

# การเปรียบเทียบวิธีการรักษาภาวะไม่เป็นสัดในแม่โคนม ในฟาร์มรายย่อย

## Comparison of Methods for Treatment of Anestrus Dairy Cows in Small Holders

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### บทคัดย่อ

การศึกษานี้มีวัตถุประสงค์เพื่อเปรียบเทียบประสิทธิภาพการใช้วิธีการต่างๆ ในการรักษาภาวะโคไม่เป็นสัดในโคนมลูกผสมโฮลสไตน์ของเกษตรกรผู้เลี้ยงโคนมรายย่อยในภาคสนาม แม่โคที่ไม่เป็นสัดถูกจัดเข้าสู่กลุ่มรักษาด้วยวิตามิน (n=54) กลุ่มรักษาด้วยสารพรอสตาแกลนดิน (n=38) และกลุ่มรักษาด้วยสารโปรเจสเตอโรนซีไอดีอาร์ (n=37) ตามผลโดยการสังเกตทางทวารหนักหรือจากภาพอัลตราซาวด์ ทำการตรวจการเป็นสัดเพื่อหาผลตอบสนองการเป็นสัดภายหลังการรักษา ใช้การวิเคราะห์ความถดถอยโลจิสติก (PROC LOGISTIC, SAS 8.02) ในการหาความสัมพันธ์ระหว่างวิธีการรักษากับอัตราตอบสนองการเป็นสัดโดยให้ชนิดของภาวะไม่เป็นสัดและฤดูกาลเป็นปัจจัยร่วม จากการวิเคราะห์ทั้งแบบที่ละปัจจัยและหลายปัจจัยร่วมกันพบว่ากลุ่มการรักษาเป็นปัจจัยที่มีผลต่อการตอบสนองการเป็นสัดอย่างมีนัยสำคัญ ผลจากการวิเคราะห์แบบหลายปัจจัยร่วมกันแสดงให้เห็นว่าการรักษาด้วยสารโปรเจสเตอโรนมีอัตราตอบสนองการเป็นสัดที่สูงกว่า (Odds ratio = 3.8 ; p<0.01) ในขณะที่การรักษาด้วยวิตามินให้ผลการตอบสนองการเป็นสัดต่ำกว่า (Odds ratio = 0.29 ; p<0.01) เมื่อเปรียบเทียบกับการใช้สารพรอสตาแกลนดิน ส่วนชนิดของภาวะไม่เป็นสัดและฤดูกาลไม่มีผลต่อการตอบสนองการเป็นสัด การศึกษานี้แสดงให้เห็นว่าสารโปรเจสเตอโรนมีประสิทธิภาพสูงในการรักษาภาวะโคไม่เป็นสัด และความสำเร็จในการรักษาไม่ขึ้นกับชนิดของภาวะไม่เป็นสัดและฤดูกาล

คำสำคัญ: การรักษา ภาวะโคไม่เป็นสัด โคนม ภาคสนาม

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## Abstract

The objective of this study was to compare the efficiency of protocols in treatment anestrus in Holstein crossbred dairy cows belonged to small holder farmers under field condition. Anestrus cows were indentified by rectal palpation or ultrasonography and they were allocated to vitamin (n=54) prostaglandin (n=38) and progesterone (CIDR) (n=37) treatment groups. Estrus detection was done for determining estrus response outcome after the treatments. Logistic regression (PROC LOGISTIC, SAS 8.02) was performed to analyze the association between estrus response and treatment method. Type of anestrus and season were considered as covariates. From both univariable and multivariable analysis, only treatment had a significant effect on estrus rate. The result from multivariable analysis showed that treatment with progesterone had a higher estrus rate (Odds ratio=3.8;  $p<0.01$ ) whereas treatment with the vitamin had a lower estrus rate (Odds ratio=0.29;  $p<0.01$ ) when compared with prostaglandin treatment. Type of anestrus and season had no significant effects on estrus response. This study demonstrated that treatment anestrus with progesterone had a high efficiency and the success of treatment was not influenced by season and type of anestrus.

## Introduction

Anestrus is one of the major causes of economic losses in dairy production. Not only does it lengthen days open, but also substantially reduced financial returns due to the extended calving interval (Mwaagna and Janowski, 2000). Several programs have been used for inducing estrus in anestrus cows. Prostaglandin and progesterone protocols are two major estrus induction methods (Odde, 1990)

Many studies in Thailand showed the advantage of using prostaglandin (Aiumlamai et al., 1995; Butcharoen et al., 2001) or progesterone (Suadsong et al., 2000) in experimental farms. However, there are limited recently studies conducted under field condition especially in small dairy farms belonged to small holder farmers. Since 2001 dairy herd health program has been implemented to dairy farms in some dairy areas in Chiangmai and Lumphoon province (Punyapornwithaya et al., 2003). Even though the reproductive performance of dairy cows has almost met to the standard level, the occurring of new cases of reproductive problems such as anestrus was still an important problem. Thus, the application of hormone treatment was added in herd health program for treatment anestrus cows.

The objective of this study was to determine the result after using conventional field treatment protocol, prostaglandin and progesterone program in treatment anesturs cows in small holder farms under field condition.

## Material and Methods

### Farms & Animals

This study was conducted during October, 2002 to July, 2003 in 41 small dairy farms belonged to Banthi dairy cooperative where located in Lumphoon province. All farms were enrolled in herd health program organized by Faculty of Veterinary Medicine, Chiang Mai University. One fixed-veterinarian has visited all farms every two weeks.

Cows entering this study were in suitable condition ( $>2.5$ ; five-score scale; Edmonson et al., 1989) and had no abnormal genital tract or pathological abnormalities of ovary when examined by rectal palpation or ultrasound in some cases. All of cows in this study were housed in tie stall barn without grazing area.

All of cows not showed estrus sign, anestrus, since 1) 60 days postpartum (PA group;  $n = 73$ ) or 2) 50 days after previous artificial insemination (AA group;  $n = 56$ ) were firstly assigned randomly to vitamin group ( $n = 54$ ) and hormone treatment group ( $n = 75$ ). Secondly, in hormone group, cows were divided in two groups by the result of rectal palpation by one fixed veterinarian. Only cows with mature corpus luteum (CL) were set into prostaglandin treatment group ( $n = 38$ ), and cows with immature CL ( $n = 20$ ) or without CL ( $n = 17$ ) were assigned to progesterone treatment group ( $n = 37$ ).

### Treatment protocol

Treatment protocols were 1) vitamin 2) prostaglandin and 3) progesterone program. Normally, inseminators or technicians usually injected 10–20 c.c. of vitamin  $AD_3E$  and palpated ovary for stimulating ovarian function and subsequently producing estrus sign. The vitamin  $AD_3E$  were composed vitamin A 300,000 – 500,000 IU, vitamin  $D_3$  75,000 – 100,000 IU and vitamin E 50 mg respectively, depended on the brand. Thus, two times weekly interval injection of vitamin and palpation ovary was designed as field vitamin group ( $n=54$ ). Cows in prostaglandin group ( $n=38$ ) were injected with 2 c.c. of Cloprostenol (Estrumate<sup>®</sup>), only cows with corpus luteum examined by rectal palpation or ultrasonography were injected with Cloprostenol on the first day. In progesterone group ( $n=37$ ), all cows in this group were inserted with controlled intravaginal drug releasing device containing 1.9 grams of progesterone (CIDR, InterAg, Hamilton, New Zealand) for 10 days.

### **Estrus detection**

Daily estrus detection was done by farmers for 21 days after the vitamin injection or 7 days in prostaglandin group and on day 3–5 days after CIDR removal. Estrus response data was recorded. Because cows were in tie stall barn which is difficult to detect primary sign as standing heat. Furthermore, estrus detection criteria were explained to farmer for detect secondary sign as uterine tone with vaginal discharge and usually exhibited when they were in estrus by farmer experience in each cows to define that cows were in estrus.

### **Statistical analysis**

The effects of treatment, season and their all interaction on estrus response were analyzed by logistic regression method (PROC LOGISTIC; SAS, 1997). Dependent variable was estrus response (0=cow did not showed sign of estrus, 1=cow was showed sign of estrus) and independent variables were treatment (1=vitamin, 2=prostaglandin and 3=controlled internal drug released; CIDR) type of anestrus (1=PA, 2=AA) and treatment season (1=hot, 2=rainy and 3=winter). Time at treatment during March to June, July to October and November to February are defined as hot, rainy and winter season, respectively. Logistic model was performed in univariable and multivariable analysis. Prostaglandin treatment, PA group and hot season were assigned as a reference group.

Odds ratio and corresponding 95% confidence interval was obtained from logistic regression. An odds ratio significantly lower or higher than 1 indicates a decreased or increased the risk of the presenting of estrus sign respectively. One class of each variable was considered as the reference and an odds ratio significantly higher (or lower) than 1 for any other class of this variable was indicative of and increased (or reduced) risk of the showing estrus sign when compared to the reference class.

## **Results**

The estrus response and descriptive data in each group was shown in table 1. Both univariable and multivariable analysis showed that only treatment had a significant effect on estrus response rate. In contrast, season had no effect on estrus response. The interaction between all variable was not found. Cows treated with progesterone had a risk of showing estrus 3.8 times (Odds ratio = 3.8;  $p < 0.01$ ) when compared with prostaglandin. Also, cows in vitamin group had a lower estrus response rate (Odds ratio = 0.29;  $p < 0.01$ ) when compared with prostaglandin.

**Table 1** Descriptive data for estrus response by group and season.

Group	Season	Estrus response (%) (no./total)
vitamin	Hot	31.57% (n=6/19)
	Rainy	40.00% (n=6/15)
	Winter	45.00% (n=9/20)
	All	38.88% (n=21/54)
prostaglandin	Hot	75.00% (n=9/12)
	Rainy	54.54% (n=6/11)
	Winter	73.33% (n=11/15)
	All	68.42% (n=26/38)
progesterone	Hot	92.30% (n=12/13)
	Rainy	75.00% (n=9/12)
	Winter	100.00% (n=12/12)
	All	89.18% (n=33/37)

**Table 2** Factors affecting estrus response from multivariable logistic regression analysis.

	Estimate	Standard Error	Chi-Square	P-value	Odds ratio	95% Wald confidence limit
group						
prostaglandin						reference group
progesterone	1.29	0.38	11.51	<0.001	3.8	1.09-13.19
vitamins	-1.26	0.28	20.09	<0.0001	0.29	0.12-0.70

## Discussion

There were many reports in treating anestrus problem, most of studies were focused on using hormone. Major groups of hormone used in estrus synchronization are prostaglandin and progesterone (Odde, 1990; Rhodes et al., 2003; Yaniz et al., 2004). Even though there are many researches in estrus synchronization in our country but most of studies were carried out in experiment farms and the aim of most study was to improve reproductive efficiency in normal cows or heifers. Contrarily, in this study, the main objective was to compare the efficiency of hormone protocol in treatment anestrus cows.

In the present study, treatment had an effect on estrus response but season and type of anestrus were not a significant factor. Percent of estrus response was statistically different between prostaglandin and CIDR groups ( $p < 0.01$ ) or prostaglandin and vitamin group ( $p < 0.01$ ). The risk of estrus response was 3.8 times when using CIDR compared with prostaglandin injection. In contrast, cows in vitamin group had lower risk of estrus response than prostaglandin group. Undoubtedly, CIDR treatment was an efficient method. Almost percents of anestrus cows treated with CIDR returned to estrus.

Although the injection of vitamin one or more than one time by farmers or technicians was a conventional method for this area; however, percent of estrus cow was slightly low (50%) and farmers were required a very high range of time (within 1–21 days) to detect cow's estrus sign. With respect to economic aspect, it was probably a valuable protocol when using prostaglandin. Injection with prostaglandin had a higher estrus response than vitamin injection but the cost was comparable. Generally, the cost of two injections of vitamin, prostaglandin and CIDR in Thailand was approximately 150, 200 and 400 Baht respectively. Nevertheless, the disadvantage point of using prostaglandin was that it was not effective to use in non-cyclic cows (Stevenson and Pursley, 1994). CIDR might be the practical alternative choice because it can be used for both cyclic and non-cyclic cows (Day et al., 2000; Xu et al., 2000). Moreover, there were reports demonstrated that one time used-CIDR could be used in estrus synchronization (Colazo et al., 2004; Punyapornwithaya et al., 2004) hence the cost of CIDR might be decreased when using the used-CIDR. However, the choice of treatment will depend on the cost of drug and the financial status of farmer. It was interesting that half of anestrus cows were responded to vitamin injection. Thus, the study of nutrition status and biochemical profile of anestrus cows might be the future study.

The successful of treatment was not affected by season. Although one report in Thailand showed that during hot or hot and high humidity season the proportion of cows showing standing heat was decreased (Rodtien et al., 1996). However, in this study, because most of farms were tie-stall type, therefore; it was difficult for farmers to detect standing heat. Farmers commonly indicated their estrus cows by using secondary sign of estrus such as the present of vaginal discharge, the swelling of vulva or other secondary signs. Thus, the present of secondary estrus sign detected by farmers might not be correlated to season. Moreover, because the success of treatment for anestrus was not depended on season; therefore, veterinarian or farmer should decide to treat anestrus cows as early as they found this problem.

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