AUTOPESEE,
a French automatic weighing scale developed
for the beef cattle performance recording

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Krakow, 10 June 2015
Agenda

- Introduction and context
- Development of the weighing scale
- Demonstration
- Conclusion
Introduction and context 1/3

France, a country of beef performance recording!

<table>
<thead>
<tr>
<th>Campaign of birth (from August 1st, n-1 to July 31st, n)</th>
<th>2011</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Animals</td>
<td>Herds</td>
</tr>
<tr>
<td>Females</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AW04m</td>
<td>203,767</td>
<td>8,786</td>
</tr>
<tr>
<td>AW07m</td>
<td>193,257</td>
<td>8,478</td>
</tr>
<tr>
<td>AW12m</td>
<td>62,869</td>
<td>4,316</td>
</tr>
<tr>
<td>AW18m</td>
<td>36,445</td>
<td>2,202</td>
</tr>
<tr>
<td>AW24m</td>
<td>25,082</td>
<td>1,595</td>
</tr>
<tr>
<td>Males</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AW04m</td>
<td>204,764</td>
<td>8,847</td>
</tr>
<tr>
<td>AW07m</td>
<td>189,783</td>
<td>8,518</td>
</tr>
<tr>
<td>AW12m</td>
<td>33,358</td>
<td>3,172</td>
</tr>
<tr>
<td>AW18m</td>
<td>4,567</td>
<td>878</td>
</tr>
<tr>
<td>AW24m</td>
<td>202</td>
<td>120</td>
</tr>
</tbody>
</table>
Introduction and context 2/3

Specific constraints of the weighing in field

- Increasing of the size of the herds
- Several groups of animals in one herd
- Distance of the plots of land
- Stress of the animals when weighed
- Less manipulations to prevent accidents
Introduction and context 3/3

⇒ The French national beef recording organisation (FCEL), 3 local beef cattle performance recording organisations and the French Livestock Institute (idele) decided to develop an automatic weighing scale thanks to Maréchalle-Pesage (manufacturer).

Aims:

1- To develop the performance recording in France and the genetic schemes

2- To improve the exhaustiveness of the data

3- To improve the breeders monitoring in their herds
Development of the weighing scale: 2 steps

Step 1
Electronic platform with an electronic indicator
TRU-TEST + RFID + corridor

Step 2
Prototypes of the autonomous weighing scale
PM 6000 Liberty
Development of the weighing scale: material and method

Day 1: First reference weighing and installation

End of day 1 to begin of day 5 (4 days): experiment outdoor or indoor (several weights registered)

Day 5: Second reference weighing and data recovery

Data analysis: comparison between the reference weights and the validated weights (correlation, bias...)

Outdoor: field
Indoor: resting area of cows

Weighing scale

Outdoor: feed station for the calves
Indoor: calf shed

idele.fr
Development of the weighing scale: global results

**Step 1:**
- 5 experiments
- Problems with RFID (reading of animals)
- Sometimes more than one animal in the weighing scale or less than one! → high variation of the weight

**Step 2:**
- 6 experiments with 4 prototypes of the PM 6000 + final draft
- Algorithm to validate the weights: algorithm using some reference table for every breeds…
## Development of the weighing scale: detailed results (step 2)

<table>
<thead>
<tr>
<th>Date</th>
<th>Breed</th>
<th>where?</th>
<th>Nb. of calves</th>
<th>% of calves with validated weights</th>
<th>Correlation reference weights / validated weights</th>
<th>Bias</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr-12</td>
<td>Blonde d'aquitaine</td>
<td>Indoor</td>
<td>27</td>
<td>Not performed</td>
<td></td>
<td></td>
<td>First prototype of PM 6000</td>
</tr>
<tr>
<td>Aug-12</td>
<td>Blonde d'aquitaine</td>
<td>outdoor</td>
<td>25</td>
<td>68%</td>
<td>0,98</td>
<td>+8,4 kg</td>
<td>Prototype PM 6000 n° 2</td>
</tr>
<tr>
<td>Mar-13</td>
<td>Maine Anjou</td>
<td>outdoor</td>
<td>18</td>
<td>100%</td>
<td>0,996</td>
<td>-15 kg (-3,16 %)</td>
<td>Prototype PM 600 n° 3 - Problem with the gate - Elaboration of the algorithm</td>
</tr>
<tr>
<td>Mar-13</td>
<td>Salers</td>
<td>outdoor</td>
<td>12</td>
<td>100%</td>
<td></td>
<td>-6 kg (+2,25 %)</td>
<td></td>
</tr>
<tr>
<td>Jul-13</td>
<td>Blonde d'aquitaine</td>
<td>outdoor</td>
<td>22</td>
<td>59%</td>
<td>0,998</td>
<td>-1,27 kg (-0,45%)</td>
<td>Prototype PM 600 n°4 - Problem with the antenna</td>
</tr>
<tr>
<td>May-14</td>
<td>Maine Anjou</td>
<td>outdoor</td>
<td>23</td>
<td>100%</td>
<td>0,991</td>
<td>-1,77 kg (-0,59%)</td>
<td>Final draft of the PM 6000</td>
</tr>
</tbody>
</table>
Development of the weighing scale: results in 2013 (step 2)

Comparison between the reference weights and the validated weights produced by the algorithm: 163 weights and 42 calves, $r^2=0.998$
Demonstration
Conclusion

Validated for the beef performance recording in France

An automatic weighing (no human support)

A weighing of a moving animal

An autonomous system (low need of energy)

A need of an electronic identification
Conclusion

Recommendations:

- Outdoor: need of a feed station for the calves, at least 4 days of registration, small plots, the calves need to stay a few days in the plot before weighed
- Indoor: at least 2 days of registration, the weighing scale should be between the resting area and the calf shed

2 main uses:

- Automatic = no human support, several weights per animal
- Classic = used with a corridor, someone has to check the weighing, one weight per animal
Thank you for your attention