ALABAMA A&M AND AUBURN UNIVERSITIES

ALABAMA COOPERATIVE Extension SYSTEM

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Implants For Growth Promotion In Beef Cattle

Few beef cattle management practices are more cost effective or have a higher return on investment than properly used growth promoting implants. Growth promoting implants are pellets that are implanted under the skin of the ear of growing calves. These pellets release extremely low concentrations of various hormones, which improve average daily gain 7 to 17 percent and feed efficiency 4 to 12 percent.

Individual implant products are approved for specific types of cattle, such as nursing calves, breeding replacement heifers, weaned calves, or finishing cattle. Consult Table 1 for implants approved by the U. S. Food and Drug Administration and available for use in beef cattle. For further information on particular products, contact the appropriate product representative.

Importance Of Good Nutrition

For a calf's growth to be enhanced by an implant, its nutrition must be sufficient to support the stimulated growth. In other words, implants will not compensate for inadequate nutrition. Implants will not improve growth if gain is less than 1.3 pounds per day before implanting. Therefore, in nursing calves the response to implants depends on the cow's milk production and creep feed availability and quality. In stocker calves the response depends upon the quality of forage and supplement. In feedlot calves the response depends upon the adequacy of the finishing diet. In all cases, the calves must be healthy and parasites must be controlled for optimal growth response.

Common Questions About Implanting

Are implanting and re-implanting nursing calves economically justified? Implanting a nursing calf increases its weaning weight 15 to 20 pounds, thereby adding $8.25 to $11.00 revenue to a calf sold for $0.55 per pound. This is achieved at a cost of about $1.25, including labor. Re-implanting market calves before weaning adds an additional 6 to 10 pounds of weaning weight to the 15 to 20 pounds gained from the first implant.

Will implants administered to calves before the feeding period decrease the response to implants administered later in the feedlot? An analysis of a large data base showed slaughter weights were increased by 30 pounds when implants were used in both preweaning and stocker phases and by 46 pounds in steers and 33 pounds in heifers when implants were used in the feedyard. These increases were observed whether or not implants had been administered in earlier phases of production.

Are there ever reasons not to implant stocker and feeder calves? The majority of stocker and feeder calves are implanted at the beginning of the grazing or feeding period. To optimize growth and feed efficiency, they are commonly re-implanted with the same or another product after the proper time interval for the particular implant used.

There are reasons for not implanting such calves. One is having a niche marketing strategy such as "natural" unimplanted beef. Another reason is concern that some implants may reduce quality grade (see Table 1) when calves are sold based on carcass quality grade. Also, implanting will not be economical if stocker calf gains are low (<1.3 pounds per day) in programs where calves are being grazed for long periods with little supplement.

Are there ever problems with implanting and re-implanting feeder heifers? If heifers are implanted with a product containing an estrogenic hormone shortly before weaning, and are then re-implanted with an estrogenic implant shortly after weaning, "estrogen stacking" may occur. Such heifers may have increased vaginal and uterine prolapses, and the incidence of "bullers" may rise. "Bullers" are calves which are continually ridden by their pen or pasture mates, resulting in injury and even death.

In order to establish a solid reputation for their calves, sellers should communicate with buyers about which implants were used, and when. A "processing map" can be used to document implant date, location, and type.

Table 1. Growth Promotant Ear Implants Approved In U. S. Beef Cattle (August 1996).

Brand Name	Active Ingredient	Amount	Use	Claim	Re-implant Interval	Slaughter Withdrawal
Implants For Nursing Calves						
CALF-oid (Pharmacia & Upjohn)	Progesterone Estradiol benzoate	100 mg 10 mg	Suckling calves (not replacement heifers) <400 pounds	Increased rate of gain	Re-implant with different product	None
Compudose 200 (Elanco)	Estradiol	24 mg	Suckling and pastured growing steers	Increased weight gain	200 days	None
			Confined steers and heifers	Increased weight gain and improved feed efficiency		
Ralgro (Mallinckrodt)	Zeranol	36 mg	Suckling calves (including replacement heifers >30 days old), weaned calves, growing cattle, feedlot steers and heifers	Increased weight gain and improved feed conversion	100 days	None
Synovex C (Ft. Dodge)	Progesterone Estradiol benzoate	100 mg 10 mg	Suckling calves (including replacement heifers <400 pounds and >45 days old)	Improved growth promotion	Re-implant with different product	None
Implants For Weaned Stocker And Feeder Calves						
Compudose 200 (Elanco)	Estradiol	24 mg	Suckling and pastured growing steers	Increased weight gain	200 days	None
			Confined steers and heifers	Increased weight gain and improved feed efficiency		
Implus-H (Pharmacia & Upjohn)	Testosterone propionate Estradiol benzoate	200 mg 20 mg	Heifers ≥ 400 pounds	Improved growth promotion and feed efficiency		None
Synovex H (Ft. Dodge)	Testosterone propionate Estradiol benzoate	200 mg 20 mg	Heifers ≥ 400 pounds	Increased weight gain and feed efficiency		None
Implus-S (Pharmacia & Upjohn)	Progesterone Estradiol benzoate	200 mg 20 mg	Steers ≥ 400 pounds	Improved weight gain and efficiency	70 days	None
Synovex S (Ft. Dodge)	Progesterone Estradiol benzoate	200 mg 20 mg	Steers ≥ 400 pounds	Increased weight gain and feed efficiency	70 days	None
Revalor-G (Hoechst-Roussel)	Trenbolone acetate Estradiol	40 mg 8 mg	Pasture steers and heifers (slaughter, stocker, and feeder cattle) **Not to be used in animals intended for subsequent breeding**	Increased rate of gain	Not indicated	None

Table 1. Growth Promotant Ear Implants Approved In U. S. Beef Cattle (August 1996) (cont'd).

Brand Name	Active Ingredient	Amount	Use	Claim	Re-implant Interval	Slaughter Withdrawal
Implants For Feedlot Calves Only						
Ralgro Magnum (Mallinckrodt)	Zeranol	72 mg	Confined slaughter steers (finishing stage/heavy weight steers)	Increased weight gain	None	None
Revalor-H (Hoechst-Roussel	Trenbolone acetate Estradiol	140 mg 14 mg	Heifers fed in confinement for slaughter (Compared to non-implanted cattle, implanted cattle may have lower marbling scores)	Increased rate of weight gain and improved feed efficiency	Use conservative or aggressive program depending on goals. Consult technical bulletins and company technical service reps	None
Revalor-S (Hoechst-Roussel)	Trenbolone acetate Estradiol	120 mg 24 mg	Feedlot steers (Compared to non-implanted cattle, implanted cattle may have lower marbling scores)	Increased rate of weight gain and improved feed efficiency	Use conservative or aggressive program depending on goals. Consult technical bulletins and company technical service reps	None
Synovex Plus (Ft. Dodge)	Trenbolone acetate Estradiol benzoate	200 mg 28 mg	Confined feedlot steers (Compared to non-implanted cattle, implanted cattle may have lower marbling scores)	Improved feed conversion	Use conservative or aggressive program depending on goals. Consult technical bulletins and company technical service reps	None

Note: Consult your veterinarian and/or product representative for additional information on each implant.

• **Read the label of the implant!** Be sure to follow label instructions as to method and site of implantation. The site for implanting is in the middle third of the backside of the ear, between the skin and cartilage.

• **Take time to implant properly.** Insure that the animal is well restrained. Restraining the head and taking your time will help you insert the implant properly. Make sure the implant is placed between the skin and cartilage and that the site is clean. The implant will not work well if it is inserted in the cartilage, and implanting at a dirty site may cause infection or an abscess around the implant, which will decrease its effectiveness.

Will implanted replacement heifers have reduced reproductive performance? The effects of implants on calving rates of heifers have varied among studies and depend on many factors, such as age at implanting, plane of nutrition after implanting, and type of implant used.

Pregnancy percentages in replacement heifers implanted at or near birth have been reduced by as much as 40 percent. It is clear that if a heifer is to be retained as a breeding replacement she should not be implanted at or shortly after birth. Research has demonstrated that implanting heifers at birth, 21, or 45 days of age with the hormones estrogen and progesterone caused their uterus at 15 months of age to be lighter, less muscular, and to have a thinner lining, or endometrium. Since the uterus is the organ where conception occurs and the embryo and fetus develop during gestation, these findings may explain this decrease in fertility.

Implanting older heifer calves has not resulted in the same severe decrease in fertility as those implanted at or near birth. In experiments conducted at various locations, heifers implanted once between 1 and 14 months of age showed no decrease in pregnancy percentages if they were fed to gain 1.1 to 1.25 pounds per day. However, if the nutrition of growing heifers is not adequate to support this moderate rate of growth, the negative effects of implants on pregnancy rates can be severe. In cases of poor nutrition, pregnancy rates of implanted heifers have been decreased by as much as 42 percent. This emphasizes how important both nutrition and implanting at the proper age are to development of replacement heifers.

Some studies have shown that implanting heifers may delay the occurrence of their first heat by one or two 21-day cycles. With this in mind, it may be advisable to retain a few addi-

tional replacement heifers if the entire group is implanted.

Will implanting sucking heifers increase their pelvic area? The size of the pelvic opening, the bony canal through which a calf passes during birth, can affect the ability of a heifer to deliver unassisted. However, implanting has not consistently increased pelvic area at 2 years of age when a heifer should first calve. In some experiments, heifers implanted with Synovex C had less difficulty delivering calves, while in other experiments this was not the case.

If it is a producer's goal to decrease the number of difficult births in heifers, the primary emphasis should be on use of bulls with expected progeny differences (EPDs) favorable for birth weight. Using implants to increase pelvic area or heifer growth should not be considered as a major method to decrease calving difficulty.

Is implanting economically justified in heifers? It clearly is if the heifer is to be sold as a stocker or feeder at weaning. For example, in a 100-cow herd, assume 85 calves are weaned, 42 are heifers, and 20 of these are to be kept as replacements. For the 20 replacements, the additional gain induced by the implants will not increase revenue because they will not be sold at weaning. However, the other 22 heifers to be sold would have an increased weaning weight conservatively estimated to be 330 pounds (22 calves x 15 pounds increased weight = 330 pounds total). This creates almost an "extra calf" for sale, which at $0.55 per pound equals an increase in gross receipts of $181.50 ($0.55 per pound x 330 pounds) from a $27.50 investment (22 calves x $1.25 implanting cost per calf).

Implant Strategy For Steers And Heifers

With the goals and management objectives for the herd in mind, the following points should assist in designing an implant strategy for the cow herd:

• Always implant steer calves at castration. Re-implant them according to manufacturer's recommendations.

• If replacement heifers are selected before implanting, implant only the ones to be sold as feeders at weaning. One way to accomplish this is to implant only those heifers born after sufficient replacements have been born during the first part of the calving season. Heavier heifers are usually kept as replacements, and the ones born earlier in the calving season are heavier at weaning. In 286 herds with records in the Alabama Beef Cattle Improvement Association data base from 1988 to 1996, replacement heifers had an average birth date 41 days earlier than other calves in the data base. Based on these records, not implanting the early-born heifers is a practical strategy in many herds. With this implant strategy, weaning weights will be increased in feeder heifers while the chance of reducing pregnancy rates in replacement heifers will be minimized. Use an implant approved for use in heifer replacements. Identify implanted heifers with a different color ear tag. Consider that buyers of replacements may discriminate against implanted heifers.

• If replacement heifers are not selected before implanting and the major goal is to maximize weaning weights of all calves, implant all heifers. Make sure heifers are implanted only if old enough (45 days of age for Synovex C; 30 days of age for Ralgro). Do not re-implant replacement heifers since this could reduce their fertility. Insure nutrition is adequate to support target growth rates.

• Never implant breeding bulls. This can cause permanent damage to their testicles.

By keeping a clear management objective in mind, you can reach a rational decision about use of implants in the brood cow herd.

Implanting Technique

Implant manufacturers have designed implanting "guns" for use with their particular products. Read the instructions for each delivery device before using it. Also, carefully read the label before using any implant. Deposit implant pellets subcutaneously, or under the hair-covered skin on the convex (rounded) side of the ear. Deposit the pellets on top of the cartilage sheet which lies under the skin.

To implant a calf, hold the ear with one hand and the implanting gun with the other, and direct the implanting needle toward the animal's head (Figure 1). With the needle's bevel (the sloped tip of the needle) pointing up, pierce the skin of the ear

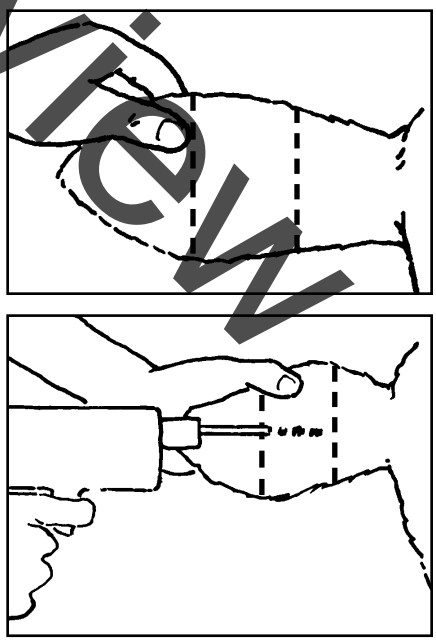

Figure 1. Implanting technique.

with the needle tip at the junction of the outer third and the inner two-thirds of the ear. With gentle pressure, tunnel the needle under the skin over the top of the cartilage sheet toward the head. Then pull the trigger. All the implant pellets will be deposited under the skin of the middle third of the ear. This site is approved by the Food and Drug Administration to insure that any implant material still remaining is trimmed away at slaughter.

Some implanting guns have instructions to withdraw the needle slightly before pulling the trigger. This creates a space for the pellets and decreases the chance of crushing them. Some guns automatically withdraw the needle when the trigger is pulled, making this step unnecessary. Read the label which accompanies the implant to insure that the proper technique is used. The number of pellets depends on the product. Whatever product you use, place finger pressure over the needle hole for a moment to help close it off after you deposit the pellets and withdraw the needle.

Use a clean, sharp implanting needle and insure that the ear is clean so that the implant site does not become infected, which will reduce the implant's effectiveness. Clean or disinfect the needle between calves. Sharpen it as necessary. Store cartridges containing implant pellets in a clean, dry place to insure that moisture does not erode their potency.

When implanting, restrain the calf's head and **take adequate time** to do the job right. Rushing the process often leads to improperly placed or defective implants. The implant will not work well if it is crushed, is inserted into the cartilage, or falls out. The implant should be intact under the skin so that the active ingredients are released slowly into the circulation. This slow, steady release causes enhanced growth and feed conversion.

A study in seven feedlots of 14 groups of cattle representing 2,573 head showed that many (33.7 percent) of the implants were improperly placed.

Improperly Administered Implants:

Problem	Percent
Abscess	22.2
Bunched	0.7
Crushed	0.6
Missing	7.5
Pellets missing	0.6
Fibrosis (scars)	1.2
In cartilage	0.4
Improper site	0.5
Total	33.7

When the implanting crews in these seven feedyards were retrained and the importantce of taking the time to do the job right was emphasized, the percentage of improper implants was reduced to 10.2 percent. This represented a potential savings to these feedyards of $187,500 to $535,000. The importance of proper technique is clearly demonstrated by this feedyard study: gains and feed efficiency will be improved only if the implants are properly administered.

Safety Of Meat From Implanted Calves

Implants contain extremely small amounts of one or two hormones which are slowly released at a constant rate over time. There is no withdrawal period before slaughter after administering any of the approved implants. The U. S. Food and Drug Administration and various international food safety commissions have consistently concluded that implants create no health hazard to the consumers of meat from implanted beef cattle.

Some people claim that implanting makes beef less tasty, but the evidence does not substantiate such a claim. Since implants generally decrease the amount of fat in meat, the beef may cook faster because it is leaner.

Implants are a safe technology which increases calf performance, reduces the cost of production, and helps keep the beef supply reasonably priced and safe. Consumers should recognize that hormones are naturally occurring substances which are present in most foods of plant and animal origin and cause no health risk. For example, the hormone estrogen is present in many implants as well as in many common foods, as illustrated in Table 2.

Table 2. Estrogen Content Of Various Foods.

Food	Nanograms Estrogen*
Beef from non-implanted steer (3 ounces)	1.3
Beef from implanted steer (3 ounces)	1.9
Milk (8 fluid ounces)	35.5
Peas (3 ounces)	336
Hen's egg (2 ounces)	1,750
Cabbage (3 ounces)	2,016
Wheat germ (3 ounces)	3,400
Soybean oil (3 ounces)	1,680,000

*1 nanogram = 1 billionth gram; 1 gram = 1/454th pound

Source: Inter-American Institute for Cooperation on Agriculture, Report on Use of Hormonal Substances in Animals, Dec., 1986.

This publication was prepared by **James G. Floyd, Jr.,** *Extension Veterinarian*, Associate Professor, **Norwood J. Van Dyke,** *Extension Animal Scientist*, Associate Professor, and **Lisa A. Kriese,** *Extension Animal Scientist*, Assistant Professor; all in Animal and Dairy Science at Auburn University.

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