

THE RELATION BETWEEN POSTPARTUM SERVICE INTERVAL AND THE REPRODUCTIVE EFFICIENCY IN A HERD OF FRIESIAN CATTLE IN THE U. A. R.

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SUMMARY

The breeding records of 435 Friesian cows having 953 pregnancies and belonging to the Tahreer Province were used in this study. Friesian cows subjected to the present study were imported mainly from the Netherlands either as pregnant heifers or heifers ready for mating. The present work was planned to determine the relationship between postpartum service interval and the breeding efficiency of Friesian cattle under the local environmental conditions of the Tahreer Province. The average postpartum service interval was 88.56 days with a standard deviation of 64.1 days. The percentage of cows that conceived from the first service, when mated within 60 days postpartum, was 31.59% which was significantly lower than for cows mated from 61 to 90 or more than 90 days post-calving. This finding proves that breeding cows less than 60 days postpartum should not be practised.

The number of services per conception for cows first mated within 60, 61 - 90, or more than 91 days postpartum were 2.89, 2.55 and 2.62 respectively. Differences between these values were found statistically insignificant. Service period length increased by the increase in postpartum service interval as it was 122.22, 137.58 and 234.72 days for cows first mated within 60, 61 - 90 and more than 91 days postpartum respectively. The differences between these three groups were statistically significant ($P < 0.01$).

A highly significant correlation of + 0.521 between postpartum service interval and service period length was obtained. The regression of service period length on postpartum service interval length was 0.82, showing that an increase of one day in the postpartum service interval corresponds to an increase of 0.82 days in service period length.

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Introduction

Periods between calvings are affected by the length of the interval from parturition to first service. Other factors undoubtedly affect the calving interval length *i.e.* periods from first to fertile service, embryonic mortality and the comparatively slight variation in gestation period length. It is particularly important to study the various components of the calving interval to increase the reproductive efficiency in dairy cattle.

The purpose of the present study was to determine the relationship between postpartum service interval and the reproductive efficiency of Friesian cattle in Egypt. A complete understanding of such a relationship would certainly help in decreasing within reasonable limits, the calving interval. However, an extreme shortening of the postpartum service interval would on the other hand unfavourably affect the reproductive performance of the cow (Elting and La Master, 1933; Hofstad, 1941; Erb and Shaw, 1946; Olds, 1950; Shannon *et al*, 1952; Trimberger, 1954; Warnick, 1955; and Touchberry, 1959. The fact that the uterus requires a certain time to attain a satisfactory condition, both histologically and physiologically, through its involution after parturition in order to receive the new expected embryo makes it possible to shorten the postpartum service interval only to a certain limit. Buch *et al* (1954) showed that the complete involution of the uterus required 47 days postpartum. The work of Hofstad (1941), Olds (1950), VanDemark and Salisbury (1950), Trimberger (1954), and Touchberry (1959) showed that the highest breeding efficiency could be obtained when cows were bred not less than 60 days postpartum.

Materials and Methods

The records of 435 Friesian cows having 953 pregnancies and belonging to the Tahreer Province were used in the present study. The study covered the period from 1955 to 1959. Most of the cows used in the present study were imported from the Netherlands either as pregnant heifers or as heifers ready for

mating. They were housed in good ventilated barns which protected them from heat during the summer. Other ways for protecting animals from the harmful effect of high atmospheric temperatures were also practised. Cows were fed according to their production and maintenance requirements. Egyptian clover (*Trifolium Alexandrinum*) and alfalfa (*Medicago sativa*) were available for the animals during the period from November to April. Rations included alfalfa or corn leaves as a green fodder were fed during the rest of the year.

Ragab and Asker (1960), calculated the milk yield of the cows included in the present study and the average was 6326 pounds in 305 days. Cows were checked for heat symptoms at least three times daily starting in the early morning and ending in the late evening.

During the period of this study only natural breeding was allowed except for only a limited number of cows that were inseminated artificially. Mating system was first arranged to breed cows as they come in heat. This system was replaced at the end of 1958 by the following system:

(a) Cows showing the signs of estrus at the morning heat check were bred in the same morning and rebred by the same sire at the following evening if still in heat.

(b) Cows expressing heat symptoms during the day were mated at the evening and rebred at the early morning of the next day if still in heat.

(c) Animals showing signs of heat at the evening heat check were mated in the early morning of the next day and rebred at the evening of the same day if still in heat.

Adult bulls were allowed to serve only at four days interval and younger bulls were allowed to serve only once a week. Only mild culling was made which allowed a considerable number of the subfertile individuals, especially if were high producers, to remain in the herd for a longer time. The breeding records were arranged in groups covering the four reproductive periods from 1955 till 1959. Each period commenced at the beginning of September and ended on August 31st. Cows having a

period of 15 months or less between calvings were considered regular breeders and those having calving intervals of more than 15 months were grouped as non-regular breeders. Data of regular and non-regular breeding cows were treated separately. Pregnancy was diagnosed routinely by rectal palpation 45 days after service.

Results and Discussion

1.—Postpartum Service Interval Length :

The average length of interval from calving to first service for the regular breeding cows in this herd was 73.15 days with a standard deviation of 44.60 days. The same average for non-regular breeders was 135.11 days with a standard deviation of 92.80 days as shown in table (1). The difference between the two groups of cows was significant ($P < .01$). The mean postpartum service interval length for the whole herd (regular and non-regular breeding cows) was 88.56 days with a standard deviation of 65.9 days. This value is comparable with the estimates of Olds (1950) and Walther (1956). The prolongation of postpartum service interval for non-regular breeders may be attributed to one or more of the following causes:

(a) The delayed involution of the uterus which may be due to abnormal parturition and such disorders as retention of placenta.

(b) Postpartum anestrus which includes the occurrence of silent heats. Trimberger (1956) found that the occurrence of silent heat was the direct cause of delayed postpartum estrus interval. Lindley (1953) mentioned that the disappearance of signs of heat 90 days postpartum, due to anestrus, should decrease reproductivity.

(c) An inefficient heat observation.

Of the total postpartum intervals investigated 24.9% were for non-regular breeders. A detailed study into the causes of the delay in the postpartum heat for such non-regular breeding cows is needed. Olds and Seath (1953), Carman (1955) and Warnick (1955) estimated a repeatability and heritability value of almost zero for postpartum service interval.

TABLE I.—Mean, Standard Deviation and Coefficient of Variability for Postpartum Service Interval of Cows Calving in the Period from 1955-1959

Observation	Breeding Season				All regular breeders	All non-regular breeders	All herd
	1955/1956	1956/1957	1957/1958	1958/1959			
	Number of pregnancies	80	131	237			
Mean (days)	82.94	66.92	70.87	75.29	73.15	135.11	88.56
Standard deviation (days)	29.90	48.00	46.40	44.50	44.60	92.80	65.90
Coefficient of variability	36.10	71.70	65.50	61.50	61.00	68.70	74.40

Year had no effect on postpartum service interval for regular breeding cows as shown by the non-significant differences in the length of this interval for cows calving in 1956, 1957, 1958 and 1959.

2.—Reproductivity as affected by the length of postpartum service interval :

(a) *Service period length as affected by the the length of postpartum service interval :*

As shown in table (2), the shortest average service period length (122.22 days) was obtained when cows were first mated within 60 days postpartum. It is observed also, that increasing the postpartum service interval is followed by the increase in service period length. This conclusion is in agreement with the finding of Touchberry (1959) but not with Trimberger (1954) who found a slight decrease in service period length by the increase in postpartum service interval. Cows first mated within less than 60 days conceived after 122.22 days and those mated 61-90 days or more than 90 days conceived after 137.58 and 234.72 days postpartum respectively. Differences between the three groups investigated were significant ($P < .01$).

TABLE 2.—Service Period Length, Number of Services for Conception and Percentage of Cows Conceiving From First Service as Affected by Postpartum Service Interval.

Reproductive Observation	Days from calving to first service			
	Less than 60	61-90	91 or more	
Service Period Length	No.	338	216	239
	\bar{X}	122.22	137.58	234.72
Number of Services per Conception	No.	338	216	239
	\bar{X}	2.89	2.55	2.62
Percentage of Cows Conceiving from first service	—	31.95	43.37	43.10

The highly significant positive correlation ($r=+0.521$) between service period length and postpartum service interval also verifies the relationship between the two variables. The regression of the number of days from calving to first service on service period length was 0.82 days which showed that one day increase in postpartum service interval corresponds to 0.82 day increase in service period length.

(b) *Number of Services per Conception as Affected by the Length of Postpartum Service Interval :*

The number of services per conception tends to decrease as postpartum services interval increases up to 90 days. Cows bred within two months after calving required 2.89 services for conception. A decrease of 0.34 in the number of services per conception was noted when first service was delayed up to 30 days (61-90 days postpartum) as shown in table (2). The number of services resulting in conception for cows first mated from 91 to 161 days or more was 2.62. Differences between these three groups however were insignificant. Moreover, no significant correlation was obtained between postpartum service interval and the number of services per conception ($r=0.062$). These results are similar to those reported by VanDemark and Salisbury (1950) and Touchburry (1959).

It is known, however, that the number of services per conception is not a good estimate for reproductivity due to the several factors that cause the variation in this number. A high number of services per conception may indicate that the cow is a poor one. On the other hand, a cow may require a very few number of services per conception and still have a long calving interval. Several cows also had an apparently small number of services per conception while the intervals between services were quite long and beyond the normal length of estrous cycles. Poor heat checking should be mentioned in this respect. The number of services per conception for cows studied could be considered quite reasonable.

(c) *Percentages of Conception from first Service as Affected by the Length of Postpartum Service Interval :*

Table (2) showed that early mating decreased the percentage of cows that conceived from the first service after calving. The same table also shows that while the percentage of cows conceiving from the first service was only 31.95% for cows bred within two months postpartum, it reached 43.37% for cows first mated from 61-90 days after calving. The percentage of conception for cows mated for the first time within more than 91 days postpartum was 43.10. The first group differed significantly ($P < .01$) from the second and third group (table 3). The differences between the second and the third groups were not significant. Trimberger (1954) showed that percentages of cows conceiving from the first service were 48%, 70% and 76% when cows were bred within 60 days, 61-90 days and more than 90 days postpartum respectively. His finding showed that the percentages of cows conceiving from the first service increased by the increase in postpartum service interval which was observed in the present study. Trimberger, however, obtained higher percentages of conception from the first service. His finding showed that the percentage of cows conceiving from the first service increased markedly as the postpartum service interval increased from less than 60 to 61-90 days. The difference between these two classes of postpartum service interval in the finding of Trimberger was 22% conceptions from the first service which is comparable to about 11% conceptions from first service in the present finding. It should be noted, however, that the present data showed a much lower percentage of conception from the first service for cows mated less than sixty days after calving which could be attributed to the same factors mentioned earlier interfering with the survivability of embryos and possibly to fertilization rate. It was noted that a relatively larger number of animals in this herd studied had several disorders after parturition which were due to some managerial faults. Moreover a large number of animals was considered silent in expressing heat symptoms which made heat checking and heat observation more difficult.

TABLE 3.—Chi Square Values for Percentages of Cows Conceiving from First Service when First bred 0-60, 61-90 and 91 or More Days Postpartum.

Postpartum Service Interval Group	X ²
0-60, 61-90 and 91 or more days	12.40**
0-60 and 61-90	10.17**
0-60 and 91 or more	7.50**
61-90 and 91 or more	0.24

It could be concluded that a period of 60-90 days for first service after calving should increase reproductivity of Friesian cattle in the Tahreer Province and that the delayed service to more than three months after calving is without beneficial effect on their reproductive performance.

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المخلص

العلاقة بين مدة التلقيح والكفاءة التناسلية في قطيع من ماشية الفريزيان

تناول البحث سجلات ولادة ٤٣٥ بقرة فريزيان شملت ٩٥٣ حالة حمل من قطيع مديرية التحرير . وكانت الأبقار المستخدمة في هذا البحث مستوردة من هولندا كعجلات ملقحة أو على وشك التلقيح . وكان الغرض من هذه الدراسة بحث العلاقة بين مدة التلقيح والكفاءة التناسلية في الفريزيان تحت الظروف المحلية في مديرية التحرير . واتضح أن متوسط مدة التلقيح ٨٨,٥٦ يوم بانحراف قياسي قدره ٦٤,١ يوماً وكانت نسبة الأبقار التي حملت من أول تلقيحه في خلال ٦٠ يوماً من الولادة ، حوالي ٣١,٥٩٪ وقد تبين أن هذه النسبة أقل معنوياً منها لو أجرى التلقيح بعد ٦١ - ٩٠ يوماً من الولادة . لذا فإنه يستحسن إيقاف التلقيح قبل ٦٠ يوماً من الولادة .

وكان عدد التلقيحات اللازمة لحدوث الحمل عند إجراء التلقيح بعد ٦٠ يوماً هو ٢,٨٩ تلقيحة بينما كان ٢,٥٥ ، ٢,٦٢ تلقيحة عند إجراء التلقيح بعد ٦١ إلى ٩٠ يوماً أو أكثر من ٩٠ يوماً أو أكثر من ٩٠ يوماً على الترتيب ، على أن الفروق بين هذه المتوسطات لم يكن معنوياً .

واتضح أن المدة السابقة للحمل زادت بازدياد الفترة السابقة لأول تلقيحه ، حيث كانت ١٢٢,٢٢ ، ١٣٧,٥٨ أو ٢٣٤,٧٢ يوماً عندما كانت الفترة السابقة للتلقيح ٦٠ ، ٦١ - ٩٠ ، أكثر من ٩٠ يوماً على الترتيب . وكانت هذه الفروق معنوية إحصائياً .

هذا وقد وجد تلازم معنوي قدره ٠,٥٢١ بين كل من المدة السابقة للحمل والمدة السابقة لأول تلقيحة بعد الولادة ، بينما كان معامل الانحدار لنفس الصفتين قدره ٠,٨٢ وهذا معناه أن كل زيادة قدرها يوماً واحداً في المدة السابقة لأول تلقيحة تسبب زيادة قدرها ٨٢ يوماً في المدة اللازمة لحدوث الحمل .