Camelina meal, a novel source of omega-3 for enrichment of poultry products

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Summary

Camelina is a novel oilseed crop increasingly grown for biofuels in marginal lands of the North American Great Plains. Its expeller meal has 10 - 20% residual oil, 30% of which is α-linolenic acid (ALA). Therefore, CM has potential as a source of omega-3 fatty acids to enrich broiler meat.

Challenge

- Omega-3 polyunsaturated fatty acids (n-3 PUFA) have shown health benefits in preventing chronic heart disease.
- Feeding flax or fish oil supplementation in the broiler diets is the most common and efficient way to enrich the meat with n-3 PUFA and long chain (LC) n-3 PUFA .
- Novel feedstuffs to enrich n-3 PUFA are needed not only for their nutritional properties, but also for their feed cost advantage (e.g., lower cost per Mcal of feed energy).
- The lower cost and increasing availability of camelina meal (**CM**) as a co-product of biodiesel production and its lack of competition as food for humans makes it a great candidate for n-3 PUFA enrichment of poultry products.

Objectives

The specific objectives of this broiler trial were:

- To analyze the diet and enrichment responses to increasing inclusions of CM in typical broiler rations on the fatty acid composition of brain tissue, liver tissue, breast meat and thigh meat.
- To determine the combination of CM level and duration of feeding to broilers to achieve the labeling claim of 300 mg n-3 PUFA / 100 g meat.

Our Approach

- 744 Ross 308 male chicks were randomly distributed among 24 cages.
- Birds were fed 1 of 4 diets in each of 3 growth phases (starter (0 – 14d); grower (15 – 28d); & finisher (29–42).
- Feed treatments consisted of 4 inclusions of screw-pressed CM (0, 8, 16 or 24%) fed for a 42d growth cycle.
- On each of d 14, 28 and 42, 3 birds were randomly selected from each test pen (total of 18 birds/treatment)
- Birds were euthanized to collect of thigh, breast, liver and brain tissue samples .
- The pooled tissue samples were analyzed for fatty acid composition.

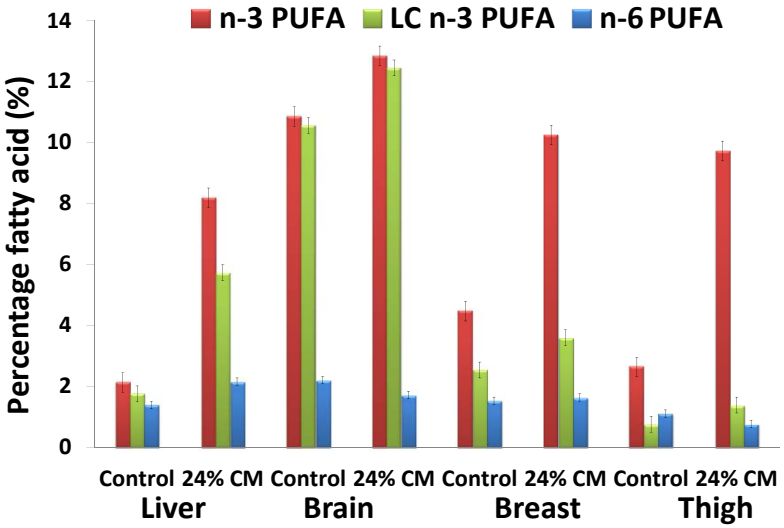

Figure 1. Change in n-3 PUFA, LC n-3 PUFA and good n-6 PUFA in different tissues of broilers fed control (0%) and 24% CM diets.

Our Observations

- Feeding Camelina meal increased n-3 PUFA by 2 and 4 fold in breast and thigh muscle, respectively (Figure 1).
- There were different trends in n-3 PUFA deposition in organs (liver and brain) vs. muscles (breast and thigh).
- Docosahexaenoic acid was the predominant n-3 PUFA in liver and brain tissue (50% and 89% of total n-3 PUFA); whereas ALA was the major n-3 PUFA in breast and thigh muscles (58% and 81% of total n-3 PUFA).
- Camelina meal supplementation increased LC-PUFA and the less inflammatory n-6 PUFA in liver. However, their transfer to muscle was not enhanced.
- We exceeded the labeling claim requirement for n-3 PUFA enrichment (300 mg/100 g meat) in thigh and breast meat by feeding the 24% CM diet for 28 and 42d, respectively.

What Does this mean?

- Camelina meal can be efficaciously included in feed to enrich omega-3 fatty acids content of broiler meat.

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