

# Cattle welfare – when access to trees

**Seminar: Organic milk  
production in Nordic  
countries  
Ellinglund, 5/9 2023**

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# Project ROBUST

## Purpose:

Study the impact of trees on cattle animal welfare  
The effect of trees on microclimate and cows' heat stress

## Record cattle behaviour:

Trees provide shade and shelter  
Trees provide the opportunity to eat leaves  
Trees provide good opportunities to scratch  
(Measurements by GPS, camera and thermologgers)



Photographer: Marendine Ladegaard, Organic Denmark



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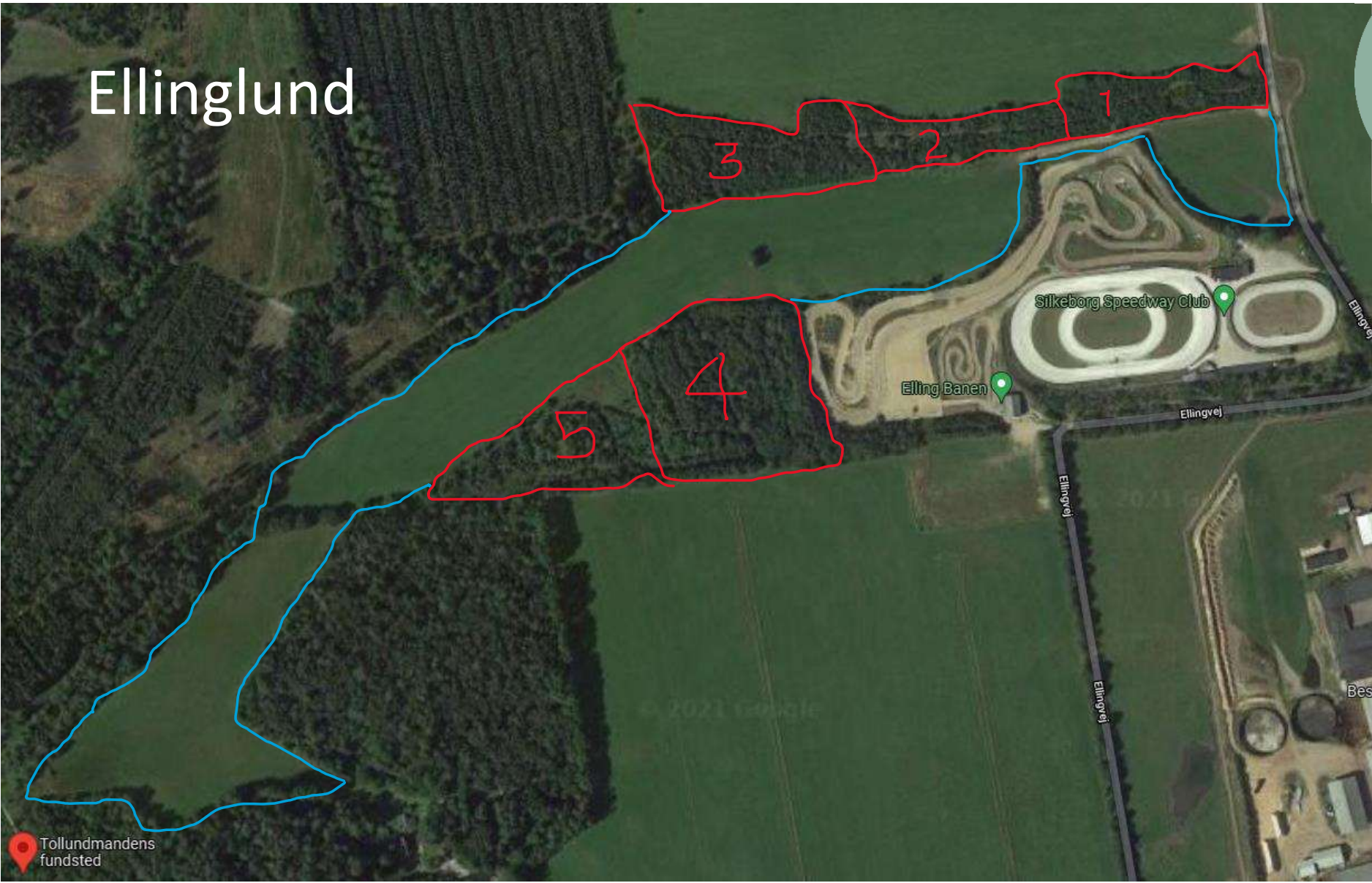


# Inclusion of hedge row, Sommerbjerg





# Ellinglund





# GPS on the cattle



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# Camera follows cattle's use of the forest



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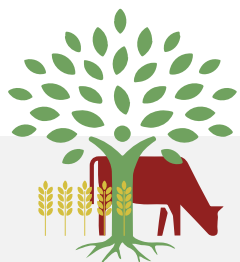




# What are they doing in the forest? Eating...



Video of cow eating 😊



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# What are they doing in the forest? Scratching



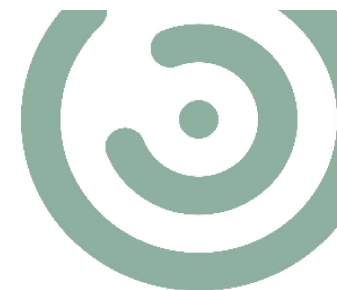
Video of calf scratching 😊



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Especially the calves were happy to use the forest area  
(Material from video from forest 4)

VIDEO 😊



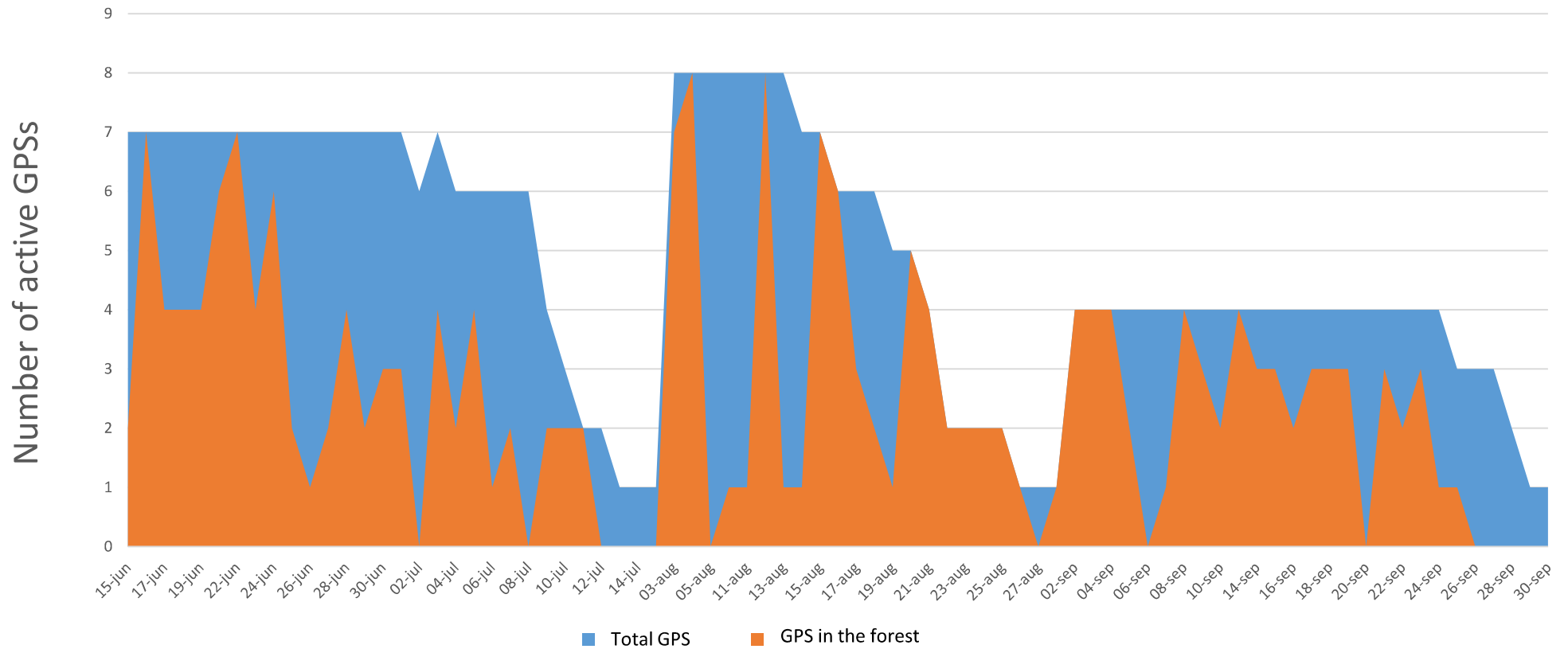
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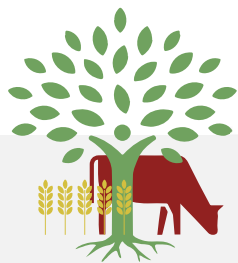
## GPS activity in Summer 2021. Ellinglund





## What time of the day are the cattle in the forest? (Ellinglund 2021)

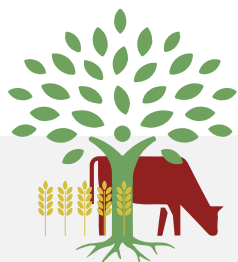
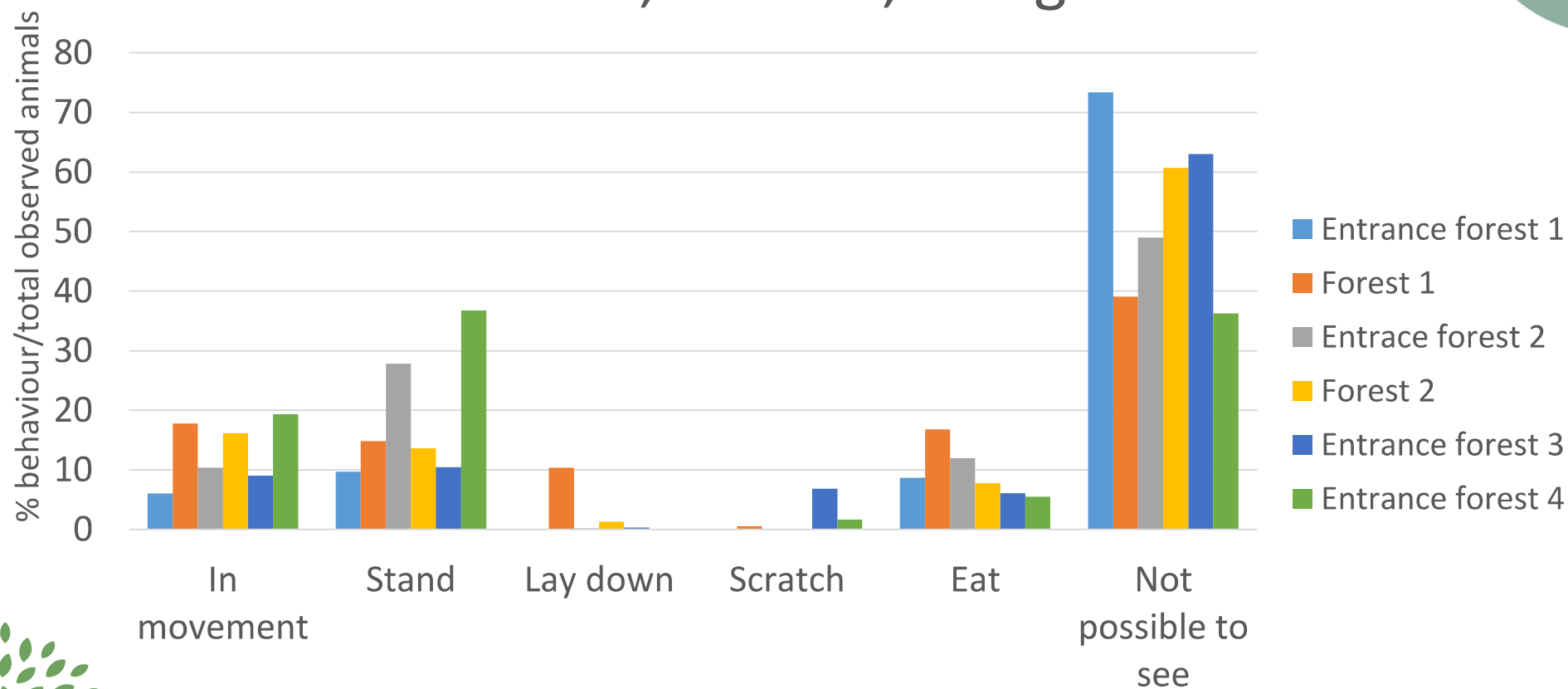
	Morning	Late morning	Noon	Afternoon	Average
% of time in forest	18,6	5,7	2,2	2,1	7,5
% of time in the field	81,4	94,3	97,8	97,9	92,5



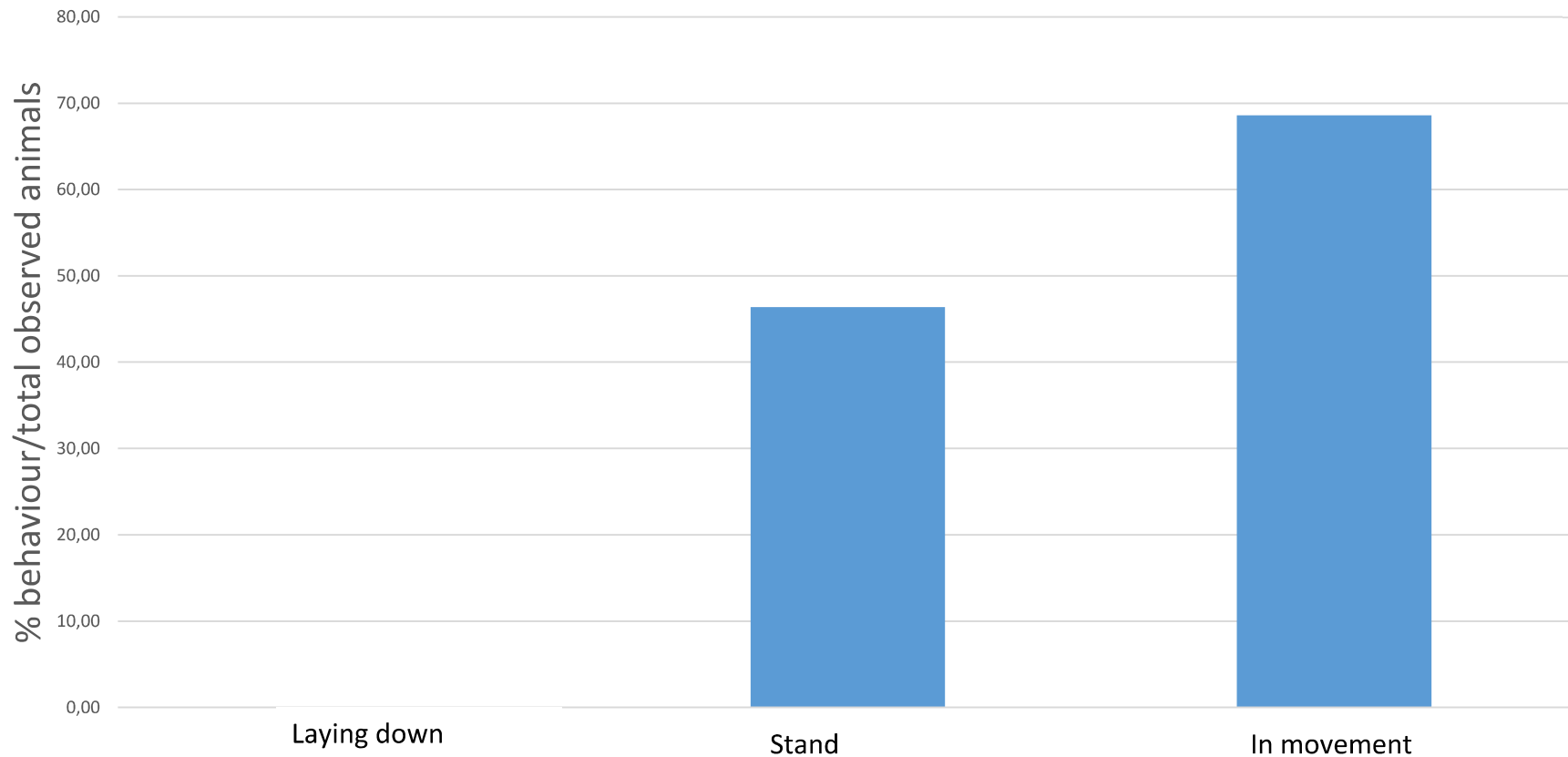




# Behavior cattle, camera, Ellinglund 2021

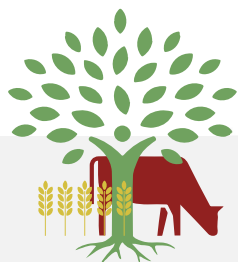
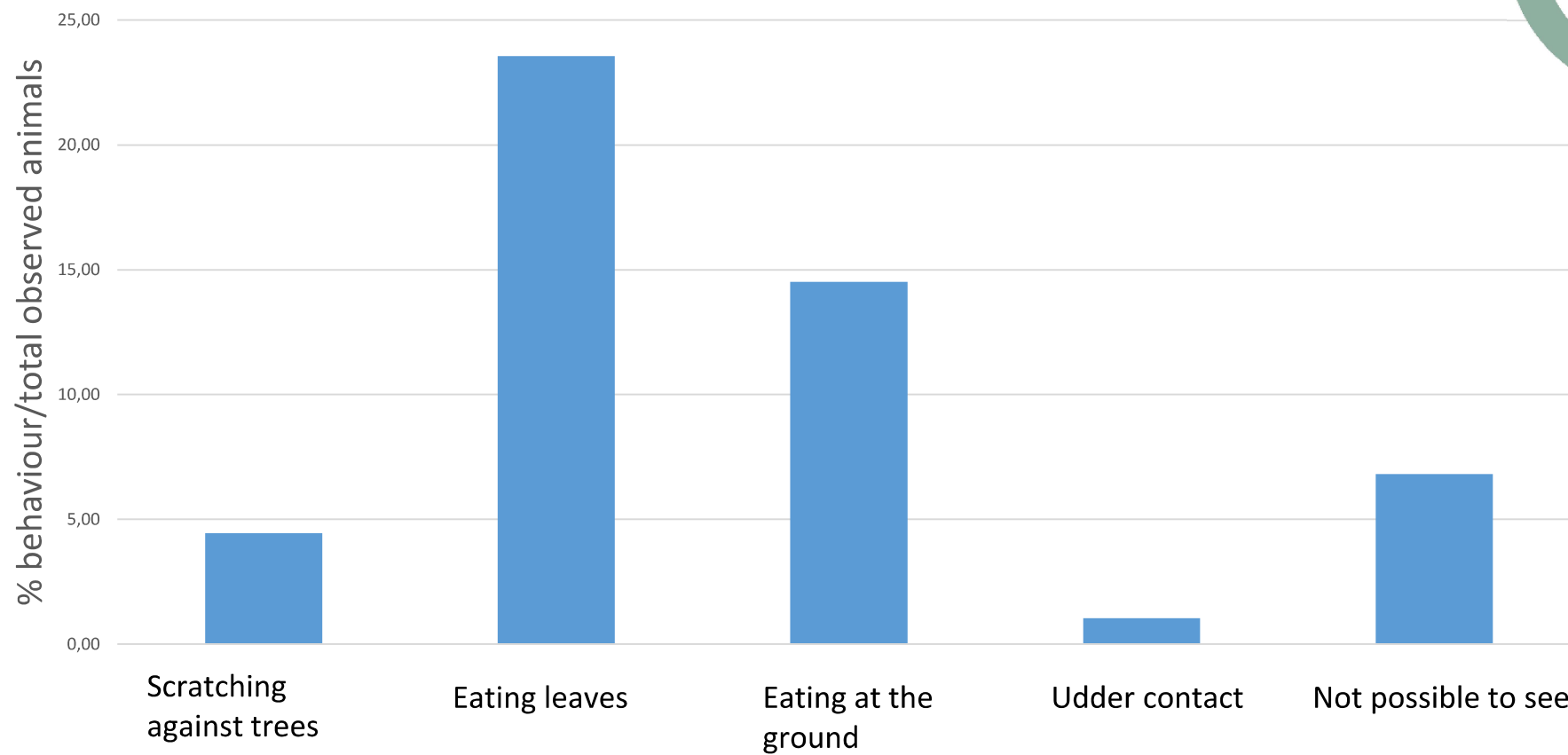


## Movement, cattle, forest 4 (Ellinglund), 2022





## Behaviour, cattle, forest 4 (Ellinglund), 2022

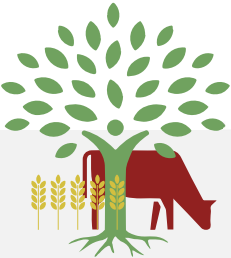






# What time of the day are dairy cows in the hedge row? (Sommerbjerg)

	Morning	Late morning	Noon	Afternoon	Average
% of time in the hedge row	1,0	1,6	3,3	18,0	6,0
% of time in the field	99,0	98,4	96,7	82,0	94,0



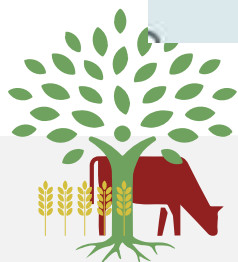
# THI index shows risk of heat stress (>68)



**Varme og fugtigheds index for kvæg (THI)**  
 THI = Temperature Humidity Index  
 Relativ fugtighed

	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
20	49	54	57	59	60	61	62	63	63	64	65	65	66	66	66	67	67	67	68	68	68
22	51	57	60	61	63	64	65	65	66	67	67	68	68	69	69	69	70	70	71	71	71
24	54	59	62	64	65	66	67	68	69	69	70	70	71	71	72	72	73	73	73	74	74
26	56	62	65	66	68	69	70	71	71	72	73	73	74	74	74	75	75	76	76	76	77
28	58	64	67	69	70	71	72	73	74	75	75	76	76	77	77	78	78	78	79	79	79
30	61	67	70	71	73	74	75	76	77	77	78	78	79	79	80	80	81	81	81	82	82
32	63	69	72	74	75	77	78	78	79	80	81	81	82	82	83	83	83	84	84	84	85
34	66	72	75	77	78	79	80	81	82	83	83	84	84	85	85	86	86	86	87	87	87

<68 Ingen varmemstress    68-72 Kan være varmemstress    73-78 Lidt varmemstress    79-89 Meget varmemstress



# Risk of heat stress hedge row/field (Sommerbjerg)



	Measured in sun/field			Measured in shade/forest		
	Small risk of heat stress	Greater risk of heat stress	High risk of heat stress	Small risk of heat stress	Greater risk of heat stress	High risk of heat stress
Number of days	71	40	11	26	4	0
Time period	8-22	9-21	13-21	8-22	11-21	-
Hours per day	1-9	1-8	1-8	1-10	1-11	-
Average temp, (°C)	24,4	29,3	34,9	23,5	27,5	-
Average humidity, (%rh)	56,2	44,7	36,7	63,7	55,3	-

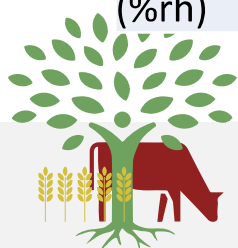




# Risk of heat stress forest/field (Ellinglund 2021)

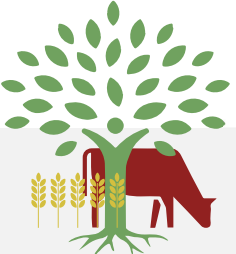


	Measured in sun/field			Measured in shade/forest		
	Small risk of heat stress	Greater risk of heat stress	High risk of heat stress	Small risk of heat stress	Greater risk of heat stress	High risk of heat stress
Number of days	87	54	18	35	9	0
Time period	7:00-00:00	7:00-20:0	8:00-19:00	8:00-23:00	11:00-20:00	-
Hours per day	1-12	1-10	1-11	1-10	1-9	-
Average temp, (°C)	24,3	29,1	34,3	23,6	27,7	-
Average humidity, (%rh)	55,9	43,3	38,9	62,6	57,5	-

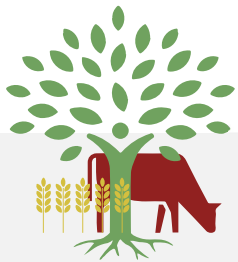




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