

Muscular pH of the rabbit

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Summary — Muscular pH of L dorsi and B femoris was measured on 215 rabbit carcasses of 2 genetically different lines. There were some differences between lines in final pH — 24 h after slaughter — and in drop in pH (between 15–20 min and 24 h *post mortem*). Final pHs were 5.71 and 5.66 (L dorsi) and 5.82 and 5.77 (B femoris); drop in pH was 1.00 and 1.05 (L dorsi), and 0.77 and 0.83 (B femoris). Carcass weight was not correlated with pH measurements.

muscular pH / rabbits / meat quality

Résumé — **pH des muscles chez le lapin.** *L'évolution post mortem du pH des muscles L dorsi et B femoris est étudiée chez 215 lapins de 2 types génétiques. Les pH ultimes moyens (24 h post mortem) des 2 souches sont, respectivement, de 5,71 et 5,66 (L dorsi), de 5,82 et 5,77 (B femoris). Les chutes de pH correspondantes (entre 15–20 min et 24 h post mortem) sont de 1,00 and 1,05 (L dorsi), de 0,77 et 0,83 (B femoris). Intra-souche, le poids de la carcasse n'est corrélé, ni avec le pH ultime, ni avec la chute de pH.*

pH musculaire / lapin / qualité de viande

INTRODUCTION

Meat quality depends on a large number of factors often related with muscular pH (Lawrie, 1985). However, few studies have been made on the pH of rabbit carcasses. Differences among rabbit strains with a different adult size — and, consequently, at a different degree of maturity — have been found in L dorsi muscle (Ouhayoun, 1978). Ouhayoun and Delmas (1988) have also found differences between muscles in a strain, depending on the type of metabolism of the muscle. The objective of the present paper is to analyze the muscular pH of 2 muscles,

on 2 genetically different strains of rabbits with the same adult size.

MATERIALS AND METHODS

215 rabbit carcasses of 2 rabbit strains (A and V) were measured. Line A has a New Zealand origin and line V a synthetic line formed by blending 2 commercial hybrids whose genetic origin includes several breeds, with a main component being Californian. Both lines are now selected by litter size.

The rabbits were weaned at an age which varied between 27 and 29 d, as weaning takes place on a fixed day. After weaning, they are placed in boxes —density 8 rabbits per box — for 42 d, and fed with a commercial granulated

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food. The animals were slaughtered at an age which varied from 69–71 d. The rabbits were fed until slaughter. The slaughter house was close to the farm, and therefore the animals did not suffer the stress of transport. Two h after slaughter, the carcasses were chilled at between 0 and 2° for 22 h.

The carcasses were weighed after slaughter and 24 h later, the accuracy of the scale being 10 g. Muscular pHs of Longissimus dorsi —at the level of the 7th lumbar vertebra, right side — and Biceps femoris were measured between 15 and 20 min after slaughter and 24 h later. A digital pH-meter with an accuracy of 0.01 units of pH and a penetration electrode with a diameter of 3 mm were used. Males and females were chosen at random.

To test differences between strains and calculate descriptive parameters and correlations the BMDP statistical package was used (Dixon, 1983).

The following traits were analysed:

CW0: Carcass weight after slaughter;

CW24: Carcass weight 24 h after slaughter;

pHL0: pH of L dorsi 15–20 min after slaughter;

pHL24: pH of L dorsi 24 h after slaughter;

dpHL: absolute drop in pH of L dorsi (*pHL0*–*pHL24*);

dpHL/pHL0: relative drop in pH of L dorsi;

pHB0: pH of B femoris 15–20 min after slaughter;

pHB24: pH of B femoris 24 h after slaughter;

dpHB: absolute drop in pH of B femoris (*pHB0*–*pHB24*);

dpHB/pHB0: relative drop in pH of B femoris.

RESULTS

Table I shows the means, standard deviations and variation coefficients of carcass weights and pHs. pH values are slightly lower than the values of Ouhayoun (1978), but similar to those of Ouhayoun and Delmas (1988). As stress before slaughter probably varies, it is not surprising to find that certain authors have noted some differences in pH. The pH 24 of L dorsi is lower than the pH 24 of the B femoris due to the different metabolism of the muscles, B femoris being more oxidative. However, the initial pH is higher in L dorsi, which im-

Table I. Means with their standard errors (SE), standard deviations (SD), and coefficient of variation (CV) of carcass weight and pH traits of 2 rabbit lines (Characters in the text).

Trait	Line V				Line A				Sig
	Mean	SE	SD	CV	Mean	SE	SD	CV	
CW0	1224	12	121	0.10	1257	12	119	0.09	NS
CW24	1206	12	120	0.10	1238	12	116	0.09	NS
pHL0	6.72	0.008	0.08	0.01	6.72	0.009	0.09	0.01	NS
pHL24	5.66	0.007	0.06	0.01	5.71	0.007	0.06	0.01	*
dpHL	1.05	0.012	0.11	0.10	1.00	0.013	0.12	0.12	*
dpHL/pHL0	0.15	0.001	0.01	0.09	0.14	0.001	0.02	0.11	*
pHB0	6.60	0.011	0.11	0.01	6.60	0.014	0.13	0.02	NS
pHB24	5.77	0.007	0.06	0.01	5.82	0.007	0.06	0.01	*
dpHB	0.83	0.014	0.14	0.17	0.77	0.016	0.15	0.20	*
dpHB/pHB0	0.13	0.002	0.02	0.15	0.12	0.002	0.02	0.18	*

NS: No significant differences between lines;

*: Significant differences ($P < 0.05$) between lines.

plies a higher absolute drop in pH. The drop in pH relative to the initial pH is also higher in L dorsi. There are some differences between lines in final pHs and drop in pH, line A having higher final pH in both muscles and drops in lower pH. There were no differences between lines in initial pHs.

Table II shows the correlations between traits. The correlations between carcass weights and pHs are proximal to 0 in all cases and lines. There are no relevant correlations between initial and final pH, but there is a relatively high correlation between drop in pH and both initial and final pH; this is probably an artificial correlation, because both are components of the drop in pH. There is some correlation within lines between muscular pH of L dorsi and B femoris.

DISCUSSION

The coefficients of variation of the pHs are small, but as the pH of the carcass has a

reduced range of variation, standard deviation and coefficient of variation are not reliable indicators of the real variation in pH, as far as the quality of the meat is concerned. A better indicator would be the variation co-efficient of the pH falls, which is more similar to the variation coefficient of other productive traits.

Quality of meat has been associated with PSE (pale, soft and exudative muscle) related to a drop in pH. In pigs, PSE is also associated with the Porcine Stress Syndrome (PSS), depending on a single gene (Webb *et al*, 1985) which apparently is not present in rabbit populations. However, recent studies in pigs place more importance on the final pH than to the drop in pH to for evaluating meat quality, independently of whether PSS is involved or not (Sellier *et al*, 1988). In our case, the differences between the strains A and V are smaller than the differences found between pig breeds, but line V showed lower final pH in both muscles, which suggests the existence of

Table II. Correlation coefficients between carcass traits and pHs. Line A above the diagonal, line V below the diagonal (Characters in the text).

	CW0	CW24	pHL0	pHL24	dpHL	dpHL/ pHL0	pHB0	pHB24	dpHB	dpHB/ dpHB0
CW0	*	1.00	-0.18	0.15	-0.21	-0.21	-0.04	0.17	-0.10	-0.11
CW24	1.00	*	-0.18	0.13	-0.20	-0.20	-0.03	0.17	-0.10	-0.11
pHL0	0.12	0.12	*	-0.27	0.87	0.84	0.38	-0.15	0.39	0.40
pHL24	0.15	0.14	-0.18	*	-0.71	-0.75	-0.24	0.42	-0.39	-0.41
dpHL	-0.00	0.01	0.83	-0.70	*	1.00	0.41	-0.32	0.49	0.50
dpHL/pHL0	-0.01	-0.00	0.78	-0.75	1.00	*	0.40	-0.34	0.49	0.51
pHB0	-0.01	0.00	0.47	-0.31	0.52	0.51	*	-0.10	0.90	0.88
pHB24	0.07	0.06	0.06	0.57	-0.28	-0.32	-0.16	*	-0.51	-0.55
dpHB	-0.04	-0.02	0.35	-0.52	0.55	0.57	0.88	-0.61	*	1.00
dpHB/pHB0	-0.04	-0.03	0.33	-0.54	0.55	0.57	0.86	-0.64	1.00	*

Values under 0.19 are not significantly different from 0.

some genetic variation for this trait. Relative drop in pH corrects some kind of scale effect due to different initial pHs — for example, having the same absolute fall, implies a different final pH. The differences between lines for this trait are somewhat irrelevant.

The independence of pH and carcass weight would suggest that carcass weight does not affect meat quality — as far as meat quality is related to pH — within the range of variation of this experiment, corresponding to the Spanish carcass market.

The observed correlation between L dorsi and B femoris pHs suggest that there are some differences in metabolism among animals.

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