Evaluation of sexual maturation in *Octopus vulgaris* (Cuvier, 1797): comparison between reared and wild animals

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Abstract

The aim of the present work is to determine sexual maturation of common octopus under local culture condition in Las Palmas (Canary Islands, Spain). To evaluate this, 2 experiments were carried out simultaneously, one in tanks and another one in off-shore cages. 20 octopuses (10 males and 10 females) were kept separately in 4 tanks, a duplicate of 5 octopuses per sex. At the same time, a duplicate of 40 octopuses of similar weight (sex ratio 5:1) were placed in off-shore cages. The trials started in November and lasted 3 months. 10 octopuses were taken every 30 days from tanks and from the cages to evaluate sexual maturation index M (Guerra, 1975) and macroscopic maturation (Dia and Goutschine, 1990). 11 wild males were collected in December and January to evaluate same parameters. Wild and reared males were mature in all cases while 40% of females kept in tanks in December were still immature. It was concluded that the presence of males and females under culture conditions may promote sexual maturation in females.

Introduction

Octopus vulgaris potential to diversify marine aquaculture has been noted (Rodríguez *et al.*, 2006; García García *et al.*, 2009), although little is known about sexual maturation processes under rearing conditions, which may affect biological parameters such as growth and mortality. On the other hand, sexual maturation of the common octopus in wild populations has been carefully evaluated (Quetglas *et al.*, 1998; Hernández García *et al.*, 2002; Rodríguez De la Rúa *et al.*, 2005; Otero, 2006). The aim of the present work is to determine whether keeping males and females together under rearing conditions may promote sexual maturation.

Materials and methods

- Evaluation of "Sexual maturation index" (M; Guerra, 1975) and "Macroscopic maturation" (Dia and Goutschine, 1990) in December and January.
- Histological study (H&E, Pas-H)
- Males and females reared separately: 2x5 males and 2x5 females in tanks
- Males and females reared together: 2x40 octopuses, sex ratio 5:1, in floating cages
- Sampling of individuals randomly

Results

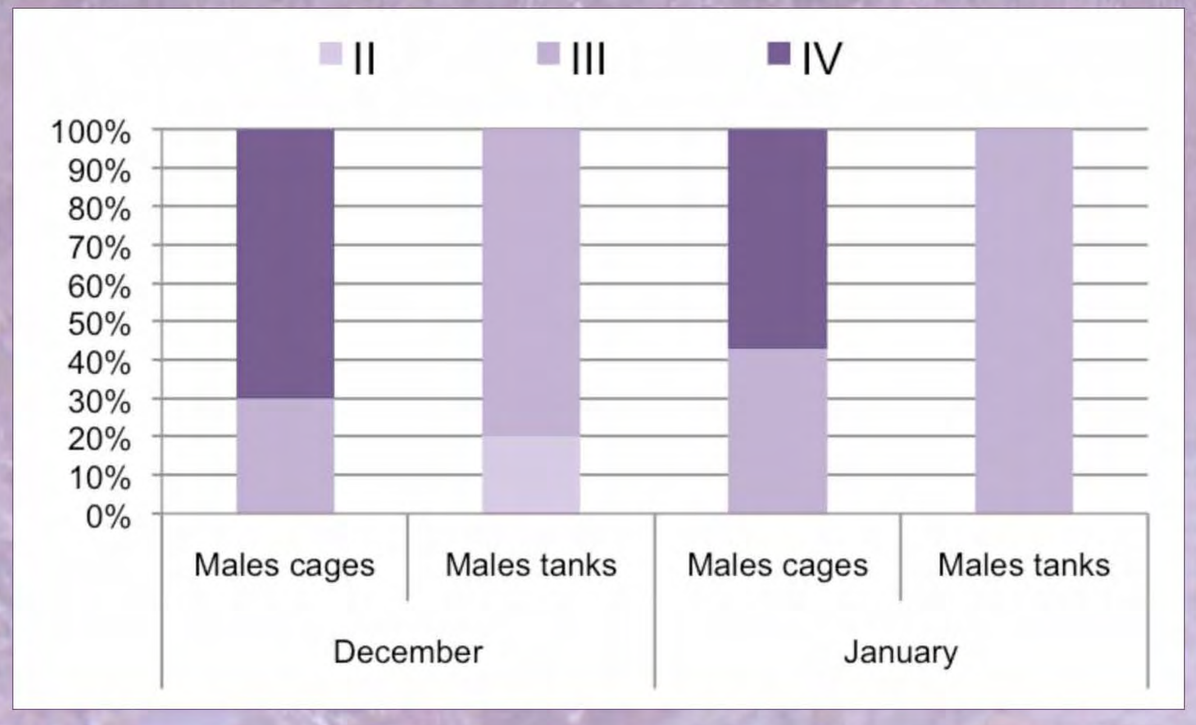

Fig. 1: Macroscopic maturation (Dia and Goutschine, 1990) in males.

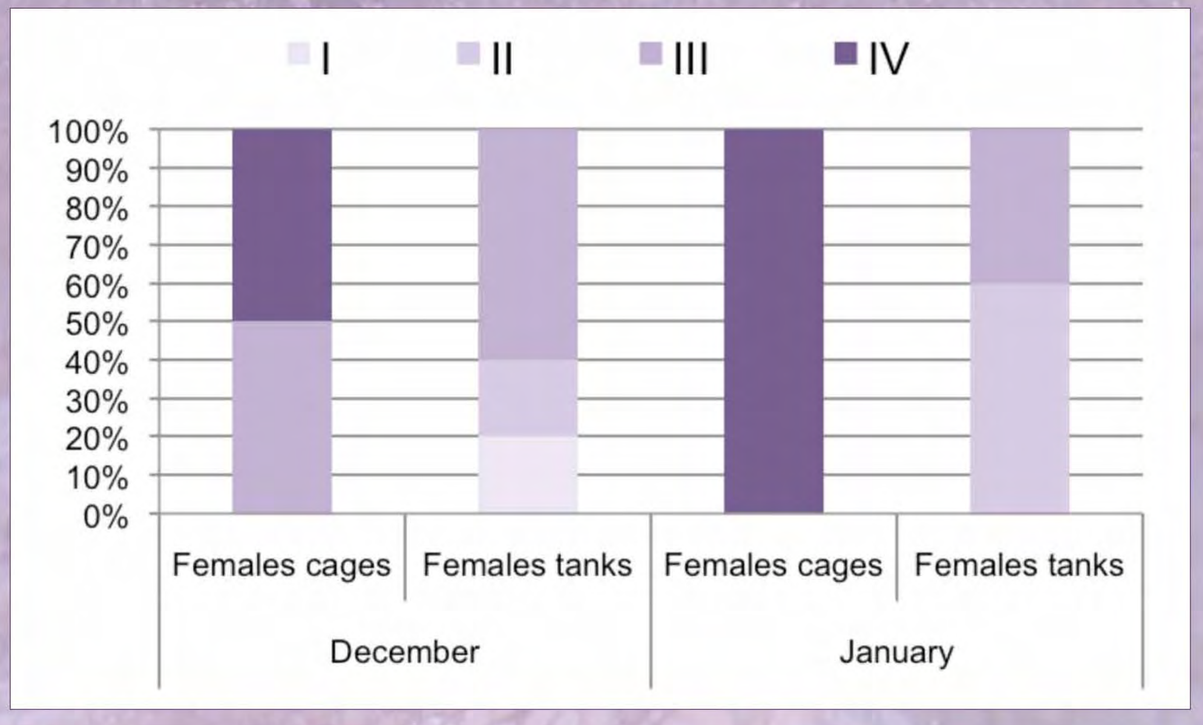

Fig. 2: Macroscopic maturation (Dia and Goutschine, 1990) in females.

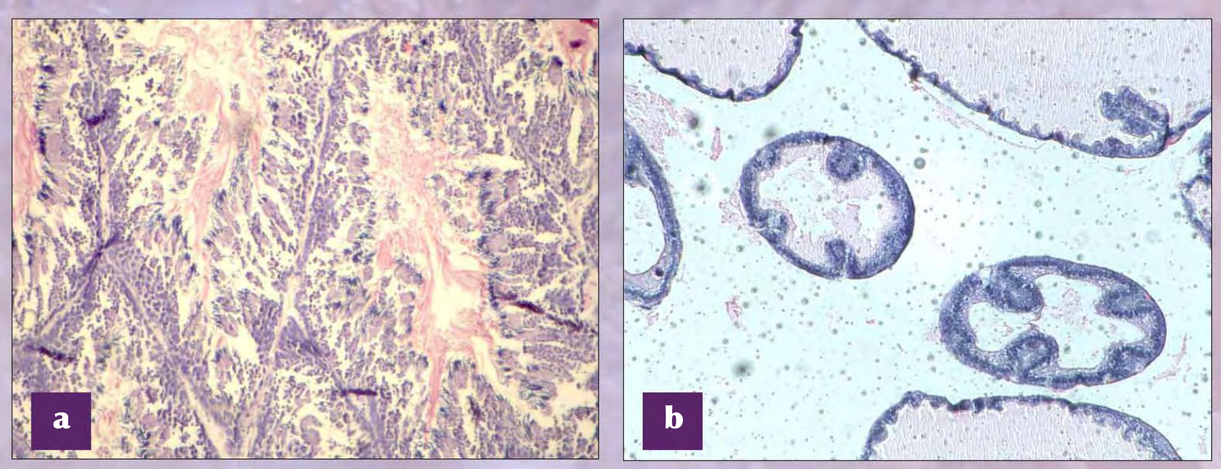

Fig 3: Transverse section (100x) of testis in state II (a) and ovary in state III (b).

Table I: Number of individual dissected, weight and M.

		December			January		
		N	Weight (g.)	M	N	Weight (g.)	M
Males	Tanks	5	1648±529	0,48±0,05	5	2143±866	0,49±0,08
	Cages	10	2328±1296	0,71±0,13	14	3021±1373	0,66±0,13
	Wild	4	1187±78	0,44±0,09	7	1883±344	0,41±0,04
Females	Tanks	5	1348±349	0,07±0,04	5	1969±181	0,08±0,02
	Cages	2	951±432	0,21±0,22	3	898±86	≥0,36
	Wild	0	-	-	1	1192	0,03

Discussion

Males were constantly mature throughout the sampling period regardless of treatment (Fig. 1) which agrees with previous reports for the given size (Quetglas et al., 1998; Hernández García et al., 2002; Rodríguez De la Rúa et al., 2005; Otero, 2006), with only one exception of one small octopus (880 g) who was in state II. On the other hand, females kept isolated from males showed in December a 40% and in January a 60 % of no mature individuals, which contrasts with females in cages (Fig. 2). This points out that the presence of males and females under rearing conditions may promote sexual maturation in females. The absence of wild females during the experimental period was related to reproductive processes occurring in the natural environment.

Potential of Octopus vulgaris to industrial rearing was again confirmed since some individuals showed more than 2 kg increment weight per month. Nevertheless, in order to increment profitability individual rearing systems or sex separation must be evaluated.

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Acknowledgements

This work was financed by JACUMAR Spanish National Plans for Aquaculture.