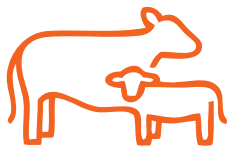


TECHNICAL BULLETIN



Growth Performance of Suckling Beef Steers After Implanting with SYNOVEX® ONE GRASS or SYNOVEX® C

Zoetis

Parsippany, NJ 07054

Use of SYNOVEX® ONE GRASS implants in suckling beef steers produced heavier weaning weights and greater ADG than a conventional implant or non-implanted controls.

Summary

- Three studies evaluated growth performance effects of implanting suckling beef steers with long-duration SYNOVEX® ONE GRASS compared to use of a conventional implant (SYNOVEX® C) or no implant.¹⁻³
 - Suckling beef steers (n=632) at South Dakota, Missouri, and Oregon research sites were provided 1 of the 3 implant strategies at calf processing.
 - Growth performance was compared after a 176- to 212-day post-implant pasture season.
- Across the 3 studies, calves implanted with SYNOVEX ONE GRASS averaged 27 to 37.4 lb more in final weight than non-implanted controls during the season, while calves implanted with SYNOVEX C averaged final weights that were 13 to 27 lb greater than controls.
- Average daily gains were improved 7.1% to 10.4% in the SYNOVEX ONE GRASS group compared to controls, and 2.5% to 7.7% in the SYNOVEX C group vs controls.
- In an overall summary analysis standardized to the shortest-duration trial (176 days) and weighted for animal numbers, SYNOVEX ONE GRASS averaged 31 lb of additional weight gain/head compared to controls, and SYNOVEX C averaged a 17 lb/head increase over controls.
- SYNOVEX ONE GRASS delivered gain benefits approximately double (1.8-times) that induced by the SYNOVEX C implant.
- Use of long-duration SYNOVEX ONE GRASS implants may help cow/calf producers more fully exploit the growth capability of their steer calves, and thus optimize profit potential.

Growth-promoting anabolic implants are widely recognized as among the most cost-effective management tools that reliably provide a high return on investment, and their efficacy has been documented in all phases of beef production. Unfortunately, some cow/calf producers continue to overlook the potential benefit of using this technology in suckling beef calves, even though research conducted over 4 decades

has demonstrated that a conventional implant increased average daily gain (ADG) of suckling calves by approximately 5% compared to non-implanted controls.⁴

Routine processing of new calves (typically around 45-60 days of age) offers a convenient time to administer implants, along with scheduled vaccinations, parasite control, branding, castration, or other procedures. Administration of an implant

Table 1 – Implants/constituents used in study.

| Implant | Constituents |
|--------------------|---|
| SYNOVEX® C | Progesterone (100 mg), Estradiol benzoate (10 mg) |
| SYNOVEX® ONE GRASS | Trenbolone acetate (150 mg), Estradiol benzoate (21 mg) |

Elapsed time between processing and weaning/backgrounding is generally longer than the duration of conventional implants approved for use in suckling calves.

late in the spring or fall at processing allows suckling calves the opportunity to acquire more weight by the time they are weaned the following fall or spring, respectively. However, elapsed time between processing and weaning/backgrounding is generally longer than the therapeutic interval of conventional implants used in suckling calves. Development of an extended, sustained-release implant offering a longer duration of androgenic and estrogenic inputs may improve pre-weaning growth performance by suckling calves beyond that achieved by conventional implants.

SYNOVEX®

Zoetis offers a diverse portfolio of SYNOVEX® performance-boosting implants for beef cattle that are backed by decades of research and demonstrated to deliver positive returns on investment. SYNOVEX cattle implants are manufactured in a broad array of formulations designed for conservative, moderate, or aggressive growth strategies. Producers can select the ideal combination of hormonal components, potency, and duration of activity to help achieve their performance and marketing goals. In addition, SYNOVEX implants are backed by the industry's largest support team, including nutritionists, veterinarians, and meat scientists focused on helping producers generate more pounds of beef with fewer resources.

Two SYNOVEX implants (Table 1) of particular relevance for suckling calves include:

- **SYNOVEX C:** a 'conservative' implant that delivers 100 mg of progesterone and 10 mg of estradiol benzoate (EB) for increased rate of weight gain in suckling steer or heifer calves (including potential replacement heifers) 45 days or older, up to 400 lb (also for increased weight gain in feedlot steers over 400 lb);

- **SYNOVEX ONE GRASS:** a 'moderate' long-duration implant that contains 150 mg of trenbolone acetate (TBA) and 21 mg of EB (equivalent to 15 mg estradiol, or E₂) for increased rate of weight gain for up to 200 days in pasture steers and heifers. The implant delivers the proven 10:1 ratio of TBA:E₂ with a patented sustained-release polymer barrier that *extends the payout up to 200 days*. This formulation enhances implant performance almost twice as long as conventional implants, providing flexibility to graze beyond the time conventional implants run out.

Three research studies compared the impacts of SYNOVEX ONE GRASS and SYNOVEX C on growth rates of suckling beef steers during a lengthy pasture season, compared to non-implanted calves.

Study A: South Dakota

Experiment Design

The first (pilot) study¹ involved 120 spring-born (March-April) bull calves reared on a commercial ranch in western South Dakota, in coordination with a university research facility. Source cows were mainly Angus crossbreds, and AI sires/herd bulls were purebred Angus. Calves were processed later in the spring for vaccination, castration, branding, and implanting. On the day of processing, the study was initiated using a modified, completely randomized design. As calves were processed, animals were randomly assigned in sequence to 1 of 3 treatment groups in a 1:2:1 ratio which yielded the following:

- Control, no implant (n=31);
- SYNOVEX C (n=60);
- SYNOVEX ONE GRASS (n=29).

Suckling calves were maintained on pasture with their cows until weaning in mid-autumn, 176 days after implant administration. Calves were weighed individually on day 176, which marked the end of the suckling phase. Body weights (BW) at weaning were reported as least squares (LS) means and statistically analyzed by appropriate standard methods using each calf as an experimental unit. Treatment effects were declared significant at $P \leq 0.05$.

SYNOVEX® ONE GRASS is a long-duration implant offering performance-enhancing activity for up to 200 days.

Results

Study results summarized in Figure 1 show that implanted steer calves gained significantly ($P \leq 0.05$) more weight over the course of the 176-day grazing season compared to non-implanted controls. The SYNOVEX C and SYNOVEX ONE GRASS groups generated 13 lb (2.1%) and **27 lb (4.3%)** more weight gain/head at weaning, respectively. Furthermore, implanting with SYNOVEX ONE GRASS produced the greatest weight gain by weaning, 14 lb/head ($P \leq 0.05$) more than that achieved with use of SYNOVEX C. Thus, the SYNOVEX ONE GRASS group achieved about *double* (2.1-times) the amount of benefit demonstrated by the SYNOVEX C group. Improvements by implanted groups assume starting weights of suckling calves were similar between groups on the day of implant administration (animals not weighed on day 0). Both implants appeared to provide suckling calves an adequate duration of their respective hormonal constituents sufficient to span the processing-to-weaning period.

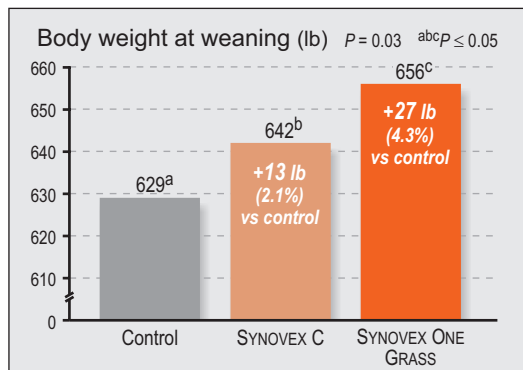


Figure 1 – Average weaning weights at day 176 post-implant for steers in Study A (South Dakota).

Study B: Missouri

Experiment Design

The second study² was similar to the original pilot study, but more robust in design. The trial involved 251 fall-born, Angus beef steer calves reared on a 5000-acre commercial ranch in southwest Missouri. Cows were primarily Angus crossbreds, and AI sires/herd bulls were purebred Angus. A randomized complete block design was utilized, with cow/calf pairs assigned to 12 pasture management groups (the primary blocking criterion) during the suckling phase. Calves averaged approximately 81 lb at birth and were processed later in the autumn when they averaged about 215 lb BW (weighed, administered vaccinations and internal/external parasite control, castrated, branded, and implanted). The study was initiated on the day of processing (day 0) and steers were randomly assigned to 1 of 3 treatment groups for implanting as follows:

- Control, no implant (n=84);
- SYNOVEX C (n=85);
- SYNOVEX ONE GRASS (n=82).

Randomization was accomplished using an ordered list for each pasture based on days-of-age for each calf, with each group of 3 sequentially ordered calves randomly assigned to 1 of the 3 experimental treatment groups. No differences between groups were detected for calf birth weight or day 0 BW ($P \geq 0.3016$). Calves remained together with their dams throughout the suckling phase (pastures 30-50 acres in size, primarily fescue mixed with white clover). Forage availability was limited during the trial because the study was conducted from late October through the winter months. Supplemental wheat haylage was provided, plus free-choice mineral for cows and dietary concentrate for calves (commodity blend offered free choice in creep feeders).

Steers were weaned the following spring, 170 days after implant administration, and then commingled on a common pasture for a 42-day backgrounding phase, after which the study was concluded (day 212). Body

Three studies compared effects of SYNOVEX® ONE GRASS and SYNOVEX® C on growth rates of suckling beef steers during a lengthy pasture season, compared to non-implanted calves.

In the SD pilot study, SYNOVEX® ONE GRASS and SYNOVEX® C generated weaning weights 27 lb and 13 lb heavier than controls, respectively.

weights at days 0 and 212 were reported as LS means and statistically analyzed by appropriate standard methods using each calf as an experimental unit. Treatment effects were declared significant at $P < 0.05$.

Results

Total weight gain and ADG outcomes for the study (Figure 2) reveal that the SYNOVEX ONE GRASS group again grew significantly ($P < 0.05$) faster than either controls or the SYNOVEX C group. Net gains of steers implanted with SYNOVEX ONE GRASS were **36 lb (7.1%)** greater than gains achieved by controls. The SYNOVEX C group averaged 13 lb of additional net gain vs controls, but this 2.6% improvement was not statistically different.

SYNOVEX ONE GRASS produced even greater gain benefit in this study, *almost triple* (2.8-times) that generated by SYNOVEX C. SYNOVEX ONE GRASS appeared to provide suckling calves an adequate duration of activity sufficient to encompass not only the processing-to-weaning period but also the backgrounding phase (212 days total). No adverse impacts of implants on morbidity, mortality, culling rate, or other drug effects were observed.

Study C: Oregon

Experiment Design

The design of a third study³ was similar to the Missouri study. The trial involved 261 spring-born calves reared on Bureau of Land Management (BLM) desert grasslands and irrigated meadows in southeast Oregon. Calves were primarily Angus beef steers. A completely random design was utilized, with cow/calf pairs assigned to 2 pasture management groups during the suckling phase. Calves averaged approximately 140 lb BW when they were gathered for standard processing procedures (weighed, vaccinated, branded, and implanted; castration was performed earlier by banding at birth). The study was initiated on the day of processing (day 0) and steers were randomly assigned to 1 of 3 treatment groups in a 1:3:3 ratio for implanting as follows:

- Control, no implant (n=37);
- SYNOVEX C (n=112);
- SYNOVEX ONE GRASS (n=112).

Randomization was performed as animals were processed on day 0 within each pasture management group, with each group of 7 sequential calves randomly assigned to 1 of the 3 experimental treatment groups (the number of control calves was intentionally limited due to costs associated with anticipated sub-par performance of non-implanted calves). No differences between groups were detected for day 0 BW ($P = 0.2265$). Calves remained

In the MO study, net gains of steers implanted with SYNOVEX® ONE GRASS were 36 lb greater than controls, and the SYNOVEX® C group averaged 13 lb of additional net gain.

SYNOVEX® ONE GRASS in the MO study provided calves an adequate duration of activity to sufficiently span the processing to backgrounding phase, 212 days.

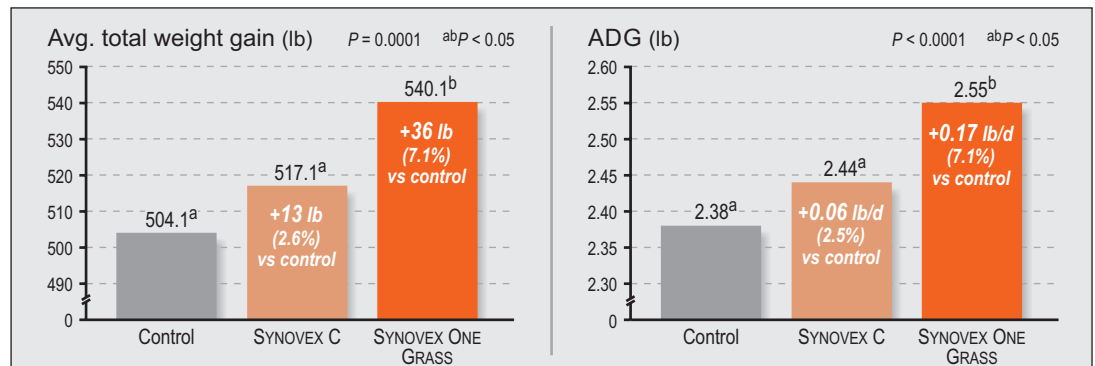


Figure 2 – Total weight gain and ADG at 212 days post-implant for steers in Study B (Missouri).

together with their dams throughout the suckling phase on their respective pastures. Younger cows initially grazed meadows for 2 months and then were transferred to BLM pastures through late summer. Older cows were placed on BLM pastures for most of the study duration. Animals were offered free choice mineral but no creep feed or supplemental forage was provided.

Steers were weaned in early autumn (approximately day 170), commingled, and fed in confinement until the start of the backgrounding period at about 200 days after implant administration, when animals were weighed and the study was concluded. Body weights at days 0 and 200 were reported as LS means and statistically analyzed by appropriate standard methods using calf as the experimental unit. Treatment effects were considered significant at $P < 0.05$.

Results

Study outcomes summarized in Figure 3 show that steers implanted with SYNOVEX ONE GRASS or SYNOVEX C grew significantly ($P < 0.05$) heavier than controls during the 200-day trial. Steers implanted with SYNOVEX ONE GRASS put on **37.4 lb (10.2%)** more weight than controls, while the SYNOVEX C group averaged 27 lb (7.4%) of additional gain vs controls. Though the SYNOVEX ONE GRASS group averaged 10.4 lb more gain than the SYNOVEX C group, this improvement was not significant ($P > 0.05$). ADG improvements mirrored total gain differences, with the SYNOVEX C and

SYNOVEX ONE GRASS groups demonstrating 7.7% and 10.4% improvements ($P < 0.05$) over controls, respectively.

The SYNOVEX ONE GRASS group gained about *1.4-times* the amount of benefit demonstrated by the SYNOVEX C group. Both implants appeared to provide suckling calves a duration of hormonal stimulation sufficient to span the processing-to-weaning period plus an additional month of pre-backgrounding time in confinement. Use of implants had no impact on morbidity or mortality, and no adverse drug effects were associated with experimental treatments.

Implications

These studies compared growth performance of suckling beef steers that received a long-duration combination implant (SYNOVEX ONE GRASS) once at post-birth processing to that of steers that received a more conventional implant (SYNOVEX C) or no implant. As a result, the SYNOVEX ONE GRASS group received an extended, sustained-release of 150 mg TBA and 21 mg EB per head, while the SYNOVEX C group received 100 mg progesterone and only 10 mg EB per head. This disparity in active ingredient and delivery system allowed steers implanted with SYNOVEX ONE GRASS to achieve superior weight gain benefits.

An overall comparison of the 3 studies is compiled in Figure 4. When the outcomes of all studies were standardized to the

In the OR study, steers implanted with SYNOVEX® ONE GRASS put on 37.4 lb more weight than controls while the SYNOVEX® C group averaged 27 lb of additional gain.

Use of implants had no impacts on morbidity, mortality, or adverse drug effects in any of the 3 studies.

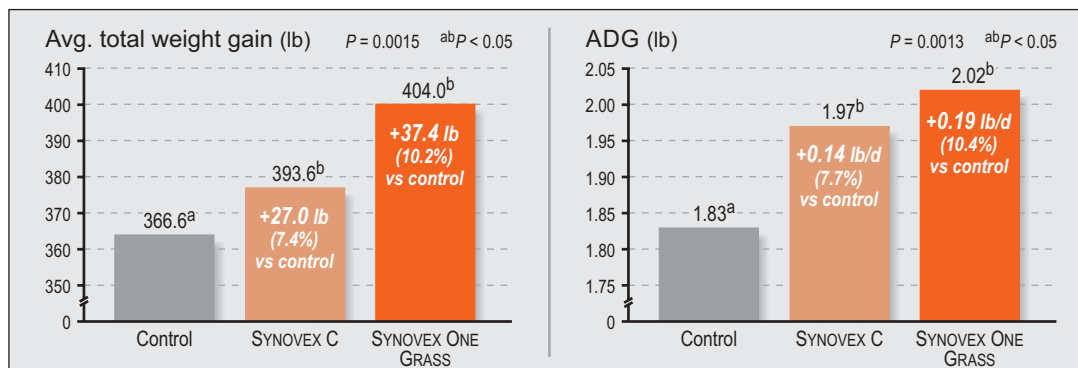


Figure 3 – Total weight gain and ADG at 200 days post-implant for steers in Study C (Oregon).

SYNOVEX® ONE GRASS averaged 31 lb of additional weight gain/head vs controls and **SYNOVEX® C** averaged 17 lb/head, when outcomes of all 3 studies were equalized at 176 days duration.

SYNOVEX® ONE GRASS delivered gain benefits approximately double that induced by a conventional-duration calf implant, **SYNOVEX® C**.

Long-duration SYNOVEX® ONE GRASS implants may help cow/calf producers improve operational efficiency by more fully exploiting the growth capability of their calves.

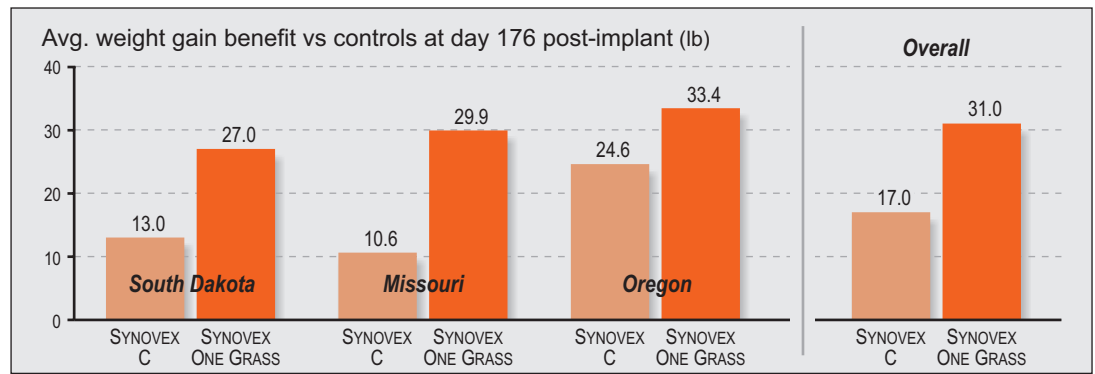


Figure 4 – Average weight gain benefit of steers implanted with SYNOVEX C or SYNOVEX ONE GRASS compared to controls in 3 studies when standardized at 176 days post-implant; and overall weighted average gain benefit for all 3 studies at 176 days post-implant.

shortest-duration trial (176 days), and weighted for the number of animals in each study, the overall benefit of SYNOVEX ONE GRASS averaged **31 lb** of additional weight gain/head compared to controls, and the benefit for SYNOVEX C was **17 lb/head**. Thus, SYNOVEX ONE GRASS delivered gain benefits approximately **double** (1.8-times) that induced by the SYNOVEX C implant.

These data compliment and re-validate the gain performance producers can expect from using a conventional suckling-calf implant like SYNOVEX C. Outcomes also demonstrate the superior weight gain advantage that a more potent and longer duration implant, SYNOVEX ONE GRASS, can provide. Both implants offer cattle producers attractive performance alternatives.

Results of these studies suggest that failure to implant suckling steer calves can cause forfeiture of calf growth potential, evidenced by inferior weight gains by the time of weaning. For cattle producers focused on efficient utilization of their resources and labor, implanting suckling calves provides a clear opportunity to optimize the pounds of beef produced and associated profit potentials.

SYNOVEX ONE GRASS appears to deliver long-duration performance for suckling calves after a single implant event, with the benefit observed up to 200 days or more post-administration in the Missouri and Oregon studies.

Conclusions

Results from 3 studies clearly support use of SYNOVEX ONE GRASS for suckling beef calves. Steers implanted once with SYNOVEX ONE GRASS at initial processing generated more weight gain and greater ADG during their suckling and early backgrounding phases (176 to 212 days post-implanting) than calves implanted with SYNOVEX C or non-implanted controls. Over the 3 studies, calves implanted with SYNOVEX ONE GRASS averaged 31 lb of additional weight gain/head compared to controls, and the benefit for SYNOVEX C was 17 lb/head.

Use of long-duration SYNOVEX ONE GRASS implants may help cow/calf producers improve operational efficiency by more fully exploiting the growth capability of calves and productivity of pastures, thus optimizing profit potential.

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Do not use SYNOVEX products in veal calves. Refer to label for complete directions for use, precautions, and warnings.

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