

PREDICTION OF FINAL BODY WEIGHT OF ROSS 308 AND ARBOR ACRE CHICKEN USING EARLY GROWTH CURVE

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ABSTRACT

Apart from body weight, a number of conformation traits are known to be good indicators of good and market value of broiler (Ibe, 2012). The objective of this study is to determine the relationship between body weights of Arbor acre plus and Ross 308 using a model of fit. 120 broiler chickens were used in this experiment, 60 Arbor- acre plus and 60 Ross 308. Using regression techniques the dependent variable, which is the weight of the bird and the independent variables, which are the morphometric traits, were used to establish a Relationship using linear regression model. The result shows that final weight of Ross 308 can be predicted from the morphometric traits as it can significantly ($p < 0.05$) fit the growth curve. The regression Coefficient of 0.79 is relatively high while the R- square of 0.62 showed a relatively high significant ($p < 0.05$) goodness of fit in all equations. The regression equations for all the morphometric traits considered in Arbor acre plus chickens showed that only body height and body length can significantly ($p < 0.05$) predict the growth curve of Arbor acre plus chickens. The regression Coefficient is high (0.91), likewise the R- square (0.82), the equations can fit the growth curve of Arbor acre plus. Prediction of final body weights using early growth curve is preferably with Ross 308 to Arbor acre plus chickens because almost all the parameters considered were significantly ($p < 0.05$) fit the growth curve.

Key Words: **Morphometric, growth, ROS 308, Arbor acre**

INTRODUCTION

Growth curves are used to describe the changes in body mass or length or number of cells overtime. Modeling of growth curves is particularly useful because it provides means for visualizing growth patterns over time, and the generated equations can be used to predict the expected weight of group of animals at specific age. The shape of growth curve can be used in the selective breeding programs. In animal species, growth parameters were shown to be heritable and responsive to the selection programs. These non-linear models allow the interpretation and understanding of growth patterns and metabolism underlying growth periods. Few studies have been devoted to model the growth curve in broilers, such as the comparison of non linear model to describe the growth in the andalusian turkey breed (A.Arando et al 2021) such as the comparison of non linear model to describe the growth in the andalusian turkey breed (A.Arando et al 2021)

MATERIALS AND METHODS

Experimental site

The experiment was carried out at the teaching, research and demonstration farm of the Department of Agricultural Technology, AkanuIbiam Federal Polytechnic Unwana in Afikpo North Local Government Area of Ebonyi State, Nigeria.

Experimental birds

A total of 120 broilers were used, 60 Arbor acre plus and 60 Ross 308 were reared in a well-ventilated pen. They were fed commercial feed for 4 weeks ad libitum for the duration of the study. Water was equally provided. Body weights were taken using a sensitive scale at day 0, 7, 14, 21, and 28. Morphology traits which included; Breast length, breast width, muscle thigh, drumstick, wing length, shank length, was taken using a measuring tape.

Data collected were subjected to linear regression procedures of Statistical Analysis System (SAS 2003).

The regression equation was:

$$Y = a + bx \text{ where}$$

$Y = \text{body weight (dependent variable)}$

$a = \text{the regression constant}$

$b =$ intercept on the y axis
 $x =$ traits of interest (independent variable)

RESULT AND DISCUSSION

The regression equation for each of the morphometric traits considered for Ross 308 are presented in Table 1. The result in the table showed that final weight of Ross 308 can be predicted from all the parameters considered as it significantly ($P < 0.05$) fits the growth curve except for breast length, breast width, drumstick and thigh length. The results further showed that breast parameters are not good predictive parameters for Ross 308 chickens. The regression coefficient of 0.79 is relatively high while the R-square of 0.62 showed a relatively high significant ($P < 0.05$) goodness of fit for all the equations.

Table 1. Regression parameters for early growth prediction in Ross 308

parameters	Regression equation	SE	P value
Body height	$BW = 285 - 77.7(BH)$	14.01	0.00*
Body length	$BW = 285 + 76.2(BL)$	14.87	0.00*
Breast length	$BW = 285 - 23.7(BRL)$	39.16	0.54
Breast width	$BW = 285 + 15.1(BRW)$	22.50	0.50
Drumstick	$BW = 285 - 25.0(DSK)$	34.51	0.47
Shank length	$BW = 285 - 87.5(SL)$	31.31	0.01*
Thigh length	$BW = 285 - 6.8(TL)$	37.30	0.86
Wing length	$BW = 285 + 68.7(WL)$	13.42	0.00*
R	0.79	223.66	
R ²	0.62		
Regression equation fitness			0.00

* $P < 0.05$

BW = Body weight; BH = Body height; BL = Body length; BRL = Breast length; BRW = Breast width; DSK = Drumstick; SL = Shank length; TL = Thigh length

Table 2 showed the regression equations for all the morphometric traits considered in Arbor acre chickens. From the table it could be seen that only body height and body length can significantly ($P < 0.05$) predict the growth curve of Arbor acre chickens. The regression coefficient is high (0.91), likewise the R-square (0.82), showing that the equations can fit the growth curve of Arbor acre chickens.

Table 2. Regression parameters for early growth prediction in Arbor acre

parameters	Regression equation	SE	P value
Body height	$BW = -58.2 - 24.5(BH)$	7.72	0.02*
Body length	$BW = -58.2 + 30.3(BL)$	5.39	0.00*
Breast length	$BW = -58.2 + 20.0(BRL)$	9.88	0.05
Breast width	$BW = -58.2 + 15.8(BRW)$	10.37	0.13
Drumstick	$BW = -58.2 + 8.9(DSK)$	15.65	0.57
Shank length	$BW = -58.2 + 6.5(SL)$	18.68	0.73

Thigh length	BW = -58.2 + 34.3(TL)	20.62	0.10
Wing length	BW = -58.2 + 14.6(WL)	10.36	0.16
R	0.91	124.91	
R-squared	0.82		
Regression equation fitness			0.00

*P<0.05 BW = Body weight; BH = Body height; BL = Body length; BRL = Breast length; BRW = Breast width; DSK = Drumstick; SL = Shank length; TL = Thigh length

For Ross 308, shank length, SL [BW= 285 - 87.5 SL] has a p value of 0.01 and wing length WL [BW= 285 - 68.7WL] has a p value of 0.00 which are highly significant and can be used to predict the body weight of Ross 308 at the early stage. In Arbor acre findings indicated that the regression equation for BH [BW= -58.2 - 24.5BH] has a p value of 0.02 and BL [BW= -5.82 + 30.3BL] has a p value of 0.00 which are highly significant and can be used to predict the body weight of Arbor acre at the early stage.

CONCLUSION AND RECOMMENDATION

The final body weight of Ross 308 can be predicted from all the parameters(BL,Bh, BW,DSK, SL,TL and WL. considered except for breast length, breast width, drumstick and thigh length. Final body weight of Arbor acre plus can be predicted from only the body height and body length. Prediction of final body weight of broilers using early growth curve is preferably to use Ross 308 to Arbor acre plus chickens because almost all the parameters considered were fit for growth curve except for breast length, breast width, drumstick and thigh length. While in Arbor acre plus only the body height and body length were fit for growth curve. Investigation should be made on arbor acre on the best way that it body weight can be predicted.

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