



# Identifying oestrogenic lucerne crops and pre-mating ewe management.

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PhD research to define best management practices for mating ewes on lucerne was conducted at Lincoln University by Rachel Fields under the supervision of Professor Derrick Moot and Associate Professor Graham Barrell.

Lucerne is a high quality feed which can be used to improve live weight and therefore fertility, in the lead up to mating. However, in some situations, lucerne can contain high levels (> 25 mg/kg DM) of the phyto-oestrogen coumestrol which can reduce ewe ovulation rate. This results in reduced lambing rate as fewer twins and more singles are produced. This has led to some reluctance by farmers to flush ewes on lucerne. However, coumestrol is not always elevated in the plant and it is high quality feed that can be used to put weight on to ewes or hoggets pre-mating. Alternative pastures may unnecessarily compromise the feed quality compared with what lucerne can provide. High quality feed is important because scanning rate is strongly related to mating weight (Figure 1).

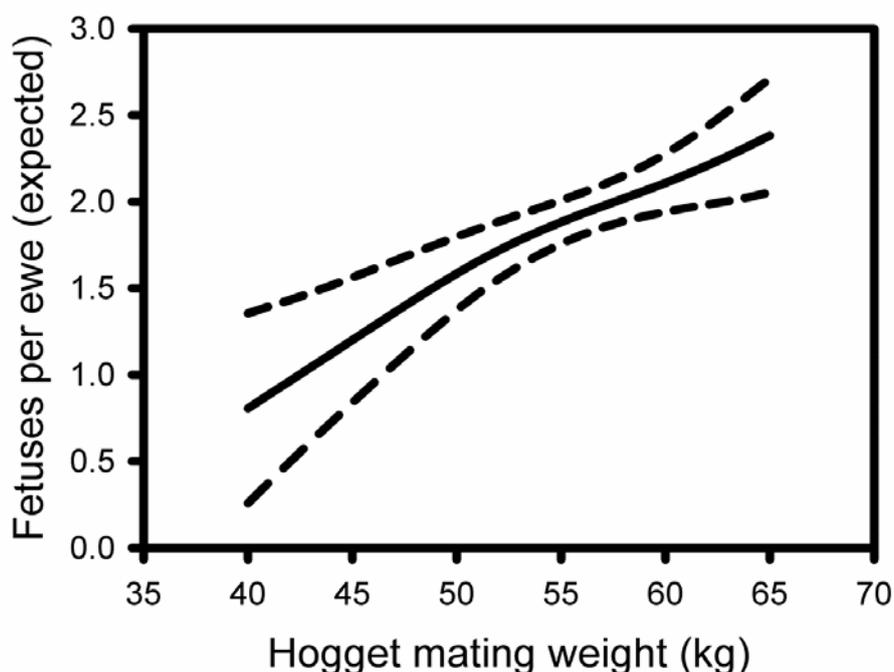


Figure 1 The expected number of fetuses per hogget (scanning rate) against the weight at mating.

### Which factors do and do not increase coumestrol?

Identifying the factors that lead to elevated coumestrol in lucerne is important so that animals are not unnecessarily removed from it. During her PhD at Lincoln, Rachel tested lucerne under different environmental conditions to isolate when coumestrol may be elevated. From this she has determined that lucerne that is flowering or wilting is not a problem and can be used as feed pre-mating. However, lucerne with moderate to severe levels of fungal diseases on leaf or stem material is at risk of having high coumestrol. The coumestrol does not get transferred to regrowth material, so even if fungal levels have been high in the previous rotation of a stand, as long as the material on offer is clean, it will be safe. Figure 2 shows some examples of pathogens that may be present in a crop and cause elevated coumestrol.



Figure 2 Examples of some of the fungal pathogens present in lucerne: *Stemphylium* (top left), common leaf spot (top right), spring black stem (bottom; can occur in autumn too). Photos: R.L. Fields, Lincoln University.

## Identifying heightened coumestrol

Fungal diseases in lucerne often occur in the lower foliage of the plant and so the stand may look clean without close inspection inside the canopy. Diseases typically follow a period of high humidity, heavy rainfall or multiple days of overcast wet weather. Rachel produced a decision tree to estimate the coumestrol levels based on the weather her crops were exposed to **since the previous grazing** (Figure 3). It has not been widely tested but did show some factors that elevate coumestrol. For example, when rainfall during regrowth was over 131 mm and there were more than 17 days with relative humidity above 95% the average coumestrol content was estimated to be 163 mg/kg DM. Avoid mating on it! In contrast, when less than 61 mm of rain fell during regrowth and there were fewer than ~5 days above 95% relative humidity the average coumestrol was estimated to be 7.9 mg/kg DM and should be safe (i.e. below 25 mg/kg DM) to graze. This decision tree is based on Jan - June field data collected for three years at Lincoln University, New Zealand so does require validation for other regions, seasons and climates. It should be considered a preliminary guide only.

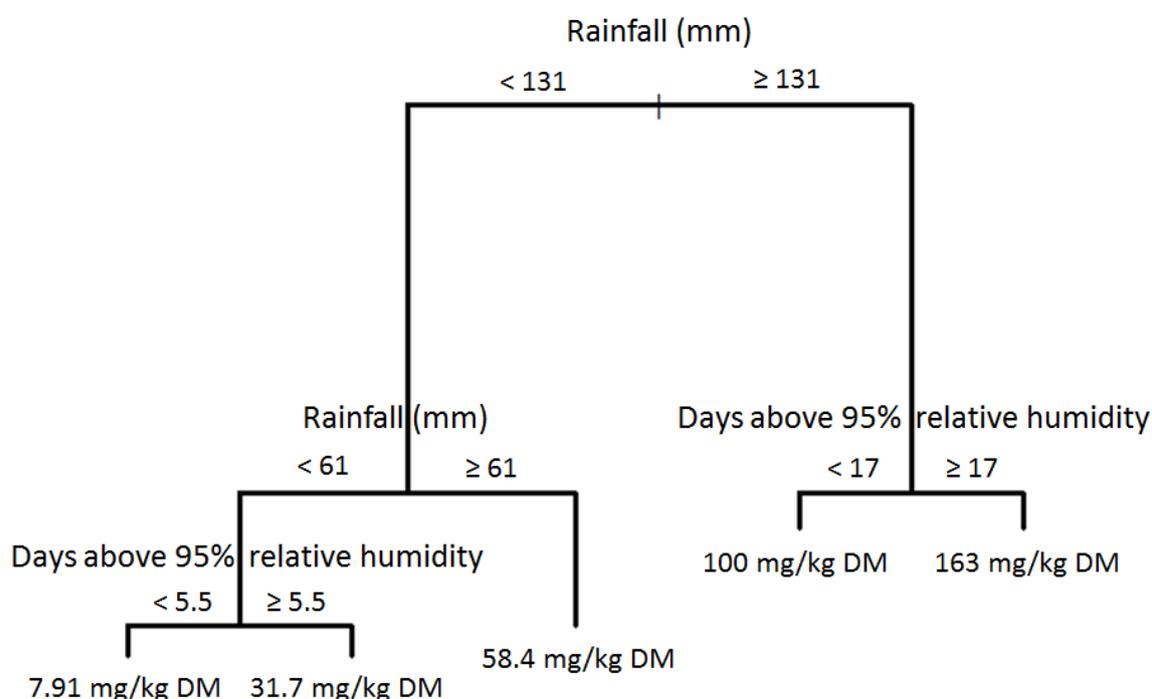


Figure 3 A decision tree to estimate mean coumestrol content based on rainfall (mm) and days above 95% relative humidity the stand was exposed to during its regrowth period.

Based on the decision tree, only the left hand branch represents conditions that gave low levels of coumestrol that would be safe to mate on. However, in all other situations rainfall should have enabled other feed to grow and be available pre mating.

Another method of identifying if the lucerne has high coumestrol is to check for udder growth and/or increased teat width in ewe lambs grazing on lucerne relative to ewe lambs on a non-lucerne pasture. Rachel observed that six month old ewe lambs had protruding udders while controls on grass did not.

### Management if coumestrol levels are elevated

If coumestrol is expected to be elevated based on fungal disease, the decision tree, or udder growth, ewes can be removed from the lucerne for about two weeks prior to joining. However, it is important to remember that liveweight strongly influences ovulation rate. If there is no alternative feed of sufficient quality, it is better for the animals to be gaining or maintaining weight on lucerne, than losing weight on poor quality feed.

The two week removal recommendation is based on an experiment where animals were removed from lucerne and put on ryegrass/white clover pastures at different times prior to a CIDR induced ovulation. The ovulation rates were then used to create a model to predict the rate that ovulation rates recover after livestock were moved to an alternative feed source (Figure 4). Based on this, ewes that direct grazed lucerne for six weeks (0 days on grass) had the lowest ovulation rate. Ovulation rates then increased with 1 and 2 weeks off lucerne before plateauing with additional time off lucerne not improving ovulation rate further.

Following mating, the pregnant animals can return to the lucerne, as coumestrol does not cause problems post-conception.

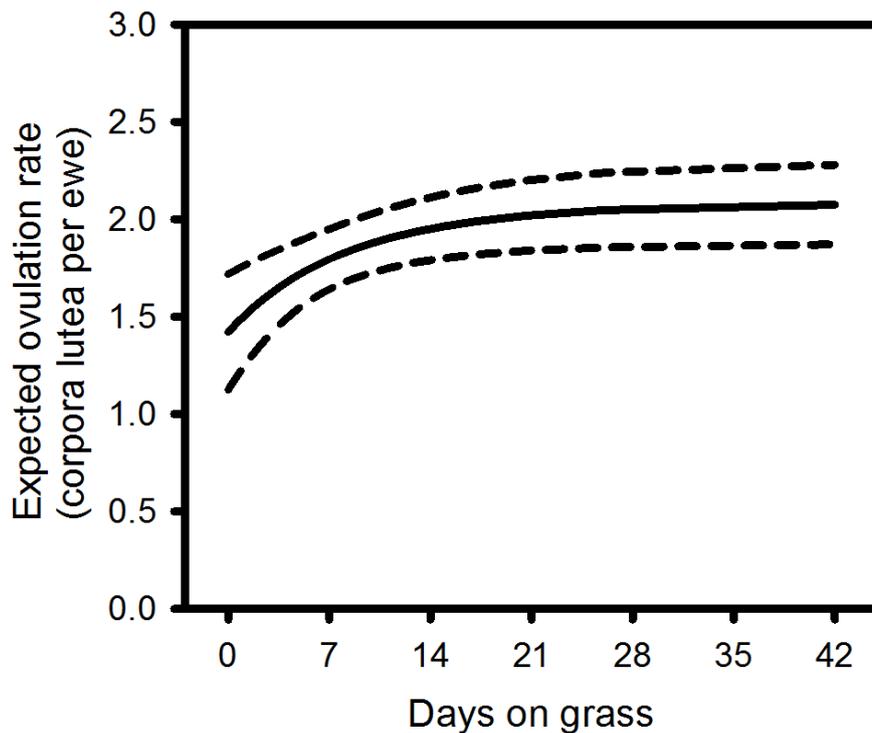


Figure 4 The expected number of corpora lutea per ewe (ovulation rate) against the number of days on grass prior to ovulation.

One aspect Rachel did not investigate is a short term (one week) flush on lucerne prior to mating. There is always something else to do in research.