DEFATTED SILKWORM (*BOMBYX MORI L.*) MEAL IN DIETS FOR BROILER CHICKENS: EFFECT ON MEAT FATTY ACID PROFILE AND SENSORY PROPERTIES

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I. INTRODUCTION

Current demographic trends impose to urgently identify alternative feed ingredients to improve the sustainability of poultry production, and insects have been identified as one of the possible sustainable candidates [1]. The silkworm (*Bombyx mori* L.) chrysalis is mainly treated as waste, despite a remarkable protein quantity and quality, and its contents of omega-3 fatty acids (FA), vitamins and minerals [1]. Despite some encouraging results have already been observed, it is fundamental to identify an ideal inclusion level and administration period that provides satisfactory productive performance and meat quality. Therefore, the present study aimed at assessing the effect of a 4% defatted silkworm chrysalis meal (SWM-DEF) inclusion in the diets for broiler chickens in different growth periods on meat FA profile and sensory traits.

II. MATERIALS AND METHODS

A total of 90 ROSS 308-day-old broiler chicks were randomly divided into 3 dietary groups (5 replicated pens/diet) and they received the following isonitrogenous and isoenergy diets: 1) a control (C) commercial diet throughout the growing period of 42 days, 2) a diet including 4% SWM (SWM1) during the starter phase (1–10 days) and the C diet up to slaughter, and 3) the C diet in the starter phase and the 4% SWM from 11 days until slaughter (SWM2). The ingredients, chemical composition and the energy content of experimental diets and SWM-DEF are reported elsewhere [2]. At 42 days, 15 animals/treatment were slaughtered, carcasses were dissected, and breasts were excised and analysed for FA profile and sensory traits (descriptive sensory analysis by a trained panel). Data were analysed by a one-way ANOVA with the experimental diet as a fixed effect (Significance: $P<0.05$).

III. RESULTS AND DISCUSSION

The dietary inclusion of SWM-DEF did not affect the main FA classes of chicken breast meat (Table 1). However, SWM2 group displayed almost 3-folds higher *n*-3 proportion compared to the SWM1 and C groups, which led to a significant reduction (42.6%) of the *n*-6/*n*-3 in SWM2 group compared to C and SWM1 ones ($P<0.001$). The results confirm the potential of SWM to improve meat healthiness, as it was highlighted by [3] where higher inclusion levels (7 and 14 %) of a full-fat SWM into chicken's were considered. Regarding the breast meat sensory traits (Table 2), aroma and odour of SWM-DEF meat remained similar to those of C. The breast meat was significantly juicier and more tender in SWM1 compared to C, whereas SWM2 showed intermediate values ($P<0.01$). The results were in line with the study by [4] where meat from chickens fed with SWM tended to show higher juiciness and tenderness compared to the control. Off-flavour intensity significantly decreased in SWM1 compared to C ($P<0.05$).

Table 1. Effect of the dietary inclusion either with 0% (Control) or 4% of defatted silkworm (*Bombyx mori*) meal during starter (SWM1) or grower and finisher (SWM2) phase on the main fatty acid classes (% of total FAME) of chicken breast meat*.

	Experimental diets			RSD[1]	P-value
	Control	SWM1	SWM2		
∑SFA	30.1	30.2	30.9	1.20	0.249
∑ MUFA	36.3	36.4	35.4	1.63	0.290
∑ PUFA	29.8	29.7	29.5	1.74	0.962
n-6	29.3	29.2	28.2	1.64	0.263
n-3	0.45^{B}	0.47^{B}	1.36^{A}	0.15	<0.001
n-6/*n*-3	65.3^{A}	62.6^{A}	21.2^{B}	5.57	<0.001

*10 samples/treatment; [1]Residual standard deviation; ^{A,B} Means in the same row with different superscript letters differ for P<0.001.

Table 2. Effect of the dietary inclusion either with 0% (Control) or 4% of defatted silkworm (*Bombyx mori*) meal during starter (SWM1) or grower and finisher (SWM1) phase on sensory traits of chicken breast meat*.

	Experimental diets			RSD[1]	*P*-value
	Control	SWM1	SWM2		
Odour:					
General intensity	55.3	48.9	52.1	13.1	0.357
Off-odour intensity[2]	44.4	38.9	16.7	3.50	0.174
Texture:					
Juiciness	46.4^{B}	67.2^{A}	53.8^{AB}	19.6	0.010
Tenderness	90.2^{B}	110^{A}	105^{AB}	15.4	0.001
Aroma:					
General intensity	59.9	58.6	54.9	12.2	0.457
Off-flavour intensity[2]	44.4^{b}	5.56^{a}	27.8^{ab}	7.14	0.028
Bombyx mori/walnut/petfood[2]	22.2	16.7	33.3	1.42	0.492
Liver/blood/metallic[2]	38.9	16.7	33.3	2.31	0.315

*15 samples/treatment; [1]Residual standard deviation; [2]Chi-square test; ^{A,B} Means in the same row with different superscript letters differ for P<0.001; ^{a,b} Means in the same row with different superscript letters differ for P<0.05.

IV. CONCLUSION

Defatted *Bombyx mori* chrysalis meal showed to be a promising feed ingredient for poultry diets at a 4% inclusion level, and the administration period from 11 days of age until slaughtering provided the best results: chicken meat benefited from an increase in the omega-3 FA proportion, without negative effects on sensory traits. A higher SWM-DEF inclusion level could be tested to achieve a further omega-3 FA increase and *n*-6/*n*-3 reduction.

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