



Camelina seed vs. flaxseed for laying hens: Effects of seed processing on omega-3 content of eggs

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Background

Camelina sativa (a.k.a. false flax) is an oilseed (~37% oil) belonging to the *Brassica* family, closely related to mustard, canola and rapeseed. The crop is attractive as it can be grown in marginal or fodder land with low input costs. It is also more thermo-tolerant and disease-resistant than canola. Therefore, camelina is better suited than canola to grow in the Brown and Light Brown soils of southeast Alberta where it could increase oilseed production by ~1M acres.

Flaxseed has traditionally been fed to layers to enrich the omega-3 (n-3) fatty acid content of eggs. Camelina is second only to flax for n-3 content (35% vs. 65% for flax) and therefore might also be fed to enrich eggs with n-3. Unlike flax, there are no competing human food uses for camelina, which means feeding camelina could be more economical than flax for n-3 enrichment of eggs. Flaxseed fed to layers is usually fed as whole seed. However, feeding whole, intact seeds to poultry reduces nutrient digestibility and increases nutrient excretion compared with reducing particle size.

Camelina is not currently listed in Schedule IV of the Feeds Act and therefore cannot be fed to food producing animals in Canada. In order to be listed, the SAFETY and EFFICACY of camelina must be demonstrated in appropriate models (i.e., laying hens)

The objective of the present study was therefore to compare feeding camelina vs. flaxseed either as whole or cracked-rolled and evaluate omega-3 fatty acid enrichment of eggs. This study would also yield important information regarding the safety and efficacy of camelina as a feedstuff for poultry.

Our approach

In a 36-week experiment, 192 laying hens housed 4 to a test cage (668 cm²/hen) in a battery were assigned to be fed one of 4 dietary regimens containing 10% of whole-seed or roller-milled flax or camelina seed.

Diets within each layer phase were formulated to provide 2.8 Mcal AME, 17% protein, 0.7% digestible lysine, 0.5% digestible threonine, 0.4% digestible methionine, 9.5% fat, 3.7% calcium, and 0.45 available phosphorus.

Eggs were collected during week 17 of the study and pooled by test cage to produce homogenized egg samples for fatty acid profiling.

What we observed

- ☑ Eggs from layers fed flaxseed had greater linolenic, EPA, DHA, total n-3 and polyunsaturated fatty acid content than layers fed camelina seed.

Table 1. Effect of oilseed type and seed processing on fatty acid composition of homogenized whole egg (mg FA/g whole egg)

	Seed type		Processing		Effects ¹	
	Camelina	Flax	Whole	Rolled	S	P
Linolenic, C18:3	2.29 ^b	3.15 ^a	2.20 ^b	3.24 ^a	***	***
EPA, C20:5	0.06 ^b	0.09 ^a	0.06 ^b	0.09 ^a	***	***
DHA, C22:6	1.55	1.55	1.49 ^b	1.61 ^a	NS	**
Total n-3	4.18 ^b	5.06 ^a	3.99 ^b	5.25 ^a	***	***
Total long chain n-3	1.86	1.89	1.78 ^b	1.98 ^a	NS	***
n-6:n-3	2.57 ^a	2.11 ^b	2.63 ^a	2.05 ^b	***	***
Saturated	25.54	25.39	25.53	25.4	NS	NS
Monounsaturated	41.84	40.6	41.67	40.76	NS	NS
Polyunsaturated	16.49 ^b	17.34 ^a	16.15 ^b	17.67 ^a	*	***

¹ Statistical significance of the effects of seed type (S) and processing (P). There was no significant interaction between seed type and processing. * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$; NS = not significant ($P > 0.10$)

- ☑ There was no effect of oilseed type on content of long-chain n-3 (DHA + EPA), the n-3 fatty acids most closely associated with health benefits in humans.
- ☑ Feeding cracked-rolled seed increased linolenic, EPA, DHA, total n-3, total long-chain n-3 and polyunsaturated fatty acid content and reduced n6:n3 ratio in eggs of layers irrespective of oilseed fed.

Implications

- ⇒ Feeding flax vs. camelina resulted in greater enrichment of omega-3 fatty acids in eggs due to greater omega-3s content in seed. It may, however, be more economical to feed camelina because there are no competing human food uses.
- ⇒ Crack-rolled seed instead of whole seed increased omega-3 enrichment of eggs irrespective of what oilseed was fed.
- ⇒ Camelina appears to as safe a flax for laying hens.

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