Lleyn Breeder Workshop
Shane Conway, Signet

The Shepherds Inn & Auctioneer, Carlisle, February 7th 2013
Overview

- Introduction & Overview of Recording
- Survey update
- Creation and interpretation of EBVs/Indexes
- Flock to flock linkage
- Sire Reference Scheme
- Planned R&D work (Ewe Longevity, Lamb Survival)
Why Breeding Improvement?

- Permanent, cumulative and cost-effective way of improving efficiency and product quality
- Way of responding to market changes
- Keep pace with other species eg. Cattle, Pigs & Poultry
THE PROBLEM:
How much of an animal’s performance is down to **GENES** and how much down to **ENVIRONMENT**?

**ENVIRONMENT?**  **GENOTYPE?**

**SUCCESS**
*it's not always what you see*
Maternal Traits

It is impossible to spot a rams’ maternal genetics by eye alone.
<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Ewes</th>
<th>No. of Lambs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>3061</td>
<td>5481</td>
</tr>
<tr>
<td>2001</td>
<td>3721</td>
<td>6564</td>
</tr>
<tr>
<td>2002</td>
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<td>6838</td>
</tr>
<tr>
<td>2003</td>
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<td>8916</td>
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<td>2004</td>
<td>5874</td>
<td>9846</td>
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<tr>
<td>2005</td>
<td>6755</td>
<td>12151</td>
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<td>2007</td>
<td>7450</td>
<td>13353</td>
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<td>2008</td>
<td>9028</td>
<td>16559</td>
</tr>
<tr>
<td>2009</td>
<td>8689</td>
<td>15544</td>
</tr>
<tr>
<td>2010</td>
<td>10790</td>
<td>19359</td>
</tr>
<tr>
<td>2011</td>
<td>10711</td>
<td>18812</td>
</tr>
<tr>
<td>2012</td>
<td>11115</td>
<td>19331</td>
</tr>
</tbody>
</table>
Breeding the Perfect Lleyn?
<table>
<thead>
<tr>
<th>Breed</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEXEL</td>
<td>203</td>
</tr>
<tr>
<td>SUFFOLK</td>
<td>71</td>
</tr>
<tr>
<td>CHAROLLAIS</td>
<td>67</td>
</tr>
<tr>
<td>HAMPSHIRE DOWN</td>
<td>57</td>
</tr>
<tr>
<td>LLEYN</td>
<td>50</td>
</tr>
<tr>
<td>BLUEFACED LEICS</td>
<td>31</td>
</tr>
<tr>
<td>DORSET</td>
<td>20</td>
</tr>
<tr>
<td>SCOTCHBLACKFACE</td>
<td>18</td>
</tr>
<tr>
<td>SHROPSHIRE</td>
<td>17</td>
</tr>
<tr>
<td>BELTEX</td>
<td>14</td>
</tr>
<tr>
<td>SOUTHDOWN</td>
<td>14</td>
</tr>
<tr>
<td>NORTH COUNTRY CHEVIOT PARK</td>
<td>11</td>
</tr>
<tr>
<td>WILTSHIRE HORN</td>
<td>11</td>
</tr>
<tr>
<td>COMPOSITE</td>
<td>9</td>
</tr>
<tr>
<td>WELSH MOUNTAIN</td>
<td>9</td>
</tr>
<tr>
<td>ZWARTBLES</td>
<td>9</td>
</tr>
<tr>
<td>EASYCARE</td>
<td>7</td>
</tr>
<tr>
<td>MEATLINC</td>
<td>6</td>
</tr>
</tbody>
</table>

......but average flock size is about 200 ewes vs. 35 for Texel

The potential for genetic change is massive
Signet have added an additional BLUP run on the 5th of August 2013 to accommodate the growing number of recorded Lleyn breeders.
Lleyn Survey Results
What do you wish to change about your Lleyn Sheep?

- Eight Week Weight
- Litter Size
- Maternal Ability
- Ewe Mature Size
- Scan Weight
- Muscle Depth
- Fat Depth

- Increase
- Maintain
- Decrease
- No Opinion
What do you think should be changed about the Lleyn sheep breed in general?
• There is a common opinion that most breeders wish to increase eight week weights, maternal ability, scan weight and muscle depth in their own flock, these are very similar within the breed in general too.

• Similarly the opinion of most is to maintain ewe mature size both in their flocks and the breed.

• In both it is of common agreement that maternal ability should be increased, high milk yields can lead to fast growing lambs which is imperative for profitability.

• Additional results from the this survey showed that 95% of breeders look at both the maternal and carcase indexes, this is very encouraging to see.
Genetic Evaluations
Identifying Superior Genetics

Genetics and the Environment

- Health
- Age
- Age of Dam
- Genetic Potential
- Year / Season
- Nutrition
- Birth & Rearing Type
Identifying Superior Genetics

Genetics and the Environment

Health
Age
Age of Dam

Year / Season
Nutrition
Birth & Rearing Type

Selecting a ram with superior breeding potential isn’t easy
Key messages

• Important to separate effects of “breeding” from “feeding”

• Not possible to identify animal with good breeding potential by “eye alone”

• Buyers need performance records
Through the analysis of pedigree and performance records a range of Estimated Breeding Values (EBVs) and Breeding Indexes are generated to help sheep producers identify genetically superior rams and ewes.
Estimated Breeding Values (EBVs) provide a measure of the breeding potential of an animal for a specific trait.

**EBVs are calculated using information from several sources:**
- Measurements from the animal itself
- Measurements from the animal’s herd mates (known as ‘contemporaries’)
- Measurements from the animal’s relatives and their contemporaries
- The degree to which one trait influences another (known as a ‘correlation’)
- The degree to which each trait is passed on to the next generation (known as ‘heritability’)
EBVs are calculated using a computational procedure known as BLUP.

Pedigree Data → Estimated Breeding Values

Performance Data → Estimated Breeding Values

Terminal Sire Traits
Maternal Traits

Index
BLUP calculates how much of each animal’s performance is due to its breeding merit and how much is due to the environment in which it has been raised.

EBVs predict the superiority (or inferiority) of the genes an animal possesses for each trait measured.
Lleyn Specific Genetic Parameters

Heritability (direct)

- Litter Size Born
- Mature Size
- Maternal Ability
- Fat Depth
- Muscle Depth
- Scan Weight
- Eight week weight

Heritability range: 0 to 0.5
Trait Correlations

• Correlation = The relationship between two variables

• Range between 0 and 1
  ➢ 0 = No Relationship
  ➢ 0.25 = Slight Relationship
  ➢ 0.75 = Strong Relationship
  ➢ 1 = Complete Relationship
Example: Correlation = 0

Relationship between Lot Number and Price
(Texel Rams at English National)
Example: Correlation = (Nearly) 1

Two operators weighing a set of lambs on the same day
# Genetic Correlations

<table>
<thead>
<tr>
<th></th>
<th>Eight week</th>
<th>Scan Weight</th>
<th>Muscle Depth</th>
<th>Fat Depth</th>
<th>Maternal Ability</th>
<th>Mature Size</th>
<th>Litter Size Born</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eight week weight</td>
<td>0.8</td>
<td>0.25</td>
<td>-0.02</td>
<td>0</td>
<td>0.5</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Scan Weight</td>
<td>0.42</td>
<td>0.21</td>
<td>0</td>
<td>0.56</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muscle Depth</td>
<td>0.07</td>
<td>0</td>
<td>0.57</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fat Depth</td>
<td>0</td>
<td>0.01</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal Ability</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mature Size</td>
<td>0.58</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Litter Size Born</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
EBVs

• Measured in the same units as the recorded traits and are thus easy to interpret (e.g. kg for liveweight)

• Expressed relative to a common baseline for all animals in the evaluation

• Can be compared across time - allowing genetic trends to be monitored

• Cannot be compared across breeds
<table>
<thead>
<tr>
<th>EBV</th>
<th>Trait</th>
<th>Characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Litter Size</td>
<td>Prolificacy</td>
<td>Maternal Performance</td>
</tr>
<tr>
<td>Maternal Ability (kg)</td>
<td>Maternal ability of ewe, relates to milk production</td>
<td></td>
</tr>
<tr>
<td>Eight Week Weight (kg)</td>
<td>Growth rate to eight weeks of age Maternal ability of ewe Weight at eight weeks of age.</td>
<td>Efficient growth</td>
</tr>
<tr>
<td>Scan Weight (kg)</td>
<td>Growth rate to 21 weeks of age</td>
<td></td>
</tr>
<tr>
<td>Muscle Depth (mm)</td>
<td>Carcase muscling</td>
<td>Lean meat yield Saleable meat</td>
</tr>
<tr>
<td>Fat Depth (mm)</td>
<td>Leanness</td>
<td></td>
</tr>
<tr>
<td>Mature Size (kg)</td>
<td>Ewe efficiency</td>
<td>Efficiency</td>
</tr>
</tbody>
</table>
Measuring Maternal Ability

When breeding female replacements, remember to check the ram’s Maternal Ability EBV.

- A ram passes his genes for Growth Rate and Maternal Ability to progeny.
- Progeny performance is influenced by genes for Growth Rate.
- The performance of lambs produced by female progeny are also influenced by his genes for Maternal Ability.

The influence of Maternal Ability could increase weaning weights by 2kg/lamb.
Ultrasound scanning

• A key element of performance recording of sheep through the Signet Service is the collection of accurate measurements of muscle and fat using ultrasound scanning machines at approximately 21 weeks of age.

• Breeders interested in carcase traits are encouraged to ultrasound scan all their lambs. Scanning creates higher accuracies and greater variance in EBVs that allow the breeder to identify high performing sheep in their flock.
Making best use of technician time on the farm

- Undercover area
- Accurate weight crate
- Scanning equipment
- Large table
- Breeding records
- Mains power
- Protected area
- Main handling system
- Adequate help
- Separate lots for male and female
Ewe mature size

Advantages
• Genetic link to lamb growth rates and carcase attributes
• Genetic link to maternal traits (in Lleyn?)
• Breeding ewe value?
• Cull ewe value
• Ability for ewe lambs to hold to the ram?

Disadvantages
• More feed required
• More housing capacity
• Lower stock density
• Heavier animals to handle
• May have poorer performance in harsh environment

Different sizes of Lleyn ewe may be economically more efficient under different environments
Ewe mature size

- Restricting ewe mature size will greatly reduce change in other traits – assuming the correlations used are correct

- Curve benders can be observed in population

- New genetic correlations may provide a better genetic solution

- Not all Lleyn flocks see an increase in mature size as an issue

ONLY 10 BREEDERS CURRENTLY RECORD EWE MATURE SIZE
Breeding Indexes

• While individual EBVs aid the selection of breeding stock for specific traits they can also be combined into breeding indexes.

• Each trait will be weighted within the index according to its relative economic importance in meeting a specific breeding objective or set of objectives.
Breeding Indexes

• Different breeders = different objectives
• No right answer
• Common approach and compromise

• Current indexes
  – Maternal Index
  – Carcase+ Index
Historic Maternal Index Construction

\[
\text{Index} = v_1 \ (8 \text{ week weight EBV}) + v_2 \ (\text{mature size EBV}) + v_3 \ (\text{litter size EBV}) + v_4 \ (\text{maternal ability EBV})
\]

(\text{where v1, v2 etc = weightings})

The historical maternal index construction took into account the 8 week weight EBV, Mature Size EBV, Litter Size EBV and Maternal Ability EBV, however in the past Lleyn breeders chose to remove Mature Size EBV & Litter Size EBV from this calculation.
Index weightings

Maternal Index

<table>
<thead>
<tr>
<th>trait</th>
<th>index weight (raw weighting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 Week Weight EBV</td>
<td>0.284</td>
</tr>
<tr>
<td>Maternal Ability EBV</td>
<td>0.716</td>
</tr>
</tbody>
</table>

Maternal Index
- No scanning data and no desire to change prolificacy

Carcase+ Index

<table>
<thead>
<tr>
<th>trait</th>
<th>index weight (raw weighting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scan Weight EBV</td>
<td>0.49</td>
</tr>
<tr>
<td>Muscle Depth EBV</td>
<td>1.11</td>
</tr>
<tr>
<td>Fat Depth EBV</td>
<td>-1.56</td>
</tr>
<tr>
<td>Maternal Ability EBV</td>
<td>0.83</td>
</tr>
</tbody>
</table>

Dual Purpose function
Accuracy Values

• The amount of data used to calculate the EBV / Index

• Expressed between 0 (nothing) & 100 (everything)

• Influenced by …
  – Whether the animal has been measured for the trait
  – Whether relatives have been measured for the trait
  – How heritable the trait is
  – Amount of information on correlated traits
  – Number of contemporaries recorded

• Accuracy Values are a measure of risk
Increase in Maternal Ability Accuracy
Lleyn Sires born since 2004

Accuracy Value for Maternal Ability vs. Number of Daughters
Using EBVs
Using EBVs is not complicated

**Buying a Recorded Lleyn Ram**

8 week weight EBV = higher early growth rate

Litter size EBV = more prolific ewes

Maternal ability EBV = ewes with more milk

High scan weight EBV = high growth rates

High muscle depth EBV = better conformation

Negative fat depth EBV = leaner lambs

Index = overall ranking

**Lleyn Breed Benchmark 2012**

The Breed Benchmark enables you to identify where a ram ranks within the breed.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Average</th>
<th>Top 25%</th>
<th>Top 10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eight Week Weight (kg)</td>
<td>0.70</td>
<td>1.20</td>
<td>1.63</td>
</tr>
<tr>
<td>Mature Size (kg)</td>
<td>1.15</td>
<td>2.79</td>
<td>4.26</td>
</tr>
<tr>
<td>Litter Size (kg)</td>
<td>-0.02</td>
<td>0.03</td>
<td>0.08</td>
</tr>
<tr>
<td>Maternal Ability (kg)</td>
<td>0.28</td>
<td>0.67</td>
<td>1.02</td>
</tr>
<tr>
<td>Scan Weight (kg)</td>
<td>1.11</td>
<td>2.02</td>
<td>2.84</td>
</tr>
<tr>
<td>Muscle Depth (mm)</td>
<td>0.38</td>
<td>0.85</td>
<td>1.29</td>
</tr>
<tr>
<td>Fat Depth (mm)</td>
<td>-0.07</td>
<td>-0.26</td>
<td>Leanser</td>
</tr>
<tr>
<td>Maternal Index</td>
<td>125</td>
<td>156</td>
<td>183</td>
</tr>
<tr>
<td>Carcase + Index</td>
<td>141</td>
<td>183</td>
<td>219</td>
</tr>
</tbody>
</table>
Breeding Data Online
Welcome to Signet
The national genetic evaluation service for cattle and sheep

You are here: Home

Beefbreeder

Get started

EBV search

Sheepbreeder

Get started

EBV search

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New Factsheet for Sheep Sale Cards Read more...
Genome wide scanning in beef cattle Read more...

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Sussex Breeding Summaries available - May 2011

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Animals & Members > Animals & Members

Click below to enter the BASCO animals and members search portal:

New Cattle Search - Click Here!!

New Sheep Search - Click Here!!

Looking for the old one, don't worry, it's still here, and can be used for member searches.

Animals & Members Search

The members portal currently allows:

- Searching of cattle/sheep breeders stored with BASCO
- Searching of cattle/sheep using identifiers and ebv's
- Viewing of back pedigree information
- Viewing of progeny listings
- Viewing of certain performance values
- Printing of animal/breeder factsheets
Flock
Connectedness
Flock connectedness – a measure of genetic linkage

Genetic linkage between flocks can be measured and is referred to as “flock connectedness” – a measure indicating the strength of linkage between flocks and how confidently EBVs and indexes can be compared between flocks.

Flock connectedness is influenced by:

- Number of genetic links to other flocks
- Closeness of the relationship between related animals
- Number of years/animals recorded in the flock

The rate of genetic gain achieved within a breed will be accelerated if recorded flocks are well connected to each other.
“An outstanding sheep is more likely to be found amongst 6,000 ewes than in a flock of 60.”
<table>
<thead>
<tr>
<th></th>
<th>Flock status</th>
<th>Across-flock comparisons</th>
<th>Linkage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Green</strong></td>
<td>Well connected</td>
<td>Can be made with confidence</td>
<td>Maintain at current level</td>
</tr>
<tr>
<td>Values above 0.025</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Amber</strong></td>
<td>Limited connectedness</td>
<td>Should be made with more care</td>
<td>Should be improved to reach acceptable level</td>
</tr>
<tr>
<td>Values between 0.0125 and 0.025</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Red</strong></td>
<td>Poor connectedness</td>
<td>Across-flock comparisons should be made with caution. However, within-flock rankings are accurate</td>
<td>Should be greatly improved to enable accurate across-flock comparisons</td>
</tr>
<tr>
<td>Values below 0.0125</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Improving Flock Connectedness

• The quickest, and best, way to generate high levels of flock connectedness is to mate a proportion of the flock (typically 30 ewes) to a Reference Ram or a Stock Sire that has been widely used in recorded flocks.

• Many breeders could improve their connectedness by purchasing rams from well-connected flocks.

• Rams should also be fully performance recorded.

• Once progeny are on the ground, retain high index lambs from these well connected sires for breeding purposes.

• Flocks should try to use at least one ram in their flock for more than one year.
Lleyn Sire Reference Group

- In the late 1970’s some of the “founding fathers” of the breed set up the original Lleyn Sheep Breeding Group.

- This was a nucleus flock which sought to improve the performance of the Lleyn.

- The Breeding Group evolved into the current Sire Reference Group.
Selection Day

- Autumn Selection Day - high indexed ram lambs are assessed by the group
  - Prize for the top scoring ram lamb

- Members can hire ram lambs - improving the genetic linkage between flocks and providing access to high quality genetics.
Bill Evans is the main contact at the moment
Welcome!

In the late nineteen seventies some of the “founding fathers” of the breed set up the original Lleyn Sheep Breeding Group. This was based on a nucleus flock, and sought to improve the performance of the Lleyn sheep as a maternal breed through performance recording. The Breeding Group evolved into the current Sire Reference Group.

In 2009 we decided after several years of selecting a “Supersire” whose semen was made available for each member to use on a number of their ewes, to change over to a system of
SRS Spring Event

TO BE CONFIRMED

• Sire Reference Scheme Spring Event kind permission of E & P Evans, Longland’s Farm, Whitbourne, Worcestershire

• Everyone welcome!

Provisional date is Sunday May 12th 2013
Future Research and Development Work
Genetic Parameter Review

• Lleyn and Dorset sheep will be the first breeds reviewed
  – Relook at heritability and correlation values in Lleyn based on the most recent data

• This may mean changes in ranking of animals
Management Groups

• Management group fitted at scanning time (21 weeks of age)

• Database and then BLUP model being enhanced to include Management Group at 8 weeks of age and mature size
EBLEX funded work at SAC being undertaken with a view to producing

– Litter Size Born EBV

and a

– Litter Size Reared EBV

Further EBLEX funded work looking at the differential as “lamb survival” in a SBF dataset this has been shown to have a heritability around 0.15
Ewe longevity
(EBLEX research proposal)

• Longevity
  – Low heritability
  – High economic value

• Records of death are limited

• Better approach “lifespan” – looking at time between birth and last natural lambing – as per beef
Electronic Data Transfer

The Signet Guide to......
providing electronic sheep data

The file specification for sending sheep records to Signet in an electronic format (Version 5, Dated 1st September 2011)

The Signet Sheepbreeder service has the facility to accept data in an electronic format. Supplying data in this format will enable records to be uploaded directly to BASCO, reducing operator error and enabling results to be processed faster. This approach will be particularly useful for larger flocks and those with their own on-farm software.

For data to be uploaded it needs to be supplied in the exact format shown overleaf. There are 24 fields in total, but only 9 are compulsory. Many fields (such as ET recipient or breed) will have a standard replicated entry. These fields assume records will be sent using an Excel spreadsheet or csv file.

User notes:
- Identifiers need to match Signet records exactly – extra or missing, spaces or dashes within an number fields will cause records to be rejected.
- If you need to check the Signet recognised Flockbook Number for a sire or dam known to Signet, please check it using “Can’t search” on the Signet website.
- Sires and dams must not be more than 10 years older than their progeny.
- Sires and dams must be at least 200 days older than their progeny.
- Although Prefixes and Names of up to 50 characters can be used, long IDs should be avoided as they may create recording problems.
- Example Code – is the part of the Flockbook Number that indicates the holding. For a flock of "ABC000", the Flock Code will be "ABC". This field enables Signet to identify the breeder (if it is a Signet client), as well as establishing the owner.
- Lambing ease scores – please use scores 1-5 (see table).
- Breed – use Signet recognised breed name (see table).
- Breed Code – this is a numeric value that relates to a specific breed. Please use the Signet recognised breed code (see table).

Breed Names and Codes
- "This is a list of recognised Breed names and Breed Codes:"

If your breed is not listed, please contact Signet directly.

Lambing Ease Scores
- "Flocks wishing to score lambing ease should use the following scores:"
- "The scores are as follows:"
- 1 = no assistance
- 2 = slight assistance by hand
- 3 = severe assistance
- 4 = non-surgical veterinary assistance
- 5 = surgical veterinary assistance (surgery)
- 6 = elective caesarean

Lambing Ease Factsheet available at: www.signetlive.co.uk

Fostering
- "Fostered lambs can be recorded in:"
- "FOSTER DETAILS"
<table>
<thead>
<tr>
<th>FIELD NAME</th>
<th>Compulsory</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELECTRONIC ID</td>
<td>NO</td>
<td>EID must be in format: 8260FFFFFAAAAA</td>
</tr>
<tr>
<td>UK NUMBER</td>
<td>NO, but preferable</td>
<td>UK Tag must be in format: UK 0 123456 12345</td>
</tr>
<tr>
<td>FLOCKBOOK NUMBER</td>
<td>YES</td>
<td>5 and 17 characters.</td>
</tr>
<tr>
<td>SEX</td>
<td>YES</td>
<td>M, F or C</td>
</tr>
<tr>
<td>DATE OF BIRTH</td>
<td>YES</td>
<td>DD/MM/YYYY or DDMMYYYY</td>
</tr>
<tr>
<td>BORN AS</td>
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<td>1,2,3,4,5,6, N/A</td>
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<tr>
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<tr>
<td>STATUS</td>
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<td>LIVE, DEAD or SOLD</td>
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<tr>
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<td>The Flock Code used in front of Sheep ID</td>
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<td>Exact FLOCKBOOK NUMBER of Dam (must exist in BASCO)</td>
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<td>SIRE FLOCKBOOK NUMBER</td>
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<td>Exact FLOCKBOOK NUMBER of Sire (must exist in BASCO)</td>
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<td>EMBRYO TRANSPLANT</td>
<td>YES</td>
<td>Y or N</td>
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<tr>
<td>RECIPIENT DAM FLOCKBOOK NUMBER</td>
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<td>Exact FLOCKBOOK NUMBER of Recipient or &quot;-&quot;</td>
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<td>CONSTITUENT_BREED_ONE</td>
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<td>Number 1-16 (or blank)</td>
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<td>Trading Name</td>
<td>Address</td>
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<tr>
<td>Finlay McGowan</td>
<td>Finlay McGowan</td>
<td>Inchecich Farms (Inchecich Flock) Arroth</td>
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### Owned Animals
- Male
- Female
- Castrate
- Live
- Dead
- Sold

### Search Criteria
- Breed: LLEYN
- Breeder Prefix: INCHECICH
- Sex: M, F, C
- Status: Live, Dead, Sold

### Search Results
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Summary

• Economically important traits are being recorded in large numbers in the Lleyn breed
• Genetic linkage issues need consideration
• Development work will provide a better understanding of genetic relationships
• Research work may lead to the development of new traits