Italian Journal of Animal Science

ISSN: (Print) 1828-051X (Online) Journal homepage: https://www.tandfonline.com/loi/tjas20

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RIASSUNTO – Stabilità ossidativa e caratteristiche qualitative di carne di pollo arricchita con PUFA n-3 – *360 broiler, femmine ceppo Cobb 500, hanno ricevuto da 21 d fino alla macellazione (46 d) una dieta commerciale addizionata con 0, 0,5 o 1% dell'alga marina* Schizochitrium *sp. apportatrice di PUFA n-3. Le carni con un più alto contenuto di PUFA n-3 presentano una ridotta stabilità ossidativa, particolarmente evidente nel petto, mentre le proprietà organolettiche valutate nella coscia non risultano influenzate dal trattamento dietetico. Il colore del petto appare più intenso nel gruppo che ha ricevuto la più alta integrazione di alga.*

KEY WORDS: chicken, n-3 PUFA, oxidative stability, organoleptic properties.

INTRODUCTION – Considering the beneficial effects of n-3 polyunsaturated fatty acids (PUFA) for human health (Leskanich and Noble, 1997) several studies have been carried out to enrich animal products with these compounds. Both eggs and poultry meat enriched with n-3 PUFA may be considered as valid n-3 PUFA alternative sources to natural occurring fish products (Meluzzi *et al.*, 2001; Sirri *et al.*, 2002). However n-3 PUFA, due to their double bonds, are highly sensitive to oxidative deterioration and responsible for the formation of peroxides and off-flavours and taste deterioration (Eriksson, 1987). The aim of this study was to evaluate the oxidative stability and sensory properties of chicken meat enriched with n-3 PUFA using as dietary n-3 source the marine alga *Schizochitrium* sp.

MATERIAL AND METHODS – A total of 360 day old female Cobb 500 reared on 18 litter pens (60 birds/pen), received from 21 d to slaughter (46 d) a corn-soybean commercial diet with 0.5% or 1% *Schizochitrium sp. algae* containing about 20% docosahexaenoic acid (DHA) (ALGA0.5 and ALGA1 respectively). The control group (Control) had no supplementation. Twelve breasts and thighs per group were collected at slaughter and stored at –40°C until lipid oxidation analysis. Iron-ascorbate-induced lipid oxidation was measured according to the method described by Kornburst and Mavis (1980). Colour of breast, thigh, skin and fat pad was evaluated using the CIE L* a* b* system with a Minolta Colorimeter CR 300. Water holding capacity was determined for drip loss, whereby the loss of water from slice of breast muscle weighting 50 g kept for 24 h suspended in glass box at 4°C was registered (Honikel, 1998). To evaluate differences in flavour and odour among groups triangular test was performed (Porretta, 1992): 20 g of drumstick were singularly packed in aluminium foil, oven cooked and tasted by 30 untrained panellists at a temperature of about 50°C. Data were submitted to one-way ANOVA using the General Linear Model of SAS. Differences among groups were separated by Student Newman Keuls test.

RESULTS AND CONCLUSIONS – The lipid oxidation analysis of breast meat samples showed that the production of malondialdehyde (MDA) increased as the incubation time increased. Breast meat from ALGA1 had significantly higher MDA concentration with values twice as many as those of Control (Table 1). A similar trend was observed in drumstick samples from ALGA1 but the differences were less remarkable and not significant (+30% than Control) (Table 2) even if in drumstick MDA values were considerably higher than in breast meat due to the higher content of lipids in leg muscles: 2.6 *vs* 1.1 % respectively.

The consistent difference between Control and ALGA1 observed in breast is due to the higher proportion of n-3 PUFA (44.2 *vs* 16.4 mg/g of lipids respectively for ALGA1 and Control), in comparison with that observed in drumstick (34.8 *vs* 25.9 mg/g of lipids for ALGA1 and Control).

Table 1. Effects of the dietary supplementation of dehydrated alga on induced lipid oxidation of breast chicken meat (nmol MDA/mg protein).

Incubation time	Groups			
(min)	Control	ALGA0.5	ALGA1	SEM
0	0.417 B	0.528 AB	0.680 A	0.057
30	0.500 b	0.735 ab	0.932 a	0.101
60	0.538 b	0.760 ab	0.960 a	0.106
90	0.524 B	0.810 AB	1.094 A	0.120
120	0.511 b	0.850 ab	1.063 a	0.128
150	0.632	0.880	1.084	0.135

a, b: P< 0.05; A, B: P < 0.01.

Table 2. Effects of the dietary supplementation of dehydrated alga on induced lipid oxidation of drumstick chicken meat (nmol MDA/mg protein).

Incubation time	Groups			
(min)	Control	ALGA0.5	ALGA1	SEM
0	0.713	0.694	0.819	0.075
30	0.881	0.841	1.177	0.160
60	1.048	1.035	1.405	0.194
90	1.077	1.209	1.462	0.225
120	1.155	1.246	1.496	0.224
150	1.193	1.239	1.662	0.239

Alga supplementation significantly affected breast meat colour enhancing the values of lightness (L*), redness (a*) and yellowness (b*) particularly in group ALGA1. In abdominal fat pad yellowness too increased in group supplemented with algae without statistical significance due to the high variability within groups. On the contrary, no effect was observed in skin and thigh meat with the exception of yellowness (b*) which was slightly lower in thigh of ALGA0.5 (Tab. 3). Water holding capacity of breast meat was not affected by the dietary treatment. As for the panel test, panellists were not able to differentiate the meat samples of treated birds from those of controls.

The use of algae, while improving the nutritional value and enhancing the colour intensity of chicken meat, did not alter the organoleptic properties. The incorporation of highly unsaturated fatty acids, however, led to a reduced lipid stability of muscles, particularly of breast, that can be prevented by enhancing the level of antioxidants in feed.

Table 3. Effects of the dietary supplementation of dehydrated algae on breast, thigh, skin and abdominal fat pad colour.

	Groups			SEM
	Control	ALGA0.5	ALGA1	
		Breast		
L*	48.50 Bb	49.86 ABb	52.13 Aa	0.77
a*	0.56 B	0.52 B	2.46 A	0.41
b*	7.80 B	8.35 B	11.37 A	0.51
		Thigh		
L*	53.35	53.65	52.09	0.50
a*	3.22	3.01	3.29	0.36
b*	8.47 a	6.69 b	7.61 ab	0.47
		Skin		
L*	73.85	70.58	72.73	1.07
a*	3.11	2.81	2.60	0.66
b*	24.54	24.75	24.81	0.69
		Abdominal fat pad		
L*	75.08	74.80	74.59	0.69
a*	-1.05	0.17	0.49	0.48
b*	26.59	29.29	30.07	1.27

a, b: P< 0.05; A, B: P < 0.01.

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