

Original article

## REPRODUCTIVE EFFICIENCY OF DAIRY COWS IN THE NORTHERN PART OF THAILAND

Veerasak Punyapornwithaya,<sup>1</sup> Sorn Teepatimakorn<sup>2</sup>

<sup>1</sup>Department of Ruminant Clinic, Faculty of Veterinary Medicine,  
Chiang Mai University, <sup>2</sup>Chiang Mai Artificial Insemination and Biotechnology  
Research Center, Chiang Mai

---

**Abstract** The objective of this study was to determine reproductive efficiency of dairy cows in the northern part of Thailand. Reproductive data from 5,806 cows in 7,285 lactation during October, 2000 to December, 2002 were analyzed to describe days to first service, days to conception, service per conception, first service conception, percent cows pregnant within 90 and 120 days postpartum of all cows and to compare means of days to first heat, days to conception, service per conception by lactation number using least square method (PROC GLM, SAS 8.02). Lactation number was divided into first lactation cows (Group 1), second to third lactation cows (Group 2) and higher than third lactation cows (Group 3). The result showed that days to first service, days to conception, service per conception, first service conception, percent cows pregnant within 90 days and percent cows pregnant within 120 days were 97.62±51.76 (mean±SD), 131.62±70.79, 1.87±1.27days, 47%, 48% and 51% respectively. Lactation number had effects on reproductive efficiency. First lactation cows (Group 1) had longer days to first service and days to conception when compared with cows in 2<sup>nd</sup> – 3<sup>rd</sup> lactation (Group 2) and ≥ 3<sup>rd</sup> lactation (Group 3) ( $p<0.05$ ). Days to first service, days to conception and service per conception of cows in group 2 were not statistically different from cows in group 3. This study provided information that expresses reproductive status of dairy cows in northern part of Thailand. It also was the basic data for future research and extension plan.

**Key words:** Reproductive efficiency, dairy cows, lactation number

---

### Introduction

Reproductive efficiency is the impor-

tant factor of dairy production. Poor

reproductive efficiency affects dairy herd

---

Address requests for reprints : Veerasak Punyapornwithaya, Department of Ruminant Clinic, Faculty of Veterinary Medicine, Chiang Mai University, Chiang Mai 50100, Thailand, E-mail:veerasak@chiangmai.ac.th

Date received : April 9<sup>th</sup>, 2004

profitability by decreasing milk yield and the number of calves produced, and by increasing the culling rate.<sup>(1)</sup>

In northern part of Thailand, there were some reports on the reproductive performance of dairy cows. However, data showing reproductive efficiency of holstein cross-bred cows in small dairy farms belonged to farmer in this area were limited. Moreover, most of reports were done for many years. Therefore, the presentation of update information is necessary for describing current status, and also the basic data for future research and extension plan.

The aim of this study was to determined reproductive efficiency of dairy cows in small holder dairy farms in the northern part of Thailand.

## Material and Method

### Data & Definition

Reproductive data during October, 2000 to December, 2002 from dairy cows in Chiang Mai, Chiang Rai and Lumphoon province was obtained from Chiang Mai Artificial Insemination and Biotechnology Research Center to

calculate reproductive indices. Data were transferred from AI software program belonged to this center into a computer spreadsheet program (Microsoft Excel) for calculating, organizing and manipulating of data before statistical analysis. In final, data were included 5,806 cows in 7,285 lactation records. Reproductive indices and their definition were described in table 1.

### Statistical analysis

All statistic procedures were done by SAS software (SAS version 8.02). Mean and standard deviation of days to first service and days to conception and service per conception of all cows were analyzed by PROC UNIVARIATE. For comparison by group, cows were divided into 3 groups by lactation number<sup>(2)</sup> group 1= primiparous cows, group 2 = cows in lactation 2 and 3, group 3= cow in lactation >3). The difference of days to first service and days to conception between cows in 1<sup>st</sup>, 2<sup>nd</sup> - 3<sup>rd</sup> and >3<sup>rd</sup> lactation were analyzed by using least square mean method in PROC GLM. Type III analysis of significance was

**Table 1.** Reproductive indices and definition

Parameter	Definition
Days to first service	The interval from calving to first service
Days to conception	The interval from calving to pregnancy
First service conception	The number of pregnancy cows inseminated at first service divided by total cows inseminated at first service
Service per conception	The total number of services divided by the number of pregnant cows
Percent cows pregnant within 90 days	The total cows pregnant within 90 divided by total cows within 90 days postpartum.
Percent cows pregnant within 120 days	The total cows pregnant within 120 divided by total cows within 120 days postpartum

used to determine the significance of reproductive index. Statistical difference was considered at  $\alpha = 0.05$ .

### Result

Mean and standard deviation of days to first service, days to conception and service per conception of all cows were shown in table 2. For all cows, first service conception rate was 47% ( $n = 3,333/7,072$ ) and percent cows pregnant within 90 days and 120 days were 48% ( $n = 1,824/3,927$ ) and 51% ( $n = 2,835/5,528$ ) respectively. From table 3, Lactation number had a significant effect on reproductive performance. The least square mean of days to first service, days to conception of first lactation cows were longer than other groups ( $p < 0.05$ ). First lactation cows required number of service per conception more than cows in 4<sup>th</sup> lactation or more ( $p < 0.05$ ).

### Discussion

The present study showed that the reproductive efficiency of dairy cows in northern part of Thailand was suboptimal and the reproductive performance was different by lactation number.

**Table 2.** Reproductive indices of all cows

Item	Number of cows	Mean $\pm$ SD
Days to first service (days)	6,880	97.62 $\pm$ 51.76
Days to conception (days)	6,125	131.62 $\pm$ 70.79
Service per conception (time)	6,125	1.87 $\pm$ 1.27

Days to first service, days to conception and service per conception are the important reproductive index.<sup>(3)</sup> The normal value of days to first service was 45-60 days after calving.<sup>(4)</sup> For 365 days calving interval, cows should be conceived around 85-90 days postpartum. Longer days to conception had a significant on economic return.

In the present study, days to first service and days to conception of all cows were longer than standard value. However of days to conception of all holstein crossbred cows in this study was shorter than pure breed holstein cows imported from Canada (days to conception = 201 days) at Chiang Mai Livestock Research Center.<sup>(5)</sup> To describe this situation the study of risk factor

**Table 3.** The comparison of reproductive indices by lactation number.

Lactation number	Days to first service Lsmean $\pm$ SE (no.)	Days to conception Lsmean $\pm$ SE (no.)	Service per conception Lsmean $\pm$ SE (no.)
Lactation 1	103.08 $\pm$ 1.15 <sup>a</sup> (n=1,988)	139.08 $\pm$ 1.68 <sup>a</sup> (n=1,765)	1.93 $\pm$ 0.03 <sup>a</sup> (n=1,765)
Lactation 2-3	96.82 $\pm$ 1.29 <sup>b</sup> (n=1,599)	131.63 $\pm$ 1.87 <sup>b</sup> (n=1,426)	1.88 $\pm$ 0.03 <sup>a,b</sup> (n=1,426)
Lactation >3	94.73 $\pm$ 0.09 <sup>b</sup> (n=3,293)	127.12 $\pm$ 1.30 <sup>b</sup> (n=2,934)	1.82 $\pm$ 0.02 <sup>b</sup> (n=2,934)

<sup>a,b</sup>Column means with common superscripts are not different ( $p > 0.05$ )

such as reproductive management, nutrition management should be done for next research.

Although cows had prolonged days to conception, the number of service per conception was close to optimum value. The reason could be explained this event was that cows had very high number of days between each insemination. Poor heat detection and prolonged days to check pregnancy might be the factors that produced a high number of days between each insemination.

First service conception rate was met optimal values and percent cows pregnant within 90 days was slightly closer to target; however, percent cows pregnant within 120 days should be much more higher than percent cows pregnant within 90. Both indices showed that between 90-120 days after parturition number of conceived cows was low.

When compared with cows enrolled in dairy herd health program, cows in this study had longer days to conception. The previous report showed that cows in northern part enrolled in dairy herd health program on which emphasis reproductive had days to conception closed to standard.<sup>(6)</sup>

In the present study, there was a significant effect of lactation number on days to first service and days to conception. Days to first service and days to conception of first lactation cows were statistically different when compared with other cows. This result was similar to the previous reports. First lactation cows had longer days to conception than other lactation cows (121d vs.104

d).<sup>(7)</sup> Cows in 1<sup>st</sup>, 2<sup>nd</sup> and > 3<sup>th</sup> had 137, 144 and 140 days respectively.<sup>(8)</sup> However, other studies found that parity was not affected on days open.<sup>(9)</sup>

Some studies have identified first parity as a risk factor for conception rate at first AI.<sup>(10-11)</sup> First parity cows were associated with lower energy balance because they eat less and have energy requirements for growth in addition to lactation.<sup>(11)</sup> From our study, the reproductive performance was obviously under standard value in first lactation cows. Thus, a good postpartum management such as nutrition managements, reproductive managements and other important managements are highly important for first lactation cows.

This study showed that reproductive efficiency of crossbred dairy cows in northern area of Thailand was under optimal level. To improve the reproductive efficiency requires much more researches and extensions. The study of reproductive management, nutrition management, the interaction between reproduction and nutrition and epidemiology of reproduction should be targeted.

## References

1. Grohn YT, Pajala-Schultz. Epidemiology of reproductive performance in dairy cows. *Anim Reprod Sci* 2000;60-61:605-14.
2. Lean IJ, Galland JC, Scott JL. Relationships between fertility, peak milk yield and lactational persistency in dairy cows. *Theriogenology* 1989;31:1093-103.
3. Weaver LD, Goodger WJ. Design and economic evaluation of dairy production health programs for dairy herds-part 1. *Compend Contin Educ* 1987;9:F297-309.

4. Weaver LD. Evaluation of reproductive performance in dairy herds. *Compend Contin Educ* 1986;8:S247-54.
5. Patcharin Sondhipipoj, Sahattaya Subrod, Prapas Mahinchai. Reproduction and production performances of imported Holstein cows from Canada. The proceedings of 37<sup>th</sup> Kasetsart University Annual Conference. 4-7 February 1999. Bangkok: Kasetsart University, 1999:237-48.
6. Veerasak Punyapornwithaya, Taweasart Tankitayanon, Khwanchai Kreusukon Suvichai Rojanasathien. The result of reproductive herd health program on reproductive efficiency in dairy cows of small holder farmer. Abstracts of the conference on quality milk to consumers. Khonkhean University. 23-24 January 2003. Khon Khean : Khonkhean University, 2003:39.
7. Anut Chantiratikul, Songsak Champavadee, Sirirod Duengpattra, Chaiya Kham-art . Reproductive performance of dairy cows in Amphur Kantarawichai, Mahasarakham province. Proceedings of 2<sup>nd</sup> Annual Conference of veterinary medicine Faculty of Veterinary Medicine Khon Khean University, 25-27 January 2001. Khon Khean : Khonkhean University, 2001:64-72
8. Farim PW, Slenning BD, Correa MT, Britt JH. Effect of calving seasons and milk yield on pregnancy risk and income in North Carolina Holstein cows. *J Dairy Sci* 1994; 77:1848-55.
9. Kinsel ML, Etherington WG. Factors affecting reproductive performance in Ontario dairy herds. *Theriogenology* 1998;50:1221-38.
10. Loeffler SH, De Vries MJ, Schukken YH, de Zeeuw, Dijkhuizen A, de Graaf FH, Brand A. Use of AI technician scores for body condition, uterine tone and uterine discharge in a model with disease and milk production parameters to predict pregnancy risk at first AI in holstein dairy cows. *Theriogenology* 1999;51:1267-84.
11. Lucy MC. Reproductive loss in high-producing dairy cattle: Where will it end ?. *J Dairy Sci* 2001;84:1277-93.