

Assessment of Reproductive Performance and Flock Composition of Small-holders Sheep and Goat Production Systems Under Assiut Governorate

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Abstract

This study was aimed to recognize the reproductive performance and herd composition of sheep and goat in six studied area located in east and west river Nile at Assiut governorate. A set of semi-structured questionnaire was used to collect information from 300 sheep owners based on single-visit-interviews. The study revealed that farmers keep mixed livestock species. Sheep and goat production are the major livestock activity in located study area. The average farm size of households surveyed in Assiut Governorate was 8.2 feddan. The farmers cultivated 50.74% and 50.86 % of their lands for green fodder and field crops in winter and summer, respectively. About 50.89 % of the total farm size area cultivated with animal fodder around the year. In summer 25.37%. Of the area was cultivated with field crops. The reproductive and productive performance of sheep and goats were discussed and data showed that, no significant differences were observed in lambing interval and age at first lambing between sheep and goats, while goats were significantly higher in litter size ($P < 0.01$), lambing mortality ($p < 0.05$) weaning weight ($p < 0.01$) and age at marketing ($p < 0.05$) than sheep. Generally, Sheep and goat production in the studied areas was constrained by different problems; where the major ones are availability and cost of feeds, limitation of land for the expansion of production and poor extension services. Sheep and goats are very important smallholder producers due to their biological factors such as short generation interval, twinning, short growth periods, do not require much space and low food requirements. In this domain, reasons of high lamb mortality rates should be identified and reduced in order to make sheep and goat production profitable and sustainable.

Keywords: Herd composition, reproductively, sheep, goat, smallholders.

Introduction

Production of small ruminants has considerable significant economic and social value in North Africa¹. In the developing world livestock are the key to security for many smallholder farmers (Owen *et al.*, 2004, 2005) and are often used as indicators of wealth. In the drier areas preferable species are goats and sheep, the ranking of the major outputs of milk,

meat, fiber, manure and skins depending on local demand, including that of the household, and access to markets. Of necessity, the systems are low-input and productivity is low. Increased livestock production is invariably associated with an increase in livestock numbers, while the available land, because of human pressure for more cropping areas and infrastructural development, has gone

down (Thomas and Rangnekar, 2004).

Small ruminants are particularly important in the region's dry areas (annual rainfall below 300 mm), where they are the main agricultural output and the most important source of livelihoods for the poor. Small ruminants offer several advantages in smallholder production systems. They do not require large initial investments because animals are relatively low-cost. Permanent buildings are not needed. Maintenance costs are low because the animals can produce milk and meat from marginal land and crop residues. Sheep and goats are important for the family diet, providing proteins and minerals. They are also a key source of income, and a preferred asset-building strategy (Delgado *et al.* 1999).

In Egypt, majority of research work to improve sheep and goat production and other livestock has been carried out under controlled conditions in experimental farms. Information greatly lacking at the grass-root level includes factors impacting on production. Few studies have elaborated on the many factors affecting the production and farming of sheep and goats in subtropics area especially upper Egypt (south Egypt).

¹Afghanistan, Algeria, Bahrain, Egypt, Ethiopia, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, Turkey, United Arab Emirates, and Yemen.

Consequently, there is generally scanty information, from the farmers' perspective, on the entire spectrum of small ruminant farming, a situation

limiting the scope of improvement interventions. The current study attempts to provide a better understanding of smallholder and pastoral/extensive farming systems, and complements past studies in the subtropics (Seleka, 2001; Wollny *et al.*, 2003).

The present work attempts to comprehensively describe the main characteristics of economic importance for sheep and goats owned by smallholders at Assiut governorate, in order to clarify the characteristics of the flocks and identify the more important fields for future investigation.

Materials and Methods

1-Description of the study areas

Geographic

Assiut is one of the largest cities of modern Egypt. It lies along the River Nile, between Al-Minyā governorate to the north and Sawhāj governorate to the south. It is located 360 Km south Cairo and lay between 27°; 10 & 48°; 48 N latitude, 31° 18 & 21° 41E longitude. Its settled area, which is limited to the river valley, extends almost 160 km along the river and is about 19 km wide. The governorate extends into the Western Desert, with Al-Wādī al-Jadīd governorate on its western boundary.

Agriculture is the main activity of the governorate; cotton, grains, vegetables, and lentils are the major crops. There are no major towns outside the governorate's capital, Assiut. The Al-Ibrāhīmīyah Canal, branching off the Nile just north of Assiut city, flows in an old river channel on the western side of the valley and irrigates the agricultural land.

Climate

The climate in this governorate is characterized by hot desert climate. There is also a lowering in elevation in mid Egypt, from the Mediterranean and the Red Sea. This gives the city and nearby towns and villages the similar properties of a continental climate, meaning that the city has harsh and chilly cold winter weather, and very hot but non-humid summers. During summer the temperature can exceed 42 °C (108 °F). Yet, in winter Assiut gets below 0 °C (32 °F) temperatures during the night and frost can easily form, while hail or snow are rare because of the low average of the city's precipitation and general low humidity.

2-Sampling and data collection

The work was done in 6 centers from Assiut governorate, as follows:

East Nile (Fath - Sahel Selim - Abnoub) West Nile (Assiut - Abu Tig - Dairout) as show in Figure 1. Five villages were selected in each center and the work was concentrated on 10 households in each village. Finally, a total of 300 households were interviewed individually using semi-structured questionnaires. The questionnaire was prepared to obtain information on sheep and goat flock composition, reproductive and productive parameters. The reproductive parameters assessed included age at first lambing, lambing intervals, pre-weaning mortality and litter size while productive parameters were mainly weaning weight and age at marketing.



Figure 1. Location of the households surveyed at Assiut Governorate in Egypt

3-Data analysis

Data from the questionnaire were entered into program Microsoft excel for generating mean± SD and frequencies. Sheep and goat reproductive and productive data were analyzed using Statistical Analysis Software (SAS 2009) package. One-way analysis of variance was applied for dependent variables using production system as independent variable.

Results and Discussion

Average farm size of households surveyed at Assiut Governorate was 8.2 feddan (Table 1). Metawi *et al.*, (2015) reported that the average land holding of Dakhla and Farafra households was 11.73 and 13.55 acres, respectively. Abdel –Monaime (2014) reported that, total land holding in the Kharga oasis was 12.7 acres for new reclaimed irrigated ar-

reas. In north coastal zone, Metawi, (2011) showed that the average farm size for the old cultivated areas at Sharkeia governorate was 2.7 acres. In east of the Nile Delta of Egypt, the average farm size in three districts of Sohag governorate ranged from 1.58 to 1.87 acres (Elnahas, 2008).

Farmers cultivated 50.74% and 50.86 %, respectively of their lands for green fodder and field crops in winter and summer (Table 1). In this field, (Metawi, 1991) 50.89 % of the total farm size area cultivated with animal fodder around the year. However, in summer, 25.37%. Of the area was cultivated with field crops was but in the old cultivated areas, such as Sharkeia governorate, east of the Nile Delta, about 47% of the arable land is cultivated with berseem as an animal fodder in winter.

Table 1. Values of land holding (feddan *) and its distribution for different crops

Agricultural systems	Winter		Summer	
	Mean	%	Mean	%
Farm size	8.20		8.20	
Green fodder ¹	2.08	25.37	2.09	25.49
Field crops	2.08	25.37	2.08	25.37
Vegetable	2.17	26.46	1.94	23.65
Fruit	1.87	22.80	1.67	20.37
Fallow land	0.00	0.00	0.42	5.12

*feddan = (1.038 acres)

¹The winter green fodder: berseem (*trifolium alexandrinum* L.); the summer green fodders: darawa and Egyptian clover

Average number of ownership per household of cattle, buffalo, sheep and goats are represented in Table (2). Results revealed that farmers keep mixed livestock species. The household own higher number of sheep (44.45%) and goat (45.42 %) than cattle (3.83 %) and buffalo (6.30 %). These percentages were observed by FAO (2007) who stated that cattle,

buffalo, sheep and goat constitute 14, 33, 57 and 43%, respectively, of farmer herds among the Middle East countries. In Ethiopia, Edea *et al.*, (2012) reported that about 76.8% of the smallholders in Adiyio Kaka and 62.6% in Horro district put sheep as first species of livestock followed by cattle indicated the importance of sheep to the smallholder farmers.

On the other hand, sheep and goat flocks are the major livestock activity within respondents of the households surveyed in Assiut governorate. Green fodders is the main source of feeding small ruminants while concentrates are not common. From December to May, Berseem (*Trifolium alexandrinum*) is dominant, while green maize or darawa fodders, as available, are important source of feed from the start of June to the end of August. Crop residues

and farm by-products have basic contribution in feeding animals especially in autumn months. From the interviewed households, 72 % of them have small ruminants only and in most cases they graze after cattle and buffalo. Metawi *et al.*, (2015) reported that 65% Dakhla and Farafra households have small ruminants. However, small ruminants are tethered by day and penned in open or roofed enclosures, or inside houses.

Table 2. Household ownership of different livestock species.

Species	Total number	% of total herd size
Cattle	94	3.83
Buffalo	155	6.30
Sheep	1093	44.45
Goat	1117	45.42

As shown in Table (3), female mature animals represented approximately 53% and 48 % of the total flock and mature male animals accounted for 23 and 17% of sheep and goats flocks, respectively. The data in

Table (3) show also that female young animals (<12 months) accounted for 13% and 19 % of the total flock while young male animals represented approximately 12% and 16% of sheep and goats, respectively.

Table 3. Average sheep and goat flock sizes (n) and flock composition (% of flock size) raised under Assiut governorate conditions

Parameters	Sheep	goat
Flock size (n)	1039	1117
Flock structure (%)	44.45	45.42
Female mature (≥ 12 months)	52.8 \pm 13.8	48.2 \pm 16.9
Female young (<12 months)	12.6 \pm 09.0	19.0 \pm 11.9
Male mature (≥ 12 months)	22.7 \pm 12.3	17.3 \pm 09.2
Male young (<12 months)	11.9 \pm 09.5	15.5 \pm 11.3

The reproductive and productive performance of sheep and goats are given in Table (4). These data showed that there was a significant difference between the two flocks for litter size, lamb mortality rate, weaning weight and age at marketing traits. However, no significant differ-

ences were observed in lambing interval and age at first lambing between sheep and goats, while goats were significantly higher in litter size ($P < 0.01$), lambing mortality ($p < 0.05$) weaning weight ($p < 0.01$) and age at marketing ($p < 0.05$) than sheep. Bushara *et al.*, (2017) reported that,

litter size was 1.42 ± 0.15 and 1.50 ± 0.19 while weaning weight was 8.41 ± 0.19 and 10.84 ± 0.34 in Tagger and desert goats, respectively.

Age at first kidding varies considerably in the literature from lowest age at first kidding noticed by Bushara *et al.*, (2017) for Tagger (384 days) and desert goats (397) days, also, Faruque *et al.* (2010) for

Black Bengal goats 370.0 ± 25.5 days in semi-intensive system, to highest age at first kidding as reported by Ahuya *et al.*, (2009) 759.4 days and Dereje *et al.*, (2015) 516.9 days or 17 months. Ahmed *et al.*, (2001) found that weaning weight (kg) was 13.77 and 12.09 for male and female desert black goats, respectively, while average marketing age was 8.3 month.

Table 4. Reproductive and productive performance of sheep and goat raised under Assiut governorate conditions

Parameters	Sheep	goat	P-value
Lambing interval (months)	9.53 ± 0.15	8.91 ± 0.11	Ns
Litter size	1.26 ± 0.09	1.68 ± 0.10	**
Lamb mortality (%)	16.8 ± 0.45	18.7 ± 0.53	*
Weaning weight (kg)	17.4 ± 0.44	14.7 ± 0.63	**
Age at first lambing (month)	15.74 ± 0.22	16.8 ± 0.34	NS
Age at marketing, month	6.61 ± 0.14	8.02 ± 0.22	*

** significant at (P<0.01), *significant at (P<0.05), Ns=non significant

Metawi *et al.*, (2015) reported that the average litter size and weaning weight of fat tail sheep were found to be 1.22 and 12.2 kg, respectively. The corresponding values for thin tail sheep were 1.37 and 17.4 kg, respectively. Higher lamb mortality rates (17%) were estimated for Dakhla flocks, while they were lower (9%) in Farafra flocks. He added that, females given first birth at age 1.3 years and lambed every 8.6 months. In this filed, Debele and Debele (2015) found in agroforestry systems of Gedio Zone, Ethiopia that the highest mortality rate occurred in suckling flock (16.24% lambs and 16.3% kids), young flock (9.64% lambs; 13.24% kids) and breeding females (ewes 12.06% and does 14.1%) in all study sites.

Conclusion

Sheep and goats are very important smallholder producers due to

their biological factors such as short generation interval, twinning, short growth periods, do not require much space and their need for feed are few. In this domain, reasons of high lamb mortality rates should be identified and reduced in order to make sheep and goat production profitable and sustainable.

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تقدير الاداء التناسلى وتكوين القطيع لانظمة انتاج الاغنام والماعز لصغار المربين فى محافظة اسيوط

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الملخص

تهدف الدراسة تقدير الأداء التناسلي وتكوين القطيع لانظمة الأغنام والماعز في ست مناطق مدروسة تقع في شرق وغرب نهر النيل بمحافظة أسيوط. واستخدمت مجموعة من الاستبيانات شبه المنظمة لجمع المعلومات من ٣٠٠ من صغار المربين استنادا إلى مقابلات فردية. وكشفت الدراسة أن المزارعين يحتفظون بأنواع الماشية المختلطة. ويعتبر إنتاج الأغنام والماعز العامل الرئيسي للثروة الحيوانية في منطقة الدراسة. وبلغ متوسط حجم المزرعة للأسر التي شملها المسح في محافظة أسيوط ٨,٢ فدان. وزرع المزارعون ٥٠,٧٤% و ٥٠,٨٦% من أراضيهم للمحاصيل الخضراء والعلفية في الشتاء والصيف على التوالي. حوالي ٥٠,٨٩% من إجمالي مساحة المزرعة المزروعة بأعلاف الحيوانات على مدار العام. وفي الصيف بلغت المساحة المزروعة بالمحاصيل الحقلية ٢٥,٣٧%. وقد تم مناقشة الاداء التناسلى والانتاجى للأغنام والماعز تحت الدراسة وأظهرت البيانات عدم وجود فروقات معنوية فى الفترة بين ولادتين والعمر عند الحمل الأول بينما اظهرت البيانات ارتفاع معنويا فى عدد الخلفات ($p < 0.01$) ونسبة النفوق وزن الفطام ($p < 0.01$) والعمر عند التسويق ($p < 0.05$) فى الماعز مقارنة بالأغنام. وبوجه عام، كان إنتاج الأغنام والماعز في المناطق تحت الدراسة مصحوب بمشاكل مختلفة من أهمها عدم توافر الأعلاف وتكلفتها المرتفعة، والحد من الأراضي لتوسيع الإنتاج وضعف الخدمات الإرشادية. وتعتبر الأغنام والماعز منتج هام لصغار المربين بسبب عواملهم البيولوجية مثل قصر الفترة بين الاجيال ، والتوأمة، ولها قصر فترة النمو ، ولا تتطلب مساحة كبيرة لتربيتها ، كما أن احتياجاتهم من الغذاء قليلة. وفي هذا المجال، يجب تحديد أسباب ارتفاع معدلات وفيات الحملان والعمل على انخفاضها ليصبح إنتاج الأغنام والماعز مربحا ومستداما.