



Daily lying time in dairy cows changes throughout lactation

First results of a STSM

Belgium -> Finland

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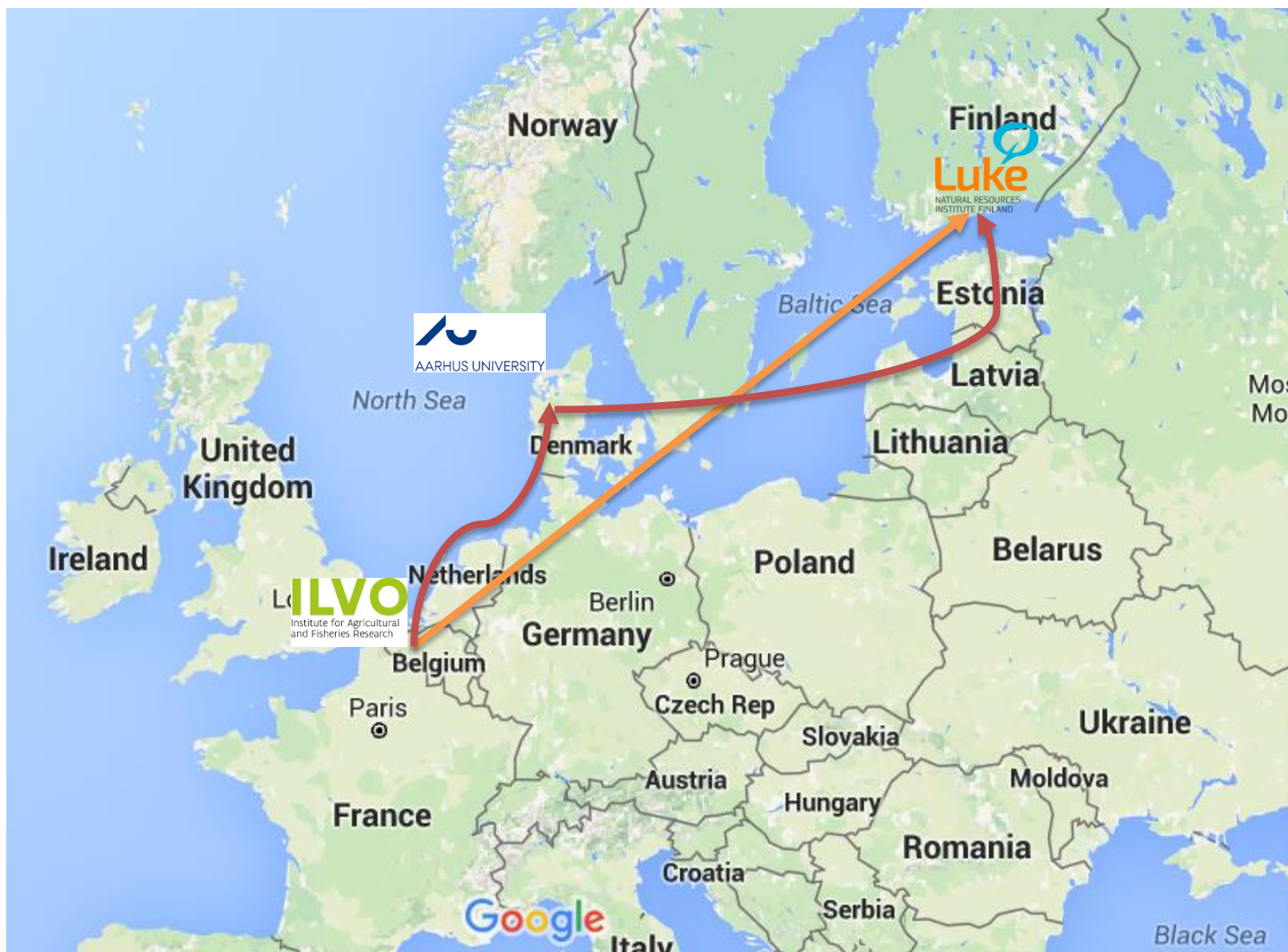
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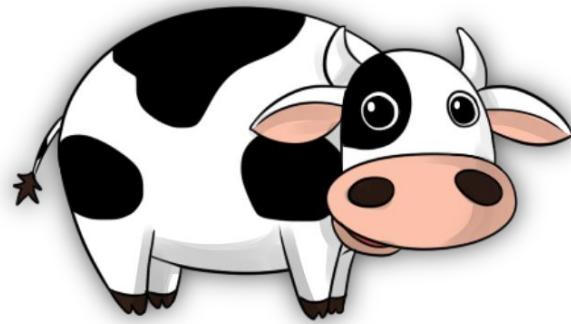
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STSM March-April 2016



Dataset



- 4 commercial farms in Denmark
- May 2008 – June 2009
- Lactating Danish Holstein cows
- Loose-housing with cubicles
- No access to pasture
- 2x day milking
- Age and calving dates are known

Dataset (2)



- IceTag3D prototypes: 200 cows/farm
- On a hind leg (~50% left, 50% right)
- 3D accelerations at 16Hz
- 5-7 lameness scorings
- 3-4 claw trimmings + hoof lesion scoring
- Milk yield: only 20% of the cows
- 53 653 days of data between 1 -305 DIM, 366 cows
⇒ 176 ± 17 cow days per DIM

Accelerometer data

- 2 bout counts
- 2 step counts



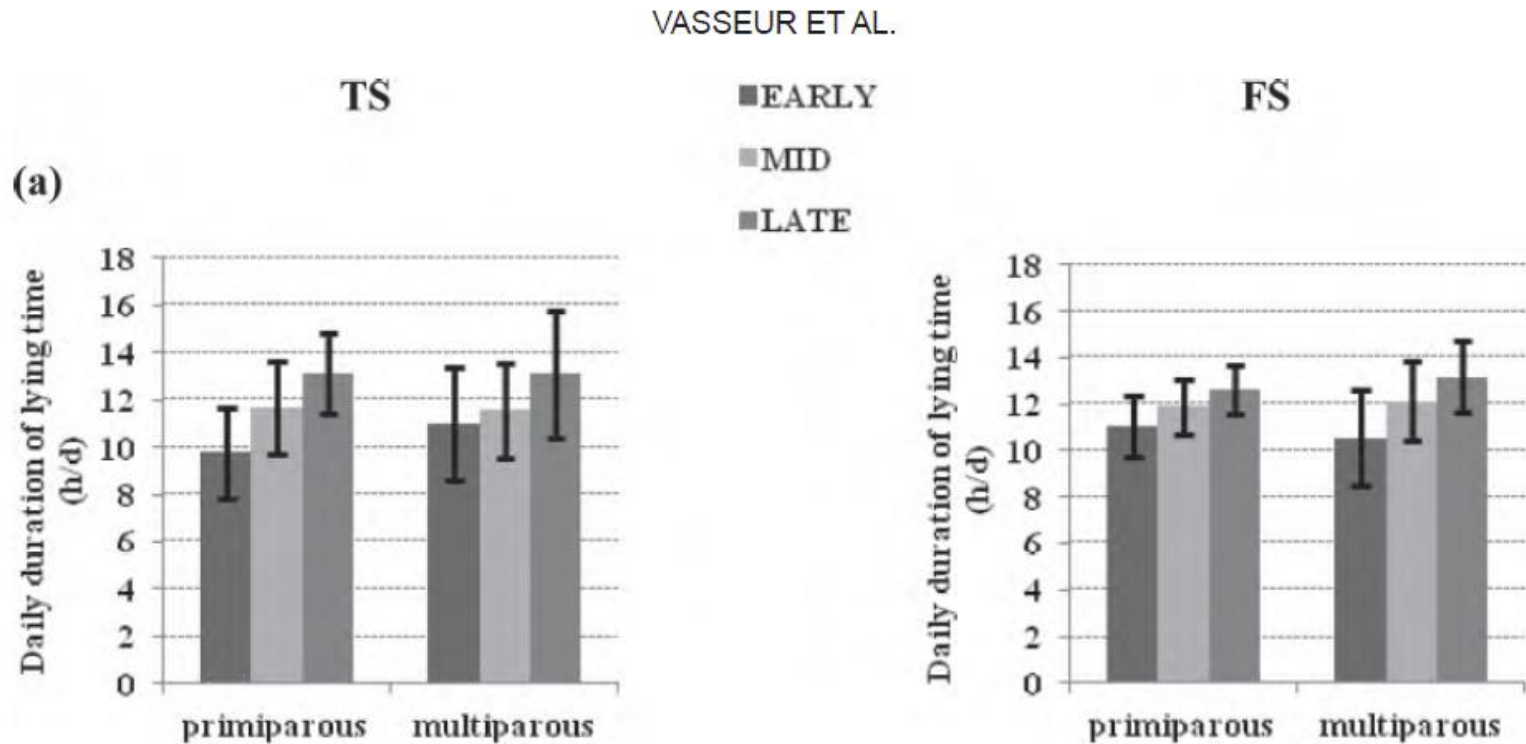
- 3 durations
- 3 motion indices



$$MI = \sqrt{x^2 + y^2 + z^2} - g$$

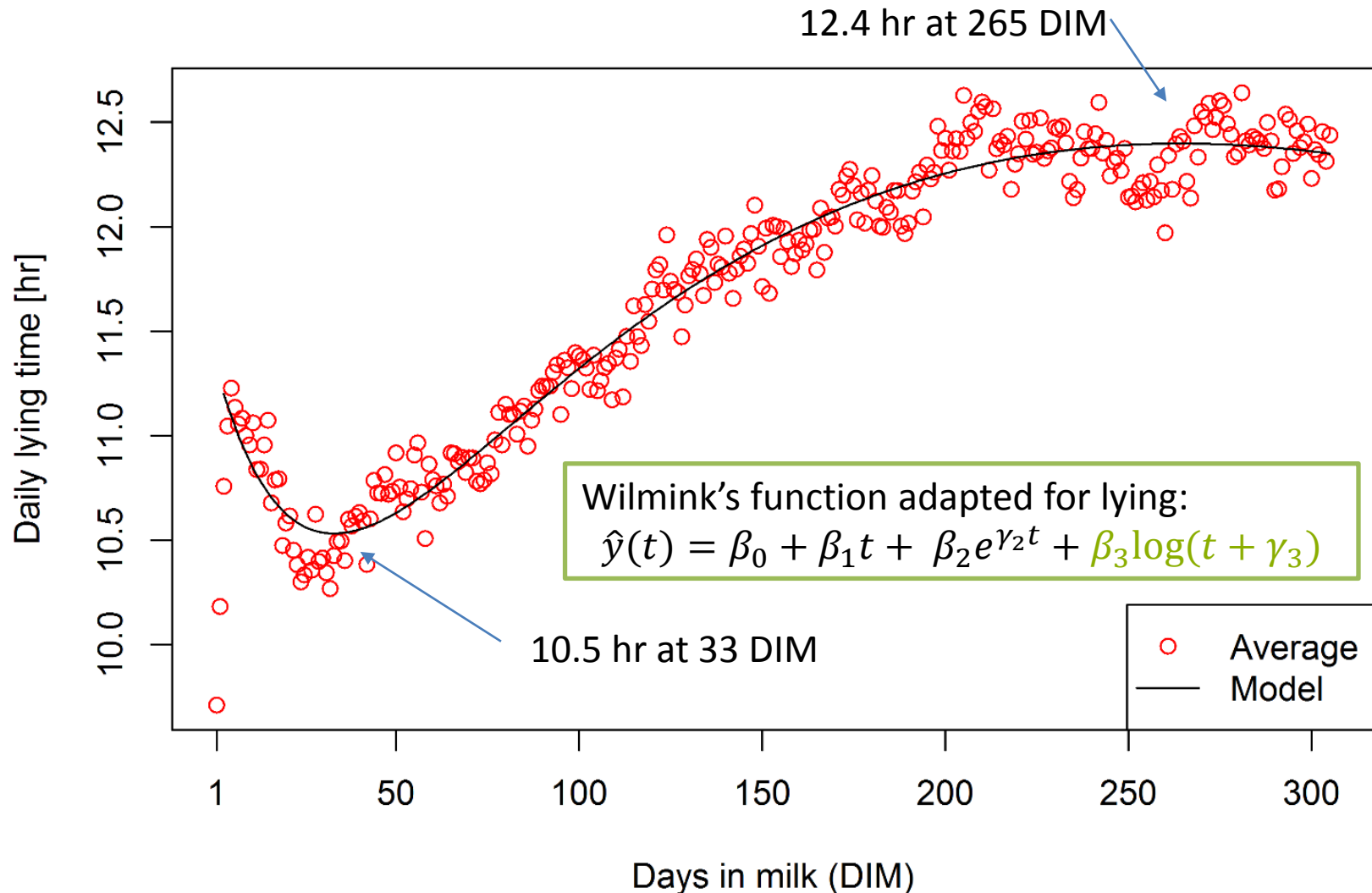
Thorup, V.M., Munksgaard, L., Robert, P.E., Erhard, H.W., Thomsen, P.T., and Friggens, N.C. , 2015. **Lameness detection via leg-mounted accelerometers on dairy cows on four commercial farms.** Animal 9, 1704-1712.

Lying time ~ lactation stage?

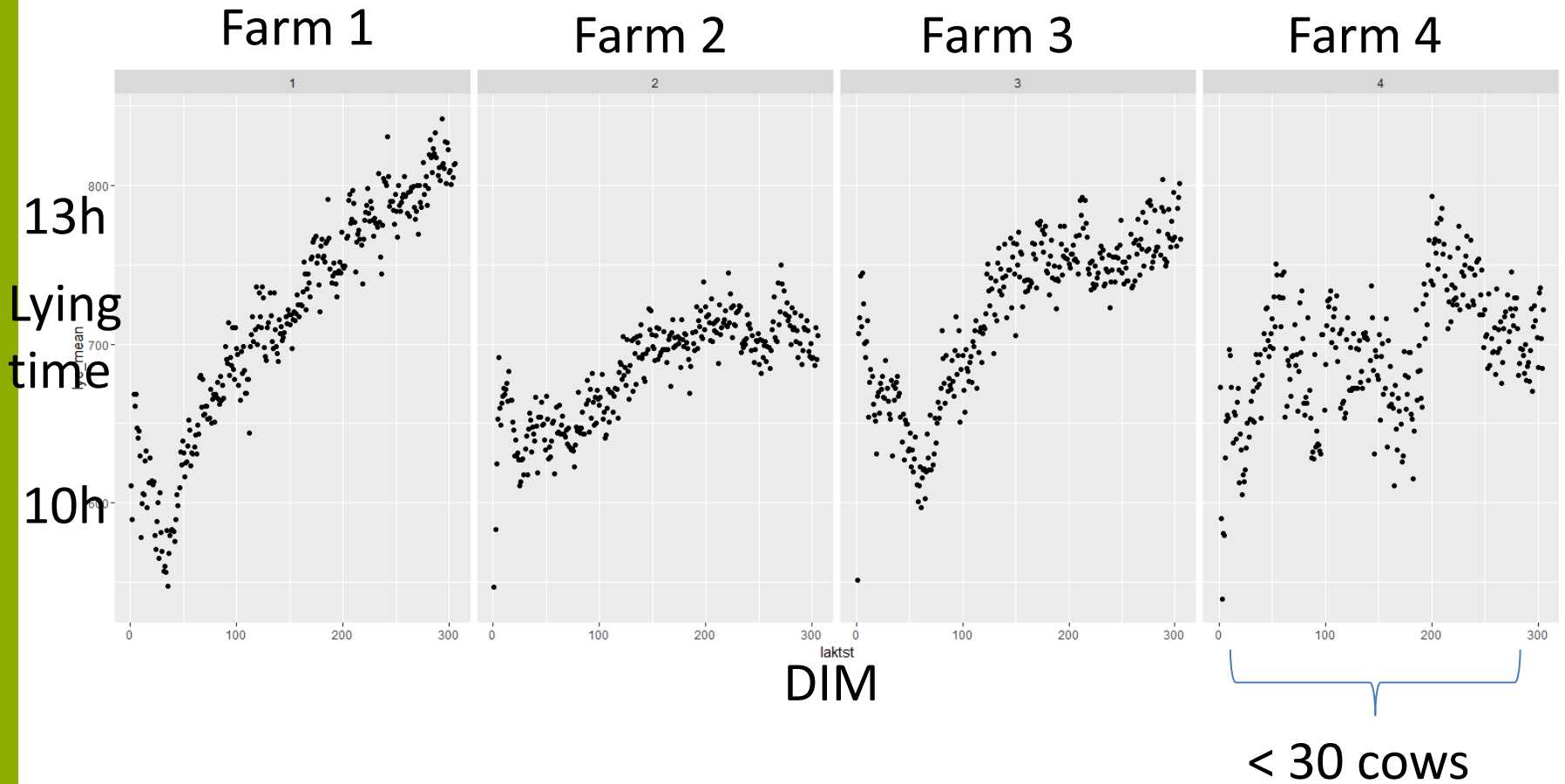


Vasseur, E., Rushen, J., Haley, D.B., and de Passillé, A.M, 2012. **Sampling cows to assess lying time for on-farm animal welfare assessment.** Journal of Dairy Science 95, 4968-4977.

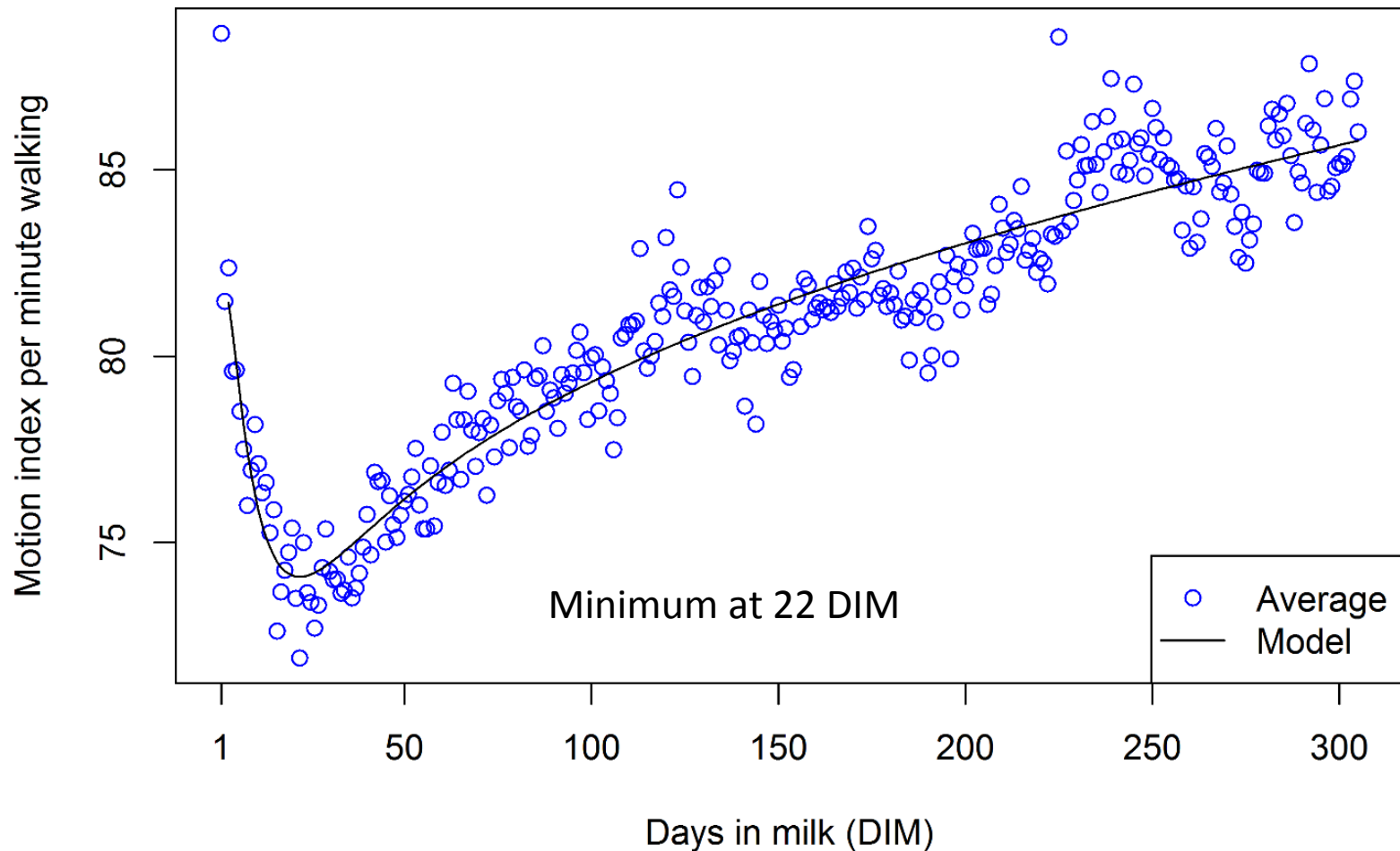
Results: Lying time ~ days in milk!



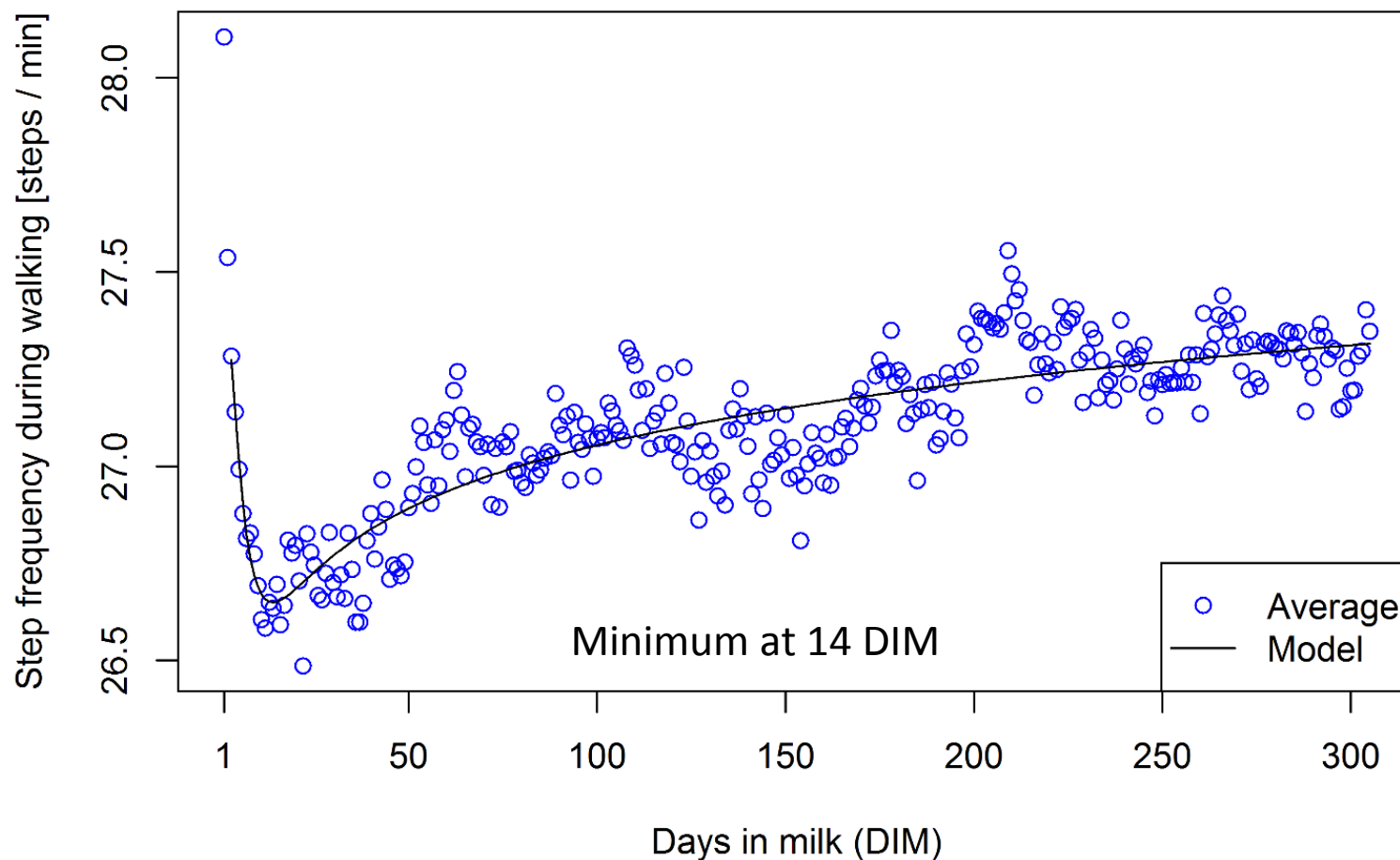
Farms



Motion index walking / min walking



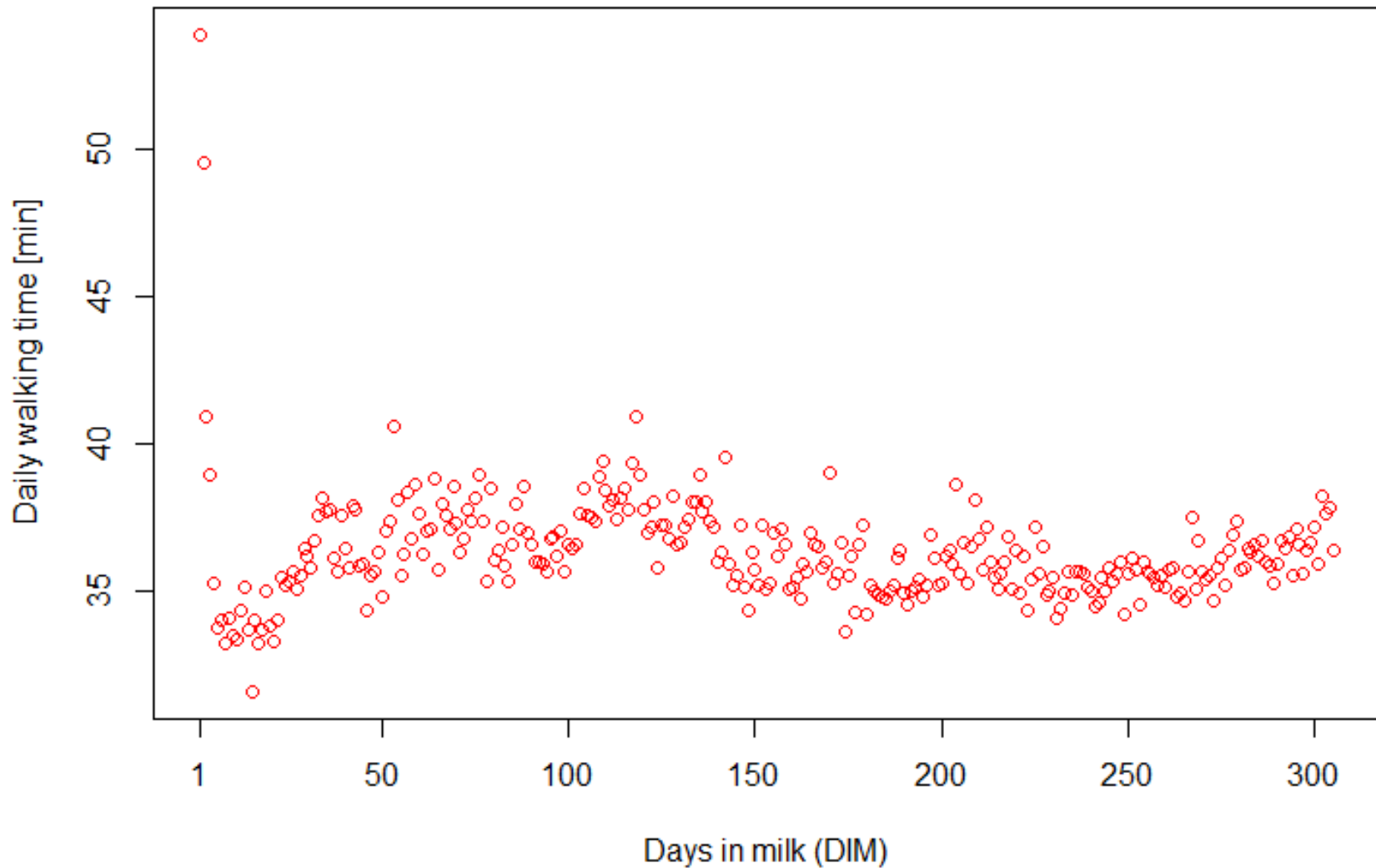
Steps per minute walking



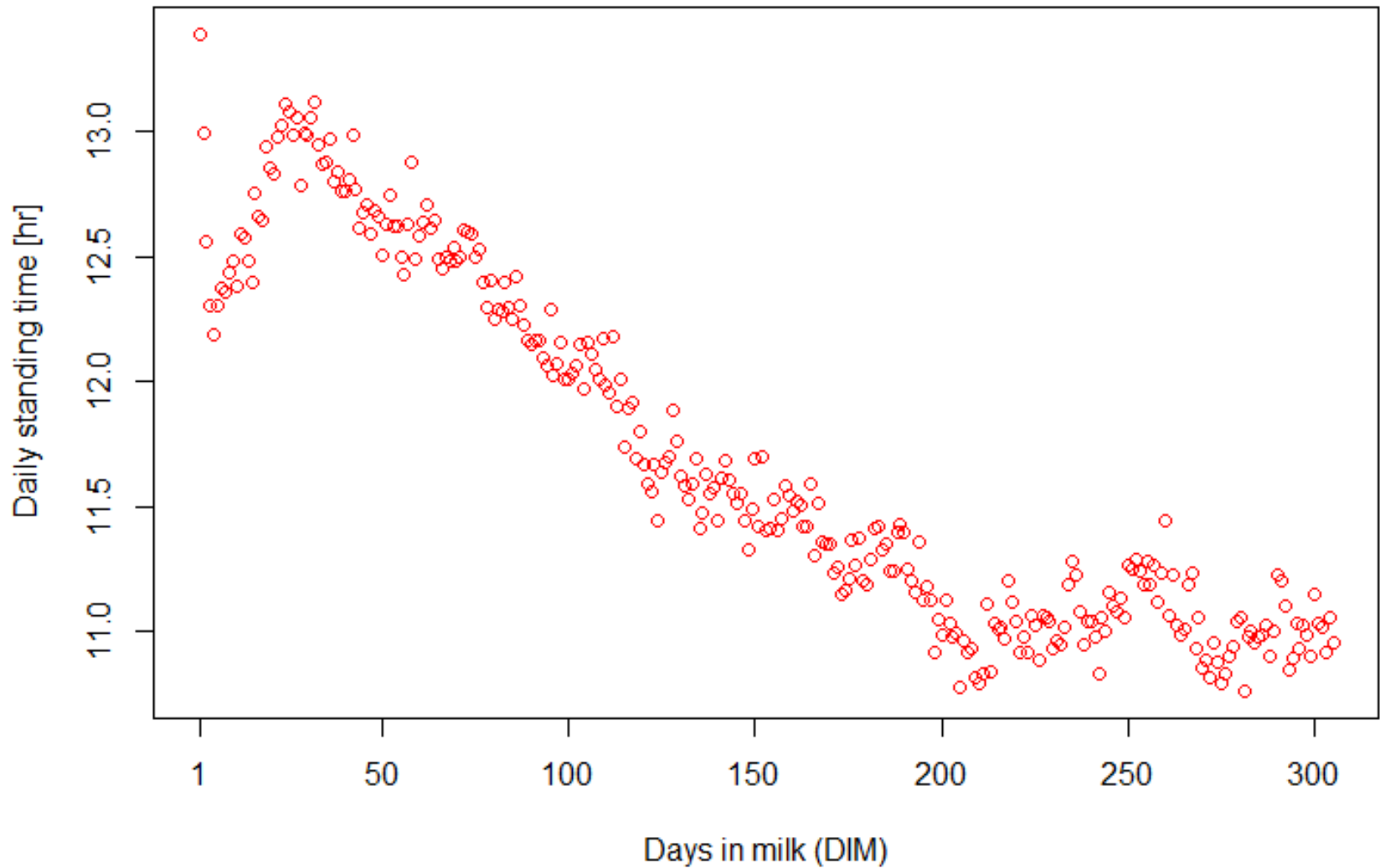
Pairwise comparison

	Start lactation (3 to 9 DIM)	Early lactation (28 to 34 DIM)	Late lactation (200 to 206 DIM)
Lying time [hr] ¹	11.1 ± 2.7 ^a	10.4 ± 2.6 ^b	12.5 ± 2.4 ^c
Motion index per minute walking ¹	78.4 ± 22.0 ^{a,b}	74.4 ± 21.4 ^a	82.6 ± 25.3 ^b
Step frequency during walking [steps/min] ¹	26.9 ± 2.1 ^{a,b}	26.7 ± 1.8 ^a	27.3 ± 2.1 ^b

Daily walking time



Daily standing time



Conclusions lying curve (1)

- Lying duration ↗ from early to mid and mid to late lactation ~literature
- BUT drop in lying time during first weeks
 - Related to peak lactation?

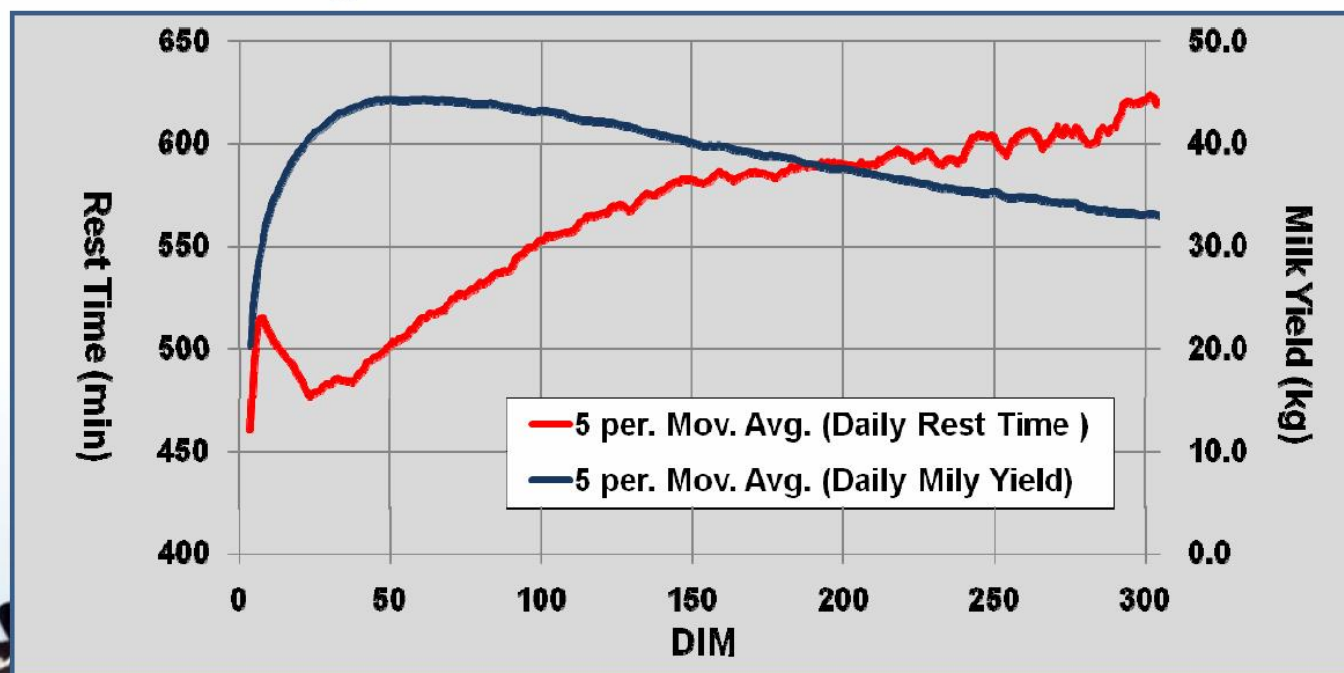
⇒ Feeding time

⇒ Cows with higher yield spent more time eating and less time lying (Løvendahl & Munksgaard, 2016)

↔ ↗ feeding time with ↗ DIM (Norrington et al., 2014)

Curve for feeding time?

The dynamics of daily rest time and daily milk production of Israeli-Holstein cows during the lactation



Data obtained from 6 herds (total of 1810 lactating cows) - average production of 11,832 kg milk /lactation, during 2009-10

Arazi, A., Ishay, E., and Aizinbud, E., 2010. The use of a new sensor (behavior tag) for improving heat detection, health and welfare monitoring in different rearing conditions. In: Skujina, E., Galvanoska, E., Leray, O., Mosconi, C. (Eds.), Farm Animal Breeding, Identification, Production Recording and Management: Proc. of the 37th ICAR Biennial Session in Riga (Latvia). ICAR, Rome, Italy, pp. 113–127.

Conclusions activity curves (2)

- Late lactation: higher MI and more steps per minute walking
 - Walk faster
 - Or smaller steps
 - Or combination => need more info
- Also a drop during first weeks
 - ⇒ Udder discomfort
 - ⇒ Fewer steps and lower MI /min walking around peak lactation
 - ⇒ Uncomfortable to lie down?

Work in progress

T. Manske et al. / Preventive Veterinary Medicine 53 (2002) 215–231



Fig. 1. Dermatitis with severe heel-horn erosion and concurrent sole ulcer.

Conclusion

- Lying time of dairy cows does not increase linearly throughout lactation

Maselyne, J., Pastell M., Thomsen, P., Thorup, V., Hänninen, L., Van Nuffel, A., Munksgaard, L., accepted (Res. Vet Sc.). **Daily lying time in dairy cows changes throughout lactation.**

- Further research needed to explain lying curve!
 - and fix it????
- Accelerometer data vs hoof lesions: work in progress
- A lot still to be discovered about behaviour of livestock and the possibilities of sensors!!



Thank you!!!

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