

# Feeding barley to starter pigs

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## Take home message

Wheat and barley are feed grains used as energy source in swine diets. Inclusion of high quality (HQ) barley grain in starter pig diets is limited in commercial feed formulation due to its greater fibre content and lower net energy (NE) value than wheat. Low quality (LQ) barley is also available, but its feed value for young pigs is unknown. To explore, 224 starter pigs (weight: 8.65 ± 0.87 kg) were fed pelleted diets including HQ or LQ barley to replace 65 per cent wheat, for 3 weeks starting at 1 week post-weaning. Total tract digestibility of energy and diet predicted NE value were greater for the wheat diet than that for barley diets. For day 1-21, feed intake, weight gain and feed efficiency (gain:feed) of the wheat diet did not differ from the HQ barley diet, but was lower than those of LQ barley diets. Feed intake and weight gain did not differ between HQ barley and LQ barley diets. In conclusion, despite lower nutrient digestibility and energy value, LQ or HQ barley can fully replace wheat grain in diets for starter pigs and achieve equivalent or better growth performance provided diets are properly balanced for energy and amino acids.

## Barley

Increased prices of feedstuffs reduce profit margins in pork production. In western Canada, Australia and northern Europe, wheat and barley are the main feed grains. Wheat grain has a greater net energy (NE) value than barley; however, the greater energy value of wheat than barley may not increase growth of pigs. Adverse agronomic conditions might turn an

expected high quality (HQ) barley grain into low quality (LQ) barley with greater fibre content and lower density. However, LQ barley might be acceptable for swine feeding if young pigs can increase intake of low energy, barley-based diets. Whether young pigs fed barley grain instead of wheat in diets formulated to equal or lower NE value can maintain growth performance requires investigation.



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### Nutrient profile of barley

The HQ and LQ barley grain contained 12.6 and 11.9 per cent crude protein (CP), similar to 12.3 per cent CP in wheat grain. The HQ barley had greater density (64.0 vs 54.4 kg/hL) and predicted NE value (2.34 vs 2.22 Mcal/kg) than LQ barley. The HQ and LQ barley samples contained 6.1 and 7.0 per cent ADF, respectively, double the 2.5 per cent ADF in the wheat sample. The HQ and LQ barley samples contained 0.55 and 0.54 per cent lysine (Lys), greater than 0.44 per cent Lys in wheat grain.

### Weaned pig trial

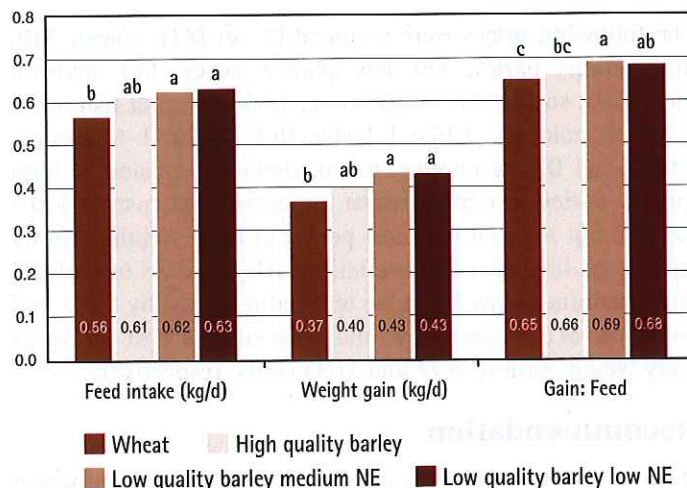
The trial was conducted at the Swine Research and Technology Centre, University of Alberta (Edmonton, AB, Canada). In total, 224 pigs (Duroc × Large White/Landrace F1; Hypor, Regina, SK, Canada) were weaned at 24 days of age. Pigs were selected based on weight gain immediately after weaning and body weight on day 5 after weaning (8.65 ± 0.87 kg). Pigs were divided within gender into heavy and light weight, randomly placing one heavy and one light barrow and gilt into one of 56 pens with four pigs each, for 14 pens per diet. Pigs were fed sequentially pre-starter and starter diets (Hi-Pro Feeds, Sherwood Park, AB, Canada) for two and five days, respectively, before feeding experimental diets.

Experimental diets contained 20 per cent soybean meal, five per cent soy protein concentrate, five per cent herring meal and one of three cereal grain samples: wheat, HQ barley or LQ barley. Four experimental diets were formulated to a specific NE value (Mcal/kg) adjusted by including canola oil (2.2 or 3.8 per cent) and for standardised ileal digestible (SID) Lys content (g/Mcal NE) using synthetic amino acids. The 4 diets were: 1) wheat-based (2.39, 4.48); 2) HQ barley-based (2.39, 4.44); 3) LQ barley-based, medium NE (2.33, 4.56); and 4) LQ barley-based, low NE (2.25, 4.69). Diets did not include antimicrobials or growth promoters. Diets were steam pelleted at 70°C.

### Trial results

Pigs maintained good health status. For the entire trial (day 1–21), growth performance for the wheat diet did not differ

Figure 1. Growth performance of piglets fed wheat or barley diets



a, b, c bars of each category without common letter differ (P < 0.05)

from those for the HQ barley diet, but was lower than those for LQ barley diets (Figure 1). Feed intake and weight gain for the HQ barley diet did not differ from those for LQ barley diets. Feed efficiency of the HQ barley diet did not differ from that of LQ barley low NE diet, but was lower than that of LQ barley medium NE diet. However, growth performance did not differ between the 2 LQ barley diets. Final BW was 16.3, 17.1, 17.6 and 17.7 kg for pigs fed wheat diet, HQ barley diet, and LQ barley diets with medium or low NE value, respectively. Final BW for the wheat diet did not differ from that for the HQ barley diet, but was lower than that for LQ barley diets.

Energy digestibility was greater for the wheat diet than barley diets (80.2 vs. 74.0 to 77.3 per cent). Energy digestibility was lower for the HQ barley diet than LQ barley diets (74.0 vs. 75.5 to 77.3 per cent). Energy digestibility was lower for the LQ barley medium NE diet than the LQ barley low NE diet (75.5 vs. 77.3 per cent). The predicted NE value was greater for the wheat diet than barley diets (2.33 vs. 2.17–2.21 Mcal/kg). The predicted NE value was lower for the HQ barley diet than LQ barley diets.

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**Cost vs. benefit**

The following prices were assumed (\$ per MT): wheat, 240; high quality barley, 220; low quality barley, 160; soybean meal, 590; soy protein concentrate, 1,500; herring fish meal, 3,350; canola oil, 1,165; L-lysine-HCl, 2,020; L-threonine, 4,600; and DL-methionine, 8,000. Dietary inclusion of high quality barley to replace wheat increased feed cost by \$10.2 per MT, but reduced feed cost per kg of body weight gain by 0.46 cents. Inclusion of low quality barley in diets formulated with medium or low NE value reduced feed cost by \$27.7 and \$45.8 per MT, respectively; and reduced feed cost per kg of body weight gain by 9.72 and 11.33 cents, respectively.

**Recommendation**

Dietary inclusion of barley grain to replace 65 per cent wheat in swine diet reduced energy digestibility, but did not reduce growth performance of weaned pigs. Pigs fed low quality barley diet had greater feed intake, weight gain and feed efficiency than pigs fed the wheat grain diet. Barley grain may replace wheat grain not only in diets for growing-finishing pig but also for starter pigs provided the diets are balanced properly for energy and amino acids.

**Acknowledgements**

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**PRRS eradication project provides benefits to Alberta's pork industry**

Submitted by the Alberta Livestock and Meat Agency

From rising production costs to animal care, there are constant challenges the pork industry has to overcome. This includes mitigating the presence of Porcine Respiratory and Reproductive Syndrome (PRRS), which can have devastating effects on production costs and animal health.

Over the last decade, there has been a strong push to eliminate PRRS in North America because the disease is costly, even in



Dr. Frank Marshall

perceived mild viral strains. However, control and elimination is often difficult, especially in hog-dense areas, as proximity to neighbours increases the threat of reintroduction.

To break the disease cycle, the producer has to physically separate the animals from the infected barn. This requires considerable time and financial investment by each producer wanting to achieve PRRS-free status.

Dr. Frank Marshall recently led a project that worked with hog farms in three adjoining counties (Westlock, Barrhead and Sturgeon) to attain PRRS eradication without depopulating the sow herd, therefore demonstrating that eradication is possible regionally. The project also provides the framework towards potentially achieving provincial PRRS-free status. Although there is a lot of work in achieving and maintaining that status, there are premium market opportunities for PRRS-free pig production.

Among other reasons, that potential inspired the Alberta Livestock and Meat Agency (ALMA) to partner with Dr. Marshall to help ease the off-site costs associated with this project. For Dr. Susan Novak, ALMA's Executive Director of

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