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***Full Length Research Paper***

# COMPARATIVE STUDY ON THE GROWTH AND SURVIVAL OF *HETEROCLARIAS* FRY FED ON *ARTEMIA NAUPLII* AND *MOINA MICRURA*.

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## ABSTRACT

Growth rate, specific weight gain, total body length and survival rate were studied in *Heteroclarias* fry fed under three (3) different treatments with shell free *Artemia naupli*, cultured *Moina micrura* and combination of both, 180 fry measuring 0.2g in weight and0.2cm in length were used in the experiment. Each treatment has two replicates. 30 individual fry were placed in each of the treatment in 50-liter plastic tank for durations for 10 weeks (70 days). Water quality parameters, pH and temperature for each treatment were monitored using pH meter (PHS-3sc) and mercury in glass thermometer (0°c-100°c) respectively. The weights increase of the fry of each treatment was measured weekly using a labtech electronic sensitive scale (0.1g-750g) the body length was also measured using a graduated ruler. Body weight gain was significantly higher ($p<0.05$) in *Heteroclarias* fry fed with *Artemia nauplii* (15.49 ± 0.01g) and *Heteroclarias* fry fed on *Artemia* + *Moina micrura* (15.09 ± 0.01g) comparedto those fed with *Moina* only (12.70 ± 0.05g). *Heteroclarias* fry fed with *Artemia* had the highest percentage weight gain (7742.50 ± 2.50%),while fry fed with *Artemia* and *Artemia* + *Moina micrura*both had same higest specific growth rate (0.062 ± 0.000). The highest total mean body length was recorded in *Heteroclarias* fry fed with *Artemia* (5.30± 1.45) although no significantly different ($p>0.05$) from others. Complete replacement of *Artemianauplii* with *Moina micrura* produced the lowest body weight gain (12.70 ± 0.05) and percentage survival rate (26.67 ± 3.34%).The result of the overall resarch showed that partial replacement of shell free *Artemia nauplii* with *Moina micrura*

showed significant growth increase and survival rate and so could be adopted for successful feeding of *Heteroclarias* fry.

Keywords: Shell free, *Artemia nauplii, Moina micrura, Heteroclarias*

## INTRODUCTION

Fingerlings production and survival rate are one of the challenges faced by fish culturist in the production of freshwater species worldwide in particular Nigeria (Adewunmi 2005).

Feed is one of the major keys to aquatic animal culture. Its value will directly affect the growth and development of the larvae. Live feeds have the advantage of not contaminating the culture water, easy digestion, and assimilation, promoting high growth and have a higher nutrition value (Barros *et al*., 2003).

The fact the *Artemia* can be stored for a longer period with only 24hrs of incubation makes them more convenient (Sorgeloos *et al*., 1980) but costly preserved.

Culture of alternative species like *Moina micrura* for feeding fish post-larvae (fry) not only support commercial interest, but also the ecological interest in the development of aquaculture industry based on local species (Brio *et al*., 2000). Species like *Moina micrura* is readily available in fresh waters and can easily be mass produced for larviculture (Okunsebor and Ofojekwu, 2009).

Several authors have demonstrated that growth and survival of fry depends on their food intake (Okunsebor *et al*., 2008), Madu and Ufodike 2001, and Adewolu *et al*., 2008).

## MATERIAL AND METHODS

### Production of *Moina micrura*

Shell free *Artemia* and cultures of *Moina Micrura* were used. *Moina micrura* was produced from the *Moina* culture in the research teaching Farm of Faculty of Agriculture Nasarawa State University, Lafia. The *Moina micrura* were distributed into different plastics tanks of ten liters capacity at the fifteen per tank. The tank was covered with mosquito net to avoid growth of other insects as well as external predators (Okunsebor and Ofojekwu, 2009). The fertilizer used was a mixture of single superphosphate(1.5g/1), groundnut cake (1.88g/l), chicken droppings (7.5g/l) and rice brain(1.87g/1) the ingredients were dried, ground and made into solution using distilled water (Rottman *et al*., 2003). The fertilizer solution was kept in the dark of 36 hours and then filtered. The filtrate was kept in a clean corked bottle in dark room to prevent algal growth (Ovie and Ovie, 2002). *Moina micrura* was fed with the fertilization solution in the morning at 8 am and evening 6pm at the rate of 4ml/l (Okunsebor and Ofojekwu, 2009). The *Moina micrura* was collected in a plankton sieve, wash with fresh water and used for the feed trials alongside with shell free *Artemia*.

### Production of *Heteroclarias* Fry

*Heteroclarias* fries were produced from a cross between the mate of *Clarias gariepinus* and female of *Heterobranchus*

*bidozalis* of 1kg in weight respectively. The female fish was infected with 0.5ml of ovaprim per 1kg fish. Three days old fries were distributed into three plastics fish tanks of 50 liters in three replicates in a flow-through system. Three treatments feeding regimes were used. Treatment I was fed only *Moina micrura*, treatment II was feed *Artemia* and *Moina micrura*, while treatment III was fed only *Artemia* which served as control. The fish were fed twice a day at 8am and 6pm. The feeding trial lasted for 70 days. Some phsico-chemical parameters of the water were analysed using APHA/AWWA/WPCF (1995) method. The growth rate of the fish was monitored using these indexes – formular.

Percentage weight gain (PWG) = $\frac{100\,(W_2 - W_1)}{W_1}$

where $W_2$ = final mean body weight and $W_1$ = initial mean body weight.

Specific growth rate of the fry in the period of experiment was determined as stated below (Adewolu *et al*., 2008).

Specific Growth Rate (SGR) = $\frac{\log_e W_1 - \log_e W_2}{T_2 - T_1}$ where w2 = final weight, W1 = initial weight, Loge = Natural log to base e, T2 = Final weight in days, T1 = Initial weight in days.

Percentage survival rate = $\frac{No\ of\ fry\ that\ survived}{Total\ no\ of\ fry\ at\ beginning}\ X\ 100$

The proximate analysis of the live diets, shell free *Artemia* and *monia micrura*, was done.

Statistical Analysis at P<0.05 was carried out using analysis of variance and the means were separated using Duncan multiple range test.

**RESULTS**

Table 1 shows the result of proximate analysis of shell free *Artemia nauplii* and *Moina micrura* used for the growth trials of *Heteroclarias* fry.

Table 1: Proximate Analysis of the diet (Shell free *Artemia* and *Moina micrura*)

| Components | *Artemia* | *Moina micrura* |
|---|---|---|
| **Protein** | 54% | 52% |
| **Lipid** | 11% | 10% |
| **Ash** | 6% | 4% |
| **Fiber** | 8% | 7% |
| **Moisture** | 5% | 10% |
| **Carbohydrate** | 16% | 17% |

Table 2 shows the growth performance and survival of *Heteroclarias* fry fed on three different treatments (*Artemia, Artemia* + *Monia micrura*, and *Monia micrura*) respectively for 70 days.

Table 2: Growth performance and survival of *Heteroclarias* fry in different treatments during the study period.

| Treatments (Parameter) | Artemia± SEM | Moina + Artemia± SEM | Moina± SEM |
|---|---|---|---|
| **Initial Weight (g)** | $0.20 \pm 0.00^{a}$ | $0.20 \pm 0.00^{a}$ | $0.20 \pm 0.00^{a}$ |
| **Final Weight (g)** | $15.69 \pm 0.01^{c}$ | $15.29 \pm 0.01^{b}$ | $12.90 \pm 0.05^{a}$ |
| **Length Increase(cm)** | $5.30 \pm 1.45^{a}$ | $5.04 \pm 1.38^{a}$ | $4.09 \pm 1.11^{a}$ |
| **Weight gain (g)** | $15.49 \pm 0.01^{c}$ | $15.09 \pm 0.01^{b}$ | $12.70 \pm 0.05^{a}$ |
| **Percentage weight gain (g)** | $7742.50 \pm 2.50^{c}$ | $7545.00 \pm 5.00^{b}$ | $6350.00 \pm 25.00^{a}$ |
| **Specific growth rate** | $0.062 \pm 0.000^{b}$ | $0.062 \pm 0.000^{b}$ | $0.060 \pm 0.001^{a}$ |
| **Survival rate (%)** | $51.67 \pm 1.67^{b}$ | $63.34 \pm 3.34^{b}$ | $26.67 \pm 3.34^{a}$ |

Rows with similar superscripts are not statistically different from each other SEM = Standard error of mean

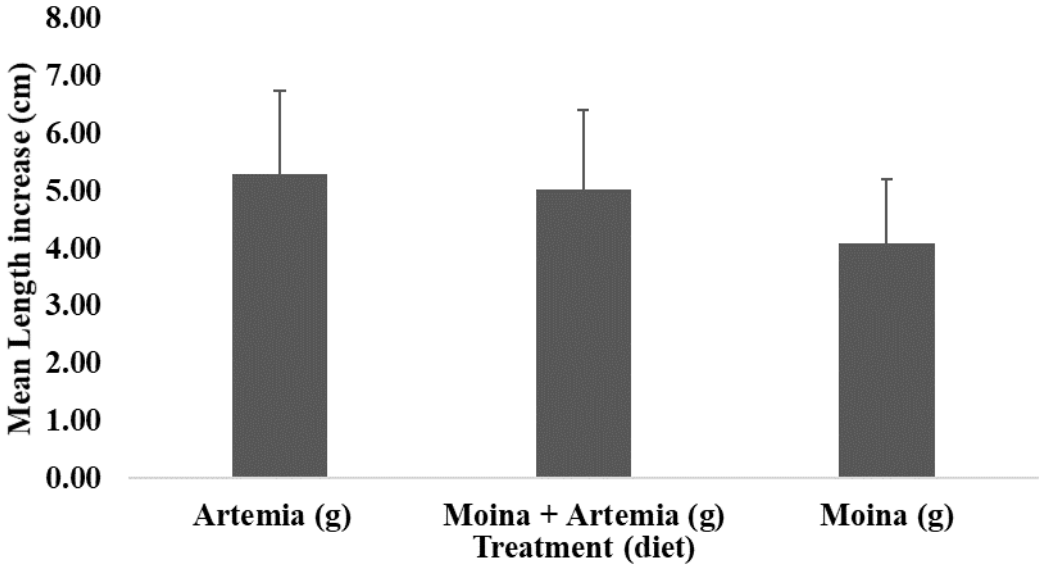


Figure 1: Mean length of *Heteroclarias* fry of the three treatments for 70 days.

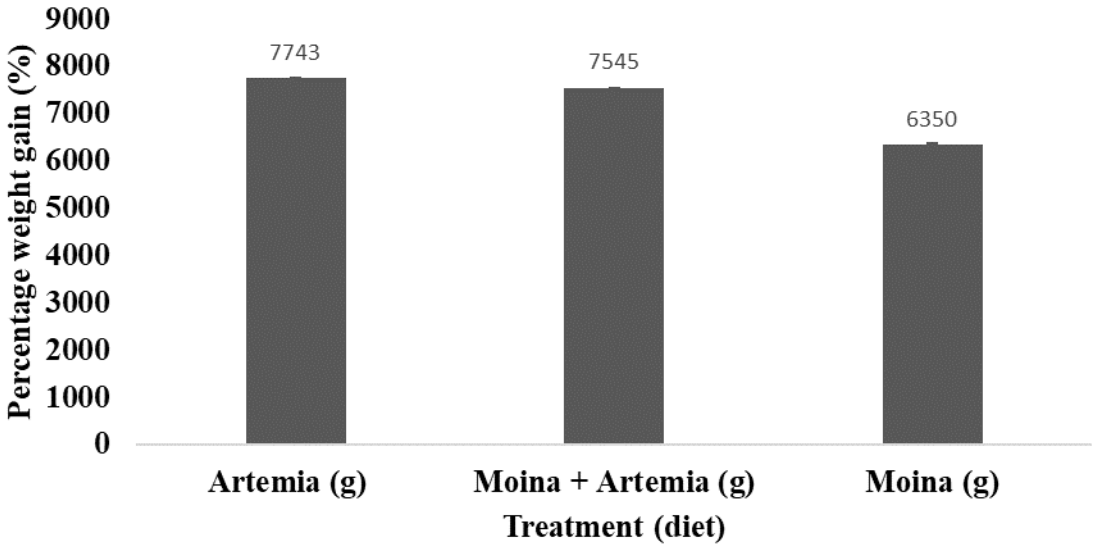


Figure 2: Percentage weight gain of *Heteroclarias* fry of the three treatment for 70 days.

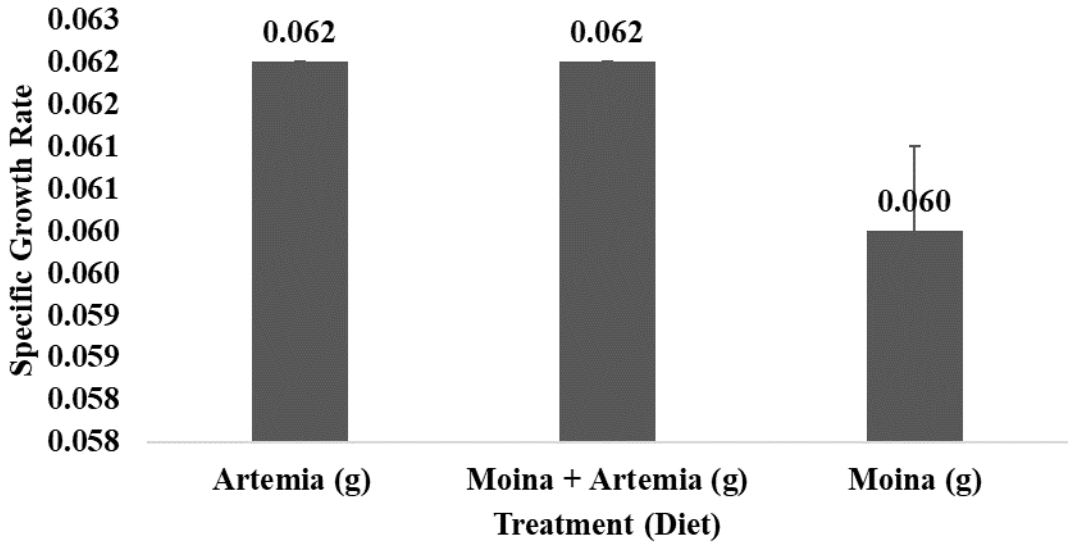


Figure 3: Effect of treatments on Specific growth rate of *Heteroclarias* fry

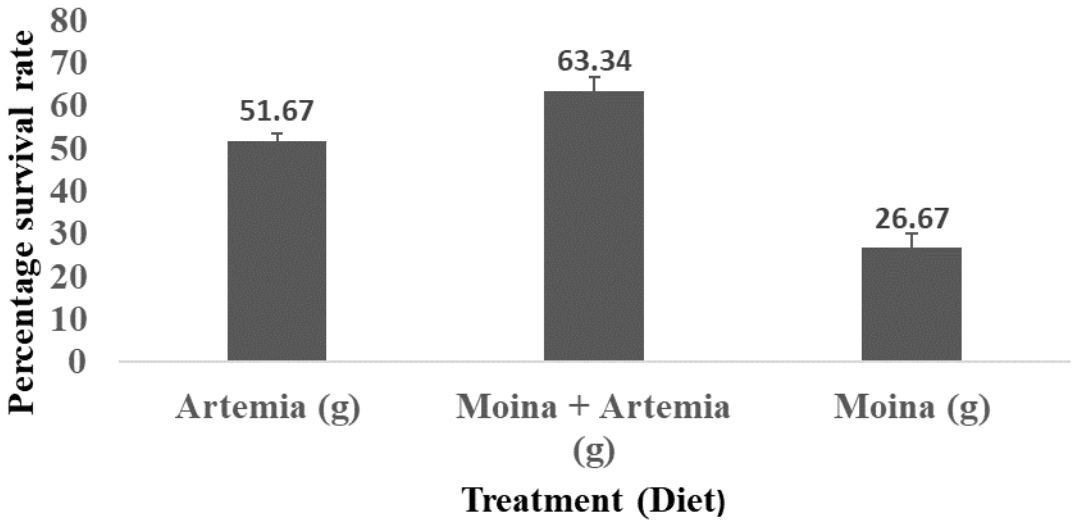


Figure 4: Effect of treatments on Percentage survival rate of *Heteroclarias* fry.

**DISCUSSION**

This research was conducted to investigate the growth and survival of Hecteroclarias fry fed with shell free *Artemia*, *Artemia* and cultured *Moina micrura* for 70 days. Body weight gain was significantly higher in *Hecteroclarias* fry fed with *Artemia* and *Artemia* + *Moina micrura* (15.49 ± 0.01, 15.09 ± 0.01) compared to *Heteroclarias* Fry fed *Moina micrura* solely (12.70 ± 0.05). The result showed that the body weight gain correlated with food quality, this is in accordance with the works of Martinez *et al.,* 2007 who demonstrated that body weight gain is greatly affected by the nutritional quality of the food.

The *Heteroclarias* fry fed on *Artemia* and *Artemia* with *Moina micrura* achieved a higher specific growth rate (0.062 ± 0.000) than the *Heteroclarias* fry fed on *Moina* solely (0.060 ± 0.000). Although statistically, the specific growth rate does not show any significant difference between *Artemia* and *Artemia* +*Moina micrura*.

The body length (5.30cm, 5.04cm, 4.09cm) of *Heteroclarias* fry in the three treatments were not significantly ($p>0.05$) different from each other. However, the percentage survival rate of *Heteroclarias* fed on *Artemia*, *Artemia* +*Moina micrura* (51.67 ± 1.67%, 63.34 ± 3.34%) showed a significant difference ($p<0.05$) from the *Heteroclarias* fry fed only *Moina Micrura* (26.67 ± 3.34%). This is in accordance with the works of Martin *et al*., 2008, Brio *et al*., 2000 who demonstrated that the Growth and survival of *Heteroclarias* fry seems directly influenced by the diet composition and can be used as a food quality index (Taxen and sorgeloos, 1996). The water parameters, temperature, $P^H$ for all treatments in this study were not significantly different.

## CONCLUSION

This research showed that *Heteroclarias* fry fed with *Moina micrura* obtained the lowest percentage weight gain, specific growth rate and percentage survival rate although not significant different from other treatments. However, it was recorded that *Moina micrura* can partially replace, shell free *Artemia* in feeding *Heteroclarias* fry with profound effect on growth and survival rate.

## RECOMMENATION

It is highly recommended that *Moina micrura* be incorporated in fish hatcheries as a partial replacement with shell free *Artemia*. This research has shown that the feeding of *Heteroclarias* fry with *Artemia* and *Moina micrura* simultaneously enhances growth and survival rate and thus reduces feeding cost. Finally, further research should be carried out on *Moina micrura* to ascertain its adequacy to completely or partially replace *Artemia* diet at a relatively lower cost.

## CONFLICT OF INTEREST

No potential conflict of interest was reported by the authors.

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