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Fecundity and spawning aspects of dogfish *Acestrorhynchus britskii* Menezes, 1969 (Teleostei, Characidae)

[Fecundidade e aspectos da desova do peixe-cachorro *Acestrorhynchus britskii* Menezes, 1969 (Teleostei, Characidae)].

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SUMMARY

The average frequency of oocyte diameter by size class and the total and relative fecundity were determinated for *Acestrorhynchus britskii*. Twenty-five females captured at Três Marias reservoir, Rio São Francisco basin, Minas Gerais State, Brazil, were used. The total fecundity was estimated by means of volumetric subsampling. The oocytes with diameter above 400µm, defined histologicaly as vitellogenic (O-IV) were used to calculate the fecundity 1(FEC1). Nine specimens had all oocytes counted and measured with micrometric ocular. For these, the fecundity 2(FEC2) was also calculated, comprising the oocytes larger than 200µm (with cortical vesicles, i.e. O-III plus O-IV). The distribution by size classes revealed the occurrence of four modes. FEC1 and FEC2 values ranged from 3,080 to 14,960 and 8,360 to 19,800 oocytes, respectively. The species under study shows low fecundity, even when the O-III are counted, possessing a distribution of the oocyte diameter frequency typical of fractionated spawning fishes. Low correlation values between FEC1 and SL and FEC1 and BW were obtained (r = 0.57 and 0.56, respectively).

KEY-WORDS: Fecundity, *Acestrorhynchus britskii,* oocyte diameter, spawning.

RESUMO

Determinaram-se a freqüência média do diâmetro ovocitário por classe de tamanho e a fecundidade total e relativa do *Acestrorhynchus britskii*,. Foram utilizadas 25 fêmeas capturadas no reservatório de Três Marias, bacia do Rio São Francisco, Minas Gerais. A fecundidade total foi estimada por sub-amostragem volumétrica. Os

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ovócitos com diâmetros acima de 400µm, definidos histologicamente como vitelogênicos (O-IV) foram usados para o cálculo da fecundidade 1(FEC1). Do total de peixes amostrados, nove exemplares tiveram todos seus ovócitos contados e medidos com ocular micrométrica. Para estes determinou-se também a fecundidade 2(FEC2) englobando os ovócitos maiores que 200µm, (com vesículas corticais, i.e.O-III e O-IV). A distribuição por classe de tamanho revelou a ocorrência de quatro modas em diferentes estágios de maturação. Os valores de FEC1 e FEC2 variaram de 3.080 a 14.960 e 8.360 a 19.800 ovócitos, respectivamente. A espécie em questão apresenta baixa fecundidade, mesmo quando considerados os O-III, possuindo distribuição de freqüência de diâmetros ovocitários típica de peixes de desova parcelada, além de baixos valores de correlação entre FEC1 e SL e BW (r = 0,57 e 0,56, respectivamente).

PALAVRAS-CHAVE: Fecundidade, *Acestrorhynchus britskii*, diâmetro ovocitário, desova.

INTRODUCTION

The prime reason for the determination of fish fecundity is to evaluate their reproductive potential, allowing inferences about the future behavior of their populations (Vazzoler, 1963). The present research aims to estimate the frequency of oocyte diameter by size class, the absolute fecundity and the relative fecundity to the body length and weight of the dog-fish *Acestrorhynchus britskii*, an endemic species of the São Francisco river basin.

MATERIAL AND METHODS

Twenty-five females in advanced gonadal maturation stage were used. They were captured by means of gillnets at Três Marias Reservoir, State of Minas Gerais (18° - 20° S, 45° - 46° W), during December, 1992 and February, 1993.

The standard length (SL), in cm, and body weight (BW), in grams, were obtained from each specimen, and the gonads removed. The histological characteristics used to classify the stages of oocyte development were based on Bazzoli & Rizzo (1990) and Bazzoli (1992). The ovarian capsule was opened and its contents put in a flask with Gilson's solution, remaining there for 60 days. After this period, the material was submitted to a continuous water flow, in order to retain preserve only oocytes with diameter above 400µm, which were regarded by Bazzoli & Rizzo (1990) and Bazzoli (1992) as vitellogenic (O-IV). Nine specimen had their oocytes washed through a sieve with 50µm of mesh size.

The absolute fecundity w
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of oocytes was then used

The diameter of oocytes
the help of a microscope
The absolute fecundity
including those with cort
µm (FEC2).

FEC1 was plotted on SL
points in association to
was verified:
FEC1 = A + B x SL and
FEC1 = absolute fecundi
SL = standard length
BW = body weight
A = linear coefficient (int
B = angular coefficient

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1300 µm.

The absolute fecundity was determinated through volumetric subsampling, as described in Bagenal & Braum (1978). The remaining oocyte mass from each specimen was transferred to a beaker and the volume completed with water to 550 ml. After homogenizing, three subsamples were obtained using a 5 ml Stempel pipette and their number of oocytes counted. The average number of oocytes was then used to calculate the absolute fecundity.

The diameter of oocytes from nine fishes of different SL was measured with the help of a microscope. These oocytes were grouped by classes of 100 μm. The absolute fecundity was estimated using only the O-IV (FEC1) or including those with cortical vesicles (O-III) whose diameter were above 200 μm (FEC2).

FEC1 was plotted on SL and BW. Through the dispersion of the empirical points in association to Pearson's test of correlation, its adhesion to models was verified:
FEC1 = A + B x SL and FEC1 = A + B x BW where,
FEC1 = absolute fecundity
SL = standard length
BW = body weight
A = linear coefficient (intercept)
B = angular coefficient

RESULTS AND DISCUSSION

The percentage distribution of oocytes by diameter classes (Fig. 1) disclosed four modes: the first mode represents the stock recruitment formed by young (O-I) and previtellogenic oocytes (O-II); the second encompasses O-III, and the remaining ones are constituted by vitellogenic oocytes. The most advanced mode could be made by atresic oocytes, a common fact in this species (Bazzoli, personal communication). He also suggests that this species is a fractionated spawner. This information is shared by Godinho (1984) and is confirmed by the pattern of oocyte distribution indicated in the present study.

FEC1 varied from 3080 to 14960 oocytes, with the average of 8265.6 ± 2813.8. As to FEC2, the values ranged from 8360 to 19800, with the average of 13585.0 ± 5755.5 oocytes. These data show that *A. britskii* has low fecundity, similar to other fractionated spawners, as compared to total spawners (Tab. 1). The vitellogenic oocytes reached a maximum diameter of 1300 μm.

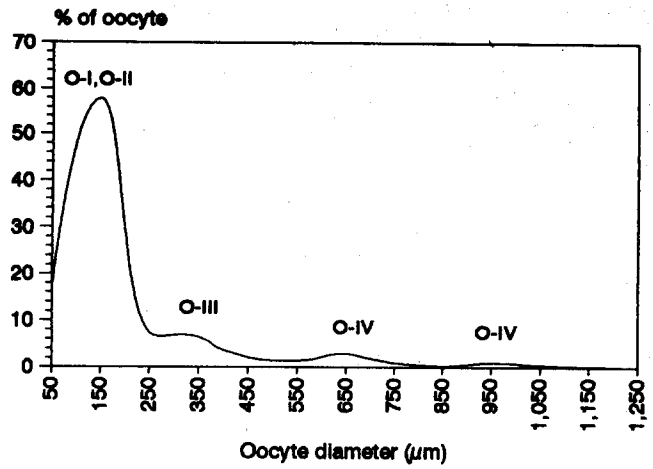

Figura 1 - Percentage distribution of *A. britskii* oocyte I, II, III and IV by diameter class.

Table 1-Type of spawning, absolute fecundity and oocyte diameter of some neotropical fish species.

Species	Spawning type	Absolute fecundity	Ooocyte diameter[1]	Source
Curimatella lepidura	Total	9933.6-151214.8	667-755	Andrade, 1990[2]
Cyphocarax gilbert	Fractioned	12749-75734	13,2-20,6	Romagosa *et al*, 1984
Gymnotus carapo	Fractioned	820-2904 1203-3039[3]	3000-3600	Barbieri & Barbieri, 1982
Leporinus friderici	Total	47677-142874	-	Nomura, 1976
Rhamdia hilarii	Fractioned	5550-52875 6250-46250[3]	1100,0	Narahara *et al*, 1989
Rhinelepis aspera	Fractioned	10800-181200	500-1500	Agostinho, 1985
Salminus maxillosus	Total	2142000	500-900	Kunkel, 1985

1 - Vitellogenic oocytes (in micrometers)

2 - Values obtained using the average of three consecutives reproductive periods

3 - Two reproductive periods were used

Fecundity differences on
were also recorded by
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Correlations between FE
resulted on the following
FEC1 = -26269 + 1983.9
FEC1 = -1532.5 + 152.5

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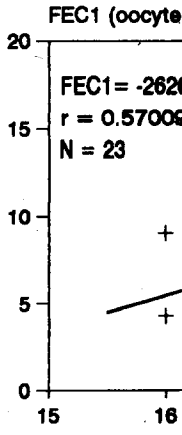


Figura 2 - Relationship bet
of *A. britskii* at Três Marias

Fecundity differences on fish of same sizes, observed in the present study, were also recorded by Vazzoler (1970), Godinho *et al.* (1977) and Caramaschi (1979). Romagosa *et al.* (1984) suggested that such differences occur due to variation on the utilization of food resources. According to Nikolskii (1963), fecundity varies in relation to the food supply, time of the beginning of sexual maturity, temperature, latitude, type of spawning, parental care and number of spawnings.

Correlations between FEC1 and SL (Fig. 2) and FEC1 and BW (Fig. 3) resulted on the following expressions:
FEC1 = -26269 + 1983.9 x SL, r = 0.57009 and
FEC1 = -1532.5 + 152.58 x BW, r = 0.55876

The low correlations observed in the present work are similar to those found in the literature (Godinho *et al.*, 1977; Narahara *et al.*, 1989). According to Zanetti (1979) *apud* Barbieri & Barbieri (1982), high correlations values occur in fishes with total spawning opposed to low values in fractionated spawners, as in *A. britskii.*

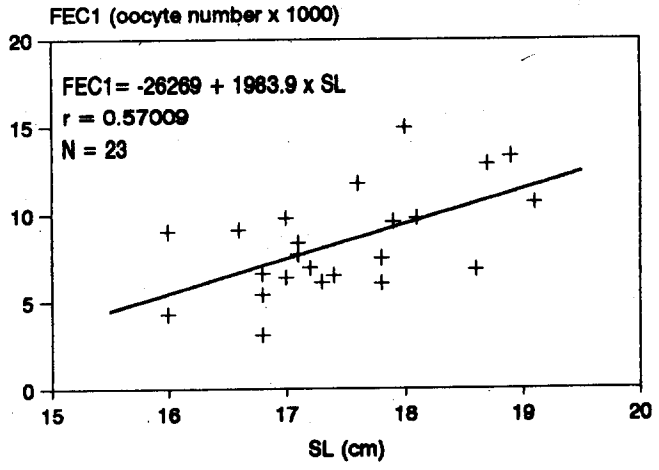
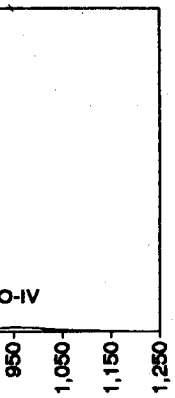


Figura 2 - Relationship between absolute fecundity (FEC1) and standard length (SL) of *A. britskii* at Três Marias reservoir.



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-755	Andrade, 1990[2]
-20,6	Romagosa *et al*, 1984
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-	Nomura, 1976
00,0	Narahara *et al*, 1989
-1500	Agostinho, 1985
-900	Kunkel, 1985

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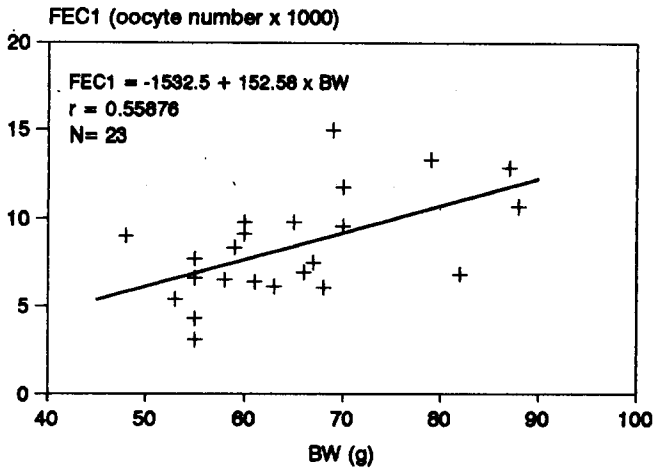

Figura 3 - Relationship between total fecundity (FEC1) and body weight (BW) of *A. britskii* at Três Marias reservoir.

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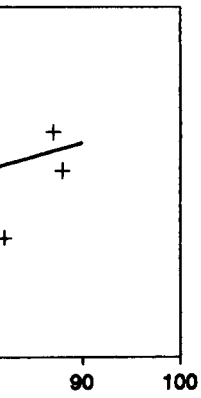

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