Pre- and Post-Weaning Growth Performance and Economic Efficiency of Rahmani and Finn Lambs and Their Crosses

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Abstract: Total of 214 born lambs included 78 Rahmani (R), 67 1/4F 3/4R, 32 1/2F 1/2R, 17 3/4F 1/4R and 20 Finn (F) were suckled their dams only until three weeks of age. From three weeks of age up to weaning at four months of age, lambs suckled their mothers freely and given green berseem (*Trifolium alexandrinum)* or berseem hay plus 100 g/day/head of ground grain mixture. From 4 to 8 months of age lambs were fed concentrate mixture, wheat straw plus fresh berseem or green sugar beet tops (winter diet) or plus berseem hay or green sorghum or dried sugar beet tops or green reed plants (summer diet). Mortality rate was significantly higher (P<0.05) in Finn sheep compared with Rahmani and increased significantly (P<0.05) with increasing Finn blood in crossbred. Average body weight at birth, weaning and 8 month of age and average daily gain (ADG), DM intake, feed conversion, average daily feed cost, price of ADG and net revenue during pre, post-weaning and whole periods were significantly higher (P<0.05) for Rahmani than Finn lambs and decreased significantly (P<0.05) with increasing Finn blood in crossbred**.**
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Key words: Rahmani, Finn, cross lambs, body weight gain, feed conversion and economic efficiency.

1. Introduction

Sheep contribute 6% of the total red meet produced in Egypt. The total sheep population in Egypt is 4,200,000 heads. Rahmani, Ossimi, and Barki, are of the main sheep breeds in Egypt with a population of 990,000, 514,000 and 470,000 respectively (Galal *et al*., 2005). Lambs born as singles recorded a higher (P<0.01) post-weaning ADG (16 g/day) than lambs born as twins (Yilmaz *et al*., 2007). Genetic group, litter size, season of birth and birth weight were significant sources of variation in the ADG and weaning weight of the lamb. Season of birth and birth weight also significantly affected pre-weaning lamb survival. About 86% of the lambs born alive were weaned with little difference between genetic groups in survival rates (Malik *et al*., 1996). Single born lambs were heavier than multiple born lambs. Single born lambs had better opportunities in the mother's wombs than the twins or triplets and were hence heavy at birth. The male lambs generally stay slightly longer in mother's womb than females and hence heavier at birth (Babar *et al*., 2004). Wojtowskt *et al*. (1990) found that effect of year and month of birth, type of birth (single, twin or triplet), sex, and age of dam were significant on birth weight. The significantly positive influence of birth weight on earliest postnatal growth rate diminished with increasing age of lambs. A negative effect of litter size was observed on birth weight and on early postnatal growth results until 10 kg (Peeters *et al*., 1996). The 1/4 Finn lambs showed significantly (P<.05) better daily gain and better body conformation than the locals (Fahmy, 1986). The objective of this study was to investigate pre and post weaning performance of Finn and Rahmani and their crosses lambs.

2. Materials and methods

A total of 214 born lambs included 78 Rahmani (R), 67 1/4F 3/4R, 32 1/2F 1/2R, 17 3/4F 1/4R and 20 Finn (F) were suckled their dams only until three weeks of age. From three weeks of age up to weaning at four months of age, lambs suckled their mothers freely. A green berseem (*Trifolium alexandrinum)* in winter or berseem hay in summer was available all the time to lambs. To enhance growth rate of lambs an average

allowance of 100 g/day/head of a ground grain mixture was given as a creep feeding. From 4 to 8 months of age lambs were fed concentrate mixture, wheat straw plus fresh berseem or green sugar beet tops (winter diet) or plus berseem hay or green sorghum or dried sugar beet tops or green reed plants (summer diet). The concentrate mixture consisted of 35% yellow corn, 35% barley and 30% soybean meal. Lambs were fed to cover the recommended requirements according to Animal Production Research Institute (1997) according to their body weight and body weight gain. The chemical composition of different feedstuffs used in feeding of lambs is presented in Table 1.

The feed conversion was calculated as the amount of DM per kg live body weight gain. Simple economical evaluation was calculated for the feed cost of ewes during the pregnant and suckling periods and the output of lamb weaned per ewe. Net revenue was calculated as the difference between output and feed cost per ewe. Average input and output were determined according the local prices for years 2009-2010. The 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, 0.01 for green reed plants and 23 for live body weight gain.

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.

3. Results and discussion

3.1. Mortality rate

As shown in Table (2), mortality rate was significantly higher (P<0.05) in Finn sheep compared with Rahmani and increased significantly (P<0.05) with increasing Finn blood in crossbred. The relationship between birth weight and mortality was quadratic (P<0.001); mortality was minimized at birth weights of 5.2 kg **(**Notter and Copenhaver, 1980**).**

3.2. Body weight and daily gain

Average body weight at birth, weaning and 8 month of age and average daily gain (ADG) during pre, post-weaning and whole periods were significantly higher (P<0.05) for Rahmani than Finn lambs and decreased significantly (P<0.05) with increasing Finn blood in crossbred (Table 3). Rahmani lambs showed the highest ADG, but Finn lambs had the lowest ADG (171.29 vs. 121.71 g/day). Lambs from 1/2 Suffolk, 1/2 Rambouillet (SR) and 1/4 Finnish Landrace, 3/4 Rambouillet (1/4 Finn) ewes grew faster than lambs from 1/2 Finnish Landrace, 1/2 Rambouillet (1/2 Finn) ewes both preweaning (303 and 298 *vs* 279 g/day; P<.005) and postweaning (253 and 241 *vs* 232 g/day; P<.05) and were heavier at 45 days (18.2 and 17.9 *vs* 16.4 kg; P<.001) and 150 days (45.3 and 43.3 *vs* 40.9 kg; P<.005). Lambs from SR and 1/4 Finn ewes did not differ significantly in preweaning or postweaning daily gain **(**Notter and Copenhaver, 1980**).** One of the factors affecting economical sheep meat production is the higher growth (Guney and Bicer, 1986). Crossbreeding could be exploited as a genetic improvement tool for enhancing weaning weight and average daily gains of lambs (Afolayan *et al*., 1999). Birth and weaning weights of lambs were affected by the lamb's genotype (Koycegiz *et al*., 2009).

3.3. Feed intake and conversion

The average DM intake during pre, post-weaning and whole periods was significantly higher (P<0.05) for Rahmani compared with Finn lambs and decreased significantly (P<0.05) with increasing the percentage of Finn blood in cross lambs (Table 4). These results may be a reflection to the differences in live body weight of lambs. Moreover, Rahmani lambs recorded better feed conversion compared with Finn lambs. The DM requirement per kg body weight gain during pre, post-weaning and whole periods was significantly lower (P<0.05) for Rahmani compared with Finn lambs and increased significantly (P<0.05) with increasing the percentage of Finn blood in cross lambs. One of the factors affecting economical sheep meat production is the higher feed conversion efficiency of the material used (Guney and Bicer, 1986).

3.4. Economic efficiency

Results in Table (5) showed that average daily feed cost, price of ADG and net revenue during pre, post-weaning and whole periods were significantly higher (P<0.05) for Rahmani compared with Finn lambs and decreased significantly (P<0.05) with increasing the percentage of Finn blood in cross lambs. One of the factors affecting economical sheep meat production is the higher feed conversion efficiency of the material used (Guney and Bicer, 1986).

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
Grain mixture	92.45	93.24	18.92	5.86	2.94	65.52	6.76
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

Table 2. Mortality rate (%).

Item	Rahmani (R)	3/4R-1/4F	1/2R-1/2F	1/4R-3/4F	Finn (F)	SEM	P-value
Pre-weaning	8.23^{c}	9.94^{c}	13.80^{b}	15.92^{b}	21.37^{a}	1.28	0.005
Post-weaning	5.51^{d}	6.65^{cd}	9.06^{bc}	11.43^{b}	14.72^{a}	0.94	0.004
Mean	6.87^{c}	8.30^{c}	11.43^{b}	13.67^{b}	18.05^{a}	1.11	0.005

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

Table 3. Body weight and average daily gain.

Item	Rahmani (R)	3/4R-1/4F	1/2R-1/2F	1/4R-3/4F	Finn (F)	SEM	P-value
Body weight (kg)							
At birth	3.26^{a}	2.82^{ab}	2.32^{bc}	1.90^{cd}	1.72^{d}	0.16	0.006
At weaning	22.70^{a}	19.78^{b}	17.08^{c}	15.06^{cd}	13.03^{d}	0.97	0.005
At 8 month	44.37^{a}	40.51^{ab}	36.70^{bc}	33.73^{cd}	30.93^{d}	1.38	0.006
Average daily gain (g)							
Pre-weaning	162.00^{a}	141.33^{b}	123.00^{c}	109.67^{cd}	94.25^{d}	6.70	0.004
Post-weaning	180.58^{a}	172.75^{ab}	163.51^{bc}	155.59^{c}	149.16^{c}	3.53	0.006
Mean	171.29^{a}	157.04^{ab}	143.26^{bc}	132.63^{cd}	121.71^{d}	5.08	0.004

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

Table 4. Average feed intake and feed conversion.

Item	Rahmani (R)	3/4R-1/4F	1/2R-1/2F	1/4R-3/4F	Finn (F)	SEM	P-value
Feed intake (g DM/day)							
Pre-weaning	510.48^{a}	454.52^{ab}	404.23^{bc}	371.11^{cd}	329.12^{d}	18.60	0.002
Post-weaning	1148.17^{a}	1114.33^{ab}	1069.55^{abc}	1031.68^{bc}	1002.32^{c}	17.89	0.029
Mean	829.32^{a}	784.42^{ab}	736.89^{bc}	701.40^{c}	665.72^{c}	18.05	0.005
Feed conversion (kg DM/kg gain)							
Pre-weaning	3.15^{c}	3.21^{c}	3.28^{bc}	3.38^{ab}	3.50^{a}	0.04	0.006
Post-weaning	6.36^{c}	6.45^{bc}	6.54^{abc}	6.63^{ab}	6.72^{a}	0.04	0.009
Mean	4.84^{d}	5.00^{cd}	5.14^{bc}	5.29^{ab}	5.47^{a}	0.06	0.002

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

Table 5. Economic efficiency.

Item	Rahmani (R)	3/4R-1/4F	1/2R-1/2F	1/4R-3/4F	Finn (F)	SEM	P-value
Feed cost (LE/day)							
Pre-weaning	1.79^{a}	1.59^{ab}	1.41^{bc}	1.30^{cd}	1.15^{d}	0.07	0.003
Post-weaning	2.30^{a}	2.23^{ab}	2.14^{abc}	2.06^{bc}	2.00^{c}	0.04	0.026
Mean	2.04^{a}	1.91^{ab}	1.78^{bc}	1.68^{c}	1.58^{c}	0.05	0.007
Price of average daily gain (LE/day)							
Pre-weaning	3.73^{a}	3.25^{b}	2.83^{c}	2.52^{cd}	2.17^{d}	0.15	0.002
Post-weaning	4.15^{a}	3.97^{ab}	3.76^{bc}	3.58^{c}	3.43^{c}	0.08	0.006
Mean	3.94^{a}	3.61^{ab}	3.29^{bc}	3.05^{cd}	2.80^{d}	0.12	0.002
Net revenue (LE/day)							
Pre-weaning	1.94^{a}	1.66^{b}	1.41^{c}	1.22^{c}	1.02^{d}	0.09	0.002
Post-weaning	1.86^{a}	1.74^{ab}	1.62^{bc}	1.52^{cd}	1.43^{d}	0.05	0.004
Mean	1.90^{a}	1.70^{b}	1.52^{c}	1.37^{cd}	1.22^{d}	0.07	0.002

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

4. Conclusions

From these results it could be concluded that Rahmani lambs showed the lowest mortality rate and increased with increasing the percentage of Finn blood and the best growth rate, feed conversion and economic efficiency and decreased with increasing the percentage of Finn blood.

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