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Correlation Between Body Weight and Linear Body Measurements in Adult Female Sahiwal Cattle

Sambhuti Shankar Sahu, S.K. Choursia, A.K. Chaturvedani* and Om Prakash

Department of Livestock Production and Management

College of Veterinary Science and Animal Husbandry, Anjora, Durg, Chhattisgarh, India

Corresponding Author: ajay.chaturvedani001@gmail.com

Abstract

The present investigation was conducted in the herd of pure bred Sahiwal cows maintained at Bull Mother Experimental Farm (BMEF) and Government Cattle Breeding Farm (CBF), Anjora, Durg (Chhattisgarh). A total of 193 adult female Sahiwal cattle over three years of age were used in the experiment. The animals were grouped into seven age groups, i.e. 3-4, 4-5, 5-6, 6-7,7-8,>8 years old, and overall. Body weight was found to be significantly ($P<0.01$) and positively correlated with height at withers (r= 0.58 to 0.73), body length (r= 0.56 to 0.76) and heart girth (r= 0.57 to 0.80) in these groups. The relatively high value of coefficient of correlation between live body weight and heart girth assumed to be more significant indicator of live body weight in Sahiwal cattle.

Key Words: Body weight, Body length, Height at withers, Heart girth, Sahiwal, Correlation.

Introduction

India is rich in livestock diversity and cattle are the most popular species among all livestock. Indigenous cattle (*Bosindicus*) compared to exotic cattle (*Bostaurus)* has lower metabolic rate, better heat tolerance , loose body skin, and more sweat glands, which play an important role in adaptation to tropical heat. Deshi breeds will continue to be valuable in our country . Body measurements play an important role in evaluating breed performance and distinguish animals (Warwick *et al.,* 1990), through predictive equations. The body measurements such as body length (BL), heart girth (HG) and wither height (HT) etc. have close relationship with body weight (Desai *et al*., 1992; Gilbert *et al*., 1993). The HG has high coefficient of correlation (r) with live body weight (LW) in many breeds of cattle (Gunawan and Jakaria, 2011; Paputungan*et al.,* 2013). The objective of present study was to find out the relationship between live body weight and linear body measurements of adult Sahiwal females at different stages of life.

Materials and Methods

The study was performed at Bull Mother Experimental Farm (BMEF) of the College of Veterinary Science and AH, Anjora, Durg and Government Cattle Breeding Farm (CBF), Anjora, Durg of the Directorate of Veterinary Services, Raipur, Government of Chhattisgarh India. The herds consist of Sahiwal cattle. Only the adult healthy non-pregnant female Sahiwal cattle over three years of age

were considered for this study. All lactating animals were managed in loose housing system (tail to tail) under identical condition of feeding and management. Cows were hand-milked regularly twice a day early in the morning and late in the afternoon after feeding concentrate mixture. Animals were taken for grazing from 7.00 to 10.00 am. The nutrient requirement of the animals was mostly met through concentrate and *ad libitum* green fodder.

Data collected on body weight and body measurements were classified on the basis of age determined from pedigree records. Seven age groups (3-4 years, 4-5 years, 5-6 years, 6-7 years, and 7-8,> 8 years old and overall) were used. A total of 193 adult true type female Sahiwal cattle were used in the study. Live body weight (BW, kg) of each animal was taken individually prior to feeding during early in the morning between 6.00 and 7.00 am before providing the animals with any feeding stuff or water. For body measurements, animals were permitted to stand on four legs squarely, relaxed / without stress (Khan *et al*., 2006). A height at withers was taken as a vertical distance (cm) between wither and the most bottom part of the front hoof on the platform. The body length was measured (cm) from point of shoulder to the point of the tuber ischii or pin bone by means of ordinary tape. The heart girth was measured (cm) by a flexible tape as the greatest circumference of thoracic cavity just behind the point of elbow. Data were analyzed through SPSS computer software version 17.0. The associations between body weight and body measurements were estimated by simple correlation (Steel and Torrie, 1980).

Results and Discussion

The interrelations among body measurements and body weight in different age groups of Sahiwal cows are presented in Table 1. The body weight of adult female Sahiwal cattle was observed to be significantly (P<0.01) and positively correlated with height at withers (r= 0.58 to 0.73), body length (r= 0.57 to 0.76) and heart girth (r= 0.57 to 0.80) in different age groups (Table 1). The highest correlation of BW with HT, BL and HG was found in 3 to above 8 years, 3 to 4 years and above 8 years groups, respectively.

Table 1: Correlation between body weight and body measurements in Sahiwal cows

Age groups (years)	Correlation between body weight and		
	Height at withers	Body length	Heart girth
3-4	0.58 *	0.76 **	0.74 **
4-5	0.59**	0.68 **	0.79 **
5-6	0.70**	0.67 **	0.66 **
6-7	0.66**	0.64 **	0.57 **
7-8	0.67**	0.56**	0.62**
> 8 years	0.68**	0.66 **	0.80**
Overall	0.73**	0.73 **	0.79**

*significant at p<0.05;**significant at p<0.01).

At the age group of 3-4 years and 5-6 years, the highest relationship was found between body weight and body length (0.76) as well as between body weight and heart girth (0.74). Several researchers reported similar finding in different breed (Dhangar and Patel, 1990; Francis *et al*., 1994). The correlation between body weight with body measurements did not show a consistent trend. However, all the correlations in the age group of 5-8 years were found to be significant

(P<0.01). The result is in agreement with findings of Fiekerden and Aydin (1992) who reported high positive correlations in Israel Friesian cattle. The results suggested that any of these variables or their combinations would provide a good estimate of predicting live body weight in cattle. Similar correlations of body weight with heart girth in cattle were also reported by Abdelhadi and Babiker (2009) and Bagui and Valdez (2007).

The relationship between body measurements and body weight depends upon breed, age, type, size, condition and fattening level of the animals (Heinrichs et *al*., 1992). Van Marle-Koster *et al. (2000)* described body measurements as selection criteria for growth in cattle. Maiwashe (2000) opined that constant checks on the relationships between body measurements and performance traits are vital in selection programme. In the present study, there were highly significant ($P \leq 0.01$) and positive correlations between live body weight and physical body measurements in all age groups, except 3-4 years. Live body weight is an important economic trait in the selection of animals. The main purpose of animal breeding is to improve traits of economic value (Mendes *et al.,* 2005). Gilbert *et al.* (1993) reported that there is close correlation between body weight and body measurements. In present study live body weight was correlated with height at wither (0.73), body length (0.73) and heart girth (0.79). The relatively high value of coefficient of correlation between live body weight and heart girth assumed to be more significant indicator of live body weight in Sahiwal cattle.

Conflict of Interest: All authors declare no conflict of interest.

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