



Assessment of the Village Sheep Production Systems Under the Prevalent Management Practices in the Nile Delta of Egypt



Sabry Abd-Allah

Animal Production Department, National Research Centre, 33 El-Bohouth Street, P.O:12622, Dokki, Giza, Egypt.

THIS field study was conducted to describe roles, desirable traits, production systems and management practices in some villages of the Delta in Lower Egypt. Data on the farmers' sociodemographic factors were analyzed using frequency counts and percentages. The generality of farmers interviewed was male with the overall male farmers being 93%. On the other hand, most of the farmers in all villages (68%) were practicing mixed crop-livestock production systems. While data recorded indicated that the selection of ewes of the next generation was very common among the farmers. As the results indicated irrespective of the villages twinning was ranked the highest ratio to be of prime importance followed by growth rate and mothering ability. Most farmers keep the sheep within the family houses in all villages under study (79.73%) to save them from, wolves, dogs, theft, cold and rain. While the average lambing rate was 135% and the fertility rate was 88.75%. Most farmers in all villages keep sheep primarily for cash sale as a source of income. Most farmers recorded that low fertility was indexed the highest ratio (0.28) compared to other constraints identified, while most of the farmers agreed that, the control of disease was indexed the second constraint (0.22). In conclusion, rural sheep farmers should be up-skilled in the management principles of sheep production. And we recommend the government promote sheep production and consider it as an economic diversification derived by including sheep meat production in local meat production improvement schemes.

Keywords: Small ruminants, Survey, Questionnaire, Farmers, Menoufia.

Introduction

Livestock in Egypt is an essential component of agriculture, because it is one of the stanchions of the Egyptian economy. Small ruminants are among the major economically important livestock and are a primary component of the animal production systems in the villages in Lower Egypt. According to Abd-Allah [1]. Egypt is making efforts to intensify animal production systems, primarily through changing reproductive management and crossing local breeds with foreign breeds. Therefore, genetic improvement of sheep through suitable strategies is the need of the day, especially under Egyptian conditions. On the other hand, a description of Egyptian small ruminant populations in Egypt is necessary for providing information on common

types and their characteristics [2]. Therefore, assessment of productivity, farmers' knowledge of feeding, management, identification of breeding goals, and description of morphological characteristics are prerequisites to setting up a genetic improvement program at the rural farmers' levels. According to FAOSTATE [3], the estimated sheep population is about 2.972 million head, and the great majority of the total sheep population is indigenous breeds. The Falahi sheep is an indigenous sheep breed of Egypt and is a fat-tailed type, characterized by a hairy coat and a multiplicity of colors from black, to all shades of brown to pure white. This breed is found in the Menoufia governorate. Due to inadequate nutrition and low

*Corresponding author: Sabry Abd-Allah, E-mail: sablogical2007@yahoo.com.

(Received 24/08/2023, accepted 30/10/2023)

DOI: 10.21608/EJVS.2023.230657.1570

©2024 National Information and Documentation Center (NIDOC)

health management, the productivity of these breeds remains less than optimal.

Conventionally, small ruminants are kept in villages, are considered a secondary occupation by their owners, and are given minor care [2]. On the other hand, they are handled by village farmers during the harvesting season and can browse and scavenge freely along roadsides and the cliffs of the canals and the Nile River. In Egypt, most of the research studies to improve the productivity of small ruminants and other livestock have been carried out under controlled conditions in experimental stations belonging to universities, research centers and institutes. Accordingly, the available information on factors related to production is very little or almost non-existent, especially at the grassroots level. A small number of researches have elaborated on a lot of factors affecting the productivity of sheep and goats in rural areas especially in Lower Egypt. To my knowledge, the productivity of sheep under village conditions is not recorded in this study area. So that's the purpose of this study was to investigate the traditional sheep production systems in rural

areas by assessing management practices needed to design sustainable sheep breeding programs under rural management conditions in Egypt.

Material and Methods

Description of the study area:

The study population comprised farmers who were engaged in sheep breeding in three villages (Shanway, Kafr El Hemma and Sakyet Abu Sha'ra) in the eastern part of Ashmoun Markz, situated between the west of the Damietta (Dumyat) branch and El Rayah El Menoufy, southern of Menoufia, Egypt as shown in Figure 1. The three villages under study in which we conduct our survey are rural and represent old agricultural destinations. They were all situated in the same area, in Ashmoun. Ashmoun was a traditional rural area where agriculture dominated the economy. Agriculture is the main activity and source of income in addition to the concentrated large number of animals in this area due to its fertile soil. Ashmoun is considered one of the poorer traditional rural areas and most farmers were independent smallholders.

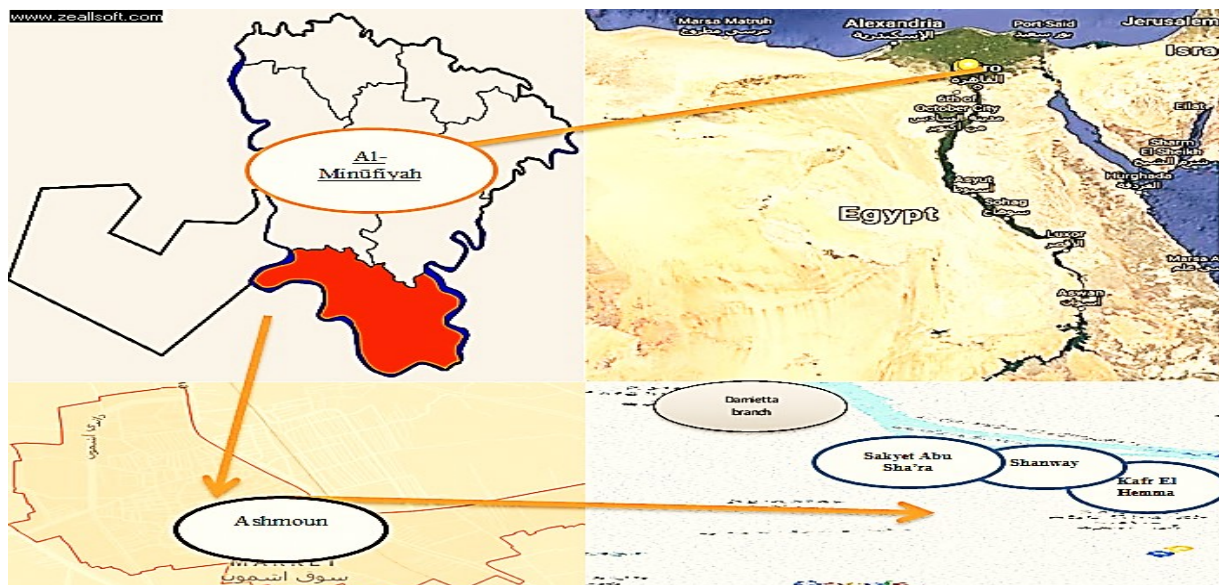


Fig. 1. Location of the study area.

Still, some landless farmers increased throughout the last years or typically owned small plots of land of fewer than one feddan. Generality, the farmers in this area depend on planting crops, vegetables and livestock production. The study area was selected purposively. purposive selection of the study area was because no studies have been conducted in these villages on this topic. The author also selected this topic because of the severity of the problem in this study area.

Methods of data collection

This study included farmers who own small ruminants in Shanway, Kafr El Hemma and Sakyet Abu Sha'ra villages in Ashmoun Markz. The selection of farmers was based on random sampling with help from village butchers or agricultural extension workers. The questionnaire was prepared in English and translated into the local 'Egyptian Arabic language by the author of the current study, who is responsible for local communication. For some respondents, the surveys were conducted individually at each site by the author. This study was a continuance of the prior study that recorded the husbandry practices and constraints associated with goat production in the same villages.

In the first stage of the study individual smallholder sheep flock, size and structure were established. Following the initial survey, a monitoring study was conducted to record the performance of sheep under village management conditions from 2018 to 2020. The records included the kidding date, the date of service after kidding, the number of kids born, and reproductive parameters.

Data management and analysis

All the answers from all farmers were collected, checked and filed in groups according to the categories of farmers. All the collected survey data were coded and entered into the computer with Excel. Data obtained was analyzed using Statistical Product and Service Solutions (SPSS) 17.0 for Windows. The analysis included descriptive statistics. Indices (weighted averages) were advanced to obtain the aggregate ranking Indices were calculated to provide a ranking of the reasons for keeping sheep, the importance of major farming activities to the family food source and income, selection criteria, and major constraints of sheep

production according to the following formula: Index = Σ of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] divided by Σ of [3 for rank 1 + 2 for rank 2 + 1 for rank

Results and Discussion

General observations in the study area:

Table 1 shows some characteristics of the farmers in the study area. The generality of farmers interviewed was male with the overall male farmers being 93%. This agrees with the reports of some studies[2] that recorded low participation of females in the same villages under study. It however is at loggerheads with some findings that women comprise most of the agricultural power in Nigeria [4, 5]. Adult girls play the majority of important role in sheep productivity, although most of them reported that it is an adult's men's liability. Out of the farmers included in the current study, about 21% were illiterate, 29.1% of the farmers attended elementary education, the rest accounted for about 25.2% secondary and 24.7% graduated from university for all farmers under study. These results supported that most of these farmers might be eligible sufficiently to adopt other types of income generation activities due to their medium educational qualifications. The average age of the respondents ranged between 20 to 70 years. The farmers were mainly in their vital age of between 30 to 60 years old. The mean age of the respondents was (45.53%) between all ages. The mean family size (i.e.: all people living in the same house) was about 7 people, their numbers ranging between 3 and 12. The mean land holding per farmer in the study area was about 8 kerat. The result was in agreement with those reported for the same area previously [2].

TABLE 1. General observations of the respondents in rural areas of the Nile Delta in Egypt.

Variables	Villages							
	Shanway		Kafr El Hemma		Sakyat Abu Sha'ra		Mean	
	(NO =28)		(NO =24)		(NO =22)		(Total No =74)	
	NO	(%)	NO	(%)	NO	(%)	NO	(%)
Gender								
Males	26.00	93.00	23.00	96.00	20.00	91.00	69.00	93.00
Females	2.00	7.00	1.00	4.00	2.00	9.00	5.00	7.00
Education status (%)								
Illiterate	28.60		20.80		13.60		21.00	
Primary	17.90		37.50		31.80		29.10	
Secondary	14.30		25.00		36.40		25.20	
University	39.20		16.70		28.20		24.70	
Old age, years	43.8±1.22		47.2±1.63		45.6±1.33		45.53±0.98	
Average family size, head	6.81±0.30		7.22±0.21		6.48±0.26		6.83±0.29	
Average landholding, K	5.7±0.53		10.3±0.16		7.6±0.27		7.86±0.36	
Average owned sheep, head	3.2±0.21		4.9±0.13		3.8±0.26		3.96±0.12	
Additional occupations								
Have additional occupation	15.00	58.00	16.00	67.00	12.00	55.00	45.00	61.00
Have not additional occupation	11.00	42.00	8.00	33.00	10.00	45.00	29.00	39.00

N= Number of farmers, SE=Standard error, % = percentage, K. (kerat). Source: Own survey.

The size of the land holding is an important factor that determines the availability of feed for sheep. Thus, feed resources are lower available in the study area. This may promote the idea of vertical expansion in the development of sheep production in rural communities by introducing or improving feeding and breeding technologies of sheep production. In other meaning, shortage of land and inadequate forages in terms of quality and quantity were also key challenges facing sheep production. Increasingly less land is left for construction which in turn limits the quantity of forage available for the sheep. Therefore, this calls for introducing or improving new management technologies that can be used amidst the prevailing challenges. The average sheep holding per farmer in the study area was about 4 head. The majority of farmers (58% in Shanway, 67% in Kafr El Hemma and 55% in Sakyat Abu Sha'ra) have an additional occupation. Additional income is the most important indicator of the economic status of a farmer. Access to additional income enables farmers to meet basic needs.

Management practice under different villages in the study area:

The results revealed that more than half (68%) of the sheep farmers in the three villages were practicing mixed crop-livestock production systems

and in which small ruminant production was the major share of livestock productivity. Livestock and crop productivity complemented each other in such a way that livestock is used as a source of money and animal manure for crop production and crop residues from crop production. Crop and Straw residues perform as the main components of livestock feed in villages under study. This type of complementarity in mixed crop-livestock production systems is well documented in the previous literature [6] in addition to our previous study [2]. Some farmers from villages under study are generally traders besides their trading activities, they trade their animals and those purchased from other farmers. Several farmers also kept the animals purchased for trade with their animals at the house for some time. The results are in agreement with the findings of some studies[2] indicating that goat production played an essential role in the mixed crop-livestock production system. The majority of the farmers (49%) recorded that tethering was the major traditional management system in the area of study. Tethered feeding was practiced around perennial crop-growing areas (Table 2). According to Abd-Allah, et al. [2], in the same villages in Egypt, the generality of the farmers reported that crop farming and livestock keeping as the main prevalent production system in

their livelihoods (83%), while most of the farmers (54%) recorded that widespread management systems in rural areas were tethering system. Data from Table 3 shows that the livestock owned by farmers comprised buffalos, cattle, goats, sheep and other chickens. sheep and goats were the main livestock used for different purposes. The mixture of animals owned in these villages was comparable to

other reports carried out in the different rural areas of Egypt [2]; Transkei [7] and Swaziland [8]. Even though a purposive sampling of the respondents may not reflect the exact picture of existing livestock ownership patterns in the study area, according to some reports [2], goats, chickens and sheep were the prevalent livestock species in the rural area.

TABLE 2. Sheep management under different villages in the Nile Delta of Egypt

Variables	Level/ Range	Mean (n=74)					
		Min		Max		Mean	
		No.	%	No.	%	No.	%
Traditional production systems	Mixed crop-livestock	49	66	51	69	50	68
	Landless Livestock	17	23	19	26	18	24
	Small-scale trade	5	7	7	9	6	8
Traditional management systems	Tethering	33	45	39	53	36	49
	Herding	10	14	14	19	12	16
	Herding and tethering	18	24	26	35	22	30

Importance of livestock to farmers in the study area:

There was general harmonization among the farmers that sheep were important for livelihoods, where it recorded the second index (0.25). Data recorded in Table 3 indicated that goats ranked the highest ratio to other animals (0.30), while the index for the other animals was between 0.04 and 0.18. All of the farmers under study have sheep. This is maybe

due to the selected farmers having more information on sheep breeding. As expected, most of the farmers in these villages do not know about the origin of their sheep breeds. The sheep breed type in these villages belongs to the Delta region and is called Baladi (Falahi) breed. The Baladi sheep is distributed throughout all villages and parts of East-Ashmoun South-Menoufia in the Delta region.

TABLE 3. Ranking of importance of livestock to farmers in the Nile Delta of Egypt.

Species	Ranked (no. of responses)			Index	Rank
	1 st	2 nd	3 rd		
Buffalo	24.32	13.51	10.81	0.16	4 th
Cattle	4.05	35.13	40.54	0.18	3 rd
Falahi sheep	28.37	37.77	4.05	0.25	2 nd
Baladi goats	54.05	21.62	2.70	0.30	1 st
Other chicken	2.70	4.05	31.08	0.07	5 th
Donkeys	0.0	4.05	21.62	0.04	6 th

1-3 represent rank 1, rank 2 and rank 3

When we asked farmers about the types of sheep they raise, some of them answered that they are called "Baladi", and some of them mentioned the word "Falahi". The higher proportion of sheep (Falahi) and goats as compared to cattle, might be because sheep can thrive well under adverse conditions (feed shortages), while cattle are considered more sensitive to feed shortages. Donkeys (*Equus Africanus Asinus*) are the oldest animals for transporting farmers and other crops in many villages

of the study area, especially when other means of transportation are limited. There is no clear explanation for the lower rank of donkeys, maybe due to farmers using motorcycles and tricycles to transport their crops and belongings from the house to the field and vice versa. On the other hand, this can be explained by the increased construction in the corners of their fields, which reduces their need for donkeys.

Flock size and Structures in the study area:

The data on the sheep flock size of the farmers in the study area is offered in Figure 2. The sheep owner determines the flock structure based on economic and management regards. Ewes formed the largest proportion (46.5%) of the flock followed by young male lambs (18.7%), Yearling Ewe (aged between 1 to 2 years) (18.4%), ewe lamb (8.16%), castrated male sheep (6.7%) and ram (1.54%). The higher proportion of ewes recorded in this study was 30% higher than prescribed for Keffa and Bench-Maji

ewes [9]. The higher proportion of ewes in the present investigation is consistent with the sheep flock structure reported for Menz sheep where breeding ewes (49.2%) were prevailing [10]. However, the result is lower compared to the 49.2% recorded for Afar ewes [11]. The size of the flock is an indicator of the breeding objective of the farmer. Farmer ownership of a higher number of female sheep means the production of a larger number of lambs which has a direct impact on selection intensity.

Fig. 2. Average sheep flock structure of the surveyed households in the study area.

Ewe: Adult Female Sheep, Yearling Ewe Female Sheep: (Age between 1 to 2 years), Ewe Lamb: Young Female Sheep, Ram: Adult Male Sheep, Wether: Castrated Male Sheep and Ram Lamb: Young Male Sheep.

Ram ownership and herding practice in the study area:

Data recorded indicated that most of the farmers were without breeding rams (83%), but all had access to ram services from the shepherds, relatives and

neighbors. All the farmers stated that mating is uncontrolled with year-round lambing. The study further indicates that shepherds ranked the highest ratio to other sources of breeding rams (0.62).

TABLE 4. Sources of breeding ram according to flock size groups (%)

Sources	Percentage of respondents per rank			Index	Rank
	1 st	2 nd	3 rd		
Shepherds	40.50	35.10	5.40	0.62	1 st
Own family	2.70	21.60	-	0.17	2 nd
Relatives	-	6.70	28.40	0.13	3 rd
Neighbors	4.00	-	13.50	0.08	4 th

1-3 represent rank 1, rank 2 and rank 3

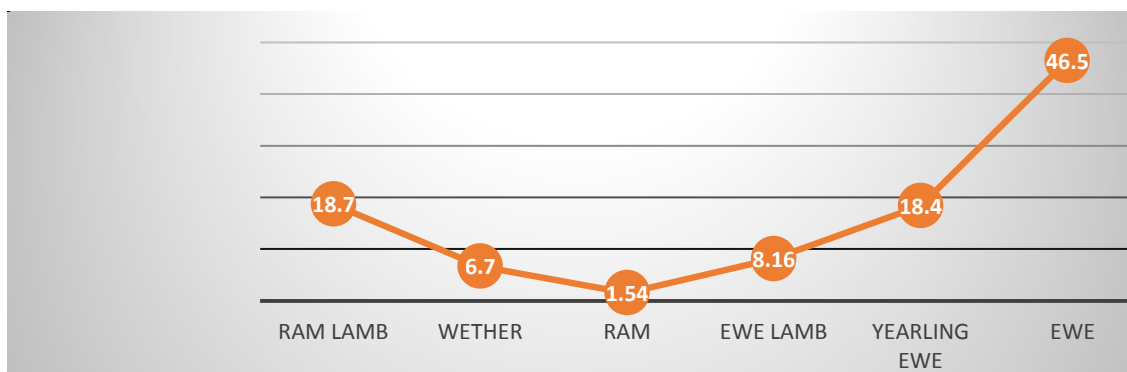


Fig. 2. Average sheep flock structure of the surveyed households in the study area.

Ewe: Adult Female Sheep, Yearling Ewe Female Sheep: (Age between 1 to 2 years), Ewe Lamb: Young Female Sheep, Ram: Adult Male Sheep, Wether: Castrated Male Sheep and Ram Lamb: Young Male Sheep.

While the index at the other sources was between 0.8 and 0.17 (Table 4). The most commonly utilized management system is an "open" system where rams are mixed constantly with ewes; it is common for sheep farmers to send non-pregnant ewes to stay with a herder flock having rams until conception and pay a breeding fee. It is necessary to face the problem of

inbreeding in the future because the most of farmers in the villages did not appear to understand this issue of using one ram common for all without employing different methods to overcome it. It was found that in the herding system, sheep were grazed beside goats throughout the year. Old men and children are usually responsible for herding sheep as seen

in Figure 3. During the winter season, the herders declared that their sheep flocks are usually mixed. During the summer season, herders in all villages herd their sheep on their private or adjacent lands within the village land to exploit crop aftermath. After the crop aftermath was depleted from the cultivated land, sheep are free to graze everywhere. All herders declared that they practiced transhumance and moved around with their animals in search of feed. herders settled in a village are usually relatives and mostly move to new places together and settle there. Monitoring of oestrus is the most significant side attributable to the herders in



Fig. 3. Shows some herders of sheep in the study area

influencing fertility. There are various methods of oestrus discovery practiced by rural herders in the study area. Almost all the herders know and combine several oestrus behavioral attributes to detect oestrus in ewes. Priorities are given to pregnant ewes when supplementing. Pregnant ewes are checked by herders about 3 times daily. If ewes are checked at night or midnight it is not necessary to check again in the early morning. Ewes that will lamb between these times usually show signs at the late-night observation. Sheepherders recorded that stillbirths were a significant cause of lamb mortality.



They also asserted that they could control losses due to stillbirths and can be reduced by frequent visits to the lambing barn and timely assistance of ewes.

Desirable traits of indigenous breeding ewes as perceived by farmers in the study area:

Data recorded in Table 5 indicate that the selection of ewes of the next generation was very widespread among the farmers. Most of the farmers recorded that they realized the importance of selection and

accomplished it to some extent however they had their criteria for the same. In contrast to the rams health and reproductive traits were more important for ewes. This is because of their belief that survival is more important than the good appearance and fast growth of the lambs. Therefore, an advantage is given to such traits of the ewes that would ensure the survival of the lambs. The respondents' index value of the study area is presented in Table 5.

TABLE 5. Reasons for ranking preferred female sheep within own flock (%)

Reasons	Percentage of respondents per rank			Index	Rank
	1 st	2 nd	3 rd		
Genotype	4.00	37.80	-	0.040	12 th
Conformation	40.50	10.80	2.70	0.067	8 th
Body size	35.10	24.30	6.70	0.076	6 th
Body colour	2.70	21.60	5.40	0.028	13 th
Fertility	40.50	21.60	2.70	0.077	5 th
Twinning	54.00	35.10	6.70	0.100	1 st
Short kidding-interval	10.80	40.50	4.00	0.053	11 th
Mother history	-	4.00	28.40	0.017	16 th
Mothering ability	37.80	40.50	4.00	0.092	3 rd
Offspring quality	40.50	31.10	4.00	0.087	4 th
Kidding type	-	13.50	10.80	0.018	15 th
Growth rate	54.00	21.60	-	0.094	2 nd
Body condition	20.30	40.50	-	0.065	10 th
Birth season	-	21.60	2.70	0.021	14 th
Free of abortion	28.40	37.80	-	0.074	7 th
Disease resistance	37.80	13.50	2.70	0.066	9 th
Grazing ability	-	4.00	21.60	0.015	17 th

1-3 represent rank 1, rank 2 and rank 3

The results showed that irrespective of the villages, the twinning rate was ranked the highest ratio to be of prime importance followed by growth rate and mothering ability. Furthermore, the majority of the respondents recorded that ewes could be preferred due to offspring quality and fertility. Most of the farmers ranked that both ewes with big body sizes are preferred for breeding purposes. Based on the view of the respondent, the confirmation was recorded to be one of the main preferred reasons for ewes. The farmers preferred this sheep breed because it has disease resistance. Likewise, they recorded that ewes were aborted and had a low body condition score with long kidding-interval and black coat color was not favored for breeding purposes. Conversely, the majority of the respondents did not select ewes due to the type of animal breed. Most of the farmers did not have any idea about the origin of indigenous sheep in the study area. Notwithstanding the aforementioned, some sheep farmers suggested that indigenous sheep were spread about Markz Ashmoun. Furthermore, birth season and kidding type for ewe, and mother history and grazing ability for ewes were placed at the bottom as the least preferred ewe attributes.

Housing management for sheep in the study area:

It is important to point out that all of the farmers of the study villages confined their sheep at night. In these villages, the number of sheep per household is small, so the farmers may use part of their home for

sheep confinement. The farmers who confined their animals reported that it was to protect them from, wolves, dogs, theft, cold and rain. Housing the animals within the family house may be a method to protect the animals from predators or theft; however, in doing so there is always a dangerous risk of zoonotic diseases which may affect humans and animals in the same. Animals may not get suitable comfort at night. The results from Table 6 indicate that most of the farmers keep the sheep within the family houses in all villages under study (79.73%). The results also indicated that in villages sheep were confined with other animals. Lambs in the first days of birth were separated from their mothers and were cared for during the day at home after sheep were taken to grazing and before they got into their house upon their return in the evening. But Owners of the largest numbers of animals (12.16%) have separate housing for their sheep. These houses were constructed purposively adjacent to their own houses.

Some farmers with small flock sizes tie their sheep to stockyards during the day. According to the information of the farmers, there is a variation in the productivity of sheep between the tethered and housed freely. Pregnant ewes and young and weak lambs are the most attackable groups. The results as assessed in the present study shows similarity with the findings of [12-16]. However, some authors [17] also reported that sheep and goats are sheltered in most cases in separate houses in the Goma district. About 37.84% (74) of the farmers kept their sheep in limestone brick places, while 27.02% of the farmers

kept their sheep in mud brick houses as shown in Figure 4. Recently, after the construction of agricultural land with limestone bricks has increased,

www.zeallsoft.com



Fig. 4. Shows some types of sheep housing in the study area

farmers' houses have become neighboring to their fields, requiring farmers to tether their animals, to protect their crops from damage.

This is a widespread habit in other parts of the Delta region [2]. Farmers use large paper containers, the bottom of which is covered with wheat or rice straw to keep newborn lambs dry, clean and warm (Figure 4). Suckling was in the morning before the mothers left for grazing and when the flocks were back from grazing in the evening. Some farmers

separated the mothers on the first days of birthing and provided care for both lambs and mothers indoors. These increase the bond between the mothers and their lambs and help to protect the lambs from the cold, sun and other environmental stresses thereby increasing lamb survival [18].

TABLE 6. Types of sheep houses and confined during night for protection (%).

Item	Housing system	Mean (n=74)	
		Frequency	Percentage
Type of housing	In the family house	59.00	79.73
	Stockyard at the main family house	6.00	8.11
	Separate constructed house	9.00	12.16
Nature of housing	Separately	13.00	17.56
	Sheep and goat alone	15.00	20.28
	Sheep and other animals*	46.00	62.16
Materials housing type	limestone bricks	28.00	37.84
	Wooden fence	5.00	6.76
	Corn stalks	8.00	10.81
	Common reed	7.00	9.46
	Mud bricks	20.00	27.02
	Concrete	6.00	8.11

*Refers to the other livestock like buffalos, cattle, goats, donkeys and chicken

Feeding management and feed resources in the study area:

Based on the view provided by the farmers, villages under study are famous for the production of green fodders (Egyptian clover) and cereal crops like

(maize and wheat) as well as vegetable crops such as potatoes and green beans of which a large part is exported. It is also famous for planting the highest quality fruits and ornamental plants. Some agricultural lands are irrigated through canals

branching from the Damietta branch of the Nile, while others are irrigated through groundwater. Agriculture is generally the main activity of the farmers due to the fertile land in the site under study. Based on interviews with 74 farmers from all villages, the main feed resources for sheep are cereals, green fodder, concentrates, crop residues, tree legumes and home residues during the summer and winter seasons. Egyptian farmers are adept at utilizing feed resources. The availability of feed resources for sheep in the study area shows seasonality. In Ashmoun, green fodders (Egyptian clover and green fodder maize) are more important

feed sources (100%), especially during the winter when a high moisture green fodder (Berseem clover) is more available. During the winter season, sheep were fed on Berseem clover. Sheep are usually tethered at the side of the field, where they are fed clover, which has been cut and carried to the animals, they are taken back to the house at night and are supplemented with bean straw and manufactured feed or a mixture of (maize and wheat bran). During the summer season, the main feed sources that farmers use next to CFM are green maize, crop residuals (sorghum, maize stover) and shrubs were common as illustrated in Figure 5.

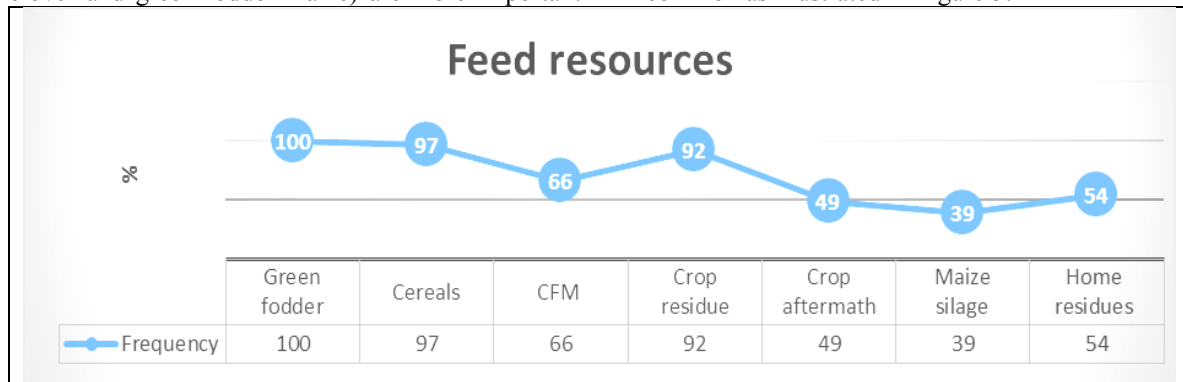


Fig. 5. Feeding and feed resources in rural areas of the Nile Delta in Egypt.

According to Zewdu [16], the quality and quantity of feed resources available for sheep depend on climatic and seasonal factors. The findings of the current study (winter season feed availability) were similar to those authors [2] who reported for the same district of the Delta region, Egypt. When there is no green fodder available ewes are fed green maize in addition to manufactured feed or grain. 66% of the respondents used a concentrate feed mixture. Onion husk, as a by-product from the preparation vegetables factories, is usually fed to sheep. The use of crop residues as a feed source was also indicated by some studies [2] in Baladi goats and others [19] in Arsi goats. Sheep are usually feeding on home residues (40%) and crop after math (39%). During the late pregnancy and lactation periods ewes are supplemented with cereal grains (ground corn and wheat).

Sheep husbandry practices in the study area:

According to farmers' group discussions, reproduction occurs at any time of the year although too many parturitions were intensive in February. Ewes that gave birth in February were inseminated in August and September when the feeding condition is better. Farmers' notes about the reproductive performance of sheep were recorded, most farmers recorded that the age at first mating of ewes and rams was (16.25 and 12.75) months as reflected in Table 7. All the farmers 100% (74) used common mating for breeding ewes. Mating was out of control, any

ram would mate with any ewe as long as it shows signs of estrus. There is a problem with breeding ewes; farmers offer for sale the females that have good conformation before they reach puberty. This is because they can get more money. Few butchers own their ram tied at home and do not allow their ram to mate with other ewes. The majority of the farmers recorded that the age at first lambing was (23.0) months, while the average gestation length was (150.5 days). Lambing intervals of less than one year and an age that ranges between 8 and 10 months were common in the area of study. While the average lambing rate was 135% and the fertility rate was 88.75%. Twinning lambs were ranging between (30 and 60%). Across the villages under study, the reproductive lifetime of ewes (8.75 years) was mentioned more frequently to have a generally high average number of lambs per ewes (11.50). The average number of lambs per lambing was 1.50 while the average mortality rate was (15.75%) and (3.25%) for the abortion rate (Table 7).

TABLE 7. Average of some reproductive performances as recalled by respondents

Parameters	Min	Max	Mean	Std. Dev
Average flock size	3.00	6.00	4.50	1.29
Age at first mating of females (months)	6.00	24.00	16.25	8.34
Age at first mating of males (months)	6.00	18.00	12.75	4.99
Age at first lambing (months)	12.00	30.00	23.00	7.74
Average gestation length (days)	145.00	155.00	150.50	4.20
Average lambing interval (months)	8.00	10.00	9.00	0.816
Average lambing rate (%)	120.00	150.00	135.00	12.90
Fertility rate (%)	80.00	100.00	88.75	8.53
Twins rate (%)	30.00	60.00	48.75	13.14
Reproductive lifetime of ewes (years)	7.00	11.00	8.75	1.70
Average number of lambs per ewes's lifetime	10.00	13.00	11.50	1.29
Average number of lambs per lambing	1.00	2.00	1.50	0.57
Average mortality rate (%)	5.00	25.00	15.75	8.46
Average abortion rate (%)	1.00	5.00	3.25	1.71

Purpose of keeping sheep in the study area:

Livestock and field crops are the most important sources of income, representing almost half of the income earned by rural farmers. These results are consistent with some reports[2], who found that goats generated suitable livelihood incomes across social groups in the Delta region of Egypt. Also, these data are supported by those of some authors[20] who reported that livestock is the main

source of income for small-scale farmers in South Africa. The results recorded the relative importance of perceptible benefits of sheep keeping such as (cash sales, traditional ceremonies, meat, and meeting basic needs). The importance of sheep production for smallholder farmers was examined based on the overall index calculated from the proportions of three ranks (Table 8).

TABLE 8. Ranking of the importance of product categories of sheep in rural areas of the Nile Delta in Egypt.

Subcategory	Percentage of respondents per rank			Index	Rank
	1 st	2 nd	3 rd		
Traditional ceremonies	37.80	20.30	4.00	0.33	2 nd
Meat	10.80	4.00	31.10	0.15	3 rd
Meet basic needs	-	10.80	20.30	0.09	4 th
Cash sale	54.00	21.60	-	0.43	1 st

1-3 represent rank 1, rank 2 and rank 3

Most of the farmers in all villages keep sheep primarily for cash sale as a source of income. Given the highest index value of 0.43, cash sale was ranked as the primary reason for keeping sheep. However sheep are sold anytime in the year and as cash is necessary, most are sold during Eid al-Adha. The generality of lambs is sold after weaning before they forfeit body condition because of weaning shock. Butchers and traders are responsible for the marketing of sheep in the three villages under study. Many farmers recorded they were selling their male lambs. Ewes lambs are sold for reproduction at the village level. Healthy ewes can be sold pre-paid with a better price even earlier than two weeks of weaning by agreement between the owner and buyer. In addition, meat received a relatively low ranking

among the reasons for keeping sheep in all traditional management systems. Traditional ceremonies and meat for consumption purposes were ranked as the second and third objectives, respectively. The majority of farmers in the study area were fattening sheep. Fattening of lambs is mostly considered because they are easier to sell for cash to cater to different family needs. The price was subjectively based on the size and appearance of the animal, and it was settled after haggling with the buyer. The finding of the current study was in contraindication with the results have been reported by some studies[21] that indicate the majority of Ethiopian farmers don't fatten their sheep. Vice versa fattening is more common among farmers in the study area. None of the farmers mentioned keeping sheep for

manure or milk production. The reason why the farmers did not milk their goats was that they were afraid that the growth of the lambs might be affected. In other words, milk production was considered sufficient only to ensure that the lambs were growing as rapidly as possible. Meeting basic needs was the least ranked objective of sheep production. Table 8 presents the ranking of the importance of product categories of keeping sheep. Similar multi-purpose functions of sheep rearing were reported for sheep keepers in the central highlands of Ethiopia [22]. Multiple functions are particularly important in low and medium-input production environments. Different authors addressed the importance of multiple values of indigenous livestock breeds in

developing countries in low input systems [23-26]. The shortage of suitable understanding of the purpose of keeping animals by their farmers has been a major reason for the failure of past genetic improvement programs [27].

Ranking of sheep production constraints by smallholder farmers in the study area:

In this study, except few farmers feed shortage is not a common problem in the study area. Most farmers believed that low fertility was the highest ratio (0.28) to other constraints identified, while most of the farmers agreed that, the control of disease indexed the second (0.22) constraint. On the contrary, the majority of farmers indexed between (0.13) and (0.17) for other constraints (Table 9).

TABLE 9. Ranking of sheep production constraints by smallholder farmers (%)

Subcategory	Percentage of respondents per rank			Index	Rank
	1 st rank	2 nd rank	3 rd rank		
Feed shortage	15.60	14.10	3.10	0.13	5 th
Low fertility in animals	45.30	10.9	6.2	0.28	1 st
Disease control	9.40	42.20	18.80	0.22	2 nd
Kid losses	17.20	12.50	21.90	0.17	3 rd
Abortion	7.80	18.80	35.90	0.16	4 th

1-3 represent rank 1, rank 2 and rank 3

Conclusions

Improvement of sheep productivity in rural villages requires an adequate understanding of the production system and its operation. This justifies a research program on nutritional studies with the farming system. The above findings clearly show that the characteristics of farmers, the mode of sheep production, the management of the animals; constraints for farmers and farmers' perception of sheep profitability are similar in the selected villages. Also, sheep production provides some socio-economic benefits that can improve the livelihoods of rural communities as well as play an important role not only as a source of long-term income but also as a source of quick cash when the household has a financial emergency. It is therefore recommended that the village production system should be studied and increased the number of villages will be studied. Also, special attention should be paid to livestock, especially small ruminants. This will ensure a reduction in the level of food instability in villages of the Delta in Egypt.

Acknowledgments

The author would like to acknowledge the farmers, extension workers and local organizations in the study area for their most valuable help, time and willingness to participate in this study.

Ethical Approval: Ethical approval for this study was obtained from the Medical Research Ethics Committee, National Research Centre

Conflict of interest: Nothing to declare.

Funding: The author declares that this study has not received any financial support. Most of the reports and data used in the survey, which were collected from farmers, extension workers, or local organizations, were free.

Endnotes

Not Applicable.

References

1. Abd-Allah, S. Application of some crossbreeding and feeding programs to improve the productive performance in Baladi sheep. Ph.D. Thesis, Fac. of Agric., Al-Azhar Univ. (2014).
2. Abd-Allah, S., Mohamed, M. I., Shoukry, M. M., Salman, F. M. and Abd-El Rahman, H. H. Assessment of the traditional goat production systems in rural areas of the Nile Delta in Egypt. *Bulletin of the National Research Centre*, **43** (1), 114 (2019).
3. FAOSTAT. <http://faostat.fao.org/> accessed on 18 October (2021).
4. Pala, A. O. The Joluo Equation, land reform, lower status for women. *FAO Review on Agriculture and Development*. 69 p., (1980).

5. Idachaba, F. S. Concepts and Strategies of Integrated Rural Development, Department of Agricultural Economics, University of Ibadan. (1980).
6. Getahun Legesse. Productive and Economic performance of Small Ruminant production in production system of the Highlands of Ethiopia. Ph.D. dissertation. University of Hohenheim, Stuttgart, Hoheinheim, Germany. (2008).
7. Bembridge, T. J. A systems approach study of agricultural development problems in Transkei. Ph.D. Thesis. University of Stellenbosch, South Africa (1984).
8. Sibisi, H. Cattle ownership and control sociological observations on some aspects of Rural development in Swaziland. Paper No. 1. Ministry of Agriculture and Cooperatives, Mbabane (1979).
9. Dejen, Assefa. Phenotypic characterization of indigenous sheep types in Kaffa and Bench-Maji zones of Southern Nations Nationalities and Peoples Region. An M.Sc Thesis Alemaya University, Dire Dawa, Ethiopia (2010).
10. Getachew Tadesse, Alemargot Haile, Markos Tibbo, Sharma, A. K., Solkner, J. and Wurzinger, M. Herd management and breeding practices of sheep owners in a mixed crop livestock and a pastoral system of Ethiopia. Debre Brehan Research Center, Ethiopia. (2010).
11. Tesfaye, Getachew. Characterization of Menz and Afar Indigenous Sheep Breeds of Smallholders and Pastoralists for Designing Community-Based Breeding Strategies in Ethiopia. Msc thesis, Haramaya University, Dire Dawa, Ethiopia (2008).
12. Abule, E. Role and making-decision power of women in livestock production around Adami Tulu. ESAP (Ethiopian Society of Animal Production). Proceedings of 6th Annual Conference of the ESAP held in Addis Ababa, Ethiopia, August 14-15 May. pp. 95-102. (1998).
13. Samuel, M. Characterization of Livestock production system; a case study of yerer water shed. Adaa Liben district of east Showa, Ethiopia. An M.Sc Thesis Alemaya University, Dire Dawa, Ethiopia. 184 p. (2005).
14. Endeshaw, A. Assessment on production system and marketing of goats at Dale district (Sidama Zone). MSc Thesis. Hawassa University, Ethiopia (2007).
15. Tsedeke, K. Production and marketing systems of sheep and goats in Alaba, Southern Ethiopia. A thesis submitted to the Department of Animal and Range Sciences, Hawassa College of Agriculture, School of Graduate Studies, Hawassa University Awassa, Ethiopia pp. 157-172 (2007).
16. Zewdu, E. Characterization of Bonga and Horro indigenous sheep breeds of smallholders for Designing Community based breeding strategies in Ethiopia pp. 44-47 (2008).
17. Belete, S. Production and marketing systems of small ruminants in goma district of Jimma zone, western Ethiopia. M.Sc. Thesis. Hawassa University 82 p. (2009).
18. Mukasa-Mugerwa, E. and Lahlou-Kassi. A. Reproductive performance and productivity of Menz sheep in the Ethiopian highlands. *Small Rumin. Res.*, **17**, 167-177 (1995).
19. Gebeyehu, A., Hundessa, F., Umeta, G., Muleta, M. and Debele, G. Assessment on challenges and opportunities of goat farming system in Adami Tulu, Arsi Ngelle and Fantale districts of Oromia Regional State, Ethiopia. *African J. Agril. Res.*, **8** (1), 26-31 (2013). DOI: 10.5897/AJAR12.1568.
20. Moorosi, L. E. Characterisation of small-scale cattle farming in Botshabelo and Thaba nchu districts of the free state. M.Sc. thesis. University of the Orange Free State, South Africa (1999).
21. Kenfo, H., Mekasha, Y. and Tadesse, Y. A study on sheep farming practices in relation to future production strategies in Bensa district of Southern Ethiopia. *Tropical Animal Health and Production*, **50** (4), 865-874 (2018).
22. Mekoya, A. Husbandry practice and productivity of sheep in Lallo-Mama Midir woreda of central Ethiopia. MSc Thesis. School of Graduate Studies of Alemaya University of Agriculture, Dire Dawa, Ethiopia. 91p. (1999).
23. Kosgey, I. S. Breeding objectives and breeding strategies for small ruminants in the tropics, (unpublished PhD Thesis, Wageningen University) (2004).
24. Mwacharo, J. M. and Drucker, A. G. Production objectives and management strategies of livestock keepers in south-east Kenya: Implications for a breeding programme. *Tropical Animal Health and Production*, **37**, 635-652 (2005).
25. Wurzinger, M., Ndumu, D., Maumung, R., Drucker, A. G., Okeyo, A. M., Semambo, D. K. and Sölkner, J. Assessing stated preferences through use of choice experiments: valuing (re) production versus aesthetics in the breeding goals of Ugandan Ankole cattle breeds (2006). In: Proceedings of the 8th World Congress on genetics applied to Livestock production, 13-18 August, (2006). Belo Horizonte, Brazil. pp 1-4.
26. Wuletaw, Z., Ayalew, W. and Sölkner, J. Breeding Scheme based on Analysis of Community breeding Objectives for Cattle in North-western Ethiopia. *Ethiopian Journal of Animal Production*, **6**, 33-66 (2006).
27. Sölkner-Rollefson, J. H., Nakimbugwe and Zarate, A. V. Analysis of determinants for success and failure of breeding programmes. pp. 273-280. In: Proceedings of the Six World Congress on Genetics Applied to Livestock Production, 11-16 January, Armidale, Australia (1998).

تقييم نظم إنتاج الأغنام القروية في ظل ممارسات الإدارة السائدة في دلتا النيل في مصر

صبرى عبد الله

قسم الإنتاج الحيواني - المركز القومي للبحوث - 33 شارع البحوث - ص.ب: 12622 - الدقي - الجيزة - مصر.

أجريت هذه الدراسة الميدانية لوصف الأدوار والسمات المرغوبة وأنظمة الإنتاج والممارسات الإدارية في بعض قرى الوجه البحري. تم تحليل البيانات الخاصة بالنواحي الاجتماعية للمزارعين باستخدام التكرارات والنسب المئوية. كان معظم المزارعين الذين تمت مقابلتهم من الذكور حيث بلغ إجمالي المزارعين الذكور 93%. من ناحية أخرى، كان معظم المزارعين في جميع القرى (68%) يمارسون أنظمة الإنتاج المختلطة من المحاصيل والثروة الحيوانية. بينما أشارت البيانات المسجلة إلى أن اختيار النعاج للتربية من الجيل الجديد كان شائعًا جدًا بين المزارعين. كما أشارت النتائج إلى أنه بغض النظر عن القرى، احتلت نسبة التوائم المرتبة الأعلى لتكون ذات أهمية قصوى يليها معدل النمو والقدرة على الأمومة. يحتفظ معظم المزارعين بالأغنام داخل منازل الأسرة في جميع القرى قيد الدراسة (79.73%). لإنقاذها من الذئب والكلاب والسرقة والبرد والمطر. بلغ متوسط معدل الحمل 135% ومعدل الخصوبة 88.75%. يربي معظم المزارعين في جميع القرى الأغنام للبيع للحصول على الأموال في المقام الأول كمصدر للدخل. سجل معظم المزارعين أن مشكلة معدل الخصوبة المنخفض تم ترتيبه كأعلى مؤشر (0.28) مقارنة بالقيود الأخرى التي تم تحديدها، بينما اتفق معظم المزارعين على أن السيطرة على المرض تمت ترتيبها بالقيود الثاني (0.22). في الختام، يجب أن يكون مربى الأغنام الريفيين ماهرين في مبادئ إدارة إنتاج الأغنام. كما نوصي الحكومة بتشجيع إنتاج الأغنام واعتباره تنوعًا اقتصاديًا من خلال تضمين إنتاج لحوم الأغنام في خطط تحسين إنتاج اللحوم المحلية.

الكلمات الدالة: المجترات الصغيرة، مسح، استئبان، مزارعون، المنوفية.