

**IN THE ENVIRONMENT COURT
AT CHRISTCHURCH
I MUA I TE KOOTI TAIAO O AOTEAROA
KI OTAUTAHI**

ENV-2018-CHC-34

IN THE MATTER OF the Resource Management Act 1991

AND

IN THE MATTER OF appeals under clause 14 of the First Schedule to the Act

BETWEEN **BEEF+LAMB NEW ZEALAND LIMITED**

Appellant

AND **SOUTHLAND REGIONAL COUNCIL**

Respondent

**WILL SAY STATEMENT OF RENE CORNER-THOMAS FOR BEEF+LAMB
NEW ZEALAND LIMITED
29 October 2021**

FLETCHER VAUTIER MOORE
LAWYERS
PO BOX 3029
RICHMOND 7050

Telephone: (03) 543 8301
Facsimile: (03) 543 8302
Email: cthomsen@fvm.co.nz
Solicitor: CP Thomsen

I, **RENE CORNER-THOMAS**, senior lecturer, will say:

BACKGROUND

1. I am employed by Massey University as a senior lecturer in Animal Science. My position is split between the School of Veterinary Science (40%) and the School of Agriculture and Environment (60%). Prior to this I was employed as a lecturer (2015 to 2018), research officer (2012 to 2015) and research assistant (2001 to 2003).
2. I have a PhD in Animal Science (2007) and a Master of Veterinary Studies (2001) from Massey University. I have a Bachelor of Science from Melbourne University (1998).
3. My areas of expertise include sheep behaviour, nutrition, reproduction and welfare. I have 17 years of experience in conducting sheep research studies.
4. I have been involved in a series of studies examining ewe and lamb behaviour in the early post-partum period. In addition, I have used GPS technology to investigate the impacts of parasitism on the behaviour of sheep. Over the last five years I have conducted studies to examine the drinking behaviour of sheep and the impacts of water restriction on lamb and ewe growth and behaviour.
5. I have been the lead or co-author on 54 peer reviewed journal articles and 27 conference papers and at least 42 other forms of dissemination such as farmer talks and rural press articles.
6. I am the president of the New Zealand Society of Animal Production (2019-2021) and a member of both the Massey University and Kaiawhina Animal Ethics Committees.
7. I confirm this will say statement has been prepared in accordance with the Code of Conduct for Expert Witnesses set out in the 2014 Environment Court Practice Note. I confirm that the opinions I express in this statement represent a summary of my true and complete professional opinions. I have

not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

SCOPE OF EVIDENCE

8. I have been asked to give this will say statement and, in due course, evidence by Beef+Lamb New Zealand Limited on the behaviour of sheep around waterways.
9. In a study conducted at Massey University's Tuapaka farm in winter of 2019, global position system (GPS) data showed that during the two-week study period 40 study ewes spent less time in the stream zone (3 m area either side of the stream) than in the rest of the paddock ($P < 0.05$; fig 2).



Figure 1. Satellite image of the study site showing paddock boundary (black line), location of the stream (blue line) and location of the water trough (black dot).

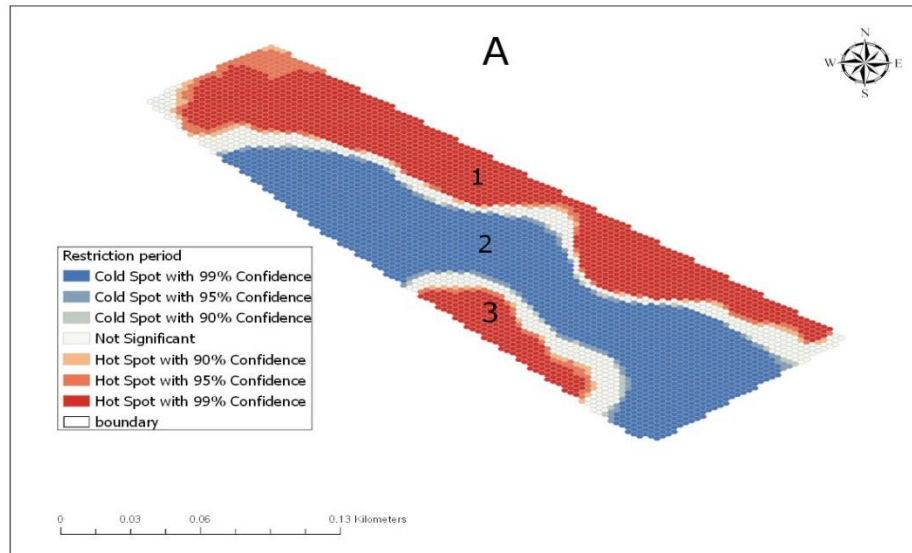


Figure 2. Hot spot analysis of the study site during a period when access to the water trough was restricted showing the density of ewe locations of 40 ewes recorded in winter 2019. Red areas indicate statistically significant ($p < 0.05$) spatial clustering of GPS locations (large positive z-scores). Blue areas indicate statistically significant ($p < 0.05$) low spatial clustering of GPS locations (small negative z-scores). White areas indicate random distribution with no spatial clustering.

10. The topography of the paddock influenced the ewe GPS locations in winter. Of the GPS locations recorded, 71% were in flat ($0-3^\circ$), undulating ($4-7^\circ$) and rolling ($8-15^\circ$) areas. The percentage of locations recorded in strong rolling ($16-20^\circ$), moderately steep ($21-25^\circ$) and steep ($26-35^\circ$) ranged were 7, 9 and 11%, respectively. Only 1% of locations were recorded in very steep ($35-75^\circ$) areas of the paddock.
11. In the same winter study in 2019, video surveillance footage showed that when ewes were within the stream zone they spent 68% of the time grazing, 11.2% walking and 2.2% interacting with the stream either sniffing or drinking water. Of the 216 behavioural observations recorded over the two-week study period only one showed a ewe walk in the stream (Bunyaga et al 2020).
12. A 60kg non-pregnant ewe has a metabolizable energy maintenance requirement of 9.0 MJ/kg DM/day. If the pasture ME content is 11 MJ/kgDM,

the ewe would need to consume 0.82 kg DM/day ($9.0 \text{ MJ/kgDM} \div 11 \text{ MJ/kgDM}$) to meet their maintenance requirements. If the average water content of pasture was 85%, the DM content of the pasture would be 15%. In order for the ewe to consume 0.82 kg DM/day she would need to consume 5.5 kg of pasture ($100 \text{ kg} \div 15 \text{ kgDM} \times 0.82 \text{ kgDM}$). If the dry matter content of the pasture is then removed from the wet weight, the ewe would have consumed 4.65 L of water per day ($5.5 \text{ kg} - 0.82 \text{ kgDM}$). Theoretically, this is at the top end of the reported water intake requirements of adult non-pregnant sheep in a temperate environment of between 2 and 4.6 l/day (Freer and Dove 2002). This means that the need for sheep to access drinking water either from a trough or stream is limited as most of its water needs can be obtained from pasture.

13. In the Manawatū region studies were conducted during autumn, winter and spring to determine the impact of restricted access to a water trough on weaned lamb (autumn) and ewe (winter and spring) live weight gain and body condition. In those studies, the moisture content of pasture ranged between 70 and 85%. In all three studies animals that were restricted from accessing the trough showed no signs of dehydration (Data not yet published).
14. Due to the high moisture content of New Zealand pastures in autumn, winter and spring there is little need for sheep to access waterways to drink. In winter, there were only five occasions amongst the 216 behavioural observations in which ewes were observed to drink water.
15. During the winter study 39 of the 40 study ewes were recorded to cross the stream at the culvert during the two-week observation period. Video footage from the downstream culvert showed that there were 304 videos of ewes in the area, of these 235 showed ewes crossing the stream at the culvert and 69 ewes grazing on one side.
16. A subsequent study was conducted in summer of 2021 with 40 non-pregnant mixed-age ewes. During the two-week observation period less than half of the ewes were observed to drink from the stream. Observations of ewe drinking were made on 47 occasions with a mean drinking duration of 12.7 seconds. In addition, of the 1,367 behaviour observations sheep were observed to walk in the stream on 190 occasions.

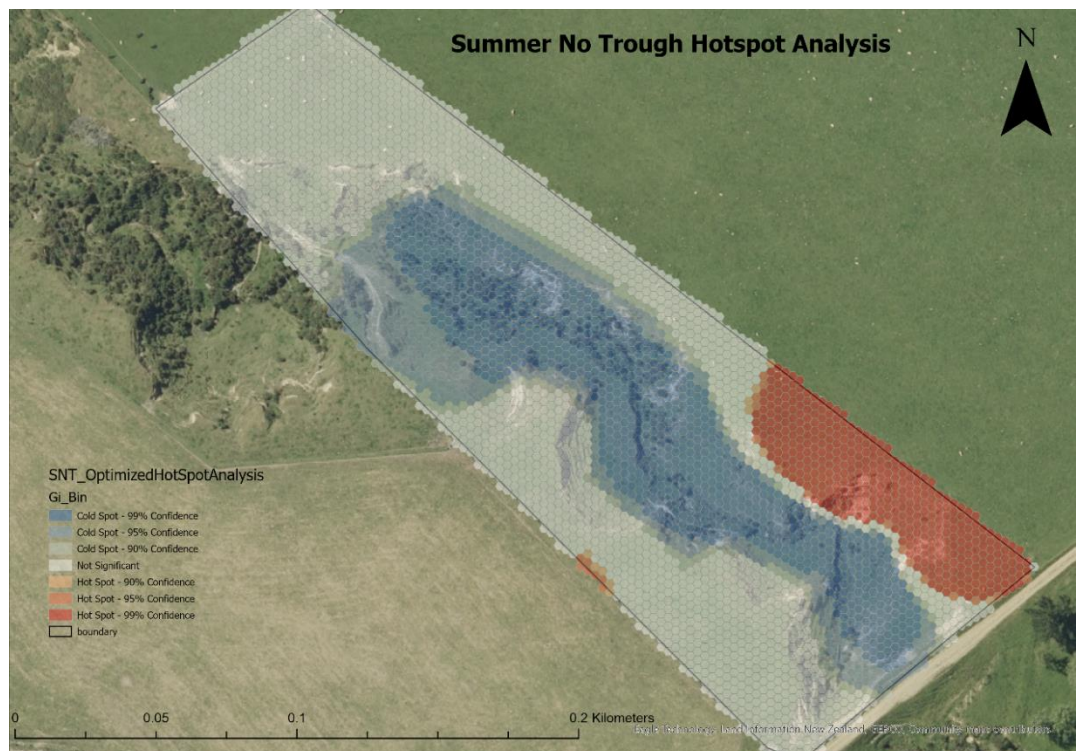


Figure 3. Hot spot analysis of the study site during a period when access to the water trough was restricted showing the density of ewe locations of 40 ewes recorded in summer 2021. Red areas indicate statistically significant ($p < 0.05$) spatial clustering of GPS locations (large positive z-scores). Blue areas indicate statistically significant ($p < 0.05$) low spatial clustering of GPS locations (small negative z-scores). White areas indicate random distribution with no spatial clustering.

17. Based on the behaviour of sheep around the waterways in winter and summer it appears that sheep spend little time near waterways. In winter sheep interacted very little with the waterway but more so in summer. Given the short periods of time ewes spent drinking in summer, the fencing of waterways to prevent sheep accessing the stream is likely to have little impact on instances where sheep interact with waterways.

R Corner-Thomas
1 November 2021

References

Bunyaga, A.S., Corner-Thomas, R.A., Burkitt, L.L., Draganova, I., Kenyon, P.R. 2020. Brief communication: The behaviour of sheep around a natural waterway. *New Zealand Journal of Animal Science and Production* 80, 124-127.

Freer, M. & Dove, H. 2002. *Sheep nutrition*, CABI publishers, Wallingford UK. pp 385.