Feeding lower energy diets to hogs

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Take Home Message

Hogs can be fed diets with reduced (≤2.2 Mcal/kg) net energy (NE) instead of traditionally-fed higher energy levels (≥2.4 Mcal NE /kg) as long as pigs sustain high feed intake. Allowing pigs to maximize feed intake is of great importance. The most economical dietary NE level was 2.1 Mcal/kg, which is much lower than corn-soybean feed energy suggestions for growing-finishing pigs. Profitability feeding lower energy diets also depends on the cost per calorie of low energy cereal grains like oats and barley and co-products relative to wheat and corn.

Why feed energy level?

Feed is the single largest cost of pork production (65 - 75%). In a farrow-to-finish operation, more than 80% of feed is consumed by hogs. Energy yielding feedstuffs account for 85 - 90% of feed cost. Therefore, nothing impacts the profitability of pork production more than the dietary energy level of feed for hogs.

There is surprisingly little information on the responses of hogs to feed energy density. The newly revised NRC 2012, a book that summarizes the nutrient requirements of pigs, has no 'Table' for feed energy requirements according to pig age or stage of production. Instead, tables show a 'standard' 2,475 kcal/kg of net energy (NE), and are footnoted *'dietary energy content relates to corn-soybean meal based diets'*. So what about our lower energy Prairie diets based on barley and now including high levels of co-products like DDGS, canola meal, etc.? Are we underfeeding feed energy and limiting our hogs from growing faster? Are we causing more tail-enders that are delayed leaving the barn?

We designed a trial to evaluate feeding lower than conventional, constant NE levels throughout to market weight with the aim of comparing our small grain-based diets to diets that would provide similar energy levels to corn-soybean diets for hogs. We compared growth performance, dressing, and carcass traits of barrows and gilts fed one of four feed energy regimens that provided a constant NE level to market weight.

Setup of the trial

We conducted the trial at a commercial contract pig grower farm in Lougheed, AB that has been set up as a test facility. In total, 504 barrows and 504 gilts initially of 30 kg BW were housed in 48 pens, 21 pigs/pen by sex. Pigs were fed one of four feed energy regimens (2.4, 2.3, 2.2, or 2.1 Mcal NE/kg and equal standardized ileal digestible [SID] lysine/Mcal NE) over 5 growth phases to market weight.

Diets included wheat DDGS decreasing from 25% in Phase 1 diets to 16.5% in Phase 5 diets. High energy diets (2.4

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Mcal NE/kg) were based on wheat grain and field pea with decreasing canola oil inclusion by growth phase. Low energy diets (2.1 Mcal NE/kg) were based on barley and oats. Diets with 2.2 and 2.3 Mcal NE/kg were 0.67:0.33 and 0.33:0.67 blends of the 2.1 and 2.4 Mcal/kg NE diets, respectively.

Pig body weight (BW) and feed disappearance (ADFI) were measured on a pen group basis at d 0, 21, 42, 56, 70, weekly thereafter as hogs approached market weight, and at shipping for slaughter (~120 kg) to calculate dressing. Pigs were shipped for slaughter at Maple Leaf (Brandon, MB). Individual warm carcasses were weighed and graded (Destron).

What we observed

Growth performance

For the entire trial (Figure 1), daily weight gain (ADG) was not affected by feed energy level. But hogs ate (ADFI) linearly more of the lower energy diets. Yet the total amount of calories consumed per hog each day linearly decreased. Therefore, weight gain per kilo of feed consumed (FE) was also reduced.

The proportion of pigs remaining in pens after the start of shipping for slaughter (first pull at d70) was greatest ($P<0.05$) for pigs fed the low energy diet. But this was in part due to a slightly greater body weight (~2 kg) at slaughter for pigs fed the 2.1 Mcal NE/kg compared with pigs fed higher energy diets.

Carcass traits

Hogs fed lower energy diets had linearly reduced dressing %, but carcass weight was not affected by feed energy level (Figure 2). Lower dressing % is explained by more fibrous feed retained in the gut at slaughter feeding the high oats-barley low energy diets.

Carcass backfat, loin depth, lean yield, and index were not affected by feed NE level. Carcass lean gain, which is similar to live weight gain but regards only the daily gain in carcass lean content, was also not affected by feed energy level. An interesting finding was that both caloric efficiency and lysinic efficiency linearly improved by decreasing feed energy. What this means is that pigs fed lower energy diets were more effective at utilizing both calories and lysine from feed to put on lean tissue in carcass.

Dollars and cents

As expected, decreasing feed energy level linearly reduced cost per tonne of feed (Table 1). Feed cost per kg of gain, and feed cost per hog were also greatly reduced. The large feed

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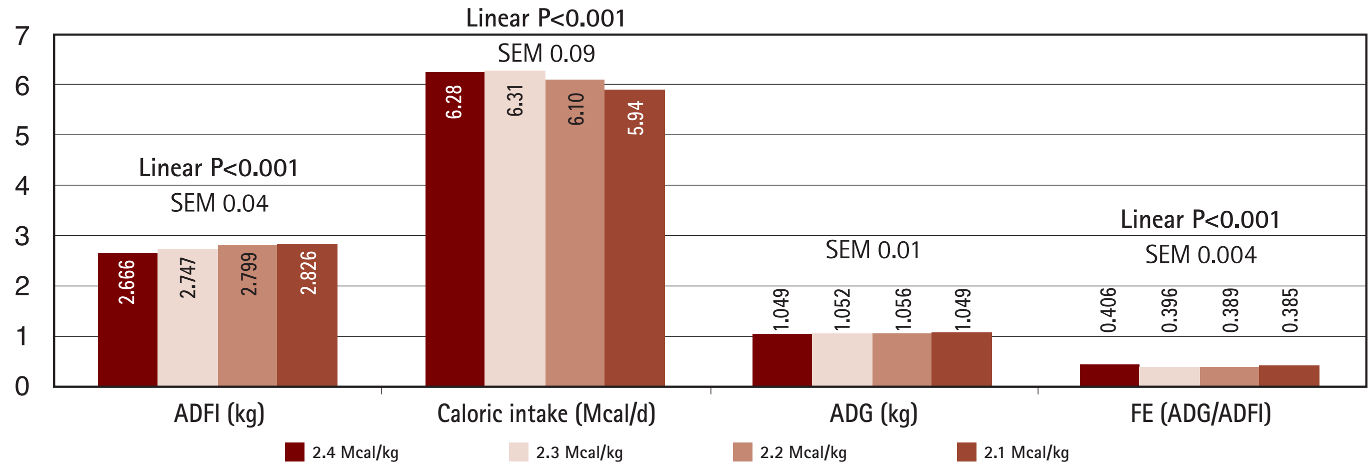

Figure 1. Effect of feed NE value on overall growth performance[a]

[a] If the P-value is less than 0.05, it means that there was a straight linear increase or decrease with every 0.1 Mcal/kg decrease in net energy value.

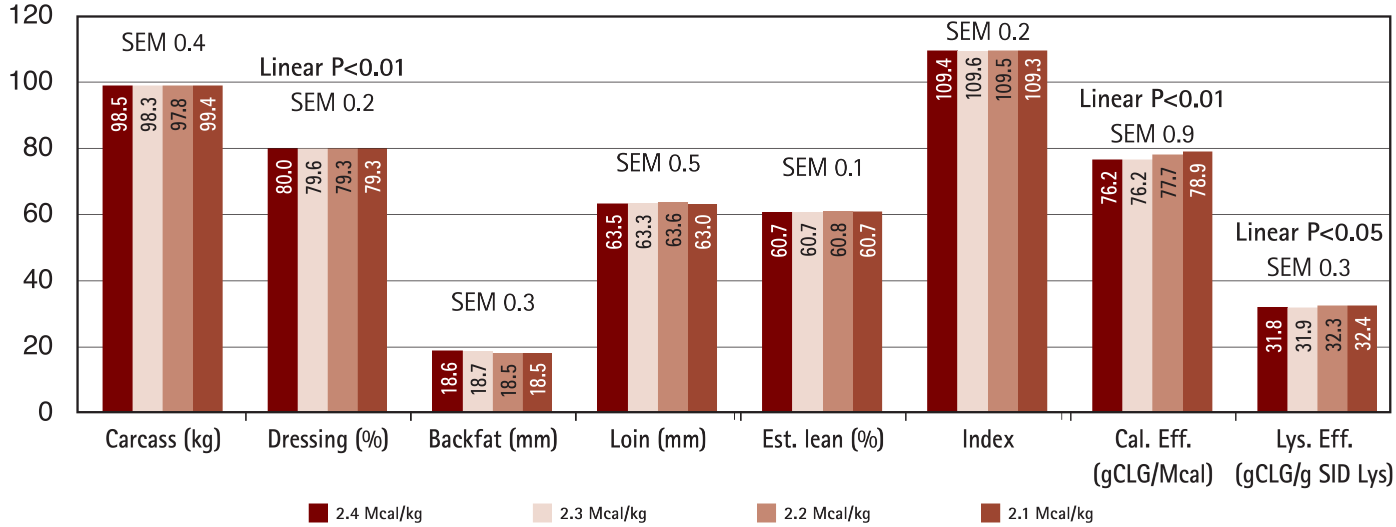

Figure 2. Effect of feed NE value on dressing % and carcass characteristics[a]

[a] If the P-value is less than 0.05, it means that there was a straight linear increase or decrease with every 0.1 Mcal/kg decrease in net energy value.

Table 1. Effect of dietary feed energy value on feed cost

	Net energy (Mcal/kg)					
	2.4	2.3	2.2	2.1	SEM	Linear
Feed cost / tonne	249.51	233.13	216.22	198.81	0.35	P<0.001
Feed cost /kg of BW gain	0.67	0.63	0.60	0.57	0.01	P<0.001
Feed cost/ pig	62.50	59.58	56.72	54.66	0.53	P<0.001
IOFC/pig	61.02	63.50	65.93	71.43	0.85	P<0.001

cost reduction meant a whopping $10 per pig increase in profit after subtracting feed cost (IOFC). The lower dressing percentage observed required an increase in live ship weight by 1 to 2 kg to achieve target carcass weights. This extra live weight meant a few days extra in the barn. However, the lower feed cost per hog made up for the extra cost of keeping hogs on farm for a few days more.

Conclusion and implications

From our results we concluded that hogs can be fed diets with reduced feed energy (≤2.2 Mcal NE/kg) instead of traditionally fed energy levels (≥2.4 Mcal NE /kg) as long as pigs can sustain feed intake. It would be like us humans eating more salad than hamburger and fries. We can only eat so much hamburger and fries because their high energy soon triggers satiety. That is harder on the wallet than consuming a lot more of cheaper, low-energy salad. But we would get to a point that we cannot eat enough green salad without losing weight. We have to feed our hogs almost to that point to be most profitable. That point is when they can almost not consume more of the low energy density feed before reducing lean gain.

This experiment was not conducted in the summer, when feeding diets with greater energy may alleviate drops in feed intake. It can get too hot in July and August even in the Prairies that hogs reduce feed intake. Only during these hot days, feeding denser energy diets may prevent both weight and lean gain loss. Our experiment did not include diseased pigs that may also have reduced feed intake. We did not look at crowding and feeder access either that may also limit feed intake.

Our trial showed that the most economically optimal feed energy level was 2.1 Mcal NE/kg, which is much 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.

Acknowledgments

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