Using breeding tools to drive efficient beef production

Emma Steele – Signet Breeding Services

Emma.Steele@ahdb.org.uk
Overview

- How do EBVs improve the efficiency of a beef enterprise?
- Why should beef producers be using EBVs & selection indexes?
- Which traits are important and how do we select for them?
- Case study of financial impact
What is Performance Recording?

• We combine pedigree and performance data to create estimated breeding values (EBVs) for individual animals

• This can:
  • Improve growth and carcase traits
  • Increase maternal efficiency
  • Enhance animal health and welfare
  • Reduce the carbon footprint of ruminant production

…For both pedigree and commercial breeders!
What is Efficiency?

• Reducing inputs for the same or increased output

Lower feed costs
• Feed efficient cattle
• Reduced days to slaughter (faster growth)
• Cattle laying down muscle vs. fat
• Reduced cow mature size

Lower vet costs
• Improved calving ease
• Healthier cattle

Lower labour costs
• Enhanced docility

Input

Genetic influences
What is Efficiency?

• …Reducing inputs for the same or increased output

More live calves over a cows working life (precocity / longevity)

More carcases of optimum weight, that meet market requirements
Assessing Performance
Genetic or Environmental?

The major difficulty to overcome:

How much of an animal’s performance is due to it’s genes and how much is because of the environment in which it is reared, managed etc?
Pedigree Data → Performance Data

Estimated Breeding Values

Terminal Sire Traits
Maternal Traits

Index
## Estimated Breeding Values - Beef

<table>
<thead>
<tr>
<th>EBV</th>
<th>Characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestation length</td>
<td>Easier calving</td>
</tr>
<tr>
<td>Calving ease</td>
<td></td>
</tr>
<tr>
<td>Birth weight</td>
<td></td>
</tr>
<tr>
<td>200 day growth</td>
<td>Efficient growth</td>
</tr>
<tr>
<td>400 day growth</td>
<td></td>
</tr>
<tr>
<td>Muscle depth / area</td>
<td>Saleable meat</td>
</tr>
<tr>
<td>Fat depth</td>
<td>Lean meat yield</td>
</tr>
</tbody>
</table>
Estimated Breeding Values - Beef

<table>
<thead>
<tr>
<th>EBV</th>
<th>Characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 day milk</td>
<td>Maternal Traits</td>
</tr>
<tr>
<td>Maternal calving ease</td>
<td></td>
</tr>
<tr>
<td>Age at first calving</td>
<td></td>
</tr>
<tr>
<td>Calving interval</td>
<td></td>
</tr>
<tr>
<td>Longevity</td>
<td></td>
</tr>
<tr>
<td>Scrotal circumference</td>
<td></td>
</tr>
<tr>
<td>Cow mature size</td>
<td></td>
</tr>
</tbody>
</table>
# EBVs in Different Production Systems

<table>
<thead>
<tr>
<th></th>
<th>Ease of calving</th>
<th>Carcase traits</th>
<th>Maternal performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal sire for the suckler herd</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Maternal sire for the suckler herd</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Sire for heifers (females retained)</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Sire for the dairy herd</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓</td>
</tr>
</tbody>
</table>
- **High Birthweight EBV** – Progeny expected to be heavier at birth, associated with higher risk of calving difficulties?
- **Low Fat Depth EBV** – Progeny expected to be leaner than average relative to carcase weight
- **High Terminal Production Index** – Progeny are designed for slaughter and will finish quickly with improved conformation and carcase attributes
- **High 200 Day Milk EBV** – Daughters are better milkers, reflected by the higher weaning weights of their calves
- **Low Scrotal Size EBV** – Male progeny may have smaller than average testicles at 400 days, daughters mature later
- **High Eye Muscle Area EBV** – Progeny have a greater degree of muscle expression relative to carcase weight
EBVs Work – Harper Adams Trial (Feb 2017)

Dirnanean Bradley
Top 1% Terminal Index

Omorga Volvo
Top 10% Terminal Index

- Commercial suckler cows inseminated to two high index Simmental bulls
- Intensively finished, just over 1 year old
- Heifer calves kept or sold for breeding
- Bradley sons worth **extra £45/head** (heavy weight penalties accounted for)
EBVs Work – Harper Adams Trial (Feb 2017)

<table>
<thead>
<tr>
<th>Breeds</th>
<th>Bradley (Top 1%)</th>
<th>Volvo Top 10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slaughter age (months)</td>
<td>12.5 (380d)</td>
<td>12.4 (378d)</td>
</tr>
<tr>
<td>Slaughter wt (kg)</td>
<td>689</td>
<td>667</td>
</tr>
<tr>
<td>DLWG wean to slaughter (kg)</td>
<td>1.82</td>
<td>1.63</td>
</tr>
<tr>
<td>DLWG from birth (kg)</td>
<td>1.69</td>
<td>1.64</td>
</tr>
<tr>
<td>Carcase wt (kg)</td>
<td>394.7</td>
<td>382.0</td>
</tr>
<tr>
<td>Carcase DG from birth (kg)</td>
<td>1.04 (0.98)</td>
<td>1.01 (0.95)</td>
</tr>
<tr>
<td>Conf score (1-15)</td>
<td>10.4 (U-/U=)</td>
<td>10.2 (U-)</td>
</tr>
<tr>
<td>Fat score (1-15)</td>
<td>8.2 (3=)</td>
<td>9.4 (3+/4-)</td>
</tr>
<tr>
<td>Carcase value (£)</td>
<td>1,385</td>
<td>1,340</td>
</tr>
</tbody>
</table>

1 DCG in brackets deducts 24kg for the bull calf birth carcase weight.
2 ABP EUROP carcase classification: Conformation: P=-1 and E+=15. Fat class: 1-=1 and 5+=15.
Hybrid Vigour is the extra performance of a crossbred animal over and above the average performance of its parents.
Which traits are enhanced through hybrid vigour?

- The more genetically different the breeds, the greater the level of heterosis.
- All traits improve however…
- …we see the biggest benefit in longevity, fertility and fitness traits.
- Reduced risk of deleterious recessive build up.

*Mongrel dogs always live forever and never see the vet.*
What's new?
Carcase traits project

AHDB Beef and Lamb
AHDB Dairy
The Buzzwords at the Moment: BIG DATA

- **BCMS**
  - Date of Birth
  - Kill Date
  - Sex
  - Breed
  - Dam (Sire)

- **Abattoir**
  - Birth Date
  - Death Date
  - Weight
  - Fat Class
  - Conformation
  - Breed

- **Breed Society/Signet**
  - Pedigree Information

**COMBINED BEEF PRODUCTION DATA**
EBVs now being produced
• Carcase weight
• Fat class
• Carcase conformation
• Days to slaughter

...still work in progress
More AHDB Beef and Lamb breeding information