Sustainable meat and milk production from grasslands

Edited by
B. Horan
D. Hennessy
M. O’Donovan
E. Kennedy
B. McCarthy
J.A. Finn
B. O’Brien

Volume 23
Grassland Science in Europe
Sustainable meat and milk production from grasslands

Proceedings of the 27th General Meeting of the European Grassland Federation
Cork, Ireland
17-21 June 2018

Edited by
B. Horan
D. Hennessy
M. O’Donovan
E. Kennedy
B. McCarthy
J.A. Finn
B. O’Brien

Agriculture and Food Development Authority
How four typical Swedish production systems for lambs affect sensory attributes of the meat


1Dept. of Animal Environment and Health, Swedish University of Agricultural Sciences, Skara, Sweden; 2Food and Meal Science, Kristianstad University, Kristianstad, Sweden; 3Dept. of Food Science, University of Copenhagen, Copenhagen, Denmark

Abstract

The aim of this study was to evaluate the effect of the four most typical production systems for Swedish lamb on sensory attributes of meat, including appearance, texture, taste and flavour using an analytical panel. The experiment included four production treatments for weaned intact male lambs: (1) indoor fed with grass and clover silage ad libitum and 0.8 kg concentrate daily per lamb; (2) grazing on cultivated pasture with or without 0.3 kg concentrate supplementation daily per lamb; and (4) grazing on semi natural pasture; eight lambs per production treatment were used. Feed rations, pasture height and live weight of the lambs were recorded. At slaughter, live weight, carcass conformation, fatness, pH and temperature decline in muscle during 24 hours after slaughter were registered. Sensory and technological meat quality parameters were tested in cooked samples of M. longissimus dorsi. Meat colour was not affected by treatment. Most sensor attributes were unaffected by production system but for ‘hay odour’ and ‘resistance to cutting’, differences between the systems were manifested.

Keywords: live weight gain, pH-value, temperature, sensory attributes, texture, colour

Introduction

It is well known that meat quality is a complex subject that includes a multitude of parameters. These parameters are, in turn, affected by many factors e.g. the production system with different feeding strategies, breeds and sexes (Tölndå, 2017). In 2016, the Swedish sheep and lamb meat production accounted for only 28% of the total Swedish consumption (Jordbruksverket, 2017). To satisfy the consumers’ demand of lamb meat, with a consumption of 1.8 kg lamb meat per person annually, the import of sheep and lamb meat increased substantially both in 2015 and 2016 (Jordbruksverket, 2017). An increasing demand of high quality lamb meat produced in Sweden results in a need to know how lamb should be reared under Swedish conditions, with the goal to obtain a high and consistent eating quality. Consumers usually determine meat quality by its eating quality, where tenderness, juiciness and flavour are the most important elements (Mclvneen and Buchanan, 2001). The eating quality of today’s Swedish lamb meat varies, which might be due to, for example, the use of different production systems, different breeds, slaughter ages and weights. It has been shown that different diets could affect the meat quality of lamb. Different feeding strategies could be grazing contra grain feeding, which could affect the flavour of the meat, for example (Watkins et al., 2013). The aim of this study was to evaluate the impact of different production models on meat quality attributes.

Materials and methods

In total, 32 crossbred intact ram lambs (Dorset × Fine Wool; 75:25) were included in the study. Groups of eight animals were assigned to one of four production treatments for weaned intact male lambs; Group 1 on indoor feeding, Groups 2 and 3 on cultivated pasture with or without supplemented concentrate, respectively, and Group 4 on semi-natural pasture. All animals in the study had access to water, salt and minerals ad libitum. Group 1 was offered a total mixed ration consisting of grass and clover silage ad libitum and a constant amount of 0.8 kg concentrate per lamb and day. Groups 2 and 3 grazed two
Table 2. Sensory attributes from lambs reared in the different production models.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
<th>SEM²</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pinkness</td>
<td>46&lt;sup&gt;a&lt;/sup&gt;</td>
<td>47</td>
<td>45</td>
<td>46</td>
<td>2.34</td>
<td>NS</td>
</tr>
<tr>
<td>Fibre structure</td>
<td>37</td>
<td>35</td>
<td>35</td>
<td>33</td>
<td>1.57</td>
<td>NS</td>
</tr>
<tr>
<td>Total lamb meat odour</td>
<td>48</td>
<td>48</td>
<td>49</td>
<td>49</td>
<td>1.07</td>
<td>NS</td>
</tr>
<tr>
<td>Acidic odour</td>
<td>32&lt;sup&gt;a&lt;/sup&gt;</td>
<td>30&lt;sup&gt;b&lt;/sup&gt;</td>
<td>31</td>
<td>33</td>
<td>0.97</td>
<td>NS</td>
</tr>
<tr>
<td>Hay odour</td>
<td>30&lt;sup&gt;a&lt;/sup&gt;</td>
<td>29&lt;sup&gt;a&lt;/sup&gt;</td>
<td>29&lt;sup&gt;a&lt;/sup&gt;</td>
<td>32&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.07</td>
<td>0.051</td>
</tr>
<tr>
<td>Resistance to cutting</td>
<td>37&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>43&lt;sup&gt;b&lt;/sup&gt;</td>
<td>33&lt;sup&gt;b&lt;/sup&gt;</td>
<td>39&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>1.91</td>
<td>0.017</td>
</tr>
<tr>
<td>Softness</td>
<td>55</td>
<td>50</td>
<td>55</td>
<td>54</td>
<td>1.90</td>
<td>NS</td>
</tr>
<tr>
<td>Tenderness</td>
<td>60</td>
<td>52</td>
<td>65</td>
<td>61</td>
<td>3.47</td>
<td>NS</td>
</tr>
<tr>
<td>Crumbliness</td>
<td>45</td>
<td>41</td>
<td>49</td>
<td>50</td>
<td>3.31</td>
<td>NS</td>
</tr>
<tr>
<td>Total lamb meat flavour</td>
<td>54</td>
<td>53</td>
<td>54</td>
<td>56</td>
<td>1.16</td>
<td>NS</td>
</tr>
<tr>
<td>Meat flavour</td>
<td>38</td>
<td>42</td>
<td>41</td>
<td>43</td>
<td>1.57</td>
<td>NS</td>
</tr>
<tr>
<td>Leafy flavour</td>
<td>31</td>
<td>33</td>
<td>33</td>
<td>35</td>
<td>2.43</td>
<td>NS</td>
</tr>
<tr>
<td>Oiliness</td>
<td>34</td>
<td>35</td>
<td>34</td>
<td>36</td>
<td>1.16</td>
<td>NS</td>
</tr>
</tbody>
</table>

<sup>1</sup> Group 1 on indoor feeding, group 2 on cultivated pasture with 0.3 kg supplemented concentrate per lamb daily, group 3 on only cultivated pasture and group 4 on only semi natural pasture.

<sup>2</sup> SEM = standard error of the mean.

<sup>3</sup> Means are between 0-100.

<sup>4</sup> Mean values with different superscripts in the same row differ significantly (P < 0.05). NS = non-significant (P > 0.05).

**Conclusion**

The results from this study indicate that intact ram lambs reared to four different production treatments (indoor, cultivated pasture with or without supplemented concentrate or semi natural pasture), covering the Swedish lamb production, did not seem to affect technological meat quality in terms of final pH and temperature of lamb carcases. Meat colour was not affected by treatment. Sensory parameters that were affected by production system were 'hay odour' and 'resistance to cutting'. With that in mind, it seems that the different production systems did not have an overall effect on eating quality such as tenderness and flavour that are the most important from a consumer perspective. From this study it was also found that in general the variation between animals was higher than between different rearing systems.

**References**


