



Progress of type harmonisation

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1. Introduction

One of the main activities of the WHFF is the harmonisation of procedures in Holstein breeding. The success of harmonized linear evaluation should be looked at as one of the greatest accomplishments of the Federation. Progress in harmonized type evaluation might seem slow to some, but in the 32 years since the first workshop for classifiers in Cremona, giant strides have been made.

2. History

The first workshop was attended by participants from 14 countries. The one in Morges, Switzerland (2022) 27 countries and 51 participants attended the workshop. In 1990 there were doubts on whether the countries could have high correlations measuring the same traits compared to other countries. We have seen linear correlations for type at the same level as production traits. This is very significant since classifiers only visually inspect the cow and the production traits are actually weighed and measured. I think we can all agree that from a beginning that was somewhat uncertain, we have universally developed a program that fits our breeder's needs.

3. Report of the 14th Workshop in Morges, Switzerland 20th – 22nd September 2022

Working Group Recommendations to WHFF Council

1. Faster implementation of new traits i.e. locomotion and body condition, in classification programs. Further in genetic evaluations scores based on former trait definitions should be left out to increase the correlations among countries.
2. The trait Angularity will from now on be named 'Rib Structure'. It is a neutral name, covering the trait definition, based on angle and spring of ribs. This name fits much better than Angularity. During the practical session everyone is very able to score this trait. From a survey only USA CAN and EST have openness still as part of this trait, not following the WHFF trait definition.
3. For stature the indicated cm's for a score 1, 5 and 9 are removed from the trait list.
4. Working group will check the pictures and description in the trait list to see if they can be made clearer.
5. Share phenotypic correlation among, body traits, feet and legs traits and udder traits. Based on the last 12 months of data.
6. Focus traits: Chest Width, Angularity, Rear Legs rear View, Foot Angle, Locomotion, Fore Udder and Udder Support.
7. Body depth should be scored independent from stature. Countries should be made aware they should score linear traits as one-dimensional traits. Make no combinations with other traits. It is the only way to increase correlations in Interbull evaluations.
8. For next workshop the working group will come up with list of conformation defects based on how commonly it is scored and incidence in population
9. Continue the program of Head Classifiers Workshop.

Explanation on Recommendations

Ad1) Locomotion is not scored in Australia, Belgium (Wallonia), New Zealand, and South Africa—_countries or country groups participating in Interbull genetic evaluation for conformation traits. USA and CAN are scoring locomotion but do not provide breeding values to Interbull. For body condition score Australia, New Zealand, and South Africa do not send breeding values to the Interbull genetic evaluation. USA is scoring BCS but does not provide breeding to Interbull.

- Ad2) The WHFF board is requested to approve the name change to Rib Structure.
- Ad3) The cm's do not add info as the score depends on the average height of the population. The indication of 3 cm's per point still is valid
- Ad4) Working group should check is pictures for rear legs set rear view can be improved. The picture for score 5 is not clear. An option is to use also similar pictures as countries use for front feet orientation. Some countries (CAN/CHE) make use of a fill score and correct score for rear leg set rear view (RLSRV) for fill of udder. In case correction of fill of udder is important, countries applying this correction should have a higher heritability for rlsrv. Check in next survey if countries apply this correction for filling of udder and what heritability they have. For fore udder some extra descriptive help text can help classifiers how to score the trait. The definition is correct but very general. On locomotion it should be more clearly written how to deal with lame cows.
- Ad5) For more understanding how the traits are scored by different countries, we request that countries send in the phenotypic correlations based on scores of 2023, before 1st of April 2024, to: stefan.rensing@vit.de and gerben.de.jong@crv4all.com.
- Ad6) Interbull correlations below 0.80
- Ad7) Based the survey and also on the phenotypic correlation analysis, it appeared that some countries still score body depth relative to stature. It should be scored independent from stature as it is a linear trait.
- Ad8) Based on the survey for conformation defects, a list of more than 120 defects was made. Many of them only scored in one country or with a very low incidence. The working group will make a list based on how many countries are scoring it and incidence in the populations. Further countries will be requested to provide descriptions for the defects as some defects have different names in different countries. For this the working group can use also the list of ICAR as a start. Information on conformation defects can be found also in ICAR guidelines on recording, section 5 conformation recording.
- Ad9) The location of the next workshop is not known yet. In October 2022 the board will decide which country will organize the world congress in 2024. In connection to this congress the workshop will likely be organized in this country. Topics mentioned for the next workshop: - role of classification in future - what is added value of classification for the dairy farmer

Summary of the 14th WHFF World Classifiers Workshop

Morges 20th - 22nd September 2022

1. In total 51 participants from 27 countries attended the workshop. List of participants, see appendix A.
2. The Conference was inaugurated by Nicolas Jotter and president of Holstein Switzerland, who did welcome all delegates and gave an introduction on the dairy milk sector, breed organisations and classification system in Switzerland. Darren Todd (NBDC R&D Manager) also spoke about UK genetics and Dairy and Beef breeds classifications.
3. The chairman of the WG presented an overview of the harmonization program and type trait definitions.
4. Working Group meeting September 20th, present: Cy Letter (USA, on line), Bruno Jubinville (CAN), Tony O'Connor (NZL), Corrado Zilocchi (ITA), Stefan Rensing (DEU), Thomas Ender (CHE), Pedro Guimaraes (BRA, first time) and Gerben de Jong (NLD) as chairman. Also present was Tamás Sebok, who would be one of the group leaders during the practical sessions during the workshop. Raffaella Finocchiaro and Diego Sierra were present as interpreter. For Thomas Ender it was his last meeting as he will no longer be the head classifier in CHE, as he wants to spend more time in his own farm.
5. In August 2022, 24 countries or country groups participated in the Interbull genetic evaluation for conformation traits. Six linear traits already have a correlation of least 0.90 but 7 are also lower than 0.80. In some cases the low average correlation is due to the fact that a number of countries do not score the actual trait definition. Latvia was included in the analysis for the first time. Poland introduced breeding values for BCS and locomotion, New Zealand for teat length. Countries that do not score all WHFF standard traits are requested to introduce quick as possible all traits and score them to WHFF definitions. The average decrease of the correlation among countries is 0.01

(0.82 in 2022), with the largest decrease (-0.02) for chest width, angularity, rear legs side view, rear legs rear view, fore udder, rear udder height, udder support, udder depth, rear teat placement. Among eight large population countries, being part for all traits in the evaluation since the beginning, the correlation stayed on the same level compared to four years ago. These countries showed an average increase since 2001 of 0.02 (average correlation 0.87 to 0.89). For angularity some countries still use openness to make up the score: USA, CAN and EST. For body depth CAN, CHE, EST and LTV score this trait in relation with stature, while the agreement in WHFF is to score this trait independent from stature.

6. Then analysis of phenotypic correlations was carried out by Stefan Rensing. He showed that these phenotypic correlations based on scores of 12 months period are a good help to analyse how certain traits are scores. 22 countries provided the phenotypic correlations. Angularity, chest width and body depth seem to have most variability. The correlations show that not all countries follow the WHFF definition but that several countries also make the change to the new angularity definition. Countries which are applying now the new trait definition should leave out scores based on the previous definition from their evaluation. For body depth it is clear that some countries score body depth in relation with stature, resulting in a low correlation between stature and body depth scores. Udder depth and central ligament: FRA should check the scale (seems scale was times -1) The differences in phenotypic correlations can give hints where countries probably apply in practice different trait definition. Countries finding very different correlations for specific combinations compared to other countries should try to find out what of the involved two traits is the reason and probably change the definition as applied.

7. On the theoretical part of the program a total of 17 Presentations were made by several countries based on:

- New name for angularity: rib structure
- Trait capacity in New Zealand
- New type traits: Front feet orientation (3 countries), udder balance (2 countries) - Videos were shown on scoring locomotion from 1 to 9.
- Relationship between foot angle and Mortellaro
- Relation mobility/lameness and feet & legs traits
- Value of scoring conformation
- Rear teat placement weighted in udder index
- Conformation defects: info in ICAR and results of survey were discussed

At The end of the workshop all countries were asked to tell what was new in their country since 2018. All countries made use of this opportunity.

Exchange this kind of information was an important part of the meeting and stimulated the discussion among participants.

All presentations will be sent to countries by electronic support.

8. On farm workshop. Both practical workshops on Mollanges Hosteins of Henchoz family in Essetines-sur-Yverdon and La Villaire Holstein of Perroud family in Echallens were very well prepare with loose cows and enough space around so groups could score and discuss animals easily.

On the first day at the beginning of the session all traits were demonstrated to the group by scoring one cow. After that the group was divided in 5 groups, and score all traits on 4 cows. All cows were first calf heifers and were discussed with the group leaders (a WG member and Tamas Sebok). In total 20 cows were analysed by the participants.

On the second day, the discussions were centred on low correlation traits (chest width, angularity (rib structure), locomotion, rear legs rear view, fore udder attachment and udder support)

9. All participants agree on the very positive discussions and on the clear definitions of all traits, including locomotion and angularity. Everybody thought that there was more unity in scoring of the traits, even the attention traits. It seems that good progress has been made since 2018!

4. Linear Definitions

One of the proactive steps taken by the WHFF was the publishing of the Standard Linear Traits and their definitions on the website they can be downloaded and printed out by anyone who wants them. I would like to go over the traits and their definitions quickly to possibly spark some discussion during the presentation and later. As a group in Shifnal we all went over the definitions and had some discussions on fine-tuning anything that was giving the classifiers trouble. All participants agree on the very positive discussions and on the clear definitions of all traits.

The following traits are approved standard traits:

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

Standard Trait Definition

The precise description of each trait is well defined and it is essential to use the full range of linear scores to identify the intermediate and extremes of each trait within its population. The assessment parameters for the calculations should be based on the expected biological extremes of two year-old heifers.

All countries at the WHFF conference in Sydney had approved and agreed to use the recommended standard linear traits, although some countries did not consider that all the traits were essential or have an economic value in their breeding programme. The position is that changes in the standard traits could occur based on scientific evidence or the requirement of the international dairy market for specific information. It is not always possible to have a single linear point of measurement, as with fore udder attachment and rib structure.

Note

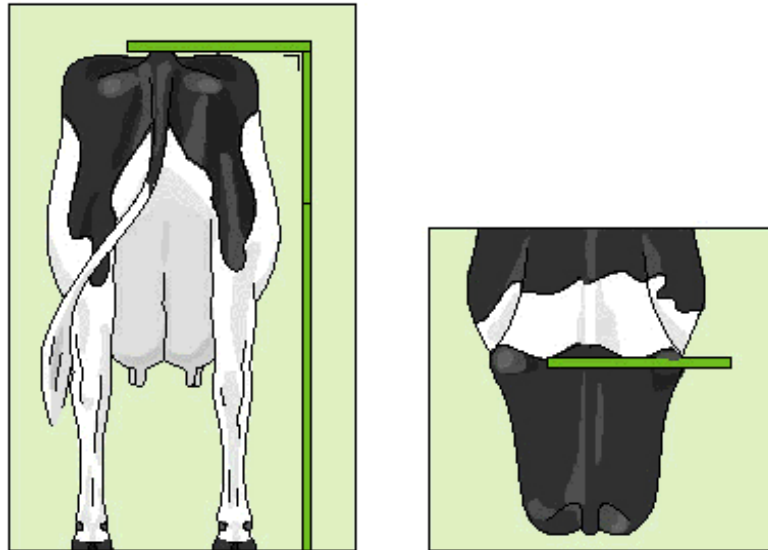
The linear scale used must cover the expected biological extremes of the population in the country of assessment. The precise measurements in the scale given, may be used as a guide and should not be treated as an exact recommendation.

1. Stature

Ref. point: Measured from top of the spine in between hips to ground.
Precise measurement in centimetres or inches, or linear scale.

- 1 Short
- 5 Intermediate
- 9 Tall

Reference scale: 3 cm per point

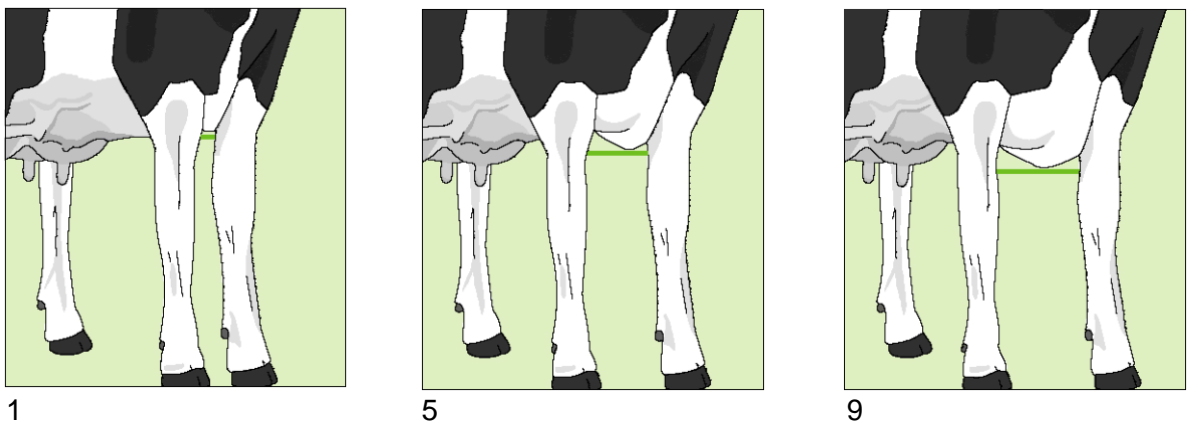


2. Chest Width

Ref. point: Measured from the inside surface between the top of the front legs.

- 1 – 3 Narrow
- 4 – 6 Intermediate
- 7 – 9 Wide

Reference scale: 13 cm – 29 cm; 2 cm per point

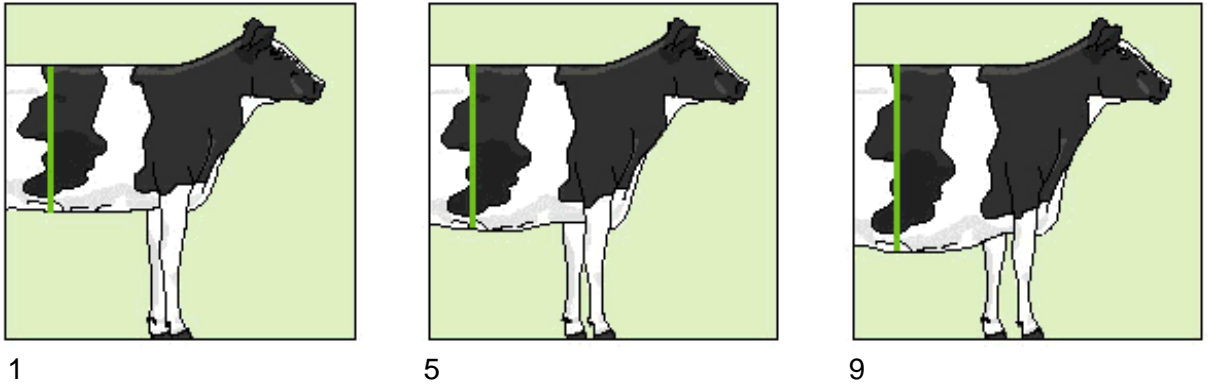


3. Body Depth

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

- 1 – 3 Shallow
- 4 – 6 Intermediate
- 7 – 9 Deep

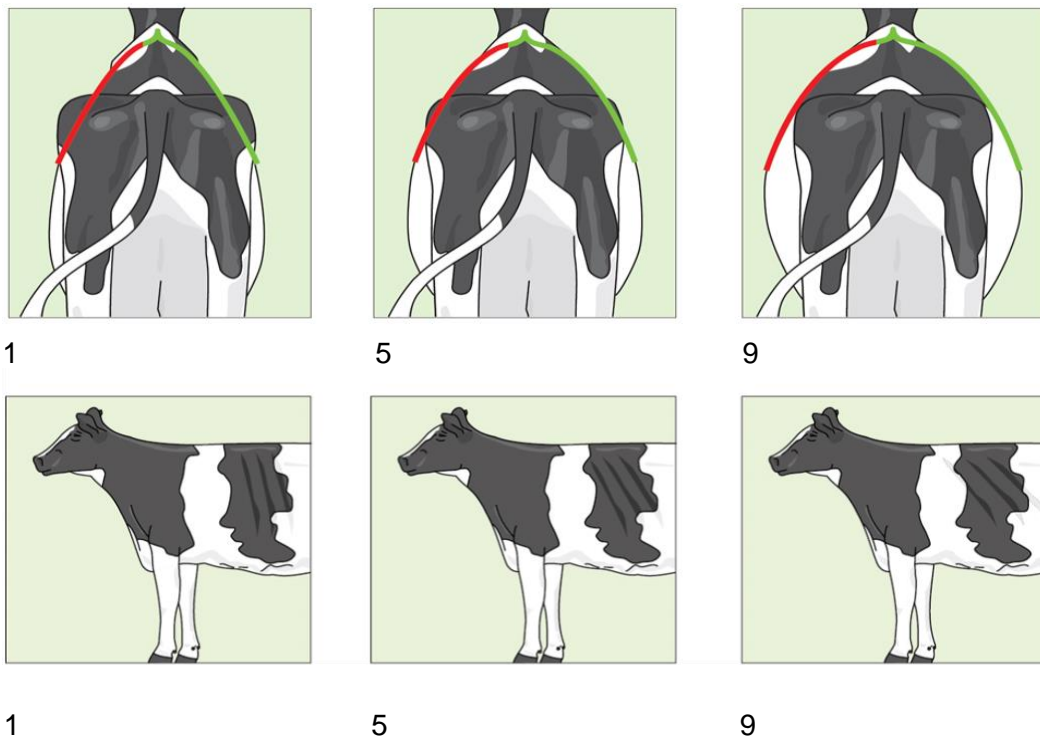
Reference scale: optical in relation with the balance of the animal



4. Rib Structure

Ref. point: The spring and angle of the ribs (60/40). Not a true linear trait. The best way to score spring, the arch of the ribs, is looking at the cow from behind. Angle is the direction of the ribs (side view). Openness is not part of the definition. Do the measurement on the left side of the body.

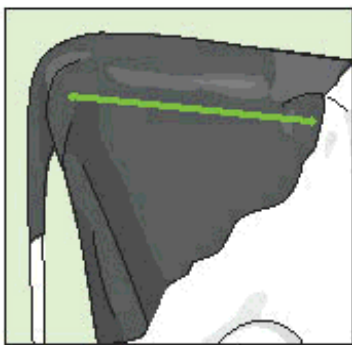
- 1 – 3 Lacks angularity (little spring of ribs and ribs are facing down)
- 4 – 6 Intermediate angularity
- 7 – 9 Very angular (much spring of ribs and ribs are pointing rearward)



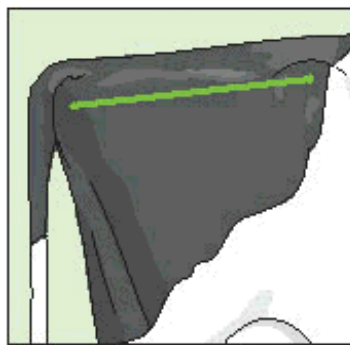
5. Rump Angle

Ref. point: Measured as the angle of the rump structure from hooks (hips) to pins.

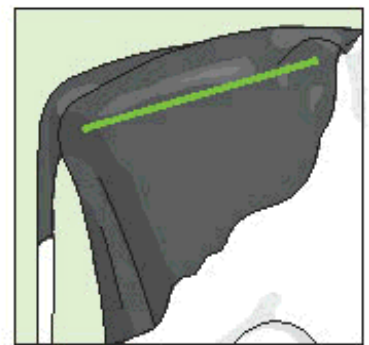
| | |
|-----------------|----------|
| 1 High Pins | (+4 cm) |
| 2 | (+2 cm) |
| 3 Level | (+0 cm) |
| 4 Slight slope | (-2 cm) |
| 5 Intermediate | (-4 cm) |
| 6 | (-6 cm) |
| 7 | (-8 cm) |
| 8 | (-10 cm) |
| 9 Extreme slope | (-12 cm) |



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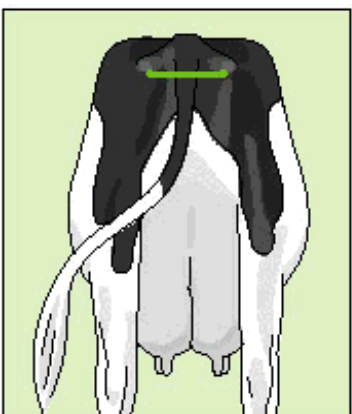
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6. Rump Width

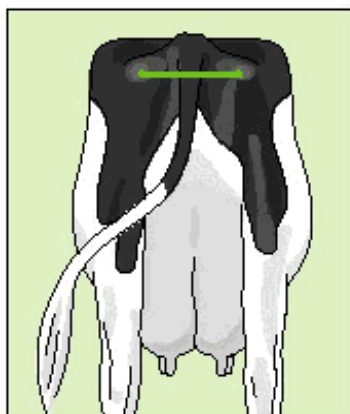
Ref. point: The distance between the most posterior point of pin bones.

- 1 – 3 Narrow
- 4 – 6 Intermediate
- 7 – 9 Wide

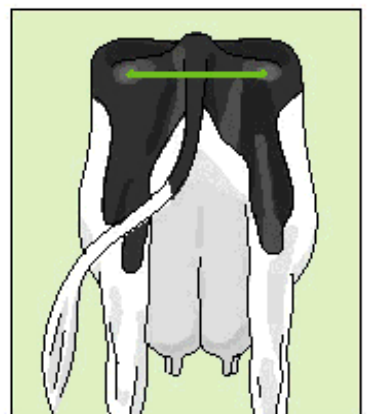
Reference scale: 10 cm – 26 cm; 2 cm per point



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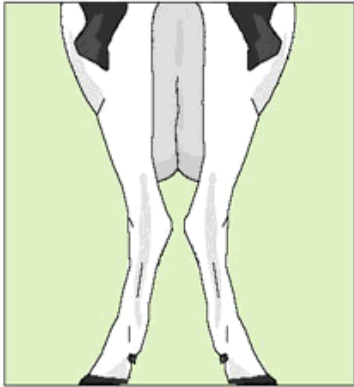


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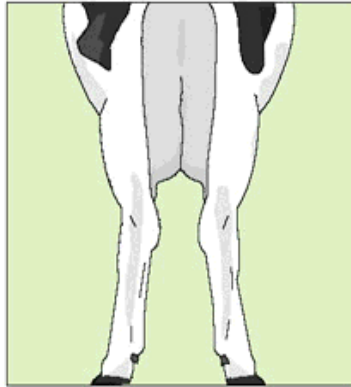
7. Rear Legs Rear View

Ref. point: Direction of the rear feet when view from the rear.

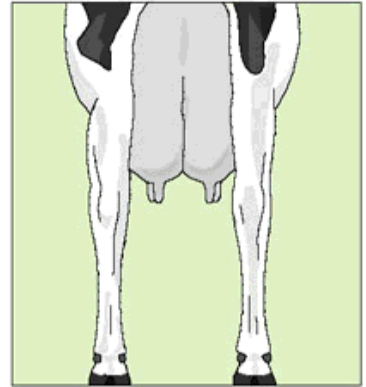
- 1 Extreme toe-out
- 5 Intermediate; slight toe-out
- 9 Parallel feet



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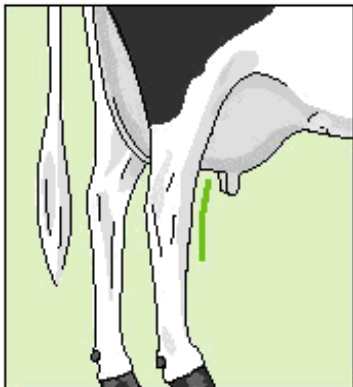


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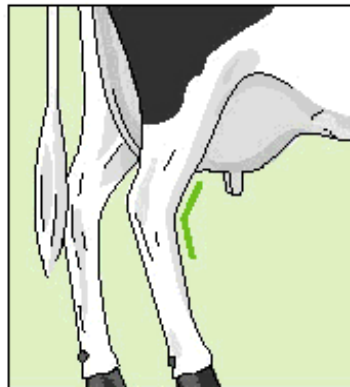
8. Rear Legs Set

Ref. point: Angle measured at the front of the hock.

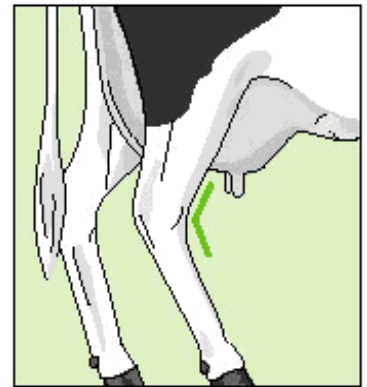
- 1 – 3 Straight (160 degrees)
- 4 – 6 Intermediate (147 degrees)
- 7 – 9 Sickie (134 degrees)



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9. Foot Angle

Ref. point: Angle at the front of the rear hoof measured from the floor to the hairline at the right hoof.

- 1 – 3 Very low angle
- 4 – 6 Intermediate angle
- 7 – 9 Very steep

Reference scale: 1=15 degrees; 5=45 degrees; 9=65 degrees

If the Foot Angle is difficult to score because of hooftrimming, bedding, manure etc. it is also possible to look at the Angle of Hairline.



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10. Locomotion

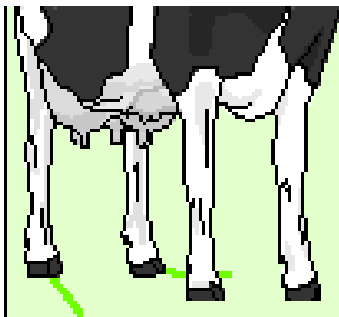
“The use of legs and feet, length and direction of the step”. Not a true linear trait.

Ref. Point:

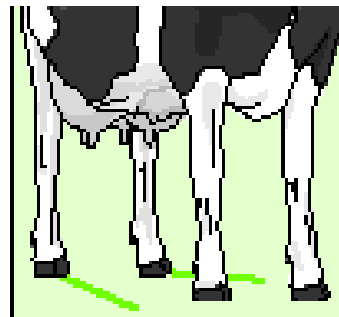
- 1 – 3 Severe abduction and short stride
- 4 – 6 Slight abduction and medium stride
- 7 – 9 No abduction and long stride

Abduction is the lateral deviation in respect to the straight line.

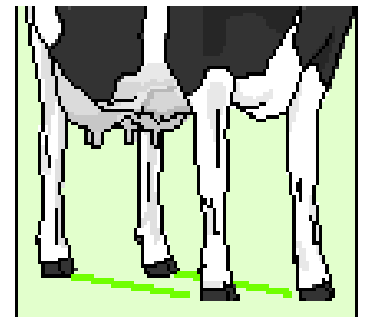
Can and should only be scored in herds where cow regularly do walk and has no lameness. If so, score all cows, be classified that day. The score of 9 means that the rear leg is put straight forward with force upon the step of the foreleg, and (extreme) lame cows getting score 1 because they have short strides.



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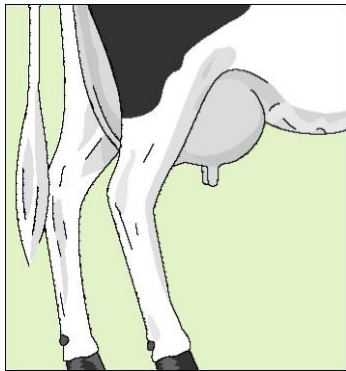
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11. Fore Udder Attachment

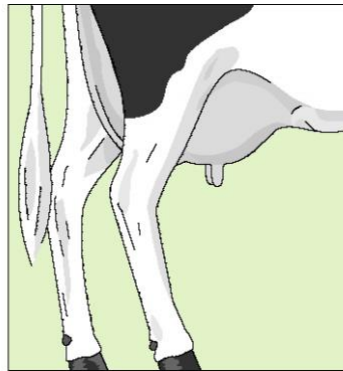
Ref. point: The strength of attachment of the fore udder to the abdominal wall.
Not a true linear trait.

- 1 – 3 Weak and loose
- 4 – 6 Intermediate acceptable
- 7 – 9 Extremely strong and tight

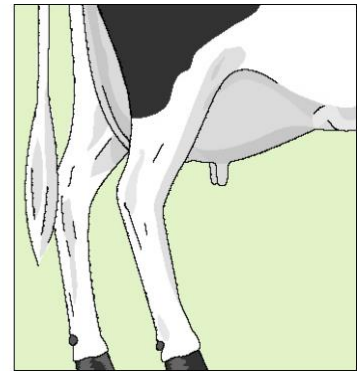
In case of a significant difference in the quality of udder attachment of both sides by scoring fore udder attachment, than the worse side must be scored. This only if the udder is healthy.



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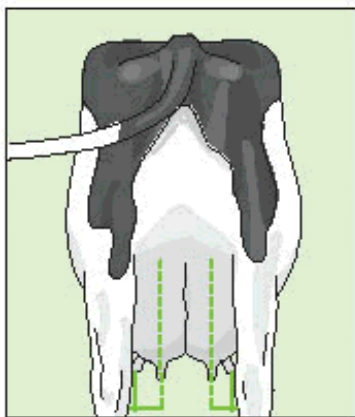


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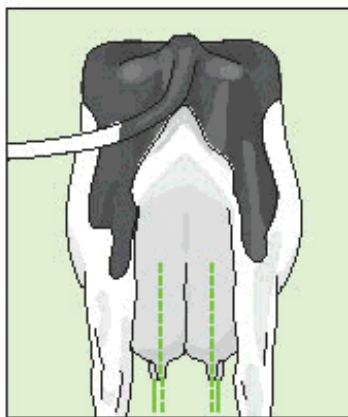
12. Front Teat Position

Ref. point: The position of the front teat from centre of quarter as viewed from the rear.

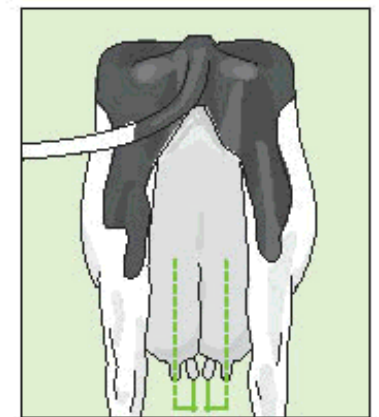
- 1 – 3 Outside of quarter
- 4 – 6 Middle of quarter
- 7 – 9 Inside of quarter



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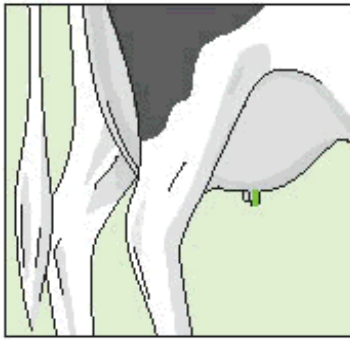
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13. Teat Length

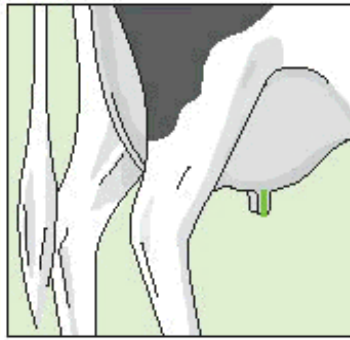
Ref. point: The length of the front teat.

- 1 – 3 Short
- 4 – 6 Intermediate
- 7 – 9 Long

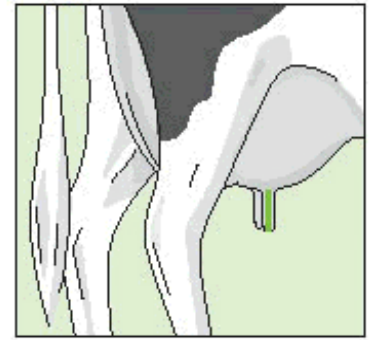
Reference scale: 1-9 cm; 1 cm per point



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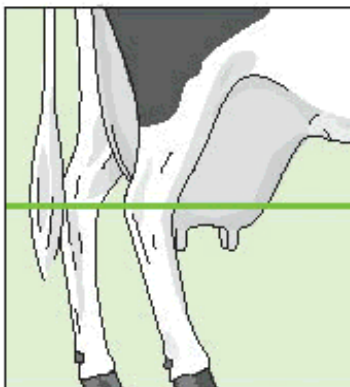
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14. Udder Depth

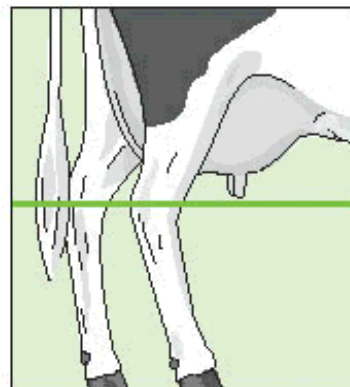
Ref. point: The distance from the lowest part of the udder floor to the hock.

- 1 Below hock
- 2 Level with hock
- 5 Intermediate
- 9 Shallow

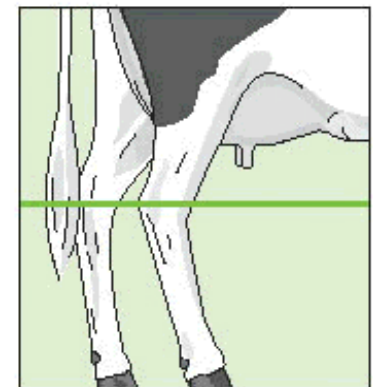
Reference scale: level=2 (0 cm); 3 per point



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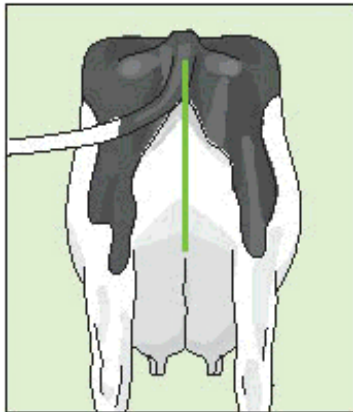
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15. Rear Udder Height

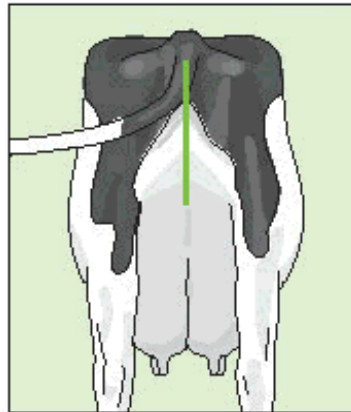
Ref. point: The distance between the bottom of the vulva and the milk secreting tissue: in relation to the height of the animal.

- 1 – 3 Very low
- 4 – 6 Intermediate
- 7 – 9 High

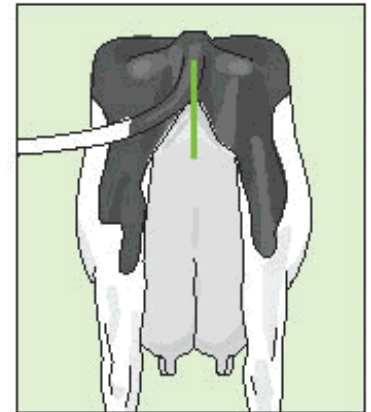
Reference scale: measured on a scale between the bottom of the vulva and the hock; the midpoint represents a score 4 (29 cm); 2 cm per point



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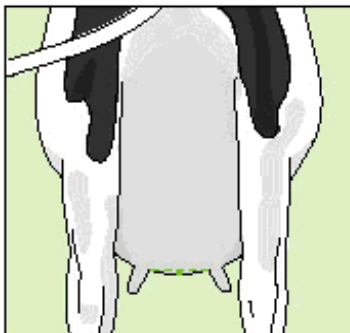


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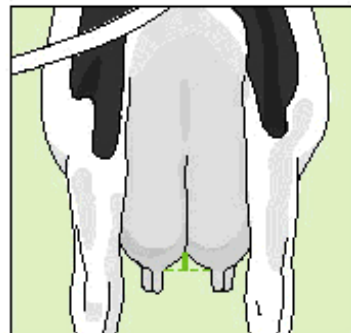
16. Central Ligament

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

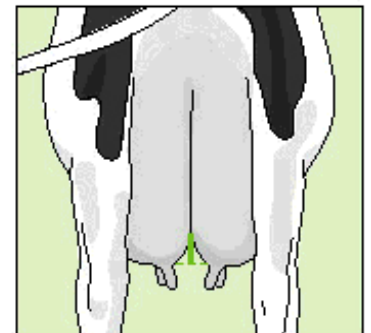
- 1 Convex to flat floor (+1 cm)
- 2 (+0.5 cm)
- 3 (+0 cm)
- 4 Slight definition (-1 cm)
- 5 (-2 cm)
- 6 (-3 cm)
- 7 Deep definition (-4 cm)
- 8 (-5 cm)
- 9 (-6 cm)



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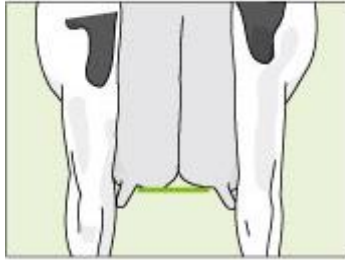
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17. Rear Teat Position

Ref. Point: The position of the rear teat from centre of quarter.

- 1 – 2 Outside
- 4 Mid point
- 7 – 9 Inside of quarter (8= touching, 9=crossing)

Reference scale: to obtain population distribution it is recommended that 4 represents mid point of the quarter



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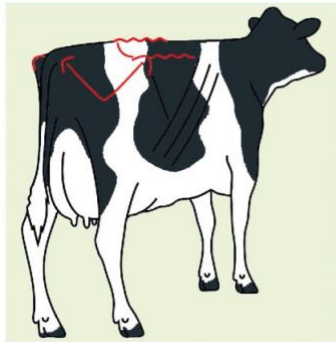
18. Body Condition Score

The covering of fat over the tail head and rump, not a true linear trait.

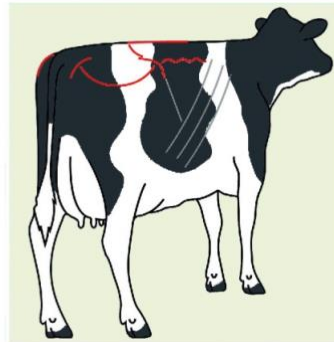
Ref. Point:

- 1 – 3 Poor
- 4 – 6 Intermediate
- 7 – 9 Grossly fat

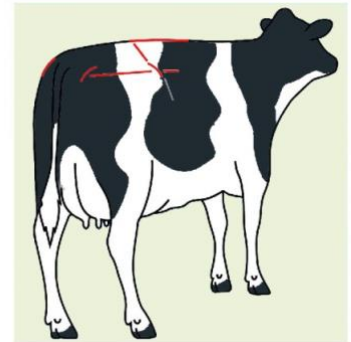
The loin is the main area to observe for scores 1-6, while the tail implant is important with the higher score (7 – 9)



1



5



9

5. Genetic correlation

The average genetic correlation between countries for 21 traits, as analysed by Interbull. An average correlation is based on the average correlation one country has with all other countries.

| Trait | Average correlation | | | | | | | | | |
|----------------------------|---------------------|------|------|------|------|------|------|-------|------|------|
| | May | May | Nov | Sept | Sept | Jan | Aug | April | Dec | Apr |
| | 2001 | 2002 | 2003 | 2005 | 2007 | 2010 | 2012 | 2014 | 2015 | 2018 |
| Stature | 0.89 | 0.92 | 0.91 | 0.92 | 0.92 | 0.91 | 0.91 | 0.90 | 0.90 | 0.91 |
| Chest width | 0.76 | 0.79 | 0.79 | 0.80 | 0.79 | 0.80 | 0.78 | 0.76 | 0.76 | 0.79 |
| Body depth | 0.75 | 0.79 | 0.80 | 0.82 | 0.81 | 0.81 | 0.81 | 0.81 | 0.80 | 0.82 |
| Angularity | 0.76 | 0.78 | 0.76 | 0.78 | 0.77 | 0.75 | 0.74 | 0.73 | 0.72 | 0.75 |
| Rump angle | 0.93 | 0.94 | 0.94 | 0.95 | 0.95 | 0.94 | 0.94 | 0.93 | 0.93 | 0.93 |
| Rump width | 0.75 | 0.83 | 0.84 | 0.84 | 0.84 | 0.87 | 0.87 | 0.86 | 0.86 | 0.87 |
| Rear leg set side view | 0.82 | 0.85 | 0.84 | 0.85 | 0.85 | 0.84 | 0.83 | 0.82 | 0.82 | 0.84 |
| Rear leg rear view | 0.77 | 0.79 | 0.76 | 0.76 | 0.74 | 0.74 | 0.74 | 0.72 | 0.72 | 0.72 |
| Foot angle | 0.57 | 0.68 | 0.66 | 0.68 | 0.72 | 0.74 | 0.73 | 0.72 | 0.73 | 0.75 |
| Fore udder | 0.74 | 0.79 | 0.80 | 0.83 | 0.84 | 0.83 | 0.83 | 0.79 | 0.78 | 0.80 |
| Rear udder height | 0.74 | 0.81 | 0.82 | 0.84 | 0.85 | 0.82 | 0.82 | 0.80 | 0.80 | 0.82 |
| Udder support | 0.77 | 0.80 | 0.78 | 0.80 | 0.81 | 0.78 | 0.77 | 0.75 | 0.75 | 0.76 |
| Udder depth | 0.90 | 0.94 | 0.95 | 0.96 | 0.96 | 0.97 | 0.96 | 0.94 | 0.93 | 0.94 |
| Teat placement | 0.89 | 0.92 | 0.91 | 0.94 | 0.93 | 0.93 | 0.93 | 0.92 | 0.91 | 0.92 |
| Teat length | 0.96 | 0.96 | 0.95 | 0.96 | 0.96 | 0.94 | 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 | 0.94 |
| Locomotion | -- | -- | -- | -- | -- | 0.72 | 0.66 | 0.65 | 0.65 | 0.64 |
| Body condition | -- | -- | -- | -- | -- | 0.77 | 0.80 | 0.83 | 0.85 | 0.85 |
| Overall conformation | 0.67 | 0.73 | 0.70 | 0.73 | 0.75 | 0.74 | 0.74 | 0.70 | 0.70 | 0.74 |
| Overall udder | 0.74 | 0.77 | 0.76 | 0.78 | 0.81 | 0.81 | 0.80 | 0.77 | 0.77 | 0.79 |
| Overall feet & legs | 0.60 | 0.67 | 0.67 | 0.69 | 0.69 | 0.69 | 0.69 | 0.65 | 0.67 | 0.68 |
| Number of countries/groups | 18 | 18 | 22 | 19 | 20 | 20 | 22 | 25 | 24 | 23 |

6. Where do we go from here?

As stated at the beginning, we are in a global market for genetics. This is an exciting time to be a breeder or Holstein enthusiast. It also is a time to make sure we are all collecting the most accurate, economically important information that is possible as classifiers and as herdbooks. As someone who has been involved on the committee from the beginning, I am pleased to report that the committee has from the start put the Holstein cow and her owner's first instead of trying to advance a particular country's agenda. The welfare of our breed looks bright around the world, but we still have much to do. The discussion of an international classification program goes on and I'm sure many of you will talk about this very thing this week. Each country has their own breeding goals but our members seem to like the same kind of cow regardless of where she comes from. It will be an exciting future. Hopefully we can continue to make much progress in evaluation of the

functionality and durability of the Holstein cow. I would like to thank the members of the working committee who have worked very hard on your behalf, especially Gabriel Blanco who has been chairing this group since 2016 and has been many years enthusiastic member:

Type Harmonisation Working Group, October 2022:

| | |
|---|--|
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|---|--|

7. References

De Jong, Gerben, 2018, Overview of Genetic Correlations Between Countries for Conformation Traits in April 2018.

World Holstein Friesian Federation website: <http://www.whff.info/>