Factors to Assess for Re-breeding after Parturition in Milking Cows

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ABSTRACT

The purpose of this study was to assess for re-breeding concentrate period in postpartum in milking cows. The 48 cows aged 3.5~5.5 years and of 400~600 kg body weight were examined every 3rd day from 15 to 36 day postpartum. Blood samples for progesterone and estradiol 17 β hormone analyses were withdrawn from the coccygeal vein every third day until the end of the experiment. The ovarian follicular numbers were verified and measured using a multi frequency probe. The least squares means are presented for each day by GLM of SAS. The results showed that ovary lengths (right ovary; 1.64±0.62 cm, left ovary; 1.44±0.46 cm) were similar in right and left ovary activity level during estrous cycle of postpartum cows. We were judged completed uterus on day at 2.31±0.17 cm level of cervix diameter. And we were monitoring started at 6.44±2.03 cm from day 15 after postpartum. The results showed that mean plasma concentration of progesterone (3.28 ng/ml) in large follicle gradually increased days 30 in postpartum. And, monitoring of estradiol 17β (22.18 pg/ml) hormone during postpartum period would be useful to predict the ovarian and uterus activity for re-breeding in postpartum milking cows.

From these results, we conclude that cervix diameter (mean: 2.31 cm) was very important for reproductive organ recovery standard level of postpartum milking cows, hormone secretion level (P_4: 3.28 ng/ml, E_2: 22.18 pg/ml) and body condition score (2.5~2.75) level about 30 days in postpartum period.

(Key words : Milking cow, Follicle, Progesterone, Estradiol 17β)

INTRODUCTION

The objectives of this study were to investigate per third days by ultrasound machine for early reproduction by check of follicular number change, hormone profiles and cervix recovery diameter after parturition. Previous studies have generated conflicting hypotheses about the pattern of growth and regression of ovarian follicles during the estrous in cattle (Spicer and Echternkamp *et al.*, 1986; Ireland and Roche *et al.*, 1987; Fortune *et al.*, 1988). But, it was not basic data about diameter change in ovaries and of cervix recovery level for re-breeding judgment index. So, we used a kind of ultrasound machine for basic data.

Hormone analysis was after blood collection for investigation correlation between ovaries activity and follicle generation. Previews reported (K.I. Parker *et al.*, 2003, P. K. Chelikani *et al.*, 2003, J. Sirois *et al.*, 1988, H. Kohram *et al.*, 1998, P. C. Sianangama *et al.*, 1996, Bo, G.A. Adams, 1995) was about follicular dynamics, follicle generate wave was investigated for judgment of re-breeding time in this study. Recently, it has been reported that has significant effects on follicular dynamics and ovary activation by hormone (GnRH) injection (H. Kohram *et al.*, 1997) or used by CIDR plus insertion in vagina (K.I. Parker *et al.*, 2003).

In this study, we did investigate about follicles dynamic and reproductive organ recovery level after control of same condition of ovary stage after prostaglandin hormone injection in postpartum. And, we checked for high pregnant rate about reproductive vital sign in postpartum.

The purpose in this study was to determine of accurate period of reproductive concentrate by judgment of affection vital sign in early postpartum dairy cows.

MATERIALS AND METHODS

Ultrasound Examinations

Ultrasound examinations were made an ESAOTE Tringa Linear portable linear scanner with a Multi Frequency probe (Pie Medical Co.) designed for transrectal examinations in cattle. Feces were removed from the rectum and each ovary was scanned several times by moving the transducer in a medial direction across

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the surface of the ovary. Ovaries were scanned in two planes whenever possible since scanning one surface of the ovary did not always permit visualization of all of the follicles present. Diameters of follicles, cervix and ovary were measured to the nearest ≥3.0 mm against the scale recorded from the ultrasound unit. Diameters of follicles that were not spherical were estimated by the longest diameters. New diagrams of the ovaries were made and compared to those made at the time of ultrasound examinations.

Experimental Protocol

Cows were given a single IM injection of 25 mg PGF-$_2\alpha$ (Lutalyse, Upjohn Co., Kalamazoo, MI, U.S.A.) between Days 15 and 16 of the postpartum to induce regression of the corpus luteum. Ultrasound examinations were performed per two day of PGF-$_2\alpha$ injection through ovulation. Animals were observed twice daily for estrous behavior.

Hormones Analysis

Blood samples were taken to Day 36 postpartum. All blood was collected into BD Vacutainer® (UK) from the jugular vein. Plasma was separated by centrifugation within 2 h and stored at −80℃ until assayed. Progesterone and Estradiol were measured by Wallac DELFIA® Progesterone and Estradiol kit (Perin-Elmer Life and Analytical Science, Wallac Oy, Mustionkatu 6, Turku, Finland).

We did validation of Ultrasonic measurement of follicular, ovaries and cervix diameter. Diameters of follicles were consistently ≥3 mm larger than the diameters determined by ultrasonograpy. Diameters of ovaries and cervixes were consistently length determined by ultrasonograpy.

Data Analysis

Profiles of the mean number of follicles (i.e., ≤3 mm, 4 to 6 mm, ≥7 mm), as well as Estradiol 17β and progesterone concentrations were compared by least squares analysis of variance and polynomial contrasts using the general linear model (GLM) procedure Statistical Analysis System (SAS).

RESULTS

Change of Ovaries and Cervix Diameter after Parturition

Ovary size was 1.64±0.62 (right ovary mean size, ROS) and 1.44±0.46 (left ovary mean size, LOS) between days 15 and 36 postpartum in one estrous cycle of postpartum cows (Fig. 1).

Fig. 2 shows recovery level of cervix diameter between days 15 and 36 postpartum. The mean cervix diameter of 15 days was 6.44±2.03 cm and, cervix mean diameter after parturition was 2.31±0.17 cm.

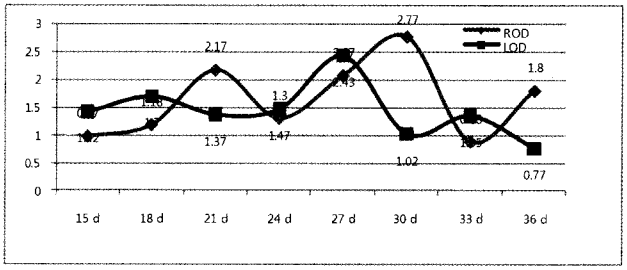

Fig. 1. Comparison of ovary diameter in one estrous cycle after parturition. ※ LOD: left ovary diameter, ROD: right ovary diameter.

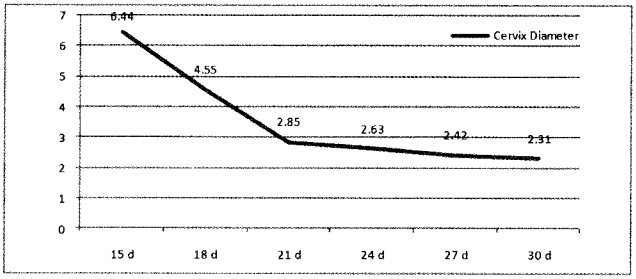

Fig. 2. Change of cervix diameter after parturition cows.

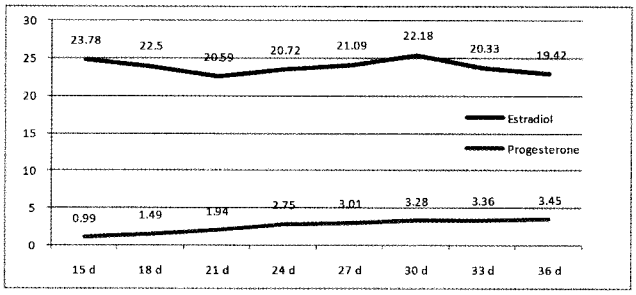

Fig. 3. Progesterone and estradiol 17β secretion level during estrous cycle after parturition.

Table 1. Follicle development number by body condition score in milking cows

Body condition	Head	No. of follicle		
		Large (≥7 mm)	Middle (4~6 mm)	Small (≤3 mm)
Normal score (2.5~2.75)	7	55[a]	52	192[a]
Weak score (≤ 2.4)	7	11[b]	31	303[b]

[a,b] : $p<0.05$.

Follicles Development Number Versus Hormone Secretion Level

Table 2. Follicle development number in postpartum cows in milking stage

Head	Follicle class	Days after parturition							
		15	18	21	24	27	30	33	36
28	Small	2.73±1.39	3.11±1.39	2.67±1.58	3.05±1.64	3.08±1.32	3.38±1.68	3.13±1.29	3.55±1.57
	Middle	1.15±0.45	1.05±0.63	1.04±0.49	0.88±0.47	0.92±0.46	0.82±0.45	1.13±0.46	1.36±0.53
	Large	0.60±0.48	0.72±0.48	0.82±0.58	0.82±0.38	0.81±0.51	0.71±0.41	1.15±0.28	1.13±0.22

Fig. 3 shows change of hormone secretion level during an estrous cycle after parturition on rising current of milk. Hormone secretion level after parturition were progesterone (3.28 ng/ml) versus estradiol 17 β (22.18 pg/ml), this numerical value was estimation of uterus revival, and large & middle follicle number is rising number in this time.

Follicles Development Number by Day Change after Parturition

Table 1 shows the influences follicle development number by body condition score after parturition. The different effect by body condition on follicles development between normal score (2.5~2.75) and weak score (≤ 2.4). The number follicles development were difference ($p<0.05$) in column in large and small follicles development number.

Table 2 shows milking cows after parturition had investigated in follicle development number. In this time, large follicle number was 1.15±0.28 and middle follicle number was 1.13±0.46 by development of small follicle.

DISCUSSION

This study investigated for re-breeding time the current that change of ovaries and cervix diameter, follicle development number by body condition score and milking stage, secretion level of hormone after parturition.

In the present study, the ovaries size were 1.64±0.62 (ROS) and 1.44±0.46 (LOS) in one estrous cycle of postpartum milking cows (Fig. 1). Kahn *et al.* (1990) reported that used ultrasonograpy as a diagnostic tool in female animal reproduction. But that report did not about ovaries diameter. So, we did calibration for difference of right and left ovaries activity according to ovaries diameter change. The results of our study at the comparison ovaries size in right and left ovaries activity were no difference significantly ($p<0.05$).

And, Fig. 2 shows change of cervix diameter between days 15 and 36 postpartum. The mean cervix diameter were recovered that to 2.31±0.17 cm in 36 days from 6.44±2.03 cm of the 15 days after parturition. We took that a standard value about cervix recovery for re-production after parturition in milking cows.

And, Fig 3 shows change of hormone secretion level during an estrous cycle after parturition a rising current of milk. Hormone secretion level after parturition were progesterone (3.28 ng/ml) versus estradiol 17β (22.18 pg/ml), this numerical value was estimation of uterus and ovaries revival, this theory were similar to those reported by Lopez *et al.* (2003).

Table 1 shows the influences follicle development number by body condition score. The different effect of body condition on follicles development between normal score (2.5~2.75) and weak score (≤ 2.4) was reflected by the difference ($p<0.05$) in column. Edmonson *et al.* (1989) reported that cows are usually scored on a 5-point scale: from 1, indicating thin, to 5, indicating fat. Furthermore, Burke *et al.* (1998) reported that alternations in metabolism and endocrine status associated with body condition may have contributed to differences in follicle dynamics between high body condition score and low body condition score cows. Domeeq *et al.* (1997) and Suriyasathaporn *et al.* (1998) have noted a linear relationship between postpartum body condition loss and fertility. We could add that this is a major factor affecting the reproductive performance of milking cows showing good body condition at parturition. More research is need to determine what to explain differences in reproductive efficiency and follicular growth patterns which, in turn may have an effect on conception rates.

And, Table 2 shows lactation was associated with decrease in follicle number in milking early stage, but this results that there was no effect in uterus recovered condition about 36 days after parturition. At this observation, follicle number were increased for re-breeding that the large follicle number was 1.15± 0.28 for estrous, and the middle follicle number was 1.13± 0.46 about 36 days after parturition. At this time, we can concentrate for re-breeding after parturition. Figueiredo *et al.* (1997) and Ginther *et al.* (1989) reported that the same results with this case.

In conclusion, we need management of the milking cows for early pregnancy after postpartum by ovary activity, cervix recovery diameter, follicles dynamics check by ultrasonograpy, body condition control and hor-

mone secretion level analysis. More research is need for high conception rate after parturition milking cows that total quality control method of a major factor affecting the reproductive performance of cows.

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