WHFF linear conformation trait list

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Table of contents

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

<u>*Note*</u>
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.

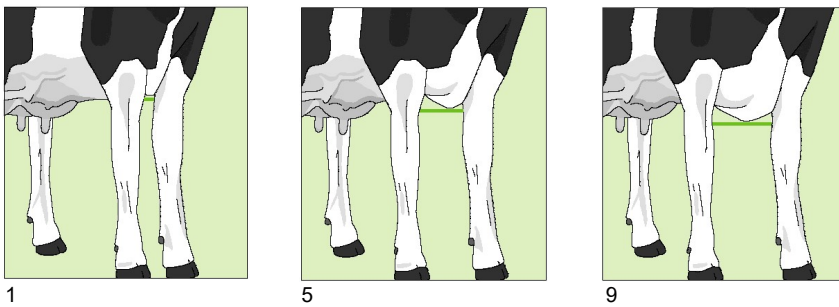1 Short
5 Intermediate
9 Tall

Reference scale: 3 cm per point
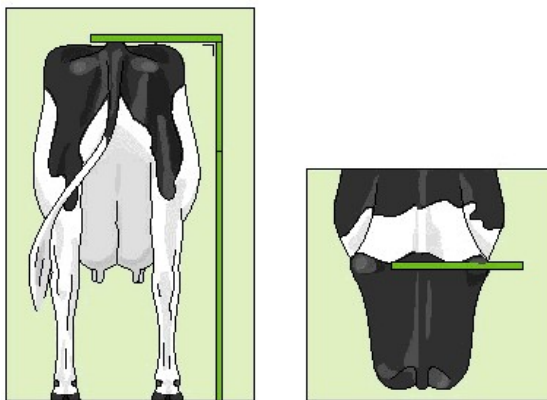
2. Chest Width
Ref. point: Measured from the inside surface between the top of the front legs.

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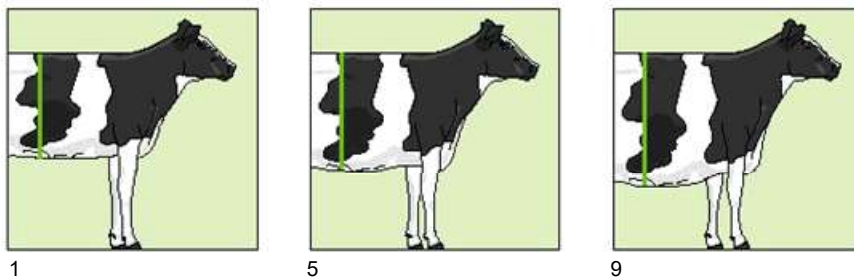7 – 9 Wide

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

1   5   9

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

1   5   9

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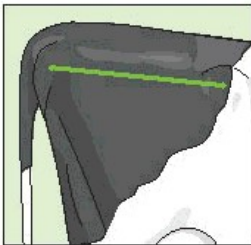
1 – 3 Lacks angularity (little spring of ribs and ribs are facing down)
4 – 6 Intermediate angularity
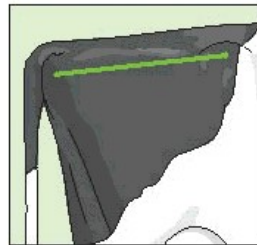7 – 9 Very angular (much spring of ribs and ribs are pointing rearward)

1   5   9

1   5   9
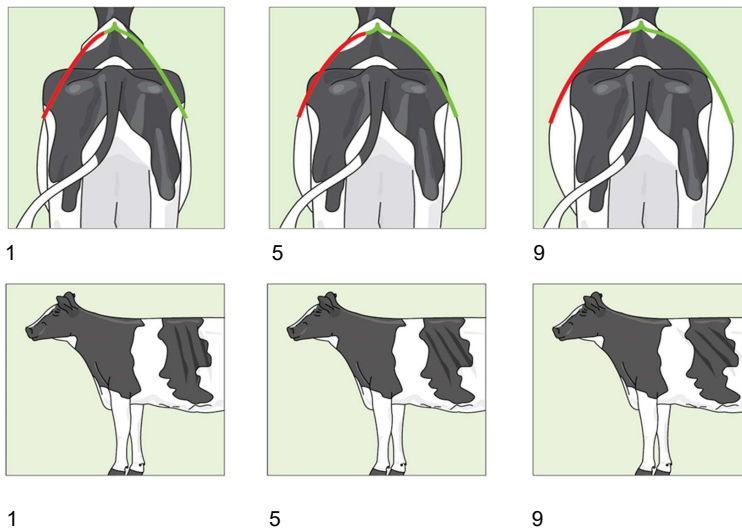
5. Rump Angle
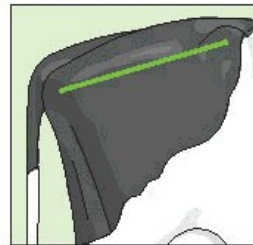**Ref. point:**   Measured as the angle of the rump structure from hooks (hips) to pins.

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)

1   5   9

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

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

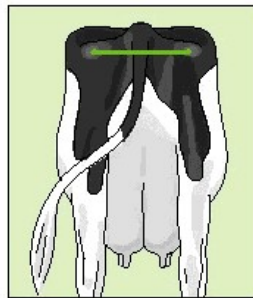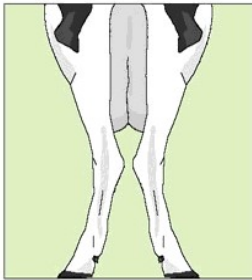Reference scale: 10 cm – 26 cm; 2 cm per point
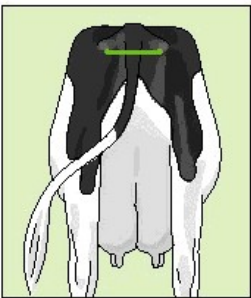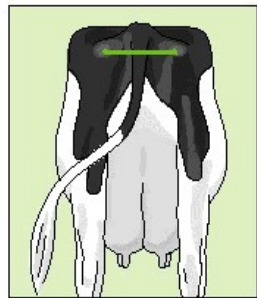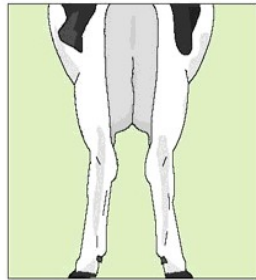

1   5   9

7. Rear Legs Rear View
Ref. point: Direction of the rear toes when viewed from the rear.
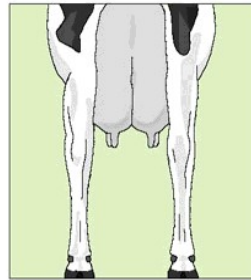
1 Extreme toe-out
5 Intermediate; slight toe-out
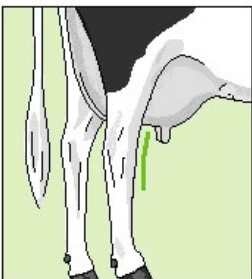9 Parallel feet

1   5   9

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 Sickle   (134 degrees)

1   5   9

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.

1   5   9

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.

1   5   9

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
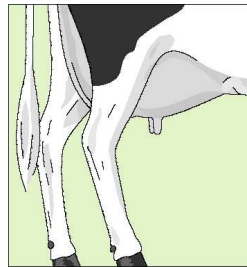   7 – 9 Extremely strong and tight

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.
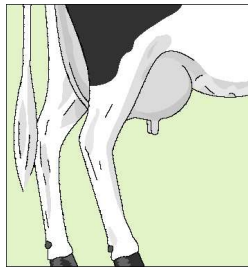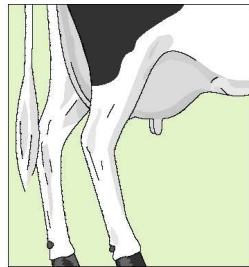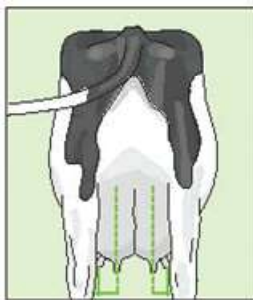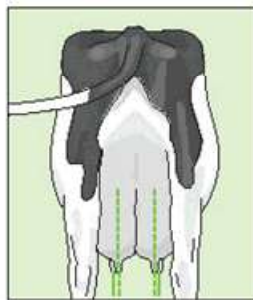

1   5   9

12. Front Teat Position
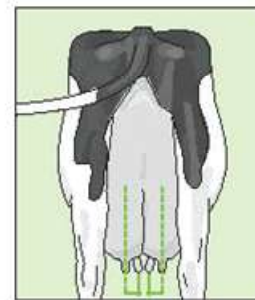*Ref. point:* The position of the front teat from centre of quarter as viewed from the rear.

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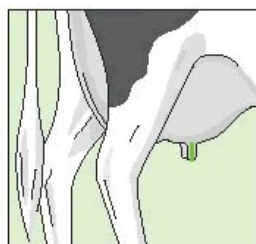

1   5   9

13. Teat Length
Ref. point: The length of the front teat.

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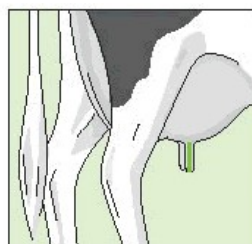4 – 6 Intermediate
7 – 9 Long

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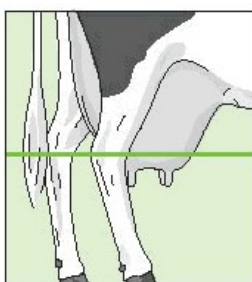

1   5   9
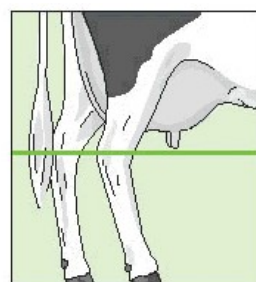
14. Udder Depth
Ref. point: The distance from the lowest part of the udder floor to the hock.
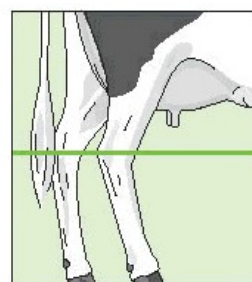
1 Below hock
2 Level with hock
5 Intermediate
9 Shallow

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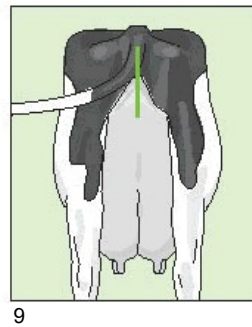

1   5   9

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

1   5   9
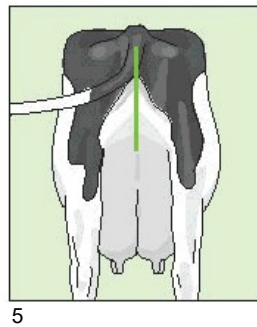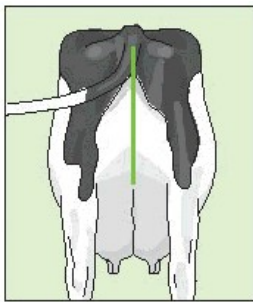
16. Central Ligament
Ref. point: The depth of cleft, measured at the base of the rear udder.

1 Convex to flat floor (>0 cm)
5   (-3 cm)
9   (<-6 cm)

1   5   9
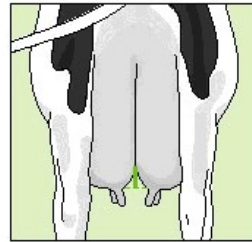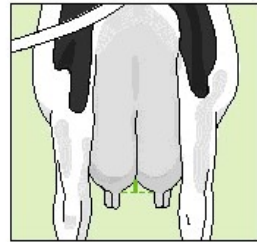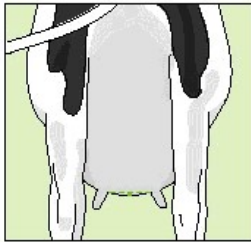
17. Rear Teat Position
Ref. Point: The position of the rear teat from centre of quarter.

        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
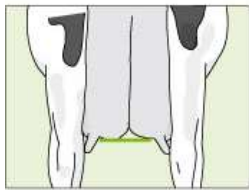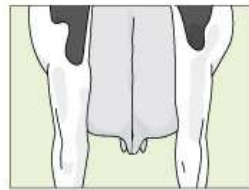
1   4   9

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

3. Genetic correlations between countries

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.

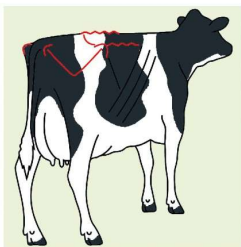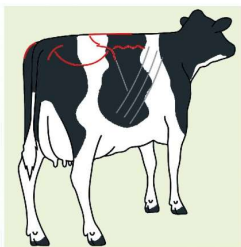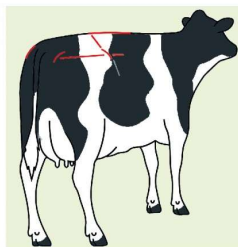| Trait	Average correlation										
	May	*May*	*Nov*	*Sept*	*Sept*	*Jan*	*Aug*	*April*	*Dec*	*Apr*	*Aug*
	2001	*2002*	*2003*	*2005*	*2007*	*2010*	*2012*	*2014*	*2015*	*2018*	*2022*
Stature	0.89	0.92	0.91	0.92	0.92	0.91	0.91	0.90	0.90	0.91	0.91
Chest width	0.76	0.79	0.79	0.80	0.79	0.80	0.78	0.76	0.76	0.79	0.78
Body depth	0.75	0.79	0.80	0.82	0.81	0.81	0.81	0.81	0.80	0.82	0.81
Angularity	0.76	0.78	0.76	0.78	0.77	0.75	0.74	0.73	0.72	0.75	0.73
Rump angle	0.93	0.94	0.94	0.95	0.95	0.94	0.94	0.93	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	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	0.84	0.82
Rear leg rear view	0.77	0.79	0.76	0.76	0.74	0.74	0.74	0.72	0.72	0.72	0.70
Foot angle	0.57	0.68	0.66	0.68	0.72	0.74	0.73	0.72	0.73	0.75	0.75
Fore udder	0.74	0.79	0.80	0.83	0.84	0.83	0.83	0,79	0.78	0.80	0.78
Rear udder height	0.74	0.81	0.82	0.84	0.85	0.82	0.82	0.80	0.80	0.82	0.80
Udder support	0.77	0.80	0.78	0.80	0.81	0.78	0.77	0.75	0.75	0.76	0.74
Udder depth	0.90	0.94	0.95	0.96	0.96	0.97	0.96	0.94	0.93	0.94	0.92
Teat placement	0.89	0.92	0.91	0.94	0.93	0.93	0.93	0.92	0.91	0.92	0.91
Teat length	0.96	0.96	0.95	0.96	0.96	0.94	0.94	0.94	0.94	0.94	0.93
Rear teat placement	--	--	0.96	0.96	0.96	0.90	0.89	0.91	0.92	0.94	0.92
Locomotion	--	--	--	--	--	0.72	0.66	0.65	0.65	0.64	0.64
Body condition	--	--	--	--	--	0.77	0.80	0.83	0.85	0.85	0.86
Overall conformation	0.67	0.73	0.70	0.73	0.75	0.74	0.74	0.70	0.70	0.74	0.69
Overall udder	0.74	0.77	0.76	0.78	0.81	0.81	0.80	0.77	0.77	0.79	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	0.66
Number of countries/groups	18	18	22	19	20	20	22	25	24	23	24