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Macronutrient composition of food for bluefin tuna (*Thunnus thynnus thynnus*) fattening

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SUMMARY – To study accurately the food utilization (digestibility, growth, waste production, etc.) of bluefin tuna (BFT), a replicated analysis of food samples is necessary throughout the fattening process. In this work we present some results of macronutrient composition of fishfood used in BFT fattening in southeast Spain. The aim was not to know the variations of macronutrient composition of fishfood, but to know their composition for further studies, as mentioned above.

Key words: *Thunnus thynnus,* fattening, fishfood, macronutrient composition.

RESUME – *"Composition en macronutriments de l'aliment d'engraissement pour thon rouge (*Thunnus thynnus thynnus*)". Afin d'étudier avec précision l'utilisation alimentaire (digestibilité, croissance, production de déchets, etc.) du thon rouge, il a été nécessaire de mener une analyse répétée d'échantillons d'aliments durant le processus d'engraissement. Dans ce travail, nous présentons quelques résultats sur la composition en macronutriments de l'aliment poisson utilisé pour l'engraissement du thon rouge dans le sud-est de l'Espagne. L'objectif n'était pas de connaître les variations de la composition en macronutriments de l'aliment poisson, mais de connaître leur composition pour des études ultérieures, comme il a été mentionné auparavant.*

Mots-clés : Thunnus thynnus, *engraissement, aliment poisson, composition en macronutriments.*

Introduction

Body composition of fishes are submitted to a high variability because of endogenous and exogenous factors (Shearer, 1994) (Fig. 1), which may have influence in some key aspects for BFT fattening, as lipid levels of final product, which depend enormously on lipid content of food (Doumenge, 1996). In order to assess the macronutrient composition and nutritional properties of a fish which will be used as food for tuna, it seems to be more accurate the periodical and replicate analysis of samples than simple analysis or scarce and vague bibliographical data.

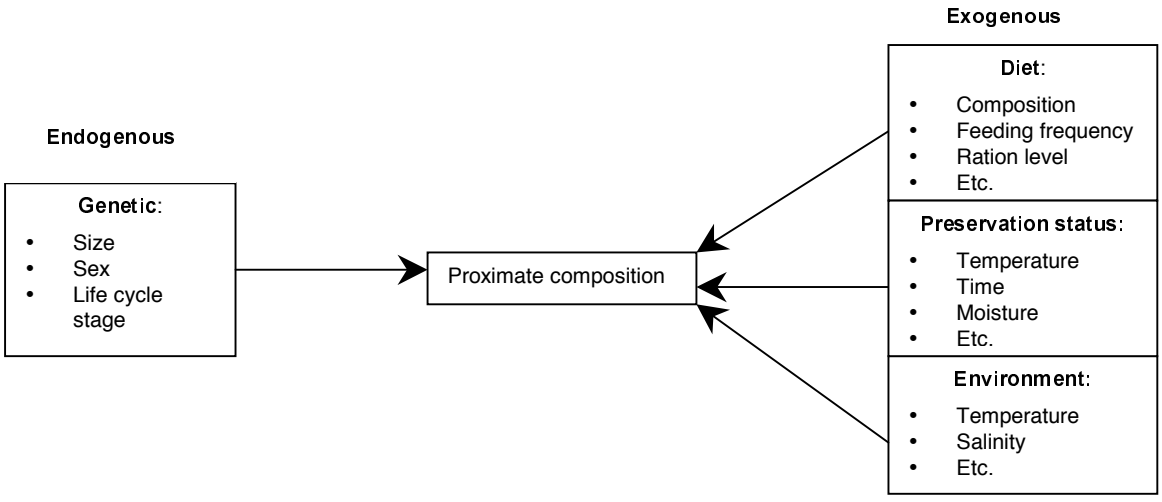

Fig. 1. Factors affecting the proximate composition of fishes (adapted from Shearer, 1994).

Materials and methods

In southeast Mediterranean, BFT fattening starts in summer, and along autumn tunas are slaughtered. Fishfood for tuna fattening were defrosted before supplying. Samples were taken monthly in July, August and September 2001. Catch data of fishfood and preservation conditions prior to its utilization were unknown. Each fishfood specie was analysed three times (subsamples), and three (individuals) of each one were done. Previously, samples were crushed and homogenised. For each diet, the protein and total nitrogen, lipid, total phosphorous and moisture content were analysed. The protein and total N content was obtained by the Kjeldhal method, using 6.25 as conversion factor for protein. The lipid content was obtained by ethylic ether extraction (SOXTEC System-HTC). The moisture was obtained by desiccation (105 ± 1ºC, 24 h) until constant weight. Total P was obtained by vanadium-molibdate method.

Results and discussion

Table 1 shows the average results of macronutrient composition of BFT fattening fishfood. Moisture, protein, total N and total P did not change significantly from one month to another for each specie. Nevertheless, lipid content experiences sensible variations. This factor seems to be more influenced by different aspects as environmental temperature, life cycle stage, feeding or preservation. Lipid content of final BFT product is very important (Giménez *et al*., 1999) and generally the accumulation of lipids notably depend on food lipid content (Kaushik, 1997; Nakagawa, 1997) in fishes. *Clupea harengus* always showed the higher lipid content than the rest of species, while *Ilex coindetii* showed the lesser.

Table 1. Average values (%) of macro and micronutrient composition from fishfood for tuna fattening

	Moisture	Lipid	Lipid DS†	Protein	Protein DS	Total N	Total N DS	Total P DS
July 2001								
Sardinella aurita	72.57	4.37	15.77	18.53	67.88	2.94	10.86	0.21
Clupea harengus	66.86	15.33	46.19	15.70	47.49	2.51	7.59	0.12
Scomber japonicus	72.85	6.63	24.23	17.72	65.56	2.83	10.48	0.17
Ilex coindetii	75.51	0.72	2.96	17.35	70.88	2.77	11.34	0.25
Boops boops	68.60	7.73	24.61	20.37	65.02	3.25	10.40	0.14
August 2001								
Sardinella aurita	70.89	8.08	27.35	16.95	58.89	2.71	9.42	0.15
Clupea harengus	73.45	2.90	10.80	18.07	68.12	2.89	10.90	0.15
Scomber japonicus	71.73	8.51	29.21	17.69	63.61	2.83	10.17	0.11
September 2001								
Sardina pilchardus	75.60	0.99	4.11	17.57	72.05	2.81	11.52	0.17
Clupea harengus	66.88	12.55	37.35	18.07	55.06	2.89	8.80	0.17
Scomber japonicus	73.08	5.44	18.82	18.64	70.88	2.98	11.34	0.17

†DS: Dirty substance.

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