The effect of routine practices on the behaviour of beef cows according to their feeding management
K. Orquera\textsuperscript{1}, I. Ortigues-Marty\textsuperscript{2}, N. Thollon\textsuperscript{3}, I. Casasús\textsuperscript{1}, B. Sepchat\textsuperscript{3} and A. De La Torre\textsuperscript{2}
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Animal behaviour can be modified in response to stimuli like weather conditions, social structure and farm management. The aim of this study was to determine if routine management activities such as weighing affected cow daily behaviour. Twelve 4 year-old lactating Charolais beef cows received a diet that met 100\% of their nutritional requirements during lactation. From the second month post-calving, cows underwent feed restriction (4 to 10 d), with feed allowance reduced to meet 50\% of their energy requirements (Challenge periods, CH), and then returned to full feed (Recovery periods, REC). This was repeated 3 times at monthly intervals. Cows were equipped with Medria\textsuperscript{®} Axel loggers which recorded physical activity continuously during the study at 5-min intervals, providing the most dominant behaviour among five activities (ingestion, rumination, rest, over-activity and other). Cows were moved from their pen to a scale and weighed at 13:30 on some days (BW, n=17 d) but not on others (W0, n=17 d), equally distributed between CH and REC periods. The time devoted to the different daily activities was analysed with a mixed model (R Core Team, 2019) according to weighing (W0 vs BW) and feeding management (CH vs REC). Feeding did not influence ingestion time but affected both rumination (308 vs 473 min/d in CH vs REC, P<0.001) and rest (666 vs 402 min/d in CH vs REC, P<0.001). Only rumination time was longer in W0 than in BW days (406 vs 375 min/d, P<0.05), implying that weighing around midday interfered mostly with the time spent by cows ruminating. The effects of both factors on other and over-activity were less evident. These results should be considered in order to schedule routine management to avoid and/or minimise interference with cattle natural behaviour patterns.

Session 08

The effect of routine practices on the behaviour of beef cows according to their feeding management

Session 08 Theatre 2

Pasture feeding effects on α-tocopherol content and lipid oxidation of beef from late maturing bulls
S. Siphambili\textsuperscript{1,2}, A.P. Moloney\textsuperscript{1}, E.G. O’Riordan\textsuperscript{1}, M. McGee\textsuperscript{1} and F.J. Monahan\textsuperscript{2}
\textsuperscript{1}Teagasc, Animal & Grassland Research and Innovation Centre, Grange, Dunsany, Co. Meath, Ireland, \textsuperscript{2}University College Dublin, School of Agriculture and Food Science, Belfield, Dublin 4, Ireland; sis39@aber.ac.uk

The finishing of late-maturing bulls at pasture offers an opportunity to increase the economic efficiency of beef production. Compared to steers bulls have faster growth rates, higher feed efficiency and higher dressing out percentages, whilst grass is the cheapest feed resource available. The purpose of the study was to investigate the effects of the change from concentrate finishing to pasture finishing on fatty acid profile, α-tocopherol concentration and lipid oxidation of beef from late maturing bulls. 48 Charolais or Limousin sired bulls were assigned to one of four production systems: pasture only (P), pasture plus 25\% dietary dry matter(DM) intake as barley-based concentrate (PC25), pasture plus 50\% dietary DM intake as barley based concentrate (PC50) or a barley-based concentrate (C). Following slaughter at 19 months of age, 14 day aged \textit{M. Longissimus thoracis et lumborum} samples were subjected to simulated retail display (4 \textdegree C,1000 lux for 12 h out of 24 h) for 3, 7, 10 and 14 days in modified atmosphere packs (MAP, O\textsubscript{2}:CO\textsubscript{2}: 80:20). There were higher muscle concentrations of C18:3n-3 (P<0.001), C20:5n-3 (P<0.001), C22:6n-3 (P<0.01), total n-3 polyunsaturated fatty acids (PUFA) (P<0.001) and high highly peroxidisable polyunsaturated fatty acids (HP-PUFA) (P<0.01) in P, PC25 and PC50 compared to C bulls, respectively, but total PUFA content did not differ. There was higher concentration of α-tocopherol (P<0.001) in muscle from P compared to C bulls. α-Tocopherol decreased significantly (P<0.001) in all samples by day 14. Lipid oxidation was higher (P<0.01) in muscle from C compared to P bulls on day 10 and day 14. Finishing bulls on pasture increases the HP-PUFA concentration in muscle from late-maturing bulls but this does not result in increased lipid oxidation due to higher α-tocopherol concentration compared to muscle from concentrate finished bulls. In conclusion, finishing bulls on pasture does not reduce the shelf life of beef compared to beef from concentrate finished bulls.

Session 08 Theatre 3

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Session 08. Physiological basis of PLF technologies to infer on animal health, welfare and production efficiency in cattle

Date: Tuesday 1 December 2020; 13.45 – 17.30
Chair: Montanholi

Theatre Session 08

Dynamic modelling for nutritional management of ruminants in the face of climate change
H.C. Dougherty, M. Evered, J.W. Oltjen and V.H. Oddy

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K. Orquera, I. Ortigues-Marti, N. Thollon, I. Casasús, B. Sepehat and A. De La Torre

Pasture feeding effects on α-tocopherol content and lipid oxidation of beef from late maturing bulls
S. Siphambili, A.P. Moloney, E.G. O’Riordan, M. McGee and F.J. Monahan

Impact of animal handling on the stress status of Rubia Gallega beef cattle: study of apoptosis
C. Fuente-Garcia, N. Aldai, E. Sentandreu, D. Franco and M.A. Sentandreu

PhenoBR: a model to characterise variations of body reserves in meat ewes
T. Mocé, D. Hazard, F. Carrière, S. Douls, D. Fouliquié, E. González-Garcia and M. Taghipoor

HappyMoo project – assessing animal welfare towards milk composition

Estimating energy balance of dairy cows with the GreenFeed system and milk mid-infrared spectroscopy
A. Guinguina and P. Huhtanen

Effects of electrochemically activated drinking water on bovine milk composition
E. Vargas-Bello-Pérez, R. Dhakal and H.H. Hansen

Cow activity measurements can be used to define new fertility traits for use in genetic evaluation
B. Heringstad, K.B. Wethal and K.I. Dragset

Effects of reproductive management on genetic evaluations of fertility traits in dairy cattle

Relationships of NMR-metabolite profiles with performance, milk and health traits in the bovine
D. Rippel, W. Xu, A. Kenez and Y. Montanholi

Poster Session 8

A validated ELISA method for detecting differences in feather corticosterone between turkey lines

Effects of feeding behaviour and physiological stage on the metabolic profile of the local goats
H. Harrabi, M. Abid, M. Fatnassi, S. Bessalah and M. Hammadi

The Effect of colostrum lactose content on growth performance of piglets
M. Sz Blvdanker-Nędza, A. Mucha and M. Tyra

Fatty acids profile of the reproductive rabbit female: preliminary results

Assessing feed efficiency in grazing dairy cows through infrared thermography
T. Haak, A. Münger, K.H. Südekum and F. Schori
The effect of routine practices on the behaviour of beef cows according to their feeding management

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  \begin{itemize}
    \item \textsuperscript{1} CITA- Aragón - IA2, Zaragoza, Spain
    \item \textsuperscript{2, 3} INRAE, Université Clermont-Auvergne, Vet-AgroSup, Saint-Genès-Champarnelle, France
  \end{itemize}

**INTRODUCTION**

**ROBUSTNESS**

Conversion of resources into products

Changing environments
AIM

Components of efficiency and resilience of beef cows

- Effect of routine weighing of beef cows on their behaviour patterns
- Does this effect depend on the feeding level?
MATERIALS AND METHODS

- Laqueuille experimental farm
- Twelve 4 year-old Charolais beef cows
- Diets
  - composition:
    - hay (105 g CP/kg DM, 4.78 MJ NE lactation/kg DM)
    - concentrate (203 g CP/kg DM, 6.92 MJ NE lactation/kg DM)
  - formulated with INRAtion software (cow weight, milk yield)
  - offered individually at 08:00, in individual troughs with automatic gates

Five nutritional challenges from the second month of lactation

<table>
<thead>
<tr>
<th>Period 1</th>
<th>Period 2</th>
<th>Period 3</th>
<th>Period 4</th>
<th>Period 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>n° days</td>
<td>Ch</td>
<td>Rec</td>
<td>Ch</td>
<td>Rec</td>
</tr>
<tr>
<td>4 d</td>
<td>17 d</td>
<td>10 d</td>
<td>18 d</td>
<td>4 d</td>
</tr>
</tbody>
</table>

FEEDING MANAGEMENT

- Challenge (50% reqs.) vs. Recovery (100% reqs.)

WEIGHING MANAGEMENT

- cows moved from their pen and weighed at 13:30 on some days (BW) but not on others (W0)
### MATERIALS AND METHODS

AXEL accelerometer sensors and data logger

#### 5 activities

- Ingestion
- Rumination
- Rest
- Over-activity
- Other activities

- **Statistical analyses:**
  - Linear mixed models
  - Daily time dedicated to each activity
  - \( n = 34 \) days
  - Fixed effects:
    - Feeding management -> Challenge vs. Recovery
    - Weighing management -> BW vs. W0
    - Period -> 2, 4, 5
  - Random effect: cow

### RESULTS

#### Daily activity budget

- **Ingestion**
  - 134 mins
  - 9%
- **Rumination**
  - 419 mins
  - 29%
- **Over_activity**
  - 118 mins
  - 8%
- **Other_activity**
  - 264 mins
  - 19%
- **Rest**
  - 505 mins
  - 35%
**Ingestion, mins/d**

- Shorter ingestion time in BW than W0 days during Challenge but not during Recovery

**Rumination, mins/d**

- Shorter rumination time in BW than W0 days during Challenge but not during Recovery
Moving the cows from their pens to the scale and back, had a clear effect both on intake and ruminination when feed was restricted to 50% but not when the diet met 100% of requirements. During the CH phase, on these BW days cows seemed to speed up both eating and ruminating, as compared to W0 days.

**Rest, mins/d**

- Longer resting time in BW than W0 days during Challenge but not during Recovery

![](chart.png)
Over-activity, mins/d

- **Feeding management**: Shorter in Challenge (93 min) than Recovery (135 min): P<0.001
- **Weighing management**: Tended to be longer in BW days (121 min) than W0 days (107 min): P<0.10

Other activities, mins/d

- **Feeding management**: Longer time dedicated to other activities in BW than W0 days during Challenge but not during Recovery

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*NS*
On BW days during the CH phases, the time saved from faster eating and rumination was spent in longer resting and other activities, as compared to days W0.

CONCLUSIONS

Weighing around midday interfered mostly with the time spent by cows eating, ruminating and resting, but only when feed intake was restricted.

The effects of both factors on over-activity and other activities were less evident.

These findings should be taken into account in order to schedule routine management to avoid and/or minimize interference with cattle natural behaviour patterns.
Thanks for your attention