Fatty acids profile of intramuscular fat in light and heavy carcass lambs

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Introduction

About 80% of light carcass lambs of dairy sheep breeds are exported from Slovakia. Breeding of specialized meat breeds with heavy carcass lamb production is expanding.

FA composition plays an important role in definition of meat quality.

FA composition affects nutritional value; n-3 PUFA have beneficial effects in human physiology and health (preventing the occurrence of coronary heart diseases, neurological dysfunctions, inflammatory and immune diseases, etc.).

Lack of information on quality of light and heavy carcass lambs, in particular as regards fatty acid profile of meat and fat.

Objectives

To determine differences in nutritional value of intramuscular fat on the basis of fatty acids profile analysis in light and heavy carcass lambs raised in different nutrition conditions.

Material and methods

Biological material

- 40 light carcass lambs (carcass weight to 13 kg):
  - 20 - artificial rearing (LLAR; milk replacer),
  - 20 - traditional rearing (HLTR; mother milk + forage).
- 40 heavy carcass lambs (carcass weight over 13 kg):
  - 20 - pastoral rearing under mothers (HLPR),
  - 20 - traditional rearing in sheepfolds, with using concentrates (HLTR).

The average empty live weight of lambs before killing was in LLAR 17.8 kg, HLTR 17.6 kg, HLPR 29.2 kg and HLTR lambs 32.5 kg and an average age was 63.6, 55.3, 105.0 and 108.9 days, respectively.

Meat samples (Musculus longissimus lumborum et thoracis - MLLT) – intramuscular fat.

Results

Table 1: Effects of type of lambs and sex on fatty acid composition (g/100g FAME) of intramuscular fat.

<table>
<thead>
<tr>
<th>Trait</th>
<th>Type of lambs</th>
<th>Sex of lambs</th>
<th>P</th>
<th>SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LLAR</td>
<td>HLTR</td>
<td>P</td>
<td>SEM</td>
</tr>
<tr>
<td>Fatty acid (C16:0)</td>
<td>3.20</td>
<td>3.10</td>
<td>0.011</td>
<td>0.01</td>
</tr>
<tr>
<td>Fatty acid (C18:2 n-6)</td>
<td>4.20</td>
<td>4.20</td>
<td>0.001</td>
<td>0.00</td>
</tr>
<tr>
<td>Fatty acid (C18:3 n-3)</td>
<td>0.80</td>
<td>0.80</td>
<td>0.001</td>
<td>0.00</td>
</tr>
<tr>
<td>Fatty acid (C20:0)</td>
<td>2.10</td>
<td>2.10</td>
<td>0.001</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Conclusion

Findings based on analyses of fatty acids profile of IMF lambs are as follows:

The highest proportion of CLA, ALA, omega 3 and other health beneficial FA in four analysed groups of lambs were found in HLPR lambs (Tables 1 and 2). HLTR lambs have the highest SFA, the lowest PUFAs/SFA ratio and the highest arachidonic and thrombogenic indexes.

Meat of HLTR lambs fed concentrates is of lower quality than meat of HLPR lambs from pasture rearing.

Meat of LLAR lambs fed milk replacer is of lower quality than meat of HLTR lambs from traditional rearing.

Table 2: Sum of fatty acids of similar type, characteristic ratios of fats and some important indices depending on type of lambs and sex of lambs.

<table>
<thead>
<tr>
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<th>P</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LLAR</td>
<td>HLTR</td>
<td>P</td>
<td>SEM</td>
</tr>
<tr>
<td>Saturated - SFA</td>
<td>44.8</td>
<td>45.6</td>
<td>0.001</td>
<td>0.00</td>
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<tr>
<td>Monounsaturated FA</td>
<td>5.4</td>
<td>5.7</td>
<td>0.001</td>
<td>0.00</td>
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<tr>
<td>Polyunsaturated FA</td>
<td>49.6</td>
<td>48.7</td>
<td>0.001</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Analyzed traits

- Fatty acids profile (totally 69 FAs) – gas chromatography.

Statistical analysis

By means of ANOVA we detected significance of differences among individual FAs or FAs groups in dependence on the type of lambs (LLTR, HLTR, HLPR) and sex of lambs.

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