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Effects on ewe reproduction of grazing willow fodder blocks during drought

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Abstract

A grazing experiment was conducted in the summer/autumn of 2003 to determine the effect of grazing on willow fodder blocks at 6000 stems/ha during mating, relative to control ewes grazed on drought pasture, upon ewe production and reproduction. The fodder blocks contained a mixture of herbage and small trees. Grazing occurred over 10 weeks, from 19 February including three cycles of mating, with four groups of 100 ewes, comprising short drought pasture typical of drought pasture, long drought pasture typical of the pasture growing in the willow fodder blocks, short drought pasture with restricted access to willow fodder blocks (restricted access) and full access to willow fodder blocks (fenced on the willow fodder blocks all the time; full access). After mating, the four groups were joined and managed as one group until weaning in late November 2003. Ewe live weight (LW) and body condition score (BCS) change and reproductive rate at foetal ultra-sound scanning, lambing, docking and weaning were measured. Ewe wool production and staple length were measured at weaning. Short drought pasture had a pre-grazing mass of 1639 kg dry matter (DM)/ha with a dead matter content of 60%; typical of drought conditions. Herbage in the willow fodder blocks was similar to both control drought pastures (short and long) in nutritive value, with an organic matter digestibility (OMD) of 0.50. Tree yields were low in the fodder blocks, but they had higher concentrations of all

Abbreviations: BCS, body condition score; CP, crude protein; CT, condensed tannin; DM, dry matter; DOMD, digestible organic matter (g)/100 g DM; ELISA, enzyme-linked immunosorbent assay; GLM, generalised linear model; HCL, hydrochloric acid; HM, herbage mass (kg DM/ha); LIG, lignin; LW, live weight; ME, metabolisable energy; ND, not determined; NDF, neutral detergent fibre; NZ, New Zealand; OM, organic matter; OMD, organic matter digestibility; *P*, probability; PG, phenolic glycoside; SAS, statistical analysis system; S.E., standard error; UDP, undegradable dietary protein

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secondary compounds, including 30 g condensed tannin (CT)/kg DM and OMD was higher, at 0.72. CT concentration was higher in the fodder block herbage than in short and long control drought pasture (5.0 g/kg versus 2.5 g/kg DM). Substantial LW loss occurred in the short control group (101 g/day), and reproductive rate was low, as would occur in severe drought conditions. Full access to fodder blocks lowered LW loss to 40 g/day and increased reproductive rate by approximately 20% units, with more ewes giving birth to twin lambs. Restricted access ewes had a low reproductive rate, similar to the short control group. Reproductive rate in full access treatment was slightly higher than in the long control group, despite similar calculated DM intakes in both groups. Calculated crude protein and CT intakes were higher for full access ewes than for any other groups, due to contributions from both the herbage and the trees; this may have increased the flow of undegradable dietary protein (UDP) to the small intestine and so have contributed to the increased fecundity of this group. Full access to willow fodder blocks proved beneficial in increasing ewe reproductive rate. However, both pasture and trees need to be managed as a tree/pasture system in order to produce herbage of higher nutritive value and more efficiently utilise willow fodder blocks as a supplementary feed.

Keywords: Drought feed; Willows (*Salix* sp.); Sheep reproduction; Condensed tannin; Willow fodder blocks

1. Introduction

Droughts, floods and weather events can all have adverse impacts on primary production, and ultimately profitability (Daw, 1999). Climatic predictions indicate that droughts will be more frequent, and more severe, in the East Coast regions of New Zealand in the future (Salinger, 2000). Willows (*Salix* spp.) have been introduced, and extensively planted, in New Zealand to control soil erosion on hill pastoral farms (Wilkinson, 1999) and, to a lesser extent, to provide shelter, shade and supplementary forage for livestock. Their multi-purpose attributes make willows potentially useful for silvopastoral systems on New Zealand hill country where soil erosion is widespread, and low rainfall in summer results in low pasture production (Oppong et al., 2001). The edible fodder of willow trees, i.e. (leaves and fine stems) in summer is adequate for maintenance of sheep, goats and red deer, and is generally higher in nutritive value than low quality summer pasture (McCabe and Barry, 1988; Kemp et al., 2001). Moore et al. (2003) found that willow supplementation of beef cattle grazing dry summer pastures reduced live weight (LW) loss under prolonged summer drought conditions. McWilliam et al. (2003, 2004) established that supplementing ewes grazing drought pasture with poplar and willow cuttings during mating reduced LW loss and increased reproductive performance, although cutting and supplementing willows to sheep and cattle grazing drought pastures can be intensive.

Growing of shrub species in rows, in association with pasture, is a practical option (Douglas et al., 1996). Large scale planting of willows originally relied on using rooted stem cuttings, but these are expensive. An alternative is to use unrooted stem cuttings, which were as productive as rooted cuttings, whilst being cheaper to establish and easier to handle (Zsuffa, 1992). Establishment of fodder blocks can be achieved by vertically planting cuttings referred to as ‘wands’ or ‘stakes’, which are often 1.0–1.2 m long, with diameters of 15–25 mm and 20–40 mm, respectively (Van Kraayenoord et al., 1986). The yield of edible forage (i.e., leaves plus stem $\leq$5 mm diameter)/tree from widely spaced trees