



# Genetic evaluation for type traits is improved

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10<sup>th</sup> January 2013

# Aim

- **Bulls and cows evaluated in the same model**
- **Use multiple trait evaluations within lactation**
- **Investigate the effect of later lactations**

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# The data

## Total number of cows in thousands

| Breed   | Lactation | Holstein | RDC | Jersey |
|---------|-----------|----------|-----|--------|
| Denmark | 1         | 996      | 177 | 180    |
|         | 2         | 254      | 26  | 19     |
|         | 3         | 160      | 32  | 21     |
| Finland | 1         | 97       | 204 |        |
|         | 2         | 35       | 68  |        |
|         | 3         | 21       | 50  |        |
| Sweden  | 1         | 222      | 215 | 2      |
|         | 2         | 4        | 2   |        |
|         | 3         | 13       | 7   |        |

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# Genetic Parameters

| Trait group   | Heritability | Highest          |
|---------------|--------------|------------------|
| Body          | 0,30         | Stature=0,6      |
| Feet and legs | 0,20         | -                |
| Udder         | 0,25         | Udder Depth=0,40 |

**Genetic correlations between lactations**

**0,87-0,999**

**Environmental correlations between lactations**

**0,10 – 0,60**

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# Correlations between lactations

| Breed    | Trait group   | Genetic correlation | Environmental correlation |
|----------|---------------|---------------------|---------------------------|
| Holstein | Body          | 0,91 - 0,999        | 0,07 - 0,38               |
| RDC      |               | 0,92 - 0,999        | 0,31 - 0,64               |
| Jersey   |               | 0,92 - 0,999        | 0,10 - 0,55               |
| Holstein | Feet and legs | 0,97 - 0,999        | 0,09 - 0,18               |
| RDC      |               | 0,96 - 0,999        | 0,40 - 0,53               |
| Jersey   |               | 0,94 - 0,999        | 0,09 - 0,20               |
| Holstein | Udder         | 0,88 - 0,99         | 0,16 - 0,40               |
| RDC      |               | 0,91 - 0,999        | 0,38 - 0,57               |
| Jersey   |               | 0,91 - 0,99         | 0,18 - 0,36               |

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# Genetic correlations within lactation

## Trait group

## Genetic correlation

Body

0,33 - 0,91

Feet and legs

-0,18 - 0,37

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# Genetic correlations within lactation

| TRAIT GROUP   | Correlation  |
|---|--------------|
| <i>Udder group 1</i>  |              |
| U. attachment, U. depth, Rear U. width, Rear U. height and U. balance | 0,06 - 0,69  |
| <i>Udder group 2</i>  |              |
| U. cleft, T. length, T. thickness, T.plac. front, T. plac. back       | -0,13 - 0,70 |

**Trait****Genetic correlations****Environmental correlations**

Udder attachment

0,93

0,29

Udder depth

0,96

0,30

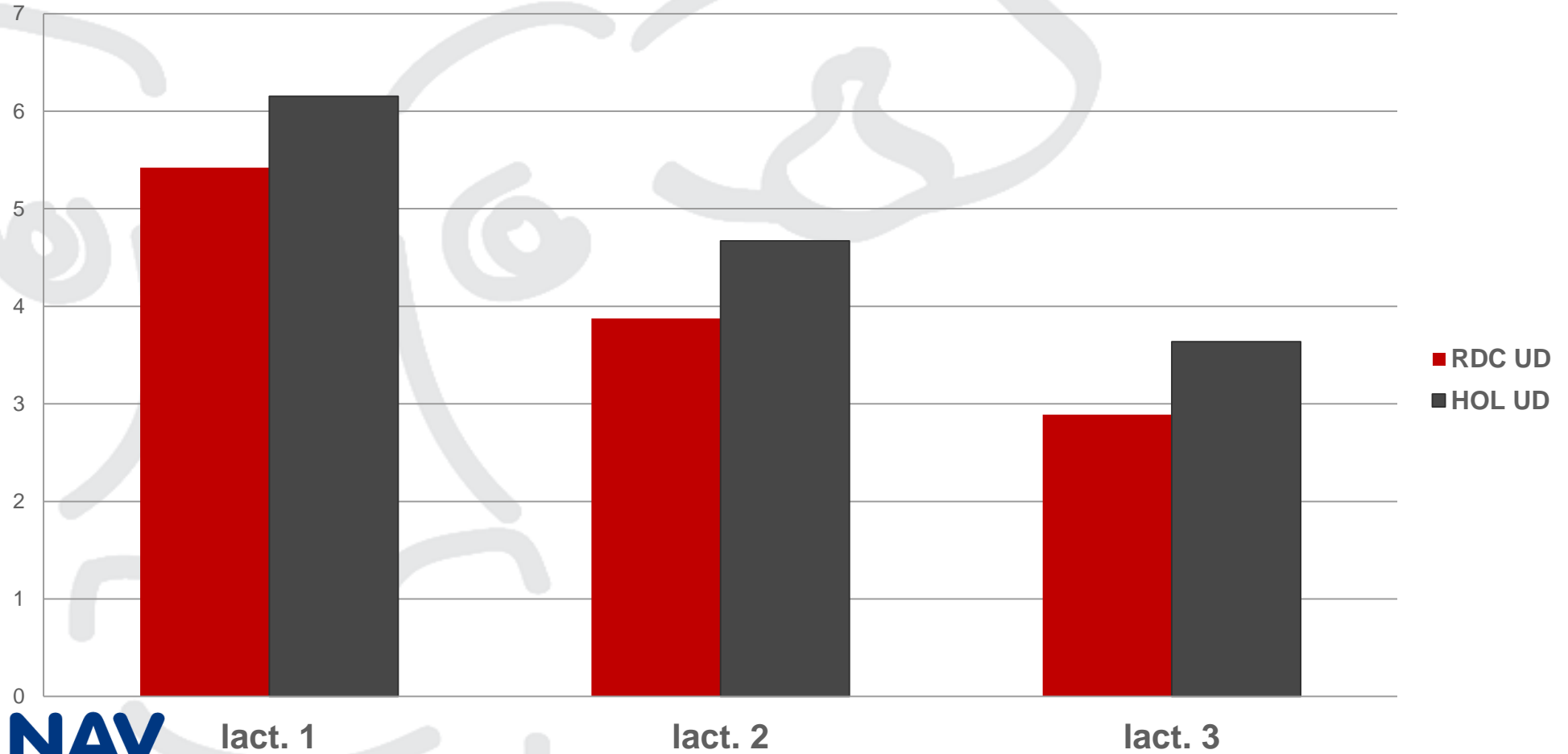
Udder cleft

0,95

,34

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# Means of Udder Depth



# Where do the results lead us?

- Selection on first lactation improves later lactations
- Records from later lactations are valuable:
- They will improve accuracy of evaluation

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# Improvements in evaluation

**3 lactations:**

**Multiple trait analysis within and between lactations in 3 trait groups**

**Body**

**Feet and legs**

**Udder**

**Data and model harmonized over countries**

**The same animal model used for both sires and dams**

**=>efficient use of data**

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# Model

|   |        |
|---|--------|
| Herd*time period (5 year of classification) | Fixed  |
| Herd*year                                   | Random |
| Year * month of calving                     | Fixed  |
| Calving age (months)                        | Fixed  |
| Lactation stage (weeks)                     | Fixed  |
| Time of visit                               | Fixed  |
| Classifier*year                             | Fixed  |
| Animal                                      | Random |

# Do breeding values change a lot?

-correlations between current and new breeding values

| Breed    | Correlations for | Body index | Feet and legs index | Udder index |
|----------|------------------|------------|---------------------|-------------|
| Holstein | Bulls            | 0,95       | 0,97                | 0,97        |
| RDC      | Bulls            | 0.96       | 0.96                | 0,96        |
| Jersey   | Bulls            | 0,97       | 0,95                | 0,97        |
| Holstein | Cows             | 0,91       | 0,92                | 0,94        |
| RDC      | Cows             | 0,91       | 0,90                | 0,94        |
| Jersey   | Cows             | 0,92       | 0,91                | 0,96        |

NA





# Do breeding values change a lot?

-correlations between current and new breeding values

| Breed    | Correlations for | Body index | Feet and legs index | Udder index |
|----------|------------------|------------|---------------------|-------------|
| Holstein | Bulls            | 0,95       | 0,93                | 0,97        |
| RDC      | Bulls            | 0,96       | 0,92                | 0,96        |
| Jersey   | Bulls            | 0,97       | 0,95                | 0,97        |
| Holstein | Cows             | 0,91       | 0,92                | 0,94        |
| RDC      | Cows             | 0,91       | 0,90                | 0,94        |
| Jersey   | Cows             | 0,92       | 0,91                | 0,96        |

NA



# Summary

- Data harmonized
- The same effects in the model for all countries
- Breeding values for sires and cows from the same analysis
- Correlations between traits
- Data from 3 lactations: high correlations between them

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# Summary

Reliabilities have increased: Selection will be more effective

There will be considerable changes in rank order of dams  
Less changes for sires



*Thank You!*

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