Quality and chemical composition of longissimus dorsi muscle of Béni-Guil sheep breeding in eastern Morocco

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Introduction: The sheep "Beni Guil" is one of the main breeds of sheep that dominates livestock farming in arid areas of eastern Morocco. Beni Guil's sheep meat is an important protein source for population in this geographical zone and it is very appreciated by consumers. This reputation is still based on informal hedonic tests and currently there is no data about nutritional value and chemical composition of this meat. Thus, this research was conducted for analyzing fatty acid profile (FA) and the identification of essential amino acid content (EAA) of Longissimus dorsi muscle of Beni Guil breed, feed on dry forage in eastern Morocco.

Material and methods

Study zone

Animal Materiel

- 10 longissimus dorsi muscle samples were selected and cut with the help of the agents of the National Association of Sheep and Goats

Samples Preparation

- Slaughtering and Sampling
- Cutting and Trimming of meat
- Freezing, Lyophilization and Gridding

Methods of analysis

- Dry matter : Oven Drying at 105°C.
- Fatty acids (FA) : GC-FID
- Proteins : Kjeldahl method.
- Amino Acids (AA) : HPLC.

Results

Table 1. Physical and chemical characteristics of Longissimus dorsi muscle of Beni Guil breed

<table>
<thead>
<tr>
<th>Parametres</th>
<th>Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total dry matter (%)</td>
<td>25.72±1.10</td>
</tr>
<tr>
<td>Total Proteins (%)</td>
<td>19.43±1.01</td>
</tr>
<tr>
<td>Total Fat (%)</td>
<td>5.14±0.65</td>
</tr>
<tr>
<td>pH</td>
<td>5.79±0.14</td>
</tr>
<tr>
<td>Water holding capacity (%)</td>
<td>22.73±2.31</td>
</tr>
<tr>
<td>Cooking loss (%)</td>
<td>35.87±1.53</td>
</tr>
</tbody>
</table>

Table 2. Sums and ratios of the fatty acid contents of Longissimus dorsi muscle of Beni Guil breed

<table>
<thead>
<tr>
<th>Sums and ratios</th>
<th>Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total e9-3</td>
<td>2.58</td>
</tr>
<tr>
<td>Total e9-6</td>
<td>9.62</td>
</tr>
<tr>
<td>SFAs</td>
<td>49.45</td>
</tr>
<tr>
<td>MUFAs</td>
<td>38.48</td>
</tr>
<tr>
<td>PUFAs</td>
<td>12.40</td>
</tr>
<tr>
<td>TUFAs</td>
<td>50.88</td>
</tr>
<tr>
<td>PUFA/SFAs</td>
<td>0.25</td>
</tr>
<tr>
<td>TFA/SFAs</td>
<td>1.04</td>
</tr>
<tr>
<td>DFA</td>
<td>67.90</td>
</tr>
<tr>
<td>OFA</td>
<td>3.52</td>
</tr>
<tr>
<td>Ratio o6/o3</td>
<td>3.78</td>
</tr>
</tbody>
</table>

Table 3. EAA and nutritional quality of Longissimus dorsi muscle of Beni Guil breed

<table>
<thead>
<tr>
<th>AAE % AAE Prot</th>
<th>LDM</th>
<th>Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cys-Met</td>
<td>2.31</td>
<td>1.7</td>
</tr>
<tr>
<td>His</td>
<td>2.47</td>
<td>1.6</td>
</tr>
<tr>
<td>Ile</td>
<td>3.15</td>
<td>1.3</td>
</tr>
<tr>
<td>Leu</td>
<td>5.11</td>
<td>1.9</td>
</tr>
<tr>
<td>Lys</td>
<td>4.60</td>
<td>1.6</td>
</tr>
<tr>
<td>Phe</td>
<td>3.17</td>
<td>1.9</td>
</tr>
<tr>
<td>Thr</td>
<td>2.64</td>
<td>0.9</td>
</tr>
<tr>
<td>Val</td>
<td>3.07</td>
<td>1.3</td>
</tr>
</tbody>
</table>

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Conclusion: The results showed that 100g of fresh meat contains 25.72% of dry matter, 5.14% of Fat, 19.43% of protein and 0.94% of mineral matter. Fatty acid analysis carried out by GC-FID showed a FA profile with 49.45% SFA, 50.88% UFA. From a nutritional point of view, the meat of the Beni Guil breed has a high biological value with a high biological value (true digestibility CUD = 94%) of essential amino acids (Fig 1 & Table - 3). The meat’s fatty acid profile (Fig 2 & Table-2) shows a relatively high level of PUFAs compared to results reported by Santercole, (2007) and Yousefi, (2012). Thus our results show a higher PUFAs / SFAs ratio compared to the value reported by Diaz in 2003. The observed o6/o3 ratio of 3.78 seems to be ideal according to the agency of food safety “AFSSA-France”(2010), which estimates that this ratio must be < 5. But according to Lorigeri & al (1999), the ideal ratio is: 2.1 ≤ o6/o3 ≤ 5.1. In addition, lowest o6/o3 ratios reduce the occurrence of some health disorders such as cardiovascular diseases, obesity and certain cancers Simopoulos (2002). To sum up, this preliminary characterization of the meat’s nutritional quality of Beni-guil’s breed shows high nutritional values from a protein and lipid profile point of view. Thus this study brings nutritional information that could be considered as an add value that will contribute to the valorization and the marketing of Beni Guil sheep meat.

References

- Yousefi, A.R. 2012. Comparison of the meat quality and fatty acid composition of traditional fat-tailed (Chall) and tailed (Zel) Iranian sheep breeds. Meat Science.[124] Consequently, the consumption of this meat will satisfy the human nutritional needs in essential amino acids (Fig 1 & Table - 3). The meat’s fatty acid profile showed a relatively high level of PUFAs compared to results reported by Santercole, (2007) and Yousefi, (2012). Thus our results show a higher PUFAs / SFAs ratio compared to the value reported by Diaz in 2003. The observed o6/o3 ratio of 3.78 seems to be ideal according to the agency of food safety “AFSSA-France”(2010), which estimates that this ratio must be < 5. But according to Lorigeri & al (1999), the ideal ratio is: 2.1 ≤ o6/o3 ≤ 5.1. In addition, lowest o6/o3 ratios reduce the occurrence of some health disorders such as cardiovascular diseases, obesity and certain cancers Simopoulos (2002). To sum up, this preliminary characterization of the meat’s nutritional quality of Beni-guil’s breed shows high nutritional values from a protein and lipid profile point of view. Thus this study brings nutritional information that could be considered as an add value that will contribute to the valorization and the marketing of Beni Guil sheep meat.

Reference

- V. Simopoulos. 2007. Total Lipids of Sarda Sheep Meat that Include the Fatty Acid and Alkenyl Composition and the CLA and Trans-18:1 Isomers. Lipids.