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!
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 (*GENE IRELAND*).
MEMBERS AND BOARD OF ICBF

AI
- Munster Al
- Dairygold
- Kerry
- SWS
- Progressive Genetics
- Dovea Al

Milk Recording
- Dairygold
- Kerry
- SWS
- Progressive Genetics
- Arrabawn
- Tipperary
- Connacht Gold

Farm Organisations
- IFA
- ICMSA

Board of 16
- ICBF
- DAF 1

Shares
- 18%
- 18%
- 18%
- 46%

Herdbooks
- Holstein Friesian
- Belgian Blue
- Angus
- Aubrac
- Blonde d'Aquitaine
- Charolais
- Hereford
- Limousin
- Normande
- Parthenais
- Piedmontese
- Shorthorn
- Simmental
- Jersey
- Kerry
- MRI
- Montbeliarde
- Rotbunt
- Saler
- ICBF
Dairy; 120k AI replace/yr (~45% total).
Beef; 30k AI replace/yr (~15% total)

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

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.

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
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)
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 dockets!
    - 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

### Dairy Herd Breeding Chart

**HerdOwner**: PAT CRONIN  
**NID**: IE1417638  
**Year**: 2008

<table>
<thead>
<tr>
<th>Cow Details</th>
<th>Proposed Bulls</th>
<th>Service Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cow Tag</td>
<td>Bull 1</td>
<td>Bull 2</td>
</tr>
<tr>
<td>IEFTZ0054R</td>
<td>54</td>
<td>120</td>
</tr>
<tr>
<td>IEFTZ0055P</td>
<td>55</td>
<td>94</td>
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<tr>
<td>IEFTZ0068E</td>
<td>68</td>
<td>121</td>
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<td>IEFTZ0080M</td>
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<td>93</td>
</tr>
<tr>
<td>IE14176380127</td>
<td>127</td>
<td>138</td>
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<tr>
<td>IE14176380157</td>
<td>157</td>
<td>116</td>
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<td>217</td>
<td>84</td>
</tr>
<tr>
<td>IE141763803221</td>
<td>219</td>
<td>80</td>
</tr>
</tbody>
</table>

- **Animal ID**, Ancestry & EBI, calving data
- **Suggested Matings**
- **Record Serves.**
- Printed A3 “card-board” and put on the wall of the dairy/office
Irish Cattle Breeding Federation

Services
- HerdPlus
- GENE IRELAND
- Genetic Evaluations
  - Farm Software Bull Files
- Tally Beef Centre
- Milk Recording
- Herdbook Services
- Suckler Scheme

ICBF Sign Up Form

ICBF Active Bull List

Publications
- This Week's Report (pdf)
- Past Weekly Reports
- Cattle Statistics
- Annual Reports
- Academic Papers

Learn more about ICBF
- Contact Information
- Costs and Benefits
- The Database
- Members
- Structure
- International Representation
- Legal and Privacy

HerdPlus
Profit through Science

Online Services
User name
[191417638]
Password
[********]

Where do I get my username and password?
Experiencing problems - Click Here

Bull Search
Search by
- Code, Tsg, Herd Book
- N. I. T. T.
- Name or part of name

Any comments on the new icbf website can be submitted here
**Record AI Events**

If you entered serve data incorrectly, please click here to delete.

**Note:** Help on entering multiple serves, click here.

<table>
<thead>
<tr>
<th>FB Jumbo</th>
<th>Animal Number</th>
<th>Last No</th>
<th>Last Calved Date</th>
<th>Last Served Date</th>
<th>Num Serves</th>
<th>Last Served Bull</th>
<th>DATE Day / Mth / Year</th>
<th>Bull Used</th>
<th>Site Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>54</td>
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<td></td>
<td></td>
<td></td>
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<tr>
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<td>9</td>
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<td>25-APR-08</td>
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<td>BUJ</td>
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<tr>
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<td></td>
<td></td>
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<td>06-MAY-08</td>
<td>1</td>
<td>UYC</td>
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</tr>
</tbody>
</table>

**Total:** 77 animals

**Selected:** 0 animals
### Fertility Profile for Herd

<table>
<thead>
<tr>
<th>FB Jumbo</th>
<th>Animal Number</th>
<th>Calving Date</th>
<th>Lact Num</th>
<th>Last Served</th>
<th>Last Bull</th>
<th>Num Serves</th>
<th>Last Preg Diag</th>
<th>Days in Calf</th>
<th>Days in Milk</th>
<th>Dry Date</th>
<th>Exp Calving Date</th>
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<tbody>
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<td>3</td>
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<td></td>
<td>63</td>
<td>141</td>
<td>23-JAN-09</td>
<td></td>
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<tr>
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<td>2</td>
<td>16-APR-08</td>
<td>LEV</td>
<td>1</td>
<td></td>
<td>63</td>
<td>130</td>
<td>23-JAN-09</td>
<td></td>
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<tr>
<td>463</td>
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<td>18-APR-08</td>
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<td>141</td>
<td>25-JAN-08</td>
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<td>470</td>
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<td>1</td>
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<td>LEV</td>
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<td>UYC</td>
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<td>57</td>
<td>127</td>
<td>29-JAN-08</td>
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<td>57</td>
<td>107</td>
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<td>22-APR-08</td>
<td>LEV</td>
<td>1</td>
<td></td>
<td>57</td>
<td></td>
<td>29-JAN-08</td>
<td></td>
</tr>
</tbody>
</table>

**Total Number of animals: 73**
iv. Future Plans

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

- 3% more records.
- Correlation = 0.93.
- Poor fertility bulls penalised most.
(i) Data edits for fertility

Delta Cleitus Jabot

PTA current data (600 days)

PTA new data (800 days)
(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</td>
</tr>
<tr>
<td>Holstein</td>
<td>1,796</td>
<td>281.9</td>
<td>-1.0</td>
</tr>
<tr>
<td>Friesian</td>
<td>242</td>
<td>281.5</td>
<td>-1.5</td>
</tr>
<tr>
<td>Limousin</td>
<td>166</td>
<td>289.6</td>
<td>3.6</td>
</tr>
<tr>
<td>Charolais</td>
<td>153</td>
<td>288.5</td>
<td>2.3</td>
</tr>
<tr>
<td>Belgian Blue</td>
<td>131</td>
<td>284.6</td>
<td>-0.3</td>
</tr>
<tr>
<td>Angus</td>
<td>121</td>
<td>283.8</td>
<td>-0.3</td>
</tr>
<tr>
<td>Hereford</td>
<td>119</td>
<td>286.4</td>
<td>0.8</td>
</tr>
<tr>
<td>Simmental</td>
<td>95</td>
<td>288.5</td>
<td>2.3</td>
</tr>
<tr>
<td>Montbelliarde</td>
<td>93</td>
<td>286.9</td>
<td>1.4</td>
</tr>
</tbody>
</table>
(i) Future; Gestation Length

<table>
<thead>
<tr>
<th></th>
<th>1\textsuperscript{st} Parity (Direct)</th>
<th>Later Parity (Direct)</th>
<th>1\textsuperscript{st} Parity (Maternal)</th>
<th>Later Parity (Maternal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1\textsuperscript{st} 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></td>
<td></td>
<td>0.03</td>
<td>-0.24</td>
</tr>
<tr>
<td>1\textsuperscript{st} Parity (Maternal)</td>
<td>0.04</td>
<td></td>
<td>0.89</td>
<td></td>
</tr>
<tr>
<td>Later Parity (Maternal)</td>
<td></td>
<td></td>
<td></td>
<td>0.08</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>
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<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 weeks gone and 90% of the cows bred!
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.
2. Herd Performance
The performance of your herd has been expressed relative to other recorded herds (with a minimum of 30 calvings)

<table>
<thead>
<tr>
<th>Category</th>
<th>Your Herd (%)</th>
<th>National Average (%)</th>
<th>Btm 15%</th>
<th>Achievable</th>
<th>Top 15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 21-day Submission rate (%)</td>
<td>75%</td>
<td>53%</td>
<td>32%</td>
<td>71%</td>
<td></td>
</tr>
<tr>
<td>% of cows submitted for mating within 21 days of MSD (40 cows) as a proportion of the herd calved up to 21 days after MSD (53 cows)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. % of cows not submitted &amp; calved &gt; 30 days</td>
<td>10%</td>
<td>36%</td>
<td>56%</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>% of cows calved &gt; 30 days at MSD (41 cows) and not yet submitted within 21 days of MSD (4 cows)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. % of cows not submitted &amp; calved &gt; 50 days</td>
<td>9%</td>
<td>32%</td>
<td>50%</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>% of cows calved &gt; 50 days at MSD (32 cows) and not yet submitted within 21 days of MSD (3 cows)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></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>68</td>
<td>IEFFTZ0068E</td>
<td>9</td>
<td>22/04/2008</td>
<td>39 days</td>
<td></td>
</tr>
<tr>
<td>264</td>
<td>IE141763880264</td>
<td>5</td>
<td>01/04/2008</td>
<td>60 days</td>
<td></td>
</tr>
<tr>
<td>267</td>
<td>IE141763820267</td>
<td>5</td>
<td>28/03/2008</td>
<td>64 days</td>
<td></td>
</tr>
<tr>
<td>478</td>
<td>IE141763870478</td>
<td>1</td>
<td>11/04/2008</td>
<td>50 days</td>
<td></td>
</tr>
<tr>
<td>483</td>
<td>IE141763840483</td>
<td>1</td>
<td>15/02/2008</td>
<td>106 days</td>
<td></td>
</tr>
</tbody>
</table>
Fertility Reports; End of Season

<table>
<thead>
<tr>
<th>Calving</th>
<th>Mating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calving period</strong></td>
<td><strong>Mating period</strong></td>
</tr>
<tr>
<td>Start</td>
<td>Mating Start Date (MSD)</td>
</tr>
<tr>
<td>Median</td>
<td>Finish/Last serve</td>
</tr>
<tr>
<td>Finish/Last calving</td>
<td>Length breeding season</td>
</tr>
</tbody>
</table>

**Related events**
- Total cows calved during the calving period: 49
- Calving interval (days): 371 days
- % cows calved by 6 weeks: 74%
- Cows confirmed pregnant: 44

Calving & serve patterns, Spring 2007

- 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><strong>c. 21-day submission rate</strong></td>
<td>76%</td>
<td>59%</td>
</tr>
<tr>
<td>% of cows submitted for mating within 21 days of MSD, as a proportion of the herd calved up to 21 days after MSD</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>d. 42-day submission rate</strong></td>
<td>98%</td>
<td>76%</td>
</tr>
<tr>
<td>% of cows submitted for mating within 42 days of MSD, as a proportion of the herd calved up to 42 days after MSD</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>g. 6-week pregnancy rate</strong></td>
<td>61%</td>
<td>55%</td>
</tr>
<tr>
<td>% of cows pregnant within 6 weeks of MSD (as a proportion of all cows calved and submitted)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>h. Overall pregnancy rate (to-date)</strong></td>
<td>90%</td>
<td>91%</td>
</tr>
<tr>
<td>% of cows pregnant (as a proportion of all cows calved and submitted)</td>
<td></td>
<td></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…. 
<table>
<thead>
<tr>
<th>Bull</th>
<th>Name</th>
<th>HO %</th>
<th>EBI</th>
<th>Milk Fertility</th>
<th>Calv Beef</th>
<th>Health</th>
<th>M Kg</th>
<th>F %</th>
<th>P %</th>
<th>CL (days)</th>
<th>Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIO</td>
<td>GIBCR</td>
<td>97</td>
<td>€161</td>
<td>€71</td>
<td>€25</td>
<td>€6</td>
<td>€14</td>
<td>-1.19</td>
<td>+.01</td>
<td>-2.65</td>
<td>Dovea</td>
</tr>
<tr>
<td>WUZ</td>
<td>WINDSOR-MANOR DURHAM ZEUS</td>
<td>100</td>
<td>€167</td>
<td>€107</td>
<td>€14</td>
<td>€6</td>
<td>€62</td>
<td>-1.19</td>
<td>+.01</td>
<td>-4.70</td>
<td>Munster / Progression</td>
</tr>
<tr>
<td>RDU</td>
<td>RUUD 96</td>
<td>100</td>
<td>€163</td>
<td>€45</td>
<td>€35</td>
<td>€6</td>
<td>€62</td>
<td>-0.06</td>
<td>+.01</td>
<td>-3.16</td>
<td>Munster / Progression</td>
</tr>
<tr>
<td>CEBH</td>
<td>CORBOYS HACKETT</td>
<td>69</td>
<td>€147</td>
<td>€52</td>
<td>€31</td>
<td>€8</td>
<td>102</td>
<td>+0.11</td>
<td>+.00</td>
<td>-3.94</td>
<td>Dovex</td>
</tr>
<tr>
<td>ZWZ</td>
<td>ZANDER KEET</td>
<td>100</td>
<td>€141</td>
<td>€66</td>
<td>€39</td>
<td>€8</td>
<td>95</td>
<td>+0.22</td>
<td>+.09</td>
<td>-2.56</td>
<td>Dovex</td>
</tr>
<tr>
<td>TIH</td>
<td>TITENSER HYLKE</td>
<td>FR</td>
<td>€136</td>
<td>€17</td>
<td>€24</td>
<td>€4</td>
<td>-340</td>
<td>+0.17</td>
<td>+.23</td>
<td>-6.40</td>
<td>Dovex</td>
</tr>
</tbody>
</table>

* Will affect Pedigree Status

Allocate Bulls to Cows

Edit Suggested Bulls

Select Breed
- Holstein/Frisian
- Pure Friesian

Select AI Organisation
- ABS
- Alts Ireland
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 (€)
Thank You.