THE ECONOMICS OF MILK PRODUCTION

IN EL GUNEID AREA, SUDAN

By

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DEDICATION

To my dear family
   Father, mother,
brothers, sisters and
uncle
      To my dear
   friends and
   colleagues
With love and respect

Rania

Acknowledgement

ABSTRACT

The main objective of this study was to investigate the economical performance of dairy production at El Guneid area of the Gazira state.

Dairy production at El Guneid area is practiced through two types of production systems, the open system and the closed one, where fresh milk is produced.

The study depended upon on-field survey, which covered the two systems of dairy farming in the study area. A questionnaire was designed to collected primary data from milk producers in forty farms.

The questionnaire was supported by secondary information from relevant sources. A descriptive statistical and budget analysis was used to identify the factors affecting the production of milk of those farms.

The study found that the fixed cost and the variable costs were higher in the open system farms than in the close system farms. However, the production of the individual cow was higher in closed system farms compared to that of the open farm.

The result obtained showed that feeding was the most prominent factor affecting profit of milk production in the two systems. Zakat, Guttan, and veterinary services and type of breed cows (Butana, cross and Frisian) were also important factors effecting the dairy milk production at EL Guneid area.

In order to develop the milk production and to reduce the costs of production, a considerable concern is needed to be directed to the production of green forage in dairy farms.

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CHAPTER ONE

INTRODUCTION

1.1. Introduction:

Animal resources in the Sudan constitute the second largest contributor to the economy of the country. Livestock contributes about 50% of the agricultural GDP of Sudan. Livestock contributed about 50% of the total non-petroleum foreign exchange earnings from export. Livestock resources utilize the marginal as well as fertile natural pastures and are known basically as main sources of meat supply. Milk production on the other hand, though is important, have been regarded as non-significant.

The total number of livestock of Sudan has been estimated around 133 million heads in 2003 producing about 1.6 million tons of red meat and about 7 million tons of milk in 2003. Most of this milk out put is not widely used as the majority of the   milk is produced in the nomadic area with no efficient means of milk collection or preservation practices. However, organized limited milk production is practiced round towns and cities to supply fresh or processed milk to consumers in the area.

1.2. Dairy production in Sudan:

Although Sudan is endowed with large numbers of livestock resources, milk production is considered low due to genetic factors and poor grazing pastures. For these reasons it is difficult to establish a dairy industry with a suitable production capacity in the Sudan. Cattle is regarded as the main source of milk production in the Sudan as it produces about 80% of the total milk out put in the country. The rest 20% is produced by goats, sheep and camels (Animal Wealth Bank, 2003).

As the demand for milk exceeds the supply of milk especially in towns, the price of milk is always rising. Sudan was forced to import milk powder to fill the gap.

The system of milk production in Sudan is traditional at a large with few intensive modern farms in large towns of the country.

1.3. Dairy cattle and their location in Sudan:

1. Kenana cattle: Found between the White Nile and Blue Nile in the area from Kosti to Sennar. They are regarded as the best dairy types in the Sudan and they produce about 40Lb/day of milk in their peak production period (Oum Benain Research Station Reports).

2. Butana cattle: Found in the adjacent area of Rufaa east and around El Rahad Scheme and Kassala. The milking cow produces about 30 lb/day of milk.

3. White Nile cattle: Found around Kosti and rest of White Nile. They are similar to Kenana cattle in milk production.

4. Baggara cattle: Found in intensive west and south of Darfur and Kordofan. They produce an average of 7.8 lb/day of milk.

5. Zebu cattle: Found in southern Sudan, and produce modest amounts of milk.

6. Nilotic cattle: Found in El Rank, Malakal and Joungli. They produce 3 liters day of milk. (Maredi Research Station Reports).

7. Other types of cattle: Found in Nuba Mountains, Ingasana and Equation state. They are hardly any information about their production.

1.4. Milk production in the Gezira:

A lot of dairy farms are found around Khartoum state and Gezira state under private and cooperative systems. They play and important role in milk production. These include: Kuku Cooperatives society in Khartoum state and Barakat Cooperative society for milk production in the Gezira Scheme. In 1977 / 78 El Shukaba National Center for Dairy Research was established as a replacement of El Nisheshiba Animal Breeding centre. The latter was established in 1957 and was transferred into the Gezira University in 1984.

1.5. Milk production in El Guneid area:

El Gunied scheme lies on the eastern Bank of the Blue Nile River, just north of Rofaa town and south of Khartoum city by about 130km.
It is bounded between 33 N°, 16 E to 33 N°, 27 E longitudes and 14 N°, 19 E to 15 N latitudes.

The area has a semi–arid climate with winter months during November to March. These months are cold and dry. April and May are hot and dry, while June to October are worm and rainy.

The annual mean temperature ranges between 19.4°C and 36.9°C. The highest humidity period occurs in August, when more than 35% of the annul rain fall ranging between 72 mm to 370 mm.

Soils of the El Guneid area are similar to those of the Gezira scheme on the western side of Blue Nile River. Typically, most of the soils are dark brown with contrasting grey layer at variable depths as in northern and central parts of the Gezira scheme. The soils are alkaline clays with calcareous matrix.

The principle activities of the people of El Guneid area are: agriculture, and working as labor and employees in El Guneid Sugar

Company. They also work as seasonal labor on other schemes and in milk production activities in the area. The system of milk production in the area is traditional system raising Kenana cattle mainly.

1.6. Problem statement:

Although the environment and climate are conductive for raising large numbers of live stock, yields and production of milk are still inadequate to fill the gap in demand of the population in El Guneid area due to several structural problems. Of these many problems facing milk production in El Guneid are the following:

1. High cost of milk production.
2. Fluctuations in the supply of milk production.

1.7. Objectives of the study:

The main objective of this study is to assess the extent of economic production performance of milk under mixed farms, natural range and pasture grazing systems in El Guneid area.

1.8. The Specific objectives:

1. To estimate the extent of the fluctuation in the demand and supply of milk production in El Guneid area.
2. To determine the best ways to achieve high milk production levels with minimum cost.
3. To test for introduction of alternative ways of production in the area of the study.

1.9. Hypotheses:

The main hypotheses to be tested are:

- Cost of feeding comprises the highest cost item in milk production.

- The fluctuations in demand and supply may be due to bad management.

- Introduction of new animal breeds may improve milk production in the area.

1.10. Methodology:

1.10.1. Data sources:

Data have been collected through two ways:

1) Primary data using a questionnaire and (2) secondary data using reports from: (i) Animal Wealth Bank and (ii) published data from the State Ministry of Agriculture and Animal wealth, and (iii) from El Guneid Sugar Scheme, in addition to (iv) Journals and the Internet.

1.10.2. Data analysis:

Data have been analyzed using descriptive statistics and budgeting methods.

1.11. The organization of the study:

The study consists of five chapters:

Chapter one: gives the introduction, problem statement, objectives and hypotheses.

Chapter two: gives the   literature review.

Chapter three: gives the research methodology.

Chapter four: gives the discussion and results**.**

Chapter five: gives the summery, conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1. Nutritional importance of milk:

Milk is an important agricultural product, which contributes greatly to food security and plays a basic role in the process of nutrition during all the stages of life of human beings.

It is a rich source of protein that is easy to digest and has comparatively lower price than that of meat and eggs (Shakir, 1993 and M., 1994).

One liter of cow's milk supplies about 10% of calories 20% of protein and 70% of the calcium daily requirements respectively. It also provides about one of third of vitamin A and thiamine daily requirements of children less than five years old (Kon, 1972).

2.2. Milk production in Sudan:

Livestock milk production is essentially a process of converting plant material into milk products (M., 1994). There is a large variation of milk production between dry and rain seasons (FMAW, 1999).

FAO and AAAID (2002) indicated that Sudan currently produces 7.1 million MT of milk per year. Most milk comes from indigenous cattle of the Zebu type and up to 90 percent of milking animals are found within the range–based nomadic and transhumant areas. Nearly 75 percent of milk production comes from cattle, 18 percent from goats and 7 percent from sheep.

Table 2.1: Fresh milk production from various animal species 1990/91-2001 in thousand metric tons

Year	Cows Milk	Goat Milk	Sheep Milk	Camel Milk	Total
1991	1682	572	148	0	2402
1992	3193	693	174	0	4060
1993	3356	841	206	0	4403
1994	3813	1020	365	0	5198
1995	4162	1022	440	0	5841
1996	4370	1024	391	0	5785
1997	4560	1026	415	0	6001
1998	4766	1028	436	0	6230
1999	4955	1197	461	37	6650
2000	5133	1245	462	39	6879
2001	5297	1295	463	40	7095

Source: Ministry of Animal Resource, Khartoum2002.

Table 2.2: Milk production in Gezira and Khartoum areas

Year	Gezira (MT)	Khartoum (MT)	Total (MT)
1989	191775	141539	333314
1990	193274	147882	314156
1991	197237	151914	349151
1992	200743	243738	444480
1993	204591	250880	455471
1994	208514	258232	466746
1995	212512	265802	478314
1996	216590	273593	490183
1997	220740	281613	502353
1998	224945	289869	514814
1999	269934	298269	568303
2000	323921	307121	631042
2001	356045	328619	684664

Source: State Ministries of Agriculture and Animal Wealth.

2.3. In Sudan there are two systems of milk production:

2.3.1. The traditional milk production system:

This system represents the settled cattle breeder in villages and the small producers who live in the margins large towns. This system is characterized by the existence of large scattered farms. Some of the farms are described as house yards where animals are bred.

2.3.2. The Dikak milk production system:

These are open space production system found on boundaries of town and villages. They are composed of traditional farms that supply consumers with fresh milk and other bi-products. The management of this system is poor and yields low production (Nour Elhouda, 1986).

2.3.2.1. The modern milk production system:

This system is characterized by producers who invest a large amount of money for the purpose of development of their farms to produce targeted commercial quantities of milk. These producers own modern dairy farms and employ large number of professional staff and skilled labor.

In addition, modern methods in breeding, production of feeds and health care are adopted. This system accommodates:

a.   Private sector.

b.   Co-operative sector.

c.   Public sector.

Badria (1996) indicated that the private sector could be represented by Khartoum milk producing companies such as the Arab Company Dairy Farm for milk production and Military Agricultural Corporation (Belgravia Dairy).

2.3.2.2. The cooperative sector dairy farming production of milk:

A production member of a co-operative such as that of Kuku is given ten feddans for each 12 milking cows. Then he is supplied with the agricultural and water services at subsidized prices (Synya, 1995).

The management of the cooperative provides veterinary extension and technical services. The most important of these cooperatives is the Kuku Scheme, which was established in 1908. It is composed of five cooperative societies, such as Hilat Kuku, Abu Deleig, Migooma, Elhaj Yousif and Wad Ramli.

2.3.2.3. The public sector dairy farms:

These farms were in fact research stations, established to improve heredity structure, genetic characteristics and increase the productivity of local cows. These could be represented by the University of Khartoum farm.

2.4. The cost of production:

The cost of production is assumed to be high and debilitate the efficient utilization of animal milk production resources in most of the African countries. The cost of production is based on the value of supplied inputs such as seeds, fodders, drinking waters; manufacturing of concentrates, taxes and the cost of labor. This problem confronts many African countries, where the cost of production, transportation, marketing and processing of milk have risen so much that consumed quantities have been reduced (Ragab, 1991).

Feeding represents 75% of the total cost of milk production in the developing countries (Mahesh, 1990). In the Sudan, feeding cost represented 86% of the total cost of milk of the production (Mustafa and Abdelrahman, 1994).

The cost of feeding is a basic part of the recurrent cost in all types of animal farms. So any reduction of the recurrent cost particularly that of cost of feeding animals would reduce the cost of milk production (Kummer Guput, 1988) by reducing the average cost of the productive unit of animals, it would be possible to gain reasonable profits. This is because the cost of production contributes the largest share of the total cost in the production of ruminants. Therefore, it is recommended to use low cost feeding sources. The ideal way is to mix some expensive concentrates with low fodder produced by cultivating large areas to benefit from the economies of scale (Rohr, 1991). William (1995) found that increasing cow productivity of milk would reduce the production cost more than increasing the size of the herd.

Ezdihar (2000) found that the cost of veterinary services in the Sudan represented 5.8% of the total cost in the traditional system while in the modern system it was about 8.3%. She also stated that the gross marginal value in traditional system was about 1/6 of that of the modern system.

Cattle Breeds and milk productivity: There are six main indigenous (zebu) types of cattle in Sudan among which Kenana and Butana are known for their good milk productivity. The milking potential of the other breeds namely, the Baggara, Nilotic, Umbbaro and Nuba is low (Babbiker and Abobaker, 2004). They also said that the milk yield of cattle under traditional management was not available. However, figures obtained from the   Um Benein research station in Blue Nile Province in Gazira state indicate that well managed Kenana (and perhaps also Buttana) cows gave 1160kg over a lactation length of 198 days, an average of 4.6 kg per day. The average annual milk yield for Kenana and Buttana is generally reported

as 150-to2000 kg. However, when animals with zero yield were eliminated, mean lactation yield rose to1511±18 kg. These yields are certainly much better yields than values of 2 3litres observed among Zebu cattle much elsewhere in Africa. The highest individual cow performance was 4530 kg, a daily yield of 22kg. (Table 6) further confirms the superiority of the two breeds relative to the meat type Baggara and effect of age on lactation performance. These not only reflect outstanding genetic potential but also support the need to select and give the breed greater consideration in dairy development programs in Sudan.

2.5. Milk production:

Nour Elhuda (1986) indicated that milk production levels are affected by many factors.

i.   Stocks and milking cow size.

ii.   The types of the breed.

iii. Environment and husbandry practices.

i. Stocks and milking cow size:

The economics of feeding of dairy animals are affected by three factors namely the cost of the various feeds, the price of milk at the farm gate and the presence of dairy markets.

The maintenance of a milking cow requires a large amount of feed. B but as milk production per year increases the share of total feed needed for the maintenance declines (Soad, 1994).

ii. The types of breed:

One of the many constraints facing milk production is the poor genetic potential of the indigenous animal in the tropics. These types of animals are characterized by some resistance to many tropical diseases.

They also suffer from poor feed, water and poor dairy potentials. They also have low milk yield and late maturity. Hence, increasing of milk production in the tropics does not depend on genetic improvement only, but also on improvement of feeding and management practices (Syrsad, 1986).

Morgan (1990) analyzed the result of a study using 2682 animals heads in 1988/89 and 1990 found that there was increase in the quantity of milk in spite of the high cost of feed. He found that this improvement was due to the increase in the price of milk, in face of low average herd sizes and associated low average milk yields.

To improve international competitiveness, he suggested that it is necessary to reduce production cost and improve milk yield. Improvement can be guaranteed by integrating a range of approved technical innovations into the production process.

Sharma and Honda (1988) collected data from 40 dairy farm units from urban, semi – urban and rural village during 1984-1985 showed that the dairy maintenance cost per animal was lower in rural area than in the urban areas. However, the cost of milk production was high relative to low yield per animal. Hence, Sharma and Honda, see that there was scope for increasing income and employment in the rural areas with improvement of production techniques.

There are no extension facilities for producers, sellers and consumers in the method of keeping and distribution of milk (Ali and Mohammed, 1988). Ezdihar (2000) mentioned that the level of education of the producer of milk improves the milk productivity due to increased awareness and knowledge of the producer.

2.6. The effect of breed:

Bood *et al*. (1990) indicated that all animals were classified on basis of their phenotypic appearance into one of the following categories:

(i) Friesian;

(ii) Friesian crossed with Creole; and

(iii) Creole.

The milk production of the animals in these three categories is summarized in Table (2.1) for two areas of Vacos and Mapou.

Table 2.1: Mean milk production and composition during the full 301 day lactation according to area of type of supplement:

	Vacoas		Mapou	
	Cow feed	CSC	Cow feed	CSC
Milk production (kg)				
301d lactation	3023	2871	2538	2649
SE	146	104	139	129
Milk consumption %				
Fat	4.08	4.57	4.31	4.61
SE	0.222	0.164	0.183	0.192
Protein	3.41	3.58	3.47	3.40
SE	0.149	0.118	0.061	0.089

2.7. Milk marketing:

Milk production and marketing activities do not have specific economic or production policies. Accordingly plans for milk production development and production in the Sudan are almost absent. This was reflected by El Haderi and Simpson since 1976. Also Adam in 1993

mentioned same position with respect to the problem of milk marketing. He referred the problem to the poor execution of milk marketing policies.

Milk wholesaling is carried out by groups of small producers, independent wholesalers and traders. Small producers in the same village may producers in the small village may assemble their milk quantities and hire transport to deliver the milk to wholesalers and traders in the market place. Wholesalers and trades and traders also buy milk directly from farms.

Wholesaler and traders sell the milk to donkey men who sell it to the households. Retailing fresh milk in Sudan has for many years been done by the donkey man who rides his donkey to deliver milk to the households in the morning. However, milk from the donkey man is suspected of added water and it may frequently go bad. Hence, conflicts sometimes arise between the two parties and the household resorts to another retailer. The other retailing outlets are the traditional shops and grocery stores. The traditional shops are usually in low and middle-income residential areas. These shops receive milk from traders and wholesalers early in the morning and the evening. Some shops and groceries also sell pasteurized milk and other dairy products like yoghurt, cheese and mish.

The distribution of milk and milk products by the processing plants is mainly through two channels, direct deliveries to retailer shops and by sales to wholesalers at factory gate The KDPF, for instant, distributes about 73 percent, 61percent and 100 percent of recombined milk, yoghurt and fresh milk respectively by refrigerated trucks to retailer shops The remaining percentages of these products are sold to wholesalers at the factory gate.

There open are open – air milk markets in Gazira and Khartoum states where the buyers to complete their deals their deals. States are both to wholesale and buyers (Babbekar and Abbobkr 2004).

2.9. Milk prices, supply and demand in the Sudan:

FAO and AAAID (2002) mentioned that milk is popularly sold in half – liter quantities. Pasteurized milk retails at SD150 per half- liter (SD 300 per liter) in Khartoum while unprocessed milk sold by vendors at about SD50-60 per half- liter (SD100 per 120 per liter) as earlier stated, the very large price differential between the tow coupled with the fall in consumers incomes   real incomes, has been major contributory factor for the limited demand for processed milk. Although there is marketed seasonality in fresh milk production, this is not reflected in the prices. It is explained that this is because the vendors absorb the differences in order to maintain their clientele

Demand and supply for milk:

2.9.1. Supply of milk in the Sudan:

FAO and AAAID (2002) indicated that in the year 2001, Sudan's milk production was estimated at just over 7 million MT of which 2.6 million or 37 percent was available for human consumption. Of the remainder 4.5 million MT, 60 percent was suckled by the young stock while about 3 percent went to waste mainly because of the high climatic temperatures and inefficient handing.

2.9.2. Demand of milk in the Sudan

Total milk demand for human consumption in 2001 was estimated at3.2 million MT, thus leaving a supply gap of 0.6 million MT or nearly 20percent, which was met largely by imports. This supply gap is forecast to

increase in the medium term as population increases and disposable personal incomes improve. Given a rate of population growth of 2.63 percent annually, an income elasticity of demand of 0.67 and an annual rate of growth of GDP per capita (a proxy for the rate of growth in per capita income) of 6.8 percent (assumed to remain constant for the coming ten years), the milk supply gap is estimated to increase to nearly 1.0 million MT by the year 2011.

2.10. Transportation:

Transportation plays an important role in agricultural development process (Hyami and Ruttan, 1971). Nur al Islam (1990) stated that investment in transportation is necessary for economic growth because it links between production and consumption area and introduces improved techniques.

2.11. Milking and milk recording:

Bood et al, (1990) showed that the cows were hand-milked twice a day in the early morning at about 5.30 a.m. and in the afternoon at about 6 pm. Milk production was recorded daily by extension officers. These field officers visited the cow keepers at dawn and dusk to measure the amount of milk produced. A volumetric measure called a quart (5 quarts to a litre) was traditionally used.

2.12. Forage and forage consumption:

Bood, *et al* (1990) indicated the cow keeper was responsible for the collection of fodder during the crop season (June to mid December). The main source of forage was cane tops. In the intercrop season a variety of grasses, shrubs, twigs, creepers and vegetable crop residues were usually collected from the road verges, common land and adjacent fields. The

forages were fed as appetizers at all times. The amounts of fodder offered and consumed were recorded. In addition, samples of forages were taken weekly for chemical analysis and nylon bag degradability.

Livestock in Sudan primarily relies on rangeland resources for 85 percent of their feed while crop residues and crop by- products (oilseed cakes, molasses etc) concentrate 10 percent; 5percent come from within the irrigated fodders and from supplementary concentrates. The quantity and quality of range feed resources is generally low and fluctuates seasonally depending on the amount of rain, to the extent that during the 1983-1985 drought, these resources could not meet total animal maintenance needs and many animals died.

Up to 63 percent of feed resources available in Gazira state (2.03 million ton) originate from the irrigation scheme. However, livestock farmers in and out of the scheme consistently reported that after animals were acquired the largest constrain to productivity was nutrition. The nutrition problem is made worse by the fact that a large number of animals is owned by farmers having limited land area such that densities are so high that there is constant re-circulation of herds in and out of the scheme. To this is added the herds of non-tenant farmers that also share the resources in the scheme area. Not to mention the animals of inward seasonal migrants and those that come in to be marketed or pass through the scheme on their way to other parts of the country. The grazing livestock population is equivalent to 2.1 million T LUs.

CHAPTER THREE

METHODOLOGY

3.1. The type of data collected:

Basically two main types of data were collected:

1. Primary data were collected through a field survey using a structured questionnaire. This included types of milking cows and breeds, types of feeding, cost of feeding, prices of milk, labor and weight of quantity of milk produced.

2. Secondary data were collected from the Ministry of Animal Wealth, Internet and Animal Wealth Bank. This included the system of milk production in Sudan, prices of milk, methods of marketing milk, transportation and the types of dairy cattle in Sudan and their locations.

3.1.1. Sample size:

There are three types of farms in El Guneid area.

a. Open farm with total number of 30 farms.

b. The close with a total the total number of 10 farms.

The total number of the farms in El Guneid area has been included in the field survey.

3.1.2. Data analysis:

3.1.2.1. Descriptive statistic analysis:

The descriptive statistics method was used to explain the normal distribution of the cows in the open and closed farms. These descriptive statistics were limited to simple calculation of:

(i) Averages, and

(ii) Frequencies,

(iii) Correlations.

(i) Average:

- This is obtained by dividing the total value by the respective number of units responsible for that value. An associated measure is the standard deviation. It shows the distribution of observed variable around the mean.

  - Calculation of the average dividing the total values by total number of variables.

  $$A = m_{i:\,1} \frac{V}{N}$$

- **Standard deviation:**

- Estimation of the standard deviation, which indicates how the observed values are distributed around the mean.

(ii) The Frequency:

The frequency classifies the respective weight of each key player in the production process and the distribution process of the milking cows.

(iii)Correlations:

This method is used to measure the relationship between two variables to investigate their relative effect on each other. For example, we can investigate the correlations between the actual productivity of a milking cow and the cost of feeding that cow.

3.1.2.2. The Budget analysis:

This method was used to estimate the profitability of milk and other by-products of dairy farms in the study area. This required the calculation of the total revenue from milk and other by-products, total variable costs to obtain the gross marginal value. It was also important to estimate the respective percentages of the different items included in the variable cost.

The gross marginal value was calculated by subtracting the total revenues accrued from the total variable cost. The calculation of the total variable cost required the listing of each variable input used in milk production.

$$MR= GR-TVC.$$

Where:

MR: marginal revenue

GR: gross revenue

TVC: total variable cost.

CHAPTER FOUR
RESULTS AND DISCUSSION

This chapter attempts to analyze data about economic structure and budget performance of milk production in open and close farms in El Geneid area.

4.1. RESULTS

4.1.1 The distribution of the level of education of milk producers in El Guneid area:

Table 4.1 shows that only 40% of farmers in the open dairy farms system were illiterate, while 33% of the farmers had primary education. The remaining of farmers were graduates (27%).

4.1 The distribution of the level of the education in the open farm:

Category	Frequency	Percent
Illiterate	12	40%
Primary	10	33.33%
Graduate	8	26.68%
Total	300	100%

Source: Field survey (2004).

Table 4.2 shows that only 30% of the farmers in the closed dairy farms system were illiterate, while 70% were graduates. Thus when comparing the open with the closed farms we found that the closed farms had better education standards that may avail them with improved husbandry practices and better animal farm management. The level of education may helps farmers to look for improved methods of raising milking cows with the aim of increasing their milk production and income. However, the level of education does not nullify the role of experience. Illiterate farmers could have developed good experience based on endogenous knowledge that may help in raising milking cattle adapted to the surrounding environment.

4.2 The distribution of the level of the education in close farms:

Level of education	Frequency	Percent

Secondary	3	30%
Graduate	7	70%
Total	10	100%

Source: Field survey (2004).
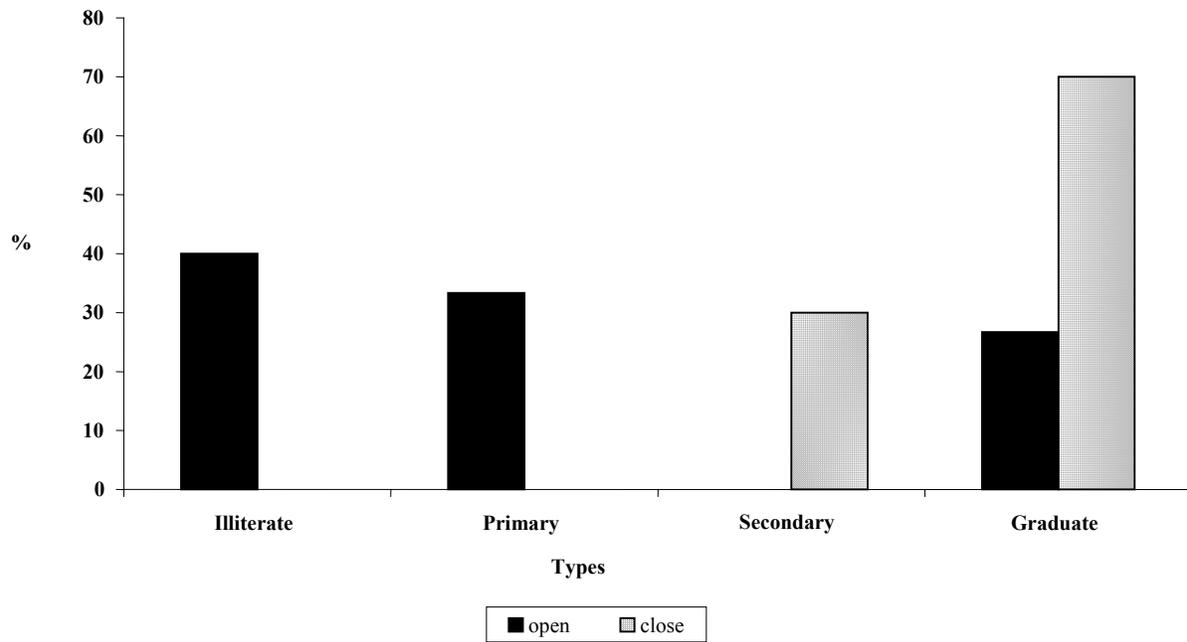
Fig. 1. The distribution of the level of the education among open and closed milk farmers in El Guneid area.

4.1.2. The distribution of milk producers in El Guneid area by age:

Table 4.3 shows that about 7% of the farmers in the open farms were found to be in the active age of 30-40 years, while 3% were found to have ages ranging between 41-50 years. About 60% were found to have ages between 61-70 years old. We expect farmers in this group to have acquired high experience in animal milk production.

4.3. The distribution of the age farmer in the open farms:

Age	Frequency	Percent
30-40	2	7%
41-50	10	33%
61-70	18	60%
Total	30	100%

Source: Field survey (2004).

Table 4.4 shows that about 60% of the farmers of the closed system fell within the age range of 30 to 40 years old, while 20% fell between 41 and 50 years old. Only 20% of the farmers had ages ranging between 51 and 60 years old. Therefore though the experience among this group is less than that of the open farms, yet they seem to be more active.

Table 4.4: Distribution of the age of the farmers in close farms:

Age	Frequency	Percent
30-40	6	60%
41-50	2	20%
51-60	2	20%
Total	10	100%

Source: Field survey (2004).

Ages together and the level of education complement each other with respect to the gaining of experience among milk producers. It is assumed that while young farmers lack experience, old farmers accumulate that experience in milk production activity. Therefore, it appears that milk producing farmers in closed farms have less experience than those in open farms. However, they had better education level, which may compensate for the experience gap.
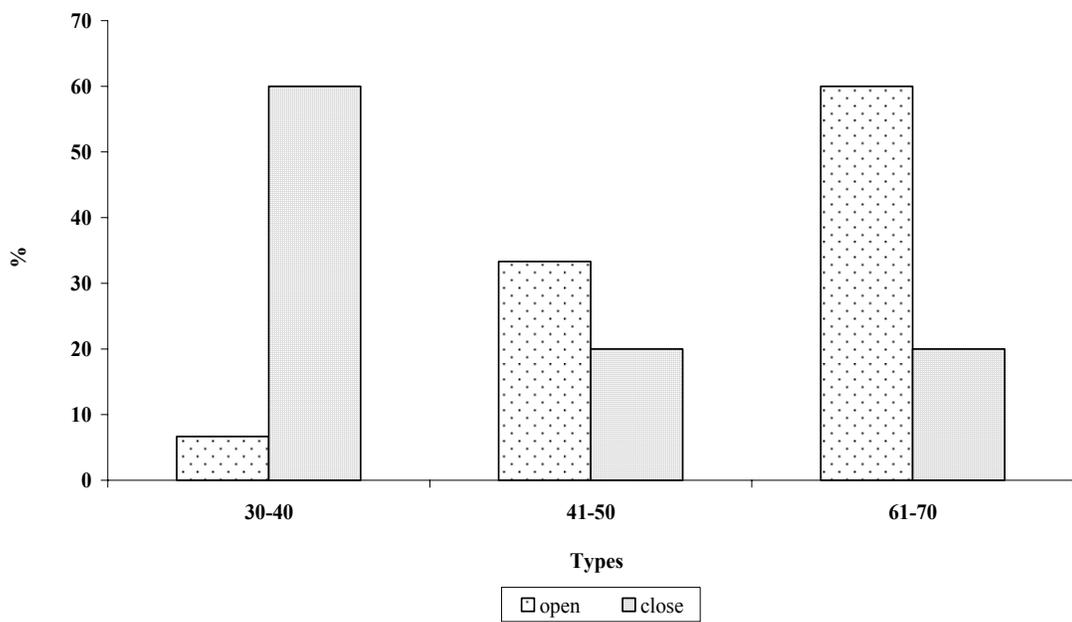
Fig. 2. The distribution age of the farmers in the farms

4.1.3. The distribution of milk producing farmers by occupation:

The distribution of milk production by occupation raises several issues. One important issue is the availability of the producer to mange his livestock throughout the production stage.

Another issue would be whether the second occupation could add to investment spending on milk farm or not. The third aspect could be if the main occupation of the management the dairy farm was not profitable enough that it forced the producer to seek for an alternative secondary occupation to supplement their present low dairy farm income. Table 4.5 shows that about 33% of the total respondents in the open farms were pure farmers and did not have another occupation.

However, the rest, about 67%, had another occupation, either as merchant (50%) or government employees (17%).

Table 4.5 Distribution of milk producing farmers by occupation in the open farms:

Occupation	Frequency	Percent
Merchant	15	50
Farmer	10	33
Officer	5	17
Total	30	100

Source: Field survey (2004).

On the other hand, the occupation status of farmer in the closed farms was quite different (table 4.6). It seemed that only 30% of the respondents were pure farmers, same as in the case of the open farms, and no one was found to be a merchant. But, more of the respondents in the close farms

(about 70%) had another job such as employees. The higher education level entertained by the second group may explain this.

Table 4.6 shows the distribution of milk producing farmer by occupation in closed farms

Occupation	Frequency	Percentage
Merchant	0	0
Farmers	3	30
Officers	7	70

Since almost 67% of the open farms and about 70 percent of the closed farms owners had other occupation rather than animal production, this may indicate that the management of the most of these farms was not as adequate as should be. Hence, production efficiency of these farms would be low and may lead low profit.
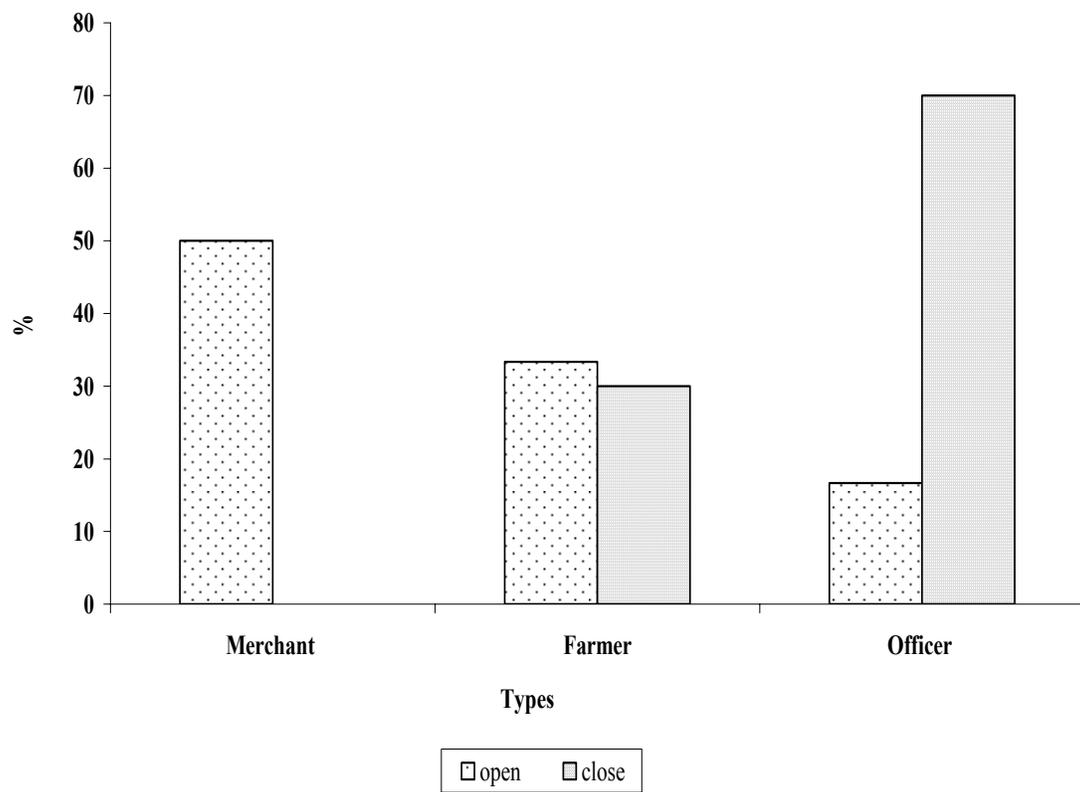
Fig. 3. Distribution of the basic occupation of the farmers in the farms

4.1.4. The distribution of dairy farms in El Guneid area according to the number of milking cows

Tables below give the relationship between the sizes of milk producing farms by number of milking cows. Table 4.6 showed the distribution of the open dairy farms into farms with cows ranging between 30 and 35, and farms with cows ranging between 36 and 40 cows and farms with cows ranging between 41 and 45 and farms with cows ranging between 46 and 50. It was observed that the number of milking cows were higher for the two former classes of farms. The first class with 30 to 35 cows had 20 % milking cows, while farms with 36 to 40 cows had 36 % milking cows. The larger farms had less percentages of milking cows. Therefore, it may be concluded that contrary to expectations, larger farms had less milking cows than smaller ones.   Thus, as most of the farmers have low numbers of milking cows, this may imply that these farms consume more feed input and give less milk production.

Table 4.7 Distribution of the number of milking cows in the open farms

Type of farm	No of milking cows	Average No. Of cows	% Of milking cows
30-35	7	35	20
36-40	14	38	36
41-45	4	43	9
46-50	5	48	10

Source: Field survey (2004)

Table 4.7 shows that the distribution of cows between closed farms varied differently from those of the open dairy farms. The farms are

classified according to 36 to 40 cows, 41 to 46 cows and 47 to 51 cows groups. Here the percentages of milking cows were higher than in those open farms. The first classified farms had about 40 % milking cows. The second classified farms had 45% milking cows whereas the last category had the highest occurrence of milking cows reaching almost 60% of the total cow population. Therefore, since most of the farmers in the closed farms had higher number of milking cows compared to those of open farms, then it may be concluded that these cows in the closed farms consumed less feed input and gave more milk production.

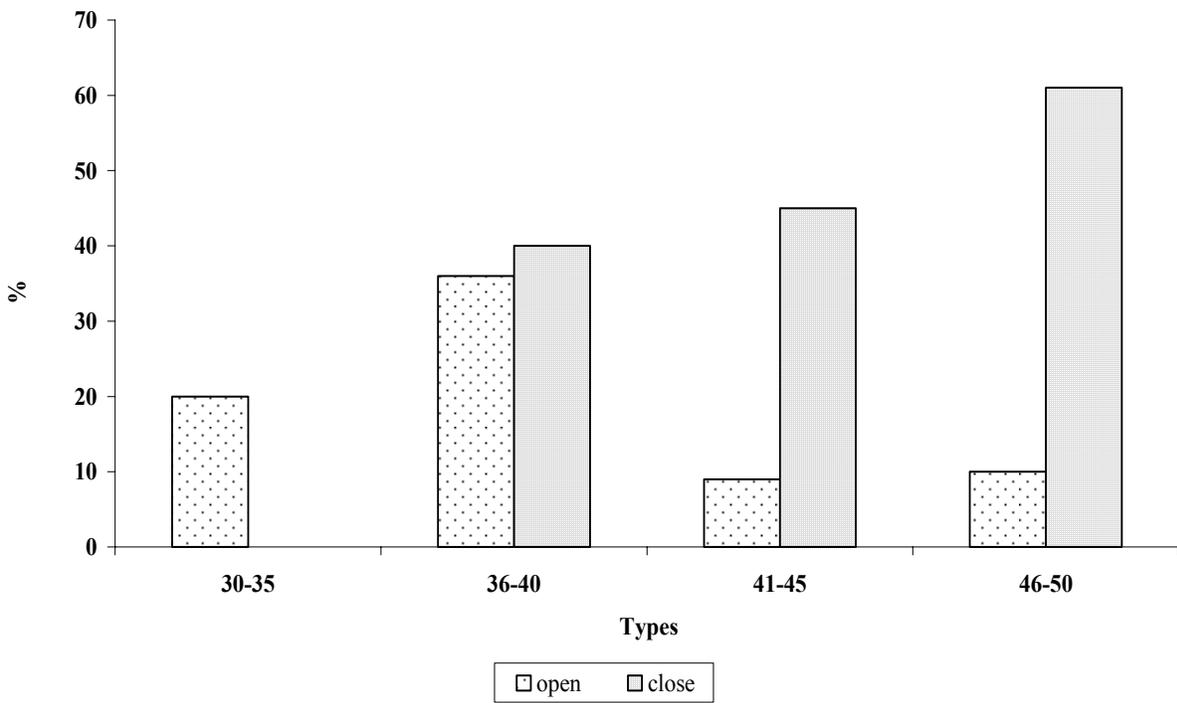**Fig. 4. Distribution of the % of milking cows in the farms**

Table 4-8: The distribution of milking cows in the closed farms

Type of farm	No of milking cows	Average No. Of cows	% Of milking cows
36-40	15	38	39
41-46	20	44	45
47-51	30	49	61

Source: Field survey (2004).

4.2. The fixed cost of open and closed dairy farms:

Table 4.8 gives the fixed cost incurred by the two types of dairy farms in El Guneid area. This fixed cost was responsible for the high cost of investment particularly in the case of the closed farms. It was observed that the closed (open) farms have higher fixed cost than that of the open (closed) farms.

Table 4.9: Average fixed cost for open and closed farms

Cost item	Average closed farm (SD)	Average open farm (SD)
Farm cost	1683000	226400
Material	373200	1945580
Cons cost	4004143	1898571
Water cost	13456000	110400
Fixed factor???	45822000	281260
Total	65338343	4462211

Source: Field survey (2004).

The variable costs of open and closed farms:

The variable costs are composed of feeding, veterinary services, zakat and Gotaan taxes. In open and closed farms the cost of feeding represented the highest item amongst all variable cost as reflected in the table 4.9. The cost of feeding accounts almost to 90 % of the total variable cost in both types of dairy farms.

Table 4.10: Average variable cost for open and closed farms

Cost item	Cost (SD)	Cost(SD)
Zakat	475000	48500
Gotaan	511820	72000
Veterinary Services	572000	2050000
Feeding	124666443	46663894
Total	126225263	48834394

Source: Field survey (2004).

4.2.1. Zakat:

It is a religious fee paid by life stock owners to the government in a specified amount of money per head when the total number of heads reaches a minimum level of 30 heads by type of livestock.

The volume of Zakat in open farms was larger than that of the closed farms because of the higher total number of heads in the open farms.

4.2.2. Gutaan:

It is an additional fee paid by live stock owners to the government. Similarly, the Gutaan taxes in the open farms were found to be higher than in the case of the closed farms. Again this amount of fees is levied upon the number of heads of animals raised by one person.

4.2.3 Veterinary services:

This cost is incurred to meet the medicinal care of livestock, which is considered crucial in the case of milk production. The cost of veterinary services was found be higher in closed farms than in open farms, perhaps due to increased awareness among closed farm owners.

4.2.4 Feeding:

The cost of feeding appears to be an important item affecting the productivity in both close and open farms. It was observed that the cost of feeding in close farm was the higher that of the close farms. This could be because most of the producers in the closed farms purchase their fodder from market, while those of the open farms use their own farm production and by-product and roam around grazing lands in El Guneid area and the vicinity.

Fig. 5. Average fixed cost for an open and a closed dairy farm in El Guneid area of the Gezira State.
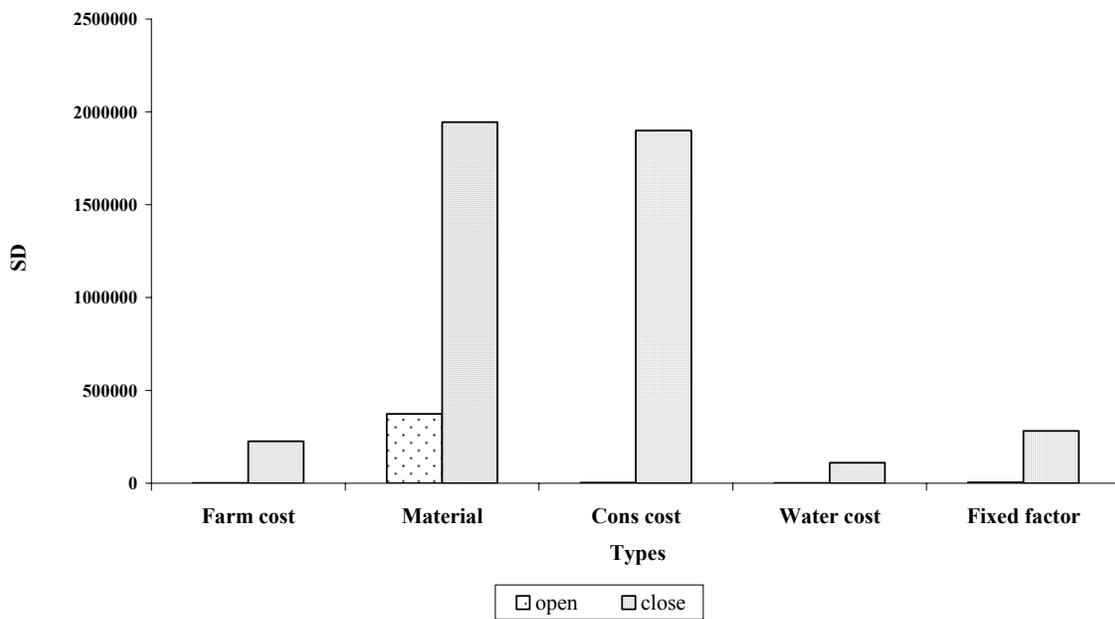
Fig. 5. Average fixed cost for an open and closed farms

4.2.5. Gross revenue of closed and open dairy farms:

The gross revenues of both farms are calculated by multiplying the quantity produced for sale by its respective price. The items produced for sale included milk, calves, old cows and cattle dung. Below is given the items in details (table 4.10). The gross revenue for the total number of the 10 open farms was about Ls 718.5 billion, with an average of Ls 23.93 per farm per years. The total estimated gross revenue of the closed technology of farms was about Ls 63.7 billion, with an average of Ls 6.36 billion per farm. Though this difference seemed unreasonable yet it may be explained as follows:

The open farms out number the closed farm and sell milk and more old cows more milk and more old cows than the latter ones. However, gives the gross revenues per cow or per milking cow the closed farms also much better than the open farms.

Table 4.11: Revenue of close and open dairy farms

Item	Open farms (SD)	Close farms (SD)
Milk	566674000	34442500
Sale of Calves	55014000	560000
Sale of old cows	78960000	10580000
Sale of cattle dung	17837700	17290600
Total	718490700	63373100

Source: Field survey (2004).
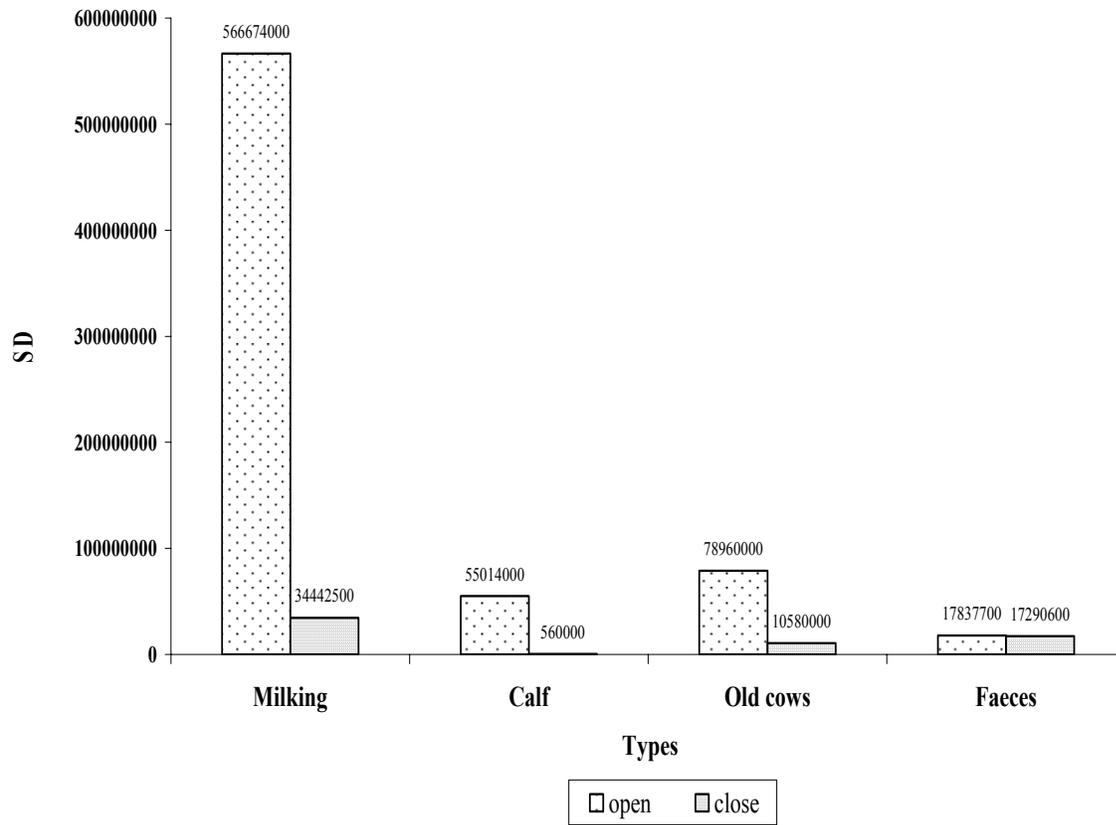
Fig. 6. Revenue of close and open farms

4.2.5.1. Gross revenue from sale of milk:

It is the main product in both open and closed farms. The gross revenue of milk production was found to be higher in the open farms than in the closed farms in total since the open farms used to have more numbers of milking cows.

However, it was observed that the milk yield per cow was higher in the case of closed farms as they select and rise improved cattle breeds, in addition to performing better management. The gross revenue per milking cow was about Ls x thousand in closed farms, and about LS x thousand in the case of the open farm.

4.2.5.2. Gross revenues from sale of calves:

This is a primary product of the two types of farms. Similarly, it was observed that the gross revenues obtained from the sale of calves were higher in the case of open farms than in the case of closed farms. This is because farmers in the open farms keep the calves for sometime and feed them until have high value in the market, whereas in the case of closed farms, farmers sell them immediately after fasting at low prices.

4.2.5.3. Gross revenue from sale of old cows:

This is an additional primary product of the two types farm which helps in increasing the profit of the farmers. It was observed that the gross revenue from the sale of old cows was higher in the case of open farms than in closed farms. This is because open farms have greater numbers of cows and therefore were expected to have larger numbers of old cows that were offered for sale.

4.2.5.4. Gross revenue from sale of cattle dung:

This is also an important source of additional revenue to the cattle farm. From the table 10.4, it was observed that the gross revenue of cattle dung was almost higher in close farms than in open farms. This may be explained by the fact that open farms cattle roam around and therefore drop their dung over extended grazing areas, whereas in the case of closed farms, the cows were kept inside their sheds and their dung were collected in one place. Thus the cattle dung of the closed farms were compiled in one place and not spread out as in the case of the open farms.

4.3. Gross marginal value and profit of the closed and open farms:

4.3.1. Gross marginal value:

It is total revenue minus the total variable cost. In this study the gross marginal value of the open farms was higher than that of closed farms. That is because the open farms had larger numbers of cows producing milk (table 4.11).

4.3.2. Profit:

It is the total revenue minus that total cost. From the table 4.11, it was also observed that the profits of the open dairy farms were higher than those of the closed dairy farms.

Table 4.12: Gross marginal value and profit of close and open dairy farms

Item	Open	Close
Marginal	592264087	14538706
Profit	514563744	10081495

Source: Field survey (2004).

4.4. DISCUSSION

This study was conducted in El Guneid area to investigate the quality of performance of milk production under two systems of production; namely the close dairy farming system and the open dairy farming system located in the Gezira state.

This study indicated that farmers of the close farms had better access to education than the open ones, which may have a significant effect on milk production. Azhar (2000) indicated that access to better education may improve cow milk productivity since education increases the awareness and knowledge of dairy producers.

The open farms were found to have farmers older in age than those in the closed farms. This may imply the extent of experience gained by open dairy farmers that may compensate for low level of education. The close dairy farms, on the other hand, were younger in age, which may reflect zeal and readiness to exert more effort to learn and apply better breeding practices of dairy farming. The study also showed that farmers of the open farms had more variation in their jobs and occupation compared to those farmers of the close dairy farms. One may argue that having more source of income reflects the risk associated with dairy farms rising, and that this versatility in jobs may reduce the attention and management of farmers in managing their farms properly. The closed dairy farmers seemed to spend more time and allocate more attention towards management of their cows. However, the findings of this study differ from those obtained by Intisar (1995). She indicated that the variation in occupation of producers could lead to positive effect on the production and profit of milk production.

The average of the milking cows per one open farm was found to be less in number than in close farms. Hence, these cows in an average open

farm were expected to consume more feed and give less milk than in an average close farm. Nevertheless, the total number of milking cows, compared to those in the close farms, was responsible for large differences encountered in the cost, revenue and respective gross marginal value and profits of the two types of dairy farms.

The open farms had higher fixed cost than that of closed farms. The variable cost of the farm indicated that:

    (i)   The volume of Zakat was larger in open farms than in the closed ones.

    (ii)   Guttan in open farms was greater than in closed farms.

    (iii)   Veterinary service in open farms had less cost than closed farms.

Azahir indicated that veterinary services were always poorer in modern system.

The milking production revenue was higher in the open farms than in closed farms due to greater number of livestock than to good breed and good management.

The revenue of calves in open farms was higher than in closed one, as they were bought after they get enough meat dressing while calves in closed farms were sold immediately after weaning.

The revenues obtained from the dung of the livestock in both the open and the closed farms were similar since the livestock of the open farms spreads out for grazing, while in closed farms, livestock was confined in one place and thus their dung was collected without waste.

Marginal gross value and profits in the open farms was higher than closed one attributed to the larger number of livestock in open farms.

Nevertheless, on average, closed farms have more productivity per cow than in open farms due to better selection of breed and better management.

CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. SUMMARY:

This study was conducted in El Guneid area of the Gezira state to estimate the economics of milk production in the area. Milk production in El Guneid area was classified in to two systems, the close and the open dairy farming systems.

The objectives of the study were to investigate the reasons behind the differences in economic production performance of the two types of dairy farming in El Guneid area. The study selected a total population size of 40 farms using full enumeration. Thus the analysis was based principally on the primary data collected through the field survey using a structured questionnaire. Secondary data were also collected from the Ministry of animal wealth, the Animal Wealth Bank and other published data sources.

The descriptive statistical analysis of showed that about 40% of the milk producers in the open farms were illiterate compared to 30% in the closed farms. The study also indicated that about 60% of the producers in the open farms were in old age group ranging between 61 and 70 years old, while in the close farms, about 60% of the producers were in the productive age group of 30 to 40 years old.

The study indicated that the open dairy farmers had more than one occupation. About 33% were merchants, 50% were pure farmers and 17% were government officials. The farmers of the close dairy farms were pure farmers (30%) and government officials (70%).

The study showed that milking cows were more prevalent in the close farms per unit typical farm than in open farms. On average, open farms had about 70% of their milking cows in farms size of 36 to 40 cows, while the close farms had 45% of their milking cows in farms size of 41 to 46 cows.

The analysis of the cost of production revealed that the fixed cost was greater in open farms than in close farms. The volume of zakat and Guttaan were also larger in open farms than in closed farm. Spending on veterinary service in open farms was less than in closed farms. Feeding in open farms was greater than in closed one.

The analysis of revenues indicated that open farms had higher revenue in milk production than in close farms, but the milk yield per cow was larger in close farms than in the open farms. The study also showed that revenues in calves, old cows were higher in the open farms than in the close ones. Accordingly, the gross marginal value and the profits of the open farms were higher than those of the close farms.

5.2. CONCLUSIONS:

1. The cost of feeding varied between the farms in two systems. The cost of feeding was relatively lower in the close farms compared to open farms because they produced their green fodder. Hence that could result in reducing the cost of production through reducing the major cost component.

2. The variation in breeds in the two systems was the main reason behind the variations in the production of milk in the systems.

3. Feeding was the most important and expensive cost in the two systems followed by zakat, Gutaan and veterinary services costs.

4. The herds of the open farms were generally underfed and received poor management.

5. Close farms give more milk production per animal than open farms. Hence the return per animal would be expected to be higher in close farms relative to that in open farms.

6. Investments in dairy farms were profitable in both systems accruing positive gross margins.

7. The field survey of milk production in El Guneid area indicated the following constraints facing dairy production in El Guneid area:

    a. Dairy production was not the main occupation, which leads to poor management.

    b. Limited supply of improved types of cattle breed especially in open farms.

    c. Limited supply in veterinary service especially for open farms.

    d. Lack of research on milk production.

    e. Absence of dairy industries that benefit from extra milk production.

5.3. RECOMMENDATIONS:

In this study the following recommendations are suggested for improving the milk production in El Guneid area:

1. Increase the capacity of growing green fodder thus reducing the cost of feeding.
2. Increase skills and knowledge of milk producers in the traditional dairy farming systems.
3. Encourage establishment of artificial insemination centers to improve types of breeds to ensure higher milk production that increases the profitability of dairy farming.
4. Increase the awareness of producers about the importance of the veterinary services through extension service.

5.4. LIMITATIONS OF THE STUDY:

There was lack of official data on dairy production and lack of accurate records. Also milk producers were reluctant to answer most of the questions of the questionnaire in fear of taxation and competition.

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