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Alternative animal protein sources for aquaculture: a preliminary study on nutritional traits of Mediterranean brocade (*Spodoptera littoralis* Boisduval) larvae

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In formulating diets for farmed aquatic species, the main ingredient used is fish meal (FM). Due to the growth that aquaculture is experiencing throughout the world, the increasing demand of feeds is resulting in a FM price increase that represents an economic limit for fish farming. The need to seek protein sources alternative to FM is a matter of great interest. Among others, the use of insect larvae as feed for fish represents an interesting alternative. The aim of this study was to evaluate the nutritional traits of mediterranean brocade larvae (*Spodoptera littoralis* Bois.) in view of their possible use as feedstuffs for rainbow trout. A sample of mediterranean brocade larvae (MBL) (VI instar) and one of pupae (MBP) were assayed for fat (EE), ash (ASH) and crude protein (CP) contents by conventional methods. Amino-acidic profile was obtained by HPLC on sample hydrolysates. Relative digestibility of protein (RDP) was estimated by the Lazo (1988) method. Data, expressed on DM basis, were compared with those of a commercial feed (CF). The fat content of MBL was lower than that recorded for CF (9.4% vs 13.6%) while MBP showed a very high value (30.3% DM). Ashes in MBL (7.7%) and MBP (6.7%) were lower than in the CF (10.9%). The CP content of MBL (44.3%) was slightly higher than the CF (40.0%) but lower than in MBP (59.1%). The RDP of MBL and MBP were about a half of the value observed in CF (27.2%). Both MBL and MBP showed a lower percentage of essential amino acids (AA) (35.8%, 36.8%) compared to CF (39.4%) even if the AA profiles were in line with the requirements found in literature for rainbow trout. In conclusion, these preliminary results suggest that preimaginal stages of *S. littoralis* may be of interest in fish feeding, though more exhaustive studies have to be performed to fully assess their use as alternative for fish meal.

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Discrimination between raised and wild European sea bass through image analysis

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This study aimed at verifying if computer image analysis could represent a good technique to discriminate between reared and wild European sea bass (*Dicentrarchus labrax*). Images were acquired from sea bass of known origin (n=47 reared and n=13 wild). Images were taken using a digital camera and standardized procedures and were analysed using ImageJ, an image-processing program. Each fish was described by 7 morphometric, 4 shape and 3 colour descriptors that were automatically measured by the software. The data resulted normally distributed and were submitted to one way-ANOVA that considered the production system (PS) as fixed effect. Linear discriminant analysis (LDA) was used as classification method to identify sea bass PS. Any morphometric parameters (i.e., area, length) were different between PS, while solidity (0.93 vs 0.91, P<0.01), mean gray value (94.7 vs 76.0, P<0.001) and median gray value (89.9 vs 72.6, P<0.001) were higher in reared if compared to wild sea bass. Solidity, the ratio between area and convex area of an object, could be possibly related to fat distribution, muscles development and growth condition. Gray values have a range between 0 (black) and 255 (white), meaning that caught sea bass was darker. Colour differences could be explained by dietary and environmental factors such as water temperature and chemical parameters. Analyzing all the 14 features using LDA method led to a 3.3% error of classification after cross-validation. Solidity, mean and median gray values resulted in a 93.3% right classification. Image analysis could be an effective tool to discriminate between reared and wild sea bass, even though further research is required to confirm its on-line application.

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Metabolic profile assessment in brown trout (*Salmo trutta fario*) by mid infrared spectroscopy

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The metabolic profile (MP) could be considered a set of information describing nutritional or health status. The haematic parameters depend on feeding, rearing conditions and water quality. Changes of some specific target can be used in preventive health examination. The study of Mid-Infrared spectrum (MIR - λ 400-4000 cm⁻¹) provides a wide range of information regarding organ-