



ENHANCING FEED EFFICIENCY WITH GRAIN PARTICLE SIZE

OPTIMISING PARTICLE SIZE DISTRIBUTION FOR GRAINS AND
PROTEIN SOURCES

Project Participants

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Problem

Grain processing and particle size is one of the biggest factors affecting how efficient pigs are in utilising the grains within their diet. Previous research has shown the average particle size of milled grains in Australia is extremely variable, suggesting poor milling practice. It has also been shown that starch digestion declines dramatically with increasing particle size, reducing the amount of energy available to the animal.

Project

This project evaluated the particle size distributions of milled grains currently used in feeds by both large and small producers. Trials were completed to test whether variations in particle size below one millimetre for field peas and sorghum influenced feed conversion growth rates in weaner pigs. The research also investigated the composition and particle size of leftover feed in the small intestine to determine passage time in the gut.

Value for Producers

Correct particle size when milling feed can help improve digestion and feed efficiency in pigs.



Background

Particle size management is an important and often overlooked aspect of feed quality. The particle size of milled grain has a marked effect on the performance of pigs. Previous research has shown that reducing the amounts of milled grain particles > 1 mm in size (for sorghum, or 1.7 mm for barley) improves feed conversion ratios in both weaner and grower pigs.

There are a wide range of particle sizes for milled grains in current production, including many with a high percentage of particles greater than one millimetre. Measurement of particle size distribution can be simple but is rarely carried out.

Recommendations

Using a hand-held sieve offers the potential for on-site adjustment of milling parameters, helping to reduce the levels of particles greater than one millimetre in size. Larger particles may be more tolerated in diets containing diverse grains than in single grain formulations.

Recommended average particle sizes for common grains is shown below (Table I).

Grain	Corn	Wheat	Sorghum	Barley
Average particle size	<0.6mm	<0.6mm	<0.5mm	<0.7mm

There are no significant performance differences for weaner pigs on sorghum or pea-rich diets with mean particle sizes between 0.4 and 0.8 millimetres. Improved animal performance is likely to be achieved with grains ground even finer.

Fine grinding can affect milling throughput, the flow of mash diets through feeding systems, and can increase the occurrence of stomach ulcers. These factors need to be considered when deciding how fine grains should be ground.

Feeds with larger particles have a slower rate of passage, suggesting the negative effect of large particle sizes on feed efficiency may be related to passage rate as well as digestibility effects.

More Information

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