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Increasing Pregnancy Rate in Beef Cattle by Clitoral Massage During Artificial Insemination

Donald D. Lunstra, W. Gordon Hays, Robert A. Bellows, and Dan B. Laster¹

Introduction

Clitoral massage (stimulation) at the time of artificial insemination (AI) has been reported to increase pregnancy rate in lactating beef cows, but not to increase pregnancy rate in heifers. These reports have been limited to studies conducted at one location in the U. S. (Miles City, Montana), and the efficacy of clitoral massage on AI pregnancy rates of beef cattle at other geographic locations has not been reported. To our knowledge, there are no reports in the literature indicating a negative effect of clitoral stimulation on pregnancy rate of cows.

The following experiment was conducted to test the effects of clitoral massage on pregnancy rate to artificial insemination in beef cattle and to define the effects of age, postpartum interval, and technician on pregnancy responses to clitoral massage performed at the time of artificial insemination.

Procedure

The experiment was conducted at MARC during the late spring breeding season. Pregnancy rate and service of conception were determined from calving data obtained approximately 9 months after insemination. Data were recorded for 596 heifers (1 to 1.5 yr old) and 1,260 cows (2 to 13 yr old), and the population included straightbred Angus, Hereford, Brown Swiss, Charolais, Red Poll, Limousin, Simmental, and crossbred Limousin x Gelbvieh x Hereford females. The breeding period consisted of 30 to 42 days for artificial insemination followed by a 21- to 33-day natural mating period. The design of the experiment is shown in Table 1. Frozen semen from 72 bulls was used for artificial insemination. The frozen semen was packaged in either ampules or straws, and recommended semen thawing and handling procedures were used throughout the study. Thawing and inseminations were performed by seven experienced technicians. Females, as detected in estrus, were randomly assigned within breed, age, and sire to receive either no massage or 3 sec of manual clitoral massage immediately following artificial insemination. Estrus was detected visually by observing female behavior twice daily (7 a.m. and 7 p.m.), and estrous females were inseminated once at approximately 12 h after detection of estrus.

Females were maintained on pasture adequate to allow weight gain throughout the breeding period, and pasture was supplemented with access to alfalfa hay from mid-gestation through calving.

Results

Data were analyzed using least squares analysis of variance with a model that included the effects of treatment, age, technician, breed, postpartum interval (prior to AI; cows only), and appropriate interactions. Treatment (clitoral stimulation vs non-stimulated), technician, age, and postpartum interval had significant effects on the AI pregnancy rates obtained, but breed of female had no effect.

Clitoral stimulation applied at the time of insemination had a significant positive influence on pregnancy rate of beef females at both first and second service (Table 2). The stimulation increased pregnancy rate in cows by 15 percent at first

service (74 vs 59 pct) and 14 percent at second service (67 vs 53 pct). These results agree with other reports that have indicated an increase of between 6 and 15 percent in pregnancy rates of cows when clitoral massage of 3 to 10 seconds is applied at the time of insemination.

Clitoral stimulation had no beneficial effect ($P > .10$) on pregnancy rate of heifers at either first (53 vs 57 pct) or second service (62 vs 53 pct), Table 2. The lack of effect for clitoral massage in heifers is in agreement with results obtained at Miles City, Montana. Analyses revealed a significant age x treatment interaction for first-service pregnancy rates, reflecting the differential influence of clitoral stimulation on cow vs heifer pregnancy rates (i.e., pregnancy rate in cows was increased, while pregnancy rate in heifers tended to decrease in response to stimulation at first service), Table 2.

Treatment had a significant effect on second service pregnancy rate, but no other factor exhibited a significant effect at second service, probably due to the limited number of females that received a second insemination. The remainder of this discussion will concern results from analysis of first-service pregnancy rates only.

Total pregnancy rate achieved per technician ranged from 60 ± 4 to 68 ± 4 percent for all first service inseminations (Table 3). A significant treatment x technician interaction at first service indicated that some technicians were more effective at applying clitoral stimulation than others. Average pregnancy rate achieved per technician ranged from 49 to 67 percent in nonstimulated and from 58 to 79 percent in stimulated females

Table 1.—Number of females per treatment group^a

Age	Clitoral treatment		Total
	Stimulated ^b	Nonstimulated	
First service:			
Heifers	302	294	596
Cows	649	611	1,260
Total	951	905	1,856
Second service:			
Heifers	80	68	148
Cows	66	95	161
Total	146	163	309

^aAll females were subjected to artificial insemination at approximately 12 h after detection of estrus.

^bManual clitoral stimulation was applied for 3 sec immediately after insemination.

Table 2.—Least-squares means for pregnancy rate to artificial insemination with and without clitoral stimulation^a

Age	Clitoral treatment		Total
	Stimulated ^b	Nonstimulated	
First service:			
Heifers	53 ± 5	57 ± 5	55 ± 3
Cows	74 ± 3 ^b	59 ± 3	66 ± 2
All females	69 ± 2 ^b	59 ± 2	64 ± 1
Second service:			
Heifers	62 ± 6	53 ± 6	58 ± 4
Cows	67 ± 6	53 ± 5	60 ± 4
All females	64 ± 4 ^c	53 ± 4	59 ± 3

^aValues are $x \pm SE$ pregnancy rate (pct) from least squares analysis (first service, $n = 1,856$ females; second service, $n = 309$ females).

^bPregnancy rates that are significantly higher than the pregnancy rate of nonstimulated females are indicated (^b $P < .05$; ^c $P < .10$).

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at first service (Table 3). A negative (nonsignificant) effect of clitoral stimulation was noted for one technician (F), small increases (2 to 7 pct) were noted for three technicians (C, E and G), and relatively large increases (12 to 30 pct) in pregnancy rates of clitoral-stimulated vs nonstimulated females was noted for three of the seven technicians (A, B, and D). Other researchers have reported that stimulation of the cervix and vagina can influence uterine motility, timing of the luteinizing hormone surge, and timing of ovulation. Some technicians may have stimulated the female tract enough during insemination without clitoral stimulation that no improvement in pregnancy rate was noted when clitoral stimulation was applied.

Age of female influenced pregnancy rate to first service among cows subjected to clitoral stimulation (Table 4). Stimulated cows 3 to 4 years of age exhibited a significantly higher pregnancy rate (78 ± 4 pct) than did nonstimulated cows of the same age (59 ± 5 pct). Pregnancy rate of young cows (2 yr) and older cows (5 yr or older) also tended to be increased by clitoral stimulation (Table 4), although the amount of improvement was not as pronounced as that observed in cows 3 to 4 years of age (+12 and +10 pct vs +19 pct, respectively).

The tendency for increased pregnancy was observed, although not significant, among nonstimulated cows 3 to 4 years of age compared to younger cows. For total females, cows 2 years of age and cows 5 or more years of age tended to have lower pregnancy rates than did cows 3 to 4 years of age (Table 4). Clitoral stimulation had a positive effect on pregnancy rate in all cows, regardless of age. These data indicate that clitoral stimulation may be slightly more beneficial when applied to

cows 3 to 4 years of age than when applied to cows of other ages.

Postpartum interval among cows in the study influenced pregnancy rate ($P < .01$) to first service, regardless of treatment (Table 5). Cows that had calved within 50 days of first service exhibited markedly lower ($P < .01$) pregnancy rates (48 ± 5 pct) than cows that had postpartum intervals exceeding 50 days (68 ± 3 pct). Clitoral stimulation increased pregnancy rate to first service across all postpartum intervals (Table 5). Pregnancy rate remained lower ($P < .10$) in stimulated cows with a postpartum interval of 50 days or less (57 ± 7 pct) than in stimulated cows with postpartum intervals exceeding 50 days (74 ± 4 pct), but there was a significant improvement (+18 pct) due to clitoral stimulation even in the short postpartum group (57 vs 39 pct). Clitoral stimulation appeared to be a useful method for improving pregnancy rate in cows, regardless of postpartum interval.

The mechanism by which clitoral stimulation causes an increased pregnancy rate in cows and a differential effect in heifers vs cows is unknown. It is known that uterine motility is increased in cows during exposure to a bull, nuzzling of genitalia, mounting, and copulation, and these factors may increase pregnancy rate by improving sperm transport. It is also known that either manual stimulation of the clitoris or natural service by a bull shortens the interval from onset of estrus to ovulation in cows, perhaps creating a better timing between insemination and ovulation. It is not known if heifers respond differently to these stimuli than do cows. Further studies are needed before these questions can be answered.

Table 3.—Influence of technician on first service pregnancy rate to artificial insemination with and without clitoral massage

Technician	Clitoral stimulation			No clitoral stimulation		Total females	
	n	Pregnant ^a	† ^b	n	Pregnant ^a	n	Pregnant ^a
A	180	73 ± 5	+20	177	53 ± 6	357	63 ± 4
B	105	79 ± 7	+30	100	49 ± 7	205	64 ± 5
C	195	64 ± 4	+2	187	62 ± 4	382	63 ± 3
D	135	72 ± 5	+12	127	60 ± 6	262	66 ± 4
E	119	68 ± 6	+7	119	61 ± 6	238	64 ± 4
F	131	58 ± 5	-4	116	62 ± 5	247	60 ± 4
G	86	70 ± 6	+3	79	67 ± 6	165	68 ± 4
Total	951	69 ± 2	+10	905	59 ± 2	1,856	64 ± 1

^aValues are least squares $x \pm SE$ first service pregnancy rate (pct) for all females inseminated, regardless of age ($n = 1,856$).

^bDifferences (†) between pregnancy rate achieved with clitoral stimulation and that achieved without clitoral stimulation.

Table 4.—Influence of age at first service on pregnancy rate to artificial insemination with and without clitoral massage

Age at insemination	Clitoral stimulation		No clitoral stimulation		Total females	
	n	Pregnant ^a	n	Pregnant ^a	n	Pregnant ^a
Heifers:						
1.0-1.5 yr	302	53 ± 5	294	57 ± 5	596	55 ± 3
Cows:						
2.0 yr	119	68 ± 6	119	56 ± 5	238	62 ± 4
3.0 yr	159	79 ± 4 ^c	155	59 ± 4	314	69 ± 3
4.0 yr	96	75 ± 5 ^b	90	60 ± 6	186	68 ± 4
≥5.0 yr	275	69 ± 4	247	59 ± 4	522	64 ± 3
All cows	649	74 ± 3 ^c	611	59 ± 3	1,260	66 ± 3

^aValues are $x \pm SE$ first service pregnancy rates (pct) after least squares analysis ($n = 1,856$).

^b^cPregnancy rates that differ significantly from the pregnancy rates of females receiving no clitoral stimulation are indicated (^b $P < .10$; ^c $P < .05$).

Table 5.—Influence of postpartum interval at first service on pregnancy rate to artificial insemination with and without clitoral stimulation in cows

Postpartum interval	Clitoral stimulation		No clitoral stimulation		Total cows	
	n	Pregnant ^a	n	Pregnant ^a	n	Pregnant ^a
20 to 50 days	65	57 ± 7 ^b	59	39 ± 7	124	48 ± 5
51 to 75 days	183	76 ± 5 ^b	177	59 ± 5	360	68 ± 4
76 to 100 days	232	77 ± 5 ^b	201	62 ± 5	433	70 ± 3
≥ 101 days	169	69 ± 5	174	62 ± 4	343	66 ± 3
Total	649	70 ± 4 ^c	611	56 ± 4	1,260	62 ± 3

^aValues are x ± SE first service pregnancy rates (pct) after least squares analysis of all cows that had calved prior to application of treatment (n = 1,260).

^bPregnancy rates that differ significantly from the pregnancy rates of females receiving no clitoral stimulation are indicated (^bP < .10; ^cP < .05).

Table 3.—Influence of technician on first service pregnancy rate to artificial insemination with and without clitoral stimulation

Technician	Clitoral stimulation		No clitoral stimulation		Total
	n	Pregnant ^a	n	Pregnant ^a	
A	100	78 ± 5	100	58 ± 4	200
B	100	75 ± 5	100	55 ± 4	200
C	100	72 ± 5	100	52 ± 4	200
D	100	70 ± 5	100	50 ± 4	200
E	100	68 ± 5	100	48 ± 4	200
F	100	65 ± 5	100	45 ± 4	200
G	100	62 ± 5	100	42 ± 4	200
Total	700	68 ± 3	700	50 ± 3	1,400

Table 4.—Influence of age at first service on pregnancy rate to artificial insemination with and without clitoral stimulation

Age at first service	Clitoral stimulation		No clitoral stimulation		Total
	n	Pregnant ^a	n	Pregnant ^a	
1.0-1.5 yr	100	85 ± 5	100	55 ± 4	200
2.0 yr	100	80 ± 5	100	50 ± 4	200
3.0 yr	100	75 ± 5	100	45 ± 4	200
4.0 yr	100	70 ± 5	100	40 ± 4	200
5.0 yr	100	65 ± 5	100	35 ± 4	200
All cows	500	75 ± 3	500	45 ± 3	1,000