Effect of fatty acid content of grower-finisher feed on fatty acid content of breast meat

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Introduction

Scientific evidences on the beneficial effects of n-3 fatty acids (FA) have been accumulated for the last half century: lowering of plasma triglycerides, increased aggregation time for platelets, decreased viscosity of blood, decreased blood pressure, reduction in atherosclerosis, reduction of inflammation, reduction in tumors (Mishra et al., 1993). Chicken meat has been shown to modify its FA profile according to FA in the diet (Hulan et al., 1984; Scaife et al., 1994; López-Ferrer et al., 1999a, b). In order to increase the amount of n-3 long-chain FA (C≥20), linolenic FA sources are less effective than docosapentaenoic (DHA) or eicosapentaenoic FA sources, although some strategies may confer low palatability to chicken meat due to strange flavours and taste (Hargis and Van Elswyk, 1993; López-Ferrer et al., 2001a).

The combination of a linolenic FA source (linseed oil –LO-) and a DHA source (**Capsomega®**) at different levels in grower-finisher broiler diets was used in the present experiment to assess the enrichment in n-3 FA (specially long-chain FA) of chicken breast meat.

Materials and Methods

Animals:
- 240 male Ross broiler in 48 cages
- 6 replicates of 5 birds per treatment
- BW and Feed Conversion Efficiency at 21d & 42d

Diets:
- commercial diet 0-21d
- experimental diets 21-42d (Table 1)

Table 1. Percentage of variable ingredients (2.4% of the diet) in feed treatments (21-42d of age)

Treatment	linseed oil[1]	Capsomega[2]
1 (control)	0.0	0.0
2	1.0	0.1
3	1.0	0.2
4	1.0	0.4
5	2.0	0.05
6	2.0	0.1
7	2.0	0.2
8	2.0	0.4

[1] linseed oil replaced soybean oil (1:1)
[2] **CAPSOMEGA** is a dried algae containing 20% DHA w/w; CAPSOMEGA replaced soybean oil and soybean meal (2:1:1)

Samples & analysis:
- breast meat 24h post mortem
- diet and breast meat total lipids (Folch method)
- FA (% total FA; area normalization)

Results and Discussion

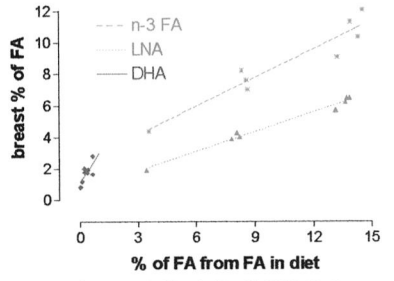
i. Performance

Dietary treatments did not affect Final BW (2146 ± 13.4 g) nor final Feed Consumption (136 ± 0.8 g) nor FCE (1.85 ± 0.010) from 21-42d; previous experiments detected differences in performance parameters when tallow was replaced by LO (López-Ferrer et al., 2001b).

ii. Total Fat Content of Breast Meat

Although total fat content of breast meat did not reach statistical significance (P=0.06), numerical differences were found between treatments (from 1.41% to 2.33% for the Control diet and 1% LO + 0.4% Capsomega diet respectively). However, no trend was detected with increasing content of LO or Capsomega in the diet: these results confirm that the replacement of variable ingredients in the experimental diets were adequate.

Figure 1. Linolenic, DHA and n-3 FA content of breast meat and feed (as % of FA).

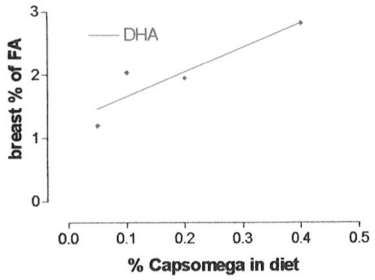


% LNA breast = 0.65 + 0.41 x % LNA feed
P<0.001 R^2=0.985 SEE=0.217

% DHA breast = 1.17 + 1.85 x % DHA feed
P<0.05 R^2=0.532 SEE=0.435

% n-3 breast = 2.36 + 0.60 x % n-3 feed
P<0.001 R^2=0.904 SEE=0.838

Figure 2. DHA content of breast meat (as % of FA) and Capsomega inclusion in feed (only for 2% LO treatments).



% DHA breast = 1.26 + 3.90 x % Capsomega
P=0.089 R2=0.829 SEE=0.335

iii. FA composition of Breast Meat

Linolenic, DHA and n-3 FA content in breast meat was higher with increasing levels of respective FA in the diet (Figure 1). DHA content increased with increasing levels of Capsomega (Figure 2).

Total n-3 FA content was 412 mg/200 g ration of breast meat, DHA 96 mg/200 g ration of breast meat, and n-6 to n-3 FA ratio was 2.0 in 2% LO + 0.4% Capsomega fed animals.

Conclusions

The combination of LO and **CAPSOMEGA®** in grower-finisher chicken diets is an interesting option to enrich meat in n-3 FA, and specifically DHA. This chicken meat would respond to the demands of the health conscious consumers.