Where Next for Dairy Breeding?
ICBF & Barryroe Meeting
11th June 2008

USE OF INSEMINATION DATA IN CATTLE BREEDING; SOME EXPERIENCES FROM IRELAND.

A. Cromie, F. Kearney, R Evans, D Berry, D Wilhelmus.

ICAR/Interbull Meeting.
36th ICAR Session, Niagara Falls, United States
16-20th June.

Use insemination data to try and avoid this!
Where Next for Dairy Breeding?
ICBF & Barryroe Meeting
11th June 2008

Overview

• Background – Irish Cattle Breeding.
• Use of Insemination data;
  1. Collection of insemination data.
  2. Use of insemination data in ICBF genetic evaluations.
  3. Use of insemination data as a support tool in decision making.
• Comments/discussion.

ICBF - Background

• Formally established in 2000
• 4 key functions;
  1. Leadership/direction.
  2. Central Database (Animal Events)
  3. Genetic Evaluations (e.g., EBI)
  4. Breeding scheme (G€N€ IR€LAND).
MEMBERS AND BOARD OF ICBF

<table>
<thead>
<tr>
<th>Board of 16</th>
<th>Shares</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>18%</td>
</tr>
<tr>
<td>18%</td>
<td>3</td>
</tr>
</tbody>
</table>

ICBF & DAF 1

Dairy; 120k AI replace/yr (~45% total).
Beef; 30k AI replace/yr (~15% total)

450k cows/yr (~40% total)

Dairy; 50k heifers/yr (~20% total)
Beef; 20k heifer/yr (~10% total)

Progress ~ 5%/year in key cattle breeding data.

~70% of herds involved in ICBF database (Animal Events)

Dairy: 1.1 mill cows & 20k herds.
Beef: 1.1 mill cows & 80k herds.
Use of Insemination Data

1. Collection of insemination data.
2. Use of insemination data in ICBF genetic evaluations.
3. Use of insemination data as a support tool in decision making.
1. Collection of Insemination Data

i. Trends in recording
ii. Technician recording of AI data
iii. Farmer recording of AI data
iv. Future plans

i. Trends in Recording

- >100% increase in AI recording.
- ~40% of total AI events in 2007 (& 70% in 2008)
Where Next for Dairy Breeding?
ICBF & Barryroe Meeting
11th June 2008

ii. Technician Recording

• AI handheld technology
  - Itronix handheld
  - Linked to database (GPRS).
  - All cows on hand-held.
  - Docket printed on-farm.
  - 240 now in operation (90%)
• Major benefits.
  - Inbreeding & lethal gene check.
  - Farmer support;
    • Sire Advice.
    • Fertility management
  - AI Company support;
    • No docket!
    • Fertility management.
    • Invoicing & stock control

iii. Farmer recording of AI data

• 157k - 63% Farm PC, 9% sheets & 28% via ICBF website
• Web-based recording - New for 2007
  - Breeding charts for on-farm recording (during season)
  - Web-based recording (end of season).
  - Farmers can also record “as events happen”.
• Link to Fertility management reports.
ICBF Breeding Chart

Animal ID, Ancestry & EBI, calving data

Suggested Matings

Record Serves.

Printed A3 “card-board” and put on the wall of the dairy/office
iv. Future Plans

- Complete roll-out of handheld technology.
  - ~80% of serves.
- Further develop web-based systems
- PDA’s & Mobile phones.
- Key driver of uptake is simple recording systems & good information for farmers/industry.

2. Use of Insemination Data in GE
2. Use of Insemination Data in Genetic Evals.

- Current;
  - Data edits for female fertility.
  - Genetic Evaluation of Gestation Length.
- Future;
  - Gestation Length Improvements
  - Other Fertility Traits
  - Validation of Sire Births.

(i) Data edits for fertility

- Female fertility is a trait of major economic importance in Ireland (24% relative weighting in EBI).
- CI Days evaluated on basis of 300-600 days (& 600 days set to missing).
- Poor fertility bulls over-evaluated?
- Use insemination data to identify cows where an “attempt” to breed has been made.
(i) Data edits for fertility

<table>
<thead>
<tr>
<th>Parity</th>
<th>Old Eval (Nov 07)</th>
<th>New Eval (Nov 07)</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>805,762</td>
<td>834,794</td>
<td>29,032</td>
</tr>
<tr>
<td>2</td>
<td>649,783</td>
<td>671,959</td>
<td>22,176</td>
</tr>
<tr>
<td>3</td>
<td>502,161</td>
<td>517,301</td>
<td>15,140</td>
</tr>
</tbody>
</table>

- 3% more records.
- Correlation = 0.93.
- Poor fertility bulls penalised most.
(ii) Genetic Evaluation of Gestation Length (direct)

<table>
<thead>
<tr>
<th>Breed of AI Sire</th>
<th>No. Sires Evaluated</th>
<th>Raw Mean</th>
<th>Genetic Data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mean St Dev</td>
</tr>
<tr>
<td>Holstein</td>
<td>1,796</td>
<td>281.9</td>
<td>-1.0 0.98</td>
</tr>
<tr>
<td>Friesian</td>
<td>242</td>
<td>281.5</td>
<td>-1.5 1.07</td>
</tr>
<tr>
<td>Limousin</td>
<td>166</td>
<td>289.6</td>
<td>3.6 0.98</td>
</tr>
<tr>
<td>Charolais</td>
<td>153</td>
<td>288.5</td>
<td>2.3 0.89</td>
</tr>
<tr>
<td>Belgian Blue</td>
<td>131</td>
<td>284.6</td>
<td>-0.3 0.94</td>
</tr>
<tr>
<td>Angus</td>
<td>121</td>
<td>283.8</td>
<td>-0.3 0.87</td>
</tr>
<tr>
<td>Hereford</td>
<td>119</td>
<td>286.4</td>
<td>0.8 0.91</td>
</tr>
<tr>
<td>Simmental</td>
<td>95</td>
<td>288.5</td>
<td>2.3 0.93</td>
</tr>
<tr>
<td>Montbelliarde</td>
<td>93</td>
<td>286.9</td>
<td>1.4 1.03</td>
</tr>
</tbody>
</table>

(i) Future; Gestation Length

<table>
<thead>
<tr>
<th></th>
<th>1st Parity (Direct)</th>
<th>Later Parity (Direct)</th>
<th>1st Parity (Maternal)</th>
<th>Later Parity (Maternal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Parity (Direct)</td>
<td>0.36</td>
<td>0.74</td>
<td>0.01</td>
<td>-0.03</td>
</tr>
<tr>
<td>Later Parity (Direct)</td>
<td>0.44</td>
<td>0.03</td>
<td>-0.24</td>
<td></td>
</tr>
<tr>
<td>1st Parity (Maternal)</td>
<td>0.04</td>
<td>0.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Later Parity (Maternal)</td>
<td>0.08</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- High heritability (dir=.40, mat=0.06)
- High correlations between parities
- No correlation between direct & maternal.
- Multi-trait calving evaluation for Gestation Length, Calving Difficulty & Calf Mortality.
(ii) Future; New Fertility Traits

<table>
<thead>
<tr>
<th>Trait</th>
<th>Number of records</th>
<th>Mean</th>
<th>h2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calving to 1st Service</td>
<td>45,370</td>
<td>83.16</td>
<td>0.0579 (0.0105)</td>
</tr>
<tr>
<td>Calving Interval</td>
<td>55,910</td>
<td>395.4</td>
<td>0.0187 (0.0054)</td>
</tr>
<tr>
<td>Submission Rate (21d)</td>
<td>36,224</td>
<td>0.6466</td>
<td>0.0160 (0.0057)</td>
</tr>
<tr>
<td>Number serves</td>
<td>45,370</td>
<td>1.535</td>
<td>0.0120 (0.0044)</td>
</tr>
<tr>
<td>Pregnant to first service</td>
<td>29,656</td>
<td>0.5166</td>
<td>0.0082 (0.0052)</td>
</tr>
<tr>
<td>Pregnancy rate (42 days)</td>
<td>29,646</td>
<td>0.6233</td>
<td>0.0355 (0.0096)</td>
</tr>
</tbody>
</table>

- Range of new fertility traits being examined – using insemination data.
- Calving to 1st service – promising.
- Currently looking at correlations with goal traits (CI Days) as an early predictor trait.

(iii) Future; Validation of Sire ID (insem vs. birth)

<table>
<thead>
<tr>
<th>Month of Insemination</th>
<th>Number of insemination &amp; birth records*</th>
<th>Number of sire errors</th>
<th>Error rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr</td>
<td>17,341</td>
<td>488</td>
<td>2.8%</td>
</tr>
<tr>
<td>May</td>
<td>25,102</td>
<td>1,769</td>
<td>7.0%</td>
</tr>
<tr>
<td>Jun</td>
<td>6,192</td>
<td>914</td>
<td>14.8%</td>
</tr>
</tbody>
</table>

*Within 280-290 days

- 6% errors between sire identified at birth & insemination record.
- Increases with season (stock bulls)
- What to do next?
3. Use of Insemination Data in Decision Support

3. Use of Insemination Data as a Support Tool

- Farmers;
  - Farm fertility management reports
  - Sire Advice Information
- AI Companies;
  - AI Management Information
  - Invoicing & semen stock.
- Future Plans.
Farmer Fertility Reports

- Range of reports
  - During season (3 weeks, 6 weeks & 9 weeks)
  - End of breeding season.
- Key performance statistics & Action Lists for cows.
- Available by web or paper.

Fertility Reports; 3 weeks

<table>
<thead>
<tr>
<th>2. Herd Performance</th>
<th>Herd</th>
<th>National Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-day Submission rate (%)</td>
<td>Your Herd</td>
<td>73%</td>
</tr>
<tr>
<td></td>
<td>National Average</td>
<td>53%</td>
</tr>
<tr>
<td>3 weeks</td>
<td>71%</td>
<td>13%</td>
</tr>
<tr>
<td>% of cows not submitted &amp; calved &gt; 20 days</td>
<td>Your Herd</td>
<td>10%</td>
</tr>
<tr>
<td>% of cows not submitted &amp; calved &gt; 20 days</td>
<td>National Average</td>
<td>36%</td>
</tr>
<tr>
<td>3 weeks</td>
<td>14%</td>
<td>12%</td>
</tr>
</tbody>
</table>
Fertility Reports; Problem Cows

4. Action List

Do not return this sheet to the Animal Events office.

The following cows may have reproductive problems and should be investigated further. Note that this list may include cows to be culled.

Cows not yet submitted for service that have calved greater than 30 days.

<table>
<thead>
<tr>
<th>FB</th>
<th>Cow ID</th>
<th>Lactation</th>
<th>Calving Date</th>
<th>Days in Milk</th>
<th>Problems/Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>63</td>
<td>IEFT20006E</td>
<td>9</td>
<td>22/04/2008</td>
<td>39 days</td>
<td></td>
</tr>
<tr>
<td>264</td>
<td>IE14176389004</td>
<td>5</td>
<td>01/04/2008</td>
<td>80 days</td>
<td></td>
</tr>
<tr>
<td>267</td>
<td>IE14176382007</td>
<td>5</td>
<td>20/04/2008</td>
<td>94 days</td>
<td></td>
</tr>
<tr>
<td>478</td>
<td>IE14176379047E</td>
<td>1</td>
<td>11/04/2008</td>
<td>56 days</td>
<td></td>
</tr>
<tr>
<td>483</td>
<td>IE141763840483</td>
<td>1</td>
<td>15/05/2008</td>
<td>116 days</td>
<td></td>
</tr>
</tbody>
</table>

Fertility Reports; End of Season

Calving

- Calving period:
  - Start: 28/01/2007
  - Median: 16/02/2007
  - Finish/Last calving: 30/04/2007

- Related events:
  - Total cows calved during the calving period: 48
  - Calving internal (days): 371 days
  - % cows calved by 6 weeks: 74%

Mating

- Mating period:
  - Mating Start Date (M50): 28/04/2007
  - Finish/Last serve: 16/06/2007
  - Length breeding season: 16 weeks 6 days
  - Cows calved and served: 49
  - Number of serves: 91
  - Cows confirmed pregnant: 44

- Farmer friendly reports for end of breeding season.
Fertility Reports; End of Season

<table>
<thead>
<tr>
<th>Category</th>
<th>Your Herd</th>
<th>National Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>c. 21-day submission rate (%)</td>
<td>76%</td>
<td>55%</td>
</tr>
<tr>
<td>d. 42-day submission rate (%)</td>
<td>98%</td>
<td>76%</td>
</tr>
<tr>
<td>g. 6-week pregnancy rate (%)</td>
<td>61%</td>
<td>55%</td>
</tr>
<tr>
<td>h. Overall pregnancy rate (%)</td>
<td>96%</td>
<td>91%</td>
</tr>
</tbody>
</table>

Sire Advice for Farmers

- Run by farmer, AI company or “default.
  - Max EBI, min inbreeding, min cost of semen
- All bulls & breeds.
- Allocated to cows.
- Bull selection saved – loaded to AI handheld + included on breeding chart.
- Completing the loop;
  - Cow calves......Genetic evaluation....Sire Advice.....Information to farmers....Recorded insemination.....Due Calving.....Cow calves....
AI Management Information

- Fertility management reports
  - Bull, technician, region.
- Semen invoicing & stock control
  - No “docket processing” – real-time information.
  - Timely invoicing.
  - Better stock control management
- Better for AI company & farmers.
AI Management Data – Future Plans

- More reports for AI companies.
- Getting reports back to farmers;
  - 3 weeks, 6 weeks, 9 weeks….but paper based?
  - Key performance indicators & SMS text messaging.
- ICBF Active Bull List.
  - Availability of AI bulls.

Summary

- Insemination data is a key component of effective breeding.
  - Cow calves......Genetic evaluation....Sire Advice.....Information to farmers....Recorded insemination.....Due Calving....Cow calves....
- ICBF; 2-pronged strategy;
  - Better data collection (handhelds & web)
  - Better reports (high value & timely)
- Results in better data for genetic evaluation.
- More profit for Irish farmers (爱尔兰)
Thank You.