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Department of Large Animal Sciences



High Milk Production Changes Lying Time of Dairy Cows

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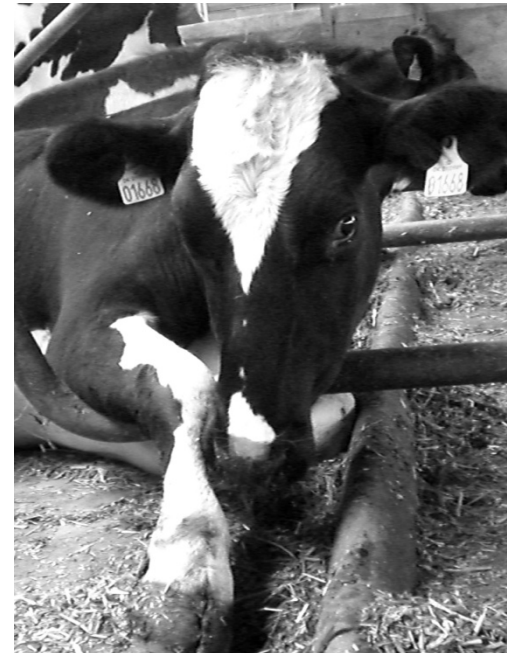


A A R H U S U N I V E R S I T Y

Department of Genetics and Biotechnology and
Department of Animal Health and Bioscience

How do the cows spend their 24 hour day

?



Time budgets



Cow no. 222
Yield: 27.5 kg
Second lact.

Milking	4 hours/day
Lying	12 hours/day
Eating	5 hours/day
Standing	2 hours/day
Drinking	½ hour/day
Social activity	½ hour/day



Cow no. 777
Yield 40.1 kg
First lact.

Milking	4 hours/day
Lying	8 hours/day
Eating	8 hours/day
Standing	3 hours/day
Drinking	½ hour/day
Social activity	½ hour/day

Why worry about lying time?

- Dairy cows lie down between 40 and 60 % of their time
- Lying time has no storing potential
- Lying time has high priority and is chosen over eating time if both needs are deprived
- Reduced lying time results in increased symptoms of both acute and chronic stress

Milk yield changes the time budget



Is this change partly genetic?

Hypothesis

That selection for increased milk production causes a correlated response in lying time of dairy cows

Cows with high genetic potential for milk production are adapting to the production level by reducing their total lying time

Registration of lying time

- IceTag® activity monitors attached to the hind leg of the cow (IceRobotics Edinburg UK. 2009)
- Automatic measures of total lying time per day
- 7 herds with loose housing and manual milking
- 357 Holstein cows
- 1822 observations on lying time



Model

Estimation of breeding values of lying time

$$\mathbf{Y} = \mathbf{X}\mathbf{b} + \mathbf{Z}\mathbf{u} + \mathbf{Z}\mathbf{p}\mathbf{e} + \mathbf{e} \quad \mathbf{b} = \begin{bmatrix} \textit{Herd} \\ \textit{Parity_group} \\ b_{DIM(\textit{Parity_group})} \end{bmatrix}$$

Breeding values of milk yield from the Danish National Cattle Database

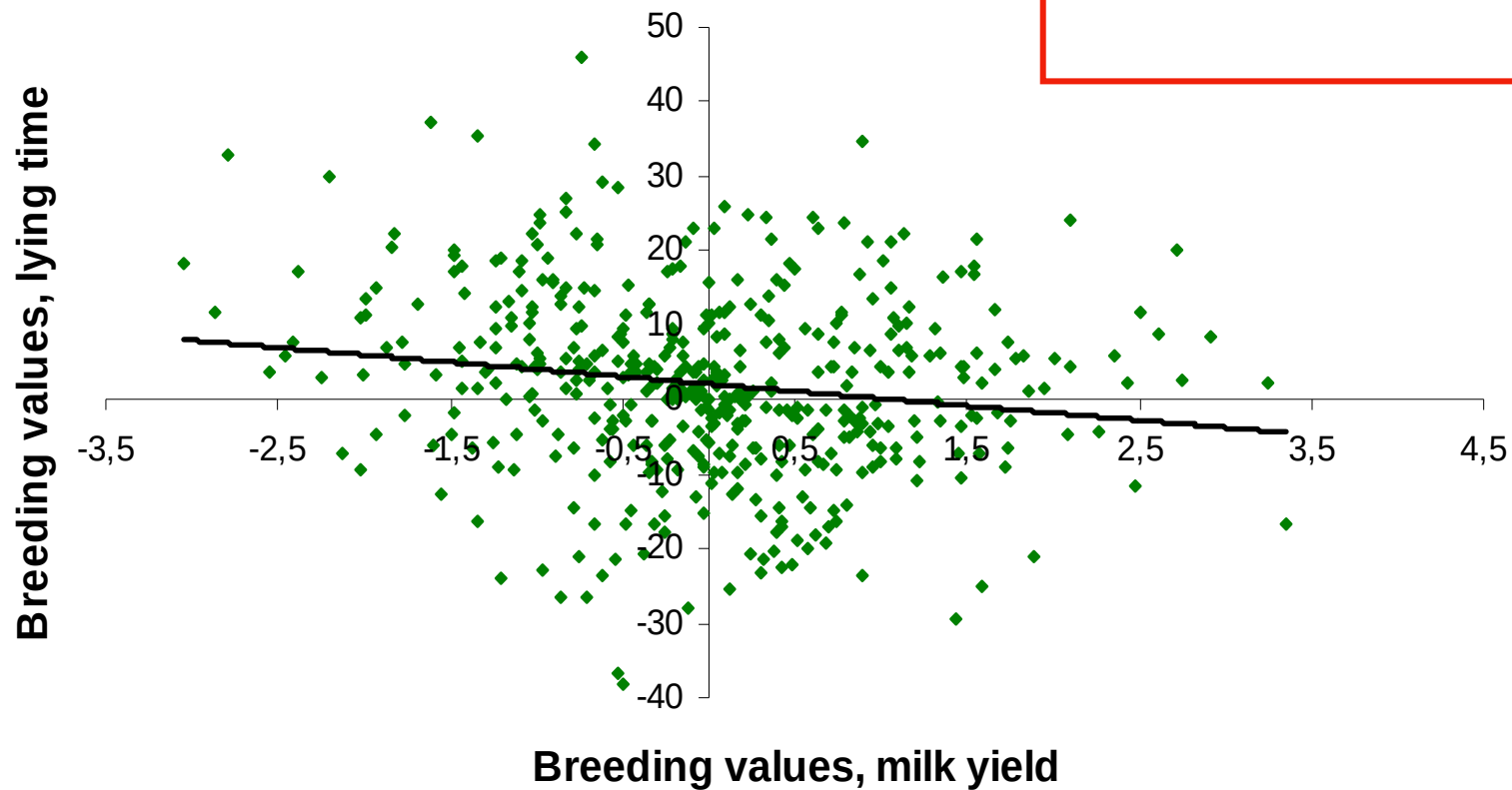
Kindly delivered by the Nordic Breeding Evaluation

Results

- Average lying time: 11.3 hours/day
- Heritability: 0.08 ($\pm$ 0.11)
- Genetic standard deviation: 41 minutes/day

Results

Adjusted genetic
correlation to milk yield:
- 0.21



Discussion

- Previous studies are limited
- Heritabilities of 0.02 and 0 in early and late lactation respectively have been shown¹
- A negative phenotypic relationship between milk yield and lying time has been shown²

¹(Løvendahl and Munksgaard 2005), ²(e.g. Fregonesi and Leaver 2002; Løvendahl and Munksgaard 2004; Fregonesi et al. 2007)

How to avoid time constraint?

- Management routines
- Barn design
- Breeding



Searching for
a free cubicle

Thank you for your attention



References

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