Reproductive Performance And Economic Efficiency Of Finn And Rahmani Ewes And Their Crosses

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ABSTRACT: One hundred and fifty Finn (F) and Rahmani (R) ewes and their crosses including 10 F, 60 R, 50 1/4F 3/4R, 20 1/2F 1/2R and 10 3/4F 1/4R were allotted to fed traditional forage diet (D1) contained concentrate mixture + wheat straw plus fresh berseem, (winter diet) or plus berseem hay and green sorghum (summer diet) or agricultural by-product diet (D2) contained concentrate mixture plus fresh berseem, fresh sugar beet tops or green reed plants (winter diet) or plus dried sugar beet tops or green or dried reed plants (summer diet). Results showed that 81% of ewes were mating during the period from April to August reaching the maximum in July. However, 83% of ewes were lambing from October to April reaching maximum in December. The fertility expressed as ewe lambing per ewe exposed (EL/EE) was higher in crossbred that pure Finn and Rahmani ewes and increased with increasing Rahmani blood. The number of lamb born and weaned per ewe exposed (LB/EE and LW/EE) was higher in the first ewes crossbred of 1/2F 1/2R than the pure breeds and other crosses. Pure Finn recorded the highest number of lamb born and weaned per ewe lambing (LB/EL and LW/EL), lambing ewe per year (EL/Y) and lamb born and weaned per lambing ewe per year (LB/EL/Y and LW/EL/Y), but Rahmani had the lowest values and increased in crossbred ewes with increasing Finn blood. Pure Rahmani breed showed the lowest FC/E/Y and 1/4 F 3/4 R had the higher OLW/E/Y and NR/E/Y, however Finn breed had the highest FC/E/Y and the lowest OLW/E/Y and NR/E/Y. Moreover, the FC/E/Y increased ($P<0.05$) and OLW/E/Y and NR/E/Y decreased ($P<0.05$) with increasing the percent of Finn blood in crossbred.
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INTRODUCTION

The 4.22 million sheep in Egypt are raised mainly in three regions: the Nile Delta, Upper Egypt and in the desert rangelands, particularly in the north-west coastal zone. Production systems and breeds in the three zones are different. There are about one million sheep in the Nile Delta, where agriculture is very intensive. Sheep are raised either by small-scale farmers or in village flocks managed by shepherds (Al-Keraby, 2000).

Egyptian sheep breeds are characterized by extended breeding seasons, high fertility, and low prolificacy. Currently in Egypt efforts are being made to intensify production systems, primarily through changing reproductive management and crossing native breeds with introduced breeds (Almahdy *et al*., 2000). Most crossbreeding schemes studied have been based on crosses between native (Ossimi [O] and Rahmani [R]) and imported breeds (e.g. Merino, Suffolk, Romanov, and Finnish Landrace [F]). The breeding plan was to produce 1⁄4 F 3⁄4 O and 1⁄4 F 3⁄4 R, which were *inter se*-mated to produce (OFO) and (RFR) as target breeds. Evaluation of these breeds has been limited to comparisons based on single-trait measures of biological performance (Aboul-Naga *et al*., 1988).

The objective of this study was to investigate reproductive performance of Finn and Rahmani ewes and their crosses.

MATERIALS AND METHODS

One hundred and fifty Finn (F) and Rahmani (R) ewes and their crosses including 10 F, 60 R, 50 1/4F 3/4R, 20 1/2F 1/2R and 10 3/4F 1/4R were allotted to fed traditional forage diet or agricultural by-product diet. In traditional forage diet (D1, n = 70), ewes were fed concentrate mixture + wheat straw plus fresh berseem (winter diet, from December to May) or plus berseem hay and green sorghum (summer diet, from June to November). While in agricultural by-product diet (D2, n = 80), ewes were fed concentrate mixture plus fresh berseem, fresh sugar beet tops or green reed plants (winter diet) or plus dried sugar beet tops or green or dried reed plants (summer diet). In both diets, ewes were fed to cover the recommended requirements according to Animal Production Research Institute (1997) according to their body weight and reproductive status. The ewes were mating naturally

to groups of rams at each site. The chemical composition of different feedstuffs used in feeding of ewes are presented in Table 1.

Average input and output were determined according the local prices for years 2008-2009. Feed prices (LE/kg) were 1.75 for concentrate mixture, 0.50 for wheat straw, 0.12 for fresh berseem, 0.75 for berseem hay, 0.07 for green sorghum, 0.04 for fresh sugar beet tops, 0.25 for dried sugar beet tops and 0.01 for reed plants. The prices of lambs at weaning (LE/lamb) were 550 for R, 500 for 1/4F 3/4R, 350 for 1/2F 1/2R, 300 for 3/4F 1/4R and 250 for F.

The obtained data were statistically analyzed using general linear models procedure adapted by SPSS (2008) for user's guide. Duncan test within program SPSS was done to determine the degree of significance between means.

RESULTS AND DISCUSSION

Mating season:

The percentage of ewes mating differ significant (P<0.05) among the different months of the year as shown in Table (2). The percentage of were mating during the period from April to August were 81%. The percentage of mating increased from April (15.33%) to rich the maximum at July (19.33%) and then decreased at August (11.33%). However, it was lower at the other months of the year from September to March of the second year. The anoestrous period was about 150 days, which was nearly similar to this obtained by Aboul-Naga *et al.* (1985) being 149.3±16.7 days.

Lambing season:

The percentage of lambing ewes during different months of the year is shown in Table (2). There were significant differences (P<0.05) in the percentage of lambing ewes among the different months. The percentage of were lambing during the period from October to April were 83%. The percentage of lambing ewes increased significantly (P<0.05) from October (8.11%) to rich the maximum in December (18.02%) and then decreased until April (8.11%). This period was suitable for lambing because the presence of berseem, which used in feeding ewes and lambs as well as suitable weather conditions. These results agreed with those obtained by Boujenane *et al*. (2005) who found that flocks that rely on pasture for their nutrition should avoid summer lambing, which results in low ewe and lamb performance.

Number of ewe lambing/ewe exposed (EL/EE):

Results in Table (3) revealed that the pure Finn ewes showed the lowest fertility expressed EL/EE (0.65) and Rahmani (0.74). While, the first cross 1/4F 3/4R had the highest EL/EE (0.88), which increased by 0.23 and 0.14 compared with pure Finn and Rahmani breeds and by 0.05 than 1/2F 1/2R cross and 0.10 than 3/4F 1/4R cross. The most interesting result is that the Finn crossbred ewes showed better fertility than Rahmani. These results agreed with those obtained by Aboul-Naga (1985) who found that the fertility rate of first cross of Finn and both Rahmani and Ossimy was higher than the pure breeds. Afolayan *et al.* (2008) reported that ewe sire breed effects were significant ($P < 0.01$) for all the reproductive traits.

Number of lamb born and weaned/ewe exposed (LB/EE and LW/EE):

The first ewes crossbred of 1/2F 1/2R recorded the highest LB/EE and LW/EE being 1.36 and 1.18, which increased by 0.40 and 0.31; 0.12 and 0.23; 0.21 and 0.20; and 0.04 and 0.08 compared with Rahmani ewes; Finn ewes; 1/4F 3/4R and 3/4F 1/4R, respectively. The LB/EE and LW/EE for crossbred ewes increased significantly (P<0.05) assuming linear relationship with a proportion of Finn blood as shown in Table 3. These results agreed with those obtained by Aboul-Naga *et al*. (1988) who reported that although the pure Finn ewes showed the lowest fertility among different breed groups, they were able to maintain their high prolificacy under prevailing subtropical conditions.

Number of lamb born and weaned/ewe lambing (LB/EL and LW/EL):

The highest prolificacy expressed as LB/EL and LW/EL was detected in Finn ewes, but the lowest values was in Rahmani ewes and increased significantly (P<0.05) in their crosses with increasing the percent of Finn blood as presented in Table 4. The 1/4F 3/4R, 1/2F 1/2R and 3/4F 1/4R performed significantly better prolificacy than the local ewes, which gave birth to 0.04, 0.29 and 0.39 more lambs and weaned 0.05, 0.20 and 0.25 more lambs/ewe lambed than the corresponding Rahmani, respectively. These results are in agreement with those obtained by Aboul-Naga *et al*. (1988) who found that pure Finn and their crosses with local breeds recorded more birth and weaned lambs per ewe lambing than the corresponding local breeds. Notter and McClaugherty (1991) reported that Finn blood increased prolificacy (lambs born per ewe lambing).

Lambing ewes, lamb born and lamb weaned per ewe per year (LE/Y, LB/E/Y and LW/E/Y):

The pure Finn ewes showed the highest number of EL/Y, LB/EL/Y and LW/EL/Y but Rahmani ewes had the lowest values (Table 5).

Moreover, The EL/Y, LB/EL/Y and LW/EL/Y of Finn and Ramany crossbred ewes increased significantly (P<0.05) with increasing the percent of Finn blood. Such performance resulted in a detectable improvement in annual number of lambs produced/ewe in the Finn and their crosses over the Rahmani ewes. These results are in accordance with those obtained by Aboul-Naga (1985) who found that 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. Aboul Naga *et al*. (1988) reported that the advantage of Finn and cross ewes over the locals was more detectable in annual lambs weaned/ewes.

Economic efficiency:

Economic efficiency parameters expressed as feed cost (FC/EL/Y), output of lamb weaned (OLW/EL/Y) and net revenue (NR/EL/Y) per ewe lambing per year are shown in Table 6. Pure Rahmani breed showed the lowest FC/EL/Y and 1/4 F 3/4 R had the higher OLW/EL/Y and NR/EL/Y, however Finn breed the highest FC/EL/Y and the lowest OLW/EL/Y and NR/EL/Y. Moreover, the FC/E/Y increased (P<0.05) and OLW/E/Y and NR/E/Y decreased (P<0.05) with increasing the percent of Finn blood in crossbred. The higher FC/EL/Y for Finn breed as well as with increasing its blood percent in crossbred may be attributed to higher body weight and subsequently increasing feed intake compared with Rahmani breed. The higher OLW/EL/Y and NR/EL/Y for Rahmani breed as well as with increasing its blood percent in crossbred might be due to the higher marketing price of Rahmani (550 LE) compared with Finn (250 LE). These results agreed with those obtained by Aboul-Naga *et al*. (1988) who found that the 1/4 F 3/4R showed better performance in their prolificacy than expected, assuming linear relationship with a proportion of Finn blood. Ahmed (2005) reported that the internal rate of return and gross margin per head of breeding ewes were used as measures of the project worth. Both biological and economic evaluation criteria improved as frequency of lambing increased and more breeds were used for crossing in the system.

Table 1. Chemical composition of different feedstuffs used in feeding of ewes.

Feedstuffs	DM %	Composition of DM %					
		OM	CP	CF	EE	NFE	Ash
Concentrate mixture	91.36	92.18	14.74	13.65	3.42	60.33	7.82
Fresh berseem	15.83	88.45	15.62	27.67	2.54	42.62	11.55
Berseem hay	90.42	87.36	12.73	29.46	1.39	43.78	12.64
Wheat straw	92.78	89.03	1.83	36.72	0.85	49.63	10.97
Green sorghum	19.65	88.84	9.35	28.15	1.63	49.71	11.16
Green sugar beet tops	12.47	77.31	15.28	12.54	2.86	46.63	22.69
Dried sugar beet tops	88.76	75.07	12.32	12.69	2.71	47.35	24.93
Green reed plants	18.43	87.53	8.81	32.27	1.92	44.53	12.47
Dried reed plants	86.85	86.06	6.63	34.82	2.07	42.54	13.94

Table 2. The percentages of mating and lambing ewes for the different months.

Month	Ewe mating		Ewe lambing	
	n	%	n	%
January	4	2.67^{ef}	17	15.32^{b}
February	5	3.33^{e}	12	10.81^{d}
March	6	$4.00d^{e}$	10	9.01^{de}
April	23	15.33^{b}	9	8.11^{e}
May	25	16.67^{ab}	5	4.50^{f}
June	27	18.00^{ab}	4	3.60^{fg}
July	29	19.33^{a}	3	2.70^{fg}
August	17	11.33^{c}	2	1.80^{g}
September	8	5.33^{d}	5	4.51^{f}
October	1	0.67^{f}	9	8.11^{e}
November	2	1.34^{ef}	15	13.51^{c}
December	3	2.00^{ef}	20	18.02^{a}
Total	150	100	111	100

a, b, c, d, e, f, g: Means in the same column with different superscripts differ significantly (P<0.05).

Table 3. Number of ewe lambing (EL), lamb born (LB) and lamb weaned (LW) per ewe exposed (EE).

Item	N	EL/EE	LB/EE	LW/EE
Rahmani (R)	60	0.74^{c}	0.96^{e}	0.87^{d}
1/4F 3/4R	50	0.88^{a}	1.15^{d}	0.98^{c}
1/2F 1/2R	20	0.83^{ab}	1.36^{c}	1.18^{b}
3/4F 1/4R	10	0.78^{bc}	1.32^{b}	1.10^{b}
Finn (F)	10	0.60^{d}	1.24^{a}	0.95^{a}

a, b, c, d: Means in the same column with different superscripts differ significantly (P<0.05).

Table 4. Number of lamb born (LB) and lamb weaned (LW) per ewe lambing (EL).

Item	N	LB/EL	LW/EL
Rahmani (R)	60	1.31^{e}	1.18^{e}
1/4F 3/4R	50	1.34^{d}	1.23^{d}
1/2F 1/2R	20	1.60^{c}	1.38^{c}
3/4F 1/4R	10	1.70^{b}	1.43^{b}
Finn (F)	10	2.06^{a}	1.56^{a}

a, b, c, d, e: Means in the same row with different superscripts differ significantly (P<0.05).

Table 5. Lambing ewes (LE/Y), lamb born (LB/EL/Y) and lamb weaned (LW/EL/Y) per ewe per year.

Item	N	EL/Y	LB/EL/Y	LW/EL/Y
Rahmani (R)	60	1.09^{d}	1.42^{e}	1.28^{e}
1/4F 3/4R	50	1.25^{c}	1.67^{d}	1.53^{d}
1/2F 1/2R	20	1.34^{bc}	2.12^{c}	1.82^{c}
3/4F 1/4R	10	1.41^{b}	2.35^{b}	1.99^{b}
Finn (F)	10	1.53^{a}	3.12^{a}	2.36^{a}

a, b, c, d, e: Means in the same row with different superscripts differ significantly (P<0.05).

Table 6. Annual feed cost (FC/EL/Y), output of lamb weaned (OLW/EL/Y) and net revenue (NR/EL/Y) per ewe lambing.

Item	N	FC/EL/Y	OLW/EL/Y	NR/EL/Y
Rahmani (R)	60	359^{d}	704^{b}	326^{b}
1/4F 3/4R	50	368^{cd}	765^{a}	397^{a}
1/2F 1/2R	20	375^{bc}	637^{c}	242^{c}
3/4F 1/4R	10	385^{b}	597^{d}	192^{d}
Finn (F)	10	396^{a}	590^{d}	173^{e}

a, b, c, d, e: Means in the same row with different superscripts differ significantly (P<0.05).

CONCLUSION

From these results it could be concluded that 1/4F 3/4R ewe was suitable as crossbred which was easily managed by farmers, prevailing environmental conditions, closer to the local sheep and have a reasonable size fat tail which is a determinant factor in consumer preference and price in the market.

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