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Research Article

Improvement of the food ingestion rate oreochromis niloticus with monosodium glutamate (msg) as attractant.

LOGBO Jhonn[1], HINVI C. Lambert[2], ELEGBEDE A. Félix[3] , FATON M. Oscar Euloge[4] , GNANCADJA Léopold[4], BONOU D. Brice[5] **EDORH A. Patrick[5], and Didier Emile FIOGBE[6]**

[1]University of Agriculture of Kétou, graduate school of the Sciences and Techniques Agronomies

[2] University of Abomey-Calavi/Laboratory of Hydrobiology and Aquaculture/Faculty of Agronomic Sciences/Benin.(FSA/UAC).

[3] Analysis Laboratory of Hydrocarbons / Head office of hydrocarbons and others fossil's / Benin.

[4]University of Abomey-Calavi/Department of plant biology/Laboratory of plant Physiology and Study of Environmental Stress/Faculty of Technical Sciences /Benin.(FAST/UAC).

[5] University of Abomey-Calavi/Laboratory of Biochemistry and Cell Biology/Faculty of Technical Sciences/Benin.(FAST/UAC).

[6] University of Abomey-Calavi/Laboratory of Hydrobiology and Aquaculture/Faculty of Technical Sciences/Benin.(FAST/UAC).

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Abstract: The present work aims to improve the food ingestion rate at *Oreochromis niloticus* using monosodium glutamate (MSG) as attractant. A single food containing 1% of glutamate in partial alternatives to finish meal was served at different rations of 10%, 15%, 20% and 25% for average weight of *O.niloticus* juvenile (7.34g).The final weight, weight gain, the specific growth rate and survival rate of fish were assessed after 3l days. The results showed that there is a highly significant difference on the threshold of 5% between the growth performances of fish fed with this different ration. The results obtained indicate that monosodium glutamate incorporated up to a 1% concentration in the feed formula of O.*niloticus* improves his appetite and his performances of growth significantly. The 20% ration is the most suitable for a better result with less loss of food.

Keywords: Monosodium glutamate, food ration, *Oreochromis niloticus*, Benin

INTRODUCTION

The fishing and aquaculture sector are today important branches of the chain of food production a sound the world .They represent the financial flows of the same order of magnitude as the meat production industry. In Benin, the most widespread fish species are Tilapia and *Clarias* due to their mode of reproduction control. Many studies have shown a considerable interest in tilapia as a potential suitor for rearing in artificial environment, through qualities such as the good adaptation to the tropical climate, rapid growth and omnivorous feeding[1] .Fish is an important source of protein in the feeding of the population in general and the south in particular. The production of fish, source of protein for many people[2], is also important because of its price lower than meat and its dietary value high in polyunsaturated fatty acids which provide protection against cardiovascular disease[3, 4] .The exorbitant cost of the ingredients in their food does not allow development of this sector. In rural areas with low income non-availability of complete and balanced food (pellets) and/or the potential fish farmers' technical level is insufficient, the use of local by-products could achieve best performance. The incorporation of certain by-products such as local meal in fish feed in only based on their protein content.

The results obtained with these local products are not neglected. The objectives of maximum dietary intake and better growth performance are not always achieved. It is there by fore necessary to find food additives that can improve ingestion and thus achieve a better performance than what is obtained sofar. What allows us to probably the choice of monosodium glutamate (MSG) as attractant in the feeding of fish to achieve a better result. The effect of salt on the palatability and performance of growth in juvenile tilapia is poorly known. In this thesis, we propose to improve the rate of intake of the food in *Oreochromis niloticus* using Monosodium glutamate as attractant ƀ.The general objective of this work is to determine the optimal level of intake of the food containing glutamate as food attractant [5,6].

MATERIEAL AND METHODS

Introductory Preliminary experience: Prior experience was conducted on the case for two weeks to assess the effect of glutamate on the development and growth of the fish. This experience was to put in our food formula 1% of glutamate in the food. After two weeks we estimated parameters such as average weight, survival and the specific growth rate of fish across the defined triplicate.

The biological material used is *O.niloticus* of 7.34g average weight and whose individual weight is between 6-12g (Figure1).They have been caught in the ponds of the site of the Research Unit on Wettlands (RUW) at UAC

Experimental device: The experiment device is composed of twelve circular pools in concrete for the present work. Water level during the work is now at 30 cm. The impoundment is provided by a valve that supplies water from the University water tower. The fish are subjected to a 6-days acclimation phase. The stocking of fish was made 48 hours before the start of the experiment. Thirty (30) juveniles are stocked per tank containing 340L of water. The four defined triplicate receive treatment .Fish were subject to different regimes of their biomass. The distribution of the food is ensured five (5) times per day 8h; 10h; 12h; 15h; and 17h. It is manually and takes into account the appetite of fish. Monitoring fishing is made every 5 day from the date start of the experiment. Physicochemical parameters (temperature, dissolved oxygen an pH of the water) are taken 2 times a week (Monday and Friday and at 7h;9h;11h;13h;15h;17h:and 19h).The test period is 31 days

At the end of the experience, the weight and individual length of a sample of 10 fish per tank are measured.

Experimental order: For the manufacture of the experimental food, several by-products were used .It is the fishmeal, soybean meal, cottonseed meal, corn bran, wheat bran, salt. These by-products are used in the development diet contains monosodium glutamate 1% in partial substitution of fish meal (Table1)

Table 1: Food formula of the experimental regime

BY-products	Percentage of incorporation
Fish meal (Senegal)	19%
Soybean meal	25%
Corn bran	22%
Cottonseed meal	20%
Wheat bran	10%
Palm oil	2%
Salt	1%
Monosodium glutamate	1%

The feed is produced as a pellet (picture 4).The food is hand mixed by adding water to obtain a homogeneous paste which is then compacted into spaghetti 1mm in diameter using a manual grinder .The food produced is sun-dried for 24-48 hours to prevent any subsequent mold growth.

Growth control: Growth control or monitoring is done every five days' supply .The fish were caught, weighed and counted in each rearing tank, which allow to calculate the average weight and feed them to the same rations.

The data from the last fishing allowed us to calculate the following parameters at each treatment such as:

*Final average biomass = biomass of all fish harvested

Final average weight = number of harvested fish.

Specific growth rate (IJ^{-1})= ln ($Pf_{(g)}$) = ln ($Pi_{(g)}$) 100/ rearing days

Gain of biomass= Final biomass_ Initial biomass

Survival rate T(%) = (Number of harvested fish 100/ Number of introduced fish)

Feed efficiency = amount of food ingested/by weight gain

Data are collected in an Excel spread-statistical tests.

The treatment being administered to different batchies during the trial period, it will be seen at the end of the experience if the animals' weight have significantly increased.

For the efficiency of the data analysis, we used the analysis of variance ANOVA

RESULTS

Physico-chemical parameters of the water

The water temperature: Figure1: shows the variation of temperature versus time. These temperature values are between 28.68 and 29.39 °C with a peak at 17 hours.

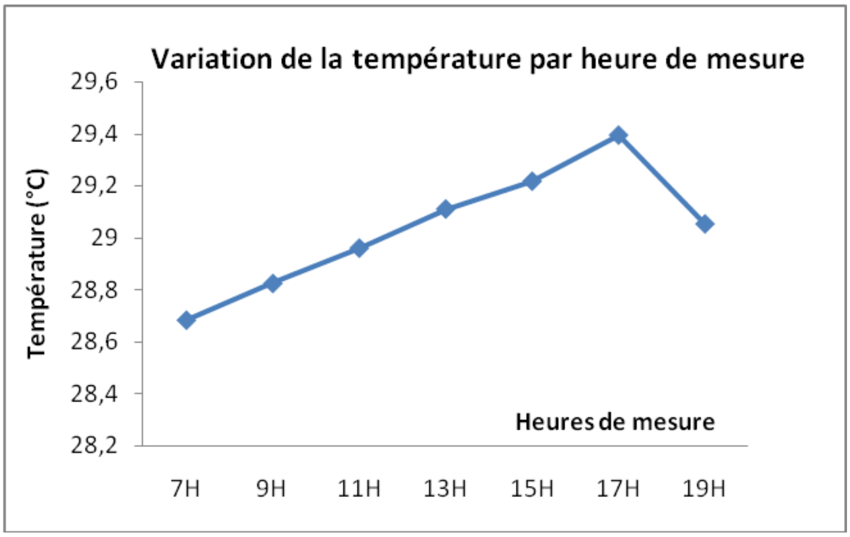

Figure 1: Daily variation of the water temperature (hours of measurement) during the day.

Water pH: Daily variations in pH at different times and during the recording time, are shown in **figure 2**.The pH decreases during the day up to 10'clock p.m. and gradually increasing in the afternoon. The average values set between 5.55 and 5.66

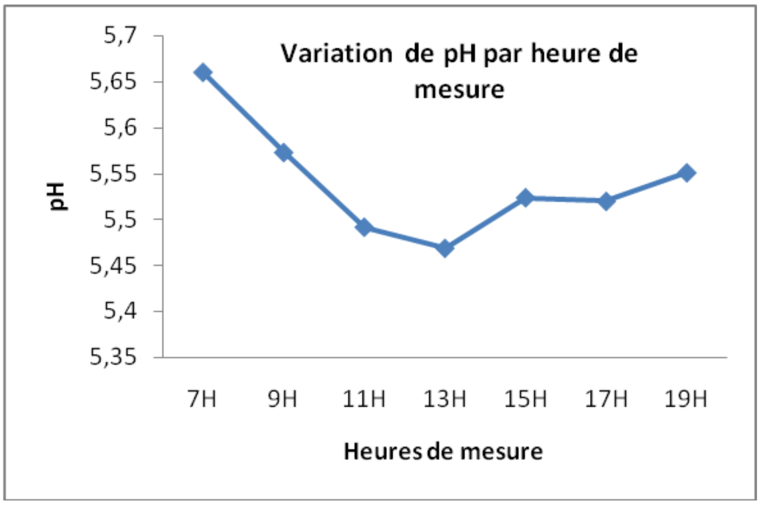

Figure 2: Daily variation in pH at different time

Dissolved oxygen content: The curve of figure 3 reflects changes in dissolved oxygen levels during the day. These measured values are between 5.23 and 5.36 mg/L.They fall at 9 am and then experiencing a gradual increase in saw tooth at 7 pm with a peak at 5 pm.

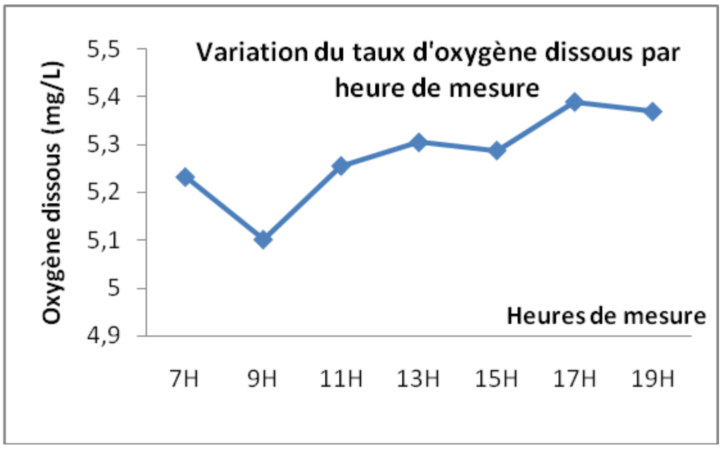

Figure 3: Daily variation of the oxygen dissolved in water during the experiment.

The results of the comparison test averages of physic-chemical parameters according to the time of measurements reveal a significant difference at significantly over time.

Growth and feed utilization parameters: The values of parameters such as average weight, the specific growth rate, survival rate and index of food consumption are calculated of the experiment. These data are processed with ANOVA 1

Weight gain: The curve in figure 4 presents the evolution of the fish weigh gain according to the different rates of rationing.

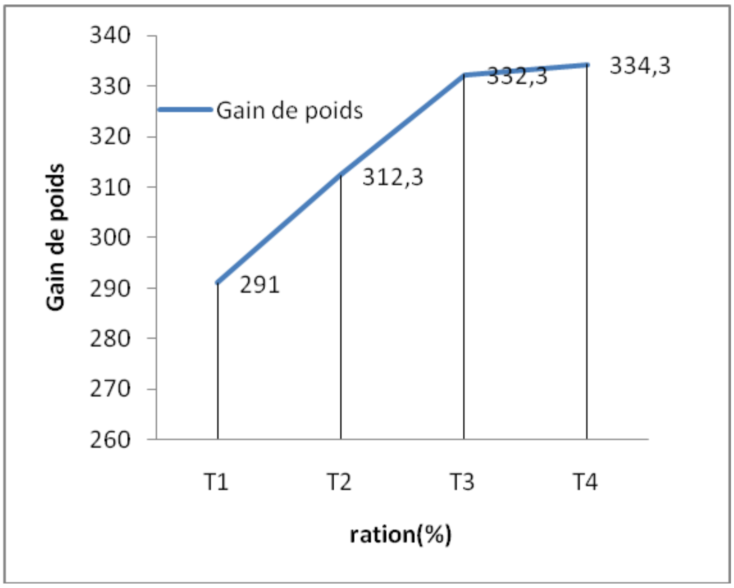

Figure 4: Effect of the ration on weight gain final in *Oreochromis niloticus* fed with food containing 1% of glutamate.

It increases progressively and reaches its maximum value with the T_3 treatment and the minima with T_1treatment or processing. It has a sight bed between T_3 and T_4.

Specific growth rate: The average data of the specific growth rate are shown in figure 5. They vary depending on the ration. The best rate is obtained with the ration of 25%

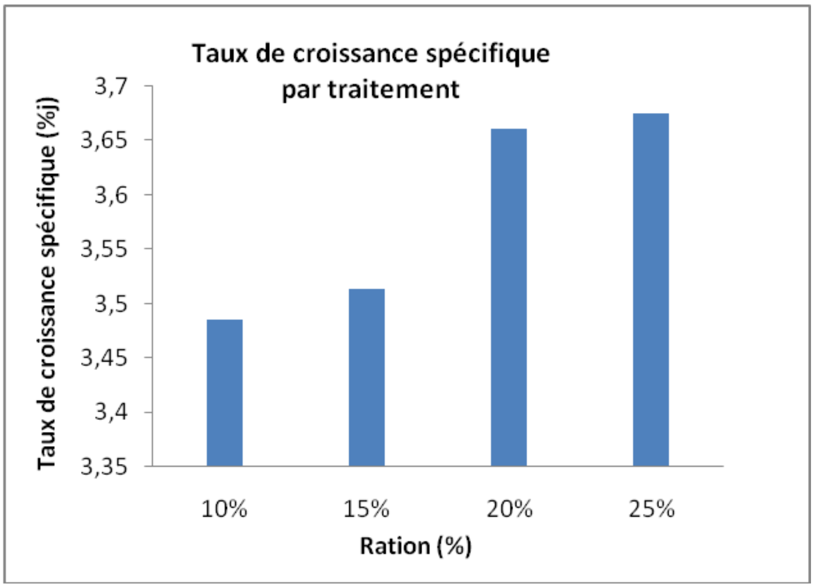

Figure 5: Action of the ration on the specific growth rate in *Oreochromis niloticus* fed with food containing 1% of glutamate.

Survival rate: The juvenile survival rate is high in all treatments[7]. These values vary between 99.95% and 99.97% (Figure6).The best survival rate is obtained with T_4 treatment (99.97≠00.1)

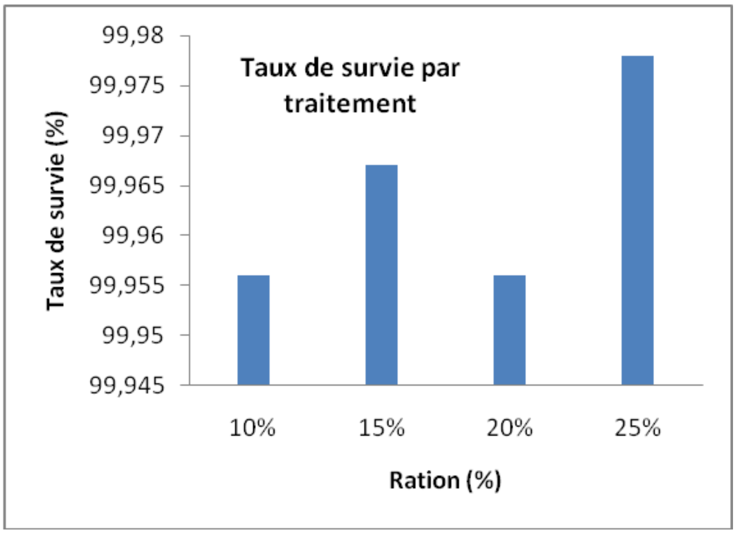

Figure 6: Action of the ration on the survival rate in *Oreochromis niloticus* fed with food containing 1% of glutamate.

Consumption index/sign: The consumption sign varies from one treatment to another. This reflects a conversion of the food. In general, these are a low conversion rate of the food distributed.

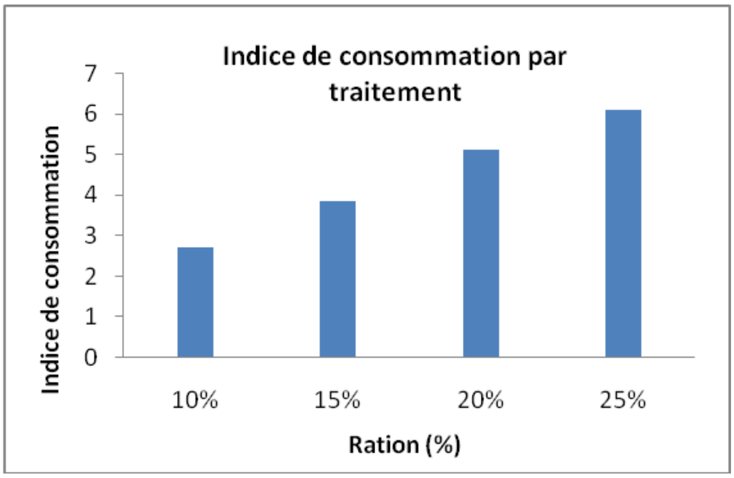

Figure 7: Action of the ration on the consumption index in *Oreochromis niloticus* fed with food containing 1% of glutamate

Average weight: Figure 8 reflects the evolution of the final average weight per treatment. The best weight (19.34 g) is obtained with the ration of 20%.

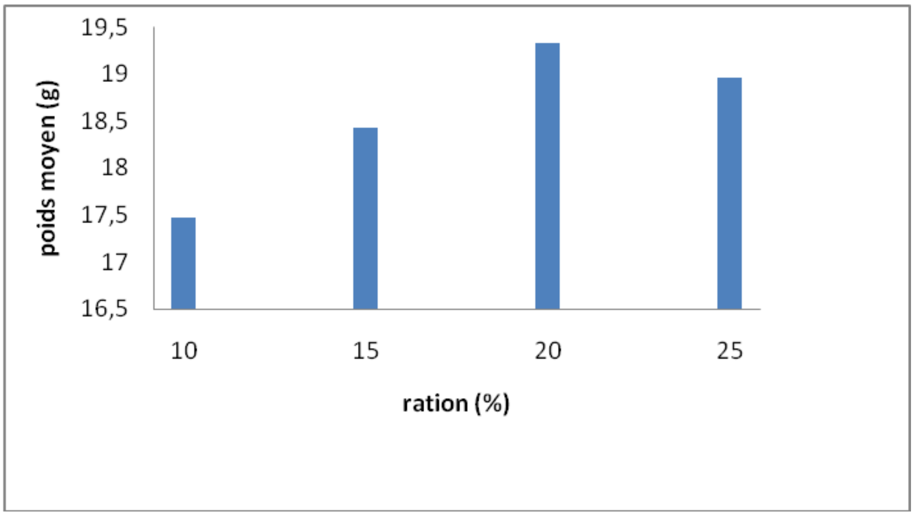

Figure 8: Action of the ration on the final weight in *Oreochromis niloticus* fed with food containing 1% of glutamate.

The comparison test of average growth parameters according to the various ration administered to fish during the experiment revealed a significant administered to fish during the experiment revealed a significant difference at the threshold of 5% of the consumption index. For the specific growth rate and fish survival rate, they do not vary depending on the given ration. The variation of the amount of feed administered in these proportions has therefore no significant effect on these two (02) parameters.

DISCUSSION

The temperatures recorded during the experiment are between 28.68 and 29.05°C.These values are in accordance with the standards required for *O.niloticus* Melard[8] set .The optimum temperature for tropical fish beyond 25°C while Egan and Boyd found that a growth of tilapias.The measured pH remained slightly acidic throughout the duration pf experiment. These values are explained by the continuous system of water renewal. They are good enough for fish farming .Indeed, kestemont *et al*.[9], assert that *Oreochromis niloticus* specie can live in water at a pH between 5 and 11.

The average maximum of dissolved oxygen concentration measured is 5.38 mg/L while the lowest is 5.10 mg/L. Low values are recorded in the morning and those higher in the afternoon. We noticed that a few days after emptying and renewal of water tanks, the dissolved oxygen content variation is due to the accumulation of organic substances (food leftovers served and feces) that stimulated the manipulation of algae whose dynamics and the phenomenon of photosynthesis by very intense time of right and intense sunlight allow an increase of water oxygen content[10-12].

These algae, in contrast breathe the night and rob the water of oxygen, which significantly reduces the content of this parameter until the morning. This variation of dissolved oxygen during the day is a constant stress limit at time of low oxygen food intake and metabolic processes continuous renewal of the tanks water will reduce the water residence time in the tanks, and thus limit the development of algae responsible for this variation in the growth of these fish. Despite this variation, these fish have survived because of their alility to adapt to adverse conditions. According to Macintosh and little[13] Egand Boyd[14], *O.niloticus* can witlistand dissolved oxygen concentrations as low as 0.1mg/L.

The initial average weight calculated at the beginning of the experiment is 7.33g. At the end of the experiment, it is 18.55g. There is therefore a significant evolution of the average weight of the fish. The specific growth rate is high for all treatments. Fish fed with ration 20% and 25% of their biomass have a specific growth slightly higher than this of fish receiving rations of 10% and 15%.These results are consistent with the standard applied by melard [15, 16.] The variation of the amount of food given in these proportions has not a significant effect on the specific growth rate (Anova1, p>3%).In view of these specific growth rate, we can say that tested rations do not have an effect on the growth of *Oreochromis niloticus*[17-22].

The survival rate is good enough (99.95%≠0.01), thus confirming the adaptation of *O.niloticus* in different rearing conditions [23-28].

It is concluded that fish are well suited to the survival[29-33]. The food consumption index obtained is high. It result/emerge of the poor recovery of food by fish probably due to the mode of distribution. The average weight obtained per ration show a better conversion of the food at 20%.

Therefore, the observation of values for all of these settings shows that glutamate to 1% in the food doesn't have a negative effect on these fish [34,35] .It should be noted that these parameters are growing on the basis of the ration given to these fish with less loss of feed for the 20% ration.

CONCLUSIONS

After this experience that focused on improving the food ingestion rate at *O.niloticus* using monosodium glutamate as attractant, we achieved results that can serve as a basis for further experiments on the species. Physicochemical parameters of water identified during the experiment showed that the ecological conditions remained within the tolerance standards of the species. Mortalities are recorded as a result of manipulation and water failure. The analysis of growth parameters revealed acceptable values that reflect the growth potential of *O.niloticus* .The ingestion rate of 20% is bound to the attractant effect of monosodium glutamate.

Monosodium glutamate incorporated up to 1% in the feeding of *O.niloticus* has actually improved its growth performance. In this context, the ratio 20% of the food containing 1% of glutamate is a good asset to optimize the performance of rural fish farmers.

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Corresponding author: FATON M. Oscar Euloge,

4University of Abomey-Calavi/Department of plant biology/Laboratory of plant Physiology and Study of Environmental Stress/Faculty of Technical Sciences /Benin.(FAST/UAC).

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