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Breeding ewe lambs successfully to improve lifetime performance☆

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ABSTRACT

Ewe lambs have the ability to be successfully bred at 7–9 months of age. Breeding ewe lambs has a number of advantages including increased profitability and lifetime reproductive performance. However due to low and variable reproductive performance and the potential for negative effects on future performance, most ewe lambs are not bred. This review compares the differences in reproductive performance between ewe lambs and mature ewes. In addition, it summarises the known effects of ewe lamb breeding on lifetime performance. It also focuses on factors affecting the success of ewe lamb breeding. Lastly, it outlines the optimal management of the ewe lamb to the weaning of her first lamb and to maximise her lifetime performance.

1. Introduction

Ewe lambs at 7–9 months of age have the potential to be successfully bred. However in many production systems such, as those in New Zealand, less than 40% of ewe lambs are bred to lamb at 12–14 months of age (Anonymous, 2013). While in Australia, less than 20% of non-Merino and less than 5% of Merino ewe lambs are bred (Curtis and Croker, 1985). If a ewe lamb can be successfully bred to lamb at one year of age, and rear lamb(s) successfully to weaning, there is the potential to increase profitability (Young et al., 2010) and lifetime reproductive performance (Kenyon et al., 2011). Additional advantages from breeding ewe lambs can also include: (1) increased feed demand in lactation, hence improving utilisation of additional herbage grown in the spring period, (2) an increase in total number of lambs born per farm per year and therefore greater income through the sale of additional lambs, (3) an early selection tool for ewe replacements, (4) more progeny born on farm, thereby increasing selection pressure for replacements, (5) a reduction in the generation interval through the selection of progeny born to ewe lambs, and (6) a reduction in greenhouse gas emissions per unit of product produced (Dyrmundsson, 1973; Tyrell, 1976; Baker et al., 1978; McCall and Hight, 1981; Hight, 1982; Gavigan and Rattray, 2002; Kenyon et al., 2004a; Hegarty et al., 2010; Kenyon, 2012).

However, given that the majority of ewes are not bred as lambs, there must be some limitations or disadvantages of this management technique that impede the use of ewe lamb breeding by farmers. Potential disadvantages include: (1) poor and variable reproductive performance, (2) an increase in feed demand, (3) greater live weight targets at a young age, (4) if not well managed, future live weight and productivity can be negatively affected, (5) progeny born to ewe lambs can display poorer survival and tend to be lighter at birth and weaning, (6) breeding at a young age can increase on farm costs, (7) breeding at a young age reduces management flexibility and can increase farmer workload, (8) mortality rates of pregnant/lactating ewe lambs can be

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higher than non-pregnant ewe lambs and (9) wool production can be reduced (Tyrell, 1976; McMillan and McDonald, 1983; Johnston et al., 1996; Gavigan and Rattray, 2002; Kenyon et al., 2004a; Kenyon, 2012).

The following review is in five parts. Firstly, it compares the reported differences in reproductive performance between ewe lambs and mature ewes. Secondly, it outlines the known effects of ewe lamb breeding on lifetime performance. Thirdly, it discusses factors affecting the success of breeding ewe lambs on the weaning of their lambs. Fourthly, it identifies management practices that maximise the performance of the ewe lamb and her progeny. Lastly, it briefly summarises the known long term effects of being born to a ewe lamb on lifetime productivity.

2. Comparison of reproductive performance of mature ewes and ewe lambs

Ewe lambs can display shorter less intense oestrus periods (Dyrmundsson, 1973; Edey et al., 1978; McMillan and Parker, 1981; Schick, 2001) and are less likely to seek and stand for the ram in comparison to mature ewes (Dyrmundsson, 1981; Smith and Knight, 1998) which has resulted in them being termed 'shy' breeders. This 'shy' breeding is illustrated by the results of Allison et al. (1975), who reported that ewe lambs need to be served by the ram on at least three occasions before 100% of ewe lambs actually have semen inside their reproductive tract. Keane (1976) reported that rams had more difficulty breeding with ewe lambs than mature ewes. Similarly, Davies and Beck (1993) suggested rams have a preference for mature ewes rather than ewe lambs, indicating ewe lambs and mature ewes should be separated for breeding. In support of this, Keane (1976) reported higher breeding performance in ewe lambs kept separate from mature ewes. A further issue with ewe lambs is the occurrence of oestrus without ovulation and ovulation without oestrus which can occur post puberty (Edey et al., 1977; Chu and Edey, 1978; Quirke, 1981). Ovulation (Quirke and Hanrahan, 1977; Davies and Beck, 1993; Beck et al., 1996; Mulvaney, 2011, Table 1) and conception/fertility rates (Keane, 1976; Smith and Knight, 1998; Annett and Carson, 2006) have also been reported to be lower in ewe lambs than mature ewes.

Post conception losses are usually greater in ewe lambs than mature ewes. Beck et al. (1996) reported higher rates of embryonic loss in ewes lambs between days 3 and 30 of pregnancy and Quirke and Hanrahan (1977) reported 33% and 73% of transferred embryos resulted in lambs born to ewe lambs and mature ewes respectively. Mulvaney (2011) reported more than twice the rates of reproductive loss, defined as the difference between ovulation rate and the number of fetuses in mid-pregnancy, in Romney ewe lambs compared to mature ewes. Quirke (1981) also stated that embryonic mortality in ewe lambs can be high and suggested that this loss was not due to a poorer uterine environment per se, but instead being due to poor quality of fertilised eggs. In support of this, Quirke and Hanrahan (1977) reported cleaved ova from ewe lambs had less than half the survival rate than those from mature ewes. McMillan and McDonald (1985) also reported fertilised ova from ewe lambs were less likely to survive than those from mature ewes which they believed was an important factor for the lower fertility observed in this age group. Lower progesterone concentrations in ewe lambs compared to mature ewes between days 14 and 30 of pregnancy (Davies and Beck, 1993) might contribute to reduced embryo survival observed in these other studies. The combined effects of lower ovulation rates, poorer breeding behaviour and increased rates of ova and embryo loss result in lower reproductive rates in ewe lambs compared to mature ewes (Donald et al., 1968; Forrest and Bichard, 1974; Mulvaney, 2011).

There are few data available on the comparative loss of fetuses in the latter half of pregnancy in ewe lambs and mature ewes. Mulvaney (2011) reported no difference in fetal loss rates between ewe lambs and mature ewes, whereas in an embryo transfer study, fetuses derived from embryos collected from ewe lambs were less likely to survive to term than those from mature ewes (Ptak et al., 2003). However, there is increased farmer and veterinary evidence in New Zealand suggesting that ewe lambs are more likely to lose fetuses in late pregnancy than mature ewes. Some potential reasons for this are discussed later in the review.

Litter size at birth is not only smaller in ewe lambs compared to mature ewes, but their lambs are also lighter and display lower survival rates (Donald et al., 1968; Dyrmundsson, 1973; Atta and El Khidir, 2005; Annett and Carson, 2006; Morel et al., 2010; Mulvaney, 2011). It has been reported that ewe lambs can display poorer maternal behaviour (Atta and El Khidir, 2005; Mulvaney, 2011), which could negatively impact on their lambs survival, although some refute this and indicate ewe lambs can be very good mothers (Dyrmundsson, 1973). Annett and Carson (2006) reported that lambs born to ewe lambs had lower IgG concentrations 24–36 h post birth than those born to mature ewes, which are also likely to impact on lamb survival. Snowder et al. (2001) using milk scores as a proxy measure for milk production showed that ewe lambs had lower milk production than older ewes and their lambs were lighter at weaning. The combined effects of lower litter sizes at birth and poorer lamb survival is that fewer lambs are weaned per ewe presented for breeding in ewe lambs compared to mature ewes (Donald et al., 1968; Dyrmundsson, 1973; Mulvaney, 2011).

3. Potential long term consequences for the young dam of breeding to lamb at 12 months of age

There are conflicting reports in the literature on the long term impacts of ewe lamb breeding. It has been reported that ewe lamb breeding can have a negative impact on live weight at the subsequent breeding, although this effect is often relatively small (Keane, 1974; Tyrell, 1976; Baker et al., 1981; McMillan and McDonald, 1983; Kenyon et al., 2008c). The potential for ewe lamb breeding to negatively affect rebreeding performance is greater if a large negative impact on rebreeding live weight occurs; however, any negative impact on live weight from breeding as a ewe lamb does not persist past the weaning of the second litter of lambs (Dyrmundsson, 1973; Kenyon et al., 2011). Similarly, while ewe lamb fleece weight can be reduced by pregnancy