A STUDY ON SOME REPRODUCTIVE AND PRODUCTIVE TRAITS OF KENANA× FRIESIAN CATTLE

BY

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DEDICATION

To my dear family
Father, mother, brothers,
sisters and husband

To my dear friend and
Colleagues

With love and respect

Faiha Osman Abdalwahed
بسم الله الرحمن الرحيم

الملحق رقم (3)

* إستمارة إعداد وثيقة المشروع

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CHAPTER ONE

INTRODUCTION

Sudan is the largest African country occupying an area estimated to be one million square miles, with great variation in climatic condition. Sudan has human population about 24 people according to 1993 census. Animal population was estimated to be 54.5 A.U according to FAO 1989 census which included 22.5 head of cattle, 18.5x10^6 head of sheep and 13.5 head of goat, but total Sudan cattle population in 2001 was 38.325 million head.

Sudanese cattle belong to the species Bos-indicus which includes humped cattle (Zebu) of Asia and Africa, Sudanese cattle are broadly classified into two breeds Nilotic cattle and North Sudan Zebu cattle.

Among cattle population in Sudan there are two important breeds Kenana and Butana which show considerable milk potentialities. They are relatively few in number 2.3 and 5 head of Kenana and Butana respectively as compared to the other cattle ecotypes in the country.

Consequently it is high time that the main gene pool of those superior breeds should be conserved from being diluted through unplanned crossing to exotic breeds.

Kenana Cattle homeland is located at triangular area bounded by Sennar, Singa, Roseiries and Kosti.

Early attempts of improvement of dairy cattle in Sudan started by grading – up of dairy cattle which was the early procedure used for pure poses of improvement of the local breed by introduction of foreign blood in the herd of the Army Veterinary Department. later known a Ghurashi Dairy Farm in 1907 another attempt was done in southern Sudan where five young
half–bred bulls (Friesian and Shorthorn) were dispatched in 1928 to up–
grade the local breeds but the trait failed, and a group of six young half–bred
bulls (five Friesian and one Shorthorn) were dispatched in the same to
inspectors in the Gezira scheme with the hope that, they may lead to an
improvement in the local breed (Sudan Veterinary Annual Report, 1928).
The objective of this study is to look into some of reproductive and
productive traits at Kenana× Friesian cross during three lactation, all period.
Traits include:

1- Age at first calving.
2- Calving interval.
3- Gestation period.
4- Service period.
5- Milk yield.
6- Lactation length.
7- Daily milk yield.
8- Dry period.
CHAPTER TWO

LITERATURE REVIEW

2.1 Factors Affecting Reproductive Traits: -.

2.1.1 Age at first calving:

The reproductive traits such as age of puberty, first oysters, fast insemination, age at first calving, calving interval, gestation period and conception rate are said to be very essential measures of female fertility, which determine the ability of Animate to give new offspring. Jansen (1985) found variable but antagonistic relation between female fertility and milk yield and attributed 28% of the disposals in Western Europe dairy cattle to fertility problems. Therefore, attention should be directed towards studying the problems associated with the female reproductive efficiency and the methods ascribed for its improvement. Gzulc and Zachwieja (1987) while working on Polish Black and White low-land herds, found that age at first calving was 27.5, 27.3 and 26.9 months. Galine and Arther (1989) stated that "in spite of the fact that there is considerable economic importance associated with factors that control the onset of the ovarian activity in tropical cattle, there has been surprisingly research Since fertility of the animal varies between breeds and among animals in the same breed, many scientists have carried researches in this respect in an attempt to see the genetic and environmental factors affecting it and to see how heritable this characteris. Sagebial et al (1974). Studied heterosis and breed effects in preweaning traits of Angus and Hereford breeds. They found that breed of sire, breed of
dam, sex of calf, year and age of dam have high significant effects (P<0.01) and there were no significant breed of sire effects for, birth date and calf survival. Arora and Sharma (1983) reported 609.67 days as age at first calving for Holstein Friesian in India which was significantly affected by season of calving. Singh and Dhillon (1983) found that the age at first calving of Buffaloes was significantly affected by year of calving and farm, accounting for 8.11 and 2.73% of the total variation. Mohadevan (1966) give age at first calving as 25.0±1.2 month for Holstein Friesian cattle in Egypt and reported non-significant difference for age at first calving between the first and second generation cows.

Mohadevan (1951) have pointed out the age at first calving in European cattle varied in the range of (27-33) months. Alberro (1983) reported 873±63 days for age at first calving of Frisian zebu heifers in India.

Also found that reflect of breed types highly significant. Mord and Akinkun (1981) when asuding the Fulani cattle performance in Nigeria found that the year of birth had significant (P<0.01) effect on age at first calving, this may be due to environmental factors influencing postnatal development of the new born calves in Sudanese cattle. Alim (1960,1962) reported 38.4 month for Kenana and 44 month Butana cattle respectively. Kalifa and shafei (1965) found 50.3 month of Butana and 42.9 month for Kenana respectively. Alim (1965) reported 43.8 months in the herd of university of Khartoum.

Alamin (1969) stated that by and early age at first calving the unproductive life of the cow is reduced and as well the generation interval is shortened, thus enabling earlier progeny testing.
In general the European cattle calve for the first time at an earlier age than the zebu cattle and when the temperate cattle were transferred to the tropics, their age at first calving showed an noticeable increase. Whereas in tropical cattle age at first calving was 3.50-4 years as cited by Mohadevan (1951) and confirmed by many scientists who came after. Alim (1965) gave 44.8 months for age at first calving of northern Sudan cattle. Fangaley (1980) reported 45 and 51 months as age at first calving for kenana and 43 for butane cattle in Sudan. In the university of Khartoum farm Danasoury and Bayoumi (1962) reported 42.9±8.9 months for age at first calving in northern Sudan cattle. While Elamin (1969) found that the age at first calving was significantly affected by the season of calving. Abdel Aziz (1994) found that the season at calving had no effect, but the year of calving had significant (p<0.05) effect on the age at first calving.

2.1.2 Calving Interval:-

Scientists have defined the calving interval in dairy cattle as "the period between any two consecutive calvings" and it should be 400 days for first lactation and one in the subsequent lactation, when revenue is to be considered as pointed out by Mahaevan (1951).

Aguilar (1981) gave 404.2 days as calving interval for Holstein Friesian, which significantly affected by year, month of calving and parity. Alberrow (1983) reported 371 ±111 and 421 ±126 days for calving interval of crossbred Friesian×Zebu cows and it is affected significantly by breed type.

In India, Arora and Sharma (1983) revealed that the calving interval of Holstein Friesian cattle was 422.27 days and was not
affected by season of calving. Gzulc and Zachwieja (1987) recorded 387.3, 368 and 386 days as calving interval for polish Black and White low land herds, respectively.

In East Africa indigenous cattle, Mahadevan (1966) gave 420, 362 and 382 days as calving interval of Naganda, East African Zebu, and Jiddu cattle respectively. Whereas in West Africa, Morade and Akinokum (1981) gave 421 days for calving interval of Fulani cattle in Nigeria, it is affected significantly (P<0.01) by season of birth and by age of the dam (P<0.05).

In Iraq Kasir et al. (1969) and Elbarbary et al. (1984) gave calving interval as 474.3 days and 14.7 months respectively. While Fayez et al. (1976) found it is 393 and 370 days for calving interval of imported and locally born Friesian in Iraq, respectively. Whereas Costa et al. (1982) showed that the calving interval of Holstein Friesian in Brazil was 406.5±4.2 days and was significantly affected by year of birth (P<0.05), but effect of the parity was found in significant.

In Egypt Mahadevan (1966) gave calving interval as 381.9±17.1 days.

In Northern Sudan cattle; Danasoury and Bayoumi (1962) reported calving of 414 and 416 days respectively. Alim (1962) gave calving interval for Butana cattle of Sudan as 416±91 days, with coefficient of variation as 22% and highly significant (P<0.01) between breed differences. Elamin (1969) reported a calving interval of 428±6.8 days, with an average coefficient of variation of 20.3% for herd of Kenana cattle breed kept at Umbenein livestock Experimental Station in Sudan. Kallafalla and Khalifa (1983)
obtained a calving interval of 438±7 days, longer in winter calvers, shorter in dry summer calvers, and intermediate in wet summer, but differences between means were not significant. Fangaley (1980) reported 412 and 373 days as calving intervals for Kenana and Butana cattle respectively. Fadl-Elmoula, A. A. (1994) suggested that the period of calving had an effect on calving interval.

2.1-3 Service period

It is a trait denoting the time from calving to the next fertile service. Constancy of service period at the optimum level indicates regularity and stability of the reproductive status of the animal especially the oestrous cycle. Several researches had been conducted to estimate the mean of service period. Bhatangar et al. (1982) obtained 139.6±6.8 days as mean service period for Tharparkar Cattle in India. They also suggested that period of calving significantly (p<0.05) affected that service period, while month of calving, dam's parity, and difference among sires did not (p>0.05). The age at first calving however had significantly (p<0.05) affected the trait.

Meanwhile, Basu et al. (1983) reported 150.36±96.91 and 145.79±96.32 days as overall mean for second and third service period for the same herd with the coefficient of variation being 64.45% and 66.07% respectively. Abdel Aziz (1994) also found that the trait was significantly (p<0.05) affected by period of calving. Osman (1972) estimated the mean service period of Sudanese indigenous cattle as 153.3 days. He reported that lactation number, season, and year of calving had significant (p<0.01) effects on service period.
Crossbreeding had been shown to influence length of service period. Patel et al. (1989) obtained mean service period of Kankrej and their F1 and F2 crosses with Jersey in India as 216.60±121.10, 109.67±7.8, and 98.82±11.51 days respectively. And percentage heritress of 19.79%.

However, Singh and Tomar (1991) found that the mean service period of Karan Fries Cows was 120±2.0 days, they also stated that the first calves had longer service period and showed decreasing trend along parity, and the trait was significantly (p<0.01) affected by season and period of calving.

For the temperate breed, Cabelo and Ruiz (1980) found mean service period of Holstein–Frisian Cows in Mexico to be 134±18.7 days. El-Barbary et al. (1983) showed that the mean service period of Frisian cattle in Iraq was 145.65±84.17 days.

2.1-4 Number of services Per Conception" NSPC"

This is one of breeding efficiency measures. The term was defined by Esslemont et al. (1985) as the total number of the service given to group of cows over defined period divided by the number of service, which results in diagnosed pregnancy not less than 42 days after services, with the services to culled cows should be included.

El–Amin (1969) reported 1.5±1.03 as means NSPC for Sudanese indigenous dairy cattle at University of Khartoum Farm. While Osman (1972) obtained 1.25 as mean NSPC for Sudanese indigenous cows at Ghazal Gawazat Station.

Kaushik et al. (1979) stated the reproductive efficiency of Zebu–temperate crossbred heifers in India. They found that the overall mean NSPC was 2. Abdel Aziz (1994) stated the effect of year of
calving and lactation number were not significant (p>0.05); however, season of the calving had significant (p>0.01) effect on NSPC. Osman and Russell (1974) reported that the overall mean number of service per second, third, fourth, and fifth conceptions of European–Zebu crossbred cows at Ghurashi dairy farm were 1.8 ± 0.06, 2.0 ±0.06, 2.0 ±0.06 and 2.1±0.07 respectively. They stated that only the period of calving had significant effect of the NSPC of Frisian cattle under Kuwait Conditions as 2.23±0.28, they also revealed that the source of animal importation and year to year variation had significant (p<0.01) effect on NSPC, but month of calving did not affect the trait 17±0.19 and the mean NSPC of breed groups; Viz1/2 Frisian x 1/2 Haryana, 1/2 Brown–Swiss x 1/2 Haryana, and 1/2 Jersey x 1/2 Haryana were 1.87± 0.24, 3.44 ±0.25, and 2.21±0.29 respectively. Variation in services per conception due to the genetic groups was not significant (p>0.05), but was significant (p<0.05) due to year of season of calving.

In Ethiopia Swensson et al . (1981) showed that the mean NSPC of Arussi breed raised at two lactation, Viz Gobe and Asella were 2.38±1.39 and 2.56±1.93 respectively. Abdel Aziz (1989) stated that the season of calving markedly affected the trait. Bhatnagar et al. (1982) estimated the overall mean NSPC of Tharparker cows in India as 1.6±0.08. The period of calving had significant (p>0.05) effect on NSPC, while month of calving, dam's parity, and difference among sires were non–significant (p>0.05).

2.1-5Gestation Period

It is the period extending from the date of conception to that of delivery. At optimum service period, gestation period was shown to
keep the regularity of inter–calving period, hence the economical and breeding efficiency of dairy cow. Osman (1972) found that the mean gestation length of Sudanese cattle at Ghazal Gawazat to be 287.2 days. Abdel Aziz (1994) stated that male conceiving cows was significantly (p<0.01) longer by 2.7 days than female conceiving cows. However both lactation number and year at calving had non–significant (p>0.05) effect on gestation period, whereas the season at calving had significant effect. On other hand, Swensson et al. (1981) reviewed the reproductive performance of Arussi Zebu breed of Ethiopia. They found that gestation period were 276.2±6.1 and 276.1±6.7 days for Gobe and Asella Station respectively, while mean gestation period of Jersey and Frisian x Arussi heifers were 275.3±6.1 and 275 .2±6.5 days respectively at Asella Station. Patel et al. (1983) estimated mean gestation period of Jersey x Kunkrej cows in India be 282.29 and 279.20 days for male and female delivery, and that of Holstein–Frisian x Kankrej were 281.90 and 278.27 days for males and females respectively. They also found that the effect of sex was significant (p<0.05) in both groups.

For the European breed, Younis (1976) showed that the mean gestation length of Frisian herd at Kuwait was 272.3±0.92 days, source of cows, year of calving, gestation period, and age at first calving had no significance on the trait, but the period and month of calving had significant (p<0.05) effect on gestation period. Costa et al. (1982) obtained mean gestation period of Holstein-Frisian in Brazil as 276.1±0.73 days and was significant (p<0.05) affected by season and sex of calf. However, Berglund and Philipsson (1987) reported that
breed, parity, and sex of the calf were significant (p<0.001) in their influence on gestation period of Swedish Frisian.

2.2 Factors Affecting on Production Treats:-

2.2-1 Factors Affecting Milk Production Traits:-

Milk production varies according to lactation length, stage of lactation number (parity). Reports (1956) {cited by Mahadevan 1966} obtained lactation durations for some European dairy cattle breeds as follows:-

Aberdeen Angus 273-282 days.
Ayrshire 277-278 days.
Jersey 277-280 days.
Holstein 278-282 days.
Shorthorn 281- 284 days.
Guerensey 282-285 days.
Hereford 283-286 days.
Brown Swiss 288-291 days.

For Simmentals Buchsteiner (1980) when studying the environmental factors affecting milk yield, found that years, season, parity and age had highly significant effects on lactation milk yield.

Effects of parity increase with the increase in herd production level .Stansin et al .(1983) working with Rumanian Simmentals observed that the lowest milk yields were for cows calving at less than two years and highest occurs in cows calving at (7.7-8.6 years ) . This indicates that age of milk in cow is very important factor in the production process, as it is connected with the development of mammary, and milk secreting glands.
For German Brown, Austerian Brown and SwissBrown Ulusan (1986) found that milk yield and lactation length were significantly affected by season of calving. Similarly (Pereira and Parased; 1987 Zuber, 1987) reported significant effect for season of calving on milk yield. Moon et al. (1984) working with Holstein Friesian, recorded significant effect for parity on lactation milk yield and highly significant effect of season. Reis and Silva (1987) collected data on 5200 lactations of Holstein Friesian and cross breed cow of 2.11 years of age, they found that all yields were significantly affected by sire, age of cow and years (P<0.01) and milk yield was affected by month of calving (P<0.05), milk increased with the increasing age of cow up to 10 years. Bhutia, Pandey and Singh (1987) studied factors affecting early components of lactation in dairy cattle, such as initial yield, peak yield and days of attain this peak, using the method of fitting constants outlined by Harry (1975). Period were delineated into years and years into three conventional season according to climatic conditions. They found that the first lactation milk yield was significantly influenced by genetic group only, where as all genetic and non genetic factors affected only the pooled date (over four lactation). Further the Duncan Multiple Range Test indicated non significant differences among the genetic groups revealing a little additional advantage in increasing Friesian inheritance above 50% level. The effects of season, period and regression of initial yield on age at first calving were not significant in first lactation. Season influenced pooled lactations significantly indicating (Nov-Feb) as the best season and (July-Oct) as the worst for initial Yield. The maximum initial yield was obtained in 3rd-4th lactation, and lowest in
first. Days to attain peak were not influenced by genetic and non genetic factor. However, pooled lactation and period effects were highly significant.

Capriles et al. (1984) while working on cross bred Holstein Friesian and Venezuelan Griollo and Brown Swiss, reported insignificant differences between year and lactation milk yield.

For Hurrah Buffaloes, Barbosa et al. (1987) using the Least Squares Analysis, found that lactation milk yield was significantly affected by sire, month of calving (P<0.01) and year of calving (P<0.05) but differences between lactation were not significant.

Khan et al (1984) reported that month of calving had an insignificant effect on lactation milk yield of Hurrah Buffaloes in India.

Asker et al. (1958) found that the Indian cows attain their maximum yield at 6.7 years of age, giving lactation milk yield as 3399lb, lactation duration as 419 days. Pandey et al. (1987) from their studies on the crosses between the Heriana Xexotic breeds (Friesian, Jersey and Brown Swiss) gave an average lactation milk yield as 2028.5±119.1 Kg and lactation duration as 302.8±8.5 days and reported a non significant breed type effect, whereas effect of season of calving on milk yield was significant.

In Sudan, Osman and Russel (1974) when studying the European breeds which were transferred to the Sudan and their cross with the Zebu breeds, gave 2906±159 liters in a period of 110±5 weeks and 1594.9±327 in 276±5 days respectively by cross bred and indigenous cattle and attributed the cause of low yield to the unfavorable
environmental conditions of the climate, low standard of animal husbandry as well as the low genetic potential of the indigenous stock. To solve the problem of thus low genetic potential of the indigenous dairy cattle breeds in the tropics, a deliberate effect should be exerted in crossing them with the most outstanding exotic dairy cattle breeds, after prolonged period of the selective breeding within the digenous stock.

In Gezira Research Farm, Hattersley (1951) reported a mean yield per lactation as 1208.9Kg or 5.3 kg/day and lactation length as 227days, using 214 records. Fangaley (1980) reported an average milk yield per lactation as 1358 and 763Kg at Umbenein and El-Nisheishiba Experimental Station respectively and 1527Kg for Butana cattle at Atbara Research Station. Also he obtained on average lactation length as 222,198 and 240 days for the three stations, respectively.

For Butana cattle, Alim (1962) gave on average milk yield of 3126Ib per lactation. Danasoury and Bayoumi (1962) obtained 442 gallons of milk per lactation for the University of Khartoum herd. For the same herd El Amin (1969) reported lactation duration of 294 days and 4599Ib as an average 305 days milk yield and stated that month of calving and age at first calving did not influence milk of the first lactation as the age of maximum production.

Beside the above reviewed factors, stresses in the farm of high ambient temperature, high humidity and erratic or inadequate rainfall detrimentally affects the productivity detrimentally affects the productivity of dairy cattle (Mc Dowell, 1983 and Ansel, 1985). Also, low fodder yield potential, high prices for concentrates and
susceptibility to wide variety of serious diseases, were shown to add to the problem (Nagarcenkar, 1982; Shinde and Taneja, 1986).

Generally, intrinsic production is physiologically antagonistic to heat tolerance, survival and tolerance to parasites (Frisch and Vercoe, 1977)

2.2-2 Lactation Length

This refers to the time spent to produce a quantity of milk, the standard unit of measuring the lactation length has been taken as 305 days, which corresponds with the reproductive cycle of a cow.

Alim (1960) reveal that mean lactation length of Kenana cattle of Sudan in Wad Madani was 224±85 days. However Alim (1962) in another experiment estimated mean lactation length of Butana cattle in Atbara as 253±85 days, However Osman and El–Amin (1971) reported mean lactation length of the Northern Sudan Zebu at University of Khartoum Farm as 294 days. Osman (1972) stated that the mean lactation length of Sudanese cattle at Ghazal Gawazat was 272.05±4.28 days. Abdel Aziz (1994) concluded that both season at calving and lactation number were not significant (p>0.05) but year at calving significantly (p<0.01) affected lactation length.

In India Misra et al. (1980) reported mean lactation length of Haryona cattle in three farms as 272.5±4.28 days, and the effect of farms and sires were not significant (p>0.05). Singh and Raut (1980) reported longer lactation length which were 371±7.18 and 431±9.59 days for non – descript and Rathi India cows under village conditions respectively. Abdel Aziz (1994) stated that the changes with respect to lactation length for different orders of lactation was not – significant for both non – descript and Rathi cow. Gondhi and Guranani (1990)
found that mean lactation period of Sahiwal cows was 345.38±4.49 days.

Several researchers investigated the effect of cross breeding on lactation length. Sharma et al. (1982) estimated the overall mean first lactation length of Sahiwal crossbred with Friesian as 292.40±4.27 days. They stated that the length increased with increased with increase Friesian inheritance up to 5/8. While Madalena et al. (1983) calculated mean lactation period for Holstesian – Friesian 7/8, Holstein – Frisian x 1/8 Gir and 3/4 Holstein–Frisian x 1/4 Gir cows in Brazil as 318±18, 301±15, and 305±14 days respectively. They concluded that genotype and parity had no significant effect on lactation length.

In Sudan, Sid Ahmed (1986) found mean lactation length in Sudanese x European cattle at Ghurashi dairy farm as 45.77±0.69 weeks, and that trait was significantly (p<0.01) affected by year and lactation number. Singh and Tomar (1991) showed that the mean lactation length of Karan Fries cows was 275±3 days and the trait was significantly (p<0.01) affected by parity number and season. Mohamoud (1998) reported that the mean lactation length for Friesian cattle was found to be 241±0.5 days and 236±0.4 days for unequal and equal data respectively.

Lactation length of the exotic breed in tropics was investigated by Menzi et al. (1982) who compared the performance of Brown–Swiss under India environment. They revealed that the mean lactation length of import I, II and locally born herds were 386, 415 and 349 days respectively, while in the second lactation the results were 371, 377 and 402 days respectively. On other hand, El–Barbary et al.
(1983) who studied that the economic characteristics of Friesian cattle in Iraq reported 316.92±97.54 days as mean lactation length. However, Mhap and Ngere (1989) obtained mean lactation length of Friesian cows in Nigeria as 292 days, and that period was significantly affected by the year of calving (p<0.01) and parity (p<0.05).

In Venezuela Torres et al. (1992) revealed that lactation length averaged 363.7±66.9, 345±73.1 and 292±62 days for Holstein, Brown Swiss and Brahman respectively. Elsamani (2000) also showed that this trait was not affected significantly by season of calving but by methods of milking in the presence or absence of their calves. In Iran Khah et al. (1992) reported that the average lactation length for Sarabi cattle was found to be 163.1 days.

Tuneja et al. (1992) noted that the first lactation length for Pure bred Jersey and Holstein – Friesian in India were 350±89 and 279±81.8 days, while the mean lactation length was 344±109.3 and 320±98.3 days respectively.

Murdia et al. (1992) showed that the lactation length for Holstein heifers was 300 days, they also found that season of calving had significantly affected lactation length. Alim et al. (1992) revealed that lactation length of Egyptian cattle was found to be 260.7 days.

Elhabeeb (1986) stated that the average lactation length of village herd was 6.66 month. Ribas et al. (1984) studied the lactation length in dairy type Holstein–Friesian herds, and found 306.5±1.8 day as average lactation length, Elsamani (2000) also stated that season of calving had significant effect on lactation length and cows calving in summer and autumn had longer lactation length than those calving in winter 308.7±2.2 vs 303±2.1 days.
Ibrahim (1983) noted that average lengths of Friesian cattle in Dairy Land Farm in the first three lactations were 297.8, 266.8 and 240.3 days respectively. He also stated that there were no significant differences between age at first calving and lactation length.

In Netherland Brand Dsma (1983) studied the differences between farm with stalls and those for group housing, he found that the lactation lengths for a groups housing and farm with individual boxes were 305 and 317 days respectively. In India Barthat et al. (1980) reported that the lactation length of Nogore herd was found to be 280.4 days. Fangaly (1980) revealed that lactation length of Kenana cattle at Umbenein and Nesheshiba were 222.7±90.86 and 198±120.8 days respectively, while lactation length of Butana at Atbara Station was 240.3±120.15 days. He also found that there were highly significant differences between lactation length and parity number.

In India Misra (1980) reported that lactation length of Haryana cattle was found to be 272.05 days. On the other hand, Bastu et al. (1979) stated that lactation length of Indian dairy breed was found to be 305 days, they also noted that lactation length was significantly affected by parity number, while breed, month and year of calving had no influence on this trait.

Lactation length of cross bred dairy cattle has been studied by many researchers. In India Singh et al. (1992) reported that lactation length for Tharparkar x Holstein–Friesian crossbred was 321.11±9.47 days. Madalena et al. (1990) noticed that lactation length for Holstein Friesian crossed by Guzera in Brazil for 1/4, 1/2, 5/8 and 3/4 foreign bloods were 221±16, 305±18, 191±19, and 329±20 respectively.
Chopra et al. (1992) stated that the first lactation of half bred cows from crossing Haryana with Holstein Friesian, Brown Swiss and Jersey cows were 344.4, 326.5 and 333 days respectively. Fadel Elmoula (1989) revealed that lactation length was affected by the percentage foreign blood, and cows with 37.5%, 50% and 62.5% foreign blood were similar in lactation length and significantly different when compared to those of 25% foreign blood.

In Mexico Becerri et al. (1983) stated that for Holstein–Friesian and Brown Swiss, lactation length was 296±8 and 290±7 days respectively. While for Holstein–Friesian x Zebu and Brown Swiss x Zebu crossbred, lactation length averaged 214 and 137 days respectively. They also reported that lactation length was highly correlated with milk yield.

In Venezuela Perozo et al. (1983) reported that the overall lactation length of pure bred and crossbred Crillo cows was 280 days. They also noted that lactation length was significantly affected by years, breed type and parity number, however, it had an influence on milk yield. Lalli et al. (1982) reported that lactation length was 318.2±11 days for pure bred Sindhi cows and 328±6.5 days for crossbred Sindhi x Jersey. Prozy et al. (1982) revealed that for Ankole, Ankole x Sahiwal (F1) and Ankole x Sahiwal (F1 – F4) heifers lactation length averaged 255, 246.2 and 270 days respectively.

2.2-3 Milk Yield

Milk yield is the most important in dairy economy. Grit efforts have been made to improve this trait. Alim (1962) studying the production record of Butana cows at Atbara, showed that the mean
milk yield was 3129±1709 pounds in 253 days. Abdel Aziz (1994) stated that month of calving and age of cows in lactation showed no difference in milk yield, and milk yield showed only slight increase after the first lactation. However, peak production was reached at 3rd lactation. In comparison, Osman and El Amin (1971) estimated mean 305 day milk yield of Northern Sudan Zebu cattle as 2088 kg.40% c.v. Abdel Aziz (1994) found that the lactation number had significant effect on the trait.

Misra et al. (1980) studied the economic characters of Haryana cattle kept in three farms. They obtained an overall mean production of 921.92±24.51 kg. Taneja et al. (1982) showed means of first lactation milk yield, milk yield per day of first calving interval, second lactation, milk yield, milk yield per day of first calving interval of Tharparkar cattle were 2377.1±7.20, 5.23, 2392.2, 7.68 and 5.53 kg respectively. However, Gondhi and Gurnani (1990) showed that the mean first lactation total milk yield of Shahiwal cows was 2352.39±38.64 kg. the trait was found to be significantly (p<0.01) affected by first lactation length and first calving interval.

Sid Ahmed (1986) obtained mean lactation yield of crossbred cows in Sudan as 514.66±9.30 imperial gallon. Abdel Aziz (1994) also stated that percentage of foreign blood, year of birth and lactation number significantly (p<0.01) affected the trait. While Ali et al (1988) found that the lactation yield was significantly (p<0.01) affected by percent Friesian blood in crossbred cows in Sudan, and the mean lactation yield were 4306,5733 and 4136 pounds for 50%, 62.5% and 75%crossbred respectively.
In other tropical countries Nagarcekar and Rao (1983) found that the mean yield of Tharparkar dams mated to Friesian bulls of USA, New Zealand, British and Indian origin were 3340, 4091, 3353 and 4236 kg respectively. On other hand, Perez–Beato and Granado (1983) showed that milk yield was significantly (p<0.01) affected by season of calving but not year of calving, while sire of calf, parity and herd had significantly (p<0.05) affected by milk yield of Holstein – Friesian x Gabon Zebu cows. In Ivory Costa, Letenneur (1983) obtained first lactation yield of N'dama cows crossed with Jersey as 1175 kg for half – bred animals and 1332 kg for 3/4 bred animals in period of 256 and 287 days respectively. Patel and Trived (1988) revealed that the mean lactation yield of 305 days for Jersey and Kankrej half bred cows was 2798.33 kg in India; they also found that the effect of season of calving on milk yield was non–significant.

The performance of the imported exotic breeds in tropics was investigated by several researchers. Costa et al (1982) obtained mean 305 day of Holstein cows in Barazial as 3935.9±32 kg. The trait was significantly affected by year, season of calving and age of the cow. In Iraq, El–Barbary (1983) showed that the mean milk yield per lactation of Friesian cattle was 2754.39±1124.35 kg. In Nigeria, Mbp and Ngere (1989) found that the overall mean lactation yield and yield per day of Friesian cows to be 2893 kg and 9.9 kg respectively. They also revealed that the effect of parity number on lactation yield and yield per day was significant, but the effect of season of calving on both trait was not significant. In Fiji McInyre (1971) found that the milk yield of Friesian and Jersey cattle were 2964 and 2320 kg respectively. Abdel Aziz (1994) stated that the effects of year of
calving and parity on lactation were significant (p<0.01) and (p<0.05) respectively.

In comparison Abdel Magid (1987) studied the dairy husbandry practices at Kuku dairy projects, he showed that the dairy milk yield for local breed of cows was 5.6 kg. Elsamani (2000) stated that there was highly significant differences between milk yield and year of calving (p<0.01) but the month of calving and age of cows did not affect the milk yield significantly.

Fangaly (1980) reported that the 305 days milk yield for Kenana cows at Umbehein and Neshesshiba Station were 1872.5 and 1367.13 kg respectively, while for Butana cows at Atbra Station the milk yield was 2254.2 kg. Bayoumi and Danasoury (1963) revealed that the average milk production for Sudanese dairy cows was 442.2 gallons with C.V. of 32%. Habeeballa (1996) reported that the daily milk yield for Kenana and Butana cattle were 7.4 and 5.0 kg respectively. He also affirmed that the milk yield was highest when the cows were in their sixth lactation and the lowest yield obtained when the cows were at their first lactation. Elhabeeb (1986) noted that the daily milk yield for Kenana cattle in a village herd averaged 3.65±1.1 kg.

The Indian researchers have considerably studied performance of Zebu cattle in the Tropics. Sukht et al. (1961) reported that the overall average milk yield of Hariana cows was 2223.9±30.7 pound. While Gandahi and Gurnani (1993) reported 2555.35, 7384±117.93 and 10793±135.83 kg milk yield for Sahiwal cows with parity number of 5, 8 and 10 respectively. Barthat and Chowdhary (1982) working on Nogori cows, showed that the 305 day milk yield average 905.2 liters. In Pakistan Dhangar et al. (1991) reported that the lactation milk yield
averaged 2630±4.03 kg with C.V. of 2.67%. In Egypt Alim (1992) estimated the lactation milk yield for Egyptian cattle as 380.4 gallons. Elsamani (2000) also stated that parity number had no significant effect on milk yield and highest milk yield being from cows in the 3rd parity, season had also significant effects in lactation yield, cows calving in November – December had highest yield.

Cross breeding of the native stock to European breed is the most important tool in the hands of the animal breeders to enhance milk production potentiality of our indigenous breeds. According to Ibrahim (1983) the first lactation yield for 62.5% foreign blood was found to be 2598.3 kg and the average milk yield of the cross 25%, 37.5%, 50% and 75% foreign blood were 2292, 2324, 2347 and 2457 kg respectively. Moreover, Mohammed (1987) stated that the average daily milk yield of the different Friesian blood percentage 25%, 37.5% and 50% or more were 8.5, 7.9 and 11.7 kg respectively. Hassan (1988) studied the yield and composition of milk of grade cows on the University Farm, showed that there were no significant differences in dairy milk yield for the cows with more than 50% foreign blood when compared with those with less than 50% foreign blood.

Elfaki (1988) revealed that cows with more than 50% foreign blood gave significantly higher (p<0.05) daily milk yield (21.7 Ib) as compared with less than 50% foreign blood which gave 20.3 Ib/day. Fawi (1994) reported that the average total milk yield was found to be 6485, 6549, 7409 and 6969 Ib for the early summer, late summer, early winter and late winter respectively, for cross breed cows at University of Khartoum Farm.
In India Prem et al. (1978) studied the performance of different grades of crosses of Sahiwal with Friesian, found that the overall average milk yield of first lactation was 1971 kg; they also stated that the lactation yield increases with increase of exotic blood up to 65% and decreases thereafter. In comparison Dhillon and Jain (1977) found that the average daily milk yield of Sahiwal and Holstein – Friesian Sahiwal crossbred were 5.72 and 4.52 kg respectively. Rao and Nagracenkar (1978) reported that the mean milk yield of different grades of Friesian crossbreds (1/4, 1/2, 5/8 and 3/4 were 1992.2, 2869.6, 2668.2 and 2752 kg respectively). Whereas Bhatangar et al. (1982) revealed that the total lactation yield for Brown Swiss x Sahiwal was 3259 kg and was higher than the yield of Sahiwal which recorded 1836 kg. Elsamani (2000) also noted that the first lactation yield was significantly affected by genetic groups and month of calving. Yeoticcar and Despande (1990) showed that the overall mean lactation yield of crossbred cows was 2159.6±10.32 kg. Elsamani (2000) also found that the level of exotic inheritance had no significant influence on milk yield. Manadakmal and Kale (1990) analyzed the records of the crosses of the Gir with Jersey, Holstein and Brown Swiss and they found that Holstein x Gir animal had the highest milk yield (3658) and 1/2 Brown Swiss–1/4 Holstein–1/4 Gir had the lowest (2477 kg). They also stated that parity, month and year of calving had a significant effect on milk yield.

Sethi et al. (1961) examined the performance of three cross breeds of Holstein, Brown Swiss, Tharparkar and four cross breed Holstein, Brown Swiss, Tharparkar and Sahiwal, they found that the milk yield of 305 days was 2651± 134 kg with c. v. 18.2% for three
cross breed and 2457±133 kg with c. v. 16.25% for four cross breeds. Elsamani (2000) stated that the milk yield was significantly affected by season of calving (p<0.05) and not by year of calving. Basu et al (1978) obtained 629.33 kg as average lactation yield in 100 day for cross breed Jersey x Hariana cattle. 50% Friesian blood crossed with Sahiwal yielded higher (6.22 kg) per day than those with less than 50% Friesian blood which yielded 5.09 kg per day. This was reported by Reddy and Basu (1985). Singh and Dave (1990) found that lactation milk yield for Tharparkar x Holstein Frisian crossbred was 1459.2±47.45 kg.

Dhangar, Trived and Patel (1992) revealed that lactation milk yield averaged 2630±4.03 kg with c. v. 2.76%. They also noted that parity number had a significant effect on milk yield. Chopra (1990) showed that the first lactation milk yield for half bred cows of Hariana with Holstein – Friesian, Brown Swiss and Jersey were 2647, 2187.7 and 1968.8 kg respectively.

In Brazil Madalena et al. (1990) reported that milk yield of 25%, 50%, 62.5% and 75% Friesian blood were 1396±175, 2953±193, 1401±205 and 2981±212 kg respectively.

In USA Brandt et al. (1966) in their study of the effect of cross breeding on production trait of Brown Swiss x Gurnsey and Brown Swiss x Holstein, found that lactation yield was 3153 and 4060 kg for these groups respectively. They also reported that higher milk was obtained when the percent inheritance from Brown Swiss and Holstein Friesian was increased and that from Gurnsey breed decreased.
Gar'Kavil et al. (1990) reported that for Ayrshire x Lativian Brown Swiss and Pure Lativian Brown Swiss in their first lactation the milk yield averaged 3131±53.8 and 2845±55.4 kg respectively and the differences between crossbred and pure bred being highly significant.

Osmolovskii and Vyazovskaya (1982) stated that the first lactation milk yield for 3/4, 1/2 Anglen crossbred with Red Steppe was 2957, 2631, and 3043 kg respectively.

In Cuba Ponce and Bell (1984) noted that the milk yield of 3/8, 5/8, 3/4 Holstein–Friesian were 2971.7, 3441.1 3566.3 kg respectively. In Russia Danil'chenko (1990) revealed that the average total milk production for Red and White Holstein x Russian Simmental was 2675 kg. Introduction of exotic breeds to tropical countries has been practiced for many decades and their performance has been estimated by many scientists.

Elsamani (2000) also stated that milk yield tends to decrease from first to third lactation and attributed this decrease to management. While Habeeballa (1996) reported 12.86 kg as daily yield for Friesian cattle. Whereas Mahamoud (1998) reported that the 84 day milk yield for Friesian cattle was found to be 811.3±5.9 liters and the average daily milk yield was 8.4±0.2 kg.

In comparison Ribas (1984) reported 5085.65±32.8 kg as average milk yield per lactation for Friesian cattle. While Neiva (1993) revealed that lactation yield average 5137.95±63.6 and 6147.3±64.5 kg for Brown Swiss and Holstein respectively. Elsamani (2000) also stated that parity number, lactation length and year of calving had a
significant effect on milk yield, but season of calving did not affect the milk yield in Brazil.

Car et al. (1978) stated that Simmental cows and Jersey cows gave daily milk yield average 15.3 and 6.6 kg respectively.

In Venezuela, Torres and Gonzalez (1992) reported that the milk yield was found to be 3278±795, 2855.5±813 kg Holstein, Brown Swiss and Brahman cows respectively, and the average daily milk yield was found to be 6.8±2.2, 7.9±2 and 7.3±2 kg respectively. They also stated that milk yield was not affected by season of calving.

In India Juneja, Sastry and Yadav (1992) showed that the mean lactation milk yield for Jersey and Holstein – Frisian were found to be 2408±655 kg and 3592±102 kg respectively.

2.2-4 Dry period

The term refers to the period of off milking. Smith (1959) stated that dry period is necessary in order to accomplish one or more of the following:
1- To replenish the body with nutrients that was depleted during lactation.
2- To repair and regenerate the alveolar system.
3- To gain stimulation for lactation as result of parturition.

The length of the dry period can not be entirely dissociated from interval between lactation because there is usually positive correlation between the lengths of one and that of the other.

Alim (1960) obtained mean dry period for Kenana cows at Gezira Research Station to be 164±94 days and the effects of preceding dry period on milk yield was not significant (p>0.05). In other research Alim (1962) showed mean dry period of Butana cows at Atbara to be
Abdel Aziz (1994) indicated that the shorter dry period, the higher the milk production "r = -0.566±0.055". However, Marples and Trail (1967) investigated the commercial herd of exotic breeds, Viz Friesian, Jersey and Guernsey in Uganda. They obtained mean dry period of 74.6, 58.4 and 70.8 days respectively. Osman and El–Amin (1971) reported 114 days as mean dry period of Northern Sudan Zebu. Sharma et al. (1982) found that the overall mean dry period of Sahiwal x Friesian cows to be 114.66±5.87 days. They stated that the period of calving effects was significant (p<0.05) but not the season of calving.

On the other hand, Chawla and Mishra (1983) reported mean length of first dry period of Sahiwal cattle in India as 134.6±4.90 days. With significant effect of farm on the character. El-Barbary et al. (1983)reported that the mean dry period of Friesian cows in Iraq was 95.84±70.95 days, and the trait was found to affect milk yield significantly (p<0.01). Patel et al. (1989) showed that the mean dry period of pure Kankrej cows in India was 212.20±28.20 days, and that of F1 and F2 crossbred with Jersey were 77.15±3.85 and 91.70±6.67 days respectively. Singh and Tomar (1991) estimated mean dry period of Karan–Fries cows in India as 66±1 days. Abdel Aziz (1994) stated that the dry period was almost similar for cows calving during different seasons.

2.3 Genetic parameters

Assessment of relative effects of heredity and environment on the reproduction and production of animals is greatly aided by estimates of heritability and genetic relationships.
Good estimates of heritability and genetic correlations were agreed upon by many scientists (Lush, 1946; Falconer, 1981; Kephthorne, 1969 and Hill, 1971) as necessary to device selection criteria and to predict rates of change for various mating and selection schemes. Hill and Nicholas,(1974) outlined the factors that influence the precision of those estimates as; the population size, family size, selection intensity, the number of generations of selection and the parameters themselves.

As regards the reproductive traits, Lesmiester et al (1986). Concluded that the reproductive traits have larger environmental variances, substantial non-additive genetic variance and low additive genetic variance.

This is why the female reproductive traits are slightly heritable.

Morade and Akinokun (1981) found that heritability estimates from half sibs analysis were (0.01± 0.03, 0.26±0.1 and 0.28±0.08) respectively, for age at first calving and overall calving intervals.

Jansen, VanderWerf and de Boer (1987) obtained estimates of heritabilities for age at first conception lower than for age at first service. Pangnacco (1987) found that age at first calving, season of calving had heritability as 0.11 and 0.07 respectively.

For India cattle, Chandiramani and Dadlani (1967) said that India cattle like others are late maturing due to both genetic environmental factors. Also they reported heritability of 1.43±0.82 for age at first calving and a significant negative genetic correlation between age at first calving and first lactation milk yield.
For calving interval, Jahansson and Hassan (1940) stated that, the optimum calving interval is between 12-14 months and shorter for cows with low persistency than for those with high persistency.

Dong and Van Vleck (1989) estimated the genetic correlation between milk yield and first calving interval, first and second lactation milk yield as (0.10) and (0.82) respectively. The corresponding Phenotypic correlation were; 0.27, 0.16 and 0.58. Heritability estimates were; 0.27 and 0.25 for first and second lactation milk yield and 0.15 for calving interval.

Saner and Gaillard (1987) found that the regression of the 305 day milk yield on calf birth weight averaged 0.65 and significant but, how exactly weight affected the preceding and succeeding lactation was not yet understood.

In Sudan, Alim (1960) in his study of Kenana cattle breed of the Gezira Research Farm, reported heritability of calving interval of 0.058±0.059 and 0.11 for Butana cattle in (1962). El Amin (1969) gave heritabilities for age at first calving and calving interval as, 0.12±0.15 and 0.05±0.06 respectively while he was working in Kenana and Butana cattle at the University of Khartoum Farm.

Fangaley (1980) working in Kenana and Butana cattle in Sudan reported heritabilities as 0.18 and 0.20 for age at first calving of Kenana at Umbenein and Elnisheshiba respectively and 0.13 for Butana cattle at Atbara.

For calving interval he reported heritabilities of 0.05, 0.09 and 0.14 for three stations respectively.

Wade and Van Vleck (1989) working in the genetic parameters for production traits in California, New York and Wisconsin, found
that the California herd had a higher mean for milk (9046Kg) and heritabilities for milk yield were; 0.34, 0.33, and 0.38 in California, New York and Wisconsin, respectively.

Hill, Edwards and Ahmed (1983) when evaluating dairy sires from field records comprising data from herds with different management systems, they found higher variance of yield and higher heritability for high yielder cows.

Arendonk, Hovenier and Boer (1987) when studying the phenotypic and genetic association between fertility and production in dairy cows, found that the heritability estimates for yield traits ranged from 0.18 to 0.41 in Dutch Friesian cows.

For Brown Swiss cattle, Thomas et al (1987) found that the heritability of first lactation milk yield was 0.35±0.19.

The relation between early components of lactation and their inheritance was described by Bhutia and Pandey (1988) when studying the Holstein Friesian & Shaniwal crosses. Found that the initial yield, peak yield and maximum yield on any day on ascending phase of lactation were positively and significantly correlated (P<0.1) across all genetic groups in the first as well as in pooled lactation.

The magnitude was 0.72±0.04 to 0.96± 0.05 and was directed towards the effectiveness of early selection of dairy cows on the basis of initial yield without waiting for peak yield.

Shanks, et al (1983) showed that heritability of mature equivalent 305 day milk yield decreased from 0.27 to 0.16 from first lactation to third lactation. Largest heritability for calving interval was 0.6±0.01 in first lactation but for culling rate and days dry were(p <0.05). Where as the heritability for calving age increased from 0.26 in first lactation
the phenotypic correlations of the 305 day yield with other traits were found to be very consistent lactation.

Elbarbary et al (1984) for Friesian cattle at Iraq found that milk yield was significantly correlated with the lactation length (0.68) and dry period (0.33).

In Sudan, El Amin (1969) gave 0.22, 0.11, 0.08, 0.36 and 0.10 as heritability for the 305 day milk yield (first record). 305 day milk yield (average of 5 records) lactation length, dry period maximum yield and persistency respectively.

Fangaley (1980) reported heritability of total milk yield for Kenana and Butana cattle at Umbenein, Elnisheishiba and Atbara as; 0.75, 0.81 and 1.55 respectively. He also gave 0.21, 0.26 and 0.20 as heritability for lactation duration at the three stations respectively.
CHAPTER THREE

MATERIALS AND METHODS

3.1 Origin of the Herd, Management Policy and Recording System:-

The data used in this study were collected from the Kenana Dairy Farm. The farm was established Seventeen Years ago as traditional farm with local cattle herd. The farm is situated at Kenana area in the White Nile State near Costae. The climate of Kenana is mainly that of White Nile State.

The second period started on May 1985 with add there 40 cross bred cows to the local herd of Kenana cattle in the farm. The program in the farm was changed by introducing this foreign blood and practicing crossbreeding activities after purchase of cross bred cattle from Khartoum and Gezira. The third periods started in April 2002 when the farm was developed by Dutch personnel who added new program called Uniform–Agri \{computer program\} and trained all of the workers of the farm in Dutch.

At the end of the 2002 the milk yield reached 4000 liter per day and the herd much as 1000 Heads of Kenana Friesian. Now the herds about 2100 Heads.

3.2 UNIFORM–Agri:

Uniform-Agri has a history of over 18 years in the dairy herd software with the headquarters in the Netherlands; the company is located close by one of the highest producing national herds in the world.

Highly educated staff with certified computer skills in combination with a dairy background is the back bone of the company; they are over 4500 individual dairy farmers using this modern windows based software program
on a daily basis. This is by far the most widely used system there is. Home markets are the Netherlands, United Kingdom and Denmark. In these countries there are local organizations active for sales and service.

UNIFORM is easy to use, powerful interfaces and covering all dairy aspect (cow ID, production, reproduction, health, feeding, young stock, …) are the main complements we get about our product. The newest windows version is extremely easy to use.

3.3 Feeding Programming in Kenana Farm:

Cattle were mainly fed by plants grown e.g. (Abu70, Sorghum bicolor, Rhodes, Lubia and Glitterier). Concentrates, wheat bran, grain, seed cakes. Cows were milking Parlor twice a day in the early morning and early afternoon.

3.4 Kenana Farm Unit:-

Kenana farm include some units:

1- Offices.
2- Records Section {Uniform- Agric. Record}.
3- Wafting room.
4- Maternity room.
5- Calves section.
6- Three Cow Stables {A, Band C}.
7- Milking Parlor.
8- Sick Animal Room.
9- Artificial insemination unit.
10- Meat Section.
11- Slaughter House.
12- Silage Processing Place.
Veterinary services on the farm were provided by the departments of veterinary medicine and surgery of the faculty of veterinary science.

Identification of herd individuals was done by application of ear tags, which corresponded with each cow page in the records (computer). The information included in the records were classification to the Normal records included: {name, number, description, pedigree, dam, sire, dams sire, status, calving date, lactation number, insemination date, insemination bull, dry of period, exp calving date and body weight condition}. Lactation records included {calving date, calving interval, age, day in milk, kg milk, % fat, % protein, kg fat, kg protein, milk and daily production of (Gr. Fat+ port)}. Milk recording. Reproduction. Offspring. Treatment and Health.

The present study only considered the date on cows with known pedigree (50-75) that had completed three lactations or more for yield.

3-5 Data collection:

Data records on 100 cows which covered the period from (98-2005), they comprised 300 lactation and 300 calving. The date inter the SPSS Computer Program (Statistical Package for Social Science). The data on production performance included the following: {milk yield, day in milk, daily milk, calving age, service period, dry period and first milk yield}.

The data on reproduction performance included the following: {age at first, calving calving interval, gestation period and service period}. 

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CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Factor Affecting Reproduction:

The factor affecting reproductive traits on the experiment groups in this study are shown on table (1). The data revealed that the imported level of means classified in tow part {minimum and maximum}. The minimum level of means in reproductive includes {2.42 years, 407 days, 265.17 days and 88.45 days}. The maximum level of means in reproductive includes {2.85 years, 442.45 days, 274.30 days and 178.50 days} in age at first calving, calving interval, gestation period, and service period respectively.

Table (1):-Distribution Level of means on Age at First Calving, Calving Interval, Gestation Period and Service Period at Kenana Friesian

<table>
<thead>
<tr>
<th>parameters</th>
<th>Min level of means</th>
<th>Max level of means</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at first calving(y)</td>
<td>2.42</td>
<td>2.58</td>
<td>0.812</td>
</tr>
<tr>
<td>Calving interval(day)</td>
<td>407</td>
<td>442.45</td>
<td>101.91</td>
</tr>
<tr>
<td>Gestation period(day)</td>
<td>265.17</td>
<td>274.30</td>
<td>18.45</td>
</tr>
<tr>
<td>Service period(day)</td>
<td>88.45</td>
<td>178.50</td>
<td>91.16</td>
</tr>
</tbody>
</table>

4.1-1 Age at First Calving:

Age at first calving in this study is shown on table (1). The experiment in this study was classified the level means in tow part minimum and maximum {2.42 and 2.85 years} respectively.

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In this study the maximum means age at first calving (2.58) years was similar to that reported by Alberro (1983), but higher to that obtained by Arora and Sharma (1983), and Fangaley (1980) and lower than that reported by Gzule and Zachwieja (1987) and Mohadevan (1966).

4. 1-2 Calving Interval:

Calving interval in this study are shown in table (1). The experiment in this study was classified the level means in tow part minimum and maximum {407 and 442.45 days} respectively.

In this study the maximum means of calving interval (442.45) days was similar to that reported by Alberro (1983), Arora and Sharma (1983) and Kallafalla and Kalifa (1983), but higher than that reported by El-barbry etal. (1984), and lower than that result obtained by Aguilar and Hinojosa (1981), Albrroi (1983), Gzulc and Zachwieja (1987), Morade and Akinkum (1981), Costa etal. (1982) and Fangaly (1980).

4. 1-3 Gestation Period:

Gestation period in this study were shown in table (1). The experiment in this study was classified the level means in tow part minimum and maximum {265.17 and 274.30 days} respectively.

In this study the maximum means of gestation period {274.30} days was similar to that reported by Swensson et al. (1981) and Costa et al. (1982) but higher than that reported by Pated et al. (1983).

4. 1-4 Service Period:

Service period in this study are shown in table (1). The experiment was classified the level means in tow part minimum and maximum {88.45 and 178.50 days} respectively.
In this study the maximum means of service period (178.50) days was similar to that reported by Singh and Tomar (1991), but higher than that reported by Bhatangar et al. (1982), Basu et al. (1983), Cabelo and Ruiz (1980), El-Barbary et al. (1983) and Pated et al. (1989), and the lower than that reported by Bhatangar et al. (1982), Basu et al. (1983), Cabelo and Ruiz (1980), El-Barbary et al. (1983) and Pated et al. (1989).

4.2 Factor Affecting Production:

The factor affecting productive traits on the experiment groups in this study are shown on table (2). The data revealed that the imported level of means classified in tow part {minimum and maximum}. The minimum level of means in productive includes {2234 kg, 282.67 days, 8.26 kg, and 85.45 days}. The maximum level of means in productive includes {5138.30 kg, 30.17 days, 15.49 kg and 161.97 days} in milk yield, days in milk, daily milk and dry period respectively.

Table (2):-Distribution level means in Milk yield, Days in milk, Daily milk, and Dry period at Kenana Friesian

<table>
<thead>
<tr>
<th>parameters</th>
<th>Min level of means</th>
<th>Max level of means</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk yield(kg)</td>
<td>2234</td>
<td>5138.30</td>
<td>1049.17</td>
</tr>
<tr>
<td>Days in milk(day)</td>
<td>282.67</td>
<td>300.17</td>
<td>48.47</td>
</tr>
<tr>
<td>Daily milk(kg)</td>
<td>8.26</td>
<td>15.49</td>
<td>3.36</td>
</tr>
<tr>
<td>Dry period(day)</td>
<td>85.45</td>
<td>161.97</td>
<td>140.22</td>
</tr>
</tbody>
</table>
4.1-2 Milk production:

Milk production in this study were shown on table (2). The experiment milk yield in this study classified the level means in tow part minimum and maximum \( \{2234 \text{ and } 5138.30 \text{ kg}\} \) respectively.

In this study the maximum means milk yield \( (5138.30) \text{ kg} \) was lower than that reported by Gondhi and Gurnani (1990)(1993), Habeeballa (1996), Dhangar et al. (1991), Yeoticcar and Desponde (1990), Manada Kmal and Kale (1990), Singh and Dave (1990), Dangar Trived and Patel (1992), Madalen et al. (1990), Danil'chenko (1990), Torres and Ganzales (1992) and Juneja, Sastry and Yadav (1990), Gandahi and Gurnani (1993), Subrt et al. (1990), Habeeballa (1996), and Neiva (1993).

4.2-2 Lactation Length (Day in Milk):

Lactation length in this study were shown in table (2), the experimental in this study classified the level means in tow part minimum and maximum \( \{282.67 \text{ and } 300.17 \text{ days}\} \) respectively.

In this study the maximum means lactation length \( (300.17) \text{ days} \) was similar to that reported by Torres et al. (1992), Murdia et al. (1992), and Elsamani (2000), but highest than that reported by Tuneja et al. (1992), Singh et al. (1992), Madalena et al. (1990) and Chopra et al. (1992) and lower than that result obtained by Singh and Tomar (1991), Mohamoud (1998), Khah et al. (1992) and Alim et al. (1992)

4.2-3 Daily Milk Yield:

Daily milk yield in this study were shown on table (2). The experiment in daily milk yield study classified the level means in tow part minimum and maximum \( \{8.26 \text{ and } 15.49 \text{ kg}\} \) respectively.

In this study the maximum means daily milk yield \( (15.49) \text{ kg} \) lower than that reported by Habeeballa (1996), Subart et al. (1990), Mahamoud
(1998), and Torres and Gonzalez (1992), but higher than that reported by Elfaki (1988). Elsamani (2000), and Car et al. (1978).

4.4-4 Dry Period:

Dry period in this study were shown on table (2). The experiment in the dry period study classified the level means in tow part minimum and maximum {85.45 161.97 days} respectively.

In this study the maximum means of dry period {161.97} days lower than that reported by El – Barbary etal (1983), and Singh and Tomar (1991) but higher than that reported by Chamla and Mishra (1983) and Patel et al. (1989).
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