Feeding Canola Meal or Soy Expeller at Two Feed Energy Levels to Growout Hogs

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Previous research trials that we've conducted showed that we can feed reduced net energy (NE) diets (≤2.3 Mcal/kg) to growout hogs instead of traditional energy levels (≥2.4 Mcal NE/kg) as long as hogs can increase feed intake to compensate for reduced dietary energy level. Conventional (solvent-extracted) canola meal (CM) has low energy value due to relatively high dietary fibre content. Soy expeller (SE) is now locally produced in Canada (Ontario, Quebec, Maritimes, Manitoba, Saskatchewan, Alberta) and has greater energy value than imported soybean meal because of remaining oil. These feedstuffs therefore offer opportunities to reduce or increase dietary net energy level at low cost. Lowering feed cost is important, as feed is the largest cost of pig production and energy yielding feedstuffs account for 85 to 90% of feed cost. Therefore, nothing impacts the cost of pork production more than the dietary energy level of feed fed to growout pigs. We needed to confirm the response of pigs to reduced dietary net energy levels to endorse previous feeding recommendations and thought to utilize canola meal vs. soy expeller to achieve that. Therefore, the objective of our trial was to compare the growth performance, carcass characteristics, and economics of barrows and gilts fed low or conventional NE diets including either canola meal or soy expeller to market weight.

Trial setup

We conducted this commercial-scale pig trial at a contract grower barn set up as a test facility (Lougheed, AB). In total, 504 barrows and 504 gilts (~33 kg BW at the start of the trial) were housed in 48 pens by sex, 21 pigs per pen. Barrows and gilts were fed two NE levels: low (2.17 or 2.20 Mcal/kg for grower and finisher, respectively) or high (2.32-2.35 Mcal/kg). Within NE level, they were fed either canola meal (25% inclusion in grower and 20% in finisher) or soy expeller (15-12.5%) with 6 pens per NE level x protein source x sex, over 5 growth phases (Grower 1: d0-12, Grower 2: d13-33, Grower 3: d34-53, Finisher 1: d54-74, Finisher 2: d75-slaughter). For all 5 growth phases, diets were formulated to equal standardized ileal digestible (SID) lysine/Mcal NE. Low NE phase diets were based on barley grain, whereas high NE diets were based on wheat grain. Within NE level, the energy value of the canola meal diet was increased to match that of the soy expeller diet by including canola oil. Pig BW and feed disappearance (ADFI) were measured on day 0, 12, 33, 53, 74, every two weeks thereafter, and at slaughter weight (130 kg). Pigs were slaughtered at Maple Leaf (Brandon, MB). Individual warm carcasses were weighed and graded (Destron).

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What we found out

For the entire trial (d0-74), although hogs fed low NE diets consumed 72 g/d more feed than those fed high NE diets, NE intake was 350 calories/d less (Figure 1). Feed intake was lower for hogs fed canola meal vs. soy expeller in the first 12 days on test, but there was no difference in feed intake for the overall trial. Caloric intake was 209 calories/d greater for hogs fed soy expeller that grew 37 g/d faster than hogs fed canola meal. Weight gain per kilo of feed consumed (feed efficiency) was 14 g/kg lower (worse) for hogs fed low vs. high NE diets and 12 g/kg greater (better) for hogs fed soy expeller vs. canola meal (Figure 1).

Carcass dressing was 0.6%-points lower feeding low vs. high NE diets and feeding canola meal vs. soy expeller (Table 1). Lower dressing % is explained by more fibrous feed

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retained in the gut at slaughter feeding the low energy diets or the canola meal diets. As a result of lower dressing %, carcass weight was 0.8 kg lower for hogs fed low vs. high NE diets and 1.4 kg greater for hogs fed soy expeller vs. canola meal. Hogs fed soy expeller averaged 2.3 mm larger loin than those fed canola meal. Dietary energy level or protein source had no effect on backfat depth, pork yield or carcass index. Hogs fed canola meal stayed 2.6 d longer in the barn than those fed soy expeller (Table 1).

Dollars and cents

Diet cost averaged $28.38 per tonne less feeding low vs. high NE diet and $7.76 per tonne more feeding soy expeller vs. canola meal. Income margin after subtracting feed cost (ISFC) per hog shipped was $2.75 greater feeding low vs. high NE diet and only $0.32 greater feeding soy expeller vs. canola meal (Table 2). The lower dressing percentage observed feeding low NE diets would require an increase in live ship weight by 1 to 2 kg to achieve target carcass weights. This extra live weight would mean a few days extra in the barn. However, the lower feed cost per hog would make up for the extra cost of keeping hogs on farm for a few days more.

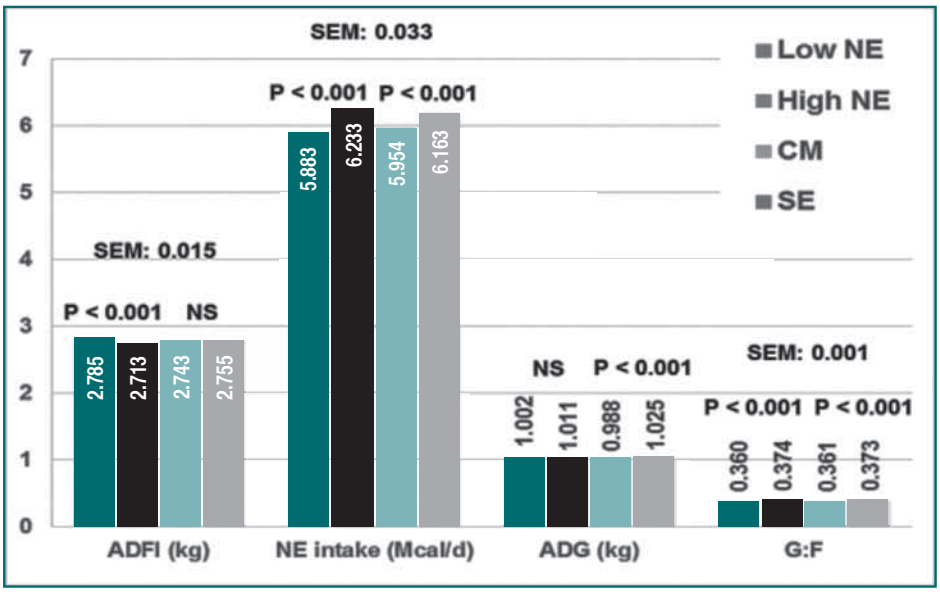

Figure 1. Effect of dietary net energy (NE) level (low vs. high) and protein source (canola meal [CM] vs. soy expeller [SE]) on growth performance.

So what does this all mean?

From our results we concluded again that hogs can be fed diets with reduced feed energy (≤2.20 Mcal NE/kg) instead of traditionally fed energy levels (≥2.32 Mcal NE /kg) as long as pigs can sustain feed intake. Once again our research showed that feeding lower NE diets resulted in greater profit margin after subtracting feed cost than feeding conventional energy levels.

Abruptly introducing 25% canola meal in the grower phase diets was a challenge to hogs, either due to the fibre content and/or the taste. If hogs had been progressively introduced to canola meal, a drop in feed intake in the first 12 days would likely have been avoided. Pigs fed canola meal never caught up to those fed more palatable, lower fibre soy expeller, but this was in part because we slightly overestimated the NE and digestible amino acid content of canola meal resulting in a minor reduction in growth performance and loin depth. This experiment proved that both soy expeller and canola meal are good supplemental protein sources and can be fed to growout hogs without much problems.

Table 1. Effect of feed net energy (NE) level (low vs. high) and protein source (canola meal [CM] vs. soy expeller [SE]) on carcass traits (SEM=Standard Error of the Mean)

	NE level		Protein source		SEM	P value	
	Low	High	CM	SE		NE	Protein
Days to slaughter from d74 on test	23.20	23.40	24.60	22.00	0.50	0.779	<0.001
Ship weight, kg	130.10	130.20	129.70	130.60	0.30	0.925	0.081
% of pigs shipped	94.20	95.40	95.20	94.40	1.00	0.406	0.578
Carcass wt, kg	101.90	102.70	101.60	103.00	0.30	<0.050	<0.001
Dressing, %	78.30	78.90	78.30	78.90	0.10	<0.010	<0.010
Backfat, mm	18.40	19.00	18.50	18.90	0.20	0.064	0.172
Loin depth, mm	61.70	61.80	60.60	62.90	0.40	0.793	<0.001
Lean yield, %	60.80	60.50	60.70	60.60	0.10	0.061	0.755
Index	115.00	115.30	115.30	115.00	0.20	0.269	0.269
Carcass revenue, $	208.47	210.85	208.61	210.71	0.75	<0.050	0.052

Table 2. Effect of dietary net energy (NE) level (low vs. high) and protein source (canola meal [CM] vs. soy expeller [SE]) on feed cost and gross income margin subtracting feed cost (ISFC) in CA$ (Spring 2016; SEM=Standard Error of the Mean)

	NE level		Protein source		SEM	P value	
	Low	High	CM	SE		NE	Protein
Feed cost/tonne	265.86	294.24	276.17	283.93	0.07	<0.001	<0.001
Feed cost/kg BW gain	0.80	0.84	0.82	0.81	0.01	<0.001	0.070
Feed cost/shipped hog	78.54	82.87	79.96	81.46	0.75	<0.001	0.061
ISFC/shipped hog	68.84	66.09	67.46	67.78	0.68	<0.010	0.480

A cautionary tale

Our experiment was not conducted in the summer time, when feeding diets with greater energy may prevent reduced weight gain. Even in the Prairies, it can get so hot in July and August that hogs may reduce feed intake. During these hot days, only feeding denser energy diets may prevent both decreased weight and lean gain. Our experiment did not include diseased pigs and we did not look at crowding and feeder access, all of which may limit feed intake. We are currently running a trial looking at interactions between dietary NE level, stocking density and feeder space. We will share results of this trial in a future edition of Canadian Hog Journal and on our website. Our trial showed that the most economically optimal feed energy level was 2.2 Mcal NE/kg, which is lower than current existing feed energy suggestions for hogs (2.4 Mcal NE.kg). Keep in mind also that feed commodities and pork prices vary. Therefore, the profitability shown here is repeatable, but its consistency will vary.

Take home message

Feeding lower net energy diets to growout hogs increased profitability without resulting in major changes in growth performance. Abruptly introducing 25% canola meal in the grower phase diets was a challenge to pigs, either because of the fibre content or the taste. Pigs fed canola meal never caught up to those fed more palatable, lower fibre, soy expeller diets, partly because we overestimated the net energy value and digestible amino acid content of canola meal, resulting in a minor reduction in growth performance and loin depth.

Acknowledgements

We would like to thank the Drumloche team for caring for the animals and for their expertise in trial conduct. We acknowledge Lewisville Pork Farm for the use of animals, and Sunhaven Farms Milling for supplying the feed. Financial support from the Canola Council of Canada and Agriculture and Agri-Food Canada is acknowledged.