THE INFLUENCE OF PHOTOPERIOD AND ENDOCRINE STATUS ON SEASONAL
REPRODUCTIVE BEHAVIOUR IN THE MALE FALLOW DEER

R. NEWMAN*, H. THOMPSON*, S. McCONNELL*, P. BAKER* and P. WYNN*

The fallow deer (*Dama dama*) is one of the major deer species used commercially
in Australia. The fallow buck, as with other male deer, shows highly seasonal
sexual activity which is associated with a markedly depressed feed intake.

Asher et al. (1987) have shown that the onset of sexual activity in the fallow
buck corresponds with the seasonal decrease in daylength and that treatment
with melatonin for 45 days at the summer solstice advanced testicular activity.
In this study we have investigated the effect of artificially altering
daylength and of administering melatonin on feed intake and endocrine status of
the animals.

Fallow bucks were kept in individual pens with controlled lighting at Badgerys
Creek, near Sydney (lat. 34°) and offered ad libitum a pelleted mixture of
lucerne hay and oats (6:4 w/w) for a period of 32 weeks commencing early
December. The bucks comprised three groups - (i) control group (n=6), exposed
to natural photoperiod, (ii) long day (LD) group (n=9) exposed to a 16L:8D
photoperiod, and (iii) long day + melatonin (LD+M) group (n=5) given two
melatonin implants (Regulin) each month from December to February to mimic
short daylengths. Feed intake was measured and venous blood samples for
hormone assay were collected weekly.

![Graph showing changes in feed intake and plasma testosterone (T) concentrations](image)

The feed intake of the control group began to decline in early March and
reached its minimum five weeks later (Fig. 1); the LD group showed a similar
change (but its onset was about one week earlier). Feed intake decline with
the LD+M group was of similar magnitude to the other groups but it began some
five weeks earlier. Plasma T concentrations in the control and LD groups
closely reflected feed intake (Fig. 1); the situation was similar for the LD+M
group with the exception that the maximum T value (24±6 ug/l) was recorded 5
weeks earlier at the beginning of February. Plasma T₄ levels paralleled feed
intakes; e.g. the mean value for the control group during January (66±4 ug/l)
was significantly higher (P<0.05) than that during March (35±2 ug/l).

The data show that in the fallow buck the seasonal increase in sexual activity
is not triggered by decreasing daylength but may be by the development of
refractoriness to the inhibitory action of exposure to long daylengths. As
administration of melatonin advanced the onset of sexual activity and the
associated depression in feed intake, we suggest that the melatonin signal does
play a role in the timing of these behavioural changes. The negative
correlation between plasma T and feed intake suggests that T may be implicated
in the regulation of feeding behaviour.


* CSIRO Division of Animal Production, Prospect, N.S.W. 2148.