Improving herd fertility

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Morrinsville,
New Zealand
Outline

- Introduction
- Current state of play in NZ
- How to improve fertility?
- Conclusions
Animal Health Centre

- Clinical vet business
- Research business
- Nutritional consultancy
- 40 vets
- 10 sites
- 300,000 cows
- 1,000 dairy herds
The NZ dairy industry

- One major farmer owned co-operative collects >90% of milk
- Predominantly export (95%)
  - Butter, cheese, casein, milk powder etc.
- Low input/low output/low cost system
- Predominantly pasture fed
  - Rye grass/white clover
  - Increasing use of maize silage
- Highly seasonal calving/breeding system
<table>
<thead>
<tr>
<th></th>
<th>NZ</th>
<th>Ireland</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. cows</td>
<td>3.92 m</td>
<td>1.09 m</td>
</tr>
<tr>
<td>No. herds</td>
<td>11,630</td>
<td>21,000</td>
</tr>
<tr>
<td>Cows/herd</td>
<td>337</td>
<td>55</td>
</tr>
<tr>
<td>Farm size (Ha)</td>
<td>121</td>
<td>40</td>
</tr>
<tr>
<td>Cows/Ha</td>
<td>2.8</td>
<td>1.7</td>
</tr>
<tr>
<td>Volume (L/cow/annum)</td>
<td>3791</td>
<td>4600</td>
</tr>
<tr>
<td>Milksolids/cow (kg/annum)</td>
<td>330</td>
<td>370</td>
</tr>
<tr>
<td>Farmer payment ($NZ/kg MS)</td>
<td>5.60</td>
<td></td>
</tr>
<tr>
<td>Farmer payment (Euro/L)</td>
<td>0.26</td>
<td>0.34</td>
</tr>
</tbody>
</table>

Cow breeds:

- Friesian
- F x J cross bred
- Jersey
- Ayrshire
- Other
Milk production by age and breed

Milk production total lactation (L)

Friesian
Jersey
Crossbred

Age group
2 3 4 5 6 7 8 9 10+ Total
The pasture growth rate and energy requirements for dairy cows

- **Pasture growth**
- **ME required**

<table>
<thead>
<tr>
<th>Month</th>
<th>Pasture growth (kg DM/ha/d)</th>
<th>Cow requirements (MJ ME/cow/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>July</td>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td>Aug</td>
<td>40</td>
<td>120</td>
</tr>
<tr>
<td>Sep</td>
<td>70</td>
<td>140</td>
</tr>
<tr>
<td>Oct</td>
<td>80</td>
<td>160</td>
</tr>
<tr>
<td>Nov</td>
<td>100</td>
<td>180</td>
</tr>
<tr>
<td>Dec</td>
<td>120</td>
<td>200</td>
</tr>
<tr>
<td>Jan</td>
<td>140</td>
<td></td>
</tr>
<tr>
<td>Feb</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>Mar</td>
<td>180</td>
<td></td>
</tr>
<tr>
<td>Apr</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>June</td>
<td>240</td>
<td></td>
</tr>
</tbody>
</table>
Changes in the dairy industry

- ↑ herd size
- ↑ /cow & /Ha production
- ↑ feed inputs
- ↑ % Holstein-Friesian genetics
- ↓ profitability and ↑ feed & land prices
- ↓ Staff availability and skills
- Changes in regulatory/consumer environment
Milksolids/cow/lactation (kg) 600

Milksolids/Ha (kg)


Dairy statistics 2006/07 lic.co.nz/publications
Current reproductive performance of NZ herds?

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cows NDO pre PSM (%)</td>
<td>20</td>
</tr>
<tr>
<td>Conception rate to 1st service (%)</td>
<td>53</td>
</tr>
<tr>
<td>3-week submission rate (%)</td>
<td>81</td>
</tr>
<tr>
<td>8-week in-calf rate (%)</td>
<td>80</td>
</tr>
<tr>
<td>Empty rate (%)</td>
<td>11</td>
</tr>
</tbody>
</table>

Based on data from Xu and Burton 2003 and McDougall and Compton 2005
Herd reproductive performance

(n = 141 herds; 2003/04)

Compton and McDougall 2005
How important farmers believe fertility is to their business

(n = 200 herdowners; Fowler and Tiddy, 2006)
Degree of satisfaction with current herd fertility (n = 199 herdowners; Fowler and Tiddy, 2006)
Reproductive performance of NZ cows

Harris 2005; www.lic.co.nz

Note denominator for ‘calved by 6 weeks’ = total cows present at start of previous breeding season (less non-reproductive deaths/culls; excludes heifers)
Herd Fertility

- Is like a cake
- Herd Management areas
  - 7 ingredients

- Calving Pattern
- Heifer Mgt.
- Body condition and nutrition
- Heat Detection
- Genetics & AB Practices
- Bull Mgt.
- Cow Health
Factors affecting reproductive performance?

**Cow level**
- Calving date
- Age
- Breed
- Peripartum + other disease
- BCS and BCS change
- Non-cycling
- Milk yield & protein %

**Genetics**
- Bull selection
- Production interaction with reproduction
- Genetics x environment?

**Herd level/managerial**
- Seasonal vs. split calving
- Once a day milking
- Nutrition
  - Milk protein %
  - Heifers
- Oestrous detection systems
- Breeding management
  - Timing of AI
  - AI technique
  - Semen handling
  - Use of hormones
- Cow group management
- Herd size
- Farm business structure
- Farmer age & education
- No. labour units on farm
- “Skill”
8 week in calf rate by BCS at start of breeding

Compton and McDougall 2006
BCS of 2523 cows from 6 herds

Interval from condition score to planned start of mating (days)

Condition score

PSM

Compton and McDougall 2006
Genes vs. management?

- Complex
- Heritability of reproduction only 5%?
  - (18% for calving to first ovulation)
  - Long term solution
  - Slow change via changes in Fertility BW
  - Cross breeding
- Thus 95% management?
  - ‘permanent’ environment effects?
- Need to work with genetics available
## Dexcel strain trial

<table>
<thead>
<tr>
<th></th>
<th>NZ70</th>
<th>NZ90</th>
<th>OS90</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calving date</td>
<td>29-Jul</td>
<td>27-Jul</td>
<td>6-Aug</td>
<td>*</td>
</tr>
<tr>
<td>CIDR (%)</td>
<td>11</td>
<td>8</td>
<td>3</td>
<td>n.s.</td>
</tr>
<tr>
<td>PSC-ovn 1</td>
<td>32.2</td>
<td>38.7</td>
<td>28.4</td>
<td>**</td>
</tr>
<tr>
<td>% heat detection</td>
<td>89</td>
<td>91</td>
<td>87</td>
<td>n.s.</td>
</tr>
<tr>
<td>Con S1 (%)</td>
<td>45</td>
<td>46</td>
<td>39</td>
<td>n.s.</td>
</tr>
<tr>
<td>Con S2 (%)</td>
<td>54</td>
<td>48</td>
<td>44</td>
<td>n.s.</td>
</tr>
<tr>
<td>6-wk in-calf</td>
<td>70</td>
<td>69</td>
<td>54</td>
<td>***</td>
</tr>
<tr>
<td>8-wk in-calf</td>
<td>80</td>
<td>75</td>
<td>62</td>
<td>***</td>
</tr>
<tr>
<td>PSM-con</td>
<td>28.4</td>
<td>29.3</td>
<td>33.6</td>
<td>n.s.</td>
</tr>
<tr>
<td>Final preg (%)</td>
<td>0.93</td>
<td>0.93</td>
<td>0.87</td>
<td>*</td>
</tr>
</tbody>
</table>
Step 1
Assess current herd reproductive performance

Step 2
Identify scope for improvement and assoc. benefits

Step 3
Consider options for change and select best option(s)

Step 4
Implement selected management option(s)

Review
When to assess herd performance?

- Midpoint of calving
- Induction time
- Before start of mating (non-cycler’s)
- 3-weeks into mating (submission rates)
- 6-8 weeks into breeding (Non-return rates)
- Pregnancy testing
How to assess performance?

• Calculate key performance indicators:
• Electronic databases
  – Mindapro reports (http://www.lic.co.nz)
  – Fertility focus reports (In-calf)
  – ‘Herd plus’ (http://www.icbf.com/)
• Manual calculations
  – # inductions/total # cows *100 (%) 
  – # non-cyclers/total # cows *100 (%) 
  – # empties (incl. culls!)/total # cows *100 (%)
2. Herd Performance (continued)

The performance of your herd has been expressed relative to other recorded herds (with a minimum of 30 calvings):

<table>
<thead>
<tr>
<th>Item</th>
<th>Bin 15%</th>
<th>Achievable</th>
<th>Top 15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>c. 21-day submission rate</td>
<td>Your Herd 65%</td>
<td>National Average 45%</td>
<td>50%</td>
</tr>
<tr>
<td>d. 42-day submission rate</td>
<td>Your Herd 75%</td>
<td>National Average 65%</td>
<td>80%</td>
</tr>
<tr>
<td>e. 1st service conception rate</td>
<td>Your Herd 37%</td>
<td>National Average 50%</td>
<td>01%</td>
</tr>
<tr>
<td>f. 2nd service conception rate</td>
<td>Your Herd 14%</td>
<td>National Average 60%</td>
<td>70%</td>
</tr>
<tr>
<td>g. 6-week pregnancy rate</td>
<td>Your Herd 56%</td>
<td>National Average 6%</td>
<td>%</td>
</tr>
<tr>
<td>h. Overall pregnancy rate (to-date)</td>
<td>Your Herd 65%</td>
<td>National Average 83%</td>
<td>92%</td>
</tr>
<tr>
<td>i. Services/conception</td>
<td>Your Herd 3.2</td>
<td>National Average 2.2</td>
<td>1.7</td>
</tr>
<tr>
<td>j. % Short repeat intervals</td>
<td>Your Herd 0%</td>
<td>National Average 8%</td>
<td></td>
</tr>
<tr>
<td>k. % Normal repeat intervals</td>
<td>Your Herd 1%</td>
<td>National Average 6%</td>
<td>7%</td>
</tr>
</tbody>
</table>
## Targets/Goals?

<table>
<thead>
<tr>
<th>Metric</th>
<th>Actual*</th>
<th>NZ herd goals‡</th>
<th>Top 25%</th>
<th>Ireland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late calvers (%)</td>
<td>5</td>
<td>5</td>
<td>0 †</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Non cyclers (%)</td>
<td>20</td>
<td>5</td>
<td>&lt;10</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Days to half cows calved</td>
<td>19</td>
<td>13</td>
<td>&lt;18</td>
<td>&gt;60</td>
</tr>
<tr>
<td>Con rate to 1st service (%)</td>
<td>53</td>
<td>71</td>
<td>&gt;55</td>
<td>&gt;71</td>
</tr>
<tr>
<td>3-week sub rate (%)</td>
<td>81</td>
<td>91</td>
<td>&gt;90</td>
<td>&gt;90</td>
</tr>
<tr>
<td>6-week in-calf rate (%)</td>
<td>68</td>
<td>84</td>
<td>&gt;75</td>
<td>&gt;71</td>
</tr>
<tr>
<td>8-week in-calf rate (%)</td>
<td>80</td>
<td>91</td>
<td>&gt;85</td>
<td></td>
</tr>
<tr>
<td>Total length of mating (d)</td>
<td>?</td>
<td>63</td>
<td>85</td>
<td></td>
</tr>
<tr>
<td>Empty rate (%)</td>
<td>11</td>
<td>7</td>
<td>&lt;7</td>
<td>&lt;8</td>
</tr>
</tbody>
</table>

*Based on data from Xu and Burton 2003 and McDougall and Compton 2005
‡ Based on the needs analysis of 200 herdowners conducted by ROMP in Feb 2006
† Based on performance of top 25% of herds that undertook whole herd pregnancy testing with the AHC in 2004/05
What to do if the targets are not being achieved?

• Each herd is different:
  • There is NOT a 1-size-fits-all solution
    – Herd specific goals
    – Need to analyse each herd’s data separately
    – Develop a plan

• Fertility is multi-factorial: there is not a ‘silver bullet’
Possible tools

• Calving pattern management
  – Breed heifers to calve earlier than cows
  – Shortened breeding periods
  – Split calving
  – Focused culling
  – Inductions

• Heifer rearing
  – Contract rearing

& weight gain contracts
Nutritional management

- BCS management
  - Drying off decision making
- Supplementary feeds
  - Maize, palm kernal, tapioca
- Transition cow systems
• Genetics
  – Cross-breeding
  – Selection of sires on Fertility EBV
  – ‘Short’ gestation bulls
  – ‘Easy calving’ bulls

• Heat detection systems
  – 1 key individual in charge of detection
  – Staff training
  – Use of detection aids: tail paint, KAMARS
  – Increased frequency of observation
Bull management

- Nutrition & BCS
- Disease
  - EBL, BVD, TB
- Fertility testing
- Rotation policies
- Lameness & injury management
Cow Health

- Periparturient disease diagnosis and treatment
- Non-cycler treatments
- Early pregnancy testing and treatment
- BVD/neospora vaccination

<table>
<thead>
<tr>
<th></th>
<th>Cont</th>
<th>P4+ODB</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>28 days submission rate (%)</td>
<td>70</td>
<td>93</td>
<td>*</td>
</tr>
<tr>
<td>% pregnant wk 4</td>
<td>35</td>
<td>55</td>
<td>*</td>
</tr>
<tr>
<td>Start breeding-conception (d)</td>
<td>40</td>
<td>25</td>
<td>*</td>
</tr>
</tbody>
</table>
NZ breeding programme

- BCS, nutrition & trace elements
- Tailpaint all cows
- Examine cows with peripartum disease
- ‘Pick-up’ bulls checked

Examine “Not detected in oestrus” cows

EB  
P4  
EB  
P4

P4 = progesterone, EB = Estradiol benzoate

- BCS
- Review performance
- Modify as required

Pregnancy diagnosis (manual or US)

Calving (80 d)
AI (28-42 d)
Bull (50-80 d)

-85 -35 -10 -2 -1 3 15 21 22 77-84 ~35-56

days after bull removal

0 = PSM*

† Planned start of calving
* Planned start of mating

† Planned start of calving

P4 = progesterone, EB = Estradiol benzoate
Conclusions

• Fertility is declining
  – Multiple reasons for this
  – Unlikely to be a ‘silver’ bullet

• Improving herd fertility requires
  – A thorough assessment of the herd
  – Combined input of veterinarian, nutritionist, AB companies etc.

• BUT top fertility can be achieved by good management