



Udder classification based on AMS-data

Niek Meijer | 26 August 2023



Royal Cooperative CRV u.a.

Cooperation of cattle breeders

the Netherlands and Flanders

23,000 members

Herd book

Herd book registration

Herd classification

Animal evaluation

Owner of CRV Holding BV



AMS-data

The Netherlands

4805 farms with AMS (33%)

9825 AMS boxes

JoinData

more than 1,400 farms

Lely

2014 onwards

375,000 milkings per day

More animals

~33% has no information from herd classification

1st + every 20th milking

Data collection



‘Achieve better breeding values for udder conformation by using more information’

Udder traits

Herd classification

- front udder attachment ✓
- front teat placement ✓
- teat length ✓
- udder depth ✓
- rear udder height ✓
- udder support ✓
- rear teat placement ✓

- lactation 1

AMS-data

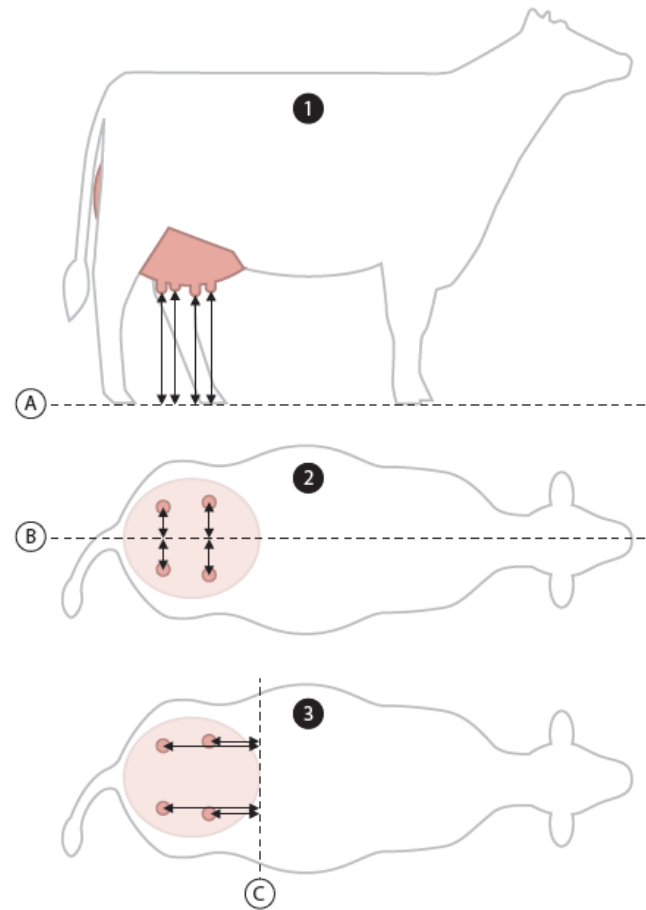
- udder depth
- distance between front teats
- distance between rear teats
- udder balance ✓

- divided into lactation 1, 2, and 3
(4 x 3 traits)

Teat coordinates

Coordinates in millimetres

- Z
- X
- Y



- 1 Z-coordinates; depth relative to the floor (A)
- 2 X-coordinates; width relative to midline cow (B)
- 3 Y-coordinates; length relative to position milking robot arm (C)

Udder balance

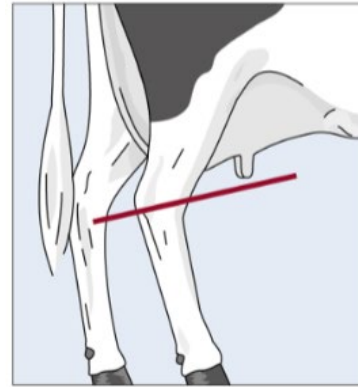
Average difference in udder depth between rear udder and front udder

Higher breeding value = higher rear udder relative to front udder

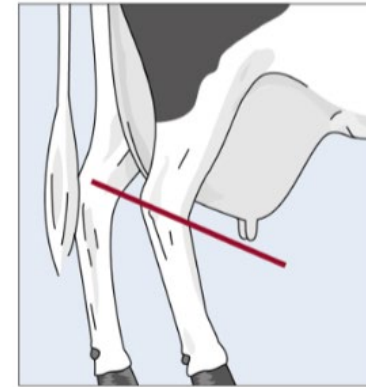
Optimum trait

Moderate correlations with current udder traits

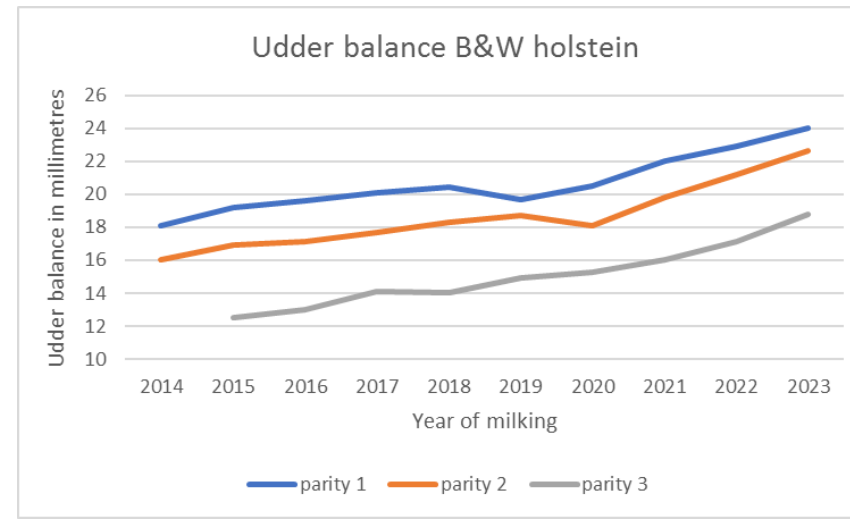
- front udder attachment 0.25
- front teat placement 0.29
- teat length 0.25
- udder depth 0.24
- rear udder height 0.53
- udder support 0.34
- rear teat placement 0.36



Negative udder balance



Positive udder balance



Heritabilities

Traits based on herd classification	h^2	Traits based on AMS	h^2
front udder attachment	0.25	udder depth 1	0.56
front teat placement	0.31	udder depth 2	0.56
teat length	0.38	udder depth 3	0.52
udder depth	0.39	distance front teats 1	0.60
rear udder height	0.26	distance front teats 2	0.53
udder support	0.22	distance front teats 3	0.45
rear teat placement	0.29	distance rear teats 1	0.45
		distance rear teats 2	0.38
		distance rear teats 3	0.33
		udder balance 1	0.45
		udder balance 2	0.42
		udder balance 3	0.43

Genetic correlations

Between traits based on herd classification and AMS data

Trait	parity 1	parity 2	parity 3
udder depth	0.98	0.97	0.97
front teat placement	0.98	0.98	0.97
rear teat placement	0.99	0.99	0.96

Genetic correlations

Between parities for traits based on AMS data

Trait	parity 1 – 2	parity 2 – 3	parity 1 - 3
udder depth	0.97	0.99	0.93
distance front teats	0.99	0.99	0.94
distance rear teats	0.97	0.98	0.90
udder balance	0.96	0.98	0.85

Reliabilities

Trait	Reliability old EBV	Reliability new EBV	Difference in reliability	Correlation
front udder attachment	78.1	81.7	3.6	0.98
front teat placement	78.7	82.7	4.0	0.97
teat length	81.3	81.7	0.4	0.99
udder depth	81.4	83.9	2.5	0.98
rear udder height	77.1	78.6	1.5	0.99
udder support	75.3	79.2	3.9	0.97
rear teat placement	77.8	81.8	4.0	0.97

*bulls born from 2010 onwards

*difference between current breeding values and new breeding values is the inclusion of the correlated traits based on AMS data

Other countries

Scandinavia (Nordic Cattle Genetic Evaluation) since November 2016

only as correlated traits

comparable heritabilities and genetic correlations found

Trait	Heritability Linear trait			Heritability AMS measure	Genetic correlation Linear-AMS
	HOL	RDC	Jersey	HOL,RDC, JER	HOL,RDC, JER
Teat Placement Front	0.32	0.27	0.27	0.61	0.91
Teat Placement Rear	0.28	0.26	0.26	0.48	0.93
Udder Balance	0.16	0.16	0.16	0.48	0.90
Udder Depth	0.39	0.34	0.34	0.67	0.97

*source: *Improved breeding values for udder conformation by including AMS data.*

Elisenda Rius-Vilarrasa and Emma Carlén (NAV/Växa Sverige), Anders Fogh (NAV/SEGES) and Terhi Vahlsten (NAV/Faba).

Summary

- **Using AMS-data for genetic evaluation of udder conformation since April 2023 in the Netherlands and Flanders**
- **Repeated records of high-quality data**
 - increased heritability
 - increased reliability
- **Udder balance**
 - First evaluation that publishes an udder conformation trait based on AMS-data
- **Automatic data collection is the future**

