

## Early prediction of some kid body dimensions from maternal traits

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### Abstract

This study was conducted in the Iraqi Ministry of Agriculture, Ruminant Research Station, west of Baghdad. It included 447 goats born of both sexes belonging to local, Shami and their crosses. The body dimensions of kids at birth and the dam's weight and age at birth, as well as the dependence of weaning weight on the birth weight of the kids by the use of simple linear regression equations. The results presented that coefficient of regression of most studied dimensions on the traits of maternal weight at birth and weight of the kid at birth has significant effect, except the regression of the body length at birth on both the maternal weight at birth and the kids weight at birth, which was not significant, The results showed the possibility of dependence on the studied maternal characteristics and kids birth weight to predict the dimensions of the goat kids body at birth.

**Keywords:** Prediction equations, Body dimensions, Goat kids

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### توقع بعض أبعاد الجسم لمواليد الماعز من صفات الام والمواليد المبكرة

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### الخلاصة

أجريت هذه الدراسة في محطة بحوث المجترات/ وزارة الزراعة العراقية، الواقعة غرب بغداد، وشملت الدراسة على ٤٤٧ من الماعز المولودين ومن كلا الجنسين ماعز محلي وشامي والتضريب بينها. تم دراسة أبعاد جسم المواليد عند الولادة ومدى اعتمادهم على وزن وعمر الام عند الولادة وكذلك اعتماد الوزن عند الفطام على وزن المواليد عند الولادة باستخدام معادلات الانحدار الخطي البسيط. أظهرت النتائج أن معامل الانحدار لمعظم الأبعاد المدروسة على صفات وزن الأم عند الولادة ووزن المولود عند الولادة له تأثير معنوي، باستثناء انحدار طول الجسم عند الولادة على وزن الأم عند الولادة ووزن المولود عند الولادة والتي لم تكن معنوية. النتائج اشارت الى إمكانية الاعتماد على الصفات الأمية المدروسة ووزن المواليد عند الولادة للتنبؤ بأبعاد جسم المواليد عند الولادة.

### Introduction

The livestock is very important sector in its contribution to food security. Despite the estimated growth of this sector in the Arab world in general, estimated at 2.3% annually, production is still far below the potential and resources available. Therefore, in order to achieve qualitative leaps that meet the needs of society in general, it is necessary to

overcome many deficiencies such as the spread of diseases, epidemics, underdevelopment of animal production systems and husbandry prevailing in the region (1).

Iraq constitute 4.5% of the total goat population in the Arab world (1). The increase in growth is a clear indication of the animal's ability to produce meat significantly and that the dimensions of the animal body in different ages including the birth stage is a strong and early signal of the

potential of the animal on high fattening, it's possible to take advantage of these traits in the conduct of selection to obtain the sires of future generations with desirable qualities (2). To find the best prediction equations to be a role in early farm animal selection programs, which effectively reduces the economic costs of raising farm animals. So, there is a need to develop prediction equations for body dimensions using independent variables that are repeatable and easily measured at the animal husbandry farms level and that was the aim of the study.

### Materials and methods

This study was conducted at the ruminants' research station in Ekrkov located in the area within 23 km west of Baghdad, for the period from 1/11 / 2013- 20/01/2014. The experiment was carried out to find out a prediction linear equation for body dimensions in goat kids. The research included 447 goat kids belong to (Iraqi Local, Shami and their crosses). Also, the study included the birth weight of the kids, the weaning weight of the kids, chest and abdominal circumference, body length and front height of the kids' body in addition to weight and age of the mother goats at birth.

Table 1: Mean ± SE of dam and kids studying traits

Trait	Overall mean ± SE
Dams weight at kidding (kg)	41.345±2.78
Kids weight at birth (kg)	2.97±0.09
Kids weight at weaning (kg)	15.53±0.45
Kids Body length at birth (cm)	27.56±0.21
Kids Chest circumference at birth (cm)	31.52±0.20
Kids Abdominal circumference at birth (cm)	31.54±0.25
Kids Front height of the kids body at birth (cm)	31.64±0.21

### Body dimensions at birth

The results in table 1 show that overall ranges of body length, chest and abdominal circumference, and front height of the body at birth were 27.65,31.52,31.54 and 31.64 cm sequentially, which were close results to (5,6).

### Phenotypic correlations

The analysis of data indicates that most of Phenotypic correlations between the four body dimensions at birth stage (body length, chest abdominal circumference, and front height of the body) were positive highly significant (P<0.01) the highest was between chest circumference and front height of the body (0.81), and the lowest was between abdominal circumference and body length (0.09) (Table 2). These results closed to the results of (7) in a study on Yankasu sheep. The phenotypic values of the two traits resulting from the total variations caused by genetic and environmental factors (8).

The equations to predict some of the traits account depending on the simple linear regression and the use of coefficient of determination (R<sup>2</sup>) which estimated (3) to describe effects of factors on studied traits statistical analysis of the data using the SAS (4) program. The equations that describe the prediction are as follows:

$$\hat{Y}_x = a + b(x_i)$$

$$a = y - bx$$

$\hat{Y}$ : The predicted (dependent) trait.

a: y- intercept of the slope line.

b: The regression coefficient.

$X_i$ : The independent trait.

### Results and discussion

#### Birth and weaning weights

It has been found that the average weight of dam at kidding, kids birth weight and kids weaning weight were 41.34, 2.92 and 15.53 kg respectively (Table 1). These results outweigh the findings of (2,5) in their studies on local and Shami goats and their crosses.

### Prediction equations

The main concern of the paper was to obtain the prediction equations of studied traits. The prediction equations for body measurements of goat in Iraq (Table 3). (9) summarizes the linear relationship between most of traits as the regression equations ranged from non-significant to significant (P<0.05) depending to attachment R<sup>2</sup> values. It has been found a significant regression to both birth and weaning weights of kids on kidding dam age with R<sup>2</sup> equal to 0.74 and 0.69 respectively. And so was the regression factor of chest and abdominal circumference and front height of the body on kidding dam weight significant (P<0.05) with R<sup>2</sup> equal to 0.65, 0.60 and 0.62 sequentially. Also, the significance of regression equations was observed in chest and abdominal circumference, and front height of the body on birth weight of kids which were about 0.66, 0.62 and 0.64 R<sup>2</sup> respectively. Otherwise, our results did not appear a significant regression neither for kid's birth and

weaning weights on kidding dam weight, nor for body length at birth on both kidding dam weight and kid's weight at birth. Thus, the final result of R2 values indicate that 60 to 74% of the studied traits variable (Y) belong to the variance of traits on which they descended (x).the accuracy of the equations used to predict the dimensions of the body through there regression on kidding dam weight and kids

weight at birth have enormous economic importance in animal production, and the ability of animal producers has a great relationship with measurements of live body and growth characters, and its essential for all ideal animal production institutions, especially the developing world (10).

Table 2: Phenotypic correlations between kids body dimensions at birth

Dimensions	Body length	Chest circumference	Abdominal circumference
Front height	0.70 **	0.81 **	0.49 **
Body length	-	0.80 **	0.09 **
Chest circumference	-	-	0.41 **

\*\* (P<0.01).

Table 3: Prediction simple linear equations of studying traits

Traits		Regression equation	Coefficient of determination (R2)
Dependent variable (Y)	Independent variable (X)		
Kids birth weight	Dam weight at kidding	$\hat{Y}=1.818+0.032(X)$	0.34
Kids birth weight	Dam age at kidding	$\hat{Y}=3.201+(-0.015)(X)$	0.74 *
Kids weaning weight	Dam weight at kidding	$\hat{Y}=12.28+0.08(X)$	0.42
Kids weaning weight	Dam age at kidding	$\hat{Y}=86.66+(-0.18)(X)$	0.69 *
Body length at birth	Dam weight at kidding	$\hat{Y}=27.14+0.01(X)$	0.56
Chest circumference at birth	Dam weight at kidding	$\hat{Y}=13.69+(-0.004)(X)$	0.65 *
Abdominal circumference at birth	Dam weight at kidding	$\hat{Y}=31.753+(-0.005)(X)$	0.60 *
Front height at birth	Dam weight at kidding	$\hat{Y}=30.16+0.036(X)$	0.62 *
Body length at birth	Kids birth weight	$\hat{Y}=20.85+2.137(X)$	0.55
Chest circumference at birth	Kids birth weight	$\hat{Y}=6.544+2.226(X)$	0.66 *
Abdominal circumference at birth	Kids birth weight	$\hat{Y}=6.112+2.368(X)$	0.62 *
Front height at birth	Kids birth weight	$\hat{Y}=24.27+2.349(X)$	0.64 *

\* (P<0.05)

## Conclusion

We concluded that it is possible to depend on dam weight and age, and kid weight at birth characteristics to predict different kids body dimensions from using the prediction equations calculated in this study to reduce the economic cost of goat breeding and to use them in the goat early selection programs.

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