Effect of commercial line and housing condition on carcass, meat and sensory quality of beef young bulls

M. Vitale¹, E. Mainau¹, M. Gil¹, J. Pallisera¹ P. Rodriguez¹, A. Dalmau¹, G. De Planell², M.A. Oliver¹ and A. Velarde¹

¹IRTA-Food Technology, 17121 Monells, Spain
²Grup Viñas, 08500 Vic, Spain
Beef production in Spain is based on the production of young bulls (≤12 m) and bulls in intensive or semi-intensive systems.

Young bulls production is mostly based on Holstein or Holstein crossbreed with Limousine, Charolaise or Simmental.

This wide variety of young crossbreed leads to a meat production systems that relies on the finishing phase to improve product quality.

Eurostat Data 2013: production of meat, % of share EU28 total
Why the housing condition?

✓ **Intrinsic** (age, muscle, carcass weight and fatness) or **extrinsic** (environmental conditions and pm tech factors) factors can affect meat quality (Dunne et al., 2008).

✓ One of the least understood is the “environment”.

✓ Previous works focused on comparison between confined or restrained animal in similar conditions. **Little info on flooring conditions effect on carcass and meat quality.**
So...what do we know?

- Benefits of providing straw are mainly related to floor comfort (SCAHAW, 2001).

- Preference of cows depends on the type of lying mat (Sonck et al., 2009) and on the quantity of straw (Jensen et al., 1988)....but can be  

- When given a choice, cattle displayed a strong preference for straw bedding over slatted floor when other floor types were available (Lowe et al., 2003).

- Studies suggest little effect of type of indoor housing on meat quality (Dunne et al., 2008; Gottardo et al., 2003).
Objective

✓ To evaluate the effect of the commercial line and the housing conditions on carcass characteristics, meat and sensory quality of beef young bulls.

1. The results presented are a part of a larger study.
2. Trial carried out under commercial conditions.
3. Only carcass, meat and sensory results discussed.
Commercial lines (CL) and treatments (TRT)

1\textsuperscript{st} PHASE according to PS

\begin{itemize}
  \item \textbf{PASTURE YOUNG BULLS (PYB):} fed on pasture until 8m finished in intensive conditions
  \item \textbf{INDOOR YOUNG BULLS (IYB):} fed with hay and concentrate after weaning
\end{itemize}

\begin{itemize}
  \item \(n=10\)
  \item \(n=10\)
  \item \(n=17\)
  \item \(n=19\)
\end{itemize}

FINISHED WITH A CONCENTRATE-BASED DIET

\begin{itemize}
  \item Space available: about 6m\(^2\)/animal
  \item No outside access during finishing period.
\end{itemize}

\begin{itemize}
  \item \textbf{Age}
  \item \(11.71 \pm 0.26 \text{ m}\)
\end{itemize}
Material and methods

1. Slaughter weight according to the **company criteria**.

2. At slaughterhouse: carcass weight (kg), conformation and fat cover scores (SEUROP).

3. At 48h pm: final pH and instrumental colour.

On previously stored samples:

4. **Instrumental texture (WBSF)**: 0d and 7d vacuum aged.

5. %**IMF**: FoodScan™ on 48h pm.

6. **Sensory analysis**: trained panel, 7d vacuum aged samples, Tcore 60ºC.
## Results: Carcass Quality

<table>
<thead>
<tr>
<th></th>
<th>PYB (n=20)</th>
<th>IYB (n=36)</th>
<th>CL</th>
<th>TRT</th>
<th>CL*TRT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carcass wgt</strong> (Kg)</td>
<td>369.3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>390.4&lt;sup&gt;a&lt;/sup&gt;</td>
<td>286.4&lt;sup&gt;b&lt;/sup&gt;</td>
<td>295.1&lt;sup&gt;b&lt;/sup&gt;</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td><strong>Conformation</strong></td>
<td>U-b</td>
<td>U&lt;sup&gt;a&lt;/sup&gt;</td>
<td>R+c</td>
<td>R+c</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td><strong>Fatness score</strong></td>
<td>2-d</td>
<td>2+c</td>
<td>3-b</td>
<td>3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

a, b, c: values in the same row with unlike letters means different for P<0.05

- ✓ Different carcass weight, conformation and fatness score due to production system.
- ✓ Slat housed animals presented higher fatness.
- ✓ No differences for final pH.
## Results: %IMF and Instrumental Colour

<table>
<thead>
<tr>
<th></th>
<th>PYB (n=20)</th>
<th>IYB (n=36)</th>
<th>SE</th>
<th>CL</th>
<th>TRT</th>
<th>CL* TRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>% IMF (LL)</td>
<td>1.66b</td>
<td>1.69b</td>
<td>2.08b</td>
<td>2.54a</td>
<td>0.607</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>L* (CIE Lab)</td>
<td>33.4b</td>
<td>36.3a</td>
<td>34.0b</td>
<td>36.1a</td>
<td>1.798</td>
<td>NS</td>
</tr>
<tr>
<td>a* (CIE Lab)</td>
<td>16.9</td>
<td>16.8</td>
<td>17.4</td>
<td>17.2</td>
<td>1.366</td>
<td>NS</td>
</tr>
<tr>
<td>b* (CIE Lab)</td>
<td>1.5c</td>
<td>2.3ab</td>
<td>2.1b</td>
<td>2.7a</td>
<td>0.986</td>
<td>0.071</td>
</tr>
</tbody>
</table>

a, b, c: values in the same row with unlike letters means different for P<0.05

- ✓ CL clearly affected % of IMF content.
- ✓ Young bulls on slat presented higher L* and b*.
- ✓ No CL effect on instrumental colour.
Results: Instrumental Texture
(WBSF, kgf/cm2)

- No effect of CL on SF at 0d (P=0.075).
- Slatted floor = more tender meat? (P<0.01).
- Interaction CL x TRT (P<0.01).

a, b, c: column of the same colour with unlike letters means different for P<0.05
Results: Sensory Analysis by trained panel

**For sensory analysis a 10cm semi-structured scale was used. All samples were evaluated by a 6-members trained panel. Samples were cooked until reach 60ºC of core temperature.**

- CL did not affected sensory characteristics.
- Housing system affected meat hardness and chewiness.
- Meat acceptability was higher for slat housed young bulls.
Conclusions

✓ Commercial line has a predominant effect on carcass quality and %IMF (so...industry decisions are crucial!!!).

✓ The interactions between CL and indoor housing system during finishing period can affect both instrumental and sensory quality of meat.

✓ On a sensory quality level, slatted-floor housing can help to produce more tender and less chewy meat than straw-bedded housing.
Thank you for your attention!

Authors gratefully acknowledge the company “Grup Viñas” for providing the animals, lambs and the abattoir used during the trial.