

Contribution of small ruminants to household income in the agroecological northwestern coastal zone of Egypt

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Keywords

Livestock, small ruminant, agroecology, farm income, animal performance, Egypt

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Summary

The study was conducted in the northwestern coastal zone of Egypt in order to explore the relative economic importance of small ruminant production. Based on water resources, the study area was divided into three agroecological sub-zones (AEZ): i) the rain-fed area (RA) in the west, ii) the dry area (DA) in the middle, and iii) the irrigated area (IA) in the east. Data collection was carried out through field surveys using a pre-tested questionnaire. Productivity ranged from 20.8 to 25.4 kg and from 18.9 to 20.9 kg for sheep and goats, respectively. Sheep and goat productivity was lower in DA than in RA or IA ($p > 0.05$). Small ruminant production was profitable under different AEZ. The returns on capital invested in sheep production were 22.3, 17.9 and 14.4% for IA, RA and DA, respectively. The corresponding figures for goat production were 16.5, 16.7 and 16.7%, respectively. The contribution of livestock to household income ranged from 40.8 to 71.6% across AEZ. Comparison between crop and livestock incomes in DA revealed that, whereas livestock accounted for 71.6% of the total net income, crop production contributed a mere 2.5–5%. Within the livestock sector, small ruminant contributed the highest (63.4%). Making farmers aware of the financial benefits of small ruminants may convince them to consider the latter as a better alternative to crop production in terms of income generation. This will probably influence their decision on the allocation of their limited resources to the competing alternatives.

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■ INTRODUCTION

The suitability of an area for either animal or crop production, and the type of animal or crop to be produced in the area depend on the agroecological conditions of the area (Tolera and Abebe, 2007). The extent of cropping and the type of crop, in turn, determine the quantity, quality and distribution of animal feed resources throughout the year. On the other hand, the feed resource bases determine the animal production system of the area. The most distinguishable example in Egypt is observed in the northwestern coastal zone (NWCZ) which extends from

Borg-Arab in the east for 520 kilometers to Sidi-Barani in the west. Based on agroecological conditions, different production systems are available as about one million head of sheep and goats are present in the zone. Lack of information on the profitability of small ruminant production as well as on its income contribution to the Bedouin folks is assumed to be the principal reason for the non-recognition of its importance by policy makers and relevant institutions and hence the resulting little attention given to its improvement in the zone. The purpose of this paper was to explore the relative economic importance of small ruminant production in NWCZ by assessing both its profitability and its contribution to household income.

■ MATERIALS AND METHODS

The study was conducted in the northwestern coastal zone of Egypt from February 2008 to August 2010 in order to assess

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the effect of water availability on the profitability and relative income contribution of small ruminant production to households. Based on water resources, the study area was divided into three agroecological subzones (AEZ): i) the rain-fed area (RA) in the west, from Sidi Barani to Matrouh, ii) the dry area (DR) in the middle, from Dabaa to Ras EL-Hekma, and iii) the irrigated area (IR) in the east, from Hammam to Borg-Arab. The study involved two districts from each area and about twenty-five households from each district, all selected randomly. Data collection was carried out through field surveys using a pre-tested questionnaire. A special questionnaire was designed to collect information on input and output parameters of different farm activities.

The agropastoral system prevails in the western region. The annual rainfall ranges from 150 to 180 mm. Agriculture relies on rainfall. Feeding mainly depends on natural ranges, barley and by-products. Animal movement is restricted to certain distances around the farm base and is characterized by more supplementary feeding.

Under the middle region condition, the pastoral system of production is dominant. The average annual rainfall is 80 mm. The transhumant farmers have a permanent base and move with their flocks to adjacent provinces where irrigated fodder and crop residues are available. They also use farm by-products and non-conventional feed sources.

Mixed crop-livestock farming system is the common practice of the eastern region. Agriculture relies on Nile water. The farmers allocate a larger proportion of their land (47%) for green fodder. Feeding mainly depends on berseem (*Trifolium alexandrinum*) from October to May, and summer fodder crops.

Barki sheep and Barki goats are the prevailing breeds reared in NCWZ. The whole farm budget was performed using Microsoft Excel spreadsheet. The returns were obtained by estimating the total value of production which included each product sold and consumed. The least square method (SAS, 2000) was used to analyze flock productivity (expressed as kilograms of live weight produced per breeding female per year) and financial performance.

■ RESULTS

Herd size, composition and age structure

The herd size and livestock composition in the studied areas are shown in Table I. Herd differed in size and composition between the different AEZ. Households in RA had larger herds (141 head) with about 79% sheep, 13% goat, 5% camel, and 3% cattle compared to the herds in DA (49 head), which were composed of about 64% sheep, 27% goat and 9% camel. The percentage of goats in the herds was higher in DA than in RA and IA. None of the surveyed farms in DA kept cattle. On the other hand, cattle and buffalo comprised about 20% and 3% of the total herd size in IA.

Table II presents the flock age structure in the different AEZ. The proportion of mature females in small ruminant flocks ranged from 36% in IA to 53% in DA.

Small ruminant performance

Productivity ranged from 20.8 to 25.4 kg and from 18.9 to 20.9 kg for sheep and goats, respectively (Table III). Sheep and goat flock productivity did not differ significantly between RA

and IR production systems. On the other hand, productivity was lower in DA than in RA or IA ($p > 0.05$). Table III shows that small ruminant production was profitable in the different AEZ.

Table I

Household ownership of different livestock species in the northwestern coastal zone of Egypt

	Species in agroecological subzones		
	Rain fed	Dry	Irrigated
Total herd size	140.7	48.9	123.00
Cattle (%)	2.70	0	19.53
Buffalo (%)	0	0	3.25
Sheep (%)	79.23	64.18	71.35
Goat (%)	13.25	26.84	5.25
Camel (%)	4.82	8.98	0.62
Livestock unit*	25.08	8.77	38.20

* 0.1 LU = 1 head of goat or sheep; 1.0 LU = 1 head of camel or cattle or buffalo

Table II

Flock age structure in the northwestern coastal zone of Egypt

	Agroecological subzones		
	Rain fed	Dry	Irrigated
Mature female (%)	40	53	36
Mature male (%)	3	2	3
Immature female (%)	25	18	22
Immature male (%)	13	6	18
Progeny < 4 months (%)	19	22	21

Table III

Small ruminant performance in the northwestern coastal zone of Egypt

Criteria	Agroecological subzones		
	Rain fed	Dry	Irrigated
Productivity			
Sheep (kg lambs/ewe/year)	25.4 ^a	20.8 ^b	25.4 ^a
Goat (kg kids/doe/year)	20.7 ^a	18.9 ^b	20.9 ^a
Return on capital (%)			
Sheep	17.9 ^b	14.4 ^c	22.3 ^a
Goat	16.7 ^a	16.7 ^a	16.5 ^a

^{a,b,c} Means in the same row with different superscript letters differ significantly at $p < 0.05$.

Contribution of small ruminant production to household income

Table IV shows that the contribution of livestock to the household income ranged from 40.8 to 71.6% across AEZ. Under DA condition, livestock production contributed 71.6% to the household income.

Table IV

Contribution of livestock to household income in the northwestern coastal zone of Egypt

Source of income	Agroecological subzones		
	Rain fed	Dry	Irrigated
Agriculture (%)	30.4	2.5	54.7
Livestock (%)	58.0	71.6	40.8
Large ruminant (%)	34.0	36.1	75.3
Small ruminant (%)	66.0	63.9	34.7
Off-farm income (%)	11.6	25.6	4.5

DISCUSSION

The proportion of immature females (18%) in DA was about three times higher than that of immature males (6%), reflecting the adaptive mechanisms to be set by farmers to cope with the negative effects of drought, such as early marketing of male lambs/kids.

The return on capital invested in sheep production agrees with the findings of Panin and Mahabile (1997), and Peacock (2008), who report that small ruminant production is profitable and economically viable. Profitability of sheep production was significantly higher in IA. But this statement did not include the family labor cost, knowing that cut-and-carry and indoor feeding systems are more labor intensive per animal unit. However, households in IA integrated small ruminant with crop production thus cutting down on feed expenses, which agrees with the findings of Savadogo (2000). On the other hand, the returns on capital invested in goat production were similar between the various AEZ ($p > 0.05$). The study revealed that goat production was more profitable than that of sheep in DA. According to Ahuya et al. (2005), the profitability of goat production emanates from the fact that goats require less feed and eat agricultural by-products that are of low value, hence the low production costs.

Within the livestock sector, small ruminant contributed the most (63.9%) to the household income. This finding is consistent with that of Shomo (2004) who reports that sheep are the main economic activity in dry areas, contributing 57–89% of the income of small-scale producers. La Rovere and Aw-Hassan (2005) report that the most vulnerable households of the country are those that depend solely on livestock production. The contribution of crop production to household income in DA systems was practically null, whereas other sources of income (mainly off-farm work) contributed 25.6%. On the other hand, crop production ranked as first

main economic activity in IA and contributed 54.7% of the household income. Furthermore, Peacock (2005), Safari et al. (2008), and Lwelamira et al. (2010) report that manure from livestock enables substantial improvement in soil quality, increases crop yield, and thus improves food security and income to the household.

CONCLUSION

Under DA condition, livestock production contributed 71.6% to the household income. Within the livestock sector, small ruminant contributed the highest (63.4%). Drought in the middle of NWCZ adversely affected both sheep and goat productivity and profitability of sheep farms. Subsidized feed and government-supported animal diets may lead to additional revenue for Bedouins through the activity of fattening lambs/kids. Reducing animal feed cost by enhancing crop by-product nutritive value is also recommended. The study revealed that goat production was more profitable than that of sheep in DA. The returns on capital invested in goat production were similar between the different AEZ ($p > 0.05$). Making farmers aware of the financial benefits of small ruminants may convince them to consider the latter as a better alternative to crop production in terms of income generation. This should influence their decision on the allocation of their limited resources to the competing alternatives.

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Résumé

Metawi H. Contribution des petits ruminants au revenu du ménage dans la zone agroécologique côtière du nord-ouest de l'Égypte

L'étude a été menée dans la zone côtière du nord-ouest de l'Égypte afin d'explorer l'importance économique relative de la production de petits ruminants. Sur la base des ressources en eau, la zone d'étude a été divisée en trois sous-zones agroécologiques (ZAE): a) la zone pluviale (ZP) à l'ouest, b) la zone sèche (ZC) au centre, et c) la zone irriguée (ZI) à l'est. La collecte des données a été effectuée au moyen d'enquêtes de terrain, à l'aide d'un questionnaire testé au préalable. La productivité a varié de 20,8 à 25,4 kg, et de 18,9 à 20,9 kg, respectivement chez les ovins et les caprins. La productivité des ovins et des caprins a été plus faible dans la ZC que dans les ZP ou ZI ($p > 0,05$). La production des petits ruminants a été rentable dans les différentes ZAE. Les rendements sur capital investi dans la production ovine ont été de 22,3, 17,9 et 14,4 %, respectivement dans les ZI, ZP et ZC. Les données correspondantes pour la production caprine ont été respectivement de 16,5, 16,7 et 16,7 %. La contribution de l'élevage au revenu du ménage a varié de 40,8 à 71,6 % dans les ZAE. La comparaison des revenus provenant des cultures et du bétail dans la ZC a révélé que, alors que l'élevage représentait 71,6 % du revenu net total, la contribution des cultures n'a été que de 2,5-5 %. Dans le secteur de l'élevage, la contribution des petits ruminants a été la plus élevée (63,4 %). Aider les agriculteurs à prendre conscience des avantages financiers des petits ruminants peut les convaincre de considérer ces derniers comme une meilleure alternative à la production agricole en termes de génération de revenus. Ces résultats pourront probablement influencer sur leur décision concernant l'allocation de leurs ressources limitées à des alternatives concurrentes.

Mots-clés: bétail, petit ruminant, agroécologie, revenu de l'exploitation, performance animale, Égypte

Resumen

Metawi H. Contribución de los pequeños rumiantes a la generación de ingresos en la zona costera agroecológica noroeste en Egipto

El estudio se llevó a cabo en la zona costera del noroeste de Egipto con el fin de explorar la importancia económica relativa de producción de pequeños rumiantes. Sobre la base de los recursos hídricos, el área de estudio se dividió en tres subzonas agroecológicas (ZAE): i) la zona rica en lluvias (ZL) del oeste, ii) la zona seca (ZC) media, y iii) la zona irrigada (ZI) en el este. La recolección de datos se llevó a cabo a través de encuestas de campo, utilizando un cuestionario previamente probado. Productividad varió de 20,8 a 25,4 kg y de 18,9 a 20,9 kg por ovejas y cabras, respectivamente. La productividad de pequeños rumiantes fue menor en ZC que en ZL o ZI ($p > 0,05$). La producción era rentable bajo las diferentes ZAE. Los retornos sobre el capital invertido en la producción de ovejas fueron de 22,3, 17,9 y 14,4% en ZI, ZL y ZC, respectivamente. Las cifras correspondientes para la producción de cabras fueron 16,5, 16,7 y 16,7%, respectivamente. La contribución de la ganadería a los ingresos familiares varió de 40,8 a 71,6% en toda la ZAE. En ZC, la comparación entre los ingresos por cosechas y por ganado reveló que el ganado representó el 71,6% del total de ingresos netos, mientras que los cultivos contribuyeron a un mero 2,5-5%; por otra parte dentro del sector ganadero, la contribución más alta (63,4%) fue la de los pequeños rumiantes. Concientizar a los agricultores de los beneficios financieros de los pequeños rumiantes podría convencerlos de considerar estos animales como una mejor alternativa a la producción de cultivos en términos de generación de ingresos. Esto probablemente les ayudará a decidir sobre la asignación de sus recursos limitados entre alternativas contendientes.

Palabras clave: ganado, pequeño rumiante, agroecología, renta de la explotación, desempeño animal, Egipto