ESTIMATING PASTORAL GRASS INTAKE BY USE OF ACCELEROMETERS

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1. My background

2. Why do we need more detailed knowledge of grass intake on pasture

3. What methods have been used to calibrate?

4. What sensors are on the marked that could be used?
ATTACHMENT OF THE SENSORS
SOME RESULTS CHECKING GRAZING TIME ESTIMATION

Cow 1934 ID 5 - Day 15

Visual observations: Missing (V,na), Lying (V,LY), Other (V,OT), Grazing (V,GR);
Activity classified from Acc: Cor. Grazing (A,GRc), Raw Grazing (A,GR), Cor. non-grazing (A,GRO), Missing (A,na)

A,na
A,GRO
A,GR
A,GRe
V,GR
V,OT
V,LY
V,na

% A,na = 1.43
% V,LY = 48.15
% V,GR = 34.57
% A,GR = 43.6
% OK GR = 84.75
% OK no GR = 74.33
FARM DATA 2011
IS GRAZING TIME ENOUGH

› We can say something about their eating behaviour
› We can identify individual cow specificity and possible abnormality
› We can identify if the pasture is offering too little

However,
CORRELATION WITH GRASS INTAKE IS NOT VERY GOOD

Grass intake relative to total

Relative grazing time

Intake~30

alpha = 35.9
beta = 0.68
cor = 0.555
p = 0.02082
## MANUALLY COUNTED BITES

<table>
<thead>
<tr>
<th>Season</th>
<th>Nb of periods (Nb of cows)</th>
<th>Period length, sec</th>
<th>Fz bites/min</th>
<th>Cow effect</th>
<th>Trial effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trial 1</td>
<td>Trial 2</td>
<td>Trial 1</td>
<td>Trial 2</td>
<td>Trial 1</td>
</tr>
<tr>
<td>spr09</td>
<td>142 (10)</td>
<td>147 (10)</td>
<td>145 ± 26</td>
<td>143 ± 25</td>
<td>52 ± 10</td>
</tr>
<tr>
<td>aut09</td>
<td>27 (10)</td>
<td>48 (10)</td>
<td>95 ± 11</td>
<td>98 ± 12</td>
<td>60 ± 9</td>
</tr>
<tr>
<td>aut10</td>
<td>66 (5)</td>
<td>21 (2)</td>
<td>139 ± 9</td>
<td>141 ± 12</td>
<td>58 ± 10</td>
</tr>
</tbody>
</table>

In order to try and supply extra information
INCLUDING BITES WE ARE FINDING GOOD CORRELATIONS

D1 min graz 30

D1 bites 30

R² = 0.8645

R² = 0.9642
MODELLING TO FIND ACCURACY
ACCELEROMETER DATA 16 HZ. SHAPE MATCHING

Section of sensor data for dataset # 2. manual bite markings as vertical lines
DOES BF ESTIMATE GRAZING

Grazing correspondence with increased threshold for bites per second

Figure 7 Evaluation of measured bite frequency correspondence with IceTag grazing annotations, based on dataset number 2 with correlation threshold at 0.65
THRESHOLD VALUE FOR BITE MOVEMENTS

when we measure more than 25 bites per minute we can be sure that 95% of the cows are grazing according to the IceTag annotations.

We tried to make a control with IGER jaw movement sensors. Program GRAZE gives annotations for Bite, chew and unknown.
Automatic = accelerometer modelling
Bite frequency, first 24 hours. Horizontal line indicates a reasonable bite frequency vs grazing threshold.