

DAIRY FARM CHARACTERISTICS UNDER MIXED FARMING SYSTEM IN ISMAILIA GOVERNORATE IN EGYPT

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SUMMARY

Characteristics of twenty dairy farms, located in five districts of Ismailia Governorate (Ismailia, El-Tall El-Kebir, Fayed, East Qantara and West Qantara) were monitored for one year (August/2003 – July/2004) through regular monthly visits. Data were collected on cultivated land, crop rotation, herd data, feeding system and dairy farm management. The objectives of this study were to define the main characteristics of the existing dairy farming system, obtain reliable data on performance of dairy cows and buffaloes, to identify major constraints facing the development of dairy farms under mixed farming systems and to get feedback from farmers in order to focus research and extension to better meet the requirements of farmers.

Results of this study indicated that average of farm size was 7.13 feddan, while average of herd size was 11.1 animal units (A.U) / farm. Average of stocking rate was 1.56 A.U / Feddan. Buffalo represented 48 % of the herd composition followed by Crossbred cows (42%) and Baladi cows (10%). Most of farmers planted berseem as a fodder crop for winter-spring season, covering about 47 % of the total planted area. In summer-autumn season, farmers planted fodder crops covering about 21% of the total planted area. The amounts fed ranged from 50 to 90 kg of fresh berseem per cow per day. Green and conserved forage, crop residues, and concentrates covered 37 %, 43 % and 20 % of the total available dry matter, respectively. Calving during (August-January) was relatively higher (64%). The lowest calving percentage took place in February – July (36%). Calving intervals for Buffaloes, Crossbreed and Baladi cows was 405, 398 and 388 days, and age at first calving was 36.4, 34.6 and 37.5 months, respectively. Total milk yield for Buffaloes; Crossbreed and Baladi cows was 1777, 1911 and 858 kg, respectively. It could be concluded that researchers and extension staff should give more attention to develop the feeding plan applied throughout the whole year for livestock holdings in the context of farming system.

Keywords: *Egypt, farm characteristics, herd size, herd composition, milk production*

INTRODUCTION

The principle animal production system in Egypt is the mixed farming system with semi-intensive / semi-commercial orientation. Mixed farming system (livestock

with crop and/or fruits and vegetables) is the dominant system in smallholder farms in Egypt. Abdel Aziz (1992) reported that about 95 % of the cattle populations in Egypt are kept on smallholder farms, with less than 5 feddans of land and who practice low input – low output production. Dairy cows and buffaloes in dairy farms are kept under the prevailing traditional systems of feeding and management adopted by the Egyptian farmers over decades (Nigm *et al.*, 1986; Aboul-Ela, 1993; Sadek *et al.*, 1994; Hathout *et al.*, 1996; Aboul-Ela *et al.*, 2000; El-Wardani *et al.*, 2000; Tabana, 2000 and El-Wardani *et al.*, 2003). Quantitative shortages and poor quality of feeds and fodder, as well as imbalanced diets affect the performance of dairy animals.

In recent decades, the importance of animal draught power has sharply declined, where dairy farming and meat production remain as important activities for many farmers (Tabana, 2000). Over the last decades several dairy development projects have been implemented in Egypt, however, many of the introduced technological innovation, infrastructure and extension services have not catered for the changing circumstances of farmers who continued to use the traditional livestock farming systems which failed to sustain productivity. The main objectives of this work were to define the main characteristics of the existing dairy farming system, obtain reliable data on performance of dairy cows and buffaloes and to identify major constraints facing the development of dairy farms under mixed farming systems.

MATERIALS AND METHODS

A preliminary survey was conducted at the beginning of this study in five districts belong to Ismailia Governorate (Ismailia, El-Tall El-Kebir, Fayed, East Qantara, and West Qantara) to select the dairy farms. Farms were selected for their criteria as common dairy farms that operate as mixed farming system, where animal raising and crop cultivation activities are practiced. Twenty dairy farms were chosen for the monthly monitoring program, four farms from each district. The monitoring program covered one year (August/2003 – July/2004).

Animals of these farms are kept under the traditional system of feeding and management adopted by the Egyptian farmers over decades. Animals were fed mainly on forages and crop residues produced on farm. In winter and spring months (Oct. – Apr.), farmers fed their animals mainly on multi cut clover berseem (*Trofolium alexandrinum*) as well as variable quantities of concentrates / bran, wheat straw and corn silage. In summer and autumn months (May - Sep.), farmers used to feed their animals on wheat straw and concentrate / bran and variable amounts of summer green fodder (mostly darawa). Animals were hand milked twice daily in the early morning (before sunrise) and in the evening (before sunset). Breedable females were serviced by the available bull in the village or in adjacent village, with the exception of few cases that were artificially inseminated. Animals were housed in traditional enclosures (stables) of various types, closed or semi-open attached to their houses during the night, while in the daylight; animals were housed in open sheds nearby the house or in the field.

One-extension staff in each district under supervision of a field research officer from Egypt-Finland Agricultural Research Project (EFARP), Agricultural Research Station in Ismailia, Agricultural Research Center, collected data from target area villages through the monthly follow-up visits to the monitored farms. A monthly

format (semi-structured interviews with questionnaires) was designed to collect quantitative data covering the areas of herd data, production, reproduction, feeding and management as well as cultivated land, crop rotation in the context of farming system. Milk records were kept for all lactating cows and buffaloes throughout the lactation period. Milk yield was measured once a month in the morning and in the evening on a fixed date at each farm. In the suckling period, the milk consumed by the calf was estimated by milking the right part of the udder in the morning and the left part in the evening. Data collected was statistically analyzed using SAS program (SAS, 2000).

RESULTS AND DISCUSSION

Farm and herd size

The data obtained from monitored farms indicated that dairy farm at village level have a common feature of mixed (crop/livestock) farming system, where animal raising and crop cultivation activities are practiced (Table 1). The analysis of data revealed that average of cultivated land feddan/farm (farm size) was 7.13 feddan ranging from 2.28 to 12.10. While, average number of animal unit (A.U) / Farm (herd size) was 11.1 and average number of A.U/ feddan. (Stocking rate) was 1.56 . Large ruminants represented about 90 % of total A.U. Similar estimates were shown by Hathout *et al.* (1996) and Tabana (2000) in the Nile Delta.

Table 1. Main features of the monitored dairy farms

District	Average of cultivated land Feddan* / Farm	Average no. Of A.U**/Farm	Stocking rate, A.U/Feddan
Ismailia	9.07	06.90	0.76
El-Tall El-Kebir	4.68	10.36	2.21
Fayed	6.31	16.22	2.57
East Qantara	7.56	08.73	1.15
West Qantara	8.06	13.30	1.65
Average	7.13	11.10	1.56

* One feddan is equal to 4200 m².

**1 Buffalo or 1 Crossbred head of cattle = 1AU (Animal Unit), 1 Baladi cattle head = 0.75AU, 1 Sheep = 0.20AU, 1 Goat = 0.15AU and 1 Donkey = 0.5AU.

Herd composition

Three types of dairy animals were differentiated in the monitored farms, Buffaloes, Crossbred and Baladi cows (Table 2). Buffaloes represented 48% of the herd followed by Crossbred (42%) and Baladi cows (10%). This indicates that Buffalo is the common dairy animals in Egyptian villages. Buffaloes were the dominant dairy animals in Ismailia district (63 %), Fayed (52%) and El Tall El-Kebir (71%) while Crossbreeds were dominant in East Qantara (73 %) and in West Qantara (66%). Baladi breed (indigenous) represents the smallest proportion, ranging from zero in East Qantara to 16 % in Ismailia. Similar results were obtained by Nigm *et al.* (1986), Hathout *et al.* (1996), Aboul-Ela *et al.* (2000), El-Wardani *et al.* (2000), Tabana (2000) and Wardani *et al.* (2003).

Table 2. Herd composition of different breeds in districts of Ismailia Governorate

District	Buffalo	Baladi-cows	Crossbreed
	%	%	%
Ismailia	63	16	21
El-Tall El-Kebir	71	15	14
Fayed	52	13	35
East Qantara	27	0	73
West Qantara	26	8	66
Average	48	10	42

Cultivated land and cropping system

Most of the lands in Ismailia Governorate are new reclaimed except in El Tall El Kebir and West Qantara districts. Average cultivated areas for different crops in winter-spring and summer-autumn seasons are given in table (3).

Table 3. Distribution of the main crops planted in winter and summer seasons

Crops	Percentage of total planted area
I-Winter-Spring season	
Berseem	46.64
Wheat	19.68
Bean	04.74
Vegetables	28.94
II-Summer-Autumn season	
Darawa (forage maize)	21.06
Maize	27.00
Cotton	04.50
Rice	08.84
Peanut	12.72
Sesame	05.57
Vegetables	20.08

Most of farmers planted berseem (*Trofolium Alexandrium.*) as a fodder crop for winter-spring season, covering about 47 % of the total planted area. In summer-autumn season, however, farmers planted fodder crops covering about 21% of the total planted area. In winter-spring season, berseem occupies the largest area in all districts except in Ismailia district where vegetables are the main crop (63%). Forage maize (Darawa) and other summer forage crops occupy a relatively small area in all other districts except in Fayed where summer forages represent 44 % of the total cultivated area. This indicates that animal production is a main agricultural activity in Fayed district.

Feed resources and Feeding system

Feed resources available in the districts are presented in table (4). Berseem is the most important green forage used in all districts and its share ranged from 19 to 31 % of the total feed dry matter. Crop residues as straw of wheat and rice, including maize

stalks ranged from 23 to 39 % of the total feed dry matter. On the average, berseem, summer green forages and hay covered 37 % of the total available dry matter, while crop residues covered 43 %, and concentrates 20 % of the total dry matter intake.

Table 4. Feed resources used in animal feeding as percentage of total dry matter

District	Green and Conserved forage			Crop residues		Concentrate
	Berseem	Darawa	Hay	Straw	Peanut tops	
Ismailia	19.1	5.8	4.7	39.3	12.4	18.7
Fayed	19.0	15.4	6.3	23.1	8.4	27.8
East Quantara	25.9	6.6	5.4	31.7	9.4	21.0
West Quantara	23.2	7.6	4.1	38.5	6.4	20.2
El Tall El - kebir	31.4	6.0	4.9	38.2	5.1	14.4
Average	23.72	8.3	5.1	34.2	8.3	20.4
		37.1		42.5		20.4

Feeding systems in different seasons are shown in table (5). In winter, berseem was the main feed. The amounts fed ranged from 50 to 90 kg of fresh berseem per cow per day. In addition, farmers offered straw to their cows except in Fayed where the cows got also concentrates. In Fayed, milk production is the main source of income for smallholder farmers. In spring the main feeds were concentrates, hay and straws in all districts. In summer the main feeds were summer fresh forages (forage Maize, Millet, Sorghum, and Napier grass), concentrates and straw. The amounts of summer forages (Darawa) given to animals ranged from 10 to 40 kg of fresh forage per animal per day. In autumn, peanut hay is an important feed resource in Ismailia Governorate, where peanut is the main summer cash crop on newly reclaimed sandy soils. In addition, the cows got some concentrates and straw.

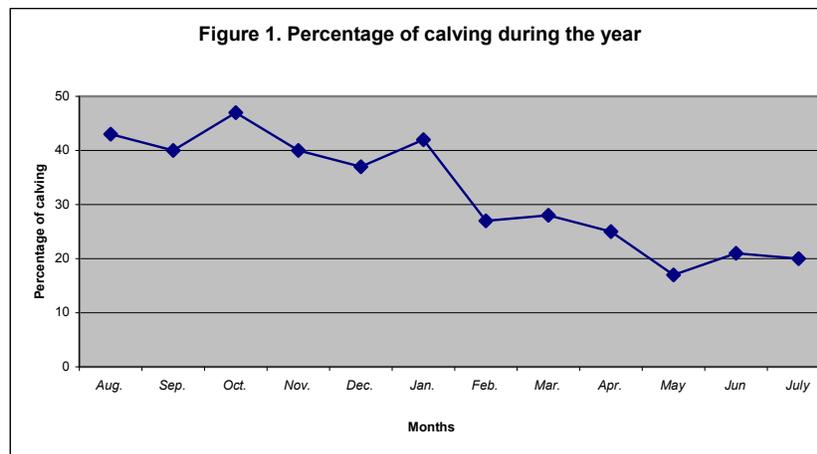
Table 5. Feed staffs used for dairy cattle in districts of Ismailia Governorate in different seasons of the year (on fresh bases)

District	Winter		Spring		Summer			Autumn				
	Berseem /kg	Conc. / kg	Straw / kg	Hay /kg	Conc. /kg	Straw /kg	Darawa /kg	Conc. /kg	Straw /kg	Peanut hay/ kg	Conc. /kg	Wheat straw/kg
Ismailia	50	-	4	2	2	4	10	4	5	5	2	4
Fayed	75	6	4	4	6	4	40	6	3	5	5	4
East Quantara	90	-	4	3	4	4	15	4	5	5	4	5
West Quantara	70	-	5	2	4	5	15	4	5	3	2	4
El Tall El - kebir	80	-	4	2	2	4	10	2	4	2	2	4
Overall Average	73	1.2	4.2	2.6	3.6	4.2	18	4	4.4	4	3	4

Such finding is consistent with those reported by other investigators (El-Shinnaway, 1990; Hathout *et al.*, 1996 and Aboul-Ela *et al.*, 2000) who indicated imbalance distribution of feed resources for livestock in Egypt between summer and winter. This imbalance in the type of feed resources available during different seasons of the year may have direct impact on productive and reproductive performance of dairy cows. El-Keraby *et al.* (1981) reported that buffalo fed solely on berseem had significantly more days open than herd mates fed on berseem along with straw and concentrates or on crop residues and concentrates. On the other hand, the practice of using a lot of dry feeding during summer, which coincides mostly with the second half of the gestation period of buffalo under traditional village conditions (Aboul-Ela, 1993 and Aboul-Ela *et al.*, 2000), may have adverse effects on foetal development and dam's body condition at calving, and in turn its reproductive and lactation performance.

Calving season

It can be noticed from figure (1) that calving during months (August-January) was relatively higher (64%) when berseem starts to be available and the lowest calving percentage took place in February – July (36%). Same results were obtained by Aboul-Ela (1993) who found that 66.3% of buffaloes calving occurred during the cold months (September – February). Hathout *et al.* (1996) and El-Wardani *et al.* (2000) reported that the percentage of calving during (November-January) was larger than during (Jun – August) in buffaloes and cattle. Most of the farmers arranged their breeding plan so that the cows give birth in the beginning of the berseem season to match the high milk production with the abundant availability of high quality forage.



Age at first calving and Calving interval

Age at first calving was around 36 months in both buffaloes and cows (Table 6). The results are similar to those of Hathout *et al.* (1996) who reported that age at first calving was 36, 33.5 and 38.5 months for Baladi cows, Crossbreds and Buffaloes, respectively. Age at first calving is affected by genetic, but it, also, depends upon

good feeding, breeding, management and climatic conditions. Modulation of managerial practices (feeding system and level) would result in reducing age at first calving of buffaloes (33.2 months, El-Ashry, 1993).

Table 6. Least-squares means and standard errors for productive and reproductive traits

Item	Age at first calving (month)	Calving Interval (day)	Average daily milk yield (kg)	Lactation length (day)
Buffaloes	36.4 ± 1.14	405.2 ± 15.42	6.3±2.26	282±16.43
Crossbreds	34.6 ± 1.14	398.2 ± 09.28	6.5±2.10	294±13.42
Baladi cows	37.5 ± 1.29	387.5 ± 09.45	3.9±2.05	220±24.49

The results of calving interval are presented in table (6). The average calving intervals for Buffaloes, Crossbreds and Baladi cows were 405, 398 and 387 days, respectively. The calving intervals were within the optimal range from the production economical point of view. This indicates that reproduction management is appropriate on the farms under survey. Under farmer conditions, Hathout *et al.* (1996) reported that calving intervals were 367, 408 and 437 days for Baladi, Crossbreds and Buffaloes, respectively. In addition, Nigm *et al.* (1986) and Wardani *et al.* (2000) reported that calving intervals were 388 and 386 days for Baladi cow, 416 and 452 days for buffaloes, respectively.

Milk production:

Milk yield is an important indicator of herd management. The average daily milk yield was calculated based on the number of lactating cows in each district in certain months. The results are shown in table (6). The highest average milk yield was found in Fayed district, with a daily yield being 9.2 kg for buffalo (2484 kg per year) and 7.9 kg for crossbred (2370 kg per year). For Baladi cows, the highest average daily yield was 4.1 (913 kg per year) in Ismailia and East Qantara. The variation between districts can be attributed to better management.

The calculated overall mean of total milk yields for Buffaloes; Crossbreds and Baladi cows were 1777, 1911 and 858 kg per animal per lactation, respectively. These results are comparable to earlier surveys from smallholder farms in the Nile Delta region. Hathout *et al.* (1996) reported that the average milk yield was estimated as 1791, 2279, and 651 kg / lactation for Buffalo, Crossbred and Baladi cows, respectively with remarkable variations among localities. Nigm *et al.* (1986) found that small livestock holdings in Delta had an average total milk yield of 638 kg for Baladi cows and 1246 kg for Buffaloes.

CONCLUSION

Feed resources are abundant in winter, while there is a shortage of feed at the beginning of summer season and at the beginning of winter season. Farmers should be encouraged to conserve feeds as hay and silage and to utilize crop residues for feed during the period of feed shortage. When milk markets are available and milk price is good, farmers would pay more attention to forage production and feeding and

they demonstrate more attention to improve milk production potential of their dairy animals. The age at first calving was 35-38 months. It should be studied how to get the heifers produce their first calf at a younger age, while calving intervals were reasonable from the economical point of view.

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خصائص مزارع الإلبان تحت نظام الزراعة المختلطة بمحافظة الإسماعيلية في مصر

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درست خصائص عشرون من مزارع الإلبان تحت نظام الزراعة المختلطة في خمسة مراكز بمحافظة الإسماعيلية (الإسماعيلية - النل الكبير - فايد - القنطرة شرق - القنطرة غرب) وذلك من خلال زيارات شهرية أستمرت لمدة عام. وقد جمعت بيانات عن أنواع ومساحة المحاصيل المنزرعة والممارسات الزراعية وبيانات عن قطيع الحيوانات ونظام التغذية ورعاية الحيوانات وادائها. وإنحصرت الأهداف الرئيسية للبحث في التعرف علي الخصائص الأساسية لمزارع الألبان والحصول علي بيانات واقعية عن أداء الأبقار والجاموس في منظومة النظام المزرعى. وكذلك التعرف علي المعوقات الرئيسية التي تعترض تطور مزارع الألبان تحت نظام الزراعة المختلطة وللحصول علي معلومات لتوجيه البحوث والإرشاد نحو تغطية أفضل لإحتياجات المزارعين.

في مزارع الإلبان تحت نظام الزراعة المختلطة التي أشتملت علي الإنتاج النباتي والحيواني معا - كان متوسط مساحة الأرض المنزرعة ٧.١٣ فدان و عدد الوحدات الحيوانية بالمنزرعة ١١.١ وحمولة الفدان من الوحدات الحيوانية ١.٥٦. مثل الجاموس النسبة الاعلى في تركيب القطيع (٤٨%) ، ثم الأبقار الخليطة (٤٢%) بينما كانت الأبقار البلدي أقل نسبة (١٠%). شغل البرسيم ٤٧% من مساحة الأرض المنزرعة خلال فصلي الشتاء والربيع بينما بلغت مساحة الأرض المنزرعة بمحاصيل العلف الأخضر الصيفية ٢١% فقط. بلغت كمية البرسيم الطازجة المأكولة لكل بقرة من ٥٠ إلى ٩٠ كيلو جرام يوميا. وكانت نسبة الأعلاف الخضراء و مخلفات المحاصيل الزراعية و الأعلاف المركزة هي ٣٧ و ٤٣ و ٢٠ % من إجمالي المادة الجافة المغذاه علي التوالي. كانت نسبة الولادات خلال الفترة من أغسطس حتي يناير ٦٤% وكانت ٣٦% خلال الفترة من فبراير حتي يوليه. كانت الفترات بين الولادات في الجاموس والأبقار الخليطة والأبقار البلدى هي ٤٠٥ و ٣٩٨ و ٣٨٨ يوم علي التوالي. بينما كانت القيم المقابلة للعمر عند أول ولادة هي ٣٦.٤ و ٣٤.٦ و ٣٧.٥ شهر علي التوالي. وكانت القيم المقابلة لإجمالي محصول اللبن ١٧٧٧ و ١٩١١ و ٨٥٨ كيلو جرام علي التوالي. من خلال منظومة النظام المزرعى يمكن للبحوث والإرشاد أن تقدم خطة تغذية عملية لتغطية إحتياجات الحيوانات الحلابة علي مدار العام في مزارع الإلبان تحت نظام الزراعة المختلطة.