BRIEF COMMUNICATION: Does feeding level of ewe lambs affect their response to vasectomised rams?

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Keywords: ewe lambs; hoggets; teasers; ram effect; reproduction; nutrition

Introduction

Exposure of ewe lambs (also known as hoggets or yearlings) to vasectomised rams (teasing) has increased breeding activity early in the breeding period in some but not all studies (Hudgens et al. 1987; Kemp et al. 1991; Ungerfled 2007; Cave et al. 2012; Kenyon et al. 2012, 2014). Additional effects reported include increased overall pregnancy rates and number of foetuses per ewe lamb (Kenyon et al. 2014). It would be of benefit if the cause of the variation among studies in the ewe lamb response to teasing could be identified.

In mature ewes, nutrition has been reported to influence the teasing response when it is used to advance the breeding season (Scaramuzzi & Martin, 2008). Therefore, the present study aimed to test the hypothesis that ewe lambs offered an unrestricted level of pastoral nutrition would have an enhanced response to teasing.

Materials and methods

The study was undertaken on the Massey University Keeble farm, 5 km south-west of Palmerston North, New Zealand (longitude 175° 36' 29.5740" E, latitude 40° 21' 8.3016" S). Two hundred and ninety five, eight-month-old Romney ewe lambs (35.5 ± 0.58 kg) which had been previously screened via serial progesterone analysis to ensure they had not reached puberty were used in the present study. On the 5th April 2011 (D1), the ewe lambs were weighed and then stratified by weight and allocated to one of four treatment groups. Group one, was kept away from all male sheep (approximately 1 km) and offered pastoral feeding conditions, with the aim of achieving a liveweight change of 0 to 0.1 kg/d (ControlLow, n = 73). Group two, was also kept away from males, but the ewe lambs were offered ad-libitum pastoral feeding conditions to achieve liveweight gains in excess of 0.2 kg/d (ControlHigh, n = 75). Group three, was joined with three vasectomised Cheviot rams (teasers) and offered pastoral feeding conditions with the aim of achieving a liveweight change of 0 to 0.1 kg/d (TeasedLow, n = 74). Group four, was also joined with three teaser Cheviot rams but ewe lambs were offered ad-libitum pastoral feeding conditions with the aim of achieving liveweight gains in excess of 0.2 kg/d (TeasedHigh, n = 73). Ewe lambs remained in these groups for 17 days (D1 – D17). Under ryegrass white clover grazing conditions lamb growth is unrestricted at pasture masses greater than 1500 kg DM/ha (Kenyon & Webby 2007). Therefore the aim of the High nutritional treatments were to keep pasture masses above 1500 kg DM/ha. In contrast the Low feeding treatments aimed to have pre-grazing masses below 1500 kg DM/ha.

On D18, the four groups were weighed before being joined together and bred with four mature intact Cheviot rams fitted with crayon harnesses, for a 17-day period (D18 - D34). During this period, the presence of crayon marks (an indicator of breeding and oestrus) on the rumps of the ewe lambs was recorded daily. On D35, the crayon colour was changed and the rams remained with the ewe lambs for a further 17 days (D35 – D52). Crayon marks were used to determine the breeding pattern of ewe lambs. During D52 to D101 all ewe lambs were managed as one group under commercial conditions and pregnancy diagnosed on D101.

Herbage measurements

The ewe lambs grazed a predominantly ryegrass, white clover sward mix. Pre- and post-grazing herbage masses were recorded each time the ewe lambs were moved during the periods D1 – D17 and D18 – 34 with a rising plate meter (Ashgrove Pastoral Products, New Zealand, 50 readings per paddock).

Statistical Analysis

Liveweight data were analysed using analysis of variance, in the generalised linear model procedure of the statistical package Minitab 13.1 (Minitab Inc, Pennsylvania, USA). In all the models, ewe-lamb group was fitted as a fixed effect.

The proportions of ewe lambs in each of the mating-performance and pregnancy categories were analysed as a binomial trait via logit transformation, using the SAS v5 (SAS Institute Inc, Cary NC, USA) procedure for categorical data modelling (GENMOD) with ewe lamb group as a fixed effect. To determine the number of fetuses identified at pregnancy diagnosis per ewe lamb presented for breeding, each ewe was categorised by the number of fetuses identified (0, 1 or 2) at diagnosis. The data was then analysed using the GENMOD procedure in SAS with ewe-lamb group as a fixed effect.

Results

Herbage masses

Pre- and post-grazing masses during D1 to D17 were lower (P < 0.05) in the ControlLow (1517 ± 58 and 1162 ± 54 kg DM/ha respectively) than the ControlHigh (1783 ± 43 kg and 1621 ± 40 DM/ha respectively) group. Similarly, pre- and post-grazing masses of the TeasedContol (1426 ± 50 and 1168 ± 50 kg DM/ha respectively) were lower than the TeasedHigh (1687 ± 50 and 1643 ± 47 kg DM/ha respectively).

Live weight

At D1 lamb groups did not differ (P > 0.05) in live weight. At D18, ControlHigh (39.5 ± 0.32 kg) and TeasedHigh (39.5 ± 0.33 kg) ewe lambs were heavier (P < 0.05) than both ControlLow (35.2 ± 0.33 kg) and TeasedLow (35.1 ± 0.33 kg) ewe lambs and remained heavier (P < 0.05) until D52 (data not shown). These differences are explained by lower (P < 0.05) liveweight changes per day in the ControlLow (-0.01 ± 0.02 kg/d) and TeasedLow (-0.02 ± 0.02 kg/d) ewe lambs during D1-18 compared to ControlHigh (0.23 ± 0.02 kg/d) and TeasedHigh (0.21 ± 0.02 kg/d) ewe lambs.

Breeding pattern

A greater proportion of TeasedHigh ewe lambs were marked during the first 17-days of breeding compared to all other groups (Table 1). While a greater (P < 0.05) proportion of ControlHigh were marked during both the first and second 17-days of breeding than TeasedLow ewe lambs. A greater (P < 0.05) proportion of TeasedLow ewe lambs failed to be marked during the entire breeding period compared to ControlHigh and TeasedHigh ewe lambs.

Pregnancy rate and number of fetuses per ewe lamb presented for breeding.

A greater (*P* < 0.05) proportion of TeasedHigh ewe lambs were pregnant to the first 17-days of

Table 1 The effect of ewe-lamb group (ControlLow, ControlHigh, TeasedLow, TeasedHigh) on ewe-lamb mating pattern (mean ± S.E. and back transformed percentage in parenthesis).

	n	Marked in the first 17-day period only	Marked in the second 17-day period only	Marked in both first and second periods	Not marked
ContolLow	73	-1.2a ± 0.28 (23.3)	-0.5 ± 0.24 (38.4)	-1.2ab ± 0.28 (23.3)	-1.7ab ± 0.37 (15.1)
ControlHigh	75	-1.2a ± 0.27 (24.0)	-0.8 ± 0.25 (30.7)	-0.6b ± 0.24 (34.7)	-2.1a ± 0.36 (10.7)
TeasedLow	74	-0.7a ± 0.25 (32.4)	-1.1 ± 0.27 (24.3)	-1.5a ± 0.30 (18.9)	-1.1b ± 0.27 (24.3)
TeasedHigh	73	0.2b ± 0.24 (54.7)	-2.4 ± 0.43 (8.2)	-0.9ab ± 0.26 (28.8)	-2.4a ± 0.42 (8.2)

[1] Data are presented as logit transformations with back-transformed percentages in brackets.
(a,b) Means within columns without a common letter differ (P < 0.05).

Table 2 The effect of ewe-lamb group (ControlLow, ControlHigh, TeasedLow, TeasedHigh) on ewe pregnancy rates to the first 17-days of breeding (D18-D34) and the entire breeding period (D18-D52) and numbers of foetuses identified per ewe-lamb presented for breeding (mean ± S.E. and back transformed percentage in parenthesis).

		Pregnancy rates		Number foetus per ewe lamb presented for breeding
	n	Pregnant to the first 17-days of breeding	Pregnant to entire 34 day period	
ContolLow	73	-2.4a ± 0.42 (8.2)	0.1 ± 0.23 (53.0)	0.69 ± 0.087
ControlHigh	75	-1.8ab ± 0.33 (14.7)	0.2 ± 0.23 (54.7)	0.76 ± 0.086
TeasedLow	74	-1.1bc ± 0.27 (25.7)	0.1 ± 0.23 (51.4)	0.68 ± 0.087
TeasedHigh	73	-0.7c ± 0.25 (32.3)	0.5 ± 0.24 (61.6)	0.77 ± 0.087

[1] Data are presented as logit transformations with back-transformed percentages in brackets.
(a,b) Means within columns without a common letter differ (P < 0.05).

breeding than ControlLow and ControlHigh ewe lambs (Table 2). A greater (P<0.05) proportion of TeasedLow ewe lambs were pregnant to the first 17-days of breeding than ControlLow ewes lambs.

Discussion

Liveweight gains during the teasing period did not differ between TeasedHigh and ControlHigh ewe lambs and were in excess of 0.2 kg/d. Under these conditions, TeasedHigh ewe lambs were more likely to be bred and be pregnant to the first 17 days of breeding. Liveweight gains during the teasing period did not differ between TeasedLow and ControlLow ewe lambs. Under these conditions TeasedLow ewe lambs were more likely to be pregnant in the first 17-days of breeding. Combined, these results indicate that teasing has the potential to increase the percentage of ewe lambs pregnant early in the breeding period under a range of nutritional/liveweight gain conditions. These results support previous studies which have indicated that the main advantage of teasing is an increase in the proportion of ewe lambs bred early (see review Kenyon et al. 2014).

TeasedHigh ewe lambs were more likely to be marked only in the first 17-days of breeding and less likely not to be marked at all, compared to TeasedLow ewe lambs. This suggests that gaining live weight in excess of 0.2 kg/d during the teasing period may have enhanced the teasing response in comparison to maintaining live weight. Although, the pregnancy rates to the first 17-days of breeding were numerically greater in TeasedHigh than in TeasedLow the difference was not statistically greater. This is the first study to evaluate the effect of liveweight gain on the teasing response in ewe lambs. It is unknown if a more enhanced response may have occurred with greater liveweight gains. Further, it is well established that heavier ewe lambs cycle earlier than lighter ewe lambs (Kenyon et al. 2014), thus it is possible that heavier ewe lambs may be less responsive to the combined effects of teasing and live weight gain.

In conclusion, the present results reinforced previous studies, which have shown that the main response from exposing ewe lambs to teasers is an increase in the proportion of ewe lambs pregnant early in the breeding period. The results also indicate that farmers should consider ensuring their ewe lambs are gaining live weight at approximately 0.2 kg/d, rather than maintaining it, to achieve a greater response from teasing. However, it is acknowledged that due to need to keep the treatment groups separate there is the potential for non-treatment factors to affect the results. Therefore further studies are required to confirm these findings. These studies should include a greater range of nutritional conditions and live weights.

Acknowledgements

Funding for this project was provided by Massey University and Beef + Lamb New Zealand. P.R. Kenyon is partially funded by the National Research Centre for Growth and Development.

References

Cave LM, Kenyon PR, Morris ST 2012. Effect of timing of exposure to vasectomised rams and ewe lamb body condition score on the breeding performance of ewe lambs. Animal Production Science 52: 471-477.

Hudgens RE, Martin TG, Diekman MA, Waller SL 1987. Reproductive performance of Suffolk and Suffolk-cross ewe and ewe-lambs exposed to vasectomised rams before breeding. Journal of Animal Science 65: 1173-1179.

Kemp RA, Lane SF, Berger YM 1991. Effects of shearing and prebreeding ram exposure on days to first marking and pregnancy rate in ewe lambs. Canadian Journal of Animal Science 71: 905-907.

Kenyon PR, Viñoles C, Morris ST 2012. Effect of teasing by the ram on the onset of puberty in Romney ewe lambs. New Zealand Journal of Agricultural Research 55: 283-291.

Kenyon PR, Thompson AN, Morris ST 2014. Breeding ewe lambs successfully to improve lifetime performance. Small Ruminant Research 118: 2-15.

Kenyon, P.R., Webby R.W 2007. Pastures and supplements in sheep production systems. In: Rattray PV, Brookes IM, Nicol AM. eds. Pasture and supplements for grazing animals. Occasional Publication No. 14. New Zealand Society of Animal Production, Hamilton, New Zealand, Pg. 151-172.

Scaramuzzi RJ, Martin GB 2008. The importance of interactions among nutrition, seasonality and social-sexual factors in the development of hormone-free methods for controlling fertility. Reproduction of Domestic Animals 43 (Suppl. 2): 129-136.

Ungerfeld R. 2007. Social factors affecting ovarian function. In Gonzalez-Bulnes A. ed. Novel Concepts in Ovarian Endocrinology ISBN: 978-81-309-0. Transworld Research Network, Kerala, India. Pg. 169-221.