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Welcome to the 2007 KSU Beef Stocker Conference. We appreciate your attendance and support of this educational event. We are fortunate to have assembled an outstanding list of presenters and topics that we believe are relevant to your bottom line.

As always, if you have any questions on the program or suggestions for future topics, please let us know. Our strength in delivering relevant information lies in working closely with you, our stakeholder.

Sincerely,

Dale A. Blasi, PhD
Extension Beef Specialist
Department of Animal Sciences and Industry
College of Agriculture

THANK YOU

We would like to express a special “THANK YOU” to Merial for their support of today’s educational program and activities for the beef stocker segment. With their financial assistance, we are able to deliver the caliber of programming that today’s events have in store for you. Please take a moment to stop by their display to see the line of products that they have to offer.
9:30 a.m.  Registration/Coffee

10:15 a.m.  Introductions

10:30 a.m.  
**Cattle Market Outlook**
*Ted Schroeder, Kansas State University*

11:15 a.m.  
**Health Protocols that Add Value**
*Van Ricketts, D.V.M., Merial Ltd.*

12:00 Noon  Barbecue Lunch

1:00 p.m.  
**Evaluating Your Sick Calf**
*Brad White, Kansas State University*

1:30 p.m.  
**Selecting Your Antibiotic**
*Hans Coetzee, Kansas State University*

2:00 p.m.  
Break

2:30 p.m.  
**Strategies for Controlling Input Costs**
*Dale Blasi, Kansas State University*

3:15 p.m.  
**Using By-product Feeds for Receiving and Growing Diets**
*Sean Montgomery, Corn Belt Livestock Services*

4:00 p.m.  Questions/Answers

5:00 p.m.  Tour of the new Beef Stocker Unit and evening barbecue
Paradigm shift:

a fundamental change in approach
driven by agents of change
Change Agents:
1. Beef Demand
2. Global Competition
3. Ethanol
4. Information

US Beef Demand, 1980-2006

Does Beef Demand Affect Producers?

<table>
<thead>
<tr>
<th>Year</th>
<th>US Per Capita Beef Supply (lbs/capita)</th>
<th>US Beef Demand Index</th>
<th>KS Fad Cattle Price ($/cwt)</th>
<th>KS 7-800 lb Steer Price ($/cwt)</th>
<th>US Average Corn Price ($/bu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>94.8</td>
<td>50</td>
<td>$61.84</td>
<td>$75.15</td>
<td>$2.22</td>
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<tr>
<td>2004</td>
<td>94.1</td>
<td>63</td>
<td>$84.52</td>
<td>$106.51</td>
<td>$2.47</td>
</tr>
</tbody>
</table>

Source: USDA, Dept. of Commerce & K-State Research & Extension
**U.S. Beef Cow Inventory January 1, 1970-2007**


Million Head

Source: USDA & K-State Research & Extension

10% Decline 1980 to 2007

---

**Total World Beef Consumption, 1996-2007 (forecasted)**


1,000 Metric Tons

Source: Foreign Ag Service, USDA

17% increase

---

**Total World Pork Consumption, 1996-2007 (forecasted)**


1,000 Metric Tons

Source: Foreign Ag Service, USDA

46% increase
World Broiler and Turkey Consumption, 1996-2007 (forecasted)

Source: Foreign Ag Service, USDA

World Beef Consumption as a Share of Total Beef, Pork, Broiler, and Turkey Consumption, 1996-2007 (forecasted)

Source: Foreign Ag Service, USDA

Market Shares of World Beef Exports by Country, 2000-2007 ('07 forecasted)

Source: Foreign Ag Service, USDA
US Ethanol Production, 1995-2009 ('07-'09 forecasted)

Source: Renewable Fuels Association & my own forecasts

Percentage of US Corn Production Used for Ethanol Production 1995-2009 ('07-'09 forecasted)

Source: Renewable Fuels Association, USDA, & my own estimates

US President George Bush
State of Union Address Jan. 23, 2007

“To reach this goal, we must increase the supply of alternative fuels, by setting a mandatory fuels standard to require 35 billion gallons of renewable and alternative fuels in 2017 -- and that is nearly five times the current target.”

ETHANOL REDUCES AMERICA’S DEPENDENCE ON FOREIGN OIL.
Corn Usage, 1987- Forecasted 2008/09

Source: USDA and own projections

Corn Supply to Usage Ratio, 1990 - Forecasted 2007/08

Source: USDA

Supply to Use Ratio and Corn Price, 1987 - Forecasted 2006/07

Source: USDA
Implications for Cattle Industry

- $3.20 - $4.00 corn here for a while
- Corn and feed grain market volatility will be high
- Less days on intensive grain diet, more forage feeding
- Substitute more corn with more ethanol byproducts
- Smaller cattle industry is probable
- Higher production cost and higher prices for beef
- Discourages exports; encourages imports
1. Fresh Branded Case-Ready Products

Branded beef was nonexistent

USDA certification programs:
2000 - 3.5 million carcasses
2006 - 6.0 million carcasses

Which Steak is from your Cattle?

<table>
<thead>
<tr>
<th>Price ($/lb)</th>
<th>Store</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5.99</td>
<td>Hy-Vee Store Brand</td>
<td></td>
</tr>
<tr>
<td>$6.48</td>
<td>Wal-Mart Store Brand</td>
<td></td>
</tr>
<tr>
<td>$8.69</td>
<td>Dillons Store Brand</td>
<td></td>
</tr>
<tr>
<td>$10.99</td>
<td>Dillons USDA Choice</td>
<td></td>
</tr>
<tr>
<td>$10.99</td>
<td>Price Chopper Creekstone Farms</td>
<td></td>
</tr>
<tr>
<td>$13.99</td>
<td>Hen House Natural Black Angus</td>
<td></td>
</tr>
<tr>
<td>$21.50</td>
<td>Rancher's Gourmet USDA Prime</td>
<td></td>
</tr>
<tr>
<td>$21.99</td>
<td>Price Chopper USDA Prime</td>
<td></td>
</tr>
</tbody>
</table>

2. Meal Packages

Single dish quick fix meal consumer expenditures expanded 83% in 2001 to $141 million – AC Nielsen

472 beef products introduced in 2001 Compared to 70 in 1997 - NCBA
3. Food Service

Food service continues to grow

Diversity of product needs

Quality control in volume are critical

Contracts

What do they require?

Product integrity – quality, consistency

High level of accountability of input supplier

Product safety assurances – mega responsibility/risk

Production practice assurances (including location?)

Traceability

Consistent continuous supply

How will producers get the signal?

What Won’t Work:

1. Relying on visual sorting for quality differentiation

2. Buying/Selling cattle without knowing how they will perform and with as little information transfer as you can get away with

3. Marketing cattle on average live or dressed weight basis for same price
How will producers get the signal?

What can work:

1. Increase Vertical Alignment
cow/calf - stocker - feedlot - processor - retail/food service

2. Objective information measured, accounted, and transferred both directions

3. Responsibilities & Rewards clearly identified
   System must be set up to:
   penalize nonperformance
   reward superior performance

4. Commitment to a common goal is essential
Health Protocols that Add Value

Van Ricketts, D.V.M.
Merial, Ltd.

Merial® SUREHEALTH®
Calf Preconditioning Program
2007 K-State Stocker Conference

Select the options you need ...

to add the value you want ...

for the marketplace you’re in.
SUREHEALTH® Source & Age

- SUREHEALTH is approved by the USDA as a Quality System Assessment (QSA) Program
- Meets requirements for QSA certification at point of origin, for export to QSA-requiring countries
- The first nationwide animal health program with QSA capabilities
- Data managed by IMI Global

SUREHEALTH® Source & Age allows you to attract feedyards involved in:

- The export market
- Selling to major beef marketers
- Branded beef programs

The market is changing. People want to know where beef is coming from.
Human population proves:
Growth potential lies overseas.

United States 4%
Rest of world 96%

Source: Cattle-Fax

Benefits of U.S. beef trade.

Source: FAO

Beef export premiums.

Source: U.S. Meat Export Federation
Net value of beef and variety meat trade.

- Japan – 35%
- Mexico – 23%
- S. Korea – 21%
- Canada – 9%
- Hong Kong – 2%
TOTAL = 90% of value of beef exports
Today, all of these countries now require a QSA.

Export opportunities for QSA-certified cattle.
- Growing populations
- Increasing beef consumption
- More countries requiring QSA
- Large premiums in the beef export market
- SUREHEALTH® Source & Age helps your cattle meet this market
Domestic opportunities for QSA-certified cattle.

- McDonald’s®, Wal-Mart®, Costco®
- All three are seeking origin-verified beef to protect consumer confidence in the products they sell
- SUREHEALTH® Source & Age helps your cattle meet this market

Domestic opportunities for QSA-certified cattle.

- Branded beef programs also want origin-verified beef
- SUREHEALTH® Source & Age helps your cattle meet this market

Domestic opportunities for QSA-certified cattle.

- Packers are paying premium prices for source-and-age verified cows
- Currently: $7 to $15 per head
- The market continues to differentiate with these premiums

Source: Cattle-Fax
How can you get involved?

Are you eligible? A quick quiz.

- Do you have a defined breeding season?
- Do you pull your bulls at certain times of the year? If not, can you segregate your calf crops by age groups?
- Do you record calf birth dates?
- Do you identify your calves by tagging them?
- Are you willing to keep this information for three years?
- Are you willing to share these records with a third-party evaluator or USDA auditor?

SUREHEALTH® Source & Age partner: IMI Global.

- USDA-approved Process-Verified Data service provider
- Will process and maintain all data
- Has a step-by-step process to get you started
- USVerified “SupplyVerified” Program will track records through the channel
Working with IMI Global: What does the producer do?

- Complete contents of USVerified™ Supply Verified™ Source & Age kit
- Provide copy of calving records (group or individual)
- Provide other supporting documents
- Conduct telephone interview

Working with IMI Global: What does IMI Global do?

- Issue and ship program-compliant tags according to the head count approved
- List producer on cow/calf producer-approved supplier list
- Enable retrieval of source and age information for buyers
- Promote special sales at www.CattleNetwork.com

Age verification.

- Producer records will be used
- Individual animal age verification
  OR
- Group age verification
Individual animal age verification.

- A birth date is recorded for every animal
- Every animal receives unique identification

<table>
<thead>
<tr>
<th>Cow Number</th>
<th>Calf Number</th>
<th>Breed</th>
<th>Color</th>
<th>Sex</th>
<th>Calving Date</th>
<th>Weaning Date</th>
<th>Weaning Wt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>427</td>
<td>45705</td>
<td>Angus</td>
<td>Blk</td>
<td>B</td>
<td>2/23/05</td>
<td>2/23/05</td>
<td></td>
</tr>
<tr>
<td>223</td>
<td>22305</td>
<td>CharX</td>
<td>Smokey</td>
<td>H</td>
<td>2/23/05</td>
<td>2/27/05</td>
<td></td>
</tr>
<tr>
<td>576</td>
<td>57605</td>
<td>Angus</td>
<td>Blk</td>
<td>H</td>
<td>2/23/05</td>
<td>2/28/05</td>
<td></td>
</tr>
<tr>
<td>129</td>
<td>12905</td>
<td>Angus</td>
<td>Blk</td>
<td>H</td>
<td>2/26/05</td>
<td>2/27/05</td>
<td></td>
</tr>
<tr>
<td>964</td>
<td>96405</td>
<td>CharX</td>
<td>White</td>
<td>B</td>
<td>2/27/05</td>
<td>2/27/05</td>
<td></td>
</tr>
<tr>
<td>504</td>
<td>50405</td>
<td>Angus</td>
<td>Blk</td>
<td>H</td>
<td>2/28/05</td>
<td>2/29/05</td>
<td></td>
</tr>
<tr>
<td>952</td>
<td>95205</td>
<td>Angus</td>
<td>Blk</td>
<td>B</td>
<td>2/29/05</td>
<td>2/29/05</td>
<td></td>
</tr>
<tr>
<td>573</td>
<td>57305</td>
<td>Angus</td>
<td>Blk</td>
<td>B</td>
<td>2/29/05</td>
<td>2/29/05</td>
<td></td>
</tr>
<tr>
<td>222</td>
<td>22205</td>
<td>Angus</td>
<td>Blk</td>
<td>B</td>
<td>2/29/05</td>
<td>2/29/05</td>
<td></td>
</tr>
</tbody>
</table>

Group age verification.

- Oldest animal’s birth date is recorded for the group
- Every animal receives unique identification

Value options from SUREHEALTH®.

<table>
<thead>
<tr>
<th>Qualifying Protocols</th>
<th>SUREHEALTH Source &amp; Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaccine control</td>
<td>√</td>
</tr>
<tr>
<td>One respiratory vaccination</td>
<td>2 doses</td>
</tr>
<tr>
<td>Bacterial respiratory vaccination</td>
<td>1 dose</td>
</tr>
<tr>
<td>Electrolyte vaccination</td>
<td>2 doses</td>
</tr>
<tr>
<td>Oral and intramuscular tapeworm</td>
<td>1 dose</td>
</tr>
<tr>
<td>35-day weaning</td>
<td>√</td>
</tr>
<tr>
<td>Adjusted to feedbunk and water rate</td>
<td>√</td>
</tr>
<tr>
<td>Vegetarian certified</td>
<td>√</td>
</tr>
<tr>
<td>Source &amp; Age</td>
<td>√</td>
</tr>
<tr>
<td>RFID</td>
<td>√</td>
</tr>
</tbody>
</table>
Program-compliant ear tags.
- Shipped from IMI, attached to approved animals and never removed
- Required: nested tag set (a.k.a. button tag and dangler tag)
- Provides for potential compliance with National Animal Identification System (NAIS)
- Benefit for livestock markets and stockers

SUREHEALTH® Source & Age.
- Meets the USDA requirement for QSA certification at point of origin
- The first nationwide animal preconditioning program with QSA capabilities
- Helps you capitalize on export and domestic marketing opportunities
- Is available to you now

To order your SUREHEALTH® Source & Age kit:
- Call 1-816-858-4796
- E-mail Verified@imiglobal.com
- Talk to your animal health supplier
Qualifying products for SUREHEALTH®.

Parasite Control
- IVOMEC® Plus (ivermectin/clorsulon)
- IVOMEC (ivermectin) Pour-On
- IVOMEC 1% Injection for Cattle & Swine
- IVOMEC EPRINEX® (eprinomectin)

Qualifying products for SUREHEALTH®.

Respiratory Vaccines (4-Way)
- Modified-Live Vaccines (MLV)
  - EXPRESS® 5
  - EXPRESS® 5-HS
  - EXPRESS® 5-PHM
  - RELIANT® 4
  - RELIANT PLUS
  - RELIANT PLUS BVD-K
- Killed Viral/Non-Replicating Vaccines
  - ELITE™ 4
  - ELITE 4-HS
  - RESPISHIELD™ 4

Qualifying products for SUREHEALTH®.

Pasteurella Vaccines
- Killed Bacterial/Non-Replicating Vaccines
  - PULMO-GUARD™ PHM-1
  - RESPISHIELD HM
Qualifying products for SUREHEALTH®.

Clostridial Vaccines (7-Way)

- ALPHA™-7
- ALPHA-7/MB™-1
- BAR-VAC® 8
- BAR-VAC 7 Somnus
- CALIBER® 7

A sure way to add value to your cattle.

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Evaluating the Sick Calf

Brad White, DVM, MD
Kansas State University
College of Veterinary Medicine

Disease Identification

• Case Definition

• Diagnosis
Are Sick Cattle All the Same?

- BRD vs. other diseases?
  - Which pathogen is causing the disease?
  - When did disease occur relative to arrival?
  - When is disease diagnosed relative to onset?

Case Definition

- **What** is the problem?
  - Could someone else identify only by reading case definition?
  - Objective, repeatable
    - Clinical vs. subclinical
  - Example: Respiratory disease in stocker calves: clinical depression and T > 105

Bovine Respiratory Disease

- Stressors
  - Castration
  - Weaning
  - Commingling
  - Ration Change
  - Transport
  - Dehydration
- Viral Infection
  - IBR, BVD
  - PI3, BRSV
- Environmental Challenge
  - Commingling
  - Sick calf shedders
  - Weather
- Decreased pulmonary immune defenses
- Bronchopneumonia (BRD)
Bovine Respiratory Disease

- Etiology not normally a single pathogen

- *Mannheimia haemolytica* most common isolate from fatal BRD cases
  - Normal inhabitant of upper respiratory tract
  - Opportunistic when normal defense mechanisms break down

BRD Progression

- Normal Calf
- Immune Challenge
- Infection / Colonization
- Expansion
- Lung Injury

Disease Detection Thresholds

- Outcome depends when intervene!
- Point of No Return?
- Intervention Points
- Severe Clinical Signs
- Mid Signs
- No Clinical Signs / Minor performance loss

Time / Tissue Damage
Disease Identification

- Case Definition
- Diagnosis

Sick vs. Ugly

“You can observe a lot by just watching.”
- Yogi Berra

BRD – Clinical Signs

Sick calves!
- Temp: 104° - 108°
- Head down
- Ears low
- Sunken flanks
- Nasal discharge
- Decreased appetite
BRD – Identifying Cases

• Early diagnosis → better Tx response

• Labor Allocation: At high risk times, check 2-3 times/day

• Hiding in group

Temporal disease risk

• BRD in stockers most likely in first 21 DOF

• Pen / group effect of infectious disease

• Pull with bias toward trend

BRD – Case ID

• Observe individuals
  – Fenceline
  – Away from group

• Observe prior to entering pen

• Feed bunk
Diagnosis

- Animal Evaluation
- Temperature
  - 5% < 105

Characteristics at Initial Treat:

<table>
<thead>
<tr>
<th></th>
<th>No Repull</th>
<th>Repull</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head:</td>
<td>108</td>
<td>32</td>
</tr>
<tr>
<td>DOF:</td>
<td>15.8</td>
<td>14.8</td>
</tr>
<tr>
<td>Wt:</td>
<td>485.7</td>
<td>467.3</td>
</tr>
<tr>
<td>Temp:</td>
<td>105.1</td>
<td>104.9</td>
</tr>
</tbody>
</table>

Clinical Illness Scores

- Criteria for placement of score on animal
- Not always necessary to formalize

<table>
<thead>
<tr>
<th>CIS Description</th>
<th>Clinical Appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Normal</td>
<td>No abnormalities noted.</td>
</tr>
<tr>
<td>2 Slightly Ill</td>
<td>Mild depression, gaunt, +/- cough</td>
</tr>
<tr>
<td>3 Moderate Illness</td>
<td>Severe depression, labored breathing, ocular/nasal discharge, +/- cough</td>
</tr>
<tr>
<td>4 Severe Illness</td>
<td>Moribund, near death, little response to human approach.</td>
</tr>
</tbody>
</table>

Diagnosis

- Use all available information
  - Treatment history
  - Clinical signs (Illness score)
  - DOF (relative risk)
  - Temperature
Animal Health Records

Daily Pull Treatment Record

<table>
<thead>
<tr>
<th>Tag (color, #)</th>
<th>Lot</th>
<th>Dx.</th>
<th>Pull #:</th>
<th>Tx:</th>
<th>ml</th>
<th>Wt:</th>
<th>Temp:</th>
<th>Comments</th>
</tr>
</thead>
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</tr>
</tbody>
</table>

Track outcomes to improve decisions.

Brad White, DVM, MS
bwhite@vet.ksu.edu
Selecting Your Antibiotic

Hans Coetzee
Kansas State University
College of Veterinary Medicine

Selecting your antibiotic

Hans Coetzee
Veterinary Clinical Sciences
Kansas State University

How do you currently choose antibiotics?
How do I decide which antibiotic to use?

- Consult your Veterinarian
- Develop Treatment Protocols
  - Dose, route, duration, frequency, withdrawal times
- Monitor disease outcomes
  - DIY "Trials" in your own production system
- Ask the right questions
  - Population of animals used in comparative trials
  - Inclusion criteria and outcomes (Case definitions)
  - Will this work in MY SYSTEM

What are some of the things I should think about before using an antibiotic?

S.P.A.C.E.

The Final Frontier!
What does it all mean?

**SPECTRUM** - Is this drug effective against this bug?

**PK/PD** - Can the drug get to the bug: Conc > MIC?

**ADVERSE REACTIONS** - Is it safe to use this drug?

**COMPLIANCE** - Can I get arrested for using this drug?

**ENVIRONMENT** - Where is the infection I’m treating?

**Spectrum**

4-Quadrant System
<table>
<thead>
<tr>
<th>Gram</th>
<th>Aerobic</th>
<th>Anaerobic</th>
</tr>
</thead>
<tbody>
<tr>
<td>(+)</td>
<td>Staphylococcus</td>
<td>Clostridium</td>
</tr>
<tr>
<td></td>
<td>Streptococcus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pasteurella/Mannheimia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Haemophilus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moraxella</td>
<td></td>
</tr>
<tr>
<td>(-)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Erysipelothrix rhusiopathiae</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bacillus anthracis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rhodococcus</td>
<td></td>
</tr>
</tbody>
</table>

**Pharmacokinetics/ Dynamics**
Pharmacokinetics

- **Aminoglycosides**
  - Conc > MIC
  - C_{max} > 10X MIC

- **β-lactams**
  - Time above MIC
  - Gram +ve: 50% > MIC
  - Gram -ve: 75% > MIC

- **Fluoroquinolones**
  - AUC > 125 X MIC
  - C_{max} > 10X MIC

What does this mean to me?

- **Penicillin:** It makes more sense to give penicillin every day for 5 days than one big dose for a day
- **Baytril:** Can be given as a single dose that will be effective for 3 days
- **Some long acting drugs will form a deposit at the site of injection and “leak” slowly into the blood**

Adverse Effects
## Compliance

### Cattle

<table>
<thead>
<tr>
<th>System</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastro-intestinal</td>
<td>Erythromycin increase GIT motility</td>
</tr>
<tr>
<td></td>
<td>Lincomycin: Gut upset</td>
</tr>
<tr>
<td></td>
<td>Florfenicol: Loss of appetite</td>
</tr>
<tr>
<td>Tetracyclines</td>
<td>possible gut upset</td>
</tr>
<tr>
<td>Skeletal</td>
<td>Muscle Blemishes and irritation on IM Injection</td>
</tr>
<tr>
<td></td>
<td>Oxytetracycline IM / Macrolides IM/Sulfonamides IM</td>
</tr>
<tr>
<td>Cardio-vascular</td>
<td>Tilmicosin IV is FATAL</td>
</tr>
<tr>
<td>Renal</td>
<td>High Dose tetracyclines can hurt the kidneys</td>
</tr>
</tbody>
</table>

### Single Dose, Long-Acting Drugs for Food Animals

- Procaine Penicillin G
- Ceftiofur Crystalline Free Acid (Excede)
- Enrofloxacin (Baytril @ 12.5 mg/kg)
- Tulathromycin (Draxxin)
- Tilmicosin SQ (Micotil)
- Florfenicol (Nuflor @ 40 mg/kg)
- Oxytetracycline LA (IM/ SQ ONLY)
Current suggested minimum and maximum times before moving to additional therapy in non-responding BRD cases.

Suggested time periods are days (24 hour periods) after the only or last administration.

### Injection Site Blemishes/ Residues

**Tissue Irritation/ Blemishes**
- Oxytetracycline IM
- Macrolides IM
- Sulfonamides IM
- Florfenicol IM
- Enrofloxacin Intravesical (mare)

**Residues**
- **AMINOGLYCOSIDES**
  - Ceftiofur Crystaline Free Ac (Excede® Intramuscular)
  - Florfenicol in Veal Calves/ Dairy Cows
  - Tilmicosin in dairy cows

### Antimicrobials banned for extralabel use in Food Animals
- Chloramphenicol
- Fluoroquinolones
- Dimetridazole
- 1prnidiazole
- Other Nitroimidazoles
- Nitrofurazones
- Glycopeptides
- Sulfonamide drugs (except approved use of sulfadimethoxine, sulfabromocarmezazine, and sulfathiazole) are banned in lactating dairy cattle.
Antimicrobials with Potential Risks in Humans

- **Tilmicosin:** Cardiotoxic on Accidental Injection (Heart Failure!)
- **Chloramphenicol:** Aplastic Anemia in humans

*Environment*

*“Privileged” Sites:*
- Central Nervous System
- Prostate
- Bone
- Seminal vesicles
- Eye
- Joints
  - May become more "permeable" if inflamed
  - Abscesses
Take Home Messages

- Develop treatment protocols with your veterinarian
- Treat early and treat right!
- Monitor treatment outcomes in your system
- Ask the right questions
- Know when to quit!

Acknowledgements

EAT BEEF
THE WEST WASN’T WON ON SALAD
Strategies for Controlling Input Costs

Dale Blasi
Kansas State University
Animal Sciences and Industry

Strategies for Controlling Input Costs
Dale Blasi, Chad Anglin, Marc Epp and Rodney Derstein

Beef Stocker Unit
Dept. of Animal Sciences & Industry
Kansas State University
Beef Stocker Segment Trends

- Increasing importance in Beef Chain
- Operations becoming more coordinated
- Operations are more technology driven
- Contractual arrangements and alliances
- Product differentiation – natural and organic markets

Controlling Input Costs

What Are the Challenges?

- Increasing/available pasture leases and structured care rates
- Increased feed and fuel input costs
- Available labor supply
- Volatile market conditions
Kuhl’s Axiom

- Buy em Cheap
- Keep em Alive
- Make em Gain
- Sell em High

Buy em “Cheap” ?

- What does that mean?
  - Pay on the front or on the back end
  - Expected vs Unknown

What Does “Buy Them Cheap” Really Mean?

- In a perfect world, all calves destined to KS would be:
  - Healthy (not stale)
  - Right breed combination
  - Castrated
  - Dehorned
  - Upper medium/large frame
  - Heavy (not extreme) muscling
  - Available in truck-sized lots
Cattle Sources

- SE US Auction Markets
  - Dickson, TN
  - Waynesboro, TN
  - Guthrie, KY
  - Sweetwater, TN
  - Lebanon, TN

Successful Receiving Programs

- Proper planning
- Functional equipment
  - Working facilities
  - Waterers
  - Feeders
- Quality ration ingredients
- Astute management and labor

Incoming Calf Weight Variation

<table>
<thead>
<tr>
<th>Lot #</th>
<th># Ht</th>
<th>Avg. Wt</th>
<th>Min</th>
<th>Max</th>
<th>S.D.</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>102</td>
<td>102</td>
<td>459</td>
<td>366</td>
<td>524</td>
<td>34.1</td>
<td>158</td>
</tr>
<tr>
<td>103</td>
<td>102</td>
<td>463</td>
<td>388</td>
<td>542</td>
<td>30.8</td>
<td>154</td>
</tr>
<tr>
<td>104</td>
<td>104</td>
<td>440</td>
<td>362</td>
<td>520</td>
<td>32.6</td>
<td>158</td>
</tr>
<tr>
<td>105</td>
<td>99</td>
<td>474</td>
<td>400</td>
<td>540</td>
<td>31.3</td>
<td>140</td>
</tr>
<tr>
<td>106</td>
<td>102</td>
<td>439</td>
<td>328</td>
<td>520</td>
<td>33.3</td>
<td>192</td>
</tr>
<tr>
<td>107</td>
<td>100</td>
<td>453</td>
<td>372</td>
<td>516</td>
<td>31.6</td>
<td>144</td>
</tr>
<tr>
<td>108</td>
<td>95</td>
<td>503</td>
<td>424</td>
<td>596</td>
<td>34.7</td>
<td>172</td>
</tr>
<tr>
<td>109</td>
<td>96</td>
<td>513</td>
<td>442</td>
<td>612</td>
<td>26.9</td>
<td>170</td>
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<tr>
<td>110</td>
<td>92</td>
<td>520</td>
<td>444</td>
<td>642</td>
<td>33.1</td>
<td>198</td>
</tr>
</tbody>
</table>
Kuhl’s Axiom

- Buy em Cheap
- Keep em Alive
- Make em Gain
- Sell em High

Bull vs Steer Performance

<table>
<thead>
<tr>
<th>Lot #</th>
<th>% Cutting Bulls</th>
<th>45 day Diff. (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>102</td>
<td>66</td>
<td>2</td>
</tr>
<tr>
<td>103</td>
<td>68</td>
<td>28</td>
</tr>
<tr>
<td>104</td>
<td>51</td>
<td>18</td>
</tr>
<tr>
<td>105</td>
<td>73</td>
<td>6</td>
</tr>
<tr>
<td>106</td>
<td>59</td>
<td>37</td>
</tr>
<tr>
<td>107</td>
<td>72</td>
<td>44</td>
</tr>
<tr>
<td>108</td>
<td>49</td>
<td>9</td>
</tr>
<tr>
<td>109</td>
<td>57</td>
<td>5</td>
</tr>
<tr>
<td>110</td>
<td>43</td>
<td>21</td>
</tr>
<tr>
<td>115</td>
<td>68</td>
<td>28</td>
</tr>
<tr>
<td>116</td>
<td>67</td>
<td>7</td>
</tr>
<tr>
<td>117</td>
<td>55</td>
<td>19</td>
</tr>
</tbody>
</table>
Health Summary - 15 Loads

<table>
<thead>
<tr>
<th>Item</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total incoming head</td>
<td>1532</td>
<td>head</td>
</tr>
<tr>
<td>Avg. bulls</td>
<td>62.6</td>
<td>%</td>
</tr>
<tr>
<td>Avg. incoming weight (no shrink adjust)</td>
<td>450.5</td>
<td>lbs</td>
</tr>
<tr>
<td>Avg. morbidity (1st pull respiratory only)</td>
<td>11.37</td>
<td>%</td>
</tr>
<tr>
<td>Avg. mortality</td>
<td>1.10</td>
<td>%</td>
</tr>
</tbody>
</table>

Compiled by Marc Epp

Technology and Health Detection
Kuhl’s Axiom

- Buy em Cheap
- Keep em Alive
  - Make em Gain
  - Sell em High

Receiving Ration Management

- Quality feed ingredients
- Clean bunks/stale feed removed
- Feed analysis - Critical
- Formulated nutritionally balanced diets
- Standardized, thorough mixing
- Timed, uniform delivery

Receiving Ration Philosophy

- Do not Compound Stress!!!!!!
**Feed Intake of Newly Weaned/Stressed Calves**

Days after Arrival | DM Intake (\% of BW)
--- | ---
1 to 7 | 0.5 to 1.5
8 to 14 | 1.5 to 2.5
15 to 28 | 2.5 to 3.5

Hutchison and Cole, Texas A&M
### Needs of a 400 lb Calf at Different Rates of Gain

<table>
<thead>
<tr>
<th>Level of intake</th>
<th>ADG</th>
<th>Protein (%)</th>
<th>NEg</th>
</tr>
</thead>
<tbody>
<tr>
<td>1% BW (4 lb)</td>
<td>0</td>
<td>15.0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td>21.2</td>
<td>61</td>
</tr>
<tr>
<td>2% BW (8 lb)</td>
<td>0</td>
<td>7.0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>1.0</td>
<td>13.0</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>2.0</td>
<td>15.2</td>
<td>70</td>
</tr>
<tr>
<td>3% BW (12 lb)</td>
<td>2.0</td>
<td>10.5</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>2.5</td>
<td>11.1</td>
<td>49</td>
</tr>
</tbody>
</table>

### Cross-Section of a Successful Starter Ration

- Palatable
- High (rumen friendly) energy and protein
- Fortified with minerals and vitamins
- Expense will vary depending upon situation
- Avoid least cost formulations
### Stocker Unit Diets, 100% DM Basis

<table>
<thead>
<tr>
<th>Feedstuff, %</th>
<th>Base #1</th>
<th>Base #2</th>
<th>Base #3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa</td>
<td>30.0</td>
<td>15.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Prairie Hay</td>
<td>16.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Dry – Rolled Corn</td>
<td>28.0</td>
<td>30.5</td>
<td>36.5</td>
</tr>
<tr>
<td>Wet Corn Gluten Feed</td>
<td>23.0</td>
<td>15.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Supplement</td>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Factors Which Determine Effective Use of Byproducts

- Distance between production/use site
- Nutrient composition and variability
- Processing costs
- Uniformity of supply
- Marketing availability
- Handling and storage concerns
Performance Summary - 15 Loads

<table>
<thead>
<tr>
<th>Item</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total incoming head</td>
<td>1532 head</td>
</tr>
<tr>
<td>Avg. Incoming weight (no shrink adjust)</td>
<td>460.5 lbs</td>
</tr>
<tr>
<td>Avg. ADG (full-fed only; after 6-8% shrink)</td>
<td>2.38 Lbs/day</td>
</tr>
<tr>
<td>Avg F:G (full-fed only; after 6-8% shrink)</td>
<td>5.06 Feed Gain</td>
</tr>
</tbody>
</table>

Compiled by Marc Espa

Forage Issues
Total and Feed Costs/Lb Gain

- Feed cost based on Shrink basis

[Bar graph showing total and feed costs per pound of gain over years 2001 to 2011.]
Make em Gain?

- Given the increase in feed and forage costs, when/where should calves gain?

Effect of Backgrounding Performance on Subsequent Pasture Performance on Double Stocked Bluestem Pastures – Anglin et al. 2007

- Study objective:
  - Evaluate differences among pens fed full-fed dry-matter intake and three various levels of restricted dry-matter intakes fed in the receiving yard and their respective performance during the subsequent grazing phase.

Background Rations Prior to Pasture Turnout – Anglin et al., 2007

<table>
<thead>
<tr>
<th>Item</th>
<th>Full Fed</th>
<th>2.50%</th>
<th>2.25%</th>
<th>2.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td># Pens (animals)</td>
<td>6 (83)</td>
<td>6 (81)</td>
<td>6 (81)</td>
<td>6 (82)</td>
</tr>
<tr>
<td>Onset wt</td>
<td>420</td>
<td>419</td>
<td>420</td>
<td>420</td>
</tr>
<tr>
<td>Offset wt</td>
<td>587a</td>
<td>562b</td>
<td>558b</td>
<td>530c</td>
</tr>
<tr>
<td>Total wt gain</td>
<td>167a</td>
<td>143b</td>
<td>138b</td>
<td>110c</td>
</tr>
<tr>
<td>ADG, lbs/day</td>
<td>3.13a</td>
<td>2.28b</td>
<td>2.13b</td>
<td>1.60c</td>
</tr>
<tr>
<td>F:G</td>
<td>5.67</td>
<td>5.34</td>
<td>5.25</td>
<td>5.76</td>
</tr>
</tbody>
</table>

a,b,c P<.05
### Calculated Background Feed Costs
Anglin et al., 2007

<table>
<thead>
<tr>
<th>Item</th>
<th>Full Fed</th>
<th>2.50%</th>
<th>2.25%</th>
<th>2.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td># Pens (animals)</td>
<td>6 (83)</td>
<td>6 (81)</td>
<td>6 (81)</td>
<td>6 (82)</td>
</tr>
<tr>
<td>ADG, lbs/day</td>
<td>3.13^c</td>
<td>2.28^b</td>
<td>2.13^b</td>
<td>1.60^a</td>
</tr>
<tr>
<td>F:G</td>
<td>5.67</td>
<td>5.34</td>
<td>5.25</td>
<td>5.76</td>
</tr>
<tr>
<td>Cost, $/hd/day</td>
<td>1.03</td>
<td>.79</td>
<td>.78</td>
<td>.74</td>
</tr>
<tr>
<td>Cost, $/hd/period</td>
<td>69.14</td>
<td>53.17</td>
<td>52.55</td>
<td>49.85</td>
</tr>
</tbody>
</table>

* a,b,c P<.05

### Grazing Performance Based on Previous Backgrounding Diet

<table>
<thead>
<tr>
<th>Item</th>
<th>Full Fed</th>
<th>2.50%</th>
<th>2.25%</th>
<th>2.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turnout wt.</td>
<td>587</td>
<td>562</td>
<td>558</td>
<td>530</td>
</tr>
<tr>
<td>Day 45 wt.</td>
<td>692</td>
<td>671</td>
<td>671</td>
<td>645</td>
</tr>
<tr>
<td>Offtest wt.</td>
<td>782^a</td>
<td>769^a</td>
<td>769^a</td>
<td>745^a</td>
</tr>
<tr>
<td>Overall wt. gain</td>
<td>195</td>
<td>207</td>
<td>211</td>
<td>215</td>
</tr>
<tr>
<td>Day 1 – 45 ADG</td>
<td>2.33</td>
<td>2.43</td>
<td>2.50</td>
<td>2.57</td>
</tr>
<tr>
<td>Day 46 – 90 ADG</td>
<td>1.88</td>
<td>2.04</td>
<td>2.05</td>
<td>2.07</td>
</tr>
<tr>
<td>Overall ADG</td>
<td>2.10</td>
<td>2.24</td>
<td>2.28</td>
<td>2.32</td>
</tr>
</tbody>
</table>

* a,b,c P<.05
## Impact of Spring Pasture Burning on Stocker Calf Performance

<table>
<thead>
<tr>
<th>Item</th>
<th>Burned Pastures</th>
<th>Unburned Pastures</th>
<th>SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. Steers</td>
<td>181</td>
<td>261</td>
<td>-</td>
</tr>
<tr>
<td>No. Pastures</td>
<td>6</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>Stocking rate, lbs/acre</td>
<td>291</td>
<td>288</td>
<td>-</td>
</tr>
<tr>
<td>Starting wt, lbs</td>
<td>497</td>
<td>495</td>
<td>0.58</td>
</tr>
<tr>
<td>Final shrunk wt, lbs</td>
<td>643</td>
<td>627</td>
<td>3.45</td>
</tr>
<tr>
<td>ADG, lb/day</td>
<td>1.81</td>
<td>1.65</td>
<td>0.05</td>
</tr>
<tr>
<td>Gain per acre, lbs.</td>
<td>85</td>
<td>76</td>
<td>2.19</td>
</tr>
</tbody>
</table>

*Barnhardt et al., 2006*

## % Crude Protein Content of Native Grass Hay by Harvest Date, 1997

![Graph showing crude protein content by harvest date for Butler, Cowley, and Marion counties.](attachment:image)
### Effect of Supplementation on Grazing ADG

<table>
<thead>
<tr>
<th>Item</th>
<th>Treatment</th>
<th>Con</th>
<th>Energy</th>
<th>SEM</th>
<th>P =</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. steers</td>
<td>140</td>
<td>188</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>No. pastures</td>
<td>4</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>In wt, lb</td>
<td>495</td>
<td>495</td>
<td>0.3</td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td>Out wt, lb</td>
<td>638</td>
<td>706</td>
<td>11.2</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>Supp. Intake, lb DM</td>
<td>-</td>
<td>5.4</td>
<td>0.5</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>ADG, lb</td>
<td>1.47</td>
<td>2.20</td>
<td>0.11</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>Supp. conversion</td>
<td>-</td>
<td>8.0</td>
<td>1.6</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Montgomery et al. (2002)

### Effect of Supplementation on Ultrasound Data During Grazing

<table>
<thead>
<tr>
<th>Item</th>
<th>Treatment</th>
<th>Control</th>
<th>Energy</th>
<th>SEM</th>
<th>P =</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. steers</td>
<td>140</td>
<td>188</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>No. pastures</td>
<td>4</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ribeye area, inch²</td>
<td>7.0</td>
<td>7.9</td>
<td>0.13</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>Rib fat, inch</td>
<td>0.08</td>
<td>0.10</td>
<td>0.003</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>Rump fat, inch</td>
<td>0.10</td>
<td>0.14</td>
<td>0.005</td>
<td>0.01</td>
<td></td>
</tr>
</tbody>
</table>

Montgomery et al. (2002)

### Grazing Supplementation and Finishing Performance

<table>
<thead>
<tr>
<th>Item</th>
<th>Treatment</th>
<th>Control</th>
<th>Energy</th>
<th>SEM</th>
<th>P =</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. steers</td>
<td>140</td>
<td>188</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>No. pens</td>
<td>4</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Initial wt, lb</td>
<td>623</td>
<td>684</td>
<td>11.9</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>Final wt, lb</td>
<td>1272</td>
<td>1272</td>
<td>10.8</td>
<td>0.98</td>
<td></td>
</tr>
<tr>
<td>DMI, lb</td>
<td>21.1</td>
<td>21.3</td>
<td>0.35</td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td>ADG, lb</td>
<td>3.61</td>
<td>3.61</td>
<td>0.051</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>G:F</td>
<td>0.170</td>
<td>0.170</td>
<td>0.002</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>DOF</td>
<td>180</td>
<td>162</td>
<td>2.5</td>
<td>0.01</td>
<td></td>
</tr>
</tbody>
</table>

Montgomery et al. (2002)
### Grazing Supplementation and Carcass Characteristics

<table>
<thead>
<tr>
<th>Item</th>
<th>Control</th>
<th>Energy</th>
<th>SEM</th>
<th>P =</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. steers</td>
<td>140</td>
<td>188</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>No. pens</td>
<td>4</td>
<td>4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HCW, lb</td>
<td>832</td>
<td>832</td>
<td>7.0</td>
<td>0.99</td>
</tr>
<tr>
<td>Dressing percent</td>
<td>65.7</td>
<td>65.1</td>
<td>0.25</td>
<td>0.15</td>
</tr>
<tr>
<td>Ribeye area, inch²</td>
<td>12.7</td>
<td>12.9</td>
<td>0.17</td>
<td>0.38</td>
</tr>
<tr>
<td>Fat thickness, inch</td>
<td>.72</td>
<td>.67</td>
<td>0.020</td>
<td>0.16</td>
</tr>
</tbody>
</table>

Montgomery et al. (2002)

### Grazing Supplementation and Carcass Yield Characteristics

<table>
<thead>
<tr>
<th>Item</th>
<th>Control</th>
<th>Energy</th>
<th>SEM</th>
<th>P =</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. steers</td>
<td>140</td>
<td>188</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>No. pens</td>
<td>4</td>
<td>4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YG 1, %</td>
<td>1</td>
<td>2</td>
<td>0.8</td>
<td>0.49</td>
</tr>
<tr>
<td>YG 2, %</td>
<td>10</td>
<td>12</td>
<td>2.9</td>
<td>0.65</td>
</tr>
<tr>
<td>YG 3, %</td>
<td>76</td>
<td>72</td>
<td>4.0</td>
<td>0.53</td>
</tr>
<tr>
<td>YG 4 &amp; 5, %</td>
<td>13</td>
<td>14</td>
<td>2.7</td>
<td>0.77</td>
</tr>
</tbody>
</table>

Montgomery et al. (2002)

### Grazing Supplementation and Carcass Quality Characteristics

<table>
<thead>
<tr>
<th>Item</th>
<th>Control</th>
<th>Energy</th>
<th>SEM</th>
<th>P =</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. steers</td>
<td>140</td>
<td>188</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>No. pens</td>
<td>4</td>
<td>4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Marbling score</td>
<td>Sm75</td>
<td>Sm75</td>
<td>8.3</td>
<td>0.19</td>
</tr>
<tr>
<td>USDA Prime, %</td>
<td>3</td>
<td>7</td>
<td>1.3</td>
<td>0.09</td>
</tr>
<tr>
<td>USDA Choice, %</td>
<td>84</td>
<td>73</td>
<td>4.9</td>
<td>0.16</td>
</tr>
<tr>
<td>USDA Select, %</td>
<td>13</td>
<td>20</td>
<td>4.9</td>
<td>0.33</td>
</tr>
</tbody>
</table>

Montgomery et al. (2002)
Controlling Input Costs

- Buy the right calves
  - Stocker returns begin with purchased or breed value attributes
- Feed inputs
  - Where/when?
- Labor
- Marketing considerations

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After the Conference, Join us at Your KSU Beef Stocker Unit

- Demonstrations
  - New pens and processing facilities
  - Cattle handling and feed/forage manufacturing
  - Advanced cattle identification and health detection technologies
  - KSU Center for Animal Identification
- Prairie Oyster Fry
Using By-Product Feeds for Receiving and Growing Diets

Sean Montgomery
Corn Belt Livestock Services

US Ethanol Plants
US Ethanol Production (Millions of Gallons)

US Corn Used for Ethanol (Millions of Bushels)

Distillers Grains Production

- 1998 produced ≈ 1 million tons of distillers grains
- 2006 produced ≈ 10 million tons of distillers grains
- 2010 estimated to produce ≈ 16 million tons of distillers grains

Weiss et al. (2007)
Comparing WDGS and WCGF

<table>
<thead>
<tr>
<th></th>
<th>WDGS</th>
<th>WCGF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>Fat</td>
<td>10 - 14</td>
<td>3 - 3.5</td>
</tr>
<tr>
<td>ADF</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>NDF</td>
<td>46</td>
<td>40</td>
</tr>
<tr>
<td>NE gain</td>
<td>0.78 - 0.85</td>
<td>0.60 - 0.65</td>
</tr>
<tr>
<td>CP / DIP</td>
<td>30 / 35</td>
<td>20 / 75</td>
</tr>
</tbody>
</table>

WCGF in Growing Diets

AH level x WCGF level interaction (P ≤ 0.01). Montgomery et al. (2003).

Beef Stocker 2007 Conference            September 27, 2007

Page 71
Digestibility and Passage Rate

<table>
<thead>
<tr>
<th>Item</th>
<th>WCGF</th>
<th>Corn</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>OM</td>
<td>86.8</td>
<td>84.0</td>
<td>0.02</td>
</tr>
<tr>
<td>NDF</td>
<td>75.7</td>
<td>58.2</td>
<td>0.01</td>
</tr>
<tr>
<td>Starch</td>
<td>96.7</td>
<td>92.7</td>
<td>0.03</td>
</tr>
<tr>
<td>Passage rate, %/h</td>
<td>3.8</td>
<td>2.7</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Both diets contained 20% hay; WCGF diet = 45% WCGF. Montgomery et al. (2004).

Effect of WCGF on Ruminal pH

Effect of WCGF (P < 0.01).

DDGS in Receiving Diets

<table>
<thead>
<tr>
<th>Item</th>
<th>DRC</th>
<th>DDGS</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. pens</td>
<td>7</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td>No. steers</td>
<td>186</td>
<td>187</td>
<td>-</td>
</tr>
<tr>
<td>DMI, lb</td>
<td>11.0</td>
<td>11.9</td>
<td>0.05</td>
</tr>
<tr>
<td>ADG, lb</td>
<td>2.36</td>
<td>2.72</td>
<td>0.11</td>
</tr>
<tr>
<td>F:G</td>
<td>4.73</td>
<td>4.48</td>
<td>0.55</td>
</tr>
<tr>
<td>Pulls, %</td>
<td>14.8</td>
<td>26.7</td>
<td>0.09</td>
</tr>
<tr>
<td>Repulls, %</td>
<td>3.1</td>
<td>8.7</td>
<td>0.09</td>
</tr>
</tbody>
</table>

Both diets contained 40% hay; DRC diet = 52% corn, DDGS diet = 53% DDGS. Drouillard et al. (1999).
**Fat in Receiving Diets**

<table>
<thead>
<tr>
<th>Item</th>
<th>Added Fat</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. pens</td>
<td>0 4</td>
<td>7 7</td>
<td></td>
</tr>
<tr>
<td>No. steers</td>
<td>186 187</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DMI, lb</td>
<td>14.0 14.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADG, lb</td>
<td>3.37a 3.65b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F:G</td>
<td>4.17 3.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morbidity, %</td>
<td>72 82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death loss, %</td>
<td>4 14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Metabolism of Linoleic Acid**

Linoleic acid (C18:2) → Arachidonic acid (C20:4) → 

\( \text{PGH}_2, \text{PGE}_2, \text{PGF}_{2\alpha}, \text{PGL}_2, \text{PGD}_2 \)

Eicosanoids

**Corn By-products in Receiving Diets**

<table>
<thead>
<tr>
<th>Item</th>
<th>Control</th>
<th>DCGF(^a)</th>
<th>DDGS(^b)</th>
<th>1(^c)</th>
<th>2(^d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADG, lb</td>
<td>3.96</td>
<td>3.72</td>
<td>4.11</td>
<td>NS</td>
<td>0.03</td>
</tr>
<tr>
<td>DMI, lb</td>
<td>14.7</td>
<td>14.8</td>
<td>15.1</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Feed:Gain</td>
<td>3.7</td>
<td>4.0</td>
<td>3.7</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

\(^a\)Diet contained 14% DCGF.  
\(^b\)Diet contained 7% DDGS.  
\(^c\)1 = Corn vs. the mean of DCGF and DDGS.  
\(^d\)2 = DCGF vs. DDGS.

**DGS in Growing Diets**

<table>
<thead>
<tr>
<th>Item</th>
<th>Corn/SBM</th>
<th>DDGS</th>
<th>WDGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADG, lb</td>
<td>2.55</td>
<td>2.68</td>
<td>2.90</td>
</tr>
<tr>
<td>DMI, lb</td>
<td>17.5</td>
<td>17.5</td>
<td>16.7</td>
</tr>
<tr>
<td>Feed:Gain</td>
<td>6.93&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6.56&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5.77&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> All diets contained 50% hay (DMB); DGS diets contained 20% DGS (DMB).

<sup>b,c,d</sup> Means within a row with uncommon superscripts differ (<i>P</i> < 0.05).

---

**Crude Protein of Native Range**

![Graph showing crude protein of Native Range over time from 18-Apr to 16-Aug.]

Montgomery et al. (2002).

---

**ADF of Native Range**

![Graph showing ADF of Native Range over time from 18-Apr to 16-Aug.]

Montgomery et al. (2002).
Net Energy of Native Range Calculated from ADF

- %TDN = 88.9 - (0.779 × ADF)
- ME (Mcal/kg) = (TDN% × 0.044) × 0.82
- NEm (Mcal/lb) = (1.37 × ME) – (.138 × ME²) + (.0105 × ME³) – 1.12 / 2.204
- NEg (Mcal/lb) = (1.42 × ME) – (.174 × ME²) + (.0122 × ME³) – 1.65 / 2.204

NRC (1996).

Predicted ADG based on ADF

Montgomery et al. (2002).

DDG and Grazing Cattle

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Cont</th>
<th>DDG</th>
<th>DDG</th>
<th>DDG</th>
<th>DDG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADG</td>
<td>% BW</td>
<td>ADG</td>
<td>% BW</td>
<td>ADG</td>
</tr>
<tr>
<td>KS06</td>
<td>1.55</td>
<td>0.50</td>
<td>2.12</td>
<td>1.00</td>
<td>2.39</td>
</tr>
<tr>
<td>KS</td>
<td>2.31</td>
<td>0.41</td>
<td>2.81</td>
<td>0.83</td>
<td>3.17</td>
</tr>
<tr>
<td>UNL06</td>
<td>1.48</td>
<td>0.50</td>
<td>2.18</td>
<td>0.75</td>
<td>2.53</td>
</tr>
<tr>
<td>UNL04</td>
<td>1.50</td>
<td>0.50</td>
<td>1.70</td>
<td>0.60</td>
<td>1.75</td>
</tr>
<tr>
<td>UNL07</td>
<td>1.36</td>
<td>0.55</td>
<td>1.96</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>UNL06</td>
<td>1.63</td>
<td>0.50</td>
<td>1.98</td>
<td>1.00</td>
<td>2.42</td>
</tr>
<tr>
<td>Unpublished</td>
<td>1.08</td>
<td>-</td>
<td>-</td>
<td>0.90</td>
<td>2.38</td>
</tr>
<tr>
<td>Unpublished</td>
<td>1.94</td>
<td>-</td>
<td>-</td>
<td>1.30</td>
<td>2.79</td>
</tr>
<tr>
<td>Mean</td>
<td>1.60</td>
<td>0.48</td>
<td>2.13</td>
<td>0.52</td>
<td>2.49</td>
</tr>
</tbody>
</table>

DDG and Grazing Cattle

Klopfenstein et al. (2007)

– Subsequent growth performance during the finishing period was not affected by supplementing DDG
– Each one pound of DDG dry matter fed decreases forage dry matter intake by 0.5 pounds

Allow for increased stocking density?

<table>
<thead>
<tr>
<th>Item</th>
<th>WC</th>
<th>DRC</th>
<th>FGC</th>
<th>HMC</th>
<th>SFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed:Gain</td>
<td>6.07</td>
<td>5.68bc</td>
<td>6.15a</td>
<td>5.46b</td>
<td>5.70c</td>
</tr>
<tr>
<td>% Incr., diet&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-</td>
<td>6.4</td>
<td>10.0</td>
<td>6.1</td>
<td></td>
</tr>
<tr>
<td>% Incr., corn&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-</td>
<td>10.4</td>
<td>16.3</td>
<td>9.9</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a,b,c</sup>Means within a row with uncommon superscripts differ (P < 0.05).

Vander Pol et al. (2006).

Diets Contained 30% WDGS (DMB)

<table>
<thead>
<tr>
<th>Item</th>
<th>WC</th>
<th>DRC</th>
<th>FGC</th>
<th>HMC</th>
<th>SFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed:Gain</td>
<td>5.95a</td>
<td>5.56b</td>
<td>5.35c</td>
<td>5.29cd</td>
<td>5.21d</td>
</tr>
<tr>
<td>% Incr., diet&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-</td>
<td>6.6</td>
<td>10.1</td>
<td>11.1</td>
<td>12.4</td>
</tr>
<tr>
<td>% Incr., corn&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-</td>
<td>12.5</td>
<td>19.2</td>
<td>21.1</td>
<td>23.6</td>
</tr>
<tr>
<td>Fecal starch, %</td>
<td>30.5a</td>
<td>14.5bc</td>
<td>7.1c</td>
<td>5.9cd</td>
<td>3.3d</td>
</tr>
</tbody>
</table>

<sup>a,b,c,d</sup>Means within a row with uncommon superscripts differ (P < 0.05).

Scott et al. (2003).

Expressed as % above WC, calculated for diet and corn only (61.4%).
Fecal Starch and Starch Digestion (64-Trial Summary)

Zinn et al. (2002)

Fecal Starch Results

% Fecal Starch, DM basis

Whole Corn
Corn Processing Method

Fecal Starch Results

% Fecal Starch, DM basis

Whole Corn Rolled Corn
Corn Processing Method
Evaluating Ration Consistency

- Coefficient of variation (CV)
  - Describes the variation within a set of observations
  - Calculated by dividing the standard deviation of a set of numbers by their mean (expressed as a percent)
- Commercial feedlot industry targets a CV of 10% or less

Evaluating Ration Consistency

- Out of 153 commercial feedlots
  - Average CV of 9.5 percent
  - Sixty-six percent had CVs below 10 percent
  - Thirty-one percent had CVs between 10 and 20 percent
  - Three percent had a CV greater than 20 percent
  (Vogel, 2000)
Coefficient of Variation (CV)

<table>
<thead>
<tr>
<th>Nutrient CV, %</th>
<th>Feedlot</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>4.7</td>
<td>8.9</td>
<td>5.0</td>
</tr>
<tr>
<td>Rumensin CV, %</td>
<td></td>
<td>22.7</td>
<td>11.9</td>
<td>1.4</td>
</tr>
</tbody>
</table>

*Nutrients analyzed consisted of DM, CP, ADF, Ca, P, K, and Mg.
*Calculated using a total of three bunk samples from each feedlot.
*Values reported on a dry matter basis.

Rumensin Coefficient of Variation (CV)

\[ y = -6.82x + 27.9 \]

\[ R^2 = 0.9604 \]

Sulfur Requirements (NRC, 1996)

- Requirement
  0.15 percent of diet DM
- Maximum tolerable level
  0.40 percent of diet DM
**Effects of High Dietary Sulfur**

- High Sulfur or Sulfate (water and/or feed)
- Sulfate Reduction in the Rumen
- Eructation
- H₂S and S²⁻ Inhalation
- Lung Tissue Damage
- Cell Damage
- Secondary Viral or Bacterial Infections
- Poor Cattle Performance

Kung et al. (1998).

**Etiology of PEM**


**Symptoms of PEM**

- Blindness
- Ataxia (incoordination)
- Recumbency with seizures
- Bloat?
Thiamine

- Necessary cofactor in the tricarboxylic acid cycle
  - Pyruvate dehydrogenase
  - Alpha ketoglutarate

Rumen pH and $[\text{H}_2\text{S}]$

\[ \text{[H}_2\text{S}] \rightleftharpoons [\text{HS}^- + \text{H}^+] \]

pKa = 6.89

Concentrations of $\text{H}_2\text{S}$ and $\text{HS}^-$ are equal at a rumen pH of 6.89 (50% of each)

Rumen pH and $[\text{H}_2\text{S}]$

What if rumen pH = 5.80?

\[
\text{pH} \approx \text{pKa} + \log \left( \frac{[\text{HS}^+ + \text{H}]}{[\text{HS}]} \right)
\]

5.80 = 6.89 + \log \left( \frac{[\text{HS}^+ + \text{H}]}{[\text{HS}]} \right)

\[
\frac{[\text{H}_2\text{S}]}{[\text{H}_2\text{S}] + [\text{HS}^- + \text{H}^+]} \times 100\% = \frac{1}{1 + 0.08} \times 100\% \approx 93\%
\]
Sulfur Variability in MWDGS

Managing Sulfur

- Know sulfate concentration of water
- Know sulfur concentration of dietary ingredients
- Formulate diets to contain ≤ 0.3% sulfur on a DM basis
- Add thiamine to the diet
- Heat stress and PEM?
- Use CTC during a PEM outbreak?
- Rapid method test for sulfur?

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Corn Belt Livestock Services
Phone: 815-499-7066
Email: s.montgomery@mchsi.com
Be sure to visit the BeefStockerUSA website at:

www.beefstockerusa.org

An information site for stocker producers presented by Kansas State University Research and Extension:

Department of Animal Sciences & Industry

Food Animal Health and Management Center
College of Veterinary Medicine

“Knowledge for Life”