



FULL LENGTH ARTICLE

Comparison of some biological aspects between the two sexes of the European hake *Merluccius merluccius* from the Egyptian Mediterranean waters



Amal Eskander Philips

National Institute of Oceanography and Fisheries, Egypt

Received 13 August 2014; revised 29 September 2014; accepted 29 September 2014
Available online 25 October 2014

KEYWORDS

Merluccius merluccius;
Mediterranean;
Morphometrics;
Size frequency length-weight;
Condition factor

Abstract Research on morphometrics, size frequency, length–weight relationship and condition factor belonging to both sexes of *Merluccius merluccius* in the Egyptian Mediterranean waters off Alexandria in the period from 2009 to 2011. The differences between the mean values of the measured morphometric characteristic in the females and males were statistically significant in eight of the fifteen morphometric measurements. The total length–guttled weight relationship was determined for males ($\text{Log } a = -2.5016$, $b = 3.22296$), females ($\text{Log } a = -2.5886$, $b = 3.2816$) and combined sexes ($\text{Log } a = -2.5069$, $b = 3.22738$). Total length–weight relationship was for males ($\text{Log } a = -2.4715$, $b = 3.2230$), females ($\text{Log } a = -2.6279$, $b = 3.3182$) and combined sexes ($\text{Log } a = -2.46607$, $b = 3.21954$). Condition factor was calculated by gutted weight. Females have higher condition value (0.670) than males (0.640). The highest value of condition factor was recorded in winter.

© 2014 Hosting by Elsevier B.V. on behalf of National Institute of Oceanography and Fisheries.

Introduction

Members of family Merluccidae (hakes) gave a worldwide distribution generally in temperate waters. In tropical waters they are present in active upwelling zones. On the eastern Atlantic there are seven varieties either classified as seven subspecies of *Merluccius merluccius* (France, 1960; Jones, 1974) or as separate species. These seven family members demonstrate a high degree of mixing and are found from Norway to South

Africa (Waldron et al., 1982). European hake *Merluccius* is a demersal and bathypelagic species, found between 27°W and 40°E longitude and between 16°N and 70°N latitude, in temperate areas of the eastern Atlantic i.e. from the coast of Norway to the Iceland of Mauritanian waters (Lioris and Matallanas, 2003). In the Mediterranean Sea, the highest concentrations of individuals are found at depths from 100 m to 200 m, and increasing in abundance from west to east (Oliver, 1991; Orsi-Relini et al., 2002; Maynou et al., 2003). In Egyptian Mediterranean waters this species was recorded by Soliman (1973, 1992) and Abdel Aziz (1976).

The present paper provides comparison between the two sexes of *M. merluccius* in morphometric, size frequency,

Peer review under responsibility of National Institute of Oceanography and Fisheries.

<http://dx.doi.org/10.1016/j.ejar.2014.09.003>

1687-4285 © 2014 Hosting by Elsevier B.V. on behalf of National Institute of Oceanography and Fisheries.

length–weight relationship and coefficient of condition in the Egyptian Mediterranean waters off Alexandria, in order to provide a more comprehensive examination of the trophic ecology.

Materials and methods

A total of 533 fishes of *M. merluccius* varying in length between 14.2 and 43 cm (TL), were collected from the trawlers operating in the Egyptian Mediterranean waters off Alexandria during the period from 2009 to 2011. For each fish total length (cm), total weight (g), gutted weight (g) and sex were recorded. For comparing morphometric measurements between two sexes, fifteen morphometric measurements were carried out on fish material for 299 males and 171 females separately at the same length group (20–36 cm) using covariance analysis (Snedecor and Cochran, 1982). The morphometric measurements related to total length included the following standard length (ST.L), head length (H.L), pre-first dorsal length (pr.D2), first dorsal fin length (D1F.L), pre-second dorsal length (pr.D2), second dorsal fin length (D2.F.L), pre-pectoral length (pr.P.L), pre-ventral length (pr.V.L.), pre-anal length (pr-A-L.) and body girth (B.G), while maxillary length (MX.L), pre-orbital length (pr-O-L), eye diameter (E.D.) and inter orbital width (I.O.W) were related to head length weight relationship which was determined from the following equation (LeCren, 1951).

$$\text{Log } w = \text{Log } a + b \text{ Log } l$$

where b = is the slope and $\text{Log } a$ in the intercept.

In the present study, gutted weight was used in order to exclude the effect of stomach contents and weight of gonads (Lagler, 1956; Ricker, 1975).

Recalculation of length–weight relationship was also done using the total Weight for comparing the results obtained in

the present study with those given by other authors in various localities.

The condition factor (K) was calculated from the following equation (Lecren, 1951)

$$K = \frac{1000 \times W}{L^3}$$

where

W = gutted weight (g)

L = total length (cm)

Results

Morphometric characters

The comparison of eleven morphometric characters in total length and four in head length between males and females *M. merluccius* in the Egyptian Mediterranean waters off Alexandria is presented in Table 1. Analysis of data indicates that females have higher mean values than that of males in all examined morphometric measurements except the eye diameter (Table 1 and Fig. 1) covariance analysis shows that females have higher significant difference than that of males in seven morphometric characters: head length (H.L), pre-first dorsal length (Pr-D1), length of first dorsal fin (D1.F.L), pre-second dorsal length (Pr-D2), body girth (B.G) pre-orbital length (Pr-O) and inter orbital width (I.O.W). For males only eye diameter (E.D) was significantly higher than that of females.

Table 1 Comparative relationship of morphometric measurements for both sexes of *Merluccius merluccius* from the Egyptian Mediterranean waters off Alexandria.

Morphometric measurements	Males				Females				FB	FM
	Mean (cm)	a	b	r^2	Mean (cm)	a	b	r^2		
<i>In total length</i>										
St.L	24.41	−0.5111	0.9163	0.9959	24.87	−0.4598	0.9169	0.9944	1.049	0.268
H.L	7.51	0.6912	0.253	0.9546	7.67	−0.4345	0.2931	0.9259	2.966*	0.199
Pr.D1.	7.23	0.9281	0.2316	0.9036	7.41	−0.7816	0.2966	0.9795	33.474**	7.333**
D1.F.L	2.13	−0.4994	0.0965	0.966	2.24	0.046	0.0798	0.8341	2.122	2.558*
Pr.D2.	10.34	0.4393	0.3642	0.9884	10.66	−0.7029	0.4112	0.9858	7.216**	2.522*
D2.F.L	11.45	−0.1042	0.4249	0.9699	11.58	−0.0207	0.4200	0.9716	0.0350	0.168
Pr.P.	7.09	−0.0102	0.2609	0.9817	7.21	0.2213	0.2531	0.9877	0.732	0.001
Pr.v.	5.52	0.6535	0.1789	0.9503	5.56	0.1517	0.1956	0.9466	0.984	0.310
Pr.A.L	11.02	0.0327	0.404	0.993	11.21	−0.2725	0.4155	0.9825	0.411	0.181
A.F.L.	11.12	−1.8753	0.4749	0.9845	11.28	−0.6867	0.4332	0.9511	0.005	0.025
B.G.	10.99	0.6882	0.4292	0.9845	11.33	−0.685	0.4348	0.9667	1.4819	9.955**
<i>In head length</i>										
Mx.L.	3.93	0.2944	0.1335	0.9626	3.99	1.2665	0.0985	0.9447	0.003	0.036
Pr.o.	2.48	0.1273	0.0865	0.9621	2.58	−0.0925	0.0968	0.9797	1.786	2.8197*
E.D	1.54	0.5942	0.0348	0.8597	1.50	0.4615	0.0376	0.8419	0.226	4.088*
I.o	1.99	0.3064	0.0618	0.9267	2.09	0.2103	0.068	0.8103	0.540	31.41**

a = intercept; b = slope; r^2 = correlation coefficient; FB: test of slope; FM: test of adjusted mean.

* Significant at 5% level.

** Significant at 1% level.

Download English Version:

<https://daneshyari.com/en/article/4493164>

Download Persian Version:

<https://daneshyari.com/article/4493164>

[Daneshyari.com](https://daneshyari.com)