Water Holding Capacity of Rabbit Meat (Belgian Giant breed)

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Abstract
Meat science has always been most interested in practical applications and macroscopic effects of internal/external factors in relation to water holding capacity (WHC). Research has been motivated by technological and sensory aspects, both finally linked to economic benefits. The objective of this study was to assess the effects of gender and different muscle groups from rabbits on WHC of their meat. Determining WHC was carried out by compression of the meat over filter paper between two plates. The biological material was collected from 56 Belgian Giant breed rabbits (25 males and 31 females). Aged 11-12 months, the rabbits had an average body weight of 11.5 kg. Measurements were performed on the muscles Longissimus dorsi (LD), Psoas major (PM) and Semimembranosus (SM) 24 hours after slaughter. The percentage of WHC was calculated as ratio (per cent) of weight of released water to intact meat. WHC for females, in LD, had an average value of 8%, in PM it had an average value of 9.31%, and in SM it had an average value of 12.91%. For males, WHC in LD was 7.6%, in PM 8.23% and in SM 11.43%. The average value for WHC was higher for females than for males. Regarding the statistical significance of differences by gender, distinct significant differences for SM and very significant differences for PM were recorded. For PM, a higher average value of WHC is probably due to the smaller diameter of muscle fibres and also to water higher percentage of them.

Keywords: meat, rabbit, water holding capacity.

INTRODUCTION
Because of its low fat and cholesterol contents, as well as the high proportion of polyunsaturated fatty acid (PUFA), rabbit meat is considered a healthy meat (Combes, 2004). However, its consumption is sometimes rejected because its preparation is considered time-consuming (long cooking) and requires culinary skills. In order to promote the consumption of rabbit meat, the processing industries are trying to develop ready-to-cook and ready to-eat products. A possible way to improve rabbit meat utilization, for convenience food preparation, could be the frozen storage of the meat (minced meat and additives-hamburgers) produced when the price of the meat is lower (during summer) and used to prepare further processed products when the price of the meat is higher (Bianchi, 2006, Puolanne and Halonen, 2010).

AIMS AND OBJECTIVES
Technological properties (including WHC) are very important to obtain meat preparations due to yield and processing losses. WHC is not studied for rabbits (Belgian Giant breed), this being the starting point of this research. The objective of this study was to assess the effects of gender and of different muscle groups in rabbits on the water holding capacity (WHC) of their meat.
MATERIALS AND METHODS
Determining the WHC was carried out by compression of the meat over filter paper between two plates – the Grau and Hamm method (Hamm, 1986, described by Pla and Apolinar, 2000). The biological material was collected from 56 Belgian Giant breed rabbits (25 males and 31 females, aged 11-12 months), which were weighed. Measurements were also performed on the muscles Longissimus dorsi (LD), Psoas major (PM) and Semimembranosus (SM) (stored at 2 °C) 24 hours after slaughter. For determination of WHC, 300±5 mg of meat was weighed, then placed on a previously desiccated and weighed filter-paper (7 cm diameter). The paper with meat was placed between two glass plates. Loads of 2.25 kg were applied for 5 minutes. After that, the damp paper filter was rapidly weight after accurately removing the compressed meat. The percentage of WHC was calculated as the ratio (per cent) of the weight of released water (damp filter paper weight-dry filter paper weight) to intact meat.

RESULTS AND DISCUSSIONS
The WHC for females, in LD muscles, had an average value of 8%, in PM an average value of 9.31%, and in SM an average value of 12.91%. For males, WHC in LD was 7.6%, in PM 8.23% and in SM 11.43%. The values obtained in this study are lower than those found by Bianchi et al., 2006 (14.5-15.4%) in L. lumborum muscles (between the 1st and 7th lumbar vertebra), lower than those from Lafuente and López, 2014, (16.25% for LD muscles), and by Simonova et al., 2010 (32% for LD muscles) for hybrid rabbits. These differences in favour of the Belgian Giant are probably due to the breed and the age of the rabbits (42 days old in the study Bianchi et al., 62–65 days old in the study of Lafuente and López, and 240 days-old in the third study, of Simonova et al.).

The coefficient of variation did not exceed the threshold of 10% expressing thus a very homogenous population. Regarding the statistical significance of differences by gender, distinct significant differences for SM and very significant differences for PM were recorded (tab.1).

CONCLUSION
In the present work, the average value for WHC was higher for female rabbits than for the males. For Psoas major muscle, a higher average value of WHC is probably due to the smaller diameter of the muscle fibres and also to their higher water percentage.

REFERENCES

<table>
<thead>
<tr>
<th>Muscles</th>
<th>Gender</th>
<th>X±s</th>
<th>s²</th>
<th>s</th>
<th>V%</th>
<th>Min.</th>
<th>Max.</th>
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</thead>
<tbody>
<tr>
<td>LD</td>
<td>F</td>
<td>8.0±0.10</td>
<td>0.09</td>
<td>0.29</td>
<td>3.66</td>
<td>7.60</td>
<td>8.40</td>
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<tr>
<td></td>
<td>M</td>
<td>7.58±0.11</td>
<td>0.10</td>
<td>0.32</td>
<td>4.16</td>
<td>7.10</td>
<td>8.10</td>
</tr>
<tr>
<td>SM</td>
<td>F</td>
<td>12.91±0.29**</td>
<td>0.66</td>
<td>0.81</td>
<td>6.28</td>
<td>11.90</td>
<td>13.90</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>11.43±0.27</td>
<td>0.60</td>
<td>0.78</td>
<td>6.80</td>
<td>10.30</td>
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</tr>
<tr>
<td>PM</td>
<td>F</td>
<td>9.31±0.35***</td>
<td>0.50</td>
<td>0.71</td>
<td>7.58</td>
<td>8.46</td>
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<tr>
<td></td>
<td>M</td>
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<td>0.21</td>
<td>0.46</td>
<td>5.62</td>
<td>7.41</td>
<td>8.80</td>
</tr>
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</table>

LD (Longissimus dorsi); SM(Semimembranosus); PM (Psoas major). **distinct significant differences (p < 0.01); *** very significant differences (p<0.001)