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CHANGES IN BODY COMPOSITION OF *HETEROBRANCHUS LONGIFILIS* (TELEOSTEI: CLARIIDAE) VALENCIENNES, 1840

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ABSTRACT:

Body composition changes in hatchery-raised sub-adult and adult *H. longifilis* was monitored, using two feeding levels. There were very little sex-based differences in the valuable muscle constituents – fat and protein. Fact showed a high level of dependence on weight that was significant (P<0.01). Protein significantly interacted with weight at the 0.001 levels, but had a negative correlation with water (-.54, P< 0.01). Dressing percentage was not influenced by sex. Females in each group grew faster than males. Fat levels had a positive correlation (r=.62) with weight and a negative correlation with water (- .78, P<0.01) .

Key words: Body composition, *Heterobranchus longifilis*, feeding level, proximate analysis, growth.

INTRODUCTION

Differences exist in body composition between even genetic strains of a species (Reinitz, *et al.*,1979; Wedekind, 1991). Among the catfishes, very little is known about body composition change. In *Anguilla* (Degani *et. al.*, 1986 a, b), protein, ash and moisture all decreased with weight. In the young sockeye salmon, body fat tended to increase with size (Groves, 1970). In *Clarias gariepinus* up to 8 months of age, muscle fat did not change but had a range of 8-15% dry matter, and moisture decreased slightly with weight, with a range of 77-81% (Degani, 1988). Heterobranchus *longifilis* is the focus of this study because of its rising popularity as any aquaculture candidate in Nigeria. As part of studies on the culture of the species, changes in its body composition in relation to age and weight was investigated.

MATERIALS AND METHODS

Fish: The fish used in this experiment were sourced from two breeding trials, using the same parental stock, and prior to the experiment, were husbanded in a re-circulation system of the Forschungszentrum fur Veredelungwirtschaft Vechta, Germany. Two hundred fish were used. At the age of 3 months the fish from the first breeding trials were split into 2 feeding groups. Group I was fed *ad libitum* (3% of fresh body weight per day). Group II was fed restrictedly (1% fresh body weight per day).

At 5 months, the fish from the second breeding trial were split into two (Groups III and IV). Group III was also fed *ad libitum* (3% of fresh bodyweight per day) and served as replicate for group I. Group IV was fed same as for group I. Group IV was fed same as for group II for which it was replicate.

HUSBANDRY CONDITIONS:

Feeding was with Trouvit Pellet No. 4 with a protein content of 45%. The fish were held in fiberglass tanks of $1m^3$ volume. Temperature, pH and Oxygen were 26^0 C, 7.01, and 86% saturation respectively.

Sampling and Measurement:

Muscle composition was determined from homogenized fillet, taken from the right hand side of the fish. Nitrogen level in the sample was determined using the Heraus Macro N analyzer. The protein level was determined by multiplying the N in the sample by a factor of 6.25. Fat was determined by the standard Soxhtlet extractor based on ether extraction of sample. Ash was determined by drying a mixture of sample and 4ml magnesium acetate at 105^0C for 2 hours and incinerating it at 600^0C for 1 ½ hour.

Dressing percentage was calculated by expressing gutted weight as a percentage of total fresh body weight. Data on all of these traits was analyzed using the General Linear Model Procedure of the SAS. Using the following model, the effect of sex, age, group, and their interactions on these traits were analyzed;

$$Y_{ijk} = U + Sex_i + age_j + group_k - (sex \cdot age)_{ij} + (Sex \cdot group)_{ik} + (age * group)_{jk} + (Sex \cdot age \cdot group)_{ijk} - e_{ij}$$

Where: U = Overall mean
i =1,2 (1 = male, 2 = female)
j = 178... 425 days (Age)
k = II, III, IV (Groups)
eij = random error

In all cases, group I and II, and III and IV were analyzed as separate pairs. Pearson's correlation were calculated combining group I with II and III with IV.

RESULTS AND DISCUSSION

Results from analyses of data are presented in Tables 1 and 2. Results of average weight measurements are shown in Table 3.

There were small but significant increases of fat with weight at the 0.001 level. The influence of sex on body fat was not significant (P>0.05). Muscle fat level was inversely proportional to water level but directly proportional to weight (Table 2) The combined influence of size at age seems to have a synergistic effect on fat level because of the 60 specimens (males and females) weighing close to 1kg, about half had fat levels of more than 2 percent and this

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TABLE 1: EFFECT OF SEX, AGE, GROUP, AND THEIR INTERACTIONS ON BODY COMPOSITION, PRODUCT AFTER GUTTING AND DRESSING PERCENTAGE.

	Wt.	Age	Sex	Group	Age* Sex	Age *group	Sex* Group	Age*Sex* Group
GW.		XXX						
GW-WT		XXX						
Water	XXX							
Fat	XXX							
Prt.	XXX	XXX						
Ash.			X					X

Key to table

xxx P<.001
xx P<.01
x P<.05

Gw = Gutted weight (product after gutting)
Gw-Wt = Dressing percent age
Prt. = Protein
Grp = Feeding Group
Wt. = Fresh body weight of fish.

constituted about 85% of all recorded fat levels more than 2%.

Dressing Percentage:

Age had a significant influence on dressing percentage (P < .01). Sex and weight had no influence on dressing percentage (Table 1) within the age weight range monitored.

When the results of proximate analysis of *H. longifilis* are compared with those from *C. gariepinus* within a similar period of development and fed a similarly composed diet (Degani, 1988; Degani *et. al.*, 1789), and with *Sarotherodon mossambicus* juveniles (Jauncey, 1982) it is seem that *H. longifilis* has a relatively low fat and high protein levels. This is also the case when it is compared with results from proximate analysis of *Anguilla,* (Degani *et. al.*, 1984). This has obvious and important nutritional implications.

Table 2 Correlation coefficients of variables (Overall)

	Prt	Ash	Fat	Water
Gw - Wt.	.47^{xxxx}	.6 ^{x}	. 6 ^{x}	-.65^{xxx} 168
	.47^{xx} 186		62^{xxx} 182	
Prt.				
Ash				
Fat	.33 187			
Water	-.54^{xx} 187^{xxx}	-.78 187		

xxx P<.001
xx P<.01
x P<.05

N/B: Abbreviations mean same as in table 2.

Dressing percentage was found not to be significantly (P > .05) influenced by sex. Females were found to have a higher average weight than males (Table 3). This contrasts with the findings of Henken *et. al.*, (1987) for *C. gariepinus* where it was found that males grew faster than females. *H. longifilis* has a prolonged pre-pubertal period of 12-14 months (Ofor, in press). Within this period, production may be maximized through mono-sex female culture since at a given time, they have a higher average weight than males. This mono-sex female culture will be highlighted in ponds since the combination of prolonged pre-pubertal period and weight advantage of females will result in their faster attainment of an economically optimal harvest weight, before the possible depressing effect of gonad maturation on growth sets in. The difference in mean weight between the sexes was greater in the group fed restrictedly, and since fish farmers are apt to underfeed, the case for a female mono-sex culture is made stronger.

Table 3: Average weight measurements of male and female *H. longifilis*

Age (days)	Group I *(ad libitum)*		Group II (Restricted	
	Male Wt (g)	Female Wt (g)	Male Wt (g)	Female Wt(g)
176	465	521	281	356
238	535	654	390	479
266	591	654	417	550
308	658	817	641	775
336	679	864	619	798
360	836	984	610	836
399	936	1,147	647	910
425	1,010	1,147	647	910

Differences between male and female significant (P<0.05)

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REFERENCES

Degani, G. Viola, S. and Lavanon, D. 1986a. Effects of dietary carbohydrate source on growth and body composition of the European eel (*Anguilla anquilla* L.) *Aquaculture*. 52:97-104.

Degani, G. Hahama, H. and Lavanon, D. 1986b The relationship of the eel *Anguilla* (L) bodysize, lipid, protein glucose, ash, moisture, body compositionand enzyme activity (aldolase). *Comparative Biochemistry and Physiology*. 84A (4). 739-745.

Degani, G. 1988. Body composition of the African catfish (*Clarias gariepinus*) at different ages. *The Israeli Journal of Aquaculture, Bamidgeh* 40 (4): 118-121.

Degani, G., Yigal Ben –Zvi and Lavanon, B. 1989. The effect of different protein levels and temperature on feed utilization, growth and body composition of *Clarias gariepinus* (Burchell, 1822). *Aquaculture*. 76:293-307.

Gallagher, M . L., Kano, E. and Beringer, R. 1984. Effect of size on composition of the American eel, *Anguilla rostrata*. *Comparative Biochemistry and physiology*. 78A: 533-536.

Groves, T. D. D. 1970. Body composition changes during growth in young sockeye salmon (*Onchorynchus nerka*) in fresh water. *Journal of the Fishes Research Board of Canada*. 27:929-942.

Henken, A . M., Boon, J.B. and Lobee, H.B.1987. Differences in growth rate and feed utilization between male and female African Catfish. *Clarias gariepinus* (Burchell. 1922) *Aquaculture*: 63:221-232.

Jauncey, K. 1982. The affects of varying dietary protein levels on the growth, food conversion, protein utilization and body composition of juvenile Tilapia (*Sarotherodon mossambicus*). *Aquaculture*. 27:43-54

Reinitz, G.L. Orme, L.E. and Hitzel, F.N. 1979. Variations of body composition and growth among strains of rainbow trout. *Transaction of the American Fisheries Society*. 108:204-207.

Wedekind, H. 1991. Untersuchungen zur productqualitat Afrikanisher welse (*Clarias gariepinus*) in Abhangigkeit von genetischer Herkunft, Futterrung, Geschlecht and Schlachtalter. Ph. D. Thesis, University of Goettingen, Germany.