Small Ruminant Research 90 (2010) 27–33

Contents lists available at ScienceDirect

Small Ruminant Research

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

Reproduction rate, milk and wool production of Corriedale and East Friesian × Corriedale F1 ewes grazing on natural pastures

R. Kremer[a,*], G. Barbato[a], L. Rista[a], L. Rosés[a], F. Perdigón[b]

[a] *Dep. Ovinos, Lanas y Caprinos, Facultad de Veterinaria, UDELAR Lasplaces 1550, Montevideo, Uruguay*
[b] *Campo Experimental No. 1, Migues, Facultad de Veterinaria, UDELAR, Uruguay*

ARTICLE INFO

Article history:
Received 8 July 2009
Received in revised form 8 December 2009
Accepted 11 December 2009
Available online 13 January 2010

Keywords:
Dairy sheep
Corriedale
East Friesian
Crossbreeding
Reproduction
Wool

ABSTRACT

A 5-year survey was undertaken to compare the productivity of crossbred ewes (East Friesian (EF) sires × Corriedale (C) dams), relative to purebred Corriedale ewes in terms of reproduction rate, wool production and quality and milk production. The experimental population consisted of a self-replacing flock of 200 breeding ewes (2–9 years of age), 120 being C and 80 EF × C (F1) crosses. The ewes were maintained on natural pastures (average 2500 kg DM year^{-1} ha^{-1}) up to 50 d prepartum, and thereafter rotated on predominant white clover pasture, at a stocking rate of 6 ewes ha^{-1}. Prior to lambing, the ewes were shorn and the lambs were weaned at 35–40 d of age (at a minimum weight of 10 kg), with the ewes being milked twice a day. F1 crossbred ewes recorded a higher (13.8%) body weight over the purebred C. Genotype had a significant effect ($P < 0.01$) on the fecundity and weaning rate—with the lambs born/ewe lambing being higher in the EF F1 crossbreds (125.0%), compared to the Corriedale ewes (113.0%). The EF F1 crossbreds generally weaned 8 more lambs per 100 ewes mated. The survival rate of the lambs was not affected by the genotype of the ewe. For a similar lactation length, the genotype of the ewe had a significant effect ($P < 0.01$) on growth rate of the lambs, with the EF F1 crossbreds recording a 14.6% higher ADG than the C lambs. During the milking-only period, the East Friesian crossbreds produced 35.2% more milk in a 100 d lactation period than the C ($P < 0.01$), resulting from a combination of a higher level of daily milk production (0.730 vs 0.540 l/d respectively) and a longer persistency. Greasy and clean wool weights were however higher in the C, while yield and staple length were lower than in the F1 crossbred ewes. Compared to the Corriedale, EF crossbreds recorded a thicker wool diameter (34.2 μm vs 29.7 μm) and lower staple strength. Year, parity and age of the ewe had a significant effect ($P < 0.01$) on the reproduction rate, milk production and wool production. The overall comparison of the F1 EF crossbreds with the Corriedale, showed that the F1 ewes had a higher reproduction rate, growth rate of the lambs and milk production. The Corriedale however had a higher wool production and finer diameter. This survey, carried out on an all year round grazing system demonstrated that the introduction of EF genes improved milk production, although the impact being below the expectation.

1. Introduction

Uruguay is an agricultural country, with 70% of its total export eminating from agriculture and animal products (beef, mutton, dairy and wool)—representing 50% of the total agriculture outputs. Cattle (10 million head) and sheep (9.5 million head) and are run on natural and/or culti-

* Corresponding author. Tel.: +598 2 6224190; fax: +598 2 6280130.
E-mail address: robertokremer@hotmail.com (R. Kremer).

0921-4488/$ – see front matter © 2009 Elsevier B.V. All rights reserved.
doi:10.1016/j.smallrumres.2009.12.009

vated pastures throughout the year. Sheep milk production is a minor industry which only began in the 1980s, as an alternative diversification, with wool, lamb and milk production all contributing to the income in this enterprise (Barbato and Kremer, 1996). In Uruguay 60% of the sheep are of the Corriedale (C) breed, a dual purpose breed with 27–30 μm diameter wool (4–5 kg greasy wool) and a reproduction potential of a 100% weaning rate—although at the commercial level, the national average weaning rate is only 65% (DIEA, 2003).

Assessment of the C as a milk producer has been previously reported (Kremer et al., 1996)—with an average of 71 l total milked milk (TMM) in a 100 d lactation period, after weaning a 10 kg lamb 35–40 d postpartum. Research on the machine milking ability further concluded that although the Corriedale has different characteristics when compared with the dairy sheep breeds, it did not appear to be a major constraint for use in sheep milk production (Kremer et al., 2000).

The East Friesian (EF), also known as Milchschaf (German Milksheep), a dairy sheep with a large body size, high twinning rate and carcass leanness (Farid and Fahmy, 1996), was first introduced to Uruguay from Argentina in 1990 (previously from Germany in the 1970s). Recently this breed has been evaluated for lamb production, as a terminal breed (Kremer et al., 2004) and as F1 dams for terminal sires (Bianchi et al., 2002). In the last 30 years, the East Friesian breed has been introduced to a number of countries to improve milk production of the local sheep breeds and for mutton production - as a F1 crossbred, due to its high twinning and growth rate, as well as a terminal breed because of its carcass leanness (Boyazoglu, 1980; Allison, 1995; Ugarte et al., 2001). The results of milk production for this crossbred are however, no coincident, and are usually below what is expected on the basis of reported performance in their areas of origin.

Although the Corriedale is present in several countries of South America and in the beginning of dairy sheep production, the EF was used for crossbreeding and upgrading, there are no reports of comparisons between the productivity of the C and these EF crosses. The aim of this study was thus to perform a long term evaluation (5-year period), on the reproduction rate, wool production characteristics and milk production of Corriedale and East Friesian sheep crosses in a natural year-round grazing system.

2. Material and methods

The evaluation was carried out over a 5-year period (1996–2000) at the Migues Experimental Station of the Veterinary Faculty of Uruguay. The annual rainfall is approximately 1100 mm, with the average daily ambient temperature ranging from 12 °C in July (winter) to 24 °C in January (summer), and an average of 29 frost days per year.

The experimental sheep population consisted of a self-replacing flock of 200 breeding ewes, consisting of 120 C and 80 F1 crossbreds (EF × C). No selection for milk production was practiced during the experiment and the EF rams ($n = 8$) used to produce the F1 crossbreds were 2–4 years of age. The F1 crossbred ewes were randomly sired by East Friesian rams, while the Corriedales ewes were randomly sired by Corriedale rams ($n = 12$). In February the semen of all the rams was collected and frozen for future use in AI. As routine practice, mating of all hoggets and ewes was programmed for March–April (autumn), with the oestrous cycle being synchronized in mid-February with the aid of intravaginal progesterone sponges (MAP, 50 mg) followed by the treatment of PMSG (200 IU). Intra-uterine inseminations using laparoscopy were performed with the frozen semen and afterwards the rams were placed with the ewes until the end of April. Ewe hoggets were mated for first time at a minimum body weight of 40 kg (18 months of age or 2 tooth), otherwise maidens were only mated during the next year at 30-month (4 tooth) of age. Mature ewes were culled according to their teeth wear—which occurred from 7 years of age.

Prior to lambing, all ewes were shorn. Lambing generally occurred between the last week of July and the first week of August (end of the winter).

The lambs were tagged and weighed at birth and again at weaning (at 35–40 d of age with a minimum body weight of 10 kg). After weaning of the lambs, the ewes were milked twice a day (approximately 07:00 and 17:00), until the average milk production was recorded < 0.2 l/d (ICAR, 2007).

The ewes were maintained on natural pastures (average 2500 kg DM year^{-1} ha^{-1}) up to 50 d prepartum, and thereafter rotated on predominant white clover sown pastures at a stocking rate of 6 ewes ha^{-1}. Supplementary feed of 150 g per ewe/d of (20% crude protein) was offered in troughs to facilitate management at the time of milking. Udder stimulation and machine stripping was practised, as well as teat dipping. The individual milk production was recorded in a volumetric jar (fortnightly, method A4) according to the ICAR (2007) guidelines for ewes.

The following wool analyses were performed annually: yield (Y) by scouring a 100 g sample; clean fleece weight (CFW), calculated by multiplying greasy fleece weight (GFW) by Y/100; staple length (L) measured in 5 raw wool samples with a ruler, after the tips had been discarded (IWTO-30); mean fibre diameter (D) determined with the aid of an Air Flow machine (IWTO-6) and staple strength (SS) using a Staple Breaker in 5 staples samples (IWTO-30) (IWTO, 2009).To summarise the following traits were recorded annually:

Reproductive traits (5-year period):
- No. ewes lambing/ewes exposed to the ram (EL/EE), fertility (1 or =0, i.e. whether a ewe exposed to a ram lambed or not).
- No. lambs born/ewes lambing (LB/EL), prolificacy rate or fecundity (1–3).
- No. lambs born/ewes exposed to a ram (LB/EE), lambing rate (0–3).
- No. lambs weaned/lambs born (LW/LB), survival of the lambs from birth to weaning (0–1).
- No. lambs weaned/ewes exposed to the ram (LW/EE), weaning rate (0–3).
- Ewe live weight at mating (ELW) (kg).

Lactation period (5-year period):
- Total weight of lambs born per ewe lambing (TWLB) (kg).
- Total weight of lambs weaned per ewe lambing (TWLW) (kg).
- Suckling length (SL)—corresponding to the suckling period of lambs (d).
- Lamb average daily gain from birth to weaning (ADG) (kg/d) (not available for 1999).
- Total milked milk (TMM), is the milk yield produced during the milking period (l).
- Milking-only length (MOL), corresponding to the period during which the ewe was milked starting when the lamb(s) were weaned, until drying off (d).
- Adjusted milked milk to 100 d (MM-100) (l), according to the Fleischmann method (ICAR, 2007).

Wool traits (3-year period):
- Greasy wool weight (GFW) (kg); wool yield (Y) (%); clean fleece weight (CFW) (kg); staple length (L) (cm); fibre diameter (D) (μm); staple strength (SS) (New/ktex).

Data were analysed using the Stata Statistical Software (StataCorp, 2001) using the least-square method for an unequal number of data. The mathematical model for the analysis of all parameters, included fixed effects for genotype (Corriedale or F1), parity (primiparous or multiparous), age of the ewe (2–9 years), year (3/5 years depending on characteristic) and residual errors. Least-square means were compared using the least significance difference (LSD) test. The comparisons were made only if the effect was determined to be significant ($P < 0.01$), by analysis of variance. Litter size and suckling length were fitted as covariates for ADG, TMM, MOL and MM-100.