

# Prediction of Body Weight from Linear Body Measurements in Nili-Ravi Buffalo Calves

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**Abstract:** Using 24 Nili-Ravi male buffalo calves, an experiment was carried out to find out the correlation of body weight with linear body measurements and to test the accuracy and precision of regression equations to estimate body weight from linear body measurements. All the linear body measurements during 6 - 24 months of age were positively and significantly correlated with body weight ( $P < 0.01$ ). The coefficient values were decreased gradually with the increase of age of calves. The body weight of 6-12, 12-18 and 18-24 month calves can be predicted on the basis of linear body measurements with very low standard error of estimates and the developed models explained 83.21, 82.23 and 66.66% of variation in body weight, respectively.

**Keywords:** Body measurements, body weight, buffalo calves, prediction.

## INTRODUCTION

The body weight (BW) of young animals is one of the most important traits for the study of growth pattern and daily management. In an organized farm, weighing scale is routinely used to take the BW but weight can seldom be measured in field level/remote areas due to lack of weighing scale. It is, therefore, desirable to estimate live weight from simple traits such as linear measurements using easily obtainable and cheaply available metric tape rule [1].

Earlier researchers [2-4] developed regression equations that could be used to predict body weight from some of the linear body measurements. Many reports are also available in cattle [2, 5, 6], goats [7, 8], sheep [9] and pig [4]. However, report [10] in the literature regarding the relationship between BW and linear measurements in buffaloes is very limited. Therefore, an attempt has been made to find out the correlation of body weight with body measurements and to test the accuracy and precision of regression equations to estimate BW from body measurements in Nili-Ravi buffalo calves.

## MATERIALS AND METHODS

The experiment was conducted at the Central Institute for Research on Buffaloes, Regional Station- Bir Dosanjh, Nabha (latitude, 30° 22'28"N and 76° 8'54"E), Patiala, Punjab, India.

Twenty four Nili-Ravi male buffalo calves were used for the study during the month of April, 1998 to April, 1999. The animals were maintained under standard management practices. The data ( $n=160$ ) were generated at monthly interval pertaining to the age group of 6-12, 12-18 and 18-24 months for different traits i.e. BW, height at wither (HW), height at hip bone (HH), body length (BL), heart girth (HG) and abdominal girth (AG).

The Pearson's correlation coefficients using SPSS [12] of all the body measurements with BW in a particular age group were calculated as per standard statistical procedure [11]. Stepwise regression method using the General Linear Model procedure was utilized to develop the prediction model [12]. All the linear measurements were taken as independent variables and BW as the dependent variables. The best prediction equations were developed for BW at 6-12, 12-18 and 18-24 months of age.

## RESULTS AND DISCUSSION

The results showed that the correlation coefficient between BW and linear body measurements varied from 0.644 to 0.908 in the age group of 6-12 month of calves. The highest coefficient of BW was noted with HG (0.908) followed by AG (0.822), HW (0.760), BL (0.722) and HH (0.644). All the values were statistically significant ( $P < 0.01$ ). At 12-18 month of age, maximum correlation of BW was recorded with AG (0.821), whereas, HG showed lowest (0.564) value. The correlation coefficients between BW and HW, HH and BL were almost similar (ranged between 0.719 - 0.790). Almost similar correlation coefficient of weight

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**Table 1: Phenotypic Correlations between Body Weight and Linear Body Measurements at Different Ages in Nili-Ravi Male Buffalo Calves**

Age (Months)	HW	HH	BL	HG	PG
6-12	0.760**	0.644**	0.722**	0.908**	0.822**
12-18	0.752**	0.790**	0.719**	0.564**	0.821**
18-24	0.731**	0.743**	0.549**	0.657**	0.579**

\*\* = Significant at 1% level (P< 0.01).

was recorded with HW (0.731) and HH (0.743) at 18-24 months of age followed by HG (0.657), AG (0.579) and BL (0.549).

It was very important to note that from 6 to 24 months of age, the correlation coefficient of BW of calves was positive and highly significant. But, the coefficient values were decreased gradually with the increase of age of calves. Earlier report [10] also supports the present finding in buffaloes.

The HG or AG can alone be used for prediction of BW in Karan–Fries cows and Murrah buffaloes with 78 vs. 74 and 72 vs. 75% precision, respectively [7]. The observation [5] in Brown-Swiss cattle envisaged that

BW can be predicted fairly accurately ( $R^2 = 0.90$ ) by measuring HG alone or with WH. Similar reports were also put forth in goat [7, 8], in sheep [13] and in pregnant cattle [6]. Another report [1] depicted that the chest girth, height at wither and body length were the best predictive variables in Nigerian Red Sokoto male goats while only chest girth and body length is enough to predict the live weight even more accurately. This result also supports the findings of earlier researcher [3].

The final BW prediction models obtained by the stepwise multiple regression method for predicting the BW of calves at 6-12, 12-18 and 18-24 months of age were as follows-

**Table 2: Phenotypic Correlations between Body Weight and Linear Body Measurements at Different Ages in Nili-Ravi Male Buffalo Calves**

Body measurements	BW	HW	HH	BL	HG	PG
<b>6-12 months</b>						
HW	0.760**					
HH	0.644**	0.689**				
BL	0.722**	0.776**	0.699**			
HG	0.908**	0.767**	0.675**	0.757**		
PG	0.822**	0.747**	0.681**	0.781**	0.883**	
<b>12-18 months</b>						
HW	0.752**					
HH	0.790**	0.918**				
BL	0.719**	0.765**	0.785**			
HG	0.564**	0.567**	0.559**	0.492**		
PG	0.821**	0.755**	0.787**	0.656**	0.613**	
<b>18-24 months</b>						
HW	0.731**					
HH	0.743**	0.770**				
BL	0.549**	0.446**	0.498**			
HG	0.657**	0.664**	0.651**	0.391**		
PG	0.579**	0.669**	0.609**	0.414**	0.369**	

\*\*Significant at 1% level (P<0.01).

$$Y = - 181.838 + 2.009 \text{ HG} + 0.662 \text{ HW},$$

$$Y = - 296.930 + 1.280 \text{ HH} + 1.450 \text{ AG} + 1.047 \text{ BL}$$

and  $Y = - 652.540 + 1.885 \text{ HH} + 3.397 \text{ HW} + 1.073 \text{ AG} + 0.935 \text{ BL}$  with  $R^2 = .8321$ ,  $P < 0.01$ , SE estimate 10.19kg;  $R^2 = 0.8223$ ,  $P < 0.01$ , SE estimate= 12.1 kg and  $R^2 = .6666$ ,  $P < 0.01$ , SE estimate 21.62, respectively.

## CONCLUSION

From the study it was concluded that height at wither, height at hip, heart girth, body length and abdominal girth were positively and significantly ( $P < 0.01$ ) correlated with BW from 6-24 months of age. The BW of 6-12, 12-18 and 18-24 month of Nili-Ravi buffalo calves can be predicted on the basis of linear body measurements with very low standard error of estimates and the developed models explained 83.21, 82.23 and 66.66% of variation in body weight, respectively.

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