Influence of Cold Stress on the Chemical Composition of Carcass to Mangalica pigs

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Abstract
The purpose of the experiment was to evaluate the chemical composition of meat of Mangalica and Large White pigs. The animals were raised in alternative system and exposed to 8-11°C. The initial weight at was 100 kg. Preparation of the carcass was made after the classical method. Linear measures were made on warm carcass. The chemical composition of meat was determined to Longissimus dorsi muscle. The protein content of meat was determinate by Tecator - Kyltec Auto Analyze and fat content by Soxtec System HT. Data were statistically analyzed by ANOVA method. Comparative with Large White breed, at Mangalica pigs, the fat thickness was significantly higher by 93% (p ≤ 0.001) and the water content of meat was lower by 8.6%. The fat content of meat was higher with 117% and cholesterol content was reduced with 32%, the differences being significant.

Keywords: chemical composition of meat, Mangalica

1. Introduction
Mangalica is one of the most popular breeds of pigs in Europe, because meat has superior properties, such as taste, marbling and low cholesterol content. Many Americans Farmers have imported the Mangalitsa breed and the technology of its raising [1]. The climate conditions have a major role in expressing the genetic potential of races and productive parameters. The climate conditions have a major role in expressing the genetic potential of races and the chemical composition of meat. To ensure a sustainable economy, this must become an eco-bio-economy, environmentally friendly and based on a livestock biodiversity [2]. The studies aimed the determination of chemical composition in Mangalica pigs exposed at cold temperature (8-11°C), compared with Large White pigs.

2. Materials and methods
The experiments were conducted on each of 22 Mangalica (M) and Large White (LW) pigs, raised in alternative system, exposed at 8-11°C. The initial weight of pigs was 100 kg. The animals had free access to water and to standard, isoprotein and isocalory diets, with 13.5% crude protein (CP), 4.9% lysine and 3100 kcal/kg metabolizable energy. Feed intake was measured on a daily basis.

The carcass prepare for biometrical and chemical determinations was performed by classical method. Carcass measurements were made after determining the warm yield. The chemical composition of meat was determined from Longissimus dorsi muscle. The meat samples were analyzed according the Weende scheme. The crude protein was determined by Tecator – Kyltec Auto Analyze, the ether extract by Soxtec System HT and cholesterol by chromatographic method.
Data was statistically analyzed by ANOVA method.

### 3. Results and discussion

The productive performances are presented in Table 1.

<table>
<thead>
<tr>
<th>Specification</th>
<th>M</th>
<th>LW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial weight, kg</td>
<td>100.28&lt;sup&gt;NS&lt;/sup&gt;</td>
<td>100.50</td>
</tr>
<tr>
<td>Final live weight, kg</td>
<td>109.36</td>
<td>112.72</td>
</tr>
<tr>
<td>Daily weight gain, g</td>
<td>385.4</td>
<td>527</td>
</tr>
<tr>
<td>Warm yield, %</td>
<td>76.5&lt;sup&gt;*&lt;/sup&gt;</td>
<td>85.4</td>
</tr>
<tr>
<td>Cold yield, %</td>
<td>72.4&lt;sup&gt;*&lt;/sup&gt;</td>
<td>81.3</td>
</tr>
<tr>
<td>Fat thickness, mm</td>
<td>67.8&lt;sup&gt;***&lt;/sup&gt;</td>
<td>35.2</td>
</tr>
</tbody>
</table>

NS: p ≥ 0.05<sup>*</sup>; p ≤ 0.05<sup>***</sup>; p ≤ 0.001

After the experimental period, the final live weight was 109.36 kg at Mangalica pigs and 112.72 kg at Large White pigs. The daily weight gain was 385.4 g and 527 g, respectively, the differences being insignificant (p ≥ 0.05).

In terms of daily weight gain, the results are determined by the physiological particularity of Mangalica breed, which is a late race, the literature data showing that, at neutral temperature, the weight of 140-180 kg is achieved at the age of 12-15 months, ensuring an average daily weight of 450-500 g [3]. Compared with the data from the literature, for cold stress conditions, the daily weight gain decreased with 8.1% at Mangalica and 29.3% at Large White [4]. The exposure to cold temperatures was better tolerated by Mangalica, which decreased average daily gain was less drastic.

The warm yield was 76.5% at Mangalica and 85.4% at Large White; the differences were given by the Mangalica particularities (p ≤ 0.005). Same trend was observed at cold yield, its values being 72.4% and 81.3%, respectively.

The fat thickness was 67.8 mm at Mangalica pigs and 35.2 mm at Large White pigs. Comparative with Large White breed, at Mangalica pigs the fat thickness was significantly higher by 93% (p ≤ 0.05). Compared with the data obtained at neutral temperatures, by exposure to cold temperatures, the fat thickness increased with 65% at Mangalica and 162% at Large White [4].

The data concerning the chemical composition are presented in Table 2.

<table>
<thead>
<tr>
<th>Specification</th>
<th>M</th>
<th>LW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water, %</td>
<td>53.18&lt;sup&gt;*&lt;/sup&gt;</td>
<td>58.21</td>
</tr>
<tr>
<td>Protein, %</td>
<td>21.22&lt;sup&gt;NS&lt;/sup&gt;</td>
<td>20.74</td>
</tr>
<tr>
<td>Fat, %</td>
<td>23.21&lt;sup&gt;***&lt;/sup&gt;</td>
<td>10.69</td>
</tr>
<tr>
<td>Cholesterol, mg/100 g</td>
<td>41.64&lt;sup&gt;***&lt;/sup&gt;</td>
<td>61.24</td>
</tr>
</tbody>
</table>

NS: p ≥ 0.05<sup>*</sup>; p ≤ 0.05<sup>***</sup>; p ≤ 0.001

The water content was 53.18% at Mangalica and 58.21% at Large White. At Mangalica pigs, the water content was lower by 8.6%, the differences being significant (p ≤ 0.05). The lower water content in meat provides greater storage capacity, being recommended to dry salami [5].

At Mangalica, the protein content was 21.22%, with 2.3% greater. The differences were not significant (p ≥ 0.05).

Compared with Large White, at Mangalica pigs the fat content was 23.21%, with 117% higher. The differences were significant (p ≤ 0.05).

The cholesterol content was 41.64% at Mangalica and 61.24% at Large White. The results obtain at Mangalica pigs were lower by 32%, the differences being very significant (p ≤ 0.001).

### 4. Conclusions

Compared with Large White, at Mangalica pigs the fat thickness was 93% higher; the meat’s water
content 8.6% lower, fat content 117% higher and cholesterol 32% lower.

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