

Sub-Theme: Animal Breeding And Genetics
PHENOTYPIC INTERRELATIONSHIP OF BODYWEIGHT AND MORPHOMETRIC TRAITS FROM WILD CLARIID FISH SPECIES IN KANO STATE

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ABSTRACT

Morphometrics and fish bodyweight studies have shown great importance in estimation of productivity and stock assessment for some fish species. Hence, the study was aimed to identify the morphometric parameters that have correlation among and between bodyweight of *Clariid* species. Thus, one hundred and seventy seven samples (*Clarias gariepinus* and *Heterobranchus longifilis*) were collected from six rivers (Thomas, Ghari, Tiga dam, Duddurun Gaya, Karaye and Bagwai). Bodyweight and twenty-two morphometric characteristics were measured on each sample. Body weight was measured in grams using sensory scale while morphometric traits were measured in centimeters using flexible tape. These were; Body weight (BW), Total length (TL), Standard length (SL), Pre-dorsal distance (PDD), Pre-anal distance (PAD), Pre-ventral distance (PVD), Pre-pectoral distance (PPD), Caudal peduncle depth (CPD), Body depth at anus (BDA), Dorsal fin length (DFL), Anal fin length (AFL), Pectoral fin length (PFL), Pectoral spine length (PSL), Dorso-caudal length (DDCF), Dorso-occipital length (DODF), Head length (HL), Head width (HW), Snout length (SNL), Inter-orbital distance (ID), Eye diameter (ED), Length of occipital fontanelle (OFL), Width of occipital fontanelle (OFW) and Snout-occipital length (DSO). The results of Pearson correlation analysis for all the variables measured showed that relationship between Body Weight and all the morphometric measurements were positive and significant indicating that selection for BW might yield a correspondent positive result in other morphometric traits. The 'r' values ranged from low (0.23) to high (0.80) for BW/PDD and BW/DDCF. Other measurements had positive and significant relationships with values ranging from 0.30 for ED/SL to 0.92 for TL/SL.

Key words: Correlation, Morphometrics Traits, Wild Clariid Species,

INTRODUCTION

Clariid species have become an important fish species in Nigerian aquaculture production. In recent times, fishermen have extensively involved in fishing and culture of this species throughout Nigeria, providing employment for the rural and urban populations. *Clariid* species are air breathing fishes, naturally occurring in freshwater bodies in Africa and South-Eastern Asia where they make up a significant component of catches in rivers and lakes (Fagbuaaro *et al.*, 2015). The *Clariid* catfishes are of great importance as food and vital for aquaculture sustainability (Vanden, Bossche and Bernacsek, 1990; Fagbuaaro *et al.*, 2015). Fagbuaaro *et al.* (2015) reported that catfishes have suitable attributes such as: ability to withstand handling stress, disease resistance, high growth rate, yield potential, fecundity, and palatability. It is one of the most readily acceptable and palatable species of catfish in Nigeria. This is because they grow highly to large sizes and with great returns on investment to farmers (Fagbuaaro *et al.*, 2015). Assessment of abundance using morphometric analysis is important to ensure the species are not endangered (Vanden, Bossche and Bernacsek, 1990; Fagbuaaro *et al.*, 2015; Iswanto *et al.*, 2015). Morphometric analyses are important tools used to differentiate closely related species of organisms having huge similarity indices of various parameters or characters (Fagbuaaro *et al.*, 2015; Naeem and Salam, 2005). Assessment of these parameters are essential in fish studies, particularly to understand the taxonomy and differences within and among stock population. While the shapes and structures are unique to each fish species, the variations between groups of same species can be related to habitat location and genetic impurity among the stocks (Carpenter *et al.*, 1996; Fagbuaaro *et al.*, 2015; Iswanto *et al.*, 2015). Therefore, morphometric investigations help to reveal interrelations between various fish body parameters such as standard length and weight and other important functional parameters of growth, hence, the objective of this study.

MATERIALS AND METHODS

The study was conducted in six selected water bodies. These are Rivers Thomas and Ghari to the North, River Duddurun Gaya to the East, River Kano (Tiga dam) to the South, Rivers Karaye and Bagwai to the western part of the state. The first three locations were selected due to their independent flow and their disconnected tributaries. The remaining three locations have the same origin as the

Kano River and two flow towards the western part of the State while Tiga dam flows toward the Southern part. The fish samples were identified using an exposition for identification by Moses and Olufeagba, (2009), and confirmed using local names provided by the fishermen. Live fish samples of *Clarias gariepinus* (143) and *Heterobranchus longifilis* (29) from the six locations described above were purchased from commercial catches of the fishermen. *Clarias gariepinus* were collected from all locations except Tiga dam. Likewise, *Heterobranchus longifilis* were collected in all locations except Rivers Duddurun Gaya and Thomas. The samples were adults and were transported in large bowls to the Laboratory of the Department of Animal Science, Bayero University Kano, where measurements were taken immediately. Twenty-two (22) morphometric characters (using flexible tape) and body weight (using sensory scale) were taken on each specimen. The data from the morphometric measurements and weight were computed in excel and analyzed using Pearson correlation to determine the relationships among variables (SAS, 2000).

RESULT AND DISCUSSION

Tables 1, 2 and 3 show the Pearson correlation analysis for all the variables measured. The relationship between Bodyweight and all the morphometric measurements were positive and significant except PDD, DDCF, ID and ED. These r^2 values were; BW/TL (0.75), BW/SL (0.73), BW/PDD (0.80), BW/PAD (0.74), BW/PVD (0.58), BW/DFL (0.65), BW/AFL (0.51), BW/PFL (0.47), BW/PSL (0.66), BW/DODF (0.68), BW/CPD (0.65), BW/BDA (0.76), BW/HL (0.69), BW/HW (0.67), BW/SNL (0.55), BW/ID (0.50), BW/OFL (0.56), BW/OFW (0.38) and BW/DSO (0.42). The morphometric measurements with negative and significant correlations were PPD/PVD ($r = -0.45$), DDCF/AFL ($r = -0.67$), DDCF/PFL ($r = -0.54$), SNL/DFL ($r = -0.41$), ID/DDCF ($r = -0.36$), ED/DFL ($r = -0.50$), ED/AFL ($r = -0.45$), OFL/DFL ($r = -0.48$) and DSO/DFL ($r = -0.34$). The remaining measurements had positive and significant relationships with values ranging from 0.30 for ED/TL, PAD/ID, ID/OFL and PDD/DDCF to 0.92 for TL/SL.

The positive Pearson correlations for all morphometric measurements shows that *Clariid* species are able to survive as a living entity with indispensable body parts. The Pearson correlation analysis showed that bodyweight had a positive and significant relationship with all the morphometric characteristics indicating that selection for body weight might yield a correspondent positive result in other morphometric characteristics. The relationship between the variables measured showed a direct proportional relationship while some had negative relationship. This could be used in selection criteria for any breeding goal in fish breeding in which emphasis would be laid on those with positive and significant relationship against the variables with negative relationship. These findings were in agreement with reports of Umoh *et al* (2015) on studies carried out on hybrid of *Clarias gariepinus* and *Heterobranchus longifilis* in some selected farms in Southern Nigeria and Teugels *et al.*, (1990) on *Clariid* strains. The high positive correlations (r) exhibited by *Clariid* species in this study indicated that as length of the fish increased, its body weight also increased. This could be attributed to the availability of quality and quantity of food and plankton yield resulting from the water body within the ecological niches of the fish. Peeple and Ofor (2011) had made similar observation.

Table 1: Pearson correlation analysis of the measured morphometric traits

	WT	TL	SL	PDD	PAD	PVD	PPD	DFL	AFL	PFL	PSL
TL	0.75**	-									
SL	0.73**	0.92**	-								
PDD	0.80**	0.86**	0.77**	-							
PAD	0.74**	0.83**	0.67**	0.91**	-						
PVD	0.58**	0.66**	0.59**	0.71**	0.68**	-					
PPD	0.21*	0.20*	0.17*	0.23*	0.23*	-0.45**	-				
DFL	0.65**	-0.04	0.24*	-0.06	-0.24*	-0.14*	0.14*	-			
AFL	0.51**	0.26**	0.48**	0.20*	0.04	0.44**	-0.24*	0.68**	-		
PFL	0.47**	0.56**	0.45**	0.62**	0.64**	0.49**	0.09	-0.26**	-0.04	-	
PSL	0.66**	0.78**	0.63**	0.81**	0.89**	0.70**	0.09	-0.28**	0.09	0.66**	
DDCF	0.20*	0.25*	-0.00	0.30**	0.42**	0.04	0.32**	-0.67**	-0.54**	0.20**	0.35**

WT-Body weight TL-Total length SL-Standard length PDD-Pre-dorsal distance PAD-Pre-anal distance PVD-Pre-ventral distance PPD-Pre-pectoral distance DFL-Dorsalfin length AFL-Anal fin length PFL-Pectoral fin length PSL-Pectoral spine length DDCF-Dorso-caudal length **/*

Table 2: Pearson correlation analysis of the measured morphometric traits

	DODF	CPD	BDA	HL	HW	SNL	ID	ED	OFL	OFW
CPD	0.62**	-								
BDA	0.75**	0.75**	-							
HL	0.45**	0.71**	0.75**	-						
HW	0.63**	0.84**	0.77**	0.80**	-					
SNL	0.58**	0.66**	0.67**	0.58**	0.73**	-				
ID	0.23*	0.54**	0.49**	0.72**	0.53**	0.13*	-			
ED	0.31**	0.35**	0.36**	0.31**	0.47**	0.69**	-0.22*	-		
OFL	0.74**	0.37**	0.60**	0.24*	0.36**	0.50**	-0.5	0.23**	-	
OFW	0.47**	0.23*	0.46**	0.32**	0.31**	0.30**	0.12	0.29**	0.58**	-
DSO	0.42**	0.58**	0.57**	0.56**	0.70**	0.81**	0.18*	0.66**	0.28**	0.17*

DODF-Dorso-occipital length CPD-Caudal peduncle depth BDA-Body depth at anus HL-Head length HW-Head width SNL-Snout length ID-inter-orbital distance ED-Eye diameter OFL length of occipital fontenale OFW-width of occipital fontenale DSO-Snout-occipital length **/*

Table 3: Pearson correlation analysis of the measured morphometric traits

	WT	TL	SL	PDD	PAD	PVD	PPD	DFL	AFL	PFL	PSL	DDCF
DODF	0.68**	0.73**	0.59**	0.82**	0.83**	0.58**	0.21*	-0.21*	0.02	0.57**	0.72**	0.40**
CPD	0.65**	0.60**	0.60**	0.74**	0.68**	0.57**	0.18*	0.02	0.31**	0.44**	0.63**	0.22*
BDA	0.76**	0.80**	0.74**	0.88**	0.86**	0.70**	0.16*	-0.06	0.25**	0.59**	0.80**	0.24*
HL	0.69**	0.65**	0.71**	0.77**	0.67**	0.53**	0.24*	0.32**	0.48**	0.37**	0.57**	0.05
HW	0.67**	0.64**	0.61**	0.77**	0.73**	0.47**	0.48**	0.01	0.22*	0.45**	0.62**	0.35**
SNL	0.55**	0.53**	0.39**	0.67**	0.73**	0.52**	0.10	-0.41**	-0.11	0.50**	0.68**	0.57**
ID	0.50**	0.41**	0.60**	0.48**	0.30**	0.41**	0.07	0.66**	0.77**	0.11	0.21*	-0.36**
ED	0.23*	0.30**	0.11*	0.39**	0.47**	0.10	0.29**	-0.50**	-0.45**	0.36**	0.48**	0.64**
OFL	0.56**	0.65**	0.42**	0.70**	0.77**	0.56**	0.09	-0.48**	-0.23*	0.57**	0.73**	0.52**
OFW	0.38**	0.47**	0.39**	0.56**	0.56**	0.29**	0.19*	-0.09	-0.18*	0.35**	0.48**	0.19*
DSO	0.42**	0.42**	0.36**	0.55**	0.60**	0.40**	0.16*	-0.34**	-0.03	0.38**	0.54**	0.50**

WT-Body weight DODF-Dorso-occipital length CPD-Caudal peduncle depth TL-Total length BDA-Body depth at anus SL-Standard length HL-Head length PDD-Pre-dorsal distance HW-Head width PAD-Pre-anal distance SNL-Snout length PVD-Pre-ventral distance ID-inter-orbital distance PPD-Pre-pectoral distance ED-Eye diameter AFL-Anal fin length DFL-Dorsalfin length PFL-Pectoral fin length OFL length of occipital fontenale PSL-Pectoral spine length OFW-width of occipital fontenale DDCF-Dorso-caudal length DSO-Snout-occipital length

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