Review of the Genetic Improvement of cattle and sheep in the UK with Special Reference to the Potential for Genomics

Report by: Peter Amer & Colleagues, Abacus Bio, New Zealand
Kim Matthews
Head of R&D

Paul Westaway
Chair of R&D Committee
Overview

• What did the review cover
• Why was a review commissioned
• Who produced the review
• What were the findings
• What were the recommendations
• How will this information be used
….but do consider reading it (or bits of it)

Sections on:
• UK breed programmes
• Farmers views in UK
• International comparisons
• Breeding for high input systems
• Current state of genomics & genomic selection

We are unlikely to do it justice in 15 minutes!


Or Google “AHDB Genetic Review”
What and why

1. Review the cost benefit of genetic improvement
   • Helps assess the value of levy support for current services
   • Helps to assess the value of genetic research proposals

2. Assess current services
   • To identify areas of enhancement / investment / review

3. Assess the “genomic opportunity”
   • Because we don’t know the value of genomic solutions for sheep and cattle in the UK
Who

• Report funded by AHDB Beef and Lamb
  • Consultation with HCC and QMS

• Project put out to tender

• Tender secured by Peter Amer’s team at Abacus Bio, New Zealand
Consultation

• The Abacus team met with:
  • Breeders
  • Breed Societies
  • Service providers
  • Industry good organisations

• Survey
  • Primarily targeted at ram and bull breeders
  • Replies from 330 farms with sheep & 143 farms with beef cattle
Value of genetic improvement

• Value of improvement in sheep was £10.7 million per annum
• Value from terminal sires was similar to previous studies
• Increases in mature ewe weight had negative impact on hill, longwool and maternal sectors
• Decrease in size of industry, reduced cost benefit relative to previous study by Amer in 2007
Value of genetic improvement through genomics

In dairy

- Value of genomics is through reduced generation interval, not increase in accuracy

In sheep

- Little potential to reduce generation interval

- Benefits must come from better prediction accuracy
  - Maternal traits present greatest opportunity
  - But require large numbers of animals phenotyping
  - Gains of 5-15% possible (least terminal sire traits)
Value of genetic improvement through genomics - summary

- Financial benefits at current penetration rates are modest
- However, as a “disruptive technology” it could be highly significant
Strengths and weaknesses of existing structures

In general the industry felt the providers of genetic evaluation services provided a good service.
Table 39: Sheep farmers’ assessment of genetic services provided by Industry bodies

<table>
<thead>
<tr>
<th>Industry body</th>
<th>Use (or know about) the services provided</th>
<th>n</th>
<th>Provide information and guidance</th>
<th>Communicaiton of financial value</th>
<th>Marketing support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signet</td>
<td>76%</td>
<td>252</td>
<td>7.5</td>
<td>6.1</td>
<td>5.9</td>
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<tr>
<td>The Breed Society</td>
<td>52%</td>
<td>173</td>
<td>5.5</td>
<td>4.8</td>
<td>4.9</td>
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<tr>
<td>BASCO</td>
<td>47%</td>
<td>154</td>
<td>7.8</td>
<td>4.3</td>
<td>4.6</td>
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<tr>
<td>NSA</td>
<td>41%</td>
<td>135</td>
<td>3.4</td>
<td>4.6</td>
<td>3.9</td>
</tr>
<tr>
<td>EBLEX</td>
<td>41%</td>
<td>134</td>
<td>5.3</td>
<td>6.3</td>
<td>5.9</td>
</tr>
<tr>
<td>EBLEX Better Return Programme</td>
<td>40%</td>
<td>131</td>
<td>5.2</td>
<td>7.1</td>
<td>6.6</td>
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<tr>
<td>Innovis</td>
<td>23%</td>
<td>76</td>
<td>5.0</td>
<td>5.1</td>
<td>5.2</td>
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<tr>
<td>Hybu Cig Cymru - HCC</td>
<td>14%</td>
<td>47</td>
<td>4.1</td>
<td>6.4</td>
<td>5.6</td>
</tr>
<tr>
<td>Quality Meat Scotland - QMS</td>
<td>13%</td>
<td>43</td>
<td>3.3</td>
<td>5.3</td>
<td>3.9</td>
</tr>
<tr>
<td>Breedplan</td>
<td>11%</td>
<td>37</td>
<td>7.5</td>
<td>4.7</td>
<td>5.1</td>
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<tr>
<td>Farm Connect - Wales</td>
<td>9%</td>
<td>30</td>
<td>4.4</td>
<td>4.9</td>
<td>3.9</td>
</tr>
<tr>
<td>NBA</td>
<td>8%</td>
<td>25</td>
<td>3.1</td>
<td>4.9</td>
<td>3.8</td>
</tr>
<tr>
<td>EGENES</td>
<td>7%</td>
<td>24</td>
<td>6.9</td>
<td>3.3</td>
<td>3.8</td>
</tr>
<tr>
<td>Pedigree Cattle Services</td>
<td>4%</td>
<td>14</td>
<td>7.1</td>
<td>4.1</td>
<td>4.1</td>
</tr>
<tr>
<td>SIL</td>
<td>2%</td>
<td>8</td>
<td>9.0</td>
<td>6.3</td>
<td>3.8</td>
</tr>
</tbody>
</table>

1Providing genetic information and guidance to pedigree breeders

2Communicating the financial value of breeding improvement to commercial producers

3Supporting the marketing of recorded animals
Strengths and weaknesses of existing structures

Barriers to faster genetic gain

• Lack of education in genetics
  • Influencing purchasing decisions
• Systems that engender market failure / poor market signals
• Concerns about data quantity and quality
• Lack of focus on economically important maternal traits
Strengths and weaknesses of existing structures

Potential solutions, include…

• Wider education and extension programmes
• Change to ram/bull marketing practices
• Capture of commercial data
• Improved animal identification (using EID) and data capture
• Development of a multi-species database
The Breeder Survey - Sheep
Figure 12: Importance of selection criteria for sheep farmers when selecting rams
Figure 14: Relative importance of traits for selecting rams
Assess the “genomic opportunity”

Extra value at current penetration rates is not high

Good phenotypes are still key
  • Cost of data capture is a major issue
  • Consider data capture from alternative sources (i.e. supply chain)
  • Work required to define Hard-to-Measure traits

Work within inherent UK population structures
  • Target genotyping of key individuals
  • Build genetic linkage between flocks/herds
  • Be aware of breed structure
Assess the “genomic opportunity”

Use other genomic information sources
- International collaboration
- Collect DNA from industry trials – such as sire tests

Invest in core structure
- Deficiencies in existing structure (e.g. poor connectedness/incorrect EBVs) will be more problematic in a genomic world
- Introduction of GBVs into existing evaluations should be seamless
Assess the “genomic opportunity”

Genomics - a potentially disruptive technology?

• Without a change in current approaches to data capture, genomic solutions could create more cost – without an increase in value

• However, the introduction of genomics as a “disruptive technology” could lead to wider changes – leading to greater reward for genetic gain and thus greater genetic gain and value
Over to Paul....
Our Objective

The best beef eating experience in the world and it's the same next time!
Background

• March 2006 took over first farm

• March 2009 took over second farm and left Genus

• Sept 2009 Launched British Angus.com

• Jan 2010 launched Sterling Sires

• Oct 2012 launched P&K Perfect Night In
2013 A YEAR WE WILL NEVER FORGET

- Winning Beef Farmer of the Year 2013 at the "British Farming Awards"
- Melview Filet Steak wins a 2013 HEFF Diamond Award
- Prona & Friends winning the 2013 Burke Trophy

A huge thanks to everyone who helped & supported us in 2013, the Melview Crew is world class!

- Elise Westaway Champion Junior Handler 2013 Moreton-in-the-Marsh
- Abby with Melview Gemma M121, 1st Summer Heifer 2013 Newbury Show
- Prona & Friends Female & Breed Champion 2013 Royal Bath & West
- Melview Georgie J017 Female & Breed Champion 2013 Monmouth Show

HOME BRED SUCCESS

Please feel free to contact us at anytime. Visitors are always welcome.

Paul, Kirsty, Elise & Georgie Westaway, C amore Hall Farm, Dymock, Glos, GL18 2AE Email paul@sterlingsires.co.uk www.melviewfarming.co.uk Tel: 01531 890411
2014: Another great year for Melview Angus!

Three First Prizes at the National Show including...

1st Prize Breeders Group of Three at ‘The National Angus Show’

We were delighted to be involved with the National at Royal Three Counties, we hope all exhibitors and friends enjoyed the three days.

A big thank you to Megan, Piers, Andy, Jamie, Keith and Dad for all your help. The Melview Crew is world class!

Winners at the National

‘New Kid on the Block’

‘Sister to Goliath & Granville’

Ernest
1st Intermediate Bull: National Show 2014
1st Group of Three: National Show 2014
Male Champion: Royal Bath & West 2014
1st Senior Bull: Monmouth 2014

Georgie
1st Cow in Calf: National Show 2014
1st Group of Three: National Show 2014
Female Champion: Morton-in-the-Marsh 2014

‘The Next Great Brood Cow?’

Prona
Her daughters were 2nd & 3rd: National Show 2014
1st Group of Three: National Show 2014
Reserve Grand Champion: Monmouth 2014

Please feel free to contact us at anytime. Visitors are always welcome.

Melview Angus
Dymock, Glos, GL18 2AE Email: paul@sterlingsires.co.uk
www.melviewfarming.co.uk | Tel: 01591 890411

Melview Angus
PAUL & KIRSTY’S PERFECT NIGHT IN
PAUL & KIRSTY’S SIRLOIN STEAK

Hugh Judd, Foodservice Project Manager
### Gold Winners

<table>
<thead>
<tr>
<th>Entered By</th>
<th>Country of origin</th>
<th>Breed of animal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian Agricultural Company</td>
<td>Australia</td>
<td>Wagyu Cross</td>
</tr>
<tr>
<td>Eleven Mill Iron Ranch</td>
<td>United States</td>
<td>Black Angus</td>
</tr>
<tr>
<td>Jan Zandbergen</td>
<td>Australia</td>
<td>Black Angus</td>
</tr>
<tr>
<td>Nice to Meat</td>
<td>Japan</td>
<td>Japanese Black Wagyu</td>
</tr>
<tr>
<td>Rangers Valley Cattle Station</td>
<td>Australia</td>
<td>Angus</td>
</tr>
<tr>
<td>Albers GMBH</td>
<td>Australia</td>
<td>Wagyu F2+ 75%</td>
</tr>
<tr>
<td>One Earth Farms/Heritage Angus</td>
<td>Canada</td>
<td>Angus</td>
</tr>
<tr>
<td>Scotbeef (M&amp;S)</td>
<td>Scotland</td>
<td>Aberdeen Angus</td>
</tr>
<tr>
<td>Miller and Carter (Mitchells and Butlers)/Blade Farming, Somerset</td>
<td>England</td>
<td>Aberdeen Angus Cross</td>
</tr>
</tbody>
</table>
My Message

Don’t walk away from negative people~~~~~~~~run!
Next Steps

AHDB Genetic Review Group

Chaired by Paul Westaway

Sheep
Howard Bates
Peter Baber
Duncan Nelless
Ros Turner

Abacus Bio made 18 recommendations
Priorities

A. Support breeders and commercial producers in recording a wider range of phenotypes, particularly for hard to measure traits, and provide a platform for the future use of genomic tools.

B. Create on-farm demonstration of the benefits of using higher genetic merit sires and recording new traits (particularly maternal traits).
Priorities

C. Establish structured, regular, commercially-focused industry meetings in order to elicit specific and direct priorities for the development of new trait genetic evaluations, selection indexes and tools for breeders and buyers of performance recorded males
AHDB Sheep Genetics Review Group

Supporting current and future service provision

- Develop protocols for HTM traits
- Consider research on HTM traits
- Facility data collection for HTM traits
- Sign collaboration agreements
- Consider DNA collection from some influential sires
- Facilitate advice on DNA storage/use
- Facilitate advice on enhancing connectedness
- Review the use of existing phenotypes – including new CT phenotypes/data mining
- Enhance data input and output

- Establish Commercial Progeny Test
- Consider whole farm costing of commercial trials
- Consider “Genetic Improvement Grants”
- Pump prime new tech – CT, FEC, IgA tests – with plans to phase out support
- Use Signet technicians for small scale trials
- Consider link to monitor farms

Demonstration and extension

Continue to engage in commercially focussed, industry meetings

Like today!!
First steps

• Develop a guidance document on DNA collection and storage

• Scope out a programme of Genetic Improvement Grants for consideration by AHDB Technical Directorate executive team and Beef & Lamb R&D Committee

• Plan ahead for an industry meeting in mid-2016
Summary

• Genetic progress continues to deliver major financial benefits to the UK sheep & beef industry

• Future genetic evaluation services need to:-
  • Maintain confidence/support for existing technology
  • Place stronger focus on maternal traits
  • Greater collaboration & use of alternative data sources

• Genomics
  • New initiatives should not be solely dependant on genomic selection
  • Sensible to establish datasets to exploit genomic information, when cost effective to do so
Reviewing our activities

November/ December 2015
Our purpose

To equip levy payers with independent, evidence-based information and tools to grow, become more competitive and sustainable

Sector Board members identified three key priorities for AHDB:

• Business improvement
• R&D and Knowledge Exchange
• Market Development
AHDB Activity Review

Objective is to listen to levy payers – identify activities that will make biggest difference to your business

Review comprises:

- A series of open meetings in England, Wales & Scotland
- Online survey for levy payers
- Stakeholder meetings
- Consultation on annual Business plans
What we want to know

We’re asking levy payers to tell us:

1. What are the biggest opportunities and challenges to your business, now & in the future?

2. What should AHDB do in the future to support you and your business?

3. How can we communicate most effectively with you?
<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 November 15</td>
<td>Carmarthen, Wales</td>
<td>Falcon Hotel, 111 Lammas Street, Carmarthen, Dyfed, SA31 3AP</td>
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<tr>
<td>30 November 15</td>
<td>Kendal, Cumbria</td>
<td>Castle Green Hotel, Castle Green Lane, Kendal, Cumbria, LA0 6RG</td>
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<tr>
<td>7 December 15</td>
<td>Cambourne, Cambridge</td>
<td>Cambridge Belfry, Back Lane, Cambourne, Cambridge, CB23 6BW</td>
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<tr>
<td>8 December 15</td>
<td>York, Yorkshire</td>
<td>Hilton York, 1 Tower Street , York, YO1 9WD</td>
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<tr>
<td>9 December 15</td>
<td>Exeter, Devon</td>
<td>Sandy Park, Sandy Park Way, Exeter, Devon, EX2 7NN</td>
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<tr>
<td>15 December 15</td>
<td>Cheltenham, Gloucestershire</td>
<td>Cheltenham Park Hotel, Cirencester Road, Charlton Kings Cheltenham, Gloucestershire, GL53 8AE</td>
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<td>11 January 16</td>
<td>Market Drayton, Shropshire</td>
<td>Tern Hill Hall, Tern Hill, Market Drayton, Shropshire, TF9 3PU</td>
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<td>12 January 16</td>
<td>Winchester, Hampshire</td>
<td>Holiday Inn Winchester, Telegraph Way, Morn Hill, Winchester, SO21 1HZ</td>
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