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Effects of Weight on Ovarian Maturity and Reproductive Characteristics in Female *Clarias jaensis* (Boulenger 1909)

Chongsi Margaret Mary Momo*, Etsabou Tabougue Elise Duchelle, Ntsoli Justin, **Meutchieye Félix**
Department of Animal Science, Faculty of Agronomy and Agricultural Sciences, University of Dschang, Cameroon
***Corresponding author: margaretchongsi@yahoo.fr**

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ABSTRACT

In Cameroon, rapid population growth and urbanization have increased the demand for animal proteins, especially fish proteins, while local production covers only about 46% of the demand, creating a deficit filled by imports. In this context, aquaculture and the development of endemic species such as *Clarias jaensis* are essential for food security and biodiversity preservation. This study aimed to evaluate the effects of female weight on ovarian maturity and artificial reproduction performance. A reproductive maturity assessment was performed on 26 females (weighing 166–621 g) at the University of Dschang to determine the maturity stage of females of different weights based on their oocytes and to define the weight classes to be used in artificial reproduction (AR). AR was carried out between 8 females and 8 males at the GIC AIO farm in Batié to conclude on the effects of weight on the reproductive performance of females. The morphometric data for observing sexual maturity were analyzed using R Studio software; while the reproduction data were analyzed with XLSTAT software. The results showed that body weight significantly influenced ovary weight and absolute fecundity, but not relative fecundity and the gonado-somatic index. The presence of germinal spots was more pronounced in females of the 507–621 g weight class. The average absolute fecundity is 6145.575 ± 6009.953 eggs, with a relative fecundity of 34.75 ± 4.69 eggs/g. A moderate positive correlation (r = 0.566) was observed in the 280–394 g weight class and hatching rate. The average fertilization, hatching, and larval survival rates were 66.5%, 39.38%, and 54.32%, respectively. No significant difference was observed between weight classes for these parameters. Although female weight influenced the quantity of eggs and maturity, it did not significantly affect oocyte quality or reproductive performance.

INTRODUCTION

In Cameroon, the current demand for fish is estimated at around 500,000 tons per year, while local production covers only about 230,000 tons in 2023, representing barely 46% of the total demand **(MINEPIA, 2024)**. This deficit is partially filled by imports, which amounted to 234,572 tons in 2023 **(Nonos, 2024)**. In this context, the valorization of endemic species represents a relevant approach to limit the overexploitation of natural stocks and to encourage their reproduction in controlled environments.

Faced with this dependence on imports and the increasing pressure on local fishery resources, fish farming appears as a strategic alternative not only to strengthen food security and support economic development but specially to preserve fish biodiversity. Among the fish species of interest, the genus Clarias holds a prominent position due to the firmness of its flesh, its adaptability to various aquatic environments, and its high commercial value **(Ayinla, 2003)**. In this context, *Clarias jaensis*, an indigenous species of Cameroon, stands out particularly for its robustness, prized flesh, and adaptation to local conditions, making it a major asset for the sustainability of national aquaculture **(Geneva *et al*., 2019)**. However, the success of its farming strongly depends on the availability of quality brood-stock, whose biological characteristics directly influence reproductive performance.

Furthermore, although this species holds strategic importance for aquaculture and the preservation of local aquatic ecosystems, the essential reproductive criteria to prioritize when selecting females remain areas requiring extensive exploration. In particular, the relationship between female weight and reproductive performance is a determining factor for the success of artificial reproduction, directly influencing the rates of fecundity, hatching, and larval survival until yolk sac depletion **(Zango *et al*., 2016)**.

Taking these factors into account, the present study was conducted to demonstrate the effects of weight on ovarian maturity and reproductive performance in female *Clarias jaensis*.

MATERIALS AND METHODS

1. Study area

This study was conducted between February and May 2025. It is structured around two complementary phases: the evaluation of the reproductive maturity of female *Clarias jaensis* through morphometric measurements at the Hydrology and Ichthyology Research Unit of FASA at the University of Dschang, and the artificial reproduction of females according to weight classes at the collective farm of the Integrated Aquaculture Common Initiative Group (GIC AIO) in Batié.

Dschang and Batié (Fig. 1) are located in the West region of Cameroon. Dschang, the capital of the Menoua Department and the arrondissement of the same name, stretches over parts of the villages Foto and Foréké-Dschang; it lies between latitudes 5°10’ and 5°38’ North and longitudes 9°50’ and 10°20’ East. It is situated at an average altitude of 1400 meters and dominated by low plateaus deeply cut by small valleys, sometimes marshy; its climate is characterized by a dry season from mid-November to mid-March and a rainy season from mid-March to mid-November **(Temgoua *et al*., 2015)**. Batié is a commune in the Hauts-Plateaux Department, located between latitudes 5°17′0″ and 5°18′53″ North and longitudes 10°17′0″ and 10°19′31″ East. Its climate is of the Guinean type, characterized by a dry season running from mid-November to mid-March, with temperatures varying between 19 and 27°C. Its average annual rainfall ranges between 1621 and 1800 mm.

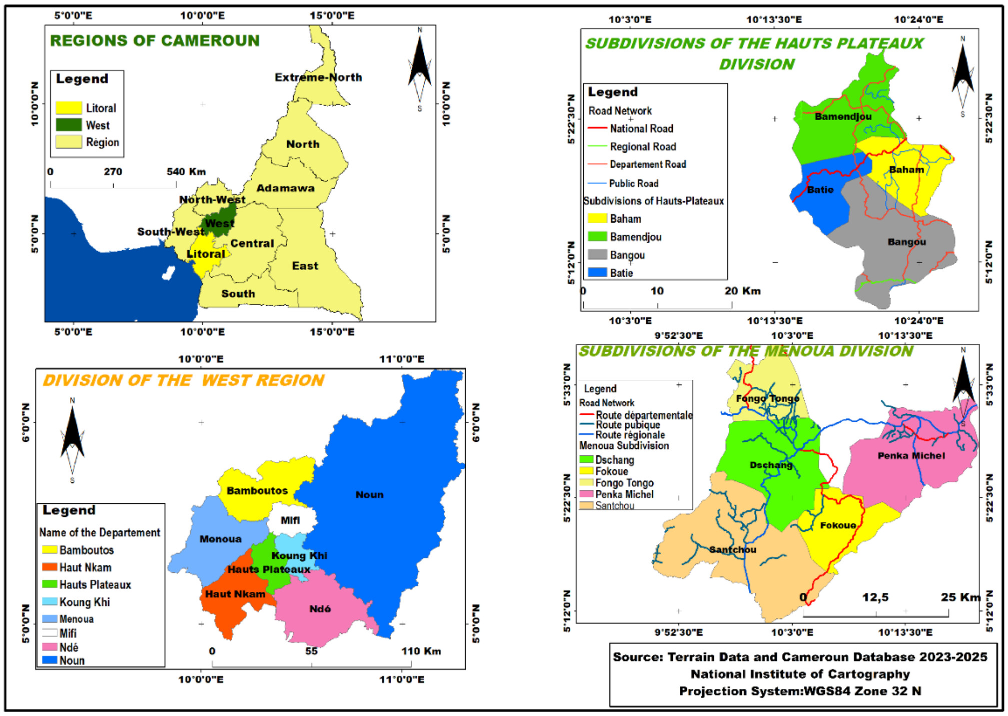


Fig. 1. Location of the Hydrology and Ichthyology Research Unit in Dschang and the GIC AIO in Batié

2. Sampling

Before the actual start of data collection, the choice of the target species remained important for the smooth progress of the work. *Clarias jaensis* is identified by its apparently round head, a single dorsal fin not connected to the caudal fin, and distinctive coloration including marbled, brown, and black, except for the ventral part which is white.

For laboratory evaluation, 30 apparently healthy female *Clarias jaensis* of varying weights, ranging from 166 to 621 g, were collected over approximately one week from the natural waters of the Mbô plain, mainly using baited size 10 and 12 hooks. The specimens were stored for about 10 days in a concrete tank, then placed in an 80-liter bucket and transported to the research unit. The selection of females is shown in Fig. (2).

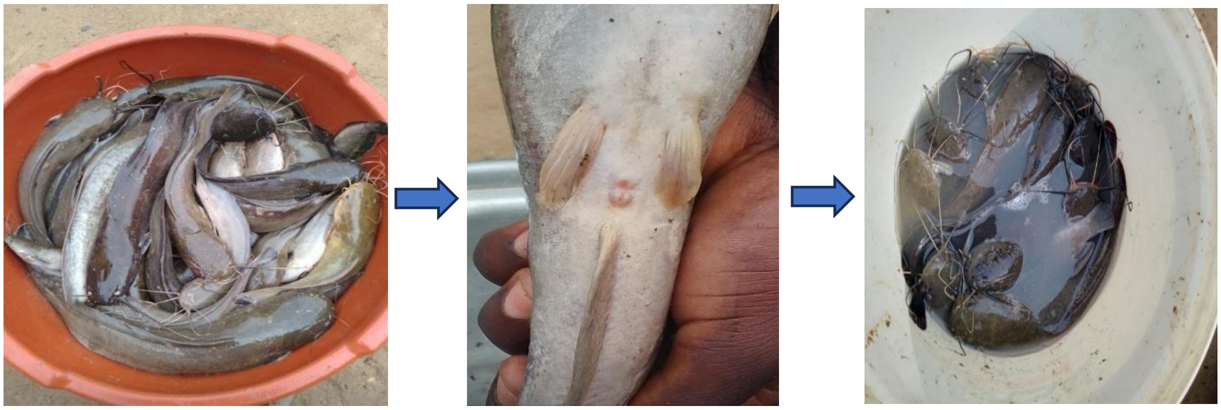


Fig. 2. Selection of female *Clarias jaensis*

For artificial reproduction, subjects in good physical condition were selected, including 12 females within the 166–621 g range divided into 4 weight classes, and 13 males averaging 321 ± 26 g, all originating from the Nkam River in Kekem. They were caught in a pond in Bapa (a village located 4 km from the Batié crossroads), where they were acclimated, transported in a 30-liter mini barrel with a perforated lid, and stored in a concrete tank at the GIC AIO farm.

3. Data Collection

Measurements of Female *Clarias jaensis* and Microscopic Observation

The measurements of female *Clarias jaensis* and microscopic observations are presented in Fig. (3). The equipment used consisted of 30 female *Clarias jaensis*, a workbench, a dissection kit, two scales (one with 1 g sensitivity and another with 0.05 g sensitivity), an ichthyometer (laminated graph paper), clove powder, a petri dish, microscope slides, and a BMS 143 stereo microscope (model number MIK749597).

Data collection ultimately focused on 26 females out of the 30 sampled, as 4 had very poorly developed, barely differentiated ovarian sacs. To assess the sexual maturity of the oocytes, measurements on the females and microscopic observation were carried out. The measurement process for each female was conducted as follows:

- Weighed using an electronic precision scale with 1 g sensitivity and a capacity of 10 kg;
- Measured using an ichthyometer (± 0.1 cm);
- Immersed in a clove bath, which served as anesthesia **(Akinrotimi *et al*., 2015)**;
- And dissected as follows: after being placed on its back on a wet cloth laid on the workbench; the abdomen was opened using forceps and a pair of scissors for the incision, and another pair of scissors for the opening; then the ovarian sacs were gently extracted using a spatula and finally separated and removed from the body using forceps and a scalpel.

Microscopic observation was conducted as follows:

- After dissection, the collected ovarian sacs were weighed using an electronic precision scale with 0.05 g sensitivity and a capacity of 250 g; they were then placed on a petri dish cover and carefully opened with a scalpel. A portion was placed on a slide to be better observed under the microscope to note the presence or absence of a germinal spot in an oocyte, as well as in the entire set of oocytes of the same female;

- 1 g was sampled for counting to calculate absolute fecundity;
- Observations were made using a BMS 143 stereo microscope equipped with a 3MP USB camera and LED lighting (model number MIK749597), which has the capacity to take detailed images of the oocytes and measure their diameter;
- The different maturation stages were determined using the gonadosomatic index (IGS), the presence of the germinal spot, and a conventional maturity degree evaluation scale inspired by the CAPPART mission **(De Kimpe, 1964)** and slightly modified **(Tembeni *et al*., 2014)**.

A: Measurement of total weight

B: Measurement of total weight

C: Dissection

D: Measurement of gonad weight

E: Measurement of 1g oocytes

F: Microscopic observation

Fig. 3. Procedure for measurement, dissection, and microscopic observation

Artificial reproduction of female *Clarias jaensis*

To obtain these performances, artificial reproduction was carried out. The following materials were assembled: 25 brood-stock including 12 females and 13 males, two scales (one with 1 g sensitivity and another with 0.05 g sensitivity), an ichthyometer (laminated graph paper), clove powder, a dissection kit, a vial of Ovaprim hormone, a 2 ml syringe, two small towels, a small porcelain mortar, 4 transparent 50-liter food-grade tanks, 4 incubation trays, a multifunctional kit for 5 parameters, a submersible electric pump with a capacity of 3000 liters per hour with integrated filter, a water heater, and a black tarp.

Ultimately, 16 brood-stock were used, notably 8 females and 8 males. The females were divided into four weight classes based on previous measurements and microscopic observations in the laboratory. These classes are: “166 g - 280 g”, “280 g - 394 g”, “394 g - 507 g”, “507 g - 621 g” for classes 1, 2, 3, and 4 respectively. Two females in total were used per class.

Hormonal induction

The females received two intramuscular injections of Ovaprim at a total dose of 0.7 ml/kg body weight **(Sugistia *et al*., 2017)**, administered respectively at 1/3 and 2/3 of the dose, with a 6-hour interval between injections. The treated females were individually kept in 20-liter plastic containers, open at the top and filled with water. They were not fed for 36 hours at a water temperature of 22 °C.

Gamete collection

After oocyte maturation, stripping was carried out on each female: using a wet towel, eggs were collected by abdominal pressure directed from top to bottom **(De Graaf & Janssen, 1996)**. The eggs were collected in pre-weighed bowls, then each bowl and its contents were weighed using a SALTER electronic scale model 1250, with a precision of 0.05 g. The number of oocytes per gram of ovaries was determined, as well as the total weight of the eggs collected from each female. To obtain milt, males were anesthetized in a clove solution and then sacrificed. The testes were extracted, cut, and ground in a small mortar. The obtained milt was drawn with a syringe and mixed with the eggs. A fertilization solution (NaCl 2 g/l and urea 4 g/l) was used to rinse the mixture for 60 seconds.

Incubation

The eggs-milt mixture was spread over trays arranged in incubation tanks. A sample of 100 eggs was taken from each bowl and simultaneously placed in the incubation tanks alongside the trays. Another sample of 100 unfertilized eggs, taken before mixing with milt, was kept to evaluate fertilization and hatching rates. The incubation tanks were covered with a black tarp to prevent nocturnal cooling. The average temperature during incubation was 20.5 ± 0.6 °C, with unstable variation among tanks of 0.6 ± 0.3 °C.

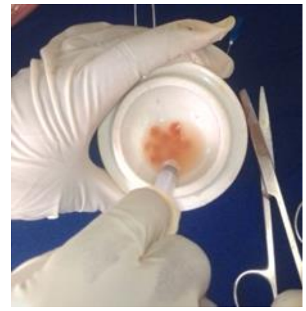
Hatching and larval monitoring

Larvae hatched approximately 48 hours after fertilization. They were counted and then maintained in the incubation tanks. No food was given during the first 7 days post-hatching, corresponding to the yolk sac resorption period. After these 7 days, the remaining larvae were counted again. The physicochemical parameters of the water (temperature, pH, salinity, total dissolved solids, conductivity) in the rearing tanks were recorded weekly, three times a day (morning, noon, evening) using a multi-parameter device.

The images in Fig. (4) summarize the different stages of the experimental procedure and Fig. (5) shows larvae at day 1 post-hatching.

a) Extraction of male gonads b) Grinding of testes c) Collection of milt





a) Extraction of male gonads b) Grinding of testes c) Collection of milt



d) Mixing of milt and eggs e) Addition of fertilization solution f) Incubation

Fig. 4. Artificial reproduction procedure

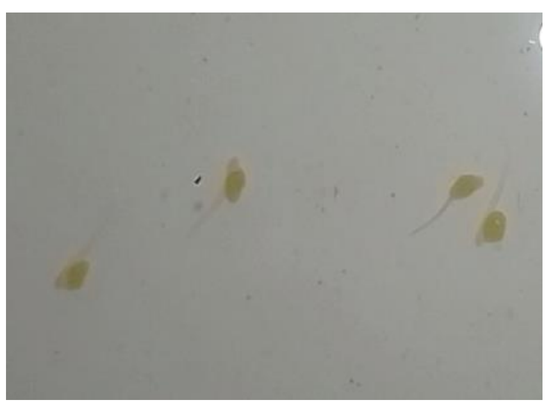


Fig. 5. Larvae at day 1 post-hatching

Calculated Parameters

The following parameters were calculated following the assessment of gonadal sexual maturity and the practice of artificial reproduction.

- Gonado-somatic index (GSI): (Weight of ovaries / Total weight of the female) × 100, expressed as a percentage (**DE Vlamin *et al*., 1982**);
- Absolute fecundity: (Number of oocytes in a sample / weight of the sample) × Total weight of the ovaries **(Bagenal, 1979)**;
- Relative fecundity: (Absolute fecundity / Total weight of the female), expressed in oocytes per gram or kilogram **(Bagenal, 1979)**.

The following parameters were calculated only after artificial reproduction:

- Fertilization rate = (Number of fertilized eggs / Total number of eggs incubated) × 100 **(Okomoda *et al*., 2017)**;
- Hatching rate = (Number of larvae obtained / Total number of eggs incubated) × 100 (**Berlinsky *et al*., 2004; Anita & Dewi, 2020)**;
- Larval survival rate = (Number of surviving larvae / Total number of larvae at the start) × 100 **(Maik *et al*. 2017)**.

4. Statistical Analyses

Data from the sexual maturity assessment were compiled and processed in an Excel file and analyzed with R Studio using Fisher's exact test and the Kruskal-Wallis rank sum test. Data from artificial reproduction were compiled and processed in an Excel file and analyzed using ANOVA F-test with XLSTAT software.

Ethical approval

The protocols used in this work was under the approval of Ethical committee of the Department of Animal Science, University of Dschang. It conforms with the internationally accepted standard ethical guidelines for the use and care of laboratory animals according to the prescriptions of European Community guidelines; EEC Directive 86/609/EEC, of November 24, 1986.

RESULTS

1. Effects of weight on quantitative and qualitative parameters related to ovarian maturity and oocyte quality

Effects of weight on quantitative characteristics

Table (1) presents the effects of weight on the different measurable and observable characteristics related to ovarian maturity and oocyte quality in *Clarias jaensis*. Complex relationships between the biomass of females and their reproductive investment were observed. There was a significant (*P*= 0.006) increase in ovarian weight with body weight, rising from 12 ± 5.2 g to 43 ± 5.2 g between the extreme classes.

Table 1. Effects of weight on quantitative parameters

Characteristics	166-280, n = 10	280-394, n = 9	394-507, n = 5	507-621, n = 2	*P*
Weight of ovaries (g)	$12^{c} \pm 5.2$	$19^{bc} \pm 9.1$	$30^{ab} \pm 11$	$43^{a} \pm 5.2$	0.006^{*2}
Number of eggs/g	$251^{a} \pm 53.5$	$268^{a} \pm 35.3$	$275^{a} \pm 50.3$	$263^{a} \pm 65.8$	0.8^{2}
Absolute fecundity	$2824^{c} \pm 1111$	$5013^{bc} \pm 2687$	$8176^{ab} \pm 3857$	$10985^{a} \pm 1419$	0.003^{*2}
Relative fecundity	$13^{a} \pm 5.4$	$15^{a} \pm 8.2$	$18^{a} \pm 9.6$	$18^{a} \pm 3.2$	0.5^{2}
Gonadosomatic index (%)	$5^{a} \pm 2.5$	$6^{a} \pm 2.7$	$7^{a} \pm 2.7$	$7^{a} \pm 0.5$	0.5^{2}
Mean diameter of oocytes (mm)	$0.384^{a} \pm 0.005$	$0.379^{a} \pm 0.004$	$0.384^{a} \pm 0.006$	$0.391^{a} \pm 0.005$	$>0.9^{2}$

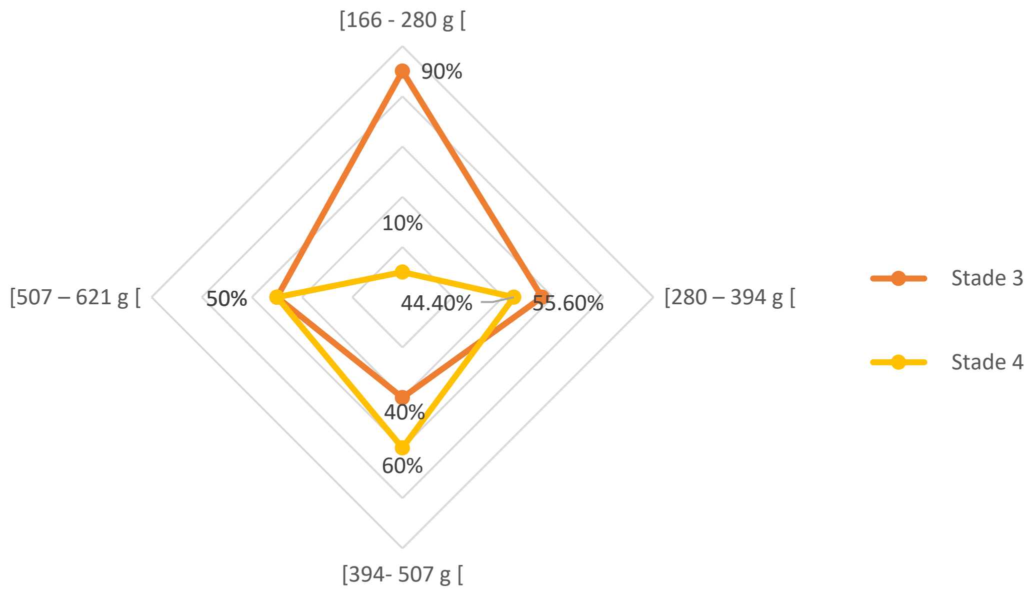
a, b, c: means carrying the same letters on the same line are not significantly different (*P* >0.05), n: sample size of females in the class, ** very significant, *P* = Probability, ² = Kruskal-Wallis rank sum test, The notation for weight classes [a,b[or [a,b] follows the standard interval rule: "a" is the smallest value in the interval, and "b" is the largest, *[a,b[*: the value "a" is included (Weight ≥ a), and the value "b" is excluded (Weight < b), *[a,b]*: both bounds a and b are included (Weight ≥ a and ≤ b).

Effects of weight on qualitative reproductive parameters

This section presents various non-measurable parameters related to ovarian maturity.

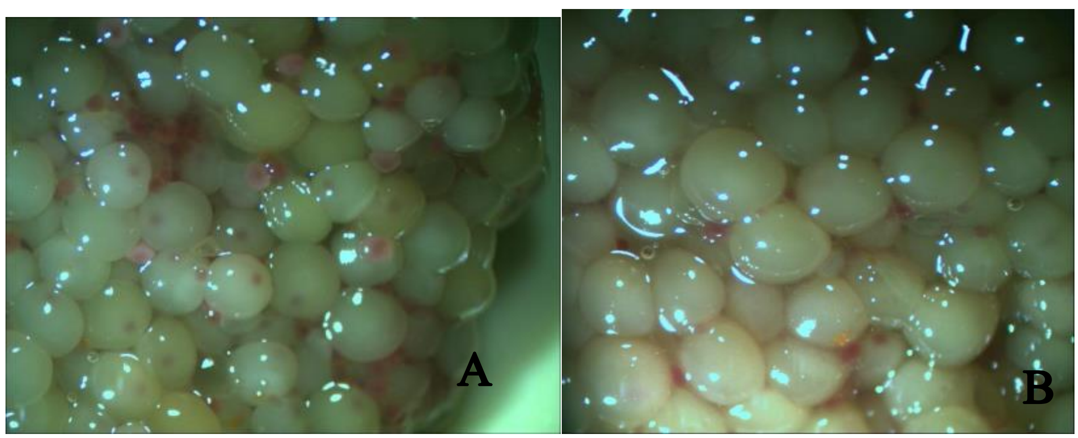
Variation in maturation stages according to weight

The following radar chart (Fig. 6) illustrates the variation of maturation stages according to weight classes. These results show that the majority of females are at maturity stage 3 (65.4%), while 34.6% are at stage 4. Statistical analysis reveals a *P*-value of 0.2, well above the usual significance threshold of 0.05. This indicates that there is no significant difference in the distribution of maturity stages between different weight classes. In other words, progression to stage 4 is not directly related to the body weight of the females, suggesting that other factors might influence their ovarian development. Fig. (7) shows typical appearances of mature and immature oocytes.



Stade 3=3rd stage, stade 4= 4th stage

Fig. 6. Variation of maturity stages according to weight classes



A: Mature oocytes, B: Immature oocytes

Fig. 7. Mature and immature oocytes in *Clarias jaensis*

Presence of germinal spots according to weight

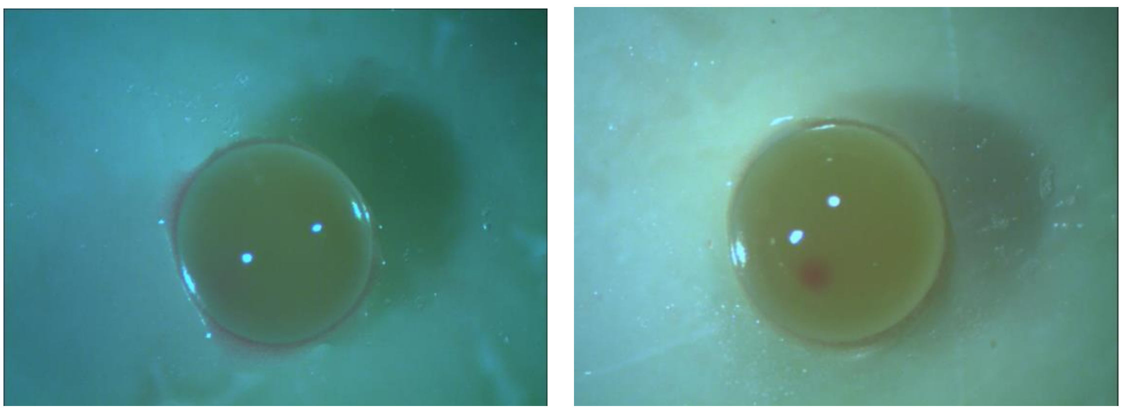
The presence or absence of black spots or germinal spots is summarized in Table (2). These results provide information on the presence of germinal spots according to weight, showing a significant effect of body weight on the appearance of black spots in females of *Clarias jaensis* (P = 0.011). While the vast majority of females in the smallest weight class (166–280) do not have them (90.0%), their frequency increases significantly in the higher weight classes: 77.8% in the 280–394 range, 60.0% in 394–507, and 50.0% in 507–621.

Table 2. Presence of germinal spots according to weight

Germinal Spot	166,280 g, n = 10	280,394 g, n = 9	394,507 g, n = 5	507,621 g, n = 2	*P* 0.01*[3]
Germinal spot absent	9 (90.0%)	2 (22.2%)	2 (40.0%)	1 (50.0%)	
Germinal spot present	1 (10.0%)	7 (77.8%)	3 (60.0%)	1 (50.0%)	

n: number of females in the class, * significant, *P*= Probability, [3] = Fisher's exact test

Fig. (8) shows an oocyte without a germinal spot (A) and with a germinal spot (B) in females of *Clarias jaensis*.



A B

A - Oocyte without germinal spot, B - Oocyte with germinal spot

Fig. 8. Absence and presence of germinal spot in an oocyte of *Clarias jaensis*

2. Reproductive performance according to body weight

This section highlights the impact of the total body weight of females on various reproductive performances.

Quantitative data on reproductive performance

Quantitative data on reproductive characteristics is represented in Table (3). The reproductive performance data for females of *Clarias jaensis* reveal an average absolute fecundity estimated at 6145.575 ± 6009.953 eggs, with extreme values ranging from 5,352 to 12,155 eggs.

Table 3. Quantitative data of reproductive parameters

Variable	Minimum	Maximum	Mean ± Standard deviation
Absolute fecundity	5352.000	12155.000	6145.575 ± 6009.953
Relative fecundity	26.850	39.920	34.750 ± 4.693
Fertilization rate (%)	34.000	86.000	66.500 ± 19.828
Hatching rate (%)	18.000	57.000	39.375 ± 12.141
Larval survival rate	38.890	66.670	54.321 ± 11.133

Effects of body weight on reproductive performance

The results relating the impact of female body weight on reproductive performance are shown in Table (4). These results highlight the effects of body weight on reproductive performance, showing that females in the weight class 280–394g exhibit a moderate positive correlation (r = 0.566) with the hatching rate.

Table 4. Linear Rrelationships between weight classes and reproductive parameters, as well as among reproductive parameters

Variable 1	Variable 2	Correlation Coefficient	Strength Interpretation
Weight class 394-507g	Absolute fecundity	0.672	Strong positive correlation
Weight class 394-507g	Relative fecundity	0.593	Moderate to strong positive
Weight class 280-394g	Hatching rate (%)	0.566	Moderate to strong positive
Weight class 507-621g	Larval survival rate (%)	0.536	Moderate positive correlation
Fertilization rate (%)	Hatching rate (%)	0.848	Very strong positive correlation

Calculated against the model Y=Mean(Y)
Significance codes: 0 < *** < 0.001 < ** < 0.01 < * < 0.05 < . < 0.1 < ° < 1

Differences between mean reproductive parameters and weight classes

Table (5) summarizes the differences between reproductive parameters based on their means. These results present the evaluation of differences between mean reproductive parameters and weight classes. For all tested parameters (absolute fecundity, relative fecundity, fertilization rate, hatching rate, and larval survival rate), *P*-values were greater than 0.05 (ranging from 0.327 to 0.889), indicating that the observed differences between means of weight classes for these parameters are not statistically significant. The average fertilization rate, at 66.5%, though moderate, shows great variability (standard deviation 19.83), with values ranging from 34 to 86%.

Table 5. Differences between mean reproductive parameters and weight classes

Dependent variable	df	Sum of squares	Mean squares	F	*P*>F
Relative fecundity	3.000	83.531	27.844	1.577	**0.327**
Fertilization rate (%)	3.000	365.000	121.667	0.204	**0.889**
Hatching rate (%)	3.000	451.375	150.458	1.037	**0.467**
Larval survival rate	3.000	267.806	89.269	0.595	**0.651**
Absolute fecundity	3.000	11,508,800,575.135	3,836,266,858.378	1.115	**0.442**

Calculated against the model Y = Mean(Y)
Significance codes: 0 < *** < 0.001 < ** < 0.01 < * < 0.05 < . < 0.1 < ° < 1

DISCUSSION

The significant increase in ovarian weight with body weight rising from 12 ± 5.2 g to 43 ± 5.2g between the extreme classes, reflects the greater capacity of heavier females to allocate more resources to ovarian production. This trend is confirmed by the marked increase in absolute fecundity, which on average quadruples, rising from 2,824 ± 1,111 to 10,985 ± 1,419 eggs ($P = 0.003$).

These results corroborate classical observations that body size is a determining factor in total reproductive output in teleosts **(Bagenal, 1979; Hunter & Macewicz, 1985)**. Indeed, a higher body weight allows greater energy allocation to oocyte synthesis, thus increasing absolute fecundity. However, it is notable that body weight does not influence relative fecundity, the number of eggs per gram of ovary, the gonado-somatic index, or the oocyte diameter. This constancy suggests that despite an increase in ovarian volume and total number of eggs, females maintain a stable proportional allocation of their energetic resources to reproduction regardless of their size. This observation aligns with the conclusions of **Murua and Saborido-Rey (2003)**, who emphasize that relative fecundity and unit characteristics of oocytes are often regulated to preserve egg quality even when total quantity varies with size. Thus, body weight primarily affects the total quantity of eggs produced without altering the quality or size of the oocytes.

The present results showed that the majority of females were at maturity stage 3 (65.4%), while 34.6% were at stage 4. Statistical analysis revealed a *P*-value of 0.2, well above the usual significance threshold of 0.05. This indicates that there is no significant difference in the distribution of maturity stages between different weight classes. In other words, progression to stage 4 is not directly related to the body weight of the females, suggesting that other factors might influence their ovarian development.

The results obtained in this study provide information on the presence of germinal spots according to weight, showing a significant effect of body weight on the appearance of black spots in females of *Clarias jaensis*. While the vast majority of females in the smallest weight class (166–280[) do not have them (90.0%), their frequency increases significantly in the higher weight classes: 77.8% in the 280–394 range, 60.0% in 394–507, and 50.0% in 507–621. This ascending distribution suggests that the presence of black spots is more common in heavier females, possibly related to physiological phenomena such as ovarian maturation, follicular atresia, or other mechanisms associated with the age or growth of the fish.

This observation indicates that the presence of these structures, which are morphological indicators of advanced oocyte maturation, is favored by higher body weight. This phenomenon is consistent with the work of **Mylonas *et al.* (2010)**, who demonstrated that progression toward sexual maturity is often associated with an increase in body size, enabling better follicular development.

The reproductive performance data for females of *Clarias jaensis* revealed an average absolute fecundity estimated at 6145.575 ± 6009.953 eggs, with extreme values ranging from 5,352 to 12,155 eggs. This dispersion suggests that body size, physiological condition of the breeders, and gonad quality play key roles in individual reproductive capacity.

This observation aligns with the findings in other fish species where absolute fecundity was strongly correlated with size and body condition **(Bagenal, 1979; Murua & Saborido-Rey, 2003)**. In contrast, relative fecundity, expressed as the number of eggs per gram of body weight, showed much lower variation (mean of 34.75 ± 4.69), reflecting a certain consistency in reproductive allocation relative to biomass, suggesting that females maintain a reproductive strategy proportional to their size, regardless of their total mass **(Hunter & Macewicz, 1985)**.

These results highlight the effects of body weight on reproductive performance, showing that females in the weight class 280–394g exhibit a moderate positive correlation (r = 0.566) with the hatching rate. This observation indicates that, although those females were smaller in size compared to other classes, they provided favorable conditions for embryonic development, resulting in a relatively high hatching rate.

This performance could be explained by several factors. On one hand, it is possible that the eggs produced by these females were of better quality in terms of embryonic viability, which aligns with the observations of **Kamler (2005)**, who noted that the biochemical composition of eggs and the physiological maturity of females significantly influenced hatching success. On the other hand, literature suggests that in some fish species, smaller females may compensate for their lower fecundity by better allocating resources toward egg quality **(Coward & Bromage, 1999)**.

In contrast, the absolute and relative fecundity in this weight class did not reach the levels observed in the 394–507g class, which is consistent with the findings of **Legendre (1986)**, who demonstrated that fecundity generally increases with female size up to a certain threshold. Thus, females in class 1, although less productive in terms of egg number, stand out for a satisfactory hatching rate, which may represent an advantage for breeders seeking better embryo viability rather than massive larval production.

The evaluation of differences between mean reproductive parameters and weight classes showed that, for all tested parameters (absolute fecundity, relative fecundity, fertilization rate, hatching rate, and larval survival rate), *P*-values were greater than 0.05 (ranging from 0.327 to 0.889), indicating that the observed differences between means of weight classes for these parameters were not statistically significant.

These findings suggest that although correlation trends may exist, the absolute mean differences between weight classes for these reproductive parameters were not pronounced enough to be considered statistically significant. This may be explained by substantial intra-class variability masking inter-class differences during analysis of variance of means. It is possible that other unmeasured factors or larger sample sizes are needed to detect significant differences between weight class means for these reproductive performances.

The average fertilization rate at 66.5%, though moderate, shows great variability (standard deviation 19.83), with values ranging from 34 to 86%. This range may be attributed to several factors, including gamete quality, insemination techniques used, and fluctuating environmental conditions that directly influence fertilization success **(Mylonas *et al.*, 2010)**. Similarly, the relatively low average hatching rate (39.38%), with variation from 18 to 57%, probably reflects differences in incubation conditions, genetic quality of breeders, or management of physico-chemical parameters **(Wedemeyer, 1996)**. Larval survival rate at seven days post-hatching, around 54.32%, is a key indicator of early developmental success, influenced by water quality, early nutrition, and disease risk management, consistent with reports from other farmed fish species **(Boeuf & Le Bail, 1999)**. This lack of statistical effects does not corroborate literature where weight is often a major factor of reproductive capacity **(Bagenal, 1979)**. However, temperature remains a critical parameter influencing fertilization, embryonic development, and larval survival in fish **(Pankhurst & Munday, 2011)**.

CONCLUSION

This study focused on the valorization of the endemic species *Clarias jaensis* in Cameroon, in response to the increasing demand for animal protein and a local production deficit. It examined the effects of female body weight on ovarian maturity and reproductive performance in *Clarias jaensis* females. The body weight of *Clarias jaensis* females significantly influences ovarian weight and absolute fecundity, with heavier females producing more eggs. However, body weight showed no significant effect on relative fecundity, the number of eggs per gram of ovary, the gonadosomatic index, the average diameter of oocytes, maturity stage, or the presence of the germinal spot.

The evaluation of the effect of female body weight on reproductive performance revealed a high individual variability in absolute fecundity, while relative fecundity remained more constant. Although females of intermediate weight showed a positive correlation with hatching rate, no significant differences were detected among weight classes for fertilization, hatching, and larval survival rates, possibly masked by uncontrolled temperature variations.

This study highlights the importance of the breeders' weight for the quantity of eggs produced, while emphasizing challenges related to the capture, storage, and transport practices of breeders in the Mbô plain. These findings call for the implementation of sustainable management strategies for natural stocks and the development of more efficient aquaculture techniques incorporating rigorous control of environmental parameters to optimize reproductive performance of *Clarias jaensis* and contribute to food security.

Availability of data and materials

All data are presented within the manuscript; however, the authors may provide additional information upon reasonable request.

Competing Interests

The authors declare that there are no competing interests.

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Conflict of interest

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