Use of three joints as predictors of carcass and body fat depots in Blanca Celtibérica goats

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SUMMARY - Nineteen adult goats of the Blanca Celtibérica breed - in non productive stage - from the experimental flock of Servicio de Investigación Agraria (Diputación General de Aragón) were scored using the lumbar, breast and tail palpation. Sternal triangle joint, lumbar square joint and tail that were handled to assess body condition scores were dissected into muscle, bone subcutaneous fat and intermuscular fat. Regression analyses were developed for predicting carcass and body fat depots, using sternal triangle, lumbar square joint and tail compositions like independent variables. The best predictor of omental fat, subcutaneous fat, intermuscular fat, kidney fat, total body and total carcass fat depots was the total fat of lumbar square joint. On the other hand 89, 80 and 86% (P≤0,01) of the variation of mesenteric, heart and udder fat depots, respectively, were accounted for by variation in intermuscular fat of sternal triangle joint. Finally, the subcutaneous fat weight of 1st tail vertebra accounted for 96% of the total variation of tail fat weight. In conclusion, the best predictor of the most important carcass and body fat depots (omental, subcutaneous, intermuscular, kidney, total body and total carcass fat) was the total fat of lumbar square joint.

Key words: Sternal triangle, lumbar square, tail, prediction, fat depots, Blanca Celtibérica goat, body condition score.

RESUME - "Utilisation de trois points de prélèvement comme prédicteurs des dépôts adipeux de la carcasse et du corps chez des chèvres de race Blanca Celtibérica". Un lot de 19 chèvres adultes de race Blanca Celtibérica, vides et taries, appartenant au troupeau expérimental du Service de la Recherche Agronomique (Gouvernement Autonome d'Aragon), ont été notées par la palpation au niveau lombaire, sternal et caudal. Le triangle sternal, le carré lombaire et la queue ont été soumis à dissection en muscle, os, gras sous-cutané et intermusculaire. L'analyse des régressions a été utilisée pour prédire les dépôts adipeux de la carcasse et du corps de l'animal moyennant l'utilisation de la composition du triangle sternal, du carré lombaire et de la queue comme variables indépendantes. Le meilleur prédicteur des graisses omentales, sous-cutanées, intermusculaires, rénales totales du corps, et totales de la carcasse a été le gras total du carré lombaire. D'autre part, 89, 80 et 86% (P≤0,01) de la variation des dépôts de gras mésentérique, du coeur et de la mamelle respectivement, ont été expliqués par la variation du gras intermusculaire du triangle sternal. Comme conclusion, le meilleur prédicteur des dépôts adipeux de la carcasse et du corps les plus importants (omental, sous-cutané, intermusculaire, rénal, total du corps et total de la carcasse) a été le gras total du carré lombaire.

Mots-clés : Triangle sternal, carré lombaire, queue, prédiction, dépôts adipeux, chèvre Blanca Celtibérica, note d'état corporel.

Introduction

Russel *et al.* (1969) working with Scottish Blackface ewes, showed that body condition score was related to the proportion of chemical fat in the body. Delfa *et al.* (1989) described the lumbar square and its tissue composition in ewes from Aragonesa breed. In goats the fat proportion on lumbar region is lower than sheep and Santucci (1984) using an adaptation of Russel's system proposed a body condition system for goats by palpation on sternal region. The Santucci's method was modified by Hervieu *et al.* (1991). On the other hand, Teixeira *et al.* (1989) proposed an additional body condition assessment in sheep, by palpation of tissues around the tail.

According to Cuthbertson (1978) an alternative procedure is to make use of the close relationship which has been found to exist between the composition of some individual joints and overall carcass composition. No information about the use of that methodology in goats is available. So the main objective of the present study was to define the use of three small joints (sternal triangle, lumbar square and tail) as predictors of body and carcass fat depots in adult goats. Those joints, easily obtained and with a low cost of removing from the carcass, offer the best compromise between cost and precision.

Material and methods

Nineteen adult goats of the Blanca Celtibérica breed - in no productive stage - were taken from the experimental flock of Servicio de Investigación Agraria (Diputación General de Aragón) and scored using the lumbar, breast and tail palpation.

Goats were slaughtered after 24 h fasting. Carcasses were cooled at 6°C for 24 h. After slaughter, contents were removed from the digestive tract, weighed and subtracted from body weight to obtain empty body weight. Omental fat, mesenteric fat, kidney fat and pelvic fat were removed and weighed separately. Carcasses were halved carefully and the left side was dissected into muscle, subcutaneous fat, intermuscular fat, bone and remainder (major blood vessels, ligaments, tendons, and thick connective tissue sheets associated with some muscles). This methodology is according to standard methods and procedures for goat carcass evaluation by Colomer-Rocher *et al.* (1987).

Sternal triangle (Hervieu *et al.*, 1991), lumbar square and tail (Delfa *et al.*, 1989) joints which were handled to assess body condition scores were dissected into muscle, bone subcutaneous fat and intermuscular fat, using the same methodology of whole carcass.

Regression analyses (Steel and Torrie, 1981) were developed for predicting carcass composition, using sternal triangle, lumbar square joint and tail compositions like independent variables. The R^2 and RSD (residual standard deviation) were used to assess the accuracy of predictors.

Results and discussion

Means, standard errors (SE) and coefficients of variation (CV) of all body fat depots are shown in Table 1. All characteristics have a substantial variation seeming that we have worked with a wide range of body condition

Figures 1, 2 and 3 show the sternal triangle, lumbar square and tail tissues compositions. The most important tissues in sternal triangle and tail were the intermuscular and subcutaneous fat respectively. Nevertheless, muscle had a higher proportion in lumbar square than the other tissues.

Table 2 shows the determination coefficients (R^2) residual standard deviations (RSD) and the best equations for predicting all body and carcass fat depots using sternal triangle, lumbar square and tail joints compositions like independent variables.

The best predictor of omental fat, subcutaneous fat, intermuscular fat, kidney fat, total body and total carcass fat depots was the total fat of lumbar square joint. In fact, proportionately, 96, 97, 98,

96, 98 and 99% (P≤0.001) of the variation in those fat depots were accounted for by variation in total fat of lumbar square joint.

On the other hand, 89, 80 and 86% (P≤0.01) of the variation of mesenteric, heart and udder fat depots, respectively, were accounted for by variation in intermuscular fat of sternal triangle joint. Nevertheless the Ln of the subcutaneous fat of 4th tail vertebra accounted for 86% (P≤0.01) of the total variation of udder fat with a residual standard deviation lower than the RSD of intermuscular fat of sternal triangle joint.

The variation of Ln subcutaneous fat of lumbar joint and subcutaneous fat of 3rd tail vertebra accounted for 89% (P≤0.01) of the total variation of pelvic fat, but the residual standard deviation of first variable was lower. Lastly, the subcutaneous fat weight of 1st tail vertebra accounted for 96% of the total variation of tail fat weight.

Table 1.   Means, standard errors (SE) and coefficient of variation (CV) of all body fat depots

| Variable	Mean	SE	CV
Live weight (kg)	57.5	2.9	22.5
Empty body weight (kg)	51.1	3.3	28.3
Cold carcass weight (kg)	27.6	2.4	37.4
Half carcass weight (g)	13295.8	1191.5	39.1
Fat depots			
Omental (g)	2646.3	561.3	92.5
Mesenteric (g)	1582.8	214.3	59.0
Heart (g)	159.6	17.9	49.1
Udder (g)	115.2	24.5	90.2
Subcutaneous (g)	2731.1	626.6	119.1
Intermuscular (g)	2683.6	487.8	79.2
Pelvic (g)	256.5	49.7	84.5
Kidney (g)	1306.3	303.4	101.2
Tail (g)	51.3	13.4	113.9
Total half carcass fat (g)	3316.7	732.9	96.3
Total body fat (g)	11088.3	2236.1	87.9
Breast bone subcutaneous fat (g)	59.0	11.5	84.9
Breast bone intermuscular fat (g)	130.5	15.5	51.8
Breast bone total fat (g)	189.5	26.4	60.7
Lumbar subcutaneous fat (g)	98.1	26.3	117.0
Lumbar intermuscular fat (g)	79.5	21.3	116.8
Lumbar total fat (g)	177.6	47.1	115.6
1st caudal vertebra fat (g)	14.2	4.3	130.7
2nd caudal vertebra fat (g)	13.0	4.0	134.0
3rd caudal vertebra fat (g)	9.8	2.3	100.2
4th caudal vertebra fat (g)	7.1	1.7	103.7
5-6-7th caudal vertebras fat (g)	7.2	2.1	124.3
Tail total fat (g)	51.3	13.4	113.9

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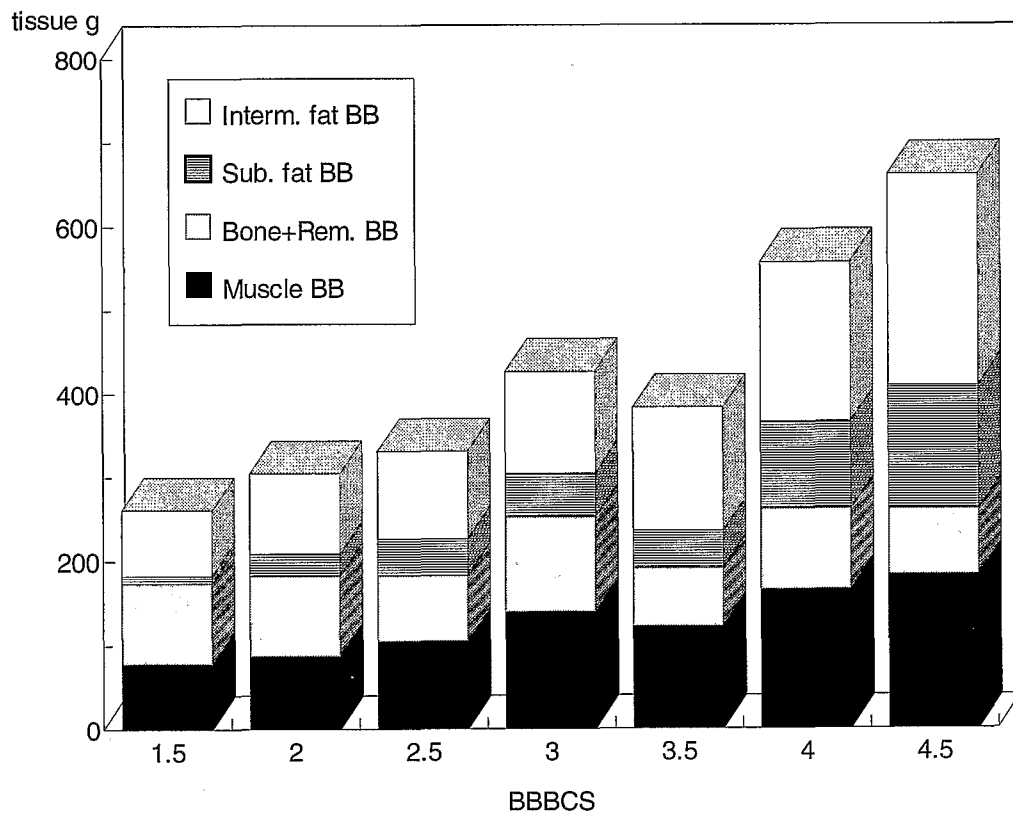
Fig. 1.   Carcass composition at different breast bone body condition scores (BBBCS).
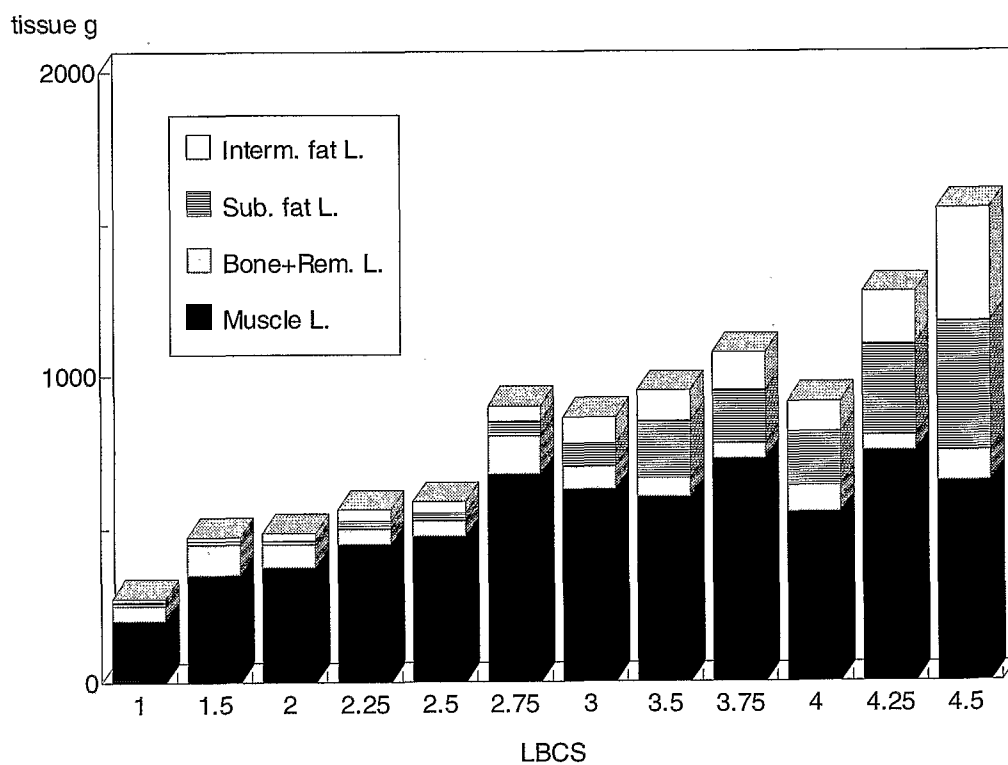
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Fig. 2.   Carcass composition at different lumbar body condition scores (LBCS).
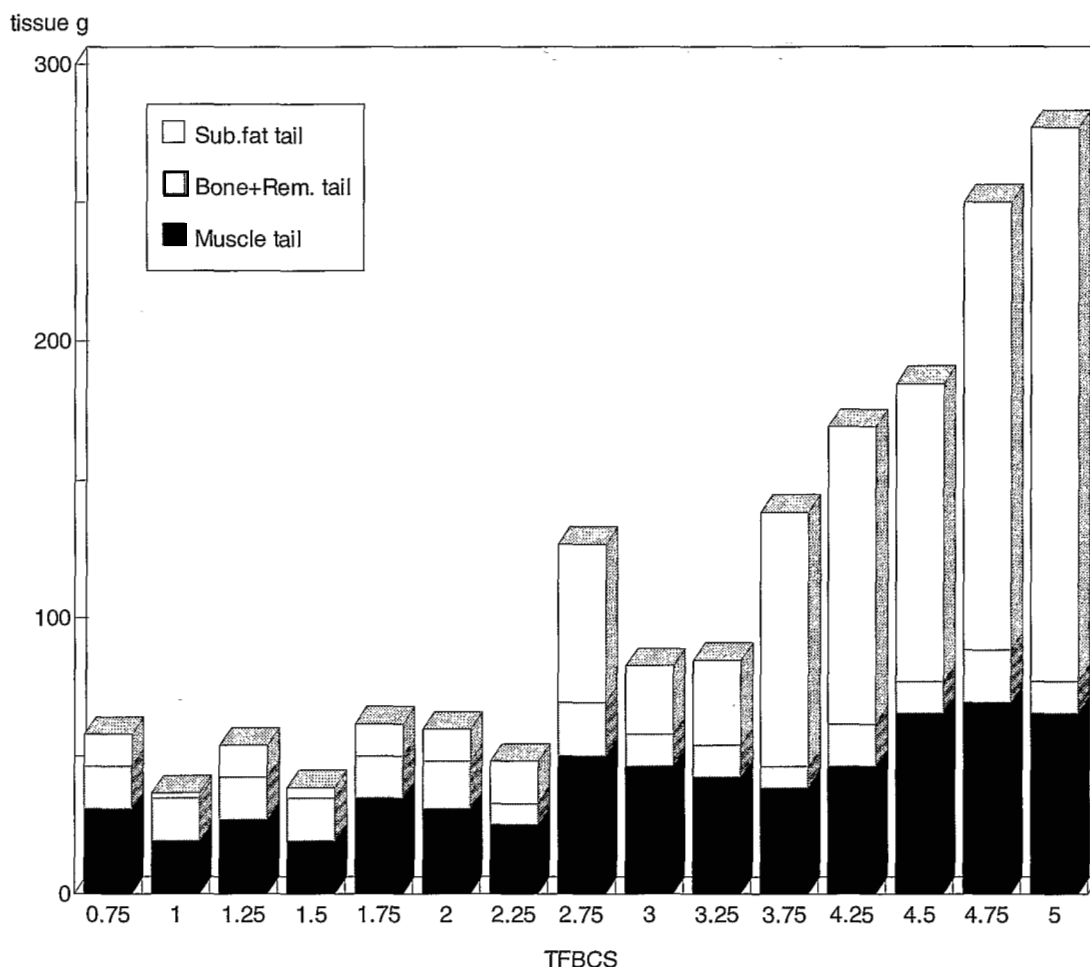
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Fig. 3.   Carcass composition at different tail body condition scores (TBCS).

The inclusion of other variables in a multiple regression with these independent variables did not improve the precision of prediction.

The best predictor of the most important carcass and body fat depots (omental, subcutaneous, intermuscular, kidney, total body and total carcass fat) was the total fat of lumbar square joint after logarithmic transformation despite the fact that the best body condition score assessed on breast bone region is better predictor than body condition score assessed on lumbar region (Hervieu *et al.*, 1991; Delfa *et al.*, 1994).

Conclusion

In conclusion, the best predictor of the most important carcass and body fat depots was the total fat of lumbar square joint after logarithmic transformation. Finally, it was important to know the composition of three small joints, without depreciating the largest joints, top pieces and value, with great accuracy of predicting the body and carcass fat depots.

Acknowledgements

Table 2. Determination coefficients (R^2), residual standard deviations (RSD) and best equations for predicting body fat depots and carcass composition using the body condition scores and live weight

Dependent var. (y)	Independent var. (x)	R^2	RSD	s^2yx	S_b	Slope	Intercept
Ln omental fat	Ln subcutaneous fat of lumbar square joint	0.96	0.25	0.04	0.98	0.73	4.63
	Ln intermuscular fat of lumbar square joint	0.92	0.33	0.07	0.96	1.07	3.24
	Ln total fat of lumbar square joint	0.96	0.25	0.05	0.98	0.92	3.19
Omental fat	Subcutaneous fat of sternal triangle joint	0.86	946.24	4.45	0.93	45.23	-22.24
Ln omental fat	Ln intermuscular fat of sternal triangle joint	0.90	0.38	0.17	0.95	2.03	-2.25
Omental fat	Total fat of sternal triangle joint	0.92	734.97	1.51	0.96	20.35	-1209.52
	Subcutaneous fat of 1st tail vertebra	0.82	1071.31	13.60	0.90	119.23	951.99
	Subcutaneous fat of 2nd tail vertebra	0.82	1078.09	14.59	0.90	126.92	996.29
	Subcutaneous fat of 3rd tail vertebra	0.83	1053.32	25.17	0.91	225.33	428.49
	Subcutaneous fat of 4th tail vertebra	0.82	1079.92	34.80	0.90	302.16	515.21
	Subcutaneous fat of 5-6-7th tail vertebras	0.55	1693.37	44.55	0.74	202.05	1189.37
	Total subcutaneous fat of tail	0.88	885.87	3.57	0.94	39.16	636.71
Ln mesenteric fat	Ln subcutaneous fat of lumbar square joint	0.83	0.26	0.04	0.91	0.36	5.84
	Ln intermuscular fat of lumbar square joint	0.82	0.27	0.06	0.91	0.54	5.12
	Ln total fat of lumbar square joint	0.84	0.26	0.05	0.91	0.46	5.11
Mesenteric fat	Subcutaneous fat of sternal triangle joint	0.70	529.36	2.49	0.83	15.55	665.04
	Intermuscular fat of sternal triangle joint	0.89	0.32	1.10	0.94	13.05	-120.21
	Total fat of sternal triangle joint	0.85	378.96	0.78	0.92	7.47	168.20
	Subcutaneous fat of 1st tail vertebra	0.74	489.20	6.21	0.86	43.30	967.43
	Subcutaneous fat of 2nd tail vertebra	0.77	458.79	6.21	0.88	47.12	970.18
Ln mesenteric fat	Ln subcutaneous fat of 3rd tail vertebra	0.80	0.29	0.05	0.89	0.49	6.35
Mesenteric fat	Subcutaneous fat of 4th tail vertebra	0.76	474.61	15.29	0.87	111.06	799.49
	Subcutaneous fat of 5-6-7th tail vertebras	0.49	684.37	18.00	0.70	73.21	1054.91
Ln mesenteric fat	Ln total subcutaneous fat of tail	0.85	0.25	0.05	0.92	0.49	5.58

Table 2. Determination coefficients (R^2), residual standard deviations (RSD) and best equations for predicting body fat depots and carcass composition using the body condition scores and live weight (Cont.)

Dependent var. (y)	Independent var. (x)	R^2	RSD	s^2yx	S_b	Slope	Intercept
Ln heart fat	Ln subcutaneous fat of lumbar square joint	0.76	0.31	0.05	0.87	0.35	3.64
	Ln intermuscular fat of lumbar square joint	0.66	0.37	0.08	0.81	0.48	3.07
	Ln total fat of lumbar square joint	0.71	0.34	0.07	0.85	0.42	3.02
Heart fat	Subcutaneous fat of sternal triangle joint	0.64	48.59	0.23	0.80	1.25	86.01
	Intermuscular fat of sternal triangle joint	0.80	36.23	0.13	0.89	1.03	24.50
	Total fat of sternal triangle joint	0.76	39.33	0.08	0.87	0.60	46.90
	Subcutaneous fat of 1st tail vertebra	0.61	50.08	0.64	0.78	3.31	112.60
	Subcutaneous fat of 2nd tail vertebra	0.67	46.13	0.62	0.82	3.69	111.63
	Subcutaneous fat of 3rd tail vertebra	0.76	39.27	0.94	0.87	6.94	91.30
	Subcutaneous fat of 4th tail vertebra	0.61	50.24	1.62	0.78	8.38	100.51
	Subcutaneous fat of 5-6-7th tail vertebras	0.34	65.48	1.72	0.58	5.10	122.81
	Total subcutaneous fat of tail	0.69	45.25	0.18	0.83	1.11	102.69
Ln udder fat	Ln subcutaneous fat of lumbar square joint	0.82	0.49	0.07	0.91	0.64	1.89
Udder fat	Intermuscular fat of lumbar square joint	0.77	51.80	0.13	0.87	0.96	36.51
	Total fat of lumbar square joint	0.79	49.38	0.06	0.89	0.44	34.81
	Subcutaneous fat of sternal triangle joint	0.72	57.07	0.27	0.85	1.71	15.23
	Intermuscular fat of sternal triangle joint	0.86	39.79	0.14	0.93	1.39	-65.46
	Total fat of sternal triangle joint	0.84	43.30	0.09	0.91	0.80	-36.52
	Subcutaneous fat of 1st tail vertebra	0.81	46.23	0.60	0.90	4.98	40.79
	Subcutaneous fat of 2nd tail vertebra	0.70	58.14	0.79	0.84	4.91	48.96
Ln udder fat	Ln subcutaneous fat of 3rd tail vertebra	0.70	0.64	0.13	0.83	0.80	2.88
	Ln subcutaneous fat of 4th tail vertebra	0.86	0.43	0.09	0.93	0.90	2.97
Udder fat	Subcutaneous fat of 5-6-7th tail vertebras	0.59	68.93	1.81	0.77	8.63	52.40
	Total subcutaneous fat of tail	0.81	46.17	0.19	0.90	1.57	31.84

Table 2. Determination coefficients (R^2), residual standard deviations (RSD) and best equations for predicting body fat depots and carcass composition using the body condition scores and live weight (Cont.).

Dependent var. (y)	Independent var. (x)	R^2	RSD	s^2yx	S_b	Slope	Intercept
Ln carcass subcutaneous fat	Ln subcutaneous fat of lumbar square joint	0.97	0.24	0.04	0.98	0.83	3.93
Carcass subcutaneous fat	Intermuscular fat of lumbar square joint	0.94	687.28	1.75	0.97	28.52	25.93
	Total fat of lumbar square joint	0.97	450.95	0.52	0.99	13.13	-39.45
Ln carcass subcutaneous fat	Ln subcutaneous fat of sternal triangle joint	0.93	0.36	0.08	0.96	1.16	2.84
	Ln intermuscular fat of sternal triangle joint	0.92	0.39	0.17	0.96	2.32	-3.97
	Ln total fat of sternal triangle joint	0.95	0.31	0.11	0.97	1.93	-2.73
Carcass subcutaneous fat	Subcutaneous fat of 1st tail vertebra	0.71	1506.31	19.12	0.84	124.16	528.44
	Subcutaneous fat of 2nd tail vertebra	0.83	1143.99	15.48	0.91	143.21	431.16
	Subcutaneous fat of 3rd tail vertebra	0.76	1368.02	32.70	0.87	241.92	-88.13
Ln carcass subcutaneous fat	Ln subcutaneous fat of 4th tail vertebra	0.65	0.80	0.16	0.81	0.91	5.80
Carcass subcutaneous fat	Subcutaneous fat of 5-6-7th tail vertebras	0.37	2229.86	58.66	0.61	185.51	955.21
Ln carcass subcutaneous fat	Ln total subcutaneous fat of tail	0.79	0.62	0.13	0.89	1.00	3.75
Carcass intermuscular fat	Subcutaneous fat of lumbar square joint	0.95	491.34	1.01	0.97	18.05	913.06
	Intermuscular fat of lumbar square joint	0.96	413.26	1.05	0.98	22.49	896.09
	Total fat of lumbar square joint	0.98	319.38	0.37	0.99	10.25	863.57
Ln carcass intermuscular fat	Ln subcutaneous fat of sternal triangle joint	0.80	0.34	0.07	0.89	0.61	5.45
	Ln intermuscular fat of sternal triangle joint	0.89	0.25	0.11	0.95	1.29	1.51
	Ln total fat of sternal triangle joint	0.88	0.26	0.09	0.94	1.05	2.33
Carcass intermuscular fat	Subcutaneous fat of 1st tail vertebra	0.76	1080.43	13.71	0.87	99.57	1268.58
	Subcutaneous fat of 2nd tail vertebra	0.89	0.89	9.58	0.95	115.50	1182.07
	Subcutaneous fat of 3rd tail vertebra	0.85	849.07	20.29	0.92	198.73	727.69
Ln carcass intermuscular fat	Ln subcutaneous fat of 4th tail vertebra	0.77	0.37	0.07	0.87	0.55	6.88
Carcass intermuscular fat	Subcutaneous fat of 5-6-7th tail vertebras	0.43	1653.93	43.51	0.66	155.37	1563.29
	Total subcutaneous fat of tail	0.85	845.95	3.41	0.92	33.53	962.80

Table 2. Determination coefficients (R^2), residual standard deviations (RSD) and best equations for predicting body fat depots and carcass composition using the body condition scores and live weight (Cont.)

Dependent var. (y)	Independent var. (x)	R^2	RSD	s^2yx	S_b	Slope	Intercept
Ln pelvic fat	Ln subcutaneous fat of lumbar square joint	0.89	0.33	0.05	0.94	0.57	3.04
Pelvic fat	Intermuscular fat of lumbar square joint	0.84	89.16	0.23	0.92	2.14	86.54
Ln pelvic fat	Ln total fat of lumbar square joint	0.88	0.34	0.06	0.94	0.72	1.93
	Ln subcutaneous fat of sternal triangle joint	0.80	0.43	0.09	0.90	0.78	2.37
	Ln intermuscular fat of sternal triangle joint	0.88	0.34	0.15	0.94	1.64	-2.58
	Ln total fat of sternal triangle joint	0.88	0.42	0.15	0.94	1.67	-1.87
Pelvic fat	Subcutaneous fat of 1st tail vertebra	0.66	129.49	1.64	0.81	9.50	121.57
	Subcutaneous fat of 2nd tail vertebra	0.87	79.65	1.08	0.93	11.62	105.51
	Subcutaneous fat of 3rd tail vertebra	0.89	72.57	1.74	0.95	20.77	52.08
	Ln subcutaneous fat of 4th tail vertebra	0.75	112.45	3.62	0.86	25.58	76.14
	Subcutaneous fat of 5-6-7th tail vertebras	0.39	173.74	4.57	0.63	15.15	147.27
	Total subcutaneous fat of tail	0.81	97.11	0.39	0.90	3.33	85.40
Ln kidney fat	Ln subcutaneous fat of lumbar square joint	0.94	0.30	0.05	0.97	0.74	3.84
	Ln intermuscular fat of lumbar square joint	0.95	0.28	0.06	0.97	1.10	2.34
	Ln total fat of lumbar square joint	0.96	0.24	0.05	0.98	0.94	2.34
	Ln subcutaneous fat of sternal triangle joint	0.83	0.50	0.11	0.91	0.99	3.02
	Ln intermuscular fat of sternal triangle joint	0.87	0.45	0.19	0.93	2.03	-3.02
	Ln total fat of sternal triangle joint	0.88	0.42	0.15	0.94	1.67	-1.87
Kidney fat	Subcutaneous fat of 1st tail vertebra	0.78	640.39	8.13	0.88	62.83	413.41
	Subcutaneous fat of 2nd tail vertebra	0.82	574.62	7.77	0.91	68.81	411.72
	Subcutaneous fat of 3rd tail vertebra	0.81	587.38	14.04	0.90	120.95	115.82
	Subcutaneous fat of 4th tail vertebra	0.83	560.57	18.07	0.91	164.74	144.42
	Subcutaneous fat of 5-6-7th tail vertebras	0.54	933.05	24.54	0.73	107.42	531.71
Ln kidney fat	Ln total subcutaneous fat of tail	0.89	0.41	0.08	0.94	0.95	3.45

Table 2. Determination coefficients (R^2), residual standard deviations (RSD) and best equations for predicting body fat depots and carcass composition using the body condition scores and live weight (Cont.)

Dependent var. (y)	Independent var. (x)	R^2	RSD	s^2yx	S_b	Slope	Intercept
Total body fat	Subcutaneous fat of lumbar square joint	0.96	2001.99	4.11	0.98	83.19	2927.38
Ln total body fat	Ln intermuscular fat of lumbar square joint	0.95	0.20	0.05	0.98	0.86	5.63
	Ln total fat of lumbar square joint	0.98	0.15	0.03	0.99	0.73	5.61
Total body fat	Subcutaneous fat of sternal triangle joint	0.86	3814.61	17.94	0.93	179.83	478.10
Ln total body fat	Ln intermuscular fat of sternal triangle joint	0.91	0.29	0.12	0.95	1.62	1.28
Total body fat	Total fat of sternal triangle joint	0.92	2882.60	5.91	0.96	81.19	-4294.97
	Subcutaneous fat of 1st tail vertebra	0.80	4463.03	56.65	0.90	470.06	4408.52
	Subcutaneous fat of 2nd tail vertebra	0.88	3466.04	46.90	0.94	525.07	4262.33
	Subcutaneous fat of 3rd tail vertebra	0.85	3861.01	92.28	0.92	912.22	2110.13
	Subcutaneous fat of 4th tail vertebra	0.79	4649.91	149.85	0.89	1180.77	2760.79
	Subcutaneous fat of 5-6-7th tail vertebras	0.49	7194.35	189.25	0.70	757.95	5623.10
	Total subcutaneous fat of tail	0.88	3501.16	14.11	0.94	156.19	3073.41
Total half carcass fat	Subcutaneous fat of lumbar square joint	0.97	604.96	1.24	0.98	27.35	633.62
	Intermuscular fat of lumbar square joint	0.96	653.05	1.66	0.98	33.73	636.51
	Total fat of lumbar square joint	0.99	384.18	0.44	0.99	15.46	571.69
Ln total half carcass fat	Ln subcutaneous fat of sternal triangle joint	0.87	0.35	0.08	0.93	0.82	4.73
	Ln intermuscular fat of sternal triangle joint	0.92	0.29	0.12	0.96	1.69	-0.32
	Ln total fat of sternal triangle joint	0.93	0.26	0.09	0.97	1.40	0.65
Total half carcass fat	Subcutaneous fat of 1st tail vertebra	0.75	1630.79	20.70	0.87	149.37	1194.05
	Subcutaneous fat of 2nd tail vertebra	0.88	1149.65	15.56	0.94	171.81	1083.14
	Subcutaneous fat of 3rd tail vertebra	0.83	1372.34	32.80	0.91	294.37	419.48
Ln total half carcass fat	Ln subcutaneous fat of 4th tail vertebra	0.74	0.50	0.10	0.86	0.71	6.73
Total half carcass fat	Total subcutaneous fat of tail	0.84	1332.12	5.37	0.91	49.94	753.93
Tail fat	Subcutaneous fat of 1st tail vertebra	0.96	12.25	0.15	0.98	470.06	4408.52
Ln tail Fat	Ln subcutaneous fat of 2nd tail vertebra	0.92	0.35	0.62	0.96	0.86	1.79
Tail fat	Subcutaneous fat of 3rd tail vertebra	0.89	19.99	0.48	0.94	5.59	-3.73
	Subcutaneous fat of 4th tail vertebra	0.92	16.89	0.54	0.94	7.67	-2.81
	Subcutaneous fat of 5-6-7th tail vertebras	0.69	33.52	0.88	0.83	5.42	12.23

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