

Progesterone Profile of Dairy Cows which Experienced the Failure of Pregnancy to Artificial Insemination (AI)

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Submission date: 03-Feb-2020 05:21PM (UTC+0800)

Submission ID: 1250643079

File name: Bukti_C31_Progesterone_Profile_of_Dairy_Cows....pdf (164.8K)

Word count: 1707

Character count: 8464

Progesterone Profile of Dairy Cows which Experienced the Failure of Pregnancy to Artificial Insemination (AI)

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(Received : June, 2019 227/19 Accepted : August, 2019)

Abstract

The aim of study was to know the profile of progesterone in milk samples of dairy cows that experienced after pregnancy failure AI. Milk samples of fifteen AI failure dairy cows were taken on days 0, 7, 14, 21 and 28 (day 0 = estrus). Progesterone analysis was performed by ELISA method. On day 7th and 14th progesterone concentrations has increased in all cows, on 21th day the levels were decreased in 3 cows and they returned to estrous, while in 12 cows the

progesterone levels were high.

Key words : Dairy cow, Progesterone, Estrous cycle, Artificial insemination.

AI Failure can be an economically important problem on dairy farms (Canu *et al.*, 2010), due to increased costs for mating, long calving intervals, rejects of cow and fewer birth of calves per year (Rustamadji *et al.*, 2007). The reproductive disorder is caused by imbalance of progesterone and estrogen. The concentration of progesterone in the blood and milk can be determined to assess the animals infertile, estrous

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Table I. Milk Progesterone Concentrations in Dairy Cows on days 0, 7, 14, 21, 28 of estrous Cycle

No. of Cows	Progesterone Concentration (ng/mL)				
	D 0	D 7	D 14	D 21	D 28
1	2.923	4.718	7.265	3.023	5.326*
2	3.122	5.898	7.138	3.028	4.102*
3	2.855	4.307	8.12	15.81	16.521**
4	3.148	5.551	8.879	15.341	11.815***
5	2.453	4.301	7.622	2.677	4.237*
6	3.202	5.379	9.381	16.024	13.181***
7	3.019	5.417	8.992	15.821	12.193***
8	2.971	5.209	9.095	15.722	11.892***
9	3.305	5.281	9.198	15.38	11.913***
10	3.199	5.362	8.683	15.653	13.00***
11	3.258	4.583	8.216	15.483	17.028**
12	3.348	5.189	8.86	16.256	17.803**
13	3.325	5.382	8.897	15.89	12.574***
14	3.099	5.324	8.989	15.206	13.011***
15	2.989	5.541	9.079	15.153	12.796***

Note:

Cow * = Failure of fertilization (on 21st and 28th day the levels progesterone were decreased)

Cow ** = Pregnant (on 21st and 28th day the levels progesterone were still increased)

Cow *** = Early Embryonic Death (on 21st the levels progesterone were increased, but on 28th day were declined)

and pregnant state, so that it can be used for estrous detection and other pathological conditions (Samik and Safitri, 2019).

Materials and Methods

Milk samples were taken on days 0, 7, 14, 21 and 28 (day 0 = estrous) in the morning from the 15 AI failure cows aged 3.5 to 5.5 years with the normal breeding cycle. The samples were kept into the ice box at 4°C, and transferred into the freezer. Before analyze the samples were thawed to room temperature. Furthermore 6 mL of each sample was taken and centrifuged at 3500 rpm for 15 minutes to separate fat and skim milk. One ml of skim milk was transferred into microtube. Hormonal assay were performed using the sandwich ELISA method. The data obtained were analyzed for ANOVA using Statistical Package Programs Social Sciences Software (SPSS).

Results and Discussion

Milk progesterone hormone profile determined on day 0 (estrous), 7, 14, 21 and 28 in 15 dairy

cattle aged 3.5- 5.5 year with the failure of AI is shown in Table I.

The progesterone hormone concentration on the day 0 (estrous) of 15 dairy cows were consistent (2.2 - 3.5 ng/mL) the results of some researchers suggested that the animals were in estrous (Hoffman *et al.*, 1983).

The hormone concentration on the day 7 of 15 dairy cow explained earlier observation that during the cycle, progesterone concentrations can be detected on the third day (Valdez *et al.*, 2005) which increases until day eight of estrous and continue to increase until 21st day of pregnancy cycle (McDonald, 2000). Which concurs the findings of Frestantie (2017) that, the formation of the corpus luteum has occurred after ovulation, so the hormone progesterone secretion begins.

The high hormone concentration on the day 14 of 15 cow explain the luteal phase, the hormone progesterone inhibit gonadotropin hormone secretion, that is Folicle Stimulating Hormone (FSH) and Luteinizing Hormone

(LH) from the anterior pituitary gland. These barriers prevent further development of successive follicles and the hormone estrogen is not produced, so the animals do not show symptoms of estrous (Hafez and Hafez, 2013).

The higher hormone concentration on the day 21 explains that the concentration of progesterone in pregnant dairy cow rises in line with positive pregnancy period. Pemayun and Budiasa (2014) suggested that concentration progesterone above 15 ng / ml can be taken as positive. This study showed that 12 dairy cows had 15 ng /mL and above, while three cow that returned to the cycle probably due to the failure of fertilization (Table I). Increased concentrations of progesterone occur gradually from day 4 to a peak on day 14 after estrous, while decreased concentrations of progesterone begin to occur after day 14 and approach concentration during pregnancy from the day 20. The up and down fluctuations of progesterone are related to the development of corpus luteum during the estrous cycle (Frastantie *et al.*, *loc. cit.*). The decrease in progesterone concentration is due to the luteolytic properties of endogenous Prostaglandin F₂ α (PGF₂ α).

The hormone concentration on the day 28 in 3 cows out of 15 cows has shown a concentration of progesterone increase above 15 ng/mL which is comparable to the reports of Pemayun and Budiasa (*loc. cit.*). The high concentration of progesterone during pregnancy due to the corpus luteum still serves to stimulate the endometrial cells to produce uterine milk which is the initial nutrient for the embryo before implantation (Hafez and Hafez, *loc. cit.*). The corpus luteum will be maintained during pregnancy so that the concentration of the hormone progesterone in milk remains high (Drajat, 2002). The formation of the placental membrane begins to develop at 15-17 days after fertilization which is the period of recognition of pregnancy which prevents the release of prostaglandin α F₂ so thus preventing the regression of the corpus and maintenance level during progesterone pregnancy (Hafez and Hafez, *loc. cit.*). Besides, 9 cows with concentration below 15 ng/mL (Table II) shown early embryonic death. In animals that failed to become pregnant, the concentration of progesterone will

decrease due to regression of the corpus luteum on the 18-24 days after estrous (Drajat, *loc. cit.*).

One of the factor affecting early embryonic death is contaminated insemination gun or plastic sheeth and fungal infested feed. The AI in the field without supporting infrastructure and poor sanitation conditions leads to bacterial and fungal infections. The presence of bacteria in the uterus may result in mild endometrial infections or subclinical endometritis (Madyawati *et al.*, 2019). Gautam *et al.* (2010) stated that the failure of AI of cattle in Indonesia subclinical bacterial and fungal infections.

Summary

On 28th day the levels were high and indicated pregnancy while in 9 other cows progesterone levels declined due to embryonic death.

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