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Comparative Effects of Organic Fertilizer on *Clarias gariepinus* Fingering using Cow Dung and Poultry (Dropping as a Case Study)

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ABSTRACT
Aquaculture came to lime light with various obstacles attached. Among them are inadequate fish seeds. Cost of fish feeds; good management and inadequate professional. In order to reduce one problem out of many, this very work is concern in boosting of the organic manure which is always responsible for the production of planktons into the culture medium shall shoulder the yolk of reducing or economizing fish feeds better skill, boosting their normal growth. It was by this note, that two organic manure (cow dung and poultry dropping) were selected by the researcher, to ascertain which among the two, will provide better result in the normal food production. While working on them he used descriptive statistics as his methodology. However, findings proved that poultry droppings are more suitable in the production of natural food for fish. The researcher further recommended that poultry droppings should be strictly put to use in order to ensure good and quality natural food production. Finally, this work has introductory aspects which authorized the brief history of fertilizer in agriculture and their types. Again chapter two of this project reviewed relevant literatures related to the work. Chapter four contained the various ANOVA tables that analayzed the final result of the work, with some graphs.

INTRODUCTION
Plants requires up to 20 different elements to carry out their life processes of these carbon (c) hydrogen (H) and Oxygen (O) are obtained from carbon dioxide and water. Fertilizer is added to soil to supply nutrients that are available or depleted in the soil.

There are 6 micro-nutrients that are required in relatively large amounts: Nitrogen (N), Phosphorus (P), Potassium (K), Sulphur (S), Calcium (Ca), and Magnesium (Mg). Nitrogen, Phosphorus, and potassium are the elements that most often require supplementing in soil and are the basis of most commercial fertilizers. There are the macro-nutrients that are required in small quantities in most plants. These iron (Fe), Manganese (Mn), Molybdenum (Mo), Copper (Cu), Boron (B), Zinc (Zn), Chlorine (Cl), Sodium (Na), Cobalt (Co), Vanadium (Va) and Silicon (Si). These micronutrients are usually available in sufficient quantities in the soil and only supplemented if a deficiency is observed. Specially, the use of fertilizer in adequate cannot be over emphasized. The waters produced by farmed aquatic animals usually support substantial phytoplankton blooms in production pond without adding inorganic nutrients. But, organic fertilization has been used to improve pond productivity for the culture of several species. A wide variety of organic materials have been used to promote the growth of zooplankton and phytoplankton as well as other invertebrates and pond micro-organism. On the other hand, fertilizer can also be used for fish production.

The Study Area

The study was conducted in Benue State of Nigeria. The state lies between longitude $6^{0}35^{1}$E and $8^{0}10^{1}$E of the Greenwich Meridian and Latitude $6^{0}30^{1}$N and 80101N of the equator, and at an elevation of 97m above the sea level in the southern Guinea savannah agro-ecological zone. The state is bounded by Nasarawa state to the North, Taraba state to the east, Kogi and Enugu state in the West, then Cross River and Ebonyi to the South. The south – eastern part of the state also shares a boundary with the

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republic of Cameroon. The state covers an area of about 67,740km^2 and has a total land mass of 30,954km^2 with two main rivers, Benue and Katsin-Ala, numerous streams, flood plains, lakes, ponds and undulating hills. The River Benue from which the state derived its name, run across the state. Gboko local government area, which is one of the biggest in the twenty three (23) local government area of the state, is the specific area of study. The local government area has Tiv speaking ethnic groups as indigenes. Gboko local government area is bounded in by Buruku local government area, in the south by Konshisha and Usongu local government area, to the west by Tarka and Gwer local government areas and the east by part of Buruku and Ushongo local government areas.

Gboko indigenes are predominantly famers favoured in this profession by two seasons experienced in the area; the dry season (November – March) and the wet season (April-October). A lot of crops such as yams, rice, soyabeans, cassava, millet, groundnut, sorghum etc are grown. A few numbers of the indigenes also keep livestock alongside with crop production. Some of the animals kept includes goats, sheep, piggery, poultry, rabbits, cattle (Benue State Ministry of Information, Makurdi 2008) and recently fish (BNARDA 2007).

The major credit institutions available in the local government area which may assist farmers financially and boost their production are United Bank for Africa (UBA), Unity Bank, Union Bank, Sky Bank Guarantee Trust Bank (GTB), Mbayion Community Bank, Multipurpose cooperative societies and few lending agencies. The experiment was undertaken in Fidei Polytechnic

Gboko, K/M 8 Gboko – Otukpo road, Gboko Benue State, Nigeria in the Department of Fisheries and aquatic technology, from January 3rd to February 22nd 2015. That is one month six days. Seven nursery tanks were used. And within them were two treatments, with tree replication and one control unit.

The materials used in this experiment were seven concrete tanks of size 2mx1m length and breadth, 0.8m deep, cow dung and poultry droppings, good ovulary water (borehole), jute bags, coppens starter feed of 0.5mm and 4mm respectively, two big plastic bowls; two plastic buckets, pen and papers for record taking, a file, seven plastic rubbers and *Clarias gariepinus* fingerlings. The concrete tanks were first of all washed and dried for 3 days. Then a measurable amount of borehole water were used to impound the tanks. Each tank was filled with water up to 0.6m and a free board of 0.2 was left up.

EXPERIMENTAL DESIGN

This experiment was designed to have two treatments, three replications. It was arranged thus; T_1,R_1 (cow dung), T_2R_1 (poultry droppings), T_1R_2 (cow dung), T_2R_2 (poultry droppings) and T_1R_3 (cow dung). T_2R_3 (poultry droppings), then TcRc served as control unit. T_1R_1, T_2R_1 R_2, T_1R_3 T_2R_3 and T_cR_c represented tank 1,2,3,4,5,6 and 7 respectively. The control unit was not treated with any fertilizer.

METHODOLOGY

The method employed for analyzing the data was descriptive statistics in Randomized Complete Block Design (RCBD).

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EQUIPMENT USED

The Experiments used in the experiment include; A meter rule, a combined digital pH meter and thermometer, sechi disk, phosphorus test kit, potassium test kit, nitrogen test kits, portable dissolved oxygen meter, Ammonia reagent test kit, nitrite reagent test kit, sensitive weighting balance, conductivity meter and strand of tread. The meter rule and the tread were used for measuring the standard and total length of the fish, while the fish placed on the table. The digital pH meter and thermometer were used for measuring pH and temperature. It has a switch knob, which indicates "on off" on either side. Anytime measurement is to be carried out, the switch knob would pushed to the direction of "on" and the temperature and pH readings displayed on the small screen. Then the pH and temperature of the water would be recorded in the morning and evening after which the averages of each day would carried out. Secchi disk is a disk painted black and white, and on to the disk a calibrated tape is tie. It is used for measuring the transparency of water. It was measure in the morning and evening as in pH. Portable dissolved oxygen meter were used to measure the dissolved oxygen in the morning and in the evening, then the average dissolved oxygen were taken every day. The portable dissolved oxygen meter was strictly use in the field. On the experimental site, every time an oxygen test was to carried out, the numbered small plastic rubbers would be used to grab a quantity of water and the analysis would be carried out on each tank by deeping the positive and negative electrodes of an oxygen meter into the water. The test would be carried out in a separate rubber. Ammonia test was carried out using a sample of water in each pond with a pipette. Then the water was filled into a clean test tube to the 5ml mark.

Six (6) drops of reagent were added in the test tube. The test tube held in place with fingers, was agitated to mix the sample. The important precaution was to use the cap and at the same time avoid skin contact. The test tube colours were always matched to the closet colour on the chart. For best results, the test tube would position vertically close to the paper and the reading were recorded. The test tube would seriously rinse after each in a tank. In case of nitrite test there were two reagents, but the procedure was the same with that of ammonia test, phosphorous, potassium and nitrogen were tested using the same method of ammonia test on their various test kits. The verification of the materials and equipment used were 75% on the aspect of precision.

FEEDING

Clarias gariepinus findings were fed with the coppens starter feeds of 0.5mm from two weeks, four days and then the size of the feeds was change to 4mm, at this stage they were fed for one week three days. The productivity of the planktons from the fertilized tanks served as the natural food for the fish. Into the seven tanks 3kg of cow dung and poultry droppings were tied in jute bags and suspended in the water column in the tank, in all the six ponds. The weighing scale was used to measure the cow and poultry droppings.

Manure source: The poultry droppings were obtained from Joseph Asugh's poultry farm while the cow dung was obtained from the Fidei Polytechnic cattle farm.

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RESULTS

The result presented here was gotten from the experiment and it was analyxed using descriptive statistic method. The result is been computed in sequence as thus; Temperature (°c), pH (power of hydrogen), transparency; dissolved oxygen DO_2 (mg/l), electricity conductivity (US/CM), as the portents water parameters. Again, average weight, weight gain, food conversion ratio (FCR) and specific growth rate were considered as the key factors for evaluating the growth performance of the *Clarias gariepinus* fish specie using cow dung and poultry droppings. Table 4.1 shows the weekly analysis of the water parameters in the pond treated with cow dung and poultry droppings, together with their mean, standard error mean and the standard deviation.

Table 4.3 Summary results of water parameters

Water quality	Cow dung	Poultry dropping	Control	LSD
Temperature ^{O}C	28.28	29.9	29.24	0.567
pH	9.15	9.20	8.80	0.205
Transparency (cm^{-3})	12.56	12.02	10.15	0.936
DO_2	8.37	6.15	7.28	0.315
Electricity conductivity (US/CM	53.18	96.26	116.25	5.177

Table 4.3 shows the summary result of the water parameters in the two medium in question (cow dung and poultry drop). Cow dung had the mean value of 28.28°c while poultry droppings had the mean value of 29.95^{0}C again, the pH value of cow dung was 9.15

whereas that of the poultry droppings was 9.20 with the control having the value of 8.80.

The value of transparency in the water treated with cow dung was 12.56 while the one that was treated with poultry droppings was having the value of 12.02. Their control was 10.15. Going by the transparency of the two medium, poultry droppings was more transparent, therefore, light penetration occurs more in the water that was treated with poultry droppings than the cow dung. More so, the mean values of the dissolved oxygen DO_2 was 8.37 in water treated with cow dung while that of the poultry droppings was 6.15 and their control were 7.28.

Table 4.4: Growth performance of fish weight using cow dung and poultry droppings

Growth indices	Cow dung	Poultry droppings	Control	LSD
Mean initial weight	18.65	19.97	17.94	-
Mean initial weight	77.64	96.98	69.56	18.690
Average weight	50.83	59.42	45.98	7.923
Weight gain	53.55	63.63	53.62	17.17
SGR	2.11	2.25	1.91	0.61
FCR	0.20	0.16	0.22	0.046

It means, the mean final weight – (minus) mean initial weight

77.64 - 18.67 = 58.97 for cow dung
96.98 - 19.97 = 77.01 for poultry droppings
Table 4.6 above shows that the mean initial weight of cow dung was 18.65g while that of poultry droppings was 19.97g. On the other hand, the mean final weight of cow dung was 77.64 whereas that of poultry droppings was 96.98g and their least significant

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different was 18.69g. Furthermore, the weight gain for cow dung was 53.55g and that of poultry droppings stood at 63.30g.

DISCUSSION

In the beginning of this work, two samples were presented (i.e cow dung and poultry droppings) to be used as treatment T_1 and treatment two T_2 in three replications. And a control unit was attached to them so as to ensure sound precision as patterns their effects on *Clarias garipinus*.

RESULT OF THE RESEARCH QUESTIONS

Furthermore, research questions were set in the proposal so as to prove it right or wrong at the end of the analysis/result. The two important research questions framed were thus;

i. Do poultry droppings have more effects on *Clarias gariepinus* growth than cow dung? Positive hypothesis.
ii. Poultry droppings do not have more effect on *Clarias gariepinus* growth than cow dung – negative hypothesis.

The result from the analysis proved the positive hypothesis right that poultry droppings have more effects for the growth of *Clarias gariepinus* than the cow dung when used to fertilize pond. However, the review and analysis of the result will defend it better, as stated below.

GROWTH PERFORMANCE

Growth performance is the key factor to testing the effect of the two treatments. At the first week of stocking to the last week (that is week 1 to week 4) various growth indices were observed and measured.

Firstly, the mean initial weight was taken at the end of the first week of stocking. The result shows that T_2 which was treated with poultry droppings carried the highest mean initial weight of 19.97, while cow dung was having the mean initial weight of 18.67. The control was having 17.94. The significance difference at the chosen level (i.e $P< 0.05$) was very infinitesimal. That is there was no significant difference. More so, at the mean final weight, poultry droppings still came first with a value of 96.97 while cow dung was having the value of 77.64 and their control which served as a reference unit was having a value of 69.56. On the other hand, their least significant was 18.690.

Biologically, the average weight of the fish has to do with its growth performance that is increase in size and body weight. This statement agreed with Millstein work on growth performance of the fish (1995) which state that "frequent fertilization affects the fish growth performance and water quality". However, the average weight of the fish stocked in the pond water treated with cow dung (i.e T_1 T_3 and T_5) was analyzed to be 50.93. On the opposite side, the average weight of fish stocked in the pond water treated with poultry droppings (i.e T_2 and T_4 and T_6) was 69.42. They had the control value of 45.98. Moreso, the least significant different within the treatments was recorded as 7.923. Notwithstanding, weight gain as observed in juvenile cat fish is cause by dissolved oxygen with increasing water temperature saturated equivalent to 100% (Buentello et al, 2000). The above stated agreed with the weight gain by *Clarias gariepinus* juvenile in the fourth week of the project experiment. The weights gained were as follows. Treatment one, two and three T_1T_3 and T_5 that were fertilized with cow dung were having the

mean weight gain of 50.98 while treatment two, four and six (i.e T_1, T_4 and T_6) were having the mean weight gain of 77.01. The treatment had their mean weight gain value of 53.62, consequently, the least significant difference was 17.170.

CONCLUSION AND RECOMMENDATION

Having worked simultaneously and equally on the two treatment (T_1 and T_2), cow dung and poultry droppings the response from the result agreed with the positive hypothesis which said that poultry droppings has more effects on *Clarias gariepinus* growth as used in fertilization. The spontaneous growth rate of *Clarias gariepinus* in the pond fertilized with poultry droppings single handed and physically proved the fact that poultry droppings perform better function in terms of fish growth more than cow dung. Lastly, the poultry droppings experienced adequate and better physiochemical parameters in the course of the experiment.

RECOMMENDATIONS

i. To increase the performance and productivity of the fish, it is essential to use poultry droppings as the source of boosting plankton in the water during fertilization.
ii. To ensure adequate and balanced water quality, use appropriate quantity of poultry droppings in the pond water as the source of organic manure.
iii. Avoid excessive use of any organic manure while carrying out pond fertilization.

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