Effect of Crossbreeding on Milk Production, Udder Health and Fertility on Dutch Organic Dairy Farms

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  – Analyzed traits
  – Analyzed breeds
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• Conclusion
Introduction:

Organic dairy farming:
- 312 farms in Netherlands
- 55 milking cows/farm
- Still ~ 65% HF blood
- ~ 6650 kg milk/ha
- ~ 6200 kg milk/cow
- 25% natural mating
Introduction:

Organic dairy farming

– Holsteins, Dutch breeds, foreign breeds and crosses

– Restrictions:
  • No fertilizer, less concentrates and AB
  • Cows on the pasture

– High variation in management
  • More depending on farm environment
  • Less possibilities to steer
Breeds:

Holstein Frisian

Dutch Friesian
Breeds:

Brown Swiss

Jersey
Breeds:

MRIJ

Blaarkop
Breeds and crosses:

- 22% HF
- 22% MRIJ
- 21% FH
- 10% GB
- 7% BS
- 7% Mon
- 7% FV
- 5% ZRb
- 4% HFxNL
- 4% HFxForB
- 3% MRIJ cross
- 2% Other
- 1% Jersey
Aim:

- The aim of this study was
  - to analyze an unique dataset with 24 different breeds and their crosses
  - to estimate the effects of crossbreeding for milk production, udder health and fertility
  - to investigate if these effects differ according to soil type and housing systems.
Available data:

- 113 Dutch organic farms
- January 1st, 2003 - February 1st, 2009
- 33,788 lactations on 15,015 individual cows (average yearly herd size of 50 cows/farm)
- 28% primiparous cows,
  23% 2nd lactation cows,
  49% 3rd or more lactation cows
Analyzed traits:

- Animal data
- Traits
  - Milk production
  - Fat and protein corrected milk yield
  - Fertility
  - Udder health
- Farm data
  - Soil type (sand vs. no sand)
  - Housing (cubicles vs. no cubicles)
Analysed breeds:

- 24 breeds in total
- 6 breeds most presented:
  - Holstein-Friesian (HF),
  - Brown Swiss (BS),
  - Dutch Friesian (DF),
  - Groningen White Headed (GWH),
  - Jersey (J),
  - Meuse-Rhine-Yssel (MRY)
Statistical analyses:

- Regression on all breed fractions, expected heterosis and recombination with ASREML
- Least square means for purebred Holsteins and crosses (F1 and backcross) with 5 other breeds
- \[ Y = \mu + \text{fixed effects} + \sum b_i \times \text{breed}_i + b_2 \times \text{heterosis} + b_3 \times \text{recombination} + \text{animal} + \text{error} \]
Results overall:

• Average milk production traits:
  – 6858 kg in 305 days
  – 300 kg fat and 235 kg protein

• Average functional traits:
  – Calving interval was 411 days
  – The lactation-average SCS was 1730 (~266,000 cells/ml)
Results; regression coefficients:

- Regression coefficients:
  - Heterosis had a favorable effect ($p<0.10$) on milk, FPCM and CI, but unfavorable for SCS
  - Recombination was unfavorable for the milk traits, but favorable for the functional traits
  - Regression coefficients differed per breed
Predicted milk production per % of HF genes:

- Brown Swiss
- Dutch Friesian
- White Headed
- Jersey
- MRY
Predicted calving interval per % of HF genes

- Brown Swiss
- Dutch Friesian
- White Headed
### Results regression soil type:

<table>
<thead>
<tr>
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<th>Milk</th>
<th>FPCM</th>
<th>SCS</th>
<th>CI</th>
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<tbody>
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<td></td>
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<tr>
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<td>-7.0*</td>
<td>-66.6</td>
<td>-20.4*</td>
<td>-59.5</td>
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* P-value < 0.10
Results regression barn type:

<table>
<thead>
<tr>
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<th>CI</th>
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* P-value < 0.10
Conclusions:

• Breeds: large differences between breeds
• Crossbreeding HF with other breeds:
  – Decreases milk production and FPCM
  – Improves fertility
  – Improves udder health in certain crosses

• Soil type and housing affected regression coefficients on breed components

→ It is important to choose the right breed or cross breed for the divers organic farm systems
Thanks for your attention,

Any questions?

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