Effect of Wheat Sample, Particle Size and Xylanase Supplementation on Energy Digestibility of Wheat Fed to Grower Pigs

R.T. Zijlstra[1], T.N. Nortey[1,2], D. Overend[3], R. Hawkes[1,2], M.D. Drew[2], J.F. Patience[1], and P.H. Simmins[4]

Summary

The feed processing procedures grinding and enzyme supplementation were tested to reduce the existing variability in DE content of wheat. Particle size reduction and xylanase enzyme supplementation increased energy digestibility of wheat and partially reduced the variation in energy digestibility.

Introduction

The DE content of Western Canadian wheat has a large range. The variation in DE content of wheat is caused by changes in energy digestibility. Specific processing procedures, for example, reduced particle size using grinding and supplementation of enzymes (xylanase) 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 wheat samples that were selected based on their NDF content, specifically 20.1, 29.3, and 35.7% NDF for W1, W2, and W3, respectively.

Experimental Procedures

Three wheat samples (W1, high; W2, medium and W3, low predicted DE), three particle sizes (fine, 400 mm; medium, 650 mm and coarse, 900 mm), and two enzyme treatments (control and 2625 U *Trichoderma* xylanase per kg diet) were tested in a 3 x 3 x 2 factorial arrangement. Grower pigs were fed two different diets containing 96% wheat 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 wheat sample, particle size, xylanase, sample x particle size, and sample x xylanase ($P < 0.01$).

The diet DE content for W1, W2 and W3 were each different ($P < 0.001$; 3694, 3412, and 3368 kcal/kg DM, respectively). The reduced DE contents for W2 and W3 thereby confirmed the predicted ranking based on increased NDF content, and was correlated to reductions in energy digestibility ($P < 0.001$; 85.1, 77.4 and 76.7%, respectively).

Overall, energy digestibility for fine was 2.3 and 3.0% higher than for medium and coarse ($P < 0.001$; 81.1, 79.3 and 78.7%, respectively). Fine improved energy digestibility 4.8% for W2 and 3.8% for W3 compared to CPS ($P < 0.01$), but not for W1 ($P>0.10$), see Figure 1.

Energy digestibility was 0.9% higher for xylanase than for control ($P < 0.01$). Xylanase improved energy digestibility 2.0% for W2 and 1.4% for W3 ($P < 0.01$), but not for W1 ($P > 0.10$).

Together, these results indicate that beneficial effects of processing depended on wheat sample.

Conclusion

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

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

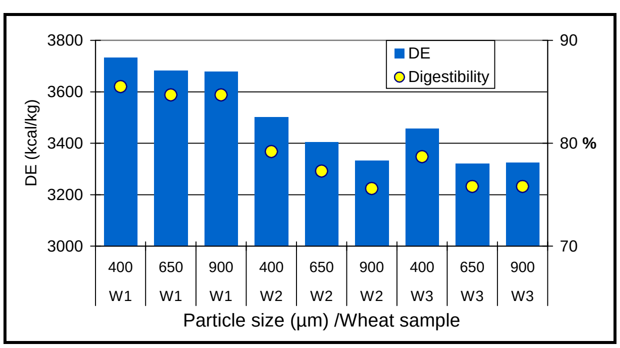
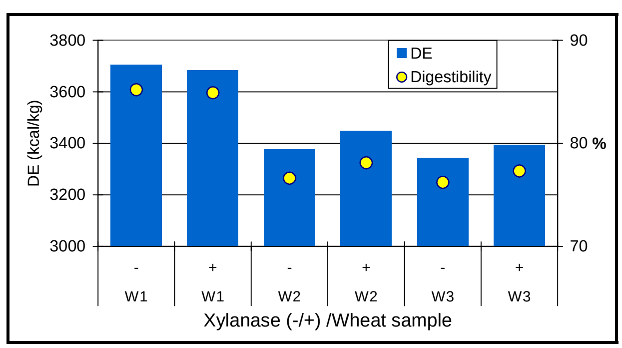


Figure 2. Effect of wheat sample and xylanase supplementation on DE and energy digestibility (%)



[1]Prairie Swine Centre Inc. Saskatoon, SK, [2]University of Saskatchewan, Saskatoon, SK, [3]Ridley Inc., Mankato, MN, [4]Danisco Animal Nutrition, Marlborough, UK