

## Appendix I

### The Danish Cattle Federation welfare assessment protocol for dairy cattle

Description of the measures included in the Danish Cattle Federation protocol for dairy cattle

(The fourth column indicates whether the measure was included in the current study)

Variable	Score		
<i>Recording, group</i>			
Lying behaviour  <i>Recorded when entering the stable</i>		Carefully enter the stable. Register number of cows rising when you enter	Not included
		Register how many cows are standing or partly standing (including the ones which rose when you entered)	Not included
		Register how many cows are lying	Not included
		Register how many of the cows which are lying have part of or the whole body outside the lying area/cubicle	Included
		Register how many cows are eating – touching the fodder with their muzzle	Not included
Positive behaviour  <i>Recorded during the stay</i>  <i>Recorded as yes/no</i>	Yes/No	Grooming (social licking)	Included
		Caudal licking (stands on three legs to lick own hindlimb/h hoof or scratching the ear with the hindleg)	
<i>Recording, sample size</i>			
CHR <i>Recorded for the variables below</i>		Eartag number	Included
Getting-up-behaviour  <i>Recorded when approaching cows lying. Gently touch of the back is allowed to get the cow to stand</i>  <i>Scale 1-5</i>	1	Normal sequence. Smooth movement with no stops	Included  <i>For calculation; score 1-2 describes untroubled getting-up, score 3-5 describes troubled getting-up</i>
	2	Normal sequence with a short break of max 5 s <sup>1</sup> eg standing on the front knees	
	3	Normal sequence with a break of more than 5 s <sup>1</sup> in any part of the movement	
	4	Normal sequence, but have difficulty in finishing the movement	
	5	Any abnormal sequence eg sitting like a dog	
Confidence  <i>The cow is approached in the barn from a 2 meter distance</i>  <i>Scale 1-5</i>	1	The cow stands and allows touch	Included  <i>For calculation; score 1-3 is sufficient confident behaviour, score 4-5 is insecure behaviour</i>
	2	The cow stands, sniffs but do not allow touch	
	3	The cow stands but moves backwards when the hand is stretched out to touch the cow	
	4	The cow moves backwards before the test person starts to move towards it	
	5	The cow avoids the test person	

Hoof condition  <i>Only hind leg hoofs</i>	<b>OK</b>	Hoofs without remarks	Included  <i>For calculation; OK is no remarks and Claw+Asy is remarks</i>
	<b>Claw</b>	Claw length > 90mm	
	<b>Asy</b>	Asymmetry - Hoof angle > 30°	
Integument alterations  <i>Alteration is defined as hairless patch, lesion and swelling</i>  <i>Scale 1-4</i>	<b>1</b>	No part of the body show signs of integument alteration	Included  <i>For calculation; score 1 is no alteration, score 2 is early stage alteration and score 3-4 is alterations</i>
	<b>2</b>	In total an area of < Ø 28.5mm (Danish 5 krone coin) is found with integument alteration	
	<b>3</b>	The total area of integument alteration is found to be between Ø 28.5mm and the palm of the hand	
	<b>4</b>	The total area of integument alteration is found to be larger than the palm of the hand	
Lameness  <i>The cow is assessed standing and walking</i>  <i>Scale 0, 2, 4, 2G</i>	<b>0</b>	The cow stands with straightened back	Included  <i>For calculation; score 0 is no lameness, score 2,4 and 2G is lameness</i>
	<b>2</b>	The cow stands with slightly curved back	
	<b>4</b>	The cow stands with curved back and relieve pressure on at least one leg	
	<b>2G</b>	The cow walks with curved back	
Body Condition Score  <i>Is assessed using the 5 scale Canadian system</i>  <i>Scale 2, 3, 4</i>	<b>2</b>	Body Condition Score $\leq 2$	Included  <i>The three categories are used in calculation</i>
	<b>3</b>	Body Condition Score $2 > < 4$	
	<b>4</b>	Body Condition Score $\geq 4$	
Cleanliness  <i>The cow is assessed from the hock and up from the side and from behind</i>  <i>Scale 1-4</i>	<b>1</b>	The animal is clean	Included  <i>For calculation; score 1-2 is clean, score 3-4 is dirty</i>
	<b>2</b>	Minor splashing on udder (including teats), thigh and/or flank	
	<b>3</b>	Areas with manure on udder (including teats), thigh and/or flank	
	<b>4</b>	Dried up areas of manure (plaques) on udder (including teats), thigh and/or flank	
Coat condition  <i>The cow is assessed from one side</i>	<b>Gla</b>	Sleek coat	Included
	<b>Mat</b>	Dull coat	
	<b>Hår</b>	Hair loss	
	<b>Rin</b>	Ringworm	

<sup>1</sup>s = seconds