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Milking performance of East Friesian Poll Dorset cross ewe hoggets

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ABSTRACT

The milking performance of East Friesian Poll Dorset cross and Poll Dorset hoggets in a commercial milking system was studied at Flock House Agricultural Centre. Hoggets were milked twice daily from 2-4 days post-lambing on a 30 bale rotary platform for about 102 days. Live weight of the Poll Dorset and East Friesian cross hoggets were similar (P>0.05), both groups increased in weight from 51.5 ± 0.7 to 61.8 ± 0.8 kg over the trial period. Mean daily milk yield of the East Friesian cross hoggets was significantly higher (P<0.01) than for the Poll Dorset hoggets, 1.13 ± 0.06 and 0.87 ± 0.08 l/ewe/day, respectively. Milk production of the East Friesian cross hoggets over the lactation period was 30% higher in milk volume (113.1 ± 6.0 versus 86.8 ± 7.9 l/ewe) but had a lower milk solids content (18.19 ± 0.06 versus 18.48 ± 0.07 %) resulting in a 25% higher yield of milk solids (204 ± 3 versus 164 ± 4 g/ewe/day) than Poll Dorset hoggets.

Keywords: sheep milking; Poll Dorset; East Friesian; milk yield; milk composition.

INTRODUCTION

The small sheep milking industry in New Zealand has mainly been based on the Poll Dorset breed because of their superior milk yields compared to other New Zealand sheep breeds (Geenty 1979). However this is still relatively low compared to breeds which are commonly milked around the world, such as Awassi, Chios, East Friesian, Lacaune and Sarde. East Friesian sheep are reputed to be the most productive milking breed in the world, producing approximately 500 litres over a 200-220 day lactation period.

Since their introduction into New Zealand East Friesian rams have been used extensively over ewes from a wide range of meat and wool breeds with the aim of improving lamb production. Within the New Zealand sheep dairy industry, including farmers who are interested in becoming involved in sheep milking, East Friesian rams have been used across Poll Dorset and Romney ewes. However there is no reliable information on the milk production of East Friesian or East Friesian crosses under New Zealand pastoral farming conditions.

The aim of this experiment was to compare the performance of East Friesian Poll Dorset cross hoggets and Poll Dorset hoggets in a commercial milking system.

MATERIALS AND METHODS

East Friesian Poll Dorset cross and Poll Dorset hoggets born in 1996 were mated in 1997. The pregnant hoggets were identified using ultrasonography and hoggets to be used in the trial were randomly selected from those due to lamb in the first cycle. Lambing occurred within a two week period from the end of August 1997. Twenty-one Poll Dorset and 47 East Friesian Poll Dorset cross hoggets were included in the trial.

Lambs were removed 2-4 days after birth and artificially reared, while hoggets entered the milking flock. Ewes were milked twice a day at 0800 and 1500 hours on a 30 bale rotary platform at the Flock House commercial sheep milking unit. Hoggets grazed predominantly ryegrass/white clover pastures, with pre and post grazing pasture levels of at least 2000 and 1400 kgDM/ha respectively to ensure that feed quantity was not limiting. Hoggets were weighed on entry into the milking flock and monthly throughout the trial. The trial was concluded on 16 December 1997 when milking was stopped due to circumstances outside the control of the trial.

Daily milk yield was measured weekly for each hogget throughout their lactation using in-line milk meters (Tru-Test Ltd, Auckland). A milk sample from each hogget was collected for milk composition analysis weekly for the first 7 weeks, then 2 weekly until the end of milking. Samples were preserved by the addition of potassium dichromate and analysed for concentrations of milk fat, milk protein and lactose using an infra-red milk analyser (Milkoscan 605, Foss Electric Denmark). The Milkoscan was calibrated for sheep-milk before analysis of the samples. The yield of milk solid components on each sample day was calculated by multiplying milk volume with the concentration of milk solid components.

Statistical analyses were carried out using generalised linear models procedures (SAS, 1987). Analysis of variance (ANOVA) was used to determine the effects of breed, lambing date, number of lambs born, stage of lactation, and interactions between these effects on total milk yield, daily milk yield, length of lactation, milk composition, and liveweight. Correlations were calculated between milk yield, composition and live weight using residuals after correcting for other fixed effects.

RESULTS AND DISCUSSION

Live weight

Live weight of Poll Dorset and East Friesian cross hoggets were similar (Table 1). Both groups increased in weight from 51.5 ± 0.7 to 61.8 ± 0.8 kg over the trial period, reflecting the high plane of nutrition on which the animals were run to provide the opportunity for them to express their lactation potential. Live weights of contemporary hoggets at weaning in December averaged 55.8 ± 1.0 kg for those rearing a lamb and 57.0 ± 1.0 kg for hoggets which did not rear a lamb. The lactating hogget live weights and liveweight gain over the lactation period were greater than other reports of lactating hoggets (Knight et al. 1995; McEwan et al. 1985). However Knight et al. (1995) noted in that trial hoggets being milked were grazed with mature milking ewes and competition between hoggets and mature ewes may have reduced the intake of the hoggets.

TABLE 1: Mean live weight, duration of lactation, milk yields and composition of the milk from Poll Dorset and East Friesian Poll Dorset cross (EFPD) hoggets.

	Poll Dorset	EFPD	Signif.
No. of hoggets	21	47	
Live weight (kg)			
1 September	50.7±2.0	49.9±1.7	ns
16 December	61.8±1.4	62.4±1.1	ns
Duration of lactation (days)	102±1	103±1	ns
Total milk yield (l/ewe)	86.8±7.9	113.1±6.0	**
Mean daily milk yield (l/ewe/day)	0.86±0.08	1.10±0.06	**
Milk composition (%)			
Fat	6.34±0.06	6.15±0.05	*
Protein	5.89±0.04	5.74±0.03	**
Lactose	5.56±0.01	5.59±0.01	*
Solids	18.48±0.07	18.19±0.06	**
Mean daily yield (g/ewe/day)			
Fat	56.3±1.6	61.5±1.3	***
Protein	51.5±1.3	63.8±1.0	***
Lactose	49.7±1.4	63.1±1.0	***
Solids	164±4	204±3	***

P<0.05; **P<0.01; ***P<0.001

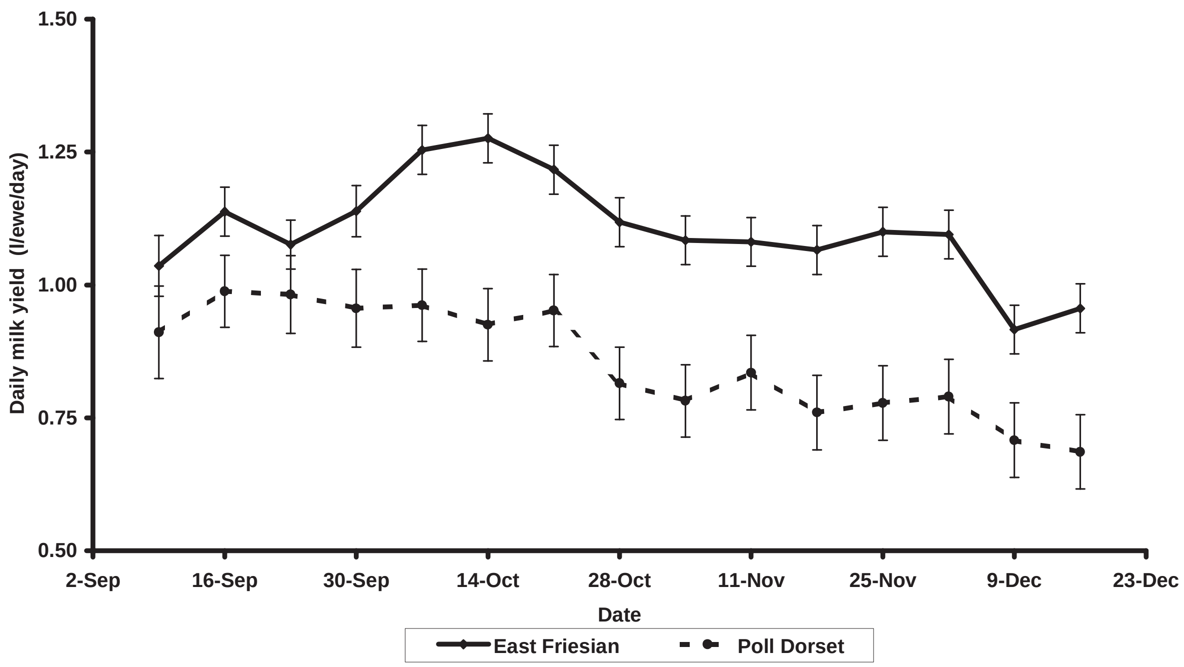
Milk production

Mean daily milk yields of the East Friesian cross hoggets were significantly higher (P<0.01) than for the Poll Dorset hoggets (Table 1). Total milk production of the East Friesian cross hoggets was 30 % higher in milk volume but had a lower milk solids content resulting in 25 % higher yield of milk solids than Poll Dorset hoggets. Lack of pure bred East Friesians or further crosses in the trial meant that estimates of heterosis on milk production could not be determined.

There was no significant (P>0.05) difference in milk yield between the East Friesian cross and Poll Dorset hoggets for the first 3 weeks of lactation (Figure 1), however production of the East Friesian crosses then continued to increase to a peak 6 weeks after the start of lactation while Poll Dorset milk yields were more consistent for the first 7 weeks and then gradually declined. Changes in daily milk yield with stage of lactation were consistent with reports from other studies (Gosling et al. 1997; Knight et al. 1993, 1995). Timing and size of peak milk yield is variable and depends on factors such as breed and feeding level, however in general peak milk yield occurs between the first and fifth week of lactation (Gosling et al. 1997). When milking ceased after 102 days lactation, East Friesians were still producing significantly (P<0.01) more than the Poll Dorsets, 0.96 ± 0.05 l/ewe/day compared to 0.69 ± 0.07 l/ewe/day.

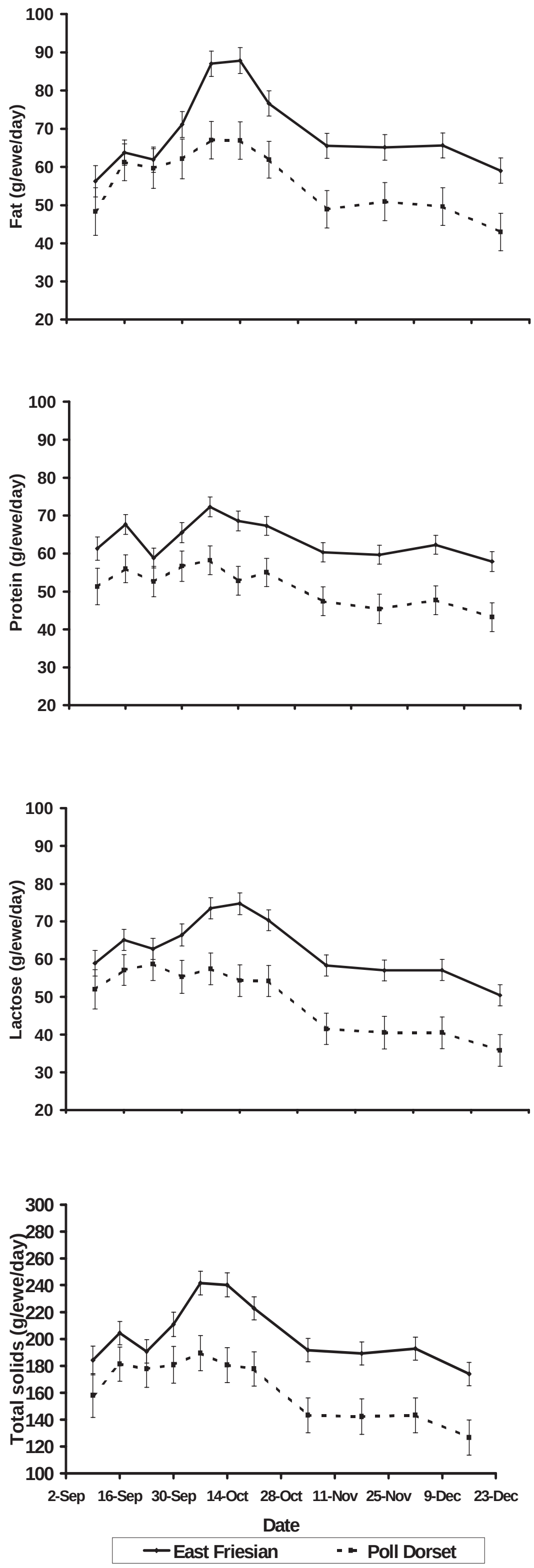
Mean composition of the milk varied significantly (P<0.05) between the breeds, with East Friesian cross milk having a lower concentration of fat, protein and total milk solids but a higher concentration of lactose. However differences were less than 0.3% and of little practical importance. Trends in milk solids concentrations through lactation agreed with those reported in other studies (Corbett

FIGURE 1: Mean daily milk yields for Poll Dorset and East Friesian Poll Dorset cross hoggets over lactation.



1968; Gosling et al. 1997) and were similar to those reported in cows (Holmes and Wilson 1984). When adjusted for differences in volume East Friesian crosses had significantly higher (P<0.001) daily yield of milk solids (Figure 2).

FIGURE 2: Mean daily yield of milk solids for Poll Dorset and East Friesian Poll Dorset cross hoggets over lactation.



Although lambs were removed 2 - 4 days after lambing and there was no difference in live weight between hoggets bearing single or twin lambs, effects of number of lambs born were significant for daily milk yield and composition for both breeds. Hoggets having a single lamb averaged 0.1 l/day more milk (P<0.001), although the difference in total milk production between hoggets having a single lamb (103.4 ± 6.1 l) and those having twin lambs (96.5 ± 7.0 l) was not significant (P>0.05). Although there was no significant difference in total solids content, fat content was 0.2% higher and protein content 0.13% lower for single than twin bearing hoggets (P<0.05). In contrast Knight et al. (1993) found no difference in milk yield between ewes giving birth to single or twin lambs.

Lactation was terminated after about 102 days in this trial, whereas usually individual ewes or groups are progressively dried off when their production falls below a threshold, such as 0.25 l/day. Gosling (pers. comm.) found that the lactation curves of ewes of different production abilities were all similar but at each stage of lactation low producers had consistently lower daily milk volumes. Poll Dorset hoggets would therefore be expected to have had a shorter duration of lactation because they would have reached the minimum production level for drying off sooner than the East Friesian cross hoggets.

No significant correlation was found between live weight and milk yield and this agrees with results obtained for adult ewes (Knight et al. 1995). Knight et al. (1995) did find a positive correlation between live weight of both hoggets and 2-year-old ewes and total milk yield and mean daily milk yield, but they noted that their results reflected the effect of live weight on conception date, with heavier animals lambing earlier and therefore being milked longer resulting in a higher total milk yield.

There were no obvious differences between breeds in ease of training and behaviour in the milking shed although these were not quantified. Animals routinely exited the milking parlour through a footbath as a preventative measure and no differences in the occurrence of scald or footrot were observed.

CONCLUSIONS

Introduction of East Friesian genetics into commercial sheep milking flocks will increase milk yield. However this will arise from an increase in volume and a longer duration of lactation which will lead to an increase in costs associated with running the milking parlour.

As upgrading to a higher proportion of East Friesian genes is seen as another step to increased milk production further studies on the effects that increasing East Friesian influence would have on milk production and overall productivity and profitability will need to be undertaken for New Zealand pastoral farming conditions.

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