

**EXTENSION****AFS-3290**

Implants and their use in beef cattle production

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The term “implant” is used to refer to a group of products used in the cattle industry that increase the rate and efficiency of growth, both metabolic and economic. Implants contain natural or synthetic compounds that produce physiological responses in the animal, similar to those of natural hormones. Implants are typically made of a powder that is compressed into a small pellet. The pellet is placed, or implanted, under the skin on the backside of the animal’s ear. Each type or brand of implant has a specific applicator, referred to as an implant gun, which is used to properly administer the implant.

Types of implants

There are three types of compounds used in implants: estrogens, androgens and progestins. Estrogens mimic the effects of the naturally occurring hormone estrogen. Estradiol benzoate, estradiol 17-beta and zeranol are the primary estrogenic compounds used in implants. Alternatively, androgenic compounds mimic the effects of the naturally occurring hormone testosterone. Testosterone propionate and trenbolone acetate (TBA) are the principal androgenic compounds used in implants. Synthetic progesterone is also used in implants; however, its growth effects in the animal are less pronounced than those of the other two hormone analogs. Table 2 (suckling calves), Table 3 (growing cattle on pasture), Table 4 (growing cattle in dry lot) and Table 5 (growing cattle fed in confinement for slaughter) list compound combinations and dosages supplied in commercially available implant products. Some commercially available implants have singular hormone activity, such as Ralgro with only an estrogenic analogue, but most have combinations of hormone analogues.

Safety of implants

There is much concern expressed by consumer groups in the news and on social media about using growth-promoting hormones in beef production systems. Table 1 shows the estrogenic activity of foods commonly consumed in the U.S. Beef from steers and heifers fed for slaughter have a very low level of estrogenic activity, regardless of implant status. In fact, ice cream contains 272 times more estrogen than implanted beef (Preston, 1997). Common grain- and vegetable-sourced foods such as peas, wheat germ and cabbage have 180 to 1,000 times the estrogenic activity of implanted beef. Natural estrogen production in humans is much higher than many expect; a pregnant female produces 90 million nanograms of estrogen/day, a non-pregnant adult female five million nanograms of estrogen/day, an adult male 100,000 nanograms of estrogen/day, and a pre-pubertal child 40,000 nanograms of estrogen/day (Preston, 1997). So, the safety of growth-promoting implants is certain. The safety of implants is assured when FDA approved products are used according to their labels. History and several organizations, including but not limited to the U.S. FDA, the World Health Organization and the Food and Agriculture Organization, have concluded that the use of implants in beef production poses no safety risk to consumers.

Table 1. Estrogenic activity per 4 ounce serving of several common foods^a.

Food	Estrogen, ng
Soybean oil	226,757
Cabbage	2,721
Wheat germ	453
Peas	453
Eggs	3,968
Ice Cream	680
Milk	15
Beef from pregnant cow	159
Beef from implanted cattle	2.5
Beef from non-implanted cattle	1.8

^a Adapted from Preston (1997)

Current use of implants

Implants have a long history of use in the beef cattle industry. The first commercial implant was introduced in 1957. Since that time, the use of implants has been widely adopted by the cattle feeding and stocker sectors of the beef industry. According to the 2011 USDA NAHMS Feedlot Survey (USDA NAHMS, 2013), up to 94% of steers and heifers are implanted at least one time during the finishing phase.

In the Southern Great Plains region (Kansas, Oklahoma and Texas), a survey of stocker cattle operations indicated that 77% of stocker calves are implanted (Asem-Hiablie et al., 2015), but use of implants is much lower in cow-calf operations. In Oklahoma, 58.6% of stocker cattle operations always implanted their steers, while only 28.8% of stocker cattle from stocker operations that included a cow-calf component were implanted (Johnson et al. 2008). A recent Oklahoma survey of 729 producers who received the Beef Cattle Manual (Vestal et al., 2007) showed that 37% of cow-calf producers with larger operations (more than 100 cows) indicated they implanted their steer calves, while only 9% of cow-calf producers with smaller operations (fewer than 100 cows) implanted their steer calves.

The U. S. Food and Drug Administration indicates that implants can only be used in production settings specifically mentioned on the label. The FDA currently recognizes four production phases: Beef Calves (preweaning), Growing Beef Cattle on Pasture (Stocker, Feeder and Slaughter), Growing Beef Cattle in a Dry Lot and Growing Beef Cattle Fed in Confinement for Slaughter. The approved implants for each production stage are presented in Tables 2, 3, 4, and 5. [Refer to the FDA website](#) for a list of the currently-approved and currently marketed implants available by beef cattle target animal class.

U. S. Food and Drug Administration reimplantation programs ruling

Label changes, effective July 1, 2023, make reimplanting within a production phase off-label use of implants unless the label specifically states it is approved for reimplanting. The cattle target animal class definitions are based on differences in physiological state and management of the animals at each phase and are reflective of the conditions of use that were used in regulatory studies to demonstrate the safety and effectiveness of the product for FDA approval. Unless the labeling of a cattle ear implant clearly states that it is approved for reimplantation within a production phase, it is not approved for reimplantation.

Tables 2, 3, 4 and 5 clarify the approved conditions of use and the products labeled for reimplanting. At the time of writing, there are no implant products labeled for reimplanting for any market class except Growing Beef Cattle Fed in Confinement for Slaughter (Table 5). To date the only products with reimplant labeling include the Zoetis products: Synovex C which is approved in a reimplantation program where Synovex C is the first implant and Synovex S is administered approximately 70-days later; Synovex S which is approved in a reimplantation program where Synovex C or Synovex S is the first implant and Synovex S is administered approximately 70-days later and Synovex Choice, Synovex Plus and Synovex ONE Feedlot which are approved in a reimplantation program where Synovex Choice is the first implant and a Synovex Choice, Synovex Plus or Synovex ONE Feedlot implant is administered 60 to 120 days later. Any other products or protocols are not approved for reimplantation.

Table 2. Beef cattle implants approved for use in beef calves (preweaning).

Steer	Heifer	Implant	Company	Ingredient/dose	Relative potency	Indications for use	Payout	Approved for reimplantation in this class
x	x	Ralgro	Merck	36 mg zeranol	Low	For increased rate of weight gain in beef calves 2 months of age or older	70-100	No
x	x	Synovex-C	Zoetis	100 mg progesterone 10 mg estradiol benzoate	Low	For increased rate of weight gain in beef calves 45 days of age and older and weighing up to 400 lbs	90-120	No

Table 3. Beef cattle implants approved for use in beef cattle on pasture (stocker, feeder and slaughter).

Steer	Heifer	Implant	Company	Ingredient/dose	Relative potency	Payout	Approved for reimplantation in this class
x	x	Ralgro	Merck	36 g zeranol	Low	70-100	No
x	x	Synovex Primer	Zoetis	50 mg trenbolone acetate 7 mg estradiol	Moderate	100-140	No
x	x	Revalor-G	Merck	40 mg trenbolone acetate 8 mg estradiol	Moderate	100-140	No
x	x	Synovex Choice	Zoetis	100 mg trenbolone acetate 14 mg estradiol benzoate	High	100-140	No
x	x	Synovex One Grower	Zoetis	150 mg trenbolone acetate 21 mg estradiol benzoate	High	180-200	No

Table 4. Beef cattle implants approved for use in beef cattle in a dry lot.

Steer	Heifer	Implant	Company	Ingredient/dose	Relative potency	Payout	Approved for reimplantation in this class
x	x	Ralgro	Merck	36 mg zeranol	Low	70-100	No
x	x	Synovex Choice	Zoetis	100 mg trenbolone acetate 14 mg estradiol benzoate	High	100-140	No
x	x	Synovex One Grower	Zoetis	150 mg trenbolone acetate 21 mg estradiol benzoate	High	180-200	No
x	X	Synovex Primer	Zoetis	50 mg trenbolone acetate 7 mg estradiol	Moderate	100-140	No

Table 5. Beef cattle implants approved for use in finishing cattle in confinement for slaughter.

Steer	Heifer	Implant	Company	Ingredient/dose	Relative potency	Payout	Approved for reimplantation in this class
x	x	Ralgro	Merck	36 g zeranol	Low	70–100	No
x		Synovex-C	Zoetis	100 mg progesterone 10 mg estradiol benzoate	Low	70–100	Yes ¹
x		Synovex-S (Beef Steers Only)	Zoetis	200 mg progesterone 20 mg estradiol benzoate	Moderate Low	100–120	Yes ²
	x	Synovex-H (Beef Heifers Only)	Zoetis	200 mg testosterone propionate 20 mg estradiol benzoate	Moderate Low	100–120	No
x	x	Synovex Choice	Zoetis	100 mg trenbolone acetate 14 mg estradiol benzoate	Moderate	100–140	Yes ³
x	x	Synovex One Grower	Merck	150 mg trenbolone acetate 21 mg estradiol benzoate	Moderate	200	No
x		Revalor-IS	Merck	80 mg trenbolone acetate 16 mg estradiol benzoate	Moderate	100–140	No
	x	Revalor-IH	Merck	80 mg trenbolone acetate 8 mg estradiol benzoate	Moderate	100–140	No
x		Revalor-S	Merck	120 mg trenbolone acetate 24 mg estradiol benzoate	High	100–140	No
	x	Revalor-H	Merck	140 mg trenbolone acetate 14 mg estradiol benzoate	High	100–140	No
x	x	Revalor 200	Merck	200 mg trenbolone acetate 20 mg estradiol	High	100–140	No
X		Revalor-XS	Merck	200 mg trenbolone acetate 40 mg estradiol benzoate	High	200	No
	x	Revalor-XH	Merck	200 mg trenbolone acetate 20 mg estradiol	High	200	No
x	x	Synovex Plus	Zoetis	200 mg trenbolone acetate 28 mg estradiol	High	150–200	Yes ³
x	x	Synovex One Feedlot	Zoetis	200 mg trenbolone acetate 28 mg estradiol	High	200	Yes ³

¹ Synovex C is approved in a reimplantation program where Synovex C is the first implant and Synovex S is administered approximately 70-days later.

² Synovex S is approved in a reimplantation program where Synovex C or Synovex S is the first implant and Synovex S is administered approximately 70-days later.

³ Synovex Choice, Synovex Plus, and Synovex ONE Feedlot are approved in a reimplantation program where Synovex Choice is the first implant and a Synovex Choice, Synovex Plus, or Synovex ONE Feedlot implant is administered 60 to 120 days later.

Effect of implants on beef cattle performance

Nursing calves

Implant products are available for calves weighing less than 400 pounds (Table 2). Implants approved and labeled for use in nursing calves generally contain a lower dose of the active ingredient compared to products cleared for use in older cattle (Tables 3 and 4). These implants are typically administered when the calves are between two and four months of age. Research has shown that implants given during the suckling phase will increase the average daily gain (ADG) of steer calves by approximately 0.10 pounds per day. Response in heifers is slightly lower. Zeranol and estradiol benzoate/progesterone implants appear to produce a slightly better response than estradiol 17-beta products.

Most calf implants are designed for payout in approximately 100 days to 120 days. Calves should be 30 days (Ralgro) to 45 days (Synovex-C) old before they are implanted, refer to the manufacturer's label for approved timing. Bull calves intended for breeding should not be implanted. Bull calves not intended for breeding should be castrated at the time of implanting, as one effect of the implant is the possible inhibition of scrotal development, which makes later castration more difficult.

Nursing bull calves vs. nursing implanted steer calves

Many producers follow the practice of leaving bull calves intact until weaning rather than castrating them. The idea is that natural hormones produced in the testicles increase ADG and weaning weight of the calves. Numerous research trials have shown that implanted steer calves gain at a rate equal to, or greater than, bull calves. Castrating bulls as small calves, as opposed to when they are older, reduces overall stress on the calf. The stress and hormonal effects of castration at weaning can reduce post-weaning gain potential and the calf's ability to withstand diseases typically associated with weaning and marketing. This difference in post-weaning performance of bulls versus steers is recognized by cattle buyers, as indicated by the fact that steers will command a \$10 to \$15 per cwt premium over intact bull calves. Producers wanting to maximize the value of male calves at weaning should consider early castration at birth or at two months to four months of age and use an implant approved for nursing calves.

Implanting replacement heifers

Producers often raise the question, "Is it safe to implant replacement heifers?" Research has shown heifer calves intended for use as breeding animals can be implanted one time between 45 days of age and weaning with no significant effect on subsequent conception rates or calving difficulty. Heifers implanted immediately at birth, following weaning, or multiple times prior to weaning had significantly lower conception rates than heifers receiving a single implant prior to weaning.

Most producers should be able to identify potential replacement heifers at weaning. The producer can then implant the stocker heifers to improve gain, while not implanting the heifers intended for breeding.

Research has clearly revealed there are little, if any, detrimental effects of administering growth-promoting implants to replacement heifers at the time of branding (2-4 months of age) or at the time of weaning. In fact, in research trials where one implant was administered to heifer calves between 30 days of age and weaning, calving difficulty was not influenced, and fertility was only slightly reduced, with a 1-3% reduction in pregnancy rate (Selk, 1997). In two recent studies (Rosasco et al., 2018 and 2019), implants administered at branding time (three months of age) or at weaning did not influence the subsequent reproductive performance of retained females. On the other hand, weight gain is consistently improved when heifers are implanted at branding or at weaning (Selk, 1997; Rosasco et al., 2018 and 2019).

Additional research has shown that heifers implanted at birth and close to puberty (generally around 9-14 months of age) had substantially reduced fertility (7% – 39% reduction in pregnancy rate; Selk, 1997) compared to non-implanted heifers. Similarly, heifers implanted more than once had substantially reduced fertility. Therefore, heifers that could potentially be kept as replacement females should either not be implanted at all or be implanted only once between 30 days of age and weaning. Replacement heifers should not be implanted prior to 30 days of age or after about seven months of age, and they should never be implanted more than once.

Stocker calves

Calves that are weaned and placed on grass or small-grain pastures for a period of time before finishing in a feedlot are referred to as stocker calves. There are several implants available for stocker calves (Table 3). Implant research trials have shown an improvement in the ADG of stocker cattle from 8-20%. Numerous trials indicate that producers can expect a 10-15% (0.18 to 0.27 pounds per day) improvement in ADG compared with non-implanted calves. These studies were conducted over various lengths of time, but the average was approximately 150 days, which is a typical stocker grazing period. Research results are inconclusive concerning the value of one type of product over another.

Payout for most stocker implants is generally in the range of 80 to 120 days, and up to 200 days (Synovex One Grower). There are currently no FDA-approved implant products available for reimplanting within a production phase. Therefore, implants designed for a longer payout time may be used as the initial and only implant to provide an active implant through a long grazing season. This would eliminate the reductions in performance when the implant payout is over.

Factors affecting stocker response to implants are numerous and include sex, weight, genetic gain potential, forage availability, diet quality, supplementation and environmental conditions. Research has shown that as ADG of non-implanted controls increases (due to pasture quality or other factors), the response to an implant also increases. No adverse effects have been documented from implanting cattle that gain at very low rates. Figure 1 shows the implant response of steers stocked on wheat pasture at either 0.75 acres per steer (1.5 steers per acre; Low Gain) or 1.5 acres per steer (High Gain) by Williamson et al., 2014. Steers stocked for a low rate of gain without implants gained only 1.4 pounds per day, while implanting increased gains by 0.28 pounds per day, a 20% increase in gain with implants. Steers stocked on wheat pasture for a high rate of gain had average daily gains of 2.19 pounds per day without implants, which was increased by 0.34 pounds per day to 2.53 with the implant, a 15% increase in gain. So, in this research, the increase in gains was similar even though the potential gains on pasture were quite different.

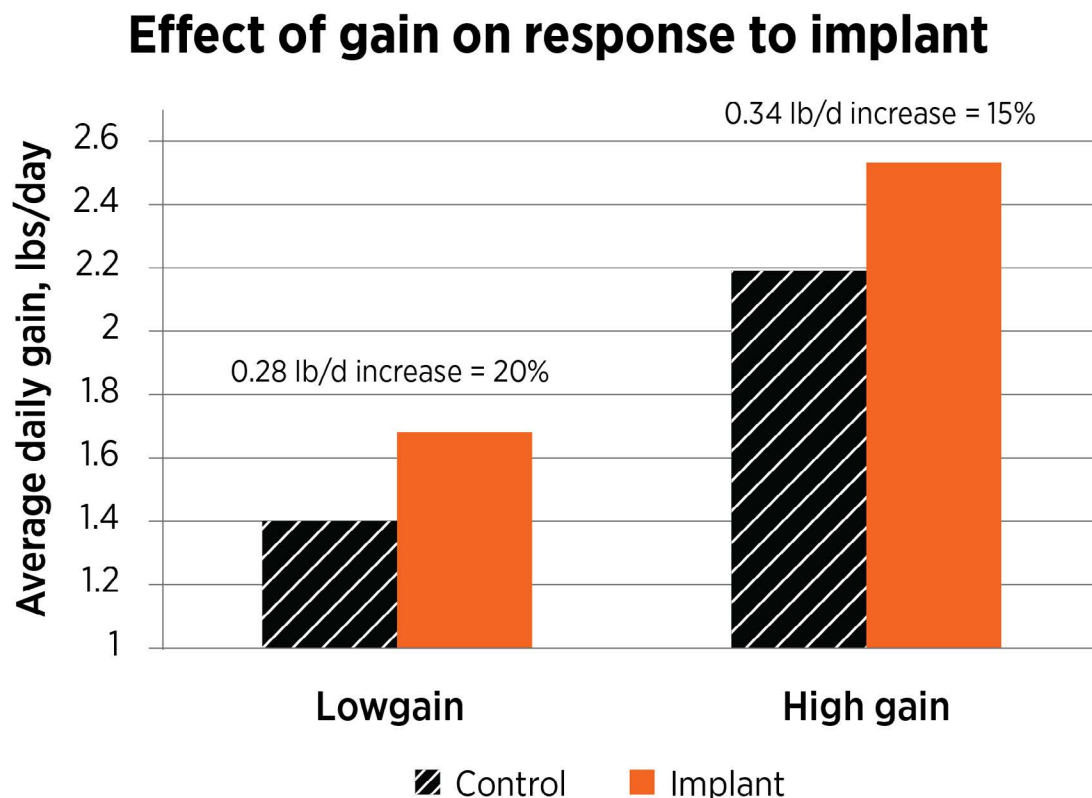


Figure 1. Implant response by steers grazing wheat pasture stocked to achieve either a low (1.5 steers per acre) or high (1.5 acres per steer) rate of gain during the winter and early spring. Adapted from Williamson et al., 2014.

Research has indicated that responses to implants, supplementation and ionophores are 100 percent additive in stocker cattle, and there may be a slight synergistic relationship. Full benefit should be expected from both the implant and the supplement program if both are used in stocker cattle. Figure 2 shows the gain response of steers grazing wheat pasture in the fall and winter to both growth-promoting implants and an ionophore (Beck et al., 2014). Steers in this experiment that were not supplied the ionophore nor given an implant gained 2.29 pounds per day, implanted steers not fed the ionophore gained 2.71 pounds per day; an increase of 0.42 pounds per day. Feeding an ionophore increased gains by 0.20 pounds per day, whether they were implanted or not, so steers that were fed an ionophore and implanted gained 0.6 pounds per day more than steers not implanted or fed an ionophore, which increased net returns by \$42 per steer.

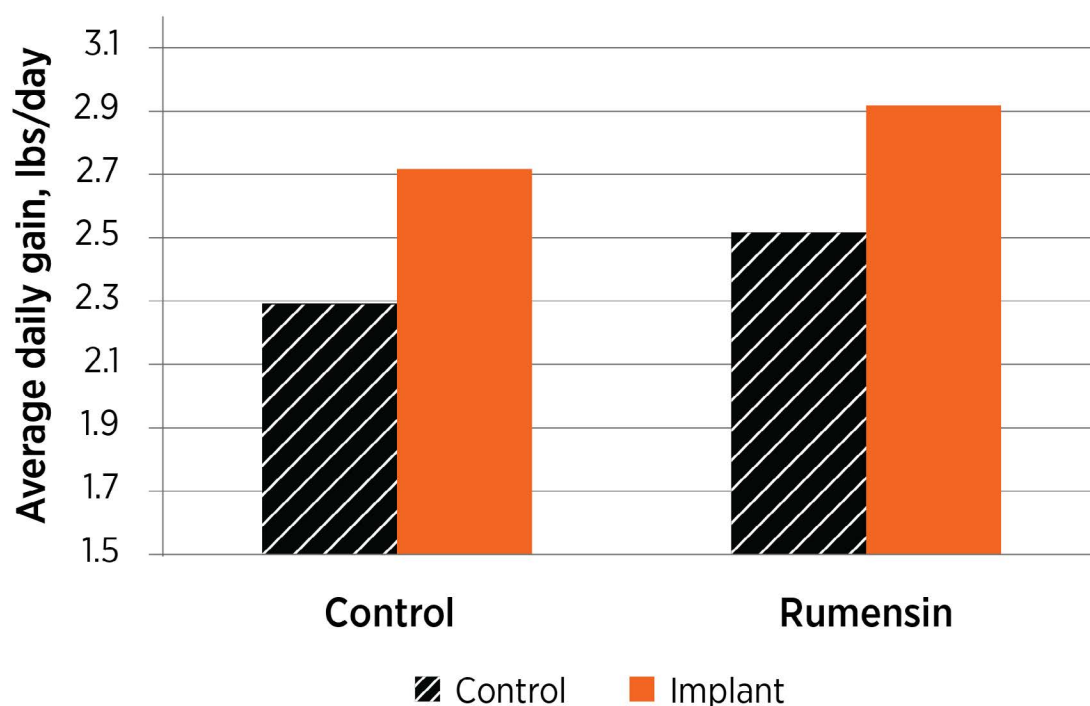


Figure 2. Gain response of steers grazing wheat pasture to growth-promoting implants and an ionophore (monensin). Adapted from Beck et al., 2014.

Finishing cattle

Implants are used extensively by the feeding industry in the U.S. to improve ADG and feed efficiency. The finishing period can range from 120 days to over 365 days. A single implant may improve ADG by 0.35 pound per day in steers and 0.25 pound per day in heifers. Feed conversion may be improved by 0.5 pounds of feed per pound of gain. Aggressive feedlot implant programs can result in up to a 21 percent improvement in daily gain and an improvement in feed conversion up to 11 percent. Maxwell et al. (2015) reported growth promoting technologies (implanting, ionophores, and feed grade antibiotics) during finishing increased body weight at harvest from 1,188 for all natural to 1,305 pounds (a 117-pound increase) due to increased ADG of 0.88 lb/day (from 2.62 lbs/day for all-natural to 3.48 lbs/day for conventional), improving feed efficiency by 21% (8.33 vs 6.57 lbs of feed per pound of gain). Hot carcass weights were increased by 84 pounds with growth promoting technologies (from 767 lbs HCW with all-natural to 850 lbs HCW with conventionally produced calves). This increased efficiency and weight gain produces a significant economic return, reduces the resources needed to produce beef, and decreases the environmental footprint of beef production.

An implant program for finishing cattle must evaluate numerous factors, including decisions concerning timing of implant, type and amount of hormone activity, and number of implant times. There are many different options available for implanting finishing calves (Table 4) ranging from very conservative (low potency hormone levels) to very aggressive (high potency hormone levels). Selection of implant program depends on previous management history, genetics of the animal, and production and marketing goals.

Implants can have pronounced effects upon carcass characteristics of cattle. In general, when cattle are fed the same number of days, implants improve carcass weight and ribeye area, while decreasing marbling scores. With these circumstances, implants may reduce the percentage of cattle grading at least USDA Choice by 2% to 24% (Duckett and Owens, 1997). Implants may also slightly increase skeletal maturity, which also impacts USDA Quality Grade. Type of implant, gender and genotype of the animal all influence these responses. However, if cattle are harvested at constant back fat thickness, implants may have little to no impact on quality grade.

For a complete review of implant effects during finishing, see Duckett and Owens, 1997.

Lifetime implanting strategies

In the modern beef industry, it is fairly common for cattle to receive three or more implants during their lifetime. For producers who operate in only one segment of the industry, the implant decision is simple. However, for producers who retain ownership of an animal through two or more phases and market cattle on a carcass merit price grid, implant decisions become more complex. It is possible that implants administered in one phase can have carryover effects in subsequent phases, however in many studies, this carryover effect has not materialized (Reuter and Beck, 2013). Implants approved for suckling calves are less potent than those approved for stockers, which are less potent than many feedlot implants. A strategy to maximize lifetime gain of the animal while minimizing deleterious effects on carcass quality and animal behavior is an implant program using increasingly potent implants. During the suckling phase, a low potency implant will be used, followed by one or two moderate implants in the growing phase, followed by a moderate implant upon placement in the feed yard, and then a high potency implant 80 days to 100 days before slaughter. The effects of multiple implants on marbling scores may become more dramatic as three or more implants are used during the animal's lifetime.

Barham et al. (2012) finished two sets of calves either directly after preconditioning for 63 days (calf-fed) or as yearlings following an extensive 133-day low growth stocker period. Calves were managed with either aggressive implanting (implants administered at weaning, during grazing [yearlings only], at arrival to the feedlot and re-implanted during finishing) or delayed implanting (implants administered only at re-implanting during finishing). Breeding selection for the herd of one set of calves had been for carcass quality and growth; while the herd for the second set were selected for maternal hybrid vigor and growth traits. The aggressive implant program increased growth and hot carcass weights of both calf-feds and yearlings from both herds. In the first herd (the one selected for carcass quality) aggressive implanting program reduced marbling score of both calf-feds and yearlings, and the impact was greatest in yearlings with the percentage of USDA Choice quality grade or greater decreased from 95% in delayed implant to 45% in aggressively implanted cattle. While in the second herd (not selected for carcass quality) marbling score, USDA quality grade and the percentage USDA Choice was not affected by implant program. This research indicates that aggressively implanting cattle prefinishing with high genetic propensity for marbling during a period of restricted nutrition can have a large impact on subsequent carcass quality yet marbling and carcass quality of cattle with limited genetic selection for those traits are not affected by implant program pre-finishing.

Producers who retain ownership of animals through more than one production phase should evaluate their overall implant program for the way they are marketing their cattle. Factors to consider are the feed cost, the base value of additional carcass weight, the Choice-Select spread and the potential value of marketing cattle into specialty, non-hormone-treated cattle (NHTC) programs.

Economics

Implants are one of the most cost-effective technologies available to cattle producers. Stocker implants typically return more than \$15 for every \$1 invested. Implants effectively increase growth rate, increase protein deposition and improve feed efficiency, resulting in approximately a 7% overall reduction in the cost to produce beef (Lawrence and Ibarburu, 2006). Consider this example of the economic potential of implanting unweaned calves: A nursing calf, implanted at three months of age and 150 days before weaning, may gain an additional 0.10 pound per day for 150 days. The 15 pounds additional weaning weight could have a value of \$1.00 to \$2.00 per pound for a total of \$30. The implanting cost is approximately \$0.85. Here, the net return would be \$29.15 per calf sold.

Alternative production systems, such as organic, NHTC or "natural", generally do not allow cattle to be implanted. Producers who want to use these production systems should ensure that the premiums they receive for these cattle offset the reduced production and efficiency associated with implants (and other technologies). Historically, these premiums have not been adequate to offset the lost production (Maxwell et al., 2015). Based on research comparing all-natural NHTC raised calves using no growth promoting technologies and conventionally produced calves managed using implants and ionophores (Maxwell et al., 2015), the all-natural calves were 115 pounds lighter at harvest (1,188 lbs vs 1,305 lbs), had lower ADG (2.6 lb/day vs 3.5 lb/day), and had 84 pound lighter hot carcass weights (767 lbs vs 851 lbs) with no difference in percent USDA Choice quality grade (90% vs 91%). All natural premiums for the NHTC calves would have to be \$11/hundredweight at slaughter based on a \$114/hundredweight live cash market in order for break-even from the lost production of forgoing the use of growth-promoting technologies. Beck et al. (2012) found that with a typical USDA Choice-Select price spread (\$8/hundredweight of Hot Carcass Weight), implanting throughout the preconditioning, stocker, and finishing phases increased net returns by \$35 to 70/head compared with implanting during the late finishing period only.

Beef quality assurance

Implant location

The only approved implantation site for all implant brands is subcutaneous placement in the middle one-third of the back of the ear. The implant must not be closer to the head than the edge of the auricular cartilage ring farthest from the head. The implant insertion procedure should be performed under conditions as sanitary as possible. Cleaning the ear, keeping equipment clean, and using a sharp needle are all recommended. Ear abscesses are the most common cause of implant defects and are usually related to poor sanitation during implantation. Proper animal restraint makes implant placement more accurate and the procedure safer for handlers. Follow all manufacturers' recommendations for implant administration.

Figure 3 shows the correct location. The Food and Drug Administration (FDA) no longer allows implants to be placed at the base of the ear.

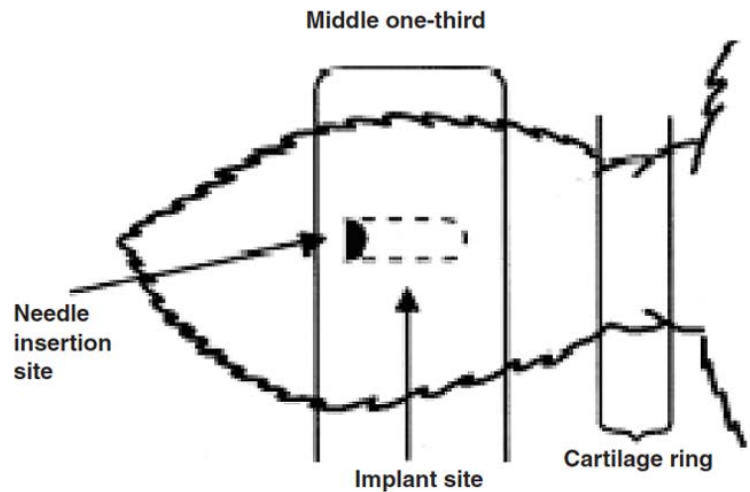


Figure 3. The correct location for implants.

Implanting procedure

A qualified and trained individual should be assigned the task of implanting. Employing the following steps will greatly diminish the incidence of implanting errors, such as abscesses, crushed pellets or missing implants. Achieving an active, undamaged, uncontaminated implant in each calf is the goal. Speed will come with practice; it is better to do it right the first time than to have to go back and fix mistakes. Similarly, it is much better to take the time to do it right than to pay for an implant and not realize a \$20 to \$30 per-head advantage because the job was not done correctly.

1. Read the label for all animal health products. Ensure the correct dosage, location and procedures are followed. Ensure the product is labeled for use in the class of animal to which it is being administered. Any deviation from label directions carries the potential for stiff legal penalties.
2. Obtain all of the necessary equipment to maintain sanitation. A tray and a large sponge soaked in disinfectant should be used to store the implant applicator between animals. An extra needle for the applicator should be available in case the needle becomes dull, burred, bent or broken. A clean table out of the way of flying debris should be used to store the applicator and implants between uses. (Figure 4)
3. Become familiar with the operation of the implant applicator.
4. Properly restrain the animal to prevent movement (Figure 5). If necessary, further restrain the head by use of a halter.
5. Inspect the animal's ear. Check for previous implants or abscesses, presence of ear tags or ear tag holes, mud, manure or other debris. Clean and dry the implant area by scraping with a knife blade or by wiping with a paper towel and disinfectant (Figure 6). Do not attempt to implant through mud or manure. If an implant is present do not re-implant.
6. If necessary, wipe off hands before handling the applicator. Mud, manure and blood can contaminate the inner workings of the applicator.
7. Wipe the needle through the sponge to disinfect it. Pull the tip of the needle across the sponge with the bevel facing down against the sponge to clean out any material inside the needle (Figure 7).
8. Pinch the tip of the animal's ear between the thumb and index finger of the left hand (for the left ear). Place the tip of the applicator needle against the ear at a slight angle, bevel side up or away from the ear, at the outer edge of the implant zone (Figure 8).
9. Slide the needle under the skin of the ear and insert it fully. Make sure it is under the skin and not in the cartilage or punctured all the way through the ear. If the needle skips off the back of the ear, return to step number 7. Mud or other debris likely will have gotten caught in the needle bevel, and if not cleaned, will be implanted into the ear with the implant on the next attempt. Using sharp needles and slowing down can reduce skipping off.
10. Slide the needle back out of the ear about as far as the length of the implant. Some models of implant applicators have needles that automatically withdraw.

11. Pull the trigger to deposit the implant and withdraw the needle completely.
12. Feel the implant site to ensure the pellets were correctly deposited, not bunched up or crushed (Figure 9). If so, check the equipment, properly restrain the animal and slow down.
13. Return the applicator to the tray and wipe across the sponge to disinfect it (Figure 7).



Figure 4. A clean table out of the way of flying debris should be used to store the applicator and implants between uses.



Figure 5. Properly restrain the animal to prevent movement.

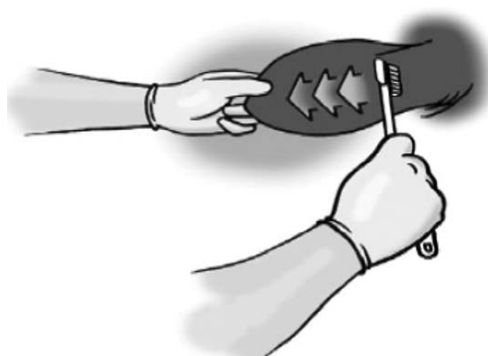


Figure 6. Clean and dry the implant area by scraping with a knife blade or by wiping with a paper towel and disinfectant.



Figure 7. Wipe the needle through the sponge to disinfect it.



Figure 8. Place the tip of the applicator needle against the ear at a slight angle, bevel side up or away from the ear, at the outer edge of the implant zone.



Figure 9. Feel the implant site to ensure the pellets were correctly deposited, not bunched up or crushed.

Other best practices

- Consult and follow label directions for all products used.
- Implants have no slaughter withdrawal, as the ear is always removed as offal during the slaughter process.
- No implants are cleared for use in classes of cattle besides calves, stockers and feedlot animals. This includes breeding animals, cull cows, dairy cattle and veal calves.
- Implants should not be administered at birth due to hormonal development of the calf. Some label instructions specify a minimum of 30 days (Ralgro) or 45 days (Synovex-C) of age for administration of calf implants, depending on the implant.
- Implants should be stored properly to maintain effectiveness. Store in a clean dry place in a plastic bag sealed to keep out moisture and debris. Consult the label for storage conditions and time of storage after opening.
- If possible, implant cattle on dry days when the cattle are dry and free of mud. This will reduce the incidence of abscesses.

Animal health

Implants are suspected to directly cause, or be associated with, several undesirable changes in animals. Responses normally associated with reproductive processes are observed in heifers, including signs of estrus, vaginal or rectal prolapses, development of the udder and other problems. Implants may increase the incidence of bullers in steers. Bullers are steers that mount others or will stand to be mounted similar to the behavior of a cow in estrus. However, it is thought that bulling is caused by a physiological defect in the animal and implants merely exacerbate this condition. Estimates of the frequency of the occurrence of bullers range from 1 percent to 4 percent.

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