The Relationship Between Sizes of African Catfish (*Clarias gariepinus*) Spawners and Their Ovaries

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ABSTRACT

This experiment studied some of the relationships between the size of various spawners of Clarias gariepinus and their ovaries (gonads). Specimens were obtained from commercial landing site on the lower Niger River at Onitsha, and grouped according to maturity levels using gonad developmental stages I-V as a guide. The results showed that increase in length of gravid immature C.gariepinus could lead to increase in the size of their ovaries. There was a significantly high determinant coefficient for the variables. Regression analysis showed a positive correlation between length of gravid immature C.gariepinus and weight of the ovaries. A negative correlation between length of gravid mature and weight of their ovaries was recorded. The value of gonadosomatic index for the gravid mature showed that spawners could use as high as 10.35% of their weight for egg production. It could be relatively inferred however, that ovaries of gravid immature C.gariepinus are longer than those of the gravid mature.

Keywords: *Catfish, Spwaners, Ovaries, Clarias gariepinus*

INTRODUCTION

African catfish are endowed with specialized reproduction strategies, which are notable in the production and spawning of large ova (Clay, 1979, Eyo and Mgbenka, 1992). The Frequency of running gonad points to the spawning period of *Clarias* species (Eyo, 1997). Sexually mature spawners can be stripped easily and some of them may be held in captivity for some hours before ovulation. Reproductive biology of the fish species in one of the tributaries of the lower Niger River has been studied (Ezenwaji, 2002). Developmental levels and size of gonad are some of the vital aspects of their reproductive biology. However, the effects of gonadotropic hormone on egg development and spawning of *C.gariepinus* obtained from lower axis (Onitsha) of the Niger River has been studied (Akpaniteaku, 2006). The relationship between maturity and size of pituitary gland has also been studied (Akpaniteaku, 2011). Relative assessment of other reproductive features and size of the fish species, could contribute to visual assessment of spawning capacity of the females. The research therefore aimed at studying some of the size and weight relationships between spawners of *C.gariepinus* and their gonads.

MATERIALS AND METHODS

Spawners for the study were obtained from commercial fish landing site (Onitsha) along the lower Niger River, a distance of about 55km from the research station. Period of collection was between 9.00am and 11.20pm in the morning, and 4.00pm and 6.30pm in the evening. Owing to the distance of the landing site, the days of collection were not fixed. They were collected between early and late part of the rainy season (April-October).

Clarias that were darkly pigmented in the dorsal and lateral parts of the body, and turned lighter in colour when exposed to light were identified. Those of them that further exhibited mosaic-like pattern of dark and light spots when frightened (*C.gariepinus*) were separated from the males by external characteristics, using visual and contact method described by Hogendoorn (1979). The specimens were transported in plastic basins covered with jute bags to prevent jumping. At the station, they were sorted into gravid immature and gravid mature groups, using methods by Akpaniteaku (2006). Weights of the specimens were obtained using the formula:

WF = WK-WT

Where: WF = Weight of fish

WK = Weight of trap plus weight of fish

WT = Weight of trap

Total lengths of specimens were taken by metre rule. All measurements were taken parallel to antero-posterior body axis. The measurement was taken from the tip of the mouth down to the end of the tail fin. They were dissected from midabdomen up to the thoracic region to deliver the gonads intact. Weights of the gonads were determined with paaco spring low-loading balance. The gonadosomatic index (GSI) was calculated.

$$GSI = \frac{\text{Weight of ovary (gonad)}}{\text{Weight of fish}} \times \frac{100}{1}$$

The data were subjected to correlation coefficient and regression analyses.

RESULTS AND DISCUSSION

The regression graph of length of gravid immature *C.gariepinus* and size of ovary is shown in Fig.I. There was a strong positive correlation (r=0.93) between total lengths of the gravid immature and size of their ovaries. The correlation between total length of gravid mature and the size of ovary was positive (Fig.2). The determinant coefficient (r) was 0.76. The correlation between total length of gravid immature and weights of their ovaries (Fig.3) was positive (r=0.76). Total length of gravid mature and weight of their ovaries (Fig.4) showed a negative correlation (r=0.23). GSI of various gonad stages of the spawners are shown in Fig.5. Mean GSI of immature ones at developmental stage II was 1.75±0.40. At stage III, their mean GSI was 4.46±0.20. The gravid mature recorded mean GSI of 5.53±0.45 at stage IV and mean GSI of 10.35±1.35 at stage V.

Regression and correlation coefficient analyses of relationship between total length of the spawners and size of their ovaries, as well as the relationship between total length of spawners and weight of their ovaries are presented on table I. There was a significantly ($P<0.05$) high correlation (r=0.93) between the variables. The correlation between length of gravid immature and size of ovaries, and length of gravid mature and the weight of ovaries were equal and also positive (r=0.76).

Ezenwaji (2002) reports that running gonads of *C.ebriensis* are observed from April to September. This is almost the same period (April to October) as the spawners of *C.gariepinus* used in the present research are obtained. Mgbenka and Eyo (1992) report May to July, corresponding with heavy-rain flooding season, believed to trigger off spawning

in *C.gariepinus*. During the assessment of gonads of *C.albopunctatus*, Aguigwo (1994) observes that spawners occurred throughout the year reaching peak in October. Akpaniteaku (2006) observes that the season lasted from April to September reaching peak in July. According to Araoye (2001) spawners at gonad stage IV and VI increased in number from May to August, corresponding with the occurrence of more of stages IV and V (Akpaniteaku, 2006). In the present research however the study period (April to October) may be regarded as the spawning season for *C.gariepinus*.

According to Huner and Dupree (1984), females should be examined to ensure that abdominal fullness reflects the size of gonads rather than the amount of food in the stomach and the intestine. The relative assessment of size of spawners and weight of their ovaries in the present research is in line with the observation of Huner and Dupree (1984). Strong positive correlation between length of gravid immature *C.gariepinus* and size of their ovaries (Fig.I and table I), may indicate that ovaries that are yet to ripe are less compact, and sometimes longer than those of the gravid mature. Ezenwaji (2002) reported that weight of ovary was the best predictor of fecundity and GSI. The negative correlation between length of gravid mature and weight of their ovaries (Fig.4 and table I) seem to be a confirmation of the previous report. According to Oniye and Onimisi (2011), fecundity varies from one fish species to the other, and it is also a function of body weight and or length, GSI of gravid mature *C.gariepinus* in the present research (Fig.5) is higher than those of gravid immature. The GSI value of gravid mature shows that the fish species could use up to 10.35% of the weight for egg production. Oniye and Onimisi (2011) report 2.25% for *Heperopisus bebe occidentalis*, and Ikomi (1996) report similar result on the GSI of *Mormyrid brienomyrus longianalis*.

CONCLUDING REMARKS

This study experimented the relationship between the sizes of African Catfish (Clarias gariepinus) Spawners and their ovaries. The study revealed a significant relationship between total length of the spawners and size of their ovaries, as well as the relationship between total length of spawners and weight of their ovaries. Judging from highest diameter size of pituitary obtained from gravid mature donors (Akpaniteaku, 2011) and size of gonads obtained in the present research (Fig.2), the reproduction-inducing capacity of gonadotropic hormone may be considered as having direct relationship with the size of ovary. The present research seems to infer however that gravid immature *C.gariepinus* is endowed with longer ovaries than the gravid mature.

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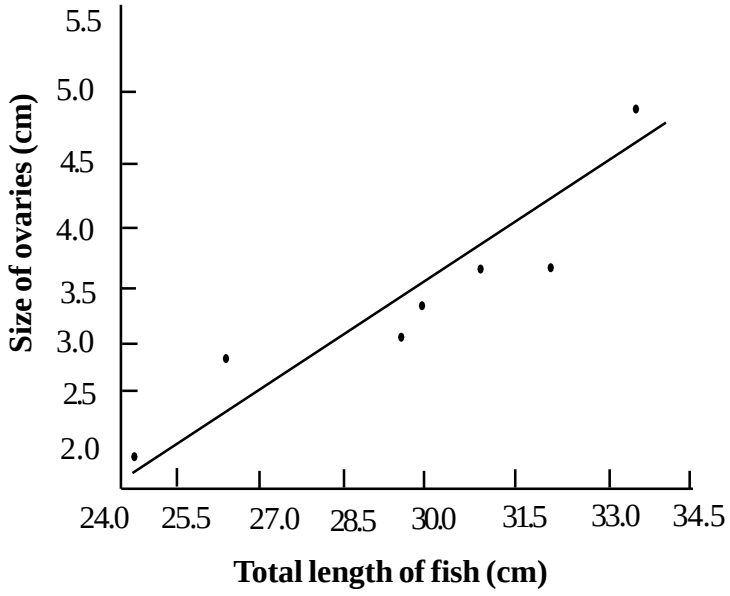

Fig. 1: Relationship between total length of gravid immature Clarias gariepinus and size of ovary.

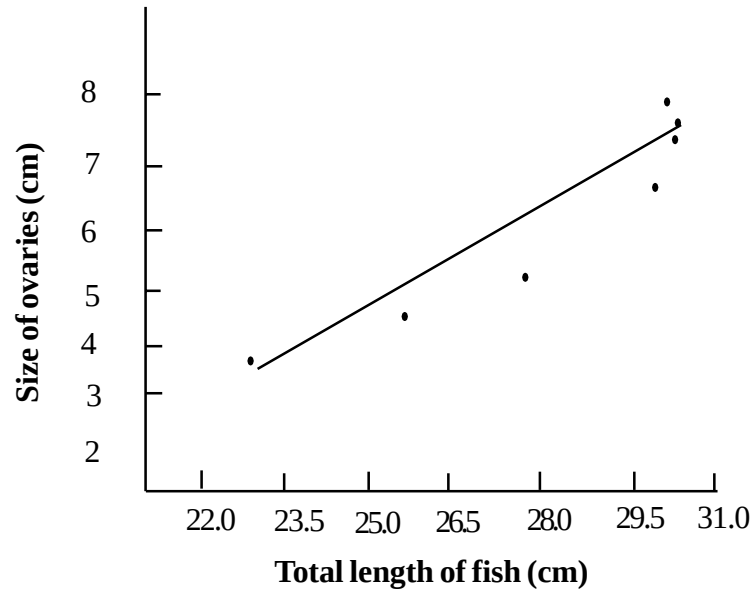

Fig. 2: Relationship between total length of gravid mature Clarias gariepinus and size of ovary.

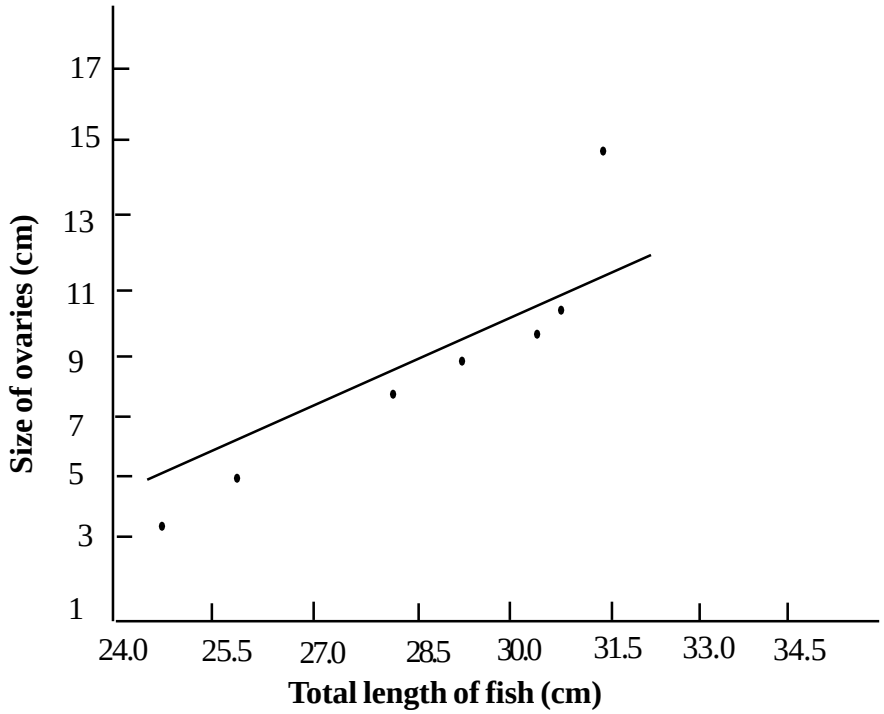

Fig.3: Relationship between total length of gravid immature Clarias gariepinus and weight of ovary.

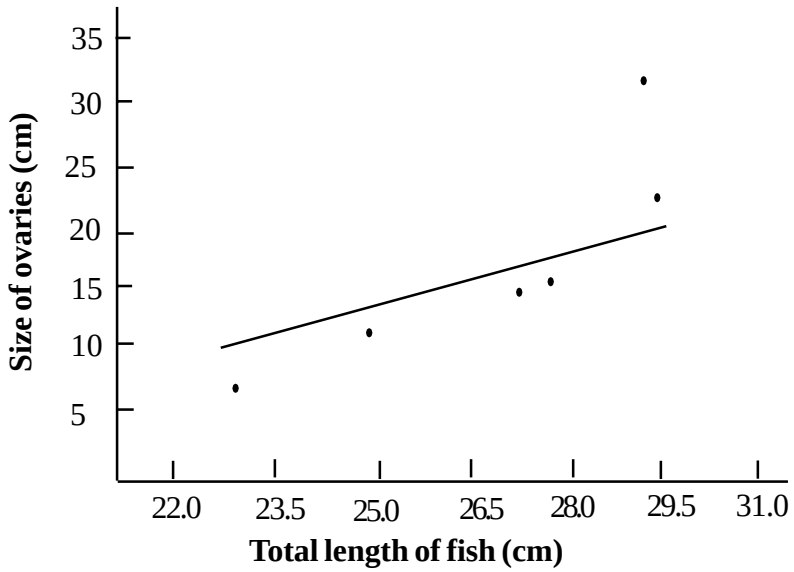

Fig.4: Relationship between total length of gravid mature Clarias gariepinus and weight of ovary.

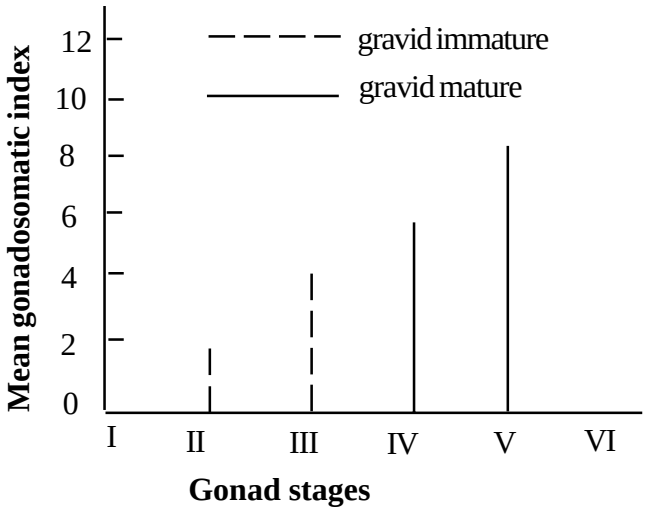

Fig.5: Mean GSI and gonadal stages of *Clarias gariepinus spawners*

Table 1: Regression equation and correlation coefficient (r) for some relationship between Clarias gariepinus spawners and their ovaries.

MGS	Variables	RE	CC
Gravid immature	Total length and size	Y=5.1+0.3x	0.93
Gravid mature	Total length and size	Y=-9.02+0.5x	0.76
Gravid immature	Total length and weight	Y=-22.8+1.0x	0.76
Gravid mature	Total length and weight	Y=-9.1+0.8x	0.23

MGS = Maturity group of spawners;RE = Regression Equation; CC = Correlation Coefficient