Body weight prediction in lambs

Carolina Flores Quintana[1], Juan Alfredo Fernández[2], Enrique Alejandro Yáñez[3]

[1]Professor, Dpto. Morfología, Facultad Ciencias Veterinarias, Universidad Nacional del Nordeste
[2]Professor, Dpto. Animal Production, Facultad Ciencias Agrarias, UNNE, Sargento Cabral 2131, Corrientes, Argentina. jualf@agr.unne.edu.ar
[3]Professor, Dpto. Animal Production, FCV, UNNE, Corrientes, Argentina. enriquey.mv@gmail.com

Abstract: small sheep farmers in northern Argentina do not have scales and know the characteristics of the Santa Ines breed. With the objective to estimate equations for prediction body weight (BW) of lambs with different ages and from different genetics groups, were determinated biometric measures: thoracic perimeter, anterior height, rump height and body length. Was recorded 581 BW and biometric data, making Pearson correlation analysis, simple regression and linear regression, calculating the BW with each body measurements and combined four, three and two biometric variables. The analysis was performed with total data and discriminated against by genetic group: wool animals, without wool and absorbent cross with Santa Inês: F1, F2 and F3. The four biometric measurements correlate with BW. In equation with four variables, rump height is the variable that least contributes to regression coefficient, and verified that the adjustment to remove body length only decreased by 1%. The combination of thoracic perimeter and anterior height has a setting of 90% in the total data, the biggest adjustment for genetic analysis group and has the highest proportion in the regression coefficient. In wool animals thoracic perimeter has lower anterior height setting, not so in the rest of the genetic groups, demonstrating the influence of wool in determining. Thoracic perimeter had the highest accuracy and easy execution for estimating body weight.

Keywords: biometric measures, height, Santa Inês, sheep, thoracic perimeter

Predição do peso vivo de cordeiros

Resumo: Os pequenos produtores ovinos do norte da Argentina não têm balança nem conhecem as características da raça Santa Inês. Objetivando estimar equações de predição do PV de cordeiros com distintas idades e grupos genéticos, determinaram-se cada 30 dias durante o ano 2012, as medidas biométricas: perímetro torácico, largo do corpo, altura anterior e altura à garupa. Obtiveram-se 581 dados de cada medida biométrica e do PV, realizando análise de correlação de Pearson, de regressão simples e de regressão linear, calculando entre PV e cada uma das medidas corporais, como de quatro, três e dois variáveis combinadas. A análise foi realizada com o total dos dados e discriminados por grupo genético: lanados, Santa Inês e cruzas absorventes com Santa Inês: F1, F2 e F3. As quatro medidas biométricas têm correlação com o PV. Na equação com quatro variáveis, altura à garupa é a variável que aporta menos ao coeficiente de regressão, assim como se verifica que eliminando largo do corpo o ajuste diminui apenas 1%. A combinação de perímetro torácico e altura anterior têm ajuste de 90% dos dados totais, o maior ajuste da análise por grupo genético e elucidam em maior proporção o coeficiente de regressão. Nos animais com lã o perímetro torácico apresenta menor ajuste que altura anterior, não assim nos outros grupos genéticos, mostrando a influência da lã na determinação. O perímetro torácico apresentou a maior precisão e facilidade de execução para estimar o PV.

Palavras–chave: altura, biometria, ovinos, perímetro torácico, Santa Inês

Introduction

Sheep farming in northern Argentina is made by small producers in extensive systems, with minimal infrastructure and low application of technology, which prevents making checks on animal performance, as well as having body weight (BW) for health measures determine the precise value for the sale of lambs or adults, let alone estimate performance characteristics prior to slaughter

To propose a methodology to estimate the BW should use reliable and easy steps to obtain, they are not influenced by the position of animal or the operator. It is reasonable to think that individual measures are not sufficient to obtain the required accuracy. Most of the studies estimating body weight from biometrics include of the thoracic perimeter as more accurate measurement and better correlation (Osorio et al., 1999; Pulgaron et al., 2003; Souza et al. 2009; Yáñez et al., 2004).

In Argentina, due to the recent introduction of the Santa Ines breed, there is no information on biometric measures and animal performance, because it is a very different region of origin.

The aim of this study was to determine which biometric allows more accurately estimate body weight of lambs wool breeds, Santa Ines and their crosses.

Material e Methods

The work was done in the farm Don Donato, located in Mocoretá, Corrientes, Argentina. The trial was conducted using male and female lambs of the genetic groups: wool (Ideal and Corriedale x Ideal), without wool Santa Inês and absorbent products crossing with Santa Inês: F1, F2 and F3. All lambs were born in 2012 and evaluated between 3.1 and 24.9 kg BW, and between 13 and 294 days old. The measurements were made without fasting, every 30 days, at different times of year.

The biometric measurements were determined with tape: thoracic perimeter, body length, anterior height and rump height, and BW with electronic scale.

The data obtained from the various biometric measurements were subjected to Pearson correlation analysis, simple regression, multiple linear regression (stepwise) and linear regression with combined two variables, using software Infostat (2007). These same analyzes were performed with the data by genetic group: wool, Santa Inês, F1, F2 and F3.

Results and Discussion

Were obtained 581 biometric data and BW, with all animals and measurement times. The thoracic perimeter was less demanding about position and immobility of animals, although the presence of wool required greater care to avoid affecting the determination.

The analyses of all the data together, the results show that thoracic perimeter, anterior height, rump height and body length have significant correlation with BW (0.93, 0.90, 0.89 and 0.75, respectively). Table 1 shows the regression equations to predict the PV. All the biometric variables, have a high setting (R2 = 0.91), but the rump height variable was not significant in the ANOVA, which is reflected in their low participation in the prediction of BW.

Table 1.- Regression equation from prediction body weight (BW) used different variables

Variables of regression	Equation	R2
Four Variables	BW = -23,14 +0,35 PT+0,25 AH+0,15 BL – 0,02 RH	0,91
Three Variables	BW = -23,19+ 0,35 PT+0,24 AH+0,15 BL	0,91
Two Variables	BW = -20,37+ 0,39 PT+0,28 AH	0,90
One Variable	BW = -17,95+ 0,60 **PT**	0,86
One Variable	BW = -18,60+ 0,67 **AH**	0,80

TP: thoracic perimeter - AH: anterior height - BL: body length - RH: rump height

When considering only thoracic perimeter and anterior height, the two variables of greatest contribution to the prediction of BW, it was noted that the adjustment only decreased by 1%, measures that refer to the same body area of animal. Measurements of two variables signify more time to achieve the estimated BW, the prediction is evaluated using one of them, noting that the thoracic perimeter is the one with better adjustment.

While any two variables can be used for prediction of PV, the accuracy in determining the thoracic perimeter is greater than the anterior height. This is more variable because we must ensure that the animal is properly stopped and quiet for a good record of data.

Table 2 shows the regression equations to estimate the BW discriminated by genetic group. The adjustment of the prediction equations of body weight with both major adjustment variables in the model, show that the genetic groups in Santa Inês and their crosses are the highest in relation to wool genetic group, which shows that the biometric measures wool breeds are more variable than breeds that have less wool.

Table 2.- Regression equation from prediction body weight (BW) used different variables, for genetic group.

Genetic Group	Equation for 2 variables	R2	Equation for 1 variable	R2
Lanado	BW = -16,39+ 0,24 PT+0,35 AH	0,87	BW = -13,92+ 0,50 PT	0,80
Santa Inês	BW = -22,15+ 0,44 PT+0,26 AH	0,90	BW = -20,03+ 0,64 PT	0,86
F1	BW = -19,28+ 0,36 PT+0,30 AH	0,89	BW = -16,27+ 0,56 PT	0,86
F2	BW = -24,27+ 0,47 PT+0,26 AH	0,88	BW = -20,74+ 0,65 PT	0,86
F3	BW = -21,45+ 0,34 PT+0,37 AH	0,90	BW = -20,00+ 0,65 PT	0,83

TP: thoracic perimeter - AH: anterior height

In the prediction equation of body weight which involved the two most significant variables, thoracic perimeter present the greater coefficient in all genetic groups except in the group wool and F3, this difference may be related to the variability generated by the presence of the wool to the thoracic perimeter measurements and not on measuring the anterior height, and the F3 may be due to the small number of records measurements.

The variables most important for the determination of body weight, thoracic perimeter and anterior height, the possibility of estimating with one of the variables most important in the estimation of body weight were evaluated. The thoracic perimeter was used as the independent variable to predict body weight in different genetic groups, showing that the decline of the adjustment when using a single variable was less than 4% in Santa Inês, F1 and F2 genetic groups, however in wool animals and F3 decline was 7%.

Determining the thoracic perimeter has the advantage easy execution, since it is not influenced by the position of the animal and immobility required for other determinations, is not necessary. The thoracic perimeter is considered as a simple and accurate tool to estimate the body weight of lambs without need for scale.

Conclusions

Thoracic perimeter is biometric measures showed the best adjustment to estimate body weight accurately from the lambs of 3 at 25 kg BW.

The thoracic perimeter is recommended for accuracy and easy execution.

The genetic group affects the measure more accurately to estimate body weight.

Anterior height is the biggest adjustment measure to estimate body weight for wool animals.

Acknowledgements

To Farm Don Donato for make available feeding animals, equipment and workers. GesGan Asesores owner of available animals for work.

References

INFOSTAT. InfoStat versión 1.1. Grupo InfoStat, FCA, Universidad Nacional de Córdoba, Argentina. 2007

Osório, J.C.; Osório, M.T.; Vaz, C.M. et al. Coeficientes de correlación entre medidas “in vivo” y de la canal en ovinos de la raza criolla. In: Congreso Latinoamericano de Especialistas en Pequeños Rumiantes y Camélidos Sudamericanos, 1., 1999, Montevideo, Uruguay. Memórias....Montevideo. 1999. CD-ROM.

Pulgarón, P.; Yglesias, R.; Castro, A. Coeficientes de correlación entre el peso vivo y medidas corporales predestete en ovinos Pelibuey bajo un sistema reproductivo intensivo. PortalVeterinaria**.** 2003 http://albeitar.portalveterinaria.com/noticia/3389/Articulos-rumiantes-archivo.

Souza, E. S.; Leal, A.; Barioni, C. et al. Utilização de medidas biométricas para estimar peso vivo em ovinos. Archivos Latinoamericanos de Producción Animal, Vol. 17, Nº. 3-4, págs. 61-66. 2009.

Yáñez, E.A.; Resende, K.T.; Días Ferreira, A.C.; et al. Utilização de Medidas Biométricas para Predizer Características da Carcaça de Cabritos Saanen. R. Bras. Zootec., v.33, n.6, p.1564-1572, 2004