QUANTITATIVE ANALYSIS OF BEHAVIOUR OF GRAZING DAIRY COWS

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GRAZING BEHAVIOUR

- Grazing behaviour is governed by a variety of plant, environmental and animal factors.
- An understanding of why, how, and when cattle graze is essential in trying to improve pasture utilisation and the management of livestock.
- Being aware of the factors that encourage or discourage grazing can help a producer make decisions about pasture rotation, supplementary feeding and stocking density.

QUANTITATIVE ANALYSIS OF BEHAVIOUR OF GRAZING DAIRY COWS

- THE EFFECTS OF SWARD HEIGHT AND GRAZING DURATION ON BEHAVIOUR AND INTAKE OF DAIRY COWS GRAZING KIKUYU *(Pennisetum clandestinum)* GRASS PASTURES. – EXP 1

- THE EFFECT OF SWARD HEIGHT AND GRAZING DURATION ON THE FREQUENCY DISTRIBUTION OF SWARD HEIGHT OF KIKUYU *(Pennisetum clandestinum)* GRASS PASTURES GRAZED BY DAIRY COWS. – EXP 2

- SPECTRAL ANALYSIS OF DAIRY COW GRAZING BEHAVIOUR PATTERNS RELATIVE TO SWARD HEIGHT AND TIME OF ALLOCATION OF PASTURE AND CARBOHYDRATE SUPPLEMENTS. – EXP 3

- TIME-DEPENDENT TRANSITION PROBABILITIES IN BEHAVIOUR OF GRAZING DAIRY COWS. – EXP 4

Background on data

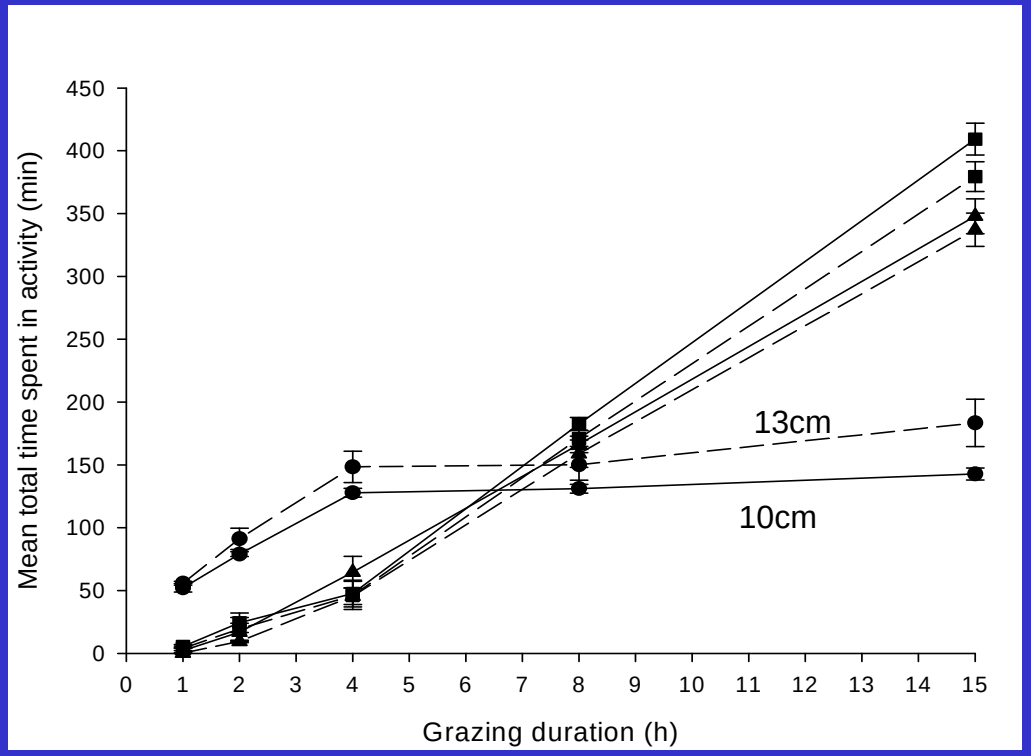
- Sward height (SH) X grazing duration (GD) study:

  6 cows were randomly allocated to one of 2 SH x 5 GD treatments on kikuyu pastures for a 15h grazing period from 1600h to 0700h over 3 days (replicates). Cows were observed at 20-minute intervals for the first 2 hrs after entering their paddocks at 1600h and thereafter at 30 minute intervals until 0700h the next day.

- Trevaskis *et al*. (2004) study:

  2 experiments designed to study the productivity and rumen status of grazing Friesian cows depending on time of allocation of pasture and carbohydrate supplement. Behaviour measurements (10min intervals) were taken in both experiments. This current study used the data from experiment 2.

Sward height v Grazing duration (exp 1)



*GT (min) = A – 163.5 * 0.64 GD*

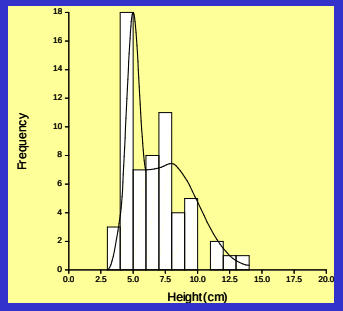
If SH10, A = 147.0; SH13, A = 166.2; r^2 = 0.92; where A is the asymptote.

Time spent grazing increased by 0.45 h/h GD and reached a maximum at 4h GD

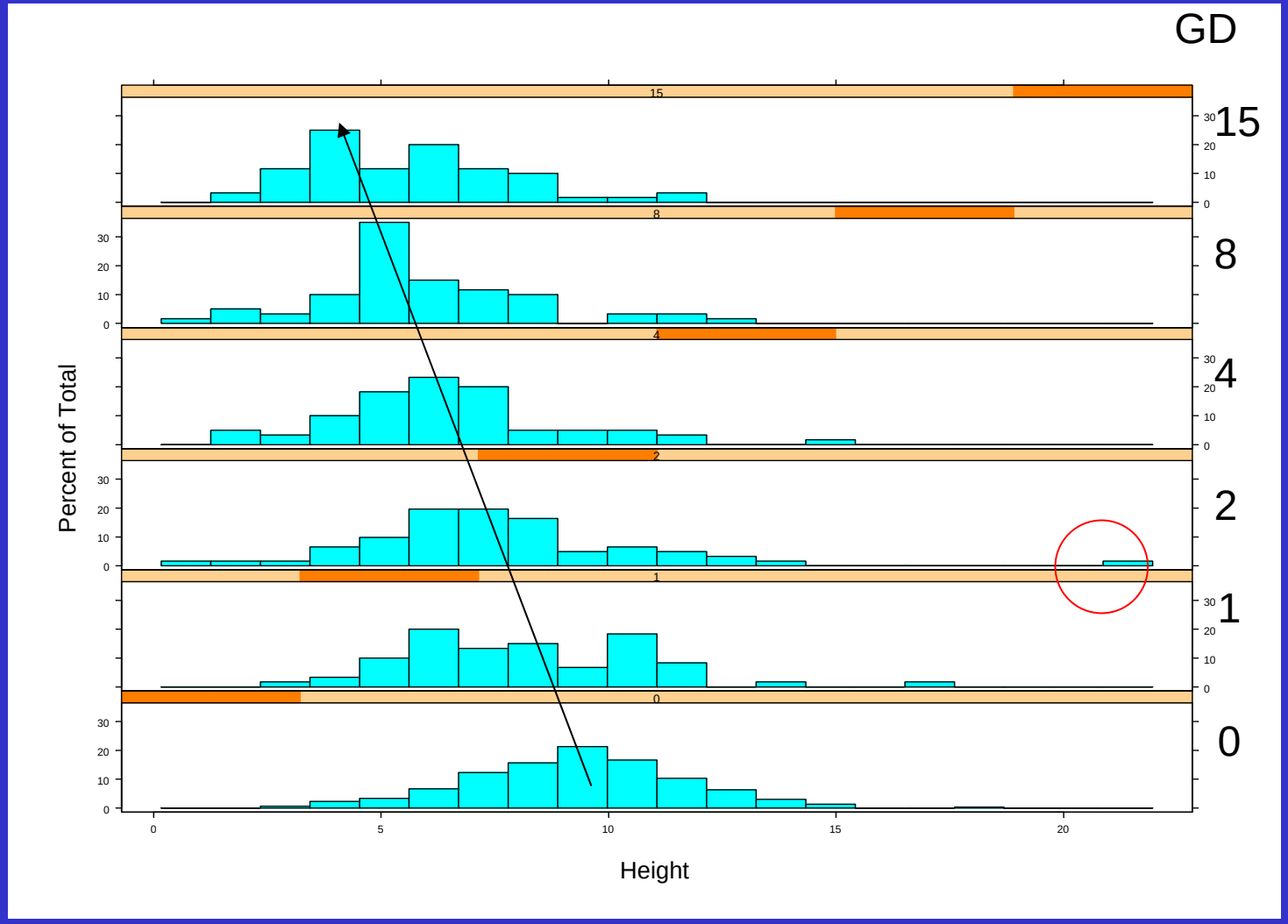
Effect of SH (—— 10cm; ----- 13cm SH) and length of grazing session (1, 2, 4, 8 and 15 h) on mean (±se) total time (min) spent (a) grazing (●), (b) ruminating (▲) and (c) resting (■) for dairy cows grazing sub-tropical pastures. Vertical bars are ±se.

Distribution of sward height (exp 2)

- Single-normal (SN), double-normal (DN), log-normal (LN), gamma (G) and Weibull (W) distributions
- No one distribution described data consistently
- Can use the DN

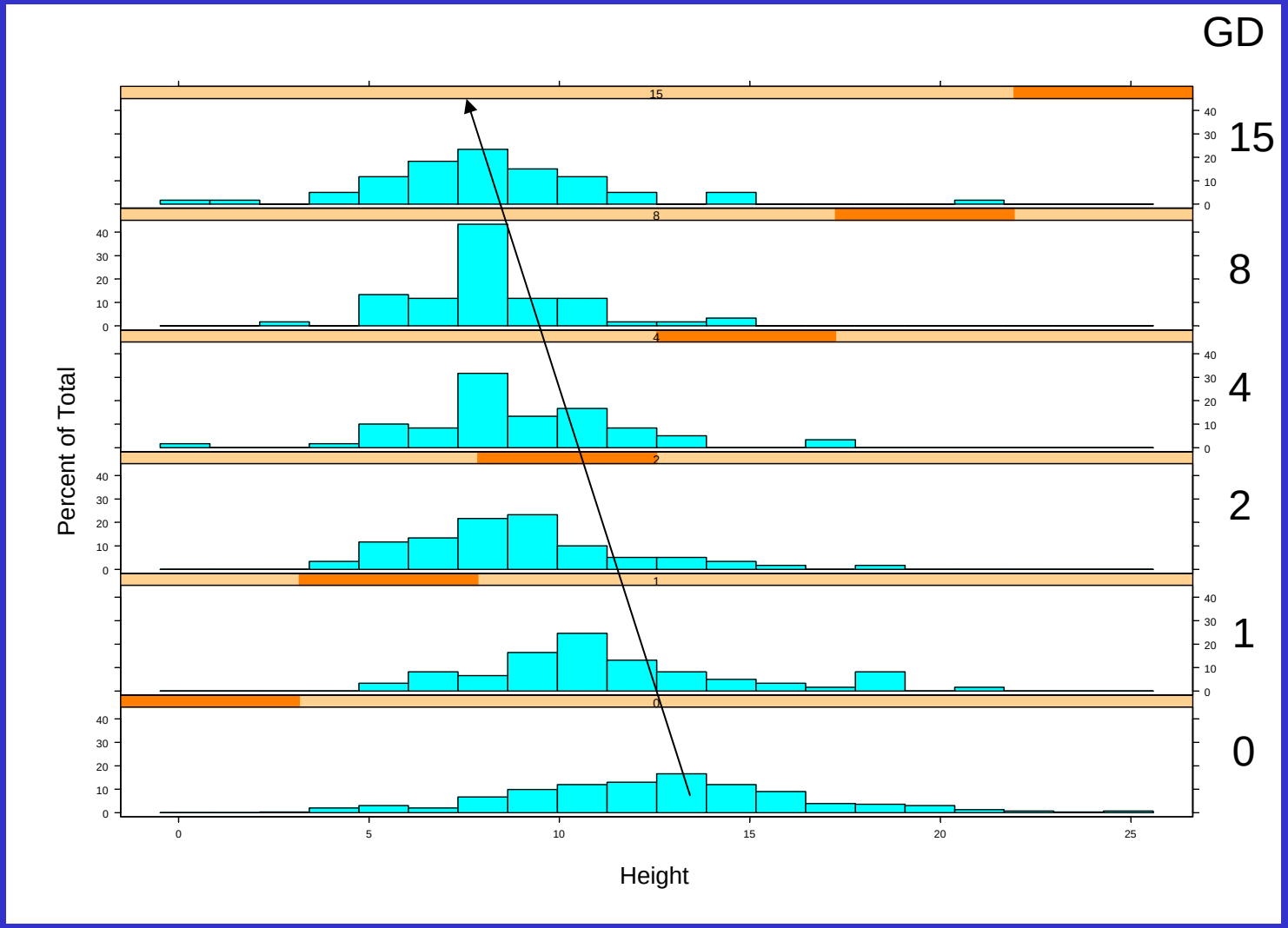


Distribution of sward height



10cm SH from 0 to 15h grazing duration

Distribution of sward height

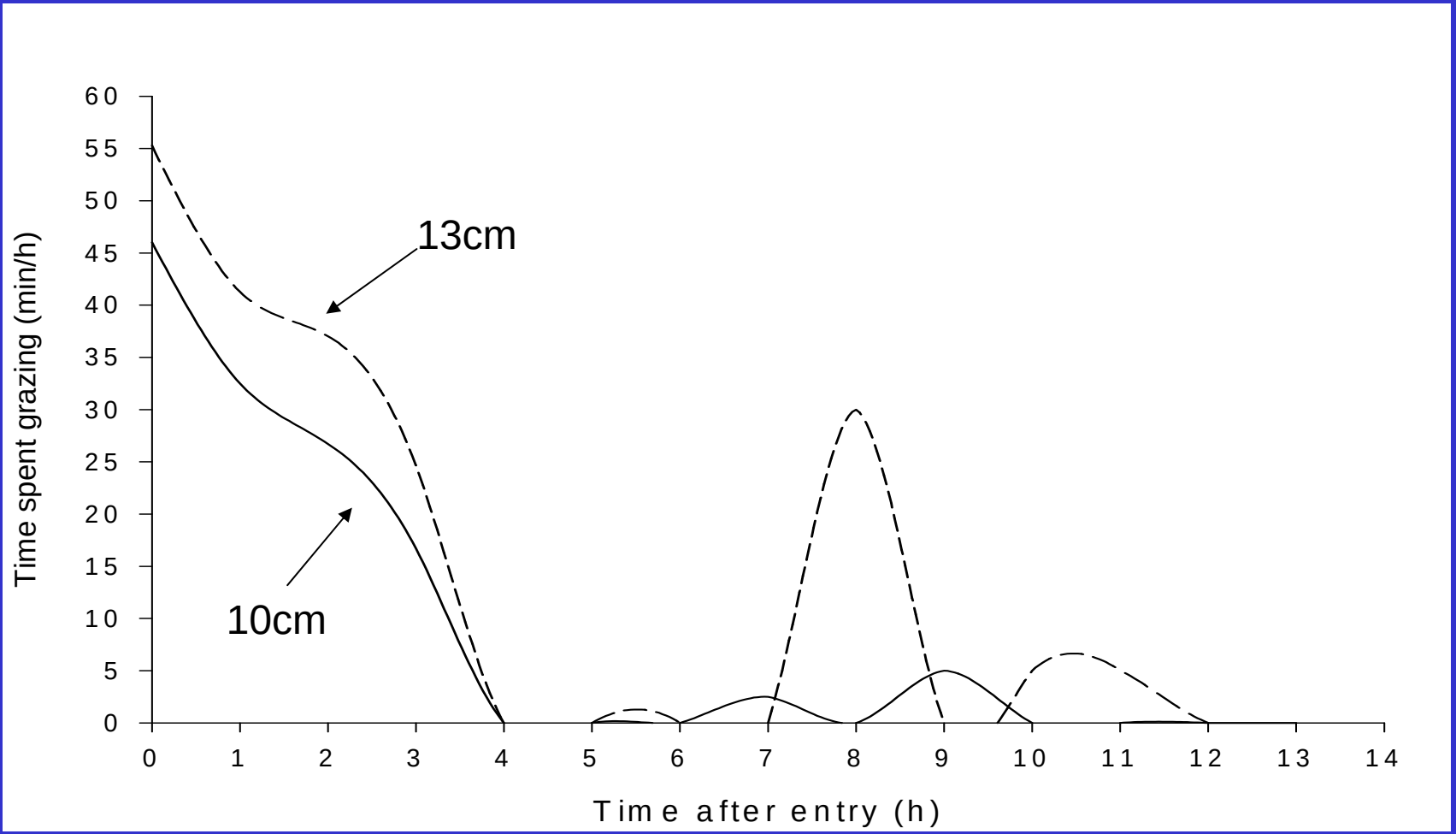


13cm SH from 0 to 15h grazing duration

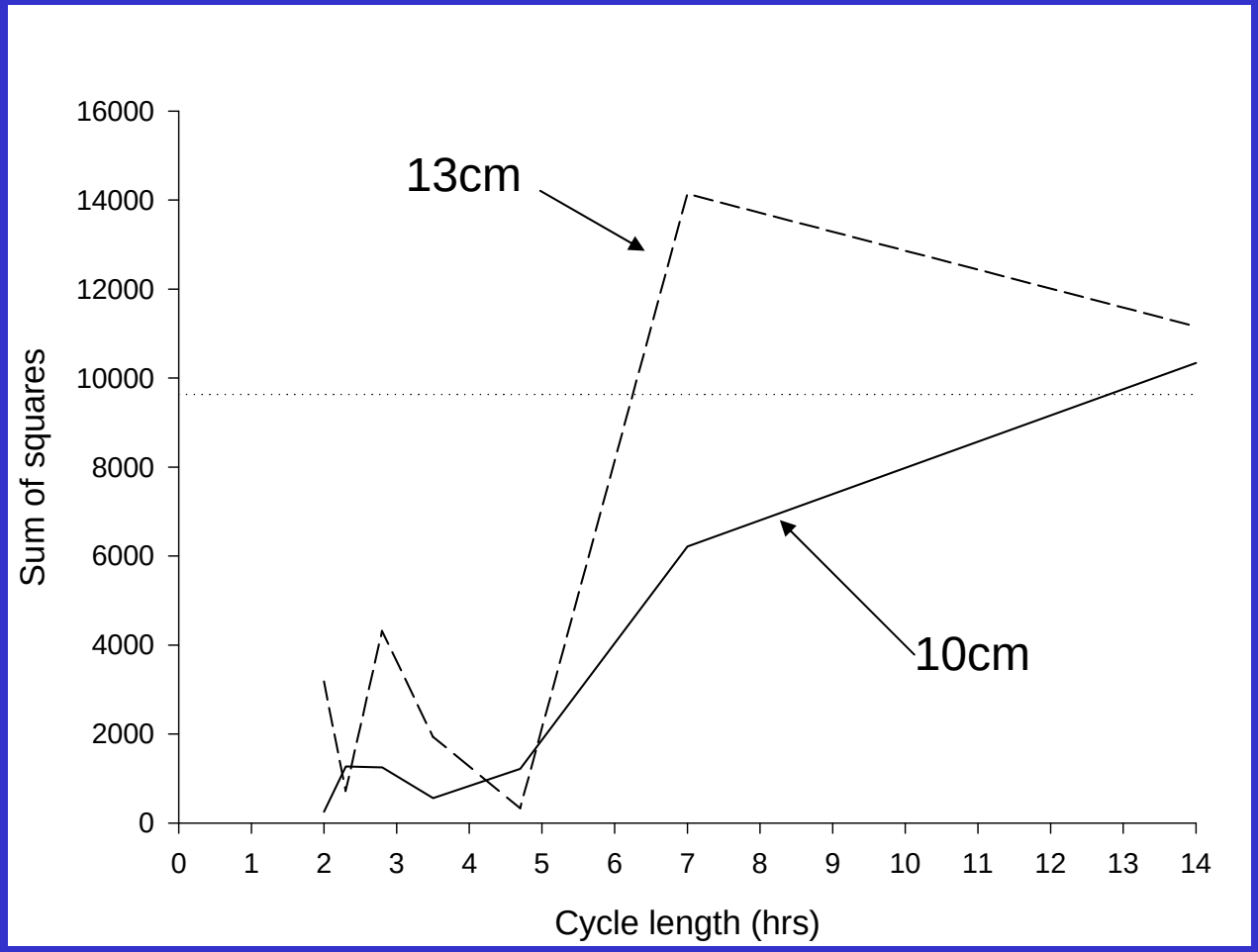
Spectral analysis of behaviour (exp 3)

- Cyclical pattern of behaviour
- Help in developing improved feed allocation systems
- Can't use ANOVA to determine differences between treatments
- Fourier analysis → Spectral analysis
- 2 data sets – Exp 1 and Trevaskis et al (2004)

Spectral analysis of behaviour – exp 1 data

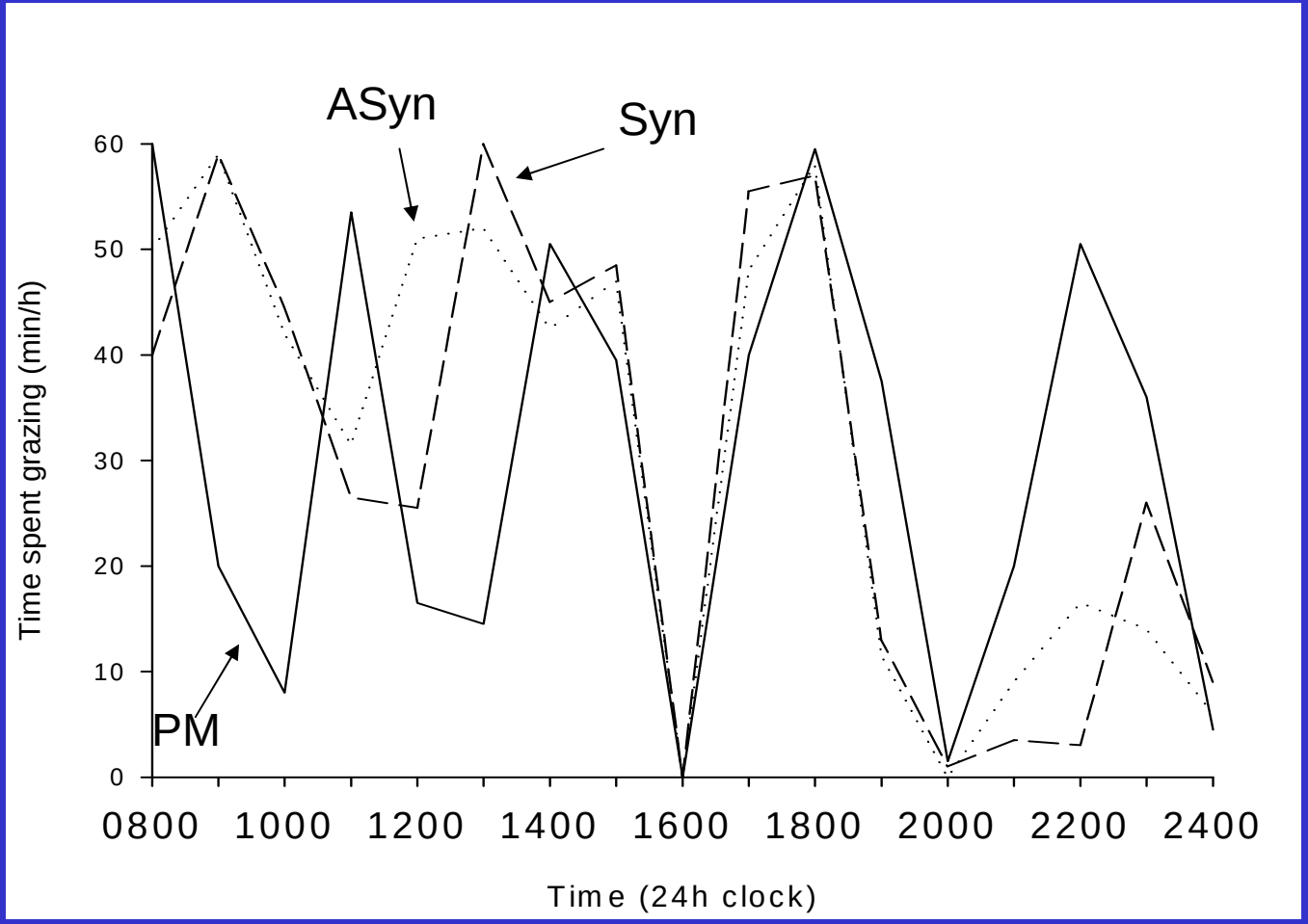


Spectral analysis of behaviour - (exp 1 data) periodogram

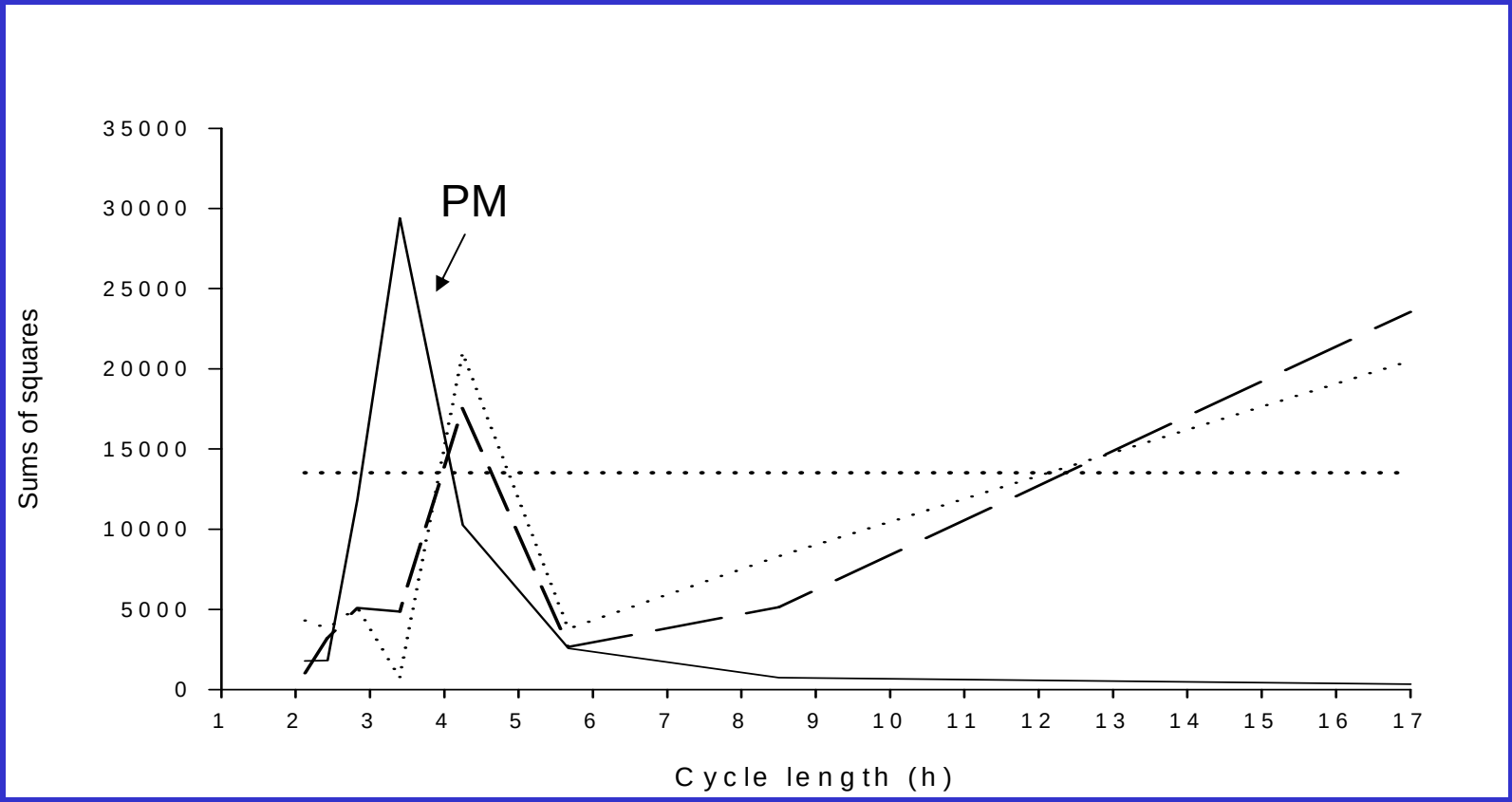


No significant difference between SH treatments

Spectral analysis of behaviour – Trevaskis et al (2004) data



Spectral analysis of behaviour – Trevaskis et al (2004) data periodogram



No significant difference between ASyn and Syn.
PM is different

Time-dependent transition probabilities (exp 4)

- Probabilities of being in state *a* at time *t*, from initial grazing of the day denoted:

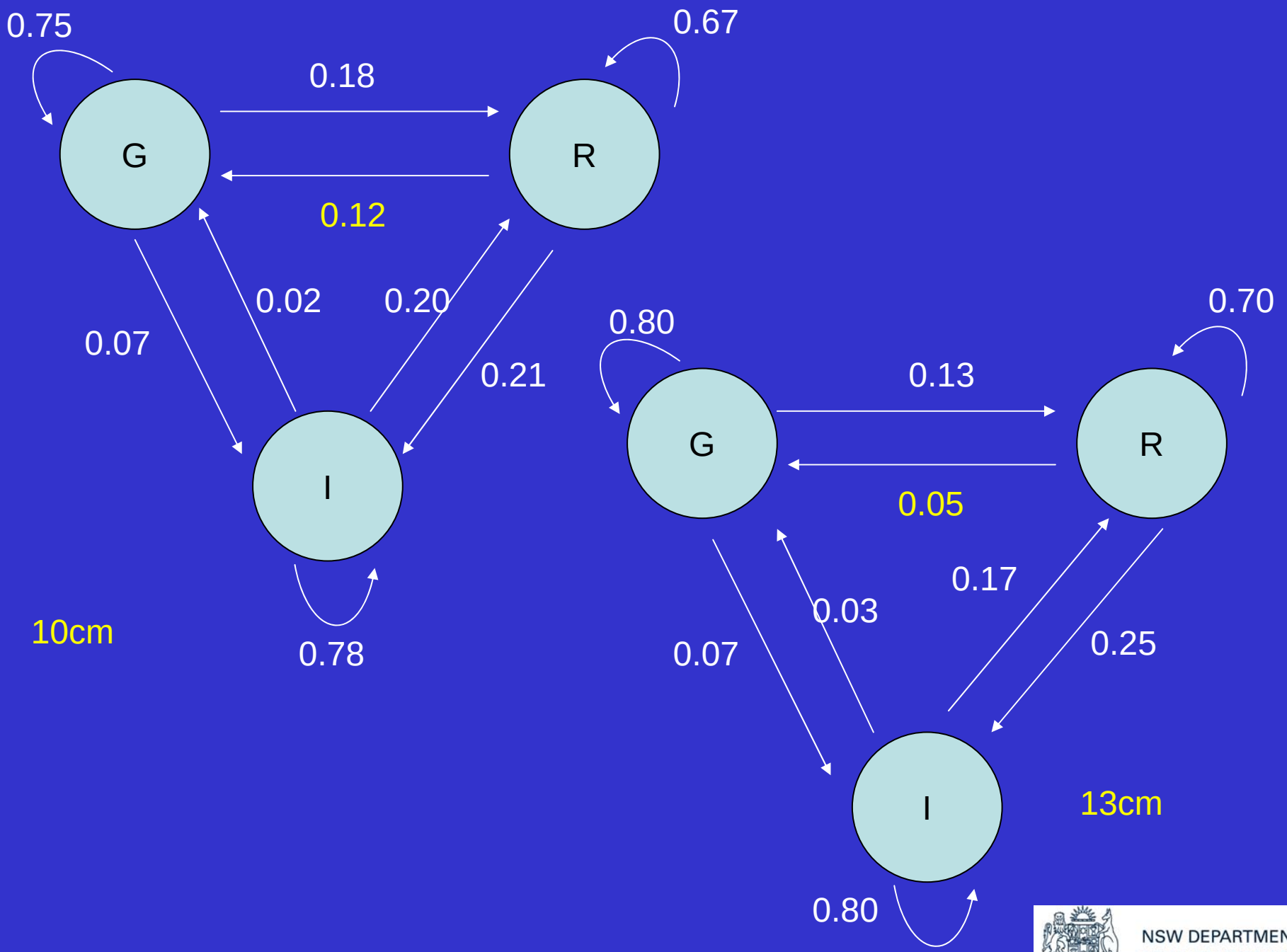
  $PBSa_t = P(\text{state } a \text{ at time } t)$ $(a=1, \ldots, s)$

- Probabilities of staying in state *a* from time *t* to time $t+\Delta t$ are denoted:

  $PSSa_t = P(\text{state } a \text{ at time } t \cap \text{state } a \text{ at time } t+\Delta t)$ $(a=1, \ldots, s)$

- Probabilities of changing of state - leaving state *a* for state *b* from time *t* to time $t+\Delta t$,

  $PCSab_t = P(\text{state } a \text{ at time } t \cap \text{state } b \text{ at time } t+\Delta t)$ $(a,b=1, \ldots, s;\ a \neq b)$



Quantitative behaviour of grazing dairy cows: Conclusions

Exp 1 – SH v GD

- Increasing SH increases GT (45min)
- Higher DMI in first 4h (13 v 10cm) → higher IR
- Remove animals; supplementary feeding

Exp 2 – Sward structure

- No distribution consistently fitted profiles
- DN can be used to describe profile

Conclusions - continued

Exp 3 – Spectral analysis

- SH v GD – same grazing pattern
- PM v ASyn v Syn – PM different pattern

Exp 4 – Transition probabilities

- High probability of moving from one state to another if been in that state for long time
- Know probability then can design feed allocation systems