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A STUDY ON SMALL RUMINANT PRODUCTION SYSTEM IN EGYPTIAN VILLAGES

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SUMMARY

This study included data on 75 flocks colleced over 5 years period in three villages of Sharkeia governorate. The data was analyzed to indicate pattern of ownership, flock structure and small ruminant reproductive performance.

Average farm size is 2.14 acres where about 96 % of the families have access to farms of 5 or less acres. Average family size is 7.2 individuals.

Eighty four percent of farmer's flocks contain less than 10 adult females. As flock size increased, tendency of keeping mixed flocks increased with increasing proportion of sheep to goats in the flocks.

Average litter size was 1.25 for sheep and 2.0 for goats. Prolificacy traits were significantly improved by increasing age of dams, with goats showing more pronounced increase than sheep up to three years old, after which they behaved similar.

Goats showed more stable weaning weight in different seasons which may be refered to that goats are more efficient in utilizing and selecting available by-products.

Number of litter weaned was 1.01 and 1.37 while kilograms of litter weaned was 21.02 and 16.24 kg for ewes and does, respectively. Annual lambing and kidding per ewe and doe was 1.22 and 1.16, respectively. Mature weight was 46.4 kg for ewes and 26.0 kg for does.

Sheep showed an appreciable advantage in annual kilograms of lambs produced per ewe compared with doe (25.6 vs. 18.77 kg). When productivity was related to dam metabolic body weight, goats became better (1.63 vs. 1.44 kg).

Keywords: sheep, goats, production systems, reproductive performance.

INTRODUCTION

Small ruminants plays efficient role in enhancing income of small holders. Its relative small input requirements and capital investment, per head, allows farmers to more efficiently utilize their limited resources.

To improve SR production it is necessary to evaluate the performance of indigenous species under owners conditions. Such data collected on farm level consider all factors which affect the performance parameters.

The aim of this work to evaluate the production of SR kept with small holders under the irrigated agriculture system in Egypt.

MATERIAL AND METHODS

The data source of this study came through a periodical visits, every two weeks, for 75 farms in three villages of Sharkeia governorate, east of the Nile delta. These farms were selected randomly from those having small ruminants in their farms. The data collected covered five years period from 1990 to 1995 and recorded data on 968 lambings and 239 kiddings.

All animals in the studied flocks were ear tagged and given age. Data collected during the visits included litter weaning weight, reproductive performance and dam weights at parturition. Weaning weights were taken at 120 ± 7 days of age, then adjusted to 120 days by using linear extrapolation from birth to weaning.

Genotypes which dominate in the studied area were Ossimi sheep and Baladi goats. The goats have mostly black long hair.

The prevailent production system is characterized with free mating, insufficient disease control and low external inputs. Feeding, from December to May, depends mainly on Egyptian clover (Berseem) while over the rest of the year animals scavenge crop residues and stubble beside household waste .

Data were analyzed by least-squares mixed procedures (SAS, 1987). For analyzing prolificacy traits and parturition interval, the following model was used :

$$Y_{ijklm} = \mu + V_i + b_j + a_k + G_L + S_m + (ba)_{jk} + (bs)_{jm} + e_{ijklm}$$

where

Y_{ijklm} = estimated value; μ = population mean; V_i = random effect of village; b_j = fixed effect of species; a_k = fixed effect of ewe/doe age; G_L = fixed effect of year; S_m = fixed effect of season of parturition; (ba)jk = interaction between species and age for each ewe or doe; $(bs)_{jk}$ = interaction between species and season of parurition; e_{ijklm} = residual term.

The fixed effect of year was not included in the model used to analyze the parturition interval.

RESULTS AND DISCUSSION

Patterns of ownership

Table 1 indicates that 96 % of families in Sharkeia have access to farms of 5 or less acres, which reflects the density of the human population on the old cultivated lands in Egypt. This has resulted in the partitioning of lands into small farm holdings which average 2.14 acres in size. In the new reclaimed areas, such as Ismailia governorate, 63 % of the farm holdings are less than 5 acres with average farm size of 5.6 acres (Abdel - Rahiem, 1990).

Table 2 indicates that family size increased parallel to land ownership, which means that increasing lands belonging to families is not necessarily accompanied with better standard of living. On the average, 22 % of family members are working in agricultural activities. This percentage was reduced to 17.6 % for families who own 3-5 acres and to 12 % for those who own more than 10 acres.

Table 1 Farm size ownership (acre) represented by percent of families owing land.

Village	Areas of lands in use (acre)										
	1&less		>1 to 3		> 3 to 5		> 5 to 10		> 10		Av.
	No	%	No	%	No	%	No	%	No	%	
1	11	36.7	14	46.7	4	13.3	1	3.3			2.04
2	8	33.3	12	50.0	3	12.5	1	4.2			2.36
3	7	33.3	11	52.4	2	9.5			1	4.8	2.03
Overall	26	34.7	37	49.3	9	12.0	2	2.7	1	1.3	2.14

Table 2: Family size as related to farm size.

Village		Farm size (acre)					
		1 & less	>1- 3	>3- 5	>5-10	> 10	Overall mean
1	Family size	6.6	7.5	9.6	8.7	15.4	7.6
	Adults in agric. activities	1.6	1.8	1.9	2.1	2.2	1.8
2	Family size	5.5	6.6	8.0	11.3	14.3	6.7
	Adults in agric. activities	1.2	1.5	1.0	2.5	0.8	1.4
3	Family size	6.3	7.0	9.4	8.0	5.5	7.0
	Adults in agric. activities	1.2	1.6	1.8	2.0	1.5	1.5
Overall	Family size	6.2	7.1	9.1	9.4	13.2	7.2
	Adults in agric. activities	1.4	1.7	1.6	2.2	1.6	1.6

In villages men are usually involved in cropping activities while women and children contribute more in livestock production activities. Keeping livestock allows good opportunity for consuming unoccupied labor hours of family members.

Flock size

Table 3 indicates that family size is the main social factor of positive effect ($p<0.01$) on flock size. On the other hand, number of adults, in the family, working in agriculture had no significant effect on farm flock size, which may be referred to that responsibility of care with SR is handled mainly by women, children and old members. Farmer's land in use was of non significant impact on flock size.

This light correlation was reported in other studies in developing countries (Levine, 1982 and Thomas et al., 1982) reflecting that lands devoted specifically to SR, in most small farm systems, is generally small or negligible.

The relationship between number of large and small ruminants was negative but not significant.

Concerning the species kept by farmers, Table (4) shows that small holders having less than 5 heads mostly keep one species. Whereas, 71 % of farmers keep either sheep or goats, only 29% keep mixed flocks. Tendency to keep mixed flocks increase with increasing flock size from 5 to 20 heads. Sixty three to 80 % of farmers keep mixed flocks while 8 - 13 % keep sheep only and 12 - 25 % keep goats only. Farmers keeping more than 20 heads mostly keep mixed flocks.

Table 4 shows that in mixeflocks of up to 20 heads size, sheep comprised around 48 % of the flock, while flocks of more than 20 heads sheep comprised around 85 %. This trend could be explained on basis of the previous information collected on flocks of the north coastal zone of Egypt (Aboul Naga, 1987) that goat's are kept for household requirements while sheep is related to commercial activities and capabilities of the owners.

Table 3 : Regression, as a measure of the role of some factors on farmer's flock size.

	Regression estimates	Standard error	Probability estimates
Intercept	1.97	0.87	0.02
Large ruminants owned by family	-0.04	0.11	0.72
Family size	0.57	0.14	0.0001
Adults working in agric. activities	0.01	0.01	0.20
Lands in use	0.01	0.01	0.36

Table 4: Frequency of flock size and sheep/goat ratio among these flocks.

Flock structure	Flock size									
	< 5		5 - 10		11 - 20		21 - 30		> 30	
	No.	%	No.	%	No.	%	No.	%	No.	%
Sheep only	13	34.2	2	8.0.	1	12.5	0	0	0	0
Goats only	14	36.8	3	12.0	2	25.0	0	0	0	0
Mixed flocks	11	28.9	20	80.0	5	62.5	2	100	2	100
Sheep% in mixed flocks	49.1		47.1		47.2		86.8		84.1	
Frequency of flock size	50.7		33.3		10.7		2.7		2.7	

In Egypt, SR flocks differe in size among diferent regions governed with different agricultural systems. In village system, 84 % of the flocks were consisted of less than 10 adult females (Table 4). In the arid range lands, Aboul Naga (1987) found that SR flock size average 255 heads while in new reclaimed areas Abdel- Rahiem (1990) found that 58.3 % of the breeders owned 5 - 24 heads.

Data illustrated in Table 5 indicates that in village flocks the productive females, of more than 18 mo old, generally represented 47.9 and 35.4 % of sheep and goats flocks, respectively. On the other hands, percentage of animals of less than one year old was more in goats flock (26.7 %) than sheep flocks (21.7 %). This may be referred to the larger litter size in goats compare to sheep.

Percentage of mature males was relatively more in goat flocks (9.4 %) than sheep flocks (4.5 %). This may due to that families left more of male goats to grow with the flock to be used for social occasions either by selling or slaughtering while male lambs mostly sold shortly after weaning.

Small ruminant productive performance

It is evident, as shown in Table 6, that goats are superior than sheep in twinning rate. The average litter size was found to be 1.25 for ewes vs. 2.0 for goats. These figures are comparable with those reported by others under research stations, which ranged for sheep from 1.14 to 1.28 under 1 crop/year system; Ragab and Asker (1954), Aboul Naga (1985) and Aboul Naga *et al.* (1987) and from 1.07 to 1.23 under 3 crops/2 years system; Al Mahdy (1987) and Zahed (1988), while for goats estimates of 1.84 to 2.1 were reported by Shalash *et al.* (1970) and Aboul Naga (1989). Tantawi and Ahmad (1960) gave, under station condition, a close estimate of 76 % for multiple birth in Baladi goats.

Table 5: Age structure of sheep and goats in the village flocks.

Age	Sheep		Goats	
	Females, %	males, %	Females, %	males, %
< 12 mo.	11.5 ± 2.8	10.2 ± 3.3	15.7 ± 3.0	11.0 ± 4.0
12 - 18 mo.	14.8 ± 1.8	10.3 ± 2.0	17.5 ± 3.1	10.6 ± 1.7
> 18 mo.	47.9 ± 5.6	4.5 ± 2.0	35.4 ± 5.4	9.4 ± 3.1

Table 6 : Incidence of multiple birth in sheep and goats.

Litter size	Sheep		Goats	
	No.	%	No.	%
Single	691	71.4	54	22.6
Twins	270	27.9	124	51.9
Triplet	7	0.7	43	18.0
Quadruplets	0	0.0	16	6.7
Quantuplets	0	0.0	2	0.8
Litter size	1.25		2.00	

The highly significant differences among villages in all prolificacy traits (Table 7) reflects that the feeding system practiced in the Egyptian villages don't adjust for the actual requirements of animals as it depend mainly on consuming agri- by-products, which varied in their availability from site to site.

Table 7. Probabilities of some factors affecting prolificacy traits for ewes and does.

Variables	L B / EL	LW / EL	KW / EL
Village	0.0028	0.0008	0.0001
Species (Sp.)	0.0001	0.0001	0.0001
Age of dam (Ag)	0.0001	0.0001	0.0001
Year	0.0056	0.1180	0.2680
Season (Se)	0.0053	0.0480	0.2370
Sp. x Ag	0.0001	0.0001	0.1040
Sp. x Se	0.3880	0.0010	0.0010

EL : ewe lambed or doe kidded, LB : lambs born or kids born,
LW : Lambs or kids at 4 mo. old, KW : Lambs or kids weight at 4 mo.(kg)

The difference between sheep and goats in all production traits is highly significant. It is evident from Table 8 that there was species difference in reproductive performance with advance of age from 18 to 36 months of age with less increase thereafter. Goats showed a greater improvement in litter either born or weaned (0.75 and 1.05) than sheep (0.17 and 0.21), respectively. Increase of age over 3 years was also accompanied with increase of both litter born and weaned, but their increasing rates were similar for the two species, being 0.15 and 0.09 for goats and 0.13 and 0.10 for sheep, respectively.

Table 8: Age effect on reproductive performance of sheep and goats.

Age of dam	Sheep			Goats		
	No.	LB/EL	LW/EL	No.	KB/DK	KW/DK
< 18 mo.	117	1.09	0.84	23	1.45	0.64
18 - 36 mo.	450	1.26	1.05	158	2.20	1.69
rate of increase with age		0.17	0.21		0.75	1.05
> 36 mo.	403	1.39	1.15	58	2.35	1.78
rate of increase with age		0.13	0.10		0.15	0.09

LB: lambs born, KB: kids born, LW: lambs weaned, KW: kids weaned, EL:ewe lambed, DK: doe kidded.

Season and year significantly affected litter size (Table 7). These effects were reduced at weaning where year effect became non significant while season was of less significance. The pronounced effect on litter size as monitored by dam condition is confirmed by the findings that ovulation rate is affected by the low feeding level of dam just before and during breeding (Wallace , 1961 and Coop, 1962) and that embryonic mortality increased by low level of nutrition during the early stages of pregnancy (McDonald, 1962). Likewise, number of litter weaned could be modified by improving management offered, espicially nutrition.

Species difference, in response to season, was recognized (Table 9). Sheep exhibited more lamb losses and lighter weaning weights in summer and autumn seasons. Goats, oppositely, showed the minimum kid losses in summer while exhibited light changes in kids weights over seasons. Aboul Naga (1983) referred the high lamb losses during summer to heat stress, beside low sanitary measures that render contagious diseases possibe.

Table 9: Season effect on reproductive performance of sheep and goats.

Season of parturition	Sheep				Goats			
	LB/EL	LW/EL	KgW/EL	Wt.at weaning, kg	KB/DK	KW/DK	KgW/DK	Wt.at weaning, kg
Winter	1.2	1.0	24.1	24.1	1.9	1.2	15.2	12.7
Spring	1.3	1.1	23.2	21.1	2.0	1.3	15.9	12.2
Summer	1.2	0.9	16.9	18.8	2.0	1.6	18.4	11.5
Autumn	1.3	1.0	19.9	19.9	2.1	1.3	15.4	11.8

The relative stable kids weaning weight, among seasons, could be referred to that goats are more efficient in utilizing and selecting variable by-products available in different seasons. Demment and Van Soest (1982) reported that goats utilize a broader range of plant species than either sheep or cattle. Goats also can stand weather as they tolerate excessive heat more efficiently than sheep.

Lambing or kidding interval is a product or expression of several factors affecting the reproductive performance of the females. Table 10 shows that season of parturition was the most important factor, while location, species, dam age and interactions among them are not of significance. Season is a reflection of environmental factors beside the type of feeding available due to crop rotation. Day length was recognized as a main factor influencing estrous activity (Legan and Karsch, 1979). Nutritional status of dams during late gestation and early lactation proved to play an important role on duration of post partum estrous (Kann and Martinet, 1975).

Table 10 : Significance of some factors affecting Lambing and kidding interval.

Source	D.F.	Mean Squares	P
Village	2	9.52	0.22
Species (Sp)	1	9.92	0.21
Dam age (Ag)	2	6.6	0.35
Season of lambing/kidding (Se)	3	49.96	0.0001
Sp x Ag	2	12.73	0.13
Sp x Se	3	0.59	0.97

Table 11 shows that incidence of parturition is spread over the year in both species. Event of lambing seems more scattered over the year than kidding. Winter showed the highest lambing and kidding incidence which indicates that summer is the most active breeding season in Egypt which agrees with the finding of Ashmawi (1979) on goats and Aboul Naga (1983) on sheep. Aboul- Ela *et al.* (1988) found that estrous activity in both sheep and goats dropped in spring with one month earlier in does.

Table 11 : Distribution of lamming and kidding over the year.

	Season			
Species	Winter	Spring	Autumn	Summer
Sheep	33.4	28.45	14.43	23.71
Goats	40.58	28.46	15.07	15.9

As evident from Table 12, parturition interval was 9.85 and 10.38 mo for sheep and goats, respectively which could be expressed as 1.22 and 1.16 times/ year for sheep and goats, respectively. This compares well with other studies on local breeds under different management systems of experimental farms (1.08 to 1.25, Zahed, 1988, Aboul Naga, 1987 and Shehata and Metawi, 1996).

Table 12 : Sheep and Goats performance under village conditions.

Table 12 : Sheep and Goats performance under village conditions.

Criteria	Sheep	Goats
Litter size	1.25 ± 0.03	2.00 ± .05
Four mo. old lambs or kids per EL/DK	1.01 ± 0.03	1.37 ± 0.06
Kg lambs or kids of 4 mo. old per EL/DK	21.02± 0.58	16.24 ± 1.1
Lambing or kidding interval, mo.	9.85 ± 0.16	10.38 ± 0.4
Average ewe or doe weight, kg	46.4 ± 6.3	26.0 ± 5.4
Annual Kg lambs or kids production per ewe or doe	25.6	18.77
Annual Kg lambs or kids production per MBW[1] of ewe or doe	1.44	1.63

1. MBW = Metabolic body weight

Mature weight for sheep (46.4 kg) is higher than the range of 37 to 41 kg reported by Galal (1987) while goats weight (26.0 kg) is close to the estimate of 27 kg, reported by Tantawy and Ahmad (1960).

Sheep showed an appreciable advantage in annual kilograms of lambs produced per ewe compared with doe (25.6 vs. 18.77 kg). However, when productivity was calculated relative to dam metabolic body weight, goats became better (1.63 vs. 1.44kg).

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دراسة على نظام انتاج المجترات الصغيرة فى القرى المصريه

حلمى مطاوع - عصام شحاته
معهد بحوث الانتاج الحيوانى - الدقى - مصر

اشتملت هذه الدراسه على بيانات جمعت على ٧٥ قطيعا على مدى خمسة أعوام فى ثلاث قرى بمحافظة الشرقيه. ولقد حللت هذه البيانات بهدف التعرف على حجم الحيازه الزراعيه لدى المربين ومتوسط حجم الاسرة ومدى مساهمه أفراد الاسرة فى العمل الزراعى وكذلك حجم وتركيب القطعان ومواصفاتها الانتاجيه.

كان متوسط حيازه الاسرة ٢ر١٤ فدان حيث كان ٩٦٪ من الحيازات فى حدود خمسة افدنه أو أقل . وكان متوسط حجم الأسرة ٧ر٢ فرد كما وجد أن ٨٤٪ من القطعان تشمل على اقل من١٠ إناث منتجة ، وبزياده حجم القطيع يغلب ان تكون القطعان مختلطه كما تتزايد بها نسبة الغنم عن الماعز.

كان متوسط عدد النعاج المولودة فى البطن ٢٤ر١ للغنم و ٠٠ر٢ للماعز. وكان التحسن فى هذه الصفه معنويا بزيادة العمر علاوه على ان الماعز اظهرت تحسنا ملحوظا عن الاغنام بتقدم العمر حتى ٣ سنوات وبزياده العمرعن ذلك كان معدل التحسين متساو فى النوعين.

ولقد تميزت الجداء بالثبات النسبى فى وزن الفطام بين المواسم المختلفه مما قد يدل على إرتباط ذلك بتميز الماعز فى القدره على الاختيار والاستفادة من المخلفات الزراعيه المتاحه مقارنه بالانواع الأخرى.

كما كان عدد النتاج المفطوم محسوبا لكل بطن ٠١ر١ و ٣٧ر١ و الكيلو جرامات المفطومه ٠٢ر٢١ و ٢٤ر١٦كجم للنعجه والعنزه على التوالى وكان معدل تكرار الولادات السنوى ٢٢ر١ و ١٦ر١ على التوالى والوزن البالغ للإناث ٤ر٤٦ كجم للنعجه و ٠٠ ر٢٦ كجم للعنزه.

أظهرت الأغنام تفوقا فى عدد الكيلوجرامات المنتجه على مدار العام لكل نعجه حيث كان ٦ر٢٥ كجم مقارنا بـ ٧٧ر١٨ كجم للعنزه فى حين انه عند تقدير إنتاجيه القطيع على أساس وزن النتاج اللذى يصل الى عمر٤ شهور خلال السنه محسوبا على اساس الوزن التمثيلى للأم كانت الماعز هى الافضل (٦٣ر١فى مقابل ٤٤ر١ كجم للماعز والغنم على التوالى).