



ISSN 2305-1088

<https://jsasj.journals.ekb.eg>

JSAS 2023; 8(2): 309-318

Received: 15-12-2023

Accepted: 28-12-2023

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Dairy production system assessment in Aswan Governorate

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Abstract

The objectives of this study were to evaluate dairy production systems in Aswan society and identify different production styles which follow at breeders and site this production system from animal's production systems in Egypt and in end describe dairy production system (cows, buffaloes, sheep and goat) in Aswan governorate and identify on strength and weakness points in this system. Aswan located in the Upper Egypt Southern 22N latitudes. Aswan Governorate comprises five districts on the two sides of the river Nile. Four districts were selected in the present study, Edfu, Kom Ombo, Nasr Al-Noba and Draw. Four villages were randomly selected within each district and twenty-five farmers within each village were randomly selected. Data on 400 farmers was collected during 12 months from January 2020 to December 2020. Information was collected through a field survey using structured questionnaire. In conclusion the study showed that dairy production is the dominant production system compared to other livestock productions in the study area. And inter dairy production system, mixed crop/livestock system is the dominant production system compared to other production systems in the study area. Native cattle are the dominant animal in mixed crop/livestock system. **Keywords:** Dairy production systems, mixed crop/livestock system, flying herds, Commercial system.

INTRODUCTION

Dairy production has been a crucial part of agricultural and food systems around the world for centuries. Global demand for food is expected to more than double by 2050 as a result of human population growth and an increase in living standards, particularly in developing countries (Rojas-Downing et al., 2017). Global production of meat is projected to more than double from 229 million tons in 1999/01 to 465 million tons, and that of milk production to grow from 580 to 1043 million tons (Steinfeld et al., 2006). In Egypt, milk production accomplishes through three main systems mixed crop/livestock production system, commercial system and urban and per-urban milk production system (flying herds) (Abdel Aziz and Sadek, 1999).

Aswan Governorate has about 88192 head from farm animals' 32185 head of cows, 10187 head of buffaloes, 23358 head of sheep, 5874 goats, 3718 head of camels, 12870 head donkeys (MOALR, 2020). Production systems changed from one country to another, among herds within the same country and over time due to varying resources, inputs, outputs, operations (Zwald et al., 2001). The resources and supplies that inter to production process and give products under especially practices and conditions, so its components include inputs (resources and supplies), processes (practices and conditions), and outputs (products and byproducts) (Khidr, 2022). The food gap is a result of an imbalance between what is available and what is needed to meet those demands. This food gap puts a strain on national investments (Abd El Sadek, 2019). Many research studies have shown that there is a deficiency in protein needs in Egypt. The socioeconomic and agricultural features of farm households are essential for creating suitable and successful livestock programmers that assist households (Ayalew et al., 2013). Furthermore, working with households to enhance livestock productivity requires an

awareness of the various elements that affect milk production and livestock raising (Zaw Win et al., 2018). A significant problem is the high rate of population density and overpopulation in the Nile Valley and Delta. As a result, over the past seven years, the Egyptian government has increased the agricultural sector by building numerous projects in Egypt's desert regions. The south area near Aswan had a large share of these projects (Khidr, 2022).

MATERIALS AND METHODS

Aswan is considered Egypt's southern gateway, the communication circle between the two halves of the Nile Valley, and the point of contact between Egypt and Africa. This is the last Governorate of Upper Egypt, in the southern 22 latitudes. The Governorate comprises four districts on the western side of the river Nile and one district on the eastern side. Four districts were selected for this study, Edfu, Kom Ombo, Nasr Al-Noba and Draw (on the western side of the river Nile). Within each district four villages were randomly selected and twenty-five farmers within each village were randomly chosen (total number of farmers 400). Some farmers have land and other landless.

RESULTS AND DISCUSSION

Management

From primary data shown, 16.7% from sampled don't respond for questionnaire while 82.3% respond for questionnaire. 99.5% from householders is males while 0.5% are females this may be due to customs society which prevent women work in field, as far away field about housing. Averages of age are between 51.1 in Edfu center to 54.57 in Draw center that's meaning trying creating source income at reach for retired. About 49.5% from breeders have secondary education, indicating that with good extension and training program they can improve their dairy production and marketing systems which are mainly based on traditional system currently, and 11% read and write, 10.5% no read no write, 10.25% have university education, 9.5% have preparatory education, 9% have primary education and finally 0.25% have diploma. In addition, 64%

of breeders have jobs while 36 % were unemployment. So, a traditional breeders depend on this system in his income and covers his needs. Which considers the second income source to 64% from breeders, while representing main income source to 36% from breeder. The average income for breeders is between 747 LE in Edfu center to 1319 LE in Draw center, this average of income very small compare with average of family which around between 6.46 in Edfu center to 8.65 in Nasr Al-Noba center this meaning that's breeders depend on plant and livestock production in cover your needs. About 90% of breeders are married, 7% are single while 3% divorced. That's in mixed crop/livestock system almost of labor is family.

Khalil and El-Ashmawy (2009) found that average farm size in Qana districts in Upper Egypt was 3.32, 5.85 and 4.58 persons/farm for El-Waqaff, Qafft and Qana districts, respectively. The percentage of family members younger than 10 years ranged between 47 and 56% in the three studied areas. However, the smallest percentage of the population was those older than 50 years (6-9%), this was consistent with those reported by (FAO, 1995) that determined the farm size as 5.5 persons per farm in Sohag Governorate. They found also Age structure of studied farms (Qana districts) found a typical pyramidal composition, and this is characteristic in developing countries where the majority of farm members are children under 17 years of age.

Environment

The climate in Aswan is hot and dry in summer from May to October and mild in winter from November to April. Rainfall is very low, irregular and unpredictable. Summer temperatures are high; reaching 38°C to 43°C with extremes of 49°C.

Land

According to primary data, 99% of breeders have land while 1% doesn't have land. That's meaning the total number of owners 396 holders has about 1293 Fadden and 75 Quorate, this area distributed abdicable on centers as follow: Edfu, Kom Ombo, Nasr Al-Noba and Draw. (Khalil and El-Ashmawy, 2009) found that in Upper Egypt (Qana districts), the total cost and net revenue per feddan for different crops in the three areas. In winter, among other winter crops, fennel generated the highest revenue in El-Waqaff compared to the other two districts, and the lowest was in Qafft, which was

followed by wheat. Berseem, Darawa, and Alfalfa had negative cash revenues, but they gained positive revenue as meat and milk products. Sugar cane generated the highest revenue compared to all summer crops in all districts, but it was not cultivated for mixed farming systems (livestock /crops) in Qana Governorate.

Water

There are two resources of water according to agro-ecology system, river and this percent 60.5%, ground wells and pipe water percent 25.5% and there are some people have both sources river and ground wells and pipe water this percent 12.75% and other percent landless.

Animal species and breed

According to field survey the animal's species are arranged in Aswan governorate as follow: native cattle, crossbred cattle, buffaloes, foreign cattle sheep and goat. Cows are considered mainly source to milk production in world and Arabic countries while buffaloes are considered the first milk animal in Egypt and in Aswan, cows are considered first source to milk production due to high numbers. Buffaloes considers third source for dairy production after native cattle and crosses cattle due to reproductive problems and increase of generation died percent.

Khalil and El-Ashmawy (2009) found that in Upper Egypt (Qana districts), the dairy herd composition per farm is in animal units (AU). Local cows, buffalo, and crossbred cows represented 77.53%, 72.80%, and 73.72% of the total animal units in El-Waqaff, Qafft, and Qana, respectively. This means that the three types of animals are economically important in those areas. There was a great difference in the types of animal holdings between the three districts. The differences might be attributed to the role of dairy animals on the farm, i.e., local cows in El-Waqaff accounted for 30.52% in spite of their low productivity. It might also be attributed to low green forage with a high quantity of farm by-products (wheat straw, sugar can tops, etc.). This condition makes it suitable for local cow raising. On the other hand, milk production is not so important since there is no available market, whereas annual calf production is economically profitable. Fattening animals have a potential market, so they represent a high percentage of the dairy herd in El-Waqaff district.

Housing

Animals housing in mixed crop/livestock system in back-yard to farmer's house and farmer's family look after with them so, all ruminants except foreign cattle and goat had a high significant effect with family size. May be because low number of foreign cattle in Aswan Governorate. There are two types of housing, a close system in which animals are tied in closed place and open system where animal non-tied in open place. Or mix that's animals put in open place in morning and collected then tied in night. About 82.5% from families is simple that's consist of father, mother and your children, 13.25% are expanded that's consist of father, mother, your children and one or both grandfather or grandmother while 4.25% is compound that's consist of group of brothers live in one housing with his families. The overall mean of family size different across Aswan centers, and ranged from 6.46 in Edfu center to 8.65 in Nasr Al-Noba.

Labor

There are two types of labor, first family labor that's presented main labor in mixed crop/livestock system which male cultivated of land, husbandry of large and small ruminants, milking and grazing while almost of female help male in milking. The second type from labor is inside some of seasonal labor who help small breeder in harvest some crop.

Feeding

The feeding system of all ruminants except buffaloes and foreign cattle was highly significantly affected by the farm area in all area this may be due to land is one of the important resources for dairy farming, area of land different from center to other where in Kom Ombo center old land and small area breed increase native cattle and goat while in Nasr Al-Noba center where new reclaimed and large ownership increase foreign cattle, crosses cattle and buffaloes, this area cultivated in winter with berseem as green fodder for animals. In small farms green fodder is available in farms where berseem in winter and darawa in summer. So, all ruminants except buffaloes and foreign cattle were a highly significantly affect with berseem area and all ruminants except foreign cattle and goats were a highly significantly affect with darawa area. Large ruminant except foreign cattle was a highly significantly affect with wheat area that may be

due to draw of wheat inter in content of ration. Inside green fodder farmers cultivated concentrates for feeding dairy animals and to fattening, all ruminants were a highly a significantly affect with sorghum area as one of the important energies concentrate in summer, also all ruminants except local cattle were a highly significantly affect with maize area as one of the important energy concentrates.

Technology

Role of technology in life of small breeder does not increase over under-structure and artificial insemination. Other works such as cleaning, feed and milking...etc. made by hands. This may be due to low number of animals at small breeder and decrease of support of finance.

Reproductive characterization

The quality of any farm production system depends on reproductive efficiency. Reproductive performance depends on environmental factors and genetic factors. Reproductive performance varies from species to other; breed to other and from animal to other. There are many standards to measure reproductive efficiency such as age at first breeding which around with 18 months for foreign cattle and crosses cattle to 24 months for buffaloes and native cattle, weight at first breeding which around with 300kg for native and crosses cattle to 350kg for foreign cattle and buffaloes, Cows were tracked visually on a daily basis, which proved to be successful. Cows were assumed to be in the heat process if one or more of the estrus symptoms, such as vaginal mucus discharge or standing behavior. Natural services were performed and the number of services per conception was recorded for each cow, that's 95.25% from small breeders using natural insemination, while 4.75% used to both natural insemination and artificial insemination. There are 14.75% from breeders have bulls, while 85.25% don't have bulls. Price of natural insemination was 20 LE, while artificial insemination was 70 LE. Days open is period from calving to conception service which around with 60 days for crosses cattle, foreign cattle and 90 day for native cattle (without any signs of estrus) post-service, rectal palpation was performed to diagnose pregnancy. calving intervals which around with 12 months for crosses and foreign, 13 months for native cattle and 14 months for buffaloes, Age at first calving which around with 30 months for

foreign and crosses cattle, 37 months for native cattle and 38 months for buffaloes and weight at first calving which around with 400 kg for native and crosses cattle and 450 kg for foreign cattle and buffaloes. Similar findings were reported by (Damarany, 2021).

Generation characterization

Generation characterization varies according to species, breed, sex and animal such as males weight at birth which around with 30 kg for native cattle, 35 kg for crosses and buffaloes to 40 kg for foreign cattle, female weight at birth which around with 25 kg for native cattle, 30kg crosses cattle and 35 kg foreign cattle, age of weaning which around with 2-6 months for buffaloes, 4-5 months for native cattle and 6 months for foreign and crosses cattle, weight of weaning around with 50-80 kg for buffaloes, 75-80 kg for native cattle, 80 kg for crosses cattle and 85-90 kg for foreign cattle and weaning period around with 60 day for buffaloes, foreign and crosses cattle to 120-150 days for native cattle. Similar findings were reported by (Kamal et al., 2015).

Productive characterization

From primary data, animals milking manual twice (in morning and in night), average of milk season around 4-5 months for native cattle, 7 months for crosses and foreign cattle and 8 months for buffaloes or 120-150 days for native cattle, 210 days for crosses and foreign cattle and 240 days for buffaloes, average daily dairy production 165.95 kg, 515.55 kg for buffaloes, 1523 kg for foreign cattle and 1724.6 kg for native cattle. The role of small ruminants as dairy animals non-found that's non-found sheep for dairy production and Aswan population don't prefer milk of goat and camels and use them to meat production alone.

Native cattle occupy primacy and contribute with by 43.94% followed by crosses cattle by 38.8% then buffaloes by 13.13% and foreign cattle by 4.23%. While buffaloes occupy primacy in dairy products, followed by crosses cattle and native cattle due to high production for buffaloes and crosses cattle and low production of native cattle, while foreign cattle don't contribute in dairy products due to low of numbers. Total dairy production in Aswan governorate by 8241 kg/day, where Nasr Al-Noba center comes in the front, which contribute with 3038 kg/day that's have large number from buffaloes, crosses cattle and

foreign cattle, then Draw center which contribute with 1994 kg/day, Edfu 1953kg/day, Kom Ombo 1256 kg/day that is have large number from native cattle.

Fattening

According to primary data, about 47.5% of breeders are fattened animals while 52.5% of them are not fattened animals. Animal species which fatten: buffaloes, native cattle, cross cattle, foreign cattle, sheep, goat, and camels. The price of meat is 85 LE/ kg/life weight and 120 LE/ kg/carcass for large ruminants. While the price of meat for a small ruminant is 65LE/kg/life weight and 100 LE/kg/carcass.

Marketing system

Channels and marketing pass which start from door of farm until reach product to final consumer are two type formal and informal. Informal marketing system, producer sells to ship, seller or direct to consumer. While in formal marketing system, producer sells to dairy production units. Informal marketing system is common system in mixed crop/livestock system due to low dairy collection units in Aswan Governorate this opinion agreement with (Tsegaye et al.2022). Primary data shown that's milk and products used for self-sufficiency.

Dairy collection, industrial and marketing points

Dairy collection units comprise dairy collection centers and dairy collection points. From secondary data shown Aswan governorate continue on dairy collection centers. These centers follow the special sector. Its number is five, two in Nasr Al-Noba, while two in Kom Ombo and one in Draw. Edfu center don't continuing any dairy collection centers. Three from dairy collection points with excellent cases, one with good cases and the least was closed (Education laboratory).

Table 1. Householders characterize in Aswan governorate centers.

Average	Total	Draw	Nasr Al-Noba	Kom Ombo	Edfu	Variables
100	400	100	100	100	100	Sample size
						Sex
99.5	398	100	100	98	100	Male
0.5	2			2		Female
-	-	54.57	51.62	54.1	51.13	Age of breeder
			16		17	Level of education
			11		4	No reading no writing.
11.8	47	7	10	7	8	Read and write.
11	44	19	12	10	5	Primary school
9	36	11	47	7	57	Preparatory school.
	38	14	9			Secondary school.
9.5	198	41		7	8	University.
49.5	41	8		53		Diploma.
	1					
10.3				16		
0.3						
				1		
						Employ
63.5	254	69	69	67	49	Employs
36.5	146	31	31	33	51	Unemployment
-	-	1319	1245	1310	747	Average of income
						Social state
1.75	7		1	2	4	Single
97.75	391	100	99	96	96	Married
0.5	2			2		Divorced or widowed

Table 2. Area of land in Aswan governorate centers.

<i>Variables/Centers</i>	<i>Edfu</i>	<i>Kom Ombo</i>	<i>Nasr Al-Noba</i>	<i>Draw</i>
Land per Fadden	331	201	555	207
Owner per Fadden	73	128	124	113
Rented per Fadden	21	93	74	19
Rented to another per Fadden	1.25	0.5	0	2
Partnership	134	75	200	28
Position by hand per Fadden	10	0	0	0
Value of rent	645	1539	1598	1046
Value of tax	110.15	50.6	164.91	63.3

Table 3. Type of land in Aswan governorate centers.

Type/center	Edfu	Kom Ombo	Nasr Al-Noba	Draw
Landless	-	-	2	2
Old	74	98	86	92
Intermediate	-	1	7	-
New	26	-	5	2
Old and intermediate	-	1	-	2
Old and new	-	-	-	2
Intermediate and new	-	-	-	-
Old, intermediate and new	-	-	-	-

Table 4. Quality of soil in Aswan governorate centers.

Quality/Center	Edfu	Kom Ombo	Nasr Al-Noba	Draw
Landless	-	-	2	2
Good	97	99	69	77
Intermediate	1	1	7	10
Fable	2	-	7	5
Good and intermediate	-	-	9	3
Good and fable	-	-	3	1
Intermediate and fable	-	-	1	1
Good, intermediate and fable	-	-	2	1

Table 5. Sources of water in Aswan governorate centers.

Source/Center	Edfu	Kom Ombo	Nasr Al-Noba	Draw
River	67	76	54	45
Ground wells and pipe water	32	11	23	36
River, ground wells and pipe water	1	13	21	16

Table 6. Average of animal units in Aswan governorate.

Item	Edfu	Kom Ombo	Nasr Al Noba	Darw
Native cattle (AU)	1.23	2.08	1.30	1.93
Crossbred cattle (AU)	1.59	1.00	2.09	1.00
Foreign cattle (AU)	0	0	0.142	0.032
Buffalo (AU)	0.28	0.42	0.82	0.33
Sheep (EE)	0.59	1.01	0.99	0.97
Goat (DE)	0.15	0.53	0.41	0.51
Total (AU)	3.84	5.04	5.75	4.77

Table 7. Type of labor in Aswan governorate centers.

Variables/Centers	Edfu	Kom Ombo	Nasr Al-Noba	Draw
Agriculture of land				
Male	2.60	2.32	3.31	3.12
Female	0	2	0	0
Husbandry of large ruminants				
Male	1.30	1.17	1.655	1.56
Female	0	1	0	0
Husbandry of small ruminants				
Male	2.60	2.31	3.31	3.15
Female	0	0	0	0
Milking				
Male	0.47	1.19	1.83	1.78
Female	1.25	0.58	1.58	0.87
Grazing				
Male	2.60	0.23	3.31	3.13
Female	0	0	0	2

Table 8. Reproductive characterization of dairy production in Aswan governorate centers.

Variables	Native cattle	Crosses cattle	Foreign cattle	Buffaloes
Age at first breeding(month)	24	18	18	24
Weight at first breeding(kg)	300	300	350	350
Calving intervals(month)	13	12	12	14
Days Open(day)	90	60	60	60
Age at first calving	37	30	30	38
Weight at first calving(kg)	400	400	450	450

Table 9. Generation characterization of dairy animals in Aswan governorate centers

Variables	Native cattle	Crosses cattle	Foreign cattle	Buffaloes
Males weight at birth	30	35	40	35
Females weight at birth	25	30	35	30
Age of weaning	4-5	6	6	2-6
Weight of weaning	75	80	90	50-80
Duration period	120-150	60	60	60

Table 10. Characterize of milk production in Aswan governorate.

Variables	Native cattle	Crosses cattle	Foreign cattle	Buffaloes
milking	2	2	2	2
Milk season(day)	120-150	210	210	240
Milk season (month)	4-5	7	7	8
Average daily milk production(kg)	1724.6	165.95	1523	515.55

Table 11. Dairy collection centers in Aswan governorate

Center	Cases	Area	Capacity (Kg)	Tanks number	Tanks Capacity (Kg)	freezer Number	Deep freezer Number	Receptor
Nasr Al-Noba	Excellent	225	3000	5	100-750	5	0	3
Nasr Al-Noba	Close	32	500	2	250	2	0	0
Kom Ombo	Good	24	1000	3	200-500	1	1	3
Kom Ombo	Excellent	32	4000	3	750	2	2	3
Draw	Excellent	16	1300	4	150-500	1	0	2

Recommendations to development of dairy sector

1-Encourage out investment in dairy field that's Aswan governorate poor in commercial dairy farms because dairy cattle are not adapted with conditions prevailing in Aswan and needs to especially condition so the investment in commercial dairy farms in Aswan is highly necessary. Addition to, mainly production depend on traditional system.

2-Dependence on buffaloes in these farms as adapted animals with Aswan governorate condition.

3- Increase dairy collection units to free economic policies and commercial openness by exported to foreign countries.

4-Increase dairy distributed units.

CONCLUSION

The study showed that dairy production is the dominant production system compared to other types of livestock productions systems in the study area. The mixed crop/livestock system is the dominant production system compared to other production systems in the study area. Native cattle are the dominant animal in mixed crop/livestock system.

SWOT Analysis

<p>Strength</p> <ol style="list-style-type: none"> 1-Crosses cattle second source for dairy production. 2-Aswan poor in flying herds system. 3-rural products. 4- High price of animal products compare with milk. 5-Available dairy collection centers. 6-Abolishment of a big part of unemployment. 	<p>Weakness</p> <ol style="list-style-type: none"> 1-Native cattle are the first source for dairy production in Aswan governorate. 2-Bufferaloes are considered the- third source for dairy production in Aswan governorate. 3-Semi-ruminants (camels) and small ruminants don't contribute in dairy production in Aswan governorate. 4-Mixed crop/livestock system main system in Aswan governorate. 5-Depends on natural insemination and manual milking. 6-Low number of dairy collection centers. 7- Low size area of old land while increase size area of new reclaimed land. 8-Poor record. 9-Traditional market.
<p>Opportunities</p> <ol style="list-style-type: none"> 1-Increase awareness with milk and milk products. 2- Attention the government with animal riches sector. 3- Encourage the investment in dairy sector. 4-Low benefit on loans. 	<p>Threats</p> <ol style="list-style-type: none"> 1-High temperature. 2-Absence of standard measurements. 3-Seasonal contracts such as diseases. 4-Brazing on agriculture land. 5-Non-using agriculture cycling. 6-Depands on old lands which have small area while cultivated new lands is high costs. 7- Lands don't have ability to cultivate.

ACKNOWLEDGEMENT

The author thanks dairy producers to respective for their wisher to participate in the study and provide valuable information.

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المخلص العربي تقييم نظام انتاج الالبان فى محافظة اسوان

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1 قسم الإنتاج الحيوانى - كلية الزراعة - جامعة سوهاج

2 قسم الإنتاج الحيوانى - كلية الزراعة - جامعة اسوان

يهدف البحث الحالى الى تقييم منظومة انتاج الالبان من الحيوانات المزرعية داخل مجتمع اسوان والتعرف على النظم المختلفة من اساليب الانتاج التى تتبع عند المربين وموقع هذا النظام الانتاجى من نظم الانتاج الحيوانى فى مصر وفى النهاية توصيف النظام الانتاجى للبن (الابقار والجاموس والاعنام والماعز) داخل محافظة اسوان والتعرف على نقاط القوة ونقاط الضعف فى هذا النظام. تقع هذه المحافظة فى جنوب صعيد مصر، وتتكون من خمسة مراكز، تقع جميعها على جانبى نهر النيل. تم اختيار اربعة مراكز، وهى مراكز ادفو- نصر النوبة -كوم امبو -دراو، وداخل كل مركز تم اختيار اربع قرى بطريقة عشوائية، وداخل كل قرية تم اختيار خمسة وعشرون مزارعاً أيضاً بطريقة عشوائية؛ ليصبح إجمالي العينة المختارة 400 مزارعاً وذلك من خلال استبيان. استغرق تجميع هذه البيانات اثنى عشر شهراً بدايةً من شهر يناير لعام 2020 إلى شهر ديسمبر لعام 2020. فى النهاية الدراسة اظهرت ان انتاج اللبن هو الانتاج السائد مقارنة بباقي المنتجات الحيوانية الأخرى. وداخل انظمة انتاج اللبن، نظام الانتاج النباتى/الحيوانى المختلط هو النظام الانتاجى السائد مقارنة بباقي الانظمة الانتاجية فى منطقة الدراسة. الماشية المحلية هى الحيوان السائد فى نظام الانتاج النباتى/ الحيوانى المختلط فى محافظة اسوان.