

# Feeding Extruded Flaxseed to Produce Omega-3 Enriched Pork

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## SUMMARY

Eighty pigs (initial body weight  $31 \pm 3$  kg) were fed diets supplemented with 5, 10 or 15% extruded flaxseed for either 4, 8 or 12 weeks prior to market. Performance was unaffected by flaxseed inclusion up to 15%. Enrichment of subcutaneous back fat with alpha linolenic acid (ALA, an omega-3 fatty acid) improved with increasing dietary levels and duration of feeding flaxseed. Consistency of ALA enrichment improved with the length of the feeding period.

## INTRODUCTION

Omega-3 fatty acids are well recognized for their human health benefits. The amount of omega-3 fatty acids present in the meat and meat products is low due to extensive use of feed ingredients deficient in omega-3 fatty acids. Flaxseed, a rich plant source of ALA, has recently gained attention as a source of ALA for growing pigs. This experiment was designed to study the impact of feeding diets containing 3 levels of extruded flaxseed for 4, 8 or 12 weeks on the ALA content of subcutaneous fat in pigs and on the consistency of the enrichment. Subcutaneous fat was sampled because it can be obtained easily by biopsy and changes in the FA composition of the backfat are indicative of changes in intra-muscular fat (marbling).

## MATERIALS AND METHODS

Eighty pigs (40 gilts and 40 barrows, initial body weight  $31 \pm 3$  kg) maintained in individual pens were fed diets supplemented with 5%, 10% or 15% extruded flaxseed for either 4, 8 or 12 weeks. Diets were based on wheat, barley and soybean

**Table 1.** Ingredient composition and calculated nutrient content of experimental diets: Phase 1a [week 1 to 4]

Ingredients (%)	Control	Flax 5%	Flax 10%	Flax 15%
Wheat	53.43	38.95	24.48	10
Barley	10	21.56	33.11	44.66
Soybean Meal	17.00	15.27	13.53	11.80
Field Peas	15.00	10.00	5.00	0.00
Linpro	0.00	10.00	20.00	30.00
Tallow	1.03	0.68	0.31	0.00
Premix <sup>b</sup>	3.54	3.54	3.54	3.54
<b>Nutrients</b>				
DE (Mcal/kg)	3.17	3.17	3.27	3.30
Crude Protein, %	20.60	20.00	19.40	18.00
AID Lysine, %	0.94	0.95	0.95	0.96
Calcium, %	0.82	0.82	0.82	0.87
Total phosphorus, %	0.61	0.56	0.57	0.61

<sup>a</sup> Phase 2 and phase 3 diets were formulated using same ingredients with varying quantities to meet the requirement of pigs of that age and weight.

<sup>b</sup> Consist of dicalcium phosphate, limestone, vitamin mix, mineral mix, salt, lysine, threonine, methionine.

*“Consistency of the enrichment improved with the length of feeding.”*

meal and were formulated in three phases to meet the nutrient requirement of the pigs of each weight and age category (Table 1). The three levels of flaxseed (5%, 10% and 15%) were supplied as an extruded mixture of flaxseed and field peas (LinPro, 50:50 extruded mixture of flaxseed and field peas) using methodology determined in a previous experiment to optimize amino acid digestibility. Diets were formulated to contain equivalent proportions of field peas.

## RESULTS AND DISCUSSION

Average daily feed intake tended to decrease ( $P=0.07$ , Table 2) but ADG was unaffected ( $P=0.46$ , Table 2) and thus G:F improved slightly (0.38 to 0.41;  $P=0.02$ , Table 2) with increasing flaxseed concentration. Alpha linolenic fatty acid concentrations in subcutaneous fat (as a % of total fatty acids) increased with increasing levels of flaxseed and duration of feeding ( $P<0.05$ , Figure 1). The maximum level of ALA (18.58%) was achieved by feeding the diet containing 15% flaxseed for 12 weeks. Moreover, the consistency of enrichment improved with the length of feeding (indicated by % CV, coefficient of variance, Figure 1).

## CONCLUSION

Up to 15% extruded flaxseed can be included in the grower and finisher pig diet without any adverse effect on the performance. Feeding extruded flaxseed to pigs results in ALA enrichment of the subcutaneous fat. The consistency of the enrichment improves with the length of time the flaxseed is included in the diet.

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**Table 2.** Performance of grower-finisher pigs fed different levels of flaxseed meal for different durations.

	Flaxseed Meal, %				P-Value
	0	5	10	15	
ADG (kg/day)	0.969	0.998	0.979	0.998	0.459
ADFI (kg/d)	2.538	2.604	2.503	2.462	0.073
G:F (kg/d)	0.383	0.387	0.392	0.407	0.014
	Weeks				P-Value
	4	8	12		
ADG (kg/day)	1.003	1.001	0.954	0.008	
ADFI (kg/d)	2.583	2.544	2.454	0.054	
G:F (kg/d)	0.391	0.395	0.391	0.765	

**Figure 1.** The interactive effect of dietary levels and length of feeding flaxseed meal on the coefficient of variance and ALA profile of subcutaneous fat in pigs

