Carcass Composition and Meat Characteristics of Two Rabbit Breeds of Different Degrees of Maturity

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(Received 12 January 1996; revised version received 28 May 1996; accepted 7 June 1996)

ABSTRACT

Carcass and meat characteristics of rabbits from two synthetic breeds of different size were compared. Breed R had a higher adult weight and reached slaughter weight 1 week before breed V. Sixty rabbits of each breed were slaughtered when they (approximately) reached the Spanish commercial liveweight of 2 kg in order to compare their carcasses and meat quality. The carcasses were measured and retailed according to the norms of the World Rabbit Scientific Association. Breed R had a considerably more developed liver, a less developed hind part, and a more developed thoracic cage. Dissectible fat content was 3.1% and 2.5% of the carcass weight for the breeds V and R, respectively. Meat content was higher in the V breed than in the R breed (53 and 51% with respect to the chilled carcasses). The ratio meat/bone was better for breed V (2.18 and 2.05, respectively). Muscular fat content, estimated in the meat of one side of the carcass, was higher for breed V. All these differences are related to the lower degree of maturity of breed R at equal weights. Muscular pH, measured on the B. femoris and on the M. Longissimus lumborum at the level of the 5th lumbar vertebra, was the same for both breeds. Colour was measured on the carcass surface and in cuts of the M. Longissimus lumborum. Some colour differences were found for the carcass surface, but not for the meat. Copyright © 1996 Elsevier Science Ltd

INTRODUCTION

Meat rabbit selection programmes are usually based on a three-way cross in which a terminal sire of large size, often selected for growth rate is used. Given the short generation interval of rabbits, this may lead to changes in carcass composition and meat quality, because rabbits are slaughtered at a fixed weight as defined by the market. Farmers are usually paid by rabbit liveweight, although there is an increasing trend in the market of also considering carcass yield. Consumers usually buy the whole carcass, but in recent years a market for retail cuts has been developed. Breeds will differ in carcass composition and meat quality at the same market weight due to differences in degree of maturity. Few works on carcass and meat quality breed comparison have been published. Rouvier (1970)

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and Perrier & Ouhayoun (1990) compared rabbit breeds slaughtered at the same age, but differing in their slaughter weight. Lukefahr et al. (1982), Lukefahr et al. (1983) and Ozimba & Lukefahr (1991) have also compared several breeds and crossbreed rabbits which had a different slaughter weight, but no comparisons have been made at the same slaughter weight of rabbits of different adult weight. Studies on rabbit meat quality have mostly concentrated on pH measurements (Ouhayoun & Delmas, 1988; Blasco & Piles, 1990; Xiccato et al., 1990) and only recently have some studies on carcass colour and muscular fat content been published (Bernardini Battaglini et al., 1994; Xiccato et al., 1994). The objective of the present work is to compare the carcass composition and meat characteristics of two breeds of rabbits of different degree of maturity at the same slaughter weight.

MATERIALS AND METHODS

Animals

Rabbits from two synthetic breeds were used in the experiment. Breed V was formed by crossing two commercial dam hybrids, and has been selected for litter size for 15 generations. Breed R was formed by crossing a commercial terminal sire hybrid with a Californian breed and has been selected for growth rate between the 4th and the 10th week of life for 10 generations. Breed R has a higher adult weight and arrives to the slaughter weight on average 1 week before breed V (Blasco & Gómez, 1993). Sixty animals of each breed were reared in collective cages of eight animals from weaning to slaughter at the experimental farm of the University of Valencia. Weaning took place at four weeks of age for both breeds, and they were slaughtered at 8 and 9 weeks of age for the breeds R and V, respectively, in order to compare both breeds at the same commercial slaughter weight. Both breeds were fed ad libitum with a standard pelleted diet (16.5% protein, 3.4% fat, 15.5% fibre). Animals were slaughtered at the abattoir on the farm, thus they did not suffer stress due to transport. No fasting was practised. Sex was taken at random, since there is no sexual dimorphism at these ages (Lukefahr et al., 1983; López et al., 1992; Blasco & Gómez, 1993). The carcasses were refrigerated 24 h at 3°C.

Carcass division

The carcasses were measured and retailed according to the norms of the World Rabbit Scientific Association (WRSA) (Blasco et al., 1993, modified in the 2nd Meeting of the International Commission on Rabbit Carcass Criteria Harmonization). The European carcasses contain head, liver, lungs, thymus, oesophagus, heart and kidneys, which were removed to obtain the Reference carcass, which only contains meat, fat and bone. The following variables, defined by the WRSA (Blasco et al., 1993), were measured on the carcass: LW: liveweight; HCW: hot carcass weight; CCW: chilled carcass weight 24 h after slaughter; DP: dressing percentage (CCW/LW)×100; DLP: drip loss percentage 100(HCW−CCW)/HCW; DL: dorsal length (interval between the atlas vertebra and the 7th lumbar vertebra); TL: thigh length (between the 7th lumbar vertebra and the ischion tuberosity); LCL: lumbar circumference; HW: head weight; LvW: liver weight; KiW: kidneys weight; LHW: thymus, trachea, oesophagus, lung and heart weight and RCW: reference carcass weight.

The reference carcass was cut in the following points: cutpoint 1; section between the 7th and 8th thoracic vertebra; cutpoint 2; section between the last thoracic and the first lumbar vertebra, following the prolongation of the 12th rib when cutting the thoracic
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wall; cutpoint 3; section between the 6th and 7th lumbar vertebra, cutting the abdominal wall transversally to the vertebral column; cutpoint 4; separation of fore legs including insertion and thoracic muscles. The following variables were measured; FLW: fore legs weight including insertion and thoracic muscles; TW: thoracic cage weight; P1-2: weight of the part of the carcass between cutpoints 1 and 2; IPW: Intermediate part weight (between cutpoints 2 and 3); HPW: hind part weight. All the retail cuts were dissected, and the following variables measured: MW: meat weight of the reference carcass; BW: bone weight of the reference carcass; LDW: longissimus lumborum weight; AWW: abdominal wall weight; MFLTW: meat weight of the fore legs including insertion and thoracic muscles; MTW: meat weight of the thoracic cage; M1-2W: meat weight of the part of the carcass between cutpoints 1 and 2; MIPW: meat weight of the intermediate part; MHPW: Meat weight of the hind part; SFaW: scapular fat weight, PFaW: perirenal fat weight, IFaW: inguinal fat weight, DFaW: dissectible fat weight of the reference carcass (DFaW = SFaW + PFaW + IFaW). The WRSA proposes two types of carcass division to facilitate comparisons with other research works: (i) Technological (using the retail cuts from cutpoints 1, 3 and 4) and (ii) Anatomical (using retail cuts from points 2 and 3). The technological division has four retail cuts: FLW, TW, P1-2 + IPW and HPW, whereas the anatomical division has three retail cuts: FLW + TW + P1-2, IPW and HPW.

Meat quality variables

Colour was measured in 47 of the carcasses (23 carcasses of V and 24 of R) with a CR-300 Minolta Chromameter, which gives the average of three measurements of lightness ($L^*$, from 0 = black to 100 = white), redness ($a^*$, from the extreme positive = red to the extreme negative = green) and yellowness ($b^*$, from the extreme positive = yellow to the extreme negative = blue) in each point. Chroma $C^* = (a^{*2} + b^{*2})^{1/2}$ (quantity of colour) and Hue $H^* = \tan^{-1}(b^*/a^*)$ (real colour) were also calculated. Measurements were taken on the carcass surface of the longissimus muscle at the level of the 4th lumbar vertebra. Colour of the longissimus was also measured at the 1st lumbar vertebra cut. Intermuscular and intramuscular fat content was evaluated in the meat of one side of the carcass by ether extraction on SoxteX (AOAC, 1990). Muscular pH of the Biceps femoris (pHBf) and pH of the longissimus (pHLd) at the level of the 5th lumbar vertebra were taken on the chilled carcass using a Crisson pHmeter provided with an Ingold penetration electrode.

Statistical analyses

Least square means were calculated to compare both breeds. The retail cut variables and fat deposits were compared in a model in which the covariate reference carcass weight was introduced, in order to allow comparisons at constant carcass weight. Preliminary analyses did not show any effect of sex, and it was excluded from the model. The GLM procedure of the SAS package (SAS, 1990) was used.

RESULTS

Table 1 shows the slaughter liveweight, carcass weight and external carcass measurements. Breed R had a lower dressing percentage (DP). As commercial carcasses differ from country to country, a reference carcass weight is calculated to allow for comparisons. In this case, the reference carcass weight accounted for the 80% of the carcass. Drip loss was the same for both breeds, 4% of the carcass weight. The three carcass measurements recommended by the WRSA showed that although carcass length was the same, lumbar
circumferences differed. Thigh length was higher in breed V (Table 2). These external measurements showed, nevertheless, a small variation.

### TABLE 1

Least Square Mean ($m$), Standard Error (s.e.), Standard Deviation (s.d.) and Coefficient of Variation (c.v.) of Several Carcass Measurements in Two Breeds of Rabbit of Different Degrees of Maturity

<table>
<thead>
<tr>
<th>Breed V</th>
<th></th>
<th></th>
<th>Breed R</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$m$</td>
<td>s.e.</td>
<td>s.d.</td>
<td>c.v. x 100</td>
<td>$m$</td>
</tr>
<tr>
<td>LW</td>
<td>1942</td>
<td>19.6</td>
<td>161</td>
<td>8.3</td>
<td>1986</td>
</tr>
<tr>
<td>HCW</td>
<td>1175</td>
<td>13.7</td>
<td>112</td>
<td>9.5</td>
<td>1110</td>
</tr>
<tr>
<td>CCW</td>
<td>1122</td>
<td>13.7</td>
<td>112</td>
<td>10.0</td>
<td>1061</td>
</tr>
<tr>
<td>RCW</td>
<td>905</td>
<td>11.7</td>
<td>95</td>
<td>10.6</td>
<td>834</td>
</tr>
<tr>
<td>DP</td>
<td>57.7</td>
<td>0.28</td>
<td>2.3</td>
<td>4.0</td>
<td>53.3</td>
</tr>
<tr>
<td>DLP</td>
<td>4.5</td>
<td>0.21</td>
<td>1.7</td>
<td>35.6</td>
<td>4.4</td>
</tr>
<tr>
<td>DL</td>
<td>251</td>
<td>1.2</td>
<td>10</td>
<td>4.1</td>
<td>249</td>
</tr>
<tr>
<td>TL</td>
<td>78</td>
<td>0.5</td>
<td>4</td>
<td>4.9</td>
<td>74</td>
</tr>
<tr>
<td>LCL</td>
<td>168</td>
<td>1.0</td>
<td>8</td>
<td>4.9</td>
<td>163</td>
</tr>
</tbody>
</table>

ns: Non significant difference; **: ($P < 0.01$).
Weights in g, lengths in mm.
LW: liveweight; HCW: hot carcass weight; CCW: chilled carcass weight 24 h after slaughter; RCW: reference carcass weight; DP: dressing percentage; DLP: drip loss percentage; DL: dorsal length; TL: thigh length; LCL: lumbar circumference.

### TABLE 2

Least Square Mean ($m$), Standard Error (s.e.), Standard Deviation (s.d.) and Coefficient of Variation (c.v.) of Several Organs and Retail Cuts in Two Breeds of Rabbit of Different Degrees of Maturity

<table>
<thead>
<tr>
<th>Breed V</th>
<th></th>
<th></th>
<th>Breed R</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$m$</td>
<td>s.e.</td>
<td>s.d.</td>
<td>c.v. x 100</td>
<td>$m$</td>
</tr>
<tr>
<td>HW</td>
<td>97</td>
<td>0.9</td>
<td>7</td>
<td>7.7</td>
<td>95</td>
</tr>
<tr>
<td>LvW</td>
<td>77</td>
<td>1.7</td>
<td>13</td>
<td>17.6</td>
<td>87</td>
</tr>
<tr>
<td>KiW</td>
<td>13</td>
<td>0.2</td>
<td>2</td>
<td>12.8</td>
<td>13</td>
</tr>
<tr>
<td>LHW</td>
<td>29</td>
<td>0.4</td>
<td>3</td>
<td>11.4</td>
<td>28</td>
</tr>
<tr>
<td>FLW</td>
<td>144</td>
<td>0.8</td>
<td>6</td>
<td>4.4</td>
<td>147</td>
</tr>
<tr>
<td>TW</td>
<td>100</td>
<td>0.9</td>
<td>7</td>
<td>7.0</td>
<td>107</td>
</tr>
<tr>
<td>PI–2</td>
<td>80</td>
<td>0.5</td>
<td>4</td>
<td>5.5</td>
<td>83</td>
</tr>
<tr>
<td>IPW</td>
<td>174</td>
<td>1.0</td>
<td>8</td>
<td>4.7</td>
<td>172</td>
</tr>
<tr>
<td>HPW</td>
<td>334</td>
<td>0.9</td>
<td>8</td>
<td>2.2</td>
<td>327</td>
</tr>
</tbody>
</table>

ns: Non significant difference; *: $P < 0.05$; **: $P < 0.01$.
Weights in g. HW: head weight; LvW: liver weight; KiW: kidneys weight; LHW: thymus, trachea, oesophagus, lung and heart weight; FLW: fore legs weight and insertion and thoracic muscles; TW: thoracic cage weight; PI–2: weight of the part of the carcass between cutpoints 1 and 2; IPW: intermediate part weight; HPW: hind part weight.
Table 2 shows the organs and retail cut composition. Breed R had a considerably more developed liver (8.2% of the carcass compared with 6.8% for breed V), indicating a lower degree of maturity of this breed from breed V. Although rabbit carcasses are usually commercialised as a whole, commercialisation in retail cuts is of increasing importance, the intermediate and hind part being the most valuable cuts. As retail cuts were corrected for reference carcass weight, their variability was small. Breed R was less developed in the hind part of the carcass (HPW) than breed V and had a more developed thoracic cage (TW), the least valuable part of the carcass. The loin weight (in the technological division) and the intermediate part of the carcass (in the anatomical division) did not differ between breeds. The fore part of the carcass was for both divisions more developed in line R. The variables that were corrected for reference carcass weight showed a small c.v. due to the close relationships between reference carcass weight and its parts.

Table 3 shows the meat, bone and dissectible fat content of the carcass. Rabbit carcasses had an small dissectible fat content, being 3.1% and 2.5% of the carcass weight for the breeds V and R, respectively (3.8% and 3.1% of the reference carcass). At constant reference carcass weight, breed V still had a higher fat content for the main fat deposit, PFaW. All fat deposits showed a large variability. Meat content was higher in the V breed than in the R breed (53% and 51%, with respect to the chilled carcass, 66% and 65%, with respect to the reference carcass). The small standard deviation of these ratios (0.017 and 0.014) made these differences significant. The ratio meat/bone was better for breed V

<table>
<thead>
<tr>
<th>TABLE 3</th>
<th>Least Square Mean (m), Standard Error (s.e.), Standard Deviation (s.d.) and Coefficient of Variation (c.v.) of Tissue Composition of the Carcass in Two Breeds of Rabbit of Different Degrees of Maturity. M, Corrected by Reference Carcass Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Breed V</td>
</tr>
<tr>
<td></td>
<td>m</td>
</tr>
</tbody>
</table>
| MW       | 593  | 7.9  | 63   | 10.7     | 543  | 8.8  | 72   | 13.3     **
| BW       | 274  | 3.6  | 30   | 10.8     | 265  | 3.2  | 27   | 10.0     *
| DFeW     | 35   | 1.1  | 9    | 26.3     | 27   | 0.8  | 7    | 25.3     **
| LDW      | 120  | 0.8  | 7    | 5.6      | 112  | 0.8  | 7    | 6.0      **
| AWW      | 54   | 0.5  | 4    | 7.0      | 64   | 0.5  | 4    | 5.9      **
| MFLTW    | 114  | 0.8  | 7    | 6.0      | 116  | 0.8  | 7    | 5.9      ns
| MTW      | 14   | 0.2  | 1    | 10.7     | 14   | 0.2  | 1    | 10.4     ns
| M1–2W    | 52   | 0.5  | 4    | 7.2      | 56   | 0.5  | 4    | 6.8      **
| MIPW     | 139  | 0.9  | 7    | 5.3      | 136  | 0.9  | 7    | 5.4      *
| MHPW     | 246  | 1.0  | 8    | 3.2      | 239  | 1.0  | 8    | 3.3      **
| SFaW     | 5.1  | 0.14 | 1.1  | 21.9     | 5.4  | 0.14 | 1.1  | 20.5     ns
| PFaW     | 15.6 | 0.42 | 3.4  | 22.1     | 11.8 | 0.42 | 3.4  | 29.1     **
| IFaW     | 12.3 | 0.43 | 4.0  | 32.2     | 11.7 | 0.48 | 4.0  | 33.9     ns

ns: Non significant difference; *: P < 0.05; **: P < 0.01.

Weights in g. MW: meat weight of the reference carcass; BW: bone weight of the reference carcass; DFeW: fat weight of the reference carcass; LDW: longissimus weight; AWW: abdominal wall weight; MFLTW: meat weight of de fore legs including insertion and thoracic muscles; MTW: meat weight of the thoracic cage; M1–2W: weight of the part of the carcass between cutpoints 1 and 2; MIPW: meat weight of the intermediate part; MHPW: meat weight of the hind part; SFaW: scapular fat weight; PFaW: perirenal fat weight; IFaW: inguinal fat weight.

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TABLE 4
Least Square Mean (m), Standard Error (s.e.), Standard Deviation (s.d.) and Coefficient of Variation (c.v.) of Meat Quality Traits in Two Breeds of Rabbit of Different Degrees of Maturity

<table>
<thead>
<tr>
<th>Breed</th>
<th>m</th>
<th>s.e.</th>
<th>s.d.</th>
<th>c.v.×100</th>
<th>Breed</th>
<th>m</th>
<th>s.e.</th>
<th>s.d.</th>
<th>c.v.×100</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFaP</td>
<td>5.59</td>
<td>0.117</td>
<td>0.89</td>
<td>15.9</td>
<td>5.19</td>
<td>0.135</td>
<td>1.06</td>
<td>20.5</td>
<td>*</td>
</tr>
<tr>
<td>pHLd</td>
<td>5.78</td>
<td>0.017</td>
<td>0.13</td>
<td>2.3</td>
<td>5.79</td>
<td>0.013</td>
<td>0.11</td>
<td>1.8</td>
<td>ns</td>
</tr>
<tr>
<td>pHBF</td>
<td>5.85</td>
<td>0.018</td>
<td>0.14</td>
<td>2.4</td>
<td>5.86</td>
<td>0.015</td>
<td>0.12</td>
<td>2.0</td>
<td>ns</td>
</tr>
<tr>
<td>L*-surf.</td>
<td>56.9</td>
<td>0.39</td>
<td>2.1</td>
<td>3.7</td>
<td>57.1</td>
<td>0.38</td>
<td>1.6</td>
<td>2.8</td>
<td>ns</td>
</tr>
<tr>
<td>a*-surf.</td>
<td>3.1</td>
<td>0.16</td>
<td>0.7</td>
<td>23.1</td>
<td>2.9</td>
<td>0.15</td>
<td>0.8</td>
<td>26.9</td>
<td>ns</td>
</tr>
<tr>
<td>b*-surf.</td>
<td>3.9</td>
<td>0.25</td>
<td>1.2</td>
<td>29.4</td>
<td>2.8</td>
<td>0.24</td>
<td>1.2</td>
<td>42.0</td>
<td>**</td>
</tr>
<tr>
<td>L*-meat</td>
<td>63.4</td>
<td>0.51</td>
<td>2.4</td>
<td>3.7</td>
<td>63.5</td>
<td>0.50</td>
<td>2.5</td>
<td>4.0</td>
<td>ns</td>
</tr>
<tr>
<td>a*-meat</td>
<td>3.9</td>
<td>0.27</td>
<td>1.2</td>
<td>31.8</td>
<td>3.9</td>
<td>0.27</td>
<td>1.4</td>
<td>35.4</td>
<td>ns</td>
</tr>
<tr>
<td>b*-meat</td>
<td>6.4</td>
<td>0.33</td>
<td>1.3</td>
<td>19.9</td>
<td>6.4</td>
<td>0.33</td>
<td>1.9</td>
<td>28.9</td>
<td>ns</td>
</tr>
</tbody>
</table>

ns: Non significant difference; *: P<0.05; **: P<0.01.

MFaP: fat percentage of the meat; pHLd: pH of the M. longissimus; pHBF: pH of the B. fermoris; L*: lightness; a*: redness; b*: yellowness; surf: measurements taken on the surface of the carcass at the 4th lumbar vertebra; meat: measurements taken on M. longissimus cut at the level of the 1st lumbar vertebra.

(2.18 and 2.05, respectively). All these differences showed a lower degree of maturity of breed R at the same carcass weight. The weights of the most valuable parts of the carcass was higher in breed V, even at constant reference weight. The M. longissimus was also more developed in breed V, while the abdominal wall was heavier in breed R.

Table 4 shows the traits related to meat quality. Breed V had a higher percentage of fat in the meat, which agrees with its higher overall fatness related to its degree of maturity, but the difference is nevertheless small. Colour surface measurements differed in the parameter b*, leading to differences in Chroma (5.06 for breed V and 4.11 for breed R) and Hue (51 and 43 for breeds V and R, respectively). Meat colour and muscular pHs were the same for both breeds.

DISCUSSION

Current programmes of selection generally use terminal sires of large size often selected for growth rate. This can lead to a less mature animal, as the results consistently show. Although selection for growth rate produces benefits, mainly due to an improvement of feed efficiency, some undesirable economic consequences for the producer are related to the use of less mature animals. Rabbits are frequently sold as entire carcasses, and there is a trend to pay for them on the basis of the dressing percentage, which is lower in less mature animals. The consumer is also having a lower quality product, since the amount of edible meat is lower in more immature rabbits at the same market weight. Comparisons with other authors are difficult due to the differences in carcass dressing and the resulting carcass weight. Only recently (Blasco et al., 1993) the WRSA defined a standard carcass division and a reference carcass for comparisons. Nevertheless the main carcass quality parameters expressed as ratios (dressing, fat content, and meat/bone ratio) can still be used for comparisons with other experiments.
The digestive tract develops early (Cantier et al., 1969; Deltoro & López, 1985) thus breed R shows a lower dressing percentage at the same weight than breed V. Meat (including muscle, fat and connective tissue) to bone ratio improves with maturity (Ouhayoun, 1980; Rao et al., 1978; Roiron et al., 1992; Parigi-Bini et al., 1992) consequently breed V has a better meat/bone ratio than breed R. Results in the literature comparing breeds of large and small size are not consistent (Rouvier, 1970; Ouhayoun, 1978; Ouhayoun, 1989; Lukefahr et al., 1982; Lukefahr et al., 1983; Ozimba & Lukefahr, 1991) partially because they are made at different slaughter weights but it can be partially due to true genetic differences between breeds. Fat tissue has a late development (Cantier et al., 1969; Deltoro et al., 1984) and breed V has a higher fat content than breed R, which is consistent with other breed comparisons (Ouhayoun, 1978; Lukefahr et al., 1982; Lukefahr et al., 1983; Ozimba & Lukefahr, 1991) although this disagrees with the results of Rouvier (1970). The higher fat content is a disadvantage in using a more mature animal, since fat is sold with the whole carcass and it is more expensive to produce that meat, but nevertheless the amount of fat in rabbit carcasses is very small and this does not represent a problem. Differences in hind quarters (346 ± 4.0 g for line V and 315 ± 4.5 g for line R) are small when considered at the same reference carcass weight. The correction for reference carcass weight was made to correct for the differences due to the degree of maturity of both lines (Deltoro et al., 1984; Deltoro & López, 1985). Other authors have not found consistent differences when comparing breeds of different size (Lukefahr et al., 1983; Perrier & Ouhayoun, 1990; Ozimba & Lukefahr, 1991).

Meat quality measurements have shown some differences between both breeds. Meat colour measurements are usually taken on meat cuts in beef, lambs or pigs, but rabbit carcasses are commercialised as a whole, thus colour measurements taken on the carcass surface seems to be a sensible quality criterion. We have found only two references in the literature, and they cannot readily be used for comparisons because Xiccato et al. (1994) give average values between Longissimus (pars lumbaris) and Biceps femoris for L*, a*, b* and C* parameters, and Bernardini Battaglini et al. (1994) give measures of carcass colour (L*, C* and H*) on longissimus, but with no indication of the site (vertebra) of measurement. The values of L* and H* given by Bernardini Battaglini et al. (1994) are similar to our values, their C* being higher than our value. Recently, Pla et al. (1995) have published colour measurements in rabbit carcasses of three different genetic origins, two of them being the breeds R and V (with a different set of data).

Intramuscular fat is a meat quality factor in pork, lamb or beef, but in rabbit it seems sensible to take the total amount of fat in the edible meat, since muscles are not separated for their sale. Ouhayoun (1989) found differences in fat content of the hind leg between seven breeds of large, medium and small size slaughtered at 11 weeks of age; the large size breeds had lower fat content than the small size ones. Line R has also a lower fat percentage of the meat than line V. Meat quality depends on a large number of factors (myoglobin concentration, type of fibres, type of metabolism, etc.) often related to muscle pH. Differences between breeds in muscle pH have been found by Ouhayoun (1978) and Blasco & Piles (1990).

The importance of comparing both breeds at the same liveweights is that this weight is fixed by the market and rabbits are slaughtered when they reach it, independently of their degree of maturity. Selection for growth rate has its main economical effect improving food conversion ratio, but it has the undesirable effect of increasing adult weight and liveweight along all the growth curve (Blasco et al., 1990). This leads to less mature animals at slaughter, which have a lower meat/bone ratio and a poorer carcass yield, and although they also have a higher fat content this does not seem important hitherto in rabbits. The use of breeds of large size has the same consequences. A way of reducing these problems would be to increase the commercial carcass size, which is more feasible.
since the market of retail cuts is expanding. Alternatively, selection programs may include carcass traits, as Rouvier (1970) recommended previously.

ACKNOWLEDGEMENTS

We are grateful to Luis Valero for his help in the slaughter process. This research is included in the project CAICYT AGF93-0634

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