BRIEF COMMUNICATION: High milk production in milked sheep grazed in large flocks in New Zealand

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Introduction

There is a paucity of published information in New Zealand (NZ) sheep on milk production in commercial-scale dairy enterprises. Much of the early research involved small numbers of animals focused on traditional breeds, with the Dorset breed considered the most suitable dairy-type sheep (e.g., Geenty & Jagusch 1974). Importation of East Friesian sheep in the mid-1990s provided new opportunities for sheep dairying (Allison 1996). Since that time, there appears to be a limited number of papers published in NZ on the milking performance of animals of East Friesian origin (e.g., Newman & Steiffel 1999; Peterson et al. 2005).

Large-scale pastoral sheep-milk production based on East Friesian-cross ewes in NZ commenced less than a decade ago in Southland by Blue River Dairy (BRD). This initiative occurred despite very limited data available on the capacity of such ewes to produce high levels of milk when grazed in large flocks. This preliminary paper reports results from daily milk recording of a sample of high-milk-production East Friesian-cross ewes and hoggets milked twice a day for a minimum of 5-6 months in the BRD flock.

Materials and methods

A summary of animal management and milk recording procedures is available elsewhere (McMillan et al. 2014). Data in this paper are from animals provided with no preferential treatment within these flocks, with ewes and hoggets grazing together on pasture from lambing in mean flock sizes of 2,800 animals. This paper reports preliminary results using the daily milk records of spring-lambing high milk-yield ewes and hoggets milked twice a day from lambing for a minimum of 5-6 months. The data are from random samples of 150 ewes and 150 hoggets producing greater than 300 and 175 litres of total milk by Day 160 of lactation, respectively. Tests of statistical difference involved one-way analysis of variance, and regression procedures.

Results

Mean daily milk yields increase to peak production early in lactation followed by a steady decline to Day 160, with ewes and hoggets performing very differently (Figure 1). Mean (± standard error) daily peak milk production in ewes is 3.09 ± 0.20 litres at the end of Week 1 and remains within 10% of peak yield from Week 1 to Week 6 of lactation. In contrast, mean daily milk production in hoggets peaks almost 50% lower (1.66 ± 0.14 litres, $P < 0.001$) and occurs a month later during Week 5 of lactation, remaining within 10% of peak yield from Week 2 to Week 8.

Compared with ewes, milk production over lactation in hoggets is more persistent, as illustrated by the different rate of decline in daily milk yields from peak. Daily decline in mean milk yield from the peak until Day 160 of lactation is 0.015 ± 0.001 litres in ewes resulting in a mean daily milk yield of 0.89 ± 0.02 litres. The daily decline in milk yield in hoggets is approximately half that of ewes (0.007 ± 0.000, $P < 0.001$), resulting in a final daily yield of 0.69 ± 0.05 litres ($P < 0.001$).

Mean cumulative milk yield to Day 160 is higher in ewes compared with hoggets (325 ± 2 vs. 197 ± 2 litres, $P < 0.001$). In fact, cumulative milk yields are significantly higher ($P < 0.001$) on each day throughout lactation in ewes compared with hoggets (Figure 2). However, the advantage reduced from 93% higher on Day 30 to 63% higher by Day 160, a linear reduction of about 3 percentage units per fortnight ($P < 0.0001$) due to more persistent lactations in hoggets.

Discussion

Milk production performance in this study is consistently higher than in previously published studies in NZ. For example, compared with other East Friesian hoggets, cumulative milk production is 25-55% higher at 100-120 days of lactation (Allison 1996, Newman & Steiffel 1999). Spring-lambing Dorset ewes at Flock House, near Bulls township, produced only 116 litres of milk over 147 days of lactation (Gosling et al. 1997) compared with 310 litres to 147 days in the current study. Dorset ewes in Canterbury performed at a higher level than at Flock House producing 140 and 154 litres in 150 days (Geenty 1980; Geenty & Davison 1982). The differences will no doubt be due in part to different breeds, strains, and feeding levels and more particularly to the bias to higher-performing animals in this study.

There appears to be no published data on milk production in East Friesian-cross adult ewes in NZ milked twice daily, although periodic data in 7/8 East Friesian ewes with lambs at foot is available (Peterson et al. 2005). Estimated cumulative milk yield to Day

Figure 1 Commercial East-Friesian-cross mean daily milk yield to Day 160 of lactation in 150 ewes and 150 hoggets lambing in the spring (litres). Includes only ewes and hoggets producing at least 300 and 175 litres to Day 160, respectively. Standard error of mean daily milk yield is less than 0.07 and 0.06 for ewes and hoggets, respectively.

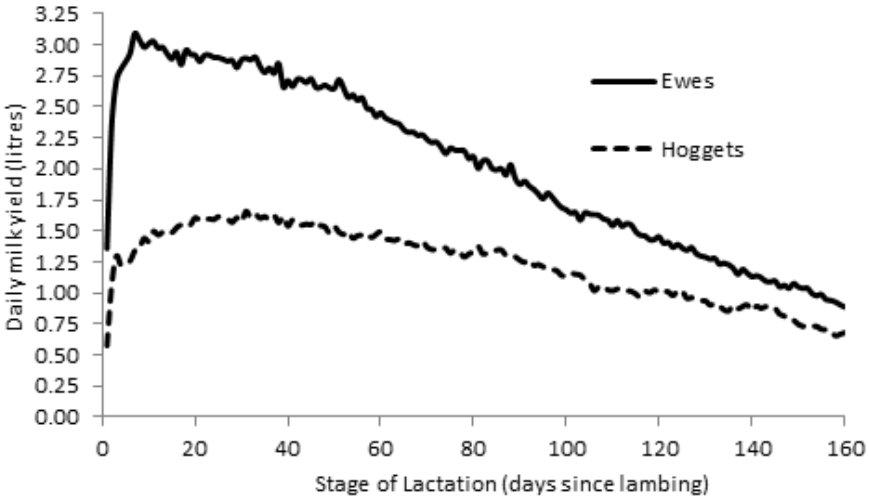
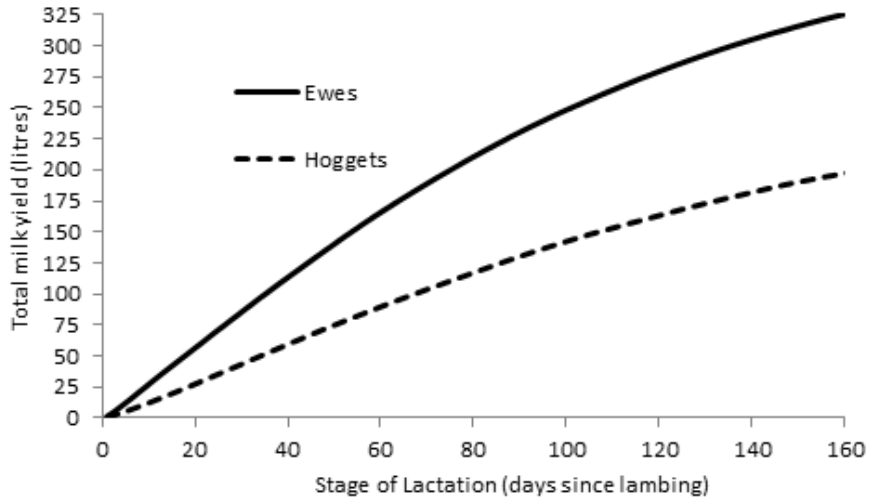


Figure 2 Commercial East-Friesian-cross mean cumulative milk yield to Day 160 of lactation in 150 ewes and 150 hoggets lambing in the spring (litres). Data includes only ewes and hoggets producing at least 300 and 175 litres to day 160, respectively. Standard error of mean cumulative milk yield on any day is less than 1.61 and 1.64 for ewes and hoggets, respectively.



63 in these oxytocin-treated ewes was 110-140 litres compared with 173 litres in ewes and 94 litres in hoggets over the same period in the current study. Peak daily milk yield in hoggets in the current study at 1.66 litres is considerably higher than the 1.30 and 0.95 litres apparent in well-fed East Friesian x Dorset and Dorset hoggets, respectively, at Flock House, (Newman & Steiffel 1999). Mean daily milk yield to Day 100 is also higher in the present study (1.42 vs. 1.10 vs. 0.86 litres, respectively). Of interest is the similar timing of peak daily milk production in East Friesian-cross hoggets in both studies. Compared with the 154 litres produced by hoggets in this study, young East Friesian-cross ewes in the USA produced only 109 litres from Day 30 to Day 160 of lactation, in part due to sucking lambs for a month (Thomas et al. 1999).

Suckling lambs full-time for a month is standard in dairy sheep systems, but not at BRD. Of interest are results from the USA indicating that suckling for 30 days results in harvested milk yield losses to Day 170-Day 180 of 35-40% (McCusick et al. 1999). Omitting milk produced in the first 30 or 60 days of lactation in this study suggests that suckling will lower yields by 20-25% or 45-50%, respectively. These losses in harvestable milk are commercially significant and suggest that low-cost alternative ultra-early weaning systems for lambs are required to lessen them.

In summary, results from this study demonstrate ewes and hoggets capable of sustaining mean daily milk yields in excess of 2.00 and 1.25 litres, respectively, for at least 6 months when grazing in large flocks. These performance levels appear higher than in many intensively managed small flocks overseas (Thomas 2001). The ewes in this report appear well adapted to NZ environments and form the foundation breeding stock for a successful NZ dairy sheep industry (McMillan et al. 2014).

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References

Allison AJ 1996. More opportunities with sheep - the East Friesian Breed and its relevance to the New Zealand sheep industry. Proceedings of the 26th Annual Conference of Society of Sheep and Beef

Cattle Veterinarians of the New Zealand Veterinary Association. Pg. 18-30.

Geenty KG 1980. Dairy and suckled milk production of Dorset ewes. New Zealand Journal of Experimental Agriculture 8: 191-197.

Geenty KG, Davison PG 1982. Influence of weaning age, milking frequency, and udder stimulation on dairy milk production and post-partum oestrus interval of Dorset ewes. New Zealand Journal of Experimental Agriculture 10: 1-5.

Geenty KG, Jagusch KT 1974. A comparison of the performance of Dorset, Corriedale, and Romney ewes during lactation. Proceedings of the New Zealand Society of Animal Production 24: 14-18.

Gosling LS, Knight TW, Newman S-AN 1997. Effects of season-of-lambing, stage-of-lactation and ewe-age on milk volume and composition of machine-milked Dorset ewes. Proceedings of the New Zealand Society of Animal Production 57: 212-215.

McKusick BC, Berger YM, Thomas DL 1999. Effects of three weaning and rearing systems on commercial milk production and lamb growth. Proceedings of the 5th Great Lakes Dairy Sheep Symposium. Pg. 16-31.

McMillan WH, McLachlan S, Hercus I 2014. Genetic evaluation in a large flock of milking sheep in New Zealand. Proceedings of the New Zealand Society of Animal Production 74: 55-57.

Newman C-AN, Steiffel W 2009. Milking performance of East Friesian Poll Dorset cross ewe hoggets. Proceedings of the New Zealand Society of Animal Production 59: 125-128.

Peterson SW, Kenyon PR, Morris ST, Lopez-Villaloboz N, Morel PCH 2005. Milk production in East Friesian-cross ewes lambing year round. Proceedings of the New Zealand Society of Animal Production 65: 173-177.

Thomas DL 2001. Choice of breed for dairy sheep production systems. Proceedings of the 7th Great Lakes Dairy Sheep Symposium. Pg. 1-8.

Thomas DL, Berger YM, McCusick BC 2000. East Friesian germ plasm: Effects on milk production, lamb growth, and lamb survival. Journal of Animal Science 77: 1-6.