Réseau laitier canadien

Canadian Dairy Network

Use and Added Value of AI Data for Genetic Evaluation and Dairy Cattle Improvement

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Use of AI Data

- **Herd management**
  - Future calving dates
  - Diagnose cow fertility problems

- **Determine semen fertility**
  - Optimize semen concentration
  - Improve semen processing methods

- **Genetic evaluation**

Improving data

- **Pedigree records**
  - ➤ Match up AI data with registration records
  - ➤ Verify that the dam of the calf was bred to the sire of the calf approximately 9 months ago
  - ➤ Check that this was the last breeding for the dam prior to the birth of the calf.

- **Improvements will affect all genetic evaluation systems**

Improving data

- **Service sire for Calving ease & Calf survival**
  - ➤ Match up AI data with calving record
  - ➤ Verification similar to pedigree records

- **Days open**
  - ➤ Can be calculated from calving dates
  - ➤ Use AI data to estimate conception date rather than from next calving date
  - ➤ Estimate days open for cows that did not (yet) calve again

Enhance existing GE

- **Account for Pregnancy effects in production evaluations**
  - Use AI data to obtain insemination dates
  - Ideally need pregnancy check to verify that conception took place
  - Use calving date 9 months later to verify conception
  - Or assume there was conception if there are no subsequent inseminations

Impact of Days Pregnant
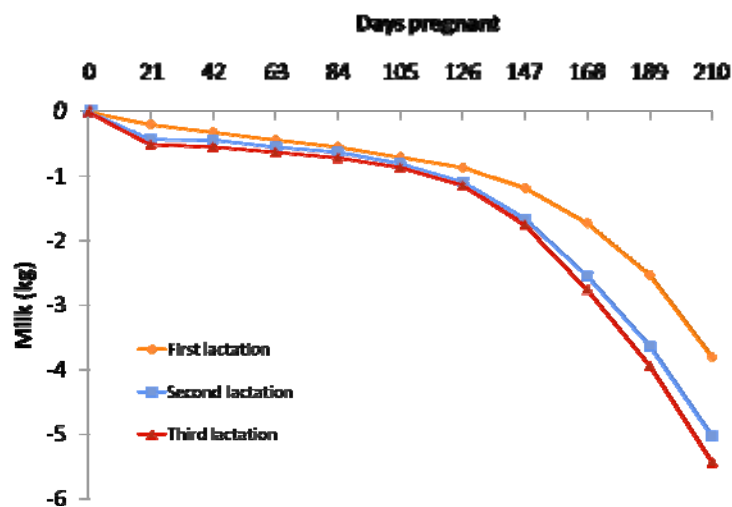
Source: J. Bohmanova, J. Jamrozik and F. Miglior, 2008

Female Fertility

When combining AI data with other information the following traits are calculated in Canada:

- **Age at first service (Heifers)**

- **Interval from calving to first service (Cows)**

- **56-day Non-Return-Rate**
- **Interval from first service to conception**
- **Number of services**

Ability to Conceive (1)

- **56-day Non-Return-Rate**
  - Requires first insemination and inseminations made in the next 56 days
- **Advantages:**
  - Available soon after the first service
  - No other data required
- **Disadvantages**
  - Only considers fertility of first insemination
  - Not a very accurate measure of fertility

Ability to Conceive (2)

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- **Number of Services**
  - ➢ Requires all inseminations
- **Advantages:**
  - ➢ No other data required
  - ➢ Good measure of how much effort was expended to try to get the cow to conceive
- **Disadvantages:**
  - ➢ All inseminations are required
  - ➢ Need to wait until we have all of them

Ability to Conceive (3)

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- **Interval from first service to conception**
  - ➢ Requires first and last insemination
- **Advantages**
  - ➢ Easy to understand measure of fertility
  - ➢ Can be calculated accurately
- **Disadvantages**
  - ➢ Need to determine that there was conception
    - ▪ Pregnancy checks or next calving date
  - ➢ Need conception

Ability to conceive

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- **56-day Non-Return-Rate**
  - ➤ Fast measure of fertility
  - ➤ Uses records from all cows
- **Number of services**
  - ➤ More detailed analysis of less fertile cows
  - ➤ Uses records on all cows
- **Interval from first service to conception**
  - ➤ Can be calculated accurately
  - ➤ But only if there is conception

Reproductive performance

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- **In Canada these female fertility traits are evaluated together with calving traits:**
  - ➤ Calving ease
  - ➤ Calf survival
  - ➤ Gestation length
  - ➤ Calf size

- **Virgin Heifer and Cow traits are assumed to be different but correlated traits**

EBV Correlations Among Female Fertility Traits

	NRR-H	NS-H	FSTC-H	CTFS	NRR-C	NS-C	FSTC-C	DO
Age at first service (AFS)	-.24	-.07		.23	-.19	-.09		.11
Non return rate in heifers (NRR-H)		.90	.74	-.17	.61	.54	.49	.28
Number of services in heifers (NS-H)			.94		.63	.64	.60	.45
First service to conception in heifers (FSTC-H)				.11	.62	.68	.66	.54
Calving to first service (CTFS)					-.02	.28	.38	.74
Non return rate in cows (NRR-C)						.89	.80	.55
Number of services in cows (NS-C)							.97	.83
First service to conception in cows (FSTC-C)								.90
Days open (DO=CTFS+FSTC-C)								

Signs have been changed: Positive Correlation means desirable relationship

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Added Value

- **More information collected => more value**

- **Minimal required fields**
  - Cow (unique ID)
  - Semen or sire used (unique ID)
  - Date of breeding

- **To evaluate fertility:**
  - Herd, technician
  - Breeding for Embryo Transfer
  - Hormone treatment used to get the cow in heat (synchronization)

Added Value

Herds providing data	Some	Some	All	All
Data from each herd	Part	All	Part	All
Improving data	Yes	Yes	Yes	Yes
Enhancing GE	No	?	No	Yes
Female Fertility	No	Yes	No	Yes

Conclusions

- **Use of AI data**
  - Improving other data
  - Enhance existing GE systems
  - Creating a genetic evaluation system for Female fertility

- **Higher Value of data**
  - When collecting more fields
  - in more herds
  - with more complete recording in each herd