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Importing a sheep which offers more - the East Friesian

A.J. ALLISON

Silverstream Ltd, PO Box 5585, Dunedin, New Zealand.

ABSTRACT

The development of more productive sheep is possible through selection within breeds and crossbreeding or by importing new genetic material. The introduction of new breeds involves complex and time consuming development of import protocols, and health testing of source flocks and individuals prior to entry into NZ. Repeat health testing of sheep (and/or recipient ewes receiving embryos) and long scrapie surveillance protocols are required prior to release. Of the new breeds, the East Friesian with large body size, high fecundity and milk production, leanness and moderate wool production will likely prove the catalyst for a sheep milking industry, and will be a component of a productive meat and wool dam. Early data confirm that the East Friesian offers considerable opportunities in these areas.

Keywords: Sheep; lactation; crossbreeding; genetic selection.

INTRODUCTION

The main emphasis on the development of more productive sheep within the NZ sheep industry has been on selection within breeds and in crossbreeding, mainly to develop new breeds (Clarke, 1995). More recently there have been introductions of new breeds with productive characteristics not present in the national flock with the Texel, Finnish Landrace and Oxford Down being the most recent. Small numbers of White Headed Marsh, Gotland Pelt, Karakul and Awassi sheep are also now in the national flock.

The most recent introduction is the East Friesian (EF) with 11 pregnant ewes and 4 rams being imported from Sweden in December 1992. The major interest is their high milk production; they are regarded as the most productive milking breed with production of 500-600 litres per lactation. The imported animals with their natural and embryo transfer progeny are presently in quarantine, and release is expected in April 1996. The other characteristics of the breed of interest include large body size (ewes averaging about 85 kg), high fecundity (a 230% lamb drop in mature ewes), leanness (low subcutaneous fat but with good internal fat reserves), and wool production (4-4.5 kg of 37 micron).

Importation Protocol

In 1972, MAF imported sheep including East Friesians. However, when scrapie was suspected in the quarantine all sheep were destroyed. Over the past decade both MAF and industry attitudes to importations have changed from a largely

fortress approach, to one of managed risk which has allowed new introductions to proceed, albeit at a very slow rate. With the initial sheep and goat importations quarantine programmes of 5 to 5.5 years were required to allow observations of the imported animals and their progeny to be made to eliminate the possibility of introducing scrapie, a slow virus disease which has a very long incubation period. The EF importation protocol allowed the importation of ewes which had to be at least 3 years of age. As well the protocol included intracerebral inoculation of young goats with mesenteric lymph node material surgically removed from these ewes. A period of 3 years from the time of inoculation is required, during which time the animals are closely observed for signs of scrapie. The sentinel goats (which are a "bioassay" to detect scrapie if present) and the original imported animals are then killed to allow histological examination of the brain prior to release from quarantine being allowed. If scrapie is present in any animal there would be characteristic changes discernible within the brain tissue, but most likely clinical symptoms of the disease would be apparent prior to this.

Performance evaluation

In 1993, groups of Romney (R) ewes derived from three studs were mated with the four original East Friesian rams, or with Border Leicester (BL) rams. After weaning the lambs were reared together, and all ewe lambs retained. The males were allocated to one of three slaughter groups and measurements of fat thickness and dissections of the hind leg into

TABLE 2: Carcass measurements in East Friesian x Romney and Border Leicester x Romney ram lambs at two slaughter times.

Slaughter	Breed	Carcass weight (kg)	GR (mm)	C (mm)	Eye muscle area (cm ²)	Dissected components of the hind leg (%)	
						Fat	Lean
1	EF X R	16.3	2.9	1.1	9.2	10.7	66.9
	BL X R	16.2	6.7	3.2	8.9	16.2	61.0
2	EF X R	23.6	9.9	2.7	15.0	15.8	64.9
	BL X R	23.8	11.1	5.0	13.8	19.6	61.6

bone, muscle and fat were undertaken on 10 carcasses of each breed from two slaughters undertaken as an AgResearch contract at Invermay. Ewe lambs (50 EFXR, and 30 BLxR) were joined with two rams on 15 May 1994 for three cycles. The ewes were laparoscoped to determine ovulation rate on 3 June and were scanned to determine pregnancy in August. Ewes were shorn as lambs and then in mid-September, and records taken of fleece weights, yield and fibre diameter.

A prototype 6-stand herringbone milking plant was commissioned in mid-October 1994. Half of the EF crosses were selected to be milked as soon as the plant was commissioned, and the remainder reared their lambs. Total milk yield for each of the breed groups was recorded each night and morning. Individual milk recorders were available from the beginning of November, and individual milk records have been taken twice per week since that time. At each milking where individual records were taken, the total milk volume was recorded out of the milk vat for each breed group. Milk meters underestimated total production by an average of 21%, so individual data were adjusted on a daily basis. When individual production dropped below 300 ml per day ewes were dried off. The EFXR ewes which reared their lambs had their lambs removed on 6 December, and were then milked. This group of ewes has been treated separately from the EF crosses which have been milked from the time the milk plant was commissioned (for 12/22 ewes this was from the day of lambing, after the lambs had colostrum).

Reproductive performance

Reproductive performance data from hoggets are summarised in Table 1. Clearly the performance of the EF crosses is superior to that of the BL crosses both in the proportion of ewes cycling and lambing. The EF crosses were slightly heavier at mating (42 v 39 kg) and in January 1995 (62 v 59 kg).

TABLE 1: Numbers of ewes by ovulation rate (OR recorded on 3 June), and number of lambs born (NLB) in East Friesian x Romney and Border Leicester x Romney ewe hoggets, aged 8-9 months at mating

Breed		Ovulation rate (number of ewes by rate)				% of ewes ovulating / lambing	Mean OR /NLB
		0	1	2	3		
East Friesian							
X Romney	OR	11	26	10	3	78	1.41
	NLB	7	34	9		86	1.21
Border Leicester							
X Romney	OR	20	9	1		33	1.11
	NLB	24	4	2		20	1.33

Carcass comparisons

The carcass composition data which indicate that EF crosses were markedly leaner than the BL crosses are presented in Table 2.

Growth rates of lambs reared by the EF X Romney hoggets, and milk production

There were insufficient BLxR hoggets with lambs to obtain any meaningful data on growth rates of lambs reared. The growth rates of the lambs on the EFXR hoggets were

exceptionally good. From birth to weaning at 7 weeks of age the lambs had average growth rates of 360g per day to reach 23 kg at weaning. After weaning, ewes were milked.

During the two-week commissioning period some trouble was experienced with vacuum levels in the milking plant and as a result there were problems in the ewes with mastitis. Two ewes were dried off because of these problems, and another six of the EF and three of the BL cross ewes were affected. Until 9 January 1995, the 20 EFXR ewes milked from the time of commissioning of the milking plant had produced an average of 85 litres of milk in 82 days of lactation (range 61 to 118 litres). The average production of the 18 ewes on 9 January was still 0.72 l/d. In contrast, the six BLxR ewes produced an average of 20 litres of milk in a 45 day lactation. The EFXR ewes which weaned their lambs, had produced an average of 34 litres of milk in 33 days to 9 January. Two of 19 ewes were dried off prior to 9 January, and the average daily production of the remaining 17 animals at that time was 0.94 l/day.

Wool production and dag score

All of the lambs were shorn in January and September, 1993. The data are presented in Table 3 and show that the EF crosses produced around 10% less wool, but the wool was slightly finer and had slightly higher bulk than the BL crosses. In terms of dag score (0-4 scale), 15 of 31 EFXR and 7 of 31 BLxR had scores of 0; the mean values were 0.9 and 1.8 respectively. The dag score of the EFXR was significantly lower (SED=0.32; P<0.01).

TABLE 3: Wool production from East Friesian x Romney and Border Leicester x Romney lambs.

Breed	N	Fleece weight (kg)	Mean diameter (microns)	% Yield	Bulk (cm ³ /g)
East Friesian					
X Romney	(50)	2.01	34.3	86.7	24
Border Leicester					
X Romney	(31)	2.25	35.6	86.4	22

DISCUSSION

The importation of new breeds of sheep which have productive characteristics not present in the national flock is an important strategy for improvement of productive performance of the national flock while also offering the possibility of new opportunities. With the recent adoption of the 'kid goat bioassay', required quarantine programmes have been reduced in length by 2 years. From a commercial point of view it is not sensible to generate very large numbers of animals prior to the time of release as was the case with both the MAF and the Lamb XL importations of Texels and Finns from Scandinavia.

As more reliable information becomes available on the safety of washed embryos it may be possible to directly import embryos without quarantine requirements. There is no evidence that it is possible to transmit scrapie from washed embryos recovered from scrapie-infected donors, although recent work has demonstrated that it is possible to transmit

scrapie on unwashed embryos (Foster *et al.*, 1992). The most economic method of importation of ovine genetic material (R.J. Lightfoot pers. comm.) would involve:

- a) recovery of embryos from females 3 years of age or older (preferably as old as possible)
- b) slaughtering donor ewes, and recovering the brain, lymph node and spleen material which is then brought into NZ with the frozen embryos and used in a bioassay
- c) using the kid goat bioassay to determine whether the donor animals were or were not infected with scrapie (it may be possible to use mice as bioassay animals in the future, which would reduce the time required to approximately 21 months)
- d) frozen embryos are retained until the bioassay is completed satisfactorily (no detection of scrapie), after which the embryos may be implanted into ewes which are not required to be in quarantine.

If the above scenario was approved by MAF and industry, then the cost of importations could be reduced to the cost of health testing donor animals and collection of embryos overseas, and then the cost of keeping the small number of goats in quarantine during the time required to complete the bioassay. Such a scenario would be much less expensive than all ovine and cervine importations undertaken in the past 20 years.

The time taken at present to develop protocols necessary to allow importations to proceed is long, and often depends on the amount of expert assistance an importer is able to provide. This is an added significant disincentive and expense. However the present funding situation within MAF makes it unlikely that allocation of additional staff within this area will be possible in spite of the greater potential for economic benefit to NZ from imports than exports of live animals (Allison, 1990). The user-pay philosophy is likely to be more evident in the future which will not be conducive to these programmes which, although offering significant opportunities for animal production, have a long lead time to any revenue stream, and therefore are usually not attractive from a traditional investor's viewpoint.

The initial observations on the performance of the East Friesian crosses are sufficiently encouraging to suggest that this breed will have a very significant part to play in the meat and wool industry, as well as being the catalyst for the

initiation of a sheep milking industry. Clearly the EF crosses are sexually precocious and will provide an acceptable fertility as ewe hoggets. Even at the relatively modest weights at the time of mating, the reproductive superiority of the EF crosses was marked. The differences between the EF and BL crosses is in the same direction as that recorded by Clarke & Meyer (1977) in two-tooth ewes. Just as significant to the application in the meat and wool industry were the growth rates of the lambs reared on these ewe hoggets. With the average growth rates for the lambs of 360 g/day from birth to weaning at 7 weeks of age, a direct influence of the milk-producing capability of the EF, there is an obvious use for the EF as a component of an improved more profitable dam breed. Crossing the EF with longwool breeds (Romney and Coopworth) will result in some reduction in fleece weight but a slight decrease in fibre diameter and increase in bulk may increase returns. Certainly the EF breed will have had little, if any, selection for wool weight or quality in the past, and some emphasis on improvement in selection of rams in the future should be effective.

The level of milk production achieved with the ewe hoggets indicates that the half-bred EF ewe will produce significant quantities of milk, and may be the foundation of a sheep milking industry in NZ. The production from the ewe hoggets is at least comparable with mature ewes of our traditional breeds, and production will be higher in adults. The development of a sheep milking industry will depend largely on an adequate price for the milk. Naturally most producers who are considering sheep milk production require reassurance that there will be reliable contracts for milk produced, and therefore markets will be the key. The Silverstream company intends to take a significant part in the development of markets for sheep's milk and products. However without the availability of more productive sheep than are presently in the NZ flocks it is not likely that an industry will develop at all! The East Friesian will therefore catalyse the industry!

The introduction of the EF will have major application to the NZ sheep industry, and the importation route has been a most effective one in achieving the aim of "getting a better sheep", the "triple product ewe".