Hogget mating in New Zealand - a survey

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ABSTRACT

Currently less than 30% of all hoggets are presented for mating in New Zealand. This would suggest that there are a number of disadvantages to this management practise. However to date it has not been accurately established what farmers perceive as the disadvantages of hogget mating and the relative importance of each of these disadvantages. A questionnaire was sent to New Zealand sheep farmers which asked a series of questions regarding farm type, size, farm class, flock type, flock size and the intended use of hogget mating in 2002 and its use in the past. Those farmers who were not intending to mate hoggets in 2002 were also asked to indicate the importance, on a scale of 1–4, of 11 stated reasons for not hogget mating. A total of 1981 questionnaires were returned and used in the present study from a total of 14,000 sent to farmers. Descriptive analysis indicated negative effects on two-tooth performance and lack of additional feed were the two main reasons for not mating hoggets. The least important variables were lack of experience and the need for extra rams/teasers. The intended use of hogget mating differed based on farm class, farm size, ewe flock size and farm and flock type. Farmers were more than twice as likely to mate hoggets in 2002 if they had a mixed-bred flock in comparison to a straight-bred flock and more than twenty times more likely to mate hoggets in 2002 if they had mated hoggets in previous years. This study indicates that farmers perceive impaired two-tooth performance as a major reason for not hogget mating, even though research to date would indicate this is not that case. Therefore either improved technology transfer is required or the effects of hogget mating on two-tooth performance need to be re-visited.

Keywords: hoggets; survey; disadvantages; mating.

INTRODUCTION

Historically in New Zealand ewes are first mated at 19-20 months of age (as a 2-tooth) despite the fact many reach puberty at 6-8 months of age and have the potential to be successfully mated at this stage. Often stated advantages of hogget mating include; additional lambs and higher net profit (Tyrrell, 1976; Hight, 1982; Gavigan & Rattray, 2002), increased efficiency (Tyrrell, 1976; McCall & Hight, 1981), improved lifetime performance (Drymundsson, 1973; McCall & High, 1981; Gavigan & Rattray, 2002), improved fertility level throughout the flock (Gavigan & Rattray, 2002), higher utilization of spring feed (Gavigan & Rattray, 2002) and increased genetic gain (Baker *et al*., 1978; Hight, 1982). Given these advantages a high utilization rate of hogget mating in the New Zealand sheep flock might be expected. However, estimated numbers of ewe hoggets presented for mating was 2.38 million out of a total hogget population of 8.06 million hoggets in 2002 (MAF, 2003), suggesting for most farmers disadvantages must outweigh advantages.

Stated disadvantages for hogget mating include; the risk of creating poor performing two-tooths (Keane, 1974; Gavigan & Rattray, 2002), extra feed demand in winter (Hight, 1982; Gavigan & Rattray, 2002), higher death rates in lambing hoggets (Gavigan & Rattray, 2002), reduced hogget wool production (Tyrrell, 1976; McMillan & McDonald, 1983; Gavigan & Rattray, 2002), extended lambing period (Hight, 1982; Gavigan & Rattray, 2002), higher animal health costs (Gavigan & Rattray, 2002), additional ram requirements (Gavigan & Rattray, 2002), increased farmer workload (Gavigan & Rattray, 2002) and the potential for smaller, less marketable lambs born to hogget's (Hight, 1982; Gavigan & Rattray, 2002). However, the relative importance of these from a farmer's perspective is not known. Knowledge of this should, firstly, identify where appropriate technology transfer is not being undertaken if there are known means to alleviate these constraints and secondly, direct future research to where it is required.

The aims of this survey were to firstly, determine the main reasons farmers have for not hogget mating and secondly, characterise those farmers who are most likely to utilize hogget mating.

MATERIALS AND METHODS

Survey participants

The questionnaire was sent in conjunction with the "Wool grower magazine, Autumn 2002", produced by WoolPro New Zealand, to 14,000 subscribers on the Meat and Wool Innovation (MWI) database which includes

livestock farmers of all kinds and others with an interest in sheep production and marketing in New Zealand.

Questionnaire

The questionnaire was designed to gather information on farm type (ram breeding or commercial), farm size, Meat and Wool Innovation Economic Service (MWIES) farm class (farm class) (MWEIS, 2003), ewe flock type (straight-bred vs. mixed-bred (individual ewes of more than one genotype)), flock size and hogget mating information. Farmers not intending to mate hoggets in 2002 were asked to indicate the importance (on a scale of 1 – 4 (1 = no importance, 2 = little importance, 3 = important, 4 = very important) of 11 stated reasons (negative effects on two-tooth performance, lack of additional feed, increased work load, inability to reach target mating weights, poor weaning weights of lambs born to hoggets, returns do not justify costs, negative effects on hogget wool, poor reproductive performance in hoggets, difficult births, lack of experience, extra ram/teaser requirements) for not hogget mating. Farmers were also given the opportunity to list any other reasons they felt were important when the decision was made not to mate hoggets. A total of nine questions were asked in the four-page questionnaire.

Data analysis

A total of 2,187 responses were obtained. Data were entered into a custom designed Microsoft 97 Access® database for subsequent manipulation and analysis. The design of the questionnaire allowed only for aggregated answers at the farmer level and did not allow separation of details to each of multiple land parcels for those farmers who were responsible for more than one land parcel. Analysis of questions relating to farm size, farm class, farm location, or flock size were restricted to those respondents with single land parcels. Respondents were classified as ram breeders or commercial farmers based on their response to the question on whether they bred stud rams.

Results for the number of farmers who intended to mate hoggets within each; farm class, farm type, farm size, flock size and flock type are presented as proportions of valid responses with 95% confidence intervals (Altman *et al*., 2000).

A multivariable logistic regression model (SAS, 1985) was used to identify significant variables for determining likelihood of hogget mating. Variables tested included; farm type, flock type, farm size, farm class, flock size and previous experience with hogget mating. A backwards stepwise model building approach was used and only significant main effects retained in the final model using a wald statistic threshold p-value of 0.05 for significance. The average importance value for the 11 stated reasons for not mating hoggets in 2002 was determined and a 95% CI calculated.

RESULTS

A total of 1981 (14% of questionnaires distributed) questionnaires were used in the present analysis. Fifty-four percent of respondents indicated that at least some of their hogget's would be presented for mating. Farmers in the North Island indicated they were more likely to mate hoggets than those in the South Island (Table 1). Within the farm class types the lowest intended rates of hogget mating occurred on South Island hill country and South Island high country farms. Hogget mating was more likely to occur on farms with flock sizes between 2501-5000 ewes than those with smaller numbers or 7500-10,000 ewes.

The proposed use of hogget mating tended to be higher on commercial farms than on ram breeding rams. Within commercial farms, mixed-bred flocks were more likely to be hogget mated than straight-bred flocks (70.8 vs. 41.4%, data not shown) whilst rates tended not to differ on ram breeding farms (55.3 vs. 46.2%). The incidence of previous use of hogget mating (on at least one occasion) did not differ between commercial and ram breeding farms (66.2 vs. 59.8%). Within commercial farms, mixed-bred flocks were more likely to have mated hoggets in the past than straight-bred flocks (79.3 vs. 54.6%) with no such difference evident on ram breeding farms. The two highest ranked reasons for not hogget mating were the perceived negative effects on two-tooth performance and a lack of feed while the two least important reasons were lack or experience and extra ram/teaser requirements (Table 2). The three most common alternative reasons given for not hogget mating were reduction in lifetime performance (n = 46), breed type not suitable (n = 27) and land type not suitable (n = 18). The only two significant ($P<0.05$) variables for determining the likelihood of hogget mating in 2002 were flock type and previous experience with the technique (Table 3). Farmers were 2.38 times more likely to be mating hoggets if they had mixed-bred flocks and 21.2 times more likely if they had undertaken hogget mating in the past.

DISCUSSION

This study suggests approximately 54% of New Zealand farmers intended to utilize the hogget mating technique with at least some of their hoggets in 2002. Recent data suggests that less than 30% of individual hoggets are mated (MAF, 2003) which would indicate that either on many farms only a proportion of hoggets are presented for mating or that farmers who intended to mate hoggets in 2002 were more likely to respond to this survey. This is a potential limitation of a survey of this kind with a low response rate of only 14%.

TABLE 1: The effect of a number of farm variables on the likelihood of hogget mating in 2002 (Mean ± 95% confidence intervals (CI)).

Variable	(n)	Likelihood of hogget mating 2002	95% Cl
Location			
North Island	1001	0.573	0.543 – 0.604
South Island	926	0.504	0.471 – 5.35
Farm class			
South Island high country	32	0.094	0.032 – 0.242
South Island hill country	175	0.314	0.250 – 0.386
North Island hard hill country	112	0.438	0.349 – 0.530
North Island hill country	667	0.580	0.542 – 0.617
North Island intensive finishing farm	223	0.614	0.549 – 0.676
South Island finishing-breeding farm	455	0.582	0.537 – 0.627
South Island intensive finishing farm	74	0.608	0.494 – 0.711
South Island mixed finishing farm	189	0.524	0.453 – 0.594
Farm size (ha)			
0 – 50	75	0.453	0.346 – 0.566
51 – 100	90	0.456	0.357 – 0.558
101 – 200	284	0.570	0.512 – 0.627
201 – 500	846	0.565	0.531 – 0.598
501 – 1000	408	0.574	0.525 – 0.621
1001 – 2000	138	0.471	0.390 – 0.554
2001 – 5000	59	0.339	0.231 – 0.466
5001 – 7500	14	0.214	0.076 – 0.476
7501 – 10000	5	0.200	0.036 – 0.624
10001 -	8	0.250	0.071 – 0.591
Ewe flock size			
0 – 500	332	0.473	0.420 – 0.527
501 – 1000	234	0.462	0.399 – 0.506
1001 – 2000	506	0.482	0.439 – 0.526
2001 – 2500	258	0.554	0.493 – 0.614
2501 – 5000	475	0.674	0.630 – 0.714
5001 – 7500	74	0.608	0.494 – 0.711
7501 – 10000	22	0.409	0.233 – 0.613
10001 -	17	0.824	0.590 – 0.938
Farm type			
Commercial	1725	0.548	0.524 – 0.571
Ram breeding	202	0.470	0.403 – 0.539
Flock type			
Straight-bred	938	0.421	0.390 – 0.453
Mixed-bred	898	0.747	0.718 – 0.775

TABLE 2: Mean importance score for contributory reasons influencing a decision not to mate hoggets. Data expressed as mean and 95% confidence interval and derived from 15,168 responses from 1,981 farmers (1 = no importance, 2 = little importance, 3 = important, 4 = very important).

	n	Mean	95% CI
Negative effects on 2-tooth performance	1349	3.03	2.960 – 3.098
Lack of extra feed for additional stock class	1387	2.89	2.815 – 2.963
Increased workload	1392	2.43	2.354 – 2.509
Inability to reach hogget mating weights	1366	2.41	2.332 – 2.486
Poor weaning weights of lambs born to hoggets	1348	2.37	2.295 – 2.437
Returns do not justify costs	1386	2.27	2.198 – 2.344
Negative effects on hogget wool	1352	2.20	2.128 – 2.275
Poor reproductive performance from hoggets	1387	2.20	2.130 – 2.267
Difficult births	1403	2.19	2.115 – 2.264
Lack of experience	1387	1.55	1.498 – 1.608
Extra ram/teaser requirements	1411	1.42	1.372 – 1.473

TABLE 3: Results of logistic regression analysis of factors associated with the likelihood of hogget mating in 2002, presented as odds ratio (OR) ± 95%CI

Variable	Category	P value	OR (95% CI)
Breed			
	Straight-bred	-	1
	Mixed-bred	<0.0001	2.38 (1.87-3.02)
Previous experience			
	No	-	1
	Yes	<0.0001	21.22 (16.08-21.22)

Intended use of hogget mating was not restricted to within a particular farm classes, farm size or flock size although intended use was higher on certain farm classes and on farms smaller than 2000 ha. South Island high country, South Island hill country and North Island hard hill country had the lowest intended rates of hogget mating. These classes of farms have the greatest percentage of 'steep' classed country and the lowest stocking rates and lambing percentages (MWIES, 2003). Therefore it is not surprising hogget mating is not greatly utilized when the performance of adult stock is impaired on this class of land. These farm classes also tend to have the largest sized farms on average (MWIES, 2003).

The intended use of hogget mating was lower on ram breeding than on commercial farms although from a genetic gain point of view it is advantageous to hogget mate (Baker *et al*., 1978; Hight, 1982). It is probable that on some ram breeding farms young ewes are not selected as replacements until after hogget live weight and wool quantity and quality data has been collected, which occurs after the hogget mating period.

In the preset study on commercial farms and to a lesser degree on ram breeding farms, mixed-bred ewe hoggets were more likely to be mated than straight-bred hoggets and, in addition, the logistic regression analysis indicated that mixed-bred hoggets were more likely to be mated than straight-bred hoggets. To achieve high lambing percentages from hogget mating a significant proportion of hoggets must have reached oestrus either before or during the mating period and be displaying relatively high ovulation rates. Meyer & French (1979) showed that cross-breeding, using nine breeds, in comparison to straight-bred Romneys increased both the percentage of hoggets achieving oestrus within the mating period and number of oestrous cycles. They also reported higher ovulation rates in Finn-Romney cross hoggets in comparison to straight-bred Romneys. Cross-breeding has also been shown to increase both fertility and fecundity in mature ewes (Meyer, 1979; Clarke, 1982). Moore *et al*. (1983) reported no difference in reproductive performance between Romney, Coopworth and Perendale hoggets. These findings suggest that hogget mating is more suited to mixed-bred animals in comparison to traditional breed types.

The perceived negative effects of hogget mating on two-tooth performance was the most important reason for not intending to mate ewe hoggets. Hogget mating has been shown to reduce two-tooth live weight (Keane, 1974; Tyrrell, 1976; Baker *et al*., 1978; Baker *et al*., 1981; McMillan & McDonald, 1983) and fleece weight (Baker *et al*., 1981, McCall and Hight, 1981; Moore *et al*., 1983) although these have tended to recover by 4-tooth age (Baker *et al*., 1981). Conversely, hogget mating has either had no effect (Keane, 1974, 1976; Tyrrell, 1976; Moore *et al*., 1983) or a positive effect (Baker *et al*., 1981; Craig, 1982; McCall & Hight, 1981; McMillan & McDonald,

1983) on two-tooth reproductive performance. Given the lack of a negative effect on two-tooth reproductive performance in the study of Keane (1974) where a 7 kg difference in mating weight was observed it is probable that farmers need not be overly concerned with lighter two-tooth weights at mating. This may warrant further investigation with modern genotypes.

The second most important reason for not hogget mating was the lack of additional feed for the extra class of stock. It is well established that well grown hoggets at mating achieve higher reproductive performance (Meyer & French, 1979; Moore *et al*., 1978). Thus the hogget mating system requires a high level of feeding from birth. In addition, Stevens (2001) reported that hogget lamb losses declined by 3% per kg gain in hogget live weight during pregnancy over the range of 4 to 10 kg gain indicating the importance of nutrition during pregnancy. Gavigan & Rattray (2002) have calculated that the mating 1000 ewe hoggets, achieving a lambing percentage of 76.5% required an additional 25,651 KgDM in comparison to a non-mated group. These pre-mentioned studies indicate to achieve high performance form a hogget mating system a significant amount of additional feed is required, which based on the findings of the present study is a limiting factor to many New Zealand sheep farmers. It is also probable that by increasing the feed available to mated/lambing hogget's the production levels of other enterprises would be reduced.

CONCLUSION

More than half of the respondents in the present study indicated they intended to mate hoggets. Those respondents least likely to mate hoggets were from the larger farm classes and from larger sized farms in general. Commercial farmers with mixed-bred flocks were more likely to mate hoggets than their counterparts with straight-bred flocks, presumably due to higher performance achieved with these mixed-bred animals. The two main reasons farmers had for not intending to mate hoggets were the perceived negative effects on two-tooth performance and lack of additional feed. However research to date would suggest that while hogget mating may hinder two-tooth live weight, reproductive performance is not impaired. Either more research is required to examine the effects of hogget mating on two-tooth performance in modern genotypes or improved technology transfer is required.

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