Best Management Practice Considerations for Cows in Confinement

Ron Lemenager, PhD, PAS
Purdue Animal Science

Preface

- Conventional production system
  - Grazing during the growing season
  - Harvested feeds during winter
    - Hay, ensiled crops
    - Supplements
  - Emphasis on extending grazing season
    - Stockpiled forage
    - Crop residues
    - Cover crops

Cows in Confinement

- Not a new concept
  - Traps, pasture sacrifice areas, drylots, semi-drylots, feedlots
- Timing
  - When grazing could damage the forage crop
    - Drought, snow cover, mud
  - When cows need close observation
    - Calving, breeding

Cows in Confinement

- Growing interest
  1. Reduce land dedicated to forage production
  2. Use cropland in double duty (grain, forage)
  3. Use locally available, economic feeds
    - Industry byproducts
    - Crop residues
  4. Cow herd expansion
  5. Bring in additional family members
- Opportunities
  - Nutrient utilization, labor efficiency, feed cost, unit cost of production
Background

Grain Prices

Nominal U.S. farm-level prices: Corn, wheat, and soybeans

Dollars per bushel

14
12
10
8
6
4
2
0


Source: USDA Agricultural Projections to 2023.

Grain Price Plateaus

Source: Ag Equipment Intelligence, Sept. 21, 2010.

Cropland and Pasture Values

Calving Season

- Ideal time depends on:
  - Environment
  - Availability of feeds
  - Intended target market
  - Labor accessibility
- 60% in spring (Feb-Apr)
  - Minimize impact of summer heat (calving/breeding)
  - Availability of forages to support lactation
- 15% in fall (Sep-Nov)
- 25% year round

USDA, 2009

Calving/Breeding in Confinement

- Many cow-calf operations have cropland?
- When is labor available?
- Is environment still an issue?
- Where are seasonal high cattle prices?

American Angus Convention, 2016

When Are Nutrient Requirements Highest?

- High Requirements
- Second trimester of Pregnancy
- Low Requirements

Mid to Late Lactation
Mid Gestation
Late Gestation
Early Lactation

American Angus Convention, 2016

Traditional Calving Scenarios

- Traditional Calving Scenarios
- Heat
- Summer Grass (May-Nov)
- Corn Stalks
- Mud, snow
- Harvesting
- Mud, snow
- Lact, 201d
- Lact, 205d
- Lact prep
- Mud, snow
- Lact prep, 90d
- Lact, 205d
- Heat
- Wean
- Breeding

American Angus Convention, 2016
### Spring Calving Scenario (traditional)

#### Table 1. Price Index & Variability by Cattle Type, 2005-2011

<table>
<thead>
<tr>
<th>Month</th>
<th>Choice Steers (A-35s, MN)</th>
<th>Variety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>97 98 101 104 99 101 104</td>
<td>103 103</td>
</tr>
<tr>
<td>Feb</td>
<td>206 217 227 216 213 213 222</td>
<td>27.7 24.1 26.6 27.8</td>
</tr>
<tr>
<td>Mar</td>
<td>96 98 101 104 99 101 104</td>
<td>103 103</td>
</tr>
<tr>
<td>Apr</td>
<td>115 126 135 132 132 129 132</td>
<td>42.9 45.5 44.7 51.9 53.7 56.9</td>
</tr>
<tr>
<td>May</td>
<td>115 126 135 132 132 129 132</td>
<td>42.9 45.5 44.7 51.9 53.7 56.9</td>
</tr>
<tr>
<td>Jun</td>
<td>115 126 135 132 132 129 132</td>
<td>42.9 45.5 44.7 51.9 53.7 56.9</td>
</tr>
<tr>
<td>Jul</td>
<td>115 126 135 132 132 129 132</td>
<td>42.9 45.5 44.7 51.9 53.7 56.9</td>
</tr>
<tr>
<td>Aug</td>
<td>115 126 135 132 132 129 132</td>
<td>42.9 45.5 44.7 51.9 53.7 56.9</td>
</tr>
<tr>
<td>Sep</td>
<td>115 126 135 132 132 129 132</td>
<td>42.9 45.5 44.7 51.9 53.7 56.9</td>
</tr>
<tr>
<td>Oct</td>
<td>115 126 135 132 132 129 132</td>
<td>42.9 45.5 44.7 51.9 53.7 56.9</td>
</tr>
<tr>
<td>Nov</td>
<td>115 126 135 132 132 129 132</td>
<td>42.9 45.5 44.7 51.9 53.7 56.9</td>
</tr>
<tr>
<td>Dec</td>
<td>115 126 135 132 132 129 132</td>
<td>42.9 45.5 44.7 51.9 53.7 56.9</td>
</tr>
</tbody>
</table>

Source: Iowa State

### Spring Calving Scenario (alternative)

#### Table 1. Price Index & Variability by Cattle Type, 2005-2011

<table>
<thead>
<tr>
<th>Month</th>
<th>Choice Steers (A-35s, MN)</th>
<th>Variety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>101 101 104 99 101 104</td>
<td>103 103</td>
</tr>
<tr>
<td>Feb</td>
<td>206 217 227 216 213 213 222</td>
<td>27.7 24.1 26.6 27.8</td>
</tr>
<tr>
<td>Mar</td>
<td>96 98 101 104 99 101 104</td>
<td>103 103</td>
</tr>
<tr>
<td>Apr</td>
<td>115 126 135 132 132 129 132</td>
<td>42.9 45.5 44.7 51.9 53.7 56.9</td>
</tr>
<tr>
<td>May</td>
<td>115 126 135 132 132 129 132</td>
<td>42.9 45.5 44.7 51.9 53.7 56.9</td>
</tr>
<tr>
<td>Jun</td>
<td>115 126 135 132 132 129 132</td>
<td>42.9 45.5 44.7 51.9 53.7 56.9</td>
</tr>
<tr>
<td>Jul</td>
<td>115 126 135 132 132 129 132</td>
<td>42.9 45.5 44.7 51.9 53.7 56.9</td>
</tr>
<tr>
<td>Aug</td>
<td>115 126 135 132 132 129 132</td>
<td>42.9 45.5 44.7 51.9 53.7 56.9</td>
</tr>
<tr>
<td>Sep</td>
<td>115 126 135 132 132 129 132</td>
<td>42.9 45.5 44.7 51.9 53.7 56.9</td>
</tr>
<tr>
<td>Oct</td>
<td>115 126 135 132 132 129 132</td>
<td>42.9 45.5 44.7 51.9 53.7 56.9</td>
</tr>
<tr>
<td>Nov</td>
<td>115 126 135 132 132 129 132</td>
<td>42.9 45.5 44.7 51.9 53.7 56.9</td>
</tr>
<tr>
<td>Dec</td>
<td>115 126 135 132 132 129 132</td>
<td>42.9 45.5 44.7 51.9 53.7 56.9</td>
</tr>
</tbody>
</table>

Source: Iowa State

### Best Management Practices

- **Altered Spring Calving Scenario**
  - Early lact, 120d
  - Mid-preg, 120d
  - Late preg, 90d
  - Plan:ng
  - Mud, snow
  - Harvesting
  - Corn stalks
  - Wean
  - Sod
  - Calving, fed
  - Wheat
  - Use straw as feed during mid-preg
  - Graze during late preg

- **Lost Calf**
  - Normal wean
  - Early wean + background

Source: Iowa State

Iowa State

American Angus Convention, 2016

Lemenager, 2016
Typical Age Distribution

- 15-20% average culling rate
  - Potential replacement heifers
    - Develop ~ 25% of calving cow number
  - ~ 20% 1st calf heifers
  - ~ 17% 2nd calf heifers
  - ~ 60% mature cows
- Opportunity to manage nutritional groups
  - Reduce feed cost
  - Avoid over/under feeding
  - Developmental (fetal/lactational) programming

Herd Health

- Balanced diets
  - Management of environmental stresses
    - Hot, humid
    - Cold, wind
    - Rain, mud
- Cons of confinement
  - Potential to concentrate disease organisms

Herd Health

- Mitigation
  - Easy observation
    - Sickness
    - Calving
    - Breeding
  - Easy to move and handle
  - Clean, dry bedding
  - Sound vaccination strategy
    - IBR, PI3, BVD, BRSV, 5-way Lepto (maybe others)
    - 7-way clostridia
    - Scours (E.coli, Rota-Corona virus)
    - Maybe (Pasteurella, Haemophilus)
  - Deworm
  - Calf colostrum

Value of Bedding-Pack Nutrients

- Anderson (2007) – North Dakota
  - More fertilizer value in bedding-pack than manure
  - Less ammonia volatilization
Bedding

- Corn stalks for cows – producer experience
  - Absorbent
  - Easier to bed
  - Easier to clean pens
- Straw and low quality forages
  - Absorbent
  - Harder to bed
  - Harder to clean pens
- ~1 LRB EOD in winter for 60 cows
- ~2 LRB ED in winter for 128 heifers

Environmental Concerns

- Each state has rules and regulations
- Confinement (CAFO) can be defined
  - By animal numbers
  - A defined period with < 50% vegetation
  - An environmental violation
- May require an nutrient management plan
- May require permits

Outside vs. Inside

- Manure spread by cow
- Soil compaction
- Riparian areas
- Animal observation
- Acc. to handling facil.
- Ice and snow
- Rough frozen ground
- Frost bite
- Bed, scape and haul
  - Minimized
  - Minimized
  - Easy
  - Easy
  - Minimized
  - Minimized
  - Minimized

Energy Requirements

- For each 10°F drop in wind chill below 30°F
  - Energy requirements increase:
    - 13% for moderate condition cows with a dry,
      winter haircoat
    - 30% for cows that are thin, wet, or have a summer
      hair coat
**Outside vs. Inside**

- **Activity**
- **Cold stress**
  - Birth weight
  - Dystocia
  - Hypothermia
  - Colostrum absorption
- **Mud**
- **Energy Requirements**
  - Reduced ~30%

- **Reduced**
- **Reduced**
  - Reduced
  - Reduced
  - Increased
- **Minimized**

**Key Facility Considerations**

**Ventilation in Confinement**

- **Respiratory challenges**
  - Humidity
  - Gasses (ammonia)
- **Mitigation** (potential for moisture condensation)
  - Ridge vents
  - Monoslope roof design
    - Eliminates air flow restrictions
    - Heat and moisture rise
    - Air movement over the cattle, not on the cattle
    - Increased solar radiation into bldg. – winter
    - Reduced heat load in bldg. - summer

**Bunk Space Recommendations**

- **Based primarily on animal size and diet**
  - 500-700 calves on grower diet
    - 12-18 inches
  - Mid-gestation cows
    - 24 inches
  - Late pregnant cows
    - 30 inches
  - Lactating cows
    - Up to 40 inches
- **Bunks on 2 sides of pen?**
Bunk Capacity Considerations

- Capacity is based on bunk dimensions
  - Throat height
  - Bottom width
  - Feed alley height and amount of flare
- Calves
  - 12” throat height (max. 18”)
  - Bottom width (max. 24”)
  - False bottom?
- Cows (high capacity)
  - Throat height (~22”)
  - Bottom width (~30”)

Calf Behavior

- Calves in feed bunk increase when:
  - Pens are not maintained (looking for a dry place)
  - Pens are crowded (looking for a quiet place)
  - Inadequate bunk space (cows pushing calves)

Animal Space Recommendations

- Outside lots (cow-calf pair)
  - 350 sq ft in a dry environment
  - Up to 800 sq ft in a cold wet environment
- Inside only (cow-calf pair)
  - Small cows (minimum of 85-90 sq. ft.)
  - Large cows (≥120 sq. ft.)
    - 100 for cow + 20 for calf
    - Allows some change in animal density

Pen Configuration

- Pen length and width dependent on:
  - Animal numbers
  - Equipment to be used
- Tractor + bale processor to bed pens
  - 80' allows driving in a circle
- Smaller equipment, different bedding strategy
  - Smaller pens could be justified
Pen Numbers

- Based on how building will be used
- From a nutritional view
  - 5 - 6 pens for the cow herd has some logic
    - Ex. 100 cow herd
      1. 25 replacement heifers
      2. 25 1st calf heifers + thin 2nd calf heifers
      3. 25 2nd calf heifers + thin mature cows
      4. 25 mature cows
      5. 25 mature cows

Calving Behavior

- Cows like to isolate themselves
- Placental fluids and membranes
  - Allow cows to initially identify calf
- Cows in tight confinement get confused
  - Too many smells from other cows calving
  - 1st calf heifers can be more confused
    - Not claim their calf
    - Claim another cow’s calf

Handling Facilities

- Designated pen for calving
  - Allows easier observation (feed alley in vehicle)
  - Calving cameras are an option (cell phone access)
  - Allows more space for calving cows and newborns
  - Individual calving pens (min. 10’x12’)
    - Can use portable corral panels
    - Can attach to pen divider, or feed bunk
    - Allows pairs to bond
- Drover’s alley connecting pens to handling
  - 12’ is a magic width
  - Can be the 12’ apron along the feed bunk
  - Can use the feed alley in double duty

Other Considerations

- Are some genetic lines more adaptable to confinement than others?
Creep Feeding

- Potential for lower WWt in confinement
- Creep feeding/early weaning justified?
  - Calf performance
  - Unit cost of production ($/lb calf weaned)
  - Calf injuries

240 Pair - Indoor

- 118 ft²/pair, 29” bunk/pair

200 Pair – Indoor/Outdoor

- 118(188) ft²/pair, 29” bunk
Herd Management Summary

- Intensified management
  - Nutrition and feeding
  - Herd health
  - Creep feeding/Early weaning
  - Bedding/Manure management
- Reduced maintenance energy requirement
- Nutritional grouping

Facility Summary

- 24 – 40 ″ bunk/cow
- ≥ 120 ft²/pair
- Designated calving pen(s)
- Creep feeding/early weaning
- Manure storage and handling
- Ventilation
- Animal observation and handling

Questions/Discussion

Ron Lemenager
rpl@purdue.edu
765-427-5972

Cow-calf Feasibility Worksheet

- 10 Key Factors (Moe Russell)
  - Cow longevity
  - Feed/pasture cost
  - Calf weaning weight
  - Manure value
  - Improved conception rate
  - Estrous sync and AI opportunity
  - Shifting calving season/higher seasonal prices
  - Calf mortality
  - Cow salvage value

55 page white paper
http://info.summitlivestock.com/cow-calf-package