# INFLUENCE OF STAGE AND NUMBER OF LACTATION ON SUCCESS OF THE ARTIFICIAL INSEMINATION IN DAIRY COWS

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## ABSTRACT

The objective of this study was to analyse the influence of stage of lactation and parity(number of lactations) on success of the artificial insemination in Holstein-Fresian dairy cows. Complete lactation records were obtined from Dairy Record System of the dairy farm of Agricultural Research and Development Station (ARDS) Șimnic Romania. A total of 204 dairy cows were grouped by their number of lactation (first, second and third). All conception date distribution was recored for eight postpartum intervals (each of 21 days) form 50 to 218 days in milk. All artificial inseminations were performed by designated inseminator after estrous detection. The percentage of cows that conceive within 112 days postpartum was 49,3% in first lactation, 48,8% in second lactation and only 39,6% in third lactation. Mean for all lactation was 47,0%. After 218 days in milk the percentage of pregnant cows was 77% in first lactation, 85,1% in second lactation, and only 65,1% in third lactation. A proportion of cows in this study had better reproductive performance and the other proportion had poor reproductive performance. In herds in wich reproduction is based on estrous detection for insemination the interval to pregnancy is extended and creates more variability in when cows receive their first insemination and become pregnant.

## INTRODUCTION

One of the most important reproductive technologies of the dairy industry is artificial insemination (AI). AI increases the use of genetically superior sires to improve performance of the dairy cows.

Estrous behavior is used to determine when a cow should be inseminated. Efficiently and accurately detecting estrous and inseminating at the proper time are of utmost importance if dairy producers want to increase reproductive efficiency.

Calving interval (CI) is the time frome one calving to the next, and is dependent on how quikly a cow conceives ofter calving. The longer a cow is open (not pregnant), the longer the CI.

With a 12 - month CI, a cow would become pregnant 83-85 days after calving. Calving interval is primarily determined by the time open between calving and conception, and is affected by estrous cycles, estrous detection, breeding and conception.

As a result of genetic selection for greater milk yield, high producing cows tend to have poor estrous expression, which is exarcerbated by poor estrous detection by personnel, especially in larger herds. Higher-producing dairy cows have reduced duration of estrous (Lopez et al., 2004). Some research reports have estimated that 20-30% of lactating cows do not cycling by 60 days in milk (Pursley et al., 2001; Gümen et al., 2003).

Voluntary waiting period (VWP) is a key management decision in which the herd manager designates a target number of days pastpartum after which cows will be inseminated.The interval from calving to first insemination provides time for uterine involution. Linderoth (2005) recomended a VWP of > 60 days because 20-30% of cows are anovulatory at 60 days.

It is important to understand the factors that affect the rate of which cows become pregnant in a dairy herd as well as the management factors that can be implemented to improve this rate.

Reproductive efficiency has a large impact on the profitability of the dairy farm. The conception rate is an important factor in the reproductive eficiency (Inchaisri, 2012).

In practice conception rate for current and following inseminations has a large effect on the decision of inseminator to start  and to stop insemination.

Numerous studies have documented that additional days in which cows are not pregnant beyond the optimal time post-calving are costly (Groenendaal et al., 2004; Meadows et al, 2005; De Vries, 2006). This is partly caused by factors such as increasing breeding cost, increasing risk of culling and replacement cost, and reduction of milk production.

The objective of this study was to anlyse the influence of stage of lactation and parity on success of the artificial insemination in Holstein-Fresian dairy cows.

## MATERIAL AND METHOD

Lactation records of 204 Holstein-Fresian  dairy cows in a herd located at Agricultural Research and Development Station (ARDS)Șimnic were obtained from dairy Record System of the dairy farm. A lactation record was considered completed when a subsequent calving date was recorded for the same cow.

A total of 204 dairy cows wese grouped by their parity stage (first, second and third). Days open for the completed lactation record wese calculated as the numbar of days between the calving date and and the conception date. Each conception date was assumed the start of a pregnancy.

All conception data distributions was recorded for eight post partum intervals  (21 days): 50-71, 71-91, 92-112, 113-133, 134-154, 155-175, 176-196 and 197-218 days in milk (DIM) Herd VWP was at 50 days postpartum. Pregnancy rates and days open were calculated for each postpartum intervals. After 8 postpartum intervals was calculated percent of open days and percent of cows with reproductive problems.

Detection of estrous was conducted by designated inseminator and the cows were inseminated using recto-vaginal technique with semen from proven Holstein-Fresian sires. Pregnancy was determined by rectal palpation.

## RESULTS AND DISCUSSIONS

Selection of the type of breeding system used in a dairy herd should be based on the ability of that system to maximize reproductive performance. A common measure of reproductive prerformance is pregnancy rate (PR).

PR represents the proportion of cows that become pregnant each estrous cycle and it determines days open after the VWP. As PR increases, days open are reduced, and the number of cows culled for reproductive failure is reduced.

Percentage of cows conceived by lactation number and at different days in milk is presented in table 1.

*Table 1*

**Percentage of conceptions by lactation number and at different days in milk**

| Lactation number | n | Lactation stage (days in milk) | | | | | | | | Pregnant cows % | Not pregnant cows % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 50-70 | 71-91 | 92-112 | 113-133 | 134-154 | 155-175 | 176-196 | 197-218 | | |
| First lactation % | 87 | 21,8 | 19,5 | 8,0 | 11,5 | 5,8 | 1,2 | 4,6 | 4,6 | 77 | 23 |
| Second lactation % | 74 | 28,4 | 8,2 | 12,2 | 9,4 | 14,8 | 1,3 | 1,3 | 9,5 | 85,1 | 14,9 |
| Third lactation % | 43 | 16,3 | 9,3 | 14,0 | 16,3 | 4,6 | - | - | 4,6 | 65,1 | 34,9 |
| Mean % | 204 | 23,0 | 13,2 | 10,8 | 11,8 | 8,8 | 1,0 | 2,5 | 6,4 | 77,5 | 22,5 |

The results of this study show that percentage of cows conceive within 112 days after calving in first lactation was 49,3%, compared with 48,8% in second lactation and 39,6% in third lactation. Mean for all lactations was 47,0% (Tabel 1). The percentage of cows that conceived between 113 and 218 days in milk was 27,7% in first lactation, 36,3% in second lactation and 25,5% in third lactation.

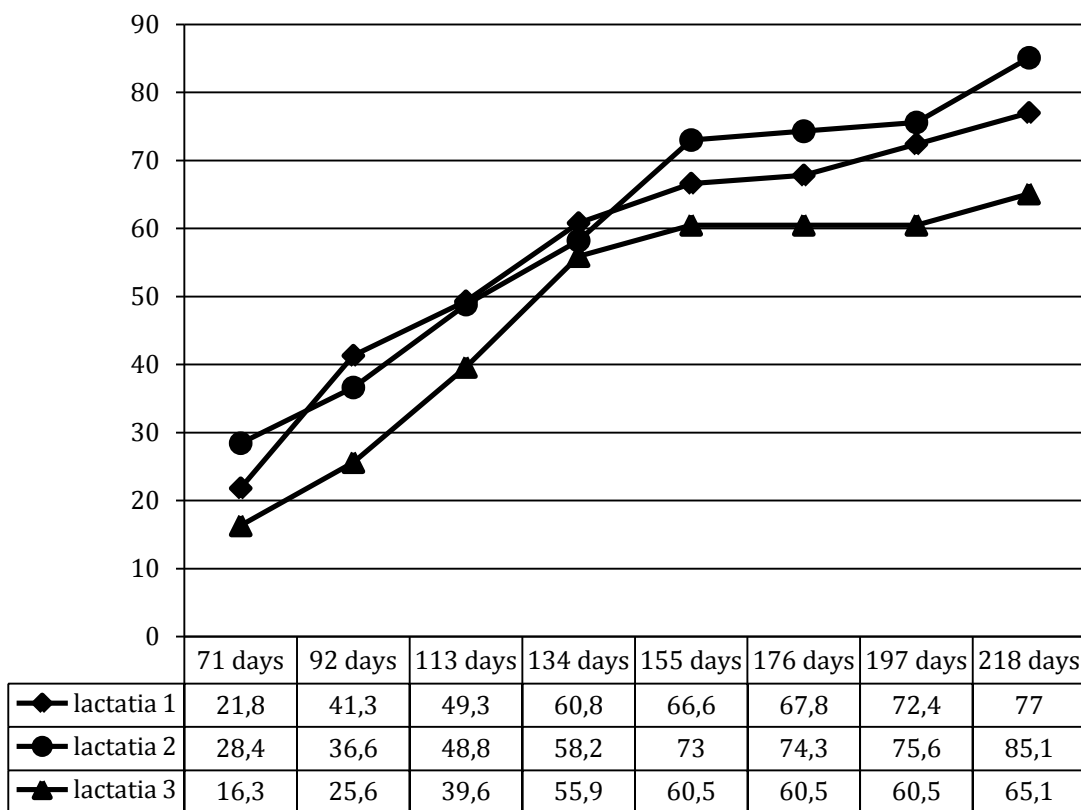Cumulative percentage of pregnant cows in first, second and third lactation is presented in figure 1.



|  | 71 days | 92 days | 113 days | 134 days | 155 days | 176 days | 197 days | 218 days |
|---|---|---|---|---|---|---|---|---|
| lactatia 1 | 21,8 | 41,3 | 49,3 | 60,8 | 66,6 | 67,8 | 72,4 | 77 |
| lactatia 2 | 28,4 | 36,6 | 48,8 | 58,2 | 73 | 74,3 | 75,6 | 85,1 |
| lactatia 3 | 16,3 | 25,6 | 39,6 | 55,9 | 60,5 | 60,5 | 60,5 | 65,1 |

**Fig. 1 – Cumulative percent of pregnant cows by lactation number and at different days in milk.**

Days open measures overall reproductive preformance. Mean days open for pregnant cows in first, second and third lactation was cows 100,24; 108,03 and 104,28 days respectively. Mean days open for all cows in first, second and third lactation was 127,31; 124,38 and 143,95 days respectively. Problems with fertility and / or estrous detection increase days open. Optimum is 85 to 115 days. A level of days open of 116 to 130 days means slight problems and a level of 131 to 145 days means moderate problems.

The percentage of cows that failed to conceive was 23% in first lactation, 14,9% in second lactation and 34,9% in third lactation.

A proportion of cows in the herd had better reproductive performance, and the other proportion had poor reproductive performance. Milk production of the cows in this study varies from 6805 kg (for primiparous) to 11251 kg (for multiparous).

Because milk production lowers the level of circulating progesterone and estrogen, and intensive management usually induces stress and reduces estrous expression,

reproductive efficiency is expected to be lower in high-producing lactations (third) compared with low-producing lactations (first or second).

Also, poor reproductive performance in lactating cows could be caused by extended interval to first service, low estrous detection/insemination rate, or low conception rate. The health of the postpartum cow is intimatley related with the ability to resume estrous cyclicity.

Anovular cows are expected to have adelay in the first estrous postpartum. Anovular cows, have a greater impact on reproductive performance in herds in which reproduction is based on estrous detection for insemination of the cows.

This extend the interval to pregnancy and creates more variability in when cows receive their first A.I. and become pregnant.

Insemination of cows as early as possible ofter parturition is not always the best way since profitability could be reduced if high-produceing cows became pregnant too early: will be very dificult to dry-off.

## CONCLUSIONS

• In herds in wich reproduction is based on estrous detection for insemination of the cows, the interval from calving to pregnancy is extended and creates more variability in when cows ceceive their first insemination and become pregnant.

• Moderate problems may be caused by not observing estrous in certain cows.

• The value of days open in third lactation indicates a problem exist, and the effectiveness of management proceduress concerning reproduction should be evaluated.

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