Egypt. J. Anim. Prod., 29, No. 2, pp. 229 - 253 (1992)

Effect of Season and Month of Calving on Estrous Performance , Serveses Conception and Milk Yield of Friesian Cows in Egypt.

H.T. Abdel-Bary, M.M. Mahmoud, H.I. Zaky, and A.A. Mohamed.

Department of Animal Production, Faculty of Agriculture, Al- Azhar University, Cairo, Egypt.

TO study the effect of season and month of calving on; estrous period length, estrous cycle length, number of services per conception, milk yield lactation period length, and dry period length ; 463 pure Friesian cows were used. The cows were imported from the Netherlands as pregnant heifers. The results obtained seem to justify the following conclusions :

1) Average length of estrous period was 16.0 hours.
2) Average length of estrous cycle, lactation period, and dry period were 27.44, 293.28 and 74.79 days, respectively .
3) The average milk yield was 4247.95 kg .
4) Number of services per conception was 2.0.

Month of calving affected significantly ($p < 0.01$) milk yield, lactation period and dry period length. Its effect on estrous period, estrous cycle, and number of services per conception was not significant.

Estrous period , Milk yield, lactation period and dry period were influenced significantly ($p < 0.01$) by season of calving, whereas estrous cycle and number of services per conception were not affected by season of calving.

Key words: Reproductive traits, friesian cows, month and season of calving. , milk yield

More than thirty years ago Friesian cattle were introduced in Egypt as pure breed in order to improve milk and meat production. Several studies proved that the productivity and reproductivity of Friesian cattle are still lower under Egyptian environmental conditions than those of their contemporaries in their original countries. The reason may be due to the climate of the arid or semi-arid areas under which the cows exist, or the way in which the cows are handled.

Elevation of environmental temperature as well as the change in daily photoperiod length characterized the climate conditions in arid and semi-arid areas. Elevation in ambient temperature causes a decrease in food intake, as well as changes in behavioural and physiological functions. This may cause lowered efficiency of performance in mammals (Bonsma, 1949).

It is well established that changes in photoperiod induce marked alterations in the neuro-endocrine activity (Turek and Campbell, 1979).

Any investigation of reproductive efficiency in dairy cattle must include detection of estrus. This is even more important in reference to large herds managed under tropical or subtropical environments because high air temperature shortens the duration of estrus and lowers its intensity (Thatcher. 1974).

Estrous period may be affected by environmental temperature. Hansel and Trimberger (1952) indicated that estrous period was shorter in subtropical climate. Month and season of calving also may affect length of estrous duration (Nikolaev, 1971 ; Arthur and Rahim, 1984).

Services per conception is another widely used index of fertility. Month and season of calving affect the number of services per conception (El-Amin *et al*, 1986). Several other factors affect services per conception such as type of mating (Alencar & Bugner, 1987), lactation and time of estrus detection (Badinga *et al.*, 1985) , post-partum estrus, service period (Bhatnagar *et al.*, 1982) and calving interval (Menendez *et al.*, 1984).

Environmental conditions associated with a subtropical area contribute to the lower reproduction & milk production (Thatcher, 1974) . Milk yield was affected by lactation period length (Ragab *et al.*, 1973), services per conception (Juma *et al.*, 1988), postpartum insemination and calving intervals (Schneider *et al.*, 1981) . Season of calving affected milk yield (Polastre *et al.*, 1987a).

The present study was undertaken to evaluate the effect of month and season of calving on some reproductive and productive traits including estrous period length, estrous cycle length, number of services per conception, milk yield , lactation period length and dry period length in Friesian cows under Egyptian environmental conditions.

Material and Methods

Four hundred and sixty three pure friesian cows were used in this study. The animals were imported from Holland as pregnant heifers and kept under regular system of feeding and management of the Tonsy farm in Giza desert (West of Giza). All cows were bred naturally using pure bred Friesian bulls. Food included Egyptian clover (Trifolum Alexandrium) and wheat straw with a concentrate ration in winter, and a mixture of green corn and clover hay with a concentrate ration in summer. Cows were fed according to their milk production. Water was always freely available. Cows were milked twice daily. Heat detection was practiced twice daily. Natural mating was allowed after complete uterine involution. Rectal palpation examination for pregnancy diagnosis at 45-60 days post-mating was done. Meteorological data for the total duration of experiment were obtained from the Government Meteorological Service Station in Gize.

The following reproductive traits were studied during different months and seasons :

1- Estrous period length : Twenty dairy cows were taken to represent each geographical season of the year. Cows were observed for 10-15 min every 2 hr along the 24 hours of the day. An expectation list was made for each cow and a record was set

up for all cows showing estrous activity at any particular time of the day. The signs of estrus were observed during heat detection cows exhibiting all or most of estrous signs were considered in estrus. The observed estrous period was calculated from the first to the last hour when a definite mounting occurred. A corrected duration of estrus was calculated by adding half an hour to the observed duration, and half an hour to the observed period after estrus cessation.

2- Estrous cycle length : Interval between two consecutive regular estruses.
3- Number of services per conception : The number of matings required for the incidence of conception.
4- Milk yield .
5- Lactation period .
6- Dry period

Data were analyzed using analysis of variance (Snedecor and Cochran, 1984). Usually data are expressed as mean ± SE.

Results and Discussion

Meteorological data .

Environmental temperature and relative humidity percent fluctuated among the different months. The highest ambient temperature was attained during July and August (34.35°C), while the lowest was recorded during January (8.5°C).Daily photoperiod length showed the longest day during July (14.05 hr), while the shortest day was recorded during December (10.26 hr) (Fig. 1) .

Estrous Period Length..

The overall mean value of estrous period was 16± 0.30 hr and ranged from 10 to 22 hr. The mean value was longer than that obtained by Nikolaev (1971) in Nulliparous cows (14.1 hr Devries *et al.*, (1972) in Friesian cows (11.36 hr).

Non- significant differences were observed between the different seasons. Estrous period was apparently longer during autumn (16.45 ± 0.75 hr) and spring (16.4 ± 0.96 hr) than in winter (15.6 ± 0.61 hours) and summer (15.56 ± 0.57 hr) (Fig. 3A and3B).

These results are in agreement with the findings of Zakaria (1981), who found that estrus duration was not affected by season. On the other hand Sukumaran and Pavithran (1971) reported that the incidence of estrus duration was affected by season and month.

The overall mean value of mounting activity was 7.97 ± 0.32 hours. Mounting activity showed significant ($p < 0.01$) differences among the different seasons with shortest value (6.6 ± 0.52 hour) during summer and the longest during spring (10.65 ± 0.50 hours (Fig 2 A,B) these findings are in agreement with DeSilve *et al.*, (1981), who found that the mating activity was increased during cold season of the year compared with warm ones.

Environmental temperature affected the mounting activity in the day of estrus (Fig. 2 A). Increasing the maximum daily ambient temperature to 25°C was associated with an increase in mounting activity, while the increase in ambient temperature above 30°C was associated with a decline in mounting activity (Gwazdauskas *et al.*, 1983). A

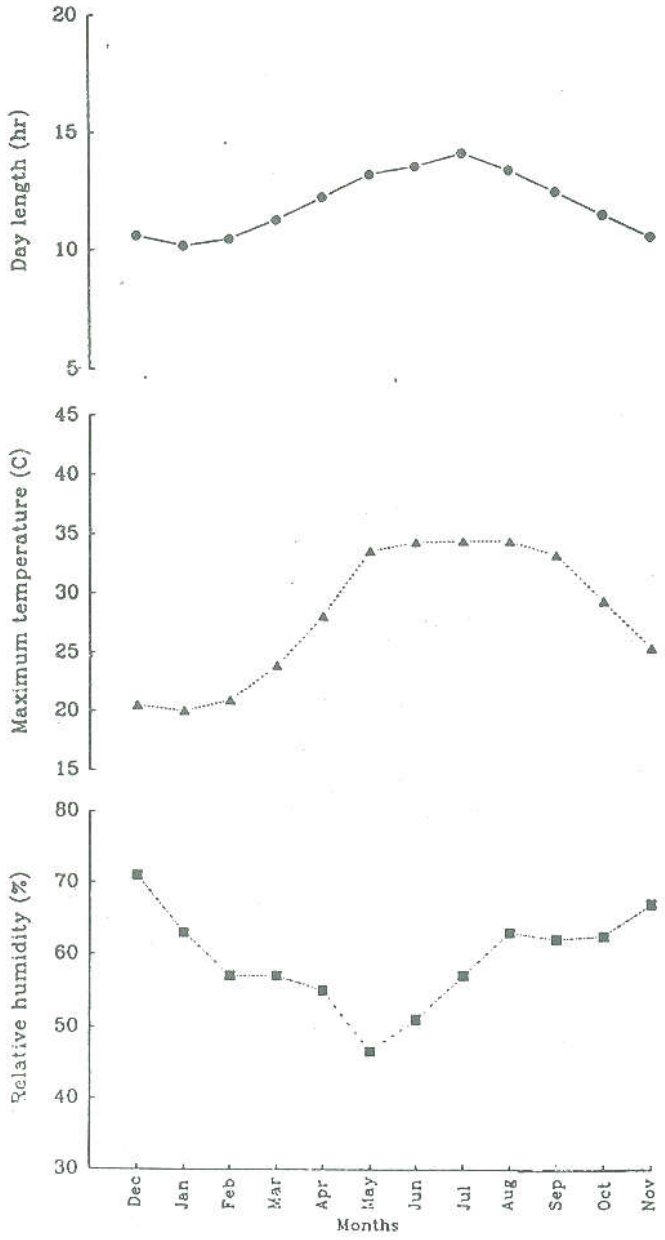

Fig.1. Monthly variations in day length; environmental temperature and humidity throughout the study.

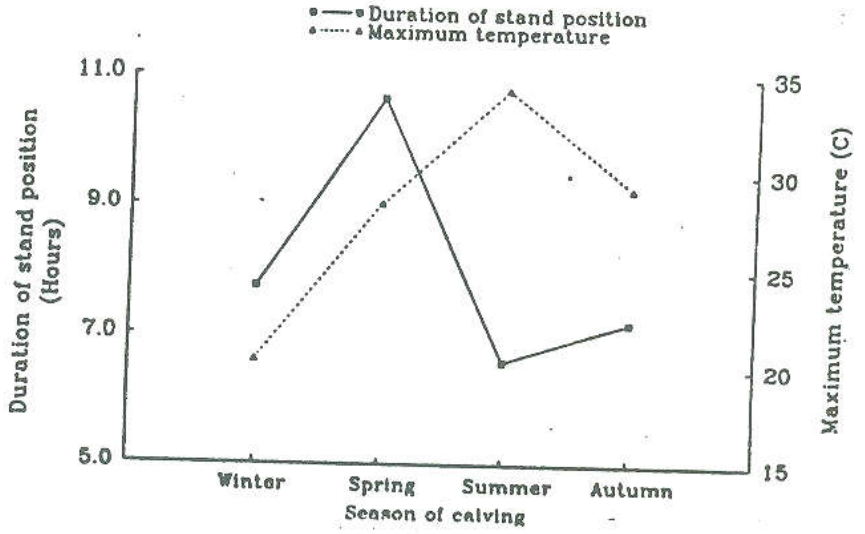

Fig.(2. A.) . Seasonal fluctuations in duration of stand position and temperature in Friesian cows.

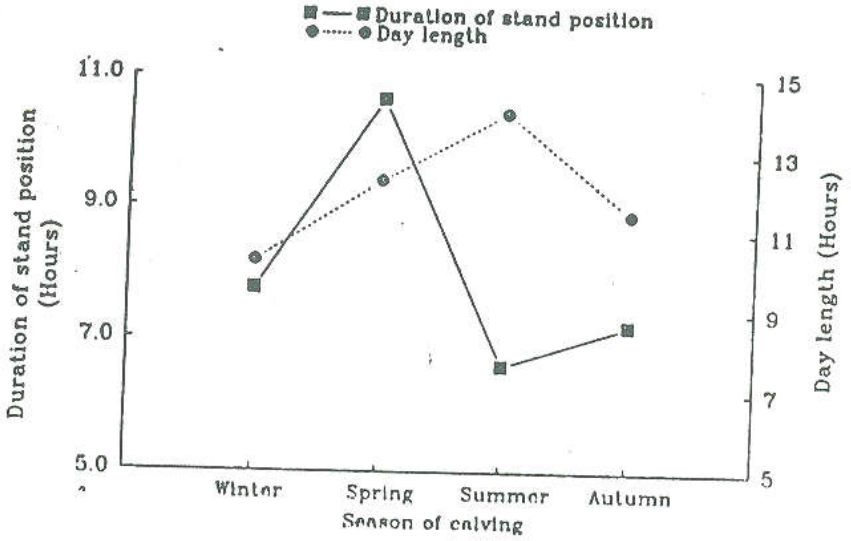

Fig. (2 B.) Seasonal fluctuations in duration of stand position and day length in Friesian cows.

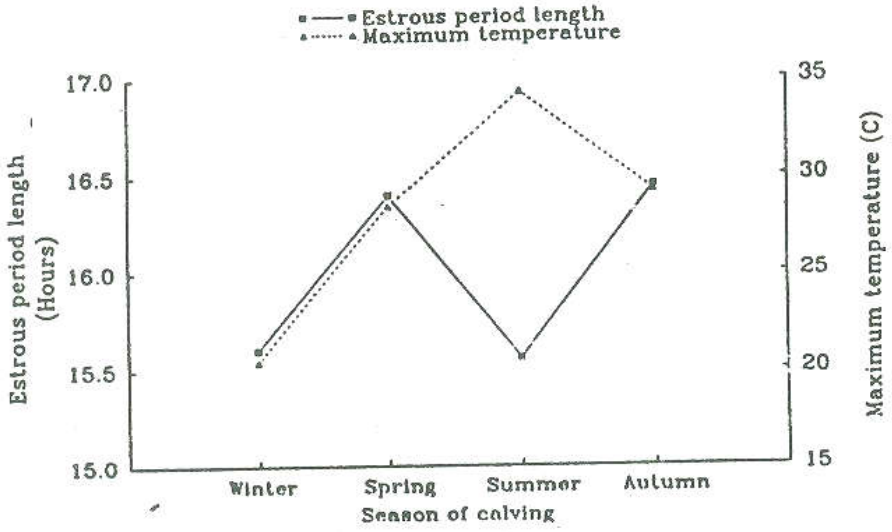

Fig.(3 A). Seasonal fluctuations in estrous period length and temperature in Friesian cows.

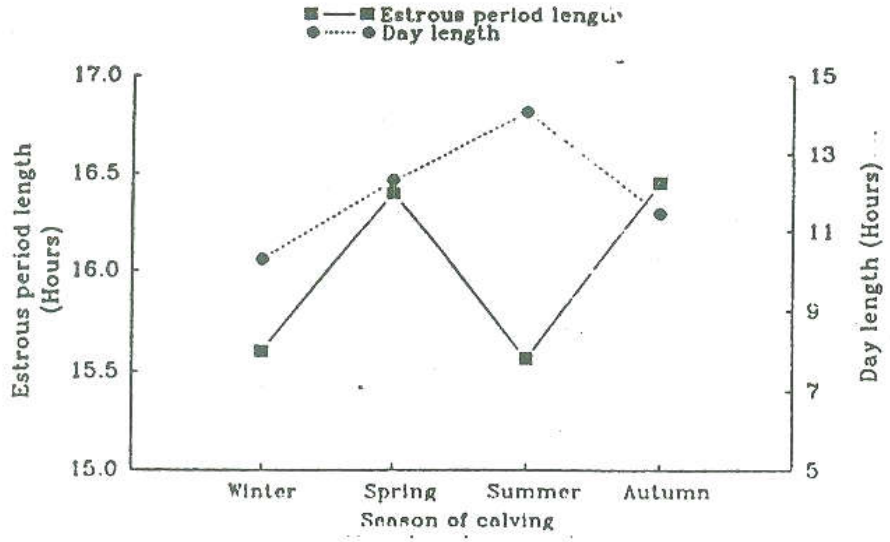

Fig. (3 B).Seasonal fluctuations in estrous period length and day length in Friesian cows.

negative correlation (r = - 0.14) was calculated between estrous period length and maximum ombient temperature.

This is in agreement with Thatcher *et al.*, (1971) who found that high temperature shortened the duration of estrus. Thatcher (1974) stated that high air temperature in tropical or subtropical environments shortened the duration of estrus and lowered its intensity in dairy cattle herds.

High environmental temperature and relative humidity had a pronounced effect on both the rectal and uterine temperatures and the concentration of progesterone and corticosteroid hormones (Gwazdauskas *et al.*, 1983). Thatcher and wilcos (1973) reported that the variation in rectal and uterine temperatures could be associated with physiological and hormonal changes at estrus. They suggested that the balance between progesterone, estrogen and luteinizing hormones secretion rate may be altered during the heat stress. Besides, adeno-corticotrophin hormone increased causing higher peripheral progesterone level.

Gwazdauskas *et al.*, (1981), reported that in hyperthermic dairy heifers preovulatory peaks of estradiol were lower and duration of estrus was shorter than in heifers exposed to 21.3 °C.

Associated with the poor reproductive performance was elevated rectal temperature and progestin. The elevated plasma progestins may be of adrenal origin and associated with the thermal stress response (Thatcher, 1974). Treatment either of contact (Gwazdauskas *et al.*, 1973) or ovarectomized cattle (Wagner *et al* ., 1972) with adrenocorticotropin (ACTH) increased peripheral progesterone concentrations. An increase in plasma progestins associated with heat stress, can alter reproductive function. The alterations in progesterone, estrogen & luteinizing hormone (LH) secretion during heat stress cause a shortening in duration of estrus (Hall *et al.*, 1959) ; Gangwar *et al.*, 1965), and increase in incidence of both silent heats (Labhsetwar *et al.*, 1963) and anestrus (Bond and McDowell, 1972), and a reduction in the intensity of estrus (Gangwar *et al.*, 1965).

Estrous Cycle Length

The overall mean value of estrous cycle was 27.44 days and ranged from 25.36 to 31.92 days. The present value was longer than that estimated by Roberts (1956) for Friesian cows (21days) ; while similar to that obtained by Plasse *et al.*, (1970) in Brahman heifers (27.7 days).

Data obtained indicated that cows calved in February exhibited longer estrous cycle (31.92 ± 2.39 days), while cows calved in November had shorter estrous cycle (25.36 ± 1.67 days) (Fig. 4 A,B) The differences among months of calving were not statistically significant. A remarkable adverse relationship was observed between maximum ambient temperature, daily photoperiod length and estrous cycle (Fig. 4 A,B). These results are in agreement with the results obtained by Plasse *et al.*, (1970) who reported that there is an indication of the influence of climate on reproduction.

Estrous cycle varied in length between seasons being longer for cows calving during winter (29.8 days) and shorter for cows calving during autumn (25.96 days) (Fig. 5 A,B). The differences among seasons in the estrous cycle were statistically not

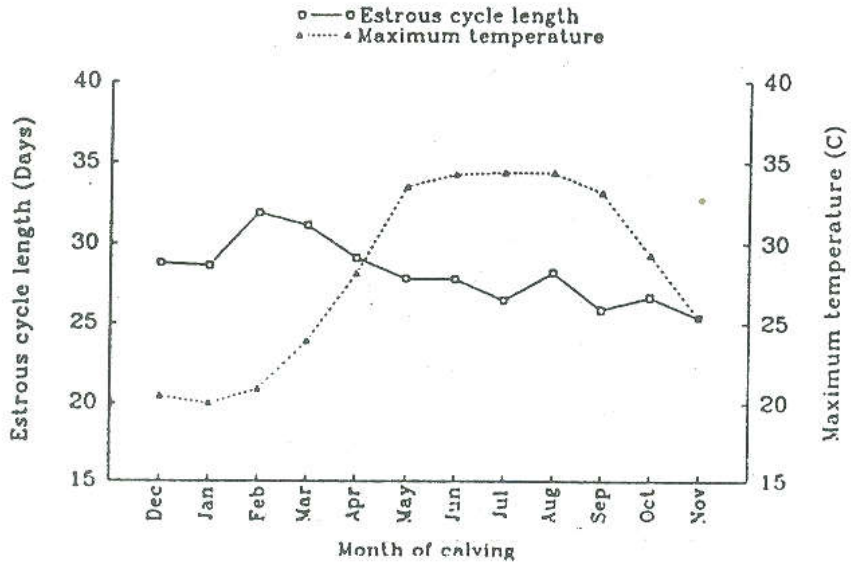

Fig.(4 A). Effect of month of calving and temperature on estrous cycle length.

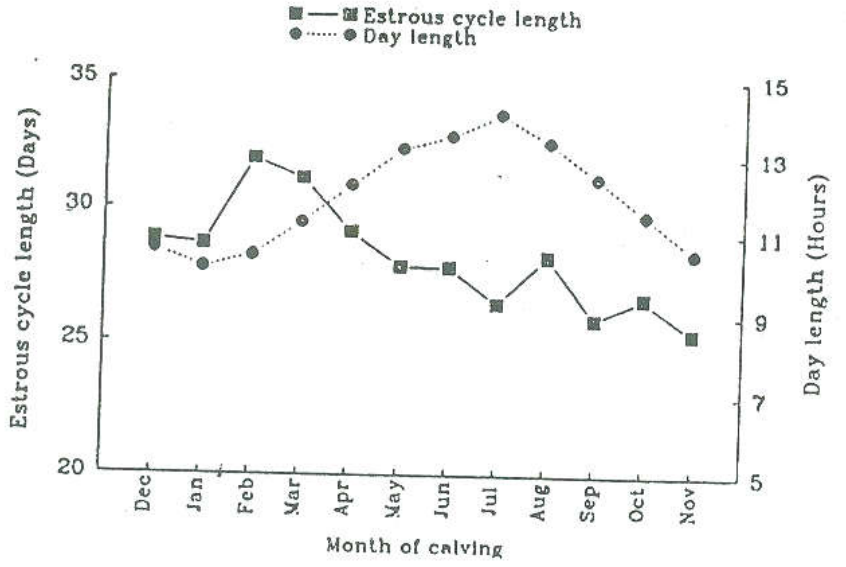

Fig. (4 B). Effect of month of calving and day length on estrous cycle length.

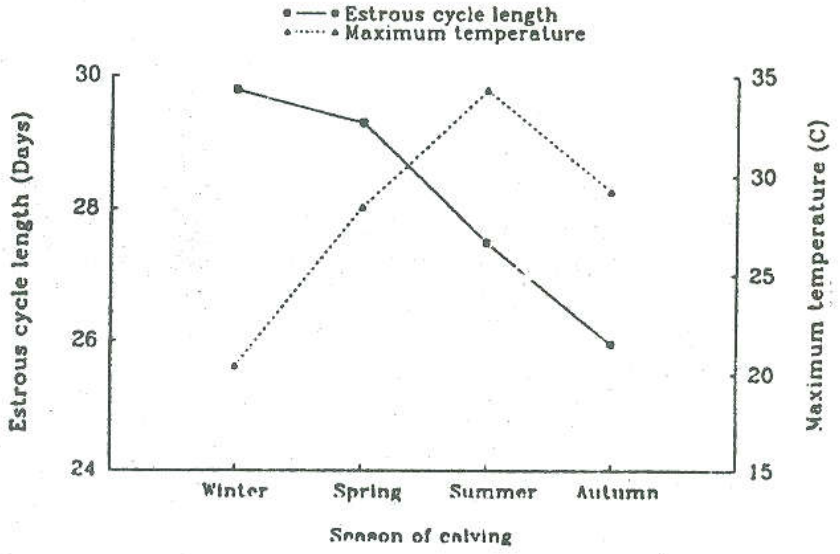

Fig.(5 A). Effect of season of calving and temperature on estrous cycle length.

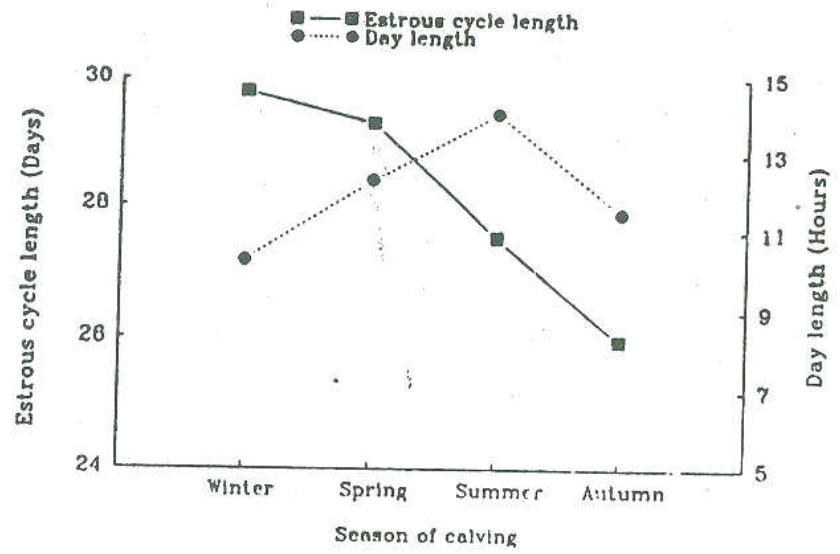

Fig. (5 B). Effect of season calving and day length on estrous cycle length.

significant. These results are in accordance with the findings of Madalena and Hinojosa (1976) who found that the estrous cycle was not affected by seasons.

A significant longer intervals from parturition to first estrous and from estrous to first ovulation in the high producing cows were observed which indicate that stress associated with high milk production may delay normal estrous cycles (Marion and Gier, 1968). They suggested also that the incidence of follicular cysts increased with level of production. It is possible that these are directly responsible for delayed estrous cycles.

A negative correlation coefficient was found between length of estrous cycles and ambient temperature (r= - 0.06). Plasse *et al.*, (1970), observed a strong relation between monthly frequency of estrus and mean minimum temperature. They added that during the cold days little or no estrual activity took place.

Number of services per conception.

Mean number of services per conception was 2.0 ± 0.06. This estimate was equal to the estimate of Badinga *et al.*, (1985), while higher than that found by Sharma (1983) and lower than the estimate of Aguilar and Hinojosa (1981). Glama *et al.*, (1976) reported that Holstein and Jerseys required 1.95 services per conception, whereas Ayrshires required 2.21 services. Thatcher and Wilcos (1973) found that services per conception were associated with frequency of heat during 0 to 60 days post-partum. A significant decline ($p<0.05$) in services required was detected with increased number of heats.

More services were needed in September calvings (2.60 ± 0.22), whereas cows calving in May needed less services to conceive (1.68 ± 0.16) (Fig.6 A,B). Statistically, month of calving did not show any significant effect on services per conception. This may indicate the response of cow to changes in ambient and body temperature, nutrition, management among months as explained by Thatcher and Wilcos (1973). Also Lopez and Ruiz (1987) found that services per conception were not affected by month of calving .

Services per conception decreased gradually from winter (2.13± 0.22) to spring (1.98 ± 0.12) , then reached a maximum during autumn (2.28 ± 0.13) (Fig. 7 A,B). No significant differences were found between seasons of calving on services per conception. Lopez and Ruiz (1987) found that services per conception were not influenced by season of year.

As shown in the present study, month and season of calving had no effect on services per conception. The effect may be due to other factors such as post-partum service (Khlabystich, 1974); type of mating (Alencar and Bugner, 1987); lactation breed, time of estrus detection, age of dam and interval from estrus detection to insemination (Badinga *et al.*, 1985) ; milk yield (Juma *et al.*, 1988); and post-partum estrus, service period (Bhatnagar *et al.*, 1982). Williamson *et al.*, (1972) indicated that the increase of services per conception may be due to apparent or real failure of the cow to exhibit estrus at the time of service, or to failure of conception to occur. Ponston *et al.*, (1962) indicated that, herds apparently having the most difficulty with detection of estrus also required the highest number of services per successful mating.

Milk yield appears to be antagonistic to reproductive performance. High milk producing cows are bred later, take longer to conceive, and require more services per

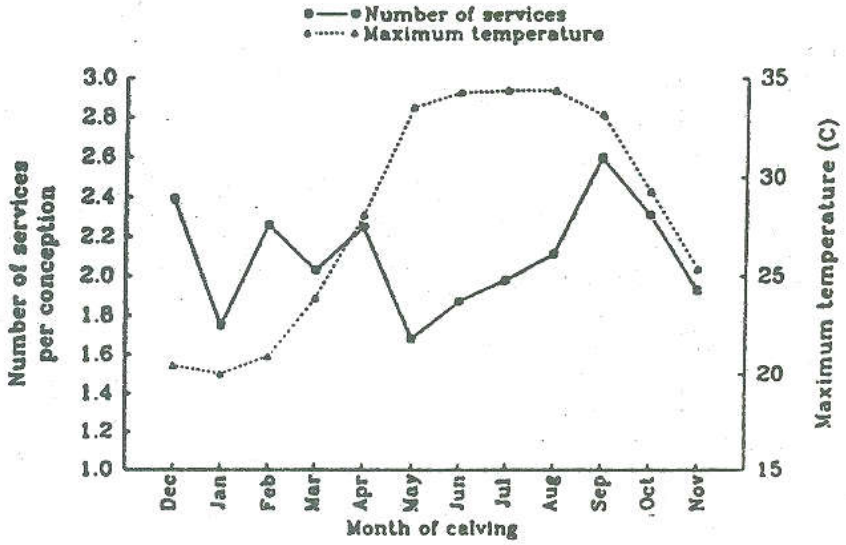

Fig.(6 A). Effect of month of calving and temperature on number of services per conception in Friesian cows

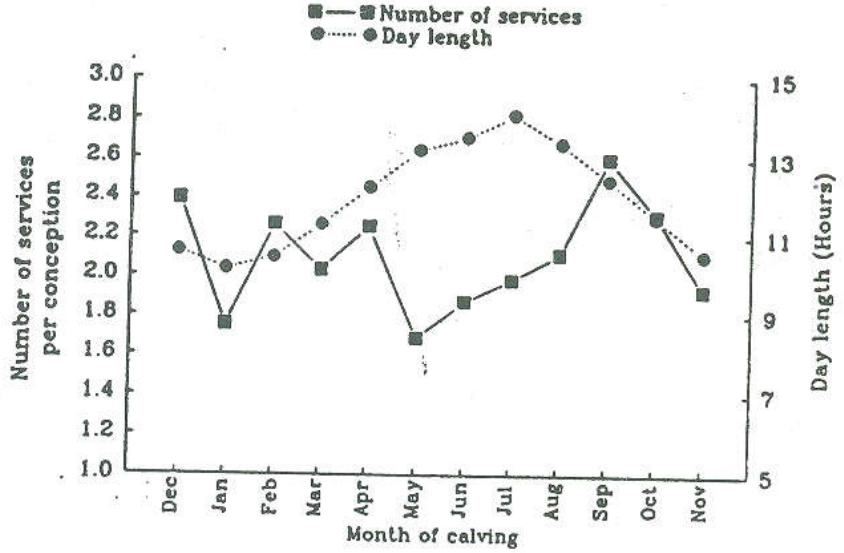

Fig. (6 B). Effect of month of calving and day length on number of services per conception in Friesian cows.

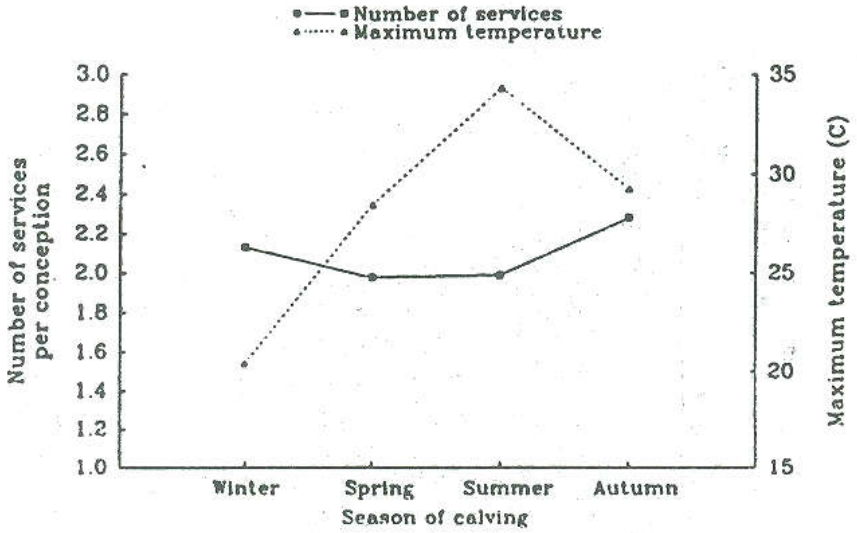

Fig.(7 A). Effect of season of calving and temperature on number of services per conception in Friesian cows.

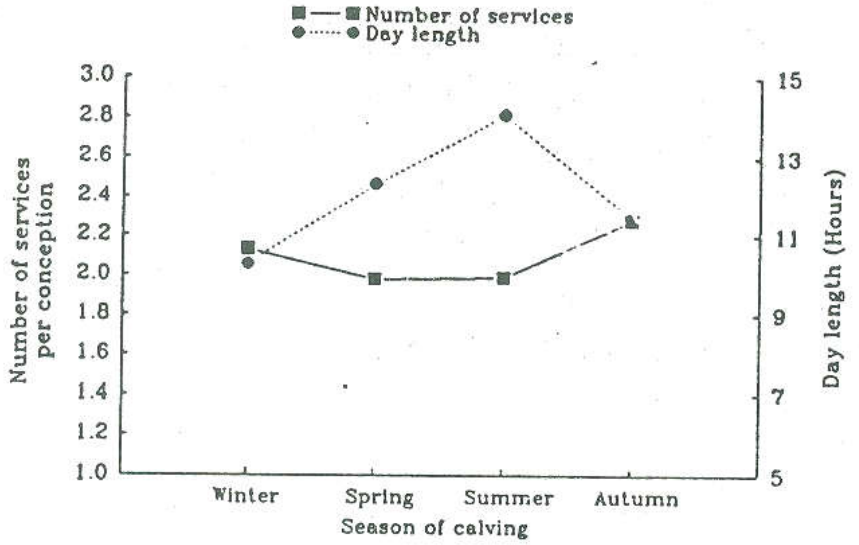

Fig. (7 B). Effect of season of calving and day length on number of services per conception in Friesian cows.

conception than do low milk producing cows (Berger *et al.*, 1981). Laben *et al.*, (1982) reported that number of breedings changed little as herd yield increased. They also added that number of breeding increased 0.14 for each 100 kg. increase in 180 day yield of fat corrected milk.

Milk yield

The overall mean of milk yield was 4247.95 ± 51.36 kg . This value is higher than those values found in Holstein Friesian (Alexander *et al.*, 1984 ; El-Barbay *et al.*, 1983).

Month of calving showed a significant ($p < 0.01$) effect on milk yield. Cows calving during November produced highest amount of milk (4840.13 ± 187.94 kg .), while cows calving during March had the lowest amount (3717.79 ± 160.76 kg.) (Fig 8 A,B). The difference between the high and the low milk production as affected by month of calving was 1122.34 kg. parekh and Singh (1982) reported also that, milk yield was affected significantly by month of calving.

As shown in the present results cows calving in November significantly produced highest yield as compared to those calving in March. The probable reason for this variation may be due to the increase in prolactin hormone secretion during late summer, and the reduction in prolactin hormone during winter months. Dular and laBella (1977) indicated that prolactin content of secretory granules in bovine anterior pituitaries is lowest in winter and greatest in summer.

The effect of season of calving on milk yield indicated higher production during autumn calving (4655.02 ± 87.60 kg.), while lower milk yield was observed in cows calving during spring (3840.35 ± 74.48 kg .) (Fig 9 A,B). Season of calving showed a highly significant (P, 0.01) effect on milk yield. In the present study a contradictory relationship was found between milk yield and dry period length.

The present estimate differed from those observations of kassab *et al.*, (1976) and Romcevic *et al.*, (1984). They reported that the average maximum milk yield was observed in cows calving in winter, while the minimum was in autumn calving. The present results are also not in agreement with Rako and Karadjole (1984), who found that the highest milk yield was attained during spring calving, while the lowest milk yield was during summer calving. These differences may be attributed to the difference in both maximum environmental temperature and daily photoperiod length which alternate the neuro-endocrine system (Schams *et al.*, 1980). The present study results, however, agrees with that of Polastre *et al.*, (1987b) who reported that cows calving in late autumn or early winter had the highest yield than those calving in other seasons.

Milk yield may be affected by other productive and reproductive factors such as calving interval (Becerril Perz *et al.*, 1981); lactation number (Pandya *et al.*, 1984) ; dry period length (El-Barbary *et al.*, 1983); and age of dam (Nobre *et al.*, 1984).

Conflicting results from earlier research on the effects of photoperiod and temperature on milk yields have been reported (Sarchet *et al.*, 1968; Murrill *et al.*, 1969).

Lactation Period Length

The mean lactation period was 293.28 ± 2.32 days and ranged from 269.45 to 323.1 days. This period is shorter than those estimated by Roman *et al.*, (1975) for Holstein

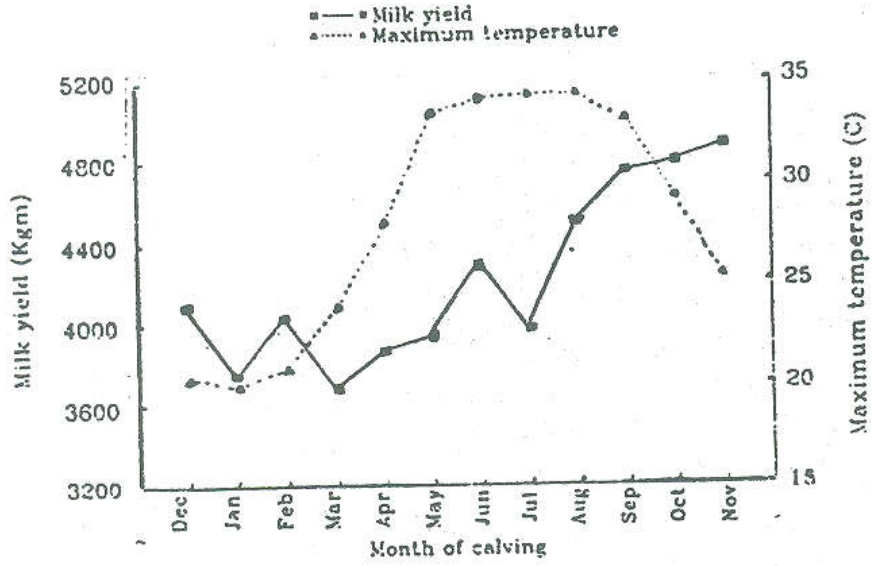

Fig.(8 A). Effect of month of calving and temperature on milk yield in Friesian cows.

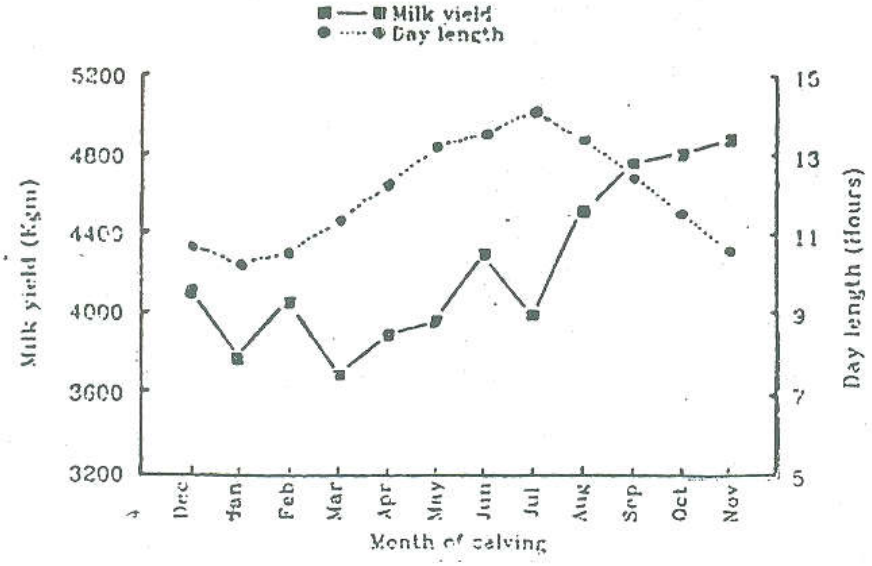

Fig. (8 B). Effect of month of calving and day length on milk yield in Friesian cows.

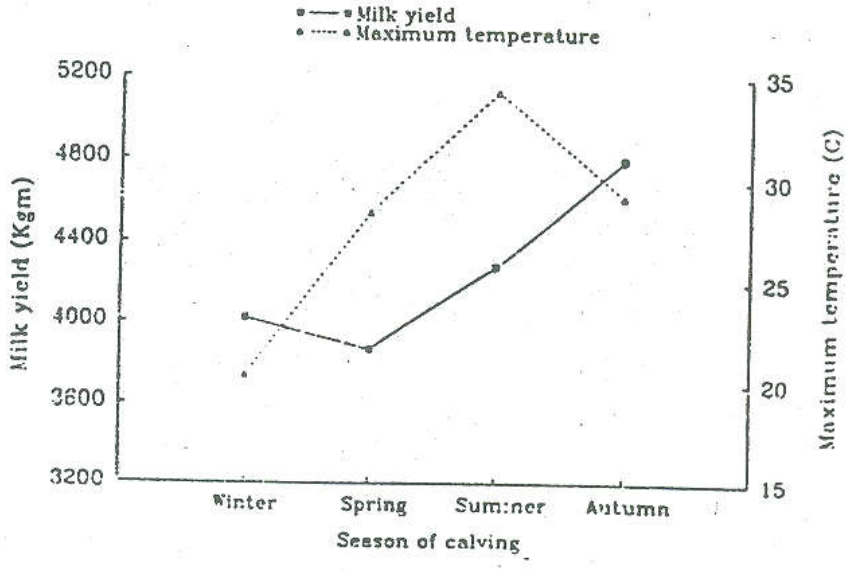

Fig. (9 A). Effect of season of calving and temperature on milk yield in Friesian cows.

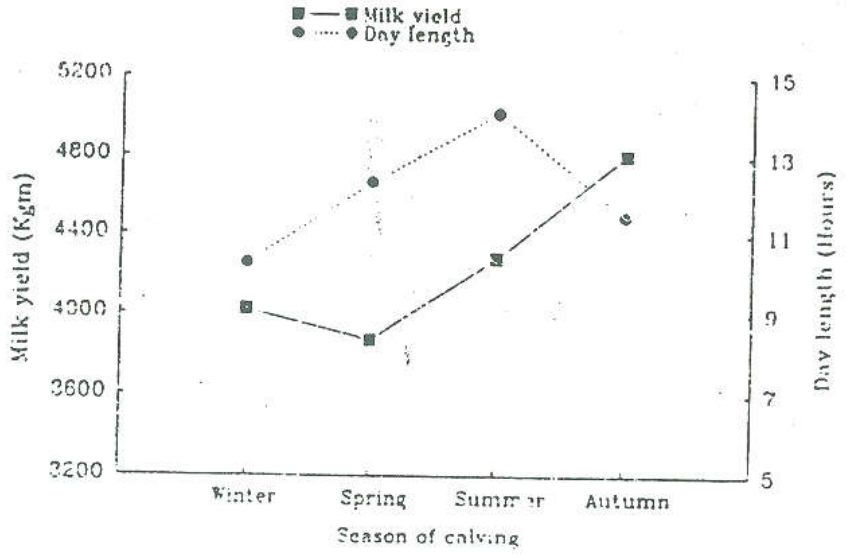

Fig. (9 B). Effect of season of calving and day length on milk yield in Friesian cows.

Friesian (325 days); Ragab *et al.*, (1973), and Nagarcenkar and Rao (1982) for Friesian cows (332 and 304 days, respectively); while it was longer than the values found by Maarof *et al.*, (1987), who estimated it by 193 days for dairy cattle, but it was almost similar to the estimation of Bhat *et al.*, (1978), who estimated the lactation period length of Indian cows by 291.9 days.

Month of calving affected significantly ($p < 0.01$) lactation period length. Lactation period was longer (323.1 ± 14.19 days) in cows calving during November, while it was shorter (269.45 ± 8.88 days) in cows calving in December (Fig. 10 A,B). Length of lactation period in the present study is in conformation with that reported by parekh and Singh (1982), although it was different from that found by Raheja *et al.*, (1983), who found that month of calving had no effect no lactation period length.

Effect of season of calving on the length of lactation period was significant ($p< 0.01$). This is in conformation with the results of Maarof *et al.*, (1987); while it does not agree with Bhan and Prasad (1985). Seasonal effect indicated longer (314.43± 5.56 days) lactation period during autumn calving, while cows that calved during winter had shorter (282.47 ± 6.33 days) period of lactation (Fig. 11 A,B). These results are in agreement with Nobre *et al.*, (1984). The difference in lactation period length between the different seasons is significant indicating that the season of calving had an influence on the length of lactation period.

Other factors also affected lactation period length. A positive correlation was found between lactation period length and milk yield (Becerril Perez *et al*, 1981); and between lactation period and dry period (Hadi and Bellorkar, 1972).

Dry Period Length

The overall mean value of dry period length was 74.79 ± 1.63 days and ranged from 57.5 to 85.7 days. This period is shorter than that found by Queiroz *et al.*, (1986) for Holstein Friesian, who reported that dry period was 111.91 days, while it is longer than values obtained by Brabander *et al.*, (1972) for Holstein Friesian (61.59 days); Bhat *et al.*, (1978) for Friesian cattle in India.

Month of calving indicated longer dry period associated with December calving (85.7 ± 11.35 days) while cows calving during October exhibited shorter dry period dry period (57.5 ± 3.82 days) than in other months (Fig 12 A,B). Month of calving showed a significant effect on dry period length. Rao and Taylor (1971) found that the longest dry period was attained in cows calving in March, and the shortest was in those calving in August.

Season of calving affected significantly ($p < 0.01$) the length of dry period. Cows calving during spring season had the longest dry period (81.46 ± 3.6 days), whereas the shortest one was observed in cows calving in autumn (65.01 ± 2.1 days) (Fig. 13 A,B) this result is in agreement with Maarof *et al.*, (1987), who found that dry period was affected by season of calving, but they reported that cows calving during autumn had a significantly longer period. The significant difference among seasons could be due to the difference in food availability and climatic conditions (Maarof *et al.*, 1987).

Dry period length may be affected by milk yield (El-Barbary, 1983) ; lactation seasons (Nagpaul and Bhatnagar, 1972), and calving interval (wood, 1985) .

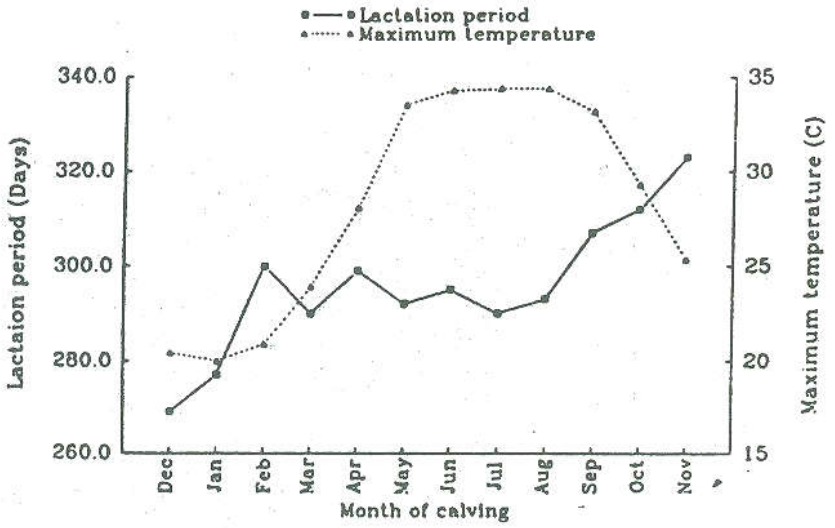

Fig. (10 A). Effect of month of calving and temperature on lactation period length in Friesian cows.

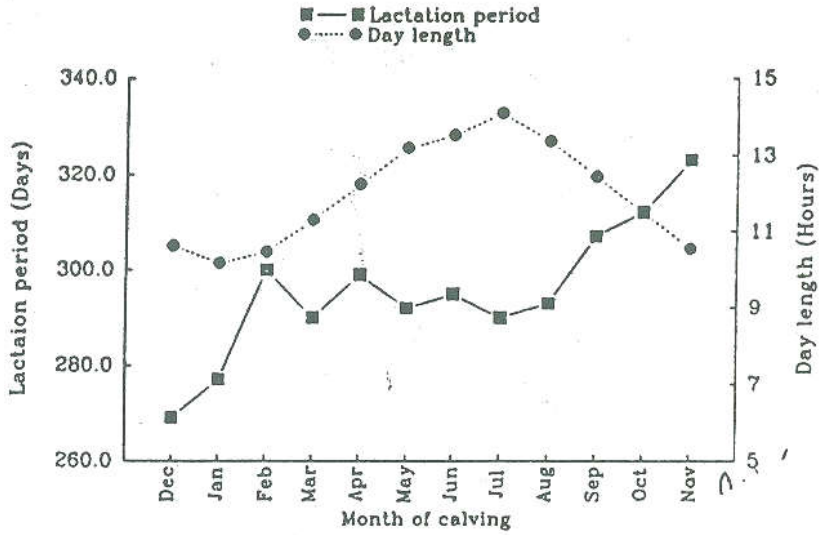

Fig. (10 B). Effect of month of calving and day length on lactation period length in Friesian cows.

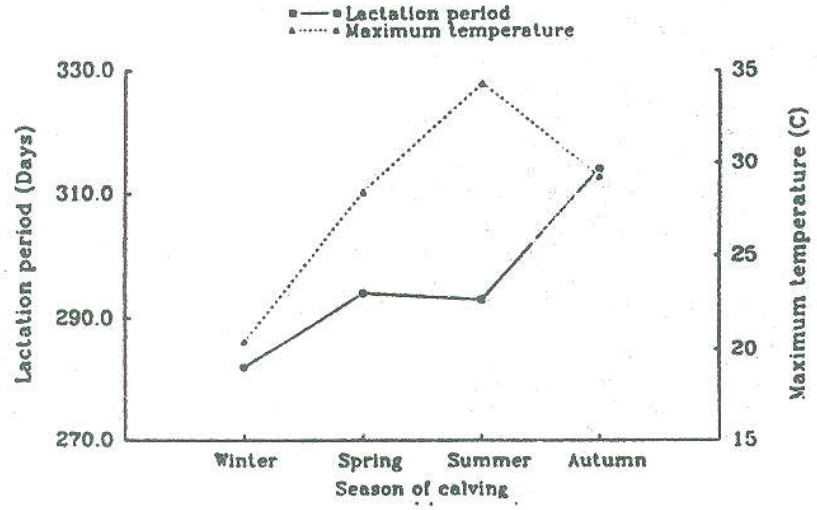

Fig. (11 A). Effect of Season of calving and temperature on lactation period length in Friesian cows.

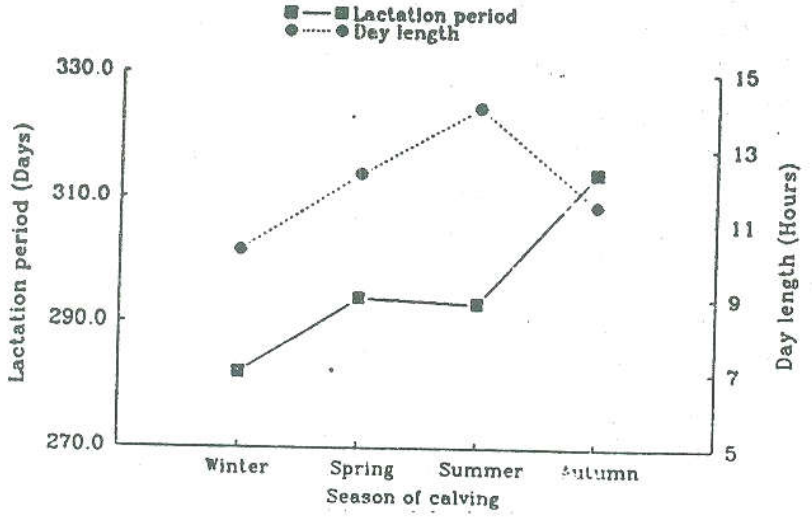

Fig. (11 B). Effect of season of calving and day length on lactation period length in Friesian cows.

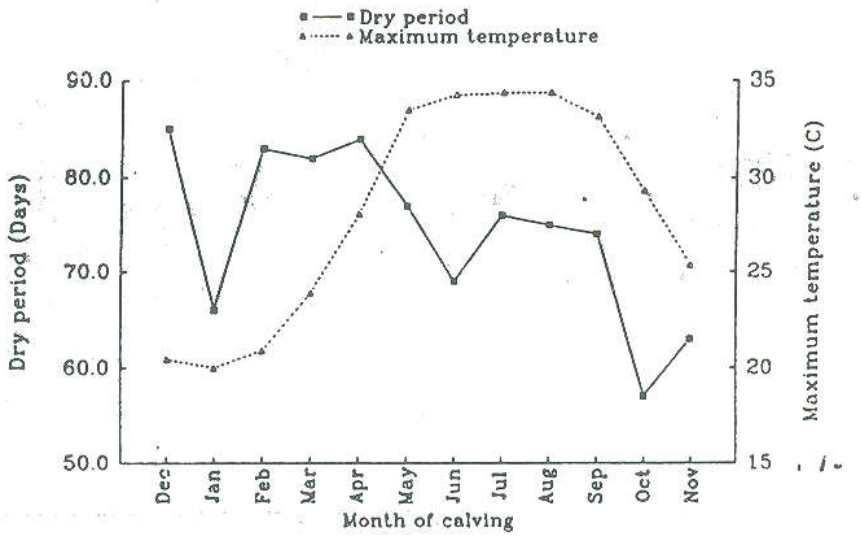

Fig. (12 A). Effect of month of calving and temperature on dry period length in Friesian cows.

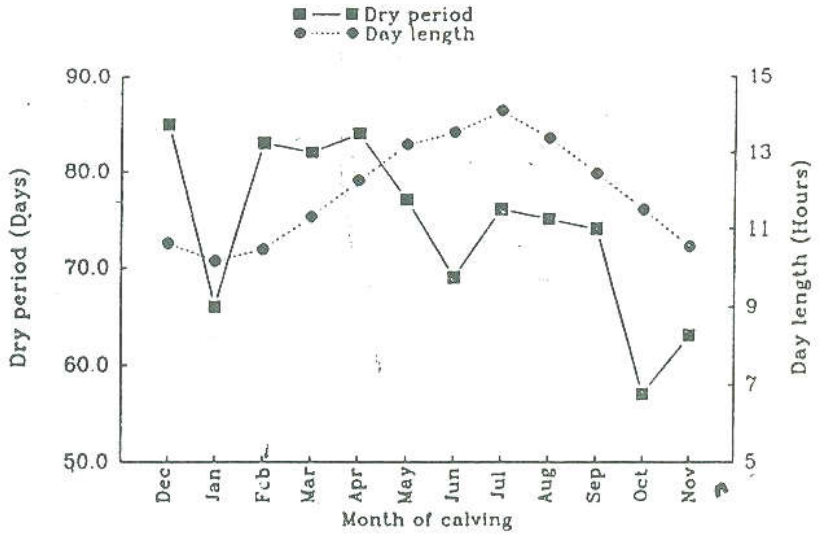

Fig. (12 B). Effect of month of calving and day length on dry period length in Friesian cows.

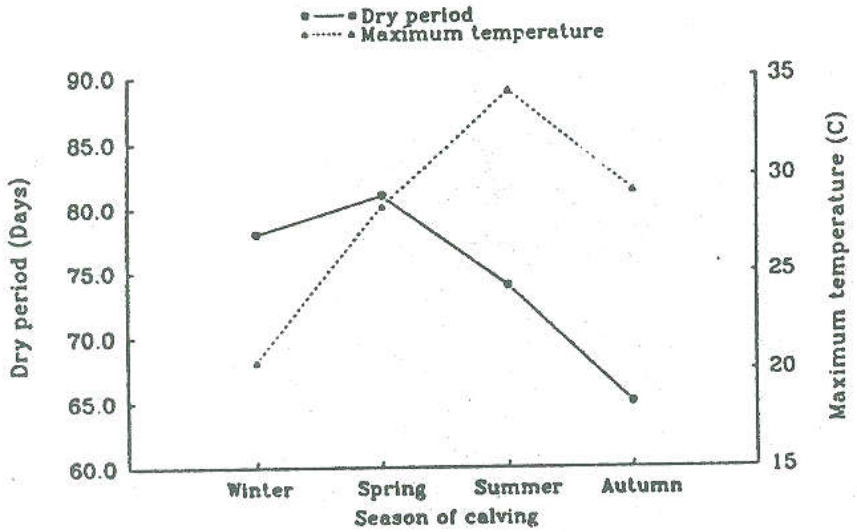

Fig. (13 A). Effect of Season of calving and temperature on dry period length in Friesian cows.

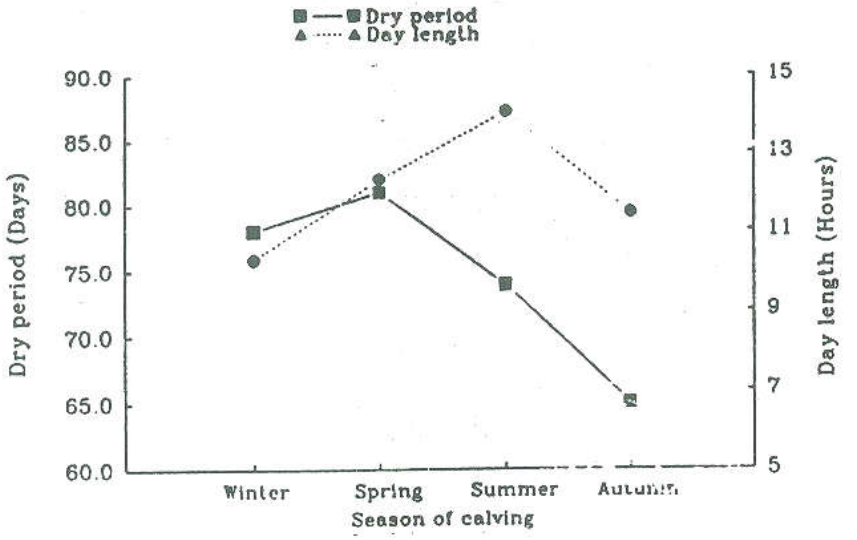

Fig. (13 B). Effect of Season of calving and day length on dry period length in Friesian cows.

References

Aguilar, C.J.A. and Hinojosa, C.J.A. (1981)Reproductive performance of Holstein Friesian cows in humid tropical climate. *Memoria Association Latino-Americana de Production Animal.* **16**:115. (A.B.A.1984, 52 : 6436).

Alencar, M.M.D.E. and Bugner , M. (1987) Performance of Conchin and Nellore cows. II. First calving. *Pesquisa Agropecuaria Brasileira* **22** (8) : 867. (A.B.A. 1988, 56: 3464).

Alexander, G.I., Reason, G.K., Gale, G.M.R. and Clark, C.H. (1984) The performance of Australian Friesian Sahiwal cattle in Darwin, Northern Australian. *World Animal Review*, **52** : 13. (A.B.A. 1985, 53: 1927).

Arthur, G.H. and Rahim, A.T.A . (1984) Temporal features of oestrus in Saudi Arabian imported cattle Urbana U.S.A. University of Illinois **304** : 3. (A.B.A. 1985, **53**: 6253).

Badinga, L.R., Collier, J., Thatcher, W.W. and Wilcox, C.J. (1985) Effect of climatic and management factors on conception rate of dairy cattle in subtropical environment. *J. Dairy Sci.* **68**:78.

Becerril Perez, C.M., Roman Ponce, H. and Castillo Rojas, H.(1981) performance of Holstein-Friesian and Brown Swiss cows and their F1 crosses with Zebu in a tropical climate *Ecnica pecuaria en Mexico* **40** : 16. (A.B.A. 1982, **50** : 1338).

Berger, P.J., Shanks, R.D., Freeman, A.E. and Laben, R.C. (1981) Genetic aspects of milk yield and reproductive performance. *J. Dairy Sci.* **64**: 114.

Bhan, C. and Prasad, J. (1985) Effect of season of calving on milk yield, fat production, lactation length and dry period of some crossbred cows of A.A.I. dairy farm. Livestock Adviser **10**: 13.

Bhat , P.N., Gurcharan Singh, J.C., Biswas, Singhal, R.A., Garg, R.C. and kumar , S. (1978) performance of Holstein-Friesian cattle in India *Ind. J. Anim. Sci.* **48** : 643.

Bhatnagar, D.S., Taneja, V.K. and Basu, S.B. (1982) Effect of various factors on some reproductive traits in Tharparkar cows. *Ind. J. Dairy Sci.* **35** : 331.

Bond, J. and McDowell, R.E. (1972) Reproductive performance and physiological responses of beef females as affected by prolonged high environmental temperature. *J. Anim. Sci.* **35** : 820.

Bonsma, J.C. (1949) Breeding cattle for increased adaptability to tropical and subtropical environment. *J. Agr. Sci.* **39**: 204.

Brabander, D.L, Boucque, de,C.V., Buysse, F.X. and Aests, J.V. (1972) First experience in Belgium with Canadian Holstein-Friesian cows. *Revue de Agriculture* **25** : 1663. (A.B.A. 1974, 42: 4187).

Desilva, A.W.V., Anderson, G.W., Gwazdauskas, M.L., McGilliard and Lineweaver. (1981) Inter-relationships with estrous behaviour and conception in dairy cattle. *J. Dairy Sci.* **64**: 2409.

De Vries, S., Osinga, A. and Zeinstra, J. (1972) The oestrous period and the oestrous cycle in Friesian milking cows in kenya as related to heat detection problems. *Anim. Reprod. Artif. Insem. Munich,summaries* **31**. (A.B.A. 1972,40 : 4379).

Dular, R. and La Bella, F. (1977) Isolated prolactin and growth hormone granules from bovine pituitary : content and stability are seasonally dependent. *Endocrine Res. Commun.*, 4 :195.

El-Amin, F.M., Simeri, N. A. and Wilcox, C.J. (1986) Genetic and environmental effects upon reproductive performance of Holstein crossbreds in Sudan. *J. Dairy Sci.* **69** : 1093.

El-Barbary, A.S.A., Al- Hkim, M.K. and Shalie, A.A.A. (1983) Some economic characteristics of the Friesian cattle in Iraq. *Ind. Vet. J.* **60** : 735 .

Gangwar, P.C. ,Braton, C. and Evans, D.L. (1965) Reproductive and physiological responses of Holstein heifers to controlled and natural climatic conditions . J. *Dairy Sci.* **48** : 222.

Glama, H., Wells, M.E., Adams, G.D. and Mohrrison (1976) Factors affecting calving interval in dairy herds. *J. Dairy Sci.*, **59** : 297.

Gwazdauskas, F.C., Thatcher, W.W and wilcox, C.J. (1973) physiological environmental and hormonal factors at insemination which may affect conception. *J. Dairy Sci.*, **56**: 873.

Gwazdauskas, F.C., Thatcher, W.W., kiddy, C.A, paape, M.J. and Wilcox, C.J. (1981) Hormonal patterns during heat stress following PGF 2 a Tham sait induced luteal regression in heifers . *Theriogenology* **16** : 271.

Gwazdauskas, F.C., Lineweaver, J.A. and Megilliard, M.L. (1983) Environmental and management factors affecting estrous activity in dairy cattle. *J. Dairy Sci.* **66**: 1510.

Hadi, M.A. and Bellorkar, P.M. (1972) Analysis of the components controlling service period in Gaolao breed of cattle in India. *International Congress on Animal Reproduction and Artificial Insemination, Munich summaries* **399** (A.B.A. 1973, 40 : 2063).

Hall, J.L., Branton, C. and Stone, J. (1959) Estrus, estrous cycles, ovulation time, time of service, and fertility of dairy cattle in Louisiana *J. Dairy Sci.*, **42** : 1086.

Hansel, W. and Trimberger, G. W. (1952) The effect of progesterone on ovulation time in dairy heifers. *J. Dairy Sci.* **35** : 65.

Juma, K.H., Al-Ani, L.M. and Rasheed, S.T. (1988) Factors affecting number of services per conception in pure bred Friesian and its crosses with native Iraqi cattle. Ind. *J. Anim. Sci.* 58194(A.B.A. 1988, 56: 6216).

Kassab, S.A., Sial, S.M.B, Gharib, F.H. and kamar, G.A.R. (1976) Physiological aspects in milk production in semi-arid conditions of graded cattle in Iraq. *Egyptian Journal of Animal production.* **16**, 1.

Khlabystich, V.M. (1974) Effect of inseminating cows soon after calving on their reproductive performance. Vsesoyuzny Nauchno-Issledovatel Skii Institut zhivotn ovodstva **38** : 84 (A.B.A. 1976, **44**: 2688).

Laben, R.L., Roger Shanks, Berger, P.J. and Freeman, A.E. (1982) Factors affecting milk yield and reproductive performance*J. Dairy Sci.* **65** : 1004.

Labhsetwar, A.P., Tyler, W.J. and Casida, L.E. (1963) Genetic and environmental factors affecting quiet ovulations in Hlostein cattle *J. Dairy Sci.* **46** : 843.

Lopez, D. and Ruiz, C. (1987) Factors affecting the reproductive performance of 5/8 Holstein 3/8 Zebucuban. *J.Agric. Sci.* **21** : 223 (A.B.A. 1988, 56 : 2908).

Maarof, N.N., Al-Ani, L.M. and Rasheed, S.T. (1987)performance of Jenupi cattle. *Ind. J. of Anim. Sci.*, **57** : 719.

Madalena, F.E. and Hinojosa, C.(1976) Reproductive performance of zebu compared with Charolais x Zebu females in humid tropical environment. *Anim. Prod.* **25**: 55.

Marion , G.B. and Gier, H.T. (1968)Factors affecting bovine ovarian activity after parturition. *J. Anim. Sci.*, **27** : 1621 .

Menendez Buxadera, A., Guerra, D., Dominguez, A., Rodriguez, N. and Morales, J.R. (1984) Seasonal variation in calving interval and its components in Holstein, Zebu, Criallo and Charolais cattle under Cuban conditions. Paris, France, INRA 101- 111 (A.B.A. 1985), **53** : 4881).

Murrill, F.D., Fide, R.N., Leonard, R.O. and Bath, D.L. (1969) Effect of corral lighting on feed intake and milk production of dairy cattle. *J. Dairy Sci.* **52** : 947.

Nagar-Cenkar, R. and Rao, M.M. (1982) performance of tharparkar exotic crosses for productive and reproductive traits. *Ind. J. Anim. Sci.* **52** : 129.

Nagpaul, P.K. and Bhatnagar, D.S. (1972) Effect of preceding dry period on lactation yield in Tharparkar cattle. *Ind. Vet. J.* **49** : 486.

Nikolaev, A.S. (1971) The oestrous cycle in nulliparous and calved heifers housed in winter. Trudey vesesoyuznogo sel skokhozyaistvennogo Instituto Zoochoogo obrazovaniya **44**: 124 (A.B.A. 1974, 41 : 2087).

Nobre, P.R.C., Milogres, J.C., Ludwig, A. and Fonseca, F.A. (1984) Genetic and environmental factors affecting length of calving intervals and age at first calving in the dairy herd at the Federal University of Vicosa, Minas Cerais State Revista da Sociedade Brasileira de Zootecnia 13 : 347. (A.B.A. 1985, **53** : 4810).

Pandya, D.K., Johar, K.S. and Singh, A. (1984) Study of some economic traits of Jersey in tropics livestock. Adviser 9 : 19. (A.B.A. 1985, **53** : 2650).

Parekh, H.K.B. and Singh, B.K. (1982) Factors affecting oestrus duration in cross-bred cows *Ind. J. Dairy Sci.* **2** : 215.

Plasse, D., Warnick, A.C and Koger, M. (1970) Reproductive behaviour of Bos indicus females in a subtropical environment. IV. Length of estrous cycle, Duration of estrus, time of ovulation, fertilization and embryo survival in grade Brahman heifers. *J. Anim. Sci.* **30**: 63.

Polastre, R., Milagres, J.C., Assis, P.S. and Fre, C.A. (1987a) Genetic and environmental factors on the performance of Holstein-FriesianxZebu cows. 4. Lactation length. *Revista da Sociedade Brasileira de Zootecnia* **16** : 254 . (A.B.A. 1988, 56:2556).

Polastre, R, Milagres, J.C., Ramas, A. De A. and Teixeira, N.M. (1987 b) Genetic and environmental factors on the performance of Holstein-Friesian x Zebu cows. 5. Genetic and phenotypic correlation. *Revista da Sociedade Brasileira de Zootecnia* **16** : 261. (A.B.A. 1988, 56:2557).

Ponston, H.A., Ulberg, L.C. and Legates, J.E. (1962) Analysis of seasonal fluctuations of reproductive performance in dairy cows. *J. Dairy Sci.* **45** : 1376.

Queiroz, S.A., Giannoni, M.A. and Ramos, A.A. (1986) Effects of environmental factors on duration of dry period in Holstein Friesian x Zebu cows in the district of Sao Carlos. *Ars. Veterinaria* 2 : 269. (A.B.A. 1988, **56** : 3367).

Ragab, M.T., Abdel-Aziz, A.S. and Norad, H.M. (1973) Phenotypic and genetic parameters of some productive traits, in a herd of Friesian cattle at the Tahreer Province. Egyptian *J. of Anim. Prod.* **13** : 1.

Raheja, k.L., Rajendrakumar and Bhat, P.N. (1983) Effect of various factors no milk yield and dry period in Indian Buffaloes *Ind. J. Dairy Sci.* **36** : 38.

Rako, A. and Karadjole, I. (1984) The effect and importance of calving season no fertility and milk yield Stoca **38** : 123. (A.B.A. 1985, **53** : 93).

Rao, M.V. and Taylor, C.M.(1971) Genetic causes of variation in gestation of Ongole cattle *Indian Vet. J.*, **48**:147.

Roberts, S.J. (1956) In Veterinary obstetrics and genital disease Ithaca, New York.

Roman, H., Cabello, E. and Wilcox, C.J. (1975)Some factors related to milk production in a tropical climate (Abst. V. Reunion Latino Americana de production animal, Maracy, Venzuela 30 Nov-5Dec.) . (A.B.A. 1976, **44** : 1476).

Romcevic, L.J., katic, M., vasovic, s, Lazorevic, R and Nikitovic, N. (1984) The effect of calving season on dairy performance of cows. Stocarstvo **38** : 171.(A.B.A. 1985, **53** : 4147).

Sarchet, J., Ward, G. and Hansen, R. (1958) Influence of artificial lighting no milk production and feed consumption of dairy cattle. Colorado Agric. Exp. Stn. *Colorado Farm Power Council Pamphlet.*

Schams, D., Stephan, E. and Hooley, R.D. (1980) The effect of heat exposure on blood serum level of anterior pituitary hormones in calves, heifers and bulls. *Acta Endocrinol.* **94** : 309.

Schneider, F., Shelford, J.A., Peterson, R.G. and Fisher, I.J. (1981) Effect of early and late breeding of dairy cows on reproduction and production in current and subsequent lactation . *J. Dairy Sci.*, **64**: 1996.

Sharma, L.D. (1983) Reproductive performance in Nagauri cattle. *Ind. J. Anim. Sci.* **53** : 1019.

Snedecor, G.W. and Cochran, W.G. (1984) Statistical methods 6th ed. *.Iowa State College Press.* Lowa U.S.A.

Sukumaran, M.V. and Pavithran, K. (1971) A note on the effect of moon and season on oestrus of cattle kerala *J. Vet. Sci.* **2**: 103 (A.B.A. 1973, 41: 2598).

Thatcher, W.W. (1974) Effect of season, climate, and temperature on reproduction and lactation. *J. dairy Sci.* **57** : 360.

Thatcher, W.W.,Fredriksson, W.B., Wilcox, C.J. and Boggs, O.P. (1971) A comparison of two methods of detecting oestrus in dairy cows. *Revn. Lat. Am. Prod. Anim., Bogota*, 1971 : 130 (A.B.A. 1972, **40** : 3102).

Thatcher, W.W. and Wilcos, C.J. (1973) Post-partum oestrus as indicator of reproductive status in the dairy cows. *J. Dairy Sci.* **56**: 608.

Turek, F.W. and Campbell, C.S. (1979) Photoperiodic regulation of neuroendocine - gonadal activity. *Biol. Reprod.* **20** : 32.

Wagner, W.C., Strohbehn, R.E. and Harris, P.A. (1972) ACTH, corticoids and Iuteal function in heifers. *J..Anim. Sci.* **35** : 789.

Williamson, N.B., Morris, R.S., Blood, D.C. and Christine, M. Cannon. (1972) A study of oestrus behaviour and oestrus detection in a large commercial Dairy herd. *Vet. Rec.* **91** : 50.

Wood, P.D.P. (1985) Importance of the calving interval to milk yield in the following lactation of British Friesian cows. *J. Dairy Res.* **52** : 1. (A.B.A. 1979, **47** : 1089).

Zakaria, A.Y. (1981) Effect of season on the oestrous cycle of cows Bos indicus indigenous to northern Nigeria. *Vet Rec.* **12** : 213.

تأثير موسم وشهر الولاده على الأداء التناسلى وانتاج اللبن لابقار الفريزيان فى مصر

حسين عبدالبارى - محمود محمد محمود- حسن اسماعيل زكى- على عباس محمد

قسم الانتاج الحيوانى - كلية الزراعة - جامعة الأزهر

اجريت الدراسه على ٤٦٣ بقرة فريزيان نقى مستورده عشار من هولاندا واوضحت الدراسة ان لشهر الولاده تأثير معنوى على ناتج اللبن وطول موسم الحليب وفترة الجفاف . بينما كان التأثير على دورة وفتره الشبق وعدد مرات التلقيح غير معنوى . كما تأثر ايضا كل من فترة الشبق وناتج اللبن وموسم الحليب وفترة الجفاف معنويا بموسم الولاده .