Implant technology has advanced to enable diverse strategies to be determined from an estimated market date to attain expectations for % Choice within a group.

• Reluctance to use aggressive implant programs because of reduction in quality grade;

• To achieve similar marbling need 30 to 90 lb + heavier steers;
• Return to a $ invested in implants = $10 to $30 in feed yards;

• Expectations for +18% ADG; +6% FE; +5% CW; + 4% in REA vs no implant - response cumulative with ionophores;

• What are our options for implant strategies in relationship to nutrient requirements and market niche?
Key points:

- Correct placement of implant - middle 1/3 of the back side of the ear (last 1/3 if part of ear lost); no abscess or crushed implants;
- Cattle fed to requirements for effective response;
- Estrogenic (E) implants - > levels of ST and IGF-1 factor to promote growth - varying length of effectiveness;

Implant processing steps (Cook, 2000)

- Disinfectant solution in tray in processing area with sponge etc to clean implant needle between animals; Change solution every 50-100 head
- Wash wet and dirty ears; remove any manure from implant site
- After placing the implant run a thumb over the implant to assure proper placement and close insertion wound
- Often implant person wear latex gloves so can clean their hands in disinfectant
Androgen (synthetic steroid - trenbolone acetate, TBA) - direct effect on muscle cells = > protein accretion, reduce fat deposition;

- Combination TBA + E or zeranol (Z; synthetic E) > growth, feed efficiencies & muscle deposition;

Selected implants available - Estrogen (E); Progesterone (P); Trenbolone acetate (TBA)

**Low**
- Ralgro (EZ36); Syn-C, Component E-C, Calfoid (E10:P100);
- Syn-S, Comp-ES, Implus-S (E20:P200);
- Finaplix-S, Comp-TS (TBA140);
- Revalor-G (E8:TBA40); Rev-IS (E16:TBA80);
- Compudose (E 25.7); Encore (E43.9);

**High**
- Magnum (EZ72); Rev-S, Comp-TES (E24:TBA120); Syn-Plus (E28:TBA200); Rev-200 (E20:TBA200);
Beef steer Implant programs

• Steer calves, 600 to finish > 200 days:
• Yearling steers to finish 150+ days;
• Heavy feeders to finish > 60 days
Holstein steers

Market options:
Pre-weaning to 1300-1350 lbs;
Started calves
• 175-225 lbs to finish;

Feeder Steers:
• 350 - 450 lbs;
• 500-750 lbs;
• 800-950 lbs

To finished BW

Feeding Options for Holstein Steers

• Continuous High Energy diets
• High energy diets to feeder BW of 350-500 lbs
• Two phase systems - higher roughage (feedlot/pasture) followed by high energy;
• Programmed feeding in large commercial feedlots from 600 lbs
Nutrient interrelationships - overview (NRC, 1996)

- E implants vs NI - 77 lb change in protein content of gain in FSBW;
- TBA + E vs NI - 154 lbs change in protein content of gain in FSBW;
- TBA + E vs NI 82% > protein accretion during 1st 40 days after implanting (Johnson et al., 1996);
- NE gain < by at least 5% with implants

Response to implants vs NI (summary of 13 studies with 9,000 steers -Guiroy et al., 2002):

- < DMI needed for NEm ; < energy content of gain; > efficiency of absorbed energy use;
- Reduction in % grading low choice;
- Cumulative effect of ionophores + implants;
Response to Protein feeding level and implant vs no implant for 770 to 1245 lbs large-framed steers (DiCostanzo, 1995)

- Maximum effects of implant & CP level = high potency implant strategy with 13.3% CP.
- High vs Medium vs NI - ADG increase 0.13, 0.14, 0.15/lb DMI, respectively;
- ADG Increases 0.10 lb for each % increase in CP; Implanting with TBA-based 14% >DMI;
- Urea as effective as undegradable CP when added < 1%

Programmed feeding systems for 600 lbs Angus steers to market (Trenkle, 2002)

- Program of 13.5% CP for 84 d reduced to 11.85% implanted with Component E-S on day 1 and Component TE-S on d 84 - lowest feed/gain
### Holstein Steer Protein Requirements vs BW and ADG

<table>
<thead>
<tr>
<th>BW,lb</th>
<th>ADG,lb</th>
<th>2.5</th>
<th>2.9</th>
<th>3.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>650</td>
<td>DMI</td>
<td>16.5</td>
<td>16.3</td>
<td>16.0</td>
</tr>
<tr>
<td></td>
<td>CP,lb/d</td>
<td>2.00</td>
<td>2.17</td>
<td>2.33</td>
</tr>
<tr>
<td>850</td>
<td>DMI</td>
<td>20.8</td>
<td>20.5</td>
<td>20.2</td>
</tr>
<tr>
<td></td>
<td>CP,lb/d</td>
<td>2.15</td>
<td>2.30</td>
<td>2.46</td>
</tr>
<tr>
<td>1050</td>
<td>DMI</td>
<td>22.9</td>
<td>22.5</td>
<td>22.2</td>
</tr>
<tr>
<td></td>
<td>CP,lb/d</td>
<td>2.18</td>
<td>2.31</td>
<td>2.43</td>
</tr>
</tbody>
</table>

Adapted from Chester-Jones et al., 1998

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Implant vs carcass composition and quality
Adapted from Guiroy et al., 2001

**Holstein steer performance by frame size and implant (I) vs no-implant (NI)**

<table>
<thead>
<tr>
<th>Frame 9</th>
<th>Frame 9</th>
<th>Frame 8</th>
<th>Frame 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>NI</td>
<td>I</td>
<td>NI</td>
</tr>
<tr>
<td>FBW</td>
<td>1326</td>
<td>1198</td>
<td>1229</td>
</tr>
<tr>
<td>ADG</td>
<td>3.04</td>
<td>2.39</td>
<td>2.89</td>
</tr>
<tr>
<td>F/G</td>
<td>6.23</td>
<td>7.09</td>
<td>6.20</td>
</tr>
<tr>
<td>REA</td>
<td>12.3</td>
<td>11.4</td>
<td>11.2</td>
</tr>
</tbody>
</table>
Steer Frame Size vs BW at 28% EBF

e.g., Implanted Frame size 5 steers need to be fed to 6-7 BW (Nichols et al., 2001)

Holstein steer
Implant strategies
Key general points to consider for implanting strategies in beef cattle:

- Steers implanted in the AM better response to those implanted in the PM;
- Timing of re-implantation - not too much overlap before pay out time;
- Back calculate from market date;
- Implant from low to high potency - gain response to re-implants is decreased.

Key general points to consider for implanting strategies in beef cattle (Pritchard, 1993):

- 200 d on feed - moderate potency and high potency terminal 100 days from market; x 3 moderate 70 days apart more bullers and riding;
- 100-150 d on feed - 2 moderate potency implants or 1st low to moderate and high potency terminal;
- 60-80 d on feed - lower potency recommended;
• Traditional approach in late 1980’s 4 lower potency estrogenic implants from weaning to market;
• Later found no benefit of multiple implants early in the feeding period;
• U of MN - 4th implant ADG >18%; F/G 10% vs NI 120 days from market; NI steers on feed 17 days longer;
• Cornell in 1992 - Ralgro at 350 lbs and Revalor after 98 days (120 d from market) - 18% ADG and 11 % F/G response to implants vs NI;

Step-Wise Strategies for implanting Holstein steers (Fowler et al, 2001)

<table>
<thead>
<tr>
<th>Day 0</th>
<th>Day 60</th>
<th>Day 120</th>
<th>Day 180</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ralgro</td>
<td>Ralgro</td>
<td>Synovex-S</td>
<td>Revalor-S</td>
</tr>
<tr>
<td>2. Synovex-C</td>
<td>Synovex-S</td>
<td>Revalor-S</td>
<td></td>
</tr>
<tr>
<td>3. Synovex-C</td>
<td>Revalor-IS</td>
<td>Revalor-S</td>
<td></td>
</tr>
<tr>
<td>4. Revalor-G</td>
<td>Revalor-IS</td>
<td>Revalor-S</td>
<td></td>
</tr>
<tr>
<td>5. Negative Control</td>
<td></td>
<td></td>
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</table>
## Performance (Fowler et al., 2001)

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>ADG</td>
<td>3.47&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>3.36&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.41&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.54&lt;sup&gt;c&lt;/sup&gt;</td>
<td>2.99&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>DMI</td>
<td>17.16&lt;sup&gt;b&lt;/sup&gt;</td>
<td>16.83&lt;sup&gt;b&lt;/sup&gt;</td>
<td>16.89&lt;sup&gt;b&lt;/sup&gt;</td>
<td>17.51&lt;sup&gt;b&lt;/sup&gt;</td>
<td>15.71&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>FG</td>
<td>4.95&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5.00&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.95&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.94&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5.26&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Final Wt.</td>
<td>1331&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1300&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1310&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1349&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1186&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a,b,c</sup> Means differ (P < .05).

## Carcass Traits

<table>
<thead>
<tr>
<th></th>
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<tr>
<td>HCW</td>
<td>798&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>781&lt;sup&gt;b&lt;/sup&gt;</td>
<td>788&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>808&lt;sup&gt;c&lt;/sup&gt;</td>
<td>704&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td>Dress %</td>
<td>60.00</td>
<td>60.00</td>
<td>60.10</td>
<td>59.90</td>
<td>59.00</td>
</tr>
<tr>
<td>BFT</td>
<td>.26</td>
<td>.25</td>
<td>.25</td>
<td>.27</td>
<td>.25</td>
</tr>
<tr>
<td>REA</td>
<td>11.37&lt;sup&gt;b&lt;/sup&gt;</td>
<td>11.43&lt;sup&gt;b&lt;/sup&gt;</td>
<td>11.69&lt;sup&gt;b&lt;/sup&gt;</td>
<td>11.65&lt;sup&gt;b&lt;/sup&gt;</td>
<td>10.24&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>YG</td>
<td>3.00</td>
<td>2.92</td>
<td>2.91</td>
<td>2.93</td>
<td>2.95</td>
</tr>
</tbody>
</table>

<sup>a,b,c</sup> Means in a row differ (P < .05).
Quality & Yield Grade Data (Fowler et al., 2001)

<table>
<thead>
<tr>
<th></th>
<th>Ral</th>
<th>Ral</th>
<th>Syn-C</th>
<th>Syn-C</th>
<th>Rev-G</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marb.</td>
<td>4.35&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.06&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.26&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>4.17&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>4.62&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Pr/Ch %</td>
<td>52.8&lt;sup&gt;b&lt;/sup&gt;</td>
<td>26.5&lt;sup&gt;a&lt;/sup&gt;</td>
<td>38.9&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>51.4&lt;sup&gt;b&lt;/sup&gt;</td>
<td>57.1&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>YG 1&amp;2</td>
<td>50.0</td>
<td>52.9</td>
<td>58.3</td>
<td>45.7</td>
<td>42.9</td>
<td></td>
</tr>
<tr>
<td>YG</td>
<td>3.00</td>
<td>2.92</td>
<td>2.91</td>
<td>2.93</td>
<td>2.95</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a,b,c</sup> Means in a row differ (P< .05).

<sup>d</sup> 3.00 = slight  4.00 = small  5.00 = modest

Summary Comments (Fowler et al., 2001)

- Implanting improved all performance variables.
- Utilizing three TBA implants going from low dose to high dose was as good as an four implant strategy.
- Carcass traits did not differ from non-implanted steers when using three TBA implants.
- Revalor-IS tended to improve performance with less reduction in quality grade than Synovex
Implant vs No Implant for 965 lb Holstein Feeders fed a for 116-d (Schaefer & Siemens, 1998 U of WI)

<table>
<thead>
<tr>
<th></th>
<th>NI</th>
<th>Syn-S</th>
<th>Syn-P</th>
</tr>
</thead>
<tbody>
<tr>
<td>FW, lb</td>
<td>1439</td>
<td>1510</td>
<td>1572</td>
</tr>
<tr>
<td>DMI, lb</td>
<td>25.6</td>
<td>26.9</td>
<td>28.0</td>
</tr>
<tr>
<td>ADG, lb</td>
<td>4.09</td>
<td>4.71</td>
<td>5.24</td>
</tr>
<tr>
<td>F/G, lb</td>
<td>6.27</td>
<td>5.72</td>
<td>5.36</td>
</tr>
<tr>
<td>REA, in²</td>
<td>12.1</td>
<td>12.3</td>
<td>13.1</td>
</tr>
<tr>
<td>Marbling</td>
<td>6.4</td>
<td>5.8</td>
<td>5.8</td>
</tr>
<tr>
<td>Maturity</td>
<td>1.5</td>
<td>1.5</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Choice vs Select differential and changes in Implant vs No Implant (NI) advantages for 965 lb Holstein steers fed for 116 days

1 cent C-S diff $1.20 for SS; $1.89 for SP

aAdapted from Schaefer and Siemens, 1998
U of WI pasture study

Synovex-S ADG advantage when pasture able to support gains >2.3 lbs/d in 380 to 490 lbs steers; economic benefit of $7 to $1 invested;

Holstein steer implanting options:

• TBA + E not recommended for high silage and moderate growth rate finishing diets < 80% concentrates;
• Best use TBA + E with high concentrate diets;
• Lower potency estrogenic based if health and environmental stressors;
• Delay 1st implant to 200-300 lb BW if DMI optimum - consider longer pay-out implants if facilities limited;
Holstein steer implanting options:

• Light feeder steers from pre-weaning for sale (120-140 d on feed) 1st implant >45 days on fed - low to moderate potency

• From 400-500 lb to market - usually 2 implants;

• Heavier feeder steers - 700 to 800 lbs to market (100-150 d on feed); 1 or 2 implants;

• Short-fed heavy feeders - low to moderate depending on market

Summary comments

• Many implant options available for dairy and beef steers;

• Feeding systems and market strategy dictate the implant program to be implemented;

• Monitor each strategy closely with good records to be able to adjust to maintain profit potential.
Implant programs for grazing beef steers