**Prime lamb production from grazed grass – effects of ewe genotype, whether joined to lamb at 1 year and ewe age on the pattern of exit from flock up to 9 years of age**

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**Application:** Retaining ewes for more than 6 years results in reduced lamb output, higher ewe mortality and an increased incidence of culling.

**Introduction:** Data from the National Farm Survey show that mean replacement rate on lowland farms in Ireland is 22% whilst ewe productivity has remained relatively static (~1.3 lambs weaned per ewe joined) for the last ~40 years. Replacement ewes represent a major cost in prime-lamb production and Keady (2014) reported that the mean cost, nationally, of producing a replacement ewe, when joined for the first time at ~19 months, equated to approximately 25% of the value of her lifetime lamb-carcass output. Since sheep-meat production costs are attributable primarily to the ewe, production costs per lamb can be reduced by increasing the number of lambs produced per ewe lifetime by joining replacements to lamb at 1 year and avoiding non-essential culling. Ewe genotype is a key determinant of ewe productivity (Hanrahan 2001, Keady and Hanrahan 2019). Currently, 66% of lowland ewes in Ireland have been sired by one of the two main terminal sire breeds (Suffolk and Texel) (Keady et al. 2019), both of which have inherently low productivity (Hanrahan 2001). The Belclare breed was developed from a range of genetic resources (Hanrahan 1989), has a litter size of approximately 2.2 under typical on-farm management conditions, and currently represents the sire of 9.5% of ewes in lowland flocks (Keady et al., 2019). Hanrahan (2001) reported that the number of lambs reared per ewe joined was 0.21 higher for ewes having Belclare sires than crossbred ewes sired by the Suffolk breed. The aim of the current study was to evaluate lifetime patterns in the causes of ewe exit from a flock managed without voluntary culling until 9 years of age, and representing ewes of different genotypes that were first joined as ewe lambs or at 1.5 years of age.

**Material and methods:** A total of 424 ewes [157 Belclare (B), 114 B×Suffolk (B×S), 153 >75%S; 2 cohorts] were joined annually, with Charollais rams, starting at 19 months of age. A random 50% of each genetic group had been joined at ~7 months and 85% had produced lambs at 1 year. Ewes only left the flock when culled for physical reasons (e.g., udder and mouth issues, or poor body condition) or when they died. All ewes were shorn at housing in early December (group pens of ~40) and offered grass silage *ad libitum* until lambing. During the 7 weeks prior to lambing ewes were offered concentrate supplement; the level depended on forage feed value and expected litter size (ultrasonic scanning). Ewes rearing singles or twins received no concentrate supplementation post lambing while those rearing triplets received concentrate (0.5 kg/d) for 5 weeks, and their lambs had access to concentrate (up to 300 g/head daily) until weaning. All lambs were managed as one flock between weaning and slaughter and offered grazed grass as the sole diet. All lambs were slaughtered prior to the end of the grazing season. The data were analysed using the MIXED, LOGISTIC and LIFETEST procedures of SAS, as appropriate.

**Results:** For the Belclare, B×S and >75%S ewes, the mean number of lambs reared/ewe-joined was 1.62, 1.69 and 1.34 (SE = 0.052) and mean age at exit from the flock was 4.6, 4.9 and 4.8 years (SE = 0.17), respectively. The reasons for culling are shown in Table 1, as a function of ewe age. The percentage of ewes that died was similar up to age 6 but increased thereafter (P < 0.05). The incidences of culling for mastitis/udder issues and poor body condition increased substantially after 7 years of age. As ewes aged the percentage culled for teeth (mouth) and lameness increased. Only 2.6% were culled for uterine prolapse (all prior to age 6). There was evidence for an effect of ewe genotype on the reason for culling: teeth accounted for a greater proportion of the culls of Belclare ewes compared with >75%S ewes (P < 0.10) while poor condition accounted for a significantly greater share of the disposals of >75%S ewes compared with Belclare (P < 0.05). There was no evidence for any difference between the disposal patterns when B×S was contrasted with the average of Belclare and >75%S ewes (i.e., heterosis). Age at first joining had no effect (P > 0.05) on output per ewe, age at culling or culling reason.

**Table 1.** Age and reason at culling (% of ewes joined)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Ewe age | | | | | | | All |
|  | 2 | 3 | 4 | 5 | 6 | 7 | 8+ |  |
| No. ewes joined | 424 | 372 | 294 | 219 | 142 | 101 | 57 | 1609 |
| Died | 4.0 | 6.2 | 2.0 | 3.6 | 4.2 | 8.9 | 14.0 | 18.2 |
| Mastitis/udder | 6.4 | 11.0 | 11.2 | 6.8 | 9.9 | 11.9 | 17.5 | 35.8 |
| Condition | 0.5 | 0.8 | 6.1 | 8.2 | 6.3 | 5.9 | 19.3 | 15.8 |
| Teeth | 0.2 | 0.3 | 4.4 | 13.7 | 4.9 | 17.8 | 24.6 | 19.8 |
| Feet | 0.0 | 0.3 | 0.3 | 0.0 | 2.1 | 5.9 | 5.3 | 3.3 |
| Prolapse | 0.7 | 1.3 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.6 |
| Other | 0.9 | 0.5 | 0.3 | 2.7 | 1.4 | 0.0 | 7.0 | 4.5 |

**Conclusion:** Mastitis/udder was the most prevalent reason for flock exit, followed by teeth, death and poor body condition. As age increased, more ewes were culled for teeth, condition and feet issues. Effects of genotype on reasons for culling were relatively minor and there was no evidence for any effect of age at first joining.

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