

**Meeting of the EGF-working group grazing
« Research methodology of grazing »
Kiel, August 29**

**Experimental design at grazing :
Paddock replicates do not remove
cow behaviour synchronization**

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Context

Rook and Penning (1991) and Rook and Huckle (1995)

- Grazing sheep or dairy cows are synchronized
- Concluded :
 - individuals are not independent
(social facilitation)
 - herd : statistical unit (replicates)

Grass and Forage Science, Journal of Dairy Science

Paddock replicates are recommended to authors

« Assumption »

Separated cows are not synchronized.

Debate : Phillips (1998) and Rook (1999)

Is synchronization mainly due to social facilitation ?

Many external factors : day-night, milking, etc

Objective of the study:

Comparison of synchronisation of grazing cows:

- within herd
- between adjacent herds
- between non adjacent herds



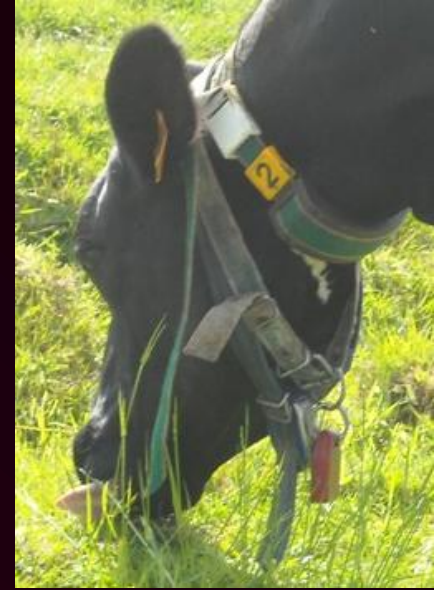
↗ *distance*

↘ *social facilitation*

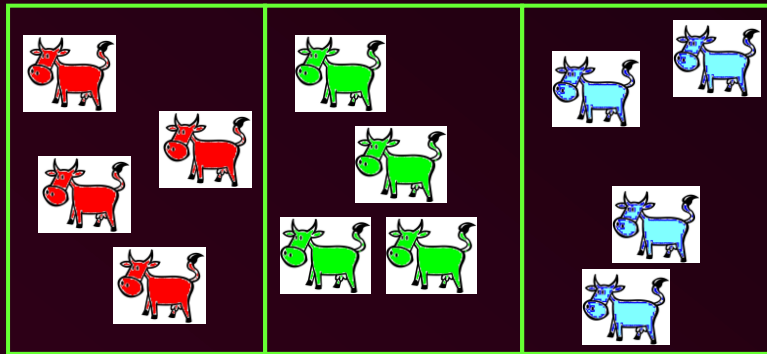
Same management in all herds : replicates

Materials and methods

- 4 strip-grazing experiments
- 12 cows / experiment, no supplementation
- 3 adjacent paddocks (4 cows/herd)
- 14 d/exp, last 5 days : behaviour recording



Ethosys



Pair of cows



Within herd



Between adjacent herds



Between non adjacent herds

distance

pairs

1

18

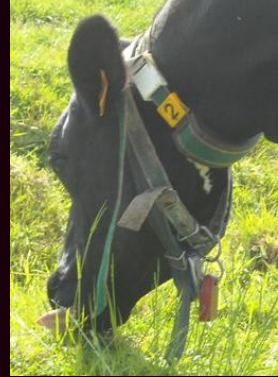
2

32

3

16

Synchronisation



Kappa coefficient (Rook and Huckle, 1995)

$$K = \frac{\text{Synchro observed} - \text{Synchro random}}{1 - \text{Synchro random}}$$

From 0 (random) to 1 (total synchronisation)

For each day and each pair of cows

(1320 = 66 pairs × 5 days × 4 experiments)

Proc mixed analysis (statistical unit = pair)

(pair random, repeated days, exp, distance)

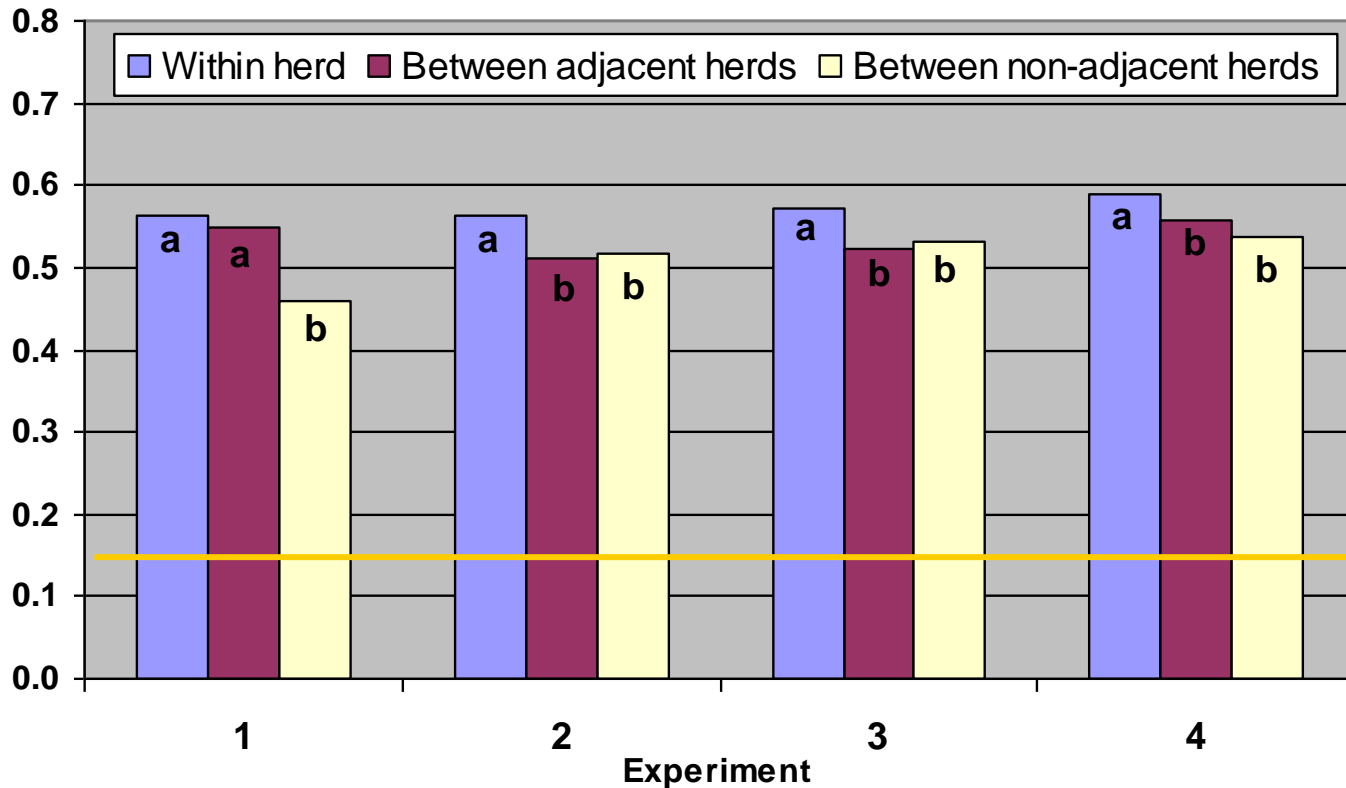
Results : K coefficients

Within herd:	0.572	<i>a</i>	
Between adjacent herds:	0.535	<i>b</i>	- 7%
Between non adjacent herds:	0.511	<i>c</i>	- 11%
<i>K = 0 (Z test)</i>	0.15		

- 1) *Cows, even separated, are always synchronized
(0.50 >> 0.15)*
- 2) *Low part of social facilitation in synchronization
(7-11%)*
- 3) *Social facilitation between adjacent herds exists
(K lower at higher distance)*

Results : Synchronization per experiment

K coefficient



K ≠ 0

Negative conclusions

- 1) Herds should not be regarded as independent on the basis of their synchronization.
- 2) To use herds instead of cows do not solve the problem of grazing synchronization.
- 3) Stop research or statistical analyses ...

Positive conclusions

- 1) Synchronisation of grazing activities in dairy cows is mainly due to external factors (90%).
- 2) Synchronization should not be used as an argument to define independence of data.
- 3) We should continue to use the individuals as statistical units.
- 4) Grazing research should continue !