# GPS tracking: use of shelter and shade by Merino ewes

*D. B. Taylor*[A,C,D,E], *D. A. Schneider*[C], *W. Y. Brown*[A], *I. R. Price*[B], *M. G. Trotter*[C], *D. W. Lamb*[C] *and G. N. Hinch*[A,C,D].

[A]Animal Science, [B]Psychology, [C]Precision Agriculture Research Group, University of New England, Armidale, NSW 2351, Australia.
[D]Australian Cooperative Research Centre for Sheep Industry Innovation, Homestead Building, University of New England, Armidale, NSW 2351, Australia.
[E]Corresponding author. Email: dtaylor2@une.edu.au

**SUMMARY**

Information on the spatial distribution of ewes was obtained by deploying GPS collars on sheep on a commercial property on the Northern Tablelands of New South Wales. The aim of this study was to quantify the relationship between local weather, topography and use of shade and shelter by sheep in 2 paddocks of 20 ha. Paddock A was characterised by 3 distinct areas: “exterior shelter” consisting of perimeter shelter belts (3–4 rows of native trees), “lone trees” consisting of individual free-standing trees within the paddock, and “remainder of paddock”. Paddock B contained areas that were categorised as for paddock A, plus an “interior shelter”, a single, internal boomerang-shaped shelter belt. Over 2 lambing seasons (spring 2008 and 2009, 43–51 days), a random sample of 5 ewes from each of the 2 flocks of 200–300 ewes (2–5 years old and shorn 2 weeks prior to commencement of the experiment) were fitted with GPS collars set to log position every 10 min. Four weather stations and 55 temperature loggers were strategically located throughout the paddocks to provide localized hourly measurements of temperature, wind speed and precipitation over the observation periods. Daily temperatures ranged between –6 °C and 27 °C; nights were generally still and frost was common; days were often sunny and windy. Wind speed reached a mean maximum of 49.6 km/h. Strong westerly winds prevailed; northerly and southerly winds were unusual. The average rainfall during the observation period was 760 mm.

As the number of times that sheep were detected in the various paddock categories was similar in each year, data for the 2 years were combined. The percentage of observations in which sheep were within 25 m of each shelter class was determined during 3 key phases of the diurnal behavioural cycle: 19:00–04:00 (night camping); 05:00–11:00 (morning grazing) and 12:00–18:00 (afternoon grazing). During night camping and when an internal shelter belt was provided (Paddock B), sheep spent more time in the vicinity (0–25 m) of the interior shelter belt (56%) than free-standing trees (12%). In Paddock A, which contained only free-standing trees (43%) or perimeter shelter belts (40%), the difference between the times spent in these areas was not significant. During daylight, shade-seeking behaviour indicated an increase in the use of free-standing trees in both paddocks. Interior shelter or free-standing trees were utilised during night camping, which may have occurred because tree canopies reduce heat loss via radiation. During the day, shade reduces radiation load, which may be of more importance to sheep than the wind protection provided by the exterior shelter belts.

These results suggest that sheep prefer to manoeuvre in and around shelter and free-standing trees within a paddock rather than exterior shelter belts along fence lines. The effects of local weather temperature extremes, wind direction, altitude and diurnal movements on daytime and night-time preferences are currently being analysed.