, longer term strategy relies on the selection or breeding of feed grains that are efficiently digested by cattle when fed whole. The review considers the chemical and physical properties of grains likely to increase the degree of grain damage during mastication, and increase the digestibility of the seed coat fraction. Research is required to determine the feasibility of selecting feed grains with these characteristics.

The second strategy is to treat whole grain with chemicals or enzymes to increase digestibility of the seed coat and consequently whole grain digestion within the rumen. Considerable research has been conducted on the sodium hydroxide (NaOH) treatment of grain, and there is sufficient evidence from cattle experiments to indicate that digestibility, liveweight gain, and milk production on NaOH-treated whole grain can be similar to that on rolled grain, provided sufficient NaOH is applied. However, a number of practical and commercial considerations have limited the more widespread adoption of this technology on farms. Although ammonia treatment offers a more practical alternative to NaOH, digestibility and animal production responses have been highly variable, and research is required to identify effective ammoniation procedures.

The increased availability of enzymes for livestock feeding has potentially provided another grain treatment option. The application of fibrolytic enzymes to whole grain prior to high-moisture storage or feeding, and their subsequent effect on grain digestibility, require research. The impact of grain characteristics, both physical and chemical, on the response to alkali or enzyme treatment also requires research.

Full Text