ECONOMIC AND PRODUCTIVE EFFICIENCY OF VETERINARY MANAGEMENT IN DAIRY FARMS

Thesis presented

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(B.V.Sc. 1990, M.V.Sc. 1994)

For

Ph.D. Degree

Animal Breeding and Production

(Economics of Animal Production, Marketing and Farm Management)

To

Animal Husbandry Department

Faculty of Veterinary Medicine

Alexandria University

1997

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To My Parents,

Brothers & Sister

and My Wife Hanan

ACKNOWLEDGMENT

The first thanks I would like to offer are due of course to my ***Merciful GOD*** who gives me all the facilities and the ability to complete this work.

I would like to express may deepest gratitude and may sincere thanks to ***Prof. Dr Abdel-Latif A. El-Kak***, ***Prof. Dr. Khairy M. El-Bayomi*** and ***Dr. Mohamed . M. Sharaf*** for suggesting the problem of this study, their guidance, support and help at all times.

Thanks also extend to all the crew of the Animal Husbandry Department for their unselfish assistance and friendship all the times of this study.

Appreciation also goes to may parents, may wife "Hanan" for their support and encouragement during the course of may education, to may sister and may brothers.

بسم الله الرحمن الرحيم

قرار لجنـــــــة الحكم والمناقشــــــــة

قامت لجنة الحكم والمناقشة بفحص الرسالة وترى انها اشتملت على بحثا هادفا ومواضيع لها اهميتها في مجال التربية والانتاج الحيواني (اقتصاديات الانتاج الحيواني والتسويق وادارة المزارع) كما قامت اللجنة بمناقشة المتقدم مناقشة مستفيضة ووجدت ان الطالب ملما الماما كاملا بكل ماجاء بها.

لـــــــــذلك

قررت اللجنة ترشيح السيد ط.ب/ **سند طلعت عطالله** للحصول على درجة دكتور الفلسفة في العلوم الطبية البيطرية-التربية والانتاج الحيواني (اقتصاديات الانتاج الحيواني والتسويق وادارة المزارع).

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INTRODUCTION

Dairy industries play an important and an increasing role in the economy of any developed or developing countries. Milk production activity contributes more than 75% of the total gross value of animal husbandry and dairy output.

During recent years livestock production systems have grown very rapidly, particularly in developing countries in order to reach self sufficiency from animal protein. Food production economics derived from livestock are extremely important because animal products account for more than 50% of food consumed and contribute high quality nutrients to our diet particularly milk and milk products. Milk production in developing countries totalled about 136 million tons in 1988 and is expected to reach 185 million tons by the year 2000, but per capita the availability is expected to remain at 41 Kg. (Krostitz, 1991).

Demand growth rate on milk was 4.8 during 1990, and growth rate of milk production will be 3.09 during the year 2000. Meanwhile, the total milk requirements during the year 2000 is expected to be about 31 million tons in Arab countries (Agam, 1994). The Arabic individual's share of animal protein was about 18 gram per day and constituted 25% from daily total protein consumed. On the other hand, world estimate of animal protein consumption was 60% in developed countries or 35% all over the world (El-Mufti, 1994 a).

In Egypt, the human nutritional problems are food shortage in the first place and bad nutrition in the second place. The individual share of animal protein in Egypt is low in comparison to daily recommendation which is 16 g (Soliman, 1991). The percentage of calories consumed from animal sources during the last two years at the international rate was about 15.8% and in developed countries equaled 30.3%, but in developing countries 9.4% and in Egypt about 8.0%.

It is essential that animal production should be continued and increased sufficiently to improve labour efficiency (which is already outstanding) so that, urban dwellers can obtain cheap food and thus have money left over for other purposes.

Veterinary medical care and management have a great role in developing milk production sector via controlling and treating different dairy herds and animals, thus decreasing mortality, increasing viability of individual cows and dairy herds, in addition to the eradication of serious diseases (causing severe economic losses in milk production sector) through efficient use of drugs, vaccines and disinfectants. Veterinary management and resources (drugs, vaccines and disinfectants) constitute about 3-5% of the total costs of milk production project, but their benefits are very high, as, they have increased returns and profits. (Biggs, 1978; Ellis and James, 1979 a, b; Howe, 1988 and El-Huassani, 1992).

The aim of this study was to determine the role of veterinary medicine and management in increasing economic and productive efficiency of dairy cows (in milk production farms). In addition, the evaluation of the role played by different factors (breed, season of production, number of cows, feeding, returns, costs and net profits) in milk production and their economic efficiencies was also carried out.

REVIEW OF LITERATURE

I- FACTORS AFFECTING MILK PRODUCTION; AN INTRODUCTION:

Developing formulae for calculating profitability of treating diseases required that, different costs (drugs, labour, losses from possible adverse effects of drugs and diagnosis before and during treatment) must set against improved production. Possible effect on environment of chemical mass use and genetic losses, also, must be considered. (Dobbins, 1977 and Kolacz, 1977). Dobbins (1977) stated that application of mastitis controlling program declined the cost per cow from $147 before controlling mastitis to $49 at 24 months after starting program.

Renkema and Dijkhuizen (1979) reported that, financial losses as a result of disease in dairy cattle are incurred through less efficient milk production, costs of veterinary treatment, reduced slaughter prices of animals as well as costs of replacement cattle.

Eckles et al., (1980), Kelly and Fingleton (1983), Antle and Goodger (1988), Howe (1988), Nix (1988), Poole (1988), Preston (1988), Weaver et al., (1988), Arbeiter (1989), Olney and Standing (1989) and Houghton and Poole (1990), suggested that the most important factors influencing milk production and profitability were animal species, breed, stage of lactation, individuals, seasons, variations from milking to milking, interval between milkings, first and last milk, fatness of cow, feed, stocking rates, capital investment, type and level of veterinary services, heat stress, parasitic infestation, use of calves to stimulate milk ejection, weaning difficulties, economic information for guiding resources used in controlling animal diseases, conception rate, oestrus detection efficiency, replacement costs, value of excess days not pregnant and cost of treatment, housing type and changes in management.

Thonon (1990) reported that, profitability of dairy farms depends on number of factors grouped into three main categories; the wishes and decision of farmer, economic policy, soil and climatic factors.

University of Rennes (1990) found that feeding had significant (80%) impact and genetic selection had approximately 20% effects on milk production.

Jadhav et al., (1991 a, b and c) and Yadav et al., (1994) reported that the most important factors affecting reproduction and production level of animals were farm type, breed of animals, lactation order, period and season of calving and age of animal at calving. Meanwhile, preventive veterinary services affecting milk yield differed due to pregnancy examination, brucellosis vaccination, breeding soundness, examination of bulls, pulmonary arterial pressure testing and compylobacteriosis vaccination (Salman et al.,1991 a, b).

Park (1992) suggested that, the most important factors influencing gross margin of milk production were milk yield and age of cow. Increasing milk yield and age of cow will increase gross margin per cow. Age at 1st calving, lactation duration, calving interval, lactation yield and daily milk yield/lactating animal were also factors affecting yield and profitability of milk production as reported by (Pradeep and Gupta, 1992).

Dobbelaar (1995) indicated that, body condition affected milk yield efficiency. Optimal body condition depended on lactation stage and is mainly influenced by cow's production performance and feeding level.

A- Seasonality effect on milk production:

Seasonal effect on dairy production is commonly related to the season (Winter or Summer). Effects of temperature, humidity and light were clearly observed on feed consumption, feed conversion and growth rate of dairy cows. Meanwhile, Stott and Williams (1962), Ingraham et al., (1974) suggested that, increasing relative humidity (from 35 to 75%) was an important factor in lowering breeding efficiency in August due to decreasing conception rate with higher temperatures.

Hoglund (1969) reported that, using Alfa Alfa haylage in feeding dairy cows was most profitable when seasonal labour was assumed to be in limited supply during September-October corn silage harvest season. Meanwhile, studies carried out by Basu and Gupta (1974), Ram and Singh (1975), Bhat et al., (1980), Parmar and Johar (1982), Basu et al., (1983) on Tharparker cattle breed indicated that Winter calvers produced more milk as compared to other seasons

Hogstrom (1977) suggested that season had a greater effect on farm net income as weather conditions had great effect on milk yield and quality. However, Bath et al., (1978) reported that, milk production had been lowest in February and highest in May. However, seasonal spread between low and high point has been decreasing dropping from 54% in 1950 to only 21% in 1976. Meanwhile, they mentioned that the average farm milk prices were lower during June and higher during January.

Eckles et al., (1980) indicated that, season had a great effect on milk production, composition and return from milk when milk is sold according to fat content.

Jassim and Ray (1986) showed that the number of days open of cows calving in Summer were significantly higher than that of cows calving in Spring or in Autumn/Winter. The interval between oestrus periods was longer in cows calving in Summer than those calving in Spring or Autumn/Winter. The number of services per conception in Spring, Summer and Autumn/Winter calving cows averaged 1.40, 1.94 and 1.76, respectively ($P < 0.05$).

Eldon and Olafsson (1988) demonstrated that the interval from calving to the 1st ovulation averaged 42 days and was significantly affected by season, geographical region and herd.

The margin over feed costs of Holstein-Friesian (H.F) cows was found to be of higher values during April-June season than those of October-December. But prevalence of mastitis and longer dry period in April-June caused declining profit compared to October-December period. (Stott and Delernzo, 1988).

Cue (1990) concluded that, calving season had significant effect on all parameters causing variability of lactation curves in dairy cattle. Moreover, Rao (1990) concluded that, animals calving in Winter had highest conception rate. Morgan (1990) reported that, increased margin and net income of milk production was virtually obtained during July-October period when higher seasonal milk prices applied.

Miettinen et al., (1991) concluded that cows which calved in late Spring had the shortest interval from calving to the first insemination and conception. Season effect on fertility was due to better metabolic balance of cows on pasture.

Dargatz and Miller (1992), stated that prolonged calving season reduced profitability by 2% for each 8.6 day shift in mean calving date. Also, Esslemont (1992) concluded that the cost of culling the cow that fails to conceive within the serving season in terms of herd depreciation and lower milk yield and calf income was calculated to be £ 590.

Pichard and Gana (1992) reported that, due to concentration of calving in Autumn, higher average milk prices were obtained, increasing gross farm income by 4%. Altogether, improved systems (calving season plus new forages) resulted in increases of 37 and 75% in net farm income. Also, autumn calving reduced risks derived from summer drought. Smith et al., (1993) also, reported that for cows which calved during spring, days open in the 1st and 2nd lactation that maximized annualized net present value (ANPV) ranged from 85 to 115 days. While for animals which calved in other months in a herd with a 7500-kg rolling herd average for milk yield, days open were >115 days for 1st-lactation cows.

Lafi et al., (1994) demonstrated that about 65% of clinical mastitis cases occurred between December and April. Meanwhile, Samaha (1996) mentioned that, during Winter months, parturition percentage in dairy farms increased compared to Summer months. Also, Winter months are the most dangerous ones on dairy farms particularly on young dairy calves below 6 months of age.

B- Year effect on milk production:

Significant year differences in milk yield were reported by Ram and Singh (1975), Parmar and Johar (1982) and Basu et al., (1983).

Bath et al., (1978) demonstrated that milk production was lowest in February and highest in May. However, seasonal spread between low and high points has been decreasing from 54% in 1950 to 21% in 1976.

Many improvements in disease control in dairying have already occurred and Beynon (1978) pointed out that, average herd-life for cows has increased from between three to four years to between four and five years since mid 1940.

Poole (1988) reported that over the next 10 years there will be fewer dairy farmers, fewer cows but with higher yield per cow.

Muller and Pflugfelder (1990) in GFR, Coquin (1991) in France, and Bockenhoff and Kern (1991) in Germany stated that, in the previous two years there was a decreasing number of cattle stock, decreasing gross domestic production of cattle, increasing milk production per cow, increasing per capita milk consumption. Self sufficiency also increased, while producer prices were lower than during the period from 1983 to 1988.

Dommerholt (1995) predicted that average milk production per cow would increase the following year and years thereafter. Also, he stated that good management in the previous five years helped dairy cows to produce more milk with less concentrates.

<u>C- Locality effects on milk production</u>:

Hoglund (1969) stated that cost-price relationships between milk production areas often vary considerably, resulting in different economic choices of forage crops to grow and in optimum combinations of forage and grain to feed.

Ellis and James (1977) reported that benefit-cost ratio differ from country to country. In India, about 5:1 and 8:1 while in South America it was higher than that. While Bakken (1982) indicated that, mastitis incidence and prevalence among herds differed from locality to another.

Kelly and Fingleton (1983) and Neidhammer (1991) mentioned that dairy farming and milk yield varied greatly between regions and localities.

Graham et al., (1991) indicated that returns per lactation differed from locality to another according to milk price. Canadian-sired Holsteins had 7.4% higher returns per lactation under Ontario milk prices and 2.2% higher returns under New Zealand milk prices, but neither differences was significant.

Lemire et al., (1991) concluded that it was useful to compare reproductive indices among regions using veterinary office microcomputer to judge economic and productive efficiency of dairy herds.

Zmija et al., (1992) indicated that locality had great efficiency in milk production in Poland and Slovakia. The direct costs constituted the largest share in overall cost structure, with

80.8%-82.2% in Poland and 83.2%-91.3% in Slovakia. The range in costs of individual elements, such as feed, labor and veterinary care tended to be wider on Slovak farms. The best results were achieved from herds numbering 400-600 head in Slovakia and around 300 head in Poland.

Widodo et al., (1994 a, b) found that farm area and average milk yield/day per cow correlated positively with the farmer's income. Also, returns of milk production differed from area to another.

D- Breed effects on milk production:

Stott and Delorenzo (1988) mentioned that calving interval and days of mastitis treatment were greater for Holstein Friesian than Jersey cows ($P < 0.01$) and mastitis incidence increased with parity in Holstein Friesian cows but did not do so in Jersey cows.

Scharf (1988) [German Black Paid (GBP), German Simmental, German Brown (GB) and Cross breed cows]; Bo (1989) [cross breeding of Danish Red Pied with Red and White Holstein (USA origin)]; Florez et al., (1989) [Red and White Holstein and Brown Swiss]; and Simerl et al., (1991) [Holstein, Jersey, Ayrshire, Brown Swiss and Guernsey] mentioned that, reproductive performance, disorders and productive efficiency differed from one breed to another.

Morgan (1990) demonstrated that Holstein-Friesians had the highest yield and margin/cow, but the Jersey breed, with its superior stocking rate, had the highest margin/hectare.

Graham et al., (1991) indicated that feed conversion efficiencies for Canadian and New Zealand-sired heifers were 0.59 ± 0.01 and 0.58 ± 0.01, respectively.

Dzhaparadze and Milyukov (1992) indicated that increases in milk yield on crossing Holstein sires with other breeds had been greater than those obtained on crossing with any other improved breed.

Glassey and Mcpherson (1993) reported that Jersey cows were more efficient producers of milk income per/Kg live weight than Friesian; while, total return of milk production per cow for Friesian was higher than Jersey cow. But Peeler et al., (1994) indicated that likelihood of disease recurring depended on cow's breed, weight, milk yield and genotype.

Ramadan (1996) indicated that on the basis of 305 days milk yield Friesian cattle produce about 9.44 Kg daily, while Egyptian Dommiati cattle produce 7.23 Kg. Meanwhile, if milk is adjusted according to the basis of 4% fat the Friesian produce 26.8 Kg.

E- Animal density effects on milk production:

Sainsbury (1969), Camm (1980), Dunn (1980) and Goodger et al., (1985) stressed that from the point of view of infectious diseases, larger units had greater risks of disease incidence.

Camm (1980), and Lowe and Stock (1990) reported that, to improve and raise milk production, you must increase the number of cows per herd. Increased concentration of cows in larger herds lead to higher inputs and higher outputs that bring economic problems to dairy industry.

ATB (1984) reported that, increased herd size, greater stocking densities, more relief workers and fewer herdsmen, all increased the risk of disease outbreaks.

Antle and Goodger (1988) suggested that incremental improvements in herd size and level of scheduled veterinary services were of greatest potential impact on productivity.

Isermeyer and Rach (1989) reported that adjustment of farm sizes to modern technology is essential, if productivity is to be increased and costs to be reduced.

Dhas (1990) indicated that 21% of the growth of milk production during 1966-1982 was accounted for by higher milk animal (cattle and buffaloes) population, 62% by increased productivity; and 17% was attributed to interaction between population and productivity. Improvement in conversion efficiency of milk animal herd has taken place largely because of an increase in the proportion of female buffaloes.

Grover et al., (1992) reported that, annual net loss in income tended to increase with size of holding unit; meanwhile, milk sold increased with increasing holding unit.

Kania and Sizaro (1992) mentioned that, the principle factors influencing dairy herd size were farm area, percentage of permanent grassland, labour resources and fodder yields obtained from grassland. Also highest milk yields per unit area and per cow obtained largest 11-15 cows and smallest 3-5 cows herds, contributory factors being their respectively high capital and labour intensity and effective utilization of fodder resources.

Jack et al., (1992) confirmed that, although herd size neither necessary nor sufficient for financial success, it was strongly correlated with farm performance. Meanwhile Boyce (1993) mentioned that, factors as building insulation, ventilation rate, climatic conditions, type of house must be considered in determining proper densities.

Doluschitz and Trunk (1993) mentioned that, cost regression effects largely exhausted when herd size was approximately 200 cows. Overall milk production was favorable in range between 60 and 500 cows.

Shah and Sharma (1994) mentioned that, annual milk production, marketed surplus, gross income and total investment per standard animal unit increased with the increase of herd size category (small 1 to 2, medium 3 to 4 and large more than 4 milk animals). Also, Widodo et al., (1994 a, b) suggested that there was a tendency for inputs as well as revenue per cow to decline as herd size increased.

F- Feed and nutrition effects on milk production:

Thomas et al., (1974) demonstrated that, milk production was limited by feeding grain at 1 Kg/4Kg milk with corn silage at 18 Kg/day but with unlimited hay. More grain fed either in early lactation (day 1 to day 45) or mid lactation (day 45 to 240) to obtain high milk production . Meanwhile, continued feeding of high grain past after 90 days of lactation and a long over lactation period did not result in increased total milk and resources returns above feed costs.

Barrett and Larkin (1977) demonstrated that, greatest variation in milk yield was attributable to nutritional status of cows and to the efficiency in converting feed into observed and utilized nutrients before and during lactation.

Williamson (1986) reported that feed costs for milk production generally estimated at around 40 percent of produced milk value. And, Daatselaar and Hoop (1988) showed that, under quota system increased in milk yield/cow did not always improve farms net margins, which tended to be more dependent on producing milk from farms own roughage.

Keller and Allaire (1990) mentioned that, changing levels of feed costs or costs other than feed had linear effects on profit economic weights and non-linear effects on economic efficiency weights.

Rose (1990) showed that, maximizing silage intake and minimizing concentrate input was relatively more important than increasing milk quality or reducing concentrate price in achieving increase in margin/milk liter. Also, the only factors of high margin over purchased feeds/liter of milk that can manipulated in short term are milk yield, quality, selection and allocation of purchased feeds. The key to optimize margin/milk liter was placing as much reliance as possible on contribution of nutrients from locally produced feeds, as silage.

Taylor (1991) indicated that, dairy farmers were not utilizing nor feeding adequate concentrates, resulting in damage to their returns from milk.Farmers at top end of scale produced 41% more milk from forage than average herd and able to trim > 0.5 Ton concentrate/cow from their bills; they achieved a margin over purchased feed of almost £ 50/ha (£ 60/acre).

Richardson et al., (1991) reported that increasing price of purchased feed stuffs, livestock and dairy producers would suffer severe economic losses.

Veepro Holland (1996) stated that, good-quality forage is the basis for economic milk production. As long as there was a good and plentiful supply of palatable forages, using concentrates could be limited, resulting in lower feed costs, depending on the area your dairying in it.

<u>G- Veterinary Management effects on milk production:</u>

Roe (1977 b) indicated that, veterinary management had the same advantages of fertilizers but the veterinary services and diseases control had the greater advantages and could be judged by determining the returns of the dollar invested in veterinary management.

Bath et al., (1978) mentioned that, the primary objective of herd health program was to increase profit by limiting occurrence of economically significant diseases. There was no justification for implementing control program that costs more than disease itself.

Ellis and James (1979 a, b) reported that, veterinary costs represented small proportion of production costs. Neither the farmers nor the veterinarian had much difficulty in weighing up costs and benefits of treating their diseased animals. Also they indicated that an integrated approach coupling a dynamic type of epidemiology with economic analysis needed to ascertain fundamental nature and effects of each health problem and implications of control in constantly changing circumstances of farm livestock production.

Wiedenroth (1979) mentioned that, in economic terms direct and indirect cost of disease and mortality could be reduced by one third by using preventive system.

Henderson (1980) indicated that, during recent years there has been increasing interest in preventive medicine in the farm. Much of what has been written and said in veterinary circles understandably refers to role played by veterinary surgeon in general farm practice. Meanwhile maintaining herd health requires cooperation of whole team of farmers, manager and stockman. Veterinary surgeon may be instigator of any system of health control, its success or failure likely depend on attitude of management, motivation and capability of stockman.

Williamson (1981) indicated that, veterinarians who wanted to maintain and strengthen their role as herd health related consultants in reproduction must be competent in analyzing and evaluating herd performance records so that deficiencies could be recognized and appropriate changes recommended for implementation by management.

ATB (1984) reported that, investment in veterinary services increased with a herd health program but return on this investment usually of order of 200% or 300%. In some herds average return may not be immediate as improvements in disease control may not reflected in current production figures. Also, ATB (1984) demonstrated that, production of cows in herds receiving herd health program increased by 6% or \$ 32.75 per cow per year. The increase in veterinary costs amounted to \$ 5.95 per cow per year which represented a return of 550% on each \$ 1.00 in which the dairy farmer invested in complete veterinary care. Herds on emergency care basis, increased production by 1.4%.

Williamson (1986) indicated that, application of herd health programs in dairy farms increased their economic and productive efficiency. Meanwhile, Antle and Goodger (1988) reported that management quality is a factor affecting economic efficiency of the dairy farms (it decreased veterinary service).

Howe (1988) mentioned that, veterinary services and medicines are examples of real resources. Their economic importance helped to sustain livestock production by preventing or curing of disease.

Chamberlain (1989) reported that, disease control by vaccination, testing and removal of infected animals, routine inspection and veterinary health checks, and surgical or medical treatment of individual animals, were essential aspects of economic management.

Gillispie (1990 a, b) mentioned that good management was vital when using all chemotherapy products and insecticides to avoid financial losses.

Miller and Dorn (1990) studied that, prevention costs per cow per year was about $ 20.88 from them drugs and biologics ($ 10.93) followed by veterinary services ($ 6.91), and producers labour ($ 3.03).

Hird et al., (1991) demonstrated that, for disease prevention, mean expenditures for veterinary services were $ 1.67 cow-year, spent on prevention of reproductive tract conditions. Preventive expenditures for veterinary services related to female infertility, vaccination against brucellosis and male infertility were $ 0.72, $ 0.39 and $ 0.22/cow/year, respectively.

New (1991) reported that, four percent of total cost of disease in 60 Tennessee cow-calf herds in 1987 to 1988 was attributable to veterinary services. Cost of veterinary services accounted for 8.8% of total cost of preventive actions. Pregnancy examinations considered most costly preventive service ($ 0.62/cow annually).

Phatak and Whitemore (1991) found that, the program involving greater veterinary participation in detection of oestrus and artificial insemination of cattle in dairy herd caused increasing pregnancy rate, decreasing number of non pregnant days and will increase income for dairy man. Percentage of return on investment in veterinary services reached approximately 4 to 1.

Salman et al., (1991 a and b) indicated that, the largest individual cost of disease prevention was the vaccine and drug cost, where the smallest individual cost was for veterinary services. The mean of total annual cost of veterinary services for administration of preventive measures in these herds was $ 1.85/ cow ($ 0 to $ 12.03). Pregnancy examination, breeding soundness examination in bulls, brucellosis vaccination, pulmonary arterial pressure test, and compylobacteriosis vaccination accounted for over 90% of money spent for preventive veterinary services.

Salman et al., (1991 a and b), El-Hussani (1992) reported that, the cost of veterinary services was relatively small percentage (5.4%-5.99%) of total mean cost of the disease incidence.

Roest (1995) reported that, sound mastitis control program assisted in reducing level of mastitis, increased milk production, reduced veterinary expenses, and fewer dairy cows culled.

1- <u>Drug effects on milk production</u>:

Morris (1977 a, b and c) and Roe (1977 a and b) reported that, optimum (most profitable) drenching scheme of parasite control depended on product price, but it was less dependent upon resource price in this case because of high returns obtained.

Goodhope and Meek (1980), Batra (1988) and Tarabla and Dodd (1990) reported that, treatment of dry cows at drying off was known to be linked with decreasing mastitis incidence, staphylococcus aureus infections, and low bacterial count in milk.

ATB (1984) demonstrated that, veterinary cost per cow averaged £ 5 and the average drug cost for attention and treatment was another £ 5 giving a total cost of £ 10/cow. Net profit per cow was £ 24. The time period to realize such profit varied from an immediate to several years depending on health status of the herd at the outset. Also, it was demonstrated that drugs used in treatment of infertility, mastitis and lameness constituted about £ 8 per cow per year annum, giving a total veterinary expenditure of £ 22 to £ 26 per cow per annum.

Goodger et al., (1988) indicated that, the net benefit of treating cows against S. agalactia was highest for cows in early lactation ($ 396/cow) and mid-lactation ($ 237/cow). A small net loss calculated for cows treated in late lactation.

New (1991) reported that, 2.3% of total cost of disease in 60 Tennessee cow-calf herds in 1987-1988 was attributable to purchase of drugs to treat sick animals. Cost of drugs and biological products used to prevent disease accounted for 69.4% of total cost of preventive actions with drugs to prevent intestinal and external parasites being most costly ($ 7.79/cow annually).

2- Vaccination effects on milk production:

Carpenter et al., (1987), Spath (1987), Gonzalez et al., (1989) and Lorenz (1989) indicated that, the vaccination was the most important way for prevention of diseases either parasitic (Anaplasma marginal, Babesia bigemina), bacterial (Brucellosis, clinical Gram-ve bacteria as E. coli) and viral (FMD) so, it would bring greater benefits than treating cows.

Frick and Lesser (1989) stated that, vaccine promises is to reduce significant management currently required to control the diseases. Meanwhile using of bactericidal protein treatment and a vaccine in which both have shown effectiveness in preliminary trials against major source of infection. The products are projected to save New York industry $ 18.7 and $ 50.9 million annually, respectively.

Nickerson et al., (1991) reported that, vaccine could be used effectively to control mastitis. Vaccination of cows using somatostaph will reduce somatic cell count in vaccinated cows than in control cows.

Salman et al., (1991 a and b) showed that approximately 60% of total mean annual disease prevention cost attributed to purchase of vaccines/drugs ($ 6.59/cow).

Miles et al., (1992) showed that, using bacteriocin and a vaccine provided effective treatment against major sources of mastitis infections, the treatment is projected to increase annual income of dairy industry by $ 18.8 to $ 39.7 million. Also bacteriocin could replace antibiotic usage and the vaccine promises to immunize cows against mastitis very effectively.

Guclielmone et al., (1993) reported that, no case of babesiasis occurred in vaccinated cattle. The benefit-cost ratio of cattle vaccination against babesiasis was 4:1 for each US dollar expanded.

3- Disinfectant effects on milk production:

Bath et al., (1978) mentioned that, bacteria adversely affect milk quality. The methods and thoroughness of cleaning and sanitizing milking equipment are important factors that affect bacterial counts in milk. Meanwhile, disinfectants are only effective when applied in a method of direct contact with disease organisms.

Philpot and pankey (1978) reported that, post milking teat antisepsis used extensively by dairy farmers in mastitis control and it was very beneficial method for preventing intramammary infection .

Riha et al., (1979) indicated that, spraying cattle with repellant diethyl toluamide against blood suckling diptera will improve daily milk yield , butter fat yield, net value of milk and total returns.

Sainsbury and Sainsbury (1979) mentioned that, there was much greater need under intensive systems of animal management to improve standards of hygiene. One of the most important ways of achieving this, was by careful and proper use of disinfection program in all livestock units.

Erskine and Eberhart (1991), Bahout (1993), Dudko et al. (1994), Kefford (1994) and Sarakby (1996) indicated that postmilking teat dip with proper management could be used effectively for controlling mastitis.

Beck et al., (1992) showed that, reduction of clinical mastitis achieved largely by measures of dry-cow therapy and teat dipping or spraying at an expenditure of £ 8.6/cow.

Miller and Bartlett (1993) reported that, disinfectants were one of most important significant variables affecting milk production quality. The marginal value product (change in revenues received) from use of iodine, chlorhexidine, and quaternary ammonium-type teat dips were $ 13.79, $16.09 and $22.17/cow/year, respectively, and these changes were statistically significant.

4- Future aid of veterinary management and its effects on milk production efficiency:

Eppard et al., (1987) and Gibson et al., (1990), Sellschopp (1990), Stennes et al., (1990), Walter (1990), Morbeck et al., (1991), Zepeda et al., (1991) and El-Ani (1993) indicated that, Bovine Somatotropin was a new technology and method used to improve cow's milk production, improving feed efficiency, decreasing cows number and density, decreasing service per conception, increasing conception rate, increasing benefits and reducing production costs.

Akpe and Wubishet (1990), Dabas et al., (1990) and Wahab et al., (1990) demonstrated that, progesterone kits, hydroxy progesterone caproate, progesterone releasing intravaginal device used for estrous detection, increasing milk yield and treatment of anestrus cows will increase profit and improve productive, reproductive and economic efficiency of the dairy cows.

Akpe and Wubishet (1990) and Vural and Izgur (1990) reported that, injection of cows with GnRH on day 14 after calving followed by injection of prostaglandin $F_{2\alpha}$ 10 days later will improve reproductive efficiency of the dairy cow and their profit. Prostaglandin F appears profitable in herds with greater than 80 days to first service by increasing economic and productive efficiency of dairy cows.

Lesser (1990), Lossouarn (1991), Shoeffling et al., (1991) and Thiede (1992) concluded that, Growth Hormones (GH) increased milk production by about 3 kg/cow per day (20.2%). It was highly significant for whole treatment period. This increase in milk production causes declining of milk price and growth revenue for non adapters but not for adapters dairy cows.

Doluschitz and Zeddies (1991) stated that, Avoparcin is an additional tool for economically minded dairy farmers to achieve optimum production and cost reduction due to its low cost their simple application. Also it was likely to be used on large number of dairy cows.

H- Reproductive efficiency and its effects on milk yield and profits:

Dijkuizen et al., (1985) indicated that, total losses due to reproductive failure were about 2% of gross production value or 10% of average farmer's income. Most important factors influencing milk production and their profitability were calving interval and persistence of milk production. During lactation the better persistence, the longer it was profitable.

Keller and Allaire (1990) indicated that, herd-age distribution variables (calving interval, age at 1st calving and culling rate) had only a scale effect on economic weights, and affected components similarly by changing amount of actual milk predicted from a given av. genetic potential.

1- Calving Interval:

Donald et al., (1978); Williamson (1986); Esslemont (1992) and Lafi et al., (1992 a and b) reported that, importance of regular calving intervals in the herd is emphasized by the fact that in most herds it costs $ 1.25 to 1.95 per day in lost income for each day calving interval prolonged beyond 365 days.

Esslemont (1992) mentioned that, total cost of long calving intervals, high culling rate and even low pregnancy rates in an integrated index reflected inefficient management.

Toombs et al., (1993) stated that, enterprise analysis improved pregnancy rates, shortened calving cycle and number of calves born earlier, if calving season increased, which raised total pounds of calves sold at weaning.

Wright and Fernando (1993) from their study on 11345 calving with 30 diary herds found that, overall incidence of abortion was 5.07%, culling rate, calving to first service interval and number of services were all significantly increased in aborting cows. Average cost of individual abortion before 250 days calculated to be £ 607. If the calf is born alive, the cost was reduced to £384 and if abortion occurred after 250 days it was further reduced to £79.

2. Days open:

Olds et al., (1979) estimated milk losses at 9.04 pounds for heifers and 18.96 pounds for cows for each day conception is delayed between 40 and 140 days after previous calving.

Williamson et al., (1980) stated that, for each 1-day reduction in interval from calving to breeding resulted in 0.8 to 0.9 day decrease in calving interval. Moreover, Morbeck et al., (1991) indicated that no correlation existed between days open and milk yield.

3- Dry period:

Barrett and Larkin (1977) demonstrated that, it was necessary to dry off cows for profitable next lactation (heifers 3 months and cows 2 months before next calf due) and so that it was important to know when the cow is due to calve.

Hlinka and Slanina (1987) mentioned that greatest losses in dairy cattle production occurred because of poor feeding in dry period and failure to group cows properly according to reproductive cycle and milk yield.

Furstenberg and Busch (1990) demonstrated that, high weight gains before calving (>2 Kg per day) had adverse effect on subsequent fertility.

Lafi et al., (1992 a and b) suggested that, proper nutrition is essential for reducing incidence and cost of milk fever, dystocia and repeat breeder syndrome.

Bruins (1995) reported that the dry period was an important part of the cows lactation cycle. Proper feeding strategy during dry period must be attained. On average, dairy cows produced 10 months a year, followed by a 2 months dry period. Although cows did not earn any money for farmers in dry period and just cause costs, the importance of this period should never be over-looked.

4- Number of services per conception and conception rate:

Williamson (1986) reported that, early breeding, diseases, bad nutrition and poor estrus detection, may cause conception rates to fall and semen costs to rise, or the reverse may occurs when improved heat detection, insemination technique, herd nutrition or disease control may result in improved conception efficiency and lower semen costs.

Weaver et al., (1988) reported that, enhancement of fertility is necessary to achieve break even point with GnRH treatment of 3rd service was 2% for low and 5% for high conception rate herds.

5- Age of cow and Age at 1st service:

Eckles et al., (1980) reported that, age of cow was a factor of considerable importance in regard to milk yield.

Chamberlain (1989) demonstrated that the average age at 1st calving of Egyptian cattle was 34 months.

Hiemstra (1994) stated that, early productivity resulted in early returns of milk production, and higher life-time production and contributed significantly to efficiency of milk production. Moreover, he indicated that, the purpose of young stock rearing is to rear well developed heifers , able to calve at age of 24 months which minimizes replacement costs.

6- Gestation period:

Hamed (1996) reported that, duration of gravidity in domestic animals differed from one species to the other; in cows it lasts 280 days while in sheep 150 days. Gravid animals could be affected by several external and environmental conditions, improper management, other causes related to the animal itself and some diseases as in, trichomoniasis and foot and mouth disease (FMD) in cows.

Ramadan (1996) mentioned that, estrus in buffalo was one of the silent heat, and the first estrus occurs at 2.5 years, and average parturition 2 each 3 years and extended till the age of 15 year. Egyptian buffalo had gestation period of 316 days and calving interval of 451 days.

I- Milking frequency and their effect on milk yield and profit:

Bath et al., (1978) reported that, records were standardized to a 2-time a-day milking basis which was more efficient and profitable.

Central System of Package and Statistics (1995) mentioned that, increasing milking frequency increased milk yield as it activated udder blood vessels and mammary cells and renew ability of the animal to yield more milk.

J- Diseases effect on milk yield and profit- An introduction:

Morris (1977 a,b and c), James and Ellis (1978), ATB (1984) and Kirk (1986) reported that, diseases influenced feed intake, feed conversion efficiency, partitioning of feed into various forms of production. Also, the disease influenced herd life length by causing death and premature disposal of the animals from the herd, that will decrease economic, productive and reproductive efficiency of the dairy herd.

Mouchet et al., (1986) from their survey on 476 dairy farms revealed that, 22.8% of veterinary expenses were due to mastitis, 12.6% infertility and endometritis, 10.9% prophylactic measures, 7.9% calf diarrhoea, 6.7% obstetrics, 6.2% antiparasitic and antimycotic treatments, 6% lameness, 5.5% vitamin, mineral and amino acid therapy, 4.6% dystocia, 4.4% milk fever, 3.8% digestive disorders, 1.7% foreign bodies and 1.6% respiratory diseases.

Miller and Dorn (1987) estimated that, in 16 dairies, mastitis was by far most costly disease, accounting for $ 186.13. Infertility was the second, accounted for $ 25.38 per cow or 14% of expenditure of $186 costs per cow only 12.2% was preventing specific diseases while 87.8% was incurred from disease. Drugs and veterinary services accounted for 16.9%.

Paramatma et al., (1989 a, b) summarized that, quantitative estimations of economic losses over years 1981 to 1985 due to diseases of cattle and buffaloes as average mortality, morbidity and total losses a year of total value of cattle asset were 7.13%, 1.87, 9.0% for cattle and 6.65%, 1.66%, 8.3% for buffaloes, respectively.

Kaneene and Hurd (1990) demonstrated that, in cows, most expensive 7 disease entities (from most to least) were clinical mastitis, breeding problems, gastrointestinal problems, parturition problems, multiple system problems, lameness and metabolic/nutritional diseases. In young stock the most costly diseases were multiple system problems, breeding problems, respiratory diseases, birth problems, gastrointestinal diseases and lameness. In calves the most costly disease problems were gastrointestinal problems, respiratory diseases, multiple system problems, birth problems, metabolic disease and lameness.

Miller and Dorn (1990) reported that total costs of disease prevention and occurrence associated with specific disease or conditions averaged $ 172.40 per cow per year, with mastitis accounted 26%, followed by infertility not otherwise specified 13%, pneumonia 5%, lameness 5%, dystocia 5%, milk fever 4%, left displaced abomasum 40% and death 3%. Also, they estimated that mastitis was the highest annual prevalence (37 cases per 100 cow-year), followed by metritis, (32 cases per 100 cow-year), pneumonia (19 cases per 100 cow-year), cystic ovaries (8 cases per 100 cow-year) and retained placenta (8 cases per 100 cow-year).

Sischo et al., (1990) from their study on 43 dairy herds found that, cost of disease was $ 1.749 million, or $ 111.68 per cow-year, 52% of cost for culling affected animals, and 24% for animal death. Calf diseases represented 4% of cost for all disease. Diarrhoea and pneumonia responsible for 86% of calf disease costs. Cow disease accounted for 92% of total disease costs- clinical mastitis and infertility accounted 53% of cow disease costs. Cost of disease prevention was $ 171616, or $ 10.72 per cow-year. Meanwhile Hoblet and Miller (1991) concluded that excessive culling is expensive, particularly in the short run.

Weighler et al., (1990) reported that udder disease was mostly category of disease reported at an av. of $ 49.85/head at risk annually, followed by reproductive problems at $ 38.05.

Salman et al., (1991 a and b) demonstrated that reproductive tract disease class was the most costly in terms of veterinary services for disease treatment ($ 0.99/cow). Dystocia was the largest veterinary treatment cost. Total mean annual cost of drugs used in treatment of disease conditions was $ 1.22/cow. Enteric salmonellosis, miscellaneous and respiratory tract disease classes had similar $ 0.31 to 0.39/cow. Death of unknown causes was most expensive disease condition, reducing costs associated with disease had potential for increasing profits in cow-calf operation. Moreover, he reported that, largest contributor to total mean annual cost of disease incidence was the cost of death of diseased animals, and this cost accounted for approximately two-thirds of total mean annual cost.

Beck et al., (1992) indicated that, infection reduces efficiency with which feed inputs are converted to milk. Major benefit in diseases control is reduction in milk losses which constitutes about £ 16.7/cow.

Lafi et al., (1992 a and b) demonstrated that, mean direct costs of milk fever, dystocia and repeat breeder syndrome for 86-cow per year were $ 231, $ 529 and $ 994, respectively.

Mailot et al., (1992) reported that, calf mortality caused the most serious economic losses. Respiratory and reproductive disorders (delayed calving, fertility and postpartum diseases) were also important factors.

Miles et al., (1992) found that, average cost was $ 125 per cow from reduced milk production, treatment and increased culling. Those losses constitute about $ 100 million annually for entire dairy farm sector when quality and production losses for processing sector are added. Cost to whole dairy industry alone nearly $ 150 million annually.

Meltzer and Norval (1993) reported that, three factors may cause an alteration in economic damage threshold, tick burden may cause damage to udder, secondary infestations. (e.g. mycosis) may cause economic damage, and nutritional stress of cattle may reduce actual average per tick weight loss.

Wittum et al., (1993) and El-Mufti (1994 b) stated that, most commonly reported causes of calf mortality were dystocia (17.5%), stillbirth (12.4%), hypothermia (12.2%), diarrhea (11.5%), and respiratory infections (7.6%). These 5 disease conditions accounted for more than 60% of all calf deaths.

1- Mastitis and their economic effects:

The types and extent of economic losses sustained by dairy industry due to mastitis were described by Janzen (1970), Dobbins (1977), Blosser (1979) and Morris and Marsh (1985), they reported that, major losses from mastitis have been identified, milk discarded due to its abnormal composition or to the presence of antibiotics, realized "clinical" and Unrealized "subclinical" reduced milk production, decreased sale value of cows sold for dairy purposes, cost of veterinary services to treat acute and chronic mastitis, cost of drug purchased by dairy men for intramammary infection, cost of increased herd replacement costs when cows were culled because of mastitis infection.

Bonewitz (1976) and Gount (1976) found that from 9% to 17% of cows were culled because of udder trouble. Also, Natzke (1976) suggested that average culling rate of 12% due to mastitis and the losses per cow about $ 11.01/cow.

Bath et al., (1978) indicated that, mastitis is by far the most costly disease affecting dairy cattle in United States. They estimated the average economic losses caused by mastitis to be at least $ 50 per cow per year. This amounts to annual loss of at least $ 500 to $ 600 million on industry-wide basis.

Camm (1980), Fustes et al., (1985), Craven (1987), Lightner et al., (1988), Frick and Lesser (1989), Howe et al., (1989), McInerney and Turner (1989), Badran and Ebeid (1990), Howard et al., (1991), Schepers and Dijkuzen (1991), Beck et al., (1992), Bahout (1993), Morin et al., (1993), Stott and Kennedy (1993), Singh and Singh (1994), Hamoen (1995 b), Radwan (1996) and Sarakby (1996) indicated that, mastitis was the most important economic disease affecting dairy cattle and causing severe economic and productive inefficiency via losses of milk production quantity, quality, increasing treatment costs, increasing culling rate and decreasing livability of the dairy cows.

2- Diseases of reproductive organs and their economic importance:

Beynon and Howe (1974) and Beynon (1978) pointed out that, by far the most important reason for disposal of dairy cows was reproductive disorders. This category accounted for over a third of outgoing cows.

Bartlett et al., (1986) reported that, economic loss for average lactation cystic follicles estimated at approximately $ 137 considering the effects on reproduction, culling, medical costs and labour. Lactation with cystic follicles produced an average of $ 68 more per 305 mature equivalent milk than lactation, without cystic follicles.

Joosten et al., (1988) reported that economic effects of retained placenta were similar in magnitude in herds of high or low productivity and high or low fertility. Sensitivity analysis showed that greatest financial losses were caused by loss of milk production, followed by animals number suffering from complications. Financial losses in herds with an average rate of retained placenta were of limited economic importance and therapeutic measures alone should be adequate. However, in a herd with high rate of retained placenta financial losses were considerable and preventive measures for whole herd could easily be justified.

Ali (1992) found that total loss in Egypt due to ovarian inactivity for at least 3 months equal to 190.75 L.E/head. Meanwhile, in cows and buffalo unfortunately, infertility incur large economic losses to animals.

3- Limb diseases and their economic importance:

Weaver (1977) estimated, loss from hind limb condemnation at over £ 20000 in January 1977. While Stott (1986) reported that, foot rot is one of most important economic diseases affecting cattle. Using a computer model for controlling this disease is of great benefit as it reduce future costs of this disease and reduces spreading of it among farms.

DeJong (1994) and Hamoen (1995 a) concluded that, legs and feet are positively correlated with dairy herd life, their productivity and profitability.

Vagsholm et al., (1991) reported that, reproductive diseases, ketosis, udder diseases and other diseases had shadow costs per case of 1751, 1268, 295 and 617 NKR, respectively (1 US $= 7 NKR). Decreased incidence of reproductive diseases, ketosis and other diseases associated with increased milk supply and increased damaged for concentrates.

Lafi et al., (1992 a and b) demonstrated that, annual cumulative incidence (CI) rate of milk fever in a herd by 1% associated with increased total (direct and indirect) cost per herd per year of $ 133. Increasing annual cumulative incidence rate of dystocia in a herd by 1% associated with increased total cost per year of $ 140.

4- Respiratory and Digestive disorders and their economic importance:

Alonge and Ayanwale (1984) and Power and Watts (1987) estimated that, annual loss of tuberculosis in Nigeria at least about 14.24 million naira, based on morbidity rate of 0.2% and a case fatality rate of 1% in cattle population of 9.3 million.

Costantoura (1985) showed that, during outbreak of ephemeral fever in experimental herd in Queensland in 1983 were 15 of 250 cows affected and 2 died. Losses caused by decreased milk yield and replacement assessed at $ 2400.

Goodger et al., (1985) reported that, outbreak of vesicular stomatitis at 2 dairies about $ 225000 over 2 months amounting to $ 202/cow for dairy 1 and $ 97/cow for dairy 2. Losses associated mostly with high culling rates. But Gallo-Gardona et al., (1987) reported that, over six year (1980-1985). Annual infection with vesicular stomatitis infection ranged from 0.5-17.7%

in all cattle and from 4.2 to 33.8% in dairy cows and estimated losses via lost milk production, cost of drugs and veterinary treatment were US $ 320.75 per sick animal infected with New Jersey strain and US $ 210.55 when infected by Indian strain total losses from herd over six year was US $ 29211.80 of which 75% due to lost milk production.

Peters (1985), Sharp and Kay (1988) and Roberts (1988) demonstrated that, Salmonella dublin and Salmonella typhimurium infection causing severe economic losses in newly born calves via body weight losses and increasing percentages of dead calves. Also, in human through losses and disorders which costs about $1000 million in Americans in 1987 and about 2 million human cases occurs annually.

Tadic and Pogacnik (1988) estimated that, enzootic bronchopneumonia caused a 6.86% reduction in weight gain, 4.7% reduction in production value, and 13.22% lower profit than expected ratio between economic losses caused enzootic bronchopneumonia, prevention cost of disease and treatment of diseased animals indicated that systematic prevention and treatment were economically justified. Meanwhile Jim et al., (1993) indicated that future studies that attempt to quantify total economic of Bovine Respiratory Diseases (BRD) is required.

New (1991) reported that, producers spent money on therapeutic veterinary services. When drugs used therapeutically, the most was spent on products to treat respiratory tract diseases ($ 0.37/cow annually).

Salman et al., (1991 a and b) demonstrated that, diarrhoea of unknown cause had highest mean annual cost ($ 1.16/cow) for vaccines/drugs among individual disease conditions.

5- Skin and parasitic diseases and their economic importance:

Steelman and Schilling (1977) indicated that, average increase in economic value over 6-year period (to 1976) for protecting Hereford steers from mosquito was $ 6.11 head per year. The 2-year average increase in economic value for crossbreed and Brahman steers was $ 1.31 and $ 5.86/head per year, respectively. protecting costs of cattle from mosquito attack by individual producers by aerial ULV application of malathion ranged from $ 7.98/head per 3 months for protecting 431 head of cattle on 956.25 ha to $ 20.21 head per 3 months for protecting 114 head of cattle on 133.33 ha.

Myers (1981) stated that, parasitic diseases affecting milk yield, gain of cattle and profit of dairy cattle treatment of dairy heifers every 60 days with 5 mg Fenbendazole/kg did not effectively control parasitism but increased average daily gain by 0.1 Lb compared with untreated controls, treatment every 30 days effectively controlled parasitism and increased daily gain by 0.2 Lb. Also treatment of cows with 5 mg/kg before freshening produced 623 Lb more milk per head than untreated cow.

Morley and Hugh-jones (1990) estimated that, treatment, prevention of anaplăsmosis and losses in milk production and those due to deaths or culling were valued at $ 0.5 million for year 1983 in red river plains and south-east areas of Louisiana in Canada.

Brown et al., (1993) concluded that, internal parasite control problem had increasing interest. In developing countries, where internal parasites are major health concern. If typical dairy herd infected with internal parasites and if treatment was implemented where all animals responded positively, the dairy farmer could expect to gain over $ 15 per head in 1988/1989. These results were most sensitive to milk price, expected improvement in performance and feed costs per cow and wage rate.

Meltzer and Norval (1993) recommended that, tick control only be applied when bont tick infestation are equal to or greater than, their economic damage threshold. Meanwhile sensitivity analysis showed that 10% rise in cost of dipping reduced to 23 (a 28% decrease) the number of weeks when tick burdens excluded economic damage threshold.

<u>II- MILK PRODUCTION COSTS, PRICES, RETURNS AND NET PROFIT</u>:

<u>A- Costs of milk production</u>:

Blake et al., (1978) suggested that, elimination of machine stripping and minimizing over milking appěared the best means of reducing average cost of milk harvest. Culling of cows exhibiting unsuitable demands for labor and machine inputs is more appropriate strategy for improvement than direct selection for efficiency of milking labour.

Ellis and James (1979 a and b) recognized that, veterinary costs represent a rather small proportion of production costs even if direct purchases of disinfectant and similar health supplies were included. Veterinary costs on a typical farm in 1978 only amounted to 5 to 6 percent of "variable costs" which included concentrates and sundries and represent only 3 to 4 percent of total of "fixed" (mainly interest, rent and labour) and variable costs.

Dunn (1980) reported that, increased productivity may be achieved by greater investment in stock without further investment in fixed costs (housing, etc). Fuller et al., (1982) demonstrated that heifer raising costs were estimated at $ 756 for 24 months or $ 1.05 per day.

Kelly and Fingleton (1983) reported that the level of cost per gallon of milk produced was kept down by low feed prices and high levels of output. Purchased are kept down by low feed prices and high levels of output. Purchased feed in milk production projects was the largest single item of costs. It accounted for between 29 and 60 percent of total costs (excluding interest, labour and capital charges) on specialist dairy farm.

Howe (1988) mentioned that, real resources of milk production were veterinary man power and medicines, farm labour, buildings, machinery, land, breeding, livestock and feed stuffs and examples of real products are milk, meat and fecal matter. Meanwhile he estimated that veterinary services and medicines had never exceeded 2% of total farm expenditure.

Nix (1988) reported that, young stock for herd replacement, the dairy "followers" were very rarely recorded in dairy castings and yet they could have considerable effect on profitability of the herd, especially as nearly 90% of UK herds are completely self contained.

Miller and Dorn (1990) reported that, total costs of disease was about $ 172.40 per cow year, $ 20.88 was for disease prevention and $ 151.52 was for disease occurrence. Most of the latter was due to deaths, culling and still births (56%), followed by milk loss (20%), drugs, biologicals and veterinary services (17%), body weight losses (4%) and labour and carcass disposal (3%).

Weighler et al., (1990) demonstrated that, out of the costs of all health-related expenditures and disease incidence in dairy herds, 89% was attributed to disease events and 11% to cost of disease prevention. Most (78%) of disease cost events was due to death and culling losses. Veterinary services accounted for only 4% of total costs and 36% for the treatment.

Hird et al., (1991) estimated that, the mean cost associated with episodes of diseases was \$ 33.90/cow-year, with \$ 0.78 and \$ 1.37/cow-year being spent for veterinary services and drugs, respectively. Highest costs for veterinary services related to episodes of disease were for dystocia, lameness and ocular carcinoma. On the other hand Hoblet et al., (1991) reported that approximately 84% (\$ 90) of costs attributed to clinical episode were associated with decreased milk production and non-saleable milk.

Yamaguishi et al., (1991) reported that, in order to identify economic parameters of farmers with propensity to seek greater technical and economic efficiency. Producer's accounts were used and operational costs are presented, broken down for labour (12% of total), machinery and equipment (22%), materials (35%) technical assistance (4%) and other costs (27%).

Zehnder et al., (1991) analyzed operating costs of milk production as a percentage of total expenditure as average, minimum and maximum values were feed costs 27.2, 23.7 and 32.3, livestock expenses 3.3, 6.3 and 10.5 administrative and management expenses 6.8, 4.9 and 8.9 and labour 40.9, 37.0 and 48.6%

Beck et al., (1992) demonstrated that, costs of main control producers (e.g. £ 8.60/cow for dry-cow therapy and teat dipping or spraying) were broadly covered by reduction in clinical mastitis, leaving benefits of reduced subclinical infection (e.g. £ 3810 for a 100 cow herd unconstrained by quota and achieving average reduction in infection) as a substantial bonus.

Khan (1992) reported that for small farms (5-10 milk animals) milk output was most important determinant of dual cost. Meanwhile for medium size farms (11-20 milk animals) variable inputs, such as dry fodder price and oil cake, played a crucial role in determination of dual cost and for large farms (> = 21 milk animals) green fodder price and oil cake were most important variable inputs that determined dual cost.

B- Prices of milk and production resources:

Kelly and Fingleton (1983) mentioned that, although relative prices of milk and concentrate feed were key factors for farmers in choosing levels of inputs and hence output from dairy cows, prices of other inputs were also important. If relative prices for inputs rise or fall, producers will decrease or increase amount they use.

Whpple et al., (1983) reported that, cross price elasticity estimates indicated that reduction in price of reconstituted milk by 1% resulted in 5 to 7.6% decrease in fresh fluid milk consumption.

Fingleton (1991), Shoeffling et al., (1991), Yamaguishi et al., (1991) and Zehnder et al., (1991) reported that, milk pricing help in determination of animal intensity, herd size , governmental plan and controlling economic and productive efficiency of the dairy farms.

Prathi and Mudgal (1992) and Shah et al., (1992) indicated that, percentage of the fat in the milk play an important role in milk pricing and their return.

Helming et al., (1992) estimated that shadow price/kg milk on the average farm was DFI 0.10 and DFI 0.39 and elasticities of response to changes in milk output were -0.76 and -0.83 for unrestricted output, 0.68 and 0.66 for demand of purchased feed and 0.62 and -0.17 for demand of intermediate inputs. The corresponding price elasticities were much lower.

Falert et al., (1993) showed that, growth in milk production has been greatest, relative to price changes. Meanwhile Jain et al., (1994) reported that annual growth rate in milk price ranged from 6.23 to 7.85% and Farrar (1994) observed that, increases in milk and calf prices, resulted in increase in net farm income.

C-Returns and Net income from milk production:

Norman and Coote (1970) indicated that, the farm produced inadequate return on capital because of heavy investment, producing poor level of management and investment income. Meanwhile Charles (1975) suggests that, animal waste contained substantial nutritional value, and are efficiently utilized by ruminants. Waste material could be safely and profitability recycled by feeding them without hazard to animal or human health, so that, considered a great source of income in animal farms.

Bath et al., (1978) mentioned that, the primary causes of unprofitable dairy operations included, low production per cow, low production per man, year of labour expanded, high expenditures for feed per cow, poor quality feed whether it was hay, corn silage or feed grains. Total income from milk depends on the amount of milk, milk fat percentage and in some markets percentage of protein or solid not fat.

Williamson (1986) mentioned that, using reproductive health programs in dairy farms will increase the efficiency of reproductive performance and net farm income.

Stott and Delorenzo (1988) indicated that, parity, breed, calving season and their interaction explained nearly 40% of variations in milk yield (breed 34.7%), but < 10% of variation in profit per lactation. Milk yield, calving interval and mastitis treatment accounted for nearly all variation in profit.

Vagsholm et al., (1988) indicated that, major economic impact of mastitis control program due to improved milk quality and to a lesser degree due to increased milk production. Net present value of MCP (mastitis control program) using 15% discount rate, for average 12-cow herd was $ (482-800).

Conlin (1991) found that profit performance was highly variable from farm to farm relative to all production measures. Highly profitable farms had larger herd sizes, higher production per cow, lower feed costs, received higher milk price and had better control of practically all production cost categories and the benefit of tighter control of economic efficiencies improved profitability by > $ 2.50/CWT independent of productivity.

Sheehan and Perry (1991) mentioned that, lower calf and cull cow prices caused severe economic losses in dairy farms. From their study on about 126 specialist dairy farms observed that average profit after unpaid family labour fell from £ 7351 to less then of £ 3136 and gross margin/cow fell from £ 687 to £ 662. Moreover, in 1992 from the study of 129 specialist dairy farms studied, average profit after unpaid family labour was less than £ 2982 and gross margin/cow was £ 696.

Congleton and Colca (1994) concluded that, milk per day was highly correlated with the present values of income per day compared to the 1st lactation yield, even at high discount rates. Also highly correlated with income per day as relative to net income per day, which includes information in addition to milk yield. Moreover, Farrar (1994) indicated that, average net farm income per/ha increased by 38% on lowland specialist farms and by 15% on upland mainly dairy farms. But Hiemstra (1994) reported that proper young stock rearing will improve dairy farm net income.

III- ECONOMIC AND PRODUCTIVE EFFICIENCY:

A- Efficiency Definitions:

Roe (1977 a and b) and Salem (1983) defined technical efficiency as it is a term often used in agricultural and veterinary literature to denote high returns to particular resource like high production per animal. This implies that, maximum technical efficiency would be obtained by operating at one or other boundaries of rational zone of production. Also, the production efficiency deals with how to reach maximum level of production from limited level of resources or the same production from lower level of resources.

Doll and Orazem (1978) and Sankhyan (1983) mentioned that, economic efficiency depended upon input output relations and methods of measuring input resources and output goods. Optimum economic efficiency can be achieved from optimal allocation of resources in their best opportunity uses. Meanwhile, technical efficiency refers to the input output ratios measured in cash picture.

El-Feel (1980) defined productive efficiency as the ratio between out put-input ratio and this required good management efficiency in mixing inputs for obtaining high production with least cost combination.

Abbott and Makeham (1990) and Hardwick et al., (1990) mentioned that economic efficiency means that firm producing on lowest cost basis feasible with techniques, skills and knowledge available. Meanwhile, efficiency in production, means that firm must be employing all of its factors of production in efficient combinations that yield high production of high profit.

Krishnaraj and Dubbey (1990 a and b) reported that, economic efficiency could be effectively explained by factors of financial stability, income, milk collection performance, investment and productivity of milk, behavioral efficiency could be explained by factors satisfaction of members, adaptation of de-worming in calves and provision of housing facilities, services rendered to members, training in dairying, health of animals, incidence of contagious disease, record keeping and adaptation of crossbred animals. Social efficiency could be explained by social responsibility and tenure of service factors.

B- Efficiency Measures:

Shaker (1980) mentioned that, efficiency measures could be done by using one or more of either collective or partial measures.

1- Collective Measures:

Schulze (1975) estimated that, loss in production in the absence of any veterinary measures would be 40%.Better production methods and veterinary action reduce this to 20% or even below 15% and with improvements in this field , figures of 10% or even below 5% were possible.

Roe (1977 a and b), Haan (1991), Kola (1991), Beck et al., (1992) and Mcinerney et al., (1992) reported that, cost benefit analysis was one of the most effective efficiency measures for any animal production projects and by using this measure we can plan and predict future problems and prepare solutions in advance. One of the basic principles of B.C analysis is to ensure that all relevant benefits and costs are included. Moreover, Ellis and James (1977) and James and Ellis (1978) demonstrated that, rising costs of foot and Mouth disease (FMD) control and increased need to eradicate disease call for more vigorous economic analysis of control projects value must be through using benefit-cost analysis techniques which estimated at about 5:1 and 8:1 in India.

Kelly and Fingleton (1983) reported that, milk price to concentrate price ratio is one of most efficient measure of dairy farming efficiency. Also they stated that changes in output level can alter cost per gallon of produced milk and price:cost ratio of milk is a measure of efficiency and differ from region to region.

Borger (1985), Jactel (1987), Prins (1987), Ansell and Done (1988) and Howe (1988) indicated that the cost benefit analysis could be used effectively for controlling food infection by salmonellosis, determination of perfect size and intensity of dairy farm and assess losses due to mastitis, assessing animal disease research and it needs to consider "Opportunity costs".

Meanwhile El-Shafey and El-Hababb (1986) stated that cost benefit analysis ratio if less than 1 indicated that the firm acts by good economic efficiency and it is a profitable firm.

Nix (1988) and Zeddies (1989) reported that, absolute level of milk capacity was not a reliable indicator for profitable milk production. While marginal costs, benefits and gross margin summarized technical and economic performance, therefore, these measures were useful in comparing efficiencies of different herds and farms.

Gumaraes (1990), Krishnoraj and Dubbey (1990 a and b) and Mattigatti et al., (1990) reported that, economic efficiency indicators were, lactation yield, daily milk yield/cow, annual milk yield/ha, reserve funds, calving interval, age at maturity, quantity of milk produced, proportion of milk supplied by members out of total milk yield during high-yielding as well as lean seasons, establishment expenses, gross margin, annual cost/milk and total cost production/animal and return/liter; respectively.

Luijt and Hillebrand (1990) reported that, profitability as measured according to family income from the farm plays a dominant role in decision on whether to continue or close down the farm.

Lane and Nussbaum (1991) reported that, enterprise analysis could be available as a tool for assessing impact of management changes. Enterprise analysis could be used to demonstrate the effect of improved reproductive efficiency on cash flow.

Repka (1991) stated that, for judging economic and productive efficiency of dairy farms mainly "large farms", total production costs per day, production costs per liter of milk and profit per liter of milk, could be used.

Doluschitz and Trunk (1993) described that, important parameters for cost benefit analysis of large farm units were, milk yield, time requirements, labour costs, capital requirements, annual investment, transport costs (roughage, slurry) and other costs related to unit size.

Shah and Sharma (1994) and Widodo et al., (1994 a and b) indicated that, income derived from enterprise was the final economic indicator which reflected its economic feasibility and viability. Investment in fixed assets are important indicators of income generating capacity. Also annual milk production and marketed surplus are some of economic indicator of efficiency to milk production projects.

2- Partial measures:

Schulze (1975) reported the need for analysis of cost effectiveness of veterinary measures. Such information in the form of index figures should be used in management, planning and control of veterinary measures as contribution to national efficiency.

Masaoud (1985) reported that, efficiency measures could be determined from quantitative analysis of farm production function. We could derive, marginal production for each resource use on total farm level and by this way we can assess the value of marginal products of resources and compare this with their opportunity uses or by using percentage value of outputs to percentage value of inputs in certain period.

Mohamed (1986) reported that for measuring production and economic efficiency the elasticity of production for each resource used in production process, total elasticity of production, total costs to production units and total income to units of production can be used.

-Production and cost function:

Sheref (1972) reported that cost function determined the relationship between different amounts of production and minimum cost levels required for obtaining certain production level.

Vinokurove et al., (1975) indicated that, each ruble spent on immunizing cattle with trichophyton (TF.130) vaccine saved 44.2 rubles.

Morris (1977 a, b and c) demonstrated that, optimum combination of two resources could be determined by using marginal principle. The optimum point where reduction in cost by eliminating one unit of anthelmintic exactly equals the cost of extra hay required to hold weight gain constant. Meanwhile, important facts about production function was, when, apply to much resource, profit will begin to fall. In some cases total out put from the system may fall (e.g. with anthelmintic, if excessive dosing impairs development of normal resistance. Also, production function is used when you apply very limited control measures which have little effect on disease, for determination of optimum point of drug application.

Roe (1977 a and b) indicated that, production functions played an important role in production economics. As much of economics concerned with way variations in inputs to production process that influence output.

Benoit et al., (1988) mentioned that the method for developing comprehensive diagnosis of farm production function must be illustrated as mixed crop/livestock farms (dairy, calf rearing cereals).

Stott and Eker (1993) concluded that a more useful application of linear regression equations was to provide aggregate cost of clinical mastitis treatment over time for the whole herd which would provide meaningful evaluation of the mastitis problem.

C- Efficiency Achievement:

1- Good planning and policy:

Ellis and James (1979 a, b) and Ruff et al., (1983) reported that veterinary costs on the typical farm represented only 3-4% of the total costs. To maximize profit you must form basis of production selection policies. Generally increased input is valid until the last additional unit of input produces the same value in output.

Perry (1983) reported that, for improvement of efficiency a primary objective must be to secure more rapid improvement in economic efficiency by raising quality, catering for consumer choice and reducing unit costs of production.

Mohamed (1986) reported that, to achieve optimum allocation of resources there were some conditions that must be met. Distribution of limited resources by way in which marginal product equal to the cost for each resource, by way in which value of marginal product for the resource become equal in all farms or by the way in which marginal product for these resources become equal in all cases.

Seyoum (1989) demonstrated that, a recent policy response has been for governments to encourage domestic milk production and increase economic and productive efficiency of dairy farms. In practice, policies of this kind faced several limitations. Importance, pattern and distribution of dairy consumption and factors which motivate consumers varied sharply between countries, ecological zones, rural and urban areas under different economic and social circumstances. Another limitation relates to comparative advantage of domestic milk production.

Gobin (1990) suggested that, communications between dairy farmers was one of the main methods for increasing economic and productive efficiency of dairy farms.

Rico Mansilla (1990) reported that the main objective of dairy development programs, is to produce the maximum of milk of high hygienic and technological quality at the lowest possible cost.

Lensch (1991), Russell (1991) and Sial (1991) stated that requirements of livestock production in year 2000 and strategies to meet consumer requirements included improvements in genetic, feeding, reproductive rate of buffaloes, better disease surveillance, control measures, variations in governmental dairy policy and dairy marketing.

Godbout (1992) reported that, basic policies of dairy industries of developed countries was to emphasize fat rather than protein or Ca production in milk, and presented reasons why this trend should be rapidly reversed.

Chahal and Singh (1993) suggested that to increase milk production and economic and productive efficiency of dairy production, technical inputs used in milk production and veterinary services must be improved and by providing assured market for milk.

Challinor and scott (1993) reported that for increasing efficiency of dairy industry national income figures must be compared and contrasted with regional income pictures.

Widodo et al., (1994 a and b) argued that further increase in milk production can be stimulated by raising farm gate price of milk or by expanding milk production into suitable new areas.

Yesseldijk (1994) reported that the starting point of making investments is a sound economic philosophy through the dairy herd.

Veepro Holland (1995) mentioned that, thorough comparison between dairy farms must be done on the basis of total amount of fat and protein produced in 305 days. That will improve efficiency of production at all times, that is certain.

2- Genetic improvement with efficient selection:

El-Barbary (1987) suggested raising of economic and productive efficiency of farm animals via genetic improvement through breeding and improvement of either native or imported cattle, continuous selection of cattle, obtaining bulls of high productive traits and distribution of this cattle in different farms, grading of dairy cattle and using artificial insemination (AI). Also, improving veterinary management and hygiene.

Dargatz and Miller (1992) reported that profit could be increased by 3% via improving bull to cow ratio from 1:25 to 1:40.

Dejonj (1994), Dommerholt (1994), Veepro Magazine (1994) stated that, improvement structure, efficiency and reliability of progeny-testing scheme and intensive use of top sires are major bases of high genetic progress and raising economic and productive efficiency of dairy farms.

3- Efficient data collection with efficient statistical analysis:

Howe and Mcinerney (1987) reported that for increasing economic and productive efficiency of dairy farms wide data bank limited to infectious diseases that are seen as community problems must be created.

Galligan and Marsh (1988), Mcinerny (1988), Weaver et al., (1988), Dahl et al., (1991 a and b) indicated that good data collection and analysis of livestock diseases and production improve financial returns and profit, so that increased economic, productive and reproductive efficiency of dairy herd may be achieved.

4- Efficient Budgeting design and usage:

Esslemont (1974), Eck and Prins (1990) on suckler cattle farming, Hoblet and Miller (1991) on partial budgeting techniques and Gemposow et al., (1992) on capital budgeting indicated that using budgeting techniques to determine economic outcome of disease reduction and control program will improve profitability, reproductive, productive and economic efficiency of livestock production systems.

5- Efficient computer usage:

Morris and meek (1980), ATB (1984), Bohlje and Eidman (1984), Braun (1986), Kirk (1986), Elmore (1987), Esslemont (1988), Nix (1988), Stein (1989), Batchelor (1990), Murray prior and Lesser (1990) and Timmons (1990) mentioned that computer use in data handling and analysis is considered as important management tool and reproductive control can be identified early so optimum farm income can be realized.

Raman and Jain (1992) mentioned that feed constituted the most important cost item in animal ration. Linear programming computer program model presented simultaneously selects concentrate and roughage components of ration, roughage concentrate ratio, level of feeding per cow, record quantity of milk production and maximizing income above feed costs.

6- Establishment of Efficient New Technology:

Introducing new technology in dairy farms will improve and increase economic and productive efficiency of dairy herd according to the results demonstrated by Kelly and Fingleton (1983), Rudovsky (1987), Poole (1988), Core (1991), Young et al., (1990), Doyle et al., (1991), Repka (1991) and preston and Zapata (1993).

7- Efficient housing type with efficient management:

Les Tropeaux de VHP ala Loupe (1990) reported that for increasing yield of dairy herds, well ventilated clean housing with adequate supply of bedding, permanent drinking water supplies, permanent access to feeds and adequate manure disposal facilities were recommened.

Kania (1992) demonstrated that, to obtain effective house for cattle, the main elements of costs were materials and labour, with greatest outlay on dairy units and the least on buildings and housing. For both dairy and beef cattle investment credit was the main source of finance. The best economic results were achieved from mixed units, followed by specialized dairy herd and lastly by specialized beef units.

8- Efficient records with efficient records keeping:

ATB (1984) indicated that a coordinated herd health program that involves herdsman, owner, veterinarian and other advisors and depends crucially on keeping adequate records will increase economic and productive efficiency of the dairy farm.

Guilhermino and Esslemont (1993) demonstrated that using information and reducing systems on dairy farms will increase profit and productive efficiency.

9- Efficient Labour usage:

Nikitin (1985) reported that, economic effectiveness of veterinary activities can be assessed in terms of losses prevention, value of enhanced productivity, costs of material resources and labour.

Khedre and Mahiplal (1992) reported that, women play an important role in mixed and dairy farming. Important securing cooperation of farm women and educating them in the use of modern dairy technologies will increase economic and productive efficiency of dairy farms.

Widodo et al., (1994 a and b) suggest that more attention must be paid to actual labour and improvement of dairy output:cost ratio.

10- Efficient Management:

Gerrits et al., (1979) and Braun (1986) reported that inefficiency was one of the most costly problems that must be overcome to improve efficient livestock production. Reproductive performance of animals is influenced by genetics, management, nutrition, disease and environmental factors as temperature and humidity.

Camm (1980) indicated that preventive measures are becoming more significant in disease control. The cost of veterinary services and management has now reached up to £ 15 million a year.

Dunn (1980) reported that any improvement in management and biological efficiency of animal production, once applied to all farms, must result in increased output. While Quinn (1980) mentioned that the requirements for successful dairy farming and management were good source of capital, stable market, correct operation size, correct soil type, water, land, high producing cows, good expenses control, proper feeding practices, efficient labour usage and careful farm management.

Braun (1986) reported that calves born dead and those that have died 24 hours after birth give a good indication about calving area management. The goal of decreasing calf mortality were for cows <6% and for heifers 8%.

Howe (1988) suggested that expenditures in veterinary services, medicines and management were very small elements of farm financial costs and offer high returns to the farmers.

Osteras and Lund (1988), Tzpori (1988), Eck and Prins (1990), Vashist and Sharma (1991), Abbot and Makeham (1992), Dean (1992) and Tamazali (1995) argued that the farm management advice would be more effective in helping dairy farmers to increase production if most valuable and easily measured physical and production characteristics on dairy farms (area, milk production, stock numbers, soil characteristics.. etc) were more clearly identified, defined and standardized. While Phanibhushan (1990) stated that, to manage dairy units successfully, the dairy manager has to perform at least 9 major activities, staffing, organization, personnel development, planning of work flow and planning for development, communication, maintenance of performance standards and quality control, training of staff with view to personnel development, acting as a friend and advisor to employees in the unit and finally maintenance of confidentiality.

Howard et al., (1991) estimated that mastitis control practices economically beneficial, and commonly dependent upon dry cow treatment and management. But Sanagiorgi and Provolo (1994) reported that increasing economic and productive efficiency of dairy farms the cowshed layout highly dependent on feed management.

MATERIALS AND METHODS

This study was carried out during Summer of 1994 to Winter of 1997 on random samples of farmers, private and governmental. Five governorates of different localities were the areas of research "Kafr-El-Shaikh, El-Behiara, Alexandria, El-Garbia and El-Monofia".

Production and economic data were collected from farmer's records and dairy farms according to Smith and Schmidit (1987), Joosten et al., (1988), Gathura and Gathuma (1991), Moore (1991), Zehnder et al., (1991), Esslemont (1992), Stott and Eker (1993) and Yadav et al., (1994).

To study different variables affecting economic and productive efficiency of veterinary management in different farms, the questionary method was used to collect the data as well from the farmers and farms of no records according to Berdlie (1974), Goodger et al., (1979), Perry et al., (1987), Smith and Schmidt (1987), Kaneene and Hurd (1990), Sammi and Haugh-Jones (1990), Weighler et al., (1990), Salman et al., (1991 a and b), Scholl et al., (1994), Shah and Sharma (1994) and Singh and Singh (1994).

Collection of the data was also done by personnel interview according to El-Meniawy (1980), Soliman (1985), Kaneene and Hurd (1990), Sammi and Hough-Jones (1990), Savara (1990), Weighler et al., (1990), Salman et al., (1991 a and b) and Shah and Sharma (1994).

The researcher was in intimate contact with farmers, managers of agricultural units, heads of village veterinary units and managers of dairy farms from which data were collected (Raskoph and Brinkley, 1971 and Lance, 1974).

Seasons were classified on the basis of atmospheric temperature, humidity and rainfall into two season. Summer extended from (21 march to 20 September) and Winter extended from (21 September to 20 March) over period of 12 years (1985-1996), according to Jabbar (1990), Yadav et al., (1994) and El-Maghraby (1995).

The farmers were visited two times, once in Summer and the other in Winter (Shah and Sharma 1994).

The sample size to study different variables affecting economic and productive efficiency of dairy farms was about 3874 records. The distribution of these records in the seasons of Winter and Summer within the years, localities, breeds and the sectors were represented in Tables (1, 2, 3, and 4).

Table (1) Number of dairy records in Winter and Summer seasons within the different years (1985-1996) as well as number of farmers, cows with records and farms included in the study.

Category / Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Winter	203	215	181	180	141	138	130	99	90	111	349	100
Summer	203	215	181	180	141	138	130	99	90	111	349	100
Farmers (1-6 cows)	-	-	-	-	-	-	-	-	-	43	281	82
Cows with records	199	211	177	176	137	120	112	81	72	50	50	-
Farms	4	4	4	4	4	18	18	18	18	18	18	18

Table (2) Number of dairy records in Winter and Summer seasons within the different localities as well as number of farmers, cows with records and farms included in the study.

Category / Locality	Kafr-El-Sheikh	El-Behaira	El-Monofia	Alexandria	El-Garbia
Winter	964	66	9	4	894
Summer	964	66	9	4	894
Farmers (1-6 cows)	350	62	-	-	-
Cows with records	605	-	-	-	882
Farms	9 (each of 50 heads)	4 (each of 200 heads)	3 (each of 600 heads) for 3 years	1 (200 heads) for 4 years	1 (650 heads) for 12 years

Table (3) Number of dairy records in Winter and Summer seasons within the different cattle breeds and buffalo as well as number of farmers, cows with records and farms included in the study.

Category / Breed	Balady	Friesian	Charolais X Freisian	Balady X Friesian	Buffalo	Charolais	Holstein Friesian
Winter	229	1502	4	86	94	19	3
Summer	229	1502	4	86	94	19	3
Farmers (1-6 cows)	217	1488	-	86	84	-	-
Cows with records	-	-	-	-	10	19	-
Farms	2 (each of 50 heads) for 12 years	14	1 (250 heads) for 4 years	-	-	-	1 (600 heads) for 3 years

Table (4) Number of dairy records in Winter and Summer seasons within the different sectors as well as number of farmers, cows with records and farms included in the study.

Category / Sector	Farmers	Private	Governmental
Winter	456	1465	16
Summer	456	1465	16
Farmers (1-6 cows)	456	-	-
Cows with records	-	1451	-
Farms	-	14	4 (each of 200 cows) for 4 years

We put in our consideration to collect a large number of records from available dairy farms to generate more accurate results to study the locality effect, production system, sector, season and year effect on variables affecting economic and productive efficiency of dairy herd according to Mukhebi et al., (1992). Also, data and sample size were one of the most important parameters to obtain a precise estimate of health and production of dairy cattle (Akhtar et al., 1988).

Data collection period extended from 1994 to 1997 for personnel interview. While for the records time series data were considered to study different variables affecting economic and productive efficiency of dairy herd (Hardwick et al., 1990; Hird et al., 1991 and Beck et al., 1992).

Variables affecting economic and productive efficiency of the dairy herd differed from one region to another (Empson, 1992). So that, the farms and farmers were classified according to farm size, region, sector, animal number and share of costs in gross return and cattle breed (Book keeping farms, 1989; Bublot et al., 1989; Hassinen and Puurunen, 1991; Grover et al., 1992; Khan, 1992 and Singh and Tyagi, 1992).

I. Information and Data collection:

Information about dairy production, diseases and mortality, reproductive performance, costs, returns and net income were collected to study different variables affecting economic and productive efficiency of dairy farms.

A- Information collected about dairy production:

Number of dairy cows, amount of nutrients (Berseem/Faddan), (B.hay, concentrates and Tibn)/Ton, causes of diseases and mortality number, measures of reproductive performance (calving interval, gestation period, dry period, services per conception and days open), and milking frequency were included.

B- Costs Information:

- Constituents of variable costs: Feed costs (berseem, B.hay, tibn, concentrates and total feed).
* Veterinary management (drugs, vaccines, disinfectants, veterinarian visits and total veterinary management) costs /LE.
* Other variable costs as (labour, litter and fuel)/LE

- Constituents of fixed costs: Animal, Building and equipments depreciations. The depreciation rate calculated on the basis of 25 years for buildings and on 5 years for equipments. While the depreciation of the dairy was calculated on about 20 years, according to the fixed line method or unidirectional method (Farah and El-Kak, 1985).

C- Variable factors of return:

Calf number, values of animal sale, growth differences, calves added to the herd value or sales and fecal matter sales), amount of milk (produced, consumed per calf and amount of milk sales and their value/LE) and price of each kilogram milk/LE.

Time factor also, considered in this study to study changes in dairy industry which happened over different periods of production. Long time series was considered extended from (1985-1996) according to Kettuen (1993) and Jain et al., (1994) that contain information about milk production resources, costs and returns at different periods.

To avoid inflation effect on the values of drugs, vaccines, disinfectants, veterinarian visits costs and total veterinary costs; cash value transformed into real ones or true values according to Hegazy (1983), Hoda (1989) and Hardwick et al., (1990). The following equation was used

$$\textbf{Real price} = \frac{\textbf{Cash price of certain year}}{\textbf{Index number of whole sale price of this year}} \times 100$$

Table (5) Index numbers of the whole sale prices from years of (1965-1996) year of 1965=100

Year	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Index number	100	107.4	110.2	112	114	115	119.1	121	128.8	147.2
Year	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Index number	158.3	170.7	186.6	214.1	234.6	285.2	308.9	337.7	391.7	430.9
Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Index number	487.8	572.1	650.2	885.9	1167.7	1302.5	1464.3	1637.9	1759.5	1865.8
Year	1995	1996								
Index number	1931.2	2096.7								

Source: Egyptian central bank journal uncollected numbers (1965-1996).

II. Statistical Analysis.

A. Data handling and computer programs:

Lotus 1-2-3, Data base, Word Star and M.Stat Computer programs were used for handling the data information (Goodger et al., 1989).

B. Data Analysis:

SPSS/PC+ (Noursis, 1984), SAS (1987), M.Stat (1984) and Harvard graphics were used for data analysis.

The analytical design was the Hierarchal one (El-Rawey and Khlafallah, 1980) to study the effect of the main variables [year, season, locality, breed, sector and the season within each of the main variables (year, locality, breed and the sector)] on the variables affecting economic and productive efficiency of dairy farms and their measures.

*** - Analysis of dairy production variables:**

The analysis was done for:

1- Studying the effect of the main variables on dairy production resources parameters that included, amount of nutrients (berseem/faddan), (B.hay, tibn, concentrates)/ton and total nutrients), Real and cash values of (drugs, vaccines, disinfectants, veterinarian visits and total veterinary management) costs.

* Total nutrients were calculated as (Starch equivalent percentage or Digestible protein percentage) according to the following equations, El-Meniawy , 1980 and Centeral System of package and Statistics ,1995):-

Starch equivalent % of the total feed =

Berseem amount X 0.09 + B.hay amount X 0.027 + Tibn amount X 0.23 + Concentrate amount X 0.76).

Digestible protein % of the total feed =

Berseem amount X 0.02+ B.hay amount X 0.006 + Tibn amount X 0.001 + Concentrate amount X 0.28).

2- Studying effect of main variables on costs parameters:-

*** Variable costs parameters:**

Costs of nutrients (berseem, B.hay, tibn, concentrates and total feed), Veterinary management costs (drugs, vaccines, disinfectants, veterinarian visits and total veterinary medicaments) and total variable costs value (LE).

*** Fixed costs parameters:**

"Animal, Building, equipment and dairying "Depreciation" value (LE).

3- Studying effect of main variables on returns parameters as:-

Calf numbers, animal sale value, calf added or sale value, growth differences value, fecal matter sale value, amount of milk (produced, consumed by calf till to weaning, sale)/Kg, returns of milk sale, price of kilogram milk in different periods.

4- Studying effect of main variables on net income parameters:-

Total returns, total costs and net income. All these parameters were calculated for each cow at their top of production to overcome variations in cows number in different dairy records.

5- The statistical models used were:

a- Analysis of variance was done to fulfil the following equation

$$Y = \mu + Y + S + L + B + SE + S(Y + L + B + SE)$$

Where:-

Y = An examined variable.

μ = Over all mean

Y_i = Random effect of the year on examined variable (year from 1985-1996).

S = Random effect of the season on examined variable (Seasons are Winter and Summer).

L = Random effect of the locality on examined variable (Locality are Kafr-El-Shaikh, El-Behaira, El-Monofia, Alexandria and El-Garbia).

B = Random effect of the breed on examined variable. (Breeds are Balady, Friesian, Charolais X Friesian, Balady X Friesian, Charolais and H.F) and buffalo species.

SE = Random effect of the Sector on examined variable. (Sector are Farmers, Private and Governmental) sectors.

S (Y + L + B + SE) = Effect of the season within the main variables (Year, Locality, Breed and the sectors) on examined variable.

Differences among the main variables (year, season, breed and the sector) were studied using Duncan's Multiple range test (DMRT).

Tests of Variance Homogeneity were done (Snedecor and Cochran, 1980) (Cochran C test, Bartlett's. Box F test and Hartely's test "Maximum variance/Minimum variance") to avoid multiple regression analysis problems as collinearity or multicollinearity or intercorrelation between the variables that may lead to unstable results (Tarabla and Dodd, 1990 and Stott and Eker, 1993).

III- Figures

The following figures were drawn to represent the effects of the years, localities, breeds, sectors and the seasons on :-

* Veterinary management patterns (Drugs, Vaccines, Disinfectants, Veterinarian visits costs and total veterinary management costs)(Figures 1, 2, 3, 4 and 5).

* Percentages of veterinary management patterns (Drugs, Vaccines, Disinfectants, Veterinarian visits costs and total veterinary management costs) to the variable and total costs (Figures 6, 7, 8, 9, 10, 11, 12, 13, 14 and 15).

* Costs of kilogram milk sale from veterinary management patterns (Drugs, Vaccines, Disinfectants, Veterinarian visits costs and total veterinary management) per piaster (Figures 16, 17, 18, 19 and 20).

IV. Correlation Matrix:

The correlation matrices were made among all different variables affecting economic and productive efficiency of the dairy farms (Production, Returns,Costs and Net profit) to determine the relationship between the variables, their intensity and their significance. Variables that had correlation coefficient, more than 0.8 were discarded from the production function to avoid the autocorrelations between these variables (El-Meniawy, 1980).

V. Economic Analysis:

A. Production and costs functions:

Multiple regression analysis was used, especially, Stepwise multiple regression to determine the best variables affecting economic and productive efficiency of dairy farms according to Ruff et al., (1983) and Moschini (1990), Tarabla and Dodd (1990), Morbeck et al., (1991), Kania and Szaro (1992) in the form of production and costs functions.

1- production functions:

The production functions were used to estimate relationships between milk production as dependent variable and production resources as independent variables. Two models of functions were used, Linear and Logarithmic models (Salvator, 1974; Doll and Orazem, 1978 and Sankhayan (1983).

Two trials of production functions were used:

The production function was made by stepwise of either backward, forward, Enter and the MAXR methods of (SAS, Spss/PC+) computer programs.

(a) The first trial of production functions aimed to:

Estimate the effect of production resources (Berseem, B.hay, Tibn, Concentrates, real value of (drug costs, Vaccine costs, Disinfectant costs, Veterinarian visits costs) and production performance parameters "Calving interval, Gestation period, Dry period, Days open, Age at first service, Services per conception and milking frequency) on milk yield for each cow.

(b) The second trial of production functions aimed to:

Estimate the effect of total nutrients (Starch equivalent and the digestible protein), total value of veterinary management and reproductive performance parameters (Calving interval, Gestation period, Dry period, Days open, Age at first service, Services per conception and milking numbers) on milk yield for each cow.

(c) Veterinary management production functions:

Were made by M.Stat, Spss/PC+ and SAS Computer programs in the Linear and logarithmic forms to determine the effect of drugs, vaccines, disinfectants, veterinarian visits and total veterinary management costs on milk production.

2- Costs functions:

Calculated using regression analysis in linear, logarithmic, half logarithmic, root, quadratic, qunitic and cubic pictures (Doll and Orazem ,1978 and Sankhayan, 1983) to determine the best type of these functions explaining the relationship between costs (variable or total) as dependent variable and milk production as independent one.

B- Statistical Measures:

The statistical measures used were t test (Salvatore, 1982) for independent variables treatments to determine the significance of each relationship between milk production as dependent variable and independent variables treatments as a whole; F. test value for determination the significant effects of the main variables (year, season, breed and the sector) on different factors affecting economic and productive efficiency of dairy farms. Also, multiple regressions (full model or stepwise model) were used to determine the significance of each step and each relationship.

Adjusted coefficient of determination (R^{-2}) was also calculated to determine the degree of each relationship and their intensity between dependent variable and independent variables (Wonnacott and Wonnacott, 1981).

- **Economic and productive efficiency measures:**

The fixed costs were calculated to include animal, buildings, equipment and dairying depreciations.

The variable costs constituents were calculated to include costs of nutrients (berseem, B.hay, tibn and concentrates), veterinary management costs (drugs, vaccines, disinfectants, veterinarian visits and total veterinary medicaments), (labour, fuel, litter and other) costs.

Returns parameters were calculated (calf number, calf added to the herd or sold, growth differences, fecal matter sale,amount of milk (produced, consumed and sale) and the milk returns.

Reproductive efficiency parameters were calculated as calving intervals, gestation period, days open, dry period, service per conception.

For measuring economic and productive efficiency of veterinary management in dairy farms the following efficiency measures were calculated for Winter and Summer seasons within the (years, localities, breeds and the sectors) over the period from 1985-1996.

According to Soliman (1985), El-Rafa (1986) and Atallah (1994) on poultry farms and Haan (1991) and Beck et al., (1992) on dairy farms the following efficiency measures were calculated for each cow.

1- Collective Efficiency measures (costs in LE):

1- Average milk production per kilogram.

2- Average total costs (average fixed costs + average variable costs)(LE).

3- Average total variable costs.

4- Returns from milk sale.
5- Percentage of variable costs to total costs.
6- Percentage of (Total returns/variable costs).
7- Total returns = Returns from (Milk sale + Culled cows + Litter and fecal matter sale + Other sales)(LE).
8- Benefit cost analysis (Total returns/Total costs).
9- Net income = Total returns - Total costs.
10- Percentage of net income to variable costs.
11- Percentage of net income to total costs.
12- Price of kilogram milk sale at certain period in certain year.
13- Costs of kilogram milk sale

$$= \frac{\textbf{Total costs}}{\textbf{Total number of kilogram milk marketed}}$$

14- Ratio of kilogram milk price to its costs

$$= \frac{\textbf{Price of kilogram milk}}{\textbf{Costs of kilogram milk marketed}}$$

15- The net income of kilogram milk sale

$$= \frac{\textbf{Total returns - Total costs}}{\textbf{Number of kilogram milk marketed}}$$

2- Veterinary management efficiency measures (costs in LE)

1- Average drug costs.
2- Average vaccine costs.
3- Average disinfectant costs.
4- Average veterinarian visits costs.
5- Average total veterinary management costs.
6- Drug costs / Total variable costs.
7- Vaccine costs / Total variable costs.
8- Disinfectant costs / Total variable costs.
9- Veterinarian visits costs / Total variable costs.
10- Total veterinary management costs / Total variable costs.

11- Drug costs / Total costs.

12- Vaccine costs / Total costs.

13- Disinfectant costs / Total costs.

14- Veterinarian visits costs / Total costs.

15- Total veterinary management costs / Total costs.

3-Costs of kilogram milk from veterinary management patterns (Drugs, vaccines, disinfectants, veterinarian visits costs and the total veterinary management costs.

1- Costs of each Kilogram milk marketed from drugs

$$= \frac{\textbf{Drug costs}}{\textbf{Total kilogram milk marketed}}$$

2- Costs of each Kilogram milk marketed from vaccines

$$= \frac{\textbf{Vaccine costs}}{\textbf{Total kilogram milk marketed}}$$

3- Costs of each Kilogram milk marketed from disinfectants

$$= \frac{\textbf{Disinfectants costs}}{\textbf{Total kilogram milk marketed}}$$

4- Costs of each Kilogram milk marketed from veterinarian visits costs

$$= \frac{\textbf{Veterinarian visits costs}}{\textbf{Total kilogram milk marketed}}$$

5- Costs of each Kilogram milk marketed from total veterinary managements costs

$$= \frac{\textbf{Total veterinary management costs}}{\textbf{Total kilogram milk marketed}}$$

RESULTS AND DISCUSSION

Feed quantity, quality and costs affected significantly dairy projects.

I- FEED CONSUMPTION.

I-1. Year and season effect (Tables 6 & 7).

Year and season of milk production showed significant ($P < 0.01$) effects on the feed consumption by dairy cows (Table 6). Average berseem consumed ranged from 1.98 to 5.68 Feddan/cow during Winter (Green season) throughout 1985 to 1996. At the same time the costs of berseem (Feddan) differed accordingly and ranged from 30.82 to 631.42 LE/cow/year (Table 7).

Average amount of Berseem hay (B. hay) differed significantly at ($P < 0.01$) according to the year and season. It ranged from 2.49 to 3.43 ton/cow in Summer seasons of 1994 and 1996 with total average of 2.75 Ton/cow. Their costs ranged from 178.03 to 1196.65 LE/cow in Summer seasons of 1985 and 1996. Table (7).

Differences in the amount of Berseem, B. hay as well as their costs are attributed to the policy of dairy farmers in Egypt. They fed berseem in Winter and B. hay in Summer and there was no berseem silage made in Egypt and the amount of B. hay fed to animals in Winter is very low or absent.The amount of tibn consumed ranged from 0.007 to 1.36 ton/cow in Winter seasons of 1986, 1987 and Summer season of 1995 as most of the farmers and dairymen increase the amount of tibn in their rations during Summer than Winter. Meanwhile, tibn costs ranged from 0.34 to 325.56 LE/cow for winter and Summer seasons of 1985 and 1996.

Concentrate amounts ranged from 0.21 to 2.86 ton/cow for Winter and Summer seasons of 1996 and 1988, while their costs was not affected significantly by the season. They ranged from 198.47 to 1254.64 LE/cow for Winter and Summer seasons of 1985 and 1993. Total feed costs ranged from 229.72 to 1978.26 LE/cow for Winter and Summer seasons of 1985 and 1993.

These results denoted that the years of 1985 to 1990 had the highest amount of feed consumption than the years of 1991 to 1996. This is due to the prices and costs of feed increased during recent years than earlier ones (Centeral System of Package and Statistics, 1995).

Table (6): Means$\pm$SE of different feed consumed per cow during different years and seasons of milk production.

Year	Season	* Number of Records	Feed consumption/cow			
			Berseem (Feddan)	B. hay (Ton)	Tibn (Ton)	Concentrate (Ton)
1985	Winter	203	5.68 ± 0.15^{A}	-	0.012 ± 0.0085^{D}	2.005 ± 0.04^{P}
1985	Summer	203	-	2.56 ± 0.068^{BC}	0.056 ± 0.010^{D}	2.286 ± 0.04^{M}
1986	Winter	215	5.72 ± 0.15^{A}	-	0.007 ± 0.0075^{D}	2.04 ± 0.041^{F}
1986	Summer	215	-	2.63 ± 0.070^{BC}	0.072 ± 0.011^{D}	2.63 ± 0.05^{E}
1987	Winter	181	5.54 ± 0.19^{A}	-	0.007 ± 0.007^{D}	2.50 ± 0.06^{H}
1987	Summer	181	-	2.62 ± 0.105^{BC}	0.129 ± 0.017^{D}	2.62 ± 0.05^{G}
1988	Winter	180	5.02 ± 0.22^{BC}	-	0.009 ± 0.0089^{D}	2.49 ± 0.07^{H}
1988	Summer	180	-	2.55 ± 0.09^{BC}	0.22 ± 0.0237^{D}	2.86 ± 0.08^{A}
1989	Winter	141	5.16 ± 0.27^{B}	-	0.012 ± 0.0012^{D}	2.38 ± 0.07^{H}
1989	Summer	141	-	2.53 ± 0.08^{C}	0.25 ± 0.02^{D}	2.71 ± 0.08^{D}
1990	Winter	138	4.88 ± 0.28^{C}	-	0.019 ± 0.011^{D}	2.55 ± 0.08^{G}
1990	Summer	138	-	2.79 ± 0.09^{BC}	0.317 ± 0.031^{D}	2.81 ± 0.08^{AB}
1991	Winter	130	4.89 ± 0.28^{C}	-	0.030 ± 0.014^{D}	2.49 ± 0.07^{G}
1991	Summer	130	-	2.81 ± 0.08^{BC}	0.355 ± 0.036^{D}	2.73 ± 0.70^{D}
1992	Winter	99	4.50 ± 0.33^{D}	-	0.022 ± 0.013^{D}	2.63 ± 0.11^{E}
1992	Summer	99	-	2.87 ± 0.08^{B}	0.401 ± 0.040^{D}	2.79 ± 0.13^{AB}
1993	Winter	90	3.61 ± 0.38^{E}	-	0.128 ± 0.027^{D}	2.21 ± 0.14^{N}
1993	Summer	90	-	2.82 ± 0.10^{BC}	0.596 ± 0.053^{D}	2.32 ± 0.14^{L}
1994	Winter	111	2.84 ± 0.23^{F}	-	0.62 ± 0.11^{D}	1.32 ± 0.12^{J}
1994	Summer	111	-	2.49 ± 0.11^{BC}	1.21 ± 0.17^{B}	1.41 ± 0.13^{Q}
1995	Winter	349	2.08 ± 0.07^{G}	-	0.912 ± 0.21^{C}	0.39 ± 0.03^{X}
1995	Summer	349	-	2.93 ± 0.07^{B}	1.36 ± 0.27^{A}	0.54 ± 0.06^{Y}
1996	Winter	100	1.98 ± 0.084^{G}	-	1.12 ± 0.089^{B}	0.21 ± 0.048^{Y}
1996	Summer	100	-	3.43 ± 0.113^{A}	1.34 ± 0.064^{A}	0.55 ± 0.060^{S}
Total Mean	Winter	1937	4.325 ± 0.2195	-	0.24 ± 0.042	1.93 ± 0.073
	Summer	1937	-	2.75 ± 0.088	0.52 ± 0.062	2.188 ± 0.13

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

* See Table (1).

Table (7): Mean±SE of the costs of different rations consumed per cow (LE).

Year	Season	No of Rec	Feed cost (LE)				
			Berseem	B. Hay	Tibn	Concentrate	Total feed
1985	Winter	203	30.82 ± 2.09^{H}	-	0.34 ± 0.02^{I}	198.47 ± 12.43^{I}	229.72 ± 12.22^{N}
1985	Summer	203	-	178.03 ± 5.14^{H}	2.68 ± 0.50^{Z}	235.99 ± 12.7^{HI}	416 ± 14.41^{KL}
1986	Winter	215	40.36 ± 10.62^{HG}	-	0.42 ± 0.042^{I}	208.8 ± 7.75^{I}	249.59 ± 7.52^{N}
1986	Summer	215	-	197.32 ± 5.58^{H}	4.00 ± 0.84^{Y}	255.46 ± 6.78^{HI}	456 ± 10.5^{K}
1987	Winter	181	49.40 ± 3.48^{HG}	-	0.39 ± 0.039^{I}	238 ± 5.59^{HI}	288.70 ± 3.40^{MN}
1987	Summer	181	-	198.65 ± 8.05^{H}	6.39 ± 0.89^{Y}	253 ± 5.33^{HI}	458.46 ± 12.23^{K}
1988	Winter	180	72.28 ± 5.33^{FG}	-	0.54 ± 0.53^{S}	265.69 ± 7.29^{HI}	338.52 ± 5.75^{LMN}
1988	Summer	180	-	270 ± 18.18^{G}	13.86 ± 1.47^{Q}	313.12 ± 8.77^{GH}	597.03 ± 22.7^{IJ}
1989	Winter	141	98.28 ± 6.28^{EF}	-	0.82 ± 0.082^{S}	281.72 ± 8.4^{HI}	380.84 ± 3.8^{KLM}
1989	Summer	141	-	316 ± 11.90^{GF}	17.30 ± 1.93^{P}	326.70 ± 9.3^{GH}	660.21 ± 18.51^{I}
1990	Winter	138	100.43 ± 5.89^{EF}	-	1.15 ± 0.81^{N}	390.74 ± 13.7^{FG}	492.33 ± 8.58^{JK}
1990	Summer	138	-	365.64 ± 12.79^{F}	25.07 ± 2.52^{Q}	427.99 ± 12.23^{F}	818.70 ± 21.48^{H}
1991	Winter	130	128.98 ± 0.71^{E}	-	2.06 ± 1.30^{N}	768.78 ± 23.9^{E}	904.41 ± 18.4^{G}
1991	Summer	130	-	427.84 ± 13.02^{E}	40.29 ± 4.03^{M}	832.86 ± 23.7^{DE}	1301 ± 30.4^{DE}
1992	Winter	99	171.77 ± 11.1^{D}	-	3.48 ± 1.82^{N}	1020.97 ± 42^{C}	1196.2 ± 32.4^{EF}
1992	Summer	99	-	517.49 ± 14.49^{D}	50.58 ± 5.46^{L}	1101.8 ± 41.9^{BC}	1669.9 ± 47.43^{B}
1993	Winter	90	198.52 ± 14.11^{D}	-	19.42 ± 4.14^{P}	1173.6 ± 79.3^{AB}	1391.6 ± 72.6^{D}
1993	Summer	90	-	623.40 ± 24.99^{C}	88.08 ± 8.14^{G}	1254.64 ± 79.8^{A}	1978.02 ± 92.9^{A}
1994	Winter	111	487.7 ± 27.79^{C}	-	110.97 ± 20^{F}	781.83 ± 72.8^{DC}	1382.44 ± 60.6^{D}
1994	Summer	111	-	655.17 ± 29.5^{C}	228.46 ± 0.17^{C}	861.38 ± 78.7^{D}	1745.01 ± 95.7^{B}
1995	Winter	349	551.66 ± 14.48^{B}	-	194.30 ± 10.8^{E}	276.75 ± 27.5^{HI}	1022.72 ± 29.3^{G}
1995	Summer	349	-	895.57 ± 27.7^{B}	269.23 ± 10.39^{B}	375.3 ± 49.36^{FG}	1540.09 ± 55.8^{C}
1996	Winter	100	631.42 ± 25.1^{A}	-	255.75 ± 21.3^{C}	272.29 ± 34.9^{HI}	1159.5 ± 45.71^{F}
1996	Summer	100	-	1196.65 ± 38.46^{A}	325.56 ± 14.23^{A}	436.04 ± 40.26^{F}	1958.26 ± 54.1^{A}
Total Mean	Winter	1937	213.46 ± 10.58	-	49.13 ± 5.07	489.75 ± 27.79	753.04 ± 25.02
Total Mean	Summer	1937	-	486.81 ± 17.48	70.35 ± 4.21	556.18 ± 30.73	1133.23 ± 39.68

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$)

I.2. Locality and season effect:(Tables 8 and 9).

Locality and season had significant effects (P< 0.01) on feed consumption patterns and their costs. (Berseem, B. hay, Tibn, concentrate and total feed). The amount of berseem consumed ranged from 0.204 Feddan/cow to 7.370 Feddan/cow for Winter seasons in El-Monofia and El-Garbia. Their berseem costs ranged from 33.38 to 417.64 LE/cow for Winter seasons of El-Garbia and Behaira.

The amount of B. hay consumed ranged from 1.44 to 3.35 ton/cow in Summer season of Alexandria and El-Garbia. Their costs ranged from 374.41 to 985.99 LE/cow/in Summer seasons of El-Garbia and Behaira.

Tibn consumed ranged from 0.22 to 1.34 ton/cow for Winter and Summer seasons of Alexandria and Behaira. Their costs ranged from 37.21 to 267.84 LE/cow for Winter and Summer seasons of El-Monofia and Behaira.

The amount of concentrate ranged from 0.44 to 3.25 ton/cow in Winter and Summer seasons of Behaira and El-Garbia. But their costs ranged from 293.35 to 1041.06 LE/cow in Winter and Summer seasons of Kafr-El-Shaikh and Alexandria provinces.

The total feed costs ranged from 562.13 to 1681.98 LE/cow/ in Winter and Summer seasons of El-Garbia and Behaira.

I-3. Breed and season effects:

Tables (10 & 11) showed significant effects (P< 0.01) of breed and season on the amount of feed consumed and their costs.

The amount of berseem consumed ranged from 0.34 to 2.37 Feddan in Winter Seasons of Holstein Friesian (H.F) and Buffalo. Berseem costs ranged from 88.6 to 718 LE/cow in Winter seasons for H.F cows and Buffaloes.

Amount of B. hay consumed ranged from 0.153 to 2.71 ton/cow in Summer seasons of H.F and Balady. Their costs ranged from 39.53 to 1219.85 LE/cow in Summer seasons for H.F cow and Buffaloes.

The amount of tibn consumed ranged from 0.08 to 1.7 ton/cow in Summer seasons for Friesian and their crosses with Balady. There was no significant effects ($P > 0.05$) of seasons on the amount of tibn consumed as well as on the tibn costs. Tibn costs ranged from 8.61 to 395.48 LE/cow in Summer seasons of H.F and their crosses with Balady.

The amount of concentrates differed significantly ($P < 0.05$) among seasons. They ranged from 0.18 to 2.55 ton/cow of cross (Friesian X Balady) and Friesian in Winter and Summer seasons. Their costs ranged from 135.12 to 1438.13 LE/cow in Winter season for the cross (Friesian X Balady) and H.F.

Total feed costs differed significantly according to the season ($P < 0.05$) The total feed costs ranged from 477.79 to 1843.03 LE/cow in Winter and Summer seasons of Charolais and Buffaloes.

Table (8): Means ± SE of the amounts of the ration consumed at different localities and seasons per cow .

Locality	Season	* Number of Records	Feed consumed/cow Berseem (Feddan)	B. Hay (Ton)	Tibn (Ton)	Concentrate ((Ton)
Behaira	Winter	66	1.39 ± 0.13^{B}	-	1.03 ± 0.132^{AB}	0.44 ± 0.065^{C}
	Summer	66	-	2.90 ± 0.22^{AB}	1.34 ± 0.097^{A}	0.65 ± 0.078^{BC}
Alexandria	Winter	4	0.23 ± 0.12^{C}	-	0.22 ± 0.02^{E}	1.14 ± 0.235^{C}
	Summer	4	-	1.44 ± 0.137^{C}	0.46 ± 0.15^{D}	1.51 ± 0.241^{C}
Kafr El-Shaikh	Winter	964	1.71 ± 0.02^{B}	-	0.47 ± 0.02^{C}	0.93 ± 0.024^{C}
	Summer	964	-	2.17 ± 0.041^{ABC}	0.99 ± 0.03^{B}	1.10 ± 0.027^{C}
El-Garbia	Winter	894	7.372 ± 0.034^{A}	-	-	2.88 ± 0.024^{AC}
	Summer	894	-	3.35 ± 0.018^{A}	-	3.25 ± 0.27^{A}
El-Monofia	Winter	9	0.204 ± 0.35^{C}	-	0.183 ± 0.09^{F}	1.50 ± 0.29^{C}
	Summer	9	-	1.90 ± 0.52^{BC}	0.464 ± 0.04^{C}	1.49 ± 0.23^{C}
Total Mean	Winter	1937	2.18±0.13	-	0.38±0.052	1.37±0.127
	Summer	1937	-	2.35±0.187	0.65±0.063	1.60±0.169

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).
* See Table (2).

Table (9): Means ± SE of the ration costs at different localities and seasons (LE/cow).

locality	Season	No of Rec	Feed costs/LE/cow Berseem	B.Hay	Tibn	Concentrate	Total feed
Behaira	Winter	66	417.64 ± 39.6^{A}	-	217.23 ± 29.8^{B}	317.68 ± 41.34^{EF}	952.6 ± 66.92^{CD}
	Summer	66	-	985.99 ± 116.3^{A}	67.84 ± 21.43^{A}	420.11 ± 50.58^{E}	1682 ± 131.58^{B}
Alexandria	Winter	4	82.91 ± 17.98^{B}	-	52.53 ± 0.52^{EF}	800.62 ± 286.38^{C}	906.06 ± 300^{D}
	Summer	4	-	388.95 ± 54.08^{B}	94.33 ± 39.84^{D}	1041.06 ± 257.1^{A}	1524.3 ± 278.3^{B}
Kafr El-shaikh	Winter	964	381.76 ± 8.82^{A}	-	97.29 ± 5.58^{D}	293.35 ± 10.75^{F}	772.7 ± 15.94^{E}
	Summer	964	-	538.99 ± 14.54^{B}	$168\ \pm6.59^{C}$	344.76 ± 12.23^{EF}	$1052\ \pm22.26^{C}$
El-Garbia	Winter	894	33.38 ± 1.76^{B}	-	-	528.05 ± 18.54^{D}	562.13±19.35F
	Summer	894	-	374.41 ± 7.40^{B}	-	601.38 ± 24.11^{D}	975.81 ± 0.27^{A}
Total Mean	Winter	1937	194.22±15.53	-	80.85±10.92	580.35±105.29	849.63±116.74
	Summer	1937	-	566.47±70.72	83.60±17.89	663.57±104.94	1355.32±134.3

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (10): Means ± SE of the ration consumed (per cow) by different breeds and during different seasons.

Breed	Season	* No of Rec	Feed consumed/cow			
			Berseem (Feddan)	B.Hay (Ton)	Tibn (Ton)	Concentrate (Ton)
Balady Balady	Winter Summer	229 229	1.55 ± 0.048^{AB} -	- 2.71 ± 0.093^{A}	0.83 ± 0.054^{B} 1.28 ± 0.07^{A}	0.29 ± 0.03^{B} 0.39 ± 0.037^{B}
Friesian Friesian	Winter Summer	1502 1502	5.02 ± 0.07^{AB} -	- 2.71 ± 0.028^{AB}	0.081 ± 0.009^{B} 0.301 ± 0.012^{B}	2.25 ± 0.026^{A} 2.55 ± 0.029^{A}
CharXFr CharXFr	Winter Summer	4 4	0.70 ± 0.595^{BC} -	- 1.87 ± 0.18^{BC}	0.45 ± 0.04^{B} 1.00 ± 0.27^{A}	0.41 ± 0.155^{B} 0.57 ± 0.0038^{B}
BalXFr BalXFr	Winter Summer	86 86	2.87 ± 0.079^{AB} -	- 2.67 ± 0.14^{AB}	1.09 ± 0.14^{A} 1.70 ± 0.21^{A}	0.18 ± 0.324^{B} 0.25 ± 0.053^{B}
Charolais Charolais	Winter Summer	19 19	1.43 ± 0.043^{DC} -	- 1.27 ± 0.15^{DC}	- 0.51 ± 0.050^{B}	1.49 ± 0.057^{A} 1.79 ± 0.050^{A}
H.F H.F	Winter Summer	3 3	0.34 ± 0.011^{D} -	- 0.153 ± 0.012^{D}	- -	2.38 ± 0.404^{A} 2.14 ± 0.078^{A}
Buffalo Buffalo	Winter Summer	94 94	2.37 ± 0.09^{A} -	- 3.83 ± 0.13^{A}	1.26 ± 0.08^{A} 1.55 ± 0.074^{A}	0.27 ± 0.031^{A} 0.44 ± 0.047^{B}
Total Mean	Winter Summer	1937 1937	2.04 ± 0.13 -	- 2.17 ± 0.104	0.53 ± 0.045 0.90 ± 0.098	1.03 ± 0.14 1.16 ± 0.04

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).

CharXFr (Charolais X Friesian)
Bal XFr (Balady X Friesian)
H.F (Holstein Friesian)
* See Table (3).

Table (11): Means ±SE of the ration costs by different breeds and seasons(LE/cow)

Breed	Season	Rec No	Feed/costs (LE/cow)				
			Berseem	B.Hay	Tibn	Concentrate	Total feed
Balady	Winter	229	428.1±16.26^{B}	-	165.25±12.4^{E}	155.4±14.35^{HI}	749.9±27.30^{F}
Balady	Summer	229	-	787.7±37.7^{B}	236.92±12.6^{C}	205.6±17^{FGHI}	1229.14±47.2^{D}
Friesian	Winter	1502	135.93±5.03^{C}	-	17.22±2.15^{HI}	470.27±12.76^{C}	623.84±14.30^{G}
Friesian	Summer	1502	-	370.22±7.25^{C}	42.62±2.42^{GH}	538.30±16.02^{C}	951.50±21.11^{E}
CharXFr	Winter	4	208.9±18.39^{C}	-	90±9.0^{F}	261±107.8^{DEFG}	559.7±195^{GH}
CharXFr	Summer	4	-	514±82.09^{BC}	189.28±6.5^{DE}	233.6±63^{EFGHI}	937.48±114.8^{B}
BalXFr	Winter	86	603.54±23.7^{B}	-	218.5±28.19^{CD}	135.12±24.1^{I}	957.17±48.83^{E}
BalXFr	Summer	86	-	802.23±44.55^{B}	345.48±44.19^{A}	179.6±37.6^{GHI}	1327.3±76.8^{CD}
Charolais	Winter	19	168.84±22^{C}	-	-	308.94±75.5^{DE}	477.8±70^{H}
Charolais	Summer	19	-	177.78±42.40^{E}	57.61±16.05^{FG}	356.41±81.5^{D}	592 ±137^{GH}
H.F	Winter	3	88.6±51.15^{C}	-	-	438.2±151.5^{A}	1526.7±143.3^{B}
H.F	Summer	3	-	39.53±6.36^{E}	8.61±1.21^{HI}	1330.6±142.4^{B}	1378.8±150^{C}
Buffalo	Winter	94	718.53±30.6^{A}	-	274.04±17.83^{B}	244.2±21^{EFGH}	1236.73±46.4^{D}
Buffalo	Summer	94	-	1219.85±47.3^{A}	328.92±16.08^{A}	294.3±30.3^{DEF}	1843.03±69.3^{A}
Total Mean	Winter	1937	336.06±23.87	-	109.28±9.93	287.59±58.14	875.97 ±77
	Summer	1937	-	558.72±38.23	172.77±14.15	448.34±55.40	1179.89±88.03

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

I-4. Effect of production sector:

Significant effects ($P < 0.01$) of production sector and season were found, on the amount of feed consumed and their costs. The amount of berseem consumed ranged from 0.62 to 5.07 Feddan/cow/ in Winter seasons of governmental and private sectors and their costs ranged from 106.99 to 584.21 LE/cow in Winter seasons for private and farmer sectors.

Berseem consumption was the main problem facing small farmers in their livestock production; as the shortage of green fodders hindered the economic and productive efficiency of small farmers (Jahangir et al., 1990).

Sector and season had no significant effects on B. hay consumption and their costs. B. hay consumption ranged from 2.68 to 2.94 ton/cow in Summer for private and farmer sectors and their costs ranged from 335.59 to 923.48 LE/cow.

Amounts of tibn consumed ranged from 0.02 to 1.48 ton/cow in Winter and Summer seasons for private and farmer sectors. Their costs ranged from 4.42 to 315.70 LE/cow in Winter seasons for private and governmental sectors.

The amount of concentrates consumed ranged from 0.18 to 2.65 ton/cow in Winter and Summer seasons for the farmers and private sector. Meanwhile, their costs ranged from 153.84 to 832.47 LE/cow in Winter and Summer seasons for private and governmental sector.

Total feed costs ranged from 593.52 to 1933.31 LE/cow in Winter and Summer seasons for private and governmental sectors. Meanwhile, for farmer sectors their costs were 951.67 and 1428.30 LE/cow in Winter and Summer seasons.

It was concluded that, the feed cost was the main item of the costs for the farmers, private and governmental sectors. These results agreed with the results of, Kelly and Fingleton (1983). These results are in consistant with those obtained by Hoglund (1969). Moreover, pointed out that most of feed of dairy cattle was the forage feeding in which the milk produced was higher than concentrate (Taylor, 1991). Also good quality forage was the basis of economic milk production as a limited concentrate consumption (Veepro Holland, 1996).

From these results it could be concluded that the total feed costs constituted the higher resource costs value and these results in line with those of Kelly and Fingleton (1983), Williamson (1986), Keller and Allaire (1990).

Table (12): Means$\pm$SE of the amounts of ration consumed Per cow for different sectors and seasons.

Sector	Season	* Rec No	Feed consumed			
			Berseem (Feddan)	B. Hay (Ton)	Tibn (Ton)	Concentrate (Ton)
Farmers	Winter	456	1.96 ± 0.04^{B}	-	1.02 ± 0.04^{D}	0.18 ± 0.012^{D}
Farmers	Summer	456	-	2.94 ± 0.06^{A}	1.48 ± 0.05^{A}	0.29 ± 0.019^{C}
Private	Winter	1465	5.07 ± 0.078^{A}	-	0.02 ± 0.004^{E}	2.33 ± 0.024^{A}
Private	Summer	1465	-	2.68 ± 0.029^{A}	0.24 ± 0.0096^{F}	2.65 ± 0.3^{A}
Govrnem	Winter	16	0.62 ± 0.182^{C}	-	1.44 ± 0.49^{B}	1.05 ± 0.125^{B}
Govrnem	Summer	16	-	2.78 ± 0.38^{A}	1.34 ± 0.30^{C}	1.23 ± 0.145^{B}
Total	Winter	1937	2.55 ± 0.09	-	0.82 ± 0.178	1.18 ± 0.053
Mean	Summer	1937	-	2.8 ± 0.15	1.02 ± 0.11	1.39 ± 0.154

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).
* See Table (4).

Table (13) Means $\pm$ SE of the ration costs for different sectors and seasons(LE/cow).

Sector	Season	Rec No	Feed costs (LE/cow)				
			Berseem	B.Hay	Tibn	Concentrate	Total feed
Farmers	Winter	456	584.21 ± 12.9^{A}	-	213.02 ± 9.5^{D}	154 ± 9^{F}	951.67 ± 20^{D}
Farmers	Summer	456	-	923.48 ± 24.34^{A}	300.41 ± 10.79^{A}	203.23 ± 12.43^{E}	1428.30 ± 32^{B}
Private	Winter	1465	107 ± 3.5^{C}	-	4.42 ± 0.82^{F}	481.7 ± 13.02^{D}	593.52 ± 14.35^{E}
Private	Summer	1465	-	336 ± 6.2^{C}	26.93 ± 1.37^{E}	548.85 ± 16.32^{C}	911.40 ± 21.33^{D}
Govrnem	Winter	16	188 ± 86^{B}	-	315.7 ± 108.5^{A}	742.24 ± 77.26^{B}	1245.5 ± 41.44^{C}
Govrnem	Summer	16	-	818 ± 121.82^{B}	282.96 ± 67.01^{C}	832.47 ± 123.7^{A}	1933.3 ± 26.22^{A}
Total	Winter	1937	293.07 ± 34.13	-	177.71 ± 39.60	459.31 ± 33.09	930.23 ± 25.26
Mean	Summer	1937	-	692.49 ± 50.78	203.43 ± 26.39	498.10 ± 50.81	1424.3 ± 26.51

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).
* Governem (Governmental sector).

II- VETERINARY MANAGEMENT:

II-1. Year and season effects:

II-1.a. Drug consumption:

Table (14, 15 and Fig 1) revealed significant effects of the year and season (P<0.01) on the real and cash values of the drugs. Real value of drugs ranged from 1.47 to 6.02 in Summer and Winter seasons of 1995 and 1987. Meanwhile, their cash value ranged from 24.70 to 65.58 LE/cow in Summer and Winter seasons of 1985 and 1994. The higher drug value in Winter seasons was due to its effectiveness in Winter seasons as it increased milk yields in the presence of high level of grasses. These results are in agreement with the results obtained by Lossouarn (1991).

II-1.b. Vaccine consumption:

The year had a highly significant effect on either the real and cash value of vaccine. On the other hand, the effect of season on vaccine real value was not significant but it had a highly significant effect on vaccine cash value. The real value of vaccine ranged from 0.50, 0.50 to 0.69, 0.69 for Winter seasons (1991, 1995 and 1987) and Summer (1987). Moreover, the vaccine cash value ranged from 3.83 to 11.67 LE/cow in Summer, Winter and Summer seasons of 1985, 1996 and 1996, respectively.

II-1.c. Disinfectant consumption.

Years and season had significant (P< 0.01) effects on disinfectant consumption. Their real value ranged from 0.29 to 0.81 for Winter and Summer seasons of 1995 and 1987. Disinfectant cash value ranged from 2.03 to 7.90 LE/cow in Winter and Summer seasons of 1985 and 1994. These results lower than those of Beck et al., (1992), who indicated that the costs of disinfectant per cow was about £ 8.6/cow/year.

II-1.d. Veterinarian visits costs.

Significant (P< 0.01) differences were found between the years for veterinarian visits costs. On contrary, effects of the seasons within the years on the costs of veterinarian visits were not significant.

Real values of veterinarian visits ranged from 0.55 to 2.27, 2.28 in Winter and Summer seasons of 1996 and 1987. Meanwhile, their cash value from 9.94, 9.98 to 23.42, 23.42 LE/cow in Winter and Summer seasons of 1985 and 1992; respectively. These results are in agreement with those obtained by Beck et al., (1992).

II-1.e. Effect of year and season on total veterinary management:

Total veterinary management differed significantly ($P < 0.01$) from year to year and from season to season. Real value of total veterinary management costs ranged from 3.05, 3.11 to 9.78, 9.31 in Summer, Winter, Winter and Summer seasons of 1995, 1996, 1987 and 1987; respectively. Meanwhile, the cash value of total veterinary management costs ranged from 44.16, 41.72 to 102.43 LE/cow/ in Winter, Summer and Winter seasons of 1985, 1985 and 1994; respectively. These results were higher than the results of Hird et al., (1991).

Table (14): Means±SE of the costs (Real value) of veterinary management(Drugs, Vaccines, Disinfectants, Veterinarian visits and Total Veterinary management) per cow among different years and seasons.

Year	Season	No of Records	Real value Veterinary Management costs Per cow				
			Drug	Vaccine	Disinfectant	Veterinarian Visits	Total veterinary Management
1985	Winter	203	5.77 ± 0.16^{A}	0.82 ± 0.036^{A}	0.41 ± 0.02^{C}	2.03 ± 0.009^{C}	9.05 ± 0.16^{A}
1985	Summer	203	5.06 ± 0.19^{B}	0.78 ± 0.005^{A}	0.66 ± 0.03^{B}	2.04 ± 0.006^{C}	8.56 ± 0.19^{B}
1986	Winter	215	5.79 ± 0.11^{A}	0.79 ± 0.0095^{B}	0.49 ± 0.01^{C}	2.20 ± 0.015^{B}	9.28 ± 0.12^{A}
1986	Summer	215	5.01 ± 0.13^{B}	0.79 ± 0.0095^{B}	0.68 ± 0.01^{AB}	2.20 ± 0.015^{B}	8.69 ± 0.14^{B}
1987	Winter	181	6.02 ± 0.092^{A}	0.83 ± 0.0096^{A}	0.55 ± 0.02^{C}	2.27 ± 0.014^{A}	9.78 ± 0.10^{A}
1987	Summer	181	5.33 ± 0.104^{B}	0.83 ± 0.0096^{A}	0.81 ± 0.03^{A}	2.28 ± 0.015^{A}	9.31 ± 0.11^{A}
1988	Winter	180	5.25 ± 0.063^{B}	0.69 ± 0.008^{C}	0.46 ± 0.01^{C}	1.97 ± 0.024^{D}	8.43 ± 0.076^{B}
1988	Summer	180	4.27 ± 0.067^{C}	0.69 ± 0.008^{C}	0.66 ± 0.01^{B}	1.97 ± 0.024^{D}	7.61 ± 0.075^{C}
1989	Winter	141	3.71 ± 0.037^{D}	0.55 ± 0.005^{ED}	0.38 ± 0.01^{D}	1.61 ± 0.020^{E}	6.27 ± 0.04^{D}
1989	Summer	141	3.25 ± 0.046^{E}	0.55 ± 0.005^{ED}	0.49 ± 0.01^{C}	1.61 ± 0.020^{E}	5.92 ± 0.05^{E}
1990	Winter	138	3.91 ± 0.052^{D}	0.53 ± 0.003^{EF}	0.37 ± 0.008^{D}	1.51 ± 0.12^{F}	6.34 ± 0.06^{D}
1990	Summer	138	3.64 ± 0.05^{D}	0.53 ± 0.003^{EF}	0.47 ± 0.01^{C}	1.51 ± 0.12^{F}	5.54 ± 0.62^{EF}
1991	Winter	130	2.96 ± 0.04^{F}	0.50 ± 0.006^{F}	0.34 ± 0.007^{CD}	1.49 ± 0.04^{F}	6.005 ± 0.08^{D}
1991	Summer	130	3.01 ± 0.042^{E}	0.51 ± 0.006^{F}	0.31 ± 0.007^{EF}	1.50 ± 0.04^{F}	5.29 ± 0.075^{F}
1992	Winter	99	3.46 ± 0.059^{D}	0.67 ± 0.02^{C}	0.30 ± 0.008^{E}	1.42 ± 0.04^{G}	5.87 ± 0.07^{E}
1992	Summer	99	2.89 ± 0.041^{F}	0.67 ± 0.02^{C}	0.32 ± 0.01^{E}	1.42 ± 0.04^{G}	5.32 ± 0.06^{F}
1993	Winter	90	3.34 ± 0.16^{CD}	0.58 ± 0.02^{D}	0.32 ± 0.04^{E}	1.18 ± 0.06^{H}	5.42 ± 0.23^{F}
1993	Summer	90	2.50 ± 0.11^{F}	0.56 ± 0.02^{D}	0.39 ± 0.09^{D}	1.18 ± 0.06^{H}	4.65 ± 0.20^{G}
1994	Winter	111	3.22 ± 0.13^{ED}	0.57 ± 0.01^{D}	0.32 ± 0.03^{E}	1.08 ± 0.05^{I}	5.49 ± 0.23^{F}
1994	Summer	111	2.57 ± 0.12^{F}	0.57 ± 0.01^{D}	0.42 ± 0.05^{C}	1.08 ± 0.05^{I}	4.72 ± 0.19^{G}
1995	Winter	349	2.23 ± 0.06^{F}	0.50 ± 0.006^{F}	0.29 ± 0.01^{F}	0.66 ± 0.02^{J}	3.75 ± 0.09^{H}
1995	Summer	349	1.47 ± 0.05^{G}	0.51 ± 0.006^{F}	0.40 ± 0.02^{C}	0.66 ± 0.02^{J}	3.05 ± 0.07^{H}
1996	Winter	100	1.74 ± 0.093^{G}	0.55 ± 0.017^{ED}	0.26 ± 0.026^{D}	0.55 ± 0.021^{K}	3.11 ± 0.127^{H}
1996	Summer	100	2.39 ± 0.105^{F}	0.55 ± 0.018^{ED}	0.39 ± 0.037^{D}	0.55 ± 0.021^{K}	$3.91\pm0.13^{H.F}$
Total Mean	Winter	1937	3.95 ± 0.088	0.63 ± 0.012	0.37 ± 0.016	1.48 ± 0.036	7.06 ± 0.11
	Summer	1937	3.44 ± 0.087	0.62 ± 0.010	0.50 ± 0.026	1.50 ± 0.035	6.13 ± 0.15

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (15): Means $\pm$SE of the costs (Cash value) of veterinary management patterns (Drugs, Vaccines, Disinfectants, Veterinarian visits and Total Veterinary management) among different years and seasons.

Year	Season	Number of Records	Cash value of Veterinary management costs (LE/cow)				
			Drug	Vaccine	Disinfectant	Veterinarian Visits	Total Veterinary Management
1985	Winter	203	28.18 ± 0.80^{G}	4.004 ± 0.17^{L}	2.03 ± 0.104^{G}	9.94 ± 0.04^{J}	44.16 ± 0.82^{I}
1985	Summer	203	24.7 ± 0.93^{H}	3.83 ± 0.02^{L}	3.19 ± 0.151^{F}	9.98 ± 0.030^{J}	41.72 ± 0.95^{J}
1986	Winter	215	33.17 ± 0.67^{G}	4.55 ± 0.05^{K}	2.85 ± 0.095^{G}	12.59 ± 0.09^{H}	53.17 ± 0.69^{H}
1986	Summer	215	28.65 ± 0.80^{G}	4.56 ± 0.05^{K}	3.92 ± 0.115^{E}	12.60 ± 0.09^{H}	49.75 ± 0.81^{H}
1987	Winter	181	39.75 ± 0.65^{E}	5.41 ± 0.096^{J}	3.61 ± 0.132^{E}	14.78 ± 0.09^{G}	63.56 ± 0.65^{G}
1987	Summer	181	34.93 ± 0.66^{F}	5.43 ± 0.067^{J}	5.34 ± 0.208^{C}	14.83 ± 0.10^{G}	60.54 ± 0.71^{G}
1988	Winter	180	46.95 ± 0.67^{C}	6.18 ± 0.076^{I}	4.13 ± 0.094^{E}	17.49 ± 0.21^{F}	74.76 ± 0.76^{E}
1988	Summer	180	37.89 ± 0.0027^{F}	6.18 ± 0.076^{I}	5.88 ± 0.137^{C}	17.49 ± 0.21^{F}	67.46 ± 0.66^{F}
1989	Winter	141	43.41 ± 0.44^{D}	6.51 ± 0.058^{H}	4.54 ± 0.149^{DE}	18.87 ± 0.24^{E}	73.36 ± 0.47^{E}
1989	Summer	141	38.00 ± 0.54^{E}	6.51 ± 0.058^{H}	5.75 ± 0.153^{C}	18.87 ± 0.24^{E}	69.15 ± 0.59^{F}
1990	Winter	138	51.04 ± 0.68^{B}	6.92 ± 0.047^{G}	4.89 ± 0.120^{DE}	19.71 ± 0.41^{D}	82.57 ± 0.86^{C}
1990	Summer	138	39.34 ± 0.55^{D}	6.92 ± 0.048^{G}	6.18 ± 0.137^{B}	19.71 ± 0.41^{D}	72.15 ± 0.82^{E}
1991	Winter	130	53.43 ± 0.82^{B}	7.42 ± 0.09^{F}	5.09 ± 0.100^{CD}	21.97 ± 0.63^{B}	87.93 ± 1.28^{B}
1991	Summer	130	43.44 ± 0.66^{ED}	7.43 ± 0.09^{F}	4.60 ± 0.123^{DE}	22.02 ± 0.46^{B}	77.51 ± 1.11^{D}
1992	Winter	99	56.77 ± 0.98^{A}	11.08 ± 0.36^{B}	4.96 ± 0.135^{DE}	23.42 ± 0.68^{A}	96.25 ± 1.22^{A}
1992	Summer	99	47.37 ± 0.68^{C}	11.08 ± 0.36^{B}	5.17 ± 0.195^{CD}	23.42 ± 0.86^{A}	87.05 ± 1.09^{B}
1993	Winter	90	58.76 ± 2.85^{A}	10.15 ± 0.407^{D}	5.76 ± 0.807^{C}	20.81 ± 0.17^{C}	95.50 ± 4.12^{A}
1993	Summer	90	44.21 ± 2.02^{D}	10.14 ± 0.414^{D}	6.94 ± 1.62^{AB}	20.81 ± 0.17^{C}	81.88 ± 3.69^{C}
1994	Winter	111	65.58 ± 3.85^{A}	10.67 ± 0.286^{C}	6.04 ± 0.57^{B}	20.12 ± 1.06^{DC}	102.43 ± 4.43^{A}
1994	Summer	111	49.26 ± 2.66^{C}	10.71 ± 0.291^{C}	7.90 ± 1.12^{A}	20.12 ± 1.06^{DC}	88.00 ± 3.69^{B}
1995	Winter	349	44.27 ± 1.59^{D}	9.79 ± 0.122^{E}	5.58 ± 0.235^{C}	12.79 ± 0.45^{H}	72.44 ± 1.87^{E}
1995	Summer	349	28.49 ± 1.05^{G}	9.80 ± 0.123^{E}	7.72 ± 0.395^{A}	12.78 ± 0.44^{H}	58.87 ± 1.45^{G}
1996	Winter	100	36.93 ± 2.09^{F}	11.67 ± 0.395^{A}	5.49 ± 0.556^{C}	11.67 ± 0.45^{I}	65.76 ± 2.84^{F}
1996	Summer	100	50.95 ± 2.47^{B}	11.67 ± 0.395^{A}	8.28 ± 0.772^{A}	11.69 ± 0.45^{I}	82.59 ± 3.13^{C}
Total Mean	Winter	1937	36.93 ± 2.09	7.86 ± 0.179	4.58 ± 0.258	15.51 ± 0.37	75.99 ± 1.66
	Summer	1937	50.95 ± 2.47	7.85 ± 0.166	5.90 ± 0.427	17.02 ± 0.37	69.72 ± 1.55

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).

II-2. Effect of locality and season on veterinary management:

Tables (16, 17 and Fig 2) showed significant effect ($P < 0.01$) of locality and season on veterinary management.

II-2.a. Drug consumption:

True value of drugs ranged from 1.78 to 4.97 in Winter seasons of Behaira and El-Garbia governorate. Meanwhile their cash value ranged from 30.45 to 81.88 LE/cow in Summer and Winter seasons of Behaira and El-Monofia.

II-2.b. Vaccine consumption:

Vaccine values differed significantly from locality to another ($P < 0.01$) and non significant from season to season. True value of vaccines ranged from 0.34, 0.36 to 0.78, 0.77 in Winter and Summer seasons of Alexandria and El-Garbia. Meanwhile, the cash value ranged from 6.9, 6.86 to 10.33, 10.33 in Winter and Summer seasons of El-Garbia and El-Monofia, respectively.

The difference in vaccine value from one locality to another attributed to differences in vaccination programs according to the endemic diseases and diseases distribution. While the vaccination program was fixed all over the year (Winter and Summer) within each farm and within each locality.

II-2.c. Disinfectant consumption:

Real and cash values of disinfectant differed significantly according to the locality and season ($P < 0.01$). The real values of disinfectants ranged from 0.27, 0.32, 0.39 in Winter, Winter and Summer seasons of Kafr-El-Shaikh, Behaira and Kafr-El-Shaikh; respectively.

The highest values were 1.43 and 2.69 in Winter and Summer seasons of El-Monofia. While their cash value ranged from 4.05 to 49.88 LE/cow in Winter and Summer seasons of Kafr-El-Shaikh and El-Monofia.

II-2.d. Veterinarian visits:

Veterinarian visits differed from one locality to another ($P < 0.01$), and season within locality had no significant effect. Real value of veterinarian visits ranged from 0.46, to 1.76 in

Winter and Summer seasons of Behaira and El-Garbia. Meanwhile, the cash value of veterinarian visits ranged from 9 to 17.76 and 17.76 LE/cow in Winter and Summer seasons of Behaira, El-Monofia and Kafr-El-Shaikh, respectively.

II-2.e. Effect of locality and season on total veterinary management:

From Tables 16 and 17 it was concluded that, the total veterinary management differed significantly ($P < 0.01$) according to locality and season of milk production. Real value of total veterinary management costs ranged from 2.9, 2.97 to 8.02, 7.66 in Winter and Summer Season of Alexandria and El-Garbia. Cash values of total veterinary management ranged from 59.9, 56.78 to 136.44, 123.66 LE/cow in Winter and Summer seasons of El-Behaira and El-Monofia.

From the results obtained, we can conclude that the differences of veterinary management costs from locality to another may be due to the differences in disease prevalence. This conclusion is supported by the large differences in incidence of various diseases in the different localities as shown in Table (18). These results agree with those obtained by Bakken, 1982.

Table (16): Means±SE for costs of veterinary management (Drugs, Vaccines, Disinfectants, Veterinarian visits and Total Veterinary management) real costs/cow, for different localities and seasons.

Locality	Season	Record No	Veterinary Management costs (real value)/cow				
			Drug	Vaccine	Disinfectant	veterinarian visits	Total veterinary Management
Behaira	Winter	66	1.83 ± 0.139^{D}	0.47 ± 0.01^{B}	0.32 ± 0.04^{B}	0.46 ± 0.034^{E}	3.09 ± 0.16^{D}
	Summer	66	1.53 ± 0.118^{D}	0.47 ± 0.022^{B}	0.34 ± 0.054^{C}	0.46 ± 0.034^{E}	2.91 ± 0.16^{E}
Alexandria	Winter	4	1.78 ± 1.33^{D}	0.34 ± 0.285^{C}	0.33 ± 0.15^{D}	0.61 ± 0.145^{D}	2.97 ± 1.82^{E}
	Summer	4	1.42 ± 1.04^{D}	0.36 ± 0.306^{C}	0.46 ± 0.16^{C}	0.61 ± 0.145^{D}	2.90 ± 1.69^{F}
Kafr El-shaikh	Winter	964	3.46 ± 0.053^{B}	0.52 ± 0.002^{B}	0.27 ± 0.005^{E}	1.37 ± 0.025^{B}	5.71 ± 0.08^{C}
	Summer	964	2.62 ± 0.043^{C}	0.52 ± 0.002^{B}	0.39 ± 0.009^{D}	1.37 ± 0.025^{B}	4.94 ± 0.06^{C}
El-Garbia	Winter	894	4.97 ± 0.063^{A}	0.78 ± 0.009^{A}	0.50 ± 0.006^{C}	1.76 ± 0.014^{A}	8.02 ± 0.07^{A}
	Summer	894	4.46 ± 0.06^{A}	0.77 ± 0.004^{A}	0.64 ± 0.009^{C}	1.76 ± 0.014^{A}	7.66 ± 0.08^{A}
El-Monofia	Winter	9	4.38 ± 0.98^{AB}	0.54 ± 0.09^{B}	1.43 ± 0.54^{B}	0.93 ± 0.23^{C}	7.29 ± 1.23^{A}
	Summer	9	2.44 ± 0.56^{C}	0.54 ± 0.09^{B}	2.69 ± 1.10^{A}	0.93 ± 0.23^{C}	6.61 ± 1.50^{B}
Total Mean	Winter	1937	3.28 ± 0.51	0.53 ± 0.079	0.57 ± 0.14	1.02 ± 0.089	6.41 ± 0.67
	Summer	1937	2.49 ± 0.36	0.53 ± 0.084	0.90 ± 0.26	1.02 ± 0.089	5.00 ± 0.69

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (17): Means$\pm$ SE for costs of veterinary management patterns (Drugs, Vaccines, Disinfectants, Veterinarian visits and Total Veterinary management) cash value (LE/cow) for different localities and seasons.

Locality	Season	Record No	Veterinary management costs (cash value/LE)				
			Drugs	Vaccines	Disinfectant	Veterinarian visits	Total Veterinary Management
Behaira	Winter	66	35.40 ± 2.68^{C}	9.18 ± 0.416^{B}	6.31 ± 0.82^{D}	9.0 ± 0.66^{D}	59.90 ± 3.26^{E}
	Summer	66	30.45 ± 2.43^{C}	9.25 ± 0.445^{B}	8.34 ± 1.06^{C}	9.03 ± 0.66^{D}	56.78 ± 3.42^{E}
Alexandria	Winter	4	43.75 ± 35.4^{BC}	8.25 ± 7.25^{C}	5.0 ± 1.68^{D}	12.00 ± 3.36^{D}	69.0 ± 47.7^{D}
	Summer	4	47.75 ± 40^{B}	8.25 ± 7.25^{C}	8.25 ± 7.25^{C}	12.00 ± 3.36^{C}	76.0 ± 53.7^{C}
Kafr El-shaikh	Winter	964	47.93 ± 0.83^{B}	7.88 ± 0.095^{C}	4.05 ± 0.08^{E}	17.76 ± 0.29^{A}	77.64 ± 1.04^{C}
	Summer	964	36.22 ± 0.62^{C}	7.89 ± 0.094^{C}	5.70 ± 0.125^{D}	17.76 ± 0.29^{A}	67.58 ± 0.86^{D}
El-Garbia	Winter	894	40.83 ± 0.41^{BC}	6.90 ± 0.115^{D}	4.46 ± 0.06^{E}	14.47 ± 0.10^{B}	66.7 ± 0.61^{E}
	Summer	894	36.22 ± 0.40^{C}	6.86 ± 0.109^{D}	5.36 ± 0.07^{D}	14.46 ± 0.10^{B}	62.91 ± 0.6^{E}
El-Monofia	Winter	9	81.88 ± 18.4^{A}	10.33 ± 1.85^{A}	26.55 ± 9.81^{B}	17.66 ± 4.42^{A}	136.5 ± 22.7^{A}
	Summer	9	45.8 ± 10.66^{B}	10.33 ± 1.85^{A}	49.88 ± 20^{A}	17.66 ± 4.42^{A}	123.7 ± 27.5^{B}
Total Mean	Winter	1937	49.95 ± 11.54	8.50 ± 1.94	9.27 ± 2.49	14.17 ± 1.76	81.94 ± 15.06
	Summer	1937	39.28 ± 10.82	8.51 ± 1.94	15.32 ± 5.70	14.17 ± 1.76	77.19 ± 17.21

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (18): Frequencies of diseases affecting animals in different localities from years 1985 to 1996 expressed as number of dairy records.

Locality	Season	Diseases of									
		Digestive	Respiratory	Reproductive	Mammary	Mastitis	Parasitic	Skin	Leg	Miscellaneous	Total
Behaira	Winter	11	8	14	1	3	1	-	5	18	61
	Summer	11	-	10	-	21	32	-	1	16	91
Alexandria	Winter	3	3	-	-	45	-	2	2	12	67
	Summer	1	-	-	-	34	-	-	-	-	35
Kafr-El-Shaikh	Winter	25	4	45	1	-	2	8	8	86	179
	Summer	70	-	139	-	-	156	13	6	40	425
El-Garbia	Winter	19	3	75	-	15	-	1	12	41	166
	Summer	12	4	150	6	65	-	6	10	93	346
El-Monofia	Winter	5	4	8	-	2	1	-	-	7	27
	Summer	3	1	2	-	3	2	-	1	-	12
Total	Winter	63	22	142	2	65	4	11	27	164	500
	Summer	97	6	301	6	123	190	19	18	149	909

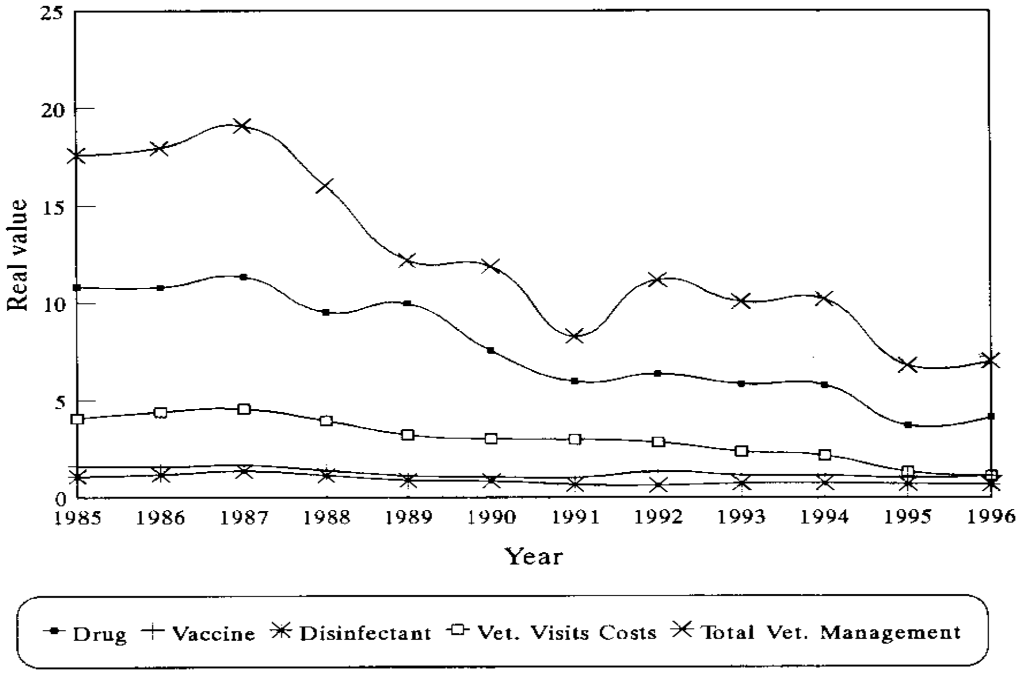

Fig. (1): Year effect on real value of veterinary management patterns.

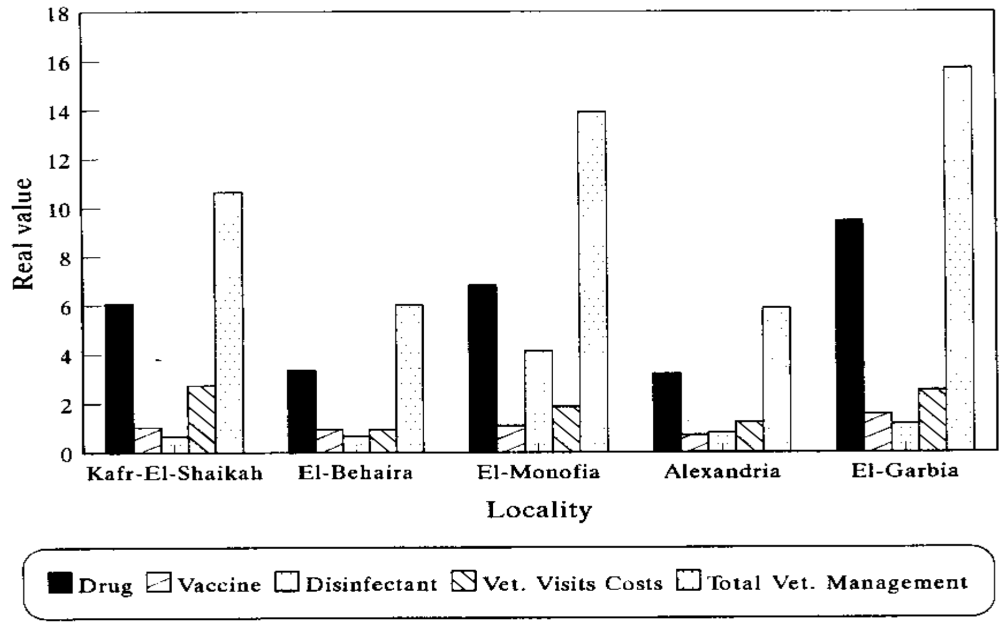

Fig. (2): Locality effect on real value of veterinary management patterns.

II-3. Effect of breed and season on veterinary management:

Breed of dairy cows and season of milk production affected significantly (P< 0.05) on the veterinary management (Tables 19, 20 and Fig 3).

II-3.a. Drug consumption:

Dairy breeds had significant (P< 0.01) effects on drug consumption (true and cash values), but season within the breed had no significant effect on either true and cash drug consumption.

Real values of the drugs were 1.51 to 5.8 in Summer and Winter seasons of Buffalo species, and Charolais X Friesian, respectively. Meanwhile the cash values were 30.45, 31.25, 31.29 to 108.25 LE/cow in Summer, Summer, Summer and Winter seasons for Buffalo, Friesian X Balady, Balady and Crossed Charolais X Friesian, respectively. Differences between the drug costs according to the breed and season may be due to differences in breed responses to different antibiotics (Craven, 1987).

II-3.b. Vaccine consumption:

The real and cash values of the vaccines affected significantly (P< 0.01) by dairy breeds. Real values of vaccine were 0.47, 0.47, 0.49, 0.49 to 0.68, 0.68 in Winter and Summer seasons for Balady, H.F and Friesian cows; respectively. Cash values of vaccine were 5.42, 5.42 to 10.13, 10.13 LE/cow in Winter and Summer seasons for Charolais and Buffalo species; respectively.

II-3.c. Disinfectant consumption:

Real values of disinfectant were 6.99, 3.51 and 0.22, 0.24 in Summer, Winter and Winter, Winter Seasons of H.F, H.F, Charolais and Balady breeds; respectively and the differences were significant (P< 0.01). Meanwhile, the cash value of disinfectant 2.21, 4.0 and 128.66, 64.66 LE/cow in Winter and Summer seasons for Charolais and Summer, Winter seasons of H.F breed; respectively.

II-3.d. Veterinarian visits:

Costs of veterinarian visits differed significantly according to the breed, While the season within breed had no significant effect.

Real value of veterinarian visits were 0.13, 0.13 to 2.15, 2.15 in Winter and Summer seasons of Charolais X Friesian and Charolais; respectively. Meanwhile, the cash value of veterinarian visits were 2.50 and 2.50 LE/cow in Winter and Summer seasons of Charolais X Friesian and they constituted the lower value. The higher values of veterinarian visits costs (cash value) were 31 and 31 LE/cow in Winter and Summer seasons for H.F; respectively.

II-3.e. Veterinary management:

From Table (19 & 20) it was concluded that, the dairy breeds had significant effects ($P < 0.01$) on the total veterinary management (real and cash values). Season within breed had no significant ($P > 0.05$) effect on the real value, but it had a significant effect ($P < 0.01$) on the cash values of veterinary management.

The lower real value of total veterinary management ranged from 2.24 to 3.14 in Summer seasons for Balady and Buffalo. The higher real values of total veterinary management were 12.19 and 10.79 in Summer and Winter seasons for H.F. Cash values of total veterinary management were 56.52, 58.24, 199.66 and 225 LE/cow in Summer seasons for Balady and Friesian X Balady. Moreover, lower cash values of total veterinary management in Winter were 65.71 and 63.41 LE/cow for Buffalo and Balady, and the higher value was 199.66 LE/cow for H.F in Winter season.

Buffaloes had greater resistance for disease in Winter than cows (Paramatma et al., 1989). The differences between the breeds in costs of veterinary management were due to the differences of the breeds in their resistances to diseases as the diseases likelihood depends on cow's breed and genotype. (Peeler et al., 1994).

The higher real value of veterinary management costs were 10.79 and 12.19 and the higher cash values 199.66 and 225 LE/cow in Winter and Summer seasons of H.F were attributed to high susceptibility for Summer mastitis. These results were not in line with the results of Berman et al., 1986 who indicated that H.F is susceptible to mastitis in Winter particularly in October-December period.

Table (19): Means±SE of veterinary management costs (real value) (Drugs, Vaccines, Disinfectants, Veterinarian visits and Total Veterinary management) costs/cow of different breeds and seasons.

Breed	Season	No of Rec	Veterinary Management costs (Real value)/cow				
			Drugs	Vaccines	Disinfectants	Veterinarian Visits	Total Veterinary Management
Balady	Winter	229	2.23±0.102^{C}	0.47±0.007^{B}	0.24±0.01^{E}	0.63±0.031^{C}	3.69±0.14^{D}
Balady	Summer	229	1.76±0.085^{D}	0.47±0.079^{B}	0.33±0.017^{D}	0.64±0.032^{C}	2.24±0.113^{E}
Friesian	Winter	1502	4.63±0.045^{A}	0.68±0.007^{A}	0.41±0.005^{CD}	1.75±0.013^{B}	7.52±0.059^{C}
Friesian	Summer	1502	3.91±0.047^{B}	0.68±0.004^{A}	0.55±0.008^{C}	1.76±0.013^{B}	6.92±0.061^{C}
CharXFr	Winter	4	5.80±1.46^{A}	0.51±0.19^{B}	0.50±0.18^{C}	0.13±0.075^{D}	6.94±1.53^{C}
CharXFr	Summer	4	2.89±0.88^{C}	0.51±0.19^{B}	0.66±0.215^{C}	0.13±0.075^{D}	4.20±1.18^{D}
BalXFr	Winter	86	2.02±0.11^{C}	0.50±0.01^{B}	0.25±0.008^{E}	0.58±0.036^{C}	3.47±0.17^{D}
BalXFr	Summer	86	1.62±0.13^{D}	0.50±0.01^{B}	0.30±0.015^{E}	0.58±0.036^{C}	3.02±0.15^{D}
Charolais	Winter	19	3.84±0.19^{B}	0.55±0.009^{B}	0.22±0.009^{E}	2.15±0.061^{A}	7.77±0.25^{C}
Charolais	Summer	19	3.44±0.22^{B}	0.55±0.009^{B}	0.43±0.020^{CD}	2.15±0.061^{A}	6.58±0.26^{C}
H.F	Winter	3	5.11±0.76^{A}	0.49±0.16^{B}	3.51±0.40^{B}	1.67±0.032^{B}	10.79±0.63^{B}
H.F	Summer	3	3.03±0.92^{B}	0.49±0.16^{B}	6.99±0.837^{A}	1.67±0.032^{B}	12.19±0.98^{A}
Buffalo	Winter	94	1.84±0.10^{D}	0.51±0.05^{B}	0.32±0.029^{E}	0.64±0.027^{C}	3.32±0.13^{D}
Buffalo	Summer	94	1.51±0.08^{D}	0.51±0.05^{B}	0.47±0.039^{CD}	0.64±0.027^{C}	3.14±0.118^{D}
Total Mean	Winter	1937	3.63±0.39	0.53±0.061	0.77±0.091	1.07±0.039	6.21±0.41
	Summer	1937	2.59±0.33	0.53±0.061	1.39±0.16	1.08±0.039	5.49±0.408

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (20): Means±SE of veterinary management costs (Cash value) (Drugs, Vaccines, Disinfectants, Veterinarian visits and Total Veterinary mangement) costs/LE/cow of different breeds and the seasons of milk production.

Breed	Season	No of Rec	Veterinary Management costs (Cash value)/LE/cow				
			Drugs	Vaccines	Disinfectants	Veterinarian visits	Total Veterinary Management
Balady	Winter	229	39.70 ± 1.72^{E}	8.64 ± 0.18^{B}	4.41 ± 0.25^{E}	10.64 ± 0.43^{D}	63.41 ± 1.92^{E}
Balady	Summer	229	31.29 ± 1.47^{E}	8.64 ± 0.18^{B}	6.00 ± 0.35^{E}	10.71 ± 0.43^{D}	56.52 ± 1.77^{F}
Friesian	Winter	1502	45.51 ± 0.51^{D}	7.03 ± 0.084^{C}	4.16 ± 0.051^{E}	17.14 ± 0.17^{C}	73.86 ± 0.69^{D}
Friesian	Summer	1502	37.41 ± 0.38^{E}	7.01 ± 0.082^{C}	5.35 ± 0.07^{E}	17.14 ± 0.17^{C}	66.93 ± 0.57^{E}
CharXFr	Winter	4	108.25 ± 1.42^{A}	9.75 ± 3.66^{AB}	9.50 ± 3.57^{D}	2.50 ± 1.50^{E}	130 ± 29.58^{C}
CharXFr	Summer	4	54.2 ± 0.88^{C}	9.75 ± 3.66^{AB}	12.50 ± 4.33^{C}	2.50 ± 1.50^{E}	79 ± 23.19^{D}
BalXFr	Winter	86	40.71 ± 2.90^{D}	9.77 ± 0.21^{AB}	4.91 ± 0.17^{E}	11.31 ± 0.69^{D}	66.71 ± 3.24^{E}
BalXFr	Summer	86	31.25 ± 2.63^{E}	9.76 ± 0.21^{AB}	5.93 ± 1.40^{E}	11.29 ± 0.69^{D}	58.24 ± 3.02^{F}
Charlas	Winter	19	46.31 ± 3.87^{D}	5.42 ± 0.507^{D}	2.21 ± 0.23^{F}	20.57 ± 1.68^{B}	74.52 ± 6.21^{D}
Chralas	Summer	19	33.15 ± 2.96^{E}	5.42 ± 0.507^{D}	4 ± 0.25^{E}	20.57 ± 1.68^{B}	63.15 ± 5.24^{E}
H.F	Winter	3	95 ± 17.43^{B}	9 ± 3.054^{AB}	64.66 ± 5.77^{B}	31.00 ± 0.99^{A}	199.66 ± 12.25^{B}
H.F	Summer	3	56.33 ± 17.67^{C}	9 ± 3.054^{AB}	128.66 ± 11.86^{A}	31.00 ± 0.99^{A}	225 ± 15.30^{A}
Buffalo	Winter	94	36.32 ± 2.02^{E}	10.13 ± 0.31^{A}	6.50 ± 0.60^{E}	12.47 ± 0.55^{D}	65.71 ± 2.64^{E}
Buffalo	Summer	94	30.45 ± 1.75^{E}	10.13 ± 0.31^{A}	9.31 ± 0.78^{D}	12.47 ± 0.55^{C}	62.55 ± 2.48^{E}
Total	Winter	1937	58.82 ± 4.26	8.53 ± 0.715	13.76 ± 1.52	15.09 ± 0.85	96.26 ± 8.08
Mean	Summer	1937	39.15 ± 3.96	8.53 ± 0.714	24.53 ± 2.72	15.09 ± 0.85	85.91 ± 7.36

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (21) Frequencies of diseases affecting animals in different cattle breeds and buffalo species from years 1985 to 1996 expressed as number of dairy records.

Breed	Season	Diseases of									
		Digestive	Respiratory	Reproductive	Mammary	Mastitis	Parasitic	Skin	Leg	Miscellaneous	Total
Balady	Winter	10	12	10	-	1	6	2	27	23	91
	Summer	15	-	37	-	39	117	3	7	12	230
Friesian	Winter	39	13	197	2	20	27	11	19	57	385
	Summer	33	3	88	5	106	53	24	4	120	436
CharXFr	Winter	4	-	2	-	-	-	-	1	2	9
	Summer	-	-	1	-	-	6	-	-	13	20
BalXFr	Winter	4	-	3	-	3	-	1	8	11	30
	Summer	2	1	7	-	6	31	4	-	6	57
Charolais	Winter	1	-	-	-	-	-	3	-	-	4
	Summer	-	-	-	-	-	-	-	-	-	-
H.F	Winter	-	-	-	-	1	-	-	1	-	2
	Summer	-	-	-	-	3	-	-	1	-	4
Buffalo	Winter	-	1	11	-		-	-	2	10	24
	Summer	-	22	71	-	6	12	-	-	6	117
Total	Winter	58	26	223	2	25	33	17	58	103	545
	Summer	50	26	204	5	160	219	31	12	157	864

II-4. Effect of sector and season on veterinary management:

II-4.a. Drug consumption:

Production sector had a significant effect (P< 0.01) on the real and cash values of the drugs. Meanwhile, the season within the sector had no significant effect on drug consumption (real or cash value).

Real value of drugs ranged from 1.45, 1.61 and 1.99 in Summer, Summer and Winter seasons for governmental and farmers sectors, respectively. Higher values were 4.77 and 4.02 in Winter and Summer seasons for private sector, respectively.(Table, 22). Meanwhile, the cash value of drugs ranged from lower value 32.14 and 32.87 LE/cow in Summer seasons for farmers and governmental sector, respectively to the higher values of 40.98, 45.39 and 48.62 LE/cow in Winter seasons for the farmers, private and governmental sector, respectively (Table, 23 and Fig 4).

II-4.b. Vaccine consumption:

Real and cash values of vaccines affected significantly (P< 0.01) by the production sector. Season within the sector had no significant effect on vaccine real and cash value at. The real value of vaccines were 0.49, 0.49 to 0.68, 0.68 in Winter and Summer seasons of governmental and private sector, respectively (Table, 22). Meanwhile, their cash values ranged from 6.72, 6.74 in Summer and Winter seasons of private sector, to 9.93, 9.93, 9.79 and 9.79 LE/cow in Winter and Summer seasons for governmental and farmers sectors, respectively (Table, 23 and Fig 4, 5).

II-4.c. Disinfectant consumption:

Tables 22 and 23 showed that, the disinfectant consumption differed significantly (P< 0.01) from one sector to another. Meanwhile, the disinfectant real value did not differ significantly from one season to another. Cash value differ from season within sector at (P< 0.01).

Real values of disinfectant were 0.25, 0.34 to 0.70, 0.582 in Winter, Summer, Summer and Summer seasons of farmers, farmers, governmental and private sector, respectively. Their cash value ranged from the lower values of 4.20, 4.96 LE/cow in Winter seasons of private and farmers sector, respectively. The higher cash values of 13.56, 10.00 LE/cow were in Summer and Winter seasons of governmental sector, respectively.

II-4.d. Veterinarian visits:

Real value of veterinarian visits costs were 0.55 0.56, 0.57, 0.57 to 1.82, 1.82 for Winter and Summer seasons of governmental, farmers and private sector, respectively. The differences among production sectors were significant (P< 0.01). Their cash values were 10.93, 11.06, 11.08, 11.10 to 17.49, 17.48 LE/cow in Winter, Summer, Summer, Winter, Summer and Winter seasons for governmental, farmers and private sector, respectively.

II-4.e. Total veterinary management:

Tables 22 and 23 indicated that, the production sector had significant effects (P< 0.01) on total veterinary management. Moreover, season within the sector had no significant effect on the total veterinary costs (real and cash value).

The lower limits of the real value were 3.04, 3.23, 3.43 and 3.99 in Summer, Summer, Winter and Winter seasons of farmers, governmental, farmer and governmental sector, respectively. Their higher limits were in private sectors as 7.12, 7.73 LE/cow for Summer and Winter seasons for private sector, respectively.

Cash values of total veterinary management ranged from lower values of 59.60, 66.84,67.10 and 67.43 LE/cow in Winter, Summer, Summer and Summer seasons of farmers, private and governmental sectors, respectively. Meanwhile, their higher limits were 79.50, 73.83 LE/cow/ in Winter seasons of governmental and private sectors, respectively.

These results indicated that, the higher veterinary management costs, were for drug and veterinarian visits costs but the lower costs were of vaccine and disinfectant. These results disagree with the results of Salman et al., (1991 a, b). They indicated that, the higher veterinary management costs were vaccine and drug costs.

It could be concluded that, the higher drug and veterinary management values were in Winter seasons due to high mortality and morbidity of diseases particularly mastitis and also the higher percentage of parturition in Winter than in Summer seasons. These results agreed with those reported by Paramatma et al., 1989; Lafi et al., 1994 and Samaha, 1996.

Table (22): Means±SE of veterinary management costs (real value) (Drugs, Vaccines, Disinfectants, Veterinarian visits and Total Veterinary management) costs/cow, of different sectors and seasons.

Sector	Season	No of Records	Veterinary Management costs (real value)/cow				
			Drugs	Vaccines	Disinfectant	Veterinarian Vists	Total Veterinary Management
Farmers	Winter	456	1.99 ± 0.050^{B}	0.503 ± 0.0051^{B}	0.25 ± 0.005^{C}	0.57 ± 0.0141^{B}	3.43 ± 0.082^{B}
Farmers	Summer	456	1.61 ± 0.051^{B}	0.34 ± 0.0051^{B}	0.34 ± 0.007^{C}	0.57 ± 0.013^{B}	3.04 ± 0.063^{B}
Private	Winter	1465	4.77 ± 0.043^{A}	0.689 ± 0.006^{A}	0.42 ± 0.0067^{B}	1.82 ± 0.012^{A}	7.73 ± 0.055^{A}
Private	Summer	1465	4.02 ± 0.046^{A}	0.686 ± 0.004^{A}	0.582 ± 0.011^{B}	1.82 ± 0.012^{A}	7.12 ± 0.059^{A}
Govrnem	Winter	16	2.43 ± 0.675^{B}	0.490 ± 0.091^{B}	0.532 ± 0.1^{B}	0.55 ± 0.1^{B}	3.99 ± 0.707^{B}
Govrnem	Summer	16	1.45 ± 0.039^{B}	0.495 ± 0.093^{B}	0.709 ± 0.019^{A}	0.56 ± 0.099^{B}	3.23 ± 0.511^{B}
Total	Winter	1937	3.06 ± 0.25	0.56 ± 0.034	0.40 ± 0.03	0.98 ± 0.042	5.05 ± 0.281
Mean	Summer	1937	2.36 ± 0.045	0.50 ± 0.034	0.54 ± 0.01	0.98 ± 0.041	4.46 ± 0.211

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).

Table (23): Means±SE of veterinary management costs (Cash value) (Drugs, Vaccines, Disinfectants, Veterinarian visits and Total Veterinary management) costs/LE/cow, of different sectors and seasons.

Sector	Season	No of Records	Veterinary Management costs (Cash value)/cow				
			Drugs	Vaccine	Disinfectant	veterinarian visits	Total veterinary management
Farmers	Winter	456	40.98 ± 1.44^{A}	9.79 ± 0.109^{A}	4.96 ± 0.108^{D}	11.10 ± 0.27^{B}	66.84 ± 1.57^{B}
Farmers	Summer	456	32.14 ± 1.09^{C}	9.79 ± 0.110^{A}	6.62 ± 0.162^{C}	11.08 ± 0.26^{B}	59.60 ± 1.27^{C}
Private	Winter	1465	45.39 ± 0.44^{A}	6.74 ± 0.082^{B}	4.20 ± 0.094^{D}	17.48 ± 0.18^{A}	73.83 ± 0.66^{A}
Private	Summer-	1465	37.36 ± 0.35^{B}	6.72 ± 0.079^{B}	5.51 ± 0.168^{C}	17.49 ± 0.18^{A}	67.10 ± 0.59^{B}
Govrnem	Winter	16	48.62 ± 13.6^{A}	9.93 ± 2.02^{A}	10.00 ± 3.11^{B}	10.93 ± 1.98^{B}	79.5 ± 14.95^{A}
Govrnem	Summer	16	32.9 ± 10.96^{C}	9.93 ± 2.02^{A}	13.56 ± 3.75^{A}	11.06 ± 1.97^{B}	67.43 ± 13.7^{B}
Total	Winter	1937	44.99 ± 5.16	8.82 ± 0.73	7.38 ± 1.104	13.17 ± 0.81	73.39 ± 5.72
Mean	Summer	1937	34.13 ± 4.13	8.81 ± 0.73	8.56 ± 1.36	13.21 ± 0.80	64.21 ± 5.18

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).

Table (24): Frequencies of diseases affecting animals in different sectors from years 1985 to 1996 expressed as number of dairy records

Sector	Season	Diseases of									
		Digestive	Respiratory	Reproductive	Mammary	Mastitis	Parasitic	Skin	Leg	Miscellaneous	Total
Farmers	Winter	34	10	45	1	-	11	1	27	46	175
	Summer	18	-	115	-	-	113	4	10	14	274
Private	Winter	23	14	151	1	17	17	-	19	105	347
	Summer	9	5	198	5	97	27	-	6	147	494
Governmental	Winter	9	4	5	-	2	1	-	3	7	31
	Summer	3	-	-	-	-	1	-	-	-	4
Total	Winter	66	28	201	2	19	29	1	49	158	553
	Summer	30	5	313	5	97	141	4	16	161	772

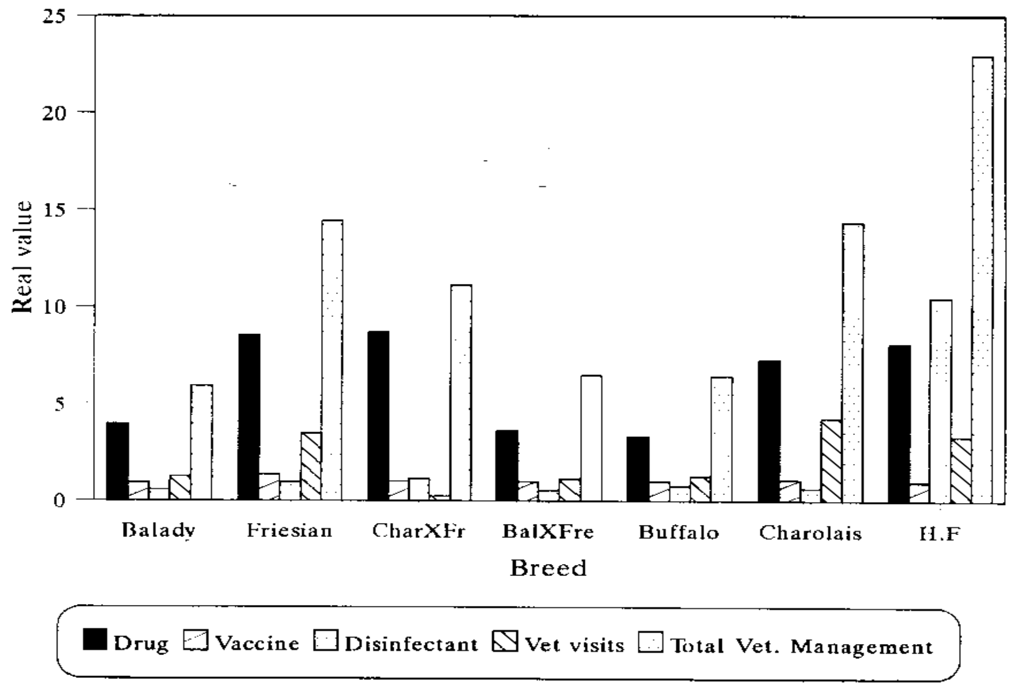

Fig. (3): Breed effect on real value of veterinary management patterns.

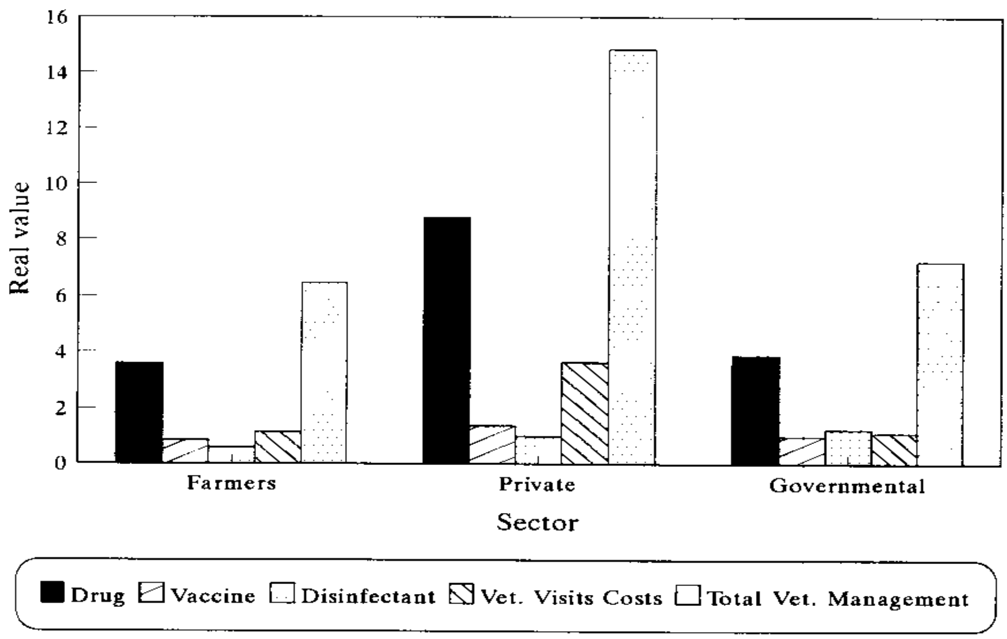

Fig. (4): Sector effect on real value of veterinary management patterns.

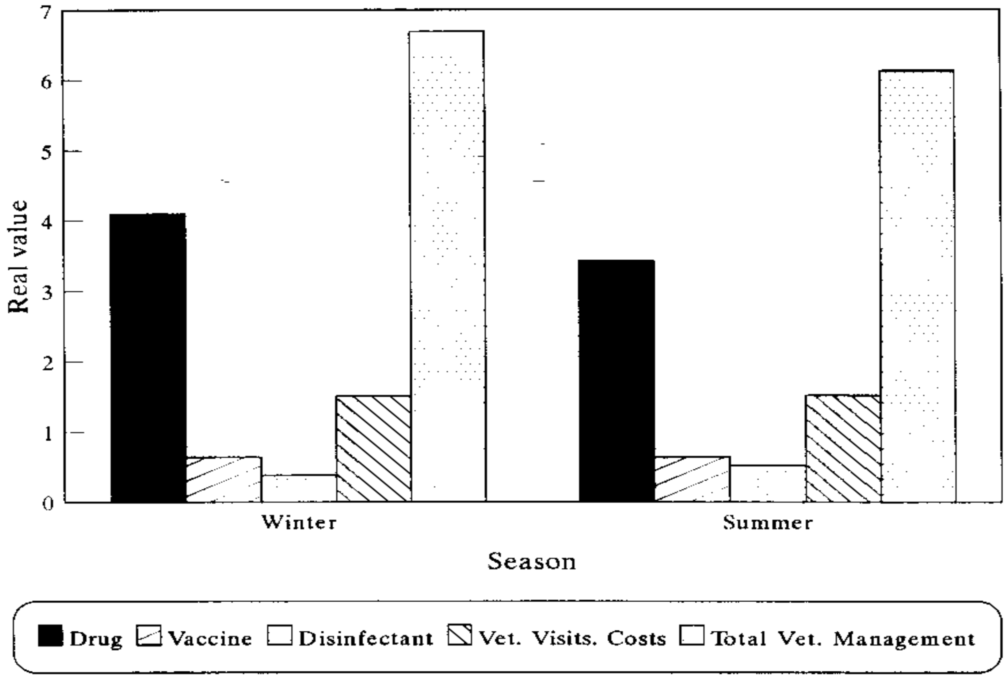

Fig. (5): Season effect on real value of veterinary management costs.

III- REPRODUCTIVE EFFICIENCY AND PERFORMANCE:

1- Year effect on reproductive efficiency and performance.

The reproductive efficiency measures (calving interval, gestation period, days open, dry period, service per conception and the age at first-service) were affected significantly by year, locality, breed, sector and season. These results are illustrated in Tables 25 and 26 and are in line with the results of Yadave et al., (1994).

III-1.a. Calving interval (CI):

Calving intervals were affected significantly ($P < 0.01$) by the year of production but it was not affected significantly by the production season.

Calving intervals ranged from the lower value of 11.86 and 11.87 months in Winter and Summer seasons in 1985 to the higher value of 12.38 and 12.38 months for both Winter and Summer seasons in 1989. These results are in agreement with the results indicated by U.S. Department of Agriculture (1976).

III-1.b. Gestation period. (GP):

The effect of the year was highly significant on gestation period but the season within the year had no significant effect.

Gestation period differed from 9.04, 9.04 to 9.66, 9.66 months in Winter and Summer seasons of 1986 and 1994, respectively. These results are similar to those obtained by Hamed (1996), who reported that the ideal GP in cows was about 280 days (9.33 months).

III-1.c. The Days open:

The days open is very important as the majority of health events are observed during the first 90 days after calving. The increase of days open over 100 days increased the costs per cow (Jadhav et al., 1991 a, b and c).

Table, 25 shows that, the days open was affected significantly by the year ($P < 0.01$). But season within the year had no significant effect. The lower values of days open were for 1995 in Winter and Summer seasons, they were 2.41, 2.41 months. While the higher values of days open were 3.27, 3.27 months in Winter and Summer seasons of 1989, respectively.

These results are not in agreement with the results obtained by Olds et al., (1979), ATB (1984), Jassim and Ray (1986) and Samaha (1996). They reported that, the days open was higher in Summer than in Winter seasons.

III-1.d. The Dry period:

The dry period was affected significantly (P< 0.01) by different years. On the other hand, the season within the year had no significant effect on the dry period.

Table (25) shows that the dry period ranged from 2.08 months to 2.57 and 2.50 months for Winter and Summer seasons of 1985, 1995 and 1994, respectively. These results were higher than the ideal dry period (55-56) days that was reported by Kang et al., (1986), Bruins (1995) and Samaha (1996).

III-1.e. Number of Services per conception (S/C):

Services per conception are affected significantly (P< 0.01) by different years of production but it did not affected by the season.

The low values of service per conception were 1.26, 1.26 times in Winter and Summer seasons of 1989. The maximum values were 2.32, 2.32 times in Winter and Summer seasons of 1996. These results are in agreement with those obtained by Eldon et al., (1990), and lower than the results obtained by Weaver et al., (1988), who reported that, the service per conception had the range 2-5 times. Also the present results disagree with Jassim and Ray (1986). They reported that, services per conception was higher in Summer than in Winter.

III-1.f. Age at first service:

Table (26) indicates that the age at first service was affected significantly (P< 0.01) by the production year; while, the season within the year did not affect significantly the age at first service.

High ages at first service were 2.55, 2.55 years in Winter and Summer seasons of 1996. The low values were of 1989 (1.75, 1.75) year for Winter and Summer seasons, respectively.

Table (25): Means ± SE of Calving interval, Gestation period, Days open and dry period, in different years and seasons.

Year	Season	Number of records	Reproductive Traits (Month)			
			Calving interval	Gestation period	Days open	Dry period
1985	Winter	203	11.86±0.06^{D}	9.04±0.04^{F}	2.83±0.07^{B}	2.08±0.04^{E}
1985	Summer	203	11.87±0.06^{D}	9.04±0.04^{F}	2.81±0.07^{B}	2.08±0.04^{E}
1986	Winter	215	12.11±0.072^{BC}	9.04±0.026^{F}	3.07±0.077^{A}	2.29±0.036^{D}
1986	Summer	215	12.10±0.072^{BC}	9.04±0.026^{F}	3.07±0.077^{A}	2.28±0.035^{D}
1987	Winter	181	12.15±0.075^{ABC}	9.05±0.031^{F}	3.09±0.080^{A}	2.30±0.036^{D}
1987	Summer	181	12.15±0.075^{ABC}	9.05±0.031^{F}	3.09±0.080^{A}	2.30±0.036^{D}
1988	Winter	180	12.28±0.079^{BA}	9.08±0.037^{EF}	3.20±0.086^{A}	2.44±0.131^{ABC}
1988	Summer	180	12.28±0.079^{BA}	9.08±0.037^{EF}	3.20±0.086^{A}	2.44±0.131^{ABC}
1989	Winter	141	12.38±0.082^{A}	9.10±0.034^{EF}	3.27±0.090^{A}	2.35±0.045^{BCD}
1989	Summer	141	12.38±0.082^{A}	9.10±0.034^{EF}	3.27±0.090^{A}	2.35±0.045^{BCD}
1990	Winter	138	12.25±0.075^{AB}	9.07±0.046^{EF}	3.17±0.086^{A}	2.31±0.045^{CD}
1990	Summer	138	12.25±0.075^{AB}	9.07±0.046^{EF}	3.17±0.086^{A}	2.31±0.045^{CD}
1991	Winter	130	12.14±0.073^{ABC}	9.10±0.044^{EF}	3.04±0.085^{A}	2.32±0.047^{CD}
1991	Summer	130	12.16±0.072^{ABC}	9.10±0.044^{EF}	3.04±0.085^{A}	2.32±0.047^{CD}
1992	Winter	99	12.21±0.077^{ABC}	9.14±0.022^{E}	3.07±0.077^{A}	2.27±0.050^{D}
1992	Summer	99	12.21±0.077^{ABC}	9.14±0.022^{E}	3.07±0.077^{A}	2.27±0.050^{D}
1993	Winter	90	12.19±0.106^{ABC}	9.36±0.065^{C}	2.83±0.084^{B}	2.33±0.061^{CD}
1993	Summer	90	12.19±0.106^{ABC}	9.36±0.065^{C}	2.83±0.084^{B}	2.33±0.061^{CD}
1994	Winter	111	11.86±0.074^{D}	9.21±0.0301^{D}	2.64±0.071^{BC}	2.50±0.060^{A}
1994	Summer	111	11.86±0.074^{D}	9.21±0.0301^{D}	2.64±0.071^{BC}	2.50±0.060^{A}
1995	Winter	349	11.93±0.058^{DC}	9.59±0.0417^{B}	2.41±0.037^{D}	2.57±0.038^{A}
1995	Summer	349	12.08±0.152^{DC}	9.59±0.0417^{B}	2.41±0.147^{D}	2.57±0.038^{A}
1996	Winter	100	12.15±1.21^{ABC}	9.66±0.091^{A}	2.49±0.051^{CD}	2.48±0.050^{AB}
1996	Summer	100	12.15±1.21^{ABC}	9.66±0.091^{A}	2.49±0.051^{CD}	2.48±0.050^{AB}
Total Mean	Winter	1937	12.12±0.17	9.20±0.042	2.92±0.074	2.35±0.053
	Summer	1937	12.14±0.17	9.20±0.042	2.92±0.083	2.35±0.053

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (26): Means ± SE of Service per conception, Ages at first service and milk frequency, in different year and seasons.

Year	Season	Number of Records	Reproductive Performance Measures		Milk Frequency
			Services per conception	Age at first Service (year)	
1985	Winter	203	1.38 ± 0.034^{F}	1.91 ± 0.043^{C}	2.01 ± 0.00912^{C}
1985	Summer	203	1.38 ± 0.034^{F}	1.91 ± 0.043^{C}	2.01 ± 0.00912^{C}
1986	Winter	215	1.68 ± 0.038^{D}	1.86 ± 0.042^{CD}	2.11 ± 0.119^{C}
1986	Summer	215	1.67 ± 0.038^{D}	1.87 ± 0.041^{CD}	2.009 ± 0.0061^{C}
1987	Winter	181	1.52 ± 0.0408^{E}	1.82 ± 0.049^{CDE}	2.00 ± 0.00^{C}
1987	Summer	181	1.53 ± 0.0708^{E}	1.82 ± 0.049^{CDE}	2.00 ± 0.00^{C}
1988	Winter	180	1.37 ± 0.038^{F}	1.79 ± 0.049^{DE}	2.00 ± 0.00^{C}
1988	Summer	180	1.37 ± 0.038^{F}	1.79 ± 0.049^{DE}	2.00 ± 0.00^{C}
1989	Winter	141	1.26 ± 0.038^{G}	1.75 ± 0.061^{E}	2.00 ± 0.00^{C}
1989	Summer	141	1.26 ± 0.038^{G}	1.75 ± 0.062^{E}	2.00 ± 0.00^{C}
1990	Winter	138	1.38 ± 0.045^{F}	1.75 ± 0.062^{E}	2.00 ± 0.00^{C}
1990	Summer	138	1.37 ± 0.044^{F}	1.75 ± 0.062^{E}	2.00 ± 0.00^{C}
1991	Winter	130	1.45 ± 0.048^{EF}	1.76 ± 0.065^{DE}	2.01 ± 0.010^{C}
1991	Summer	130	1.44 ± 0.048^{EF}	1.76 ± 0.065^{DE}	2.03 ± 0.016^{C}
1992	Winter	99	1.51 ± 0.053^{E}	1.79 ± 0.085^{DE}	2.35 ± 0.048^{A}
1992	Summer	99	1.51 ± 0.053^{E}	1.79 ± 0.085^{DE}	2.35 ± 0.048^{A}
1993	Winter	90	1.71 ± 0.063^{D}	1.91 ± 0.048^{C}	2.32 ± 0.048^{A}
1993	Summer	90	1.72 ± 0.063^{D}	1.91 ± 0.048^{C}	2.30 ± 0.048^{A}
1994	Winter	111	1.81 ± 0.062^{C}	1.81 ± 0.040^{CDE}	2.13 ± 0.032^{B}
1994	Summer	111	1.81 ± 0.062^{C}	1.81 ± 0.040^{CDE}	2.13 ± 0.032^{B}
1995	Winter	349	2.17 ± 0.0412^{B}	2.04 ± 0.025^{B}	2.02 ± 0.007^{C}
1995	Summer	349	2.17 ± 0.0412^{B}	2.04 ± 0.025^{B}	2.02 ± 0.007^{C}
1996	Winter	100	2.32 ± 0.058^{A}	2.55 ± 0.049^{A}	2.01 ± 0.01^{C}
1996	Summer	100	2.32 ± 0.058^{A}	2.55 ± 0.049^{A}	2.01 ± 0.01^{C}
Total Mean	Winter	1937	1.63 ± 0.046	1.89 ± 0.051	2.08 ± 0.023
Total Mean	Summer	1937	1.62 ± 0.049	1.89 ± 0.051	2.07 ± 0.014

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).

2- Locality effect on reproductive efficiency and performance:

III-2.a. Calving interval. (CI):

Locality of milk production was found to have significant (P< 0.05) effects on calving interval but the season did not. Their values ranged from 11.02 and 11.02 months in Winter and Summer seasons of Alexandria province to 12.28, 12.28, 12.28 and 12.26 months in Winter and Summer seasons of El-Garbia and Behaira provinces, respectively (Table 27).

III-2.b. Gestation period.(GP):

Table (27) showed the significant (P< 0.01) effect of the locality on GP. Meanwhile the season within locality had no significant effect on GP. Gestation period ranged from 8.98 to 9.74 months in Winter and Summer seasons of El-Garbia and Behaira, respectively.

III-2.c. Days open.(DO):

The locality had significant (P< 0.01) effects on days open. While, days open were significantly affected by season within locality. The low days open was 1.8 months in Winter and Summer seasons of Alexandria. The higher value was 3.29 months in Winter and Summer seasons of El-Garbia locality. These results are in agreement with the results obtained by Eldon and Olafsson (1988) and Smith et al., (1993).

III-2.d. Dry period.(DP):

Dry period was affected significantly (P< 0.01) by the locality where the animals were found, but was not affected significantly by the season. From Table (27) dry periods ranged from 2.17 months to 2.57 months in Winter and Summer seasons of El-Garbia and Behaira.

III-2.e. Services per conception.(S.C):

The locality had significant (P< 0.01) effects on services per conception. While the season within locality had no significant effect on services per conception.

Table (28) demonstrates that the services per conception ranged from 1.50 to 2.80 times in Winter and Summer seasons of El-Garbia and El-Monofia.

III-2.f. Age at first service:

The locality had significant (P< 0.01) effect on the age at first service. Table (28) demonstrates that the higher age at first service was 2.30 year. While the lower age at first service was 1.55 year in Winter and Summer seasons of Behaira and Alexandria.

Table (27): Means±SE of Calving interval, Gestation period, Days open and dry period. For different localities and seasons.

Locality	Season	Number of Records	Reproductive performance			
			Calving interval	Gestation period	Days open	Dry period
Behaira	Winter Summer	66 66	12.28 ± 0.162^{A} 12.26 ± 0.163^{A}	9.74 ± 0.105^{A} 9.74 ± 0.105^{A}	2.53 ± 0.086^{B} 2.52 ± 0.086^{B}	2.57 ± 0.07^{A} 2.56 ± 0.07^{A}
Alexandria	Winter Summer	4 4	11.02 ± 0.165^{C} 11.02 ± 0.165^{C}	9.22 ± 0.103^{BC} 9.22 ± 0.103^{BC}	1.80 ± 0.115^{C} 1.80 ± 0.115^{C}	2.37 ± 0.235^{A} 2.37 ± 0.235^{A}
Kafr El-shaikh	Winter Summer	964 964	11.93 ± 0.028^{AB} 11.98 ± 0.057^{AB}	9.39 ± 0.018^{B} 9.39 ± 0.018^{B}	2.53 ± 0.021^{B} 2.58 ± 0.055^{B}	2.53 ± 0.020^{A} 2.53 ± 0.020^{A}
El-Garbia	Winter Summer	894 894	12.28 ± 0.035^{A} 12.28 ± 0.035^{A}	8.98 ± 0.017^{C} 8.98 ± 0.016^{C}	3.29 ± 0.039^{A} 3.29 ± 0.038^{A}	2.17 ± 0.029^{A} 2.17 ± 0.029^{A}
El-Monofia	Winter Summer	9 9	11.45 ± 0.19^{BC} 11.45 ± 0.19^{BC}	9.06 ± 0.026^{C} 9.06 ± 0.026^{C}	2.38 ± 0.0196^{BC} 2.38 ± 0.0196^{BC}	2.55 ± 0.153^{A} 2.55 ± 0.153^{A}
Total Mean	Winter Summer	1937 1937	11.79 ± 0.116 11.79 ± 0.116	9.27 ± 0.053 9.27 ± 0.053	2.50 ± 0.056 2.51 ± 0.062	2.43 ± 0.101 2.43 ± 0.101

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (28): Means±SE of Service per conception, Ages at first service and milk frequency. For different localities and the seasons.

Locality	Season	Number of Records	Reproductive performance		Milk Frequency
			Service per conception	Age at first service (Year	
Behaira	Winter Summer	66 66	2.12 ± 0.064^{B} 2.14 ± 0.061^{B}	2.30 ± 0.062^{A} 2.30 ± 0.062^{A}	2.00 ± 0.00^{B} 2.00 ± 0.00^{B}
Alexandria	Winter Summer	4 4	2.25 ± 0.25^{B} 2.25 ± 0.25^{B}	1.55 ± 0.155^{C} 1.55 ± 0.155^{C}	2.00 ± 0.00^{B} 2.00 ± 0.00^{B}
Kafr El-shaikh	Winter Summer	964 964	1.76 ± 0.026^{C} 1.76 ± 0.026^{C}	1.84 ± 0.017^{BC} 1.85 ± 0.017^{BC}	2.00 ± 0.00^{B} 2.00 ± 0.00^{B}
El-Garbia	Winter Summer	894 894	1.50 ± 0.016^{C} 1.50 ± 0.016^{C}	1.92 ± 0.25^{B} 1.93 ± 0.25^{B}	2.12 ± 0.027^{B} 2.12 ± 0.027^{B}
El-Monofia	Winter Summer	9 9	2.80 ± 0.32^{A} 2.80 ± 0.32^{A}	1.76 ± 0.09^{BC} 1.76 ± 0.09^{BC}	2.33 ± 0.16^{A} 2.33 ± 0.16^{A}
Total Mean	Winter Summer	1937 1937	2.08 ± 0.135 2.08 ± 0.135	1.87 ± 0.11 1.88 ± 0.11	2.09 ± 0.037 2.09 ± 0.037

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

3- Breed effect on reproductive efficiency and performance:

Calving interval, gestation period, days open, dry period, number of services per conception and the age at first service affected significantly by the breed of dairy cows and did not affected by the season of production.

III-3.a. Calving interval.(CI):

The higher calving interval was 13.67 months in Winter and Summer seasons of Buffalo (Table 29). These results were lower than those of Ramadan (1996) who reported that, the calving interval in Buffalo was about 15 months. While the lower calving interval was 11.36 months in Winter and Summer seasons of H.F. Moreover, results disagreed with the results obtained by Stott and Delorenzo (1988). They reported that the CI for H.F was longer than the CI of other breeds of cows.

The ideal CI was 12-13.5 months for dairy cattle, and this range maximized profit and milk yield. Higher calving interval than this range increased production costs by about (0.78-1.95) £/cow for each day over this range (U.S. Department of Agriculture, 1976; Donald et al., 1978 and Gerrits et al., 1979).

III-3.b. Gestation period.(GP):

Gestation period differed from 9.07 months in Winter and Summer seasons of the cross Charolais X Friesian. The lower period was 9.08 months in Winter and Summer seasons for Friesian and the higher GP was 11.09 months in Winter and Summer seasons for buffalo.

III-3.c. Days open.(DO):

Table (29) reveals that, the days open ranged from (higher days open of Friesian cows) 3.03 in Winter and Summer seasons to the lower days open as 2.26 , 2.27, 2.26 and 2.26 months in Winter and Summer seasons for Balady and H.F.

III-3.d. Dry period.(DP):

Table (29) showed that the dry period ranged from 2.25, 2.25, 2.30, 2.30 months to 2.93, 2.93 months for Winter and Summer seasons of Charolais, Friesian and Buffalo; respectively.

III-3.e. Number of Service per conception.(S.C):

Table (30) demonstrate that, the values of service per conception were 1.51, 1.50 times in Winter and Summer seasons of Friesian cows. Meanwhile, the higher service per conception were 2.94, 2.94, 2.83 and 2.83 times in Winter and Summer seasons for Buffalo and H.F. Buffaloes required high number of services than cattle to conceive. These results agree with those obtained by Williamson (1986), Ramadan (1996) reported that, buffalo characterized by silent heat and each 5 cycles have two cycle with silent heat due to decreasing level of estrogen hormone, so that buffalo have lower conception rate than cattle.

III-3.f. Age at first service:

The higher ages at first service were 2.65, 2.65, 2.76 and 2.76 years in Winter and Summer seasons of Buffalo species and Charolais; respectively. These results are in agreement with Ramadan (1996), who mentioned that the age at first service in buffalo occurs at 2-5 years of age. On ther hand, the age first service was 1.62 years for Charolais X Friesian for either Winter and Summer seasons.

Table (29): Means±SE of Calving interval, Gestation period, Days open and dry period of different breeds and seasons.

Breed	Season	No. of Rec.	Reproductive Efficiency			
			Calving interval	Gestation period	Days open	Dry period
Balady	Winter	229	11.50±0.044^{B}	9.23±0.021^{C}	2.26±0.038^{F}	2.46±0.042^{ABC}
Balady	Summer	229	11.50±0.044^{B}	9.23±0.021^{C}	2.27±0.039^{F}	2.46±0.042^{ABC}
Friesian	Winter	1502	12.12±0.024^{B}	9.08±0.011^{C}	3.03±0.026^{A}	2.30±0.020^{C}
Friesian	Summer	1502	12.16±0.040^{B}	9.09±0.010^{C}	3.06±0.042^{A}	2.30±0.020^{C}
CharXFr	Winter	4	11.50±0.215^{B}	9.07±0.0475^{C}	2.42±0.215^{D}	2.37±0.235^{BC}
CharXFr	Summer	4	11.50±0.215^{B}	9.07±0.0475^{C}	2.42±0.215^{D}	2.37±0.235^{BC}
BalXFr	Winter	86	11.67±0.083^{B}	9.34±0.037^{CB}	2.32±0.070^{E}	2.62±0.080^{ABC}
BalXFr	Summer	86	11.66±0.083^{B}	9.34±0.037^{CB}	2.31±0.070^{E}	2.62±0.080^{ABC}
Charolais	Winter	19	12.04±0.121^{B}	9.50±0.045^{B}	2.54±0.112^{C}	2.25±0.162^{C}
Charolais	Summer	19	12.04±0.121^{B}	9.50±0.045^{B}	2.54±0.112^{C}	2.25±0.162^{C}
H.F	Winter	3	11.36±0.49^{A}	9.10±0.057^{C}	2.26±0.53^{F}	2.83±0.161^{AB}
H.F	Summer	3	11.36±0.49^{B}	9.10±0.057^{C}	2.26±0.53^{F}	2.83±0.161^{AB}
Buffalo	Winter	94	13.67±0.093^{B}	11.09±0.049^{A}	2.58±0.069^{B}	2.93±0.069^{A}
Buffalo	Summer	94	13.67±0.093^{B}	11.09±0.049^{A}	2.58±0.069^{B}	2.93±0.069^{A}
Total Mean	Winter	1937	11.98±0.152	9.48±0.038	2.48±0.151	2.53±0.109
	Summer	1937	11.98±0.152	9.48±0.038	2.48±0.153	2.53±0.109

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (30): Means±SE of Service per conception, Ages at first service and milk frequency of different breeds and seasons.

Breed	Season	No. of Rec.	Reproductive performance		Milk Frequency
			Services per conception	Ages at first service (Year)	
Balady	Winter	229	2.004 ± 0.043^{B}	2.13 ± 0.033^{B}	2 ± 0.00^{B}
	Summer	229	2.004 ± 0.042^{B}	2.13 ± 0.033^{B}	$2\pm0.0.00^{B}$
Friesian	Winter	1502	1.51 ± 0.014^{D}	1.80 ± 0.016^{BC}	2.07 ± 0.016^{B}
Friesian	Summer	1502	1.50 ± 0.014^{D}	1.81 ± 0.016^{BC}	2.06 ± 0.0061^{B}
CharXFr	Winter	4	1.92 ± 0.075^{BC}	1.62 ± 0.125^{C}	2 ± 0.00^{B}
CharXFr	Summer	4	1.92 ± 0.075^{BC}	1.62 ± 0.125^{C}	2 ± 0.00^{B}
BalXFr	Winter	86	1.98 ± 0.067^{BC}	1.87 ± 0.040^{BC}	2 ± 0.00^{B}
BalXFr	Summer	86	1.98 ± 0.069^{BC}	1.87 ± 0.040^{BC}	2 ± 0.00^{B}
Charolais	Winter	19	1.63 ± 0.098^{CD}	2.76 ± 0.057^{A}	2 ± 0.00^{B}
Charolais	Summer	19	1.63 ± 0.098^{CD}	2.76 ± 0.057^{A}	2 ± 0.00^{B}
H.F	Winter	3	2.83 ± 0.16^{A}	1.80 ± 0.196^{BC}	3 ± 0.00^{A}
H.F	Summer	3	2.83 ± 0.16^{A}	1.80 ± 0.196^{BC}	3 ± 0.00^{A}
Buffalo	Winter	94	2.94 ± 0.078^{A}	2.65 ± 0.045^{A}	2 ± 0.00^{B}
Buffalo	Summer	94	2.94 ± 0.078^{A}	2.65 ± 0.045^{A}	2 ± 0.00^{B}
Total Mean	Winter	1937	2.11 ± 0.076	2.09 ± 0.073	2.15 ± 0.002
	Summer	1937	2.11 ± 0.076	2.09 ± 0.073	2.15 ± 0.002

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

4- Sector effect on reproductive efficiency and performance:

III-4.a. Calving interval (CI):

Sector and season within the sector had no significant effect on the calving intervals. Table (31) showed that, the calving intervals were 12.15, 12.15, 11.96 and 12.07 months for Winter and Summer seasons of private and farmers sectors; respectively. On contrary, the Governmental sector had a lower calving interval of 11.58 months in Winter and Summer seasons.

III-4.b. Gestation period.(GP):

Table (31) showed that, the sector had a significant effect on gestation period, while season within sector had no significant effect on gestation period. On the other hand, gestation period ranged from 9.62 to 9.09 months in Winter and Summer seasons of farmers and private sector.

III-4.c. Days open:

Sector and season within the sector had no significant effect on days open. The lower days open values were 2.24, 2.24, 2.33 and 2.44 months for Winter and summer seasons of governmental and farmers sectors; respectively. Meanwhile, the higher days open were 3.06, 3.05 months in Winter and Summer seasons of private sector (Table, 31).

III-4.d. Dry period:

Sector and season had significant ($P < 0.05$) effect on dry period while the season within the sector had no significant effect on it. Their lower values were 2.30, 2.30, 2.31 and 2.31 months in Winter and Summer seasons of private and governmental sectors, respectively. Higher dry periods were 2.57 and 2.57 months in Winter and Summer seasons of farmer sectors.

III-4.e. Number of Services per Conception:

Number of services per conception was affected significantly ($P < 0.01$) by the sector. Season within the sector did not affect significantly the number of services per conception.

The lower number of services per conception were 1.48, 1.48 times in Winter and Summer seasons of private sector. Higher number of services per conception were 2.20, 2.20 and 2.35, 2.35 times in Winter and Summer seasons of the farmers and governmental sector, respectively.

III-4.f. Age at first service.

Sector and season within sector had no significant effect on the age at first service. Table (32) shows that, the higher values of age at first service were 2.04, 2.04 and 2.13, 2.13 years in Winter and Summer seasons of governmental and farmer sector; respectively. While, the lower values of age at first service 1.82, 1.82 years in Winter and Summer seasons for private sector.

Table (31): Means±SE of (Calving interval, Gestation period, Days open and dry period) of different sectors and seasons.

Sector	Season	No of Rec.	Reproductive efficiency			
			Calving interval	Gestation period	Days open	Dry period
Farmers	Winter	456	11.96 ± 0.053^A	9.62 ± 0.0384^A	2.33 ± 0.30^B	2.57 ± 0.032^A
Farmers	Summer	456	12.07 ± 0.119^A	9.62 ± 0.0384^A	2.44 ± 0.113^B	2.57 ± 0.032^A
Private	Winter	1465	12.15 ± 0.024^A	9.09 ± 0.012^C	3.06 ± 0.027^A	2.30 ± 0.020^B
Private	Summer	1465	12.15 ± 0.024^A	9.09 ± 0.010^C	3.05 ± 0.026^A	2.30 ± 0.020^B
Govrnem	Winter	16	11.58 ± 0.215^B	9.34 ± 0.167^B	2.24 ± 0.105^B	2.31 ± 0.11^B
Govrnem	Summer	16	11.58 ± 0.215^B	9.34 ± 0.167^B	2.24 ± 0.105^A	2.31 ± 0.11^B
Total	Winter	1937	11.89 ± 0.097	9.35 ± 0.069	2.54 ± 0.144	2.39 ± 0.054
Mean	Summer	1937	11.93 ± 0.119	9.35 ± 0.069	2.57 ± 0.081	2.39 ± 0.054

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (32): Means±SE of Service per conception, Age at first service and milk frequency of different years and seasons.

Sector	Season	No of Rec.	Reproductive efficiency		Milk Frequency
			Service per conception	Ages at first service (Year)	
Farmers	Winter	456	2.20 ± 0.033^A	2.133 ± 0.024^A	2.00 ± 0.00^A
Farmers	Summer	456	2.20 ± 0.033^A	2.133 ± 0.024^A	2.00 ± 0.00^A
Private	Winter	1465	1.48 ± 0.014^B	1.82 ± 0.017^B	2.08 ± 0.00^A
Private	Summer	1465	1.48 ± 0.014^B	1.82 ± 0.017^B	2.08 ± 0.00^A
Govrnem	Winter	16	2.35 ± 0.2025^A	2.04 ± 0.155^A	2.00 ± 0.00^A
Govrnem	Summer	16	2.35 ± 0.5875^A	2.04 ± 0.155^A	2.00 ± 0.00^A
Total	Winter	1937	2.01 ± 0.08	1.99 ± 0.06	2.02 ± 0.00
Mean	Summer	1937	2.01 ± 0.21	1.99 ± 0.065	2.02 ± 0.00

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

IV- MILKING FREQUENCY:

Increasing the number of milking causes increasing the milk yield. It activated udder blood vessels and mammary cells and renew the ability of the animal to yield more milk. So the milking records standardized to a 2-times a-day milking basis which is more efficient and profitable. Milking frequency differed from year to year, locality to another locality, breed to breed, sector to another and from season to season. According to labour efficiency, production of cow and dairy farmers capital.

IV-1. Year and season effect:

Milk frequency affected significantly (P<0.01) by the year. The lower milk frequencies were 2.00 times for Winter and Summer seasons of 1987, 1988, 1989 and 1990. Meanwhile, the higher milk frequencies were about 2.35, 2.35, 2.32 and 2.30 times in Winter and Summers seasons of 1992 and 1993, respectively.

IV.2. Locality and season effect:

Locality had significant effect (P< 0.01) on milk frequency. Table (28) showed that the higher values of milk frequency were 2.33 and 2.33 times in Winter and Summer seasons of El-Monofia locality. Lower values of milk frequency were 2, 2, 2, 2, 2, 2, 2.12 and 2.10 times for Winter and Summer seasons of Kafr-El-shaikh,Behaira,Alexandria and El-Garbia, respectively.

IV.3. Breed and season effect:

Milk frequency differed significantly (P< 0.01) from one breed to another. The lower values were 2, 2, 2.07, 2.06, 2, 2, 2, 2, 2, 2, 2 and 2 times in Winter and Summer seasons of Balady, Friesian, Charolais X Friesian, Friesian X Balady, Buffalo, Charolais. The higher milk frequency values were found in H.F farms as it 3 and 3 times for Winter and Summer seasons of H.F breed (Table, 30).

IV.4. Sector and season effect:

Sector effect on milk frequency was significant (P< 0.01). Table (32) showed that the higher values were 2.08 and 2.06 times in Winter and Summer seasons of private sector, respectively. Lower values were 2 times in Winter and Summer seasons of farmers and governmental sectors, respectively.

V- COSTS PARAMETERS:

V-1. Effect of year and season on other costs parameters:

V-1.a. Fuel costs:

Fuel costs affected significantly by year and the season of production (P< 0.01). The lower values of fuel costs were 0.58, 0.38 to 17.03, 16.02 LE/cow/for Winter , Summer, Winter and Winter seasons of 1996, 1996, 1992 and 1993, respectively.

V-1.b. Litter costs:

Litter costs affected significantly (P< 0.01) by the year. The lower values of litter costs were 15.14, 15.60, 15.98 LE/cow in Summer seasons of 1985, 1986 and 1989, respectively. The higher litter costs values were 104.64 and 122.10 LE/cow in Winter seasons of 1995 and 1996.

V-1.c. Labour costs:

The labour costs differed significantly (P< 0.01) from one year to another and from season within year to another. The lower values were 15.58 and 15.58 LE/cow in Winter and Summer seasons of 1996. While, the higher labour costs were 912.34 and 798.26 LE/cow in Winter seasons of 1992 and 1991, respectively. (Table, 33).

VI-VARIABLE COSTS

VI-1. Effect of year and season on total variable costs:

Table (33) showed that there was a highly significant (P< 0.01) effect of the year on the total variable costs. The lower values of total variable costs were 524.30, 659.20, 694.57 and 821.56 LE/cow in Winter and Summer seasons of 1985 and 1986, respectively. The higher values of total variable costs were 2663.7, 2454.32 LE/cow in Summer seasons of 1993 and 1992, respectively.

Table (33): Means±SE of the Fuel, litter, labour and total variable costs/LE/cow during different years and seasons.

Year	Season	No of Rec.	Other variable costs/LE/cow			Total Variable costs
			Fuel	Litter	Labour	
1985	Winter	203	6.92±0.03^{J}	29.87±0.12^{E}	213.62±5.08^{G}	524.30±13.05^{O}
1985	Summer	203	3.86±0.02^{K}	15.14±0.31^{E}	181.76±0.93^{H}	659.20±14.75^{N}
1986	Winter	215	8.08±0.17^{I}	43.18±1.33^{D}	339.57±3.70^{F}	694.57±8.446^{N}
1986	Summer	215	4.74±0.04^{K}	15.60±0.288^{F}	294.57±3.35^{G}	821.56±13.50^{L}
1987	Winter	181	6.93±0.092^{H}	42.71±0.62^{D}	406.25±5.15^{E}	810.86±5.32^{M}
1987	Summer	181	6.29±0.097^{J}	17.17±0.32^{F}	337.52±4.91^{F}	879.99±17.81^{L}
1988	Winter	180	11.35±0.101^{F}	42.15±0.72^{D}	489.73±6.37^{E}	956.53±6.93^{K}
1988	Summer	180	7.48±0.143^{J}	18.06±0.21^{F}	378.27±5.98^{F}	1068.31±27.48^{I}
1989	Winter	141	12.63±0.129^{E}	42.06±0.31^{D}	579.27±8.93^{D}	1088.72±9.30^{I}
1989	Summer	141	8.30±0.175^{I}	15.98±0.44^{F}	437.04±8.22^{E}	1190.70±26.16^{J}
1990	Winter	138	14.02±0.181^{D}	47.37±0.32^{D}	679.36±11.86^{C}	1315.67±12.97^{H}
1990	Summer	138	9.15±0.191^{H}	21.13±0.84^{E}	503.39±10.53^{D}	1424.55±31.08^{G}
1991	Winter	130	15.64±0.237^{C}	47.40±0.36^{D}	798.26±14.73^{B}	1853.66±22.43^{F}
1991	Summer	130	10.80±0.58^{G}	21.44±0.92^{E}	656.49±46.99^{C}	2067.24±58.94^{E}
1992	Winter	99	17.03±0.44^{A}	47.08±0.84^{D}	912.34±26.31^{A}	2268.95±43.65^{D}
1992	Summer	99	10.60±0.23^{G}	25.34±1.56^{E}	661.43±19.35^{C}	2454.32±65.95^{B}
1993	Winter	90	16.02±1.05^{B}	55.42±3.18^{D}	788.04±53.23^{B}	2349.34±117.75^{C}
1993	Summer	90	10.25±0.77^{G}	28.82±2.32^{E}	570.71±38.99^{D}	2663.70±133.35^{A}
1994	Winter	111	12.12±1.311^{E}	65.60±4.37^{D}	589.31±68.21^{D}	2152.42±120.75^{E}
1994	Summer	111	6.83±0.80^{I}	42.64±3.77^{D}	393.72±47.61^{F}	2276.23±137.43^{EC}
1995	Winter	349	2.64±0.46^{K}	104.64±4.95^{B}	126.58±42.11^{H}	1329.04±48.10^{G}
1995	Summer	349	1.51±0.28^{L}	64.33±2.72^{C}	82.62±28.12^{I}	1747.39±68.06^{F}
1996	Winter	100	0.58±0.388^{M}	122.10±6.15^{A}	15.58±0.15^{J}	1453.06±111.98^{G}
1996	Summer	100	0.38±0.258^{M}	76.99±3.13^{C}	15.58±0.15^{J}	2204.86±97.73^{EC}
Total Mean	Winter	1937	10.33±0.37	57.46±1.93	494.82±21.205	1399.76±43.38
	Summer	1937	6.69±0.29	30.22±1.40	376.09±17.92	1621.50±57.68

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

VII- FIXED COSTS:

VII-1. Year and season effect (Table 34).

Year of milk production had highly significant (P < 0.01) effects, while the season within year had no significant effect on the fixed costs patterns. Animal depreciation exerted major influence on which cow culling system is most profitable. (Pearson and Preeman, 1973). Lower animal depreciations were 72.87, 72.87 LE/cow in Winter and Summer seasons of 1995. Higher values of animal depreciations were 139.78 to 140.116 for Winter and Summer seasons of 1985.

Buildings depreciation was higher in the later years than the earlier years of this research. Higher buildings depreciation were 62.32, 65.42, 102.31 and 100.18 LE/cow in Winter and Summer seasons of 1995 and 1996, respectively. While the lower building depreciations were 39.40, 38.30, 40.57, 40.39 and 39.83, 39.83 LE/cow in Winter and Summer seasons of 1985, 1986 and 1987 ,respectively.

Equipment depreciation were 1.45, 1.45, 1.18, 1.18 and 5.53, 5.53 LE/Cow in Winter and Summer seasons of 1996, 1995 and 1994, while, the higher values of equipment depreciation were in 1985 and 1986 (25.31, 25.31, 23.24, 23.36 LE/cow) in Winter and Summer seasons, respectively.

Total fixed costs were 210.29, 205.31, 204.56 and 203.78 LE/cow in Winter and Summer seasons of 1996 and 1985 ,respectively. These values are considered as high fixed costs value. Meanwhile, the lower total fixed costs were 146.13, 146.11 and 139.17, 139.17 LE/cow in Winter and Summer seasons of 1993 and 1995, respectively (Table, 34). Lower fixed costs increased in seasonal grass based system of milk production (Kelly and Fingleton, 1983).

VIII- EFFECT OF YEAR AND SEASON ON TOTAL COSTS.

There were significant (P< 0.01) effects of both year and season within year on total costs values.

Values of total fixed costs ranged from lower value of Winter, Summer and Winter seasons of 1986, 1985 and 1985 (884.11, 862.98 and 728.88 LE/cow, respectively) to higher values in Summer seasons of 1993, 1992 and 1994 (2809.81, 2614.89 and 2436.12 LE/cow, respectively). These results are in agreement with those of Fuller et al.,(1982). They reported that heifer raising costs $ 756 for 24 months or $ 1.05 per day.

Table (34): Means±SE of fixed cost parameters (Animal, Building and equipment), depreciation (Dep), Total fixed and total costs/LE/cow, for different years and seasons.

Year	Season	No of Rec.	Fixed costs patterns			Total Fixed costs	Total Costs
			Animal Dep.	Building Dep.	Equip Dep		
1985	Winter	203	139.78±6.83^{A}	39.40±2.26^{D}	25.31±0.84^{A}	204.56±6.80^{AB}	728.88±14.20^{Q}
1985	Summer	203	140.116±6.85^{A}	38.30±2.01^{D}	25.31±0.84^{A}	203.78±6.70^{AB}	862.98±16.31^{P}
1986	Winter	215	125.46±5.58^{AB}	40.57±2.12^{D}	23.24±0.85^{B}	189.53±5.44^{BC}	884.11±10.22^{P}
1986	Summer	215	125.46±5.55^{AB}	40.39±2.12^{D}	23.36±0.85^{B}	189.25±5.41^{BC}	1010.81±14.93^{N}
1987	Winter	181	97.008±5.02^{ED}	39.83±1.87^{D}	21.21±1.01^{C}	158.09±4.99^{D}	968.97±7.95^{O}
1987	Summer	181	97.008±5.02^{ED}	39.83±1.87^{D}	21.21±1.01^{C}	158.09±4.99^{D}	1038.07±17.96^{N}
1988	Winter	180	118.24±8.52^{BC}	45.002±2.06^{C}	17.03±1.02^{D}	180.82±8.91^{C}	1136.80±11.97^{M}
1988	Summer	180	118.24±8.52^{BC}	45.002±2.06^{C}	17.03±1.02^{D}	180.32±8.91^{C}	1248.72±25.93^{L}
1989	Winter	141	93.31±7.52^{ED}	46.41±2.409^{C}	15.33±1.13^{E}	155.11±8.08^{ED}	1243.83±14.42^{L}
1989	Summer	141	93.31±7.52^{ED}	46.41±2.409^{C}	15.33±1.13^{E}	155.11±8.08^{ED}	1345.80±23.92^{K}
1990	Winter	138	98.50±9.61^{ED}	47.44±2.48^{C}	14.47±1.15^{F}	160.47±10.18^{D}	1476.15±17.70^{J}
1990	Summer	138	98.50±9.61^{ED}	47.44±2.48^{C}	14.47±1.15^{F}	160.48±10.18^{D}	1585.04±28.76^{I}
1991	Winter	130	124.72±14.80^{AB}	47.34±2.55^{C}	13.90±1.14^{G}	186.02±15.47^{C}	2039.58±28.15^{F}
1991	Summer	130	125.88±14.89^{AB}	47.60±2.54^{C}	13.90±1.14^{G}	187.24±15.56^{C}	2254.48±59.41^{E}
1992	Winter	99	102.7±12.20^{ECD}	45.73±2.22^{C}	12.07±1.30^{H}	160.58±12.56^{D}	2429.40±44.78^{C}
1992	Summer	99	102.7±12.20^{ECD}	45.73±2.22^{C}	12.07±1.30^{H}	160.63±12.56^{D}	2614.89±62.61^{B}
1993	Winter	90	96.65±8.72^{ED}	39.26±2.58^{D}	10.14±1.69^{I}	146.13±9.90^{ED}	2495.51±120.13^{C}
1993	Summer	90	96.65±8.72^{ED}	39.24±2.58^{D}	10.14±1.69^{I}	146.11±9.90^{ED}	2809.81±133.53^{A}
1994	Winter	111	87.96±6.45^{E}	66.81±5.36^{B}	5.53±1.45^{J}	160.36±8.30^{D}	2312.93±122.38^{D}
1994	Summer	111	87.96±6.38^{E}	66.81±5.36^{B}	5.53±1.45^{J}	159.90±8.13^{D}	2436.12±137.68^{C}
1995	Winter	349	72.87±1.91^{F}	65.32±2.79^{B}	1.45±0.45^{K}	139.71±3.46^{E}	1468.83±48.95^{J}
1995	Summer	349	72.87±1.90^{F}	65.42±2.79^{B}	1.45±0.45^{K}	139.71±3.46^{E}	1887.13±68.55^{G}
1996	Winter	100	106.70±3.73^{CD}	102.31±8.14^{A}	1.18±0.85^{K}	210.29±9.51^{A}	1663.34±113.09^{H}
1996	Summer	100	103.89±2.35^{CD}	100.18±7.92^{A}	1.18±0.85^{K}	205.31±8.27^{A}	2410.24±99.02^{C}
Total Mean	Winter	1937	105.32±7.57	52.11±2.81	13.40±1.07	170.96±8.6	1570.69±46.16
Total Mean	Summer	1937	105.35±7.45	51.86±3.02	13.40±1.07	170.49±8.5	1792.01±57.38

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

V-2. Locality and season effects on other costs parameters:

V-2.a. Locality and season effect on fuel costs:

Fuel costs ranged from 0.61 to 1.11 LE/cow in Winter and Summer seasons of Behaira and it constituted the lower fuel value. Meanwhile, the higher fuel values were about 20.78, 19.43 and 19.69 LE/cow in Winter, Summer and Winter seasons of, Alexandria, El-Monofia and El-Monofia, respectively.

V-2.b. Locality and season effect on litter costs:

Litter costs ranged from 101.37 to 69.95 LE/cow in Winter seasons of Behaira and Kafr-El-shaikh, and it constituted the higher litter costs/cow. Their lower costs value presented in Summer seasons of both Kafr-El-shaikh and El-Garbia governorate. Their values were 38.24 and 22.46 LE/cow.

V-2.c. Locality and season effect on labour costs:

Labour costs also, affected by locality and season within locality at (P< 0.01). The lower labour costs were 19.74 and 20.10 LE/cow in Winter and Summer seasons of Alexandria. Higher labour costs were about 464.95 and 466.77 LE/cow in Winter and Summer seasons of El-Garbia governorate. These results agree with those obtained by Zmija et al., (1992) who reported that fuel, litter and labour differed according to locality and season (P< 0.01).

VI-VARIABLE COSTS

VI-2. Effect of locality and season on total variable costs:

There was a significant (P< 0.01) effect of locality and season on total variable costs. (Table, 35). The higher values of total variable costs were in Winter and Summer seasons of Alexandria. Their values were about 3285.55 and 3435.10 LE/cow. While the lower total variable costs were 1357.47, 1388.63, 1120.86, 1230.60 and 1150.99 LE/cow in Winter and Summer seasons of Kafr-El-shaikh and Winter seasons of El-Behaira, El-Monofia and El-Garbia, respectively.

VII- FIXED COSTS

VII-2. Effect of locality and season on fixed costs:

Locality had significant (P< 0.01) effects on fixed costs parameters (animal, building and equipment) depreciation and fixed costs.

From Table (36) the lower value of animal depreciation were 73.36, 73.36 LE/cow in Winter and Summer seasons of Behaira. Higher value was in El-Monofia, and about 145.83 and 145.83 LE/cow in Winter and Summer seasons of Alexandria governorate, respectively.

Building depreciation had the higher value of 98.05, 97.79 LE/cow in Winter and Summer seasons of Behaira, respectively. Meanwhile the lower Building depreciation value were found in Alexandria governorate (11.69 and 11.69 LE/cow) in Winter and Summer seasons.

Equipment depreciation ranged from the higher values of El-Monofia governorate (62.63 and 62.63 LE/cow) in Winter and Summer seasons to lower values (2.52 and 2.52 LE/cow) in Winter and Summer seasons of Behaira. Most of the lower values were obtained from the farmer sector in which no large or expensive equipment are used in cattle management.

Total fixed costs differed significantly from locality to another ($P < 0.01$). The differences of the season within locality were not significant. Higher values of fixed costs were 235.77 and 235.77 LE/cow in Winter and Summer seasons of El-Monofia governorate. Lower values were 153.69 and 153.65 LE/cow in Winter and Summer seasons of El-Garbia governorate.

VIII-2. EFFECT OF LOCALITY AND SEASON ON TOTAL COSTS:

From Table (36) it could be concluded that, there was a significant ($P < 0.01$) effect of year and season on the values of total costs. The higher values were 3452.75 and 3604.50 LE/cow in Winter and Summer seasons of Alexandria. Lower total costs were 1294.90 and 1304.5 LE/cow in Winter seasons of both Behaira and El-Garbia.

Table (35): Means±SE of Fuel, litter, labour and total variable costs /LE/cow for different localities and seasons.

Locality	Season	No of Rec.	Other variable costs/LE/cow			Total variable costs
			Fuel	Litter	Labour	
Behaira	Winter	66	1.11 ± 0.45^{F}	101.37 ± 10.92^{A}	2.31 ± 1.23^{G}	1120.86 ± 68.07^{G}
	Summer	66	0.61 ± 0.24^{G}	57.28 ± 6.21^{C}	2.3 ± 1.23^{G}	1798.98 ± 13.47^{C}
Alexandria	Winter	4	20.78 ± 1.13^{A}	-	47.72 ± 3.63^{E}	3285.55 ± 2580.7^{B}
	Summer	4	10.78 ± 3.20^{C}	-	47.72 ± 3.63^{E}	3435.10 ± 2093.3^{A}
Kafr El-shaikh	Winter	964	8.001 ± 0.28^{D}	69.95 ± 2.13^{B}	429.45 ± 15.59^{B}	1357.74 ± 24.36^{E}
	Summer	964	4.08 ± 0.16^{E}	38.24 ± 1.36^{E}	226.77 ± 10.26^{C}	1388.63 ± 25.19^{E}
El-Garbia	Winter	894	11.29 ± 0.136^{C}	45.91 ± 0.430^{D}	464.95 ± 8.52^{A}	1150.99 ± 28.11^{G}
	Summer	894	8.07 ± 0.114^{D}	22.46 ± 0.27^{F}	466.77 ± 8.63^{A}	1536.05 ± 38.88^{D}
El-Monofia	Winter	9	19.69 ± 8.54^{B}	-	19.74 ± 10.21^{F}	1230.60 ± 197.63^{F}
	Summer	9	19.43 ± 8.60^{B}	-	20.10 ± 10.13^{F}	1705.67 ± 229.88^{C}
Total Mean	Winter	1937	12.17 ± 2.106	72.40 ± 4.47	192.83 ± 7.85	1629.14 ± 579.77
	Summer	1937	8.59 ± 2.46	39.32 ± 2.61	152.73 ± 6.31	1972.88 ± 480.14

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).

Table (36): Means±SE of (Animal, Building and equipment) depreciation (Dep.),Total fixed and total costs/LE/cow for different localities and seasons.

Localit	Season	No of Rec.	Fixed costs patterns/LE/Cow			Total Fixed costs	Total Costs
			Animal Dep	Buld. Dep	Equip.Dep		
Behaira	Winter	66	73.36 ± 3.96^{B}	98.05 ± 17.31^{A}	2.52 ± 1.30^{D}	173.98 ± 18.99^{B}	1294.90 ± 83.25^{F}
	Summer	66	73.36 ± 3.90^{B}	97.79 ± 7.32^{A}	2.52 ± 1.30^{D}	174.21 ± 18.97^{B}	1973.24 ± 145.5^{B}
Alexandria	Winter	4	145.83 ± 0.00^{A}	11.69 ± 0.725^{C}	11.69 ± 0.725^{C}	169.25 ± 1.37^{B}	3452.75 ± 258.1^{A}
	Summer	4	145.83 ± 0.00^{A}	11.69 ± 0.725^{C}	11.69 ± 0.725^{C}	169.25 ± 1.37^{B}	3604.50 ± 209.3^{A}
Kafr El shaikh	Winter	964	108.33 ± 3.52^{AB}	74.67 ± 0.93^{B}	-	183.08 ± 3.70^{B}	1540.85 ± 25.36^{D}
	Summer	964	107.94 ± 3.51^{AB}	74.76 ± 0.90^{B}	-	182.48 ± 3.66^{B}	1571.13 ± 25.78^{D}
El-Garbia	Winter	894	101.87 ± 2.57^{AB}	23.21 ± 0.259^{C}	28.60 ± 0.067^{B}	153.69 ± 2.65^{B}	1304.50 ± 27.22^{F}
	Summer	894	102.06 ± 2.58^{AB}	23.95 ± 0.055^{C}	28.63 ± 0.065^{B}	153.65 ± 2.63^{B}	1689.71 ± 38.03^{C}
El-Monofia	Winter	9	111.26 ± 26.4^{AB}	61.85 ± 15.51^{B}	62.63 ± 15.12^{A}	235.77 ± 38.80^{A}	1466.44 ± 186.2^{E}
	Summer	9	111.26 ± 26.4^{AB}	61.85 ± 15.51^{B}	62.63 ± 15.12^{A}	235.77 ± 38.80^{A}	1941.33 ± 199.8^{B}
Total Mean	Winter	1937	108.13 ± 7.29	53.89 ± 6.94	21.08 ± 3.44	183.15 ± 13.10	1811.88 ± 116
	Summer	1937	108.09 ± 7.27	54.00 ± 4.90	21.09 ± 3.44	183.07 ± 13.08	2155.98 ± 123.7

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).

V-3. Effect of breed and season on other costs parameters:

Fuel, litter and labour costs Differed from breed to another and from season within breed to another (P< 0.01).

V-3.a. Fuel costs:

The fuel costs ranged from the higher value of Winter and Summer seasons and they were 53.79 and 53.79 LE/cow in Winter and Summer seasons of H.F. Fuel costs value of cross Charolais X Friesian in Winter and Summer seasons constituted the lower fuel costs. They were about 1.32 and 1.32 LE/cow in both seasons.

V-3.b. Litter costs:

Litter cost values were higher in case of Buffalo, crossed Friesian X Balady and Balady and equal 149.34, 96.45 and 87.82 LE/cow in Winter seasons, respectively. Lower values were for Summer seasons of Charolais and Friesian (11.31 and 22.52 EL/cow).

V-3.c. Labour costs:

Labour costs, affected by breed and season within breed at (P< 0.01). The higher values costs were 534.87 and 414.35 LE/cow in Winter and Summer seasons of Friesian cattle. Buffaloes had the lower labour requirements as their value in Winter and Summer seasons while were about 0.77 and 0.77 LE/cow. Buffaloes were more resistant to diseases and can live and resist bad environmental conditions, so they required less labour than other cattle breeds. Also Buffaloes data were collected mainly from the farmer sector which is characterized by the higher family labour.

VI-VARIABLE COSTS

VI-3. Effect of breed and season on total variable costs:

There was a highly significant (P< 0.01) effect of breed and season within breed on total variable costs Table (37). The higher values of total variable costs were for buffalo in Summer season, H.F in Winter and Summer seasons and their values were 1991.32, 1834.69 and 1712.04 LE/cow, respectively. Meanwhile, the total variable costs were lower in Summer, Winter and Winter seasons of Cross Charolais X Friesian, Balady and Friesian X Balady, respectively and their values were 1033.84, 962.04 and 1120.33 LE/cow.

VII- FIXED COSTS

VII-3. Effect of breed and season on fixed costs:

Fixed costs patterns differed significantly ($P < 0.01$) from breed to breed while season effect within breed had no significant effect. ($P > 0.05$).

From Table (38) the higher values of animal depreciations were 116.79 and 116.79 LE/cow in Winter and Summer seasons of H.F. Meanwhile the lower values of animal depreciation were 63.07 and 62.35 LE/cow in Winter, Winter and Summer seasons of Balady and cross Friesian X Balady.

Building depreciations were 100.44 and 98.84 LE/cow for Buffalo in Winter and Summer seasons and constituted the higher value. While the lower values were for Winter and Summer seasons of H.F and they were 0.77 and 0.77 LE/cow.

Equipment depreciations ranged from the 0.11, 0.24 to 73.70, 73.70 LE/cow in Winter and Summer seasons of Balady and cross Charolais X Friesian.

Total fixed costs were high for the cross Charolais X Friesian, Buffalo and Friesian and their total fixed costs were 231.75, 231.75, 193.53, 188.60 and 176.02 and 176.14 LE/cow in Winter and Summer seasons, respectively. Meanwhile, the breed of lower fixed costs were for H.F, Balady and Charolais as their values were 120.66, 120.66, 130.53, 131.004, 145.05 and 145.05 LE/cow in Winter and Summer seasons, respectively.

VIII-2. EFFECT OF BREED AND SEASON ON TOTAL COSTS:

Table (38) reveales that there were significant ($P < 0.01$) effects of breed and the season within the breed on total costs.

Breed of higher total costs were Buffalo, H.F, H.F and their total costs were 2179.98, 1955.33 and 1832.66 LE/cow in Summer, Winter and Summer seasons, respectively. Lower costs were 1092.62, 941 and 1164.1 LE/cow in Winter seasons of Balady, Charolais X Friesian and Charolais, respectively.

These results are in agreement with the results of Grover et al., (1992) who indicated that, maintenance costs was higher in buffalo than cattle.

Table (37): Means±SE of Fuel, litter, labour and total variable costs/LE/cow for different breeds and seasons.

Breed	Season	No of Rec.	Other variable costs/LE/cow			Total Variable costs
			Fuel	Litter	Labour	
Balady	Winter	229	1.01 ± 0.27^{E}	87.82 ± 4.15^{C}	58.80 ± 15.15^{E}	962.04 ± 33.90^{J}
Balady	Summer	229	0.55 ± 0.14^{F}	57.33 ± 2.85^{D}	33.29 ± 8.00^{F}	1376.95 ± 48.35^{E}
Friesian	Winter	1502	11.66 ± 0.162^{B}	47.92 ± 0.91^{E}	534.87 ± 9.45^{A}	1298.12 ± 22.88^{F}
Friesian	Summer	1502	7.33 ± 0.112^{C}	22.52 ± 0.55^{G}	414.35 ± 7.81^{B}	1467.39 ± 27.53^{D}
CharXFr	Winter	4	1.32 ± 0.44^{D}	-	1.46 ± 0.845^{H}	709.09 ± 192.80^{K}
CharXFr	Summer	4	1.32 ± 0.44^{D}	-	2.28 ± 0.765^{G}	1033.84 ± 119.07^{I}
BalXFr	Winter	86	-	96.45 ± 7.71^{B}	-	1120.33 ± 51.71^{H}
BalXFr	Summer	86	-	63.63 ± 6.86^{D}	-	1449.19 ± 79.21^{D}
Charolais	Winter	19	12.30 ± 1.46^{B}	35.78 ± 1.33^{F}	392.54 ± 74.84^{C}	1292.95 ± 177.92^{G}
Charolais	Summer	19	6.33 ± 0.68^{C}	11.31 ± 0.45^{H}	346.35 ± 37.43^{C}	1018.97 ± 179.03^{I}
Buffalo	Winter	94	-	149.34 ± 9.58^{A}	0.77 ± 0.07^{I}	1452.46 ± 48.52^{D}
Buffalo	Summer	94	-	84.96 ± 4.7^{C}	0.77 ± 0.07^{I}	1991.32 ± 70.96^{A}
H.F	Winter	3	53.79 ± 2.00^{A}	-	54.50 ± 18.59^{D}	1834.69 ± 151.91^{B}
H.F	Summer	3	53.79 ± 2.00^{A}	-	54.50 ± 18.59^{D}	1712.04 ± 131.45^{C}
Total	Winter	1937	11.44 ± 0.618	59.61 ± 3.38	148.9 ± 16.99	1238.52 ± 97.09
Mean	Summer	1937	9.90 ± 0.48	34.25 ± 2.20	121.6 ± 10.38	1435.67 ± 79.37

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (38): Means ± SE of (Animal, Building and equipment) depreciation (dep), Total fixed and total costs/LE/cow for different breeds and seasons.

Breed	Season	No of Rec.	Fixed costs patterns/LE/cow				
			Animal Dep.	Building Dep.	Equip Dep.	Total Fixed costs	Total costs
Balady	Winter	229	63.07 ± 1.69^{D}	67.30 ± 3.51^{C}	0.11 ± 0.01^{D}	130.53 ± 4.13^{B}	1092.62 ± 35.3^{H}
Balady	Summer	229	63.70 ± 1.69^{D}	67.02 ± 3.50^{C}	0.24 ± 0.01^{D}	131.004 ± 4.1^{BC}	1507.98 ± 49.7^{E}
Friesian	Winter	1502	114.19 ± 2.65^{A}	44.58 ± 0.78^{D}	17.32 ± 0.37^{B}	176.14 ± 2.7^{ABC}	1471.27 ± 22.9^{F}
Friesian	Summer	1502	114.27 ± 2.65^{A}	44.38 ± 0.76^{D}	17.33 ± 0.37^{B}	176.02 ± 2.7^{ABC}	1643.41 ± 27.2^{D}
CharXFr	Winter	4	73.77 ± 8.59^{C}	84.11 ± 14.94^{AB}	73.70 ± 25.03^{A}	231.75 ± 48.72^{A}	941 ± 146.16^{I}
CharXFr	Summer	4	73.77 ± 8.59^{C}	84.11 ± 14.94^{AB}	73.70 ± 25.03^{A}	231.75 ± 48^{A}	1265.5 ± 73.36^{G}
BalXFr	Winter	86	63.07 ± 2.37^{D}	70.26 ± 4.15^{BC}	-	133.39 ± 5.38^{BC}	1253.7 ± 52.4^{G}
BalXFr	Summer	86	62.35 ± 2.64^{D}	70.93 ± 4.12^{BC}	-	133.33 ± 5.41^{BC}	1582.6 ± 80.1^{E}
Charolais	Winter	19	60.65 ± 5.20^{D}	84.21 ± 1.92^{AB}	-	145.05 ± 6.38^{BC}	1438 ± 174.7^{F}
Charolais	Summer	19	60.65 ± 5.20^{D}	84.21 ± 1.92^{AB}	-	145.05 ± 6.38^{BC}	1164.1 ± 175.8^{H}
H.F	Winter	3	116.79 ± 87.43^{A}	0.77 ± 0.026^{E}	3.13 ± 0.099^{C}	120.66 ± 87.66^{C}	1955.33 ± 240^{B}
H.F	Summer	3	116.79 ± 87.43^{A}	0.77 ± 0.026^{E}	3.13 ± 0.099^{C}	120.66 ± 87.66^{C}	1832.66 ± 80.2^{C}
Buffalo	Winter	94	93.08 ± 4.71^{B}	100.44 ± 10.59^{A}	-	193.53 ± 21.3^{AB}	1646.03 ± 55.7^{D}
Buffalo	Summer	94	89.76 ± 3.56^{B}	98.84 ± 10.47^{A}	-	188.60 ± 11.6^{AB}	2197.98 ± 77.9^{A}
Total	Winter	1937	83.51 ± 16.09	64.52 ± 5.13	23.56 ± 6.37	161.57 ± 25.18	1399.70 ± 89.59
Mean	Summer	1937	83.04 ± 15.96	64.32 ± 5.10	23.6 ± 6.37	160.91 ± 23.69	1552.81 ± 80.60

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).

V-4. Effect of sector and season on costs parameters:

The sector and the season within the sector was affected on fuel, litter and labour costs. significantly ($P < 0.01$).

V-4.a. Fuel costs:

Fuel costs were higher in private sector in Winter and Summer seasons (12.31, 7.75 LE/Cow). While the lower fuel costs were 6.18, 3.54 LE/cow in Winter and Summer seasons of Governmental sectors. Most of the farmers did not use the fuel in heating animal house so the value of fuel in farmers sector is very low or nill which could be neglected.

V-4.b. Litter costs:

Litter costs value for farmer sector were 114.68 and 72.24 LE/cow. They were of high values in Winter and Summer seasons. Private sector constituted the lower litter costs as 42.92 and 18.96 LE/cow in Winter and Summer seasons. While the governmental farms mostly did not use any litter for management cattle so the value of it is null or very low and can be neglected.

V-4.c. Labour costs:

The labour costs were high in Summer seasons of private and they were about 434.28 LE/cow. Meanwhile, in Summer, Winter and Winter seasons of governmental, governmental and private sector their value were 13.02, 12.81 and 5.66 LE/cow, respectively. Farmer sectors and their labour, was commonly family labour and its value very low or neglected.

VI-VARIABLE COSTS

VI-4. Effect of Sector and season on total variable costs:

Table (39) showed that, the governmental sector constituted the major sector of total variable costs in both Summer and Winter seasons as their values were 2461.38 and 1903.99 LE/cow, respectively. Meanwhile, the seasons of Summer, Summer, Winter and Winter of farmers, private, private and farmers sector had the lower total variable costs value and they were 1560.15, 1439.51, 1289.14 and 1133.72 LE/cow, respectively.

VII- FIXED COSTS

VII-4. Effect of sector and season on fixed costs:

The fixed cost patterns (animal, building and equipment) depreciation and total fixed cost differed significantly (P< 0.01) from sector to another.

Table (40) showed the high value of animal depreciation (113.86, 113.86 LE/cow in Winter and Summer seasons of private sector. While the Winter and Summer seasons of governmental and farmer sector were the lowest value. They were 109.17, 109.17, 73.21 and 72.66 LE/cow, respectively.

Building depreciation had the higher value in governmental sector as it 189.57, 189.57 LE/cow in Winter and Summer seasons. Low values were 74.08, 73.61, 42.99 and 42.83 LE/cow in Winter and Summer seasons of farmers and private sector, respectively.

Equipment depreciations were higher in governmental sector and equal 37.57 and 37.57 LE/cow in Winter and Summer seasons, respectively. Meanwhile, the lower values were, 17.57 and 17.57 LE/cow in Winter and Summer seasons of private sector, respectively.

Total fixed costs per (LE) were higher in governmental sector (336.37, 336.37 LE/cow) followed by private sector (174.47, 174.47 LE/cow), and then farmer sectors (147.33 and 146.31 LE/cow) in Winter and Summer seasons, respectively.

VIII-4. EFFECT OF SECTOR AND SEASON ON TOTAL COSTS:

Table (40) shows that, the total costs differed from sector to another and from season to another(P<0.01).The higher total costs were 2797.75 and 2240.43 LE/cow/ in Summer and Winter seasons of governmental sector. Meanwhile, the Summer, Summer, Winter and Winter seasons of farmers, private, private and farmers sectors constituted the lower costs as their values were 1706.52, 1613.90, 1463.61 and 1281.14 LE/cow, respectively.

It could be concluded that, the main costs parameters of milk production were feed costs, livestock expenses, animal depreciation, administrative and managemental expenses and labour expenses. These results agree with the results of Zehnder et al., (1991).

Table (39): Means±SE of fuel, litter, labour and total variable costs/LE/cow for different sectors and seasons (winter and summer) within the sector.

Sector	Season	No of Rec.	Other variable costs parameters/LE/cow			Total Variable costs
			Fuel	Litter	Labour	
Farmers	Winter	456	-	114.68 ± 3.89^{A}	-	1133.72 ± 21.44^{D}
Farmers	Summer	456	-	72.24 ± 2.15^{B}	-	1560.15 ± 32.62^{C}
Private	Winter	1465	12.31 ± 0.16^{A}	42.92 ± 0.402^{C}	5.66 ± 9.28^{C}	1289.14 ± 22.78^{E}
Private	Summer	1465	7.75 ± 0.12^{B}	18.96 ± 0.272^{D}	434.28 ± 7.64^{A}	1439.51 ± 27.75^{D}
Govrnem	Winter	16	6.18 ± 2.22^{B}	-	12.81 ± 5.22^{B}	1903.99 ± 639.88^{B}
Govrnem	Summer	16	3.54 ± 1.32^{C}	-	13.02 ± 5.245^{B}	2461.38 ± 543.64^{A}
Total	Winter	1937	6.16 ± 0.04	52.53 ± 1.42	6.15 ± 4.83	1442.28 ± 228.03
Mean	Summer	1937	3.76 ± 0.48	30.40 ± 0.80	149.1 ± 4.29	1820.34 ± 34.67

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (40): Means±SE of (Animal, Building and equipment) depreciation (Dep), (Total fixed and total) costs/LE/cow for different sectors and seasons.

Sector	Season	No of Rec.	Parameters of Fixed costs/LE/cow			Total Fixed costs	Total Costs
			Animal Dep.	Building Dep.	Equip Dep.		
Farmers	Winter	456	73.21 ± 1.53^{C}	74.08 ± 1.53^{B}	-	147.33 ± 2.82^{C}	1281.14 ± 22.57^{F}
Farmers	Summer	456	72.66 ± 1.36^{C}	73.61 ± 1.85^{B}	-	146.31 ± 2.52^{C}	1706.52 ± 33.69^{C}
Private	Winter	1465	113.86 ± 2.73^{A}	42.99 ± 0.73^{C}	17.57 ± 0.36^{B}	174.47 ± 2.83^{B}	1463.61 ± 22.81^{E}
Private	Summer	1465	113.86 ± 2.73^{A}	42.83 ± 0.72^{C}	17.59 ± 0.36^{B}	174.47 ± 2.83^{B}	1613.90 ± 27.44^{D}
Govrnem	Winter	16	109.17 ± 7.69^{B}	189.57 ± 63.66^{A}	37.57 ± 11.12^{A}	336.37 ± 58.76^{A}	2240.43 ± 647^{B}
Govrnem	Summer	16	109.17 ± 7.69^{A}	189.57 ± 63.66^{A}	37.57 ± 11.12^{A}	336.37 ± 58.76^{A}	2797.75 ± 556.9^{A}
Total	Winter	1937	98.74 ± 3.98	102.21 ± 21.97	18.38 ± 3.82	219.38 ± 21.47	1661.72 ± 230.79
Mean	Summer	1937	98.56 ± 3.92	102.00 ± 22.07	19.38 ± 3.82	219.05 ± 21.37	2039.39 ± 206.03

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

IX.MILK PRODUCTION:

There were significant difference (P< 0.01) between years, localities, breeds and sectors and season in the amount of milk produced, consumed by calf, sold and milk returns. Price of kilogram milk differed according to year, locality, breed and sector but season within them (year, locality, breed and sector) did not have a significant effect (P>0.05) on the price of kilogram milk. These results are similar to those of Richards (1978), Poole (1988) and Dommerholt (1995).

IX.1.a. Year and season effect on milk produced, consumed, sold, kilogram milk price and milk returns:

High amounts of milk produced were 2631.84, 2542.59 and 2531.35 kg/cow, in Winter seasons of 1992, 1989 and 1990, respectively. The lesser amount of milk produced were 1229.19, 1020.05 and 992.25 kg/cow for Summer seasons of 1994, 1995 and 1996, respectively. These results are similar to those of Ram and Singh (1975), Parmar and Johar (1982) and Basu et al.,(1983).They indicated that the year have significant effect on milk yield.

The amount of milk consumed by calves until weaning were 178.75, 164.97, 163.66 and 158.76 kg/calf in Winter seasons of 1995, 1993, 1996 and 1994, respectively. And it constituted the maximum amount of milk consumed. Meanwhile, the minimum amounts consumed were 146.74, 139.62, 137.12, 147.19, 137.65, 137.41 and 148.47 kg/calf in Winter seasons of 1985, 1986, 1987, 1988, 1989, 1990, 1991 and 1992, respectively.

The amounts of milk sold were maximal as 2473.37, 2395.70, 1393.70 and 2383.48 kg/cow in Winter seasons of 1992, 1989, 1990 and 1991, respectively. The minimal amounts of sold milk were 1352.58, 1407.89, 1296.97, 1295.66, 1229.19, 1020.02 and 992.25 kg/cow for Summer seasons of 1988, 1985, 1987, 1986, 1994, 1995 and 1996, respectively.

The price of kilogram milk was not affected significantly (P> 0.05) by the season within the year. Maximum kilogram milk prices were 1.41, 1.41 LE/kg in Winter and Summer seasons of 1996 and 1.31, 1.31 LE/cow in Winter and Summer seasons of 1995, respectively. Minimum prices were 0.56, 0.56, 0.65 and 0.65 LE/kg in Winter and Summer seasons of 1985 and 1986, respectively. Seasons of maximum milk returns were Winter seasons of 1992, 1993 and 1991. Their values were 2855.76, 2613.4 and 2502.70 LE/cow, respectively. Minimum return values were 959.76, 842 and 788.41 LE/cow in Summer seasons of 1987, 1986 and 1985, respectively.

Table (41): Means±SE of milk production, consumption, sold (Kg/cow) and kilogram price (LE/kg) for different years and seasons.

Year	Season	No of Rec.	Milk parameters (kg)			Price of Kg (LE)	Milk Returns (LE)
			Milk produced	Milk consumed	Milk sold		
1985	Winter	203	2122.5±32.28^{C}	146.74±4.22^{BC}	1975.76±31.65^{C}	0.56±0.00^{L}	1106.5±17.7^{K}
1985	Summer	203	1407.89±25.66^{H}	-	1407.89±25.66^{H}	0.56±0.00^{L}	788.4±14.33^{N}
1986	Winter	215	2034.42±30.51^{D}	139.62±4.58^{C}	1894.79±30.48^{D}	0.65±0.00^{K}	1231.7±19.8^{L}
1986	Summer	215	1296.45±24.75^{I}	-	1296.45±24.75^{I}	0.65±0.00^{K}	842.25±16.0^{N}
1987	Winter	181	2059.83±36.16^{D}	137.12±5.18^{C}	1922.71±36.43^{D}	0.74±0.00^{J}	1422.7±26.9^{L}
1987	Summer	181	1296.97±27.68^{I}	-	1296.97±27.68^{I}	0.74±0.00^{J}	959.8±20.48^{M}
1988	Winter	180	2182.33±37.73^{C}	142.12±5.05^{C}	2040.20±38.32^{C}	0.81±0.00^{I}	1652.64±31^{I}
1988	Summer	180	1352.58±27.68^{H}	-	1352.58±27.68^{H}	0.81±0.00^{I}	1095.6±27.4^{K}
1989	Winter	141	2542.59±125.0^{AB}	147.19±5.38^{BC}	2395.40±124^{AB}	0.86±0.00^{H}	2060±107.3^{F}
1989	Summer	141	1516.90±42.68^{G}	-	1516.90±42.68^{G}	0.86±0.00^{H}	1304.56±36^{J}
1990	Winter	138	2531.35±52.27^{AB}	137.65±6.09^{C}	2393.70±51.4^{AB}	0.98±0.00^{G}	2345.9±50.4^{D}
1990	Summer	138	1587.70±42.62^{G}	-	1587.70±42.62^{G}	0.98±0.00^{G}	1556±41.8^{K}
1991	Winter	130	2520.89±45.59^{AB}	137.41±6.33^{C}	2383.48±45.6^{AB}	1.05±0.00^{F}	2502.7±47.9^{C}
1991	Summer	130	1548.71±34.69^{G}	-	1548.71±34.69^{G}	1.05±0.00^{F}	1626.1±36.4^{I}
1992	Winter	99	2631.84±59.61^{A}	148.47±6.74^{BC}	2483.37±59.41^{A}	1.15±0.00^{E}	2855.8±58.3^{A}
1992	Summer	99	1661.86±46.88^{G}	-	1661.86±46.88^{G}	1.15±0.00^{E}	1911.1±53.9^{G}
1993	Winter	90	2417.55±99.05^{B}	164.97±8.37^{AB}	2252.53±101.3^{B}	1.16±0.00^{D}	2613.4±117^{B}
1993	Summer	90	1505.55±66.56^{G}	-	1505.55±66.56^{G}	1.16±0.00^{D}	1747.11±77^{H}
1994	Winter	111	1963.99±94.12^{E}	158.76±10^{ABC}	1805.22±94.28^{E}	1.23±0.00^{C}	2220.45±116^{E}
1994	Summer	111	1229.19±59.73^{I}	-	1229.19±59.73^{I}	1.23±0.00^{C}	1512.00±73^{K}
1995	Winter	349	1660.88±35.65^{G}	178.75±6.40^{A}	1482.12±35.30^{G}	1.31±0.001^{B}	1950.14±46^{G}
1995	Summer	349	1020.05±28.88^{J}	-	1020.05±28.88^{J}	1.31±0.001^{B}	1393.6±37.4^{J}
1996	Winter	100	1624.30±50.20^{F}	163.66±7.30^{AB}	1460.64±4.72^{F}	1.41±0.005^{A}	2037.85±67^{F}
1996	Summer	100	992.25±32.88^{J}	-	992.25±3.28^{J}	1.41±0.005^{A}	1406.8±46.8^{L}
Total	Winter	1937	2191.03±58.18	150.20±6.30	2040.82±54.47	0.99±0.0004	1999.81±58.7
Mean	Summer	1937	1368.00±39.39	-	1368.00±35.92	0.99±0.0004	1345.21±65.0

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

IX-1.b. Effect of year and season effect on the other returns patterns:

The year had a highly significant effect ($P < 0.01$) on other return patterns (animal sale, growth differences, calf added or sold and litter). Also season within the year affected significantly the same return patterns ($P < 0.05$). Maximum values of animal sale were 310.85, 267.22 in Summer seasons of 1992 and 1993 and the minimal ones were 1.41, 3.24 and 5.04 LE/cow in Winter seasons of 1986, 1987 and 1995, respectively. Growth differences of animals ranged from high values of 486.94 and 436.54 LE/cow in Winter and Summer seasons of 1996. To low values 21.70, 20.34 in Winter and Summer seasons of 1986. (Table, 42).

Table (42) reveales that, the high values of calves added or sold were 931.17 and 834 LE/cow in Winter seasons of 1996, 1995. Meanwhile the low values were 432.09 and 457.9 LE/cow in Winter seasons of 1985 and 1986. Litter values ranged from 137.37 and 136.62 LE/cow in Winter and Summer seasons of 1992 to the low value of 63.79, 52.12, 67.77, 59.10 and 59.97, 59.95 LE/cow in Winter and Summers seasons of 1995, 1996 and 1985.

IX. 1.c. Effect of Year and Season on total returns:

Year and season had a clear significant effect ($P < 0.01$) on the total return values. The maximum values were 3802.3 and 3692.61 LE/cow in Winter seasons of 1992, 1993 and 1996, respectively. Minimal values were 983.30 and 952.17 LE/cow in Summer seasons of 1985 and 1986. These results indicated that, the higher return patterns in dairy farms were from milk and dung sales. These results are in agreement with those of Shah and Sharma (1994).

IX.1.d. Effect of Year and season on net profit:

Net profit values differed significantly from year to year and from season within year to another ($P < 0.01$). The highest values were 1812.56, 1896.39 and 1606.62 LE/cow in Winter seasons of 1995, 1996 and 1989, respectively.

These results are like those of Hogstrom, 1977; Berman et al., 1986; and Morgan, 1990; Pichard and Gana, 1992.

The minimum net profit values were - 507.74, - 360.95, -190.35, -147.16 and -18.33 LE/cow in Summer seasons of 1996, 1994, 1993, 1992, 1991 and 1986, respectively.

Table (42): Means$\pm$SE of other returns patterns (Animal sale, growth differences, calf added or sale, litter sale)/LE/cow, (Total returns and Net profit)/LE/cow for different years and seasons.

Year	Sea	No of Rec.	Other returns patterns/LE/cow				Total Returns/LE/cow	Net Profit/LE/cow
			Animal	Growth Differences	Calf added or sale	Litter		
1985	Win	203	11.73 ± 6.39^{G}	128.8 ± 2.01^{D}	432.0 ± 13^{G}	59.9 ± 0.23^{I}	1739 ± 23.2^{L}	1010.1 ± 29^{F}
1985	Sum	203	9.42 ± 4.92^{G}	130.1 ± 1.8^{D}	-	59.9 ± 0.25^{I}	983.3 ± 15^{N}	120.3 ± 21^{I}
1986	Win	215	1.41 ± 0.14^{H}	21.7 ± 3.6^{G}	457.9 ± 15^{G}	69.75 ± 0.25^{H}	1774.8 ± 24^{L}	890.7 ± 28^{G}
1986	Sum	215	17.36 ± 7.7^{G}	20.34 ± 3.58^{G}	-	69.71 ± 0.30^{H}	952.2 ± 17.6^{N}	-58.3 ± 22^{K}
1987	Win	181	3.24 ± 0.32^{I}	22.1 ± 4.29^{G}	487 ± 19.5^{FG}	76.35 ± 0.56^{G}	2011.8 ± 27^{L}	1042.9 ± 33^{F}
1987	Sum	181	34.5 ± 16.4^{F}	22.1 ± 4.29^{G}	-	76.30 ± 0.59^{G}	1092.7 ± 26^{M}	54.63 ± 32^{J}
1988	Win	180	28.15 ± 11.5^{F}	34.4 ± 5.66^{FG}	540.2 ± 20^{F}	75.81 ± 0.91^{F}	2341.2 ± 21^{K}	1204.4 ± 37^{D}
1988	Sum	180	93.05 ± 24.2^{D}	33.2 ± 5.58^{FG}	-	85.75 ± 0.93^{F}	1307.6 ± 32^{K}	58.9 ± 38^{J}
1989	Win	141	30.53 ± 14.9^{F}	26.4 ± 6.13^{G}	638.0 ± 23^{E}	95.44 ± 1.45^{E}	2850.5 ± 110^{A}	1607 ± 111^{B}
1989	Sum	141	77.30 ± 22.3^{E}	27.9 ± 6.26^{G}	-	95.32 ± 1.50^{E}	1505.1 ± 40^{I}	159.3 ± 36^{I}
1990	Win	138	9.21 ± 8.60^{G}	39.3 ± 8.04^{EFG}	646.6 ± 30^{E}	106.52 ± 2.11^{C}	3147.3 ± 60^{G}	1671.5 ± 65^{B}
1990	Sum	138	167.1 ± 34.9^{C}	37.4 ± 7.8^{EFG}	-	106.36 ± 2.16^{C}	1866.7 ± 46^{L}	282 ± 45.4^{H}
1991	Win	130	24.7 ± 15.32^{F}	48.9 ± 10.0^{EF}	669 ± 31.9^{ED}	120.74 ± 2.9^{CB}	3366.1 ± 57^{E}	1326.5 ± 61^{C}
1991	Sum	130	310.9 ± 44.4^{A}	49.6 ± 10.1^{EF}	-	120.68 ± 3^{CB}	2107.3 ± 54^{K}	-147.1 ± 64^{E}
1992	Win	99	17.31 ± 13.8^{G}	54.5 ± 12.7^{E}	737.3 ± 35^{CD}	137.37 ± 4.64^{A}	2802.3 ± 77^{A}	1372.9 ± 81^{C}
1992	Sum	99	322.2 ± 49.5^{A}	54.5 ± 12.74^{E}	-	136.62 ± 4.76^{A}	2424.5 ± 64^{H}	-190 ± 73.4^{B}
1993	Win	90	12.70 ± 11.7^{G}	132.6 ± 20.5^{D}	805 ± 42.1^{BC}	128.73 ± 7.47^{B}	3692.5 ± 13^{B}	2000 ± 104^{E}
1993	Sum	90	267.2 ± 63.7^{B}	132.6 ± 20.5^{D}	-	127.38 ± 0.76^{B}	2274.5 ± 99^{J}	-536 ± 107^{A}
1994	Win	111	9.3 ± 8.4^{G}	260.7 ± 30.62^{C}	810.4 ± 56^{BC}	127.12 ± 8.5^{CB}	3428 ± 116^{D}	1115 ± 119^{E}
1994	Sum	111	185.2 ± 43.8^{C}	255.0 ± 30.06^{C}	-	122.32 ± 8.8^{CB}	2705 ± 95^{K}	-361 ± 125^{N}
1995	Win	349	5.04 ± 0.45^{H}	428.1 ± 9.4^{B}	834.3 ± 25^{B}	63.79 ± 3.80^{I}	3281.4 ± 50^{F}	1812.6 ± 51^{A}
1995	Sum	349	96.2 ± 20.3^{D}	423.5 ± 9.3^{B}	-	52.12 ± 3.67^{I}	1912 ± 46^{L}	25 ± 6.28^{J}
1996	Win	100	-	486.9 ± 15.0^{A}	931.07 ± 27^{A}	67.77 ± 2.8^{I}	3560 ± 68^{C}	1897 ± 103^{A}
1996	Sum	100	-	436.5 ± 14.2^{A}	-	59.10 ± 9.4^{I}	1902.5 ± 4^{L}	-508 ± 98^{M}
Total Mean	WinSum	1937	12.77 ± 7.26	140.39 ± 10.66	665.73 ± 28	94.10 ± 2.96	2832.90 ± 53	1412.55 ± 68
		1937	131.7 ± 27.67	135.22 ± 10.51	-	92.63 ± 3.01	1752.86 ± 44	-91.66 ± 55

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).

IX.2.a. Effect of locality and season on milk produced, consumed, sold, kilogram milk price and milk returns (Table 43):

The amount of milk produced ranged from the maximal amounts, 3436.33, 2400, 2424 and 1983 kg/cow in Winter seasons of El-Monofia, El-Garbia, alexandria and Summer season of El-Monofia, respectively. Winter, Summer and Summer seasons of Behaira, Kafr-El-shaikh and Behaira constituted the minimal amounts of milk production/cow as 1480.07, 1135.57 and 897.84 kg/cow, respectively. These results are parallel with the reports of Kelly and Fingleton (1983) and Graham et al., (1991).

The amount of milk consumed ranged from 346.66, 203.77 and 146.55 kg/calf (Winter seasons of Alexandria, Behaira and Kafr-El-shaikh, respectively. The amounts of 151.36 kg/calf in Winter season of El-Garbia and 144 kg/calf in Winter season of Alexandria constituted the minimal amounts of milk consumed (Table, 43).

The amounts of milk sold differed according to the season ($P < 0.05$). They were about 3089.66, 2280.75, 2249.60 and 1983 kg/cow in Winter seasons of El-Monofia, Alexandria, El-Garbia and Summer season of El-Monofia, respectively. The lower amounts of milk sold were 1744.92, 1555.32, 1251, 1276.31 and 1135, respectively in Winter, Summer, Summer, Winter and Summer seasons of Kafr-El-shaikh, El-Garbia, El-Monofia, Behaira and Kafr-El-shaikh. The lowest amounts of milk sale were 897.84 kg/cow for Summer season of Behaira governorate.

The prices of a kilogram of milk sold differed from locality to another ($P < 0.01$). Maximum prices were 1.29, 1.29 LE/kg in Winter and Summer seasons of Behaira governorate. Meanwhile, in Alexandria they were 1.26 and 1.26 El/kg in Winter and Summer seasons. The lower prices were found in Winter and Summer seasons of El-Garbia 0.80 and 0.80 El/kg, respectively.

Milk returns ranged from 3880.66, 2940.25 and 2502.44 LE/cow in Winter, Winter and Summer seasons of El-Monofia, Alexandria and El-Monofia, respectively, to lower values in Summer, Winter and Summer seasons of Kafr-El-shaikh, Behaira and El-Behaira (1234.67, 1671.28 and 1167.81 LE/cow, respectively) (Table, 43)

IX-2.b. Effect of locality and season on other returns patterns:

The locality and the season within locality had a great significant (P< 0.01) effect on the other returns patterns (animal sale, growth differences and calf added or sale). Litter sale differed significantly from locality to another (P< 0.01) but not differ from season to another at (P> 0.05).

Animal sale values ranged from 141.04 and 85.01 LE/cow in Summer seasons of Kafr-El-shaikh and El-Garbia, respectively, to 21.58 and 2.23 LE/ cow in Winter seasons of Kafr-El-shaikh and El-Garbia, respectively. Meanwhile, growth difference values were high in Winter and Summer seasons of Behaira (463.84 and 87.35 LE/cow) and low as 27.84 and 27.84 LE/cow in Winter and Summer seasons of El-Garbia governorate. Calf added or sold values were maximum in Winter seasons of Alexandria, El-Monofia and Behaira (1200, 960.88 and 907.13 LE/cow, respectively). Their minimal values 602.70 and 667.94 LE/cow in Winter seasons of El-Garbia and Kafr-El-shaikh, respectively.

Litter sold values ranged from the higher value of 96.18, 91.44, 80.25, 79.55 and 79.50 LE/cow in Winter seasons and Summer of Kafr-El-shaikh, Winter season of Alexandria, Winter and Summer seasons of El-Garbia, respectively. Their lower values were 60.69, 54.66, 47.4 and 29.55, respectively, in Winter, Winter, Summer and Summer seasons of Behaira, El-Monofia, Behaira and El-Monofia, respectively.

IX. 2.c. Total returns:

Locality and season within year had significant effects (P< 0.01) on the total return values. Maximum total returns were 5153.88, 4578.75 and 3102.96 LE/cow in Winter seasons of El-Monofia, Alexandria and Behaira, respectively. Their minimal values were 2373.72, 1715.22, 1602.53 and 1475.08 LE/cow in Summer seasons of Alexandria, Kafr-El-shaikh, Behaira and El-Garbia, respectively.(Table, 44).

These results were parallel with those of Graham et a., (1991) who reported that, the total returns differed from locality to another.

IX.2.d. Net profit:

Locality and the season within locality had significant (P < 0.01) effects on the net profit. Maximum values were 3687.44, 1811.80 and 1379.95 LE/cow in Winter seasons of El-Monofia, Behaira and Kafr-El-shaikh, respectively. Their lower values were 1269, 1126 and 348 LE/cow in Winter, Winter and Summer seasons of El-Garbia, Alexandria and El-Monofia, respectively. The lowest net profits were -214.63, -370.71 and -1231 LE/cow in Summer seasons of El-Garbia, Behaira and Alexandria, respectively. These results in line with those of Graham et al., (1991).

It could be concluded that, Winter seasons had a higher milk yield, milk sale, milk returns and net profit than Summer seasons. These results are in agreements with the results of Basu and Gupta (1974), Ram and Singh (1975), Hogstrom (1977), Bath et al., (1978), Bhat et al., (1980), Parmar and Johar (1982), Basu et al., (1983), Moon and Kim (1989), Lossouarn (1991) and Samaha (1996).

Table (43): Means±SE of milk Production, consumption and sold(/Kg/cow) kilogram price and milk returns(LE/cow)for different localities and seasons.

Locality	Season	No of Rec.	Parameters of milk/Kg			Price Kilogram	Milk Returns
			Milk produced	Milk consumed	Milk sale		
Behaira	Winter	66	1480.07 ± 95.56^{F}	203.77 ± 26.18^{B}	1276.30 ± 94.24^{F}	1.29 ± 0.01^{A}	1671.3 ± 124^{H}
	Summer	66	897.84 ± 59.50^{H}	-	897.84 ± 59.50^{H}	1.29 ± 0.01^{A}	1167.8 ± 76.8^{I}
Alexandria	Winter	4	2424 ± 404.91^{B}	$144.0 \pm 16.^{C}$	2280 ± 411.8^{B}	1.26 ± 0.04^{B}	2940 ± 611^{B}
	Summer	4	1521 ± 333.5^{E}	-	1251 ± 333^{C}	1.26 ± 0.04^{B}	1966 ± 480^{D}
Kafr El shaikh	Winter	964	1891.48 ± 18.08^{D}	146.55 ± 2.73^{C}	1744.92 ± 18.46^{D}	1.10 ± 0.008^{D}	1884.4 ± 30.5^{E}
	Summer	964	1135.57 ± 13.50^{G}	-	1135.57 ± 13.49^{G}	1.10 ± 0.008^{D}	1235 ± 217.68^{G}
El-Garbia	Winter	894	2400 ± 28.74^{B}	151.36 ± 1.77^{C}	2249.6 ± 28.72^{B}	0.80 ± 0.001^{E}	1861.4 ± 33.2^{F}
	Summer	894	1555.51 ± 15.91^{E}	-	1555.32 ± 15.92^{E}	0.80 ± 0.006^{E}	$1282. \pm 20.4^{J}$
El-Monofia	Winter	9	3436.33 ± 352.7^{A}	346.66 ± 94.04^{A}	3089.66 ± 347.3^{A}	1.25 ± 0.02^{C}	3880.6 ± 97.8^{A}
	Summer	9	1983.00 ± 197.7^{C}	-	1983 ± 197.74^{A}	1.25 ± 0.02^{C}	2502.4 ± 97.8^{C}
Total Mean	Winter	1937	2326.37 ± 178.01	198.46 ± 28.14	2128.09 ± 180.10	1.14 ± 0.015	2447.46 ± 181
	Summer	1937	1418.58 ± 124.03	-	1364.54 ± 123.93	1.14 ± 0.016	1630.64 ± 178

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).

Table (44): Means±SE of other returns patterns (Animal sale, growth differences, calf added or sale, litter sale), Total returns and Net profit/LE/cow for different localities and seasons.

Locality	Sea	No of Rec.	Other returns patterns/LE/cow				Total Returns/ LE/cow	Net Profit/ LE/cow
			Animal	Growth differences	Calf added	Litter		
Behaira	Win	66	-	463.84 ± 22.6^{A}	907.1 ± 61^{BC}	60.7 ± 4.51^{A}	3102 ± 137^{C}	1811.8 ± 131^{B}
	Sum	66	-	387.35 ± 19.2^{B}	-	47.4 ± 3.45^{A}	1602 ± 80^{I}	-370.7 ± 154^{K}
Alexandria	Win	4	-	358.23 ± 80.9^{C}	1200 ± 108^{A}	80.3 ± 23.3^{B}	4578 ± 669^{B}	1126 ± 226.57^{B}
	Sum	4	-	358.23 ± 80.9^{C}	-	78.7 ± 9.08^{D}	2373 ± 451^{G}	-1231 ± 194^{D}
Kafr El shaikh	Win	964	21.58 ± 4.7^{C}	250.66 ± 7.70^{E}	667.94 ± 14^{CD}	96.2 ± 2.18^{A}	2920 ± 30^{D}	1380 ± 26.4^{C}
	Sum	964	$141.0 \pm 13.^{A}$	248.09 ± 7.61^{E}	-	91.4 ± 2.41^{A}	1715 ± 25^{H}	144.09 ± 23.4^{G}
El-Garbia	Win	894	2.23 ± 1.58^{D}	27.84 ± 1.84^{F}	602.7 ± 8.94^{D}	79.5 ± 0.54^{B}	2573 ± 40^{F}	1269 ± 28.53^{D}
	Sum	894	85 ± 9.33^{B}	27.84 ± 1.84^{F}	-	79.5 ± 0.54^{B}	1475 ± 24^{J}	-214 ± 25.39^{J}
El-Monofia	Win	9	-	257.33 ± 70.8^{D}	960.9 ± 204^{AB}	54.7 ± 2.3^{C}	5153 ± 502^{A}	3687.4 ± 388^{A}
	Sum	9	-	257.73 ± 70.8^{D}	-	29.5 ± 3.2^{C}	2790 ± 213^{E}	348.3 ± 194.9^{F}
Total Mean	Win	1937	4.76 ± 3.40	271.58 ± 36.77	867.72 ± 79.1	74.28 ± 6.6	3665 ± 275	1854.6 ± 160.1
	Sum	1937	45.2 ± 4.46	255.84 ± 36.08	-	65.3 ± 3.73	1991 ± 158	-270 ± 116.33

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).

IX.3.a. Effect of breed and season on milk produced, consumed, sold, kilogram milk price and milk returns:

Milk produced, consumed, sold, kilogram milk price and milk returns differed significantly from breed to another breed ($P < 0.01$). Season within breed affected milk produced, consumed, sold and returns from milk sale ($P < 0.01$), while the kilogram milk price did not affected by season within breed ($P > 0.05$).

The higher amount of milk produced were 4575, 2445, 2294.30 and 2196 kg/cow for Winter, Summer, Winter and Winter seasons of H.F, H.F, Friesian and Charolais X Friesian, respectively.

These results were in line with those of Berman et al., (1986), Morgan (1990) and Ramadan (1996). They indicated that H.F had higher milk yield than Egyptian Dommiati and Buffalo. Also these results agreed with Dzhaparadze and Milyukov (1992). They indicated that milk obtained from crossing Friesian with any other breeds is higher than crossing with any other improved breed. Lower milk production were 883.12, 887.31 and 851/kg in Winter seasons of Balady, crossed Friesian X Balady and Buffalo, respectively. But the higher amounts were 1600, 1446.16, 1454.83 and 1349.10 kg/cow for Winter, Summer, Winter and Summer seasons of Buffalo, Friesian, Balady and Charolais, respectively.

Results for buffalo were higher than those of Grover et al., (1992), who reported that buffalo yielded 1216/liter and the cow yielded 926/liter of milk/year. Amounts of milk consumed differed from breed to another and ranged from 202.69, 200, 172.25 and 170.25 kg/cow in Winter seasons of buffalo, H.F, crossed Friesian X Balady and Charolais, respectively.

The lower amounts of milk consumed were 115 kg/calf in Winter seasons of Mixed Charolais and Friesian. Medium level of milk consumption were 156.17, and 146.33 kg/cow for Balady and Friesian breeds, respectively.

Amount of milk sold were also, significantly differed ($P < 0.01$) of the higher breed of milk sale was H.F in Winter and Summer seasons as it 4375 and 2445 kg/cow for Winter and Summer seasons, respectively. Meanwhile, the breed of medium milk sale were Friesian 2147.96 kg/cow in Winter and Charolais as the amount of milk sale were 1951.84 kg in Winter seasons while the breed of low amount milk sale were Friesian in Summer seasons as it give 1446.05, followed by Charolais X Friesian, 2081 kg in Winter seasons followed by Charolais 1349.10 kg for Summer seasons. The lowest value was for crossed Friesian X Balady as 1174.32, balady 1298.66 kg/cow in Winter seasons of these two breeds followed by crossed Friesian X Balady as 887.31 kg/cow, then the Balady 883.12 kg of milk sale for Summer seasons of both breeds, respectively.

The price of kilogram milk sold was maximal (1.42, 1.42 LE/kg) for Buffalo. The higher percentage of fat (7%) and (9%) SNF causing the higher price of Buffalo milk per kilogram than cows milk which have 4% fat and 8.5% SNF (Prathi and Mudgal, 1992; Shah et al., 1992), followed by Friesian X Balady 1.29 and 1.29 LE/kg in winter and Summer seasons, respectively. Meanwhile, the lower kilogram milk prices were for Charolais, Friesian, H.F, Charolais X Friesian and Balady as the kilogram milk price were, 0.84, 0.84, 0.88, 0.88, 1.23, 1.23, 1.24, 1.24 and 1.25 LE/kg, respectively, for Winter and Summer seasons.

The higher values of milk returns (amount of milk sale multiplied by milk price) were 5389.66 and 3003.33 LE/cow in Winter and Summer seasons of H.F followed by Winter seasons of Charolais X Friesian 2609.25 and Buffalo 2005.57 kg/cow. Meanwhile, the lower returns of milk sale were for Buffalo, Charolais, Friesian X Balady and Balady as their value of milk returns were 1221.81, 1140, 1146.89 and 1090.20 LE/cow for Summer seasons of this breeds, respectively (Table, 45).

IX-3.b. Other returns patterns:

Return patterns of animal sale, growth differences and calf added or sale, litter sale were affected significantly, ($P < 0.01$) by the cows' breeds and the season of production ($P < 0.05$). Values of animal sale for Balady, Friesian, and Charolais were 70.08, 142.2 and 284.21 LE/cow in Summer seasons as the culling of animal commonly occured in Summer seasons.

Values of growth differences differed significantly ($P < 0.01$) from breed to breed. High growth difference values were for Buffalo species (509.91 and 476.88) followed by those of Friesian X Balady (484.29 and 484.69) LE/cow. Low growth differences values were (79.90, 79.50, 22.51 and 22.54) LE/cow in Winter and Summer seasons of Friesian and Charolais, respectively. Meanwhile, values of the calf added were 1465, 975, 860.63, 813.21 and 797.35 LE/calf in Winter seasons of H.F, Charolais X Friesian, Buffalo, Friesian X Balady and Balady, respectively. Also, there were low values of calf added or sold as 606.88 and 144.73 LE/calf in Winter seasons of Friesian and Charolais, respectively. Values of litter sale were greater in Winter and Summer seasons of Charolais and Friesian. their values were 113.84 and 113.84, respectively. Their lower values were 50.66, 36.66, 53.83, 47.64, 54.62, 47.54, 59, 34.50, 63.31, 43.36, 95.29, 94.12 LE/cow for H.F,-Balady, Friesian X Balady, Charolais X Friesian, Buffalo and Friesian for Winter and Summer seasons of that breeds, repectively.

IX. 3.c. Total returns:

Total returns differed significantly ($P < 0.05$) between different breeds and seasons. This finding agrees with Statt and Delorenzo (1988). Maximum values of total returns were 7071.33, 4084.75, 3439.45 and 3206.1 LE/cow in Winter seasons of H.F, Charolais X Friesian, Buffalo and Summer seasons of H.F, respectively. Meanwhile, the minimum values were 2853.57, 1526.81, 2721.03, 1602, 2874.41, 1679.16, 1975, and 1560 LE/cow in Winter and Summer seasons of Balady, Friesian, Crossed Friesian X Balady and Charolais, while in Summer season for Buffaloes as its value was 1742.07 LE/cow, respectively.

IX.3.d. Net profit:

Net profits were affected significantly ($P < 0.01$) by dairy breed and season of milk production. Higher net profits were 5116, 3143.75, 1762 and 1620.55 LE/cow, in Winter seasons of H.F, Charolais X Friesian, Balady and cross Friesian X Balady, respectively. These results are in line with the results of Berman et al., (1986) who reported that, the H.F had higher margin in April-June period.

Medium net profit values were 1373.33, 1246.75, 905.25 and 537.10 LE/cow in Summer, Winter, Summer and Winter seasons of H.F, Friesian, cross Charolais X Friesian and Charolais, respectively. The results of H.F are in line with results of Morgan (1990). He indicated that, H.F had higher margin in Winter than other cattle. At the same time the lowest net profits were 396, 96.58, 18.83, -41 and -438 LE/cow in Summer seasons of Charolais, Friesian X Balady, Balady, Friesian and Buffalo, respectively. (Table, 45).

Table (45): Means ± SE of milk production, consumption, sold kg/cow, kilogram milk price and milk returns/LE for different breeds and seasons.

Breed	Season	No of Rec.	Parameters of milk/Kg/cow			Price of Kilogram	Milk Returns/cow
			Milk produced	Milk consumed	Milk sale		
Balady	Winter	229	1454.83 ± 80^{F}	156.17 ± 4.85^{AB}	1298.6 ± 80.4^{L}	1.24 ± 0.011^{D}	1566.16 ± 72.91^{F}
Balady	Summer	229	883.12 ± 35^{H}	-	883.1 ± 35.3^{M}	1.25 ± 0.011^{D}	1090.2 ± 45.86^{M}
Friesian	Winter	1502	2294.3 ± 15^{C}	146.33 ± 2.19^{AB}	2147.7 ± 15.5^{C}	$0.88 \pm 0.005^{F}0$	1931.3 ± 21.7^{D}
Friesian	Summer	1502	1446.1 ± 11.3^{F}	-	1446 ± 11.3^{E}	$.88 \pm 0.005^{F}$	1293.8 ± 14.82^{G}
CharXFr	Winter	4	2196 ± 149.4^{D}	115 ± 5^{B}	2081 ± 149.5^{F}	1.24 ± 0.03^{C}	2609.23 ± 246^{B}
CharXFr	Summer	4	1348.5 ± 0.8^{G}	-	1348 ± 139^{G}	1.24 ± 0.03^{C}	1694.7 ± 207.6^{E}
BalXFr	Winter	86	1346.5 ± 67.3^{G}	172.25 ± 7.36^{AB}	1174.32 ± 67.6^{L}	$1.29 \pm 0.003^{B}1$	1522.25 ± 87.08^{F}
BalXFr	Summer	86	887.31 ± 48.2^{H}	-	887.3 ± 48.2^{M}	$.29 \pm 0.003^{B}$	1146.9 ± 60.8^{L}
Charolais	Winter	19	2122.4 ± 66.9^{D}	170.5 ± 9.5^{AB}	1951.84 ± 66.7^{D}	0.84 ± 0.04^{G}	1170.96 ± 153.7^{E}
Charolais	Summer	19	1349.1 ± 60^{G}	-	1394.1 ± 59.2^{G}	0.84 ± 0.04^{G}	114.05 ± 85.01^{L}
H.F	Winter	3	4575 ± 105^{A}	200 ± 0.00^{A}	4375 ± 105.6^{A}	1.23 ± 0.04^{E}	5389.66 ± 306.6^{A}
H.F	Summer	3	2445 ± 78.3^{B}	-	2445 ± 7.82^{B}	1.23 ± 0.04^{E}	3003.3 ± 81.71^{A}
Buffalo	Winter	94	1600 ± 49.2^{E}	202.7 ± 8.9^{A}	1397.6 ± 48.6^{G}	1.42 ± 0.007^{A}	2005.6 ± 71.4^{C}
Buffalo	Summer	94	851.4 ± 30.8^{H}	-	851.4 ± 30.8^{M}	1.42 ± 0.007^{A}	1221.81 ± 46.26^{A}
Total	Winter	1937	2227.0 ± 76.11	166.13 ± 5.4	2060.00 ± 76.27	1.16 ± 0.019	2763.58 ± 137.05
Mean	Summer	1937	1315.79 ± 37.7	-	1322.12 ± 47.37	1.16 ± 0.019	1517.38 ± 77.43

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (46): Means$\pm$SE of other returns patterns(animal sale, growth differences, calf added or sale, litter sale) LE/cow, total returns and net profit/LE/cow for different breeds and seasons.

Breed	Sea	No of Rec.	Other returns patterns/LE/cow				Total Returns /cow	Net Profit /cow
			Animal	Growth differences	Calf added	Litter		
Balady	Win	229	-	386.5 ± 14.3^{D}	797.4 ± 34^{BC}	53.83 ± 3.14^{B}	2854 ± 80^{E}	1762.0 ± 80^{C}
Balady	Sum	229	70.08 ± 30^{C}	368.5 ± 13.8^{D}	-	47.64 ± 4.84^{B}	1527 ± 52^{K}	18.8 ± 61.6^{L}
Friesian	Win	1502	-	79.9 ± 3.6^{F}	606.9 ± 9.06^{C}	95.3 ± 1.22^{A}	2721 ± 26^{F}	1248.7 ± 20^{F}
Friesian	Sum	1502	142.2 ± 12^{B}	79.5 ± 3.6^{F}	-	94.12 ± 1.24^{A}	1602 ± 20^{J}	-41 ± 3.87^{M}
CharXFr	Win	4	-	441.6 ± 8.43^{C}	975 ± 131.5^{B}	59 ± 3.93^{B}	4085 ± 305^{B}	3144 ± 160^{B}
CharXFr	Sum	4	-	441.6 ± 8.43^{C}	-	34.5 ± 0.86^{B}	2171 ± 215^{G}	905 ± 160^{G}
BalXFr	Win	86	-	484.3 ± 26.01^{B}	813.2 ± 38^{BC}	54.62 ± 6.9^{B}	2874 ± 107^{E}	1621 ± 118^{D}
BalXFr	Sum	86	-	484.7 ± 26.16^{B}	-	47.54 ± 6.84^{B}	1679 ± 81^{J}	96.6 ± 11.6^{J}
Charolais	Win	19	-	22.51 ± 12.3^{G}	144.7 ± 66.5^{D}	113.5 ± 12.3^{A}	1975 ± 171^{H}	537.1 ± 79^{H}
Charolais	Sum	19	284.2 ± 170^{A}	22.51 ± 12.28^{G}	-	113.5 ± 12.3^{A}	1560 ± 229^{K}	396.5 ± 183^{I}
H.F	Win	3	-	166 ± 125.1^{E}	1465 ± 367.5^{A}	50.66 ± 0.66^{B}	7071 ± 278^{A}	5116 ± 222^{A}
H.F	Sum	3	-	166 ± 125.1^{E}	-	36.66 ± 1.20^{B}	3206 ± 150^{D}	1373 ± 144^{E}
Buffalo	Win	94	-	509.9 ± 13.07^{A}	860.6 ± 33^{BC}	63.31 ± 3.78^{B}	3439 ± 86^{C}	1793.4 ± 82^{C}
Buffalo	Sum	94	-	476.9 ± 13.3^{B}	-	43.36 ± 2.41^{B}	1742 ± 51^{I}	-438 ± 73.9^{N}
Total	Win	1937	-	298.97 ± 27.97	808.97 ± 82.7	70.03 ± 4.56	3574 ± 108	2174 ± 108
Mean	Sum	1937	63.78 ± 30.2	291.38 ± 28.95	-	59.61 ± 4.24	1926 ± 114	330 ± 91.31

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

IX.4.a. Effect of sector and season on milk produced, consumed, sale, kilogram milk price and milk returns:

Milk production, consumption, sale, and milk returns differed significantly from sector to sector ($P < 0.01$), while, the season within sector did not significantly affect milk price (Table 47). High amounts of milk produced were about 2320.45, 1858.52, 1450.70 and 1488.94 kg/cow in Winter, Winter, Summer and Winter seasons of private, Governmental, private and farmers sector, respectively. Meanwhile, the lower amounts of milk produced were 1150.25 and 931.63 kg/cow for governmental and farmers sector of Summer season of both sectors.

The amount of milk consumed was not affected by the season (249.17 and 144.34 and 171.70 kg/calf) in Winter seasons of governmental, private and farmers sector, respectively.

The amount of milk sold was 2176.11, 1609.50, 1450.59 and 1317.24 kg/cow in Winter, Winter, Summer and Winter seasons of private, governmental, private and farmers sector, respectively. They constituted the maximum amounts while the minimum amounts were 1150.25 and 931.63 kg/cow in Summer seasons of governmental and private sector, respectively.

Price of kilogram milk differed in different sectors and seasons. The prices were 1.32, 1.32, 0.85, 0.85 and 1.29, 1.29 LE/kg in Winter and Summer seasons of farmer, private and governmental sectors, respectively.

Milk returns had maximum values of 2073.18, 1914.48 and 1753.02 LE/cow in Winter seasons of governmental, private and farmers sector, respectively. Meanwhile, the lower values 1489.37, 1267.48 and 1234.88 LE/cow in Summer seasons of governmental, private and farmer sectors (Table, 47).

IX-4.b. Other returns patterns:

From Table (48) it was found that the sector had significant ($P < 0.01$) effect on animal sale, growth differences and calf added or sale, litter sale. Also, season had significant effects ($P < 0.01$) on these patterns, except growth differences and litter sale. Values of sold animals were found in Winter and Summer seasons of private sector as 15.56 and 144.68 LE/cow.

Values of growth differences were high in Winter, Winter, Summer, Summer, Winter and Summer seasons (530.14, 474.05, 474.19, 231.52, 52.05 and 50.12 LE/cow) of governmental, farmer, farmer, governmental, private and private sector, respectively. The values of calf added or sold were 909.56, 834.03 and 587.82 LE/calf in Winter seasons of governmental, farmers and private sector, respectively. Litter sold values were high in Winter seasons of private, governmental and farmers sectors and Summer seasons of private sector (97.15, 68.50, 55.33 and 96.56 LE/cow, respectively). Meanwhile, the lower values of litter sold were 45.55 and 36.56 LE/cow in Summer seasons of farmers and governmental sector, respectively.

IX. 4.c. Total returns:

The values of total returns differed significantly due to sector and season ($P < 0.05$). The higher values of total returns were 3581.37, 3116.47, 2667.33, 1754.63 and 1757.43 LE/cow in Winter, Winter, Winter, Summer and Summer seasons of governmental, farmers, private, farmers and governmental sector, respectively. Lower value of total returns were 1559.27 LE/cow in Summer season of private sector.

IX.4.d. Net profit:

Table (48) shows that, there were significant effects of sector ($P < 0.01$) and seasons ($P < 0.05$) on net profit values.

High values of net profit were 1835.87, 1340.93 and 1203.72 LE/cow in winter seasons of farmers, governmental and private sector, respectively. These results are in line with the results of Sheehan and Perry (1991) who indicated that gross margin /cow was £ 696. The lower net profit value was 48.10 LE/cow in Summer seasons of farmer sector, and the lowest values were -54.62 and -1040.31 LE/cow in Summer seasons of private and governmental, sector, respectively. Meanwhile, the Summer season of governmental sector had a total costs of 2797.75 LE/cow so that it gave the lowest net profit value.

Table (47): Means±SE of milk production, consumption, sold(kg/cow), kilogram milk price and milk returns/LE for different sectors and seasons.

Sector	Season	No of Rec.	Parameter of milk/Kg				
			Milk produced	Milk consumed	Milk sale	Price of Kilogram	Milk Returns
Farmers	Winter	456	1488.94±25.12[C]	171.7±3.66[B]	1317.3±24.9[D]	1.32±0.003[A]	1753±233.7[C]
Farmers	Summer	456	931.63±21.92[E]	-	931.7±21.9[F]	1.32±0.003[A]	1234.9±28.7[E]
Private	Winter	1465	2320.45±19.07[A]	144.3±2.1[B]	2176.1±19[A]	0.85±0.007[B]	1914.5±24.13[B]
Private	Summer	1465	1450.7±11.53[C]	-	1451±11.5[C]	0.85±0.007[B]	1267.5±15[E]
Govrnem	Winter	16	1858.62±316.9[B]	249.1±58.8[A]	1609.5±283[B]	1.29±0.023[C]	2073.2±372.6[A]
Govrnem	Summer	16	1150.25±206.9[D]	-	1150.3±206[E]	1.29±0.023[C]	1489.4±275.5[D]
Total	Winter	1937	1889.18±120.36	188.36±21.52	1700.96±108	1.15±0.011	1913.56±210
Mean	Summer	1937	1177.52±80.11	-	1177.63±79.8	1.15±0.011	1330.60±106

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (48): Means±SE of other returns patterns(animal sale, growth differences, calf added or sale, litter sale) LE/cow, total returns and net profit/LE/cow for different sectors and seasons.

Sector	Sea	Rec No	Other returns patterns LE/cow				Total Returns cow	Net Profit cow
			Animal sale	Growth differences	Calf added	Litter		
Farmers	Win	456	-	474.05±6.5[B]	834.03±21[B]	55.33±2.0[C]	3117±3[C]	1836±40[A]
Farmers	Sum	456	-	474.19±6.38[B]	-	45.55±2.6[D]	1755±3[C]	48.1±41[D]
Private	Win	1465	15.56±3.28[B]	52.05±2.71[D]	587.8±9.02[C]	97.15±1.2[A]	2667±3[B]	1231±21[C]
Private	Sum	1465	144.7±10.6[A]	50.12±2.50[D]	-	96.56±1.2[A]	1559±2[D]	-54.6±20[E]
Govrnem	Win	16	-	530.14±83.15[A]	909.56±93[A]	68.50±7.5[B]	3581±32[A]	1341±630[B]
Govrnem	Sum	16	-	231.52±54.73[C]	-	36.56±4.6[E]	1757±3[D]	-1040±603[F]
Total	Win	1937	5.18±1.09	352.08±30.78	777.13±41	73.66±3.5	3141±12	1469.33±230
Mean	Sum	1937	48.2±3.53	251.94±21.20	-	59.55±2.8	1690±2.6	-348.8±221

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

X- REGRESSION RELATIONSHIPS BETWEEN INDEPENDENT VARIABLES (YEAR, SEASON, LOCALITY, BREED AND SECTOR) AND DEPENDENT ONES (MILK PRODUCTION AND MILK PRODUCTION RESOURCES):

Table (49) shows that the independant variables explained:

1- About 96, 69, 50 and 85 % from the amount of Berseem, B.hay, tibn and concentrate consumption and about 82, 77, 52, 68 and 73% from the costs of berssem, B.hay, tibn, concentrate and total feed costs, repectively.

2- They explained about 56, 51, 57, 85 and 71% from the real value of the drug, vaccine, disinfectant, veterinarian visits and total veterinary costs. And it explained about 36, 71, 72, 64 and 53% from their cash value, repectively.

3- They explained about 14, 54, 11, 8, 33 and 18 % from the calving interval, gestation period, days open, dry period, service per conception and the age at first calving, repectively.

4- They explained about 10% from the milking frequency.

5- They explained about 82, 49, 74 and 70% from the value of fuel, litter, labour and total variables costs and explain about 70, 11, 64, 98 and 19% from the value of animal, building, equipment depreciation and total fixed costs, respectively.

6- They explained about 69% from the total costs.

7- These variables explained about 38, 20, 77, 67 and 51% from the number of live born calf and the value of (animal number, animal sale and culled cows, growth differences of the animals, calf added or sale and fecal matter sale), respectively.

8- Independent variables explained about 54, 66, 50, 60 and 99% from the amount of milk (produced, consumed, sale), price of kilogram milk sale and returns from milk sale per (LE), repectively.

9- They explained about 68 and 56% from the total returns and net profit values.

Table (49): Dependent variables and independent variables (year, season, locality, breed, sector and season and the season within them) and their determination coefficients (R^2).

Variable	R^2	Variable	R^2	Variable	R^2
Feeding Berseem	0.96	**Feeding costs** Berseem costs	0.82	Total fixed costs	0.19
B.hay	0.69	B.Hay costs	0.77	**Total costs**	0.69
Tibn	0.50	Tibn costs	0.52	**Returns** Calf no	0.38
concentrate	0.85	Concentrate costs total feed costs	0.68 0.73	Animal sale	0.20
Veterinary services Drug	0.56	**Veterinary costs (Cash value)** Drug costs (Cash value)	0.36	Growth differences	0.77
Vaccine	0.51	Vaccine costs (Cash value)	0.71	Calf added or sale	0.67
Disinfectant	0.57	Disinfectant costs (Cash value)	0.72	Fecal matter sale	0.51
Veterinarian costs	0.85	Veterinarian visits costs (Cash value)	0.64	Amount milk (Kg)	0.54
Total veterinary costs	0.71	Total veterinary costs (Cash value)	0.53	Milk consume (Kg)	0.66
Reproductive Efficiency Calving interval	0.14	**Other costs** Fuel costs (Cash value)	0.82	Milk sale (Kg)	0.50
Gestation period	0.54	Litter costs (Cash value)	0.49	Milk returns	0.60
Days open	0.11	Labour costs (Cash value)	0.74	Price of Kg	0.99
Dry period	0.08	Total variable costs (Cash value)	0.70	**Total returns**	0.68
Service per conception	0.33	**Fixed costs** Animal depreciation (Cash value)	0.11	**Net profit**	0.56
Ages	0.18	Building depreciation (Cash value)	0.64		
Milking frequency	0.10	Equipment depreciation (Cash value)	0.98		

Costs and cash values (LE).

XI- COLLECTIVE EFFICIENCY MEASURES:

Tables (50-57) illustrate that the year, season, locality, breed, sector and the season within them had significant effects ($P < 0.01$) on the collective efficiency measures (variable costs to total costs, total returns to variable costs, returns to total costs, net income to variable costs, net income to total costs, milk returns to variable costs, milk returns to total costs, milk returns to total returns, net income to milk sale, costs of kilogram milk sale and price of kilogram milk to its costs).

XI-a. Effect of year and season on collective efficiency measures:

- Variable costs:

XI.a.1. Variable costs to total costs:

The variable costs as percentages to total costs ranged from high percentage (93.15, 93.29%) in Winter and Summer seasons of 1992 and 93.78% in Summer seasons of 1993, to low percentages (71.79 and 76.64%) in Winter and Summer seasons of 1985.

-Total returns:

XI.a.2. Total returns to variable costs:

The year and season within the year had significant effect on the percentage of total returns to variable costs. Their values ranged from the maximum values in Winter seasons of 1985 and 1989 (331.67% to 261.81%). Minimum values of 101.93, 98.78, 85.40, 91.16 and 86.28% were found in Summer seasons of 1991, 1992, 1993, 1994 and 1996, respectively.

XI.a.3. Total returns to total costs:

Percentages of returns to total costs differed from season to season and from year to year. Their high percentages were 239.57, 229.16, 223.40 and 213.23% in Winter seasons of 1985, 1989, 1995 and 1990, respectively, that constituted the higher profit and their percentages were higher than 100% or 1.These results were in line with those of Jactal, 1987. Lower percentages of returns were 102.11, 94.22, 105.26, 104.79, 93.47, 92.72, 80.96, 85.18, 101.28 and 78.93% as found in Summer seasons of 1985, 1986, 1987, 1988, 1991, 1992, 1993, 1994, 1995 and 1996, respectively. These results agreed with those of Haan (1991).

- Net Income:

XI.a.4. Net income to variable costs:

The higher net income values (percentages of variable costs) were demonstrated in Table (50). They were, 192.65, 147.56, 128.23, 128.61, 125.91, 124.04 and 130.51% in Winter seasons of 1985, 1989, 1986, 1987, 1988, 1990 and 1996, respectively. Meanwhile, their lower values were 18.25, 6.20, 5.511, 13.37. 19.79 and 1.39% in Summer seasons of 1985, 1987, 1988, 1989, 1990 and 1995, respectively. Lowest percentages were (-7.09, -7.11, -7.75, -20.10, -15.85 and -23.02%) in Summer seasons of 1986, 1991, 1992, 1993, 1994 and 1996, respectively.

XI.a.5. Net income to total costs:

Table (50) showed that, the higher values of the net income (as a percentage of total costs) were in Winter seasons of 1985, 1989, 1990 and 1995. They were about 138.5, 128.68, 113.23 and 123.40%, respectively. The lower percentages were 13.94, 5.26, 4.71, 11.83, 17.77 and 1.28 in Summer seasons of 1985, 1987, 1988, 1989, 1990 and 1995, respectively. Meanwhile, the lowest percentages were -5.77, -6.52, -7.27, -19.05, -14.81 and -21.06% in Summer seasons of 1986, 1991, 1992, 1993, 1994 and 1996, respectively.

-Milk returns:

XI.a.6. Milk returns to variable costs:

Percentages of milk returns per variable costs were 211.03, 189.20, 177.33, 175.45 and 172.77% in Winter seasons of the years 1985, 1989, 1986, 1987 and 1988, respectively, and they constituted the higher values. The lower percentage were, 103.16, 102.55, 78.66, 77.87, 76.66, 65.56, 66.42 and 63.80% in Winter seasons of 1994 and Summer seasons of 1988, 1991, 1992, 1995, 1993, 1994 and 1996, respectively.

XI.a.7. Milk returns to total costs:

The higher milk returns per total costs percentages were 165.61, 151.80, 158.92 and 146.83% in Winter seasons of 1989, 1985, 1990 and 1987, respectively. Moreover, the lower percentages were 91.35, 83.32, 92.45, 87.73, 96.93, 98.16, 72.12, 73.08, 62.17, 62.06, 70.98 and 58.36% for Summer seasons of 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995 and 1996, respectively.

XI.a.8. Milk returns to total returns:

Percentages of milk return to total returns differed from year to year. Their higher percentages were 79.52, 88.71, 88.88, 86.55, 87.66, 85, 80.23, 80.60, 76.78, 71.81 and 73.64% in Summer seasons of 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994 and 1996 and Winter season of 1991 and 1992 (74.82% and 75.27%). The low percentages were 63.99, 69.98, 57.87, and 57.21% in Winter seasons of 1985, 1986, 1995 and 1996, respectively, and the Summer season of 1995 (69.18%).

- Kilogram of milk:

XI.a.9. Net income of kilogram milk:

The net income kilogram milk sold had the higher values of 129.83, 122.37, 115.12 and 69.82 piasters in Winter seasons of 1996, 1995, 1989 and 1990, respectively. Meanwhile, the lower values were -4.50, -9.50, -11.45, -35.56, -29.36, 2.38 and -51.17 piasters for Summer seasons of 1986, 1991, 1992, 1993, 1994, 1995 and 1996, respectively.

XI.a.10. costs of kilogram milk sale:

Costs of kilogram of milk were about 242.90, 198.18, 186.62 and 185.003 piasters in Summer seasons of 1996, 1994, 1993 and 1995, respectively. Lower values were in Winter, seasons of 1988, 1990, 1987, 1989, 1986 and 1985, respectively. Their values were 55.72, 61.66, 50.39, 51.92, 46.66 and 36.89 piasters, respectively, and Summer seasons of 1985 and their values were 61.29 piasters.

XI.a.11. Price of a kilogram milk as percentage to its costs:

Price of a kilogram of milk as percentages to its costs differed according to the year and season. Maximum percentages were 165.63, 158.93, 151.80, 139.30, 146.85, 145.36 and 132.18% in Winter seasons of 1989, 1990, 1985, 1986, 1987, 1988 and 1995, respectively. Meanwhile, the lower percentages were 72.13, 73.09, 62.15, 62.06 and 58.14% in Summer seasons of 1991, 1992, 1993, 1994 and 1996, respectively.

Table (50): Means±SE of Variable costs to total costs, total returns to variable costs, returns to total costs, net income to variable costs, net income to total costs, milk returns to variable costs of different years and seasons.

Year	Sea.	No of Rec.	Collective Efficiency Measures (%)					
			(Variable /total) costs	(Total returns /variable) costs	(Returns /total) costs	(Net income/ variable) costs	(Net income/ total) costs	(Milk returns/ variable) costs
1985	Win	203	71.79 ± 0.78^{H}	331.67 ± 7.65^{A}	238.5 ± 5.4^{A}	192.65 ± 7.02^{A}	138.57 ± 5.3^{A}	211 ± 6.2^{A}
1985	Sum	203	76.64 ± 0.58^{G}	149.16 ± 2.90^{G}	102.11 ± 2^{K}	18.25 ± 2.82^{H}	13.94 ± 2.18^{I}	119.6 ± 2^{F}
1986	Win	215	78.63 ± 0.55^{F}	255.52 ± 4.36^{C}	200.47 ± 3^{F}	128.23 ± 4.49^{C}	100.74 ± 3.8^{F}	177.3 ± 3.4^{C}
1986	Sum	215	80.95 ± 0.49^{F}	115.93 ± 3.37^{I}	94.22 ± 2.3^{L}	-7.09 ± 3.05^{L}	-5.77 ± 2.33^{L}	102.5 ± 2.4^{H}
1987	Win	181	83.96 ± 0.35^{E}	248.11 ± 5.57^{D}	207.62 ± 4^{E}	128.61 ± 5.59^{C}	107.63 ± 4.7^{E}	175.5 ± 3.8^{C}
1987	Sum	181	84.10 ± 0.46^{E}	124.17 ± 5.25^{H}	105.26 ± 3^{K}	6.20 ± 4.84^{J}	5.26 ± 3.63^{J}	109.0 ± 3.0^{G}
1988	Win	180	84.86 ± 0.53^{E}	244.77 ± 5.17^{D}	205.94 ± 4^{E}	125.91 ± 5.21^{C}	105.99 ± 4.6^{E}	172.7 ± 3.6^{C}
1988	Sum	180	84.70 ± 0.73^{E}	122.40 ± 5.13^{H}	104.71 ± 3^{K}	5.511 ± 4.33^{J}	4.715 ± 3.22^{J}	102.5 ± 2.5^{H}
1989	Win	141	87.99 ± 0.41^{D}	261.81 ± 7.25^{B}	229.1 ± 0.1^{B}	147.56 ± 7.4^{B}	128.68 ± 6.7^{B}	189.2 ± 5.2^{B}
1989	Sum	141	87.76 ± 0.64^{D}	126.40 ± 3.62^{H}	111.83 ± 2^{J}	13.37 ± 3.06^{I}	11.83 ± 2.53^{I}	109.6 ± 2.3^{G}
1990	Win	138	89.48 ± 0.47^{C}	239.24 ± 10^{E}	213.23 ± 8^{D}	127.04 ± 10^{C}	113.23 ± 8.4^{D}	178.3 ± 51^{C}
1990	Sum	138	89.30 ± 0.62^{C}	131.03 ± 4^{H}	117.77 ± 3^{J}	19.77 ± 3.79^{H}	17.77 ± 3.24^{H}	109.2 ± 2.5^{G}
1991	Win	130	91.29 ± 0.55^{B}	181.63 ± 8.26^{F}	165.03 ± 7^{G}	71.56 ± 8.21^{E}	65.03 ± 7.06^{G}	135.01 ± 3^{E}
1991	Sum	130	91.34 ± 0.64^{B}	101.93 ± 3.13^{J}	93.47 ± 2.4^{L}	-7.11 ± 2.70^{L}	-6.25 ± 2.41^{M}	78.66 ± 1.9^{I}
1992	Win	99	93.15 ± 0.47^{A}	167.57 ± 11^{F}	156.51 ± 9^{H}	58.30 ± 11.6^{F}	50.59 ± 9.91^{H}	125.9 ± 5.5^{E}
1992	Sum	99	93.29 ± 0.51^{A}	98.78 ± 3.67^{J}	92.72 ± 3.1^{L}	-7.75 ± 3.41^{L}	-7.27 ± 3.14^{M}	77.9 ± 2.67^{I}
1993	Win	90	89.49 ± 1.91^{C}	157.17 ± 18.3^{F}	147.97 ± 13^{I}	51.07 ± 17.52^{F}	48.07 ± 12.8^{H}	111.2 ± 9.4^{G}
1993	Sum	90	93.78 ± 0.46^{A}	85.40 ± 4.48^{K}	80.96 ± 3.8^{M}	-20.10 ± 4.19^{N}	-19.05 ± 3.8^{N}	65.56 ± 3.2^{J}
1994	Win	111	88.21 ± 1.55^{DC}	159.26 ± 14.4^{F}	148.2 ± 10^{J}	51.80 ± 13.88^{F}	48.20 ± 10.6^{H}	103.2 ± 9^{H}
1994	Sum	111	90.92 ± 0.68^{B}	91.16 ± 10^{I}	85.18 ± 7.7^{M}	-15.85 ± 9^{M}	-14.81 ± 7.7^{I}	66.4 ± 6.8^{J}
1995	Win	349	87.54 ± 0.57^{D}	246.89 ± 7.74^{D}	223.4 ± 6.2^{C}	103.72 ± 7.52^{D}	123.40 ± 4.4^{C}	146.7 ± 4.6^{D}
1995	Sum	349	91.19 ± 0.21^{B}	109.38 ± 3.85^{H}	101.2 ± 3.1^{K}	1.39 ± 3.69^{K}	1.28 ± 6.15^{K}	76.6 ± 3.1^{I}
1996	Win	100	86.10 ± 0.41^{D}	244.98 ± 7.37^{D}	214.01 ± 6^{D}	130.51 ± 7.09^{C}	114.01 ± 5.8^{D}	142.7 ± 5.8^{D}
1996	Sum	100	91.00 ± 0.14^{B}	86.28 ± 2.92^{K}	78.93 ± 2.5^{N}	-23.02 ± 2.74^{N}	-21.06 ± 5.8^{O}	63.8 ± 2.28^{J}
Total Mean	Win	1937	86.04 ± 0.71	228.21 ± 8.92	195.83 ± 6.6	109.74 ± 8.80	95.33 ± 7.00	155.72 ± 9.2
Total Mean	Sum	1937	87.91 ± 0.51	111.83 ± 4.36	97.35 ± 3.30	-1.36 ± 3.96	-1.61 ± 3.84	90.11 ± 2.88

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).

Table (51): **Means±SE of Milk returns to total costs, Milk returns to total returns, net income to amount milk, costs of kilogram milk sale and price of kilogram milk to its costs for different years and seasons.**

Year	Season	No of Rec.	Collective efficiency measures (%)				
			Milk returns/ total costs	Milk returns/ total returns	Net income/ amount milk	Costs of kilogram milk sale (Piaster)	Price/kilogram to its costs
1985	Winter	203	151.80 ± 3.64^{B}	63.99 ± 0.74^{D}	51.12 ± 1.20^{EF}	36.89 ± 2.54^{Q}	151.80 ± 3.64^{AB}
1985	Summer	203	91.35 ± 1.84^{H}	79.52 ± 0.40^{AB}	8.54 ± 1.67^{HI}	61.29 ± 1.85^{M}	91.36 ± 1.84^{F}
1986	Winter	215	139.31 ± 2.86^{D}	69.98 ± 0.84^{CD}	47.00 ± 1.14^{F}	46.66 ± 2.57^{P}	139.30 ± 2.86^{B}
1986	Summer	215	83.32 ± 1.81^{I}	88.71 ± 0.61^{A}	-4.50 ± 2.54^{J}	78.01 ± 2.46^{L}	83.32 ± 1.81^{G}
1987	Winter	181	146.83 ± 3.36^{C}	71.24 ± 0.96^{C}	54.28 ± 1.23^{E}	50.39 ± 1.25^{O}	146.85 ± 3.36^{B}
1987	Summer	181	92.43 ± 2.35^{H}	88.88 ± 0.69^{A}	4.21 ± 2.92^{I}	80.03 ± 2.37^{K}	92.46 ± 2.35^{F}
1988	Winter	180	145.37 ± 3.48^{C}	71.05 ± 0.95^{C}	59.03 ± 1.33^{E}	55.72 ± 1.31^{N}	145.36 ± 3.48^{B}
1988	Summer	180	87.73 ± 2.01^{I}	86.55 ± 1.08^{A}	4.35 ± 3.49^{I}	92.32 ± 2.69^{L}	87.73 ± 2.01^{FG}
1989	Winter	141	165.61 ± 4.90^{A}	71.61 ± 1.02^{C}	115.12 ± 3.02^{C}	51.92 ± 1.54^{O}	165.63 ± 4.87^{A}
1989	Summer	141	96.93 ± 2.15^{H}	87.66 ± 1.06^{A}	10.50 ± 2.65^{H}	88.72 ± 2.31^{I}	96.93 ± 2.15^{F}
1990	Winter	138	158.92 ± 4.71^{AB}	75.06 ± 1.02^{B}	69.82 ± 2.01^{D}	61.66 ± 1.47^{M}	158.93 ± 4.71^{A}
1990	Summer	138	98.16 ± 2.32^{H}	85.008 ± 1.41^{A}	17.71 ± 3.42^{G}	99.83 ± 2.62^{H}	98.16 ± 2.32^{EF}
1991	Winter	130	122.70 ± 3.00^{E}	74.82 ± 1.03^{B}	55.65 ± 2.56^{E}	85.5 ± 1.78^{J}	122.70 ± 3.00^{D}
1991	Summer	130	72.12 ± 1.78^{J}	80.23 ± 1.52^{A}	-9.50 ± 4.57^{K}	145.57 ± 4.70^{E}	72.13 ± 1.78^{H}
1992	Winter	99	117.55 ± 4.69^{F}	75.27 ± 1.05^{B}	53.26 ± 3.33^{E}	97.82 ± 2.45^{H}	117.56 ± 4.69^{D}
1992	Summer	99	73.08 ± 2.33^{J}	80.60 ± 1.60^{A}	-11.45 ± 5.00^{K}	157.34 ± 4.87^{D}	73.09 ± 2.33^{H}
1993	Winter	90	104.72 ± 6.56^{G}	67.11 ± 2.11^{CD}	53.26 ± 14.87^{B}	110.78 ± 10.04^{G}	104.70 ± 6.56^{E}
1993	Summer	90	62.17 ± 2.71^{K}	76.78 ± 1.94^{AB}	-35.56 ± 7.36^{M}	186.62 ± 6.68^{C}	62.15 ± 2.71^{I}
1994	Winter	111	96.00 ± 6.84^{H}	60.46 ± 2.13^{D}	61.76 ± 19.77^{DE}	128.12 ± 39.17^{F}	96.003 ± 6.84^{EF}
1994	Summer	111	62.06 ± 5.49^{K}	71.81 ± 1.65^{C}	-29.36 ± 18.49^{L}	198.18 ± 20.57^{B}	62.06 ± 5.49^{I}
1995	Winter	349	132.76 ± 3.64^{D}	57.87 ± 0.77^{E}	122.3 ± 4.63^{B}	99.10 ± 6.86^{H}	132.18 ± 3.64^{C}
1995	Summer	349	70.98 ± 2.58^{J}	69.18 ± 0.57^{CD}	2.38 ± 6.13^{JI}	185 ± 6.70^{C}	70.80 ± 2.58^{GH}
1996	Winter	100	124.67 ± 4.82^{E}	57.21 ± 1.03^{E}	129.83 ± 5.14^{A}	113.07 ± 13.19^{H}	123.82 ± 4.82^{D}
1996	Summer	100	58.36 ± 1.06^{L}	73.64 ± 0.96^{B}	-51.17 ± 17.53^{N}	242.90 ± 17.4^{A}	58.14 ± 1.99^{J}
Total Mean	Winter	1937	133.85 ± 4.37	67.97 ± 1.137	72.70 ± 5.01	78.13 ± 7.01	133.73 ± 4.36
Total Mean	Summer	1937	79.05 ± 1.12	80.71 ± 1.12	-7.82 ± 6.31	134.65 ± 6.26	79.02 ± 2.44

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).

XI-b. Effect of locality and season on collective efficiency measures:

- Variable costs:

XI.b.1. Variable costs to total costs:

Variable costs to the total costs percentage ranged from high percentages (95.2 and 95.3) in Winter and Summer seasons of Alexandria) to low percentages (86.6% and 83.9%) in Winter seasons of Behaira and El-Monofia.

XI.b.2. Total returns to variable costs:

The year and season had significant effect on the percentage of total returns to variable costs. They ranged from 418.8 and 139.4% in Winter season of El-Monofia and Alexandria to 215.1, 123.5, 89.1, 163.6, 69.1 and 96% in Winter season of Kafr-El-shaikh and Summer seasons of Kafr-El-Shaikh, Behaira, El-Monofia, Alexandria and El-Garbia, respectively.

XI.b.3. Total returns to total costs:

Percentages of total returns to total costs ranged from 351.5 and 239.6% in Winter seasons of El-Monofia and Behaira, 87.3, 81.2 and 65.9% in Summer seasons of El-Garbia, Behaira and Alexandria, respecticvely. These results are lower than results of James and Ellis (1978) and in line with those of Ellis and James (1977) and Kelly and Fingleton (1983).

-Net income:

XI.b.4. Net income to variable costs:

The percentages of net income to variable costs were demonstrated in Table (52). They were about 299.6 and 161.6% in Winter seasons of El-Monofia and Behaira. Meanwhile the lower percentages were 34.3, 20.4 and -35.8% in Summer, Winter and Summer seasons of Alexandria, El-Monofia and Alexandria, respectively.

XI.b.5. Net income to total costs:

The locality had significant effects on income to total costs percentages. Higher percentage values were found in Winter seasons of El-Monofia and Behaira (251.5 and 139.9%). Their values were 32.6, 17.9 and -34.2% in Winter, Summer and Summer seasons of Alexandria, El-Monofia and Alexandria, respectively.

- Milk returns:

XI.b.6. Milk returns to variable costs:

The percentage of milk returns to the variable costs ranged from 315.3 and 161.7% in Winter seasons of El-Monofia and El-Garbia, respectively. to 88.9, 89.5, 64.9 and 83.5% in Winter, Winter, Summer and Summer seasons of Kafr-El-shaikh, Alexandria, Behaira and El-Garbia, respectively. Lowest percentage (57.2%) was found in Summer season of Alexandria.

XI.b.7. Milk returns to total costs:

The percentages of milk returns to total costs differed according the season and locality. Their high percentages were 260, 140 and 120 and 130% in Winter seasons of El-Monofia, El-Garbia , Kafr-El-shaikh and El-Monofia, respectively. Meanwhile the lower percentages were 80, 60, 90, 50 and 80% in Summer, Summer, Winter, Summer and Summer seasons of Kafr-El-shaikh, Behaira, Alexandria, Alexandria and El-Garbia, respectively.

XI.b.8. Milk returns to total returns:

Milk returns to total returns percentages were 89.7, 86.9 and 82.8% in Summer seasons of El-Monofia, El-Garbia and Alexandria while the lower percentages were found as 64.2 and 53.9% in Winter seasons of Alexandria and Behaira, respectively.

- Kilogram milk:

XI.b.9. Net income of kilogram milk sold:

Net incomes to the values of milk sold had the percentages of about 142, 119.3% in Winter seasons of Behaira and El-Monofia, respectively. Meanwhile, lower percentages were -80.9, -13.8 and -41.3% in Summer seasons of Alexandria, El-Garbia and Behaira, respectively.

XI.b.10. Costs of kilogram milk sold:

The higher costs of kilogram milk were 237 and 219.8 piaster in Summer seasons of Alexandria and Behaira and the lower values were 47.5, 88.3 and 58 piaster in Winter seasons of El-Monofia, Kafr-El-shaikh and El-Garbia, respectively.

XI.b.11. Price of kilogram milk sold to its costs:

The percentages of the price of kilogram milk to its costs differed from locality and season to another. Maximum percentages were 263.4, 127.7, 127.1 and 138% in Winter, Summer, Winter and Winter seasons of El-Monofia, El-Monofia, Behaira and El-Garbia, respectively. Minimum percentages were 124.6, 79.5, 73.6, 58.7, 83.2 and 53.6% of Winter, Summer, Summer, Summer, Winter and Summer seasons of Kafr-El-shaikh, Kafr-El-shaikh, El-Garbia, Behaira, Alexandria and Alexandria governorate, respectively.

Table (52): Means±SE of the Variable costs to total costs, total returns to variable costs, returns to total costs, net income to variable costs, net income to total costs, milk returns to variable costs for different localities and seasons.

Locality	Sea	No of Rec.	Collective efficiency Measures (%)					
			(Variable/ total) costs	Total returns/ variable costs	Returns/ total costs	Net income/ variable costs	Net income/ total costs	Milk returns/ variable costs
Behaira	Win	66	86.6 ± 2.39^{C}	276.8 ± 12.3^{B}	239.6 ± 12.6^{B}	161.6 ± 12.3^{B}	139.9 ± 11.4^{B}	149.1 ± 10.6^{C}
	Sum	66	91.2 ± 0.58^{B}	89.1 ± 6.67^{G}	81.2 ± 5.78^{I}	-20.6 ± 6.6^{I}	-18.8 ± 5.9^{I}	64.9 ± 5.27^{F}
Alexandria	Win	4	95.2 ± 22.6^{A}	139.4 ± 23.3^{A}	132.6 ± 14.9^{F}	34.4 ± 1.30^{E}	32.6 ± 21.79^{C}	89.5 ± 29.1^{E}
	Sum	4	95.3 ± 2.61^{A}	69.1 ± 39.69^{L}	65.9 ± 35.05^{J}	-35.8 ± 6.6^{J}	-34.2 ± 24^{J}	57.2 ± 33.5^{G}
Kafr El shaikh	Win	964	88.1 ± 0.2^{BC}	215.1 ± 4.31^{D}	189.6 ± 3.57^{D}	101.6 ± 4.25^{D}	89.6 ± 2.57^{D}	138.8 ± 2.17^{D}
	Sum	964	88.4 ± 0.29^{BC}	123.5 ± 2.36^{F}	109.2 ± 1.70^{G}	10.4 ± 2.12^{G}	9.2 ± 1.70^{G}	88.9 ± 1.65^{E}
El-Garbia	Win	894	88.2 ± 0.37^{BC}	223.6 ± 3.20^{C}	197.3 ± 2.30^{C}	110.3 ± 2.90^{C}	97.3 ± 2.29^{C}	161.7 ± 2.39^{B}
	Sum	894	90.9 ± 0.27^{B}	96.0 ± 18.79^{H}	87.3 ± 1.02^{H}	-14.0 ± 1.2^{H}	-12.7 ± 1.0^{H}	83.5 ± 1.10^{F}
El-Monofia	Win	9	83.9 ± 12.2^{D}	418.8 ± 84.9^{A}	351.5 ± 35.8^{A}	299.6 ± 28.4^{A}	251.5 ± 20.9^{A}	315.3 ± 39.6^{A}
	Sum	9	87.9 ± 2.95^{B}	163.6 ± 16.7^{E}	143.7 ± 12.2^{E}	20.4 ± 5.48^{F}	17.9 ± 12.18^{F}	146.7 ± 12.5^{C}
Total Mean	Win	1937	88.4 ± 7.55	254.74 ± 25.6	222.12 ± 13.8	141.5 ± 9.83	122.18 ± 11	170.88 ± 16.7
	Sum	1937	90.74 ± 1.34	133.78 ± 16.8	-7.72 ± 6.95	-7.92 ± 4.4	-7.72 ± 6.95	88.24 ± 10.8

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (53): Means±SE of Milk returns to total costs, Milk returns to total returns, net income to amount milk, costs of kilogram milk sale and price of kilogram milk to its costs for different localities and seasons.

Locality	Season	No of Rec.	Collective efficiency Measures (%)				
			Milk returns/ total costs	Milk returns/ total returns	Net income/ amount milk	Costs of kilogram milk sale (Piaster)	Price of kilogram/ its costs
Behaira	Winter Summer	66 66	130 ± 9.45^{C} 60 ± 4.74^{G}	53.9 ± 2.57^{E} 72.9 ± 2.04^{C}	142 ± 23.09^{A} -41.3 ± 33.87^{I}	101.5 ± 35.14^{F} 219.8 ± 32.90^{B}	127.1 ± 9.45^{B} 58.7 ± 4.73^{F}
Alexandria	Winter Summer	4 4	90 ± 80.13^{E} 50 ± 29.77^{H}	64.2 ± 4.27^{D} 82.8 ± 5.66^{B}	49.4 ± 4.57^{E} -80.9 ± 23.89^{J}	151.4 ± 10.41^{C} 237 ± 96.21^{A}	83.2 ± 8.13^{D} 53.6 ± 29.78^{G}
Kafr El shaikh	Winter Summer	964 964	120 ± 1.79^{D} 80 ± 1.27^{F}	64.5 ± 0.55^{D} 72 ± 0.48^{C}	79.1 ± 2.94^{C} 12.7 ± 2.81^{G}	88.3 ± 4.92^{H} 139.4 ± 3.62^{D}	124.6 ± 1.79^{C} 79.5 ± 1.27^{D}
El-Garbia	Winter Summer	894 894	140 ± 1.77^{B} 80 ± 0.94^{F}	72.3 ± 0.37^{C} 86.9 ± 0.34^{A}	56.4 ± 0.83^{D} -13.8 ± 1.66^{H}	58 ± 1.39^{I} 108.6 ± 2.27^{E}	138 ± 1.77^{B} 73.6 ± 0.94^{E}
El-Monofia	Winter Summer	9 9	260 ± 32.97^{A} 130 ± 10.97^{C}	75.3 ± 4.64^{C} 89.7 ± 3.52^{A}	119.3 ± 10.39^{B} 17.6 ± 9.91^{F}	47.5 ± 63.89^{J} 97.9 ± 10.43^{G}	263.4 ± 32.97^{A} 127.7 ± 10.97^{B}
Total Mean	Winter Summer	1937 1937	148±25.22 80 ±9.53	66.04±2.48 80.86±2.40	89.24±8.36 -21.14±14.42	89.34±23.15 160.54±29.08	147.26±10.8 78.62±9.53

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

XI-c. Effect of breed and season on collective efficiency measures:

- Variable costs:

XI.c.1. Variable costs to total costs:

Breed of dairy cows had significant effects on the percentage of variable costs to their total costs. Top percentages were 93.4, 93.8, 91.3, 91.6 and 91.3% in Summer, Winter, Summer, Summer and Summer seasons H.F, H.F, Buffalo, Friesian X Balady and Balady, respectively. And the least ones were 75.4 and 81.7% in Winter and Summer seasons of Cross Charolais X Friesian cows, respectively.

-Total returns:

XI.c.2. Total returns to variable costs:

The overhead percentages were 576.1, 385.4 and 296.6% in Winter seasons of Charolais X Friesian, H.F and Balady, respectively. Meanwhile, the lowest ones were in Summer seasons of Balady, Friesian, Friesian X Balady and Buffalo, and their percentage, were 110.9, 109.2, 115.9 and 87.5%, respectively.

XI.c.3. Total returns to total costs:

Breed and Season had significant effects ($P < 0.01$) on the total returns to the total costs. The utmost percentages were 434.1, 361.6 and 261.2% in Winter seasons of Charolais X Friesian, H.F and Balady, respectively. While, the smallest percentages were 101.2, 97.5, 106.1 and 79.9% in Summer seasons of Balady, Friesian, Friesian X Balady and Buffalo, respectively. These results, agree with the results of El-Amrawi (1994) where he reported that B/C analysis in buffalo reached to 6:1 due to ovarian inactivity.

- Net income:

XI.c.4. Net income to the variable costs:

Breed and the season affected significantly ($P < 0.01$) net income to total variable costs. Superior percentages were in Winter seasons of Charolais X Friesian, H.F and Balady. Their values were 443.3, 278.8 and 183.2%, respectively. While, the lowest ones were -208, -22% in Summer seasons of Friesian and Buffalo, respectively.

XI.c.5. Net income to total costs:

Percentages of net income to the total costs were 334.1, 261.6 and 161.3% in Winter seasons of Charolais X Friesian, H.F and Balady, respectively. Meanwhile, the lowest values were 1.20, -2.5 and -20.1% in Summer seasons of Balady, Friesian and Buffalo, respectively.

- Milk returns:

XI.c.6. Milk returns to variable costs:

The top percentages of milk returns to variable costs were 368, 293.8 and 175.4% in Winter, Winter and Summer seasons of Charolais X Friesian, H.F and H.F, respectively. Meanwhile the smallest percentage were 79.2, 88.2, 79.1 and 61.7% for Balady, Friesian, Friesian X Balady and Buffalo, respectively.

XI.c.7. Milk returns to total costs:

Milk returns to total cost percentages were on top for Charolais X Friesian, H.F and H.F, in Winter, Winter and Summer seasons. Their percentages were 280, 280 and 160, respectively. Minimum percentages were 80, 70 and 60% for Summer seasons of Friesian, Friesian X Balady and Buffalo, respectively.

XI.c.8. Milk returns to total returns:

The overhead percentages of milk returns to total returns were 93.7, 85.1, 80.7 and 76.2% in Summer, Winter, Summer and Winter seasons of H.F, Charolais, Friesian and H.F, respectively. Meanwhile, the lowest ones were 58.3 and 54.9% in Winter seasons of Buffalo and Balady, respectively.

- Kilogram milk:

XI.c.9. Net income of kilogram milk sale:

The net income to the amount of milk sold had the above percentages of Winter seasons of Charolais X Friesian, Balady and Friesian X Balady. They were 151, 135.7 and 138 piaster, respectively. Meanwhile, the tiniest lower percentages were 2.1, -2.8 and -51.4 piaster for Summer seasons of Balady, Friesian, Friesian X Balady and Buffalo, respectively.

XI.c.10. Costs of a kilogram milk sold:

Superior values of kilogram milk were 256, 178.4 and 170.8 piasters in Summer seasons of Buffalo, Friesian X Balady and Balady, respectively. Meanwhile, the lowest percentages were 75, 73, 68, 44.7 and 45.2% in Summer seasons of H.F and Winter seasons of Charolais, Friesian,H.F and Charolais X Friesian, respectively.

XI.c.11. Price of a kilogram to its costs:

Percentage of the price of kilogram to its costs differed from breed and season to another ($P < 0.01$). Top percentages were, 274.3, 275.2 and 164.1% in Winter, Winter and Summer seasons of Charolais X Friesian, H.F and H.F, respectively. The lowest percentages were, 72.6, 72.3 and 55.5% for Summer seasons of Balady, Frsian X Balady and Buffalo, respectively.

Table (54): Means ± SE of Variable costs to total costs, total returns to variable costs, returns to total costs, net income to variable costs, net income to total costs, milk returns to variable costs for different breeds and seasons.

Breed	Sea	No of Rec.	Collective Efficiency Measures (%)					
			(Variable/ total) costs	Total returns/ variable costs	Returns/ total costs	Net income/ variable costs	Net income/ total costs	Milk returns /variable costs
Balady	Win	229	88 ± 0.327^{B}	296.6 ± 12.8^{C}	261.2 ± 10.4^{C}	183.2 ± 12.6^{C}	161.3 ± 10^{C}	162.8 ± 6^{D}
Balady	Sum	229	91.3 ± 0.38^{A}	110.9 ± 4.21^{J}	101.2 ± 3.40^{I}	14 ± 3.89^{K}	120 ± 3.40^{K}	79.2 ± 3.5^{J}
Friesian	Win	1502	88.1 ± 0.28^{B}	209.6 ± 1.42^{F}	184.6 ± 1.89^{E}	96 ± 2.32^{F}	84.6 ± 1.85^{F}	148 ± 1.7^{E}
Friesian	Sum	1502	89.3 ± 0.23^{B}	109.2 ± 1.42^{J}	97.5 ± 1.01^{I}	-2.8 ± 1.26^{M}	-2.5 ± 1.01^{L}	88.2 ± 0.9^{I}
CharXFr	Win	4	75.4 ± 21.7^{D}	576.1 ± 148^{A}	434.1 ± 59.4^{A}	443.3 ± 131^{A}	334.1 ± 36^{A}	368 ± 76.9^{A}
CharXFr	Sum	4	81.7 ± 4.60^{C}	210 ± 156.2^{F}	171.5 ± 11.3^{F}	87.6 ± 142^{G}	71.5 ± 11.2^{G}	163.9 ± 14^{D}
BalXFr	Win	86	89.4 ± 0.47^{B}	256.6 ± 14^{D}	229.2 ± 11.5^{D}	144.6 ± 13.6^{D}	129.2 ± 11^{D}	135.9 ± 9^{F}
BalXFr	Sum	86	91.6 ± 0.47^{A}	115.9 ± 13.8^{I}	106.1 ± 10.7^{H}	6.7 ± 13.4^{L}	6.1 ± 10.7^{J}	79.1 ± 9.7^{J}
Charolais	Win	19	89.9 ± 1.35^{B}	152.8 ± 8.08^{H}	137.4 ± 6.52^{G}	41.5 ± 7.49^{I}	37.4 ± 6.52^{H}	131 ± 4.54^{G}
Charolais	Sum	19	87.5 ± 1.96^{B}	153.2 ± 18.1^{H}	134.1 ± 14.1^{G}	38.9 ± 17.13^{J}	34.1 ± 14^{I}	111.9 ± 11^{H}
H.F	Win	3	93.8 ± 0.33^{A}	385.4 ± 21^{B}	361.6 ± 31.6^{B}	278.8 ± 24.5^{A}	761.6 ± 3.1^{B}	293.8 ± 37^{B}
H.F	Sum	3	93.4 ± 4.89^{A}	187.3 ± 20.4^{G}	147.9 ± 8.9^{G}	80.2 ± 14.5^{H}	74.9 ± 8.93^{G}	175 ± 11.9^{C}
Buffalo	Win	94	88.2 ± 0.43^{B}	236.8 ± 7.90^{E}	209.0 ± 6.75^{E}	123.5 ± 7.8^{E}	109 ± 6.8^{E}	138 ± 5.9^{F}
Buffalo	Sum	94	91.3 ± 3.66^{A}	87.5 ± 3.20^{K}	79.9 ± 2.72^{J}	-22 ± 5.12^{N}	-20.1 ± 2.7^{M}	61 ± 2.16^{K}
Total Mean	Win	1937	86.97 ± 3.55	301.38 ± 30.4	259.58 ± 18.2	187.27 ± 28	230.98 ± 10	196.7 ± 20
	Sum	1937	89.4 ± 2.31	139.14 ± 16.7	119.74 ± 7.44	28.94 ± 28.2	40.58 ± 5.9	108.3 ± 7.6

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).

Table (55): Means±SE of Milk returns to total costs, Milk returns to total returns, net income to amount milk, costs of kilogram milk sale and price of kilogram milk to its costs for different breeds and seasons.

Breed	Season	No of Rec.	Collective efficiency measures (%)				
			Milk returns/ total costs	Milk returns/ total returns	Net income/ amount milk	Costs of kilogram milk sale	Price of kilogram/its costs
Balady	Winter	229	140 ± 5.41^{C}	54.9 ± 0.97^{I}	135.7 ± 6.86^{B}	84.1 ± 8.24^{H}	147.4 ± 5.40^{C}
Balady	Summer	229	70 ± 2.99^{H}	71.4 ± 0.95^{E}	2.1 ± 8.74^{I}	170.8 ± 9.42^{C}	72.6 ± 2.99^{J}
Friesian	Winter	1502	130 ± 1.30^{D}	71 ± 0.32^{E}	58 ± 1.11^{F}	68.6 ± 1.73^{J}	128.2 ± 1.30^{D}
Friesian	Summer	1502	80 ± 0.76^{G}	80.7 ± 0.35^{C}	-2.8 ± 1.40^{J}	113.6 ± 1.79^{E}	77.4 ± 0.76^{G}
CharXFr	Winter	4	280 ± 43.65^{A}	63.9 ± 2.94^{G}	151 ± 10.7^{A}	45.2 ± 82.11^{B}	274.3 ± 43.65^{A}
CharXFr	Summer	4	130 ± 11.94^{D}	78.1 ± 2.31^{D}	67.5 ± 6.40^{E}	94.4 ± 7.72^{G}	131.3 ± 11.94^{D}
BalXFr	Winter	86	120 ± 8.24^{E}	53 ± 1.85^{E}	138 ± 21.89^{B}	106.8 ± 49.3^{F}	120.8 ± 8.24^{E}
BalXFr	Summer	86	70 ± 7.65^{H}	68.3 ± 1.20^{F}	10.9 ± 21.55^{H}	178.4 ± 24.28^{B}	72.3 ± 7.65^{H}
Charolais	Winter	19	120 ± 3.29^{E}	85.1 ± 2.70^{B}	27.5 ± 4.22^{G}	73.7 ± 5.63^{I}	114 ± 3.29^{F}
Chralaos	Summer	19	100 ± 7.95^{F}	73.1 ± 4.04^{E}	29.41 ± 13.60^{G}	86.3 ± 13.47^{H}	79.3 ± 7.95^{G}
H.F	Winter	3	280 ± 4.43^{A}	76.2 ± 6.01^{C}	116.9 ± 3.24^{D}	44.7 ± 65.63^{K}	275.2 ± 4.43^{A}
H.F	Summer	3	160 ± 2.93^{B}	93.7 ± 3.49^{A}	56.2 ± 4.09^{F}	75 ± 3.75^{I}	164.1 ± 2.92^{B}
Buffalo	Winter	94	120 ± 4.78^{E}	58.3 ± 1.34^{H}	128.3 ± 11.54^{C}	117.8 ± 11.60^{D}	120.6 ± 4.78^{E}
Buffalo	Summer	94	60 ± 1.90^{I}	70.1 ± 1.13^{E}	-51.4 ± 17.72^{K}	256.0 ± 17.81^{A}	55.5 ± 1.90^{I}
Total	Winter	1937	170±28.54	65.92±2.30	107.91±8.50	77.27±32.30	168.64±10.15
Mean	Summer	1937	95.71±5.16	76.48±1.92	15.98±10.5	139.21±11.17	93.21±5.15

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

XI-d. Effect of sector and season on collective efficiency measures:

-Variable costs:

XI.d.1. Variable costs to total costs:

The percentage of variable costs to total costs was affected significantly by the sector of milk production ($P < 0.01$), as well as by the season ($P < 0.05$). The higher percentages were, in Summer, Summer, Winter, Winter and Summer seasons of the Farmers, private, farmers, private and governmental sectors. Their values were 91.4, 89.2, 88.5, 88.1 and 88%, respectively. The lowest percentages were 85% in Winter season of the governmental sectors.

XI.d.2. Total returns to variable costs:

The top percentage were, 274, 206.9 and 188.1% in Winter seasons of the farmers, private and governmental sector, respectively, and the lowest values were 112.5, 108.3 and 71.4% for Summer seasons of farmers, private and governmental sector, respectively.

- Total returns:

XI.d.3. Total returns to total costs:

Percentages of total returns to total costs were on top of Winter seasons of farmers, private and governmental sector. Their values were 243.3, 182.2 and 159.9%, respectively. The minimum percentages were 102.8, 96.9 and 62.8% in Summer seasons of farmers, private and governmental sector, respectively.

- Net income:

XI.d.4. Net income to variable costs:

Superior percentages of net income to variable costs were found in Winter seasons. They were 161.9, 93.4 and 70.4% for farmers, private and governmental sector, respectively. While the percentages of Summer seasons were 3.1, -3.8 and -4.2% for farmers, private and governmental sector, respectively.

XI.d.5. Net income to total costs:

Percentages of net income to the total costs were greatest in Winter seasons for the farmers, private and governmental sector. They were 143.3, 82.2 and 59.9%, respectively. The lowest percentages were 2.8, -3.4 and -3.7% for Summer seasons of the same sectors, respectively.

- Milk returns:

XI.d.6. Milk returns to variable costs:

The percentages of milk returns to variable costs differed according to the sector and seasons. Winter seasons had the highest percentages (154.6, 148 and 108.9%) in farmer, private and governmental sectors, respectively. Summer seasons had the lowest percentages (79.1, 88 and 60.5%) in farmers, private and governmental sector, respectively.

XI.d.7. Milk returns to total costs:

Top values were 140, 130 and 90% in Winter seasons of farmers, private and governmental sector, respectively, and the lowest values were in Summer seasons and their percentages were 70, 80, and 50% in farmers, private and governmental sectors, respectively.

XI.d.8. Milk returns to total returns:

Overhead percentages of milk returns to the total returns were 84.7, 81.3, 71.8 and 70.4% in Summer, Summer, Winter and Summer seasons of governmental, private, private and farmers sectors, respectively. The smallest ones were 57.9 and 56.3% for Winter seasons of governmental and farmers sectors.

-Kilogram milk sale:

XI.d.9. Net income of kilogram milk sold:

Superior values of the net income to the amount of milk sold were, 139.4, 55.3 and 83.3% in Winter seasons of farmers, private and governmental sectors, respectively. Meanwhile the lowest percentages were 5.20, -3.8 and -9.1% for Summer seasons of farmers, private and governmental sectors, respectively.

XI.d.10. Costs of kilogram milk sale:

The greatest costs of kilogram milk were 243.2, 183.3, 139.2 and 111.3 piasters for Summer, Summer, Winter and Summer seasons of governmental, private, governmental and private sectors, respectively. Meanwhile the lower percentage were 97.3, and 67.3 piasters for Winter seasons of farmers and private sector, respectively.

XI.c.11. Price of kilogram to its costs:

The price of kilogram to its costs differed also from sector and season to another ($P < 0.01$). Top percentages were, 135.7, 126.4 and 92.7% in Winter seasons of farmers, private and governmental sectors, respectively. In Summer seasons they were 72, 76, and 53% of farmers, private and governmental sectors, respectively.

Table (56): Means±SE of Variable costs to total costs, total returns to variable costs, returns to total costs, net income to variable costs, net income to total costs, milk returns to variable costs for different sectors and seasons.

Sector	Sea.	No of Rec.	Collective efficiency measures (%)					
			(Variable/ total) costs	Total returns / variable costs	Returns / total costs	Net income/ variable costs	Net income/ total costs	Milk returns/ variable costs
Farmers	Win	456	88.5±0.208^{B}	274.9±5.88^{A}	243.3±4.69^{A}	161.9±5.7^{A}	143.3±4.7^{A}	154.6±3.8^{A}
Farmers	Sum	456	91.4±0.210^{A}	112.5±3.69	102.8±2.92^{D}	3.1±3.51^{D}	2.8±2.92^{D}	79.1±2.79^{E}
Private	Win	1465	88.1±0.29^{B}	206.9±2.88^{B}	182.2±2.26^{B}	93.4±2.74^{B}	82.2±2.24^{B}	148.5±1.8^{B}
Private	Sum	1465	89.2±0.24^{A}	108.3±1.42^{E}	96.9±1.005^{E}	-3.8±1.25^{E}	-3.4±1.0^{E}	88±0.96^{D}
Govrnem	Win	16	85±9.55^{C}	188.1±69.8^{C}	159.9±32.1^{C}	70.4±69.3^{C}	59.9±17.1^{C}	108.9±48^{C}
Govrnem	Sum	16	88±1.72^{B}	71.4±21.1^{F}	62.8±17.1^{F}	-4.2±20^{F}	-3.7±16.5^{E}	60.5±17.1^{F}
Total	Win	1937	87.2±3.34	223.3±26.18	195.13±13.0	108.56±13-	95.13±8.0	137.3±17.8
Mean	Sum	1937	89.53±0.72	97.4±8.73	87.5±7.00	1.63±8.2	-1.43±6.8	75.8±6.95

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (57): Means±SE of Milk returns to total costs, Milk returns to total returns, net income to amount milk, costs of kilogram milk sale and price of kilogram milk to its costs for different sectors and seasons.

Sector	Season	No of Rec.	Collective efficiency measures (%)				
			Milk returns/ total costs	Milk returns/ total returns	Net income/ amount milk	Costs of kg milk sale (Piaster)	price of kilogram/ its costs
Farmers	Winter	456	140±3.05^{A}	56.3±0.67^{D}	139.4±5.90^{A}	97.3±10.22^{E}	135.7±3.05^{A}
Farmers	Summer	456	70±2.29^{E}	70.4±0.47^{C}	5.20±5.59^{D}	183.3±6.47^{B}	72.00±2.29^{D}
Private	Winter	1465	130±1.37^{B}	71.8±0.33^{C}	55.3±0.86^{C}	67.3±1.66^{F}	126.4±1.37^{B}
Private	Summer	1465	80±0.76^{D}	81.3±0.35^{B}	-3.8±1.37^{E}	111.3±1.72^{D}	76.4±0.76^{D}
Govrnem	Winter	16	90±27.01^{C}	57.9±7.05^{D}	83.3±53.3^{B}	139.2±76.79^{C}	92.7±27.01^{C}
Govrnem	Summer	16	50±14.18^{F}	84.7±4.42^{A}	-9.1±121.7^{F}	243.2±118^{A}	53.0±14.18^{E}
Total	Winter	1937	120±10.47	62±2.66	92.66±20.02	101.26±29.55	118.26±10.47
Mean	Summer	1937	66.66±5.74	78.8±1.74	-2.56±42.88	179.26±42.06	67.13±5.74

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

XII- EFFICIENCY OF VETERINARY MANAGEMENT:

Tables (58-63) and Fig (6-15) show that, the main variables (year, locality, breed and sector) and the season within each of them had significant effect on the percentages of Drug, vaccine, disinfectant, veterinarian visits and total veterinary management costs to each of variable costs and to the total costs ($P < 0.01$).

XII-a. Year and season effect on veterinary management efficiency measures:

Drugs:

XII-a.1. Drug costs to variable costs:

Top percentages of the drug costs to variable costs were 5.7, 4.8, 4.9, 4.9% in Winter seasons of 1985, 1986, 1987 and 1988, respectively, and the lowest ones were 2.09, 1.76 and 1.96% in Summer seasons of 1992, 1993 and 1995, respectively.

XII-a.2. Drug costs to total costs:

Drug costs to total cost percentages were 4.16, 4.21% in Winter seasons of 1987 and 1988. Lowest percentages were found (2.06, 1.93, 2.41, 1.63 and 1.76%) in Summer, Summer, Winter, Summer and Summer seasons of 1991, 1992, 1993, 1993 and 1995, respectively.

-Vaccines:

XII-a.3. Vaccine costs to variable costs:

Vaccine costs to variable costs percentages were 0.96, 0.93% in Winter seasons of 1995, 1996 and 0.40, 0.39% in Winter and Summer seasons of 1991.

XII-a.4. Vaccine costs to total costs:

Table (58) showed that the vaccine costs to variable costs had top percentages 0.82, 0.80% in Winter seasons of 1995 and 1996. The lowest values were 0.42 and 0.40% in Summer seasons of 1992 and 1993.

- Disinfectants:

XII-a.5. Disinfectant costs to variable costs:

Disinfectant costs to variable costs percentages were 0.61 and 0.56% in Summer seasons of 1987 and 1988, respectively. The lowest percentages were, 0.25, 0.23 and 0.23% in Summer, Winter and Summer seasons of 1991, 1992 and 1992, respectively.

XII-a.6. Disinfectant costs to total costs:

The higher percentage of disinfectant costs to total costs were 0.51, 0.47 and 0.45% in Summer seasons of 1987, 1988 and 1995, respectively. The lowest values were, 0.22, 0.21 and 0.21% for Summer, Winter and Summer seasons of 1991, 1992 and 1992, respectively.

- Veterinarian visits:

XII-a.7. Veterinarian visits costs to variable costs:

Peak percentage of veterinarian visits costs to variable costs were 2.02, 1.86 and 1.83% in Summer seasons of 1985, 1986 and 1987, respectively. The least values were 0.98, 0.83, 0.82, 0.92 and 0.57% in Winter, Summer, Summer, Winter and Summer seasons of 1993, 1993, 1995, 1996 and 1996, respectively.

XII-a.8. Veterinarian visits costs to total costs:

Percentage of veterinarian visits costs to variable costs were 1.54, 1.53% in Winter seasons of 1988 and 1987, respectively and the lowest percentages were 0.77, 0.74 and 0.51 for Summer seasons of 1993, 1995 and 1996, respectively.

-Total veterinary management costs:

XII-a.9. Total veterinary management costs to variable costs:

Percentage of veterinary management costs to variable costs were 8.94, 7.90, 7.87 and 7.80% in Winter seasons of 1985, 1987, 1988 and 1986, respectively. Meanwhile the minimum values were 3.83 and 3.39% in Summer seasons of 1992 and 1993, respectively.

XII-a.10. Total veterinary management costs to total costs:

Percentages of veterinary management costs to total costs were top and equal 6.69 and 6.64% in Winter seasons of 1988 and 1987, respectively. Meanwhile, the least values were 3.72, 3.54. 3.13, 3.61 and 3.67% in Summer seasons of 1991, 1992, 1993, 1995 and 1996, respectively. These results are in line with the results of Ellis and James (1979 a and b), Howe (1988), New (1991), Salman et al., (1991 a and b) and El-Hussani (1992).

Table (58): Means±SE of Veterinary management efficiency measures as percentage of variable and total costs for different years and seasons.

Year	Sea	No of Rec.	% of Drug costs to		% of Vaccine costs to		% of Disinfectant costs to	
			Variable costs	Total costs	Variable costs	Total costs	Variable costs	Total costs
1985	Win	203	5.7 ± 0.174^{A}	3.94 ± 0.102^{B}	0.78 ± 0.020^{B}	0.54 ± 0.01^{CD}	0.41 ± 0.021^{L}	0.28 ± 0.01^{L}
1985	Sum	203	3.7 ± 0.118^{D}	2.79 ± 0.082^{G}	0.6 ± 0.0083^{EF}	0.46 ± 0.005^{I}	0.54 ± 0.051^{C}	0.40 ± 0.03^{F}
1986	Win	215	4.8 ± 0.097^{AB}	3.76 ± 0.068^{CD}	0.60 ± 0.010^{EF}	0.52 ± 0.009^{D}	0.41 ± 0.012^{L}	0.31 ± 0.01^{K}
1986	Sum	215	3.5 ± 0.085^{D}	2.84 ± 0.060^{G}	0.56 ± 0.004^{F}	0.45 ± 0.003^{E}	0.50 ± 0.021^{E}	0.40 ± 0.01^{F}
1987	Win	181	4.9 ± 0.118^{AB}	4.16 ± 0.103^{A}	0.67 ± 0.009^{CD}	0.56 ± 0.01^{CD}	0.44 ± 0.015^{I}	0.37 ± 0.01^{G}
1987	Sum	181	4.3 ± 0.136^{B}	3.57 ± 0.101^{D}	0.64 ± 0.0081^{D}	0.53 ± 0.009^{D}	0.61 ± 0.025^{A}	0.51 ± 0.02^{A}
1988	Win	180	4.9 ± 0.108^{AB}	4.21 ± 0.098^{A}	0.65 ± 0.009^{D}	0.55 ± 0.01^{CD}	0.43 ± 0.011^{J}	0.37 ± 0.01^{G}
1988	Sum	180	3.8 ± 0.088^{D}	3.18 ± 0.063^{F}	0.60 ± 0.007^{EF}	0.51 ± 0.005^{D}	0.56 ± 0.16^{B}	0.47 ± 0.01^{B}
1989	Win	141	4.0 ± 0.083^{BC}	3.55 ± 0.074^{D}	0.60 ± 0.006^{EF}	0.53 ± 0.007^{D}	0.42 ± 0.015^{K}	0.37 ± 0.01^{G}
1989	Sum	141	3.5 ± 0.129^{D}	3.01 ± 0.103^{F}	0.57 ± 0.0092^{F}	0.49 ± 0.01^{DE}	0.48 ± 0.014^{F}	0.42 ± 0.01^{E}
1990	Win	138	3.9 ± 0.124^{C}	3.55 ± 0.107^{D}	0.53 ± 0.0054^{G}	0.47 ± 0.005^{E}	0.38 ± 0.014^{D}	0.34 ± 0.01^{I}
1990	Sum	138	3.03 ± 0.10^{E}	2.65 ± 0.081^{G}	0.51 ± 0.011^{G}	0.45 ± 0.009^{E}	0.45 ± 0.017^{H}	0.40 ± 0.03^{F}
1991	Win	130	3.01 ± 0.12^{E}	2.73 ± 0.106^{G}	0.40 ± 0.0073^{H}	0.37 ± 0.005^{G}	0.28 ± 0.010^{Q}	0.26 ± 0.01^{M}
1991	Sum	130	2.30 ± 0.07^{G}	2.06 ± 0.064^{I}	0.39 ± 0.010^{H}	0.35 ± 0.008^{G}	0.25 ± 0.015^{R}	0.22 ± 0.01^{O}
1992	Win	99	2.70 ± 0.14^{F}	2.48 ± 0.124^{H}	0.50 ± 0.018^{G}	0.46 ± 0.016^{F}	0.23 ± 0.014^{S}	0.21 ± 0.01^{P}
1992	Sum	99	2.09 ± 0.08^{H}	1.93 ± 0.070^{IJ}	0.45 ± 0.009^{HG}	0.42 ± 0.008^{F}	0.23 ± 0.019^{S}	0.21 ± 0.01^{P}
1993	Win	90	3.03 ± 0.34^{E}	2.41 ± 0.150^{H}	0.58 ± 0.0511^{F}	0.51 ± 0.043^{D}	0.34 ± 0.049^{P}	0.25 ± 0.02^{N}
1993	Sum	90	1.76 ± 0.10^{I}	1.63 ± 0.088^{J}	0.43 ± 0.020^{HG}	0.40 ± 0.01^{F}	0.28 ± 0.041^{Q}	0.25 ± 0.03^{N}
1994	Win	111	3.97 ± 0.33^{C}	3.23 ± 0.221^{F}	0.71 ± 0.049^{BC}	0.62 ± 0.042^{B}	0.41 ± 0.041^{L}	0.32 ± 0.02^{J}
1994	Sum	111	3.09 ± 0.31^{E}	2.67 ± 0.236^{G}	0.71 ± 0.053^{BC}	0.62 ± 0.041^{B}	0.46 ± 0.036^{G}	0.40 ± 0.03^{F}
1995	Win	349	4.00 ± 0.16^{BC}	3.42 ± 0.131^{DE}	0.96 ± 0.021^{A}	0.82 ± 0.021^{A}	0.52 ± 0.019^{D}	0.44 ± 0.01^{D}
1995	Sum	349	1.96 ± 0.08^{I}	1.76 ± 0.074^{J}	0.71 ± 0.022^{BC}	0.64 ± 0.017^{B}	0.50 ± 0.018^{E}	0.45 ± 0.01^{C}
1996	Win	100	2.97 ± 0.01^{F}	2.55 ± 0.0154^{G}	0.93 ± 0.034^{A}	0.80 ± 0.03^{A}	0.40 ± 0.029^{M}	0.35 ± 0.02^{H}
1996	Sum	100	2.51 ± 0.01^{G}	2.28 ± 0.0118^{I}	0.56 ± 0.018^{F}	0.51 ± 0.016^{D}	0.39 ± 0.037^{N}	0.35 ± 0.03^{H}
Total Mean	Win	1937	3.99 ± 0.15	3.33 ± 0.108	0.65 ± 0.020	0.56 ± 0.017	0.38 ± 0.021	0.32 ± 0.01
	Sum	1937	2.96 ± 0.10	2.53 ± 0.086	0.56 ± 0.015	0.48 ± 0.011	0.43 ± 0.03	0.37 ± 0.01

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (59): Means±SE of Veterinary management efficiency measures as percentage of variable and total costs for different years and seasons.

Year	Sea	No of Rec.	% Veterinarian visits costs to		% Total veterinary management costs to	
			Variable costs	Total costs	Variable costs	Total costs
1985	Win	203	2.02 ± 0.04^{A}	1.41 ± 0.019^{G}	8.94 ± 0.23^{A}	6.19 ± 0.119^{C}
1985	Sum	203	1.60 ± 0.0280^{H}	1.21 ± 0.018^{J}	6.48 ± 0.137^{I}	4.87 ± 0.086^{M}
1986	Win	215	1.83 ± 0.012^{C}	1.44 ± 0.0139^{F}	7.80 ± 0.115^{D}	6.09 ± 0.088^{E}
1986	Sum	215	1.69 ± 0.048^{G}	1.33 ± 0.032^{I}	6.33 ± 0.122^{K}	5.04 ± 0.077^{L}
1987	Win	181	1.82 ± 0.011^{D}	1.53 ± 0.010^{B}	7.90 ± 0.118^{B}	6.64 ± 0.105^{B}
1987	Sum	181	1.83 ± 0.046^{C}	1.51 ± 0.031^{D}	7.41 ± 0.176^{E}	6.14 ± 0.123^{D}
1988	Win	180	1.82 ± 0.018^{D}	1.54 ± 0.016^{A}	7.87 ± 0.105^{C}	6.69 ± 0.101^{A}
1988	Sum	180	1.86 ± 0.061^{B}	1.52 ± 0.043^{C}	6.87 ± 0.149^{F}	5.69 ± 0.101^{H}
1989	Win	141	1.72 ± 0.012^{F}	1.51 ± 0.010^{D}	6.80 ± 0.082^{G}	5.98 ± 0.07^{F}
1989	Sum	141	1.74 ± 0.058^{E}	1.49 ± 0.042^{E}	6.32 ± 0.184^{L}	5.44 ± 0.139^{J}
1990	Win	138	1.49 ± 0.026^{J}	1.33 ± 0.021^{I}	6.39 ± 0.136^{J}	5.70 ± 0.114^{G}
1990	Sum	138	1.54 ± 0.06^{I}	1.34 ± 0.048^{H}	5.55 ± 0.173^{N}	4.86 ± 0.134^{N}
1991	Win	130	1.19 ± 0.035^{L}	1.08 ± 0.028^{K}	4.90 ± 0.140^{R}	4.44 ± 0.125^{Q}
1991	Sum	130	1.20 ± 0.055^{K}	1.07 ± 0.045^{L}	4.14 ± 0.141^{T}	3.72 ± 0.116^{T}
1992	Win	99	1.07 ± 0.038^{P}	0.98 ± 0.032^{M}	4.50 ± 0.179^{S}	4.15 ± 0.145^{R}
1992	Sum	99	1.05 ± 0.047^{Q}	0.96 ± 0.041^{O}	3.83 ± 0.128^{W}	3.54 ± 0.106^{W}
1993	Win	90	0.98 ± 0.072^{R}	0.86 ± 0.060^{R}	4.95 ± 0.420^{Q}	4.04 ± 0.225^{S}
1993	Sum	90	0.83 ± 0.048^{T}	0.77 ± 0.042^{T}	3.39 ± 0.20^{X}	3.13 ± 0.164^{X}
1994	Win	111	1.08 ± 0.071^{O}	0.94 ± 0.060^{Q}	6.18 ± 0.39^{M}	5.13 ± 0.28^{K}
1994	Sum	111	1.11 ± 0.089^{M}	0.97 ± 0.060^{N}	5.44 ± 0.44^{O}	4.73 ± 0.32^{Q}
1995	Win	349	1.09 ± 0.039^{N}	0.95 ± 0.032^{P}	6.59 ± 0.201^{H}	5.64 ± 0.161^{I}
1995	Sum	349	0.82 ± 0.026^{U}	0.74 ± 0.023^{U}	4.01 ± 0.120^{V}	3.61 ± 0.100^{V}
1996	Win	100	0.92 ± 0.04^{S}	0.79 ± 0.03^{S}	5.24 ± 0.24^{P}	4.50 ± 0.21^{P}
1996	Sum	100	0.57 ± 0.02^{V}	0.51 ± 0.02^{V}	4.05 ± 0.17^{U}	3.67 ± 0.15^{U}
Total Mean	Win	1937	1.41 ± 0.034	1.19 ± 0.027	6.50 ± 0.19	5.43 ± 0.145
	Sum	1937	1.32 ± 0.048	1.11 ± 0.037	5.31 ± 0.178	4.53 ± 0.134

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

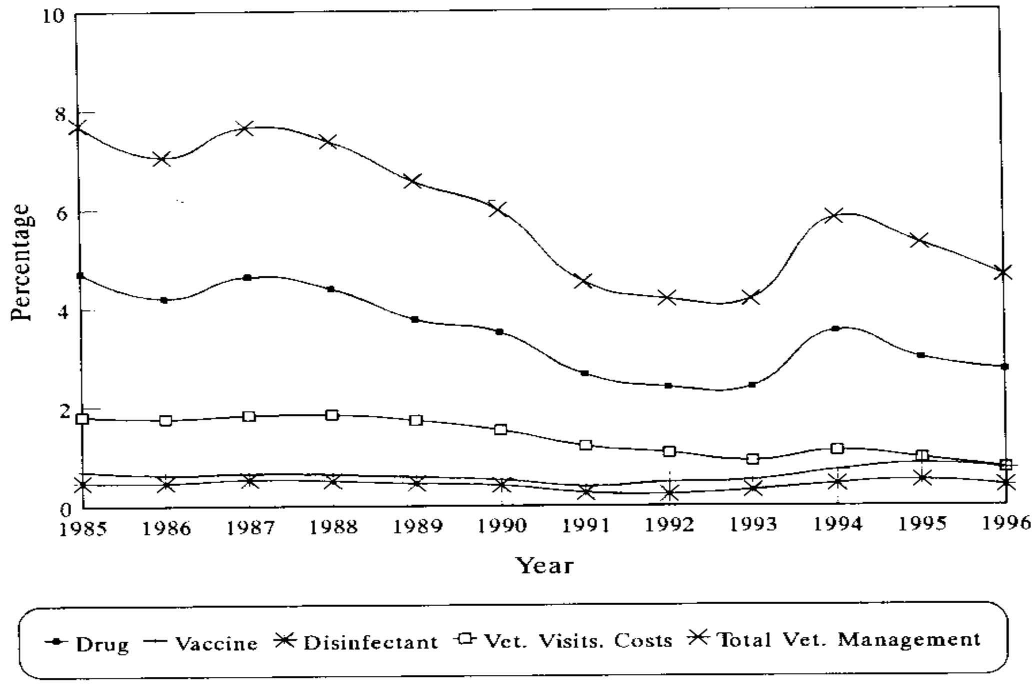

Fig. (6): Year effect on percentage of veterinary management patterns to variable costs.

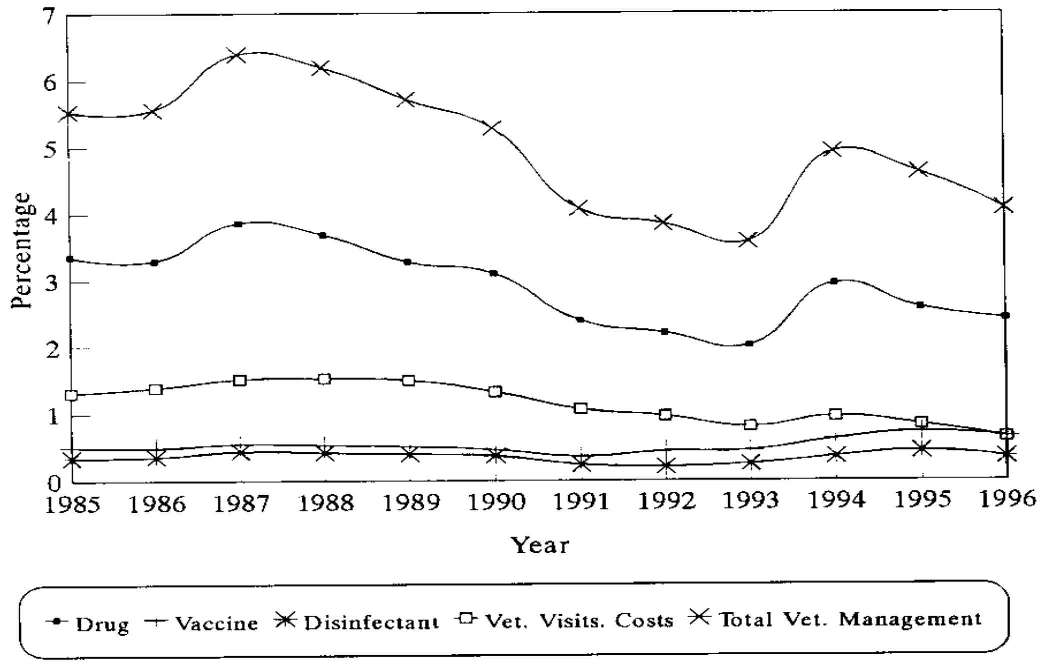

Fig. (7): Year effect on percentage of veterinary management patterns to total costs.

XII-b. Locality and season effect on the efficiency measures of the veterinary management:

-Drugs:

XII-b.1. Drug costs to variable costs:

The highest percentage of drug costs to variable costs were for Winter seasons of El-Monofia, El-Garbia and Kafr-El-shaikh (10.93, 4.45 and 3.98%, respectively). The lowest ones were (3.53, 3.19, 2.92 and 0.66%) in Winter, Summer, Summer and Summer seasons of Behaira, Kafr-El-shaikh, El-Garbia and Alexandria, respectively.

XII-b.2. Drug costs to total costs

Top percentages of drug costs to total costs were 10.73, 3.61 and 3.43% in Winter seasons of El-Monofia, El-Garbia and Kafr-El-shaikh, respectively. The lowest percentage were 2.49, 0.60 and 1.71% in Summer seasons of El-Garbia, Alexandria and Behaira, respectively.

-Vaccine:

XII-b.3. Vaccine costs to variable costs:

Vaccine costs to variable costs differed from locality and season to another. It were 1.01, 0.94 and 0.79% in Winter seasons of El-Monofia, Behaira and Alexandria, respectively. Minimum values were 0.13, 0.68 and 0.50% in Winter, Winter and Summer seasons of Alexandria, El-Garbia and El-Garbia, respectively.

XII-b.4. Vaccine costs to total costs:

Percentages of vaccine costs to total costs were superior in Winter seasons of Kafr-El-shaikh, Behaira and El-Monofia as their percentage (0.60, 0.79 and 0.30%, respectively). The smallest percentages were 0.56, 0.56, 0.43 and 0.12%for Summer seasons of Kafr-El-shaikh, El-Monofia, El-Garbia and Alexandria, respectively.

-Disinfectants:

XII-b.5. Disinfectant costs to variable costs:

Percentage of disinfectant costs to variable costs were the top in Winter, Summer and Winter seasons as their percentage (1.94, 1.20 and 0.92%) for El-Monofia, El-Monofia and Alexandria, respectively. And the lower values were 0.36, 0.39 and 0.48% in Winter, Summer and Summer seasons of Kafr-El-shaikh, Alexandria and Behaira, respectively.

XII-b.6. Disinfectant costs to total costs:

Maximum percentages of disinfectant costs to total costs were in Summer, Winter and Winter seasons of El-Monofia, Alexandria and Behaira (1.01, 0.58 and 0.45%, respectively). Meanwhile, the lowest ones were 0.35, 0.31 and 0.23% in Summer, Winter and Winter seasons of Alexandria, Kafr-El-shaikh and El-Monofia, respectively.

- Veterinarian visits:

XII-b.7. Veterinarian visits costs to variable costs:

Percentages of veterinarian visits costs related to variable costs were 1.59, 1.58 and 1.55% in Winter, Summer and Winter seasons of El-Grabia, Kafr-El-shaikh and Alexandria, respectively. Lowest ones were 1.16, 0.92, 0.84 and 0.57% in Summer, Summer, Winter and Summer seasons of El-Garbia, El-Monofia, Behaira and Alexandria, respectively.

XII-b.8. Veterinarian visits costs to total costs:

The highest percentages of veterinarian visits costs to total costs were 1.3, 1.29 and 1.21% in Summer, Winter and Winter seasons of Kafr-El-shaikh, El-Garbia and Kafr-El-shaikh, respectively. The smallest percentages were 0.52, 0.48 and 0.63% in Summer, Winter and Summer seasons of Behaira, El-Monofia and Alexandria, respectively.

-Total veterinary management:

XII-b.9. Total veterinary management costs to variable costs.

The total veterinary management costs to variable costs represented the top values in Winter, Summer and Winter seasons of El-Monofia, El-Monofia and El-Garbia. They were 15.06, 8.42 and 7.19%, respectively. Meanwhile, the lower values were 5.03, 3.63 and 1.76% in Summer seasons of El-Garbia, Behaira and Alexandria, respectively.

XII-b.10. Total veterinary management costs to total costs:

The highest percentages of total veterinary management costs to total costs were 7.28, 5.84 and 5.56% in Summer, Winter and Winter seasons of El-Monofia, El-Garbia and Kafr-El-shaikh, respectively. The smallest percentages in Summer, Winter and Summer seasons of Behaira, El-Monofia and Alexandria, respectively, were found to have 3.25, 2.10 and 1.60%.

Table (60): Means±SE of Veterinary management efficiency measures as percentage of variable and total costs for different localities and seasons.

Locality	Sea	No of Rec.	% Drug costs to		% Vaccine costs to		% Disinfectant costs to	
			Variable costs	Total costs	Variable costs	Total costs	Variable costs	Total costs
Behaira	Win	66	3.53 ± 0.27^{E}	2.79 ± 0.221^{E}	0.94 ± 0.05^{B}	0.79 ± 0.045^{A}	0.55 ± 0.038^{D}	0.45 ± 0.03^{C}
	Sum	66	1.91 ± 0.18^{H}	1.71 ± 0.144^{I}	0.64 ± 0.05^{H}	0.58 ± 0.042^{D}	0.48 ± 0.040^{F}	0.43 ± 0.03^{D}
Alexandria	Win	4	3.64 ± 2.41^{D}	2.75 ± 2.65^{F}	0.79 ± 0.64^{C}	0.67 ± 0.66^{B}	0.92 ± 0.445^{C}	0.58 ± 0.54^{B}
	Sum	4	0.66 ± 0.13^{I}	0.60 ± 0.135^{J}	0.13 ± 0.05^{J}	0.12 ± 0.055^{H}	0.39 ± 0.034^{I}	0.35 ± 0.02^{H}
Kafr El-shaikh	Win	964	3.98 ± 0.07^{C}	3.43 ± 0.066^{C}	0.70 ± 0.013^{D}	0.60 ± 0.011^{C}	0.36 ± 0.009^{J}	0.31 ± 0.01^{I}
	Sum	964	3.19 ± 0.06^{F}	2.64 ± 0.052^{G}	0.66 ± 0.010^{G}	0.56 ± 0.008^{E}	0.50 ± 0.01^{E}	0.41 ± 0.01^{E}
El-Garbia	Win	894	4.45 ± 0.06^{B}	3.61 ± 0.039^{B}	0.68 ± 0.02^{E}	0.56 ± 0.01^{E}	0.44 ± 0.005^{G}	0.36 ± 0.01^{G}
	Sum	894	2.92 ± 0.04^{G}	2.49 ± 0.032^{H}	0.50 ± 0.01^{I}	0.43 ± 0.009^{F}	0.43 ± 0.007^{H}	0.37 ± 0.02^{F}
El-Monofia	Win	9	10.9 ± 0.39^{A}	10.73 ± 0.17^{A}	1.01 ± 0.236^{A}	0.30 ± 0.113^{G}	1.94 ± 0.49^{A}	0.23 ± 0.03^{J}
	Sum	9	3.64 ± 1.05^{D}	3.03 ± 0.84^{D}	0.67 ± 0.166^{F}	0.56 ± 0.13^{E}	1.20 ± 0.36^{B}	1.01 ± 0.30^{A}
Total Mean	Win	1937	5.30 ± 0.64	4.66 ± 0.62	0.82 ± 0.19	0.58 ± 0.16	0.842 ± 0.19	0.38 ± 0.12
	Sum	1937	2.46 ± 0.29	2.09 ± 0.24	0.52 ± 0.057	0.45 ± 0.04	0.60 ± 0.16	0.51 ± 0.07

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).

Table (61): Means±SE of Veterinary management efficiency measures as percentage of variable and total costs for different localities and seasons.

Locality	Season	No of Rec.	% Veterinarian visits costs to		% total veterinary management costs to	
			Variable costs	Total costs	Variable costs	Total costs
Behaira	Winter	66	0.87 ± 0.066^{H}	0.75 ± 0.057^{F}	5.90 ± 0.32^{G}	4.79 ± 0.29^{E}
	Summer	66	0.57 ± 0.059^{I}	0.52 ± 0.051^{H}	3.63 ± 0.26^{I}	3.25 ± 0.21^{H}
Alexandria	Winter	4	1.55 ± 0.31^{C}	0.63 ± 0.53^{G}	6.91 ± 3.75^{D}	4.65 ± 4.4^{F}
	Summer	4	0.57 ± 0.14^{I}	0.50 ± 0.115^{I}	1.76 ± 0.18^{J}	1.60 ± 0.16^{J}
Kafr El shaikh	Winter	964	1.41 ± 0.020^{D}	1.21 ± 0.016^{C}	6.47 ± 0.093^{E}	5.56 ± 0.07^{C}
	Summer	964	1.58 ± 0.030^{B}	1.30 ± 0.022^{A}	5.94 ± 0.098^{F}	4.95 ± 0.07^{D}
El-Garbia	Winter	894	1.59 ± 0.019^{A}	1.29 ± 0.011^{B}	7.19 ± 0.08^{C}	5.84 ± 0.05^{B}
	Summer	894	1.16 ± 0.011^{F}	1.00 ± 0.0086^{D}	5.03 ± 0.05^{H}	4.31 ± 0.04^{G}
El-Monofia	Winter	9	1.17 ± 0.24^{E}	0.48 ± 0.073^{J}	15.06 ± 3.93^{A}	2.10 ± 0.34^{I}
	Summer	9	0.92 ± 0.24^{G}	0.84 ± 0.086^{E}	8.42 ± 1.82^{B}	7.28 ± 1.65^{A}
Total Mean	Winter	1937	1.31 ± 0.131	0.872 ± 0.13	8.30 ± 1.63	4.58 ± 0.426
	Summer	1937	0.96 ± 0.052	0.83 ± 0.056	4.95 ± 0.48	4.27 ± 0.426

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).

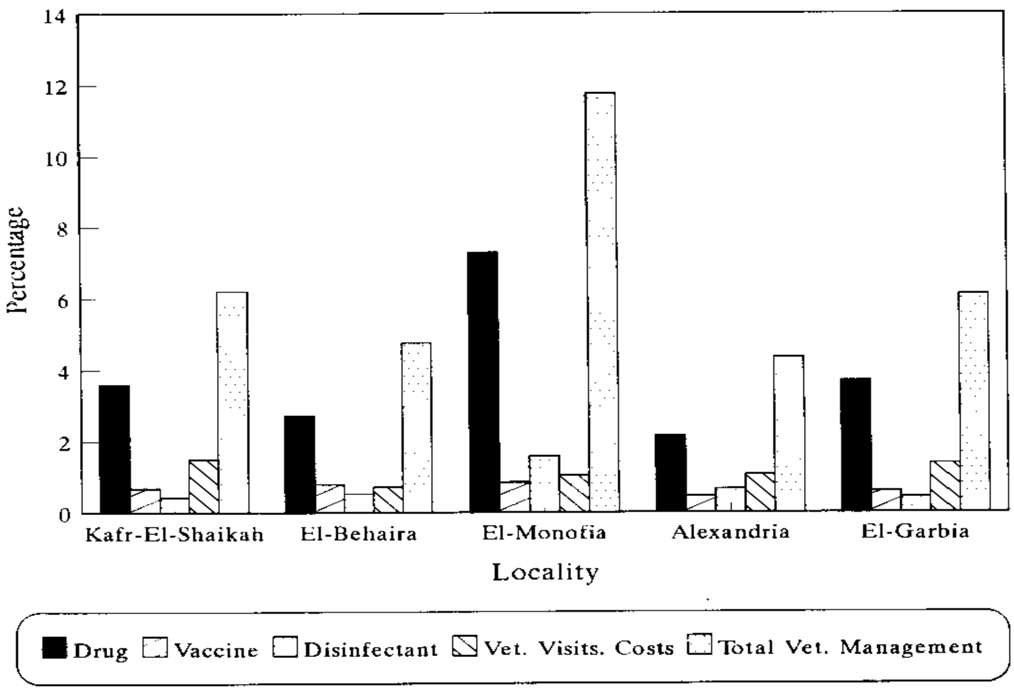

Fig. (8): Locality effect on percentage of veterinary management patterns to variable costs.

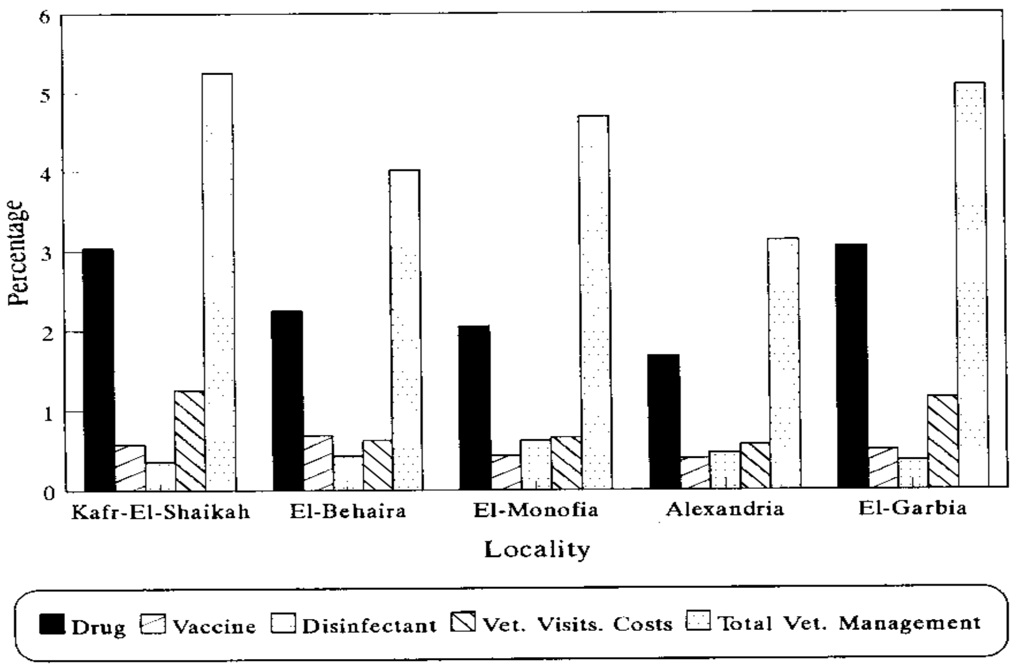

Fig.(9): Locality effect on percentage of veterinary management patterns to total costs.

XII-c. Breed and season effect on the efficiency measures of veterinary management:

- Drugs:

XII-c.1. Drug costs to variable costs:

The topmost percentages of drug costs to variable costs, were 20.27, 5.61 and 5.35% in Winter, Summer and Winter seasons of Charolais X Friesian, Charolais X Friesian and H.F. The smallest values were 2.61, 2.38 and 1.64% in Winter, Summer and Summer seasons of Buffalo, Friesian X Balady and Buffalo, respectively.

XII-c.2. Drug costs to total costs:

The supermost percentages of drug costs to total costs were 4.38, 3.97 and 3.49% in Summer, Winter and Winter seasons of Charolais X Friesian, Balady and Friesian. The minimum ones were 1.85, 1.48, 0.51 and 0.31% in Winter, Summer, Winter and Summer seasons of Charolais X Friesian, Buffalo, H.F and H.F, respectively.

- Vaccines:

XII-c.3. Vaccine costs to variable costs:

Vaccine costs to variable costs percentages were 1.43, 1.05 and 0.98% in Winter seasons of Charolais X Friesian, Balady and Balady X Friesian, respectively. The lowest values were 0.55, 0.53, 0.48 and 0.44% in Summer, Summer, Winter and Winter seasons of Friesian, H.F, H.F and Charolais, respectively.

XII-c.4. Vaccine costs to total costs:

The vaccine costs to total costs had top percentages i.e 0.90, 0.86 and 0.75% in Winter, Winter and Summer seasons of Balady, Friesian X Balady and Charolais X Friesian, respectively. Meanwhile, the lowest percentages were 0.38, 0.27 and 0.04% in Winter seasons of Charolais,Charolais X Friesian and H.F, respectively.

- Disinfectant:

XII-c.5. Disinfectant costs to variable costs:

The peak percentages of disinfectant costs to variable costs were 3.52, 1.80 and 1.60% in Winter, Summer and Winter seasons of H.F, H.F and Charolais X Friesian, respectively. The lowest percentages were 0.46, 0.44, 0.38 and 0.17% in Summer, Winter, Winter and Winter seasons of Friesian, Buffalo, Friesian and Charolais, respectively.

XII-c.6. Disinfectant costs to total costs:

Disinfectant costs to total costs were 1.6, 1 and 0.44% in Summer, Summer and Winter seasons of H.F, Charolais X Friesian and Balady, respectively. Other lowest percentages were 0.33, 0.32, 0.10 and 0.15% in Winter seasons of H.F, Friesian, Charolais X Friesian and Charolais, respectively.

- Veterinarian visits:

XII-c.7. Veterinarian visits costs to variable costs:

The higher percentages of veterinarian visits costs to variable costs were in Summer, Summer, Summer, Winter and Winter seasons of Charolais, H.F, Charolais and H.F and they were 2.42, 1.82, 1.73 and 1.71%, respectively. The lowest ones were 0.91, 0.71, 0.29 and 0.21% in Summer, Summer, Winter and Summer seasons of Balady, Buffalo, Charolais X Friesian and Charolais X Friesian, respectively.

XII-c.8. Veterinarian visits costs to total costs:

Top percentages of veterinarian visits costs to total costs were in Summer, Summer and Winter seasons of Charolais, H.F and Charolais and equal to 1.98, 1.96 and 1.5%, respectively. The lowest percentages were 0.64, 0.18, 0.16 and 0.14% for Summer, Summer, Winter and Winter seasons of Buffalo, Charolais X Friesian, H.F and Charolais X Friesian, respectively

- Total veterinary management:

XII-c.9. Total veterinary management costs to variable costs:

The Total veterinary management costs to variable costs had the topmost percentages (23.6, 13.37 and 11.08%) for Charolais X Friesian, H.F and H.F in Winter, Summer and Winter seasons, respectively. Meanwhile the lower percentage were 4.84, 4.76, 4.60 and 3.42% in Summer, Winter, Summer and Summer seasons, respectively in Balady, Buffalo, Friesian X Balady and Buffalo, respectively.

XII-c.10. Total veterinary management costs to total costs:

The maximum percentages of total veterinary management costs to total costs were 12.39, 6.40 and 6.32% in Summer, Winter and Summer seasons of H.F, Balady and Charolais X Friesian, respectively. But the lowest percentages were 4.08, 3.09, 2.46 and 1.05% in Summer, Summer, Winter and Winter seasons of Friesian X Balady, Buffalo Charolais X Friesian and H.F, respectively.

Table (62): Means±SE of Veterinary management efficiency measures as percentage of variable and total costs for different breeds and seasons.

Breed	Sea	No of Rec.	% Drug costs to		% Vaccine costs to		% Disinfectant costs to	
			Variable costs	Total costs	Variable costs	Total costs	Variable costs	Total costs
Balady	Win	229	4.61 ± 0.21^{D}	3.97 ± 0.185^{B}	1.05 ± 0.037^{B}	0.90 ± 0.029^{A}	0.52 ± 0.02^{E}	0.44 ± 0.01^{C}
Balady	Sum	229	2.70 ± 0.16^{J}	2.36 ± 0.130^{H}	0.73 ± 0.023^{G}	0.64 ± 0.018^{F}	0.48 ± 0.02^{G}	0.43 ± 0.01^{D}
Friesian	Win	1502	4.24 ± 0.05^{E}	3.49 ± 0.037^{C}	0.63 ± 0.006^{H}	0.52 ± 0.005^{G}	0.38 ± 0.01^{J}	0.32 ± 0.04^{I}
Friesian	Sum	1502	3.17 ± 0.04^{I}	2.65 ± 0.031^{G}	0.55 ± 0.004^{K}	0.47 ± 0.038^{J}	0.46 ± 0.01^{H}	0.38 ± 0.01^{G}
CharXFr	Win	4	20.27 ± 6.2^{A}	1.85 ± 0.225^{K}	1.43 ± 0.445^{A}	0.27 ± 0.16^{L}	1.60 ± 0.54^{C}	0.19 ± 0.06^{J}
CharXFr	Sum	4	5.61 ± 1.71^{B}	4.38 ± 1.335^{A}	0.92 ± 0.335^{D}	0.75 ± 0.27^{C}	1.27 ± 0.42^{D}	1.00 ± 0.33^{B}
BalXFr	Win	86	3.83 ± 0.24^{G}	3.37 ± 0.214^{E}	0.98 ± 0.058^{C}	0.86 ± 0.031^{B}	0.49 ± 0.02^{F}	0.43 ± 0.02^{D}
BalXFr	Sum	86	2.38 ± 0.20^{L}	2.11 ± 0.16^{J}	0.82 ± 0.058^{E}	0.72 ± 0.043^{D}	0.48 ± 0.03^{G}	0.42 ± 0.02^{E}
Charolais	Win	19	3.90 ± 0.19^{F}	3.39 ± 0.158^{D}	44 ± 0.015^{N}	0.38 ± 0.013^{K}	0.17 ± 0.09^{R}	0.15 ± 0.01^{K}
Charolais	Sum	19	3.90 ± 0.33^{F}	3.20 ± 0.256^{F}	0.62 ± 0.029^{I}	0.51 ± 0.022^{H}	0.49 ± 0.03^{F}	0.40 ± 0.02^{F}
H.F	Win	3	5.35 ± 1.26^{C}	0.51 ± 0.132^{M}	0.48 ± 0.150^{M}	0.04 ± 0.011^{M}	3.52 ± 0.14^{A}	0.33 ± 0.01^{H}
H.F	Sum	3	3.30 ± 1.05^{H}	0.31 ± 0.513^{N}	0.53 ± 0.19^{L}	0.18 ± 0.161^{I}	1.80 ± 0.83^{B}	1.60 ± 0.69^{A}
Buffalo	Win	94	2.61 ± 0.13^{K}	2.31 ± 0.121^{I}	0.77 ± 0.031^{F}	0.68 ± 0.026^{E}	0.44 ± 0.02^{J}	0.38 ± 0.02^{G}
Buffalo	Sum	94	1.64 ± 0.13^{K}	1.48 ± 0.091^{L}	0.58 ± 0.030^{J}	0.52 ± 0.025^{G}	0.48 ± 0.03^{G}	0.43 ± 0.02^{D}
Total	Win	1937	6.40 ± 1.18	2.69 ± 0.152	0.82 ± 0.12	0.52 ± 0.039	1.01 ± 0.12	0.32 ± 0.024
Mean	Sum	1937	3.24 ± 0.51	2.35 ± 0.359	0.67 ± 0.095	0.54 ± 0.095	0.78 ± 0.19	0.66 ± 0.15

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (63): Means$\pm$SE of Veterinary management efficiency measures as percentage of variable and total costs for different breeds and seasons.

Breed	Season	No of rec.	% Veterinarian visits costs to		% total veterinary management costs to	
			Variable costs	Total costs	Variable costs	Total costs
Balady	Winter	229	1.26 ± 0.061^{G}	1.07 ± 0.049^{F}	7.40 ± 0.49^{F}	6.40 ± 0.213^{B}
Balady	Summer	229	0.91 ± 0.047^{K}	0.80 ± 0.036^{J}	4.84 ± 0.20^{K}	4.24 ± 0.155^{I}
Friesian	Winter	1502	1.56 ± 0.013^{E}	1.29 ± 0.0095^{D}	6.84 ± 0.067^{G}	5.65 ± 0.048^{E}
Friesian	Summer	1502	1.47 ± 0.01^{F}	1.23 ± 0.013^{E}	5.66 ± 0.062^{J}	4.74 ± 0.045^{M}
CharXFr	Winter	4	0.29 ± 0.095^{M}	0.14 ± 0.125^{N}	23.60 ± 6.58^{A}	2.46 ± 0.56^{M}
CharXFr	Summer	4	0.21 ± 0.101^{N}	0.18 ± 0.099^{L}	8.02 ± 2.30^{D}	6.32 ± 1.79^{C}
BalXFr	Winter	86	1.06 ± 0.061^{H}	0.92 ± 0.051^{G}	6.37 ± 0.29^{H}	5.59 ± 0.24^{F}
BalXFr	Summer	86	0.92 ± 0.088^{J}	0.81 ± 0.07^{I}	4.60 ± 0.31^{M}	4.08 ± 0.24^{K}
Charolais	Winter	19	1.73 ± 0.068^{C}	1.50 ± 0.055^{C}	6.26 ± 0.26^{I}	5.45 ± 0.22^{G}
Charolais	Summer	19	2.42 ± 0.135^{A}	1.98 ± 0.094^{A}	7.44 ± 0.48^{E}	6.09 ± 0.36^{D}
H.F	Winter	3	1.71 ± 0.16^{D}	0.16 ± 0.020^{M}	11.08 ± 1.33^{C}	1.05 ± 0.155^{N}
H.F	Summer	3	1.82 ± 0.086^{B}	1.69 ± 0.028^{B}	13.37 ± 1.61^{B}	12.39 ± 1.35^{A}
Buffalo	Winter	94	0.93 ± 0.043^{I}	0.82 ± 0.037^{H}	4.76 ± 0.193^{L}	4.20 ± 0.17^{J}
Buffalo	Summer	94	0.71 ± 0.043^{L}	0.64 ± 0.037^{K}	3.42 ± 0.168^{N}	3.09 ± 0.14^{L}
Total	Winter	1937	1.22 ± 0.065	0.84 ± 0.049	9.47 ± 1.31	4.54 ± 0.22
Mean	Summer	1937	1.20 ± 0.072	1.20 ± 0.072	6.76 ± 0.73	5.85 ± 0.583

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

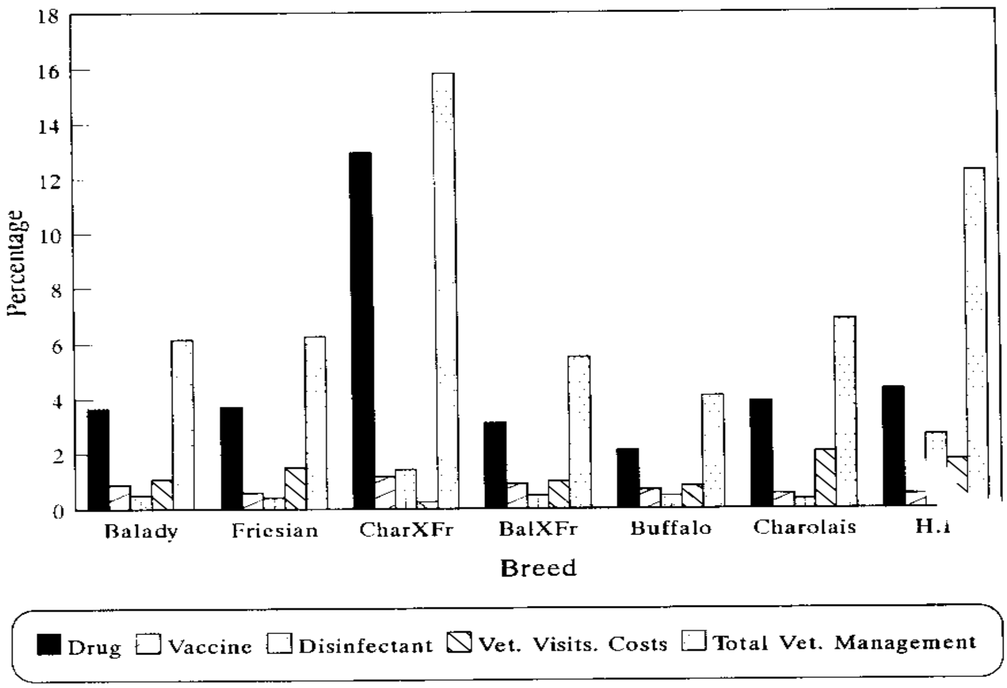

Fig. (10): Breed effect on percentage of veterinary management patterns to variable costs.

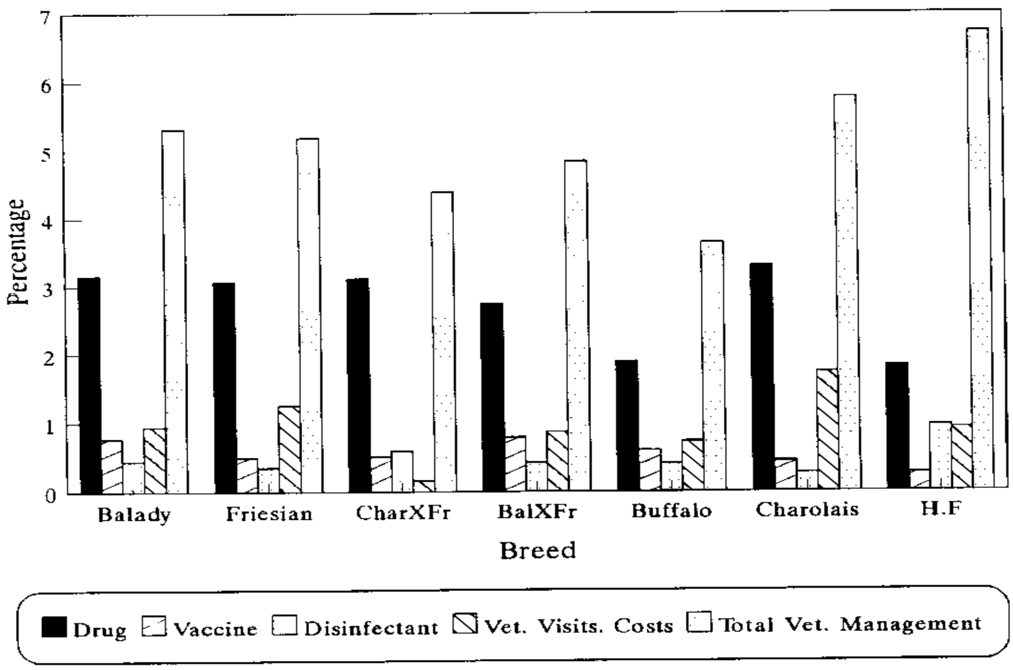

Fig. (11): Breed effect on percentages of veterinary management patterns to total costs.

XII-d. Sector and season effect on the efficiency measures of veterinary management:

- Drugs:

XII-d.1. Drug costs to variable costs:

The sector had significant effect on drug costs to variable costs ($P < 0.01$), while the season within sector had no significant effect ($P < 0.05$). Their percentages were 3.91, 4.28 and 6.89% in Winter seasons of farmers, private and governmental sector, respectively. These percentages constituted the higher percentage. Lower percentages were in Summer seasons (2.33, 3.25 and 1.96%) for farmer, private and governmental sector, respectively.

XII-d.2. Drug costs to total costs:

The sectors and seasons had significant ($P < 0.01$) effect on drug costs to variable costs. Thee highest percentages were 3.4, 3.52 and 2.71% in Winter, Winter and Summer seasons of farmers, private and private sector, respectively. Meanwhile the lowest percentages were 2.06, 1.87 and 1.57% in Summer, Winter and Summer seasons of farmers, governmental and governmental sector, respectively.

- Vaccines:

XII-d.3. Vaccine costs to variable costs:

The sector had a significant effect ($P < 0.01$) on the percentages of vaccine costs to variable costs. The season also affected this variable significantly ($P < 0.05$). The highest percentages were 0.98, 0.74 and 0.99% in Winter, Summer and Winter seasons of farmers, farmers and governmental sectors, respectively. Meanwhile, the lowest percentages were 0.61, 0.54 and 0.57% in Winter, Summer and Summer seasons of private, private and governmental sector, respectively.

XII-d.4. Vaccine costs to total costs:

The sector had a significant effect ($P < 0.01$) on the percentage of vaccine costs to total costs. Also, the season within sector affected this variable significantly ($P < 0.05$). Highest percentages were 0.85, 0.66 and 0.58% in Winter, Summer and Winter seasons of farmers, farmers and governmental sectors, respectively.

The lowest percentages were 0.51, 0.45 and 0.47% in Winter, Summer and Summer seasons of private, private and governmental sector, respectively.

- Disinfectant:

XII-d.5. Disinfectant costs to variable costs:

The sector had a significant effect (P< 0.01). But the effect of season within sector was non significant (P> 0.05). The highest percentages were 0.94, 0.72 and 0.49% in Winter, Summer and Winter seasons of governmental, governmental and farmer sector, respectively. Meanwhile, the lowest percentages were 0.47, 0.38 and 0.46% in Summer, Winter and Summer seasons of farmer, private and private sector, respectively.

XII-d.6. Disinfectant costs to total costs:

The sector had a significant effect (P< 0.01), but the effect of season within the sector was not significant (P> 0.05) on disinfectant costs to total costs. The highest percentages were 0.59, 0.44 ,0.42 and 0.42% in Summer, Winter and Summer, Winter seasons of governmental and farmer sector, respectively. Meanwhile the lowest percentages were 0.31 and 0.39% in Winter and Summer seasons of private sector.

- Veterinarian visits:

XII-d.7. Veterinarian visits costs to variable costs:

The sector had significant effect (P< 0.01) on veterinarian visits costs to variable cost. But the season within the sector was not effect (P> 0.05). Highest percentages were in Winter, Summer and Winter seasons of private, private and farmers sectors, respectively, as their percentages were 1.61, 1.53 and 1.06%. Meanwhile, the lowest percentages were 0.81, 0.91 and 0.47% in Summer, Winter and Summer seasons of farmer and governmental sectors, respectively.

XII-d.8. Veterinarian visits costs to total costs:

The sector had a significant effect (P< 0.01). Also the season within sectors affected (P< 0.05) veterinarian visits costs to total costs. The highest percentages were 1.33, 0.92 and 0.72% in Winter, Winter and Summer seasons of private, farmer and farmer sectors, respectively. Meanwhile, the lowest percentages were 0.72, 0.55 and 0.41% in Summer, Winter and Summer seasons of farmer, governmental and governmental sectors, respectively.

- Total veterinary management:

XII-d.9. Total veterinary management costs to variable costs:

The sector had a significant effect (P< 0.01), while the season within the sector affected at (P< 0.05) total veterinary management costs to variable costs. Highest percentages were

6.46, 6.91 and 9.75% in Winter seasons of farmer, private and governmental sector, respectively. Meanwhile, the lowest percentage were 6.36, 5.80 and 3.74% in Summer seasons of the same sectors, respectively.

XII-d.10. Total veterinary management costs to total costs:

The sector had a significant effect ($P < 0.01$). But the season within the sector had significant effect ($P < 0.05$) on total veterinary management costs to total costs. Highest percentages were 5.61, 5.68 and 4.85% in Winter seasons of farmer and private sectors and Summer season of private sector, respectively. Meanwhile, the lowest percentages were 3.87, 3.46 and 3.06% in Summer, Winter and Summer seasons of farmer, governmental and governmental sectors, respectively.

Table (64): Means±SE of Veterinary management efficiency measures as percentage of variable and total costs for different sectors and seasons.

Sector	Sea	No of Rec.	% Drug costs to		%Vaccine costs to		%Disinfectant costs	
			Variable costs	Total costs	Variable costs	Total costs	Variable costs	Total costs
Farmers	Win	456	3.91 ± 0.129^{C}	3.40 ± 0.110^{B}	0.98 ± 0.019^{B}	0.85 ± 0.01^{A}	0.49 ± 0.01^{C}	0.42 ± 0.01^{C}
Farmers	Sum	456	2.33 ± 0.102^{E}	2.06 ± 0.081^{D}	0.74 ± 0.019^{C}	0.66 ± 0.01^{B}	0.47 ± 0.01^{C}	0.42 ± 0.01^{C}
Private	Win	1465	4.28 ± 0.05^{B}	3.52 ± 0.037^{A}	0.61 ± 0.006^{D}	0.51 ± 0.01^{D}	0.38 ± 0.01^{F}	0.31 ± 0.04^{E}
Private	Sum	1465	3.25 ± 0.041^{D}	2.71 ± 0.030^{C}	0.54 ± 0.004^{F}	0.45 ± 0.01^{F}	0.46 ± 0.01^{E}	0.39 ± 0.07^{D}
Govrnem	Win	16	6.89 ± 2.53^{A}	1.87 ± 0.68^{E}	0.99 ± 0.23^{A}	0.58 ± 0.19^{C}	0.94 ± 0.21^{A}	0.44 ± 0.14^{B}
Govrnem	Sum	16	1.96 ± 0.682^{F}	1.57 ± 0.53^{F}	0.57 ± 0.162^{E}	0.47 ± 0.13^{E}	0.72 ± 0.15^{B}	0.59 ± 0.12^{A}
Total	Win	1937	5.02 ± 0.903	2.93 ± 0.27	0.86 ± 0.085	0.64 ± 0.07	0.60 ± 0.076	0.39 ± 0.06
Mean	Sum	1937	2.51 ± 0.275	2.11 ± 0.213	0.61 ± 0.061	0.52 ± 0.05	0.55 ± 0.05	0.46 ± 0.06

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

Table (65): Means±SE of Veterinary management efficiency measures as percentage of variable and total costs for different sectors and seasons.

Sector	Season	No of Rec.	% Veterinarian visits costs to		%total veterinary management costs to	
			Variable costs	Total costs	Variable costs	Total costs
Farmers	Winter	456	1.06 ± 0.029^{C}	0.92 ± 0.024^{C}	6.46 ± 0.155^{C}	5.61 ± 0.128^{B}
Farmers	Summer	456	0.81 ± 0.029^{E}	0.72 ± 0.022^{D}	6.36 ± 0.138^{E}	3.87 ± 0.1058^{D}
Private	Winter	1465	1.61 ± 0.014^{A}	1.33 ± 0.010^{A}	6.91 ± 0.067^{B}	5.68 ± 0.048^{A}
Private	Summer	1465	1.53 ± 0.018^{B}	1.27 ± 0.013^{B}	5.80 ± 0.061^{D}	4.85 ± 0.0446^{C}
Govrnem	Winter	16	0.91 ± 0.017^{D}	0.55 ± 0.162^{E}	9.75 ± 2.73^{A}	3.46 ± 1.09^{E}
Govrnem	Summer	16	0.47 ± 0.072^{F}	0.41 ± 0.066^{F}	3.74 ± 0.87^{F}	3.06 ± 0.672^{F}
Total	Winter	1937	1.19 ± 0.02	0.93 ± 0.06	7.70 ± 2.65	4.91 ± 0.422
Mean	Summer	1937	0.93 ± 0.039	0.80 ± 0.033	5.30 ± 0.35	3.92 ± 0.27

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

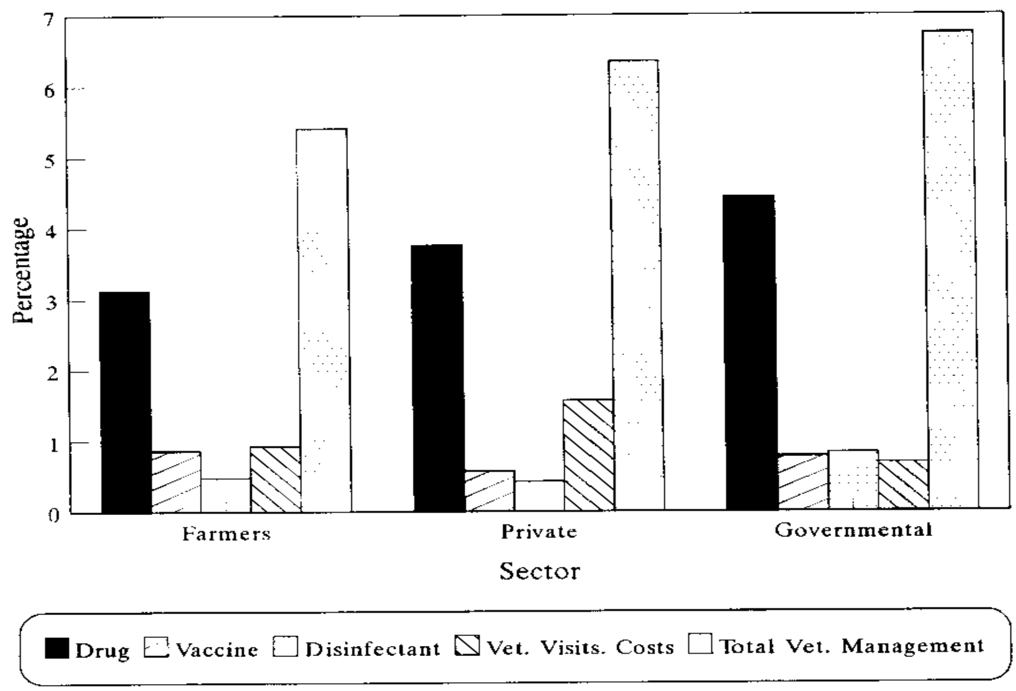

Fig. (12): Sector effect on percentage of veterinary management patterns to variable costs.

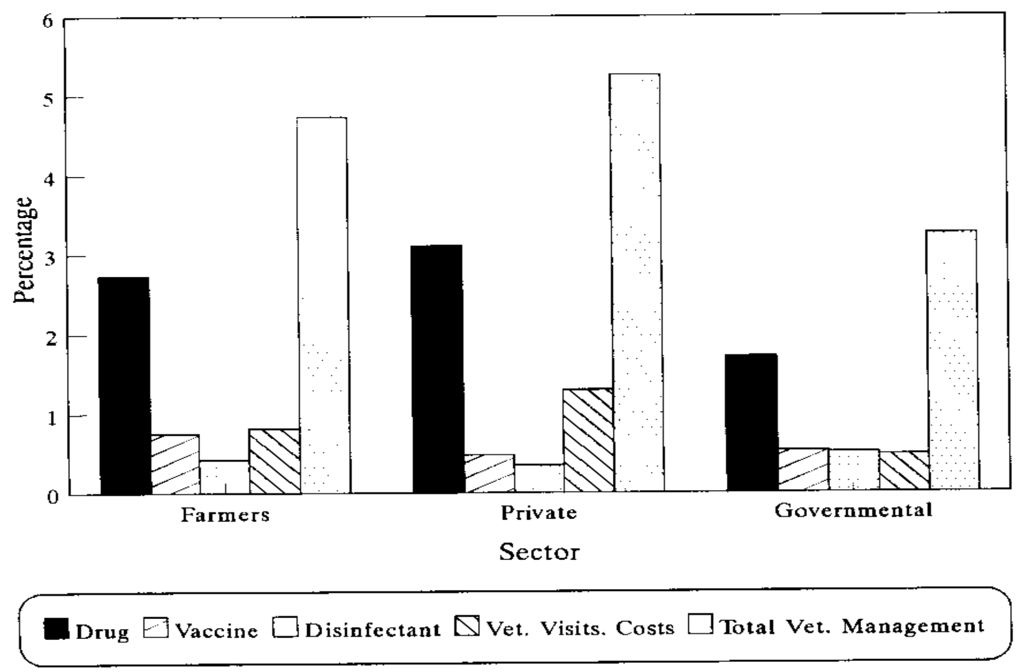

Fig. (13): Sector effect on percentage of veterinary management patterns to total costs.

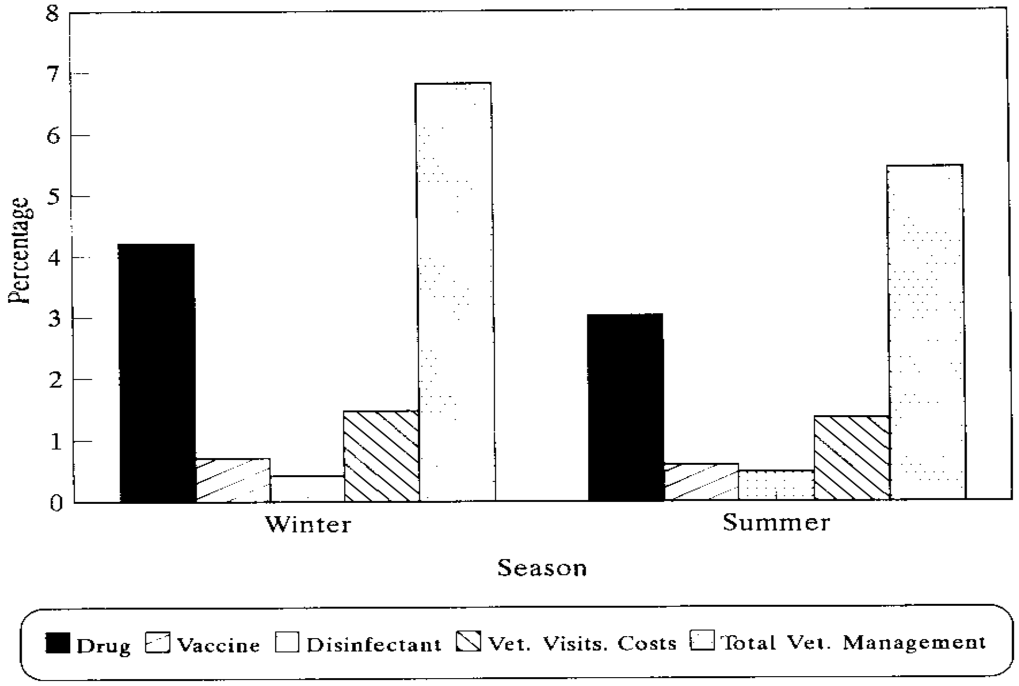

Fig. (14): Season effect on percentage of veterinary management patterns to variable costs.

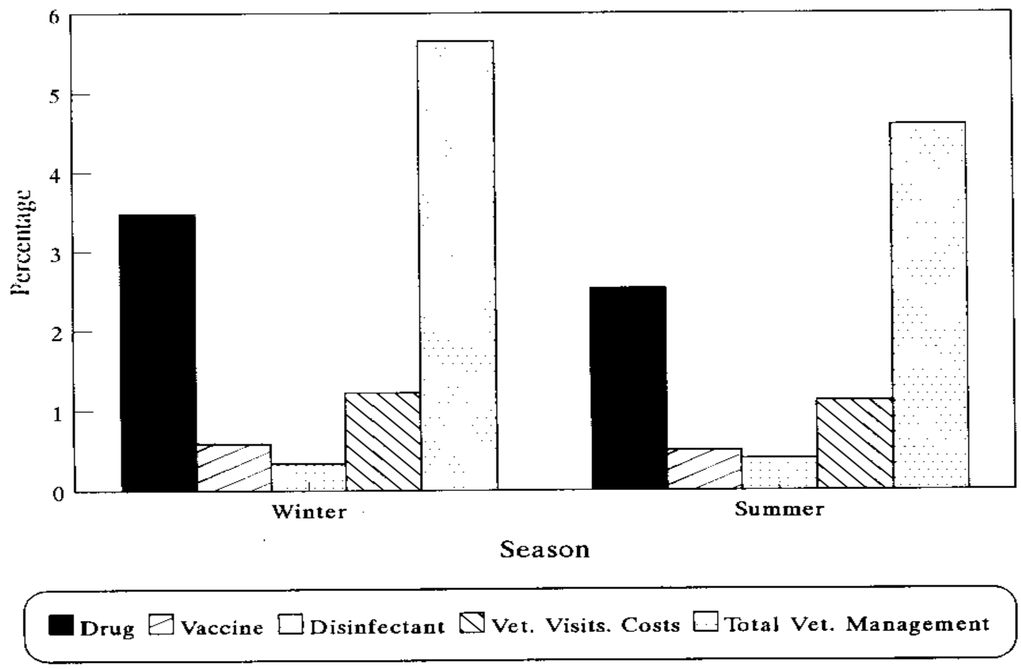

Fig. (15): Season effect on percentage of veterinary management patterns to total costs.

XIII- SHARE OF DRUGS, VACCINES, DISINFECTANTS, VETERINARIAN VISITS AND TOTAL VETERINARY MANAGEMENT COSTS OF A KILOGRAM OF MILK:

Tables (66-69) and Fig. (16-20) show that, the year, season, locality, breed, sector and the season within them had significant ($P < 0.01$) effects on the costs of kilogram of milk from Drugs, Vaccines, Disinfectants, Veterinarian visits and Total veterinary management costs. Season within locality did not affect significantly the costs of a kilogram milk from drugs and vaccine. ($P > 0.05$).

III-1. Year and season effects on:

XIII-1.a. Drug costs of a milk kilogram:

The highest drug costs of a kilogram of milk were 7.72, 5.57 and 5.36 piasters in Winter, Summer and Summer seasons of 1994, 1994 and 1996, respectively. The lowest costs were, 2.06, 1.83, 1.85 and 1.50 piasters in Winter, Winter, Summer and Winter seasons of 1989, 1986, 1985 and 1985, respectively.

XIII-1.b. Vaccine costs of a milk kilogram:

Top vaccine costs of a milk kilogram were 1.36, 1.34 and 1.26 piasters in Winter, Summer and Summer seasons of 1994, 1994 and 1996, respectively. Smallest costs were 0.20, 0.29 and 0.25 piaster in Winter, Summer and Winter seasons of 1985, 1985 and 1986.

XIII-1.c. Disinfectant costs of a milk kilogram:

The higher disinfectant costs of a kilogram milk were 1.01, 0.84 and 0.80 piaster/kg in Summer seasons of 1996, 1995 and 1994, respectively. The lowestr costs were 0.1, 0.15, 0.20, 0.21, 0.20, 0.21, 0.22 and 0.21 piasters/kg in Winter seasons of 1985, 1986, 1987, 1988, 1989, 1990, 1991 and 1992, respectively.

XIII-1.d. Veterinarian visits costs of a milk kilogram:

The veterinarian visits share in the costs of a kilogram of milk were 2.183, 2.189, 1.55 and 1.51 piasters/kg in Winter, Summer, Summer and Summer seasons of 1994, 1994, 1992 and 1991, respectively. Meanwhile, the lowest values were 0.53, 0.76, 0.70 and 0.82 piasters in Winter, Summer, Winter and Winter seasons of 1985, 1985, 1986 and 1987, respectively.

XIII-1.e. Total veterinary management costs of a milk kilogram:

Costs of total veterinary management were highest in Winter, Summer and Summer seasons of 1994, 1994 and 1996, while were 11.99, 9.95 and 8.93 piaster, respectively. The lowest values were 2.35, 3.16 and 2.96 piasters in Winter, Summer and Winter seasons of 1985, 1985 and 1986, respectively.

Table (66): Means ± SE of the share of Drugs, Vaccines, Disinfectants, Veterinarian visits and total veterinary management in the cost of (Kg) milk for different years and seasons.

Year	Season	No of Rec.	Costs of Kilogram milk from Veterinary management patterns (piaster)				
			Drug	Vaccine	Disinfectant	Veterinarian visits costs	Total veterinary management costs
1985	Winter	203	1.50 ± 0.049^{H}	0.20 ± 0.0038^{J}	0.10 ± 0.000680^{I}	0.53 ± 0.0094^{L}	2.35 ± 0.059^{K}
1985	Summer	203	1.85 ± 0.082^{G}	0.29 ± 0.00645^{I}	0.24 ± 0.015^{G}	0.76 ± 0.016^{J}	3.16 ± 0.099^{I}
1986	Winter	215	1.83 ± 0.046^{G}	0.25 ± 0.0059^{J}	0.15 ± 0.00613^{H}	0.70 ± 0.013^{K}	2.96 ± 0.061^{J}
1986	Summer	215	2.38 ± 0.090^{E}	0.38 ± 0.011^{G}	0.33 ± 0.014^{F}	1.07 ± 0.030^{F}	4.17 ± 0.128^{H}
1987	Winter	181	2.20 ± 0.065^{E}	0.30 ± 0.0039^{H}	0.20 ± 0.0089^{G}	0.82 ± 0.018^{I}	3.53 ± 0.086^{J}
1987	Summer	181	2.92 ± 0.096^{D}	0.45 ± 0.010^{F}	0.44 ± 0.020^{D}	1.23 ± 0.026^{E}	5.05 ± 0.13^{G}
1988	Winter	180	2.43 ± 0.066^{E}	0.32 ± 0.0081^{H}	0.21 ± 0.0070^{G}	0.91 ± 0.020^{H}	3.88 ± 0.084^{I}
1988	Summer	180	3.00 ± 0.087^{C}	0.48 ± 0.0119^{F}	0.46 ± 0.015^{D}	1.40 ± 0.038^{C}	5.35 ± 0.133^{E}
1989	Winter	141	2.06 ± 0.057^{F}	0.30 ± 0.00623^{H}	0.20 ± 0.0074^{G}	0.89 ± 0.023^{H}	3.47 ± 0.081^{I}
1989	Summer	141	2.80 ± 0.093^{D}	0.46 ± 0.0109^{F}	0.40 ± 0.012^{E}	1.39 ± 0.045^{C}	5.06 ± 0.144^{G}
1990	Winter	138	2.30 ± 0.075^{E}	0.30 ± 0.00681^{H}	0.21 ± 0.00919^{G}	0.88 ± 0.027^{H}	3.70 ± 0.106^{J}
1990	Summer	138	2.80 ± 0.118^{D}	0.47 ± 0.0127^{F}	0.42 ± 0.017^{D}	1.40 ± 0.055^{C}	5.11 ± 0.188^{F}
1991	Winter	130	2.39 ± 0.097^{E}	0.32 ± 0.0089^{H}	0.22 ± 0.00964^{G}	0.96 ± 0.033^{B}	3.92 ± 0.135^{I}
1991	Summer	130	3.03 ± 0.125^{C}	0.51 ± 0.013^{E}	0.32 ± 0.019^{F}	1.55 ± 0.063^{B}	5.42 ± 0.198^{E}
1992	Winter	99	2.44 ± 0.117^{E}	0.46 ± 0.019^{F}	0.21 ± 0.013^{G}	0.98 ± 0.033^{G}	4.11 ± 0.156^{H}
1992	Summer	99	3.09 ± 0.151^{C}	0.69 ± 0.026^{D}	0.34 ± 0.028^{F}	1.51 ± 0.061^{B}	5.65 ± 0.227^{E}
1993	Winter	90	3.97 ± 0.185^{D}	0.63 ± 0.063^{D}	0.32 ± 0.034^{F}	1.02 ± 0.056^{F}	4.96 ± 0.291^{G}
1993	Summer	90	3.01 ± 0.151^{C}	0.77 ± 0.037^{C}	0.42 ± 0.030^{D}	1.42 ± 0.069^{C}	5.69 ± 0.219^{E}
1994	Winter	111	7.72 ± 1.54^{A}	1.36 ± 0.24^{A}	0.71 ± 0.125^{C}	2.183 ± 0.44^{A}	11.99 ± 2.28^{A}
1994	Summer	111	5.57 ± 0.54^{B}	1.34 ± 0.148^{A}	0.80 ± 0.078^{B}	2.189 ± 0.21^{A}	9.95 ± 0.87^{B}
1995	Winter	349	3.67 ± 0.248^{C}	0.83 ± 0.043^{C}	0.47 ± 0.031^{D}	0.983 ± 0.041^{G}	5.96 ± 0.299^{E}
1995	Summer	349	3.18 ± 0.153^{C}	1.15 ± 0.037^{B}	0.84 ± 0.041^{B}	1.404 ± 0.058^{C}	6.60 ± 0.211^{D}
1996	Winter	100	2.74 ± 0.16^{D}	0.87 ± 0.042^{C}	0.45 ± 0.081^{D}	0.876 ± 0.047^{H}	4.94 ± 0.267^{G}
1996	Summer	100	5.36 ± 0.253^{B}	1.26 ± 0.0503^{A}	1.01 ± 0.164^{A}	1.290 ± 0.069^{D}	8.93 ± 0.387^{C}
Total Mean	Winter	1937	2.52 ± 0.225	0.51 ± 0.037	0.28 ± 0.028	0.97 ± 0.063	4.64 ± 0.32
	Summer	1937	3.24 ± 0.161	0.68 ± 0.031	0.50 ± 0.037	1.38 ± 0.061	5.51 ± 0.244

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

XIII-2. Locality and season effects on:

XIII-2.a. Drug costs of a milk kilogram:

The highest drug costs per kilogram milk sale were 3.44, 3.55, 4.23 and 3.79 piasters in Winter and Summer seasons of Kafr-El-shaikh and Behaira, respectively. Lowest values were 1.38, 1.71 and 1.96 piaster in Winter, Summer and Winter seasons of Alexandria, Alexandria and El-Garbia, respectively.

XIII-2.b. Vaccine costs of a milk kilogram:

The highest vaccine costs of a kilogram milk sold were 0.61, 0.83, 1.29 and 1.39 piasters in Winter and Summer seasons of Kafr-El-shaikh and Behaira, respectively. Meanwhile, Winter seasons of El-Monofia, Alexandria and El-Garbia constituted lowest costs as their values were 0.35, 0.30 and 0.32 piasters.

XIII-2.c. Disinfectant costs of a milk kilogram:

The highest disinfectant costs of a kilogram milk were 0.85, 1.27, 0.71 and 0.85 piasters in Winter and Summer seasons of Behaira and El-Monofia, respectively. Meanwhile the lowest values 0.31, 0.58, 0.34, 0.73, 0.21 and 0.37 piaster in Winter and Summer seasons of Kafr-El-shaikh, Alexandria and El-Garbia, respectively.

XIII-2.d. Veterinarian visits costs of a milk kilogram:

The highest costs of a kilogram milk were 1.14, 1.64, 1.16, 1.33 and 1.01 piasters in Winter and Summer seasons of Kafr-El-shaikh, Behaira and Summer seasons of El-Garbia, respectively. Lowest costs were in Summer and Winter seasons of El-Monofia, Alexandria and the Winter season of El-Garbia as their value were 0.50, 0.77, 0.57, 0.88 and 0.70 piasters, respectively.

XIII-2.e. Total veterinary management costs of a milk kilogram:

The highest costs were 5.51, 6.63, 7.55 and 7.80 piasters in Winter and Summer seasons Kafr-El-shaikh, and Behaira, respectively. Meanwhile, lowest costs were 2.61, 3.78, 3.19 and 4.39 piasters in Winter and Summer seasons of Alexandria and El-Garbia, respectively.

Table (67): Means ± SE of the share of Drugs, Vaccines, Disinfectants, Veterinarian visits and Total veterinary management in the cost of (Kg) milk for different localities and seasons.

Locality	Season	No of Rec.	Costs of kilogram milk from veterinary management patterns (piaster)				
			Drug	Vaccine	Disinfectant	Veterinarian visits costs	Total veterinary management costs
Behaira	Winter	66	4.23 ± 0.57^{A}	1.29 ± 0.206^{A}	0.85 ± 0.182^{B}	1.16 ± 0.172^{B}	7.55 ± 0.94^{A}
	Summer	66	3.79 ± 0.29^{AB}	1.39 ± 0.146^{A}	1.27 ± 0.262^{A}	1.33 ± 0.152^{AB}	7.80 ± 0.62^{A}
Alexandria	Winter	4	1.38 ± 0.95^{D}	0.30 ± 0.25^{E}	0.34 ± 0.175^{E}	0.57 ± 0.13^{E}	2.61 ± 1.49^{E}
	Summer	4	1.71 ± 1.125^{D}	0.44 ± 0.36^{D}	0.73 ± 0.27^{C}	0.88 ± 0.19^{C}	3.78 ± 1.9^{D}
Kafr El shaikh	Winter	964	3.44 ± 0.203^{AB}	0.61 ± 0.032^{C}	0.31 ± 0.017^{E}	1.14 ± 0.053^{B}	5.51 ± 0.290^{B}
	Summer	964	3.55 ± 0.114^{AB}	0.83 ± 0.023^{B}	0.58 ± 0.018^{D}	1.64 ± 0.035^{A}	6.63 ± 0.143^{AB}
El-Garbia	Winter	894	1.96 ± 0.026^{D}	0.32 ± 0.0051^{E}	0.21 ± 0.0033^{F}	0.70 ± 0.00802^{D}	3.19 ± 0.039^{F}
	Summer	894	2.53 ± 0.041^{C}	0.46 ± 0.0073^{D}	0.37 ± 0.0074^{E}	1.01 ± 0.0130^{B}	4.39 ± 0.062^{C}
El-Monofia	Winter	9	3.06 ± 0.88^{B}	0.35 ± 0.07^{E}	0.71 ± 0.21^{C}	0.50 ± 0.113^{E}	4.63 ± 0.8^{C}
	Summer	9	2.70 ± 0.74^{C}	0.54 ± 0.11^{C}	0.85 ± 0.21^{B}	0.77 ± 0.18^{C}	6.24 ± 1.11^{AB}
Total Mean	Winter	1937	2.814 ± 0.52	0.574 ± 0.112	0.484 ± 0.117	0.814 ± 0.0952	4.69 ± 0.711
	Summer	1937	2.856 ± 0.462	0.732 ± 0.129	0.760 ± 0.153	1.126 ± 0.114	5.76 ± 0.767

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).

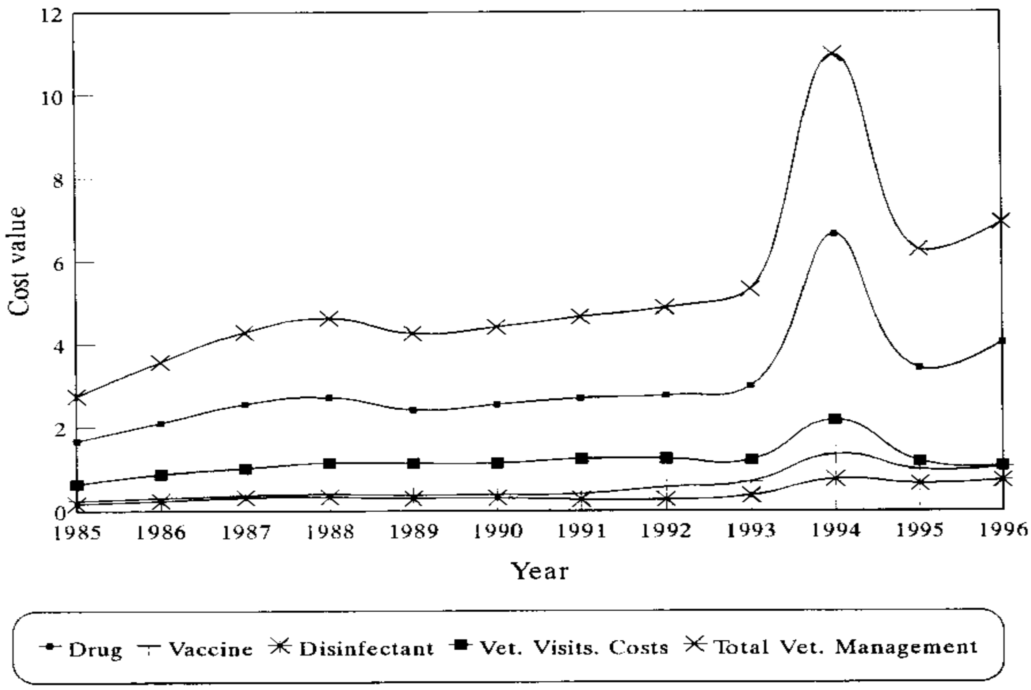

Fig. (16): Year effect on costs of (Kg) milk from veterinary management patterns (piaster).

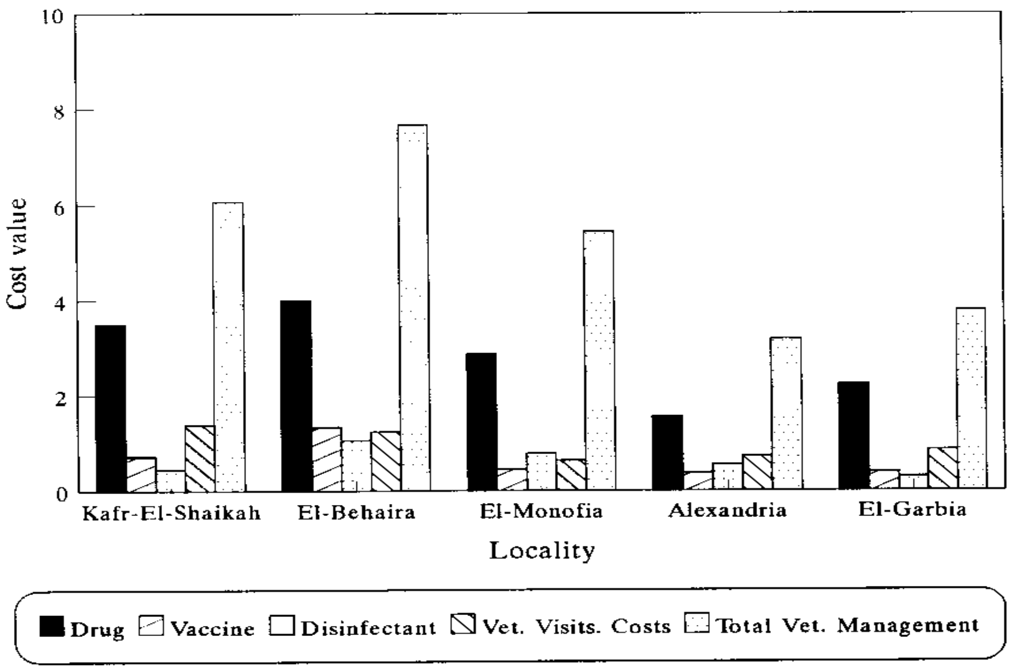

Fig. (17): Locality effect on costs of (Kg) milk from veterinary management (piaster).

XIII-3. Breed and season effects on;

XIII-3.a. Drug costs of a milk kilogram:

The highest costs of a milk kilogram from the drug were 4.16, 4.10, 5.19, 4.13, 7.57 and 4.80 piasters in Winter and Summer seasons of Balady, Charolais X Friesian and Friesian X Balady, respectively. Meanwhile, lowest values were 2.91, 3.77, 2.31, 2.54, 2.16, and 2.34 piaster in Winter and summer seasons of Buffalo, Charolais and H.F, respectively.

XIII-3.b. Vaccine costs of a milk kilogram:

The highest costs were 0.94, 1.18, 1.61, 1.52, 0.84 and 1.34 piasters in Winter and Summer seasons of Balady, Friesian X Balady and Buffalo, respectively. Meanwhile, the lowest values 0.35, 0.52, 0.44, 0.26, 0.41, 0.20 and 0.36 piaster in Winter, Summer, Winter, Winter, Summer, Winter and Summer seasons of Friesian, Friesian, Charolais X Friesian, Charolais, Charolais, H.F and H.F, respectively.

XIII-3.c. Disinfectant costs of a milk kilogram:

The highest costs were 1.48, 1.15 and 1.27 piasters in Winter and Summer seasons of H.F and Summer seasons of Buffalo, respectively. Meanwhile, the lowest seasons were 0.10, 0.30, 0.20 and 0.40 piaster in Winter, Summer and Winter seasons of Charolais and Summer seasons of Friesian, respectively.

XIII-3.d. Veterinarian visits costs of a milk kilogram:

The highest costs of a milk kilogram were 2.20, 1.93, 1.04, 1.73, 1.03, 1.56, 1.27, 1.03, 1.35 and 1.27 piasters in Winter, Summer, winter, Summer, Winter, Summer, Summer, Winter, Summer and Summer seasons of Friesian X Balady, Friesian X Balady, Buffalo, Buffalo, Charolais, Charolais, H.F, Balady, Balady and Friesian, respectively. The lowest costs were 0.12 and 0.17 piaster for cross Charolais X Friesian in Winter and Summer seasons.

XIII-3.e. Total veterinary management costs of a milk kilogram:

The highest kilogram costs from total veterinary management costs were 12.21, 9.41, 8.13 and 9.23 piasters in Winter and Summer seasons of Friesian X Balady, and Summer seasons of Buffalo and H.F, respectively. Meanwhile, the lowest costs were 3.68 and 3.72 piaster in Winter seasons of Friesian and Charolais.

Table (68): Means±SE of the share of Drugs, Vaccines, Disinfectants, Veterinarian visits and total veterinary management in the cost of (Kg) milk for different breeds and seasons.

Breed	Season	No of Rec.	Costs of Kilogram milk from veterinary management patterns (piaster)				
			Drug	Vaccine	Disinfectant	Veterinarian visits	Total veterinary management
Balady	Winter	229	4.16 ± 0.36^{B}	0.94 ± 0.068^{C}	0.48 ± 0.036^{D}	1.03 ± 0.056^{B}	6.62 ± 0.449^{C}
Balady	Summer	229	4.10 ± 0.25^{B}	1.18 ± 0.052^{B}	0.81 ± 0.057^{B}	1.35 ± 0.056^{B}	7.45 ± 0.323^{C}
Friesian	Winter	1502	2.28 ± 0.044^{D}	0.35 ± 0.0061^{D}	0.20 ± 0.0037^{E}	0.84 ± 0.0108^{C}	3.68 ± 0.057^{E}
Friesian	Summer	1502	2.79 ± 0.041^{C}	0.52 ± 0.0079^{D}	0.40 ± 0.0061^{D}	1.27 ± 0.015^{B}	5.00 ± 0.061^{D}
CharXFr	Winter	4	5.19 ± 1.24^{AB}	0.44 ± 0.135^{D}	0.44 ± 0.135^{D}	0.12 ± 0.071^{D}	6.20 ± 1.22^{C}
CharXFr	Summer	4	4.13 ± 1.195^{B}	0.70 ± 0.22^{C}	0.93 ± 0.282^{B}	0.17 ± 0.098^{D}	5.94 ± 1.535^{D}
BalXFr	Winter	86	7.57 ± 1.92^{A}	1.61 ± 0.306^{A}	0.81 ± 0.150^{B}	2.20 ± 0.56^{A}	12.21 ± 2.85^{A}
BalXFr	Summer	86	4.80 ± 0.59^{B}	1.52 ± 0.176^{A}	0.87 ± 0.089^{B}	1.93 ± 0.28^{B}	9.41 ± 1.030^{B}
Charolais	Winter	19	2.31 ± 0.130^{D}	0.26 ± 0.017^{D}	0.10 ± 0.0087^{E}	1.03 ± 0.055^{B}	3.72 ± 0.207^{E}
Charolais	Summer	19	2.54 ± 0.250^{D}	0.41 ± 0.039^{D}	0.30 ± 0.023^{E}	1.56 ± 0.135^{B}	4.83 ± 0.440^{D}
H.F	Winter	3	2.16 ± 0.38^{D}	0.20 ± 0.071^{D}	1.48 ± 0.167^{A}	0.70 ± 0.011^{C}	4.56 ± 0.28^{D}
H.F	Summer	3	2.34 ± 0.79^{D}	0.36 ± 0.115^{D}	1.15 ± 0.44^{A}	1.27 ± 0.060^{B}	9.23 ± 0.790^{B}
Buffalo	Winter	94	2.91 ± 0.187^{C}	0.84 ± 0.049^{C}	0.59 ± 0.120^{C}	1.04 ± 0.068^{B}	5.41 ± 0.32^{D}
Buffalo	Summer	94	3.77 ± 0.224^{C}	1.34 ± 0.063^{B}	1.27 ± 0.183^{A}	1.73 ± 0.151^{B}	8.13 ± 0.44^{B}
Total	Winter	1937	3.79 ± 0.608	0.66 ± 0.093	0.58 ± 0.088	0.99 ± 0.118	6.05 ± 0.76
Mean	Summer	1937	3.49 ± 0.477	0.86 ± 0.096	0.81 ± 0.154	1.18 ± 0.113	0.659 ± 0.659

Means within the same column and bearing different superscripts are significantly different ($P<0.01$).

XIII-4. Sector and season effects on:

XIII-4.a. Drug costs of a milk kilogram:

The highest value were 4.51, 4.05, 5.94 and 3.7 piasters in Winter and Summer seasons of farmers and governmental sector, respectively. Meanwhile, the lowest values were 2.2 and 2.78 piasters in private sector, respectively.

XIII-4.b. Vaccine costs of a milk kilogram:

The highest values were 1.02, 1.26, 1.88 and 1.83 piasters in farmers and governmental sector in Winter and Summer seasons, respectively. The lowest were 0.32 and 0.49 piaster in Winter and Summer seasons of private sector, respectively.

XIII-4.c. Disinfectant costs of a milk kilogram:

The highest values were 0.51, 0.80, 1.8 and 2.69 piasters in Winter and Summer seasons of farmers and governmental sector, respectively. The lowest were 0.20 and 0.40 piasters in Winter and Summer seasons of private sector, respectively.

XIII-4.d. Veterinarian visits costs of a milk kilogram:

Topmost values were in Summer, Summer, Winter and Summer seasons of farmers, private, governmental and governmental sector (1.45, 1.30, 1.39 and 1.65, respectively). The lowest values were 1.21 and 0.84 piasters in Winter seasons of farmers and private sector, respectively.

XIII-4.e. Total veterinary management costs of a milk kilogram:

Highest values were 11.04, 9.88, 7.26 and 7.57 piasters in Winter and Summer seasons of governmental and farmers sectors, respectively. Meanwhile, lowest values were 3.57 and 4.98 piaster in Winter and Summer seasons of private sector, respectively.

Table (69): Means ± SE of the share of Drugs, Vaccines, Disinfectants, Veterinarian visits and Total veterinary management in the cost of (Kg) milk for different sectors and seasons.

Sector	Season	No of Rec.	Costs of Kilogram milk from veterinary management patterns (piasters)				
			Drug	Vaccine	Disinfectant	Veterinarian visits	Total veterinary management
Farmers	Winter	456	4.51 ± 0.42^{A}	1.02 ± 0.064^{B}	0.51 ± 0.032^{D}	1.21 ± 0.114^{C}	7.26 ± 0.604^{C}
Farmers	Summer	456	4.05 ± 0.18^{A}	1.26 ± 0.041^{B}	0.80 ± 0.024^{C}	1.45 ± 0.069^{B}	7.57 ± 0.272^{C}
Private	Winter	1465	2.20 ± 0.026^{C}	0.32 ± 0.00433^{C}	0.20 ± 0.0047^{F}	0.84 ± 0.0062^{D}	3.57 ± 0.037^{D}
Private	Summer	1465	2.78 ± 0.037^{C}	0.49 ± 0.00653^{C}	0.40 ± 0.010^{E}	1.30 ± 0.015^{B}	4.98 ± 0.059^{D}
Govrnem	Winter	16	5.94 ± 2.025^{A}	1.88 ± 0.77^{A}	1.80 ± 0.69^{B}	1.39 ± 0.36^{B}	11.04 ± 3.15^{A}
Govrnem	Summer	16	3.70 ± 0.732^{B}	1.83 ± 0.57^{A}	2.69 ± 1.00^{A}	1.65 ± 0.415^{A}	9.88 ± 1.995^{B}
Total	Winter	1937	4.21 ± 0.155	1.07 ± 0.27	0.83 ± 0.24	1.14 ± 0.16	7.29 ± 1.26
Mean	Summer	1937	3.51 ± 0.316	1.19 ± 0.205	1.29 ± 0.16	1.46 ± 0.16	7.47 ± 0.77

Means within the same column and bearing different superscripts are significantly different ($P < 0.01$).

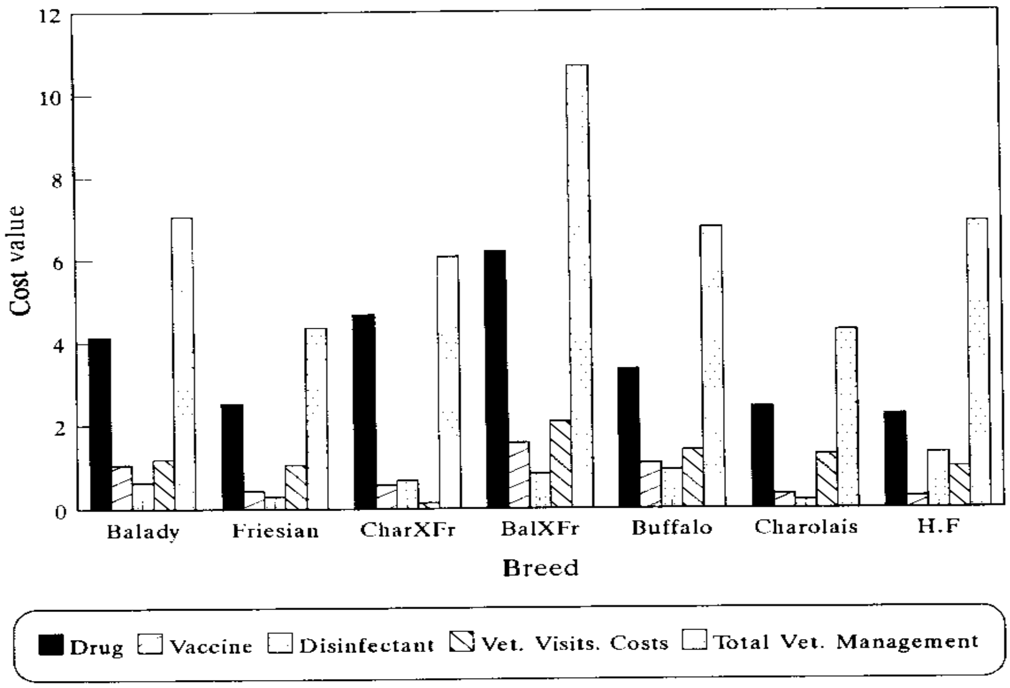

Fig. (18): Breed effect on costs of (Kg) milk from veterinary management patterns (piaster).

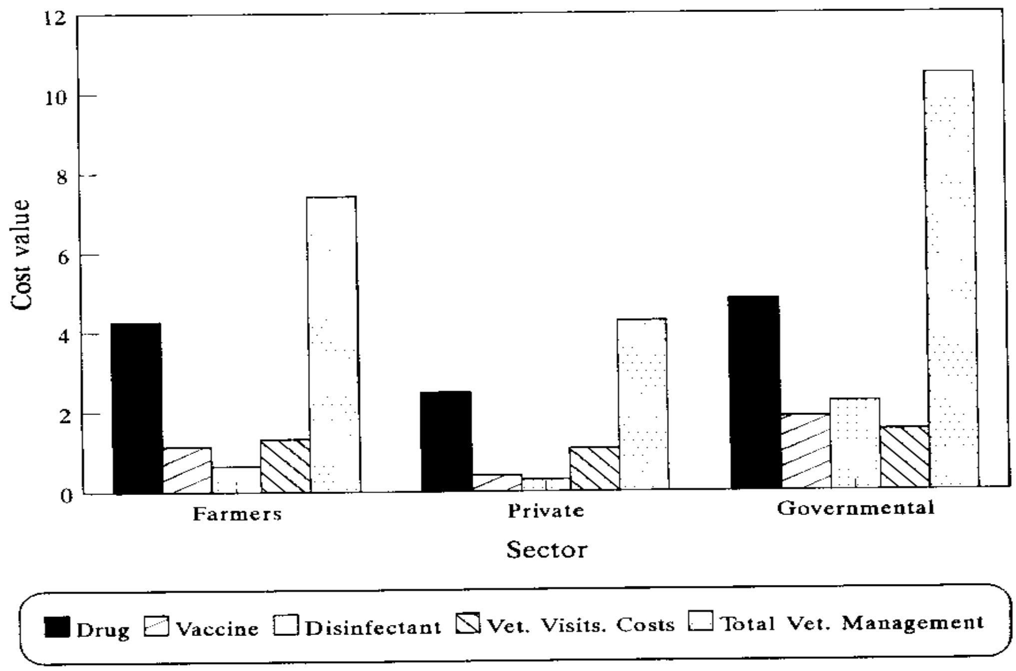

Fig. (19): Sector effect on costs of (Kg) milk from veterinary management patterns (piaster)

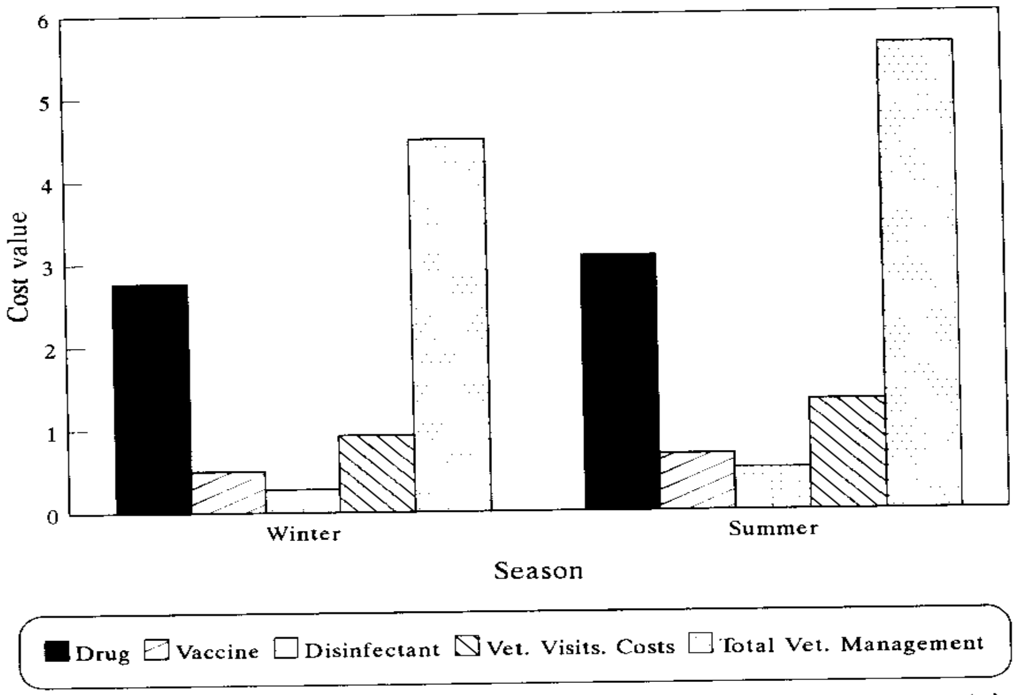

Fig. (20): Season effect on costs of (Kg) from veterinary management patterns (piaster).

XIIII- REGRESSION RELATIONSHIP BETWEEN INDEPENDENT VARIABLES (YEAR, SEASON, LOCALITY, BREED AND SECTOR) AND EFFICIENCY MEASURES OF MILK PRODUCTION (INDEPENDENT VARIABLES):

Table (70) showed that:-

1- The independent variables explained about 55, 54, 51, 53, 52, 44, 39, 45, 47, 39 and 39% from the collective efficiency measures.

2- Also, the main variables explained about 35, 28, 36, 37, 22, 18, 62, 58, 43 and 36% from the efficiency measures, Drugs, vaccines, disinfectants, veterinarian visits and total veterinary management costs related to variable and to total costs.

3- The main variables explained about 15, 35, 40, 20 and 21% from the costs of a milk kilogram from Drugs, vaccines, disinfectants, veterinarian visits and total veterinary management costs.

Table (70): **Dependent variables (Efficiency measures), and independent variables (year, season, locality, breed, sector and season within them) and their determination coefficient R^2.**

Efficiency Measure	R^2	Efficiency Measure	R^2
1-Collective efficiency measures Variable costs/Total costs	0.55	Disinfectant costs/Variable costs	0.22
total returns/Variable costs	0.54	Disinfectant costs/Total costs	0.18
Returns/Total costs	0.51	Veterinarian visits costs/ Variable costs	0.62
Net income/Variable costs	0.53	Veterinarian visits costs/ Total costs	0.58
NET income/Total costs	0.52	Total veterinary management costs/Variable costs	0.43
Milk Returns/ Variable costs	0.44	Total veterinary management costs/Total costs	0.36
Milk Returns/Total costs	0.39	**3- Costs of a milk kilogram from veterinary management patterns** Costs of Kg milk from drugs (Piaster)	0.15
Milk Returns/Total Returns	0.45	Costs of Kg milk from vaccines (Piaster)	0.35
Net income/Milk Sale	0.47	Costs of Kg milk from disinfectant (Piaster)	0.40
Costs of Kg milk sale	0.39	Co[illegible]ilk from veterinarian visits costs ([illegible])	0.20
Price of Kg/Kg Cost	0.39	Costs of Kg milk from total veterinary management costs (Piaster)	0.21
2- Veterinary management efficiency Measures Drug costs/Variable costs	0.35		
Drug costs/Total costs	0.28		
Vaccine costs/Variable costs	0.36		
Vaccine costs/Total costs	0.37		

Table (71): Number of dairy records, minimum, maximum, mean, standard deviation, coefficient of variation, total and the mean±SE of the variables used in the production and cost functions.

Variable	No of Rec.	Min	Max	Mean	SD	C.V%	Total	Mean ± SE
1- Animal Number	3874	1.00	3739	11.0062	106.10	964.07	42638	11.00620±1.7
2- Feed								
Berseem	3874	-	9.00	2.15	3.008	139.92	8349	2.15±0.0483
B. hay	3874	-	9.33	1.37	1.60	116.78	5318	1.37±0.0257
Tibn	3874	-	9.00	0.40	0.72	178.13	1566	0.40419±0.01
Concentrate	3874	-	8.00	1.95	1.33	68.205	7581	1.956±0.0214
3- Veterinary Management								
Drug	3874	0.16	4.35	3.76	1.95	51.861	14585	3.76±0.0313
Vaccine	3874	0.05	8.20	0.64	0.21	33.76	2490	0.6428±0.003
Disinfectant	3874	0.05	8.53	0.45	0.35	76.8077	1770	0.456±0.0056
Veterinarian costs	3874	0.05	4.52	1.52	0.69	45.8830	5891	1.520±0.0112
Total veterinary costs	3874	0.79	17.84	6.38	2.70	42.888	24742	6.3866±0.043
4- Reproductive efficiency								
Calving interval	3874	10.00	19.30	12.10	1.00	?99	46.893	12.1046±0.01
Gestation period	3874	8.9	11.5	9.23	0.50	5.52199	35789	9.23±0.00818
Days open	3874	1.00	5.00	2.86	0.93	32.783	11100	2.86±0.015
Dry period	3874	0.50	5.30	2.35	0.58	24.9225	9136	2.35±0.00944
Service per conception	3874	1.00	5.00	1.66	0.680	40.922	6444	1.6634±0.010
Age at first service	3874	1.00	3.50	1.87	0.46	24.6986	7255	1.872±7.390
5- Milk								
Milking frequency	3874	2.00	3.00	2.04	0.21	10.566	7939	2.04±0.0034
Total costs	3874	257	9878	1536.51	51[illegible]		5952445	1536.511±8.3
Milk amount	3874	123	7443	1719.211	719.38	41.8440	6660281	1719.21±11.5

XV- Correlation matrix

Table (72) illustrates the following results:

1- HIGH POSITIVE CORRELATIONS (P< 0.01) BETWEEN:

A- Total veterinary costs and drug costs 0.67

2- HIGH NEGATIVE CORRELATIONS (P< 0.01) BETWEEN:

A- Milk price and each of drug (-0.65), veterinarian visits costs, (-0.80) and total veterinary costs (-0.76).

3- MEDIUM POSITIVE CORRELATIONS (P< 0.01) BETWEEN:

A- Amount of concentrate and each of drug value (0.40) and vaccine value (0.44).

B- Vaccine value and drug value (0.42).

C- Veterinarian visits costs and each of Concentrate (0.47) and vaccine value (0.40).

D- Total veterinary management costs and each of Concentrate (0.48), vaccine value (0.53) and disinfectant value (0.38).

4- MEDIUM NEGATIVE CORRELATIONS (P< 0.01):

A- Tibn and each of, drug value (-0.43), vaccine value (-0.32) and total veterinary costs (-0.49).

B- Gestation period and each of Vaccine value (-0.36) and total veterinary costs (-0.32).

C- Service per conception and each of Veterinarian visits (-0.38) and total veterinary management costs (-0.32).

5- LOW POSITIVE CORRELATIONS (P< 0.01):

A- Berseem and each of drug (0.28) and vaccine value (0.27).

B- B. hay and vaccine value (0.07).

C- Disinfectant and each of Animal number (0.106) and B. hay (0.18), concentrate (0.27), drug value (0.22) and vaccine value (0.32).

D- Veterinarian costs and each of Berseem amount (0.12) and disinfectant value (0.26).

E- Total veterinary management and berseem (0.25).

F- Calving interval and each of vaccine (0.06 [illegible] disinfectant value (0.054), veterinarian visits costs (0.02), total veterinary management costs (0.034).

G- Days open and each of drug (0.18), vaccine value (0.26), disinfectant (0.11), veterinarian costs (0.19) and total veterinary costs (0.21).

H- Age at first service and disinfectant (0.01).

I- Milk frequency and each of vaccine value (0.21) and disinfectant value (0.06).

J- Amount of milk produced and each of drug value (0.26), vaccine value (0.17), disinfectant value (0.003), veterinarian visits costs (0.202) and total veterinary value (0.25).

6- LOW NEGATIVE CORRELATIONS (P< 0.01).

A- Drug and each of Animal numbers (-0.03), B. hay (-0.14).

B- Vaccine and each of Animal numbers (-0.01) and tibn value (-0.32).

C- Disinfectant and each of Berseem (-0.01) and tibn value (-0.16).

D- Veterinarian visits costs and each of Animal numbers (-0.011) and tibn (-0.50).

E- Total veterinary management costs and each of Animal numbers (-0.04), B. hay (-0.09).

F- Calving interval and drug value (-0.01).

G- Gestation period and each of drug (-0.28), disinfectant value (-0.101), veterinarian visits costs (-0.29).

H- Dry period and each of drug value (-0.15), vaccine value (-0.18), disinfectant value (-0.05), veterinarian (-0.10), total veterinary costs (-0.15), days open (-0.10).

I- Service per conception and each of drug (-0.29), vaccine value (-0.11) and disinfectant value (-0.04).

J- Age at first service and drug value (-0.15), vaccine (-0.30), veterinarian visits cost (-0.29) and total veterinary management costs (-0.18).

K- Milk frequency and each of veterinarian visits costs (-0.10) and total veterinary management costs (-0.04).

L- Kilogram milk price and disinfectant (-0.29).

Table (72): Simple correlation matrix among animal number, feed pattern (berseem, derris, tibn and concentrate), real value of veterinary management patterns (drugs, vaccines, disinfectant, veterinarian visits and total veterinary management), reproductive efficiency patterns (calving interval, gestation period, days open, dry period, service per conception and age at first service), milking frequency, price of kilogram milk sale and milk amount.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1) Number																		
(2) Berseem	-.05																	
(3) B.hay	-.01ns	.61																
(4) Tibn	-.01ns	-.27	.14															
(5) Concentrate	-.005ns	.29	.19	-.56														
(6) Drug	-.03	.28	-.14	-.43	.40													
(7) Vaccine	-.01ns	.27	.07	.32	.44	.42												
(8) Disinfectant	.106	-.01ns	.18	-.16	.27	.22	.32											
(9) Veterinarian visits costs	-.11	.12	-.10	.50	.47	.67	.40	.26										
(10) Total veterinary costs	-.04	.25	-.09	-.49	.48	.96	.53	.35	.81									
(11) Calving interval	-.01ns	.092	.08	.04	.18	-.01	.06	.054	.02	.034								
(12) Gestation period	.002ns	-.16	.03	.37	-.37	-.28	-.36	-.101	-.29	-.32	.37							
(13) Days open	.02ns	.18	.07	-.25	.40	.18	.26	.11	.19	.21	.79	-.14						
(14) Dry period	-.008ns	-.14	-.05	.18	-.25	-.15	-.18	-.05	-.10	-.15	.05	.28	-.10					
(15) Services per conception	.06	-.08	.04	.35	-.31	-.29	-.11	-.04	-.38	-.32	.10	.42	-.12	.14				
(16) Age at first service	-.02ns	.003ns	.10	.21	.16	-.15	-.03	.01ns	-.29	-.18	.09	.31	-.076	-.02	.26			
(17) Milking frequency	.05	.12	.06	-.12	.31	-.05	.21	.06	-.10	-.04	.09	-.08	.14	-.09	.06	.012ns		
(18) Price	.06	-.21	.05	.52	-.47	-.65	-.47	-.29	.88	-.76	.01ns	.36	-.15	.15	.39	.16	.13	
(19) Amount milk	.04	.57	-.41	.38	.38	.26	.17	.003ns	.202	.25	.092	-.21	.21	-.22	-.21	-.13	.21	-.14

All (r) were significant at (P<0.01) except (ns) in which (r) were not significant at (P<0.05).

XVI Milk production functions

Production functions of milk production were estimated in two forms; linear and logarithmic.

LOGARITHMIC FUNCTIONS:

Demonstrated milk production as a dependent variable and the variables having correlation coefficient not more than (0.8) used in the production functions.

Comparisons between logarithmic production functions were done to choose the best function which describes the relationship between production resources and milk production. The comparisons between the different functions were done according to the acceptance of the functions economically, statistically, reality in their results.

A- First trial:

This was done to choose the best function which describes the relationship between the variables affecting milk production {Animal number, amount of (berseem/Feddan, "B.Hay, Tibn and concentrate"/ton), real value of drugs, vaccines, disinfectant and veterinarian visits, calving interval, gestation period, days open, dry period, service per conception, age at first service and milking frequency). The best logarithmic function had the form

FUNCTION	$Log\ Y = 3.367 + 0.2331\ Log\ X_{15} + 0.0998\ Log\ X_{11} - 0.100\ Log\ X_9 - 0.0985\ Log\ X_5 +$
t	$(22.80)^{**}$ $(5.77)^{**}$ $(6.85)^{**}$ $(-3.69)^{**}$ $(8.212)^{**}$
	$0.1508\ Log\ X_2 - 0.1048\ Log\ X_{10} - 0.0672\ Log\ X_{17} - 0.1287\ Log\ X_3 + 0.0346\ Log\ X_1 -$
t	$(14.841)^{**}$ $(-6.697)^{**}$ $(-4.099)^{**}$ $(-8.756)^{**}$ $(4.748)^{**}$
	$0.2523\ Log\ X_{16} - 0.4770 Log\ X_{13} + 0.09953\ Log\ X_4 + 0.1124\ Log\ X_8 + 0.5669\ Log\ X_{19}$
t	$(-10.865)^{**}$ $(-3.192)^{**}$ $(6.599)^{**}$ $(8.190)^{**}$ $(8.018)^{**}$
F	$(203.67)^{**}$
R^{-2}	(0.42285)

$X_{i\ ....\ n}$ (explained in Table 73).

* significant at ($P < 0.05$).
** significant at ($P < 0.01$).
*** significant at ($P < 0.001$).

Results indicated the function significance ($P < 0.01$) and about 42.28% from the changes in milk production was due to changes in the production resources.

Table (73) shows the average elasticity of the days open was + 0.23. That is, changes of days open by 10% in the period 40-140 days after parturition will increase milk production by about 2.3%. The best period is about 100 days (Olds et al., 1979), as most of the general health events observed during the first 90 days after calving (Jadhav et al., 1991). Delayed service to 100 days after parturition was the best period increasing milk production and conception. Average elasticity of the real values of the costs of veterinarian visits was + 0.0998. That is, the increase of veterinarian visits by 10% increased the amount of milk production by 0.998%. Average elasticity of real value of vaccine was -0.10, meaning that, increasing of the vaccine real value by 10% decreased milk production by about 10%. Average elasticity of concentrates was + 0.0985 meaning that, increasing the amount of concentrates by about 10% caused increase of milk production by 0.985%. This result, agreed with the results of Stoddard (1969) who indicated that feeding concentrated increases milk production and profit.

Table (73): Elasticity of independent variables shared in the milk production function as well as total elasticity

Code	Symbol	Variable	Elasticity
1	X_{15}	Days open (Month)	+ 0.23
2	X_{11}	Veterinarian visits costs (Real value)	+ 0.0998
3	X_9	Vaccine costs (Real value)	- 0.100
4	X_5	Concentrate (Ton)	+ 0.0985
5	X_2	Berseem (Feddan)	+ 0.1508
6	X_{10}	Disinfectant (Real value)	- 0.1048
7	X_{17}	Service per conception	- 0.0672
8	X_3	B.Hay (Ton)	- 0.1287
9	X_1	Animal Numbers	+ 0.0346
10	X_{16}	Dry period (Month)	- 0.2523
11	X_{13}	Calving Interval (Per month)	- 0.4770
12	X_4	Tibn (Ton)	+ 0.09953
13	X_8	Drug value (Real value)	+ 0.1124
14	X_{19}	Milk (Frequency)	+ 0.5669
Total Elasticity			+ 0.26253

Table (73) also demonstrated that the average elasticity of berseem was 0.1508 meaning that, increasing the amount of berseem by 10%, increased the amount of milk produced by about 1.508%. This result was in agreement with those of Taylor (1991) who indicated that, milk production from forage feeding were higher than those due to concentrate feeding. Average elasticity of disinfectant (real value) was -0.1048, which means that, increasing of disinfectant by 10% caused decreasing of milk yield by about 1.048%. The average elasticity of services per conception was -0.0672 meaning that the increase of the services per conception by 10% caused decreasing milk production by about 0.67%.

The average elasticity of Berseem hay was -0.1287, meaning that increasing the amount of B.hay consumed by 10% caused decreasing of milk production by about 1.28%. The average elasticity of animal numbers was 0.0346 meaning, that increasing animal numbers by about 10% caused increasing milk production by about 0.346%. This result is in agreement with those of Houghton and Poole (1990), Grover et al., (1992), Jack et al., (1992). They indicated that milk production increased with increasing holding unit, but not in line with the results of Widodo et al., (1994 a and b), who reported that there was a tendency for milk production and revenue per cow to decrease as holding unit and animal number increased.

The average elasticity of dry period was -0.25 meaning that, increasing of dry period by 10% caused declinig of milk production by about 2.52%. Average elasticity of calving interval was -0.47, that is increasing, calving interval by 10% caused decreasing of milk production by about 4.77%. Average elasticity of tibn consumed was +0.09 meaning that, increasing of tibn consumed by about 10% caused increasing of milk production by about 0.99%. Average elasticity of drug real value was +0.1124 that is, increasing of drug real value by 10% led to increasing of milk production by about 1.12%. Elasticity of milk frequency was + 0.5669, that is increasing of milk frequency by about 10% caused increasing of milk production by about 5.66%.

Table (73) shows, also that the total elasticity of milk production was 0.26 that is to say, changes of all production resources in the equation by 10% would result in increasing of milk production by about 2.62%.

Total elasticity of milk production was smaller than one, meaning that, milk production farms acted in the second stage of production in which the production increased by declining percentages more than increasing production resources.

B- Second trial:

1. Trial a (starch equivalent):

The aim of this trial was to determine the relationship between milk production as dependent variable and the independent variables affecting milk production (Animal numbers, total feed "Starch equivalent", total veterinary management costs "real value", calving interval, gestation period, days open, dry period, services per conception, age at first service and milk frequency).

This trial made in two forms; linear and logarithmic. The best logarithmic functions tooke the following form:-

FUNCTION t	$\text{Log } Y = 2.85 - 0.014 \text{ Log } X_1 + 0.221 \text{ Log } X_6 - 0.068 \text{ Log } X_{12} - 1.677 \text{ Log } X_{13} + 1.132 \text{ Log } X_{14}$ (19.73)** (2.48)** (43.30)** (5.31)** (-6.050)** (5.5151)**
t	$+ 0.464 \text{ Log } X_{15} - 0.2161 \text{ Log } X_{16} - 0.0985 \text{ Log } X_{17} - 0.111 \text{ Log } X_{18} + 0.406 \text{ Log } X_{19}$ (6.858)** (-9.899)** (-6.523)** (-5.099)** (6.555)**
F	(365.906)**
R^{-2}	(0.48511)

$X_{1 \ldots n}$ (explained in Table 74).

These results indicate the significance of the function at ($P < 0.01$) and that about 48.511% of the changes in milk production were due to the changes of production resources used in this equation.

Table (74) demonstrates that the average elasticity of animal numbers was -0.014, so that, 10% increase of animal number will cause decreasing of milk production by about 0.14%. Average Elasticity of total feed (Starch equivalent) was about 0.221 so that, 10% increase of starch equivalent caused, increasing of milk production by about 2.21%. Elasticity of total veterinary management (real value) was about +0.068 meaning that 10% increasing of total veterinary management value increased milk production by about 0.68%. Elasticity of calving interval was -1.667 meaning that, increasing the calving interval by 10% caused decreasing of milk production by 16.67%. Elasticity of gestation period was 1.132, so that, increasing of gestation period by 10% caused increasing of milk production by 11.32%. Elasticity of Days open was, 0.464, so that 10% increasing of days open caused increasing of milk production by about 4.64%. Average elasticity of the dry period was -0.2161, meaning that, increasing of the dry period by about 10% caused decreasing of milk production by about 2.16% which is in line with the results of Bruins (1995) who reported that although cows did not earn any money for farmers in dry period and just causes high costs, the importance of this period should never be overlooked.

Table (74): Elasticity of independent variables shared in the milk production function as well as total elasticity.

Code	Symbol	Variable	Elasticity
1	X_1	Animal Numbers	- 0.014
2	X_6	Total feed (Amount.Starch equivalent)	+ 0.221
3	X_{12}	Total veterinary management value (real value)	+ 0.068
4	X_{13}	Calving Interval (Month)	- 1.667
5	X_{14}	Gestation period (Month)	+ 1.132
6	X_{15}	Days open (Month)	+ 0.464
7	X_{16}	Dry period (Month)	- 0.2161
8	X_{17}	Service per conception	- 0.0985
9	X_{18}	Ages (Year)	- 0.111
10	X_{19}	Milking Frequency	+ 0.406
Total Elasticity			+ 0.1844

Table (74) also shows that, the average elasticity of services per conception was -0.0985 meaning that, increasing of services per conception by about 10% caused decreasing of milk production by about 0.985%. Average elasticity of age at first service was -0.111 meaning that, increasing of age at first service by about 10% causing decreasing of milk production by about 1.11%. The older age at first service increased the calving interval, decreased milk production and profit, (Olds, 1969). The average elasticity of milk frequency was + 0.406, meaning that, increasing of milk frequency by about 10% causing increasing of milk production by about 4.06%, and this agree with the results of Central System of Package and Statistics (1995). They indicated that, increasing milk frequency increases milk yield, as activated udder blood vessels and mammary cells and renew the ability of the animal to yield more milk.

Total elasticity of production was + 0.1844, that is, changes of all production resources in this equation by 10% resulted in an increase of milk production by about 1.844%. The total elasticity of production was smaller than one meaning that the dairy farms acted in the second stage of production in which the production increased by declining percentages more than the production resources.

2. Trial b (Digestible protein):

The aim of this trial was to determine the relationship between milk production as dependent variable and the independent variable resources (Total feed "digestible protein", real value of total veterinary management, calving interval, gestation period, days open, dry period, service per conception, age at first service, milking frequency).

Also, this trial was made in two forms linear and logarithmic. The best logarithmic function took the form of.

FUNCTION t	$\text{Log } Y = 3.08 + 0.1882 \text{ Log } X_7 + 0.023 \text{ Log } X_{12} - 1.402 \text{ Log } X_{13} + 0.915 \text{ Log } X_{14} +$ (20.807)** (39.86)** (1.66)** (-4.968)** (4.349)**
 t	$0.3838 \text{ Log } X_{15} - 0.069 X_{17} - 0.092 X_{18} + 0.388 X_{19}$ (5.524)** (-4.52)** (-4.123)** (6.114)**
F	(364.529)**
R^{-2}	(0.45805)

$X_{i \ldots\ldots n}$ (explained in Table 75).

The results of this function indicate the significance of the function ($P < 0.01$) and that about 45.80% of the changes in milk production were due to changes of production resources used in this equation.

Table (75) shows that the the average elasticity of the total feed (Digestible protein) was 0.1882 so that, increasing the digestible protein of the feed by about 10% caused increasing of milk production by 1.882%. Average elasticity of real value of total veterinary management costs was (0.0230) meaning that, 10% increase of the veterinary management caused increasing of the milk production by about 0.23%. Average elasticity of the calving interval was -1.402 meaning that 10% increase of the calving interval caused decreasing of milk production by, 14.02%. Average elasticity of gestation period was, 0.915 meaning that, 10% increase of gestation period caused increasing of milk production by, 9.15%. Average elasticity of days open was 0.3838 meaning that, increasing days open by 10% caused increasing of milk production by 3.83%. The average elasticity of dry period was -0.216, meaning that, 10% increase in the dry period caused decreasing of milk production by 2.16%, the average elasticity of service per conception was -0.069, meaning that 10% increase of services per conception caused decreasing of milk production by about 0.69%, the average elasticity of age at first service was -0.0926 meaning that, 10% increase in age at first service caused decreasing milk production by 0.926%, the average elasticity of milk frequency was 0.388 meaning that increasing milk frequency by 10% caused increasing milk production by about 3.88%.

Table (75): Elasticity of independent variables shared in the milk production function as well as total elasticity.

Code	Symbol	Variable	Elasticity
1	X_7	Total feed (Amount.digestible protein)	+ 0.1882
2	X_{12}	Total veterinary management value (Real value)	+ 0.0230
3	X_{13}	Calving Interval (Month)	- 1.402
4	X_{14}	Gestation period (Month)	+ 0.915
5	X_{15}	Days open (Month)	+ 0.3838
6	X_{16}	Dry period (Month)	- 0.216
7	X_{17}	Service per conception	- 0.069
8	X_{18}	Ages (Year)	- 0.0926
9	X_{19}	Milking frequency	+ 0.388
Total elasticity			+ 0.1184

The total elasticity of the function was + 0.1184, that is to say, changes of all production resources in this equation by 10% resulted in an increase of milk production by 1.184%. The total elasticity of the function was smaller than unity meaning that the dairy farms acted in the second stage of production in which the production increased by declining percentages than the increasing of the production resources.

XVI Veterinary production functions

XVI.A. EFFECT OF THE DRUG, VACCINE, DISINFECTANT AND VETERINARIAN VISITS COSTS ON MILK PRODUCTION:

To estimate the effectivness of, Drugs, vaccines, disinfectant and veterinarian visits costs on milk production; the linear and logarithmic functions were demonstrated. Milk production was the dependent variable and the veterinary management was the independent variables.

The best function was the logarithmic function , and took the form of:

FUNCTION	$\text{Log } Y = 3.01 + 2.50 \text{ Log } X_8 + 1.30 \text{ Log } X_9 - 1.65 \text{ Log } X_{10} + 9.69 \text{ Log } X_{11}$
t	(290.353)** (16.45)** (4.60)** (-10.07)** (6.75)**
F	(242.42)**
R^{-2}	(0.200)

From the veterinary management logarithmic production function and Table (76), it was found that, the average elasticity of drugs was + 2.5 meaning that, increasing of drug real value by 10% caused increasing of milk production by about 25%. Average elasticity of vaccine was (+ 1.3) that, is increasing of vaccine real value by 10% caused increasing of milk production by about 13%. It controlled diseases (Tamazali, 1995) and increasing fertility (Pfisterer, 1990)

Table (76): Elasticity of independent variables (Drug, Vaccine, Disinfectant and Veterinarian visits costs) shared in the milk production function as well as total elasticity

Code	Symbol	Variable	Elasticity
1	X_8	Drug value (Real value)	+ 2.50
2	X_9	Vaccine value (Real value)	+ 1.30
3	X_{10}	Disinfectant value (Real value)	- 1.65
4	X_{11}	Veterinarian visits costs (Real value)	+ 9.69
Total Elasticity			+ 11.84

Average elasticity of the disinfectant was -1.65 meaning that, increasing of disinfectant real value by 10% causing decreasing of milk production by about 16.5%. The frequent uses of the only type of disinfectant all over the year may increase resistance of the microorganisms against this type of disinfectant, so we must change the type of the disinfectant from period to another to avoid this resistance. The average elasticity of veterinarian visits costs was + 9.69, so that, 10% increasing of veterinarian visits caused increasing of milk production by about 96.6%. These results are in agreement with those of Quinn, 1980; Williamson 1981 and Beck et al., 1992. They reported that, the veterinarian visits was the highest effective pattern of veterinary management on milk production.

The total elasticity of this function was 11.84. That is 10% increase of the veterinary management resources caused increasing of milk production by about 118.40%.

Also, from Table (76) it caould be concluded that, the total elasticity of the function was 11.84 and it was higher than one, meaning that, the dairy farms acted in the first stage of the production for veterinary management resources in which the production increased by increasing percentages than those of veterinary managemental patterns (drug, vaccine, disinfectant and veterinarian visits) real value.

From the previous function and Table (76) we can conclude that the function was significant ($P < 0.01$) and the veterinary management patterns (drug, vaccine, disinfectant and veterinarian visits) costs (real value) explained about 20% of milk production variability.

XVII. SEPARATE EFFECTS OF (DRUGS, VACCINES, DISINFECTANTS, VETERINARIAN VISITS COSTS AND TOTAL VETERINARY MANAGEMENT COSTS) ON MILK PRODUCTION:

Each of the veterinary management costs (real value) was taken in simple regression equations, in the form of linear and logarithmic functions to determine the relationship between each resource and milk production. The best form of the function was the logarithmic function.

XVII.a. Effect of the drug on milk production:

Real value of of drugs, and milk production relationships explained by the logarithmic function, equation which took the form of:-

FUNCTION t	$\text{Log } Y = 3.04 \quad + \quad 3.01 \text{ Log } X_8$ $(497)^{**} \quad (28.458)^{**}$
F	$(28.458)^{**}$
R^{-2}	(0.173)

The equation was significant ($P < 0.01$), the drug explained about 17.3% of the changes in milk production.

It also shows that the elasticity of the drug real value was 3.01 meaning that, increasing of the drug real value by 10% caused increasing of milk production by about 30.1%. As elasticity of the drugs was (+ 3.01) higher than unity so that the dairy farms acted in the first stage of production for the drug (production increased by higher percentage than the increasing of drug real value). Drugs increased productivity and daily gain (Tretevich, 1989; Pfisterer, 1990; El-Kudsy, 1995 and Yussef 1995).

XVII.b. Effect of the vaccine on milk production:

Real value of the vaccine and milk production relationship, illustrated by equation.

FUNCTION t	$\text{Log } Y = 3.26 + 3.46 \text{ Log } X_9$ $(565.377)^{**} \quad (15.181)^{**}$
F	$(230.45)^{**}$
R^{-2}	(0.056)

The equation was significant ($P < 0.01$) and the vaccine real value explained about 5.6% from the changes in milk production. Also it showed that, the average elasticity of vaccines was +3.46. That is increasing of the vaccine real value by 10% causing increasing of milk production by about 34.6%.

Elasticity of the vaccines was +3.46 higher than unity meaning that the dairy farms acted in the first stage of production. Vaccines helped efficient treatment against different diseases and increased productivity and profitability of the dairy farms. These results agree with those of Vinokurove et al., 1975. They indicated that, each ruble spent on immunizing cattle with Trichophyton (TF-130) vaccine saved 44.2 rubles.

XVII.c. Effect of the disinfectant on milk production:

Real value of the disinfectant and milk production relationship, illustrated by equation.

FUNCTION	Log Y= 3.22 + 7.52 Log X_{10}
t	(982.304)** (5.217)**
F	(27.22)**
R^{-2}	(0.007)

It could be concluded that:-

The equation was significant ($P < 0.01$) and the disinfectant real value explained about 0.7% from the changes in milk production. Also it showed that, the average elasticity of disinfectant was (+7.52). That is increasing of the vaccine real value by about 10% caused increasing of milk production by, 75.27%. In which the disinfection help in the destruction of many microorganisms causing decreasing milk production quality and quantity. This results agreed with those of Beck et al., (1992), Bahout (1993), Miller and Bartlett (1993), Dudko et al., (1994), Kefford (1994) and Sarakby (1996). Where they reported that disinfectants and post milking teat dips is one of the most important variables affecting milk production quality and quantity. The total elasticity of the disinfectants (+ 7.52) and being higher than unity, the dairy farms acted in the first stage of production.

XVII.d. Effect of the veterinarian visits on milk production.

FUNCTION	Log Y= 3.16 + 2.36 Log X_{11}
t	(982.240)** (23.348)**
F	(545.11)**
R^{-2}	(0.123)

From this logarithmic function, we can conclude that:-

The equation was significant ($P < 0.01$) and the veterinarian visits real value explained about 12.3% from the changes in milk production. That the average elasticity of veterinarian visits was +2.36 means that increasing the veterinarian visits real value by 10% caused increasing of milk production by about 23.6%. The total elasticity of the function + 2.36 and being higher than one means that the dairy farms acted in the first stage of production for the veterinarian visits.

XVII.e. Effect of the total veterinary management on milk production:

The best forms of the functions which describe this relationship was the logarithmic production function which took the form of.

FUNCTION	$\text{Log } Y = 2.91 +$	$3.61 \text{ Log } X_{12}$
t	$(273.309)^{**}$	$(26.834)^{**}$
F	$(720.04)^{**}$	
R^{-2}	(0.157)	

This equation was significant ($P < 0.01$) and the total veterinary management described about 15.7% of the changes in milk production.

This function showed that the average elasticity of total veterinary management was +3.61 meaning that, increasing of the total veterinary managements real value by 10% caused increasing of milk production by about 36.1%. The total elasticity of the function + 3.61 was higher than one, so that, the dairy farms acted in the first stage of production for the total veterinary management. As the veterinary management had a great effect on milk production and resulted in increasing of milk production via increasing fertility, increasing productivity, improving herd life and controlling different diseases affecting milk production and thus increasing profit. These results are in agreement with those of Nikitin (1985), Antle and Goodger (1988), Howe (1988) and DeJonj (1994). Investment in veterinary management increased milk production and profit, which agreed with those of ATB (1984), Phatak and Whitemore (1991).

XVIII. MIXING THE VETERINARY RESOURCES (DRUG, VACCINE AND DISINFECTANT) TO DETERMINE THE BEST RESOURCE MIXTURE AFFECTING MILK PRODUCTION:

From the multiple regression equations done, the logarithmic production function was the efficient one.

XVIII.a. Mixing drug with the vaccine:

Logarithmic production function explained the effect of both drug and vaccine on milk production in the following equation.

FUNCTION t	$\text{Log } Y = 3.05 + 2.90 \text{ Log } X_8 + 4.22 \text{ Log } X_9$ $(291.982)^{**}$ $(23.451)^{**}$ $(1.691)^{**}$
F	$(406.54)^{**}$
R^{-2}	(0.173)

Table (77): Elasticity of independent variables (Drug and Vaccine) shared in the milk production function.

Code	Symbol	Variable	Elasticity
1	X_8	Drug value (Real value)	+ 2.90
2	X_9	Vaccine value (Real value)	+ 4.22
Total Elasticity			+ 7.12

From the previous equation and Table (77) it cauld be concluded that, the drug and vaccine real values explained about 17.3% from the variability of milk production. Drug elasticity was + 2.9, meaning that, increasing of the drug real value by 10% increased the milk production by about 29%. Average elasticity of vaccine was + 4.22 so that, increasing of the vaccine real value by 10% caused increasing of milk production by 42.2%. Total elasticity of the function was 7.12 and was higher than unity meaning that the milk production increased by increasing percentages than increasing of drug and vaccine real value. These results explained that the main resources of veterinary management were the drug and vaccine and they constituted about 60% of the total annual costs of diseases prevention. These results were in agreement with those of Salman et al., (1991 a and b). They reported that approximately 60% of total annual diseases prevention costs was attributed to purchase of vaccines and drugs which constituted about ($ 6.59/cow).

XVIII.b. Mixing drugs with vaccine and disinfectant:

As the main effective patterns against diseases were drug, vaccine and disinfectant, logarithmic functions was the best to explain the relationship between them and milk production the equation took the form:-

FUNCTION t	Log Y= 3.011 + 3.10 Log X_8 + 1.62 Log X_9 - 1.49 Log X_{10} (291.982)** (24.94)** (5.805)** (-9.120)**
F	(304.50)**
R^{-2}	(0.191)

Table (78): Elasticity of independent variable (Drug, Vaccine and Disinfectant) shared in the milk production function.

Code	Symbol	Variable	Elasticity
1	X_8	Drug value (Real value)	+ 3.10
2	X_9	Vaccine value (Real value)	+ 1.62
3	X_{10}	Disinfectant value (Real value)	- 1.49
Total Elasticity			+ 3.23

Previous equation and Table (78) Showed that:-

The equation was significant ($P< 0.01$), and about 19.1% of the changes that occured in milk production were attributed to drugs, vaccines and disinfectants. Average elasticity of drugs was (+ 3.10), meaning that, increasing real value of drugs by 10% increased the milk production by about 31%. Average elasticity of vaccines was + 1.62, so that increasing of the vaccine real value by about 10% causing increasing of milk production by 16.2% and the average elasticity of disinfectant was -1.49, meaning that, increasing of the disinfectant real value by about 10% causing decreasing of milk production by about 14.9%. The total elasticity of the function was +3.23 and it was higher than one, i.e. dairy farms acted in the first stage of production. Increasing of these resources together by 10% caused increasing of the production by about 32.3%.

IXX. Costs functions of milk production

IXX.A. THE TOTAL COSTS FUNCTION OF MILK PRODUCTION:

The total costs function of the milk production was made. The best function was the logarithmic cost function which took the form.

FUNCTION t	Log TC= 2.512 + 0.193 Log Y (44.998)** (11.107)**
F	(123.36671)**
R^{-2}	(0.0306)

Where (TC) refered to the total costs in Egyptian pounds (LE) and (Y) refers to total milk production (Kg). It was found that the function was significant ($P < 0.01$) and about 3.06% from the changes in milk production costs was attributed to the changes in milk production quality and quantity. Increasing of the milk production by about 10% causing increases of the total costs by about 1.93%.

IXX.B. THE TOTAL VARIABLE COSTS FUNCTION OF MILK PRODUCTION:

The relationship between the total variable costs and milk production was made. The best function was the logarithmic function which took the form.

FUNCTION t	Log TVC= 2.493 + 0.1779 Log Y (40.681)** (9.287)**
F	(86.24487)**
R^{-2}	(0.02154)

Where (TVC) referred to the total variable costs in Egyptian pounds (LE) and (Y) refers to total milk production (Kg). It was found that the function was significant ($P < 0.01$) and about 2.15% of the changes in variable costs of milk production were attributed to the changes in milk production quality and quantity. Increasing of the milk production by about 10% causing increases of the total variable costs by about 1.77%.

APPENDIX

I- Alternative production functions

1- **Logarithmic functions**: (First trial):

FUNCTION	$\log Y = 3.409 + 0.3312 \text{ Log } X_{15} + 0.0942 \text{ Log } X_{11} - 0.0894 \text{ Log } X_9 + 0.0984 \text{ Log } X_5 +$
t	$(22.23)^{**}$ $(4.522)^{**}$ $(6.374)^{**}$ $(-3.250)^{**}$ $(8.169)^{**}$
	$0.1534 \text{ Log } X_2 + 0.3992 \text{ Log } X_{14} - 0.1025 \text{ Log } X_{10} - 0.0685 \text{ Log } X_{17} - 0.1263 \text{ Log } X_3 +$
t	$(14.995)^{**}$ $(1.77)^{**}$ $(-6.534)^{**}$ $(-4.149)^{**}$ $(-8.548)^{**}$
	$0.0342 \text{ Log } X_1 - 0.0372 \text{ Log } X_{18} - 0.2555 \text{ Log } X_{16} - 0.8961 \text{ Log } X_{13} + 0.0999 \text{ Log } X_4 +$
t	$(4.685)^{**}$ $(-1.557)^{ns}$ $(-10.969)^{**}$ $(-3.006)^{**}$ $(6.625)^{**}$
	$0.1108 \text{ Log } X_8 + 0.5623 \text{ Log } X_{19}$
t	$(8.047)^{**}$ $(7.952)^{**}$
F	$(178.67643)^{**}$
R^{-2}	(0.42330)

Linear

FUNCTION	$Y = 1148.21 + 0.32 X_1 + 65.96 X_2 - 128.42 X_3 - 104.45 X_4 + 141 X_5$
t	$(30.99)^{**}$ $(15.53)^{**}$ $(199.06)^{**}$ $(209.97)^{**}$ $(44.44)^{**}$ $(166.65)^{**}$
	$-216.05 X^9 - 44.21 X_{10} - 34.66 X_{11} - 1033.91 X_{12} + 1078.40 X_{13} + 1071.07 X_{15}$
t	$(17.76)^{**}$ $(2.78)^{**}$ $(3.82)^{**}$ $(15.19)^{**}$ $(16.21)^{**}$ $(16.23)^{**}$
	$-141.34 X_{16} - 65.88 X_{17} - 47.17 X_{18} + 289.57 X_{19}$
t	$(83.62)^{**}$ $(19.83)^{**}$ $(5.29)^{**}$ $(42.71)^{**}$
F	$(228.18)^{**}$
R^{-2}	(0.4701)

Linear

FUNCTION	$Y = 1241.56 + 0.306\ X_1 + 66.61\ X_2 - 128.91\ X_3 - 101.39\ X_4 + 140.52\ X_5$
t	$(74.51)^{**}\ (14.20)^{**}\ (202.44)^{**}\ (213.78)^{**}\ (42.37)^{**}\ (168.17)^{**}$
	$- 230.39\ X_9 - 36.32\ X_{11} + 34.60\ X_{13} - 141.11\ X_{13} - 65.93\ X_{17} - 51.91 X_{18}$
t	$(22.53)^{**}\ (4.33)^{*}\ (15.39)^{**}\ (85.85)^{**}\ (21.39)^{**}\ (6.81)^{**}$
	$+ 291.72\ X_{19}$
t	$(43.21)^{**}$
F	$(282.5)^{**}$
R^{-2}	(0.4675)

Linear

FUNCTION	$Y = 1133.32 + 0.31\ X_1 + 65.33\ X_2 - 128.50\ X_3 - 103.55\ X_3 + 141.54\ X_4$
t	$(29.99)^{**}\ (15.07)^{**}\ (190.95)^{**}\ (210.21)^{**}\ (43.50)^{**}\ (166.54)^{**}$
	$+5.61\ X_8 - 222.18\ X_9 - 45.06\ X_{10} - 43.45\ X_{11} - 1031.86\ X_{13} + 1077.05\ X_{14}$
t	$(0.81)^{**}\ (18.46)^{*}\ (2.88)^{**}\ (4.61)^{**}\ (15.13)^{**}\ (16.17)^{**}$
	$+ 1069.13\ X_{15} - 140.92\ X_{16} - 65.94\ X_{17} - 48.26\ X_{18} + 292.70\ X_{19}$
t	$(16.17)^{**}\ (83.05)^{*}\ (19.61)^{**}\ (5.51)^{**}\ (43.37)^{**}$
F	$(213.96)^{**}$
R^{-2}	(0.4702)

Linear

FUNCTION	$Y = 1358.21 + 37.23\ X_{15} + 0.332\ X_1 - 59.46\ X_{17} - 287.26\ X_9 + 319.72\ X_{19}$
t	$(14.264)^{**}\ (3.731)^{**}\ (4.129)^{**}\ (-4.329)^{**}\ (-6.327)^{**}\ (7.581)^{**}$
	$+ 134.64\ X_{16} - 126.32\ X_3 + 133.88\ X_5 - 94.62\ X_4 + 67.86\ X_2$
t	$(-8.904)^{**}\ (-15.242)^{***}\ (13.164)^{**}\ (-6.191)^{**}\ (15.338)^{**}$
F	$(337.43762)^{**}$
R^{-2}	(0.46486)

Starch Equivelant (Second trial) 1

Linear

FUNCTION	$Y = 907.227 + 0.942\ X_1 + 0.0495\ X_6 + 7.33\ X_{12} - 735.50\ X_{13} + 775.11\ X_{14}$
t	(4.24)** (6.66)** (39.350)** (1.95)* (-2.63)** (2.750)**
	$+ 770.9\ X_{15} - 129.29\ X_{16} - 124.63\ X_{17} - 129.108\ X_{18} + 341.19\ X_{19}$
t	(2.754)** (-8.023)** (-8.266)** (-6.191)** (7.962)**
F	(268.49120)**
R^{-2}	(0.40851)

Digestable Protein (Second trial) 2

Linear

FUNCTION	$Y = 901.27 + 0.937\ X_1 + 0.221\ X_7 + 2.32\ X_{12} - 744.78\ X_{13} + 793.67\ X_{14}$
t	(4.238)** (6.66)** (39.945)** (0.617)ns (-2.678)** (2.828)**
	$+ 771.10\ X_{15} - 123.66\ X_{16} - 117.19\ X_{17} - 126.98\ X_{18} + 296.27\ X_{19}$
t	(2.767)** (-7.701)** (-7.86)** (-6.117)** (6.916)**
F	(274.20176)**
R^{-2}	(0.41363)

Digestable protein (Second trial) 2

Linear

FUNCTION	$Y = 941.57 + 0.940\ X_1 + 0.222\ X_7 - 749.83\ X_{13} + 796.89\ X_{14} + 776.93\ X_{15}$
t	(4.653)** (6.684)** (4.57)** (-2.698)** (2.841)** (2.790)**
	$- 124.06\ X_{16} - 118.83\ X_{17} - 128.02\ X_{18} + 293.007\ X_{19}$
t	(-7.734)** (-8.045)** (-6.188)** (6.893)**
F	(304.67)**
R^{2}	(0.41372)

2- Logarithmic functions: (First trial)

FUNCTION	$\text{Log } Y = 3.61 - 0.4253 \text{ Log } X_{12} + 0.2193 \text{ Log } X_{15} + 0.1747 \text{ Log } X_{11} + 0.0982 \text{ Log } X_{5} +$
t	(22.75)** (-5.123)** (5.385)** (7.894)** (8.186)**
	$0.1420 \text{ Log } X_{2} - 0.0659 \text{ Log } X_{10} - 0.0696 \text{ Log } X_{17} - 0.1415 \text{ Log } X_{3} - 0.0453 \text{ Log } X_{1} -$
t	(14.229)** (-3.543)** (-4.264)** (-9.603)** (6.243)**
	$0.0431 \text{ Log } X_{18} - 0.2471 \text{ Log } X_{16} - 0.4532 \text{ Log } X_{13} + 0.1036 \text{ Log } X_{4} + 0.3433 \text{ Log } X_{8} +$
t	(-1.820)** (-10.61)** (-3.00)** (6.870)** (7.073)**
	$0.5212 \text{ Log } X_{19}$
t	(7.626)**
F	(191.81374)**
R^{-2}	(0.42496)

FUNCTION	$\text{Log } Y = 3.59 - 0.34 \text{ Log } X_{12} + 0.27 \text{ Log } X_{15} + 0.16 \text{ Log } X_{11} - 0.043 \text{ Log } X_{9} +$
t	(22.24)** (-3.58)** (3.65)** (6.77)** (-1.426)^{ns}
	$0.098 \text{ Log } X_{5} + 0.146 \text{ Log } X_{2} + 0.1826 \text{ Log } X_{14} - 0.065 \text{ Log } X_{10} - 0.0682 \text{ Log } X_{17} +$
t	(8.141)** (14.135)** (0.784)^{ns} (-3.507)** (-4.132)**
	$- 0.1367 \text{ Log } X_{3} - 0.0417 \text{ Log } X_{1} - 0.041 \text{ Log } X_{18} - 0.2494 \text{ Log } X_{16} - 0.6774 \text{ Log } X_{13} +$
t	(-9.09)** (5.503)** (-1.738)* (-10.696)** (-2.230)**
	$0.1036 \text{ Log } X_{4} + 0.3013 \text{ Log } X_{8} + 0.5470 \text{ Log } X_{19}$
t	(6.866)** (5.491)** (7.733)**
F	(169.44013)**
R^{-2}	(0.4250)

Digestable protein (Second trial 2)

FUNCTION	$\text{Log } Y = 3.074 + 0.0079 \text{ Log } X_{1} + 0.188 \text{ Log } X_{7} + 0.02405 \text{ Log } X_{12} - 1.382 \text{ Log } X_{13} +$
t	(20.731)** (0.1817)^{ns} (39.870)** (-0.0824)** (-4.893)**
	$0.904 \text{ Log } X_{14} + 0.379 \text{ Log } X_{15} - 0.217 \text{ Log } X_{16} - 0.071 \text{ Log } X_{17} - 0.092 \text{ Log } X_{18} +$
t	(4.294)** (5.463)** (-9.962)** (-4.633)** (-4.105)**
	$0.388 \text{ Log } X_{19}$
t	(5.963)**
F	(328.32)
R^{-2}	0.45816

II- Alternative veterinary production functions

1- Linear functions:

FUNCTION	$Y = 1247.52 + 4.93\ X_8 + 2.69\ X_9 - 1.97\ X_{10} + 2.75\ X_{11} + 2.51\ X_{12}$
t	$(1137.25)^{**}\ (0.736)^{ns}\ (3.031)^{**}\ (-6.63)^{**}\ (0.398)^{ns}\ (0.379)^{ns}$
F	$(65.90)^{**}$
R^{-2}	(0.077)

FUNCTION	$Y = 1247.62 + 7.46\ X_8 + 2.94\ X_9 - 1.72\ X_{10} + 5.25\ X_{11}$
t	$(33.658)^{**}\ (9.66)^{**}\ (4.991)^{**}\ (-5.105)^{**}\ (2.407)^{**}$
F	$(82.36)^{**}$
R^{-2}	(0.078)

FUNCTION	$Y = 1365.68 + 9.37\ X_8$
t	$(16.371)^{**}\ (16.682)^{**}$
F	$(278.28)^{**}$
R^{-2}	(0.067)

FUNCTION	$Y = 1357.16 + 5.63\ X_9$
t	$(38.107)^{**}\ (10.729)^{**}$
F	$(115.11)^{**}$
R^{-2}	(0.029)

FUNCTION	$Y = 1716.18 + 6.61\ X_{10}$
t	$(90.43)^{**}\ (0.201)^{ns}$
F	$(0.04)^{ns}$
R^{-2}	(0.0001)

FUNCTION	$Y = 1401.95 + 2.08\ X_{11}$
t	$(51.641)^{**}$ $(12.857)^{**}$
F	$(165)^{**}$
R^{-2}	(0.041)

FUNCTION	$Y = 1290.90 + 36.70\ X_{12}$
t	$(45.075)^{**}$ $(16.365)^{**}$
F	$(267)^{**}$
R^{-2}	(0.064)

FUNCTION	$Y = 1252.22 + 8.25\ X_8 + 2.42\ X_9$
t	$(34.821)^{**}$ $(13.32)^{**}$ $(4.27)^{**}$
F	$(148.91)^{**}$
R^{-2}	(0.071)

FUNCTION	$Y = 1269.08 + 8.56\ X_8 + 3.13\ X_9 - 1.63\ X_{10}$
t	$(35.218)^{**}$ $(13.79)^{**}$ $(5.37)^{**}$ $(-4.867)^{**}$
F	$(107.75)^{**}$
R^{-2}	(0.076)

III- Alternative costs functions

1- Total costs (TC):
- Linear function:

FUNCTION	$TC = 967.91 + 0.355\ Y$
t	$(20.214)^{**}$ $(13.815)^{**}$
F	$(190.85)^{**}$
R^{-2}	(0.0467)

- Half logarithmic

FUNCTION	$C = -807.29 + 7.33\ Log\ Y$
t	$(10.182)^{**}$
F	$(103.68)^{**}$
R^{-2}	(0.026)

- Half logarithmic

FUNCTION	$Log\ C = 3.03 + 5.60\ Y$
t	$(11.81)^{**}$
F	$(139.59)^{**}$
R^{-2}	(0.035)

- Square roote

FUNCTION	$C = 780.75 + 1.86 \sqrt{Y}$
t	$(11.247)^{**}$
F	$(126.50)^{**}$
R^{-2}	(0.031)

- **Square roote**

FUNCTION t	C= 1720.69 + 6.002Y - 3.00 √Y (4.76)** (-2.90)**
F	(74.97)**
R^{-2}	0.037

- **Square roote**

FUNCTION t	C= 2307 + 1.38 - 7.10 Y^2 - 7.15 √Y (4.76)** (-2.90)** (-2.937)**
F	(51.20)**
R^{-2}	0.037

- **Quintic**

FUNCTION t	C=1475.61 - 2.99 + 2.23 Y^2 - 2.48Y^3 (-2.209)** (3.95)** (-3.58)**
F	(52.64)**
R^{-2}	0.039

2- Total variable costs (TVC):

FUNCTION t	TVC= 963.36 + 0.233 Y (25.758)** (11.626)**
F	(135.16)**
R^{-2}	(0.03348)

ENGLISH SUMMARY

ECONOMIC AND PRODUCTIVE EFFICIENCY OF VETERINARY MANAGEMENT IN DAIRY FARMS

Recently, milk production and milk industry found a greater concern in Egypt. Dairy farms intensified the veterinary management and services, so that, it is necessary to know the effect and the role played by veterinary management and drug costs as important resources of milk production.

The present study was carried out at the Animal Husbandry Department, Faculty of Veterinary Medicine, Alexandria University during 1994-1997. It included 3874 dairy records and 6 different breeds and buffaloes. Data of the period 1985 to 1996 were collected from the accurate records in three different sectors (farmers, private, and governmental farms) and five different localities (governorates).

The aim of this study summarized in the following items: First; to know the economic and productive efficiency of veterinary management in dairy farms. Second; determining the variables affecting milk production. Third; To determine the factors affecting returns, costs, and income of milk production. The present study revealed that the years, localities, sectors, and dairy breeds had significant effects on all milk production resources, amount of milk produced, price and return of milk. Also, significant effects extended to the economic and production efficiency of the veterinary management.

Effect of season/year:

Total ration costs had the range 229.2-1978.26 LE/cow/season. Total real and total cash values of veterinary management ranged on sequence from 3.05 to 9.78 and from 41.72 to 102.43 LE/cow/season. Total costs were from 728.88 to 2809.81 LE/cow/season. Total return was 952.17-3802.30 and net return was 535.46-1896.0 LE/cow/season. The rate of total return to total costs ranged from 80.96 to 239.57%, and the rate of net return to total costs had the range of 21.06-138.5%. Net return from a kilogram of milk related to the total costs was -51.7-129.83%. Price of a marketed kilogram of milk represented 58.14-165.63% of its cost. The costs of drugs, vaccines, disinfectants, veterinarian visits, and total veterinary services represented, respectively, 1.63-4.16, 0.23-0.82, 0.21-0.51, 0.74-1.52, and 3.54-3.67% as related to the total costs of milk production. A marketed kilogram of milk had, 1.5-7.72, 0.29-1.36, 0.10-1.01, 0.53-2.189, and 2.35-11.99 piasters as its cost share from the drugs, vaccines, disinfectants, veterinarian visits, and total veterinary services.

Effect of season/locality:

Total ration costs had the range 562.13-1781.98 LE/cow/season. Total real and total cash values of veterinary management ranged on sequence from 2.9 to 8.02 and from 56.78 to 136.44 LE/cow/season. Total costs were from 1304.5 to 3604.50 LE/cow/season. Total return was 1475.08 - 4578.75 and the net return was - 1231.0 to 3687.44 LE/cow/season. The rate of total return to the total costs ranged from 65.90-351.30 %. The rate of net return to total costs had the range of - 34.2-351.30 %. Net return from a kilogram milk in relation to the total costs was - 80.9-119.30 %. The price of a marketed kilogram of milk represented 53.60-263.40 % of its cost. The costs of drugs, vaccines, disinfectants, veterinarian visits, and total veterinary services represented, respectively, 0.6-10.73, 0.12-0.79, 0.23-1.01, 0.48-1.30 and 1.60-7.28 % as related to the total costs of milk production. A marketed kilogram of milk had, 1.38-4.23, 0.3-1.39, 0.21-1.27, 0.5-1.64 and 2.61-7.8 piasters as its cost share from the drugs, vaccines, disinfectants, veterinarian visits, and total veterinary services.

Effect of season/breed:

Total ration costs had the range 477.79-1843.03 LE/cow/season. Total real and total cash values of veterinary management ranged on sequence from 2.24 to 12.19 and from 56.52 to 225.0 LE/cow/season. Total costs were from 941.0 to 2179.98 LE/cow/season. Total return was - 438.0 -3143.0 and net return was 535.46-1896.0 LE/cow/season. The rate of total return to total costs ranged from 79.9 to 434.10 %. The rate of net return to the total costs ranged from - 20.1 to 334.10 %. Net return from a milk kg. related to the total costs was 54.9-93.70 %. The price of a marketed kilogram of milk represented 55.5-275.2 % of its cost. The costs of drugs, vaccines, disinfectants, veterinarian visits, and total veterinary services represented, respectively, 0.31-4.38, 0.04-0.90, 0.10-1.60, 0.14-1.98, and 2.46-12.39 % as related to the total costs of milk production. A marketed kilogram of milk had, 2.26-7.57, 0.20-1.61, 0.10-1.48, 0.70-2.20 and 3.68-9.41 piasters as its cost share from the drugs, vaccines, disinfectants, veterinarian visits, and total veterinary services.

Effect of season/sector:

Total ration costs had the range 951.67-1428.30 LE/cow/season. Total real and total cash values of veterinary management ranged on sequence from 3.04 to 7.73 and from 59.60 to 73.83 LE/cow/season. Total costs were from 1281.14 to 2240.43 LE/cow/season. Total return was 1559.72-3116.47 and net return was from -ve 104.31 to 1835.87 LE/cow/season. The rate of total return to the total costs ranged from 62.8 to 243.3 %. The rate of net return to the total costs had the range of -3.7-334.1%. Net return from a kilogram of milk related to the total costs was - 9.1-139.4 %. The price of a marketed kilogram of milk represented 53.0-135.7 % of its cost. Costs of drugs, vaccines, disinfectants, veterinarian visits, and total veterinary services represented, respectively, 1.57-3.52, 0.45-0.85, 0.31-0.59, 0.41-1.33, and 3.06-5.86 % as related to the total costs of milk production. A marketed kilogram of milk had, 2.2-5.92, 0.32-1.88, 0.20-2.69, 1.84-1.65, and 3.57-11.04 piasters as its cost share from the drugs, vaccines, disinfectants, veterinarian visits, and total veterinary services.

The milk production functions were determined in linear and logarithmic forms and the best forms of the functions were the logarithmic functions which describe the relationship between the milk production as the dependent variable and the variables affecting milk production as the independent variables. These functions indicated that the best variables affecting milk production are animal numbers, berseem, B. hay, tibn, concentrate, total energy of the feed, digestible protein of the feed, drug, vaccine, disinfectant, veterinarian visits costs and the total veterinary management costs, calving interval, gestation period, days open, dry period, services per conception, age at first service and the milking frequency.

The costs functions were determined which explain the relationship between the costs of production, either variable or total costs, as the dependent variable and the milk production as the independent variable.

It was concluded that although the veterinary services represented a small percentage in the costs of milk production they had greater effect on the success of any dairy project. Monofia governorate, winter season and farmers had the significant lead of milk production.

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الملخص العربى

الكفاءة الأقتصادية والأنتاجية للرعاية البيطرية فى مزارع انتاج الألبان

زاد الأهتمام أخيرا بانتاج وصناعة الألبان فى ج م ع وتم تكثيف الجهود للرعاية والخدمات البيطرية داخل مزارع انتاج الألبان. وعليه كان من الضرورى معرفة أثر كل من الرعاية البيطرية والتكلفة الدوائية كعنصرين أساسين من مدخلات انتاج الألبان.

أجريت هذه الدراسة فى قسم رعاية الحيوان-كلية الطب البيطرى-جامعة الأسكندرية فى الفترة من ١٩٩٤ -١٩٩٧ . شملت البيانات عدد ٣٨٧٤ سجلا لأنتاج الألبان ممثلين لستة سلالات بالأضافة الى الجاموس لفترة انتاج امتدت من ١٩٨٥ – ١٩٩٦ فى خمس محافظات (البحيرة-الأسكندرية-كفر الشيخ-الغربية-المنوفية) . تم تجميع البيانات من ثلاث قطاعات (المزارعين-مزارع القطاع الخاص-مزارع القطاع العام) من السجلات الدقيقة او عن طريق صحائف الأستبيان.

يتلخص هدف هذه الدراسة فى اولا: دراسة المتغيرات المؤثرة فىانتاج اللبن- ثانيا: دراسة العوامل المؤثرة على تكاليف و ايرادات و صافى العائد من الألبان المنتجة -ثالثا: تحديد مدى الكفاءة الأقتصادية والأنتاجية للرعاية البيطرية فى مزارع انتاج الألبان.

وخلصت الدراسة الى وجود التأثير المعنوى لكل من سنوات و مناطق وقطاعات الأنتاج وكذلك سلالة الأبقار على مدخلات انتاج الألبان ، كمية ، سعر و عوائد الألبان المباعة. كما وجد هذا التأثير المعنوى أيضا بالنسبة للرعاية البيطرية والتكلفة الدوائية وبالنسبة لكافة معايير الكفاءة الأقتصادية والأنتاجية.

- تأثير الموسم /سنة الأنتاج.

تراوح اجمالى تكلفة العلائق المستهلكة بين ٢٢٩,٢ و ١٩٧٨,٢٦ جنيه/حيوان. أما الرعاية البيطرية تراوح اجمالى قيمتها الحقيقية و النقدية على التوالى بين ٣,٠٥ و ٩,٧٨ وبين ٤١,٧٢ و ١٠٢,٤٣ جنيه/بقرة/موسم. أجمالى التكاليف فقد تراوح بين ٧٢٨,٨٨ و ٢٨٠٩,٨١ جنيه/بقرة/موسم. تراوح اجمالىالعائد بين ٩٥٢,١٧ الى ٣٨٠٢,٣٠ أما صافى العائد فكان بين - ٥٣٥,٤٦ و ١٨٩٦,٠ جنيه/بقرة/موسم.

تراوح معدل اجمالى العائد الى اجمالى التكاليف بين ٨٠,٩٦ الى ٢٣٩,٥٧٪ أما معدل صافى العائد الى اجمالى التكاليف فتراوح بين ٢١,٠٦ و ١٣٨,٥٪. كان صافى العائد من بيع كيلوجرام لبن الى

اجمالى التكاليف من – ٥١,٧ الى ١٢٩,٨٣٪ ونسبة سعر كيلو اللبن الى تكلفته كانت ٥٨,١٤ الى ١٦٥,٦٣ ٪.

بالنسبة للرعاية البيطرية والتكلفة الدوائية، كانت نسبة تكلفة الأدوية، التحصينات، المطهرات، زيارة الطبيب البيطرى و مجمل تكاليف الرعاية البيطرية الى اجمالى التكاليف ١,٦٣–٤,١٦ ، ٠,٢٣ – ٠,٨٢ ، ٠,٢١– ٠,٥١ ، ٠,٧٤– ١,٥٢ و ٣,٥٤ – ٣,٦٧ ٪ على التوالى. وكان نصيب كيلوجرام اللبن المباع من هذه العناصر بالتوالى ١,٥ – ٧,٧٢ ، ٠,٢٩ – ١,٣٦ ، ٠,١٠ – ١,٠١ ، ٠,٥٣ – ٢,١٨٩ و ٢,٣٥ – ١١,٩٩ قرشا.

– تأثيرالموسم /منطقة الأنتاج.

تراوح اجمالى تكلفة العلائق المستهلكة بين ٥٦٢,١٣–١٧٨١,٩٨ جنيه/حيوان. أما الرعاية البيطرية تراوح اجمالى قيمتها الحقيقية و النقدية على التوالى بين ٢,٩ و ٨,٠٢ وبين ٥٦.٧٨ و ١٣٦,٤٤ جنيه/بقرة/موسم. أجمالى التكاليف فقد تراوح بين١٣٠٤,٥ و ٣٦٠٤,٥٠ جنيه/بقرة/موسم. تراوح صافى العائد بين – ١٢٣١,٠ و٣٦٨٧,٤٤ جنيه/بقرة/موسم.

تراوح معدل اجمالى العائد الى اجمالى التكاليف بين ٦٥,٩٠ الى ٣٥١,٥ ٪ أما معدل صافى العائد الى اجمالى التكاليف فتراوح بين – ٣٤,٢ و ٣٥١,٣٠ ٪. كان صافى العائد من بيع كيلوجرام لبن الى اجمالى التكاليف من – ٨٠,٩ الى ١١٩,٣٠٪ و نسبة سعر كيلو اللبن الى تكلفته كانت ٥٣,٦٠ الى ٢٦٣,٤٠ ٪.

بالنسبة للرعاية البيطرية والتكلفة الدوائية، كانت نسبة تكلفة الأدوية، التحصينات، المطهرات، زيارة الطبيب البيطرى و مجمل تكاليف الرعاية البيطرية الى اجمالى التكاليف ٠,٦–١٠,٧٣ ، ١٢,٠ر – ٠,٧٩ ، ٠,٢٣– ١,٠١ ، ٠,٤٨– ١,٣٠ و ١,٦٠ – ٧,٢٨ ٪ على التوالى.كان نصيب كيلوجرام اللبن من هذه العناصر على التوالى ١,٣٨–٤,٢٣، ٠,٣–١,٣٩، ٠,٢١–١,٢٧، ٠,٥–١,٦٤ و ٢,٦١–٧,٨ قرشا.

– تأثيرالموسم /السلالة.

تراوح اجمالى تكلفة العلائق المستهلكة بين ٤٧٧,٧٩–١٨٤٣,٠٣ جنيه/حيوان. أما الرعاية البيطرية تراوح اجمالى قيمتها الحقيقية و النقدية على التوالى بين ٢,٢٤ و ١٢,١٩ وبين ٥٦,٥٢ و ٢٢٥,٠ جنيه/بقرة/موسم. أجمالى التكاليف فقد تراوح بين٩٤١,٠ و ٢١٧٩,٩٨ جنيه/بقرة/موسم. تراوح صافى العائد بين – ٤٣٨,٠ و٣١٤٣,٠ جنيه/بقرة/موسم.

تراوح معدل اجمالى العائد الى اجمالى التكاليف بين٧٩,٩ الى ٤٣٤,١٠ ٪ أما معدل صافى العائد الى اجمالى التكاليف فتراوح بين – ٢٠,١ و ٣٣٤,١٠ ٪ و ان صافى العائد من بيع كيلوجرام لبن

الى اجمالى التكاليف من ٥٤,٩ الى ٩٣,٧٠٪ و نسبة سعر كيلو اللبن الى تكلفته كانت ٥٥,٥ الى ٢٧٥,٢ ٪.

بالنسبة للرعاية البيطرية والتكلفة الدوائية، كانت نسبة تكلفة الأدوية، التحصينات، المطهرات، زيارة الطبيب البيطرى و مجمل تكاليف الرعاية البيطرية الى اجمالى التكاليف ٠,٣١-٤,٣٨، ٠,٠٤-٠,٩٠، ٠,١٠-١,٦٠، ٠,١٤-١,٩٨ و ٢,٤٦-١٢,٣٩٪ على التوالى. وكان نصيب كيلوجرام اللبن من هذه العناصر على التوالى ٢,٢٦-٧,٥٧، ٠,٢٠-١,٦١، ٠,١٠-١,٤٨، ٠,٧٠-٢,٢٠ و ٣,٦٨-٩,٤١ قرشا.

- تأثير الموسم /القطاع.

تراوح اجمالى تكلفة العلائق المستهلكة بين ٩٥١,٦٧-١٤٢٨,٣٠ جنيه/حيوان. أما الرعاية البيطرية تراوح اجمالى قيمتها الحقيقية و النقدية على التوالى بين ٣,٠٤ و ٧,٧٣ وبين ٥٩,٦٠ و ٧٣,٨٣ جنيه/بقرة/موسم. أجمالى التكاليف فقد تراوحت بين ١٢٨١,١٤ و ٢٢٤٠,٤٣ جنيه/بقرة/موسم. تراوح صافى العائد بين - ١٠٤,٣١ و ١٨٣٥,٨٧ جنيه/بقرة/موسم.

تراوح معدل اجمالى العائد الى اجمالى التكاليف بين ٦٢,٨ الى ٢٤٣,٣ ٪ أما معدل صافى العائد الى اجمالى التكاليف بين - ٣,٧ و ١٤٣,٣ ٪ و صافى العائد من كيلو اللبن الى اجمالى التكاليف كان بين - ٤٩,١ و ١٣٩,٤ ٪ أما نسبة سعر كيلو اللبن الى تكلفته كانت ٥٣,٠ الى ١٣٥,٧ ٪.

بالنسبة للرعاية البيطرية والتكلفة الدوائية، كانت نسبة تكلفة الأدوية، التحصينات، المطهرات، زيارة الطبيب البيطرى و مجمل تكاليف الرعاية البيطرية الى اجمالى التكاليف ١,٥٧-٣,٥٢، ٠,٤٥-٠,٨٥، ٠,٣١-٠,٥٩ ، ٠,٤١-١,٣٣ و ٣,٠٦-٥,٨٦ ٪ على التوالى. وكان نصيب كيلوجرام اللبن المباع من هذه العناصربالتوالى ٢,٢-٥,٩٤، ٠,٣٢-١,٨٨، ٠,٢٠-٢,٦٩، ١,٨٤-١,٦٥ و ٣,٥٧-١١,٠٤ قرشا.

تم تقدير الدوال الأنتاجية فى صورها الخطية و اللوغاريتمية. و قد وجد ان الدالة اللوغاريتمية هى افضل الدوال التى تشرح العلاقة بين انتاج اللبن كمتغير تابع و العوامل الأنتاجية كمتغيرات مستقلة. و اوضحت تلك الدوال ان افضل المتغيرات التى تؤثر على الأنتاج هى اعداد و كثافة الحيوانات و كميات البرسيم و الدريس و التبن و الأعلاف المركزة و كمية الطاقة و البروتين المهضوم فى العليقة و الأدوية و التحصينات و المطهرات و زيارات الدكتور البيطرى و اجمالى الرعاية البيطرية و الفترة بين ولادتين و طول فترة العشار و الفترة من الولادة حتى التلقيح المخصب و العمر عند اول تلقيح و عدد مرات الحليب.

كما تم تقدير دوال التكاليف فـى صورهـا الخطيـة و اللوغاريتميـة و النصـف لوغاريتميـة و الجذرية و التربيعية و التكعيبية و الأنية. و قد تبين ان افضل تلـك الـدوال هـى الدالـة اللوغاريتميـة التى توضح العلاقة بين التكاليف (كلية او متغيرة) كمتغير تابع و كمية اللبن كمتغير مستقل.

اوضحت النتائج انه بالرغم من ان الرعاية البيطرية احتلت نسـبة غـير كبـيرة فـى اجمـالى تكلفة انتاج اللبن فقد كان لها أكبر الأثر الموجب على كفاءة انتاج الابقار. احتفظت محافظة المنوفية بالمركز الأول فى الألبان و كذلك المزارعين وموسم الشتاء.

لجنـة الاشـــــــراف

الأستاذ الدكتور/ عبد اللطيف عطية القاق

استــاذ الأقتصـــاد الزراعـــى

كليـــة الزراعـــة

جامعة الأسكندرية

الأستاذ الدكتور/ خيرى محمد البيومى

استــاذ التربيـــة و الانتـــاج الحيـــوان

رئيس مجلس قسم رعاية الحيوان

كليـــة الطـب البيطـرى

جامعة الأسكندرية

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كليـــة الطـب البيطـرى

جامعة الأسكندرية

الكفاءة الاقتصادية و الانتاجية للرعاية البيطرية فى مزارع انتاج الألبان

رساله مقدمه

من

السيد ط.ب./سند طلعت عطاالله

بكالوريوس العلوم الطبية البيطرية لعام ١٩٩٠ م جامعة الأسكندرية

ماجستير العلوم الطبية البيطرية لعام ١٩٩٤ م جامعة الأسكندرية

للحصول على

درجة دكتوراه الفلسفة فى العلوم الطبية البيطرية

التربية و الانتاج الحيوانى

(اقتصاديات الانتاج الحيوانى و التسويق وادارة المزارع)

الى

كلية الطـــب البيـــطرى

جامعة الاسكندريه

١٩٩٧