

Response of growing pigs to the inclusion of hybrid rye in low or high energy diets

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SUMMARY

This experiment was designed to determine if increased dietary energy content will compensate for the reduced feed intake previously shown in pigs fed diets with hybrid rye substituting for wheat. We hypothesized that pigs fed 40% hybrid rye would perform better on the high than the low energy diets. A total of 160 pigs (70.1 kg BW) housed into 32 pens, 5 pigs per pen, were fed diets with 0 or 40% hybrid rye (var. 'KWS Bono'), either with low (2350) or high (2450) kcal NE per kg of diet over two growth phases (Phase 1; 70 to 85 kg BW; Phase 2; 85 to 130 kg BW).

Overall (d 0 to 50), pigs fed the low energy rye diets gained 77 g/d less than those fed the high energy rye diet or the low energy diet without rye, which was caused by an effect observed in the first 17 days of the trial. Final BW and overall feed intake were not affected by rye inclusion or NE level. The NE intake was greater and feed efficiency (G:F) was reduced in pigs fed rye diets compared to those fed diets without rye, whereas there was no effect of NE level on NE intake or G:F. Feed cost per pig and per kg BW gain was lower for the low NE vs. the high NE diets. There was no effect of rye inclusion on feed cost per pig, but feed cost per kg BW gain tended to be 0.04 CAD higher for diets with rye compared to those without. In conclusion, pigs can be fed diets including 40% hybrid rye with only minor changes in growth performance. Increasing the NE level of the first phase diet in the grower-finisher barn may be useful to avoid a reduction in growth performance when feeding hybrid rye. Reducing the dietary NE level can be a good strategy to save money on feed costs in the grower-finisher barn.

INTRODUCTION

Long term sustainability of the livestock industries in the Canadian Prairies is dependent on increased use of alternative feeds and by-products. One such example is rye, a cereal crop comparable to wheat. New rye hybrids with improved yield potential of 25 to 30% higher than older varieties has resulted in increased acreages planted in Saskatchewan and Alberta, making it competitive as a feed grain. The new hybrid varieties (developed by KWS in Germany) not only have increased yields but have improved grain quality and are more resistant to ergot.

Rye has the potential to be a cost-effective ingredient in swine diets. Recent research demonstrated that the new hybrid rye varieties could replace wheat or corn in diets fed to growing pigs with minor effects on growth performance or carcass traits. Several studies observed slightly reduced feed intake for pigs fed increasing hybrid rye substituting for wheat or corn, which in turn resulted in lower average daily weight gain. Typically, the growing pig will eat to meet their energy requirements, meaning that for diets with a high energy value a lower daily feed intake is needed to maintain growth performance. The current experiment was designed to determine if an increased dietary energy content will compensate for reduced feed intake of pigs fed diets formulated with rye substituting for wheat. Our objective was to determine the effects of 40% hybrid rye inclusion in diets formulated to be either low or high net energy (NE) on growth, feed intake, and energy digestibility of growing pigs. We hypothesized that growing-finishing pigs fed 40% hybrid rye would perform better on the high than the low energy diets.

"Rye has the potential to be a cost-effective ingredient in swine diets."



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EXPERIMENTAL PROCEDURES

At the Prairie Swine Centre, 80 barrows and 80 gilts (~70 kg BW) were placed in 32 pens, 5 pigs per pen, and allocated to be fed diets with either 0% or 40% hybrid rye replacing wheat, and with either low (2350 kcal) or high (2450 kcal) NE per kg of diet, resulting in 4 treatments and n = 8 pens per treatment. Hybrid rye fed in this trial was the variety 'KWS Bono' developed by KWS LOCHOW GMBH (Bergen, Germany) and obtained from FP Genetics Regina, SK. The low energy diets were formulated to have similar dietary inclusion levels of all major ingredients compared to the high energy diets, except for a decreased inclusion of canola oil. Test diets were fed to slaughter weight over 2 growth phases (Phase 1; 70 to 85 kg BW; Phase 2; 85 to 130 kg BW). Pigs had free access to water and the assigned test diet in pelleted form.

RESULTS AND DISCUSSION

The hybrid rye fed in this experiment had relatively low levels of mycotoxins, including ergot. Energy digestibility was unaffected by rye inclusion and was reduced in the low relative to the high energy diets.

For the first 8 days of the trial, pigs fed diets with hybrid rye had reduced feed intake (Figure 1). The reduction in feed intake with the hybrid rye diets was greater in the low vs. the high NE diets (reduction of 0.18 vs. 0.07 g/d, respectively). Feed efficiency (G:F) was also reduced in pigs fed the low energy rye diet, resulting in less weight gain than pigs fed one of the other three diets, and lower body weight on d 8. In the next 9 days (d 8 – 17), pigs on the low energy hybrid rye diets had numerically the lowest feed intake and feed efficiency, resulting again in lower weight gain and lower body weight on d 17. For the next growth period (d 17 to 28), the opposite happened with pigs fed the low energy rye diet gaining the most weight and having the best feed efficiency, perhaps indicating compensatory gain happened. Body weight was slightly lower for the low energy rye diets than the other diets on d 28. There was no effect of rye inclusion or NE level on weight gain after d 28, and body weight on d 43 and d 50 was no longer different among the treatments (Figure 2).

Looking at the overall results for the entire trial (d 0 to 50; Figure 3), pigs fed the low energy rye diets gained 77 g/d less than those fed the high energy rye diet or the low energy diet without rye. Overall feed intake was not affected by hybrid rye inclusion or NE level. Net energy intake was consistently greater for pigs fed diets with rye compared to those fed diets without rye. Overall feed efficiency was reduced in pigs fed rye diets compared to those fed diets without rye but was not affected by NE level.

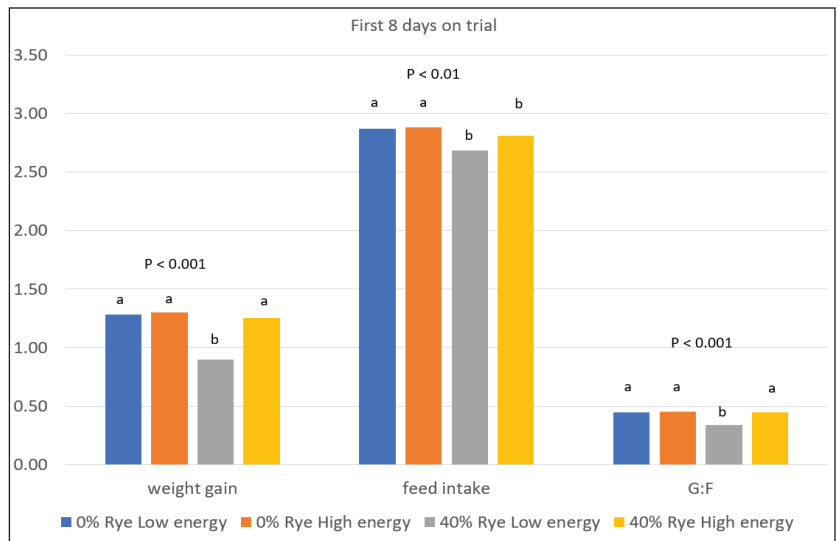


Figure 1. Growth performance in the first 8 days on trial of pigs fed 0 or 40% hybrid rye with low (2350 Mcal) or high (2450 Mcal) net energy

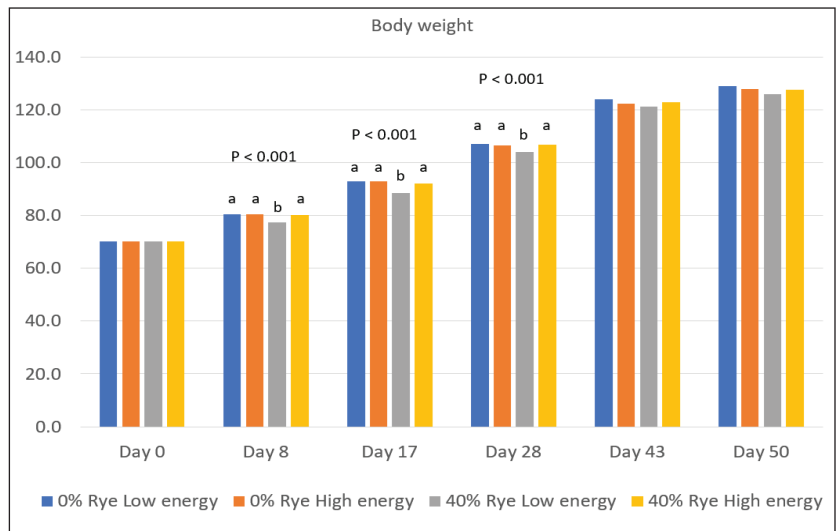


Figure 2. Body weight of pigs fed 0 or 40% hybrid rye with low (2350 Mcal) or high (2450 Mcal) net energy

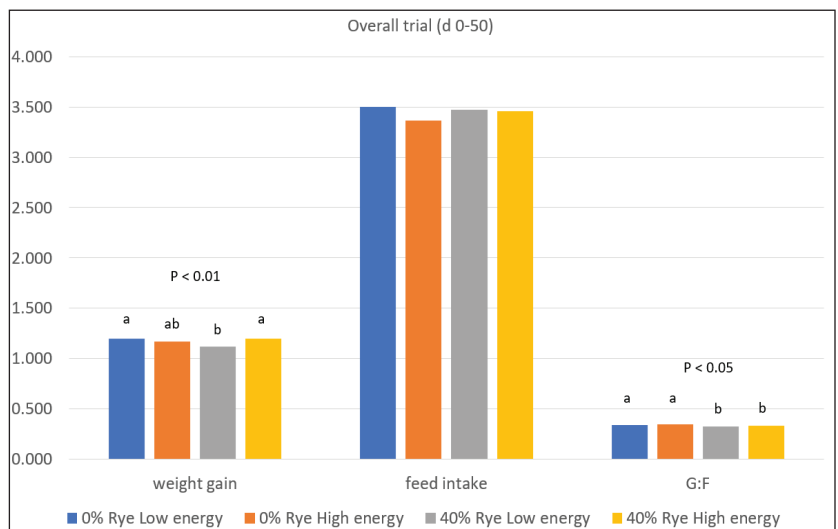


Figure 3. Overall (d 0 – 50) growth performance of pigs fed 0 or 40% hybrid rye with low (2350 Mcal) or high (2450 Mcal) net energy

We calculated the average cost of all ingredients between June and December 2022 on the Canadian Prairies. The rye diets were slightly cheaper than the wheat diets, but feed cost per pig was similar between the two grains. On the other hand, feed cost per kg BW gain tended to be \$0.04 higher for pigs fed hybrid rye vs. the wheat control diet, due to the lower overall feed efficiency for pigs fed the hybrid rye diets. The low NE diets were cheaper than the high NE diets, which translated to \$5.22 lower feed cost per pig and \$0.06 lower feed cost per kg BW gain for pigs fed low vs. high NE diets (Table 1).



"Pigs did well on the 40% hybrid rye diets regardless of the dietary NE level."

IMPLICATIONS

Altogether, our data show that in younger animals the NE level of the diet may need to be considered when formulating diets including hybrid rye to avoid a reduction in growth performance. After the first 17 days, pigs did well on the 40% hybrid rye diets regardless of the dietary NE level, resulting in similar feed intake and final body weight as pigs fed wheat diets.

A good strategy to save money on feed costs in the grower-finisher barn would be to reduce the dietary NE level, as long as pigs can increase their feed intake to make up for the reduced energy level.

Table 1. Feed cost of grower-finisher pigs fed high or low NE diets with or without 40% hybrid rye¹ inclusion²

	Rye		NE		0% Rye		40% Rye		SEM	P-values		
	0%	40%	Low	High	Low NE	High NE	Low NE	High NE		Rye	NE	Rye*NE
Feed cost/pig	89.43	89.73	86.97	92.19	87.98	90.88	85.95	93.51	1.61	0.833	0.002	0.115
Feed cost/kg BW gain	1.52	1.56	1.51	1.57	1.48	1.57	1.54	1.58	0.03	0.059	0.002	0.168

¹ KWS LOCHOW GMBH (Bergen, Germany).

² LSmeans based on 8 pens of 5 pigs each per hybrid rye level × NE level.

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