1. INTRODUCTION

1.1 Finnish Sheep, their origin and characteristics

Finnish Landrace (Finn) sheep originated in Finland and are descendants of the Mofloun. They are related to other Scandinavian short-tail sheep. The breed has been described by Goot (1973) as having a narrow head, straight nose and short ears, being usually polled, with fine legs and a short tail and white in colour. Some individuals are black, but the black colour is recessive to the white. Some ewes have four functional teats (Maijala, 1974).
The breed is characterized by its high prolificacy, fertility and early sexual maturity (Goot, 1973; Maijala and Osterberg, 1977). Both ewe-and ram-lambs can be used for breeding at 6-8 months. Conception rate of ewe-lambs in Finland averaged 95 percent (Goot, 1973). Litter size for 1-year old, 2-year old and adult ewes is about 1.8, 2.4 and 2.7, respectively. A good part of the ewes can conceive out of season (37 percent). Rams show high libido, large testes and good fertility. High gonadal activity is common to both sexes.
A small flock size and a very intensive flock management system have prevailed in Finland, where sheep raised indoors during the long extremely cold winter, contributed to the development of the breed. The breeders select intensively for more lambs from their small flocks, for which they are able to provide very intensive care.
Average litter weight at 150 days is 71 kg (Goot, 1973). Mature weight averages 62 kg for ewes and 88 kg for rams. Carcass yield of lambs is competitive with other European breeds but their quality is somehow poorer. Fat is located mainly in body cavities and subcutaneously. Fleece weight is inferior to most other breeds, averaging 2 kg;

1.2 Finnish Sheep in temperate countries

The first Finn sheep were exported from Finland in 1961 to the Animal Breeding Research Organization, Edinburgh, U.K. The first results on their performance and utilization out of Finland were published by Donald and Read (1967).
Since then, Finn sheep have been introduced to over 40 countries in different continents, and over 500 research papers and articles have reported on them. Prof. K. Maijala and his colleagues in Finland have reviewed their trials consecutively (Maijala, 1967; Maijala, 1974; Maijala and Osterberg, 1977; Maijala, 1980; Maijala, 1984). Further reviews on Finn sheep in comparison to other breeds were reported by Terrill (1974), Jakubec (1977) and Nitter (1978).
These reviews clearly showed that the high fertility of Finn sheep, both male and female, has expressed itself in many environmental conditions and proved to be heritable in different gene backgrounds. On the other hand, growth rate and carcass traits, especially for pure Finn, were poorer on the average than other temperate breeds. Also wool, milk yield and survival rate for the pure Finn were not satisfactory. Maijala (1980) reported that the

results of these trials confirmed the original idea that such an extremely prolific breed should be utilized mainly through crossbreeding.
In the updated review of Maijala (1980 and 1984), Finn sheep and their crosses were compared with more than 40 different breeds and other crosses. Most of the breeds involved appeared only in one country, i.e. native breeds. Some breeds were used in more than two countries, and were used as reference breeds, i.e. Border Leicester, Cheviot, Dorset Horn, East Friesian, Ile-de-France, Merino, Romney, Scotch Blackface, Suffolk and Texel. To compare the results of various studies, the values of different traits of Finn sheep and their crosses were expressed as a percentage of the corresponding value of the reference breed or cross. Unweighted means for these relative values were estimated for 1/1, 3/4, 1/2, and 1/4 Finn groups (Table 1). The author summarized his findings as follows: a decrease of 1 percent in the Finn breed was associated with a decrease in litter weight weaned/ewe mated by 1.4 percent, number of lambs born/ewe mated by 1.2 percent, ovulation rate by 1 percent, litter size weaned by 0.9 percent and litter size born by 0.7 percent.
Table 1: Relative values of some reproduction traits of the Finn sheep and its crosses in temperate countries.

Ewe traits	breed groups			
	1/1 F	3/4 F	1/2 F	1/4 F
Age at puberty			91(2)·	
Age at puberty			90(2)	
Age at 1st lambing	86(1)		99(2)	
Length of ovarian activity	114(2)	1133		
Length of oestrus cycle			99(3)	
Duration of oestrus			127(4)	
% in oestrus in March			143(1)	
% in oestrus in April			220(1)	
% in oestrus in May			575(1)	
% in oestrus in Jan.-June			144(4)	
% in oestrus in July-Dec.			94(4)	
% multiple births			328(10)	
Lambs weaned/lambs born alive	121(3)			99(3)
Litter wt. weaned/ewe wt.			125(30)	
Lambs born/ewe/year		12(31)	141(1)	120(4)
Lambs slaught./ewe/year			139(10)	112(1)
Lambings/year in 8 mo. syst.			111(12)	105(4)
Lambing difficulty score	55(2)		87(16)	78(2)
Total no. born in 5 yrs.				156(6)
Total no. weaned in 5 yrs.				132(6)
Total wt. Weaned in 5 yrs.				122(6)
Ewe longevity				93(6)
Lamb vigour score			899	

Source: Maijala (1984).
· Numbers in parentheses are number of studies on which the average is based.

1.3 Finn Sheep imported from Finland

Table 2 gives the imports during the period from 1969 to 1986, according to the records of the Finnish Sheep Breeders Association (E. Hautkangus, personal communication). These do not include importations from a secondary country such as those imported from U.K. by the National Academy of Science and Technology in Egypt in 1974 (10 rams), and from Yugoslavia in 1975 which were consequently imported into Iraq by FAO project No 71/542 (25 ewes + 5 rams).
The most significant trial in respect of the number of animals involved, duration, available information, and impact on development plans is that of the Ministry of Agriculture in Egypt, followed by that of the Agriculture Research Organization in Israel. Those of Cyprus, Lebanon, ENAS and Iraq are of lesser impact. Very few reports are available on these trials, which ceased after a few years. The Libyan and Iraqi trials were large as far as the number of imported animals was concerned. However, the trials were ceased after a few years. Those of Algeria and Iran were carried out by private breeders and there was no way of tracing their results.
Table 2: Finn sheep imported from Finland

Country	Year	Animals	Importing Organization
Algeria:	1969	2M+25F	Mr. E. Saefi (private breeder).
Cyprus:	1972	6M+22F	Ministry of Agriculture and Natural Resources.
Egypt:	1970	10M	Ministry of Land Reclamation (FAO project).
	1981	10M+12F	Ministry of Agriculture (EMOA).
	1984	12M	MO A
	1985	10M	National Academy of Science (ENAS).
	1986	8M+12F	MOA.
Iran:	1975	10M	Iran Shellcott Company (privatecompany).
Iraq:	1978	15M+175F	Ministry of Agriculture.
Israel:	1970	6M	Agriculture Research Organization (ARO).
	1971	6M	ARO.
	1973	4M	ARO.
	1977	4M	ARO.
	1982	3M	ARO.
Lebanon:	1974	4M+7F	Mr. M. Marrauche (private breeder).
	1980	6M	American University of Beirut.
Lebanon:	1979	50M+450G	Agricultural Research Organization.

2. EGYPTIAN MINISTRY OF AGRICULTURE (EMOA) TRIAL

2.1 Objectives and breeding plans

As with most of the subtropical breeds, the fat-tail Egyptian sheep breeds are characterized by good fertility, ability to breed at differenttimes of the year and low prolificacy. Ossimi (0) and Rahmani (R) Nile-Valley breeds have a conception rate of more than 80 percent when bred once/year and over 70 percent when bred each 8 months successively (Aboul-Naga and Aboul-Ela, 1985). Their prolificacy ranged from 1.15 to 1.25 lambs/ewe lambed.

Improving their prolificacy by introducing the blood of prolific Finn sheep seemed a worthwhile idea from the developmental point of view, at the same time utilizing their ability to breed more than once per year. The trial was started in 1974 by the Animal Production Research Institute, MOA, to improve lamb production from R and 0 by crossing with Finn sheep.

The breeding plan was to cross the local ewes with the imported Finn rams. The first cross was back-crossed to the local to produce 1/4 Finn 3/4 local (1/4 F 3/4 L) from each breed group. The 1/4 F 3/4 L cross was either inter se mated, for some generations, and involved in a selection programme to establish a new breed type with better lamb production, or utilized as a dam breed to be mated to terminal size (Suffolk cross) to produce fat lambs. The 1/4 F 3/4 L was thought to be more suitable as a crossbred group for the prevailing conditions based on the following criteria:

- Their prolificacy would not be too high and ewes could be managed easily by the farmers.
- Ewes could stand the prevailing environmental conditions better than the crosses with higher Finn blood.
- The ewes' ability to breed at different times of the year was expected to be closer to the local sheep.
- Sheep have a reasonable size fat tail which is a determinant factor in consumer preference and price in the market.
- The genotype could be easily produced by using the 1/2 Finn rams, produced on state farms, on the breeders flock. One imported ram is estimated to produce 3-5 thousand 1/4 Finn ewes in the breeders flock over 5-7 years.

The last criterion is crucial in large-scale development programmes to improve lamb production from local sheep. The breeding plan does not involve artificial rearing of the lambs or hormonal treatment of the ewes. It is impractical to do any of these treatments under farm conditions.

The trial was carried out at Sakha and Mehalet-Mosa Animal Production Research Stations in 1974 utilizing 4 Finn rams, from the 10 rams imported by FAO project (UAR 49), as a pass-on gift. With the encouraging results of the Finn crosses, this was followed later on by the importation of successive batches of Finn rams and ewes from Finland in collaboration with the Finn Aid Programme (Table 2). The Finn ewes were imported only for experimental work.

All the Finn crossbred ewes were mated each 8 months as were the local ewes. The mating seasons were September, May and January, each lasting

for 35-45 days. The ewes were mated in groups of 30-35 each with one fertile ram.
All the Finn rams were mated naturally to the fat-tail local ewes. Within a few weeks from importation, they had a training period to copulate with the fat-tail ewes. Their response to the training varied from 1-2 days to a few weeks. Afterwards, they were all able to be hand-served to the fat tail ewes with a high conception rate. It should also be noted, that no hormonal or light treatment was applied on the Finn crossbred ewes in the trial.

2.2 Reproductive performance of the Finn ewes

The first results on the reproductive performance of the Finn crosses with either 0 or R local ewes were reported by Aboul-Naga (1985). Prolificacy, expressed as number of lambs born/ewe lambed, increased by 0.68 and 0.70 in the Finn-Rahmani (FR) and Finn-Osimi (FO) first cross, respectively, and by 0.17 and 0.27 lambs in 1/4 F 3/4 R and 1/4 F 3/4 0, respectively, over the local ewes (Table 3). It should be noted that the latter group were 2-3 years old and 2-5 years in the first cross and 2-9 years for the local ewes. Although age of ewe was included in the model adopted for analysing the data there could however be a confounding effect between age and breed groups.
The most interesting result is that the Finn crossbred ewes showed better fertility than the local ewes at different seasons of mating which resulted in a higher figure for number of lambings/ewe/year. Such performance resulted in a detectable improvement in annual number of lambs produced/ewe in the Finn crosses over the local ewes; 1.25 and 0.80 lamb for FR and FO and 0.19-0.44 and 0.34-0.55 lamb for 1/4 F 3/4 R and 1/4 F 3/4 0, respectively. The author wishes to highlight the good ability of the Finn crosses to rebreed each 8 months and that 1/4 Finn ewes are expected to show better performance when they have attained maturity.
Table 3: Performance of Finn cross ewes with local Ossimi (0) and Rahmani (R) under a system of a crop/8 months in Egypt.

Breed group	No.	EL/EE*	LB/EE	LB/EL	Lambings/ ewe/year	LB/ewe/ year
R	775	.715	1.01	1.37	1.07	1.47
F x R	151	.880	1.73	2.06	1.32	2.72
FR x R	160	.826	1.14	1.54	1.24	1.91
R x FR	284	.781	1.20	1.50	1.17	1.76
0	411	.743	0.98	1.28	1.11	1.42
F x 0	77	.768	1.48	1.93	1.15	2.22
F0 x 0	108	.824	1.13	1.42	1.24	1.76
0 x F0	40	.847	1.31	1.55	1.27	1.97

* EL: ewe lambed; EE: ewe exposed to rams; LB: lambs born.

Recently, Aboul Naga et al. (1988) gave data from 18 successive mating seasons (5589 records) for different Finn crosses including first interbred generation of 1/4 F 3/4 L, (1/4 F 3/4 R)2 and (1/4 F 3/4 0)2. The pure Finn ewes showed the lowest fertility among different breed groups studied

(Table 4), particularly in May mating. On the other hand, they were able to maintain their high prolificacy under prevailing subtropical conditions.
The figure of 2.43 lambs/ewe lambed is comparable with the figures reported under temperate conditions (Maijala, 1984). Lamb losses, however, were so high that in the end the Finn sheep had a lower advantage over the local breeds in number of lambs weaned/ewe mated.
The first cross ewes had a slightly better conception rate than the local ewes, but they had significantly higher prolificacy over the corresponding local breed of 0.37 and 0.30 lambs/ewe lambed for FR and FO, respectively. The two reciprocals of 1/4 Finn (LxFL and FLxL) performed significantly better than the local ewes. They gave birth to 0.11-0.19 more lambs and weaned 0.07-0.17 more lambs/ewe lambed than the corresponding local breeds. The advantage of 1/4 Finn ewes over the locals was more detectable in annual lambs weaned/ewes joined to range from 0.27 to 0.50/lambs/ewe yearly.
It should be noted that the 1/4 Finn groups were slightly less prolific than the 1st cross ewes, meanwhile they were detectably of better fertility. The 1/4 Finn showed better performance in their prolificacy than expected, assuming linear relationship with a proportion of Finn blood.
The inter se mating group of 1/4 F 3/4 R was of slightly lower fertility than their parents; Meanwhile they gave birth to 9 percent more lambs than the R and at the end had an advantage of 17 percent for annual number of lambs weaned than the local ewes. On the other hand, the (1/4 F 3/4 0)2 ewes showed better performance than their parents which was greater than the local 0 ewes. More data are still needed before evaluating the effect of interbreeding on the performance of 1/4 Finn ewes.
Table 4: Analysis of data accumulated over 18 successive mating seasons (each 8 months) for Finn crosses with Egyptian local sheep.

Breed group	No. of breed	EL/EE*	LB/EE	LW/EE	LB/EL	LW/EL	LW/EE/ year
Finn	46	0.50	1.26	0.88	2.43	1.71	1.32
R	1512	0.72	0.92	.0.82	1.31	1.17	1.23
FR	743	0.77	1.27	1.10	1.68	1.46	1.65
R x FR	513	0.80	1.11	1.00	1.42	1.27	1.50
FR x R	428	0.80	1.11	1.99	1.44	1.28	1.49
(1/4F 3/4R)2	741	0.76	1.06	1.93	1.40	1.24	1.40
0	613	0.68	0.81	0.72	1.22	1.08	1.08
F0	382.	0.75	1.11	1.98	1.52	1.35	1.47
0 x F0	316	0.72	1.00	1.89	1.41	1.25	1.34
F0 x 0	229	0.80	1.02	1.91	1.34	1.18	1.37
(1/4F 3/40)2	66	0.55	1.26	1.05	1.42	1.19	1.58

* EL: ewe lambed; EE: ewe exposed to ram; LB: lambs born; ...

2.3 Seasonal variation in breeding and sexual activity of Finn crosses

Although Finn crosses showed a good ability to breed each 8 months, their reproductive performance varied greatly from one season to another (Table 5). Seasonal variation in fertility was less observed with January and May mating having a lower conception rate than September. September mating showed significantly (P<.01) better prolificacy among different Finn crosses with an average advantage of 0.30 and 0.32 lambs/ewe lambed over January and May matings, respectively. Seasonal variation in the reproductive performance of Finn crossbred ewes was further augmented by seasonal differences in lamb survival. LW/EE in September mating is 45 percent and 16 percent more than those mated in January and May, respectively.

Table 5: Seasonal variation in reproductive performance of Finn cross with Egyptian breeds.

Mating season	No. of records	EL/EE*	LB/EE	LW/EE	LB/EL	LW/EL	LW/EE/ year
September	1746	0.75	1.23	1.13	1.70	1.57	1.70
January	1559	0.82	1.10	0.86	1.40	1.08	1.29
May	2284	0.69	0.93	0.81	1.42	1.22	1.22

* EL: ewe lambed; EE: ewe exposed to ram; LB: lambs born; ...

These results are in agreement with the findings of seasonal variation in oestrous activity and ovulation rate of Finn crosses (1/4 F 3/4 R and 1/4 F 3/4 0) reported by Aboul-Naga and Aboul-Ela (1985). The 1/4 F 3/4 0 showed a drop in their oestrous activity from April to June, while 1/4 F 3/4 R ewes had a lighter drop from Feb.-June. Percentage of ewes in oestrus was never less than 60 percent in both breeds at any month of the year. The authors reported a high incidence of ovulated anoestrus in spring months in local ewes and their crosses with different temperate breeds.

Oestrous and ovarian activity of the imported purebred Finn ewes was investigated versus their half-sibs in Finland (Aboul-Naga et al., 1984) and vs. the two local breeds (Aboul-Naga et al., 1985). Only slight differences were found in oestrous activity and ovulation rate in different seasons of the year between Finn ewes raised in Egypt and their half-sibs raised in Finland (Fig. 1). The anoestrous period averaged 149.3±16.7 and 142.5±7.8 d for the two groups, respectively. The Egypt group had lower oestrous activity at the start of the breeding season with a trend in some ewes to extend their breeding season.

The comparison in oestrous activity between Finn and local ewes showed a clear anoestrous period in the former (from June-September) in which R ewes had consistent oestrous activity throughout the year, with slight drop in March-June. On the other hand, most of the 0 ewes showed anoestrous period during July-September. Percentage of 0 ewes in oestrus was generally less than the R at different months of the year.

2.4. Adaptability of Finn sheep and their crosses to subtropical conditions

Physiological response of Finn rams to heat stress and direct solar radiation under the subtropical conditions of Egypt was studied by El-Shikh et al. (1982) in comparison with three local breeds R, 0 and Barki (B) and another two exotic breeds, Suffolk (SF) and Ile-de-France (IDF). The Finn sheep had the highest overa ll rectal temperature (40.7 C) followed by the SF then IDF (Table 6). The mean value for rectal temperature of the exotic breeds studied was significantly higher than that in any of the local breeds.

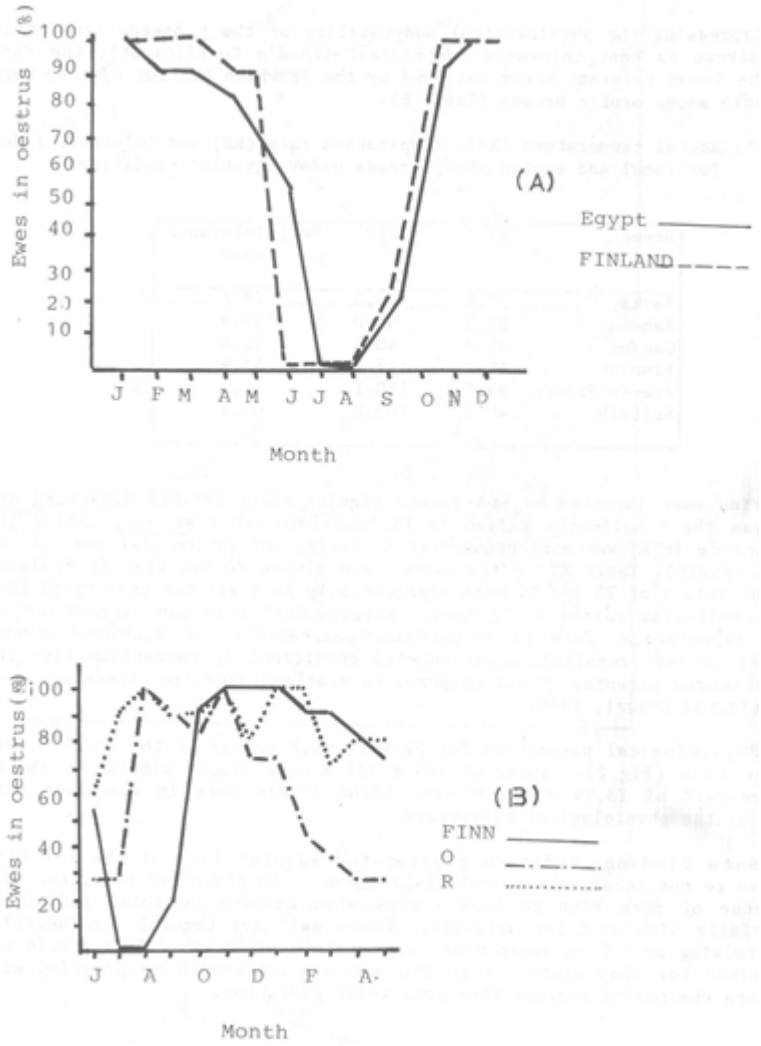

Fig 1. Oestrous activity of Finn ewes in Egypt vs. Finn ewes in Finland (A) and vs. R and 0 local ewes (B)

Expressing the physiological adaptability of the 6 breeds studied to heat stress as heat tolerance coefficient (Rhod's Coefficient), the Finn was the least tolerant breed followed by the SF while the IDF was the most adaptable among exotic breeds (Table 6).

Table 6: Rectal temperature (RT), respiration rate (RR) and tolerance index for local and exotic sheep breeds under Egyptian conditions.

Breed	RT	RR	Heat Tolerance Index

Barki	39.5	70.9	79.1
Rahmani	39.3	57.0	82.9
Ossimi	39.3	60.5	81.6
Finnish	40.8	117.7	55.9
Ile-de-France	39.9	120.1	71.2
Suffolk	40.2	105.8	65.4

Finn ewes imported by MOA showed significantly (P<.01) higher RT and RR than their half-sibs raised in Finland (Aboul-Ela _et__al_., 1987). The difference in RT was more pronounced in spring and autumn (1.7 and 1.4 C, respectively). Their RT in the summer was almost double that in Finland. Concentrations of T3 and T4 were significantly less all the year round than their half-sibs raised in Finland. Experimental work was carried out at Sakha Experimental Farm to investigate adaptability of different Finn-R crosses to the prevailing environmental conditions in comparison with the two purebred parents. Their response to heat and exercise stress was also investigated (Fawzi, 1986).

Physiological parameters for FR were much closer to the local R than to the Finn (Fig. 2). Those of 1/4 F 3/4 R were almost similar to the R. The results of T3,T4 and cortisone blood levels were in agreement with those of the physiological parameters.

Such findings indicate clearly the adaptability of the 1/4 Finn crosses to the local subtropical environment. On the other hand, the high response of pure Finn to heat stress when exposed to solar radiation, especially with muscular activity, should call for careful consideration when raising pure Finn sheep under subtropical conditions. They should not be walked for long distances to the pasture and should be provided with adequate shelter to protect them from solar radiation.

2.5 Fattening and carcass performance

A series of fattening trials was carried out to investigate fattening and carcass performance of different Finn crosses versus local lambs at different growing stages. Aboul-Naga and Aboul-Ela (1985) reported fattening and carcass performance of fat-lambs resulting from crossing 1/4 F 3/4 0 ewes with SF crossbred rams as terminal sire vs. local 0 lambs.

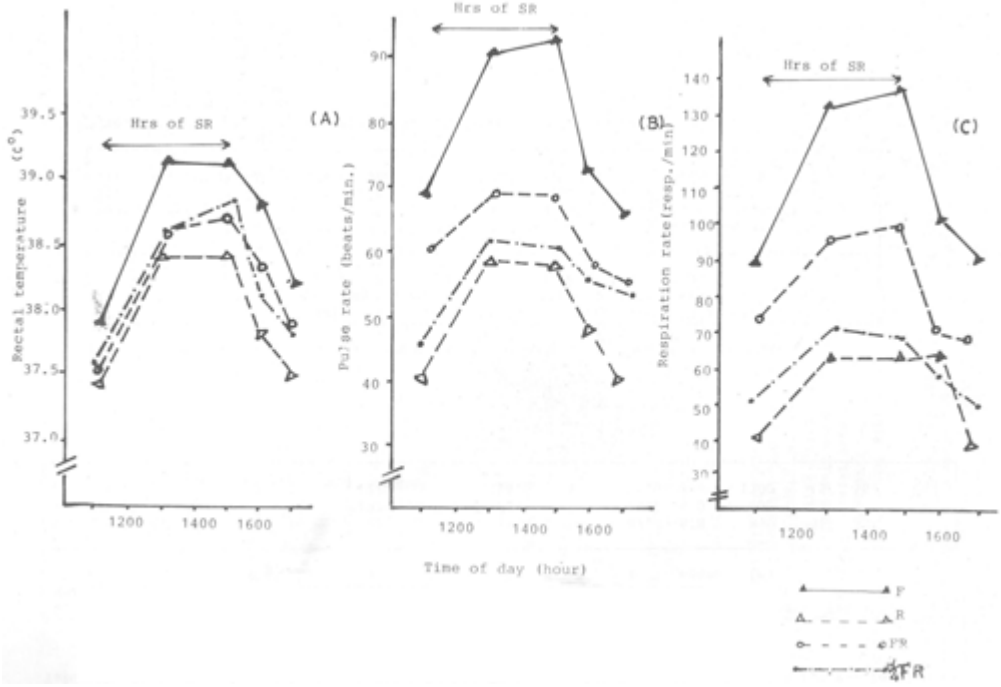

Fig 2. Rectal temprutre (A), pulse rate (B), respiration rate (C) of fine, R and their crosses when exposed to solar radiation (SR)

Table 7. Fattening and performance of fat-lambs; SF cross x 1/4 Finn 3/4 0 (SF x 1/4 FO) vs. local 0 in Egypt

Slaughter age and breed group	No	Fatten. period (wk)	Daily gain (8)	Slaught-ter wt.(kg)	Hot care. (kg)	Dress. %	Prime cuts %	Subcut fat score	Inter fat (g)	Fat %	Lean %
6 months (SFxl/4 FO)	21	16	194	37.7	19.4	59	87.7	6.8	890	31	53
4 months(SFXl/4F 0)	14	8	192	28.7	12.5	55	79.4	6.0	402	23	57
8 months(O)	18	16	127	35.3	16.5	47	68.0	2.6	1300	15	56

Table 8. Fattening and carcass performance of 1/4 Finn lambs vs. local lambs in Egypt.

Breed	Init. wt.	Final	Live	Hot	Dress.	Subcut.	Internal	Tail	Fat	Lean

group	(kg)	wt. (kg)	body conf.	carcass (kg)	%	fat score	fat	wt. (kg)	%	%
Ossimi	12.8a	31.9a	4.6ab	12.3a	52.3a	3.4ab	0.65a	1.2a	14.0a	66.6a
Rahmani	15.9ab	31.7a	4.7b	14.3a	56.2a	3.4ab	0.44a	1.2ab	13.0a	68.la
1/4 F 3/40	16.7b	34.6a	6.7c	14.5a	51.7a	4.8b	0.54a	0.4b	21.lb	59.lb
1/4 F3/4R	16.6b	34.0a	5.6ac	14.5a	51.6a	3.8ab	0.50a	0.6b	20.0b	59.0b

* means followed by the same symbol do not differ significantly (P<0.05)

The crossbred lambs had an average slaughter weight of 37.7 kg about 2 months earlier than the local 0 lambs (Table 9). They also had a better carcass performance, e.g. dressing percentage, prime cuts percentage, etc. Local carcasses were leaner, most of their fat being deposited in their fat-tail.

Fahmy (1986) reported other fattening trials involving different Finn crossbred lambs with either R or 0, fat-lambs resulting from using SF crossbred rams on 1/2 and 1/4 Finn ewes. The most interesting results are those comparing 1/4 Finn lambs with the local ewes (Table 8). The 1/4 Finn lambs showed significantly (P<.05) better daily gain and better body conformation than the locals. Their carcasses had significantly more fat percentage and insignificantly more subcutaneous and Internal fat than the locals. On the other hand, they had a significantly lighter (P<.05) fat-tail.

2.6 On-farm experiences and results

After the encouraging experimental results on 1/4 Finn crosses, breeders from different delta provinces were allowed to buy 1/2 Finn rams.

The numbers of 1/2 Finn rams sold to breeders over the period from 1982 to mid-1987 and those planned to be provided up to 1990 are presented in Table 9. The rams are ready for sale at the age of 1.5 years after testing for phenotypic performance, libido and semen quality. It can be noticed that the number of rams sold to breeders increased year after year which indicates increasing demand from breeders for the Finn crosses.

Table 9: Number of Finn cross ewes and rams distributed to producers from 1982-86 and planned to be distributed up to 1990.

Year	82/83	83/84	84/85	85/86	86/87	87/88	88/89	89/90
Ewes	164	140	304	249	240	300	300	300
Rams	34	70	152	154	175	200	200	200

In 1983, another programme was initiated in some delta provinces (Sharkia and Kaliobia). The objective of the programme was to provide small farms with 3-4 pregnant 1/4 F 3/4 L ewes (mostly R crosses in their 1st lambing) plus one ram on a 2-year easy credit in the context of a rural development programme.

The number of small farmers involved in the programme was 26 in Sharkia and 13 in Kaliobia provinces. Periodic visits were made to those breeders by technical staff able to follow up the performance of the 1/4 Finn cross under breeders' conditions over the period 1983-86. Table 10 represents reproductive performance of the flocks studied in Sharkia province.

The average lamb crop of Finn crossbred ewes in each flock ranged from one to 7 crops and the average number of ewes/flock ranged from 1.5 to 7 ewes. Lambing interval, with the rams run with the ewes all the time, averaged 9.4 months per ewe. Ewes having more than 2 crops showed a figure of about 8 months as lambing interval.

The annual number of lambs born/ewe averaged 1.65 with a clear trend of increasing number of lambs with advancing number of crops produced. The annual number of lambs was 2.2 on the average for those having 4 crops and more, which is a very satisfactory figure for lamb production under these conditions. The annual number of lambs weaned averaged 1.6 lambs with a similar trend with increasing number of crops.

A new phase of the trial which started in 1986 has the aim of validating the results of the Finn crosses under producers' conditions with both small farmers and sheep breeders. Four central villages were selected for the study in Sharkia province. The field survey covered 50 small farmers and breeders in each of these villages to investigate the prevailing small ruminant production systems, and how they integrated with other livestock and cropping activities. Quarter Finn ewes (3-5) plus one ram were distributed to sixty small farmers in these villages together with 1/2 Finn rams distributed to 15 sheep breeders.

The productivity of these animals and performance of their offspring will be followed for 3 productive cycles (about 2 years). The results will be important in establishing a large-scale development programme to improve lamb production from local sheep through introducing the blood of the prolific Finn sheep.

3. ISRAELI AGRICULTURAL RESEARCH ORGANIZATION TRIAL

The trial was started in 1970 at the Volcani Centre, Agricultural Research Organization at Bet Degan. It aimed to improve fecundity of both mutton Merino (MM) and Awassi (AW) sheep under an intensive management system (zero grazing), and to improve daily gain of the fat-lambs produced.

3.1 Breeding Plan

The breeding plan reported by Goot (1975) involved the crossing of MM and fat-tail AW ewes by imported Finn rams. Six Finn rams were imported from Finland in 1970 followed by 4 rams in 1973, 4 rams in 1977 and finally 3 rams in 1982.
The Fl ewes were either mated to the fat-lamb sire breed, e.g. Suffolk (SF) or Assaf (As), or inter se mated to produce F2 for a selection programme within each breed group.
The MM ewes were hand served and AW ewes were synchronized and artificially inseminated. Without such treatment, it was practically impossible for the Finn rams to copulate with the fat-tail AW ewes (Goot, 1975).
Table 10: Performance of 1/4 Finn ewes under small farmers' conditions in Sharkia Province.

Village and producer	No. of crops	No. of records	Average No. of ewes	No of lambs born	Annual lambs born	No of lambs weaned	Annual lambs weaned	Lambing interval
I-1	7	49	7.0	65	2.43	55	2.14	8.17
I-2	5	13	2.8	17	2.25	17	2.25	8.00
I-3	5	17	3.4	25	1.88	23	1.73	9.70
I-4	6	22	3.7	32	2.21	30	2.10	8.30
I-5	1	4	4.0	6	2.25	6	2.25	--
Average	4.8	21	4.17	29	2.20	26.2	2.09	8.50
B-1	4	11	2.75	13	2.39	11	1.16	11.25
B-2	4	20	5.00	28	2.10	25	1.84	8.00
B-3	1	3	3.00	5	2.25	5	2.25	--
Average	3.0	11.3	3.6	15.3	1.90	13.7	1.80	9.60
K-1	4	9	2.25	14	1.85	13	1.72	10.25
K-2	4	8	2.00	10	1.58	10	1.58	9.75
K-3	4	5	1.50	5	1.00	3	1.00	8.00
K-4	2	3	1.50	2	0.92	2	0.92	9.50
K-5	5	10	2.00	11	1.25	9	1.10	11.00
K-6	4	8	2	12	1.91	12	1.91	9.50
K-7	5	17	3.4	28	2.33	27	2.20	8.60
K-8	4	9	2.25	15	1.77	14	1.68	10.60
Average	4.0	8.6	2.1	12	1.60	11.3	1.50	9.65
BN-1	2	6	3	5	1.11	5	1.11	9.50

BN-2	2	6	3	6	1.30	6	1.30	9.50
BN-3	2	12	6	14	1.50	10	1.10	9.50
BN-4	2	8	4	11	1.44	11	1.44	10.00
BN-5	2	5	2.5	4	1.10	3	1.82	9.00
BN-6	2	6	3	6	1.25	5	1.10	10.00
BN-7	2	5	2.5	5	1.25	5	1.25	10.00
BN-8	2	5	2.5	5	1.25	5	1.25	9.50
BN-9	1	6	6	6	1.50	5	1.25	
BN-10	1	2	2	3	2.25	3	2.25	----
Average	1.8	6.1	3.5	6.5	1.40	32.0	1.40	9.60
Overal1 mean	3.4	26.9		35.3	1.65		1.60	9.40

3.2 Preliminary results of the Finn crosses

The results of the 1st phase of the trial were reported by Goot (1975) and Goot et al., (1976). They can be summarized as follows:

- 81 percent of Finn X MM (FM) and Finn X AW (FA) first crossbred hoggets (approx. 14 months old) lambed vs. 64 percent for MM and 33 percent for AW hoggets. Average lambing percentages were 120, 100, 80 and 30 for the four breed groups, respectively.
- The 2-6 year old FM crossbred ewes produced 0.3-0.8 more lambs/ewe mated than MM. There were too few FA ewe records to be analysed.
- There were no differences in growth rates of MM and Fl lambs, but birth weight and 150-day weight of F2 lambs were smaller than MM lambs.
- Mortality up to 120-days was the highest in MM lambs followed by F2 and Fl lambs. Finn crosses were more affected by outbreaks of pneumonia in the summer months.

3.3 Assessment of Finn crosses under an accelerated mating system

Another project was initiated, in collaboration with USAID, to evaluate the potentiality of the Finn crosses under an accelerated mating system, and to test other Finn crosses with AW, and compare them with Romanov (RV) crosses with AW and MM.

The mating was set up in the accelerated mating system in June, September and December/January. The ewe-lambs were mated as close to these months as possible after syncronization and hormonal treatment with PMS. The ewes were hand served, and usually 2 oestrous cycles were allowed as a mating period. Ewes failing to conceive would be rebred within a few months in the following mating season.

Ewe-lambs were mated at the age of 244+48, 265+42 and 219+10d for FM, FA and 3/4 AW, respectively. Forty-eight to 62 of them conceived in the first mating season, 34-52 percent in the second and 4 percent in the third. Number of lambs born/hoggets lambed was 1.75, 1.73 and 1.41 for the three breed groups, respectively (Goot et al., 1984a).

Reproductive performance of FM, FA ewes and their interbred generations under accelerated lambing were reported by Goot et al., (1980) and Goot et al., (1984a). Actual lambing frequency/year was 1.4 for FM and 1.2 for FA. Number of lambs born to FA ewes (2.6) was insignificantly higher than those born to FM ewes (2.34). Within FM ewes, there were no differences between generations but within FA ewes there was a significant ($P<0.05$) drop in number of lambs born/ewe lambed for the Fl to the F2 and following generations (Table 11).

Table 11: Reproductive performance of FM, FA ewes and their interbred generations under an accelerated lambing programme (Israeli trial).

Lambing season	EP*	EL/EEL %	LB/EL	Lambing EP/year	LB/EP year
FM(F1) 1975-1982					
Nov.-Feb.	198	87± 8.5	2.08121		
May-Sept.	184	7Q±14.3	1.92120		
All	382	79±14.3	2.00121	1.17±12	2.35±.21
FM(F2) 1975-1982					
Nov.-Feb.	222	89±12.3	1.98+119		
May-Sept.	212	64±27.7	1.69+29		
All	434	76±24.3	1.84+28	1.24U4	2.34±.33
FA(F1) 1977-1983					
Nov.-Feb.	296	91± 7.7	1.92+21		
May-Sept.	182	74±12.O	2.02+14		
All	365	84+13.6	1.99±21	1.45±12	2.90±.21
FA(F2) 1977-1982					
Nov.-Feb.	148	92± 9.3	1.76±.13		
May-Sept.	138	76110.9	1.54±.24		
All	266	84+12.7	1.65±.22	1.361.22	2.31±.35

* EP: ewes present; EL: ewes lambed; EEL: ewes eligible for breeding; LB: lambs born.

When data were pooled over genotype and generations, ewes mated out of season (Dec.-April) performed significantly less than those mated in season (June-Sept.) by 19 percent of ewes lambed and by 0.16 percent lamb/ewe lambed.

The expected lambing to lambing interval in the applied accelerated mating system ranged from 7 to 9 months, but in FA ewes it ranged from 7 to 12 months. There was a big gap between January and June matings. Percentage of dry ewes based on ewe mated in each period was 10 percent in June, 15 percent in September, 18 percent in Dec./Jan. and 23 percent in April.

Due to unforeseen circumstances, most of 3/4 F 1/4 AW ewes and some of the 1/4 F 3/4 MM and all the 1/2 As 1/4 F 1/4 AW ewes were transferred to a private commercial farm. The rest of 1/4 F 3/4 MM were raised in another private farm. The management system was different in the two farms from that in Bet-Degan and therefore, contemporary comparisons were not possible. However, data from the two private farms were analysed and reported by Goot et al. (1984a). The general conclusion drawn regarding

these crosses was: differences between 1/4 Finn and 1/2 Finn and between 1/2 Finn and 3/4 Finn on the other hand were less than that expected, assuming linear increase in prolificacy with the increase in Finn blood (Table 12). Difference in management and age groups involved in each breed group is a possible reason for this discrepancy. The reported figures, however, were based on unweighted mean of year, age and season groups.

Table 12: Reproduction performance of different Finn groups in the Israeli trial.

Genotype (% of Finn blood)	Once-yearly LB/EL *;		Accelerated mating LB/EL/year	
	No.	diff.	No. diff.	No. diff.
1/4 F	1.58		2.18	
		0.30		0.28
1/2 F	1.88		2.46	
		0.08		0.53
3/4 F	1.96		2.96	

LB: lambs born; EL: ewes lambed

3.4 Seasonal sexual activity of Finn crosses

Seasonal differences in sexual activity of Finn crosses were investigated and reported by Amir et al., (1980) and Amir et al., (1984). Length of sexual season was similar in FM and MM ewes, but FM ewes started their season later (beginning of August) and terminated later (beginning of March) vs. June and January for MM, respectively. The last oestrus in the season in FA ewes was detected by February-March, except for one ewe (out of 14 studied) which showed normal cycling throughout the year. The ewes resumed normal cycling activity in June-September, meanwhile silent ovulation during the anoestrous period (April-May) occurred in almost half the FM and FA ewes as detected by plasma progesterone concentration twice weekly.

Post-partum oestrus for FM and FA ewes lambed in October and early November occurred within 60 days in 9 percent of the cases. Days for post-partum oestrus averaged 41.3 and 36.9 days for FM and FA ewes, respectively. Most of the ewes, however, had an active ovary within 4-6 weeks post-partum. Ewes lambing in January, did not exhibit oestrus until the next sexual season.

Conception rate and litter size of FM and FA ewes bred at different months of the year are shown in Table 13.

Table 13: Lambing rate and litter size of Finn crosses at different mating seasons in the Israeli Trial.

Season of mating	Hormonal treatment	Number treated	Number bred	% lambed	Mean litter size
April	with	114	102	47.0	1.8
June	with	457	433	63.3	2.0
September	with	372	359	55.7	1.8
	without	--	168	64.2	1.7
December	with	222	205	66.8	1.8
	without	--	225	73.3	1.8

Response of ewes to exogenous hormones for oestrous synchronization was similar in different months during both sexual season and anoestrous period. Conception rate, however, was insignificantly higher with natural rather than induced oestrus (Table 13). Within oestrus induction, the conception rate was significantly lower in April than June or December. No significant differences were found in litter size of ewes bred at different months which ranged from 1.7 to 2.0.

Some trials using artificial photoperiod and the introduction of the ram for improving fecundity in FM and FA ewes were reported (Amir et al., 1984). Artificial lighting did improve the fertility of the ewes. The introduction of the rams was of value, although the number of animals used was small. The results of different trials on sexual activity of the Finn crosses indicated the suitability of FM and FA ewes for a frequent mating schedule to breed more than once/year.

3.5 Lamb and carcass performance

Finn-AW crossbred lambs performed marginally better than the Finn-MM lambs (Goot et al. 1984c). The authors reported that AW and FA dams, having plenty more milk than MM and FM ewes, stimulated the growth performance of their lambs, but the differences were statistically insignificant. Overall, Finn cross twin-born lambs showed similar mortality to that of singles, and was significantly less than that of triplets and quadruplets. Mortality from 0-150 days in Finn-crossbred lambs averaged 22 percent in the experimental flocks and 11.5 percent in the commercial farms.

Goot et al. (1984b) pooled together information available on carcass performance and carcass composition of lambs involved in different fattening trials (Table 14). Awassi lambs needed twice as long as Finn crosses to attain slaughter weight. Genotype differences were insignificant in daily gain, which ranged from 291 g for 3/4 FA to 343 g for AS FA lambs. Apart from the very high coefficient of variation in Awassi due to wide weight range, the most noticeable feature was the clear reduction of the fat tail in the crossbreds, by 93 percent in FA and by 88 percent in AS FA.

Kidney and intermuscular fat contents were similar in all Finn crosses and were significantly higher than in MM and AW. Internal and subcutaneous fat

was higher in AW and FA lambs than other genotypes. Total carcass fat was the highest in AW, intermediate in Finn crosses and the lowest in MM. The contribution of the Finn genotype to fat composition appears to be in two opposite directions; reducing the fat-tail and subcutaneous fat in Finn-AW crosses and increasing internal and intermuscular fat in both Finn-AW and Finn-MM crosses.
Using AS and SF as terminal sires for fat-lambs did not show encouraging results as compared to the performance of Finn cross ram-lambs (Goot et al. 1984c).
Table 14: Lamb and carcass performance of different genotypes studied in the Israeli trial.

Genotype	No. of lambs	Daily wt. gain (g/d	No. of lambs	Slaughter wt. age (kg/d)	Hot Carcas (kg)	Dressing %	Tails wt. (g)
AW	—	—	7	51.1263	25.0	48.9	57
MM	—	—	33	56.5300	29.6	52.3	(docked)
FM	63	309+14	8	45.4143	23.5	51.8	118
FA	90	302+12	11	45.3145	22.3	49.2	402
As FM	19	343+30	9	46.2139	23.3	50.4	208
As FA	23	334+31	4	45.8141	23.3	50.9	674
3/4 FA	32	291+21	-				
F test		n.s	**	**	**	n.s.	**

3.6 Finn vs. Romanov first crosses

In 1975, 5 Romanov (RV) rams were imported from France to compare the performance of Romanov crosses with MM (RVM) and AW (RVA) to the Finn crosses. Difficulty in mounting of RV rams was reported (Goot et al. 1979).
There was no significant difference between the two prolific breeds in lambing and reproductive performance of their 1st cross. Romanov sires, however, greatly increased the incidence of pigmented and kemp fibres in the wool of their progeny. RVM ewes gave slightly higher percentage of twins than the FM ewes. There were also some sets of triplets in RVA which reflected in a higher lambing percentage than FA (Table 15). Neither body weight nor daily gain of Fl lambs was affected by the sire breed. The F2 progeny with Finn blood was heavier at birth and grew faster to weaning than with RV blood 4.1 kg and 233g/day vs. 36kg and 198g/day, respectively.
Further contemporary comparisons for Finn and RV crosses with AW were reported by Goot et al. (1984b). They analysed 3-year data comparing Fl of FA and RVA under an accelerated lambing programme. They had similar figures in different reproductive performance traits, but the results were in slight favour of the RV crosses.

Table 15: Contemporary comparison between Finn-AW(FA) and Romanov-AW (RVA) in accelerated lambing in Israel.

Reproduction criteria	FA	RVA
Mean EP*	41.50	33.50
EEL/EP	1.69	1.52.
EL/EEL	0.80	0.94
LB/EEL	1.54	1.84
LB/EL	1.93	1.96
Lambing/EP/year	1.35	1.43
LB/EP/year	2.60	2.81

*EP: ewes present; EEL: ewes eligible for breeding; EL: ewes lambed; LB: lambs born

4. THE EGYPTIAN NATIONAL ACADEMY OF SCIENCE AND TECHNOLOGY (ENAS) TRIAL

The trial was conducted in 1974 by Al-Azhar University in collaboration with ENAS. The objective was to study intensive lamb production from local sheep. The breeding plan was to cross the three Egyptian local breeds; Rahmani (R), Ossimi (0) and Barki (B) with Finn rams and to use the first crossbred ewes as dam lines to be sired by Suffolk (SF) and Ile-de-France (IDF) for fat-lamb production. The first cross between SF and IDF with local sheep was also tested.

Some managerial problems caused the reduction of the initial size of the flock, and to move it to another farm. Also the delay in importing exogenous rams in the proper time affected the time schedule of the plan. Management problems also contributed to the delay in executing the plan.

According to the latest progress reports of the trial (Zahed 1988) F Finn crossbred ewes with different local breeds have started to reproduce under accelerated lambing system of mating each 4 months and those failed to conceive joined the next mating, their reproductive performance are presented in Table 16.

Table 16: Reproductive performance of Finn crossbred ewes vs. local ewes in the ENAS trial.

Breed	No. of records	EL/EE*	LB/EL	L/yr	LB/EE/yr
R	1951	0.41	1.10	1.04	0.86
0	2545	0.52	1.07	0.95	0.83
B	1903	0.40	1.07	1.02	0.64
FR	33	0.49	1.30	1.00	0.96
F0	68	0.55	1.46	1.04	1.20
FB	78	0.52	1.25	1.19	0.98

*EL: ewe lambed; EE: ewe exposed; LB: lambs born; L: lambing

Finn crossbred ewes showed better fertility than B and R local ewes but comparable to 0. The low fertility of R and B was probably due to the induction of newly bought ewe-lambs. Finn crossbred ewes gave higher multiple births than the locals. Differences in LB/EL were 0.20, 0.18 and 0.39 for FR, FB and FO ewes from their corresponding local breeds. The advantage of Finn crosses over the locals were more detectable in LB/EE/yr to be 41, 45 and 53 for the three crosses, respectively.

Table 17 represents lamb performance of different Finn crossbred lambs (E.S.E. Galal, personal communication). FR and FO lambs were heavier at birth and of better growth performance up to weaning than Finn x Barki (FB) and commercial Finn cross (225, 253, 176 and 186 g/day, respectively). Growth performance of different Finn crosses diminished clearly after weaning to average only 164 g/day.

Table 17: Lamb performance of different Finn crosses in the ENAS trial.

Trial	FB	F0	FR	Commercial Finn cross	Overall

No. of lambs	31	24	25	45	125
Birth weight (kg)	3.5	3.7	3.7	3.5	3.6
Weaning weight (kg) (at 4 weeks)	13.4	17.8	18.0	13.9	15.4
Daily gain (g) (birth-wean.)	176	153	255	186	210
Weight at 12 weeks(kg)	16.7	22.5	23.7	18.7	19.9
Daily gain (g)(wean.-12 weeks)	120	165	204	171	164

5. CYPRUS AGRICULTURAL RESEARCH INSTITUTE TRIAL

The Cyprus trial was started in 1972. Twenty-five 6 month-old lambs (22 F and 3 MM) were imported from Finland (Table 2). The objective of the trial was to test the performance of purebred Finn under Cyprus conditions and cross them with both Cyprus fat-tail ewes and Awassi x Chios crossbreds. The crossbred females produced were bred to Ile-de-France (IDF) rams (imported from France) to produce fat-lambs. The results of the trial were reported by Agrotis (1976) and Cyprus Agriculture Research Institute (1980).

5.1 Performance of purebred Finn

Table 18 shows the performance of Finn ewes in Cyprus over the years 1973-75. Estimate of lambs born/ewe lambing was high, higher than that of Chios sheep in Cyprus (Hadjipanayoti, personal communication). However, 23 percent of the lambs produced were born dead which is a very high figure for Cyprus conditions. Lamb losses during the suckling period were also high in the first 2 years. This resulted in figures of only 1.0, 1.0 and 1.33 lambs weaned/ewe lambing in the year of 1973, 1974 and 1975, respectively. Ewe fertility was also unsatisfactory (less than 70 percent). These factors resulted in a lower number of lambs weaned per ewe joined. Birth weight of the purebred Finn lambs was rather low. Their subsequent growth rate up to weaning, however, was satisfactory.

5.2 Performance of Finn crosses

Finn crossbred ewes with Cyprus fat-tail or Awassi x Chios were bred to IDF rams. The available number of crossbred ewes was small. However, the results in Table 19 indicate good prolificacy in the Finn crossbred ewes especially with. Awassi x Chios. Gestation length of Finn crossbred ewes was shorter than that of Cyprus ewes.

Birth weight of the Finn crossbred lambs was rather high (4.8 kg for males 4.5 kg for females). Mortality rate up to weaning was only 0.6 percent and that from weaning up to 20-weeks of age was 4.1 percent.

Finn crossbred lambs showed the highest postweaning growth rates among local breeds, Awassi and their different crosses; 247-257 g/day vs. 185g/day for local lambs (Cyprus Agricultural Research Institute, 1977).

Birth weight of the fat-lambs resulting from crossing with IDF was less than that of the first cross, perhaps due their high prolificacy (Hadjipanayoti, personal communication).

Furthermore, milk production of the Finn crossbred ewes was not satisfactory (Table 19).

Table 18: Performance of purebred Finn sheep in cyprus.

criteria	1973	1974	1975
No. of ewes lambing	15	15	18
No. of lambs /ewe lambing	1.9	2.3	2.3
No. of lambs born live /ewe lambing	1.4	1.4	1.5
No. of lambs weaned	15.0	15.0	24.0
Mean birth wt. of lambs (kg)	2.0	2.3	2.4
Mean Weaning wt. of lambs (kg)	10.6	13.0	19.0
Average daily gain till weaning (kg)	0.245	0.3.5	0.273

Table 19: Results from IDF x Finn x (Awassi-Chios) and IDF x (Finn x Cyprus fat-tail) in Cyprus.

Criteria	IDF(Finn x Cyprus sheep)	IDF Finn x (Awassi x Chios)
No. of ewes lambing	27	10
No. of lambs born/ewe lambing	1.5	.8
Mean birth wt. of male lambs (kg)	0.9	3.1
Mean birth wt. of female lambs (kg)	2.9	2.9
Gestation length (days)	146.9	147.4
No. of milked ewes	23	8
Lactation period (d)	41-105	41-112
Mean daily yield (kg)	0.745	0.810

6. AMERICAN UNIVERSITY OF BEIRUT (AUB) TRIAL

AUB started the trial in 1980 in collaboration with USAID. The breeding plan was to mate the Finn rams imported from Finland (6 rams) with Texel ewes. The crossbred rams (FT) produced together with the pure Finn were mated to fat-tail Awassi (AW) ewes. Information is available on the trial up to 1982 (American University of Beirut, 1982) but due to civil conditions prevailing in Lebanon, no further information could be obtained.

6.1 Reproductive performance

Due to the difficulties in copulating with fat-tail AW ewes, artificial insemination (AI) was practised. Semen characteristics and sexual activity of Finn and FT rams were studied at different times of the year, in comparison with local Awassi rams. Number of rams invilved in the trial was: 1 Finn, 2 FT and 1 AW. Higher sperm concentration and better sperm motility and sexual activity were found in AW rams than Finn during late summmer, autumn and spring with no seasonal fluctuations in percentage of living spermatozoa. On the other hand, no seasonal fluctuations were reported in semen characteristics or sexual activity of Finn and FT rams. In all breed groups studied, low values for spermatogenesis were recorded during early summer due to high ambient temperature.
Sixty-one and 76 AW ewes were artificially inseminated in the autumn of 1980 and 1981 respectively, using fresh semen from FT rams. Each ewe received on the average 3 inseminations/heat. Lambing rate averaged 80 percent, and was the highest for the fresher semen. Gestation length of AW ewes inseminated was 147 days with a range of 144-151 days. Number of lambs born per AW ewe lambed was 1.02 lambs in 1981.

6.2 Performance of Finn cross lambs

Birth weight of FT x AW (FTA) crossbred lambs did not differ significantly from AW lambs; 3.91 vs. 3.5 kg, respectively (Table 20). At 10 weeks of age the differences became statistically significant for ram-lambs in favour of the crossbred lambs (17.7 vs. 14.4 kg, respectively) while it was non-significant for ewe-lambs (14.9 vs. 14.8 kg, respectively). At 20 weeks of age the differences were 2.6 kg for ram-lambs and 1.1 kg for ewe-lambs. Eight crossbred lambs out of 50 died, 4 of them within the first 2 weeks.
FTA ram-lambs reached puberty early at 6-7 months old, while only 33 percent of FTA ewe-lambs reached puberty by that age. Genes responsible for early sexual maturity are transmitted through crossing with Finn sheep.
Data on slaughtering one single FTA lamb were reported with 37.8 kg slaughter weight and a dressing percentage of 43.9. Weight of internal fat was 0.79 and fat-tail was 0.5 kg.

Table 20: Performance of FT x AW vs. AW lambs in Lebanon.

Trait	Ewe-lambs		Ram-lambs	
	FTA	AW	FTA	AW
Birth wt.(kg)	3.74	3.5	4.12	3.43
10 weeks weight (kg)	14.90	14.8	17.70	14.40
20 weeks weight (kg)	20.60	19.4	24.20	21.60
28 weeks weight (kg)	29.10	23.3	33.20	30.20

7. IRAQI MINISTRY OF AGRICULTURE TRIAL

Two trials with Finn sheep were carried out in Iraq:
A) The first was that planned and executed by the FAO project (IRQ/ 71/542). Twenty-five ewes (10 mature ewes and 15 ewe-lambs) plus 5 rams were imported from Yugoslavia in 1975. It was thought that the animals would adapt better to Iraqi conditions than if imported directly from Finland (Karam, personal communication). The breeding plan was to cross the Finn rams to local Awassi (AW) ewes.
The purebred Finn was badly affected by the prevailing environmental and hygienic conditions. Finn rams had difficulty in mating with AW ewes. Artificial insemination was practised to overcome the problem. Also, AW ewe-lambs were docked early in their life to allow natural mating with the purebred Finn rams.
The trial was reported by Karam (personal communication) as not successful due to lack of proper health care and the non-adaptability of Finn sheep to the prevailing conditions.
B) Later in 1978, the Government of Iraq imported a flock of 175 ewe lambs plus 15 rams from Finland. The flock was raised pure near Mosul, but suffered from health problems and non-adaptability to the environmental conditions. Finn rams were also mated with local Hamadani ewes the reciprocal cross was also produced, but no reports are available on the performance of these crosses.

8. LIBYAN TRIAL

In terms of the number of pure Finn sheep imported, the trial was large-scale. It was started in 1979 by the Libyan Agriculture Research Centre which imported 450 pure Finn ewes and 50 rams from Finland. The flock was raised pure on a farm near El-Marg city in a big agriculture project named "El-gabal El-Akhdar" or Green Hill. The area is relatively of high elevation and has mild weather as compared to the severe desert conditions around.

Soon after the arrival of the flock it faced many difficulties including health problems and poor adaptation. The big flock diminished drastically and the trial was terminated completely within two years.

9. GENERAL CONCLUSIONS AND RECOMMENDATIONS

Many trials with Finn sheep have been carried out over the last two decades albeit in isolation from each other. Such rich experiences were not exchanged between countries of the region, especially in view of the lack of reports in many of these trials. Causes of failure, when they existed, were common among these trials. Sharing experiences between countries in the region would be useful to avoid duplicated efforts in these trials. General conclusions on the introduction of Finn sheep which may be drawn from different trials reported in this paper are as follows:

1. All the trials aiming at breeding pure Finn sheep under subtropical conditions in the region were not successful. Pure Finn sheep faced problems of adaptability to prevailing environmental conditions and had some health problems, especially pneumonia. Bad management contributed significantly to the failure of some of these trials.
2. On the other hand, all the crossbreeding trials with Finn sheep in the region were quite successful. They showed that genetic factors responsible for high prolificacy and good fertility in this breed were transmitted to their crosses with different native subtropical sheep in the same way as with temperate breeds.
3. Pure Finn rams, or nucleus flocks, involved in these crossbreeding trials should not be walked for long distances to the pasture or exposed to direct solar radiation.
4. Difficulties of Finn rams in mating with fat-tail ewes were frequently reported. AI was used successfully to overcome this problem. In some instances it seems easier to train these rams on hand serving the native fat-tailed ewes. Docking of native ewe-lambs is not practical, except on an experimental scale.
5. Prolificacy, defined as number of lambs born/ewe lambed, was improved in the Finn crosses as compared to the native sheep in the region from 33 to 56 percent in the 1st cross and from 19 to 32 percent in the 1/4 Finn. However, most of the Finn crossbred ewes reported had not attained maturity to show their full potentiality.
6. It was interesting to note that Finn crossbred ewes with subtropical sheep showed encouraging results in their ability to breed more than once/year, especially those with lower Finn blood.
7. The preliminary results obtained on the interbred groups of the Finn crosses did not show much drop in ewe reproductive performance. More data are still needed to clear that point.
8. Crossing with Finn rams greatly decreased the fat-tail in the progeny, especially in the first cross. This point should be considered carefully from the point of view of lamb marketability. Crossing with Finn sheep also decreased the amount of subcutaneous fat, but increased internal and intermuscular fat.
9. Results on using terminal sires in the Finn crossbred ewes were not encouraging. Furthermore, it complicated the crossbreeding system for implementation under small farmer conditions and with less educated producers.
10. The utilization of Finn embryos and/or frozen semen in the cross breeding trials with native sheep is worthy of investigation to avoid problems of adaptability of imported Finn rams/sheep and as a possibly less expensive procedure.

11. Evaluation of the results of Finn crosses under breeder conditions is essential before recommending its wide implementation in each country.
12. The ongoing trials should be monitored and evaluated constantly to provide an answer on points which are still obscure.

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