BloEx - Journal
Britain International of
EXACT Sciences Journal
Publish: | January - May - September |
E-ISSN: 2686-1208
P-ISSN: 2686-1216
http://biarjournal.com/index.php/bioex

Essay of Different Proportion of Protein on Growth of juvenile Distichodus antonii schilthius 1891.l. In vivo in Kisangani (D. R. Congo.)

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Abstract:

The present work was carried out in 201 at Facultural Institute of Agronomic Science of Yangambi in the province of Tshopo (RDC) and focuses on the Essay of different proportion of protein on growth of juvenile Distichodus antonii schilthius 1891.l. In vivo in Kisangani (D. R. Congo.) The objective pursued by this work was of study the performance of growth of juvenile of Distichodus antonii schilthius vivo in. Methodology and results: It resulted from the study that Distichodus antonii has doubled weight during all the experience. According to the t test of STUDENT calculated between the gain of body mass of fish fed with the food R1 continent 300% of protein and the R2 continent 25 % of protein showed a non significant difference (P<0,05). The SGR (Specific Growth Rate ''SGR'') appeared meaningfully and significantly correlated to the fed. The results of mortality rate during this experience did not seem being correlated to the different diet but rather to the manipulation of fish and other experimental protocols artefacts. The protein content of the carcasses of Distichodus varied of 117, 40% for the food R1 and 135, 84% for the food R2. The diet R2 appeared performing compared to the diet R1 according to body protein gain by unit of consumed protein and for the weight gain by unit of consumed protein by Distichodus antonii.

Keywords:
mboto; growth; Distichodus antonii; kisangani

I. Introduction

World production from capture fischeries and aquaculture for human consumption reached approximately 106 million tonnes of fish in 2004, of which 43 % is provided by aquaculture. The share of sub-saharan Africa in this production remains insignificant: 0,16 % of tonnage and 0,36 % in terms of value. Yet aquaculture was introduced into the Democratic Republic of Congo over the 1940s-1950 years by Belgian colonizers because of the immense natural aquacultural potential of our contry. Valuation for quacultic purposes of thes biophysical potentialities should certainly have been to be a powerful factor of sustainable economic development, food security and poverty and malnutrition in DRC (FAO 2006).

Unfortunately, despite multiple efforts in the past and after the so-called wild wars, international donors have taken to stimulate its growth on the one hand, and others, there are many attempts through Carnival projets for its expression, the Congolese Aquaculture sector remained slightly and could not achieve the expected results.

Paradoxically, most African countries use fish imports to meet local demand for fisheries products. Thereby Brummet, R.E., Lazard, J. & Moehl, J. (2008), strong that African states (DRC) import about 4,2million tonnes of fish per year for an estimated value of Euro 2,2 billion, making the Congolese nation thousand thousand dollars a year.

Therefore, the need to develop this sector is acquitted to reverse this trend and fight against malnutrition that is settled in the country. Several factors are held responsible for the poor performance of Congolese aquaculture (Nyongombe, U., 1993). The most cited are the absence or insufficiency of quality juvenilles, the lack of fish foods, the poor fishing line, the inadequacy of extension methods and difficult access to investment capital as well as the lack of introduction of new aquaculture species, coronary on the one hand, policies and unfair approaches, and others on the lack of a strategy and national plan for subtainable development of the aquaculture sector (N'shimba, S-W-M; 2008). As a result, aquaculture is still essentially a craft activity, possibility of providing professional opportunities. Production is relatively low and intended for family consumption or small-scale marketing. (Mate, M. 2001).

The main species of fish used in Congolese fish farm belong to the family of Cichlidea and Claridea. The most use dis undoubtedly the Tilapia (Oréochromis niloticus). The breeding claridea are represented by the species Clarias Gariepinus. Wildlifeness introduction tests were initiated in Kisangani, this is the case of Chrysichthys Wagerari (Nyakabwa, M., 1988). The D. antonii especies of the vernacular name « MBOTO » is a fish with the yellow pineapple, very french bond whose adult weight can weigh 4 to 15 kg (Mbadu, Z. V. et VREVEN, E., 2008). This live in the Congo River and its tributaries, il is overfishing and starts too rarely. In the current state of knowledge, the livestock and nutritional date of this species are almost-axisent. However, any process of domestication of a species of fish necessarily passes through the control of the mass production of quality juveniles and the formulation of food specific to this species.

Consequently, it becomes essential on the one hand, to undertake more research on the reproduction of this species and on the strategies of breeding of their larvae and on the other hand, to carry out studies aiming at determinig the specific food needs. Of this secies at differentontogenetc stages. It is this perspective that this study was initiated.

The present work was carried out in 201 at Facultural Institute of Agronomic Science of Yangambi in the province of Tshopo (RDC) and focuses on the Essay of different proportion of protein on growth of juvenile Distichodus antonii schilthius 1891.l. In vivo in Kisangani (D. R. Congo.). Its specific objective is to verify the acceptability of the artificial food by the juvenile of this species at different raw protein levels, in a controlled medium.

On the scientific level, this pilot work will lay the research bases on the child's food strategies of this species, as well as the strategies of its breeding in captivity, will allow fish farmers to diversify fish species in their ponds, but also to offer the market a finished product of good quality.

This investigation proposes to demonstrate the assumptions that, the juveniles of D. antonii would accept the articial food in a controlled environment and the diets in different protein levels would influence the growth of this species in vivo.

II. Review of Literature

2.1 Middle

The study was conducted in the province of Tshopo, within the Institute of Agronomic Sciences of Yangambi, Yangambi, Democratic Republic of the Congo. This city is included in the climate area climate area, 0°31N, 25°11S and between 376 and 460 m altitude, with a climate of the AF type (Nyongombe. U, 1993).

Figure 1. *Map of Kisangani City (source: www. google)*

2.2 Biological Material

Juveniles of D. antonii are collected via fishing and purchase from local fishermen in the wild on the Congo River after location of spawning and nursery grounds of Echirochloa pyramidalis grasses (photo1) Wagenia Falls in Kisangani (DRC). These fish are always collected using a large mesh net. Specimens of plus or minus 5 cm captured are transported to IKENGE fish ponds in Kisangani Commune (PK 4, BANGBOKA Road) by land in an 80liter water-resistant plastic cask equipped with a battery aerator at a temperature of density of about 50 juveniles per 20 liters of water. Upon arrival, they are stored in a previously fertilized pond, without artificial feeding.

Figure 2. *Juveniles of D. antonii (Source: persnal)*

2.3 Laboratory Equipment:

The materials used in the laboratory for the completion of this study are:

1) Bakelette Aquamerk ;
2) Water thermometer ;
3) Precision balance ;
4) Definition ;
5) Oxygenator ;
6) Breeding ;
7) 500 liters tits and 210 litres ;
8) Plastic bags ;
9) Floor sand ;
10) Bresse ;
11) Foam or sponge 20,30 and 20 cm.
12) Pissets ;
13) Test tubes ;
14) Gauge ;
15) Ballon ;
16) Erlenmeyers.

III. Research Methods

The experience of the present work has been carried out on the premises of the Faculty Institute of Agricultural Sciences of Yangambi in Kisangani (Plateau Plateau Medical District). After the unfertilized pond period and individual weighing of individuals, 180 juveniles were randomly assigned to the average number of 30 per experimental pool. Two fish were sacrificed and kept in the freezer to facilitate the protein assay at the beginning of the experiment and two others will be taken for the same cause at the end of the experiment. The dead will be counted daily, removed and weighed. The duration of the experiment was 112 days; this was determined by the doubling of the weight of juveniles.

Raising tanks (plastic) of rectangular shape and a working volume of 1 m3 on average were installed in a hangar built with planks in IFA compound in Kisangani (photo3). These basins are fed by REGIDESO water collected and stored in a 220-l tank, which was considered as a mechanical filter to allow us to filter this water, finally to be able to obtain water with properties almost identical to that of fish ponds. After this filtration, this water is poured into a large tank of 500 l and which will in turn feed the basins in the hangar (aquarium). In the 220-liter tank, to filter the water we used gravel, fine sand and foam or sponge at respective heights of 20, 30 and 20 cm. The breeding circuit is an open circuit with a slight flow rate of water constantly. During this experiment, the fish were subjected to natural photoperiod. Measurements of temperature, pH, transparency of cultured water, nitrate, carbonate hardness and nitrite were taken daily with a pH-meter or aquamerk strips esha 2 times a day. That is, in the morning at 8:00 am and in the evening at 4:00 pm. Dissolved oxygen was provided by an electrical oxygenator with the capacity to supply oxygen in 300 l of water.

IV. Discussion

4.1 Experimental Device and Juvenile Weight Taking

Figure 2. *Experimental devices at Ifa-Yangambi (Source: personal)*

4.2 Pre-experimentation

The pre-experimentation aimed to test the appetability of the food by the juveniles. It had duration of 30 days before the actual experiment. Calculation of optimal rationing rate.

$$R = 9{,}291 \times P^{-0{,}324}$$

With R in (%) and P in (g)
(Source : Kestmont. P. 2010)

4.2 Experimental Foods and Feeding

When formulating the experimental feed, we used imported ingredients and local raw materials. Fishmeal and premix vitamins and minerals will be imported from Belgium and the rest of the ingredients (palm kernels, rice bran, peanut oil, E. pyramidalis flour, T. africana flour and P. endes flour) will be harvested from the wild and purchased at the local Kisangani market. Plant by-products according to their nature will always be subjected in turn to a heat treatment, 1 to 3 hours of scarification or cooking depending on the fuel source (wood or charcoal).

These firings will be successively followed by drying in the sun and passing through the mill in order to obtain fine flours before any incorporation into the experimental regimes. Depending on the diet, the protein and carbohydrate ingredients will always be weighed and mixed until a homogeneous powder is obtained, to which are added the respective proportions of vitamins and mineral premix, cassava starch and oil.

Water would then be added to the mixture (in the proportion of 0.5 l of water plus cassava starch plus 1 kg of formulated feed). The paste obtained after two minutes of mixing will then be dried in the sun (28-35 ° C) for 2 to 30 days. Once dried, it will be manually cut into small particles (5mm) and kept at less than 20 ° C before being distributed to fish (ABOU, 2007). After daily weighing, the granules would be manually dispensed to apparent satiety, twice daily (9:30 am and 2:30 pm), in two passes each time. After each feeding, we will siphon the bottom of the basin to avoid the multiplication of carbon dioxide produced by the decomposition of the previous ration.

Figure 3. *Balance for Weighing (Source: personal)*

Table 1. Ingredient Composition of the Experimental Diet (g.kg-1)

Aliment (g Protéine/kg d'aliment		
Ingrédients	250	300
Farine de poisson	204	267
Farine de T. africana	102	133
Farine de P. endens	102	133
Farine d'E. pyramidalis	102	133
Son de riz	208	51
Tourteau de palmiste	100	100
Huile d'arachide	100	100
Amidon de Manioc	20	20
Vitamine premix	30	30
Minéral premix	30	30
PB (%)	25	30
Energie Brute (KJ)	9523,67	9813,94

4.3 Evaluation of the Growth and Use of Food

From the results obtained, several parameters were calculated to evaluate growth and feed efficiency (MONENTCHAM, 2009). These parameters are:

- The specific growth rate (TCS);
- Weight gain (GP) in%;
- Food Efficiency (CEA);
- The protein efficiency ratio (CEP) and
- Protein retention (PR).
- Determination of the protein content of whole fish (Kjeldahl method);

Protein content = total nitrogen x 6.25
The formulas for calculating these factors are:
TCS (% d-1) = 100 (Ln Pf-Ln Pi) / ΔT
GP (%) = 10 [(Pf-Pi) / Pi]
CEA = (Weight gain of poisons including biomass of the dead) / Q
CEP = (Weight gain of poisons including biomass of the dead) / P
RP = 100 [((Pf * PCf) - (Pi * PCi)) / (Q * PA)]

Where Pf = final weight in g; Pi = initial weight in g; T = duration of the experiment in day; Q = quantity of food distributed in g; PCf = final protein body content; PCi = initial protein body content; PA = protein content of the food.

4.4 The Zootechnical Parameters

Two diets with different levels of crude protein were tested in this work on juvenile D. antonii. Diets at 30% and 25% were designed to evaluate the growth of IN VIVO juveniles.

Table 2 shows the main zootechnical parameters taken into account during the experiment. The values shown represent the average of two observations made in breeding ponds for each experimental diet. These values are supplemented by a standard deviation indicating the variation existing within the same regime.

Table 2. Influence of Tested Diets on the Main Zootechnical Parameters of Juvenile D.antonii rearing

Paramètres	**Régime 1**	**Régime 2**
Nombre initial	90	90
Nombre final	25	34
Survie	27,7 ± 2,4	37,7 ± 11,8
Mortalité (%)	72,2±1,9	62,2 ±13
Biomasse initiale (g)	112 ± 12,7	106 ± 16,9
Biomasse finale (g)	307±12,72	306± 7,07
Poids initial moyen (g)	1,2 ± 0,42	1,17 ± 0,56
Poids final moyen (g)	12,3 ± 1,5	9,0 ± 5,1
G (% jour^{-1})	92,3 ± 36,9*	71,8 ±76,9
TCS (%.jour-1) (SGR)	2,08 ± 0,35*	1,88 ± 0,77*
Ingéré (g)	1430 ± 9,89**	984 ± 24,74**
EA	0,19 ± 0,05**	0,26 ± 0,06**
FCR	7,3 ± 3,4*	4,92 ± 2,04

Legends: G = weight gain, SGR = specific growth rate, M = mortality rate, EA = feed efficiency.

4.5 Mass Gain (G) and Specific Growth Rate (TCS)

a. Mass Gain (G)

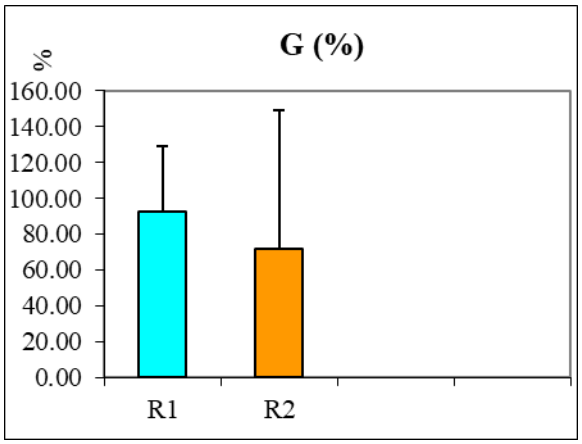

Figure 4. *Masse Gain (G)*

This parameter expresses the growth rate of juveniles per unit time. It clearly shows that the juveniles increased the weights during the experiment in the following order : R1 : 92,3 ± 36,9 et R2 : 71,8 ±76,9. Therefore the R2 diet was more efficient than the R1 diet in terms of daily mass gain.

b. Specific Growth Rate (TCS)

This parameter expresses the growth rate of juveniles per unit time.

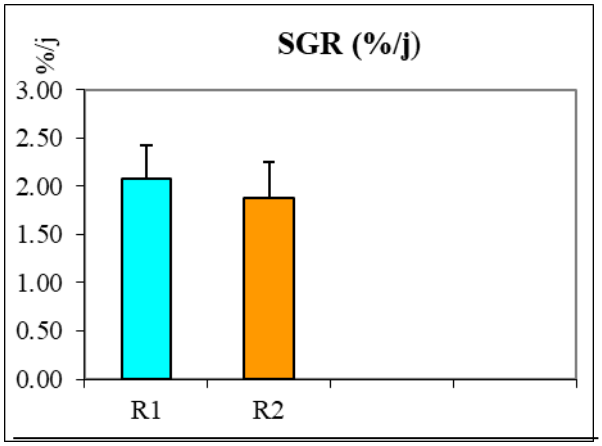

Figure 5. *Specific Growth Rate (TCS) of the juveniles*

This figure illustrates the influence of different rations on the growth of juveles. Indeed, the specific growth rate is higher for the R2 ration.

c. Food Efficiency (EA)

This parameter expresses the effectivess of food on the growthof juveles, the figure clearly shows that the R2 ration was more effective than the R1 ration during the experiment.

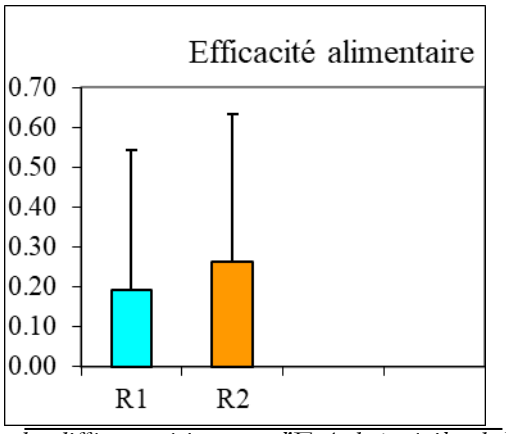

Figure 6. *Influence des différents régimes sur l'EA de juvéniles de Distichodus antonii*

d. Feed Conversion Rate (FCR)

This parameter expresses the rate of fees conversion by juvenilles. Il is the level of valuation of food by the organism of the fish. It would appear that the R1 diet is more converted than the R2 diet. So the increase in animal protein content in the ration of this species does not allow the fish to use it.

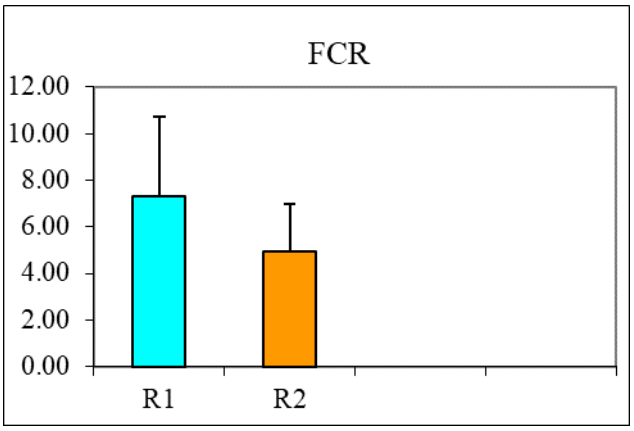

Figure 7. *Influence of Different Diets on FCR of Juveniles of Distichodus Antonii*

4.6 Total Protein

- At the beginning of the experiment: 54.25% (protein content) for both treatments
- At the end of the experiment: 117.40% for R1 and 135.84% for R2.
- As a result, the R2 diet was efficient compared to the diet R1 with respect to the final protein content

V. Conclusions

During the 112 days that our experiment lasted, the breeding conditions were kept optimal for the growth of Distichodus antonii. Mortality was high in all groups regardless of treatment. This has not always been the case in similar experiments with D. antonii. For example, Bulalo (2013) and Bonyonga (2010) had mortality rates of 64.4 ± 6.8% and 29.4 ± 14.5, respectively. While in our case the average mortality rate was 65.8 ± 7.12%.

With regard to the total protein assay, the protein contents of the Distichodus antonii carcasses at the end of the experiment varied between 135.84% for the R2 diet and 117.40% for the R1 diet. The initial body protein content was 54.6%. Nevertheless, the R2 diet has

been effective compared to the R1 diet. In view of the above, our assumptions are therefore confirmed.

That the duration of the experiment is also increased to at least 365 days with an intermediate sampling every 30 days at mid-term; which would be desirable, and,

That log-type growth equations be calculated for each experimental basin and for each interim sampling period;

That different lipid classes are determined at the level of perivisceral fat, liver and gonads.

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