NEW STRATEGIES FOR IMPROVING ANIMAL PRODUCTION FOR HUMAN WELFARE

Proceedings

The Fifth World Conference on Animal Production

August 14–19 1983

Volume 2

FREE COMMUNICATION PAPERS

Japanese Society of Zootechnical Science

Tokyo Japan

MATERNAL PERFORMANCE OF DLS SHEEP AND ITS CROSSES WITH THE FINN LANDRACE BREED

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SUMMARY DLS ewes selected for extended breeding season were mated to Finn Landrace rams (F) and the resulting ½F ewes were mated to both parental breeds to produce the two backcrosses ¼F and ¾F. The percentage of ewes lambing in the four genetic groups was above 96%. Litter size at birth increased almost linearly with the increase in the proportion of Finn sheep. The number of lambs born alive was 1.17, 1.37, 1.75 and 1.92 in DLS, ¼F, ½F, ¾F respectively. Mortality at birth was highest in the ¾F at 12% and lowest in the ¼F at 3.6%. Preweaning mortality was also highest in the ¾F at 17.1% followed by ½F at 8%. Litter size at weaning was 1.09, 1.29, 1.61 and 1.64 in the 4 groups respectively. Litter weight at birth of lambs born alive ranged from 5.07 kg for DLS to 5.54 kg for ½F. Litter weight at weaning was 27 kg in the DLS, 3 kilograms lighter than in the 3 crosses. Date of lambing retarded progressively with the increase in the proportion of the Finn in the crosses. The average for DLS was the 22nd of December, whereas for the ¾F it was the 30th of January.

INTRODUCTION Results from crossing the Finn sheep with local American breeds has been reviewed recently by Dickerson (1) and showed a marked improvement in the prolificacy of the crosses as compared to the pure local breeds. Using the Finn sheep in the development of new breeds has been reported by Hulet and Ercanbrack (3) in the case of the Polypay breed developed in USA. Selecting the DLS for early breeding season resulted in a marked drop in the prolificacy observed, presumably because the ewes which are selected are those which conceive at their very early cycles which are known to be less prolific (2). To improve the prolificacy of the DLS breed, crossing with the Finn sheep was initiated in 1975. The purpose of this article is to report on the performance of the first and backcrosses of the Finn x DLS and compare it to that of the pure DLS.

MATERIALS AND METHODS DLS ewes were mated to Finn rams starting from 1974 to produce ½Finn ½DLS ewes (½F). These ewes were later mated to DLS, and Finn rams to produce the two backcrosses (¼F and ¾F respectively). ¼F ewes were also produced by mating DLS ewes to ½F rams starting from 1977. The crossbred ewes were mated for the first time between 15 and 18 months of age, whereas the DLS ewes were involved in the crossing only after they had lambed twice in the herd. Mating was started on the first day of June and lasted until November. At lambing, the lambs were identified and weighed soon after birth and left to suckle their dams until weaning at 70 days post partum. Most of the ewes were weaned on one day during the week, so the actual weaning age varied between 67 and 73 days. The ewes were kept on roughage-basis diet comprising of grass-legume silage offered ad libitum, supplemented with varying amount of grain. The ewes were flushed before the breeding season by withholding the grain feeding for two weeks, then doubling it during the last two weeks before mating. Grain supplementation was increased just before lambing and for those ewes producing multiple births. The following traits were studied; fertility, the ratio of ewes lambing to those exposed to the rams. Prolificacy was measured as the number of lambs born total, born alive and weaned of those ewes lambing. Lamb production was calculated as the kilograms of lamb born total, born alive and weaned per ewe lambing. Date of lambing was expressed as the number of days from January first. The data were analyzed using the General Linear Model of the SAS procedures. The following statistical model was used:

$$\gamma = \mu + bd_i + d_{ij} + bs_k + (bd \times bs)_{ik} + a_l + r_m + e_{ijklmn}$$

where bd referes to breed of dam, d to individual ewe within breed of dam, bs to breed of sire, $bd \times bs$ to the interaction breed of dam x breed of sire, a to age of dam, r to year of birth and e to a random element associated with each observation γ. All the elements in this model were assumed to be fixed except d and e which were assumed to be random. The model used to analyse the litter weaning weight also included age at weaning as a covariate. Significant differences among subclass means were tested using t test.

RESULTS Fertility: Very few ewes remained non-pregnant or aborted. Fertility was above 96% with differences between genetic groups being small and non-significant. Prolificacy: The number of lambs born and weaned increased progressively with the increase in the proportion of the Finn breed (table 1). Although $\frac{3}{4}$F had the highest prolificacy at birth of 2.2 lambs born, 75% higher than the DLS, 0.3 lambs (12%) died at birth or were born dead. The lowest mortality at birth was manifested by the $\frac{1}{4}$F cross at 3.6%. Of the 1.9 lambs born alive to $\frac{3}{4}$F ewes, a further 0.3 lambs died before weaning (17.1%). Due to the high mortality in the $\frac{3}{4}$F cross both $\frac{1}{2}$F and $\frac{3}{4}$F had similar litter size at weaning which was significantly larger that $\frac{1}{4}$F and DLS. At weaning both $\frac{1}{2}$F and $\frac{3}{4}$F crosses were about 50% higher than DLS in litter size (table 1).

Table 1. Least squares means for litter size, kg of lamb produced, lambing index and percent superiority of the crosses over the DLS.

Genetic group	No of ewes	Fertility %	Litter size: Birth total	Litter size: Birth alive	Litter size: Weaning	Kg of lamb produced: Birth total	Kg of lamb produced: Birth alive	Kg of lamb produced: Weaning	Lambing Index
Least squares means:									
DLS	193	.98[a]	1.23[a]	1.17[a]	1.09[a]	5.05[a]	5.07[a]	27.1[a]	9.2[a]
$\frac{1}{4}$F	166	.99[a]	1.42[a]	1.37[a]	1.29[a]	5.32[a]	5.41[a]	30.1[a]	2.6[b]
$\frac{1}{2}$F	273	.97[a]	1.89[b]	1.75[b]	1.61[b]	5.68[a]	5.54[a]	30.9[a]	-14.2[c]
$\frac{3}{4}$F	29	.96[a]	2.15[c]	1.92[a]	1.64[b]	5.69[a]	5.36[a]	30.4[a]	-30.3[c]
Percent superiority over DLS:									
$\frac{1}{4}$F			15.4	17.1	18.3	5.3	6.7	10.8	
$\frac{1}{2}$F			53.6	49.6	47.7	12.5	9.3	13.7	
$\frac{3}{4}$F			74.8	64.1	50.4	12.7	5.7	11.8	

abc: means followed by different letters are significantly ($P<0.05$) different.

Kilograms of lamb produced: Litter weight of lambs born alive ranged from 5.1 kg for the DLS to 5.5 kg in the $\frac{1}{2}$F. At weaning, the DLS litters were about 3 kg (11 to 14%) lighter than the three crosses.

Date of lambing: DLS ewes were significantly the earliest to lamb, followed by $\frac{1}{4}$F, $\frac{1}{2}$F and $\frac{3}{4}$F in that order, the relation seemed to be linear between the date of lambing and the proportion of the Finn breed in the cross.

Effects of breed of sire, age of ewe and year of lambing: The effects of breed of sire and its interaction with breed of dam and age of dam were non-significant except on date of lambing. Year of lambing was a significant source of variation on all the traits studied except on litter weight at birth.

DISCUSSION The popularity of the Finn sheep is manifested in its wide spread importation into various countries. One negative aspect in selecting the DLS breed for early lambing date is that the prolificacy decreased noticeably since the early lambing ewes conceive at their early estrous cycles when the ovulation is at its lowest level. The crossing with the Finn was aimed at investigating the advantage of incorporating a proportion of the Finn breeding in the DLS. The results of the present study indicated that there is no real advantage in exceeding 50% Finn in a cross since the high mortality of the lambs and their slow growth rate reduce the lamb production at weaning to the level of the $\frac{1}{4}$F and $\frac{1}{2}$F. The other negative influence of increasing the Finn breeding is the adverse effect on date of lambing, the main criterion of selection of the DLS breed. Dickerson (1) summarized the results of crossing Finn sheep with the American local breeds. His results were similar to present findings in that although the Finn crosses may be decisively superior to local breeds in prolificacy, however, when measuring ewe productivity in terms of kilograms of weaned lambs the advantage of the Finn crossing becomes less evident due to the high mortality of the lambs and their slower growth rate.

LITERATURE (1) Dickerson, G.E., ARS. North Central Regional Publ. 246:30, 1977. (2) Fahmy, M.H., Sheep Canada Magazine, 1(1):20,21,44-46, 1976. (3) Hulet, C.V. and Ercanbrack, S.K., Sheep and goat handbook. Vol. 1, Agriservices Foundation, Clovis Cal. U.S.A. 1979.