

## **DEER ON RED CLOVER PRODUCE RED URINE: A CASE REPORT**

**P R Wilson, J Niezen, T Barry, M Chick  
Massey University, Palmerston North, New Zealand**

### **1 INTRODUCTION**

There is considerable interest in investigation of a range of pasture species for various requirements for deer grazing. Recent trial work (Scott, 1989) indicated that red deer had a strong preference for red clover. That study also reported a preference for chicory, lotus and some other pasture species.

The agronomic features of red clover are that it grows well in warm environments, or warm seasons, and because of its root structure it is a relatively drought resistant pasture species. The resultant high summer production combined with the high palatability suggest that this species may be appropriate for farmers to employ during periods of lactation, particularly in dry areas. Furthermore, red clover has a high energy content and therefore theoretically may produce higher growth rates per kg dry matter consumed.

Studies at Massey University were undertaken to investigate some of the practical aspects of using pure red clover swards for lactating hinds and to look at the potential for productivity improvements from this species.

However, it is essential when investigating the use of various feedstuffs that the health status of the animal is monitored closely. The range of effects such as bloat, nitrate poisoning, oestrogenic problems, red water problems and micotoxicoeses have been reported from a range of pastures or crops in a range of animal species. This report adds to that list. It is a preliminary description of the occurrence of red urine from red deer grazing red clover swards.

### **2 DESCRIPTION OF PROJECT**

Approximately 3 hectares of red clover were sown in spring to produce pure red clover swards. On December 30, 24 red deer hinds and their calves were placed onto these pastures. Three groups of eight hinds with calves were grazed to different pasture heights (high, medium and low). A control group was placed on a high allowance of conventional ryegrass-clover pasture equivalent to the high allowance of red clover.

The hinds and calves were weighed routinely and at periodic intervals were yarded, separated, and milk production estimated after milking with an electric milking machine following approximately four hours separation from calves. Bodyweight patterns of hinds and calves were measured. The potential for the use of red clover for summer management to improve growth rates on calves, and maintain hinds in good condition is shown by the body weight data in Table 1. Calves weaned from the high allowance red clover plots were 8.5 kg heavier than controls on ryegrass/white clover after grazing those plots for eight weeks. Hinds on high red clover allowances gained weight while those on control pastures lost weight.

**Table 1**

**Summary of weaning weights (Feb 28) and hind body weight changes on three allowances of red clover from Dec 29 to Feb 28, compared with a high allowance of ryegrass/white clover pasture (control)**

Group	Mean weight of weaners (kg) ± SEM Feb 28	Mean weights of hinds (kg) ± SEM	
		Initial (Dec 29)	Final (Feb 28)
High Clover	51.3 ± 0.95	94.5 ± 1.06	97.8 ± 0.95
Medium Clover	49.5 ± 1.03	97.7 ± 1.06	101.2 ± 0.95
Low Clover	46.7 ± 0.96	96.3 ± 1.03	96.6 ± 0.95
Control	42.8 ± 0.93	101.0 ± 1.03	97.6 ± 0.93

### 3 CLINICAL OBSERVATIONS

Two days after the hinds were placed on red clover the researchers noted what appeared to be red splashes on the red clover. When brought into the yards it was noted that the urine on the concrete floor was red. This sparked an investigation with the first fear being an outbreak of infectious disease, ie. leptospirosis.

#### 3.1 Clinical examination

The cardinal signs were all normal, there was no sign of anaemia and the animals did not appear to be distressed in any way. Subsequently fresh urine samples were collected and to the dismay of the clinician and researchers the urine voided was normal colour. However, within a short period the urine began to change to a red hue. Within one hour the urine was a scarlet red colour. This distinguishes the urine from the crimson or port wine colour of haemoglobinurea. It later became apparent that urine voided onto the hocks of both mothers and calves turned red. This red staining was also observed on the tip of the tail and either side of the vulva where the swishing tail deposited urine.

All deer appeared to be affected. It was later observed that male deer also produced red urine after grazing the red clover pastures.

#### 3.2 Haematology

Blood samples were taken from eight hinds from both the control and clover groups. Analyses of blood parameters are shown in Table 2 and all parameters were in the normal range and there was no difference between the deer on clover and normal pasture.

**Table 2**

**Mean (n=8) blood parameters of hinds on red clover and control ryegrass/white clover pastures**

Parameter	Control	Red Clover	"Normal"
Hb(g/dl)	14.1	13.8	16.1
PCV (%)	37.2	36.8	45
MCHC (g/dl)	37.9	37.6	35.5
Total Protein (g/l)	60.1	60.9	68
Fibrinogen (g/l)	3.0	2.0	<4
WBC ( $\times 10^9/l$ )	5.76	5.74	6.1
GT	33	32.3	38
Copper ( $\mu\text{mol/l}$ )	15.5	17.9	>8

Note: "Normal" values are for non-lactating red hinds. No data is available for lactating red hinds.

### 3.3. Urinalysis

Urinalysis indicated no abnormalities and no precipitative pigment was observed. pH was normal. Tests for haemoglobin were negative.

### 3.4 Further investigations

Once it was discovered that urine changed colour over a period of time, fresh urine samples were collected and a chronological record kept of the rate of change. It was noted that the urine achieved its brightest scarlet colour after approximately 60 minutes.

To test whether this was a light responsive process fresh urine samples were collected and immediately placed in a darkened box. Samples were withdrawn at 15 minute intervals and it was observed that the rate of colouration was the same as for duplicate samples maintained in light. Thus the process appeared not to be photosensitive.

In order to test whether the process was an oxidative process fresh urine specimens were collected and placed in a container and air replaced by nitrogen. Without the presence of oxygen the urine did not change colour. Thus the colouration appeared to be an oxidation process.

### 3.5 Biochemical analyses

Chromatographic biochemical analyses for anthocyanins and iso-flavonoids were undertaken and proven negative. Search of the literature revealed an indication that the red pigmentation may be a result of metabolism of tryptophan and this theory at the time of writing, is under investigation.

## 4 CONCLUSION

The occurrence of red pigmentation of urine in red deer on red clover is an interesting phenomenon. This phenomenon is very rare if non-existent in other ruminant species. Very occasionally have one or two sheep or cattle or goats on red clover shown a slight red

pigmentation. It has never been observed that whole herds of animals on red clover have been affected.

It would appear that the metabolism of some component of red clover in red deer is different to that in other species. It could be that the rapid flow rate of digesta, particularly the low fibre pastures such as red clover, may result in a shift of metabolism from rumen to intestine thereby altering the nature and character of by-products entering the bloodstream in deer compared with sheep and cattle. Alternatively, it could be that the oestrogenic component of clover is altering ruminal microbiological breakdown of clover components again resulting in a different pattern of metabolism.

Clinically this syndrome is important because it is anticipated that a large number of deer farmers in the future will employ red clover swards to maximise production. It is essential that farmers and veterinarians are alerted to this urine colouration problem and to be aware that it appears to be a process which is not harmful to the animal.

In terms of differential diagnosis the important feature is that urine is normal colour when voided but changes to a scarlet colour over a 60 minute period. This feature should enable the veterinarian to differentially diagnose this cause of red urine when compared with the other more serious problems associated with haemoglobinuria.

#### **Reference**

Scott, E.I. (1989). Pasture preferences of deer. Proc. No.6. Deer Branch NZVA. 176-180.