Milk production and fertility performance of Holstein, Jersey and Holstein x Jersey cows in the Irish national dairy herd

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Grass-based seasonal system

Alignment grass supply & animal requirements

Compact calving
High EBI
High fertility status
dairy herd

The Irish Agriculture and Food Development Authority
Key Characteristics of the Grazing Cow

- Highly fertile - 365 d calving interval
- High grass DMI (16–20kg/DM/day)
- Productivity (1,200–1,400kgMS/ha) (15,000–17,000 litres/ha)
- Average 5 lactations

Calf registration (2000–14)
Background

- (Inter)national research has shown benefits to the H x J cow relative to both parental breeds
  - Milk production (Prendiville et al., 2010; Dillon et al., 2007)
  - Fertility (Prendiville et al., 2011; Sneddon, 2011; Vance et al., 2011)
  - Feed efficiency (Grainger and Goddard, 2004; Prendiville et al., 2010)
  - Survivability (Lopez-Villalobos et al., 2000; Dillon et al., 2007)
  - Profitability (Prendiville et al., 2011; Buckley et al., 2007)

- Controlled environment – limited by scale
Objective

Compare the biological performance of Holstein, Jersey and Holstein x Jersey cows in commercial spring calving dairy herds practicing crossbreeding in Ireland
Data

• Herd criteria:
  1. Spring calving (>80% calved between 1st Jan and 31st May)
  2. A mixture of H, J and H x J cows
  3. Years 2008-2012 inclusive

• 24,279 cows from 40 herds (ICBF database)
Statistical analysis

• Contemporary group: Herd - Year - Season grouped by calving date

• Data were analysed using Linear Mixed Models
**Statistical analysis - ASREML**

- **Linear mixed models** estimated the least square means of milk production and fertility traits

\[ Y = \sum_{i=1}^{3} breed_i + heterosis + recombination \text{ loss} + parity + cow + herd_{year \_season} + residual \]

<table>
<thead>
<tr>
<th>Dependent variables (Y):</th>
<th>Fixed effects:</th>
<th>Random effect:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk yield</td>
<td>Breed</td>
<td>Cow</td>
</tr>
<tr>
<td>Fat yield</td>
<td>Heterosis</td>
<td>Contemporary group</td>
</tr>
<tr>
<td>Protein yield</td>
<td>Recombination loss</td>
<td>Residual</td>
</tr>
<tr>
<td>Age at 1st calving</td>
<td>Parity</td>
<td></td>
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<tr>
<td>Calving interval</td>
<td></td>
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<tr>
<td>Submission rate</td>
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</tbody>
</table>

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Results
## Milk production performance

<table>
<thead>
<tr>
<th></th>
<th>Holstein</th>
<th>Jersey</th>
<th>Holstein x Jersey</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Milk yield (kg)</strong></td>
<td>5217</td>
<td>4230</td>
<td>+264 kg 5.6%</td>
</tr>
<tr>
<td><strong>Milk solids yield (kg)</strong></td>
<td>404</td>
<td>395</td>
<td>424</td>
</tr>
<tr>
<td><strong>Fat yield (kg)</strong></td>
<td>218</td>
<td>226</td>
<td>236</td>
</tr>
<tr>
<td><strong>Protein yield (kg)</strong></td>
<td>186</td>
<td>169</td>
<td>188</td>
</tr>
<tr>
<td><strong>SCS</strong></td>
<td>5.0534</td>
<td>5.0613</td>
<td>4.9017</td>
</tr>
</tbody>
</table>
Milk Solids Production

**Proportion Holstein (%)**

- Non-additive
- Additive

**Milk solids (kg)**

- +25 kg
- +3%

**€61/cow per lactation**
# Fertility performance

<table>
<thead>
<tr>
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<th>Holstein</th>
<th>Jersey</th>
<th>Holstein x Jersey</th>
</tr>
</thead>
<tbody>
<tr>
<td><em><em>AFC</em> (d)</em>*</td>
<td>744</td>
<td>762</td>
<td>741</td>
</tr>
<tr>
<td><em><em>CIV</em> (d)</em>*</td>
<td>382</td>
<td>387</td>
<td>377</td>
</tr>
<tr>
<td><em><em>SR</em> (%)</em>*</td>
<td>68</td>
<td>74</td>
<td>75</td>
</tr>
</tbody>
</table>

*AFC = Age at 1st calving; CIV = Calving interval; SR = Submission rate*
Calving interval

+€94 /cow per lactation

Proportion Holstein (%)

Non-additive effects

Additive effects

Calving interval (days)

0 25 33 50 66 75 100

0 25 33 50 66 75 100

365 370 375 380 385 390

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Conclusion

• Superior animal performance in crossbreds
  • Greater milk solids
  • Lower SCC
  • Improved fertility performance

• Profitability maximised in crossbreds
  • Additional profit €155 /cow per lactation

Results consistent with those observed in a controlled environment
We wish to acknowledge Irish dairy farmer funding of this research

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