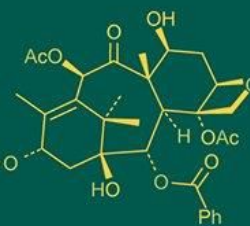
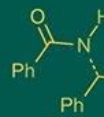
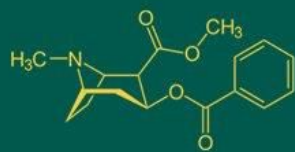


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Length of estrous cycle in Holstein-Friesian upgraded COWS

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Abstract

A normal healthy reproductive cycle in females include onset of early postpartum estrus, successful conception and a normal parturition. The number of services required for a successful conception determines the fertility status of a breeding herd and thus the overall breeding efficiency of a farm. A study was conducted in an organized dairy farm where five years data from 1996 to 2000 was statistically analysed. The overall incidence of the estrous cycle length of less than 17 days, 18 to 24, 25 to 35, 36 to 48 days and more than 48 days were estimated to be 5.61, 42.49, 13.80, 16.08 and 22.00 percent, respectively. The incidence of interservice intervals varied significantly ($p < 0.05$). The difference in the incidence of normal cycles might be due to difference in breed, plane of nutrition, management and agroclimatic conditions. The period of two heats is a reflection of one heat missed or silent heat, but the possibility of embryonic death cannot be ruled out. Inadequate oestrus detection was an important factor for a high incidence of long returns obtained in this study.

Keywords: Estrous cycle length, parity and Holstein-Friesian upgraded cows

Introduction

Cow fertility is both biologically and economically important to enhance the efficiency of production; however a satisfactory single measure of female reproductive performance has not been established. Estrus detection rate in dairy herds are often low and represent a major limiting factor in optimizing reproductive performance. Fertility of dairy animals is a managerial rather than a physiological. According to Forde *et al.* (2011) [32], it is well acknowledged that the estrous cycle of domestic cattle (*Bos taurus*) lasts roughly 21 days, with a typical range of 18 to 24 days. Improved heat detection might benefit from a more precise understanding of the typical cycle duration. Research has shown that differences in estrous-cycle length are more common between cows than within them. Significant differences in the duration of the estrous cycles have been noted in the cows. Mares *et al.* (1961) [18] observed estrous cycle length in heifers to be affected significantly by the season of birth and the system of mating. In contrast, the duration of the estrous cycle does not seem to be consistently affected by either the cow's fertility breeding value or number of previous postpartum cycles (Reed *et al.*, 2022) [22]. The most common interval between inseminations was 22 days rather than the accepted 21-days normal interval, with a range of 18 to 28 days (Remnant *et al.*, 2015) [23]. Taking these factors into account, the current study was undertaken to know the occurrence of average interoestrous interval or length of estrous cycle in different lactations in a well-organized dairy farm near Bengaluru.

Materials and Methods

The present study utilized the data on 224 cows collected from the history sheets of organized dairy farm at Bengaluru (Bangalore) for a period of five years (1996-2000). The Holstein-Friesian upgraded (Local X HF) cows were properly managed under the good veterinary care. The cows were fed a basal standard diet (concentrates) based on the quantity of milk produced. In addition, the cows were fed on pasture, guinea grass, Punjab-18 variety hybrid Napier and subabul. To know the length of estrous cycle in different lactations or parity, the data were grouped as parity 1, 2, 3, 4, 5, 6 and 7. In order to cope-up with the effect of non-orthogonality of the data due to unequal subclass frequencies, method of least square analysis was employed.

The data was analyzed by chi-square analysis as per the methods of Snedecor and Cochran (1994)^[26].

Results

Estrous cycle length (ECL) or interservice intervals

The frequency distributions of interservice intervals or estrous cycle length are presented in the Table 1. It could be

observed from the table that in the overall incidence, the estrous cycle length of less than 17 days, 18 to 24, 25 to 35, 36 to 48 days and more than 48 days were estimated to be 5.61, 42.49, 13.80, 16.08 and 22.00 percent, respectively. The incidence of interservice intervals varied significantly ($p < 0.05$).

Table 1: Estrous cycle length in various lactations

ECL (days)	Parity or Lactations							Total	In percent (%)
	1	2	3	4	5	6	7		
<17	18 (9.94)	5 (2.63)	8 (6.50)	1 (1.29)	3 (5.45)	1 (3.84)	1 (14.28)	37	5.61
18-24	69 (38.12)	77 (40.52)	59 (47.96)	31 (40.25)	29 (52.72)	12 (46.15)	3 (42.85)	280	42.49
25-35	25 (13.81)	30 (15.78)	15 (12.19)	10 (12.98)	4 (7.27)	7 (26.92)	-	91	13.80
36-48	28 (15.46)	30 (15.78)	14 (11.38)	16 (20.77)	13 (23.63)	4 (15.38)	1 (14.28)	106	16.08
>48	41(22.65)	48 (25.26)	27 (21.95)	19 (24.67)	6 (10.90)	2 (7.69)	2 (28.57)	145	22.00
Total	181	190	123	77	55	26	7	659	

ECL = Estrus cycle length

Discussion

Estrous cycle length or Inter service intervals

Profound variations in the length of the estrous cycles have been observed in the cows. Several studies indicated that the cycle averages 21 days, but the length of the estrous cycles with two to three waves of follicle development averaged 21.4 and 23.7 days, respectively.

It is very well documented that large proportion of infertility problems in dairy cattle are centered on the disturbance in the estrus phase. Reproductive efficiency in dairy cows is affected adversely by aberrations in the estrous cycle. The relationship of interoestrous intervals with other indices of herd reproduction performance was investigated by Gaines *et al.* (1993)^[7]. Pregnancy rates were found to be higher (63%) for cows with normal interoestrus intervals of 18 to 24 days, and were significantly lower for cows with intervals of 4 to 17 days (50%) and 25 to 35 days (53%). The interoestrus interval profile of a dairy herd may therefore be a value in examining the fertility (Gaines, 1989; Narasimha Rao *et al.*, 1996)^[8, 21].

Results of the present study revealed that the incidence of normal estrous cycle length (18-24 days) to be 42.49 percent. Several studies have reported the incidence of normal cycle length (18-24 days) to vary between 18.1 percent to 60 percent (Badawy *et al.*, 1973; Luktuke *et al.*, 1973; Coetzer *et al.*, 1975; Kabuga and Alhassan, 1981; Ghosh *et al.*, 1996; Jabbar *et al.*, 1983; Sharma *et al.*, 1984; Warren, 1984; Khasatiya *et al.*, 1998; Narasimha Rao *et al.*, 1996 and Zi *et al.*, 2003)^[2, 17, 4, 15, 9, 13, 25, 29, 16, 21, 31], respectively. This was in agreement with the findings of the present study. However, others have observed higher incidence of normal cycle (Diaz and Gonzalez, 1965; Johnson and Ori, 1986)^[27, 14]. On the other hand, few studies have also reported lower incidence of normal cycles than those observed in the present study (Martinez *et al.*, 1984; Soto and Gozalez, 1990)^[19, 27]. The difference in the incidence of normal cycles might be due to difference in breed, plane of nutrition, management and agroclimatic conditions.

The incidence of short cycles (less than 17 days) in the present study was 5.61 percent. Several investigators

reported the incidence of short cycles to vary between 1.3 to 22.78 percent (Kabuga and Alhassan, 1981; Jabbar *et al.*, 1983; Sharma *et al.*, 1984; Warren, 1984; Khasatiya *et al.*, 1998; Ghosh *et al.*, 1996; Narasimha Rao *et al.*, 1996)^[15, 13, 9, 25, 29, 16, 21]. The estimated value of 5.61 percent is almost nearer to the value of 4.3 and 4.5 percent by Jabbar *et al.* (1983)^[13] in HF cows and 4.3 percent by Narasimha Rao *et al.*, (1996)^[21], while it is higher than the 1.3 percent reported by Kabuga and Alhassan (1981)^[15] in HF cow. Williams (1967)^[30] observed that short cycles in dairy cows were due to uterine irritation and failure of corpus luteum and pointed out that short cycles could often be induced with stress. Bane and Rajakoski (1961)^[3] and Sreenan and Diskin (1985)^[28] indicated that short cycles might be due follicles of the first wave follicular cyst or split oestrus.

The incidence of long cycles (25 to 35 days) obtained in the present study was 13.80 percent. The incidence of long cycles have been reported to vary between 6.9 to 19.52 percent by several studies (Kabuga and Alhassan, 1981; Jabbar *et al.*, 1983; Sharma *et al.*, 1984; Warren, 1984; Narsaimha Rao *et al.*, 1996)^[15, 13, 25, 29]. The estimated value of 13.80 percent was almost close to 12.5 percent reported by Kabuga and Alhassan (1981)^[15] in HF cows, while it was higher than 6.9 percent reported by Jabbar *et al.* (1983)^[13] in HF cows and seven percent reported by Narasimha Rao *et al.* (1996)^[21] in Jersey cows. The occurrence of irregular long cycles (25-35 days) was attributed to early embryonic mortality by Sreenan and Diskin (1985)^[28] in dairy cows.

The incidence of twice the length of normal cycles (36-48 days) recorded in the present study was 16.08 percent. The estimated value is in close conformity with the observed value of 16.5 percent reported by Narasimha Rao *et al.* (1996)^[21] in Jersey cattle. However, several studies reported its incidence to vary between 2.5 to 29.3 percent (McDowell, 1970; Kabuga and Alhassan, 1981; Jabbar *et al.*, 1983; Sharma *et al.*, 1984; Ghosh *et al.*, 1996; Narasimha Rao *et al.*, 1996; Khasatiya *et al.*, 1998; Zi *et al.*, 2003)^[15, 13, 9, 13, 25, 21, 16, 31]. This denotes that the period of two heats is a reflection of one heat missed or silent heat, but the possibility of embryonic death cannot be ruled out. The incidence of interoestrus intervals of greater than 48

days recorded in the present study was 22 percent, which closely agree with reported value of 20.8 percent in HF cows by Jabbar *et al.*, (1983)^[13]. However, a much higher incidence of 40.6 and 34.8 percent are reported by Zi *et al.* (2003)^[31] in Chinese Holstein cows and Narasimha Rao *et al.* (1996)^[21] in Jersey cows from India. Further, a much lower incidence of 3.8 percent has also been reported in HF cows (McDowell, 1970).

Most of the studies have reported almost similar incidence of abnormal type of cycles in cattle (Eswariah, 1976; Sharma *et al.*, 1984; Martinez *et al.*, 1984)^[6, 25, 19]. Therefore, occurrence of long cycles might be related to aberrations in follicular maturation, ovulation and corpus luteal formation (Glencross and Pope, 1981)^[10] and include conditions as prolonged estrus, split estrus etc. The length of the estrous cycle in cows tends to be related to the number of waves of follicular growth during the ovarian cycles. Ultrasound imaging of ovaries indicated that short, normal and long cycles are usually accompanied by ovulation of dominant follicle emerging from the first, second and third follicular waves respectively (Savio *et al.*, (1988)^[84].

In a well managed herd with accurate detection of oestrus and presenting the cows for service, at least 45 percent of interval should be within the 18 to 24 days. Thus 12 percent for intervals of less than 17 days, 53 percent intervals of 18 to 24 days, 15 percent for intervals of 25 to 35 days and 10 percent each for intervals of 36 to 48 days and more than 10 days (Anon., 1984)^[1].

Conclusion

The present study revealed the incidence of the estrous cycle length of less than 17 days, 18 to 24, 25 to 35, 36 to 48 days and more than 48 days to be 5.61, 42.49, 13.80, 16.08 and 22.00 percent, respectively. The difference in the incidence of normal cycles might be due to difference in breed, plane of nutrition, management and agroclimatic conditions. The incidence of twice the length of normal cycles (36-48 days) recorded in this study was 16.08 percent. The period of two heats is a reflection of one heat missed or silent heat, but the possibility of embryonic death cannot be ruled out. The incidence of inter-oestrus intervals of greater than 48 days recorded in this study could be due to inadequate oestrus detection since 16.08 percent of inter service intervals were in the range of 36 to 48 days category, i.e., approximately equivalent of two oestrus cycle length.

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References

1. Anon. Dairy Herd Fertility. Reference Book. London: HMSO; 1984. p. 13, 15, 20.
2. Badawy AM, El-Bashary AS, El-Keraby FE. Studies on the sexual behaviour of the female purebred Holstein-Friesian in Egypt. II. Estrus cycle length and duration of estrus. Alexandria Journal of Agricultural Research. 1973;21:179-184.
3. Bane A, RajaKoski E. Follicular activity during the oestrous cycle. Cornell Veterinarian. 1961;51:77-79.
4. Coetzer WT, Mantz AH, Vermeliten JA, Coetzee JE. Observation on the occurrence of oestrous in Africander and Jersey cattle under extension conditions in North Cape. South African Journal of Animal Science. 1975;5:47-51.
5. Diaz OH, Gonzalez C. The sexual cycle of cow. Animal Breeding Abstracts. 1965;37:2449.
6. Eswariah Y. Studies on pattern of oestrous cycle and its aberration in crossbred cows. M.V.Sc. Thesis. Indian Veterinary Research Institute, Izatnagar; c1976.
7. Gaines JD, Thomas CB, Eicker S. The inter-oestrous interval profile of a dairy herd, How useful is it. Veterinary Medicine. 1993;88:665-671.
8. Gaines JD. The role of record analysis in evaluation subfertile dairy herds. Veterinary Medicine. 1989;84:532.
9. Ghosh SK, Agarwal SR, Shankar U, Yadav MC. Pattern of oestrous cycle and its aberrations in repeat breeding crossbred cattle. Indian Journal of Animal Reproduction. 1996;17:27-29.
10. Glencross RG, Pope GS. Concentration of estradiol 17 β and progesterone in the plasma of dairy heifers before and after cloprostenol induced and natural luteolysis and during early pregnancy. Animal Reproduction Science. 1981;4:93-103.
11. Habib MA, Bhuiyan AKFH, Amin MR. Reproductive performance of Red Chittagong cattle in a nucleus herd. Bangladesh Journal of Animal Science. 2010;39(1&2):9-19.
12. Harvey WR. Mixed models least square and maximum likelihood computer program. Snedecor GW, Cochran WG, editors. Statistical Methods. 8th ed. Iowa State University Press, Ames, USA; c1994.
13. Jabbar B, Ali NM, Jawad A, Pant HC. Analysis of factors affecting calving intervals of exotic dairy cows in town supply dairy herd in Iraq. World Review of Animal Production. 1983;19:19-23.
14. Johnson AO, Ori OO. Oestrous detection by mount received in Friesian X Bunaji and Bunaji heifers. Journal of Agricultural Science. 1986;107:67-69.
15. Kabuga JD, Alhassan WS. The reproductive performance of a small herd of Holstein Friesian in the humid forest zone of Ghana. World Review of Animal Production. 1981;17:3-9.
16. Khasatiya CT, Dhama AJ, Shan RG, Kavani FS. Studies on palpable genital abnormalities and oestrous cycle pattern in repeat breeding bovines. Indian Veterinary Journal. 1998;75:426-429.
17. Luktuke SN, Bhattacharya AR, Singh SK, Khan BV. Studies on pattern of estrous cycle in crossbred cattle. Indian Journal of Animal Production. 1973;4:142-46.
18. Mares SE, Menge AC, Tyler WJ, Casida LE. Variation in estrual cycles of Holstein-Friesian cattle. Journal of Dairy Science. 1961 May;44(5):897-904.
19. Martinez G, Salano R, Coral J, Ricardo E, Mtkka J. Reproductive performance in a herd of Zebu cows, The oestrous cycle. Animal Breeding Abstracts. 1984;54:2125.
20. McDowell RE. Breeding dairy cattle for adaptability in Venezuela. US Department of Agriculture Research Progress Report; c1970.
21. Narasimha Rao AV, Suribabu M, Ramamohan Rao H. Studies on oestrous cycle patterns in postpartum Jersey cows. Indian Veterinary Journal. 1996;73:692-693.

22. Reed CB, Kuhn-Sherlock B, Burke CR, Meier S. Estrous activity in lactating cows with divergent genetic merit for fertility traits. *Journal of Dairy Science*. 2022 Feb;105(2):1674-1686.
23. Remnant JG, Green MJ, Huxley JN, Hudson CD. Reproductive performance of dairy cows in relation to their management and feeding. *Journal of Dairy Science*. 2015;98(2):889-897.
24. Savio JD, Keenan L, Boland MP, Roche JF. Pattern of growth of dominant follicles during the oestrus cycle of heifers. *Journal of Reproduction and Fertility*. 1988;83:663-671.
25. Sharma NC, Luktuke SN, Singh B. Pattern of oestrous cycle in crossbred cows. *Indian Journal of Animal Science*. 1984;54:696-9.
26. Snedecor GW, Cochran WG. *Statistical Methods*. 8th ed. Iowa State University Press, Ames, USA; c1994.
27. Soto SCA, Gonzalez SC. Time of first postpartum oestrus and the duration of the oestrous cycle in crossbred cows. 1. Effects of breed type, season and parity. VI Congreso Venezolano de Zootecnia. San Cristobal, Venezuela; c1990 Nov.
28. Sreenan JM, Diskin MG. The extent and timing of embryonic mortality in cows. In: *Embryonic Mortality in Farm Animals*. Martinus Nijhoff Publishers; c1985. p. 1-11.
29. Warren ME. Biological targets for fertility and their effects on herd economics. In: *Dairy Cow Fertility*. Eddy RJ, Ducker MJ, editors. British Veterinary Association; c1984. p. 1-14.
30. Williams H. Control of ovarian cycle in cattle. Australian Veterinary Association Conference; May; Melbourne, Australia; c1967.
31. Zi XD, Ma L, Zhou GQ, Chen CL, Wei GM. Fertility of Holstein cows in Chengdu, China. *Asian-Australasian Journal of Animal Sciences*. 2003;16:185-188.
32. Forde N, Beltman ME, Lonergan P, Diskin M, Roche JF, Crowe MA. Oestrous cycles in *Bos taurus* cattle. *Animal reproduction science*. 2011 Apr 1;124(3-4):163-169.