A dairy-beef index to rank beef bulls on profitability when mated to a dairy cow

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Number of dairy-bred calves is increasing

- 40% more births from dairy herd (+ 414k)
- 72% more beef * dairy births (+ 275k).
- Increase in peak; 27% born in Feb 2010 (274k) versus 37% for Feb 2018 (538k)
Slaughter performance of dairy* beef steers by age & month of slaughter.

<table>
<thead>
<tr>
<th>Month_Year</th>
<th>Age Category</th>
<th>Age</th>
<th>Count</th>
<th>Cwt</th>
<th>Price/kg</th>
<th>Value</th>
<th>Conf</th>
<th>Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2 year old out of shed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015_03</td>
<td>22-25 months</td>
<td>726</td>
<td>5,830</td>
<td>320</td>
<td>420.0</td>
<td>€1,344</td>
<td>5.90</td>
<td>8.83</td>
</tr>
<tr>
<td>2016_03</td>
<td>22-25 months</td>
<td>728</td>
<td>7,913</td>
<td>328</td>
<td>398.5</td>
<td>€1,307</td>
<td>5.88</td>
<td>9.00</td>
</tr>
<tr>
<td>2017_03</td>
<td>22-25 months</td>
<td>729</td>
<td>9,724</td>
<td>324</td>
<td>390.8</td>
<td>€1,266</td>
<td>5.68</td>
<td>8.85</td>
</tr>
<tr>
<td>2018_03</td>
<td>22-25 months</td>
<td>729</td>
<td>8,854</td>
<td>323</td>
<td>401.7</td>
<td>€1,297</td>
<td>5.63</td>
<td>8.81</td>
</tr>
<tr>
<td><strong>2+ years off grass</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015_07</td>
<td>25-28 months</td>
<td>825</td>
<td>4,995</td>
<td>338</td>
<td>437.3</td>
<td>€1,478</td>
<td>5.86</td>
<td>9.20</td>
</tr>
<tr>
<td>2016_07</td>
<td>25-28 months</td>
<td>827</td>
<td>6,234</td>
<td>337</td>
<td>395.0</td>
<td>€1,331</td>
<td>5.67</td>
<td>8.96</td>
</tr>
<tr>
<td>2017_07</td>
<td>25-28 months</td>
<td>828</td>
<td>7,101</td>
<td>336</td>
<td>409.0</td>
<td>€1,374</td>
<td>5.57</td>
<td>8.97</td>
</tr>
<tr>
<td>2018_07</td>
<td>25-28 months</td>
<td>828</td>
<td>6,620</td>
<td>328</td>
<td>397.7</td>
<td>€1,305</td>
<td>5.35</td>
<td>8.22</td>
</tr>
<tr>
<td><strong>2.5 years of grass</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015_09</td>
<td>28-30 months</td>
<td>896</td>
<td>8,144</td>
<td>351</td>
<td>402.5</td>
<td>€1,413</td>
<td>5.98</td>
<td>9.01</td>
</tr>
<tr>
<td>2016_09</td>
<td>28-30 months</td>
<td>898</td>
<td>11,222</td>
<td>348</td>
<td>379.6</td>
<td>€1,321</td>
<td>5.66</td>
<td>8.58</td>
</tr>
<tr>
<td>2017_09</td>
<td>28-30 months</td>
<td>898</td>
<td>12,176</td>
<td>348</td>
<td>381.8</td>
<td>€1,329</td>
<td>5.51</td>
<td>8.88</td>
</tr>
<tr>
<td>2018_09</td>
<td>Not avail</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

• Definite decline in conformation of dairy beef steers over last 3-4 years. From O+ (on average) to O=.

• Also a decline in carcass weights.
The challenges

1. With a growing dairy herd, the quality of Irish beef production is at risk of deterioration

2. Good fertility and survival equates to a greater proportion of beef sire usage on dairy cows

3. Dairy farmers focused on dairy farmers
   • Easy calving, short gestation length bulls
Need a dairy-beef index that....

1. Strikes a sensible balance between calving ease and carcass merit
2. Is scientifically sound, robust and defendable
3. Facilitates identification of beef bulls suitable for heifers
4. Incentivises beef breeders to target the dairy industry as a market
5. Incentivises beef breeders targeting the dairy industry to record appropriate traits accurately
<table>
<thead>
<tr>
<th>Sub-index</th>
<th>Trait</th>
<th>% genetic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calving</td>
<td>Calving difficulty</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Gestation length</td>
<td>35%</td>
</tr>
<tr>
<td></td>
<td>Calf mortality</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>Calf vigour</td>
<td>Under research</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Feed intake</td>
<td>33%</td>
</tr>
<tr>
<td></td>
<td>Environmental footprint</td>
<td>Under research</td>
</tr>
<tr>
<td></td>
<td>Age at slaughter</td>
<td>13%</td>
</tr>
<tr>
<td>Carcass</td>
<td>Carcass weight</td>
<td>35%</td>
</tr>
<tr>
<td></td>
<td>Carcass conformation</td>
<td>35%</td>
</tr>
<tr>
<td></td>
<td>Carcass fat</td>
<td>35%</td>
</tr>
<tr>
<td></td>
<td>Ability to meet carcass specs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Meat quality</td>
<td>16%</td>
</tr>
<tr>
<td>Societal</td>
<td>Docility</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Polled</td>
<td>100%</td>
</tr>
</tbody>
</table>
Calving difficulty (heifers v cows)

8% difference in heifer difficulty for the same cow difficulty score
Max level of acceptable difficulty

Percentage of dairy farmer (n=98)

<table>
<thead>
<tr>
<th>Level</th>
<th>Dairy Cow</th>
<th>Dairy Heifer</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>3%</td>
<td>12%</td>
</tr>
<tr>
<td>1%</td>
<td>4%</td>
<td>10%</td>
</tr>
<tr>
<td>2%</td>
<td>13%</td>
<td>19%</td>
</tr>
<tr>
<td>3%</td>
<td>21%</td>
<td>23%</td>
</tr>
<tr>
<td>4%</td>
<td>15%</td>
<td>5%</td>
</tr>
<tr>
<td>5-9%</td>
<td>16%</td>
<td>12%</td>
</tr>
<tr>
<td>&gt;= 10%</td>
<td>27%</td>
<td>17%</td>
</tr>
</tbody>
</table>

The Irish Agriculture and Food Development Authority
Penalising more difficult bulls more

Labour (incl. vet)
Reduced cow performance
Cow mortality
Suitability for heifers

- Risk of calving difficulty
  - Bull genetic merit
  - Reliability of bull genetic merit
  - Cow
  - Cow management
Suitability for heifers

• Risk of calving difficulty
  • Bull genetic merit
  • Reliability of bull genetic merit
• Cow
• Cow management
Suitability for heifers

Calving difficulty

Probability

50% rel
Suitability for heifers

Probability

Calving difficulty

80% rel
70% rel
50% rel
Suitability for heifers

- 90% rel
- 80% rel
- 70% rel
- 50% rel
Suitability for heifers

- 90% rel
- 80% rel
- 70% rel
- 50% rel
Suitability for heifers – Angus AI bulls

Considers genetic merit plus reliability

Probability of suitable for heifers

Number of bulls
Other calving traits

• Gestation length
  • Slippage in calving date – cost of production
• Calf mortality
  • Opportunity cost of 28-day old calf

• Impact of calving difficulty on calf mortality captured in calf mortality genetic merit
• Impact of short & long gestation on calving difficulty & calf mortality captured in respective genetic merit
Efficiency traits

• Daily feed intake
  • Tully - 600 animals per year
  • GREENBREED – measure daily emissions

• Age at slaughter
  • Total feed intake and environmental footprint
  • >80 days difference in age at slaughter for 1 v 5 star animals
  • Work in progress
Carcass traits

• Carcass weight, conformation and fat score
  • Based on associations with cut yields

• Meat quality
  • Breed bonuses
  • Genetic evaluation for meat quality underway

• Out of spec
  • 280 kg to 380 kg
  • Superior to O=
  • Rapid reduction in price/kg and loss of AA/HE bonus
<table>
<thead>
<tr>
<th>Breed</th>
<th>Number of bulls</th>
<th>No progeny</th>
<th>Carcass wt</th>
<th>% &lt;280 kg</th>
<th>Carcass conf</th>
<th>% &lt;O=</th>
<th>price (cents/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LM</td>
<td>25</td>
<td>4834</td>
<td>334</td>
<td>10%</td>
<td>7.0</td>
<td>1%</td>
<td>393</td>
</tr>
<tr>
<td>BB</td>
<td>29</td>
<td>2405</td>
<td>351</td>
<td>8%</td>
<td>7.8</td>
<td>2%</td>
<td>388</td>
</tr>
<tr>
<td>AA</td>
<td>35</td>
<td>2309</td>
<td>295</td>
<td>32%</td>
<td>5.6</td>
<td>12%</td>
<td>385</td>
</tr>
<tr>
<td>HE</td>
<td>31</td>
<td>1251</td>
<td>316</td>
<td>27%</td>
<td>5.5</td>
<td>17%</td>
<td>365</td>
</tr>
<tr>
<td>NR</td>
<td>10</td>
<td>168</td>
<td>307</td>
<td>29%</td>
<td>4.2</td>
<td>62%</td>
<td>360</td>
</tr>
<tr>
<td>FR</td>
<td>117</td>
<td>2066</td>
<td>309</td>
<td>26%</td>
<td>4.5</td>
<td>51%</td>
<td>349</td>
</tr>
<tr>
<td>HO</td>
<td>509</td>
<td>957</td>
<td>303</td>
<td>31%</td>
<td>3.6</td>
<td>74%</td>
<td>348</td>
</tr>
<tr>
<td>JE</td>
<td>50</td>
<td>244</td>
<td>255</td>
<td>66%</td>
<td>3.3</td>
<td>84%</td>
<td>321</td>
</tr>
</tbody>
</table>
Example for carcass weight spec

Bull A has CWT = -25
- 35% probability out of spec
- Penalty of €49

Bull B has CWT = +5
- 16% probability out of spec
- Penalty of €23
Out of spec – Angus active sires
Social traits

- Docility
  - Risk of injury
  - Risk of death
- Polled
  - Cost of polling
Combined index - Proposed
### Current versus new

<table>
<thead>
<tr>
<th>Index</th>
<th>Current Calving difficulty</th>
<th>Heifer difficult</th>
<th>Cow difficult</th>
<th>Prob safe on heifer</th>
<th>Gest</th>
<th>Mort intake</th>
<th>Carcass weight</th>
<th>Carc. Conf</th>
<th>Carc. fat</th>
<th>% out of spec - CWT</th>
<th>% out of spec Conf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calving difficulty</td>
<td>1.37</td>
<td>6.15</td>
<td>2.03</td>
<td>66%</td>
<td>-1.41</td>
<td>-0.45</td>
<td>0.1</td>
<td>0.2</td>
<td>0.689</td>
<td>0.605</td>
<td>19%</td>
</tr>
<tr>
<td>Top on DBI</td>
<td>2.61</td>
<td>7.85</td>
<td>3.23</td>
<td>44%</td>
<td>-0.43</td>
<td>-0.40</td>
<td>-0.18</td>
<td>12</td>
<td>1.429</td>
<td>0.01</td>
<td>13%</td>
</tr>
</tbody>
</table>

**Superior beef merit for minimal compromise on calving performance**
Beef farmers purchasing dairy beef calves

- Current focus is a breeding index for dairy farmers.
- Once calf is born focus shifts to “profit from beef”.
  - Calving traits dropped
  - Added in non-genetic effects
- Opportunity to generate for all dairy beef calves at birth (i.e., with passport).
- Calves must be DNA verified => surety for buyer.
- Pilot project under way.
Next Steps.

• Further details
  • Minimum criterion for a bull to be included on the ICBF Active Bull List.
  • Which traits to put on the list, e.g., suitable for use heifers?
• Implementation group to meet to finalise - ICBF board in November
  • New ICBF Active Dairy Beef Bull List for AI sires for Dec 2018
• Continue work on other categories of animals, most notably young breeding bulls
Take home message

- New index to rank beef bulls for use on dairy cows
  - Compromise between the needs of dairy and beef farmers
- Massive variability exists within breeds
  - Opportunity to purchase on genetic merit rather than breed
    => Both for breeding & calf purchasing decisions.
- Gains to be achieved by combining all traits and minimising risks