Effect of Barley Sample, Particle Size and Enzyme Supplementation on Energy Digestibility of Barley Fed Grower Pigs

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Summary

The feed processing procedures grinding and enzyme supplementation were tested to reduce the existing variability in DE content of barley. Particle size reduction but not enzyme supplementation increased energy digestibility of barley and partially reduced the variation in energy digestibility.

Introduction

The DE content of Western Canadian barley has a large range. The variation in DE content of barley is caused by changes in energy digestibility. Specific processing procedures, for example, reduced particle size using grinding and supplementation of enzymes that degrade ingredient factors that limit energy digestibility (fibre) may hypothetically increase energy digestibility and thereby reduce the variation. This hypothesis was tested using three barley samples that were selected based on their ADF content, specifically 5.7, 8.1, and 11.4% ADF for B1, B2, and B3, respectively.

Experimental Procedures

Three barley samples (B1, high; B2, medium and B3, low predicted DE), three particle sizes (fine, 400 mm; medium, 650 mm and coarse, 900 mm), and two enzyme treatments (control and 500 U ß-glucanase per kg diet plus xylanase) were tested in a 3 x 3 x 2 factorial arrangement. Grower pigs were fed two different diets containing 96% barley in subsequent periods for 6 observations per diet. Feed and collected faeces were analyzed for gross energy, dry matter, and chromic oxide to determine apparent total-tract energy digestibility and DE.

Results and Discussion

Energy digestibility was affected by barley sample ($P < 0.001$), particle size ($P < 0.001$), and a barley sample x particle size interaction ($P < 0.05$). But unlike previous studies, energy digestibility was not affected by enzyme supplementation ($P > 0.10$).

The diet DE content for B1, B2 and B3 were each different ($P < 0.001$; 3180, 2997 and 2567 kcal/kg DM, respectively). The reduced DE contents for B2 and B3 thereby confirmed the predicted ranking based on increased ADF content, and was correlated to reductions in energy digestibility ($P < 0.001$; 74.3, 69.5 and 58.5%, respectively).

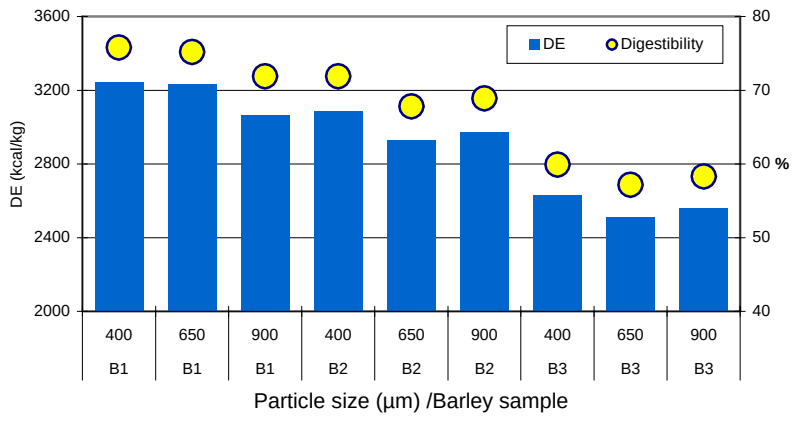
Overall, the DE content for fine was 3.4 and 4.2% higher than for medium and coarse particle size ($P < 0.001$; 2988, 2891 and 2866 kcal/kg DM, respectively). The reduced DE contents for medium and coarse particle size were correlated to reductions in energy digestibility ($P < 0.001$; 69.2, 66.7 and 66.4%, respectively). Energy digestibility was similar for barley sample B2 ground finely and barley sample B1 ground coarsely, suggesting that reducing particle size for medium DE barley may reduce variation in DE content (Figure 1).

The lack of enzyme response suggests that ß-glucans or xylans did not cause the reduced DE content for barley samples B2 and B3.

Conclusion

Prediction of barley quality prior to processing and subsequent adjustments in processing may be components in a decision model to achieve a

Figure 1. Effect of barley sample and particle size on DE and energy digestibility (%)



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