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Influence of Gestagen and Estrogen Treatment on Postpartum Reproductive Activity in Dairy Cattle

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Summary

The effects of MGA and DES treatment on various reproductive functions after calving was studied in 11 dairy cows. Beginning Day 15 postpartum the cows were individually fed 0.5 mg of MGA for 14 days. Injection of 5 mg of DES followed Day 1 after withdrawal of MGA treatment. These treatments of compound reduced the average intervals from calving to estrus, ovulation and uterine involution. The average lengths of the intervals between first and second, and second and later estrus were approximately normal. However, these treatments did result in a lower conception rate in postpartum.

The frequency of calving in the life of a cow affects considerably the lifetime production. Thus, the interest in reproduction rate and consequently in the intervals from parturition to first estrus or to conception arises from different sources.

The authours have investigated the reproductive efficiency in dairy cattle (Holstein) in the region of Igu District located near Sendai (1). The results from these studies are summarized in Table 1. The intervals from parturition to first breeding or to conception showed a considerable variation. The variation in calving intervals is, in part, due to the biological variation in the interval from parturition to first estrus and in part, to the management practice in the breeding. However, the frequency of calving or calving intervals is regulated largely by how soon after calving the cow is rebred. A calving interval of 12 months appears to be optimal from the standpoint of raising lifetime production of a dairy cow. But, a delay after calving of at least 50–60 days before rebreeding is essential to enhances the rate of conception and reduces the probabilities of breeding difficulties. This low fertility following parturition is, in part, relate to the involution of the uterus (2, 3).

TABLE 1. *Calving interval and fertility in Holstein.*

Calving interval (days)	No. of cattle	Interval from parturition to conception		
		Postpartum breeding interval (days)	Conception rate at first breeding	Services per conception
310–329	19	42.0	18/19 (94.8) %	1.05
330–349	21	57.5	19/21 (90.5)	1.1
350–369	36	75.4	26/36 (72.2)	1.4
370–389	14	77.0	5/14 (35.7)	1.8
390–409	12	82.3	4/12 (33.3)	2.3
410–459	17	98.1	3/17 (17.6)	3.2
460–	20	157.8	7/20 (35.0)	3.8

The studies on beef cows have reported that the treatment with gestagen or estrogen or both later in the postpartum interval may decrease the time from calving to breeding and tend to have lower fertility at first estrus (4).

The authors have attempted (1) to decrease the variation in the time of first estrus and to shorten the intervals from parturition to estrus in a group of postpartum dairy cows, (2) to have no influence on conception rate at second estrus within 60 days postpartum. The objectives of the current study were to investigate the effect of gestagen and estrogen treatment on estrus, ovulation, uterine involution and conception in postpartum dairy cattle.

Experimental Procedure

This study was conducted in the Faculty Farm of Tohoku University at Kawatabi, from August 1968 to February 1969. This experiment involved 11 cows, 10 Holsteins and 1 Jersey. All cows were grazed from May to October on improved blue grass pasture. Some concentrate supplementation was practiced. Winter feeding was in a dry lot. The winter ration consisted of concentrate and mixed hay or corn silage. All animals were milked twice a day.

The compounds used were melengestrol acetate (MGA) and diethlstilbestrol (DES). MGA was offered daily at rate of 0.5 mg per animals mixed in cornstarch. This treatment began day-15 after postpartum and lasted 14 days. A single subcutaneous injection of 5 mg of DES followed Day-1 after withdrawal of MGA treatment.

All cows were bred at first estrus following the treatment of compounds. Those not conceiving at first service were bred at subsequent estrus periods until they conceived. The breeding was accomplished by hand mating. The determination of estrus implied careful observation of the behavior and mucous discharge of cows 2 or more times daily beginning immediately after parturition. The time of uterine involution and ovulation were determined by weekly rectal palpation of the reproductive organs beginning 15 days after parturition. The uterus was

considered as involuted when it has returned to its normal, nonpregnant position and when the two horns are similar in diameter and showing normal consistency and tone.

All cows which had not returned to estrus 35 to 42 days following breeding were examined by rectal palpation to determine pregnancy.

Results and Discussion

The intervals from calving to first estrus, first ovulation and uterine involution are shown in Table 2. The intervals from parturition to first estrus ranged from 29 to 41 days, averaging 33.3 days. The average length obtained was shorter than the lengths found in the different studies hitherto (5). Foote et al (4) Tilton et al (6) reduced also the interval from calving to first estrus by treatment of gestagen and estrogen in beef cows. The average length from first to second estrus was 20.2 days and these estrus cycles were nearly normal in length. The shorter length in estrus cycle was observed in No. 9. Inadequate corpus luteum development or maintenance appeared in this animals.

The estrus and ovulation were inhibited during treatment of compounds. In all animals, the development of follicles in the ovaries was detected between the start and the cessation of treatment. These observations would agree with the results obtained by Smith and Zimbelman (7).

The first ovulation after calving was observed in eight of eleven cows by Day 5 after injection of estrogen. In some cattle (No. 4, 8), the first developed follicle led to atresia and failed to ovulate. There was a tendency for the first ovulation to

TABLE 2. *Intervals from parturition to first*

No. of cattle	Breed	Intervals from parturition			Intervals between first and second estrus (days)
		to first estrus (days)	to first ovulation (days)	to uterine involution (days)	
1	Holstein	31	32	30	20
2	Jersey	29	31	29	18
3	Holstein	29	32	32	23
4*	〃	32	28	28	21
5	〃	41	41	33	18
6	〃	29	31	29	21
7	〃	30	31	29	22
8**	〃	—	51	29	23
9	〃	30	30	26	14
10	〃	33	39	23	21
11	〃	31	31	40	21
Average length (M±S.D.)		33.3 ± 6.8	34.3 ± 6.7	29.8 ± 4.3	20.2 ± 2.6

occur in the ovary opposite that which contained the corpus luteum of pregnancy. This results are similar to the observation reported by Saiduddin et al (8). Most cows ovulated between 1 to 5 days after injection of estrogen and between 1 to 4 days from estrus. There appeared to be a slight tendency for ovulation to occur sooner after estrus. Some animals ovulated before being detected in estrus.

The first ovulation was usually accompanied with estrus. Then, the estrus and the ovulation was repeated two times within 60 days postpartum. The length of estrus was normal thereafter.

The intervals from calving to uterine involution ranged from 23 to 40 days, averaging 29.8 days. These obtained lengths were shorter than the results reported in different studies hitherto (5). Similar results were found when a progesterone was given after calving and followed by an estrogen injection (4). A significant correlation between postpartum intervals to estrus and uterine involution was indicated by Buch et al (9). The exogenous hormones may have a possible directly influence on shortening of the interval to uterine involution or by stimulating the endogenous endocrine activity. The hastening of estrus and ovulation after calving by treatment of MGA and DES may be accompanied by earlier involution of the uterus to breeding conditions.

The conception rates obtained here are shown in Table 3. Some cows did not conceived during the experiment. Cow No. 5 exhibited a cystic condition 30 days after calving. This lower fertility may have resulted from too early treatment of MGA in order to obtain two estrus with ovulation within 60 days postpartum. Then, it has resulted in the initiation of estrus and breeding before the reproduc-

estrus, first ovulation and uterine involution

Intervals from DES treatment to ovulation (days)	Ovulation side of ovary	Side of pregravid horn	Remarks
5	left	right	
3	〃	〃	
5	〃	〃	* first developed follicle of non pre- gravid horn side lead to atresia
1	〃	left	
13	right	〃	
4	〃	right	
3	left	〃	** first developed follicle of non pre- gravid horn side lead to atresia
21	right	〃	
3	〃	left	
12	left	right	
3	right	left	

tive function was restored to a condition compatible with conception or early pregnancy maintenance.

The milk secretion in cows was not affected by treatment of MGA and DES throughout experiment.

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TABLE 3. *Conception rates of cows conceiving within the first five services after calving*

No. of cattle	Calving number	Conception folloing service					Remarks
		First	Second	Third	Fourth	Fifth	
1	6	−	−				
2	4	−	−	+			
3	9	−	−	−	−		
4	4	−	+				* Exhibition of cystic condition
5*		−					
6		+					
7	3	−	−	+			
8	6	−	−	−	+		
9	3	−	−	+			
10	4	−	−	−	−	+	
11	1	−	−	−	−	+	

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