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Growth Implants on Beef Heifer Reproduction

This guide discusses the benefits and concerns in the use of growth implants with beef heifers.

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Growth promoting implants are used extensively in beef cattle finishing programs and in suckling and growing steer programs. Implants are one of the most economical means of improving performance. However, producers are concerned with implanting suckling and growing heifers because of the possible negative effects on subsequent reproduction of heifers selected as replacements.

Replacement heifers need to grow rapidly, reach puberty early, conceive early, and increase in skeletal structure to reduce calving difficulty. If implants could be used to increase growth and skeletal structure and not affect fertility, they could be very advantageous.

Over 40 research studies have been reported on the effects of implants on growth rate, pelvic size, reproduction, and calving difficulty of replacement heifers. This research was summarized to provide the following recommendations on the use of implants for heifers. Economic considerations are also provided to help producers determine their risk/benefit ratio.

Implants Available

Table I shows the various implants available for suckling and/or growing heifers. The Food and Drug Administration (FDA) regulates the use of these implants so producers need to read and follow the label directions. Only Ralgro and Synovex-C implants have been approved by the FDA for use in heifers to be saved for breeding. Ralgro can be used in heifers that are at least 1 month of age and Synovex-C can be used in heifers that are 45 days of age or older. The other implants are not approved for use in

replacement heifers; although Calf-oid and Heifer-oid have similar chemical makeup to Synovex-C and Synovex-H, respectively. Therefore, the following discussion will cover only the effects of Ralgro and Synovex-C implants.

Table I. Growth promoting implants for heifers.			
Trade name	Company	Ingredients	Use
• Ralgro	Pitman-Moore Inc.	Zeranol (estrogenic)	Suckling and growing
• Synovex-C	Syntex Agr. Bus. Inc.	Estradiol and progesterone	Suckling
• Synovex-H	Syntex Agr. Bus. Inc.	Estradiol and testosterone	Growing
• Compudose	Elanco Anim. Health	Estradiol	Growing
• Calf-oid	Upjohn Co.	Estradiol and progesterone	Suckling
• Heifer-oid	Boehringer Ingleheim	Estradiol and testosterone	Growing

Effect of Implants on Growth Rate

In general, these implants given at 1 to 2 months of age will increase weaning weights of heifer calves by 2 to 6 percent or 10 to 30 pounds. The Synovex-C implant appears to have a longer lasting effect than Ralgro and may continue to increase growth rate up to 12 months of age. Implants given at 1 to 2 months of age and again at weaning will yield heavier yearling weights.

Effect of Implants on Puberty

Puberty in heifers is the first behavioral estrus followed by ovulation and development of a corpus luteum. Heifers implanted at one to two months of age with either Ralgro or Synovex-C will show a greater incidence of non-ovulatory estrus periods (false heats) after weaning than non-implanted heifers. Multiple implanted heifers may show up to 50 percent non-ovulatory estrus periods. This means heifers show riding activity and stand to be ridden but have not reached puberty. In general, research shows that the implants have little effect on the onset of puberty when heifers receive an adequate level of nutrition.

Effect of Implants on Pregnancy

Ralgro - A Ralgro implant given at birth (or one day old) can decrease yearling pregnancy rates considerably. Five research studies show an average reduction of pregnancy of 35 percentage points. Thus, heifers should not be implanted with Ralgro at birth if they will be kept for breeding. Label directions indicate that heifers should be at least one month of age before Ralgro is given if heifers are to be saved for breeding.

Research shows a Ralgro implant given to heifers between one and 10 months of age can have variable effects on yearling pregnancy rates (*Table II*). Of 24 studies, about 40 percent showed a positive effect, 24 percent showed no effect, and 36 percent showed a negative effect on yearling pregnancy rates. The results ranged from a negative 14 percent to a positive seven percent, with an average of a negative one percent. When results of the studies were pooled and interpreted, the implant had little or no effect on yearling pregnancy rates if heifers were fed to gain at least 1.1 pounds per day to reach breeding weights.

Table II. Effects of single Ralgro implant on yearling heifer pregnancy rates.

Location of study	Age at implant (months)	Ylg. preg. rate, ^a %		
		Cont.	Imp.	Diff.
NE	1	96	96	0
OK	1.5	46	50	+4
TX	1.5	77	70	-7
KS	1.5	76	81	+5
KS	1.5	85	81	-4
KS	2	100	100	0
WY	2	83	73	-10
KS	2	86	90	+4
KS	2-3	78	79	+1
KS	2-5	98	98	0
MO	3	90	84	-6
FL	3	52	50	-2
CO	3	86	86	0
CO	6	86	93	+7
TX	5	77	76	-1
NE	6	96	96	0
IN	6	100	86	-14
KS	6	85	90	+5
FL	8	82	68	-14
NM	8	35	37	+2
LA	9	85	86	+1
NE	9	96	100	+4
KS	9-10	96	89	-7
OR	10	85	91	+6
			Average	-1

^aCont. = non-implanted, Imp. = implanted, Diff. = difference between groups.

Research on multiple (2 or more) Ralgro implants given between one and 11 months of age showed a decrease in pregnancy rates in yearling heifers in 55 percent of the studies, while 45 percent showed no effects or an increase in pregnancy. However, several studies found a considerable negative effect (from -16 percent to -42 percent), while the positive effects were quite small. Most studies reporting negative

effects had heifers on a low nutritional level. Studies in Montana and Nebraska found that increasing nutrition level to heifers overcame the adverse effects of multiple implants on fertility. In Nebraska, heifers implanted at one, six, and nine months of age and fed to gain one pound per day from weaning to breeding had a 12 percent decrease in pregnancy rate, while similar heifers fed to gain 1.3 pounds per day showed no decrease.

Synovex-C - Research is limited on the effects of Synovex-C given at or near birth on pregnancy rates; however, it is not recommended if heifers are to be retained for breeding. The label directions indicate heifers should be at least 45 days of age before implanting.

When Synovex-C implants were given to heifers between two and three months of age, effects on yearling pregnancy rates varied from +2 percent to -9 percent in seven studies, with an average of -2 percent (*Table III*). When heifers were implanted at six months of age, two studies showed an average decrease of three percent in pregnancy rates. In a Nebraska study, heifers implanted at both two and six months of age had pregnancy rates five percent lower than non-implanted heifers (*Table IV*). Early pregnancy rates (in first 21 days of breeding) tended to be lower for all groups of implanted heifers. Therefore, a slight decrease in early fertility and pregnancy rate may occur if heifers are implanted at either two or six months of age. Heifers that did not gain adequately to reach breeding weights had the greatest decrease in fertility.

Table III. Effects of single Synovex C implant on yearling heifer pregnancy rates.					
Location of study	Age at implant (months)	Length of breeding season (days)	Ylg. preg. rate,^a %		
			Cont.	Imp.	Diff.
IN	2	90	96	94	-2
TX	2	90	77	79	+2
CAN	2	70	93	95	+2
CAN	2	70	97	91	-6
MO	2-3	45	81	77	-4
CO	3	95	99	90	-9
NE	2	63	93	92	-1
				Average	-2

^aCont. = non-implanted, Imp. = implanted, Diff. = difference between groups.

Effect of Implants on Pelvic Area and Calving Difficulty

Research has shown that calving difficulty in two-year-old heifers is inversely related to pelvic area. Therefore, increasing pelvic area should help reduce calving difficulty. Many studies on both Ralgro and Synovex-C show implants increase yearling pelvic area substantially. However, this advantage must be present at calving to reduce calving difficulty. Studies on Ralgro have shown variable calving results; thus, the effects on precalving pelvic area and calving difficulty are inconclusive. The studies on Synovex-C implants showed precalving pelvic areas of heifers were slightly larger due to the implants; however, only a slight reduction in calving difficulty was found. An exception to this occurred in a Nebraska study (*Table IV*) when heifers given Synovex-C implants at both two and six months of age

had only half the calving difficulty (14 versus 32%) as the non-implanted heifers, although the implanted heifers had a 5 percent decrease in yearling pregnancy rate.

Item	Treatment groups ^a			
	Cont.	2 mo	6 mo	2 and 6 mo
Number of heifers	94	94	93	88
12 month weight, lb	651	669	649	682
Precalving weight, lb	937	944	939	953
12 month pelvic area, cm ²	158	168	164	171
Precalving pelvic area, cm ²	240	243	250	248
Puberal before breeding season, %	83	84	77	78
First service conception, %	68	65	57	61
Pregnancy in breeding 21 days, %	67	60	61	55
Pregnancy in breeding 63 days, %	93	92	89	88
Calf birth weight, lb	73	74	77	71
Calving difficulty, %	32	29	23	14

^aCont. = non-implanted, 2 mo = implanted at 2 months of age, 6 mo = implanted at 6 months of age, 2 and 6 mo = implanted at both 2 and 6 months.

Summary of Implant Research

1. Heifer calves implanted at birth (especially with Ralgro) may have substantially lower fertility, thus, potential replacements should not be implanted at birth.
2. Implants should be given according to label directions when calves are at least 30 days old (Ralgro) or 45 days old (Synovex-C). These implants are very economical and will increase weaning weights by 10 to 30 pounds.
3. Heifer calves implanted once during the suckling period may experience a small decrease in early fertility, but yearling pregnancy rates are only slightly affected if adequate nutrition is provided.
4. Multiple implants can cause adverse effects on reproduction but may be overcome with high levels of nutrition.
5. Implants will increase yearling pelvic area, but the advantage decreases by calving time and effects on reducing calving difficulty are minimal.
6. Implanting replacement heifers probably won't affect their future milk production as two-year-olds or their calf weaning weights.
7. Implanting pregnant heifers may cause abortions.

Economics of Implant Use

Because research studies have shown both advantages and disadvantages of implants on heifers, producers need an economic evaluation before using implants. Many factors can be considered in an economic analysis, such as the increase in weaning weight, price of calves at weaning, replacement heifer rate, change in yearling pregnancy rate, value of bred heifers, and any long-term effects on calf

production. An economic analysis using these factors was reported by Gutierrez et al. at Colorado State University. The assumptions used were: calf weaning weights of 450 pounds, selling price of \$.90 per pound, heifer replacement rate of 15 percent, and bred heifer value of \$800.

Table V shows that the net return per heifer implanted when all heifer calves were implanted at two to three months of age compared to no heifers implanted.

Table V shows three different weight gains (increases in weaning weight) and three possible changes in yearling pregnancy rates due to the implants. For example, if the heifers sold at weaning gained an additional 21 pounds due to the implants and the heifers saved for breeding had a five percent decrease in yearling pregnancy rate, the return is \$4.12 per implant. In general, the returns to implants are positive unless fertility is decreased more than five percent. Producers can use this table to help estimate the return they could expect under their management.

Table V. Economics of implanting heifer calves			
	Weaning weight gain (lb)		
Pregnancy rate change	15	21	25
	Net return per implant (\$)		
0%	4.37	7.27	9.20
-5%	1.22	4.12	6.05
-10%	-6.17	-3.29	-1.34
(Gutierrez et. al, 1993)			

Recommendations on Using Implants

1. Both advantages and disadvantages of implants need to be considered and weighed on an economic basis before implanting heifer calves.
2. If heifers to be saved for breeding can be identified early (before two months of age or at processing), **DO NOT IMPLANT THEM.**
3. If replacement heifers cannot be identified until weaning time or later and economic returns to implants appear positive, all heifers can be implanted at about two months of age. Implants will increase weaning weights and market value. Heifers kept as replacements should be fed to reach breeding weights before the breeding season.
4. If heifers are implanted at both two and six months of age or later, additional replacement heifers should be saved to compensate for lower yearling pregnancy rates. High nutrition levels may help overcome the negative effects of implants.

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