Conformation:
what does it add to nowadays breeding?

In relation with breed organisations

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The start breed organisations (1)

- Breed organisations started 100-150 years ago
- Focus on pedigree registration
- Define perfect type of cow
  - which fits the farmer best
  - which produces more milk and has longevity
- Promote trade
  - between farmers
  - between countries

The start breed organisations (2)

- First data collection
- Pedigree
- Conformation scores
  general descriptives
- In 1980’s : linear traits introduced in most countries

Linear conformation scores

Goal:

- make traits easier to score: one dimension

- base for mating program

  -> new traits easier to make ‘corrections’

- eases understanding exchanged scores

  -> international trade

- base for International conversion breeding values

-> need for harmonization

Harmonisation of linear traits

- Start with Holstein Classifiers Working Group
- Need for harmonization acros breed
- ICAR Working Group on conformation
- Cattle : dairy
  dual purpose
  beef

  Goats

List of conformation traits

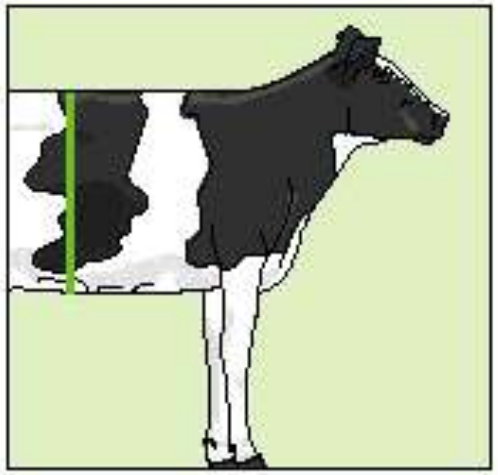
1. Stature
2. Chest Width
3. Body Depth
4. Angularity
5. Rump Angle
6. Rump Width
7. Rear Legs Set
8. Rear Legs Rear View
9. Foot Angle
10. Fore Udder Attachment
11. Rear Udder Height
12. Central Ligament
13. Udder Depth
14. Front Teat Placement
15. Teat Length
16. Rear Teat Placement
17. Locomotion
18. Body condition score

Body Depth

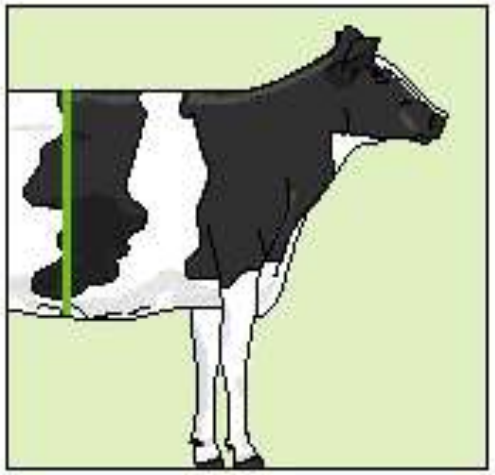
Body Depth

Ref. Point: Distance between top of spine and bottom of barrel at last rib – the deepest point: independent of stature.

1 Shallow
5 Intermediate
9 Deep



1
Shallow



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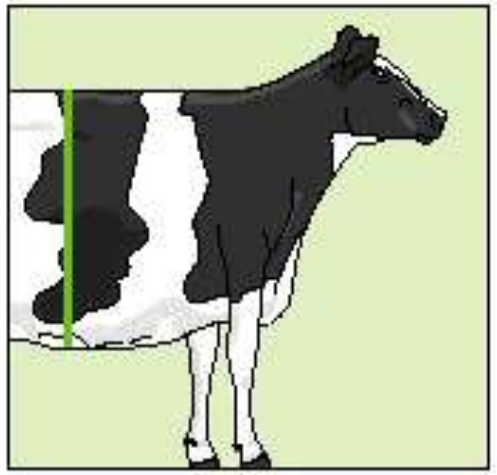


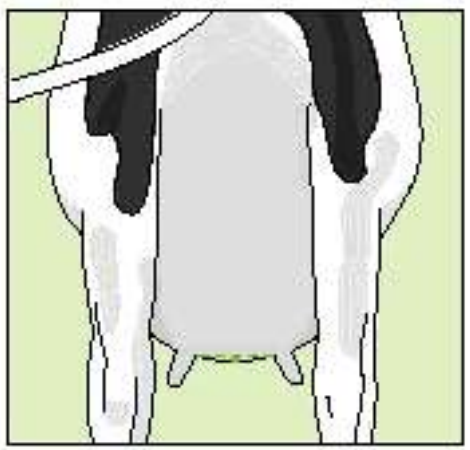
9
Deep

Central Ligament

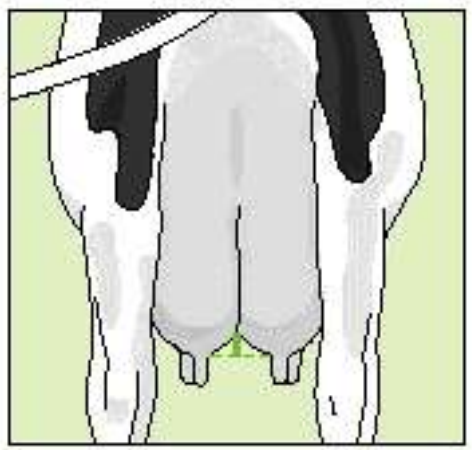
15. Central Ligament

Ref. point: The depth of cleft at the base of the rear udder.

1 Convex to flat floor (flat), broken ligament
5 Intermediate
9 Deep cleft/strong ligament



1
Broken



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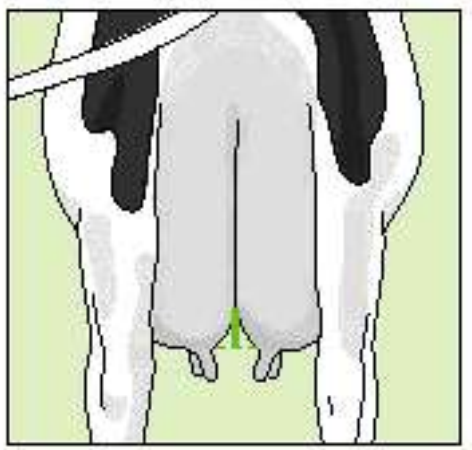


9
Strong

average correlation

trait	<0.80	0.80=< <=0.90	>= 0.90
stature			0.90
chest width	0.76		
body depth		0.80	
angularity	0.72		
rump angle			0.93
rump width		0.86	
rear leg set		0.82	
rear leg rear view	0.72		
foot angle	0.73		
fore udder	0.78		
rear udder height		0.80	
udder support	0.75		
udder depth			0.93
teat placement			0.91
teat length			0.94
rear teat placement			0.92
locomotion	0.65		
body condition		0.85	
overall conformation	0.70		
overall udder	0.77		
overall feet & legs	0.67		

Average of genetic correlation between countries for 21 traits analysed by Interbull

Trait	Average correlation								
	May 2001	*May 2002*	*Nov 2003*	*Sept 2005*	*Sept 2007*	*Jan 2010*	*Aug 2012*	*April 2014*	*Dec 2015*
Stature	0.89	0.92	0.91	0.92	0.92	0.91	0.91	0.90	0.90
Chest width	0.76	0.79	0.79	0.80	0.79	0.80	0.78	0.76	0.76
Body depth	0.75	0.79	0.80	0.82	0.81	0.81	0.81	0.81	0.80
Angularity	0.76	0.78	0.76	0.78	0.77	0.75	0.74	0.73	0.72
Rump angle	0.93	0.94	0.94	0.95	0.95	0.94	0.94	0.93	0.93
Rump width	0.75	0.83	0.84	0.84	0.84	0.87	0.87	0.86	0.86
Rear leg set side view	0.82	0.85	0.84	0.85	0.85	0.84	0.83	0.82	0.82
Rear leg rear view	0.77	0.79	0.76	0.76	0.74	0.74	0.74	0.72	0.72
Foot angle	0.57	0.68	0.66	0.68	0.72	0.74	0.73	0.72	0.73
Fore udder	0.74	0.79	0.80	0.83	0.84	0.83	0.83	0.79	0.78
Rear udder height	0.74	0.81	0.82	0.84	0.85	0.82	0.82	0.80	0.80
Udder support	0.77	0.80	0.78	0.80	0.81	0.78	0.77	0.75	0.75
Udder depth	0.90	0.94	0.95	0.96	0.96	0.97	0.96	0.94	0.93
Teat placement	0.89	0.92	0.91	0.94	0.93	0.93	0.93	0.92	0.91
Teat length	0.96	0.96	0.95	0.96	0.96	0.94	0.94	0.94	0.94
Rear teat placement	--	--	0.96	0.96	0.96	0.90	0.89	0.91	0.92
Locomotion	--	--	--	--	--	0.72	0.66	0.65	0.65
Body condition	--	--	--	--	--	0.77	0.80	0.83	0.85
Overall conformation	0.67	0.73	0.70	0.73	0.75	0.74	0.74	0.70	0.70
Overall udder	0.74	0.77	0.76	0.78	0.81	0.81	0.80	0.77	0.77
Overall feet & legs	0.60	0.67	0.67	0.69	0.69	0.69	0.69	0.65	0.67
Number of countries/groups	18	18	22	19	20	20	22	25	24

Harmonisation works

Effect:
New countries

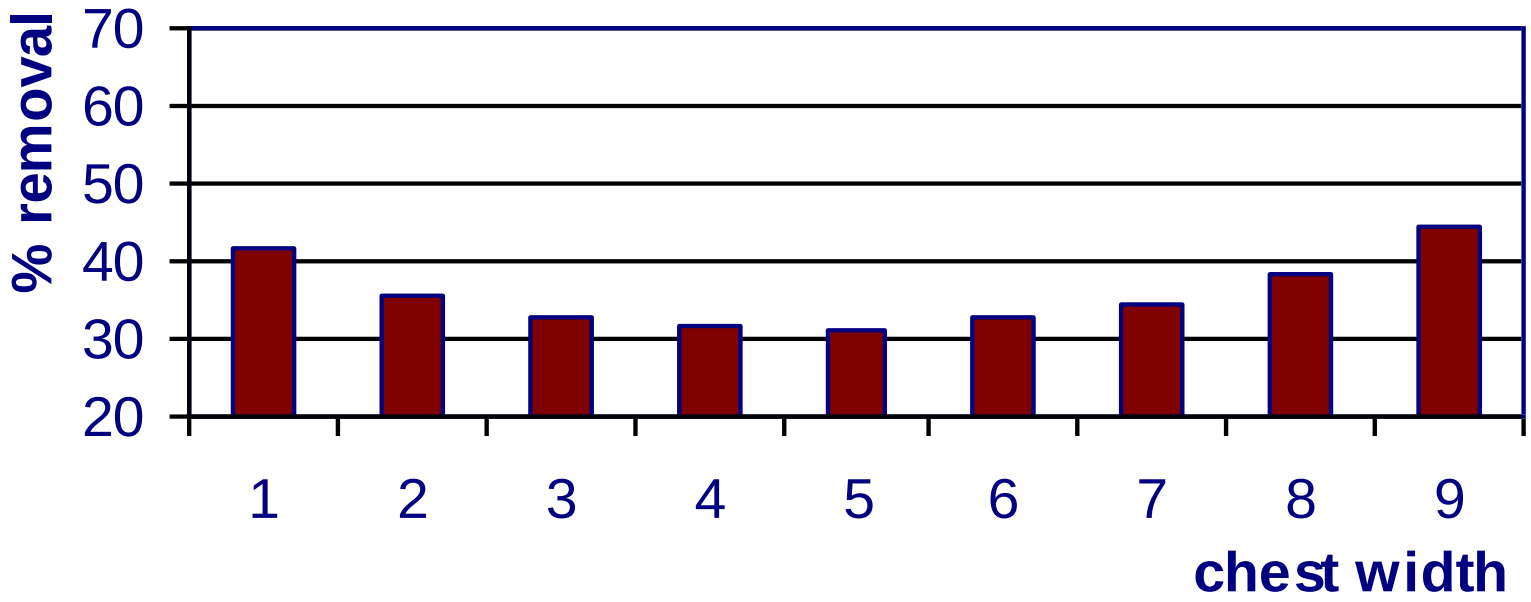
conformation - what does it add

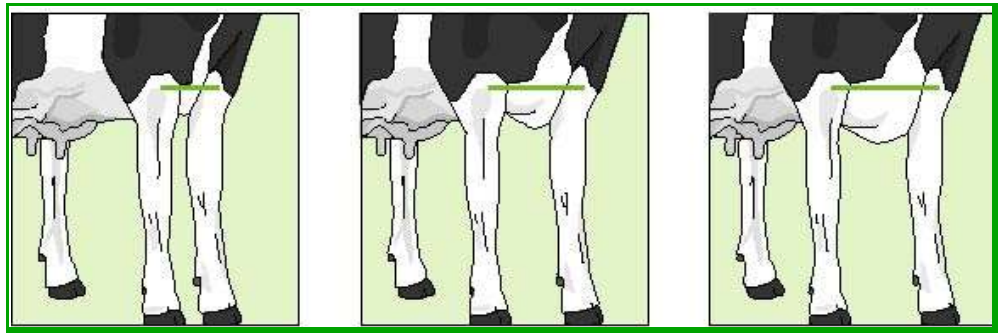
Relationship conformation – functional traits

- What type of cows functions the best

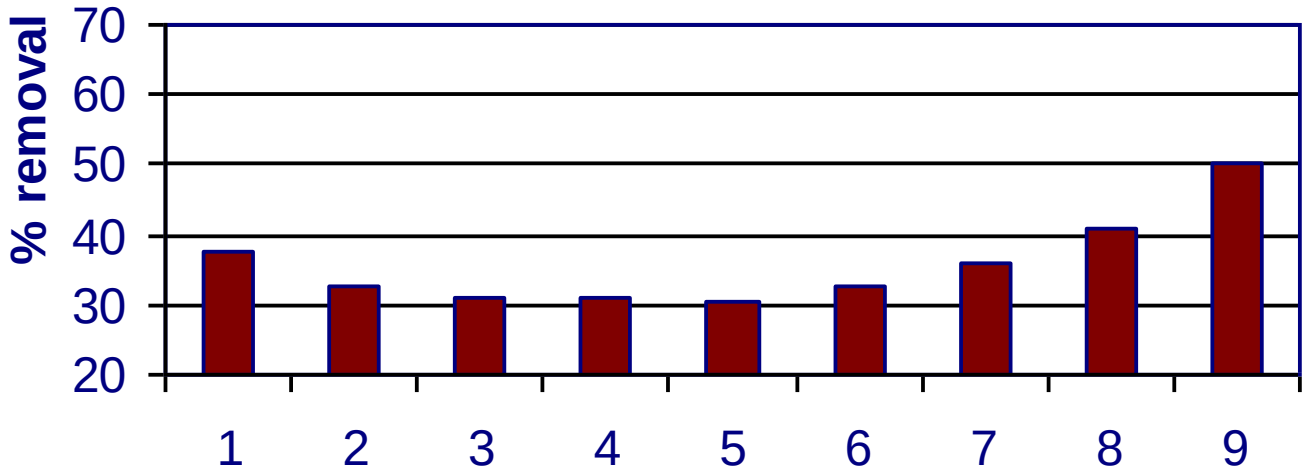
- Relationship linear scores with functional traits
  - longevity
  - udder health
  - calving ease
  - claw health
  - ……

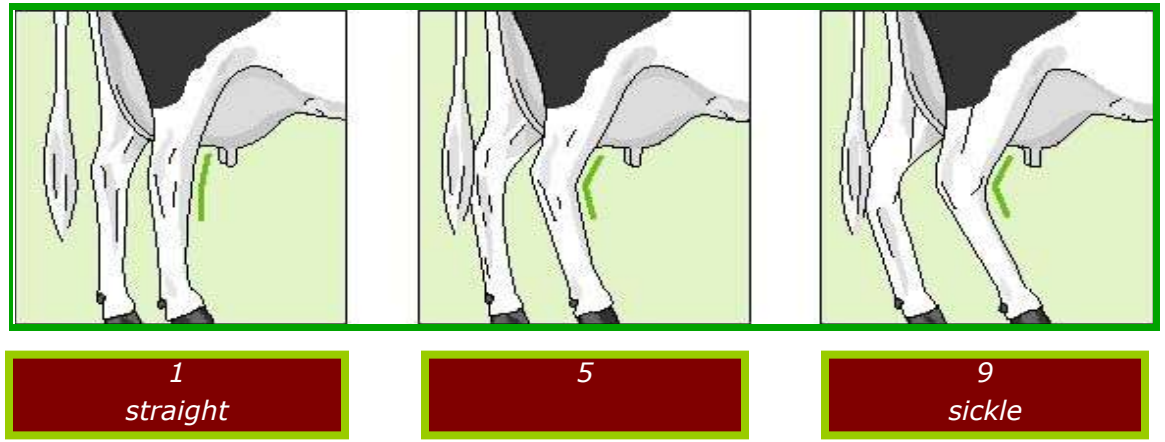
Chest Width


% removal
70
60
50
40
30
20
1
2
3
4
5
6
7
8
9
chest width

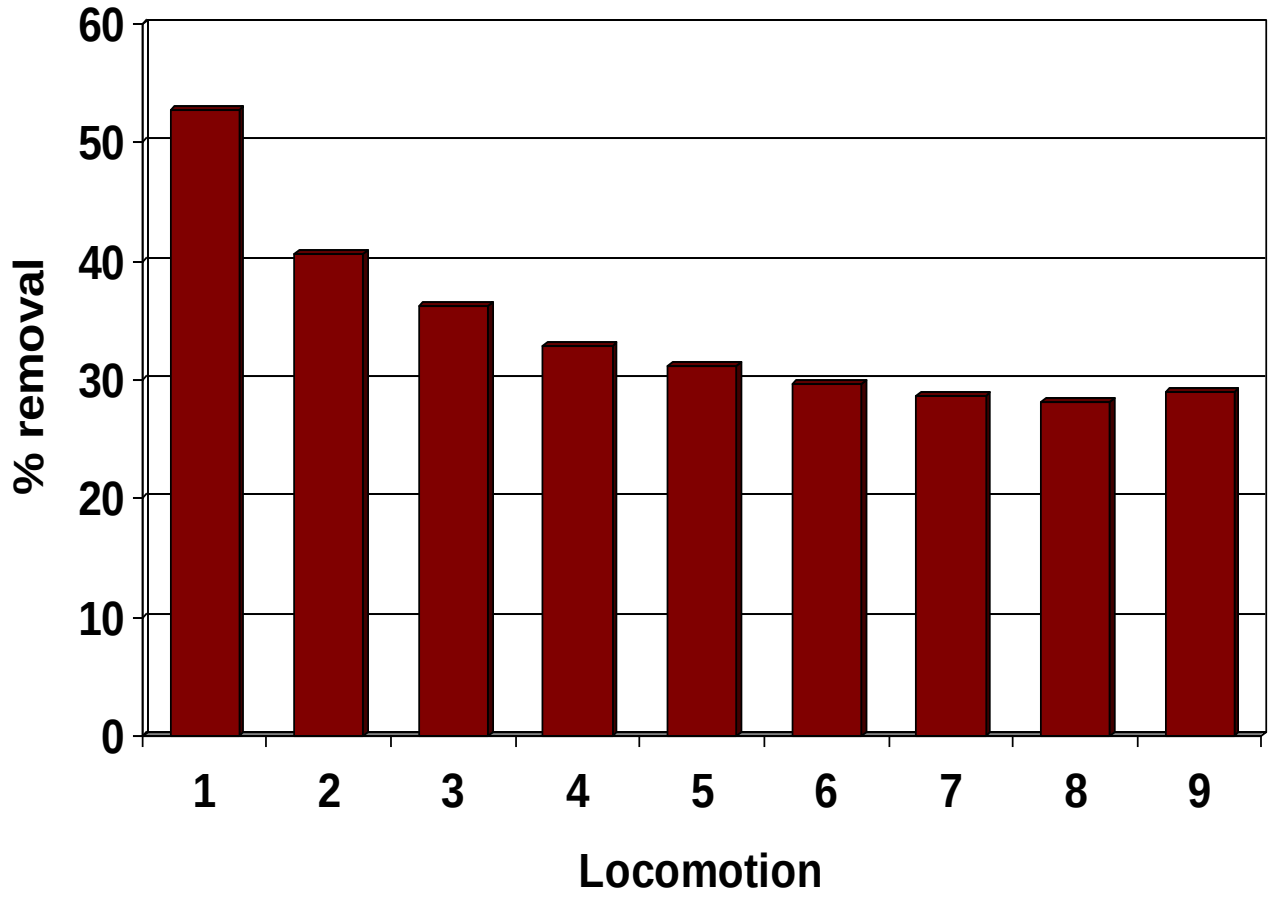

1
narrow
5
9
wide

Rear Legs Set

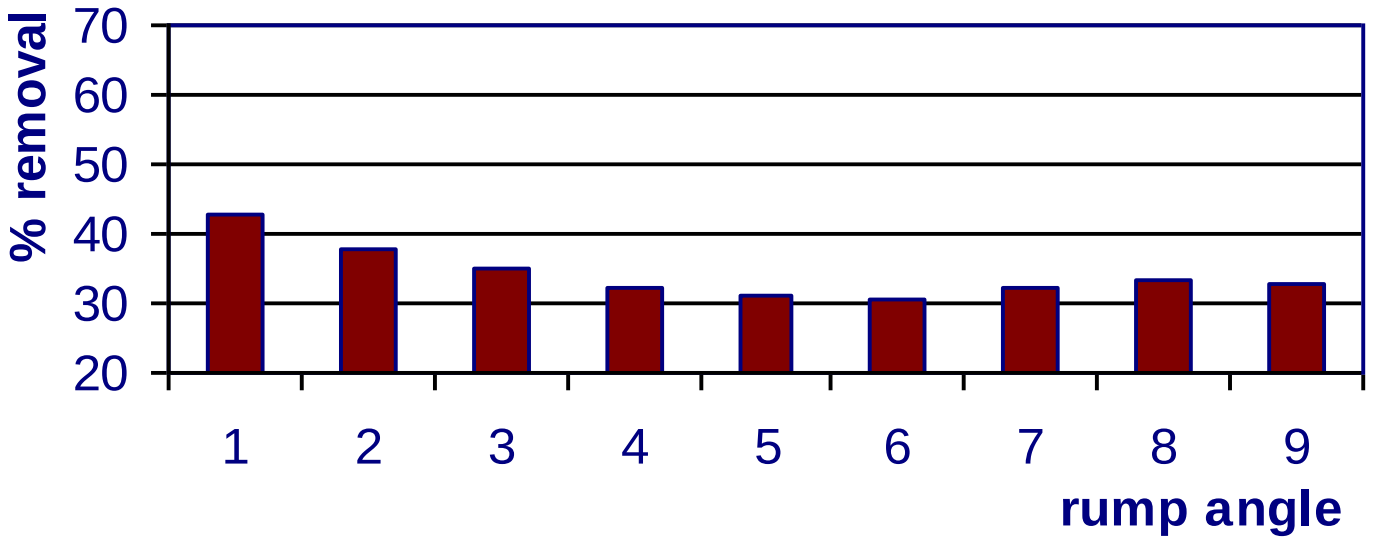


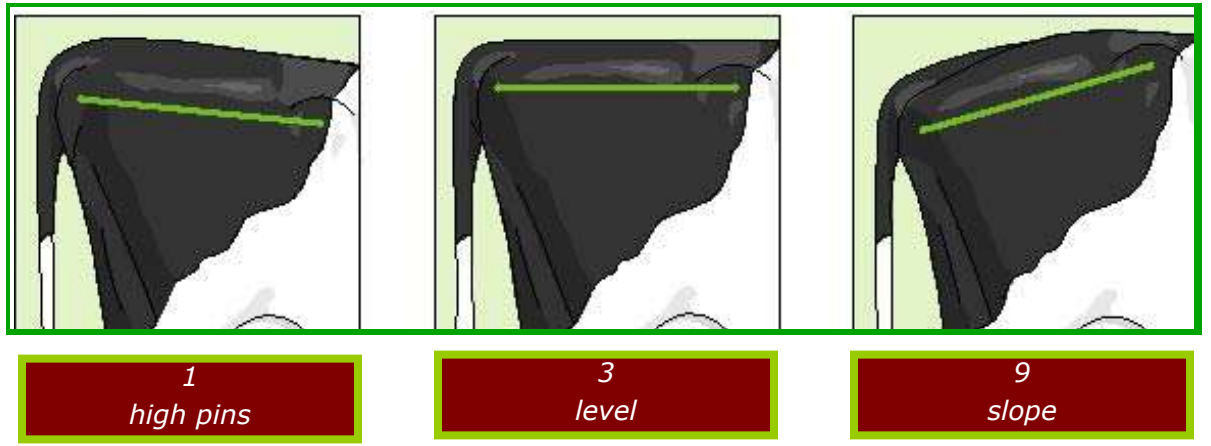


Locomotion

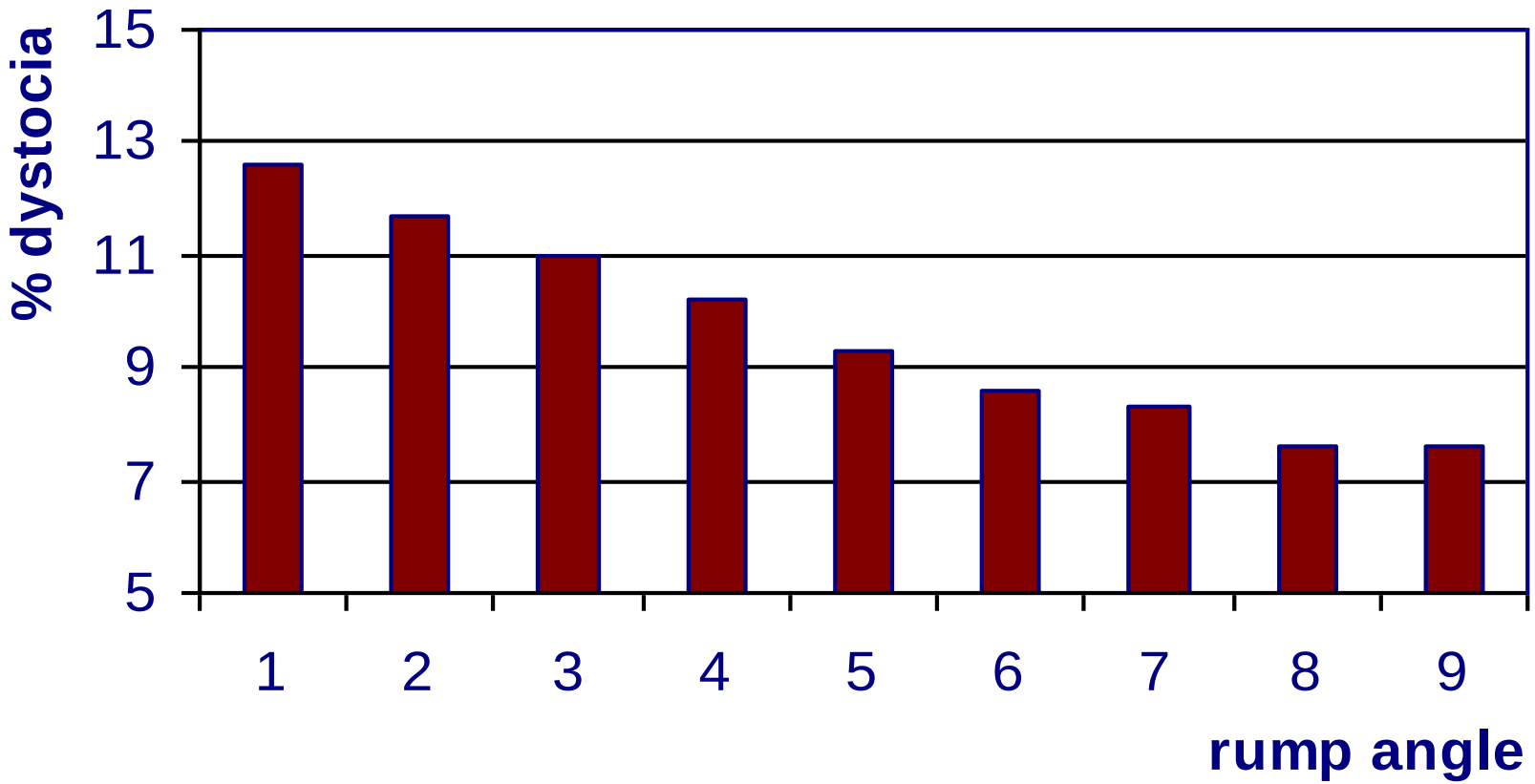


Rump Angle

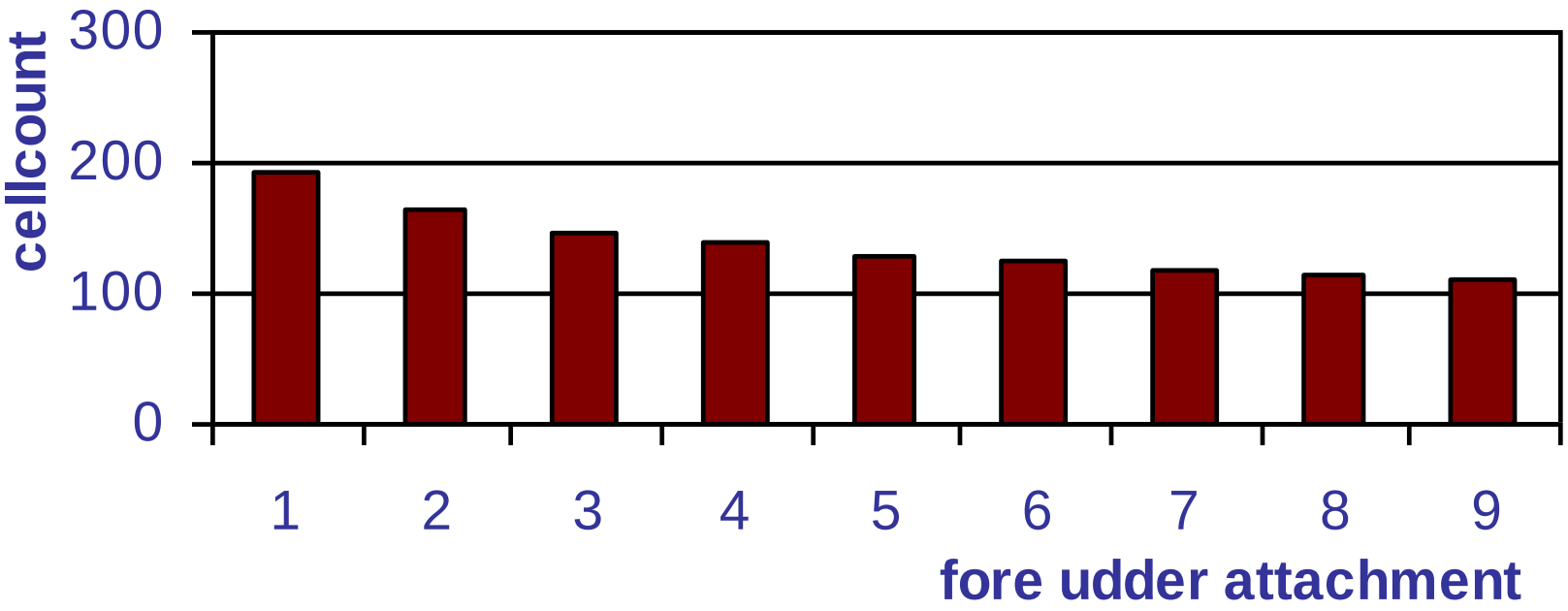

% removal
70
60
50
40
30
20
1
2
3
4
5
6
7
8
9
rump angle


1
high pins
3
level
9
slope

Rump Angle
in relation with % dystocia



Fore Udder Attachement in relation with Somatic Cellcount



Value of conformation

- We have
  - Harmonized scores for traits
  - Breeding values
  - Conversion of breeding values
  - Mating programs

-> farmers get a lot of information

-> also on other traits

-> deal with breeding goal

Breeding goal

- Milkproduction traits
- Longevity
- Udder health
- Fertility
- Claw health
- Calving traits

Relationship – genetic correlation production

	kg protein
angularity	0.29
rear udder height	0.20
udder depth	-0.28

Predictability angularity -> reliability 0.09 / 9%

Relationship – genetic correlation longevity

	longevity
locomotion	0.25
udder depth	0.22
rear udder height	0.21
body depth	-0.36
angularity	-0.32
chest width	-0.29
scc	0.48

Relationship – genetic correlation fertility

	fertility
bcs	0.39
udder depth	0.21
fore udder attachment	0.16

angularity	-0.36
body depth	-0.27
rear udder height	-0.17

Relationship – genetic correlation udderhealth = SCC / SCM*

	SCC/SCM
udder depth	0.32
fore udder attachment	0.26
bcs	0.21

*SCM = subclinical mastitis

Relationship – genetic correlation maternal calving ease

	maternal calving ease
rump angle	0.29
rump width	0.20
locomotion	0.17

Relationship – genetic correlation claw health

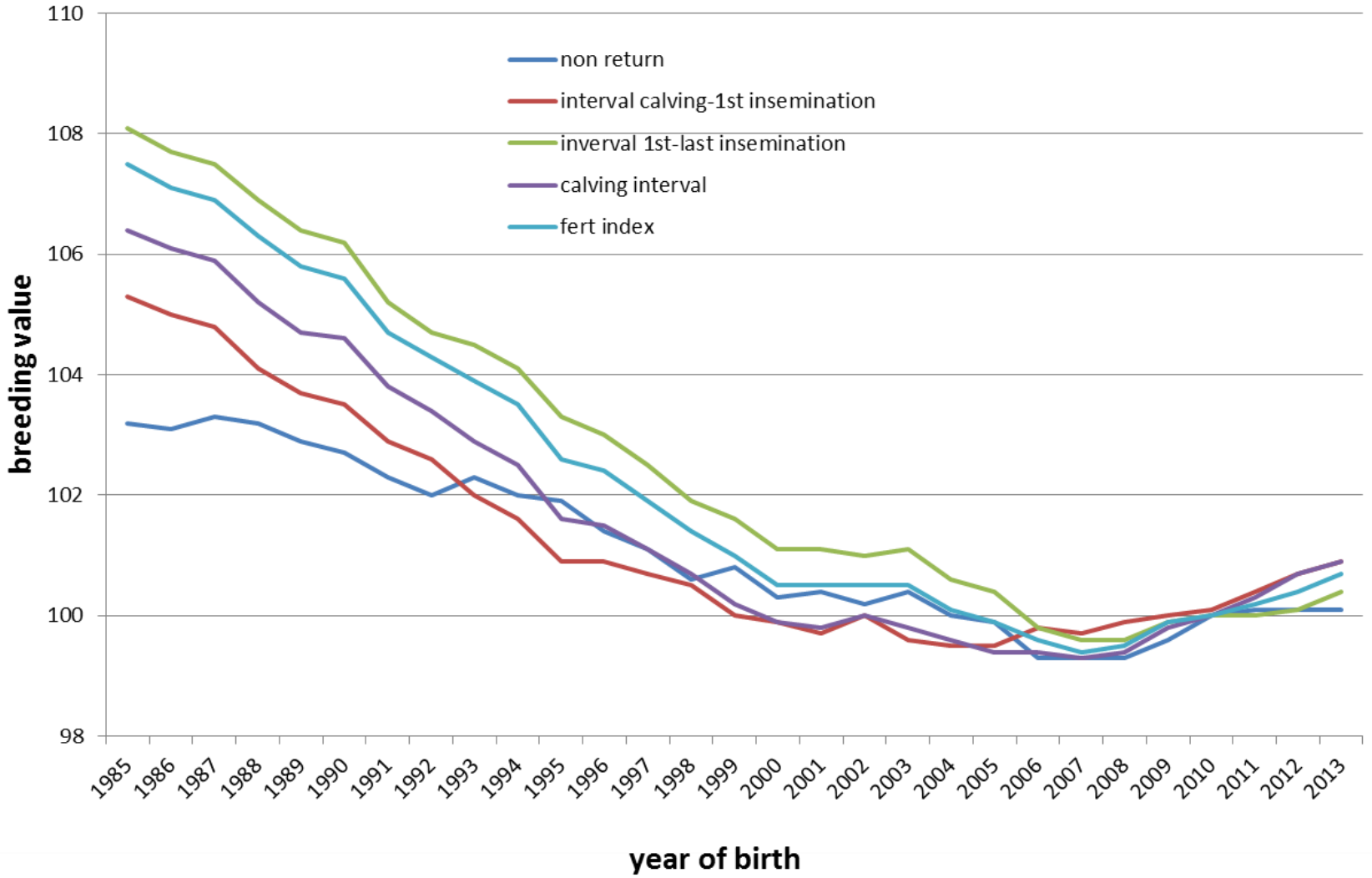
	claw health
locomotion	0.79
rear leg set rear	0.47
rear leg set side	-0.29

Locomotion a very valuable trait !

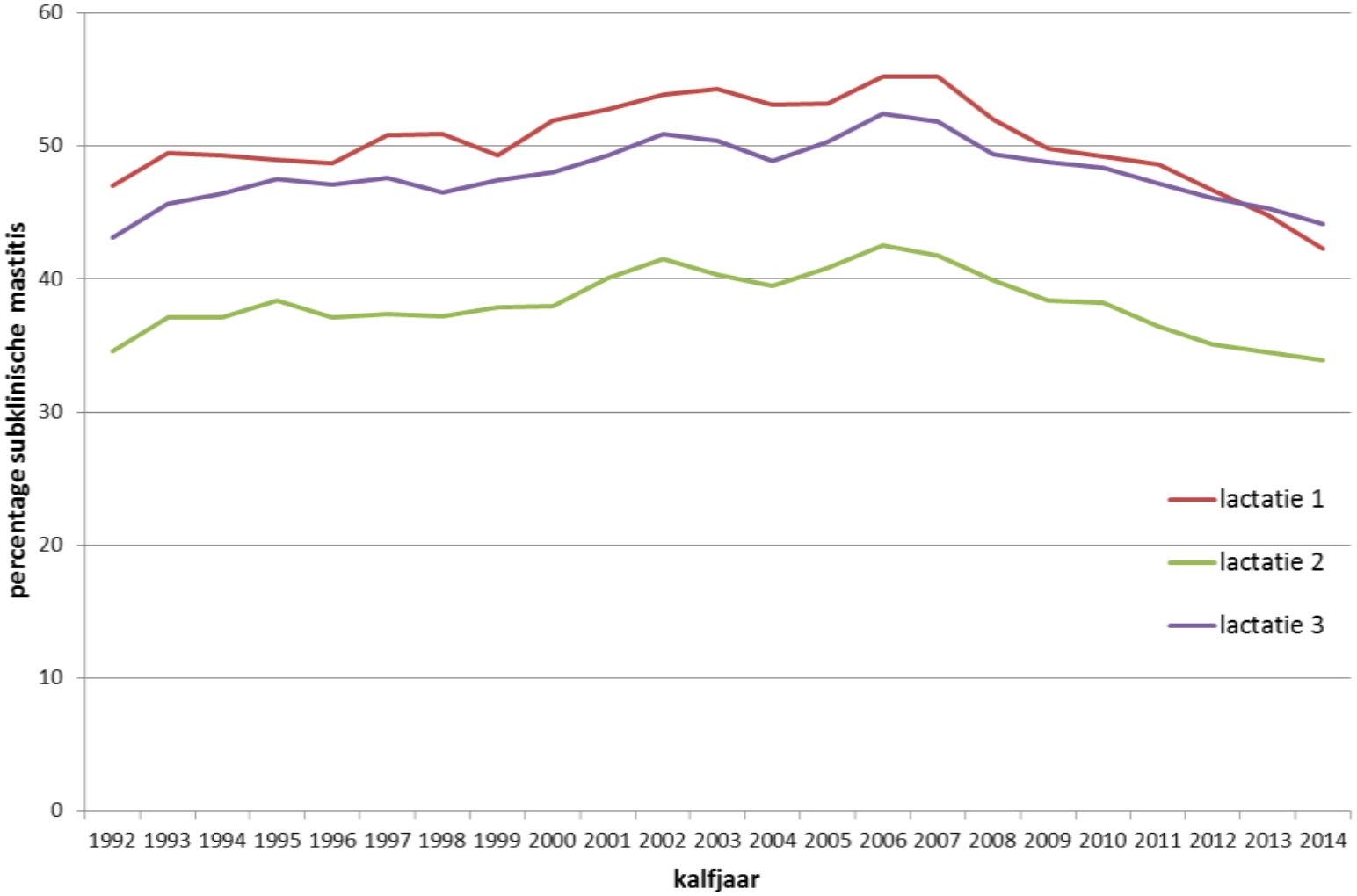
BUT

- Conformation is a TOOL
- Direct selection on traits more effective
- And in Holstein some traits need extra attention

Trend in cows - fertility



Trend udder health - phenotypic



Breed organisations and conformation

- Conformation has been and still is an important trait for famers and in breeding
  - Does not tell EVERYTHING on
    - Income
    - Health
    - Fertility
    - Efficiency

- Breeding goal is broader

- Next steps to be taken in fields
  - Data collection
  - Breeding goal
    - cooperation

Many developments on data collection

- Data from milk robots -> robot efficiency
- Usage of M/NIR -> ketosis
- Feed intake measurements
- Methane measurements
- More sensors coming
- ……

Breed organisations - Cooperation

- Datacollection - costly

- Data handling – management info
  breeding values

- Breeding goal -> join forces

  only one client : farmer

In conclusion

- Scoring cows on conformation has been succesfull
  - Defining the right type of cow
  - Harmonisation across countries works
  - Conformation has value for the modern cow
    - Corrections mating
    - Support/improve other traits

- But breeding goal is much broader than conformation can cover
  - production & functional traits tell how the perfect cow looks like

- Focus on new traits, data and cooperation on breeding goal

-> FARMER !!!

Conformation and passion for breeding