Analysis of suckler cow reproductive performance on 37 Irish beef farms

R.F. Taylor¹,², M. McGee¹, A.K. Kelly² and P. Crosson¹

¹Teagasc, AGRIC Grange, Dunsany, Co. Meath, Ireland
²School of Agriculture, University College Dublin, Belfield, Dublin 4 Ireland
Irish beef sector

• 140,000 farms in Ireland – specialist beef production 78,000 (CSO, 2016)

• Average suckler herd size is 26 breeding females and farm size 35.4 hectares (NFS, 2016)

• Beef sector accounted for 34% of gross agricultural output in 2015 (DAFM, 2016)

• >50% of output generated from the suckler herd (DAFM, 2016)

• Approx. 1.1 million suckler cows in Ireland (CSO, 2016)

• Suckler farms are one of the least profitable agricultural enterprises (NFS, 2016)
Net Margin

Source: Teagasc National Farm Survey

* Excl. direct payments

The Irish Agriculture and Food Development Authority
What drives profitability?

<table>
<thead>
<tr>
<th></th>
<th>Farm Size (ha)</th>
<th>Stocking rate (LU/ha)</th>
<th>Beef live weight output (kg)</th>
<th>Gross output (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>LU</td>
</tr>
<tr>
<td><strong>Suckler to finishing</strong></td>
<td>€/LU</td>
<td>-0.05 (NS)</td>
<td>0.02 (NS)</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>€/ha</td>
<td>0.23 (NS)</td>
<td>0.46 ***</td>
<td>0.17</td>
</tr>
<tr>
<td><strong>Suckler to live sale</strong></td>
<td>€/LU</td>
<td>-0.06 (NS)</td>
<td>-0.15 (NS)</td>
<td>0.53 ***</td>
</tr>
<tr>
<td></td>
<td>€/ha</td>
<td>0.25 *</td>
<td>0.01 (NS)</td>
<td>0.43 ***</td>
</tr>
</tbody>
</table>

* P<0.05, ** P<0.01, *** P<0.001, Source: Taylor et al., 2016
National herd reproductive data

• Reproductive performance of the national herd is below target

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calving interval (days)</td>
<td>407</td>
<td>365</td>
</tr>
<tr>
<td>Calving rate</td>
<td>0.82</td>
<td>1.00</td>
</tr>
<tr>
<td>Heifers calving at 22-26 months</td>
<td>18%</td>
<td>100%</td>
</tr>
<tr>
<td>Calf mortality rate (at 28 days)</td>
<td>6%</td>
<td>&lt;5%</td>
</tr>
</tbody>
</table>

• Research models have shown that poor reproductive performance has a negative effect on farm profitability (Crosson and McGee, 2012; Kenny and Diskin, 2014)
Study objectives

• Determine which herd level reproductive measures are the main drivers of gross output

• Assess the impact of suckler herd reproductive performance on farm gross output
Materials and Methods
Sample set

- 37 farms
- 7 years data (2008-2014)
- Nationally distributed
- 3 systems
  - Suckler to finishing
  - Suckler to live sale
  - Suckler to finishing/live combination
- All participated in a knowledge transfer programme for minimum of three years
BETTER Farm Beef Program

• BETTER – Business, Environment and Technology through Teaching, Extension and Research

• Aims:
  • Increase technical efficiency
  • Identify KPIs in a range of beef systems
  • Demonstrate merits of record keeping

• Areas of focus:
  • Reproductive performance
  • Physical performance
  • Grassland management
  • Financial performance

The Irish Agriculture and Food Development Authority
Data collection

- **Reproductive data**: Irish Cattle Breeding Federation (ICBF)
- Collected on animal level basis-aggregated to herd level
- Variables measured (annual basis):
  - Empty rate
  - Calving rate
  - Weaning rate
  - Average age at first calving
  - Average age at calving
  - Average calving interval
  - Number of months with calvings
  - Calf mortality
Data collection cont’d.

- **Financial data:** – Teagasc eProfit Monitor software
- Recorded by farmer in conjunction with farm advisor
- Information from sales, purchases and inventory changes used to calculate gross output value
- Prices corrected for inflation over the 7-year period
  - CSO price index

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>0.87</td>
<td>0.78</td>
<td>0.79</td>
<td>0.96</td>
<td>1.08</td>
<td>1.1</td>
<td>1</td>
</tr>
</tbody>
</table>
Statistical Analysis

- **Proc Univariate (SAS 9.4)** - check for normality and identify outliers

- **Proc Corr (SAS 9.4)** - Spearman partial correlation analysis correcting for year variation

- **Proc GLMSELECT (SAS 9.4)** – stepwise regression identifying main drivers of gross output

- **Proc Reg (SAS 9.4)** – quantifying the effect each variable in the model had on the model selected
Results
# Descriptive Data Analysis

<table>
<thead>
<tr>
<th></th>
<th>National</th>
<th>Average</th>
<th>Std. Dev</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herd size (no. cows)</td>
<td>26†</td>
<td>57.94</td>
<td>24.412</td>
<td>15</td>
<td>136</td>
</tr>
</tbody>
</table>

## Correlation Analysis

<table>
<thead>
<tr>
<th></th>
<th>Average herd age</th>
<th>Average age at first calving</th>
<th>No. mts with calving</th>
<th>Calving with assistance</th>
<th>Average calving interval</th>
<th>Calf mortality</th>
<th>Gross output per LU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calving rate</td>
<td>-0.07 (ns)</td>
<td>-0.20 **</td>
<td>0.14 (ns)</td>
<td>0.11 (ns)</td>
<td>-0.07 (ns)</td>
<td>-0.3 * (P=0.07)</td>
<td>0.21</td>
</tr>
<tr>
<td>Weaning rate</td>
<td>-0.05 (ns)</td>
<td>-0.18 *</td>
<td>0.13 (ns)</td>
<td>0.04 (ns)</td>
<td>-0.09 (ns)</td>
<td>-0.66 ***</td>
<td>0.23</td>
</tr>
<tr>
<td>Empty rate</td>
<td>0.17 *</td>
<td>0.25 ***</td>
<td>-0.11 (ns)</td>
<td>-0.19 (ns)</td>
<td>0.07 (ns)</td>
<td>0.35 *</td>
<td>-0.30 **</td>
</tr>
<tr>
<td>Gross output/LU</td>
<td>-0.15 *</td>
<td>-0.17 *</td>
<td>-0.11 (ns)</td>
<td>0.09 (ns)</td>
<td>-0.00 (ns)</td>
<td>0.06 (ns)</td>
<td>-</td>
</tr>
</tbody>
</table>

* P<0.05, ** P<0.01, *** P<0.001
All farms

\[ r^2 = 0.17, y = -10.498x + 1056.76, P < 0.001 \]
## System Analysis

<table>
<thead>
<tr>
<th></th>
<th>Slope</th>
<th>R-squared</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suckler to finishing (∑ r-sq=0.29)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>1686.15</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Average age at first calving</td>
<td>-14.80</td>
<td>0.144</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Number months with calving</td>
<td>-165.98</td>
<td>0.136</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Number months with calving$^2$</td>
<td>12.92</td>
<td>0.016</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

### Graphs

- **Gross output per livestock unit (€/LU) vs. Average age at first calving (months)**
- **Gross output per livestock unit (€/LU) vs. Number of months with a calving**
## System Analysis

<table>
<thead>
<tr>
<th></th>
<th>Slope</th>
<th>R-squared</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suckler to live sale ($\sum r$-sq=0.191)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>499.84</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Average age at first calving</td>
<td>-13.19</td>
<td>0.1058</td>
<td>0.1</td>
</tr>
<tr>
<td>Average age of herd</td>
<td>-46.92</td>
<td>0.0458</td>
<td>0.07</td>
</tr>
</tbody>
</table>

![Gross output per livestock unit (€/LU) vs. Average age at first calving (months)](image1)

![Gross output per livestock unit (€/LU) vs. Average age of the herd (yrs)](image2)
Conclusion
Conclusion

• Calving rate and weaning rate are found to be positively associated with gross output

• Average age at first calving is negatively related with calving rate, weaning rate and gross output

• Calf mortality negatively impacts on calving rate, weaning rate and gross output

• Average age at first calving and number of months with a calving were the main variables effecting gross output on suckler to finishing farms

• Average age at first calving and average age of the herd were the main reproductive factors contributing to gross output on suckler to live sale farms

• Analysis at animal level will be carried out to elucidate these results further
Thank You