Technology and progression in ruminant livestock systems

Prysor Williams
Bangor University
The non-ruminant sector: where are we at?

- Modern-day pig and poultry production
- Small number of companies
- Highly efficient industry, much investment in R & D
The ruminant sector: where are we at?

• Big diversity across many fronts
The ruminant sector: where are we at?

• Big diversity across many fronts
The ruminant sector: where are we at?

• Big diversity across many fronts
• Sheep sector the most low-tech of all livestock sectors
  – “Dog and stick”, very much rooted in tradition
  – This is part of its appeal
  – Very important sector in terms of land use
The sheep sector: particularly challenging?

• Sheep sector is faced with multiple challenges
  – “The B-word” poses particular threats
  – Very fragmented industry, with thousands of small producers
    • Though social value of this is immeasurable
  – Average age of main decision-maker is high
The sheep sector: particularly challenging?

• Sheep sector is faced with multiple challenges
  – Costs of technology
  – Poor/er market returns has held back investment
  – Benefits not as immediately visible compared to other sectors
  – Can’t change the landscape or the climate
“New” pressures

- Livestock agriculture often reported as a significant source of environmental impact

Giving up beef will reduce carbon footprint more than cars, says expert

Study shows red meat dwarfs others for environmental impact, using 28 times more land and 11 times water for pork or chicken.
WHAT TO EAT IN JANUARY
The sheep sector: particularly challenging?

• Technology is key to IFM

• ...though the concept of IFM is less familiar to the sector
The sheep sector: getting it on board

• Many of the challenges could be the instigators of change
• Market forces will reduce labour availability
  – Bigger units
• Environmental and business pressures will drive efficiency
• New entrants = new ideas
• Generational change will embrace technology and change
The sheep sector: getting it on board

• The good news
  – Rapidly-evolving, highly-efficient innovators, with a real thirst for knowledge
  – College and/or university-educated
  – Well-travelled
  – Industry organisations really promoting embracing of science and technology
Research and agriculture: where are we?

• Many exciting developments at various stages of implementation
• Any progressive industry invests in research
• Agriculture should be no different
  – Farmers need to engage with researchers and vice versa
• Many relevant projects at Henfaes Research Centre
Clover: A practical measure

- Determine N\textsubscript{2}O emissions from Ryegrass-Clover systems vs. Ryegrass-fertiliser
- Clover reduced N\textsubscript{2}O emissions without reducing yield
Monitoring soil N levels

- Development of electrodes and probes
- Field-testing
- Generate fertiliser recommendations
  - Targeted applications
Henfaes: the Uplands Sustainable Intensification Platform
Aim: to increase grassland productivity through optimised soil, nutrient and grazing management

How to better utilise grass as the base of lamb production systems
• Upland ‘ffridd’
  – ± lime/fert, ± re-seed, ± rotational grazing
• Upland ‘ffridd’
  – ± lime/fert, ± re-seed, ± rotational grazing
- Lowland fields
  - ± lime/fert, ± re-seed, ± rotational grazing
Henfaes: approach

- Lowland fields
  - ± lime/fert, ± re-seed, ± rotational grazing
• Drilling (with HSG, clover + timothy)
• Grassland quality and quantity
• Introduced sheep + lambs
  – Condition-scored and weighed
Greenhouse gas emissions

- Ffridd
• Grass utilisation is critical
• Other factors that affect growth rates and performance
Carbon footprints

System boundary

**Farm inputs**
- Concentrate
- Feed crops
- Fertiliser (N, P, K)
- Lime
- Manure
- Pesticide
- Fuel
- Electricity
- Bedding material
- Purchased sheep

**On-farm production**
- Home reared replacements
- Sheep flock
- Pasture & feed crops
- Soil
- Excreta

**Farm outputs**
- Finished lambs
- Store lambs
- Breeding sheep
- Cull sheep
- Wool

**Economic allocation**

Ysgol Amgylchedd, Adnoddau Naturiol a Daearyddiaeth
School of Environment, Natural Resources & Geography
Carbon footprints

- Means (kg CO$_2$ equivalents/kg lamb):

<table>
<thead>
<tr>
<th>Emission source</th>
<th>Lowland</th>
<th>Upland</th>
<th>Hill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs (direct and indirect emissions)</td>
<td>2.18</td>
<td>2.70</td>
<td>2.98</td>
</tr>
<tr>
<td>Enteric CH$_4$</td>
<td>4.62</td>
<td>5.59</td>
<td>8.61</td>
</tr>
<tr>
<td>Excreta CH$_4$</td>
<td>0.11</td>
<td>0.13</td>
<td>0.20</td>
</tr>
<tr>
<td>N$_2$O from soils (direct and indirect emissions)</td>
<td>3.79</td>
<td>4.21</td>
<td>5.91</td>
</tr>
<tr>
<td>N$_2$O from manure storage (direct and indirect emissions)</td>
<td>0.14</td>
<td>0.23</td>
<td>0.16</td>
</tr>
</tbody>
</table>

\[\text{Total} = 10.85 \quad 12.85 \quad 17.86\]

- Carbon footprints ranged from:
  - 5.4 to 21.5 kg CO$_2$ e/kg lamb – lowland farms
  - 8.3 to 18.3 kg CO$_2$ e/kg lamb – upland farms
  - 8.8 to 33.3 kg CO$_2$ e/kg – hill farms

- Other studies have found C-footprints to range by a factor of 15 times
Highlighting “win-wins”

• Regression analysis showed that:
  1) Concentrate use
  2) Number of lambs reared per ewe
  3) Lamb growth rate
  4) Percentage of ewe and replacement ewe flock not mated

= efficiency is key
Other developments
Other developments

AgriNet

Farmer: www.agri.net.ie

<table>
<thead>
<tr>
<th>Date</th>
<th>14/06/2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mob</td>
<td>All Mobs</td>
</tr>
<tr>
<td>Daily Growth</td>
<td>82.1</td>
</tr>
<tr>
<td>Farm Cover</td>
<td>66%</td>
</tr>
<tr>
<td>Total Area</td>
<td>20.0</td>
</tr>
<tr>
<td>Total LU</td>
<td>510.0</td>
</tr>
<tr>
<td>Weather</td>
<td></td>
</tr>
</tbody>
</table>

Demand / Day: 1550
Demand / Ha: 56.3
LU / Ha: 3.42
Cover LU: 195.03
Short Term Silage: 0 (Ha)
Long Term Silage: 0 (Ha)
Rotation Length: 23
Rotation Last Week: 29.1
Area Unmeasured: 3 (Ha)
Post Grazing Cover: 30
Litre/Cow/Day: 27.74 (1206)
KgMS/Cow: 2.00
Milk Quality: 70.04% / 70.46%
KgMS/He YTD: 14 (28.6 Ha)

Cover: 32
Target Pre-Grazing Cover: 1390
Deficit: 125
Demand Line:

Decisions:

- 2+ Year Old Quantity: 0 to 1
- 2+ Year Old Grass: 0 to 20
- Rotation Length: 20 to 23

Decision Notes:

Continue to graze C8&C9 with 12 hours allocated to get through it quicker. Grass/clover not sown, Graze B1 next as >1000kg DM/ha then graze B6 as paddocks to freshen up for calves. Covers on B5/B6 should be around 1200kg+ DM/ha then (grass/clover less stemmy). Maybe move calves into B7 - nice cover of fresh grass. Keep hours on B to 5 hours for now to get through C paddocks. Continue grazing A1 - 2, more grazing before 20. No grazing on thin paddocks - fresh grass as it was topped. Little rain to forecast with temperatures in the high teens so drought is expected. Build covers for the coming weeks. Keep cover >190kg DM at least to ensure grass ahead of cows. Lengthen rotation as growth expected to drop. Spread SuffaCAN this week 3/4 of a bag/acre.
So, where are we going...?
So, where are we going...?

• Whatever happens, the core principles remain
  – Efficiency is key
  – People want value and quality
  – Competition not disappearing

• Increasing demand for ‘sustainably produced’ meat

• Doing the basics right...
• ...Whilst being ready to change
So, where are we going...?

- Research & technology can’t replace or change everything...
- ...but it has to be part of the answer
Many thanks