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MENU

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USE OF BLACK SOLDIER FLY (*HERMETIA ILLUCENS*) MEAL IN RAINBOW TROUT (*ONCORHYNCHUS MYKISS*) FEEDS

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Introduction

A key aspect of the aquaculture industry sustainability is the supply of proteins for aqua feeds as fish meal (FM) is a finite resource. Several alternatives have been tested and nowadays FM represent only about 10 to 20% of the feed for carnivorous aquaculture species, the rest of protein supply being covered mainly by vegetable proteins even if adverse effect can occur (Jobling, 2015). Recently the interest of researchers about insect meals has increased, and studies have highlighted that they can successfully be used in fish diets (Barroso et al., 2014; Henry et al., 2015). Black soldier fly (BSF-*Hermetia illucens*) meal seems a good candidate due to its valuable nutritional properties; the aim of this research was to investigate the effects of the inclusion of a defatted BSF in rainbow trout feed on performances, somatic indexes, and some quality parameters. Data were analyzed by one way ANOVA. Significance was accepted for $P \leq 0.05$.

Materials and methods

360 rainbow trout (*Oncorhyncus mykiss*) (mean initial body weight 179 ± 10g) were individually weighed and randomly divided into 12 fiberglass tanks. Three diets were formulated (4 replicates/diet) containing increasing levels of a defatted BSF in substitution of 0, 25 and 50% of the FM protein, leading to an inclusion of 0, 20 and 40% of BSF. Diets were isonitrogenous and isoenergetic. Fish were fed 7 days a week at 1.5% of body weight (BW), and the feeding trial lasted 78 days. Individual mean weight gain (WG), feeding rate (FR), feed conversion rate (FCR), protein efficiency ratio (PER), and specific growth rate (SGR) were calculated using the tank as experimental replicate. Hepatosomatic (HSI), viscerosomatic (VSI) indexes, fatness coefficient (CF), slaughtering performance, physical traits of fillets 24 h *post mortem* and cooking losses were evaluated on 5 fish per tank (20 fish/ treatment).

Results

Results showed that no statistical differences were observed for performance parameters and somatic traits (Table I). FCR was very good (less than 1) in all diets and other performance parameters resulted in line with data reported in literature.

Similarly, no statistical differences were observed for slaughtering performances, *post mortem* traits, color parameters, and cooking losses (table II).

Discussion

Even if BSF is one of the most studied insect meals, due to the differences on insect rearing substrate or processing technologies as well as fish species and stage, the results are often conflicting. St-Hilaire et al. (2007) fed rainbow trout with diets where 25 and 50% of FM component were substituted by full fat BSF. No differences appeared between control and 25% BSF diet while a significant decrease on weight gain and FCR were recorded at higher level of substitution. Sealey et al. (2011) reared BSF on fish offal enriched substrates and concluded that the meal could be used to replace up to 50% of fishmeal protein in trout diets without affecting fish growth. On Atlantic salmon, Lock et al. (2014) raised inclusion levels up to 25% without negative consequences on performances. On a trial on juvenile turbot, defatted BSF was able to be included up to 33% on the diet without any significant effects on feed intake and FCR. However, the SGR resulted significantly lower for all the inclusion levels tested (Kroeckel et al., 2012). In this trial defatted BSF was able to substitute 25 and 50% of the FM protein without imparting performances and quality parameters. Further investigations are needed to confirm these results.

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Table I. Growing performance traits (n=4) and somatic indexes (n= 20) of trout

	BSF0	BSF25	BSF50	s.e.m	Anova -P-value
WG (g)	360.46	336.14	358.93	5.07	0.84
FR (%)	1.41	1.39	1.40	0.00	0.30
FCR	0.93	0.89	0.90	0.01	0.54
PER	2.40	2.47	2.46	0.03	0.63
SGR (%)	1.38	1.41	1.41	0.02	0.76
HSI (%)	1.63	1.73	1.71	0.02	0.16
VSI (%)	8.94	9.25	9.21	0.14	0.63
CF (%)	1.57	1.41	1.39	0.66	0.47

Table II. Trout slaughtering performance (%), physical traits of fillets 24 h *post mortem* and cooking losses (n= 20)

	BSF0	BSF25	BSF50	s.e.m	Anova -P-value
Dressing percentage[#]	88.88	88.87	88.94	0.11	0.97
Fillets with skin (% BW)	53.18	53.48	52.92	0.36	0.82
Skinned fillets	42.98	43.49	43.66	0.38	0.75
pH	6.36	6.38	6.41	0.01	0.37
L	45.06	46.38	47.98	0.52	0.07
a*	0.24	-0.25	-0.29	0.15	0.25
b*	6.34	6.67	6.67	0.12	0.44
Cooking losses (%)	11.19	11.30	11.09	0.26	0.95

[#]Dressing percentage= 100 x (eviscerated fish weight x BW^{-1})
Color parameters: L: lightness; a*: redness; b*: yellowness

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