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MILK PRODUCTION AND MARKETING EFFICIENCY FOR DAIRY FARMS (CASE STUDY IN KAFER EL-SHEIKH – EL-BEHEIRA – QENA) GOVERNORATES

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ABSTRACT

Milk marketing was studied in a hundred and fifty farms practicing mixed (Crop / livestock) farming system. The studied farms were selected randomly from three governorates: two in Delta (El-Beheira (B) and Kafer El-Sheikh (K)) representing (buffalo–rice based system) and one in Qena (Q) for (buffalo -sugar cane based system) in Upper Egypt. The study aimed to study milk production and marketing efficiency in these governorates. A questionnaire was designed and administered in the study areas to collect data from dairy farms. Data included milk yield, some reproductive parameters, milk prices, milk market and milk for home consumption. Results for cow milk yield recorded that 60.19%, 46.95% and 72.44% sold and home consumption was 39.81%, 53.05% and 27.56%. While, buffalo milk was 65.63%, 42.58% and 83.63% sold and for home consumption was 34.37%, 57.42% and 16.37% for K, Q and B respectively. Two types of traders share farmers milk revenues wholesalers; 23.44%, 12.05% and 12.18% while, retailer share were 15.63%, 17.45% and 10.71 for cow milk for K, Q and B, respectively. Buffalo milk share of the wholesale trader was 27.82%. 9.82% and 8.36% and retailers were 18.18%, 14.54% and 18.19% for the same studied governorates, respectively. From the present results it can be concluded that dairy farms can get more profits if village cooperatives or farmers associations establish to collect milk from small dairy farms.

Keywords: Milk, Wholesaler, retailer, cow, Buffalo, revenues

INTRODUCTION

Egypt's economy is based on of which subsistence agriculture accounting for one third of the Gross Domestic Product (GDP), livestock production contributes 30-35% of the GDP (Ministry of Agriculture and Land Reclamation -Economic affair sector MALR-EAS, 2011). Milk production is plays an important role in the livelihoods of the people in rural areas of Egypt. Average annual milk production in Egypt is 5.28 million tons which increases annually by about 6.5%. Milk consumption is 6.13 million tons, therefore, the average per capita consumption of milk 85.48 kg/year 2.7% (Mohamed *et al*., 2008). The gap between production and consumption of milk is 0.85 million tons/year and this is filled by importation to the tune of 1.068 million tons. Local milk production constitutes 86.1% of the total consumption (MALR-EAS, 2011). Yehia and Akram (2010) reported that milk production revenues in Egypt, is 3.29 billion Egyptian pounds represents 10.5 & 29.3 % from the total agriculture production and animal production respectively. The same authors reported out of the total milk production of 6.12 million tons produced

yearly of which buffalo milk represents 48.12% and cow milk represents 50.8% while goat milk represents 2.12%. Increasing productivity of animals has the potential of developing the milk sector in Egypt and consequently increasing smallholder income and employment of new generation from the high-value of milk products thereby contributing to poverty alleviation and improves nutrition states in the country (Mohamed *et al*., 2008).

Mohamed *et al*. (2008) reported that milk products in Egypt are channeled to consumers through both formal and informal milk marketing systems. The informal market involves direct delivery of fresh milk by producers to consumers in the immediate neighborhood or sale to itinerant traders or individuals in nearby towns. In the informal market, milk may pass from producers to consumers directly or it may pass through two or more market agents. The informal system is characterized by no licensing requirement to operate, low cost of operations, high producer price compared to formal market and no regulation of operations. The term 'informal' is often used to describe marketing systems in which governments do not intervene substantially in marketing.

The present study aimed to investigate milk production and marketing efficiency for dairy farms in Delta (Kafer - El-Sheikh and El-Beheira) and Upper Egypt in (Qena).

MATERIALS AND METHODS

This study was conducted depending on two types of data secondary data were collected from official statically (Ministry of Agriculture and Land Reclamation, (MALR), Bulletin of the balance of food, various issues 2009) to give indication of milk production situation in Egypt. Also primary data were collected by interviewing farmers who raised dairy cow and/or buffalo under mixed farming system (Livestock/crops). Three governorates were randomly selected to represent cows and buffalo dairy farms in Delta (Kafer- El-Sheikh (K) and El-Beheira (B)) and Upper Egypt in (Qena (Q)). The three governorates were selected to represent milk production within two farming systems which cultivated most cash crops in Delta (Rice, wheat and corn) and Upper Egypt.(sugar cane, wheat and corn). Two districts and two villages in each district were randomly selected in each governorate. One hundred and fifty farmers who have dairy buffaloes and/or dairy cattle with cultivated land were randomly selected for interviewing. For the field survey, the method of data collection was "single visit-multiple-subject survey". Data collection started from October 2010 till February 2011, on 150 farms in three governorates (fifty farms each). Questionnaires were designed and pre-tested for clarity on a limited number of farms who have experience in raising dairy cow and/or buffalo under mixed farming system. The questions covered various aspects of average daily milk production, lactation length, milk price, quantity of sold milk and home consumption for cows and buffalo milk. Quantity of milk marketing and its prices to wholesaler or retailer was collected to calculate the differences between farm gate and consumer price.

Thus the selected sample can be classified among the "multi-stage" sample or cluster sample.

The study used statistical descriptive and quantitative analysis to calculate relative impotence and average of different technical and economic variables. Also the study used economic efficiency measures and milk marketing efficiency according to marketing margin for both wholesaler and retailer, share wholesaler or retailer to consumer price. Statistical model was used to study affects of Governorates on numbers of milking buffalo and cows, daily milk production, production total milk/lactation and milk price. The degree of significance among means were performed through Duncan test (Duncan 1955) using the SAS program (SAS, 2004).

Statistical Model

$Y_{ij} = \mu + G_i + e_{ij}$

Where:

Y_{ij} **=** any observations numbers of milking buffalos and cow**,** daily milk production total milk/lactation and milk price

μ = overall mean

G_i = the effect of governorate i = 1, 2 and 3 where: 1 =Kafer El-sheikh, 2 = Qena and 3 = El-Beheira

e_{ij} = the residual effect.\

RESULTS AND DISCUSSION

Relative importance of milk production, home consumption and quantity of imported milk.

Dairy farming in Egypt is characterized by small holders who own less than 5 milking animals/farmer. Broadly, there is one major conventional milk cattle production system in rural Egypt namely; the mixed crop–livestock production system. Relative importance of local milk production from various sources in Egypt and imported from outside Egypt are illustrated in table (1). The figures in the table show that cow and buffalo milk production represent 97.6% of total milk production and consumption. Egypt has 75.60% and 100% self-sufficient from cow and buffalo milk respectively. Cow milk is less in self-sufficiently than buffalo milk although cow milk produced is more than buffalo. This might be due to that most of cow milk is possessed into cheese, yogurt, butter etc. Moreover cow milk price is cheaper than buffalo. Buffalo milk is mostly consumed as fresh or produced into butter. Although, Egypt imports substantial quantities of milk, this hardly meets demand.

The main imported milk is cow milk due to its low price and its availability in international market. On the other hand buffalo milk is mainly found in some developing countries in limited quantities and poor hygiene therefore, it is difficult to relay on imported buffalo milk. Consumption per capita of cow milk is higher than buffalo milk. It might be attributed to fact that buffalo milk is the preferred milk by most Egyptians. Goat milk represents a fraction of national total milk production. It is produced mainly in desert areas for home consumption and has little market in Egypt.

Table1. Relative importance of milk production, consumption and imported (Quantity: in thousand tons).

Animal	Milk production		Milk Consumption		self-ufficiency%	Imports of Milk		Per capita consumption kg / day	
	Quantity	%	Quantity	%		Quantity	%	Quantity	%
Cow Milk	2647	50.2	3501	57.1	75.60	1068	100	48.85	57.1
Buffalo Milk	2502	47.4	2502	40.8	100.00	-	-	34.84	40.8
Goat Milk	127.5	2.44	127.5	2.1	100.00	-	-	1.79	2.1
Total	5276.5	100	6130	100	86.10	1068	100	85.48	100

Source: Ministry of Agriculture and Land Reclamation, Bulletin of the balance of food, various issues 2009.

Milk production and marketing in study sample survey:

1 – Cow milk production and consumption:

The rural smallholder milk producers contribute for about 85% of the total milk production (Mohamed *et al*., 2008). Feeds of animals come mainly from crop-residues which are mostly supplemented with concentrate feeds. Most dairy farmers in rural areas do not adoption some simple feeding packages prescribed to them such as (corn silage – berseem hay - crop residues ammonia/urea treatment) which might improve milk productivity. Most cows in the present study were crossbreds in Delta and Upper Egypt.

Table 2 shows production and reproduction parameters of dairy cows in K, Q and B governorates and relative importance of milk sold and home consumption. Average numbers of studied dairy cows within the three studied areas were not significantly different. Average daily milk, total milk production/ lactation were significantly ($P \leq 0.05$) higher for K or B compared to Q while, differences were not significant between K and B. The difference might be attributed to the environmental temperature in Q which is higher than the other two governorates or to differences feedstuffs types and quantity offered to the animals. Khalil and El-Ashmawy (2008) found that average daily milk production in Upper Egypt was between 6.42 to 6.79 kg and total milk per lactation was 1645.30 to 11687 kg for crossbred cows. Local breed average daily milk was between 4.10 and 4.50 kg/day and total lactation milk per lactation was 809 and 837 kg.

Lactation length was significantly ($P \leq 0.05$) shorter in Q compared to K or B while, differences were not significant between K and B. The differences might be attributed differences in the genetic make-up of cattle in most of the dairy farms under the study or the higher ambient temperature in Q. Variation among governorates could be attributed to better farm management and efficient utilization of farm feed resources. Milk price in K was significantly lower ($P \leq 0.05$) than that in Q and B. It might be due to higher availability of cow milk than local market demand. Moreover, there are no milk price polices to protect milk producers from mediate traders. In this respect local authorities in the governorate have to establish milk producer cooperatives. Total milk revenue /cow in B was higher than that in Q and K. This may be attributed to two reasons, firstly total milk production/lactation has no significant differences between B and K while, milk price was significantly ($P \leq 0.05$) higher in B. Secondly milk production in B was

significantly (*P*≤ 0.05) higher than that in Q but milk price was somewhat less. This might be a reflection of feeding or transportation costs.

Table 2. Cow milk production, relative impotence of milk sold and home consumption.

Items	K		Q		B	
	N	mean ±SE	N	mean ±SE	N	mean ±SE
Av. No. of dairy cows	47	2.89 ±0.45	36	2.17 ±0.30	40	2.97 ±.032
Av. Daily milk production (kg)/head	44	9.13[a] ±0.25	32	7.60[b] ±0.36	40	8.96[a] ±0.40
Av. Lactation length (days)	42	224.29[a] ±4.71	32	201.09[b] ±6.63	40	226.50[a] ±6.53
Av. Milk production /lactation(kg)/head	42	2047.14[a] ±81.62	32	1528.28[b] ±97.09	40	2029.44[a]±135
Milk price (L.E)/(kg)	45	1.95 ± 0.02	33	3.00 ±0.27	40	2.89 ±0.06
Total milk revenue /lac. (L.E)		3992		4647		6004
Milk sold (kg)/head		1232		727		1505
Milk sold (kg)/farm		3560		1578		4470
Milk sold (%)		60.19		46.95		72.44
Milk for home cons. (kg)/head		815		822		523
Milk for home cons. (kg)/farm		2355		1784		1553
Milk for home cons. (%)		39.81		53.05		27.56

Home consumption including suckling calves
N: number of farms Cons.: consumption Source: Data study sample survey year 2011

2 – Buffalo milk production and consumption:

Results in Table (3) show that buffalo milk production in K and B were significantly (*P*≤0.05) higher in average daily milk, lactation length, and total milk production/lactation compared to Q. The differences might be attributed to the fact that most farmers in Upper Egypt interviewed indicated that they prefer to raise a cow than a buffalo for different reasons mainly for the latter's low purchase price, high milk yield, less feed consumption and the environment in Upper Egypt. Khalil and El-Ashmawy (2008) found that average daily buffalo milk production in Upper Egypt was between 5.00 to 6.02 kg and total milk per lactation was 1200 to 1253 kg. The same author reported that lactation length ranged between 208 and 240 days. Khalil and Sammour (2006) reported that average daily buffalo milk production in El-Beheira was between 7.1 and 8.7 kg/day. Khalil and Sammour (2006) reported that daily cow milk production was 9.7 kg / day. El-Ashmawy et. al. (2006) reported that average daily buffalo production in El-Beheira was 7.1 kg/day and total milk production/lactation 1835 kg. El-Giziry et al. (2011) found that daily milk production in Delta was 11.17 kg/day for lactating buffalo.

Lactation length was significantly (P ≤ 0.05) shorter in Q compared to B while, the differences were not significant between K and both B and Q. The differences might be attributed to better farm management such as right heat detection on proper time and efficient utilization of farm feeding resources. The prevailing breeding practiced by farmers in the Delta cross breeding with improved Italian buffalo adapted to the Egyptian environmental conditions

could also be a factor. This is hardly the case in Qena. Milk production per lactation in B was significantly higher ($P \leq 0.05$) than both K and Q. Also difference between K and Q was significant ($P \leq 0.05$). It was clear that three significant differences might be attributed to a genetic factor resulting from crossing improved buffalo with the local buffalo and/or to management factors (availability of feed resources, rearing system for heifers was better or weather temperature especially in summer played a role). Milk prices in Q and B were significantly higher ($P \leq 0.05$) than K. It might be due to the higher availability of milk than local market demand. Milk collection centres are spread across many villages in K. It is lucrative business to sell milk to big processing companies in Egypt.

Table 3. Buffalo milk production, relative impotence of milk sold and home consumption.

Items	K		Q		B	
	N*	mean ±SE	N*	mean ±SE	N*	mean ±SE
Av. No. of dairy animal	44	2.98 ±0.48	36	2.14 ±0.30	39	3.00 ±0.33
Av. Daily milk production (kg)/head	44	7.18^{b} ± 0.17	36	6.83^{b} ± 0.25	39	8.64^{a} ± 0.35
Av. Lactation length (days)	42	208.63^{ab} ±4.7	36	196.25^{b} ±6.63	39	215.00^{a} ±6.5
Av. Milk production /lactation (kg)/head	42	1497.72^{b} ±53.14	42	1400.9^{c} ±68.0	39	1857.8^{a} ±77.78
Milk price (L.E.)/(kg)		2.97^{b} ± 0.04		4.16^{a} ± 0.18		4.04^{a} ±0.09
Total milk revenue /lac. (L.E)/head		4448		5828		7506
Milk sold (kg)/head		983		597		1554
Milk sold/farm		2919		1278		4662
Milk sold (%)		65.63		42.58		83.63
Milk for home cons. (kg)/head		515		804		304
Milk for home cons. (kg)/farm		1535		1721		912
Milk for home consumption (%)		34.37		57.42		16.37

Home consumption including suckling calves
N* number of farms used for calculation Source: Data study sample survey year 2011

Buffalo milk revenue in B was significantly higher ($P \leq 0.05$) than that in Q and K. This could be due to two reasons: 1) total milk production/lactation was higher in B than K and Q while, milk price in B was slightly less than Q whereas K milk price significantly lower than Q and B. this can be due to the high feeding costs, lack of equipment and managerial skills were the major constrains to milk processing and the poor road infrastructure was the major threat to marketing of dairy products. Percentage of buffalo milk sold in B was the highest followed by K and Q. This might be due to good milk price that encourages producers to give more attention to milking buffalo. Buffalo milk demand in B was more than the milk produced. In K two thirds of buffalo milk was sold and farmers kept one third for home consumption and all cow milk produced was sold because of high demand than buffalo. Concerning Q, milk marketing concept is still primitive because of the social customs that farmers disseminate produced milk between home consumption and large proportion to neighbors, labor and relatives for free.

Milk marketing efficiency indicators for dairy farms:

Marketing efficiency is defined as the movement of goods from producers to consumers at the lower cost consistent with the provision of the services that consumers desire and are able to pay for. The differences between farm gate price and consumer price was identified as milk marketing margins. Tables (4 and 5) shows milk marketing of cows and buffalo in three studied areas. Farm gate price in Q shows higher price compared to K and B. Milk producers share from cow consumer price were 77.11% in B followed by Q 70.50% and K 60.94% the corresponding values of, buffalo milk in K, Q and B were 54.00% 75.64%, 73.45%.

The cow milk wholesaler share percentage from consumer price in the same studied governorates were 23.44%, 12.05% and 12.18% and retailer share were 15.63%, 17.45% and 10.71%for the corresponding studied governorates. This might be because that Upper Egypt in general has less quality infrastructure so; the milk collection centers encourage milk producers to submit their milk with higher price. Moreover, the dairy farms in Upper Egypt have low producing animals compared to Delta farms thus, the milk availability is less. The reason might be due to that green forage areas especially during summer in Upper Egypt much low than Delta. Also hot weather in the area is considered as constrain of milk marketing making is a risky business in Upper Egypt.

Table 4. Marketing efficiency indicators of farms producing cow milk in study sample.

Items	K	Q	B	Average
Farm gate price (L.E)	1.95	3.00	2.89	2.61
wholesaler price (L.E.)	2.7	3.5	3.3	3.17
Retailer price (L.E.)	3.2	4.25	3.7	3.72
Milk marketing differences				
wholesaler price – farm gate price (L.E.)	0.75	0.50	0.41	0.57
Retailer price – wholesaler price (L.E.)	0.50	0.75	0.40	0.55
Retailer – farm gate price (L.E.)	1.25	1.25	0.81	1.12
Percentage shares of consumer price				
Share of the producer from the consumer price (%.)	60.94	70.50	77.11	69.88
Share wholesaler from consumer price (%)	23.44	12.05	12.18	15.88
Share of retailer from consumer price (%)	15.63	17.45	10.71	14.69

Source: Data study sample survey year 2011

Buffalo milk wholesaler from consumer price in the same studied governorates were 27.82%, 9.82% and 8.36% and retailer share were 18.18%, 14.54% and 18.19 for K, Q and B respectively. Farmers get reasonable milk price share from direct milk marketing to consumers in all studied governorates. Differences between farm gate price and other prices might be attributed to that quantity of milk produced in K was higher than local demand therefore, wholesalers transfer milk to big cities that offer better prices. Proportion of market price losses in Q was higher than in B. It might be due to the long distances between milk producers and markets or to

the low productivity of cows obligating milk collector trader from big numbers of producers that cost more money.

Table 5. Marketing efficiency indicators of farms producing Buffalo milk in study sample.

Items	K	Q	B	Average
Farm gate price (LE)	2.97	4.16	4.04	3.66
wholesaler price (LE)	4.5	4.7	4.5	4.57
Retailer price (LE)	5.5	5.5	5.5	5.50
Milk marketing margins				
wholesaler price – farm gate price (LE)	1.53	0.54	0.46	0.9
Retailer price – big trader price (LE)	1	0.8	1	0.93
Retailer – farm gate price (LE)	2.53	1.34	1.46	1.84
Percentage shares of consumer price				
Share of the producer from consumer price (%)	54.00	75.64	73.45	66.61
Share wholesaler from consumer price (%)	27.82	9.82	8.36	16.42
Share of retailer from consumer price (%)	18.18	14.54	18.19	16.97

Source: Data study sample survey year 2011

CONCLUSION

There is clear difference in milk marketing margins between farm gate price and consumer price due to the activities of intermediary traders gained significant parts of farm revenues. It means that farms can get more milk revenue in case of farmers associations or cooperatives are established to improve farm milk price. Milk processing as a means of extending the shelf life of milk products is a viable alternative that can guarantee better market prices. The productivity of the dairy animals was relatively low. The present study provided some baseline information on the dairy cattle value chain at the marketing level.

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الكفاءة الانتاجية والتسويقية لمزارع إنتاج الألبان (دراسة حالة كفر الشيخ – البحيرة – قنا)

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أجريت الدراسة على مائة وخمسون مزرعة لانتاج الالبان تحت نظام الانتاج المختلط (نباتى/حيوانى) فى ثلاث محافظات هى البحيرة وكفر الشيخ ممثلين لمنطقة الدلتا ونظام الانتاج (أرز – وأبقار/جاموس حلاب) وقنا ممثل لمصر العليا تحت (نظام قصب السكر –أبقار/جاموس حلاب). وقد تم تجميع البيانات بعد أجراؤ أختبار مبدئى للاستمارة الاستبيان فى الفترة من أكتوبر ٢٠١٠ الى فبراير ٢٠١١ وكان الهدف من الدراسة هو دراسة الكفاءة الانتاجية والتسوقية لمزارع أنتاج لالبان. وقد أعتمدت الدراسة على نوعين من البيانات هما: الثانوية من الاحصائيات التى تم نشرها فى قطاع الشئون الاقتصادية بوزراة الزراعة عن الانتاج المحلى من الالبان كمية الاستيراد من الالبان وحجم الفجوة. و البيانات الاولية التى تم تجمعها من المربين التى تمت لديهم الدراسة وقد تضمنت بيانات عن مزارع أنتاج الالبان البقرى والجاموسى وتتمثل فى متوسط الانتاج اليومى وطول موسم الحلايب وكمية المباع والمستهلاك منزليا لكل من ألبان الابقار والجاموس كلا على حدا. ومن خلال أستعراض البيانات أوضحت نتائج الدراسة الاتى: من البيانات المتعلقة بالالبان تم حسب عملية التسويق ونسبة المشاركة فى الربح لكلا من تاجر الجملة والتجزئة وأوضحت النتائج أن ٦٠,١٩% ٤٦,٩٥% و ٧٢,٤٤% من ألبان الابقار تباع و ٣٩,٨١% و ٥٣,٠٥% و ٢٧,٥٦% تستهلاك منزليا أم ألبان الجاموس فكانت ٦٥,٦٣% و ٤٢,٥٨% و ٨٣,٦٣% تباع وكانت ٣٤,٣٧% و٥٧,٤٢%١٦,٣٧% تستهلاك منزليا فى كفر الشيخ وقنا والبحيرة على التوالى. ووجد أن تجار الالبان بالجملة يستفيدو بنسبة ٢٣,٠٣% و ١٢,٠٥% و ١٢,١٨% من مكسب المزرعة وكذلك تجار التجزئة يشارك المزرعة مكسبها بحوالى ١٦,٠٣%و ١٧,٤٥% و ١٠,٧١% من البان الابقار فى نفس محافظات الدراسة على التوالى. وبالنسبة للالبان الجاموس كانت المشاركة فى المكسب ٢٧,٨٢% و ٩,٨٢%و ٨,٣٦ لتجار الجملة بينما التجزئة كانت تشارك فى مكسب المزرعة ١٨,١٨% و ١٤,٥٤% و ١٨,١٩% لنفس المحافظات على التوالى. من تلك النتائج يمكن أن نزيد من مكسب مزارع الالبان أذا تحسن وضع التسويق عن طريق عمل جمعيات أهلية أو من خلال تعاونيات حكومية لمساعدة المربين فى القرى لتجميع الالبان وأعادة تسويقة بهامش ربح أفضل من تجار الجملة أو التجزئة.

قام بتحكيم البحث

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