REPLACEMENT HEIFER DEVELOPMENT & NUTRITION

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AGRICULTURE AND NATURAL RESOURCES
Heifer Development

Proper selection and development of replacement heifers is one of the most important management decisions in beef production.
Heifer Development is Important

Why?

The replacement heifer becomes the genetic building block for the cow herd
Replacement Heifers

Do you buy?  

Do you raise?
Replacement Heifers

Do you buy?

- Genetic changes made in less time
- Find quality heifer that fits your herd, calving time & environment
- Consistent supply
- Disease control
- Up front cash outlay

Do you raise?

- Cost of Production (feed, minerals, vet, labor, bull or AI, facilities, management)
- Opportunity cost of space, feed resources, labor
- Death loss
- Pregnancy rates 1st time
- Heifer value at weaning
- Long term commitment
Why raise your own heifers?

- Tradition: we’ve always done it that way!
- Can’t find the genetics desired or needed.
- Biosecurity
- Known commodity
- More economical: (?)
Raise Your Own

- Most popular choice based on TRADITION
  – But is that CORRECT?
- Does it make sense (or cents) within your operation?
- Are you willing to commit to “doing it right”?
- What else could you do with your current resources?
Evaluate Your Replacement Program

• Do you take advantage of maternal and terminal heterosis?
• Do you need to reduce the number of enterprises that you manage?
• Is your calf crop capable of generating higher prices in today’s market?
• Are your “home-raised” heifers more economical than purchased heifers?
Can We Go From Here....
To Here???
A Long Term Project

- Cow mating to birth = 283 days
- Birth to weaning = 205 days
- Weaning to breeding = 242 days
- Heifer breeding to calving = 283 days
- Calving to weaning first calving = 205 days
- Minimum number of days from conception to first opportunity for return………………

1218 days!!!
Develop a Budget

Raising Beef Replacement Heifers

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Monroe County
Buckeye Hills EERA
What Does She Cost???

- KSU budget assumes 83.5% heifers started make it to calving. 16.5% loss (2% culled as yearlings, 12% culled after breeding, 1.5% open, and 1% death loss)
- Documents **ALL** expenses and opportunity costs up to calving.
- As of December, 2014, the program projects a springer heifer break-even price of$2134.39
Heifer Development Goals

• Goals
  – Become pregnant within first 25 days of breeding season
  – Give birth to a live calf
  – Raise calf to average weaning weight
  – Breed back within 1st 45 days of breeding season
  – Continue to produce a calf every year
Why?

Getting well developed heifers bred early in the breeding season has long-term positive impact on the cow herd production and profitability.
Obstacles Along the Way…

- Anestrus or age at puberty
  - To calve heifers at 2 years of age, heifers must go through puberty at 12-15 months of age.
  - To maximize reproduction efficiency, heifers need to go through puberty at 12 months of age.
Main Factor Regulating Age of Puberty

• Weight
  - Heifers must reach 65-70% of their mature weight before they will go through puberty.
  - This weight is called “Target Weight”
    - $1200 \times 0.65 = 780 \text{ lbs.}$
    - $1300 \times 0.65 = 845 \text{ lbs.}$
    - $1400 \times 0.65 = 910 \text{ lbs.}$
Other Factors Regulating Age at Puberty

• Breed
  – Age at puberty highly correlated with milk production.
  – British breeds:
    • Angus and Shorthorn earlier than Hereford
  – Continental breeds:
    • Simmental and Gelbvieh earlier than Charolais, Limousin, and Chianina
  – Brahman-based breeds
    • Very late, some as late as 24 months
“Old School” Selection Process

• Retain the biggest heifers at weaning.
• Positives:
  - Likely from earlier calving dates.
  - Likely from heavier milking dams.
• Negatives:
  - Biggest heifers may be overly fat.
  - May lead to a gradual increase in mature cow size.
Calf Selection Guidelines

- Growth rate
- Structural correctness
  - Mother’s feet, hooves (long, crooked toes)
- Genetic potential for milk production
- Muscle
- Age
- Frame score
Helpful Tools in Selection

- Recording weights of cows and calves at weaning
- Measuring hip height and frame score
- Ultrasound the yearlings for carcass merit
- Utilize Breed Association data base information (Look at EPD’s)
- Implement DNA technology if/when practical
Size and frame score determine the mature weight of the cow

Hip height (inches), frame score and mature weight for heifers.

<table>
<thead>
<tr>
<th>Age Months</th>
<th>Frame Score (hip height in inches)</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
<td>38.2</td>
<td>40.3</td>
<td>42.3</td>
<td>44.4</td>
<td>46.5</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>39.2</td>
<td>41.2</td>
<td>43.3</td>
<td>45.3</td>
<td>47.4</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>40.1</td>
<td>42.1</td>
<td>44.1</td>
<td>46.2</td>
<td>48.2</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>40.9</td>
<td>42.9</td>
<td>44.9</td>
<td>47.0</td>
<td>49.0</td>
</tr>
<tr>
<td>Estimated Mature Weight</td>
<td></td>
<td>900 lb</td>
<td>1,000 lb</td>
<td>1,100 lb</td>
<td>1,200 lb</td>
<td>1,300 lb</td>
</tr>
<tr>
<td>Frame Score</td>
<td>Steer Slaughter Wts.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>7</td>
<td>1351 and up</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1251 - 1350</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1151 - 1250</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>1051 - 1150</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>3</td>
<td>951 - 1050</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
16 – 18% of the national cow herd is replaced annually by heifers.

Assuming half of the calf crop is heifers, 32 – 36 % of all heifer calves will serve as replacements.

What does this replacement rate equate to in your herd?
Heifer Development Numbers

• How many will you keep?
  – Rule of Thumb-select at least 25-50% more than desired and grow to breeding age
  – Make a 2\textsuperscript{nd} selection at yearling age
    • Looks can change
    • Place emphasis on reproductive tract and pelvic measurements
NEGOTIATING THE PATH FROM A WEANED HEIFER UNTIL SHE WEANS HER FIRST CALF
Heifer Development Guidelines

• Heifers should weigh 65% of their mature weight at puberty.
• Heifers should gain 1 to 1.5 lbs./day from weaning to breeding.
• Heifers should weigh 85% of their mature weight at first calving.
• Heifers should gain 0.5 to 1.0 lbs./day from breeding to calving.
## Growing Heifer Example

<table>
<thead>
<tr>
<th>Situation at Weaning:</th>
<th></th>
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<tbody>
<tr>
<td>Heifer age:</td>
<td>7 months or 210 days</td>
</tr>
<tr>
<td>Average weaning weight:</td>
<td>500 lbs</td>
</tr>
<tr>
<td>Average frame score:</td>
<td>5-6</td>
</tr>
<tr>
<td>Weaning date:</td>
<td>October 10</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Target Estimates:</th>
<th></th>
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<tbody>
<tr>
<td>Target breeding date:</td>
<td>May 15</td>
</tr>
<tr>
<td>Target breeding weight:</td>
<td>780 lb (1,200 pounds times 65%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Calculations:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gain needed:</td>
<td>780 minus 500 = 280 lb</td>
</tr>
<tr>
<td>Feeding period:</td>
<td>215 days (Oct 10 to May 15)</td>
</tr>
<tr>
<td>Average Daily Gain:</td>
<td>280 lb divided by 215 days = 1.30 lb/day</td>
</tr>
</tbody>
</table>
Do not give heifers creep feed during the suckling period as fat may be deposited in the developing udder, which will lower subsequent milking ability.

Growth promoting implants (Ralgro or Synovex-C) are used in suckling calves to increase weaning weights, but are not approved for use in breeding heifers.

Provide free choice high quality minerals & WATER
### Table II. Nutrient requirements of weaned heifer calves.\(^1\)

<table>
<thead>
<tr>
<th>Heifer weight (lbs)</th>
<th>Gain (lbs)</th>
<th>Dry Matter Intake (lbs)</th>
<th>Total Protein (lbs)</th>
<th>ME (Mcal/lb)</th>
<th>TDN lbs. (%TDN)</th>
<th>Ca (lb)</th>
<th>P (lb)</th>
<th>Vit. A (IU Thousand)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medium Frame</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>1.0</td>
<td>11.8</td>
<td>1.11</td>
<td>1.02</td>
<td>7.3 (62%)</td>
<td>.036</td>
<td>.025</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
<td>12.1</td>
<td>1.25 (10.3%)</td>
<td>1.13</td>
<td>8.3 (69%)</td>
<td>.046</td>
<td>.027</td>
<td>14</td>
</tr>
<tr>
<td>600</td>
<td>1.0</td>
<td>13.5</td>
<td>1.19</td>
<td>1.02</td>
<td>8.4 (62%)</td>
<td>.038</td>
<td>.027</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
<td>13.8</td>
<td>1.32 (9.5%)</td>
<td>1.13</td>
<td>9.5 (69%)</td>
<td>.046</td>
<td>.029</td>
<td>16</td>
</tr>
<tr>
<td><strong>Large Frame</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>1.0</td>
<td>12.4</td>
<td>1.16</td>
<td>0.98</td>
<td>7.3 (59%)</td>
<td>.038</td>
<td>.025</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
<td>12.9</td>
<td>1.32 (10.2%)</td>
<td>1.05</td>
<td>8.3 (64%)</td>
<td>.049</td>
<td>.026</td>
<td>14</td>
</tr>
<tr>
<td>600</td>
<td>1.0</td>
<td>14.1</td>
<td>1.25</td>
<td>0.98</td>
<td>8.3 (59%)</td>
<td>.039</td>
<td>.027</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
<td>14.8</td>
<td>1.41 (9.5%)</td>
<td>1.05</td>
<td>9.4 (64%)</td>
<td>.049</td>
<td>.028</td>
<td>16</td>
</tr>
<tr>
<td>700</td>
<td>1.0</td>
<td>15.9</td>
<td>1.34</td>
<td>0.98</td>
<td>9.4 (59%)</td>
<td>.040</td>
<td>.029</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
<td>16.6</td>
<td>1.49 (9.0%)</td>
<td>1.05</td>
<td>10.6 (64%)</td>
<td>.049</td>
<td>.032</td>
<td>17</td>
</tr>
</tbody>
</table>

\(^1\)NRC, *Nutrient Requirements of Beef Cattle*, 1984. Requirements do not include extra energy needed during extremely cold weather.
Yearling Selection Guidelines

- Growth rate
  - Target Weight (Cycling)
- Adequate pelvic area
- Structural correctness
- Disposition
- Fleshing ability (easy keeping)
- Muscling
- Frame size
1 month before breeding season

- Vaccinate heifers against Vibrio, Lepto, and respiratory disease complex (IBR, BVD, etc.). Boost. Again, MLV vaccines are best.
- Deworm.
- Plan the breeding season.
  - 3 weeks before cows?
Yearling Guidelines

• Artificial and/or natural breeding programs
  – Target calving date for 2 years of age.
• Utilize sires that excel in calving ease and maternal traits.
• Synchronize heats when possible.
• Limit duration of calving season.
Observation-Estrus: the Basics

- Primary Signs
  - Mounting by other females.
  - Clear mucus discharge from the vagina.
Observation-Estrus: the Basics

• Secondary Signs
  – Increased activity
  – Actively mounting other cows
  – Swollen vulva
  – Dirt on flank and/or roughened tailhead
Yearling Selection Guidelines

- Post Breeding
  - Kept more heifers than needed (up to 1.5X).
  - Let the bull help select
    - $\pm$ 45 day breeding season (max 65)
    - Sell anything that is open (and late breeders?)
  - Culling now based on failure to become pregnant, lack of adequate growth.
    - Pregnancy check
Goal

For the best development, replacement heifers should be managed as a separate group from the time they are weaned as a calf until they wean their first calf.
In nearly every situation ........

It Just Doesn’t HAPPEN!!!
Proper Nutrition is Critical

Research on TDN
- 100 days prior to calving
- High = 100% NRC
- Low = 65% NRC

Other research
- Low protein diets show colostrum production is affected and calf vigor is reduced

Body Condition Score
- BCS 5.5-6 is ideal

<table>
<thead>
<tr>
<th>Energy Level</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth Weight, lbs.</td>
<td>67</td>
<td>63</td>
</tr>
<tr>
<td>%Calving Difficulty</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>%Calves Alive at Birth</td>
<td>97</td>
<td>90</td>
</tr>
<tr>
<td>%Heifers Cycling After 40 Days</td>
<td>41</td>
<td>26</td>
</tr>
<tr>
<td>%Heifers Cycling by Start of Breeding Season</td>
<td>74</td>
<td>56</td>
</tr>
<tr>
<td>%Heifers Cycling by End of Breeding Season</td>
<td>100</td>
<td>93</td>
</tr>
<tr>
<td>Weaning Weight of Calves, lbs.</td>
<td>353</td>
<td>325</td>
</tr>
</tbody>
</table>

Effect of BCS at Calving on Pregnancy During the Breeding Period

Body weight loss pre-calving:
For every kg (2.2lbs.) lost pre-calving, the % of cows in estrus at 60 days postpartum decreases by 0.5%
e.g. 20 kg (44lbs.) loss = 10% less heats

Wettemann, 1994
4 Stages of Production

• **Stage 1.** The first 82 days post-partum. During this time, the heifer must be re-bred. High nutrient requirement.

• **Stage 2.** Days 83 - 205 post-partum. At the end of this stage, the calf is weaned.

• **Stage 3.** Days 206 to 315 post-partum. The nutritional requirements of the cow are the lowest at this time.

• **Stage 4.** Days 316 to 365 post-partum. This is the time immediately pre-calving. Nutritional requirements are increasing at this time due to the increasing size of the fetus.
### 1100 lb. cow, 15 lbs. milk/day

<table>
<thead>
<tr>
<th>STAGE</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nem, Mcal/d</td>
<td>15.6</td>
<td>11.9</td>
<td>8.1</td>
<td>10.3</td>
</tr>
<tr>
<td>PROTEIN, lb/d</td>
<td>2.7</td>
<td>2.1</td>
<td>1.4</td>
<td>1.6</td>
</tr>
<tr>
<td>CALCIUM, g/d</td>
<td>33.0</td>
<td>27.0</td>
<td>17.0</td>
<td>25.0</td>
</tr>
<tr>
<td>PHOSPHORUS, g/d</td>
<td>25.0</td>
<td>22.0</td>
<td>17.0</td>
<td>20.0</td>
</tr>
<tr>
<td>VITAMIN A, Iu/d (thousands)</td>
<td>39.0</td>
<td>36.0</td>
<td>25.0</td>
<td>26.0</td>
</tr>
</tbody>
</table>

Monroe County
Buckeye Hills EERA
• Don’t reduce feed quantity or **quality**
• Inadequate nutrition pre and post – calving reduces pregnancies.
  - prolonged anestrus and lower conception rates.
• Body condition score at calving is most critical – should be 5.5 to 6.0.
• Minimize weight loss between calving and breeding.
  - try to maintain at BCS ~ 5.5.
Forages in Short Supply?

• Feed concentrates to the cows.
  - Limiting factor on mature cows is energy
  - 1st calf heifers may need more protein
• Early wean the calves from heifers?
  - Cost effective method to add pounds to calves and reduce cow feed requirements.
What is an Ideal Breeding Heifer
The Ideal Heifer

- Start with a MATERNAL F1 female:
  - Breed(x) X Angus, Breed(x) X Hereford, Breed(x) X Simmental, Breed(x) X Shorthorn, etc.
- 65-70% of mature weight at breeding time.
- Bred to a proven calving-ease sire.
- Calves unassisted as a two-year-old.
- Breeds back < 90 days.
- Stays in herd for several years
Thoughts

• The **average** Ohio cow-calf producer probably cannot justify devoting significant resources to the raising of replacement females.
• Replacement heifers are generally the most mismanaged group of animals in the typical cow-calf operation.
• If you are willing to look, there are sources of replacement females with known genetics and health history.
Thoughts cont’d

- Small herds should consider purchasing replacement heifers or utilize custom heifer development programs.
- If raising your own replacement heifers, utilize “maternal” breeds and emphasize **MODERATE** cow size.
- Limit breeding season to 45-65 days and cull open heifers after breeding season.
Thoughts cont’d

• Breed to **PROVEN** calving-ease sires.
• Breed heifers one cycle earlier than mature cows.
• Provide proper nutrition
• Intensely manage heifers 60 days prior to calving through breeding season as a 2+ yr. old.
• Consider early weaning calves from all first-calf heifers.
Proper Heifer Development Takes Time, Money and Commitment

Questions?