CARCASS AND MEAT QUALITY OF STRAIGHTBRED AND CROSSBRED RABBITS

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ABSTRACT

The objective was to evaluate the effects of the genetic group (straightbred *vs* crossbred) and age on carcass quality of rabbits. A total of 128 straightbred Botucatu and Botucatu x White German Giant crossbred rabbits, males and females, were involved in the study. Young rabbits were weaned at 35 days and sequentially slaughtered, four per genetic group x sex combination, at: 42, 49, 56, 63, 70, 77, 84 and 91 days of age. A 2 X 2 factorial arrangement in a split-plot design was employed. Commercial carcasses were heavier and reference carcasses tended to be heavier in crossbred rabbits throughout the experiment (1284 *vs* 1229 g and 1036 *vs* 1000 g, respectively, $P<0.05$), but when the data were corrected for slaughter weight, differences became non significant. No genetic group effect was detected on dissectible fat weight, both not adjusted and adjusted for slaughter weight. Loin and fore part were heavier in crossbreds (309 *vs* 296 g, $P = 0.0511$ and 298 *vs* 283 g, $P<0.05$, respectively); these differences also became non significant with the adjustment for slaughter weight. No genetic group effect was detected for hind part weight. Non adjusted weights of kidneys, liver and thoracic viscera were larger in the crossbred genetic group (12.5 *vs* 11.8 g, 73.2 *vs* 68.3 g, and 30.8 *vs* 26.2 g, respectively; $P<0.05$). After the adjustment for slaughter weight, only the weight of thoracic viscera remained significantly heavier in crossbreds (30.4 *vs* 28.6 g). No effect of genetic group was detected on meat to bone ratio and muscle ultimate pH (pHu). With the exception of hind part weight adjusted for slaughter weight, all other traits showed age effects. Muscle pHu oscillated between 5.49 and 5.70, whereas commercial and reference carcass weights ranged from 544.1 to 1492 g and 696.4 to 1798 g, and meat to bone ratio from 5.10 to 8.47, between 42 and 91 days of age. Dissectible fat represented 2.11% of the reference carcass at 42 days and 3.38% at 91 days of age. Crossbreeding may be recommended for the production of prime retail cuts. For a minimum reference carcass weight of 1 kg, slaughter should take place between 63 and 70 days of age.

Key words: rabbit, carcass traits, retail cuts, muscle pHu.

INTRODUCTION

Increasing rabbit meat consumption has been a challenge in the last few years. High prices associated with lack of interest in whole carcasses have contributed to this situation. The development of processed products such as retail cuts and precooked meals is an attempt to meet the changing demand. Knowledge about carcass traits such as weight and percentage of prime retail cuts and meat to bone ratio are essential for this new market.

According to BLASCO and OUHAYOUN (1996) first retail cuts are hind legs, loin and fore legs. Proportion of loin ranges from 23 to 28% and of hind legs from 27 a 29 % of the commercial carcass; whereas meat to bone ratio ranges from 7 to 8 (OUHAYOUN, 1989; PARIGI-BINI *et al*., 1992).

The objective was to evaluate the effects of the genetic group (straightbred *vs* crossbred) and age on carcass and meat quality of rabbits.

MATERIAL AND METHODS

The experiment was carried out in the Rabbit Production Unit of *Faculdade de Medicina Veterinária e Zootecnia da UNESP, Campus de Botucatu, SP,* Brazil, from March through May, 2003.

Initially, 144 weaned rabbits, males and females, were caged in flat deck wire cages, fitted with nipple drinkers and feeders. Cages were housed in an open, east-west oriented building protected with plastic adjustable curtains. Rabbits were randomly assigned to treatments, nine per cage, according to genetic group and sex, at weaning (35 days of age).

Only 128 animals were, in fact, involved in the study; the remaining 16 (one per cage) were included with the objective of replacing possible mortality losses. Half of the rabbits were from the Botucatu strain and half were products of crossbreeding between Botucatu females and White German Giant males from a commercial producer. The Botucatu genetic group is a synthetic strain, originated from Norfolk 2000 hybrids (MOURA *et al*., 2000). According to that breeding company, Norfolk hybrids originated from a two generation crossbreeding program involving the New Zealand White, Californian and Bouscat Giant breeds. The German Giant breed is heavier and assumed to be later maturing than the Botucatu strain.

Animals had free access to feed and water. A pelleted feed was formulated according to DE BLAS and MATEOS (1998) and produced on campus.

At 42, 49, 56, 63, 70, 77, 84, 91 days of age all rabbits were weighed; one was randomly taken from each cage (four per treatment) for slaughter. Slaughter took place at the Experimental Chicken Slaughter House on campus. A neck hit was followed by jugular vein bleeding.

Hot carcasses including head, thoracic viscera (heart, lungs, trachea, oesophagus and thymus), liver and kidneys were packed in plastic bags, chilled with crushed ice, and kept in the refrigerator at 4°C for 24 hours. Commercial chilled carcass weight and reference carcass weight were recorded according to BLASCO and OUHAYOUN (1996). Dissectible fat (scapular, perirenal, and inguinal deposits), as well as thoracic viscera, liver, and kidneys were weighed in an analytical scale. First retail cuts (fore legs plus thoracic cage, hind legs, and loin) were obtained by cutting carcasses at the technological joints (BLASCO and OUHAYOUN, 1996). The left hind leg was used for meat to bone ratio evaluation. The ultimate pH (pHu) was determined on the left *Longissimus dorsi* muscle.

A 2 X 2 factorial arrangement in a split-plot design was employed. Two analyses of carcass traits, except for meat to bone ratio, were performed: not adjusted and adjusted for slaughter weight, by means of the MIXED procedure of SAS (1996).

RESULTS AND DISCUSSION

Commercial carcasses were heavier and reference carcasses tended to be heavier in crossbred rabbits throughout the experiment, but when the means were corrected for slaughter weight, differences became non significant (Table 1). This is an indication that differences in carcass weight were mostly due to body weight differences. Head, which is included in the commercial carcass, but not in the reference carcass, was heavier in crossbreds; a trend persisted even after the correction for preslaughter weight. No differences between genetic groups were detected for dissectible fat weight, both uncorrected and corrected for preslaughter weight. Loin and fore part were heavier in crossbreds, whereas no difference between genetic groups was detected for the hind part. After the correction for slaughter weight, those differences became non significant. Uncorrected weights of kidneys, liver and thoracic viscera were larger in the crossbred genetic group. After the correction for preslaughter weight, thoracic viscera still remained heavier in crossbreds. No effect of genetic group was detected on meat to bone ratio and muscle pHu.

Under a commercial point of view, the most valuable retail cut is the loin, followed by the hind part. Percentage of loin and hind part (relative to the reference carcass) did not differ between genetic groups, whereas fore part percentage tended to be larger in crossbreds (28.8 *vs* 28.4%, P = 0.0528). This finding is consistent with the heavier thoracic viscera depicted for crossbreds, and may be an indication of increased cardiorespiratory capacity in this group.

There is no indication of difference in the degree of maturity between groups, given that no genetic group x age interaction was detected for any trait. There was an age x sex interaction for hind part weight ($P<0.05$); males exceeded females from 49 to 63 days of age, whereas from 63 to 77 days females exceeded males for this trait (Figure 1). Males had more developed heads than females (117 *vs* 114 g, $P<0.05$), both corrected and

uncorrected for slaughter weight. Heavier heads may be interpreted as secondary sexual characteristics of male rabbits. The weights of liver and kidneys, corrected for slaughter weight, were also larger in males (72.8 *vs* 68.8 g, P<0.05, and 12.4 *vs* 11.9 g, P<0.05, respectively).

Table 1. Least-squares means of carcass quality traits, uncorrected and corrected for slaughter weight, according to genetic group

Trait	Uncorrected			Corrected		
	Straight bred	Crossbred	Prob.	Straight bred	Crossbred	Prob.
Commercial carcass (g)	1229	1284	0.0188	1253	1261	0.2927
Reference carcass (g)	1000	1036	0.0638	1020	1017	0.7173
Head weight (g)	112.4	117.7	0.0044	113.6	116.6	0.0552
Dissectible fat (g)	27.3	27.4	0.9807	29.3	26.5	0.1435
Fore part (g)[A]	283.3	297.9	0.0120	289.3	292.4	0.1668
Loin (g)	295.5	308.7	0.0511	300.9	303.3	0.4796
Hind part (g)	401.4	412.4	0.1221	408.9	405.6	0.4707
Meat to bone ratio	7.03	7.04	0.8921			
Kidneys (g)	11.8	12.5	0.0115	12.0	12.4	0.1138
Liver (g)	68.3	73.2	0.0437	70.0	71.7	0.3524
Thoracic viscera (g)[B]	28.2	30.8	0.0012	28.6	30.4	0.0144
pHu	5.58	5.61	0.3354	5.58	5.61	0.2134

[A] Fore legs plus thoracic cage
[B] Heart, lungs, trachea, oesophagus and thymus

With the exception of fore part percentage and hind part weight corrected for slaughter weight, all other traits showed age effects (P<0.05, see Figure 1 for reference carcass traits). Muscle pHu did not show a clear trend with age, oscillating between 5.49 and 5.70, from 42 through 91 days of age. These results are unexpected because the combination of an increase in glycolytic metabolism and a decrease in oxidative activity during muscle growth should be accompanied by pHu lowering (DALLE ZOTTE and OUHAYOUN, 1995). PLA *et al*. (1998) reported values for muscular pH ranging from 5.61 to 5.63 for three lines and liveweights ranging from 1800 to 2300 g.

Reference carcass weight ranged from 544 g at 42 days to 1101 g at 70 days to 1492 g at 91 days of age. Meat to bone ratio ranged from 5.10 to 7.88 to 8.47, respectively, at the same ages. These latter values compare favorably to those reported by PLA *et al.* (1998) from 4.16 to 4.87 for three lines and liveweights ranging from 1800 to 2300 g.

Dissectible fat represented 2.11% of the reference carcass at 42 days and 3.38% at 91 days of age. A more pronounced increase in fat weight occurred after 70 days, when it corresponded to 2.22% of the reference carcass. These values are compatible with that of 2.5% reported by PLA *et al*. (1996) for the precocious strain R, at a liveweight of 2 kg.

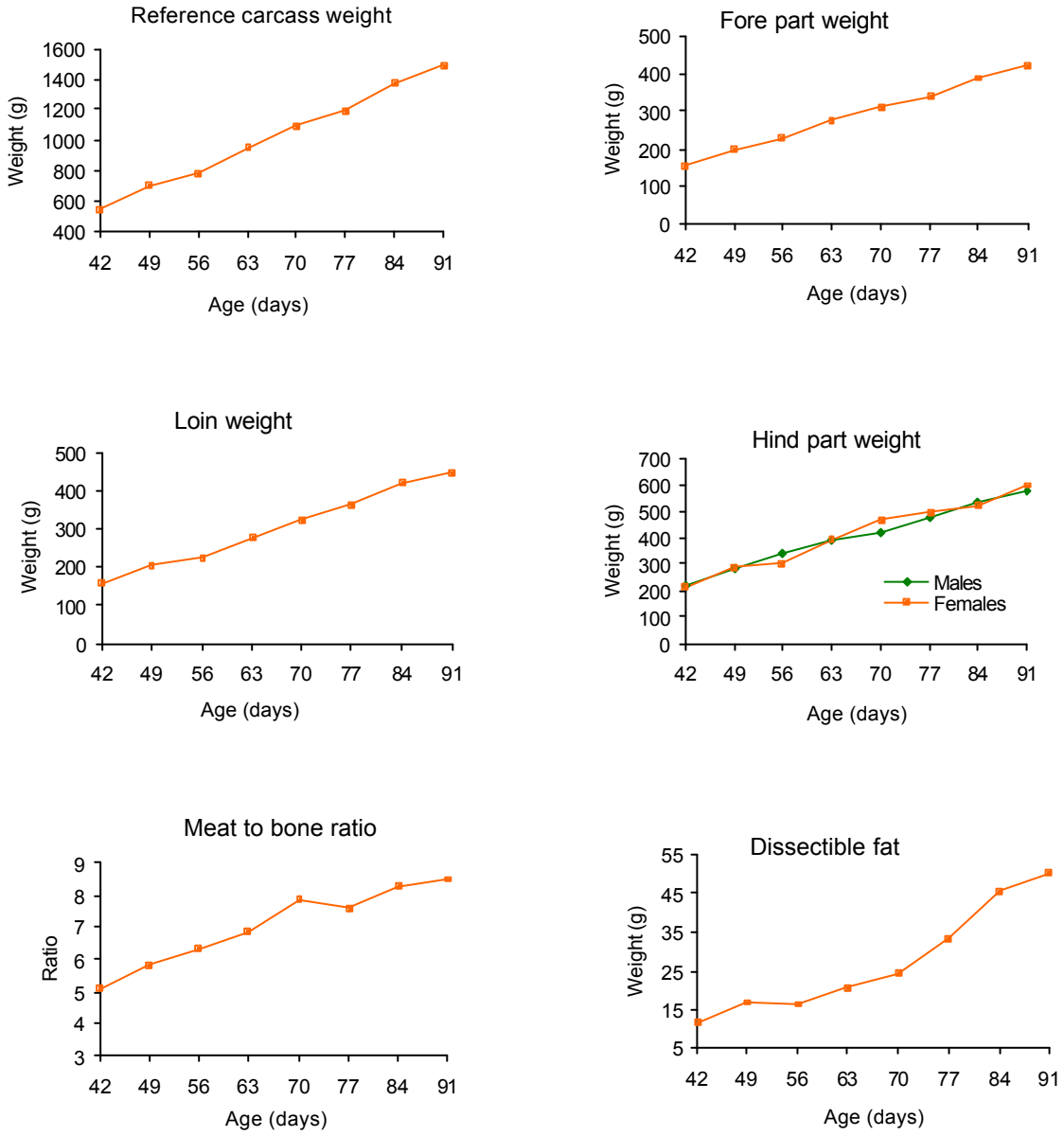

Figure 1. Effect of age on reference carcass. Curves were drawn according to significant interactions in the statistical analyses: two curves for genetic group x age interaction and one curve for no interaction

Crossbreeding may be recommended for the production of retail cuts because products provided heavier carcasses and loins, without increased fatness. For a minimum reference carcass weight of 1 kg, slaughter should take place between 63 and 70 days of age.

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