
THE PROCEEDINGS OF THE
NEW ZEALAND SOCIETY
OF
ANIMAL PRODUCTION
VOLUME 62 2002

BRIEF COMMUNICATION: Does stocking rate of singleton ewes during lambing and lactation affect performance?

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Keywords: ewe; singleton; weaning weight; live weight; lamb

Abstract:

The impact of singleton-ewe stocking rate (SR, 11, 13, 15 ewes ha) during lactation on ewe and lamb performance to weaning was examined over three years. Pasture mass before lambing in 2014 was considerably higher than that in both 2015 and 2016. At weaning in 2014 there was no effect (P>0.05) of SR on ewe live weight, while in 2015 and 2016, SR 11 ewes were heavier (P<0.05) at weaning than both SR 13 and 15 ewes. Lamb live weight during lactation was not affected (P>0.05) by SR in any year. Combined, these data suggest that when pasture mass is high, SR of up to 15 ewes per ha can be utilised but at lower pasture covers increasing SR will negatively affect ewe, but not lamb live weight. Farmers, therefore, need to consider carefully if they should utilise higher SR under these circumstances.

Introduction

Multiple-bearing ewes and their lambs have a greater nutritional demand during lactation than do singleton-bearing ewes (Nicol & Brookes 2007) and are traditionally maintained in a single paddock (set stocked) for lambing, and the lactation period, at a lower stocking rate (SR, ewes per ha). Lower SRs increase feed availability for the ewe and lamb unit, and reduces the competition for lambing sites. The lambing percentage of the New Zealand flock has increased over the last 20 years (B+LNZ 2017) resulting in more multiple-bearing ewes (Amer et al. 1999). A possible management practise to meet the extra flock nutritional demand from more multiples, is to restrict the intake of singleton-bearing ewes by increasing their SR over the lambing and lactation period, making more land available for multiple-bearing ewes. Recently in Ireland, SR has been shown to affect per hectare (ha) performance in prolific ewes (Earle et al. 2017), although the data suggested there was a SR ceiling after which further increases in performance were not observed. Under New Zealand conditions, the effect of SR on ewe and lamb performance appears not to have been examined for more than 30 years. Further, early studies did not necessarily focus on singleton-rearing ewes during lactation, often failed to report pasture mass, and the SR utilised were sometimes extreme, or were just modelling exercises only (Suckling 1975; Trotter et al. 1975; Johnson et al. 1982; Smeaton et al. 1983; McCall et al. 1984). Therefore, the aim of the present experiment was to examine the impact of SR during the lambing and lactation period on the performance of singleton-rearing ewes and lambs to weaning under differing pasture masses.

Materials and Methods

All animal procedures were carried out with the approval of the Massey University Animal Ethics Committee (MUAEC 14/63). The study was conducted at Massey University's Riverside Farm, 10 km north of Masterton, New Zealand.

Experimental design

The study was repeated over three years (2014, 2015 and 2016) and utilised six 1.5 ha paddocks per year, which were established with ryegrass and white clover. Paddocks were randomly allocated to one of three SR treatments, allowing two replicates per year. The SR utilised were 11, 13 or 15 singleton-bearing/rearing ewes per ha in the lambing and lactation period (starting approximately five days before the predicted start of lambing (pre-lambing)) until weaning. The traditional SR of singleton-bearing/rearing ewes on the farm was 10 to 11 ewes per ha. Each year, 117 singleton-bearing Romney ewes which had been identified as pregnant, using trans-abdominal ultrasound, to a 17-day breeding period, were utilised. Different ewes were used each year. The weight of ewes and pasture mass available were representative of farming conditions that year. Total ewes per SR treatment in each year were 33, 39 and 45 for the SR 11, 13 and 15 respectively, across the two replicates. If a ewe lost her lamb she was maintained within her treatment group until the end of the study.

Ewe live weights (LW) and ewe body condition score (BCS, Jeffries 1961) were recorded before lambing and at weaning. Lambs were identified to their dam, tagged, their sex determined and birth weight recorded (twice daily lambing beats at approximately 8 am and 2 pm). Lambs were weighed again at weaning. Weaning occurred 90, 73 and 80 days after the midpoint of lambing in 2014, 2015 and 2016, respectively. Complete ewe and lamb birth weight data were collected for 91, 98 and 96 ewes and their lambs in 2014, 2015 and 2016 respectively. Some data were lost due to, ewes giving birth to twins, ewe ill health and deaths, inability to identify ewes that gave birth to dead lambs. and lost ewe ear tags. These issues occurred across all treatments. Only complete ewe–lamb data were used for ewe pre-lambing live weight and BCS and lamb birth weight data. If a ewe lost her lamb before weaning, her data was not included in the ewe weaning weight data.

Pasture mass pre-lambing and on three occasions during lactation was recorded with a rising plate meter (Jenquip, Feilding, New Zealand) with 50 readings per paddock.

Statistical analysis

All statistical analysis was carried out using SAS v9.4 (SAS, 2014). Due to the differences in the timing of weighing events, each year was analysed separately. The effect of SR on ewe and lamb live weights was analysed using a mixed model that contained the fixed effect of SR and random effect of replicate. Ewe BCS was analysed using a generalised model using a Poisson distribution and logit transformation with the fixed effect of SR. Herbage mass before lambing was analysed using a mixed model that included the fixed effect of SR. Herbage mass in the lactation period was pooled across the three collection times and the model included the fixed effect of SR.

Results and discussion

Pasture mass before lambing did not differ between SR in either 2014, 2015 or 2016 (Table 1), although regardless of treatment, pasture masses were higher in 2014 than in the other years. Pasture masses below approximately 1200 kg DM per ha have been reported to reduce ewe DM intake and live weight (Kenyon & Webby 2007). It is unsurprising, therefore, that there was no impact of stocking rate on animal performance in 2014. These results suggest that under pasture conditions where pasture masses are above 1200 kg DM per ha a SR of at least 15 can be utilised. In 2014, pasture masses during lactation were greater (P<0.05) in the 11 than 15 SR treatment while 13 SR tended to differ (P=0.05) from both. This suggests that a lower SR, with high before lambing pasture masses, may result in poor herbage quality in the post-weaning summer period.

In 2015, there was no difference in pasture masses in lactation between SR treatments. While in 2016, pasture masses of 11 SR were greater (P<0.05) than those of both SR 13 and 15. In both 2015 and 2016, pasture mass before lambing and during lactation would have limited ewe intake, in all treatments. Further, low pasture allowances during lactation have been reported to reduce ewe live weight (Kenyon & Webby 2007). The lower live weights of SR 13 and 15 ewes (P<0.05) at weaning than those of SR 11 ewes were, therefore, not unexpected although, BCS did not differ between groups. Previous research over the ewe SR range of 12 to 20 and pasture masses below 1200 kg DM per ha has shown negative effects of higher SR on ewe live weight (Smeaton et al. 1983; McCall 1984). Combined, these data suggest that at low pasture masses before lambing, higher SR rates should be avoided from a ewe live weight perspective due to potential negative impacts on her future performance. If higher SR are to be utilised, more feed will be required after weaning to ensure

Table 1 The effect of stocking rate of singleton-rearing ewes in the lambing and lactation period (11, 13 and 15 ewes/ha) on pasture mass (kg DM/ha) before-lambing and during lactation (mean ± SEM).

Stocking rate	Pasture mass (kg DM/ha)	
(ewes/ha)	Before-lambing	Lactation
2014		
11	1789±168	1954[b]±107
13	1836±168	1592[ab]±107
15	1479±168	1271[a]±107
2015		
11	881±31	777±36
13	952±31	727±36
15	989±31	686±36
2016		
11	728±100	797[b]±23.9
13	741±100	689[a]±23.9
15	722±100	689[a]±23.9

[ab] Values with columns and years with differing superscripts are significantly (P<0.05) different.

Table 2 The effect of stocking rate of singleton-rearing ewes in the lambing and lactation period (11, 13 and 15 ewes/ha) on ewe live weight (kg) and body condition score before-lambing and at weaning and lamb live weight (kg) at birth and weaning (mean ± SEM).

Stocking rate		Ewe live weight (kg)			Ewe BCS		Lamb live weight (kg)	
(ewes/ha)	n	Before lambing	n	Weaning	Before Lambing	Weaning	Birth	Weaning
2014								
11	25	56.6±0.9	23	53.7±2.1	2.5±0.3	2.8±0.3	5.1±0.3	24.3±1.5
13	31	56.0±0.9	28	50.4±2.0	2.5±0.3	2.7±0.3	4.8±0.5	23.4±1.4
15	35	57.1±0.9	29	51.7±2.1	2.5±0.3	2.7±0.3	5.1±0.2	24.1±1.5
2015								
11	29	77.1±1.1	23	77.6b±2.0	3.6±0.4	3.5±0.3	6.7±0.3	29.8±1.3
13	34	76.2±1.0	29	71.3a±2.0	3.3±0.3	3.3±0.3	6.5±0.4	28.0±1.3
15	35	76.8±1.0	31	69.5a±1.9	3.5±0.3	3.2±0.3	6.4±0.2	27.6±1.3
2016								
11	28	68.9±1.5	28	64.9b±2.6	2.9±0.3	3.3±0.3	6.1±0.2	28.8±0.9
13	32	70.0±1.4	30	58.3a±2.6	3.0±0.3	3.0±0.3	6.0±0.2	27.0±0.8
15	36	69.5±1.4	34	55.2a±2.6	3.2±0.3	3.0±0.3	6.0±0.2	28.2±0.7

[ab] Values with columns and years with differing superscripts are significantly (P<0.05) different.

adequate breeding weights are achieved. Interestingly, lamb live weights at weaning were not affected (P>0.05) by SR in any of the three years. This contrasts with previous findings (Sucking 1975; Smeaton et al. 1983; Trotter et al. 1975; McCall et al. 1984) regardless of pasture mass: the reason for this contrast is unknown. The present results suggest that the ewe can buffer the effects of higher SR on lamb live weight. This is most apparent in the ewe weaning weights observed 2015 and 2016. It would be of interest to determine if this affect is observed under differing pasture growth conditions and/or with different sized ewes. For example, if pasture growth which was not measured in the present study, was high in spring would the impact of higher SR, at low pasture covers, on ewe live weight be present? Further, it is possible that lighter ewes under the conditions experienced in 2015 and 2016, would be lesser affected by lower levels of feed availability due to lower maintenance requirements.

In conclusion, the present experiment found that singleton lamb live weight at weaning was not influenced by SR over the range of 11 to 15 ewes per ha. This may come at a cost to the ewe's live weight however, especially under restricted feeding conditions. Additional ewe nutrition post weaning would be required to recover this loss. Economic modelling is now required to determine the impact on whole flock productively of greater SR of singleton ewes during lactation to allow lower SR for multiple-bearing ewes.

Acknowledgements

We gratefully acknowledge Massey University for funding this work and the students of Taratahi Training College who collected the data as part of their practical and theoretical training.

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