Subjective measurements of fat cover and kidney knob and channel fat for predicting shoulder, neck and flank plus breast tissue composition of Blanca Celtibérica kids.

Medidas subjetivas del grado de engrasamiento y cantidad de grasa pélvico renal para predecir la composición tisular de la espalda, cuello y bajos de cabritos Blanco Celtibéricos.

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SUMMARY
CCW, the assess of FC on two scores (1-5) and (1-15) and the assess of KKCF amount on two scores (1-3) and (1-9) were used as predictors of shoulder, neck and flank plus breast tissue composition of 31 Blanca Celtibérica kids, with an average CCW of 6,9± 2,1 Kg.
Proportionately 97, 91 and 92% of the variation in muscle weight of shoulder, neck and flank plus breast, respectively were accounted for by variation in CCW.
The variation in CCW also explained 96, 49 and 86% of the variation of shoulder, neck and flank plus breast bone tissue composition. The inclusion in the prediction equation for neck bone weight of FC (1-15), increase the precision in 7% and reduced the RSD in 5,7%.
Finally the variation in CCW and FC (1-15) explained 87, 76 and 90% of the variation in fat weight of shoulder, neck and flank plus breast, respectively. Nevertheless the inclusion of KKCF amount (1-3) in the prediction equations of fat weight of shoulder and flank plus breast increase the precision in 2% and reduced the RSD in 6,1 and 10,2%, respectively.
ADDITIONAL KEYWORDS: Kids, Prediction, Tissue composition, Shoulder, Neck, Flank plus breast.

RESUMEN
El peso canal fría, grado de engrasamiento con dos escalas de (1-5) y de (1-15) puntos y cantidad de grasa pélvico renal con dos escalas de puntuación (1-3) y (1-9) fueron utilizados como predictores de la composición tisular de la espalda, cuello y bajos de 31 cabritos de raza Blanca Celtibérica, con una media de peso canal fría de 6,9± 2,1 Kg.
La variación del peso canal fría explicó el 97, 91 y 92% de la variación en el peso del músculo de la espalda, cuello y bajos respectivamente.
Así mismo, la variación del peso canal fría explicó el 96, 49 y 86% de la variación en el peso del hueso de las mismas piezas y en el mismo orden. No obstante la entrada en la ecuación de predicción del peso del hueso del cuello, del engrasamiento (1-15) mejoró la precisión de la estimación en 7 puntos porcentuales, con una reducción del RSD asociado del 5,7%.
Finalmente la variación del peso canal fría y engrasamiento (1-15) explicó el 87, 76 y 90% de la variación en el peso de la grasa total de la espalda, cuello y bajos. No obstante la entrada en la ecuación de predicción de la cantidad de grasa pélvico renal (1-3), mejoró la precisión de la estimación de la variación del peso de la grasa total de la espalda y bajos en un 2%, con una reducción del RSD asociado de un 6,1 y 10,2% respectivamente.
PALABRAS CLAVE ADICIONALES: Cabritos, Predicción, Composición tisular, Espalda, Cuello, Bajos.

INTRODUCTION

Spain is the second goat producing country of the European Union, with a 21% of the total census, after Greece that has 48.7% (Delfa, 2004).
In spite of it, it does not exist in our country any Symbol or Quality Reference for the carcass and goat meat; whereas in Portugal, with a census of 27.8% of the Spanish and a production of meat that only supposes 13.9% of the Spanish, have five Origin Protected Designations.

With all the positive implications to breed goats, revaluation of marginal areas and resources, landscaping maintenance, improvement the producers income and therefore population fixation in difficult and abandoned areas, revaluation of the meat and finally conservation and improvement of a most important genetic patrimony (Delfa et al., 2005a,b).

For Delfa and Teixeira (1998), the evaluation of the quality of the carcass and its economic value, it must be based on the proportion of joints obtained from the carcass and on the tissue composition of each joint. So the aim of the present study was to evaluate the accuracy of cold carcass weight (CCW) and the different subjective measurements of fat cover (FC) and kidney knob and channel fat (KKCF) for predicting shoulder, neck and flank plus breast tissue composition of Blanca Celtibérica kids.

MATERIAL AND METHODS

CCW, FC with two scales of annotation (1-5) and (1-15) points and KKCF with other two scales of annotation (1-3) and (1-9) points, according to the methodology pointed out by Colomer-Rocher et al. (1988) and Delfa et al. (2005c, d), were scored by two expert evaluators and used for shoulder, neck and flank plus breast tissue composition prediction on 31 Blanca Celtibérica kids ranking a live weight of 6,9 ± 2,1 Kg.

The left sides of carcasses were cutting and each joint dissected according to the Standardized Reference Methodology proposed by Colomer-Rocher et al. (1987, 1988).

Data were statistical analyzed using a stepwise regression procedure by (Bendel y Afifi, 1977 y Wilkinson, 1989), on the purpose of knowing the degree of precision (in terms of percentage of explained variance) of the CCW and assigned notes the FC and KKCF.

RESULTS AND DISCUSSION

On Tabla 1, 2 and 3 are shown the percentages variation explained (R^2) and residual standard deviations (RSD) of weight of shoulder, neck and flank plus breast tissue composition accounted for by CCW, subjective measurements of FC and KKCF.

Proportionately 97, 91 and 92% of the variation in muscle weight of shoulder, neck and flank plus breast, respectively were accounted for by variation in CCW. As we was commented on the introduction we not found any reference on the subject of the present work. Nevertheless Delfa et al. (2005a) working with kids from the same breed predicted the 99% of the variation in carcass muscle weight using a multiple regression equation with CCW and KKCF (1-9) as independent variables.

The variation in CCW also explained 96, 49 and 86% of the variation of shoulder, neck and flank plus breast bone tissue composition. The inclusion in the prediction equation for neck bone weight of FC (1-15) increase the precision in 7% and reduced the RSD in 5,7%. Using the same variables Delfa et al. (2005a) predicted the carcass bone weight with an accuracy of 95%.

CCW explained 53 and 66% of the variation of shoulder and flank plus breast subcutaneous fat weight. The inclusion in the prediction equation for shoulder subcutaneous fat weight of FC (1-15) increase the precision in 11% and reduced the RSD in 11,2%. In the same way, the inclusion in the prediction equation for flank plus breast subcutaneous fat weight of KKCF (1-3) and FC (1-15) increase the precision in 21% and reduced the RSD in 36,3%. Nevertheless, the neck subcutaneous fat weight was not estimable.

In relation to intermuscular fat composition of three joints, 81, 67 and 92% of the variation of the shoulder, neck and flank plus breast intermuscular fat weight, respectively were accounted for by variation on CCW. The inclusion in the prediction equation for neck intermuscular fat weight of FC (1-15) increase the precision in 5% and for shoulder intermuscular fat weight of the same variable and KKCF (1-9) increase the precision in 9% and reduced the RSD in 27,1%. However Delfa et al. (2005a) predicted with an accuracy of 94% the intermuscular fat weight of the carcass using a multiple regression with CCW and FC (1-15) as independent variables

Finally, the variation in CCW and FC (1-15) explained 87, 76 and 90% of the variation in fat weight of shoulder, neck and flank plus breast, respectively. Nevertheless the inclusion of KKCF amount (1-3) in the prediction equations of fat weight of shoulder and flank plus breast increase the precision in 2% and reduced the RSD in 6,1 and 10,2% respectively. Using the same variables Delfa et al. (2005a) predicted the total carcass fat with an accuracy of 90%.

REFERENCES

Bendel, R.B. and Afifi, A.A. 1977. Comparison of stopping rules in forward “stepwise” regresión. Journal of the American Statistical Association, 72: 46-53.

Colomer-Rocher, F., Morand-Fehr, P., Kirton, A.H. 1987. Standard methods and procedures for goat carcass evaluation, jointing and tissue separation. Livest. Prod. Sci., 17: 149-159.

Colomer-Rocher, F., Morand-Fehr, P., Kirton, A.H., Delfa, R., Sierra-Alfranca, I. 1988. Métodos normalizados para el estudio de los caracteres cuantitativos y cualitativos de las canales caprinas y ovinas. Cuadernos INIA, Núm. 17: 41 pp.

Delfa, R., 2004. Los ultrasonidos como predictores del reparto del tejido adiposo y de la composición tisular de la canal en cabras adultas. Tesis Doctoral. Facultad de Veterinaria. Universidad de Zaragoza. 230 pp.

Delfa, R. and Teixeira. A. 1998. Calidad de la canal ovina. Ovino de Carne: aspectos claves. Ediciones Mundi-Prensa. 373-400.

Delfa, R., Cadavez, V., Rodríguez, S., González, C., Teixeira, A. 2005a. Prédiction de la composition tissulaire de la carcasse de chevreaux Blanca Celtibérica. 12e Rencontres, Recherches, Ruminants. Paris (Francia): 395.

Delfa, R., Rodrigues, S., Cadavez, V., González, C., Teixeira, A. 2005b. Predicción de la composición regional de la canal de cabritos de raza Blanca Celtibérica, a partir de medidas subjetivas del grado de engrasamiento y cantidad de grasa pélvico renal. XV Congresso de Zootecnia. I Congresso Ibero-Americano de Zootecnia. Vila Real. Portugal. Livro de Comunicaçoes, 685-688.

Delfa, R., Teixeira, A., Colomer-Rocher, F. 2005c. Conformación, engrasamiento y sistemas de clasificación de la canal caprina. Estandarización de las metodologías para evaluar la calidad del producto (animal vivo, canal, carne y grasa) en los rumiantes. Monografías INIA. Serie Ganadera nº 3, 181-188.

Delfa, R., Teixeira, A., Colomer-Rocher, F. 2005d. Composición regional y tisular de la canal caprina. Estandarización de las metodologías para evaluar la calidad del producto (animal vivo, canal, carne y grasa) en los rumiantes. Monografías INIA. Serie Ganadera nº 3, 189-198.

Wilkinson, L. 1989. The system for statistics. Evanston, IL: Systat. Inc.

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Table 1. Percentage variation (R^2) and residual standard deviations (RSD) of weight of shoulder tissue coposition (g) accounted for by cold carcass weight, subjective measurements of fat cover and kidney knob and channel fat. Prediction equations of weight of shoulder tissue composition with indication of coefficients (b) and the intercept (a)

Steps	DependentVariate (y)	Independent Variate (x)	R^2	RSD	b	Sb	Intercept
1	Muscle	CCW	0,97 **	24,5	61,3	2,1	42,8
1	Bone	CCW	0,96 **	7,3	17,3	0,6	42,6
1	Subcutaneous fat	CCW	0,53 **	15,2	5,1	1,4	-15,4
2		FC (1-15)	0,64 **	13,5	5,1	1,7	
1	Intermuscular fat	CCW	0,81 **	10,7	7,8	0,8	-28,1
2		FC (1-5)	0,88 **	8,7	12,3	3,7	
3		KKCF (1-9)	0,90 **	7,8	2,7	1,0	
1	Total fat	CCW	0,76 **	21,1	13,3	1,6	-48,2
2		FC (1-15)	0,87 **	16,3	6,4	2,4	
3		KKCF (1-3)	0,89 **	15,3	15,2	7,1	

NS = Not significant; * P≤ 0,05; ** P≤0,001

Table 2. Percentage variation (R^2) and residual standard deviations (RSD) of weight of neck tissue coposition (g) accounted for by cold carcass weight, subjective measurements of fat cover and kidney knob and channel fat. Prediction equations of weight of neck tissue composition with indication of coefficients (b) and the intercept (a)

Steps	DependentVariate (y)	Independent Variate (x)	R^2	RSD	b	Sb	Intercept
1	Muscle	CCW	0,91 **	19,1	28,0	1,7	-14,9
1	Bone	CCW	0,49 **	15,8	9,1	1,6	18,5
2		FC (1-15)	0,56 **	14,9	-4,1	1,9	
	Subcutaneous fat	Not estimable					
1	Intermuscular fat	CCW	0,67 **	8,6	4,7	0,9	-13,2
2		FC (1-15)	0,72 **	8,1	2,3	1,0	
1	Total fat	CCW	0,71 **	8,4	5,1	0,8	-11,0
2		FC (1-15)	0,76 **	7,9	2,3	1,1	

NS = Not significant; * P≤ 0,05; ** P≤0,001

Table 3. Percentage variation (R^2) and residual standard deviations (RSD) of weight of flank plus breast tissue coposition (g) accounted for by cold carcass weight, subjective measurements af fat cover and kidney knob and channel fat. Prediction equations of weight of flank plus breast tissue composition with indication of coefficients (b) and the intercept (a)

Steps	DependentVariate (y)	Independent Variate (x)	R^2	RSD	b	Sb	Intercept
1	Muscle	CCW	0,92 **	17,6	27,9	1,5	-42,4
1	Bone	CCW	0,86 **	7,1	8,3	0,6	4,1
1	Subcutaneous fat	CCW	0,66 **	17,1	7,3	1,1	-42,7
2		KKCF (1-3)	0,83 **	12,2	15,9	5,0	
3		FC (1-15)	0,87 **	10,9	5,0	1,7	
1	Intermuscular fat	CCW	0,92 **	17,6	27,9	1,5	-42,4
1	Total fat	CCW	0,75 **	25,6	14,2	1,6	-61,3
2		FC (1-15)	0,90 **	16,7	9,5	2,4	

3		KKCF (1-3)	0,92 **	15,0	6,0	7,0	

NS = Not significant; * P≤ 0,05; ** P≤0,001