A Study on Growth Performance of *Clariasgariepinus* Fingerlings fed with Maggot of Muscoid flies

Wama.B.E[1].,Bingari, M.S[1]., Garba,L.C[1]. and Estu, J.I[1].
Department of Biological Sciences, Taraba State University, Jalingo.
Corresponding Author: Wamabinga@gmail.com

ABSTRACT: *Growth performance of Clariasgariepinus fed with maggots of muscoid flies was investigated using 80 fingerlings procured from Olu farm in Jalingo, Taraba State. The fingerlings werestocked into two improvised plastic containers A and B with 40 fingerlings in each. The improvised container A was for the experimental diet (maggot meal) and B was for control diet (vital feed). The fish were fed 5% of their body weight, thrice a day for four weeks. The study showed specific growth rate of 12.27cm for maggot meal and 17.0cm for the control diet. The statistical analysis (t-test) showed no significant difference in the mean weight gain of the diets. The use of maggot as whole meal for fish can therefore be recommended in aquaculture because of its cost effectiveness and growth performance.*

INTRODUCTION

Fish is an important source of food and income to many people in developing countries. In Africa, 35 million people depends wholly or partly on the fisheries sector for their livelihood (FAO, 1996a). It is estimated that by 2050, when world population is projected to be over 9 billion, Africa will have to increase food production by 300%, Latin America by 80% and Asia 70% to provide minimally adequate diets for the projected population (FAO 1999). The consumption and demand for fish as a cheap source of protein is on the increase in Africa, because of the level of poverty in the land. The vast majority of the fish supply in most cases comes from the rivers in the continent. While capture fisheries based on species that are presently exploited seem to have reached their natural limits (FAO, 1996c), there is considerable potential to expand aquaculture in Africa in order to improve food security (Kapetsy, 1994;Jamu and Ayinla, 2003).

Although potentials abound in the continent for the development of viable fish farming, one of the major hindrances to the development of aquaculture industry in Africa is the lack of locally produced high-quality fish feed. Fish requires high quality nutritionally balanced diet for growth and attainment of market size within the shortest possible time. Fish feed technology is one of the least developed sectors of aquaculture particularly in Africa and other developing countries of the world (FAO, 2006).

Fish feed is one of the major inputs in aquaculture production. It is also one of the fundamental challenges facing the development and growth of aquaculture in the African continent. Fish feed development in Sub-Saharan Africa has not made a significant progress in aquaculture as expected. Development and management of fish feed, play very vital role in aqua cultural growth and expansion. (Jamu andAyinla,2003).As aquaculture becomes intensive, most farmers in Africa depend largely on fish feed from European countries for the productivity and sustainability of the industry. For example, in Nigeria an estimated 4,000 tons of quality fish feeds are imported into the country each year (AIFP, 2004).

Fish feed is very important in the efficiency and overall performance of fish in the pond and least cost feed production which will reduce the cost of production of fish. This is why any attention towards the production of effective and cheap feed will benefit fish farmers in Africa, since the feed ingredients are rich in desired nutrients. The attempt to get good protein source to replace fish meal has led to studies on maggots as food for fishes in aquaculture (Teotia and Miller, 1973). Bondari and Sherpard (1981) showed that 1-2 tonnes of maggots could be produced in a month in a 20,000 laying cage. Recently fish farmers especially in the integrated farming system have been encouraged to recycle waste from animal dung (especially poultry) as food for fish rather than discard them. Poultry manure is not only use as organic manure but also for the production of maggots which are processed as fish feed; (Ugwumba and Abumoye, 1998).

MATERIALS AND METHODS

EXPERIMENTAL DIET

Maggots were extracted from poultry droppings at NAFNAP comprehensive services Jalingo Taraba. The harvesting of the maggots was by floatation method (feldam-musham, 1944). A hand bowl of droppings impregnated with maggots was poured into a plastic sieve which was half dip in a bucket of clean water. The sieve was move up and down repeatedly until the maggots are thoroughly clean. Lastly, the sieve was dip into hot water for 15 seconds to kill the maggots and some bacteria present. The maggots were sun-dried for 3 days and thereafter ground into powder using mortar and pestle. A binder was added to the ground maggots with hot water and made into pellets using perforated zinc roofing sheet. The maggots meal were weighed and kept in a plastic container

EXPERIMENTAL FISH

80 fingerlings of *Clariasgariepinus* were obtained from Olu fish farm in Jalingo, Taraba state, Nigeria. They were transported to the biological of Taraba state university using oxygenated plastic rubber. They were kept in an improvised transparent plastic container (a substitute for glass aquarium) for 2 weeks for acclimatization, and were fed with a commercial diet (vital feed) of 35% crude protein. At the end of the week, the fishes were randomly selected and stocked into 2 plastic containers A and B with 40fingerlings in each. Before the stocking of the fish, the improvised plastic rubber were thoroughly washed and half filled with water stored in a large container for 24 hours to get rid of the chlorine in the water. Using hose pipe, the volume of water was replace by adding fresh water into each container. Container A was fed with experimental diet (maggot meal) while container B was fed with control diet (vital feed).Fishes were fed with 5% of their body weight per day and the feeding was done thrice a day (8:00am, 12:00noon and 5:00pm); the feeding lasted for four weeks. Weight, standard length and total length of the fish were taken every one week and recorded.

GROWTH PERFORMANCE DETERMINATION

The growth parameters were determined are as follows:

SPECIFIC GROWTH RATE (SGR)

$$SGR = \frac{\log wtf - \log wti}{T} \times \frac{100}{1}$$

Where:
Wtf= mean final weight
Wti= mean initial weight
T = period in days

DAILY WEIGHT GAIN (DWG)

$$DWG = \frac{wtf - wti}{T}$$

MEAN WEIGHT GAIN (MWG)

MWG = wtf - wti

PERCENTAGE BODY WEIGHT INCREASE (%)

$$\frac{\text{Mean weight gain}}{\text{Mean initial weight}} \times \frac{100}{1}$$

TOTAL FEED INTAKE (TFI)

$$\text{TFI} = \frac{\text{feed weight}}{\text{Fingerlings number}}$$

WATER QUALITY

The water temperature and pH were monitored throughout the duration of the experiment. Temperature was measured using a mercury thermometer while the pH was measured using a pH meter.

RESULTS

The study on growth performance of *Clariasgariepinus* fed with maggot of muscoid flies showed the following result, Table1:

TABLE1 SUMMARY OF GROWTH INDICES, FEED UTILIZATION OF *C. Gariepinus.*

GROWTH INDICES	MAGGOT MEAL (Container A)	COMMERCIAL DIET (Container B)
Specific growth rate (SGR)	12.27	17.0
Daily weight gain (DWG) (g)	2.46	4.6
Mean weight gain (MWG) (g)	7.38	9.4
Percentage body weight increase (%)	18.0	24.0
Total feed intake (g)	10.7	17.1
Mean initial weight (g)	220.7	177.2
Mean final weight (g)	515.8	573.6
Mean initial total length (cm)	7.6	7.0
Mean final total length (cm)	9.9	10.1
Mean initial standard length (cm)	7.4	7.0
Mean final standard length (cm)	7.8	8.5
Daily feed intake	10.2	16.3
Water temperature (^{0}C)	27.6	27.8
pH	7.4	8.0

The study showed increase weight for both maggot meal and control diet (Table2):

TABLE2 MEAN WEIGHT GAIN AND STANDARD LENGTH OF *C. gariepinus*

Mean weight gain per week of *C.gariepinus* Mean standard length of*C. gariepinus*

Weeks	maggot	control	maggot	control
1	5.5	6.7	5.0	5.3
2	7.5	8.7	6.6	7.7
3	9.5	10.3	7.6	9.5
4	12.8	14.1	8.7	10.3

When tested statistically using T-test, it showed significant difference between *C. gariepinus* fingerlings fed with both maggot meal and control diet ($P>0.05$ $T=1.273$, $df=3$).

There is also an increase in standard length of *C. gariepinus* fed with both maggot meal and control diet (vital feed) Table2. When subjected to analysis of variance (ANOVA) it showed no significant difference between the meals ($P<0.05$ $F= 0.568$ $df=3$).

Table3 depicts the water physiochemical parameters of improvised plastic rubber A and B

TABLE3: PHYSIOCHEMICAL PARAMETERS OF MAGGOT AND CONTROL (VITAL FEED)

Temperature (^{0}C)			pH	
Week	maggot	control	maggot	control
1	26.0	25.0	6.3	7.3
2	26.8	26.3	6.3	7.7
3	26.4	27.9	7.0	7.9
4	29.0	29.3	7.3	7.0

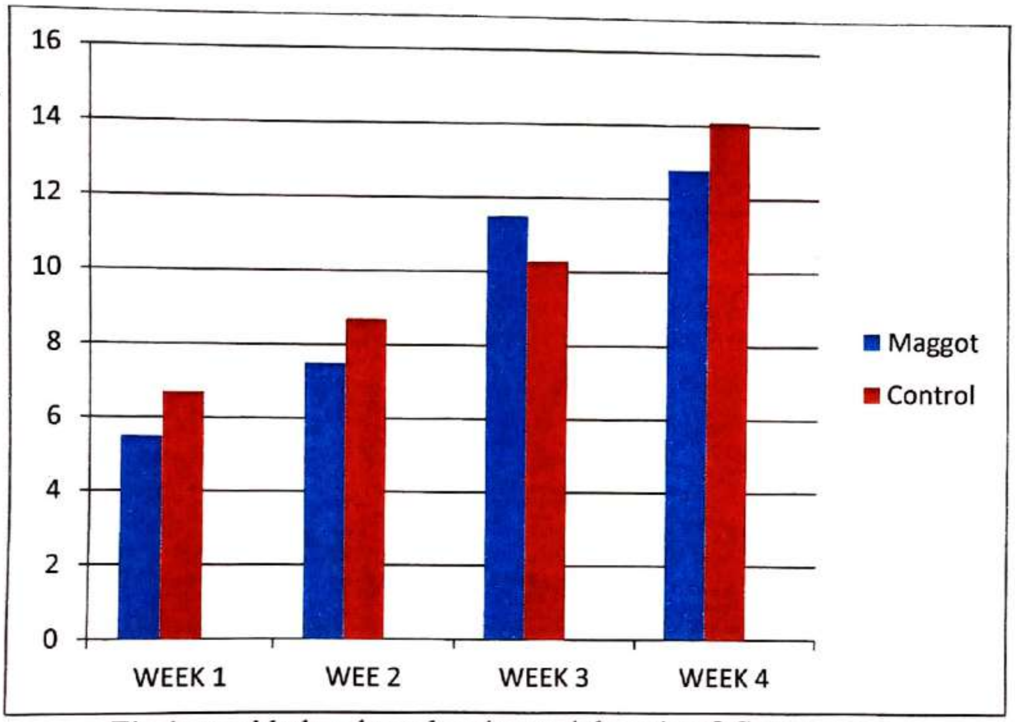

Fig 1: weekly barchart showing weight gain of *C.gariepinus.*

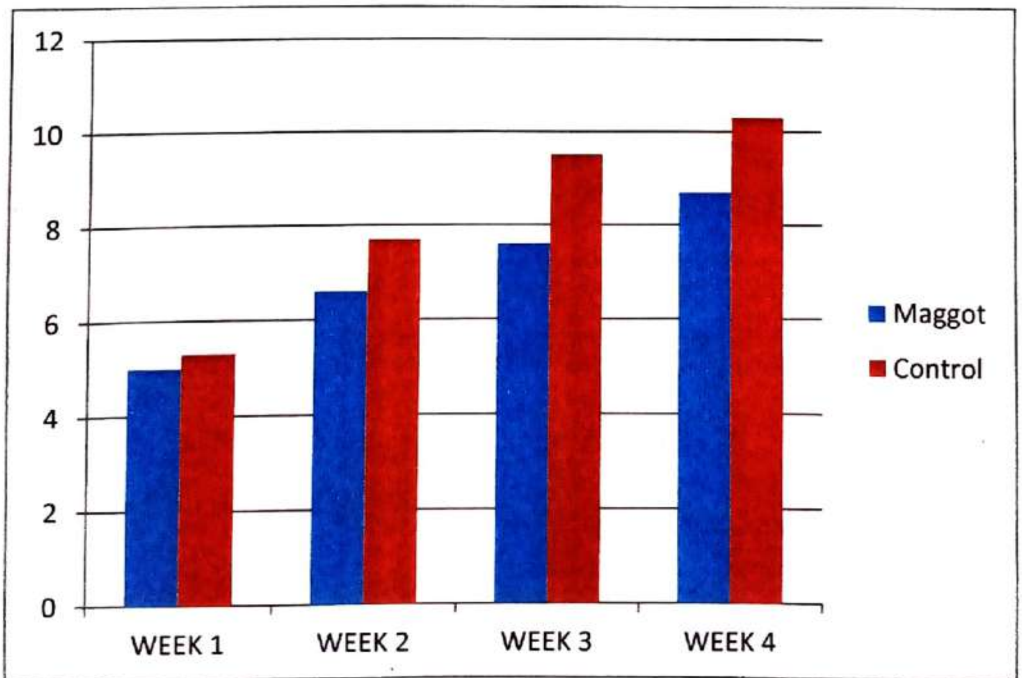

Fig 2: weekly barchart showing standard length of *C. gariepinus*.

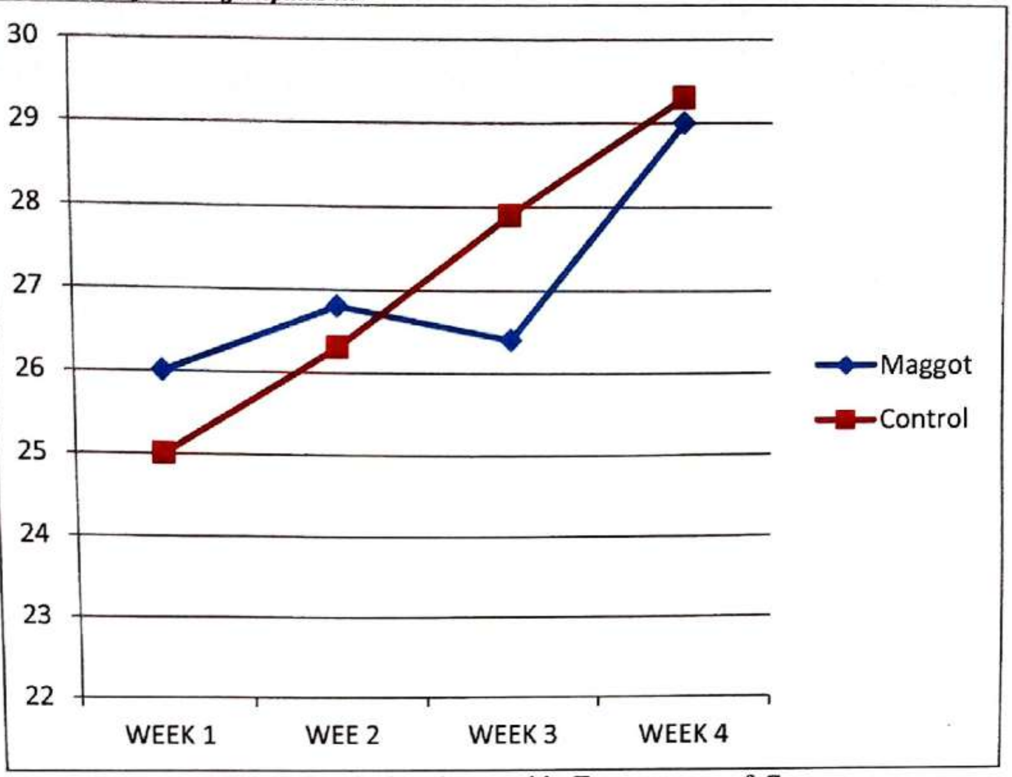

Fig 3: Graph showing weekly Temperature of *C. gariepinus* fed with maggot & control diet.

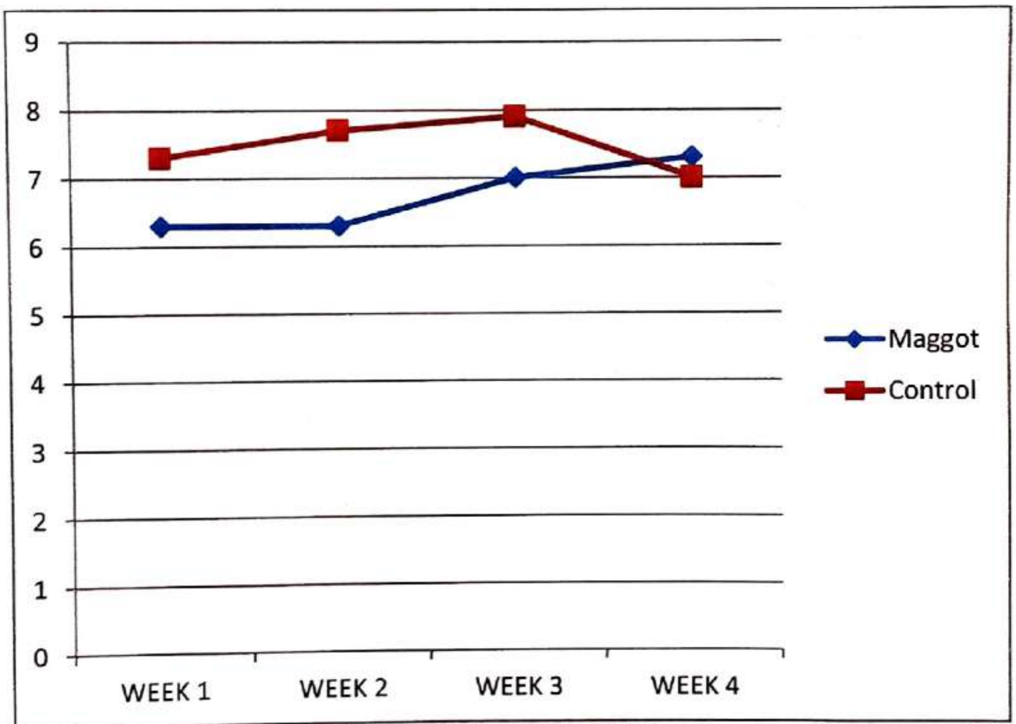

Fig 4: Graph showing weekly pH of *C.gariepinus*fed with maggot and control diet.

There was little variation in temperature value of maggot (A) and control (B) recorded. The temperature increase from 26^0C to 29^0C for maggot and 25^0C to29.3^0C for control, Figure 3. The pH value of maggot meal (A) was slightly lower than that of the commercial diet (B) in the first 2 weeks likewise the water pH in the 1st week read 7.9 in the 3rd week, slightly decreases to 7.0 in the fourth week as in Figure 4.

DISCUSSION

The study on growth responses as in table1 showed a growth rate of 12.27 on *C.gariepinus* fed with maggot and 17.0 for control diet and a weight gain of (7.38g and 9.4g) for maggot meal and control diet respectively. The result is slightly lower than the result of Atteh and Ologbenla (1993) who reported growth rate of 16.0 cm on *C.gariepinus* fed with maggot, the difference may be due to physicochemical parameters and geographical location of the study area. The result also showed increase in weight gain and standard length of both maggot and control diets. This agreed with the findings of Adesulu and Mustapha (2000) who reported high content of protein energy and mineral in maggot meals leading to increase in weight and length of fish. Ugwumba and Ugwumba (2003) documented that physicochemical parameters also have an effect on the growth of fish. They observed a temperature range of 25-29°C and pH of 6.0-8.0 water quality parameters suitable for fish growth. This agreed with the findings of this research as shown in Table 3.

Sun-dried maggots were exposed to bacteria and other germs both of which added nutritional value of the maggot. So therefore maggot meal is recommended because of recycling waste of poultry-fish farms and controlling vectors of diseases like Flies. According to (Ayinla, 2003) leaching of flavor from diet is found to attract fish to food. A major concern in the use of maggot in fish diet is the possibility of disease transmission and the repulsive nature of its odour during processing and usage. However, earlier studies have shown that the risk of disease transfer is low if maggots are properly treated under strict hygienic conditions before been incorporated into fish diet. (Adesulu and Mustapha, 2000).

CONCLUSIONS

Maggots have only been associated with waste products; decay and worthlessness but maggot meal for fish has not only shown to be safe for fishes but also a rich protein source for fish. The study of replacement of commercial feed with maggot as a source of animal protein is justifiable for the following reasons:

- Maggot meal is cheap and can easily be raised from organic waste.
- Controls disease through minimizing flies population via effective treatment of maggots as feed.
- An effective creation of cycle in fish/poultry farms, via effective management of poultry waste.

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