Sheep Industry consultation meeting

Killeshin Hotel, Portlaoise
Thursday 18th December 2014
Teagasc Sheep Research Programme

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Animal & Grassland Research and Innovation Programme
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Sheep Ireland Meeting, 18th December 2014
CONTEXT

33,500 Sheep producers Nationally
2.5 million ewes
Average flock size < 100 ewes
Low weaning rate 1.3 lambs /ewes
81% of lamb meat exported
Efficient lamb production give very good incomes
Increased lamb prices from 2010
Significant scope for increasing output at farm level & nationally
Food Harvest 2020
Greater use of grazed grass
Anthelmintic Resistance
STAP
Teagasc Resources

Staff
- Research, Technical, Farm Staff
- Flocks
  - 1200 ewes including 350 Pedigree (Suffolk, Texel, Belclare)
  - Replacements (n=250)
  - Rams (n=100)
  - Store lambs (n=240)
  - 13 BETTER farms (n~ 4000+ ewes)

Laboratories (Athenry & Grange)

Land
- 128 ha
Overall & Specific Objectives of the Sheep Programme

Increase the **productivity**, **sustainability** and **competitiveness** of Irish sheep production systems

- Increase production efficiency – Grazed grass
- Increase the rate of genetic gain
- Adopt best practices in relation to animal health
- Improve product quality
- Enhance knowledge transfer to drive farm efficiencies
- Provide Leadership to the Sheep Industry
# Research Programme Staff

<table>
<thead>
<tr>
<th>Programme</th>
<th>Research Staff</th>
<th>Collaborators</th>
</tr>
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<tbody>
<tr>
<td>Research-Demonstration Farm &amp; Variety Evaluation</td>
<td>P. Creighton, N. McHugh &amp; M. O’Donovan (MP) WF (Elizabeth Earle)</td>
<td>T. Boland (UCD), &amp; D. Grogan (DAFM)</td>
</tr>
<tr>
<td>Lamb Meat Quality</td>
<td>M. Diskin, A. Moloney, P. Allen (Ashtown), WF (Noel Claffey)</td>
<td>F. Monaghan, N Brunton (UCD) L. Farmer</td>
</tr>
<tr>
<td>Age at lambing, Ewe lifetime Performance Trace elements</td>
<td>T. Keady</td>
<td>University of Nottingham</td>
</tr>
<tr>
<td>Flock Health</td>
<td>B. Good &amp; O. Keane (GR)</td>
<td>G. Mulcahy, T. De Waal T. Sweeney (UCD) &amp; QUB S. Galloway &amp; G. Davis (NZ)</td>
</tr>
<tr>
<td>Genetics</td>
<td>N. McHugh. D. Berry. M. Diskin WF (Alan Bohane)</td>
<td>A Fahey (UCD), Sheep Ireland J. McEwan (NZ)</td>
</tr>
<tr>
<td>BETTER Farm</td>
<td>M. Diskin, C. Lynch</td>
<td>Frank Hynes, Shane McHugh &amp; Michael Gottstein. Advisors/Veterinarians</td>
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</tbody>
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Knowledge Transfer
Sheep Programme 2014

Michael Gottstein
Head of Sheep Programme

The Irish Agriculture and Food Development Authority
Overview

• Public Events
• BETTER Farm Programme
• STAP Year 2 Preparing for Year 3
• Public Events
• Other initiatives
Public Events

- Sheep Conferences (2014)
  - Hill Sheep Conference Bantry (350)
  - National Conference Athlone (600)
  - National Conference Donegal (800)

- Public Events
  - 10 on farm/mart & Athenry (June – Sept)

- Regional Sheep Seminars this Autumn
Technology Transfer (Sheep Team)

70 Advisers with sheep groups
- 150-180 clients
- 200 consultations
- SFP, AEOS, TAMS etc
- ePM, Derogations, Fertiliser Plans
- 3+ discussion groups (cattle & Sheep)

3 Specialists & Research Colleagues

Outside Agencies
- UCD
- Sheep Irl
- Bord Bia
- Industry
BETTER Farm Programme

Eight Lowland Farms
- Kerry (2013)
- Tipperary (2013)
- Kilkenny
- Wexford
- Louth (2013)
- Roscommon
- Leitrim (2013)
- Donegal

Potential New Farms
- Donegal
- Kildare
- Mayo
- Westmeath
- Wicklow (Hill)
- Cork (Hill)

Three Hill Farms
- Donegal
- Sligo
- Mayo
Plans for 2015

STAP Year 3
Revised STAP Programme 2016
• Input into revised scheme

Sheep 2015 – Athenry 20th June 2015

Sheep Conferences
• 1 Hill Conference (Westport 28th January)
• 2 Lowland Conferences (Killarney 3rd Feb & Trim 4th Feb)
• Industry event with keynote speakers
Other Issues

Annual Selection of new BETTER farms

You Tube Clip – key skills – Lameness & Drench Test
https://vimeo.com/96799237
2015 – Breeding (Ram & Ewe), Grass Mgt, Finishing Lambs

Technical Support for Private Consultants
• 8<sup>th</sup> October (n=25)
• More in 2015
Sheep Nutrition Research at Lyons Research Farm
University College Dublin

Tommy Boland
School of Agriculture, Food Science and Veterinary Medicine
Facilities

- 350 mature ewes
- 100 ewe lambs
  - Synchronised lambing 2nd wk March
- CPT flock and ram testing centre for Sheep Ireland
- Housing for 550 sheep
- Individual Feeding Facilities for 100 sheep
- Animal digestibility facilities for 30 sheep
- Mobile handling facilities
- Artificially reared lamb facilities
Current Sheep Nutrition Research Projects – UCD lead

Understanding the impact of maternal nutrition on subsequent offspring performance - Fiona McGovern, IRCSET funded

Nutrition as a driver of flock performance – Frank Campion, Walsh Fellowship Teagasc

The effect of multi-species pasture mixtures on ewe and lamb performance – Bridget Lynch and Connie Grace, DAFM Stimulus
Industry Funded Research

- Artificial lamb rearing

- Trace element supplementation

- Energy supplements during pregnancy and lactation
Collaborative research work with Teagasc

RAPIDFEED - Development, calibration and validation of feed intake methodology to rapidly screen dairy, beef and sheep for feed intake and efficiency. Emer Kennedy PI, DAFM stimulus

OVIGEN – Multibreed sheep genetic and genomic evaluations. Noirin McHugh PI, DAFM stimulus
Other sheep research areas in UCD

- Meat quality – RAMLAMB: Frank Monaghan and Alan Fahey
- Parasites – Torres Sweeney, Theo de Waal, Grace Mulcahy
- Flock Health – Michael Doherty
Collaboration

- Teagasc: Research and Advisory
- Sheep Ireland
- International: UK, France, NZ, Australia

Minimise duplication
Complementary research programs
Sheep Ireland Update
Sheep Ireland – Some Info

• Began in 2009
• Followed on from PSBIP (LMI)
• Little genetic progress in past 30 years
• 2.5 million breeding ewes
• 80,000 rams – 20,000 needed per annum
• In 2014 SI performance recorded 10,000 Pedigree ram lambs
• Over 35,000 lambs performance recorded (Including Pedigree & Commercial)
Ewe breeds Vs Recorded breeds

<table>
<thead>
<tr>
<th>Breed</th>
<th>No. of Performance recorded Lambs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texel</td>
<td>4944</td>
</tr>
<tr>
<td>Charollais</td>
<td>4557</td>
</tr>
<tr>
<td>Suffolk</td>
<td>3379</td>
</tr>
<tr>
<td>Belclare</td>
<td>1679</td>
</tr>
<tr>
<td>Vendeen</td>
<td>457</td>
</tr>
</tbody>
</table>

Top 3 breeds = 71%

Figures are taken from the NFS 2011
What does Sheep Ireland do?

- Ram looks are certainly important!!
- Not always a good indicator of future performance
- EuroStars use data to 'back-up' the looks
What does Sheep Ireland do?

Genetic Evaluations in action:

Super ewe
- Goes in lamb every year
- Has twins every year
- No lambing difficulty
- Both lambs drafted at weaning every year
- Never lame
- Ticks all the boxes
Why Euro-Stars are important?

'Lambs separated at birth'

Farm A: Intensive Farmer
- Creep feeding
- Super grass

Farm B: Extensive Farmer
- No creep feeding
- Poor Grass
Why Euro-Stars are important?

'Pick the best genetics'

Farm A: Intensive Farmer
- Creep feeding
- Super grass

Farm B: Extensive Farmer
- No Creep fed
- Poor Grass
# Sheep Ireland's Catalogue

<table>
<thead>
<tr>
<th>Lot:</th>
<th>Owner:</th>
<th>Breeder:</th>
</tr>
</thead>
<tbody>
<tr>
<td>IE042868504040G</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MD113040</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ballybur</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DOB: 28-Mar-2013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Twin</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Ancestry

- **Glenside Razzle Dazzle**
  - FPG1000055
- **Curley**
  - TYC09016
- **Oberstown Tornado**
  - PFI12026

## Euro-Star Indexes 06/10/2014

- **Replacement (€ 1.445)**
  - Acc 40% Rank Top 3%
- **Terminal (€ 0.786)**
  - Acc 43% Rank Top 1%

### Performance Indexes

- **Lamb Survivability (0.331%)**
  - Poor 0% ▲ Acc 36% 100%
- **Days to Slaughter**
  - 7.547 days 0% ▲ Acc 51% 100%
- **No. of Lambs Born** (€ 0.27)
  - 0% ▲ Acc 61% 100%
- **Daughters Milk** (€ 0)
  - 0% ▲ Acc 29% 100%
Sheep Ireland: Constraints

- **No CMMS**
  - Every Flock is manually set up and updated
  - Rams can not be tracked once sold (commercial)
  - ICBF model is not yet in place in sheep

- **Parentage assignment**
  - Mob mating
  - Single sire mating

- **Cost of AI**

- **Number of traits**
  - ~15 in sheep
  - ~35 in cattle

- **Data being recorded**
  - Need to significantly increase volume of data

- **Average pedigree and commercial flock size is small**

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**Average acc% of a new born calf in Ireland is 0.55**

**Average acc% of a new born lamb in Ireland is 0.18**
Sheep Ireland - Structure

• LambPlus (Pedigree Data)
  • 600 flocks in 2015

• MALP (Maternal Lamb Producers Group)
  • 3500 ewes single sire mated
  • Commercial data

• CPT (Central Progeny Test)
  • 2500 ewes AI’d in Oct 2014
  • Commercial data
Number of LambPlus Breeders

![Graph showing the increase in the number of LambPlus Breeders from 2008 to 2016. The number of Breeders increases significantly from around 100 in 2008 to over 600 in 2016.](#)
The Ram Search had over **38,000** hits last year.
Any Questions?

GEE, THESE EWES ARE MAD FOR THESE 5 STAR RAMS!

Lambing experience available on CPT Flocks

Find us on Facebook
Introduction to Animal Breeding & Genomics

Donagh Berry
Teagasc, Moorepark, Ireland

Donagh.berry@teagasc.ie
Traditional Animal Breeding

- Lamb has 40 day weight of 19 kg
- Ram accuracy 18%
Ram completes his progeny test

- Ram has 100 lambs on the ground
- More of his DNA expressed in the population
- Ram accuracy increases to ~60%
Using technology of today

- Dairy calf BV accuracy increases to ~ 76%
- Equivalent to 54 daughters milking
DNA - From the tip of your nose to the tops of your toes!!

DNA is the same in every cell of your body and doesn't change throughout your life.
How do we use this DNA information?
What is a SNP?

• 99.9% of human DNA is identical – most of the differences are in the form of SNPs

Single Nucleotide Polymorphism

Change
How do SNPs relate to performance?

<table>
<thead>
<tr>
<th>SNP</th>
<th>Var</th>
<th>40 day wt</th>
<th>Number lambs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>+5</td>
<td>-0.6</td>
</tr>
<tr>
<td>1</td>
<td>G</td>
<td>+20</td>
<td>-0.4</td>
</tr>
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</table>
Genomic selection

• Increase accuracy of selection at a younger age

• Traditionally used parental information
  • Progeny = $\frac{1}{2}$ mother + $\frac{1}{2}$ father DNA
  • Progeny = average of mother & father BVs
  • Assumed full sibs were identical

• Available SNP information can be used to supplement the traditional approach
  • See difference in full-sibs at birth
Indentifying Mendelian sampling term

The Irish Agriculture and Food Development Authority
Why not 100% accurate?

• Performance is typically affected by more than one gene
  • Up to 80% of human stature attributable to genetics – no major gene found to date
• Genes may influence more than one characteristic
• Genes interact with one another
• Genes interact with the environment
To Conclude

- Differences seen between individuals of a species are mostly due to SNPs (tiny pieces of DNA)

- We can relate SNP variants to performance
  - Genomic selection
OVIGEN
Multi-breed sheep genetic and genomic evaluations

Industry Meeting, 18th December 2014
Background

- Genetic gain levels **remain low**
- Farmer confidence → accuracy levels
- Can **improve accuracy** (and genetic gain):
  1. More on farm **recording**
  2. **Parentage** data
  3. Superior genetic evaluations
  4. **Genomic selection**
Objectives

1. Increase accuracy
2. Develop across-breed genomic selection
3. Reduce fluctuations in star ratings
<table>
<thead>
<tr>
<th>Phenotypes</th>
<th>RHF (97%)</th>
<th>JR094747 (83%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calving/ Lambing Difficulty</td>
<td>10,641</td>
<td>627</td>
</tr>
<tr>
<td>Mortality</td>
<td>13,009</td>
<td>674</td>
</tr>
<tr>
<td>Milk</td>
<td>117</td>
<td>568</td>
</tr>
<tr>
<td>Carcass weight</td>
<td>358</td>
<td>0 (301)</td>
</tr>
</tbody>
</table>
**Phenotypes**

- **Other phenotypes**
  - **Lambing:** lamb vigour, mothering ability
- **Farmer scored:** lamb quality, ewe mature size & milk
- **Carcass information:** CT scanning, factory data
- **Ewe stayability**
- **New web screens** → aid better recording
- **Integration of all flockbooks**
- **Data Quality Index**

**Results:** more accurate data for genetic evaluations
Traditional Animal Breeding

How can we improve the accuracy?

- Lamb has 40 day weight of 19 kg
- Ram accuracy 18%
Improving genetic evaluations

3. Across breed stars

Results: more accurate evaluations and less fluctuations

2. Increase accuracy

Comment:
International data

Accuracy v. low
International data

Steps

1. Identify foreign animals in national database
2. Agreement on sharing of genetic information
3. Research phase
4. Implementation

Research underway:
Eblex in UK... (for Texel and Charollais)
France (for Vendeen) & NZ (INZAC flock)
Others???
Genomic Selection

Objectives

1. Genotyping informative animals
2. Implement national genomic evaluations
Genotyping proposal

- Genotype ~12,000 animals
- Prerequisite to genotyping → MUST have data in Sheep Ireland
  - Without this genomic selection is useless
- Proposal
  - Genotype all pedigree ewes and rams from the breeds with sufficient data
First job - Population structure

How related are breeds? Can more breeds be included for genomics?
Predicted numbers of pedigree sheep to be recorded in 2015

<table>
<thead>
<tr>
<th>Breed</th>
<th>No. Sires</th>
<th>No. Dams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texel</td>
<td>355</td>
<td>3,150</td>
</tr>
<tr>
<td>Charollais</td>
<td>248</td>
<td>2,750</td>
</tr>
<tr>
<td>Suffolk</td>
<td>220</td>
<td>2,170</td>
</tr>
<tr>
<td>Belclare</td>
<td>74</td>
<td>828</td>
</tr>
<tr>
<td>Vendeen</td>
<td>62</td>
<td>290</td>
</tr>
</tbody>
</table>

**Genotype all ewes and rams**
Genotyping proposal
Need industry buy in!!
“Other” breeds

• How do we get genomics??

1. MUST have more data in Sheep Ireland
   • Without this genomic selection is useless

2. Investigate cheap parentage options
   • Ultra low cost options will be investigated
What's in it for me??

Lethal recessives

Scrapie

MSTN

Myomax

Genomes can do all of this in one step!!!

Parentage verification

Genomic selection

Breed information

Inbreeding

Genomics can do all of this in one step!!!

The Irish Agriculture and Food Development Authority
What do I need to do and when??

- **March 2015**: Commence DNA collection
- **August 2015**: Commence to genotype animals
- **January 2016**: Parentage & major gene results
- **Spring 2016**: Genotype option for lambs
- **January 2017**: Genomic selection preliminary results

Industry meeting
Project Rollout

- All DNA collected by Sheep Ireland
- SI mobile Pratley to visit all flocks

- Proposed begin date - Spring 2015
  - Will differ depending on breed
- Minimum - once lambs are old enough to handle
DNA Collection

• **Great opportunity to collect data:**
  • Weigh ewes
  • Collect BCS
  • Weigh 2015 born lambs
  • Tidy all flock Inventories
  • Other possible phenotypes being considered............
Taking the DNA sample

- DNA punches to be used
- Correlated with NSIS/EID tag
- Logged on SI database
- DNA owned by ‘Sheep Ireland’
- Enough DNA for other uses
- Storage location - to be decided
Take home messages

• For Genomics to work for Ireland all sectors need to contribute
• Genomics will not replace the need for hard work - Performance Recording
• Genomics will deliver higher accuracies and better €uroStars as a result
• Genomics will deliver many other benefits
  • Parentage
  • Info on lethal genes
  • Info on useful genes – Scrapie, Myomax, etc, etc
  • Inbreeding info