

## Some Prediction Equations of Live Weight from Different Body Measurements in Shami (Damascus) Goats

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**Abstract:** This study was carried out with Damascus (Shami) goats and their kids at research and training farm of Mustafa Kemal University to obtain some prediction equations between live weight and different body measurements. The data were from dams at mating season and from kids at three days age. Stepwise regression was used to determine the most suitable model in prediction of live weight using different body measurements. For live weight estimation, the biggest  $R^2$  values were obtained from equations with hearth girth, hip width, hip height, withers height and width of tuber coxae. It is concluded that live weight could be predicted by using different body measurements for both Shami dams and their kids.

**Key words:** Shami (Damascus) goats, live weight, body measurements

### Introduction

In the countries that animal marketing carried out by live weight, weighing equipments required at the market place cause big difficulties. In order to overcome these difficulties, especially in cattle production, some body measurements are used to estimate the live weight for a long time (Anonymous, 1995). Using this kind of estimation could also be applicable in goat keeping. Some body measurements correlated with live weight could be used in objectively and easily selection way in goat too. These measurements are body length, withers height, hip height, hearth girth, shoulder width and chest depth. Linear relation between live weight and these measurements are investigated with regression equations. Gajbhiye and Johar (1985) were reported correlation coefficients for live weight with body length as 0.74, with height at withers as 0.78, with hearth girth as 0.80 in Marga sheep. In this study determination coefficient among live weight and these parameters were reported as 84.45% in multiply regression equation using four body measures. Pradhan (1982) developed two equations for prediction of body weight using different body measurements for goats as "body weight= [body length x hearth girth] x 2/10.5" and for sheep as "body weight= [body length x hearth girth] x 2/12".

The aim of this study is developing regression equations between live weight and different body measures in Shami (Damascus) goats which are raised at Mediterranean region of Turkey as well as in some Middle East Countries.

### Materials and Methods

This study was carried out with 61 heads of Damascus (Shami) goats and 62 heads of their kids at Research and Training Farm of Agriculture Faculty of Mustafa Kemal University in Antakya province of Turkey. Antakya is located between 36° North latitude and 36° East longitude in the Eastern Mediterranean region where climatic conditions are hot and dry in summer and warm and rainy in winter.

For live weight estimation, body length, withers height, chest depth, hip height, hip width, width of tuber coxae, pin height and pin width were measured with measuring stick; hearth girth and cannon circumference were measured by weighing tape. Goats were weighed by scale with 100 g of sensitivity after 12 h of food withdrawal. These applications were done at mating season for dams, at three days age for kids. All measurements are applied while animals are standing in normal pose. The measurements were taken as below;

- Body length-the distance from the tip of sternum to the tail base
- Heart girth-the circumference of the chest just behind the forelimbs
- Withers height-the distance from shoulder-blades to the ground
- Chest depth-the greatest depth, measured between top of withers and sternum
- Hip height-height from spina iliaca to the ground
- Hip width-distance between spina iliaca dorsalis
- Width of tuber coxae-distance between spina iliaca ventralis
- Pin height-height from tuber ischiadicum to the ground
- Pin width-distance between tuber ischiadicum
- Cannon circumference-circumference of hind-leg on cannon

In the study, the stepwise regression was used for determination of the most suitable model in prediction of live weight using different body measurement (Pedhazur, 1997; Dytham, 2000).

**Results and Discussion**

It is well known that the amount of explainable variance in regression models are related to effecting independent variable numbers on dependent variable. On the other hand, increment of independent variable number is not practical. For this reason, it is necessary to detect the least variable number for explaining the most variation (Dytham, 2000). Forward selection, backward elimination and stepwise regression are the methods of reduced model determination.

In this study, regression models and their R<sup>2</sup> values for prediction of live weight are given in Table 1. As seen in the table, although R<sup>2</sup> values of models increase by the number of variables, all R<sup>2</sup> values are acceptable level. R<sup>2</sup> is a statistic that is widely used to determine how well a regression fits as the coefficient of determination. R<sup>2</sup> represents the fraction of variability in dependent variable that can be explained by the variability in independent variables.

Table 1: The models for prediction of live weight from different body measurements and their R<sup>2</sup> values

	Models	R <sup>2</sup>
Kids	BW=1.295 x HG-65.55	0.74
	BW= 0.913 x HG + 2.113 x HW-65.946	0.81
	BW= 0.817 x HG + 1.973 x HW + 0.319 x HH-78.36	0.84
Dams	BW= 0.224 x HG-4.349	0.77
	BW= 0.17 x HG + 0.122 x WH-6.541	0.83
	BW= 0.138 x HG + 0.11 x WH + 0.198 x WTC-0.654	0.86

BW, body weight; HG, hearth girth; HH, hip width; HH, hip height; WH, withers height; WTC, width of tuber coxae

Residual graphs are given in Figure 1 and Figure 2. The both figures are formed to indicate the adequacy and validity assumption of models. The randomly distributed points in rectangular shape surrounding zero value in graphs show the sufficiency of models (Alpar, 1997; Pedhazur, 1997).

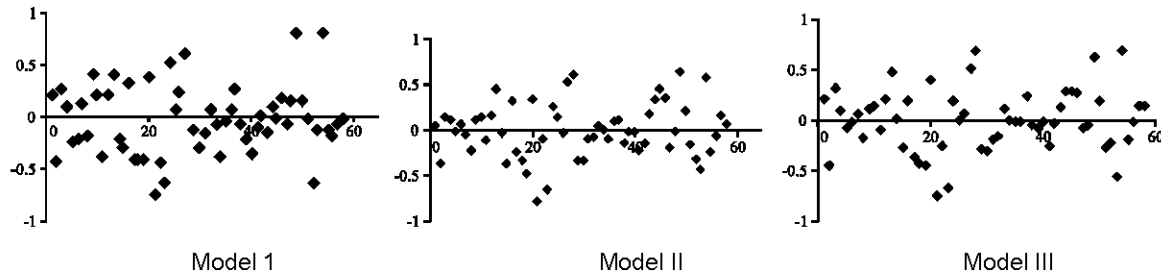


Fig. 1: Residual distribution belong to kids

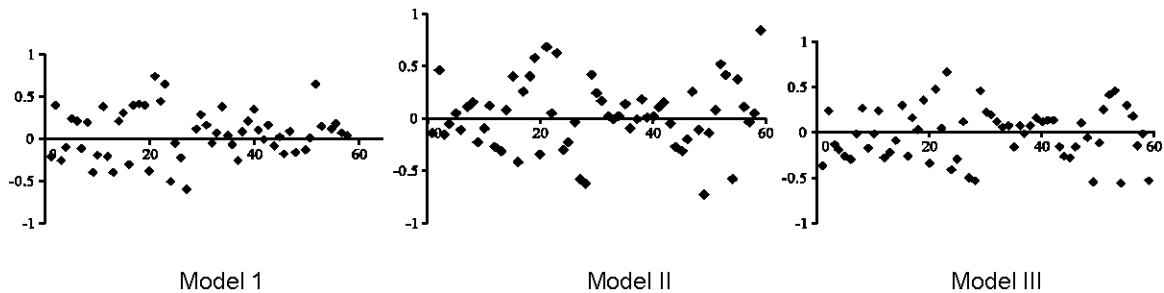


Fig. 2: Residual distribution belong to dams

There is no strong relation among independent variables when regression models are formed. The Variance Inflation Factor (VIF) which are formed from diagonal component of reverse of correlation matrix concerning to independent

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variable show that this hypothesis is fitting or not. The bigger than 10 VIF values are indicator of strong multicollinearity (Alpar, 1997 and Pedhazur, 1997). In the study the obtained VIF values that less than 5 explain that there were no multicollinearity problem.

As a conclusion, live weight of Shami dams and kids could be predicted by using different body measurements. Increment in used measurements increases the precision of prediction.

**References**

- Anonymous, 2005. Body measurements as a management tool for crossbred dairy cattle at a smallholder farm condition. Prepared by B.S.J. Msangi, M.J. Bryant, P.Y. Kavana, Y.N. Msanga and J.B. Kizima, [www.ihh.kvl.dk/htm/php/Tsap99/15-msangi.htm](http://www.ihh.kvl.dk/htm/php/Tsap99/15-msangi.htm); Date of Connection, 11 Jan 2005
- Alpar, R., 1997. Uygulamalı Çok Değişkenli İstatistiksel Yöntemlere Giriş. I. Kültür Ofset, pp: 337, Türkiye
- Gajbhiye, P.U., Johar, K.S., 1985. Collage of Veterinary Science and Animal Husbandry, Jawaharlal Nehru Krishi VishwaVidyalaya, Mhow, Mdyha Pradesh 453 446, India. Indian J. Animal Sci., 55: 604-606
- Pradhan, S.L. 1982. Department of Development Animal Health, Lalitpur, Nepal. Nepalese J. Animal Sci., 3: 27-30
- Dytham, C., 2000. Choosing and Using Statistics. Blackwell Science Ltd. pp: 218. USA
- Pedhazur, E. J., 1997. Multiple Regression in Behavioural Research. Rinehart and Winston Inc., pp:1058. America