Sex and weight effect on Serrana kids carcass and meat characteristics

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Introduction

In Portugal it won relevance meat promotion by the creation of Protected Origin Denomination (P.O.D.) associated to the national local breeds. This P.O.D.'s may play an important role for local breed's conservation through its valorisation at the consumer's level. However the quantitative and qualitative characteristics of carcass or meat produced should be investigated in order to adapt production to the consumer's demands, contributing to their satisfaction. In the last decades it was observed an increased interest in this species and the effect of sex and carcass weight on carcass composition (Thonney *et al.*, 1987; Teixeira *et al.*, 1995; Gallo *et al.*, 1996) as well as meat quality (Babiker et al., 1990; Dhanda *et al.*, 2003; Kadim *et al.*, 2003). In spite of the countless studies already accomplished relatively to the carcass and meat quality in several breeds, it doesn't exist, still, a satisfactory knowledge and characterization of most of the Portuguese local breeds, as it is the case of the Serrano kids. This work has as objective to examine the effect of sex and carcass weight on some carcass and meat characteristics of Serrano, Portuguese local breed, kids.

Material and methods

In this study 27 male and 23 female Serrana kids were used. Animals were slaughtered after 24 hours fasting in a commercial slaughterhouse. Carcasses obtained from these animals were halved through the vertebral column, kidney knob and channel fat (KKCF) was removed and weighted separately. The left side was divided into eight standardized commercial joints: leg, chump, loin, ribs, anterior ribs, shoulder, breast and neck, according to the jointing procedure system of Estação Zootécnica Nacional – Fonte Boa (EZN – Portugal), as outlined by Teixeira (1984). Some tissue measurements (Pálsson, 1939; Timon and Bichard, 1965) were taken on the surface of muscle *longissimus* at 12^{th}-13^{th} ribs level, with a metal ruler, as follow: maximum muscle width (A, mm); maximum muscle depth (B, mm); subcutaneous fat depth above B (C, mm) and subcutaneous fat depth above central face of muscle *serratus ventralis* (j, mm). pH were measured

in muscle longissimus at 12^{th}-13^{th} ribs level, 1 and 24 hours after slaughter. Colour was evaluated in muscle longissimus surface using a Minolta colorimeter in L*a*b* system. The carcass data were analysed using the Mixed Models Procedure (Proc Mixed) of (SAS, 1998) and used Sex and Weight as fixed effects and their interaction. A Tukey's pairwise test was used to examine the significance of the differences between sex and weight least square means.

Results and discussion

Least squares means by sex and carcass weight for the killing out and carcass joints proportion are shown in table 1. Female kids presented higher ($P<0.05$) breast and KKCF proportions than male kids. Similar findings were reported by Gallo *et al.* (1996) in Criollo goats in the South of Chile. No differences ($P>0.05$) were found between sexes in any other carcass joint proportion. An increase ($P<0.01$) on breast proportion was observed with increasing carcass weight, nevertheless the value for the higher weight group were not significantly different from both 2-4 and 4-6 weight groups. However differences are quite small and no differences were found between the two heavier groups. Even thought not significant ($P>0.05$), KKCF proportion increased with increasing carcass weight, this result is in agreement with those attained by Thonney *et al.* (1987) and Teixeira *et al.* (1995) who found an increasing in this carcass component with carcass weight (maturity) increasing.

Table 1. Least squares means (± standard error) for killing out and carcass joints proportions (%) by sex and carcass weight

	Sex		Carcass weight (kg)			Significance levels	
	Males	**Females**	**3**	**5**	**7.5**	**Sex**	**Weight**
Killing out	47.2±0.60	47.2±0.68	46.7±0.69	46.9±0.65	48.0±0.97	ns	ns
Leg	24.1±0.28	23.9±0.32	24.8±0.33	24.1±0.31	23.1±0.46	ns	ns
Chump	7.6±0.12	7.9±0.14	7.6±0.14	7.6±0.13	8.0±0.19	ns	ns
Loin	10.1±0.21	10.0±0.24	9.6±0.24	10.1±0.23	10.4±0.34	ns	ns
Ribs	6.9±0.14	6.7±0.16	6.6±0.16	6.8±0.15	7.0±0.23	ns	ns
Anterior Ribs	5.3±0.16	5.3±0.18	5.3±0.18	5.5±0.17	5.1±0.26	ns	ns
Shoulder	20.6±0.63	18.9±0.71	20.7±0.72	19.1±0.69	19.5±1.02	ns	ns
Breast	$10.9±0.28^{a}$	$11.8±0.32^{b}$	$10.5 ±0.32^{a}$	$11.9 ±0.31^{b}$	$11.7 ±0.45^{ab}$	*	**
Neck	11.8±0.22	11.6±0.25	12.0±0.25	11.8±0.24	11.4±0.35	ns	ns
KKCF	$2.8±0.27^{a}$	$3.8±0.30^{b}$	2.9±0.31	3.2±0.30	3.8±0.43	*	ns

a, b – Means in the same row, within treatment, with different superscripts differ significantly (* - $P<0.05$; ** - $P<0.01$; ns – not significant); KKCF – Kidney Knob and Channel Fat

Least squares means by sex and carcass weight for tissues measurements are shown in table 2. Male kids presented smaller (P<0.05) subcutaneous fat depth above central face of muscle *serratus ventralis* (j). Carcass weight increase produced a significant increase (P<0.001) on muscle *longissimus* maximum width and depth (A and B measurements). Dhanda *et al.* (2003) also found that increasing live weight produces an increase of eye muscle area, as should be expected. Subcutaneous fat depth above B (C measurement) and above central face of muscle *serratus ventralis* (j measurement) increased (P<0.01) with increasing carcass weight. Dhanda *et al.*, 2003, reported similar results, indicating an increase of fat thickness with live weight increasing.

Table 2. Least squares means (± standard error) for tissues measurements (mm) by sex and carcass weight

	Sex		Carcass weight (kg)			Significance levels	
	Males	**Females**	**3**	**5**	**7.5**	**Sex**	**Carcass weight**
A	38.9±0.99	37.5±0.87	34.4±1.00^{a}	38.8±0.95^{b}	41.3±1.41^{b}	ns	***
B	17.0±0.50	16.9±0.44	14.5±0.51^{a}	16.7±0.48^{b}	19.6±0.72^{c}	ns	***
C	1.1±0.11	1.1±0.10	0.9±0.12^{a}	0.9±0.11^{a}	1.6±0.14^{b}	ns	***
J	3.8±0.86^{a}	6.6±0.82^{b}	4.0±1.00^{a}	3.4±0.85^{a}	8.1±1.20^{b}	*	**

a, b, c – Means in the same row, within treatment, with different superscripts differ significantly (* - P<0.05; ** - P<0.01; *** - P<0.001; ns – not significant); A – maximum muscle longissimus width; B – maximum muscle longissimus depth; C – subcutaneous fat depth above B; j - subcutaneous fat depth above central face of muscle *serratus ventralis*

Least squares means by sex and carcass weight for meat pH and colour are shown in table3. No significant differences were found between sexes in meat pH and colour. pH24 decrease (P<0.05) was observed with carcass weight increasing. Similar results were found by Dhanda *et al.* (2003). Meat luminosity (L*) decreased with carcass weight increasing, no singnificant effects were found in red (a*) and yelow (b*) indices. Contrarily, Dhanda *et al.*, 2003 found, not significant, increases of L* and a* parameters, and a significant increase in b*.

Table 3. Least squares means (± standard error) for meat pH and colour by sex and carcass weight

	Sex		Carcass weight (kg)			Significance levels	
	Males	**Females**	**3**	**5**	**7.5**	**Sex**	**Carcass weight**
pH1	6.5±0.05	6.4±0.06	6.5±0.06	6.4±0.06	6.5±0.08	ns	ns
pH24	5.9±0.03	5.9±0.04	6.0±0.04^{a}	5.8±0.03^{b}	5.8±0.05^{ab}	ns	*
L*	49.1±0.71	49.7±0.80	51.1±0.81^{a}	46.9±0.77^{b}	50.3±1.14^{ab}	ns	**
a*	9.7±0.55	9.7±0.62	8.6±0.63	10.7±0.60	9.9±0.89	ns	ns
b*	9.8±0.25	9.7±0.29	9.7±0.29	9.5±0.28	10.1±0.41	ns	ns

a, b – Means in the same row, within treatment, with different superscripts differ significantly (* - P<0.05; ** - P<0.01; ns – not significant).

Conclusions

At the carcass weight range studied carcass joints proportions or meat properties do not differ significantly between sexes. Carcass characteristics do not change much from 3 to 5 kg, however at 7 kg carcass presents more fattened. For that it is recommended to slaughter kids at 5 kg, producing more meat than at 3 kg. It would be interesting to analyse if the differences in fatness at 7 kg have a negative impact in palatability.

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