IS DAIRY CROSSBREEDING A PROFITABLE WAY FOR HOLSTEIN FARMS?

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Context

- Dairy crossbreeding remains very marginal in France (Dezetter et al., 2014)
- F1 crossbreds could compete with Holstein cows for milk production while having a better fertility (Heins et al., 2012; Dezetter et al., 2015)
- Few information available about profitability of dairy crossbreeding (Lopez-Villalobos et al., 2000; Heins et al., 2012)
- The long transition phase from pure Holstein herd to steady equilibrium has not been studied yet
Research question and hypothesis

- Is implementing dairy crossbreeding in Holstein herds more profitable than staying with pure Holstein?
- At short and long term?
- Depending on:

<table>
<thead>
<tr>
<th>Breeding strategy</th>
<th>Initial dairy operation</th>
<th>Management objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breeds</td>
<td>Average milk yield</td>
<td>Housing capacity</td>
</tr>
<tr>
<td>Crossbreeding scheme</td>
<td>Reproductive and health performance</td>
<td>Contract with a dairy company</td>
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<tr>
<td>Selection of sires</td>
<td>Herd management</td>
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Study objective

ASSESSING THE EFFECT OF INTRODUCING DAIRY CROSSBREEDING IN HOLSTEIN DAIRY OPERATIONS ON FARM PROFITABILITY

Comparison of operations where crossbreeding was implemented with operations staying with pure Holstein at short, medium and long term
Utility criteria chosen for this comparison

Margin over variable costs:

\[ \sum_{i=1}^{n} [(Revenues_{n} - Variable costs_{n}) \times (1 + 0.03)^{-n}] \]

Annual discounting

A difference of margin will correspond to a difference of net profit
Modeling to assess these criteria

**Modeling**

- Large number of scenarios simulated
- Dynamic: assessing several generation of cows
- Validity

**Field data**

- Estimation of additive and non-additive effects using national data (Dezetter et al., 2015)

Parameterization
Modeling dairy operation

Objectives

Farmer = decisions

Action

Herd and heifers

Available information:
- Animal and economic performance
- Animal performance

Genetic value

Reproduction cycle
- calving
- conception
- abortion
- ovulation
- conception

Genetic value

Lactation cycle
- lactation
- dry period
- feeding
- mastitis
- health disorders
- feeding

Descriptive variables
Scenarios tested with a time horizon of 15 years and 250 replications

250 replications to stabilize the standard error between replications

Milk and feed prices computed from year 2014

Scenarios depending on:

- Breeding strategy
- Initial dairy operation
- Management objectives

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<tr>
<td>HO</td>
<td>9000L, 120 cows/</td>
<td></td>
</tr>
<tr>
<td>HOxMOxSR</td>
<td>Average prevalence of disorders</td>
<td>Constant number of cows</td>
</tr>
<tr>
<td></td>
<td>8500L, 120 cows/</td>
<td>Same breeding value</td>
</tr>
<tr>
<td></td>
<td>High prevalence of disorders</td>
<td>Constant volume of milk sold</td>
</tr>
</tbody>
</table>
A slow evolution of genotypes of cows in the herd

Percentage of cows

Period
[years 1 to 5[

Period
[years 5 to 10[

Period
[years 10 to 15[

year (last day)

G2

G3

G4 et +

F1

HO
Crossbreeding increased milk price due to increased fat and protein contents

Deviation of average milk selling price (€/1000 L) of HOxMOxSR scheme compared to pure Holstein breeding

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An increase of margin with average prevalence of disorders and constant number of cows

9000L, 120 cows/
Average prevalence of disorders

Period [years 1-5]  Period [years 5-10]  Period [years 10-15]

Cumulated discounted margin over variable costs (€ x 1000)

+1.5%  +32€/cow/year

↑ fertility, udder health and contents of milk
↓ ↓ volume of milk sold when the number of cows remains constant
A larger increase of margin with high prevalence of disorders and constant number of cows

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- Volume of milk sold
- Milk price and cows culled prices
To summarize:

- Differences of fat and protein contents impacted even more the margin in operation with average prevalence of disorders
  - +4 % (+9€/1000L/year)

- Differences of 5 cows between HOxMOxSR and HO to produce the same volume

### Effect of crossbreeding for constant volume of milk compared to constant number of cows

<table>
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<tr>
<td>9000L/ Average prevalence</td>
<td>↑↑</td>
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<tr>
<td>8500L/ High prevalence</td>
<td>↑</td>
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In conclusion

- Crossbreeding improved profitability of operation while reducing number of events
  ➔ +30 to +90€/cow/year or +6 to 9€/1000L/year

- Differences of margins appeared after year 5

- Crossbreeding seemed to be an interesting solution
  ➔ Especially in operations with high prevalence of reproductive and health disorders