Applied Animal Behaviour Science xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

Applied Animal Behaviour Science

journal homepage: www.elsevier.com/locate/applanim

The sucking behaviour and milk intake of one- to three-week-old triplet lambs during natural and competitive suckling situations

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ARTICLE INFO

Article history:
Received 21 October 2015
Received in revised form 10 March 2016
Accepted 10 April 2016
Available online xxx

Keywords:
Sheep
Lambs
Triplets
Sucking
Behaviour
Milk intake

ABSTRACT

Within triplet litters, light-born lambs are at greater risk of dying than heavier lambs in the first week of life. However, the implications of within-litter differences in sucking behaviour for milk intake and growth beyond the first week are unclear. We hypothesized that within litter, triplets born lightest would still be lightest at one to three weeks of age, that these lambs would have lower milk intake than heavier lambs, and that differences among lamb ranks (heaviest, medium, or lightest-born in litter) would be exacerbated in a competitive situation. Triplets in 10 litters were ranked according to birth weight and their sucking behaviour measured in two situations when they were 8–17 days old. In the morning session, undisturbed behaviour was recorded for 100 min, after which the lambs were separated from the ewe for four hours. They were then returned to the ewe and competitive sucking behaviour was recorded for 15 min. Measures of live weight and abdominal girth were taken before and after each observation period to estimate milk intake. At 8–17 days of age, the lightest-born lambs were still lightest but the medium and heavy born lambs no longer differed in live weight ($P = 0.002$). During the undisturbed period, heavy-born lambs sucked less often ($P = 0.026$) and for less time overall ($P = 0.007$) but gained similar live weight to their lighter siblings ($P = 0.299$), indicating that they were more efficient at extracting milk. In the competitive session, light-born lambs tended to gain less live weight ($P = 0.086$) and competed with the medium-born lambs for the teat not preferred by the heavy lambs ($P = 0.0005$). These observations indicate that heavy-born lambs are efficient feeders, that medium-born lambs work harder to achieve the same milk intake, and that light-born lambs achieve lower milk intakes, contributing to their persistently lower weight. Thus, management strategies such as fostering or supplemental feeding should be focussed on the lightest-born triplets.

1. Introduction

Improved lambing percentage has been the greatest contributor to increased profit from sheep farming in New Zealand (Geenty, 1997; Morris and Kenyon, 2014), particularly as the value of lamb has continued to rise over the last four decades (Morel et al., 2008). To this end, many sheep breeders have increasingly focused on selecting ewes for fecundity, resulting in a 30% increase in the national lambing percentage since 1960 (Morel et al., 2008; Morris and Kenyon, 2014). This increase is due to a greater percentage of ewes delivering twins and triplets.

However, neonatal mortality of lambs is higher for triplet litters than for single or twin litters (Dwyer, 2003; Dwyer and Lawrence, 2005; Everett-Hincks and Dodds, 2008), and triplet litters require considerably more attention for farmers to realize their production potential (Everett-Hincks and Dodds, 2008). The production of larger litters, if followed by higher lamb mortality, is unacceptable, from both economic and animal welfare perspectives (Nowak, 1996; Everett-Hincks et al., 2005; Ferguson et al., 2014).

Lamb birth weight is the primary risk factor for mortality during the first three days after birth, with smaller, lighter lambs at greater risk of dying due to starvation and/or hypothermia during this critical neonatal period (Nowak and Poindron, 2006; Stafford et al., 2007; Dwyer, 2008; Morel et al., 2008). Triplet lambs are born smaller and lighter than twin and single lambs (Stafford et al., 2007) due to competition for nutrients among fetuses in the same uterine horn (Everett-Hincks et al., 2005). After birth, triplet lambs

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http://dx.doi.org/10.1016/j.applanim.2016.04.009
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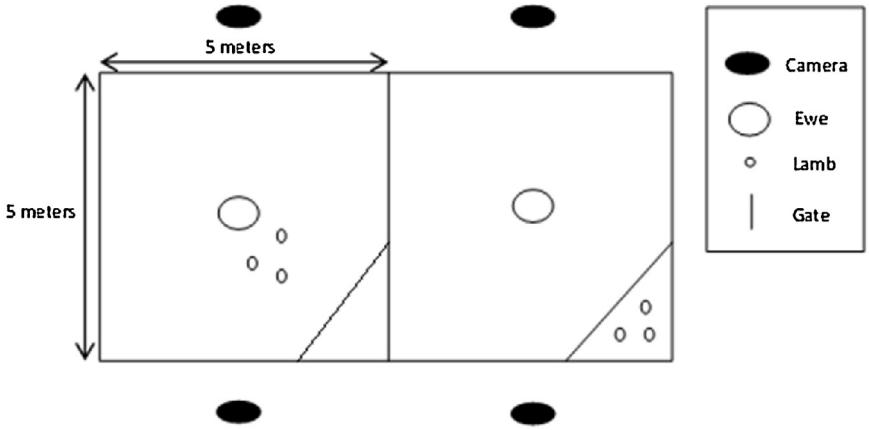

Fig. 1. Observation pens for the sucking behaviour test, including the location of lambs and ewe. Left pen shows set up for morning and afternoon observation periods. Right pen shows set up during 4 h separation prior to afternoon competitive observation period.

must also compete for an inadequate milk resource, both in terms of volume and because milk can be accessed by only two lambs at any given time (Everett-Hincks et al., 2005). The inadequacy of milk volume is largely due to the fact that the ewes' milk production does not increase proportionally to increased litter size (Hutton et al., 2011) and is reflected in the fact that triplet lambs grow more slowly than single and twin lambs (Morris and Kenyon, 2004). Thus triplets face a greater risk of mortality within the critical neonatal period (Dwyer and Lawrence, 2005; Everett-Hincks and Dodds, 2008).

Within triplet litters there is significant variation in lamb birth weight (Everett-Hincks et al., 2005), and triplets differ in terms of their behaviour, milk intake and survival, such that lambs born lighter are at greater risk of dying within the first three days of life (Dwyer and Lawrence, 2005; Morel et al., 2008). Importantly, lighter lambs are less vigorous and slower to suck for the first time than their heavier siblings (Dwyer, 2008). This reduced sucking behaviour indicates that the lightest-born lamb receives less colostrum and milk in the early neonatal period, further predisposing it to infection and starvation-exposure during this period (Dwyer, 2008).

For those triplet litters in which all three lambs survive, differences in sucking behaviour and milk intake appear to persist after the critical neonatal period. For example, wide variation in milk intake within triplet litters has been reported up to nine weeks of age, with an average 24% difference between the lambs with the greatest and least intake (Hinch, 1989). Within twin litters, higher mortality and slower growth rate of the lighter-born lamb persists up to weaning (Schreurs et al., 2010). This results in lower weaning weights, making it less likely that these light-born lambs will be kept as replacement ewes, and an overall decrease in flock efficiency (Thomson and Muir, 2009). However, there has been no research on the competitive behaviours of triplet-born lambs, and the implications of within-litter differences in sucking behaviour for milk intake and growth beyond the critical neonatal period remain unclear (Hinch, 1989; Kerslake, 2010). Specifically, it is not known whether the lightest-born triplets have persistently lower milk intakes than their heavier-born siblings. If so, this would suggest an untapped potential for growth in the lightest-born triplet lambs and possible production improvement through intensive management.

Measuring sucking behaviour as an estimate of milk intake is simple, cheap and non-invasive, and Cimen (2007) reported a positive relationship between sucking behaviour and milk intake in sheep. However, more direct indicators of milk intake, such as weight and abdominal girth gain should also be measured (Cimen, 2007).

The aim of this study was to determine whether differences in sucking behaviour and milk intake persist beyond the critical neonatal period within triplet litters in which all three lambs survive. We hypothesized that triplet lambs born lightest would still be the lightest lambs at 8–17 days old, that the lightest-born lambs would have lower milk intakes than the heavier lambs, and that differences among lamb ranks would be exacerbated in the competitive event.

2. Materials and methods

All procedures were conducted at the Massey University Keeble Farm, Palmerston North, New Zealand, with approval from the Massey University Animal Ethics Committee (Protocol Number 08/59).

2.1. Animals and general care

Twenty-eight triplet-bearing ewes were identified at the time of pregnancy diagnosis (50 days after breeding) using ultrasound scanning. The ewes were multiparous crossbreds: 50% Romney, 25% Texel and 25% Finnish Landrace. Lambs were sired by Romney rams. The first triplet litter was born on September 5th, 2008 and the last litter was born on September 29th. Of the 28 ewes identified as triplet-bearing, only 25 gave birth to triplets (Table 1). Of these, only 10 complete triplet litters survived to at least eight days of age (Table 1), and were therefore available for this study. The other ewes lost at least one lamb; either it was stillborn or died during the first seven days after birth.

According to normal New Zealand extensive husbandry practice, the sheep were kept outside and had access to water and pasture

Table 1
Lambs born to 28 ewes that were expected to have triplets.

Lambs	Number of ewes
Only 2 lambs born	3
One lamb born dead	8
Two lambs born dead	3
One lamb died within 7 days	2
Two lambs died within 7 days	2
Three lambs alive at 8 days of age	**10**
Total	28

The bold highlights the number of litters included in the study (those that survived to 8 days of age).

Please cite this article in press as: Van Welie, L.A., et al., The sucking behaviour and milk intake of one- to three-week-old triplet lambs during natural and competitive suckling situations. Appl. Anim. Behav. Sci. (2016), http://dx.doi.org/10.1016/j.applanim.2016.04.009