CHAMPION Feed Services Ltd.

Growth Implants for Beef Cattle

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Take Home Message

- ✓ The cattle feeding business is one of narrow, and often unreliable, margins. It is important , therefore, to keep close control on the unit costs of production.
- ✓ Feeders must keep their costs below the "break-even" that is needed recover production costs.
- ✓ Adding the cost of a growth implant will actually reduce the unit cost (the cost per pound of gain) because the value of extra gains are usually several times the cost of implanting the cattle.

Introduction

Growth implants are one of the most effective tools for achieving increased production (up to 13% more gains for the same feed cost) with only a small additional cost for the implant. The cost of implants and implanting them will vary from $2.00 to $6.00. The improved gains can amount to from $5.00 to $10.00 for each additional $1.00 of cost for the implant.

History - Background

Growth promoting hormones and implants have been used in beef production since the mid 1950's when diethylstilbestrol (DES) was first introduced as a feed additive. It was later found to be more convenient and effective as a pellet implanted between the skin and the cartilage of the ear. The implant released a small amount of the artificial hormone daily over a period of 60 to 120 days. By the mid 1970's it was discovered that DES, given to women in much larger therapeutic doses, was a cause of cancer in their offspring. As a result, the use of DES was discontinued in medicine and DES growth implants for beef production were banned.

By the mid 1960's - and into the 1970's - new natural hormone products were introduced. Other products, which stimulated the animal to raise its own level of hormone production, were also registered. Before they could be registered for use all of these products were rigorously tested and proven not to cause cancer, birth defects, reproductive failure or other ill effects to both livestock and consumers.

Types of Growth Implants

At present (2000) there are three general types of growth implants used in beef production. The first is composed of the natural hormones progesterone, estrogen and testosterone which are produced by the animal. They are used as a single estrogen implant (*Compudose*®)or as estrogens in combinations (*Synovex*®, and *Component*®). The second contains a biologically active (estrogenic) product, zeranol, which stimulates the animal to produce more of its own natural hormones (*Ralgro*®). A third product contains a synthetic testosterone, trenbolone acetate, which is combined with estrogen (*Revalor*® and *Synovex Plus*®).

Natural hormone products

The three types of natural hormone growth implant products available are shown in the 'Active Ingredient' row in Table 6 of the article **Growth Implant Strategies**. The natural hormone products are sometimes called 'endogenous' because they are the same as those produced by the animal itself.

Hormone combinations

The hormone combinations are formulated differently for calves, steers and heifers. The products used for steers are a combination of progesterone and the female sex hormone estradiol in the benzoate form. The two products currently registered for use in Canada are *Synovex-S*® and *Component E-S*®. The hormone product for heifers contains the estradiol benzoate combined with the male sex hormone testosterone propionate. *Synovex-H*® and *Component E-H*® are the products registered for use in Canada. These products are virtually the same and have similar effects and give similar results.

Calf formulations contain the natural hormones progesterone and estradiol benzoate. The two calf products currently registered for use in Canada, *Synovex C* ® and *Component E-C*®, contain a lower dose of the hormones and may be used on calves to be kept as feeders as well as heifer calves kept for breeding.

Single hormone

The one single hormone product, *Compudose*®, contains estradiol-17 beta in a special silastic plastic implant which releases the active ingredient over a period of up to 200 days. The extended release is designed to remove the need for reimplanting in a feeding period which lasts more than 100 to 125 days.

Estrogenic products

The second type of growth implant contains zeranol, which has the effect of stimulating the animal to produce more of its own estrogen and other hormones related to growth. The synthetic product is sometimes called 'exogenous' because it is not produced by the animal.

Zeranol *(Ralgro®)* has been available in Canada for more than twenty years. Zeranol is the active ingredient extracted from a mould found in corn. It is mildly estrogenic, with 25% of the estrogenic activity of the natural estrogens at the same dose level.

Synthetic hormones combined with natural hormones

In 1994 one of the 'new generation' of growth implants was registered for use in Canada. *Revalor S*®, is a combination of a synthetic product, trenbolone acetate (TBA) and estradiol in a ratio of 5:1. The trenbolone acetate is 'androgenic' because it mimics the anabolic effect of the male sex hormone testosterone. TBA is even more effective when combined with the natural female hormone estradiol. A second new generation product, *Synovex Plus*®, containing a TBA/estradiol ratio of 7:1 has also been introduced.

How Growth Implants Work

Growth implants for beef cattle are tiny pellets, usually 2 millimetres in diameter. The one exception is *Compudose*® which is a flexible cylinder about 30 mm long and 5 mm in diameter. Implants are inserted, with a specially designed hypodermic needle, between the skin and cartilage of the ear. The ear is used because it is not part of the food system so there is no risk of the highly concentrated pellet being found in meat. Once implanted, the active ingredients are slowly released into the animal's blood stream. This increases the blood hormone level just enough to stimulate additional growth. At this level the animal's system directs more of the feed energy consumed toward the production of lean muscle and away from additional fat production. This 'repartitioning'

of energy toward muscle from fat production is sometimes called an 'anabolic effect'. As a result implanted animals grow faster, have leaner carcasses at a given weight, and make more efficient use of the feed that they consume. The feeder can raise beef at a lower cost, and the consumer benefits from both the lower cost and leaner cuts of beef. The anabolic effect is especially noted in *Revalor*® and *Synovex Plus*® implanted steers. A Colorado study showed that steers implanted with *Revalor*® had increased rib eye area and less fat. The combined androgen and estrogen agents also produced a slightly higher marbling score. The full anabolic effect of *Revalor*® and *Synovex Plus*® was only available when the steers were on a full feedlot finishing diet. For this reason it is recommended as a 'terminal' implant for use in the last 120 days of the finishing period. Implanted steers and heifers with any of the implants may need to be kept on feed from 10 to 15 days longer than unimplanted animals if the feedlot wants the same degree of marbling needed for the AA and AAA quality grades (see Reimplanting and Timing).

With the exception of the terminal implants *Revalor*® and *Synovex Plus*® the growth implants are effective in improving gains and feed conversion in feeder cattle on backgrounding diets, on pasture, as well as cattle on full feedlot rations. All growth implants, however, show the greatest improvement in gains and efficiency on higher energy diets. Improvement will be disappointing if pastures or backgrounding diets do not supply the energy required for the expected gains.

Implanting Procedures - Implant Site

Sanitation

Because the implant procedure produces a break in the skin, it is very important to maintain careful sanitary precautions. The needle of the implant device should be kept sharp and stored in a disinfectant solution between animals. It is best to clean the implant site on the ear with a disinfectant solution, especially if the ear is fouled with dirt or manure. There have been cases where an implant site has become infected and the implant was expelled or walled off in the abscess process. The benefit of the implant was lost and the infection probably reduced normal expected gains.

Implanting site

Growth implants should be inserted between the skin and the cartilage at the back of the ear. The proper location for all implants registered for use in Canada is now in the middle third of the ear (see Figure 1).

Implanting technique

Proper insertion of the implant pellet(s) is the key to successful use of growth implants. The needle must be sharp. A dull or burred needle will be difficult to use and can cause tissue damage which may lead to infection at the implant site. The proper angle of insertion is very important. The needle should be placed almost parallel to the ear with the bevel side away from the ear. Too steep an angle may result in the pellets being placed in the cartilage itself, where absorption will be slow. If the angle is too steep the needle may penetrate through the ear, where the pellets will be lost and wasted.

Figure 1. Implanting Site. The implanting needleshould be inserted at the X in the diagram to the full length of the needle. The needle is then withdrawn about one centimetre (one half inch) and then the pellets are forced into the ear as the needle is slowly withdrawn completely.

The site should be chosen to avoid the major cartilage ridges and blood vessels in the ear (see Figure 1). The needle should be inserted its full length between the skin and the cartilage. It should then be pulled back almost half way as the trigger is pulled to expel the pellets. This will provide a space for the implant and avoid the danger of crushing the pellets. Crushed pellets will be absorbed too rapidly and have often been associated with riding behaviour in newly implanted cattle. A pellet which is placed next to a broken blood vessel will soften and also be absorbed too rapidly. Properly implanted pellets will feel like tiny peas in a pod under the skin of the ear. When the needle is withdrawn gently pinch the insertion site to close it. This improves sanitation, helps to avoid infection and loss of the implanted pellets.

Withdrawal times

As of October 1990 all of the growth implant products used for beef production are registered for zero withdrawal time.

Implanting bull calves

Several studies have shown that testicle growth is reduced by at least 25 percent in bull calves implanted from birth to 90 days of age. Producers have also reported that bull calves implanted at birth are much more difficult to castrate because of abnormal testicle growth. Implants should not be used on bull calves intended for breeding purposes.

Implanting heifers to be used for replacements

With the exception of *Synovex C*® and *Implus C*®, used for suckling calves, growth implants are not registered for use in heifers intended for breeding stock. A review of 16 research studies showed that, in most cases a single implant had very little effect on conception in heifers during the first exposure cycle. Implanted heifers often had increased pelvic areas at breeding but by calving time there was little difference between implanted and unimplanted heifers. Lighter weight and younger implanted heifers exhibited a delay in age at first estrus, but heifers which had been fed to heavier weights had little difference in age at puberty. An Alberta study also showed that implanted heifers had increased pelvic area at breeding, with no difference at calving time and no difference in calving difficulty. Pregnancy rates in the Alberta study were slightly lower in implanted heifers (91.6% vs 97.6%). Overall pregnancy rates were acceptable however, and *Synovex C*® did not appear to have a marked detrimental affect on fertility later in the heifer's productive life.

Reimplanting and Timing Implants

The various implants have different payout periods (see Table 6 in **Growth Implant Strategies**). If the expected feeding period is longer than the payout period most feeders will reimplant, often with a different product. Most implants release their contents at a reducing rate as they near the end of their payout period. In some cases the second implant is used when the payout period for the first has not been completely used.

If a feeder is backgrounding weaned calves, to grass them next summer and feed them out as short keeps, the expected total feeding period could be as much as 300 to 400 days. This then might involve using a second, and possibly a third implant. The feeder will have to select from the eleven

implants currently available, keeping in mind the type of animal and the kind of feeding program at each stage in the feeding period.

All implants tend to delay fattening, which is one of the reasons they can improve growth rate and feed efficiency. If feeders are targeting a market that pays a premium for marbling (AAA or Prime grades) they should time the last implant so that most of its payout time is used before the target slaughter weight. This will allow the animals to develop the desired marbling levels. If they are using one of the new implants containing trenbolone acetate, the implant should be used at least 100 to 120 days before the end of the feeding period.

Improved Gains, Feed Efficiency, Economics

Alberta field and feedlot trials, as well as those in the rest of Canada and the U.S. have shown that growth implants can increase average daily gains and improve feed efficiency. As a result the cost per pound of gain is reduced. Economic partial budgets show that cost of production can be reduced $5.00 to $10.00 or more for each dollar spent to implant feeder cattle (see **Growth Implants for Beef Cattle - Economic Implications**).

Summary

The growth implants which are now registered for beef cattle in Canada can increase growth rate by five to twenty-three percent, and improve feed conversion efficiency by four to eleven percent. The improved performance can provide an extra return of five to ten dollars for each dollar spent for the growth implant. When these registered implants are properly used they reduce the cost of production and result in leaner carcasses at any given age or weight. Thus they benefit both the producer and consumer of beef. The registered implants are thoroughly tested for safety to both the beef animal and the consumers of beef. Beef carcasses are thoroughly screened for the presence of residues. In nearly thirty thousand carcasses sampled from 1990 to 96, none of the meat samples showed residues which exceeded the very conservative maximum residue levels set by the United Nations Food and Agricultural Organization and the U.S. Food and Drug Administration.

Note:

- For more detail on improved gains, feed efficiency and economics see **Growth Implants For Beef Cattle - Economic Implications**.

References

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