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2015
ANNUAL CONFERENCE

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DAIRY HERD MANAGEMENT

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HOARD'S DAIRYMAN

Don't miss another information packed issue of *Hoard's Dairyman*

With information from the dairy industry's most respected specialists, researchers, veterinarians, and dairy farmers, *Hoard's Dairyman* is a source that is unparalleled in the dairy industry. Our editors travel over 100,000 miles per year to serve you with the most reliable dairy information available.

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WELCOME!

Welcome to this year's Dairy Calf and Heifer Association Conference! Themed "Connect with the Best," this conference will offer unmatched networking opportunities and highlight the latest practices, technology and research in the calf and heifer industry. We hope you enjoy the conference!

REGISTRATION

MONDAY, MARCH 30
10:30 AM – 4:00 PM

TUESDAY, MARCH 31
5:30 AM – 4:30 PM

WEDNESDAY, APRIL 1
5:30 AM – 12:00 PM

TRADE SHOW

The conference trade show will be held during the first day of the conference (Tuesday). There will also be scheduled breaks, a breakfast and a networking reception – allowing ample time to browse the trade show. The trade show reception will wrap up day one of the conference with food, networking and live entertainment. Listed below are the specific trade show activities and breaks.

TUESDAY, MARCH 31

6:30 – 7:45 AM:	Breakfast & Welcome
10:15 – 10:45 AM:	Morning Break
1:00 – 2:00 PM:	Dessert Break
3:00 – 3:30 PM:	Afternoon Break
5:30 – 8:00 PM:	Trade Show Reception

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SCHEDULE AT A GLANCE

MONDAY, MARCH 30		
10:30 AM - 4:00 PM	Registration Open	*Registration Desk*
12:00 - 5:00 PM	Pre-Conference Tour & Lab Demonstrations	*UW School of Veterinary Medicine & Wisconson Veterinary Diagnostic Lab*
5:00 - 6:00 PM	Exhibitor Reception	*Monona*
TUESDAY, MARCH 31		
6:30 - 7:45 AM	Breakfast & Welcome	*Trade Show*
8:00 - 10:15 AM	Classroom Sessions	*Wisconsin, Ballroom FGH, Geneva & Mendota*
10:15 - 11:45 AM	Break	*Trade Show*
10:45 - 11:45 AM	Classroom Sessions	*Ballroom FGH, Geneva, Mendota*
11:45 AM - 1:00 PM	Annual Business Luncheon Program	*Wisconsin*
1:00 - 2:00 PM	Dessert Break	*Trade Show*
2:00 - 3:00 PM	Classroom Sessions	*Ballroom FGH & Geneva*
3:00 - 3:30 PM	Break	*Trade Show*
3:30 - 4:30 PM	Classroom Session	*Wisconsin*
5:30 - 8:00 PM	Trade Show Reception	*Trade Show*
WEDNESDAY, APRIL 1		
6:30 - 7:30 AM	Breakfast with the Farm Tour Hosts	*Geneva/Mendota*
7:30 - 8:30 AM	New Technologies Roundtable	*Wisconsin*
8:45 - 10:00 AM	Producer Perspectives Roundtable	*Wisconsin*
10:00 - 10:30 AM	Break	*Convention Center Lobby*
10:30 AM - 12:00 PM	Keynote Address	*Wisconsin*
12:00 - 5:00 PM	Farm Tours	*Doerfer Bros. Farm & Larson Acres*
5:00 PM	Conference Closes	

2015 TRADE SHOW EXHIBITORS

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THANK YOU

TO OUR EXHIBITORS

SAVE THE DATE

2016 DCHA Annual Conference

March 8–10, 2016
Madison, Wis.

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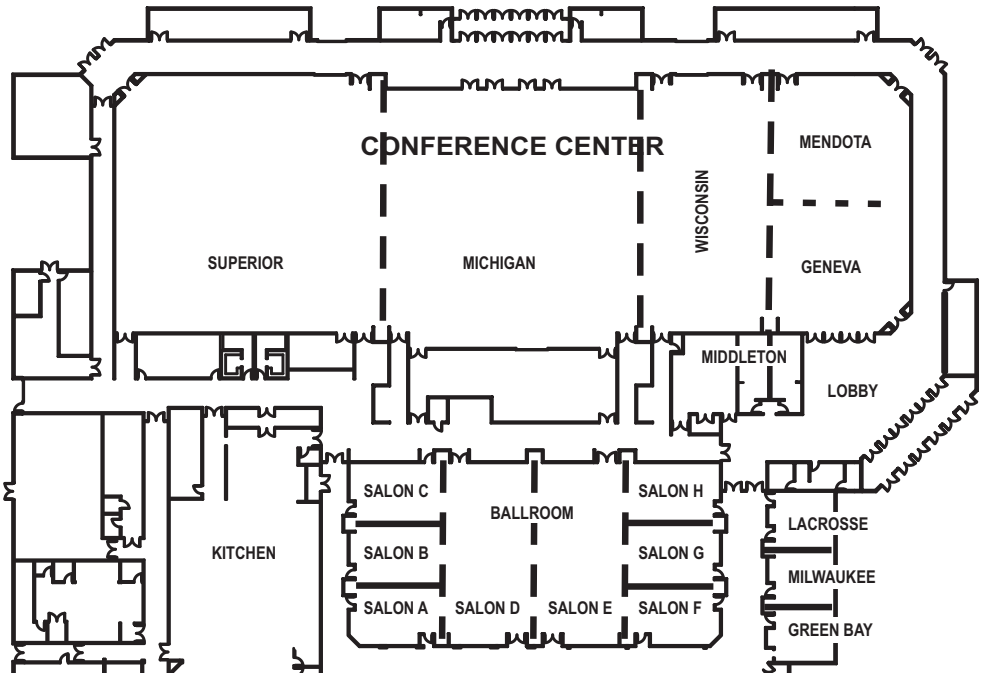
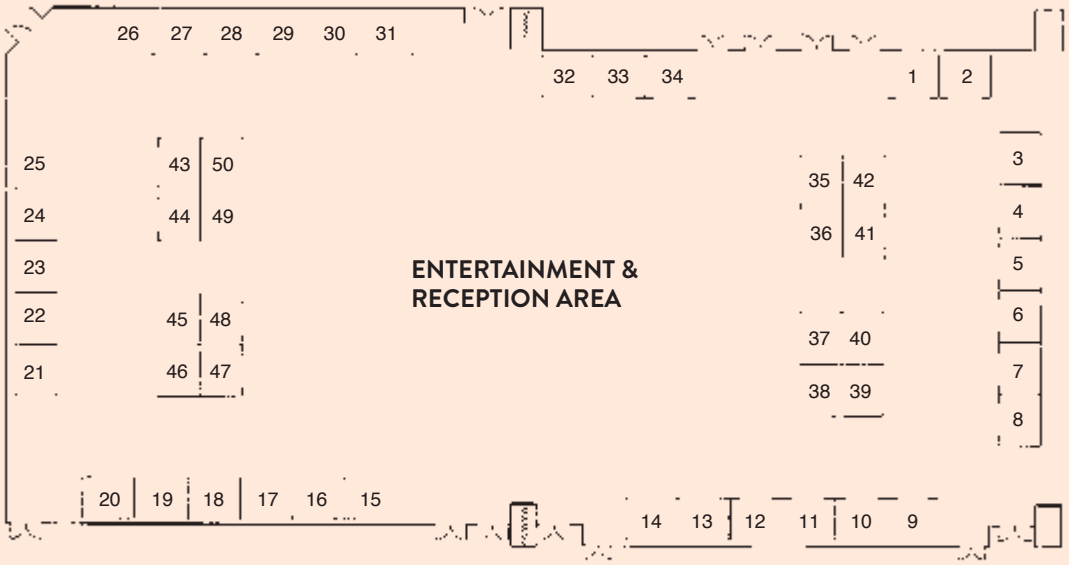
CONFERENCE MAPS

CONFERENCE MEETING ROOM AREA



TRADE SHOW AREA



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CONFERENCE AGENDA

MONDAY, MARCH 30

BOARD OF DIRECTORS MEETING
9:00 - 11:00 AM

Sponsored by Calf-Tel

REGISTRATION OPEN
10:30 AM – 4:00 PM

PRE-CONFERENCE TOUR & LAB DEMONSTRATIONS
Meet at registration area at 11:45 AM, pre-registration required for tour.

12:00 – 5:00 PM

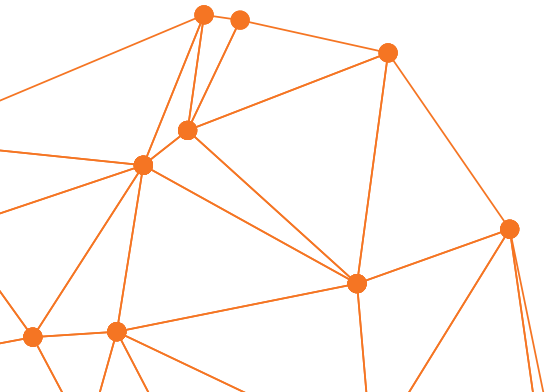
Dr. Don Sockett, Wisconsin Veterinary Diagnostic Lab; Dr. Theresa Ollivett, UW School of Veterinary Medicine; Dr. Keith Poulsen, Wisconsin Veterinary Diagnostic Lab

Exclusive tours of the Wisconsin Veterinary Diagnostic Lab and University of Wisconsin – School of Veterinary Medicine will be combined with sessions and demonstrations on calf respiratory scoring, thoracic ultrasound and pharyngeal swabbing.

Sponsored by Land O'Lakes Animal Milk Products

EXHIBITOR RECEPTION
5:00 – 6:00 PM | Monona

Sponsored by Hoard's Dairyman and Calf-Tel



TUESDAY, MARCH 31

BREAKFAST & WELCOME
6:30 – 7:45 AM | Trade Show

Join all registered attendees and exhibitors to kick off the conference and network with the Board of Directors.

Sponsored by Merck Animal Health

PROFESSIONAL CALF RAISING THROUGH THE EYES OF A SPECIAL OPERATIONS SOLDIER
8:00 – 9:00 AM | Wisconsin

Dr. Sam Barringer, Merck Animal Health

This presentation will look at how to plan, build and execute effective calf raising systems with an emphasis on innovation, conceptualization and leadership for adapting to challenges. It will also focus on the multiple ways that calf raising and health programs can be implemented in order to make changes to your system.

Sponsored by Milk Products and Vita Plus

TRACK OPTIONS - SELECT ONE

TRACK A: SEEING THE BIG PICTURE; DO YOU HAVE THE VISION?
9:15 – 10:15 AM | Salon Ballroom FGH

Dr. Tom Fuhrmann, DairyWorks Management System

Whether growing replacement heifers for your own dairy operation or growing replacements for customers, results are predicated on your plan and its execution. This presentation will describe some of the management principles and risk factors to consider in your plan to grow replacements efficiently and profitably.

TRACK B: LEARNINGS OF A CALF MANAGER

9:15 – 10:15 AM | Geneva

Ermith Ocampo, Calf Source, LLC

Ermith Ocampo of CalfSource, LLC in Kaukauna, Wis. will share his experience managing and motivating a diverse team of calf care employees and how they strive to balance employee satisfaction and accountability with the expectations and goals of upper management. Learn through the lens of a successful manager "in the middle."

Sponsored by Hubbard Feeds

TRACK C: FEEDING DAIRY STEERS FOR PROFITABLE WEIGHT GAIN

9:15 – 10:15 AM | Mendota

Frank Wardynski, Michigan State University Extension

This session will address nutritional aspects of feeding healthy dairy beef steers to gain body weight in order to increase profitability. The discussion will address feeding strategies at birth, through milk consumption and up to six months of age.

BREAK

10:15 – 10:45 AM | Trade Show

Sponsored by ImmuCell Corporation

TRACK OPTIONS - SELECT ONE

TRACK A: RISK MANAGEMENT: WHAT EXACTLY DOES THAT MEAN IN THE CALF AND HEIFER SEGMENT?

10:45 – 11:45 AM | Salon Ballroom FGH

Dr. Greg Bethard, Pagel's Ponderosa Dairy, Dairy Dreams & Rons Cheese

Any business has risks; the calf and heifer business is no exception. This presentation will explore risks from the custom grower perspective, and from the dairy perspective. Risks may include: market, biosecurity, environmental risks, and the best use of resources.

TRACK B: ANIMAL WELFARE: CONTRIBUTING TO A POSITIVE IMAGE

10:45 – 11:45 AM | Geneva

Chase DeCoite, National Cattlemen's Beef Association

Discover consumer perceptions and expectations of on the farm animal welfare and how dairymen can contribute to creating a positive image for the beef and dairy industries.

Sponsored by Boehrigner-Ingelheim Vetmedica, Inc.

TRACK C: MARKET PERSPECTIVE: WHERE IS DAIRY BEEF HEADED?

10:45 – 11:45 AM | Mendota

John Nalivka, Sterling Marketing, Inc.

This presentation will take a closer look at the economics of the beef industry and how different key factors are driving the industry today. How do dairymen fit into today's beef industry and how can you adjust your business to benefit from the growing role of calf-feds in the beef industry?

Sponsored by Merck Animal Health

ANNUAL BUSINESS LUNCHEON

11:45 AM – 1:00 PM | Wisconsin

Learn about and contribute to the future direction of DCHA.

DESSERT BREAK

1:00 – 2:00 PM | Trade Show

TRACK OPTIONS - SELECT ONE

TRACK A: FINANCIAL PLANNING: ONE OF THE MOST CRITICAL STEPS TO SUCCESS

2:00 – 3:00 PM | Salon Ballroom FGH

Gary Sipiorski, Vita Plus; David Rinneard, BMO Harris; Jason Karszes, Cornell University; Claus Haaren, Brooksco Farms

This roundtable will share different roles and experiences under the broad topic of financial planning. Conference attendees will have ample opportunity to ask questions and gain insights that will help guide critical planning for success.

TRACK B: FACILITIES DESIGNED FOR CALF HEALTH

2:00 – 3:00 PM | Geneva

Dr. Ken Nordlund

The presentation will emphasize calf barn design features to reduce the risk of nursing calf respiratory and diarrheal disease. Key discussion items will include: all-in, all-out grouping techniques, nesting scores in cold weather, drainage beneath bedding and positive pressure ventilation systems to supplement natural ventilation.

Sponsored by DBC Ag Products

BREAK

3:00 – 3:30 PM | Trade Show

MANAGING YOUR TEAM – UP, DOWN & ALL AROUND

3:30 – 4:30 PM | Wisconsin

Tom Wall, Dairy Interactive, LLC and Language Links, LLC

From new employees to middle managers and family members, managing people will always be a challenge. Learn how to get your team more focused and working together toward making everyone's job a lot easier.

TRADE SHOW RECEPTION

5:30 – 8:00 PM | Trade Show

Connect with industry-leading companies, fellow producers, veterinarians and more - all while enjoying great food, drinks and live entertainment!

Entertainment sponsored by Purina Animal Nutrition

WEDNESDAY, APRIL 1

BREAKFAST WITH THE FARM TOUR HOSTS

6:30 – 7:30 AM | Geneva/Mendota

Join the conference farm tour hosts for breakfast and an overview of each operation. Hosts will share background information on their operations to give attendees a sneak peak at the afternoon farm tours.

NEW TECHNOLOGIES – APPLIED IN THE REAL WORLD

7:30 – 8:30 AM | Wisconsin

Brandon Andersen, Genomic Testing; Dan Seimers, Activity Monitoring; Katie Schollmeyer, Prebiotics

New technologies continue to shape and advance our industry. Three new technologies will be featured on this producer roundtable, including the application of genomic testing, activity monitoring in a heifer operation, and the use of prebiotics. From the words of a producer, you will learn how they have applied these technologies and have the opportunity to ask questions about their experiences.

Sponsored by SCR Dairy and Semex

ACROSS THE COUNTRY: CALF EMPLOYEE & MANAGER PERSPECTIVES

8:45 – 10:00 AM | Wisconsin

Tracy Loos, Rosy-Lane Holsteins, Watertown, WI; Darin Mann, M & M Feedlot, Parma, ID; Aaron Harpster, Evergreen Farms, Spruce Creek, PA

This roundtable will feature three unique calf and heifer management operations, as presented by the employees and owners that drive their success. Learning from peers has never been more important, and that is exactly what this panel will provide to conference attendees.

Sponsored by Merck Animal Health

BREAK

10:00 – 10:30 AM | Convention Center Lobby

Sponsored by Huvepharma

KEYNOTE ADDRESS: CHANGING PERCEPTION ON A REALITY SHOW: UNDERCOVER BOSS COMES TO THE FARM

10:30 AM – 12:00 PM

Brad Scott, Scott Brothers Dairy Farm

When you have the opportunity to change millions of consumers' perceptions about dairy farming, do you take the risk or politely decline? Hear why California dairy farmer, Brad Scott, and his family took the risk of having Hollywood cameras on their farm and how it built a lifelong relationship with a national brand. Watch clips from the show and discover ways you can positively impact consumer confidence locally and nationally.

Brad Scott, *Scott Brothers Dairy Farm*
San Jacinto, California

FARM TOUR DEPARTURE

12:00 PM | Meet in conference center lobby for departure.

Box lunch provided to tour participants.

DOERFER BROS. | VERONA, WIS.

Hutches, groups, indoor pens? What's the best way to raise calves? After exploring each of these housing options, the 700-cow farm built a new calf facility in 2012.

During an on-farm tour, you will learn how calves progress from pens to group housing to the parlor. Walk through the 60-by-156-foot calf facility and see how automated calf feeders, RFID technology, ventilation tubes and adjustable curtains have created calf comfort and excellent growth rates.

Buses sponsored by Golden Calf Company

LARSON ACRES | EVANSVILLE, WIS.

Technologies in calf production can help with efficiency and performance. Larson Acres has adopted this mentality on their 5,000-acre and 2,800-cow operation. With herd management software, a focus on the environment and five nursery barns, Larson Acres has been responsible for many of the industry's firsts.

During this tour you will see many of these innovations, including: all-in, all-out calf facilities, transition and maternity settings, sand and manure separation systems, and a cross ventilation barn that focuses on cow comfort.

Sponsored by Sexing Technologies

RETURN TO HOTEL, CONFERENCE CLOSES

5:00 PM

Thank you for joining us. Safe travels home!

FARM TOUR PROFILES

DOERFER BROS. | Verona, Wisconsin

INFORMATION & ORIGIN:

Doerfer Bros. Farm is a 900-cow, 4,200-acre operation in Verona, Wis., operated by John and Gary Doerfer, their father Richard and long-time herdsman Scott Dahlk.

Through the years, the team has raised calves in several settings, including: hutches, indoor pens and groups. After exploring each of these housing options, the team built a new all-in, all-out calf facility in 2012 with a focus on calf comfort and performance. The new facility is a 60-by-156-foot calf building complete with automated calf feeders, RFID technology, ventilation tubes and adjustable curtains.

Today, calves in the facility more than double birth weights by weaning at 54 days of age. The team credits the four automated calf feeders, seasonal milk replacers and high-quality starter grains as top tools in reaching their calf performance goals.

CALF MANAGEMENT TIMELINE:

DAY 1: Within one hour after birth, calves are dried, fed 1 gallon of quality colostrum and a colostrum supplement.

DAYS 1-3: Calves are moved to individual calf pens. Heat lamps are placed above calves during periods of cold temperatures. At day three, calves are moved into the group feeding system in groups of 25.

DAYS 4-54: Calves are raised on automated calf feeders with the same group through weaning. The automated system heats water to 102 degrees Fahrenheit, mixes and dispenses milk replacer based on the calf's individual needs. The system is set so levels of milk replacer are increased automatically for each calf over time.

DAYS 55-150: Calves are weaned and transitioned to a heifer facility where they are fed a TMR and raised on a bedding pack. The team converted their previous calf barn to create this heifer facility.

DAYS 151-90 DAYS PREGNANT: Heifers are transported to a custom grower at 5 months of age. The custom grower breeds the heifers at 15 months. Heifers return to Doerfer Bros. Farm at 90 days pregnant.

WHAT YOU'LL SEE:

- **New calf facility:** Calf comfort and performance is promoted through a new 60-by-156-foot, all-in, all-out calf facility.
- **Automated calf feeders:** Calves are raised on four automated calf feeders from day four through weaning. Calves enter the feeding station up to five times each day until their individual allotment has been consumed. At the maximum feeding level, each calf consumes 2.5 gallons (or 9 liters) of milk replacer per day. By day 44, milk replacer levels begin to drop so a smooth weaning transition can occur at day 54.
- **Weaned calf facility:** The Doerfer Bros. team utilizes their previous calf facility for weaned heifers. The existing facility was transported to a new location on the farm to allow room for the new calf facility.

LARSON ACRES | Evansville, Wisconsin

INFORMATION & ORIGIN:

Larson Acres is a family farm in Evansville, Wis., currently owned by six Larson families spanning five generations. The Larsons combine their interests, efforts and enthusiasm for farming to operate their business. The farm started nearly 90 years ago with just 80 acres and six cows and has grown to more than 2,800 cows on 5,500 acres today.

With the expansion of Larson Acres in 2010, the team expanded their heifer herd from 1,250 heifers to a total of 2,375 heifers. The expansion also included the addition of four nursery barns and a calf facility for 2-5 month old calves. The new barns are operated as all-in, all-out facilities.

The team at Larson Acres says dairy farming is about producing high-quality milk, but it's also much more than that. It is about doing what's right for the families in the community, the animals and the environment.

CALF MANAGEMENT TIMELINE:

DAY 1: One gallon of colostrum is fed to calves in the maternity pen. Calves are placed in individual pens in a nursery barn and paste dehorned.

DAYS 2-42: Calves are fed pasteurized whole milk three times per day in buckets. A starter grain is introduced at day four.

DAYS 42-48: Calves are transitioned to weaning through once per day feedings. A divider between two calves is removed and the calves are introduced to their first pen mate.

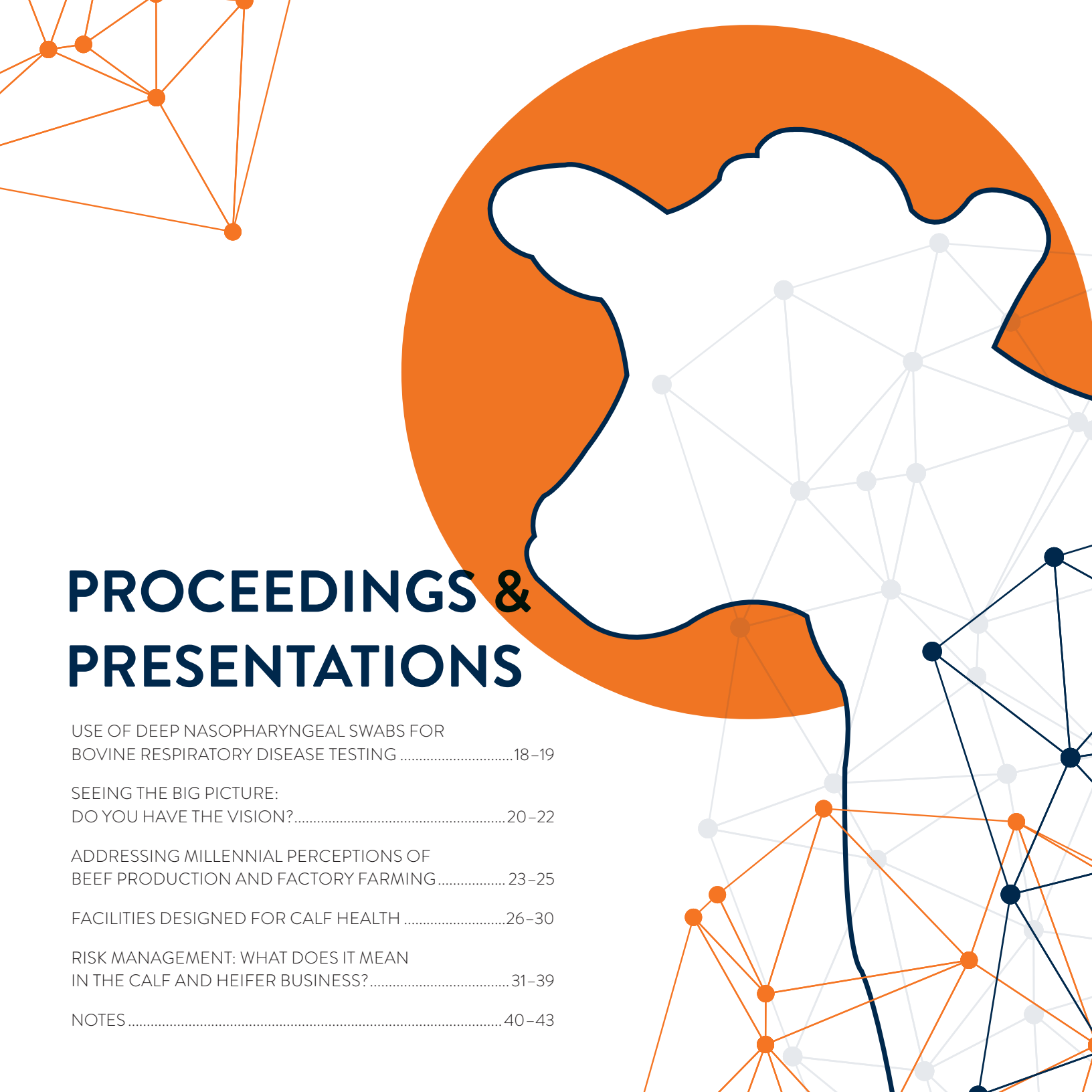
DAYS 49-55: Calves are completely weaned and remain with their first pen mate to minimize stress of the transition.

DAYS 56-90: Calves are moved to a group facility and transitioned to groups of eight. Starter grain is continued to be offered.

DAY 90: Calves are moved into groups of 16 and transitioned to a total mixed ration.

WHAT YOU'LL SEE:

- **Calf facilities:** Four nursery barns and a calf facility for 2-5 month old calves provides a nourishing and safe environment for calves. Nursery barns are operated as all-in, all-out facilities.
- **Sand and manure separation:** An on-site sand separator helps recycle sand for use as bedding and reduces the amount of truck traffic. During the expansion, the Larsons added an additional separator which saves more than 13,000 tons of sand and approximately 2,250 gallons of diesel fuel every year.
- **Transition and maternity facility featuring cross-ventilation:** A portion of the new cross-ventilated barn houses dry cows, heifers two months from calving and transition animals. Cross-ventilation pulls water-cooled air across the width of the barn which provides consistent temperatures year round, better fly and bird control, improved air quality and increased cow comfort. Transition cows are grouped by first-calf heifers and cows, then by due date. Prior to calving, cows are moved to individual maternity pens to allow for better monitoring and a smooth, safe delivery.



PROCEEDINGS & PRESENTATIONS

USE OF DEEP NASOPHARYNGEAL SWABS FOR BOVINE RESPIRATORY DISEASE TESTING

D.C. Sockett DVM, MS, PhD

Diplomate ACVIM

Wisconsin Veterinary Diagnostic Laboratory

University of Wisconsin

INTRODUCTION

Deep nasopharyngeal swabs have been validated as a viable alternative to trans-tracheal wash or bronchial-alveolar lavage in cases of bovine respiratory disease and are superior to nasal swabs especially for *Mycoplasma bovis*.[1,2] The technique is simple and safe to perform and is very reliable.

MATERIALS REQUIRED FOR SAMPLE COLLECTION AND SUBMISSION:

Double Guarded Culture Swab (33 inch length): For bacteriological culture, one swab is required for each animal sampled. If the submitting veterinarian wants both bacteriology and virology testing done then two swabs are needed for each animal sampled.

Bacterial Transport Media:

M6® Viral Transport Media

WVDL General Submission Form: An electronic copy is available at www.wvdl.wisc.edu. Click on the forms link to download the submission form. The forms can be filled out either manually or electronically.

The double guarded culture swab, viral and bacterial transport media can be purchased from the Wisconsin Veterinary Diagnostic Laboratory Madison (WVDL), WI. Telephone 608-262-5432. Allow sufficient time (3-5 working days) for delivery of the kit. The cost of the bacterial sampling kit which includes six double guarded culture swabs and bacterial transport media is $30.00. The cost of the viral sampling kit which includes six double guarded culture swabs and viral transport media is $45.00. The cost of the bacteriology/virology sampling kit which includes 12 double guarded culture swabs, six bacterial transport media and six viral transport media is $65.00. In addition to the cost of the kit, the WDVL will also charge for the shipping costs as well.

Livestock producers can purchase a kit with a valid credit card. The cost of the kit does not include the testing costs. Pharyngeal swab samples must be submitted to the laboratory by a licensed veterinarian. Testing will not be done unless the WVDL receives a completed General Submission Form that is signed by a veterinarian. Livestock producers should coordinate the collection of samples with their herd veterinarian.

COLLECTION PROCEDURES:

Veterinarians should plan on sampling 4–6 animals during an acute outbreak of respiratory disease. If at all possible, samples should be collected **before** the onset of antimicrobial treatment. Samples **must be chilled within 1-2 hours of collection**.

1. Restrain the animal's head. The animals head **cannot** move. Movement of the head can cause the swab to **break off** in the pharynx.
2. Clean the nostrils with a clean, disposable cloth.
3. Measure the distance from the nostril to the medial canthus of the eye.
4. Remove the twist tie from the culture swab.
5. Insert the 33 inch double guarded culture swab into the **ventral** meatus of the nose and advance it the pre-measured distance from the nostril to the medial canthus of the eye. Swabs placed in the dorsal meatus of the nose cannot advance far enough to obtain a deep pharyngeal sample.
6. Retract the culture swab approximately 1-2 inches.
7. Push the inner blue PVC swab sheath through the end of the outer clear PVC tube.
8. Push the cotton-tipped polystyrene swab through the blue PVC swab sheath for a distance of roughly 1-2 inches. Vigorously rotate the swab against the pharyngeal mucosa for **30-45 seconds**
9. Retract the cotton tipped swab into the blue PVC swab sheath
10. Remove the entire double guarded swab from the animal's nose.
11. Using a clean pair of scissors cut the cotton tipped swab roughly **5-6** inches from the tip. **Do not cut the swab too short;** short swabs are difficult to remove from the transport media. Place the swab in the bacterial transport media. **Make sure the cotton-tipped swab is fully immersed in the black transport media**.
12. Repeat the procedure with a different double guarded culture swab in the other nostril. Cut the cotton tipped swab roughly 4-5 inches from the tip. Place the swab in the viral and *Mycoplasma bovis* transport media.

Label all the transport media legibly with the animal's identification number or name. Please make sure the animal's I.D. matches exactly the I.D. on the WVDL General Submission Form.

If the samples cannot be shipped immediately, they should be temporarily stored at 4 °C. Maintaining swabs at 4 °C instead of at room temperature increases the recovery rate of bacterial pathogens from diagnostic samples.[3,4]

SHIPPING REQUIREMENTS

Completely fill out the WVDL General Submission Form. The form can be filled out either manually or electronically. For bacteriology, request the bovine respiratory disease panel which includes *Mycoplasma* spp. For virology, request the bovine respiratory disease panel. The panel includes real time PCR testing for IBR, BVD, BRSV and respiratory corona virus.

Send the samples **overnight** with a sufficient number of ice packs to ensure they remain cold during shipment to the laboratory. The laboratory should receive the samples no later than 24-36 hours after collection.

If possible, clients should schedule shipments to avoid weekend and holiday delivery of samples to the laboratory.

REFERENCES

1. Godinho KS et al. 2007. Use of deep nasopharyngeal swabs as a predictive diagnostic method for natural respiratory infections in calves. Vet Rec 160: 22-25.
2. Thomas A. et al. 2002. Comparison of sampling procedures for isolating pulmonary mycoplasmas in cattle. Vet Res Comm 26: 333-339.
3. Rishmawi N et al. 2007. Survival of fastidious and nonfastidious aerobic bacteria in three bacterial transport swab systems. J Clin Microbiol 45: 1278-1283.
4. Perry JL 2001. Effects of temperature on fastidious organism viability during swab transport, abstr. C-55, p.51. Abstr 101st Gen Meet Am Soc Microbiol, Orlando, Fl.

SEEING THE BIG PICTURE: DO YOU HAVE THE VISION?

Thomas Fuhrmann, DVM

DairyWorks Management Systems

Tulare, CA

Calf ranches, veal operations and calf-rearing departments of dairies share similar goals: produce a healthy, rapidly growing animal that is productive and profitable for veal or beef slaughter or for a dairy herd replacement. While many variables contribute to producing that productive animal, three factors calf operations managers should consider include: management capacity of the operation and its staff; health maximization and optimizing animal welfare principles.

MANAGEMENT CAPACITY OF REPLACEMENT OPERATIONS

Calf operations managers implement three basic management strategies: 1) organize work; 2) train, motivate and discipline workers; and 3) monitor results. All management efforts are predicated on the unique needs of the baby or adolescent animal; work must be organized to benefit the animal rather than focusing on what is easiest for the work staff. Workers need be focused on the unique requirements of an animal that is highly susceptible to health risks and growth requirements. Monitoring the details of growth, health and cost-effectiveness of these strategies is crucial on operations that realize product delivery to their customer only after significant capital outlay.

Organizing work must be accomplished with two goals: maximum productivity and efficiency. Three critical areas for organizing work are the colostrum delivery program, application of health programs and implementation of feed management programs. In each of these three critical areas, organizing how work is performed is the "practice" which is the sequel to the "principle". For example, the *principle* of feeding colostrum is to provide sufficient antibodies and nutrients to compensate for their absence of these in the newborn. The *practice* is accomplished in a variety of work systems that feed 2 – 4 liters of colostrum at one time by either suckling or direct feeding with an esophageal tube. Devising a specific work system is the manager's responsibility and depends upon facilities, climate, the manager's goals and the workers' competencies.

Training workers after the work system is developed is critical to attaining maximum productivity and efficiency. Managers or supervisors train workers through a three step process: describe, demonstrate and coach the worker as he/she does the work. Hands on calf managers are very good trainers; they train by doing and then permit their staff members to participate and learn on the job with their supervision.

Managers of calf operations need to develop the appropriate monitoring parameters that are unique to calf operations. Good managers set specific goals and monitor performance frequently. For example, monitoring colostrum delivery is best done by measuring total protein levels in calves 3 – 5 days after birth by obtaining a blood sample and using appropriate calf-side testing technology to measure protein (which is indirectly correlated to antibody levels). Monitoring health programs requires compiling, analyzing and interpreting data on death loss and health treatments. Feed management monitoring can be done by measuring daily weight gains but requires appropriate animal weight determination at birth and at periodic times throughout the animal's growth cycle. In all cases, monitoring should verify that work systems and worker performance are acceptable. If not, work systems need be adjusted or workers need retraining.

HEALTH RISK MANAGEMENT

Disease impacts not only death loss and medicinal costs, but chronic disease produces poor quality replacements and lower profitability for both the grower and the customer. With increasing consumer concern regarding animal drug residues entering the food chain and because animal health products add significant expense, minimizing the use of animal medications to only those that are essential and justifiable is a prerequisite and a goal for dairy calf and heifer operations owners and managers.

Baby calf health risks are minimized when adequate colostrum is fed to newborns. When colostrum feeding is controlled, baby calves normally require minimal vaccination, treatment or prophylactic care if raised in a clean, well-ventilated and comfortable facility and if they are fed properly. If very young calves are purchased with an unknown history of colostrum feeding, management to minimize health risk might include vaccination and prophylactic

use of medicinals in addition to good feeding practices.

Whether baby calves are raised in groups or in individual hutches, weaning and moving calves to group pens posses significant risk for respiratory disease. Moving and regrouping management strategies such as sorting calves by size, forming smaller groups of calves (10 – 12 calves per pen for 2- 4 weeks) and training calves to eat and drink in their new environment reduce stress that increases susceptibility to respiratory pathogens. Vaccination programs designed with your veterinarian are almost always beneficial and cost effective for animals in this age group. Feed management and rations formulated to promote 2 lbs/day weight gain almost always support immune defense mechanisms such that disease susceptibility is low.

Respiratory pathogens common in the calf's environment are generally controlled by good management practices so the relative risk for pneumonia is low. The one exception is pneumonia caused by Mycoplasma species; this disease is worth describing in more detail.1

Mycoplasma bovis has been identified as a common pathogen in the lungs of dairy and beef animals afflicted with pneumonia. However the organism also can be isolated from the lungs and upper respiratory tract of cattle without clinical symptoms of disease. While the organism can be present in bulk tank milk on some dairy farms, *M. bovis* has been isolated in nasal swabs of calves from both diseased and nondiseased herds suggesting that consumption of contaminated milk is not the only (or presumably not the major) source of calf exposure. The organism can be cultured in sand bedding and dirt lots on dairies where it can persist for months and it seems plausible that animals of all ages are susceptible to exposure to the organism in their normal environment. Once exposed, *M. bovis* commonly resides in the upper respiratory tract and is transmitted from animal to animal via aerosols, contact, water, feed and housing.

Respiratory disease can occur at any age. Signs of disease may be subtle and variable and include increased respiratory rate, coughing, nasal discharge, inner ear infection (head tilt or purulent discharge from the ear) and in limited cases, joint swelling and lameness. Because clinical signs for mycoplasma pneumonia are not different from those of other bacterial or viral infections, identification of *M. bovis* as the primary pathogen in groups of calves with pneumonia requires complex diagnostic testing early in the course of disease to be certain that other pathogens (e.g. bovine respiratory syncitial virus, Pasteurella multocida, Mannheimia haemolytica) are not the initial and primary cause. Your veterinarian should become involved when outbreaks of respiratory disease occur that do not respond to normal preventive and treatment programs. Sacrificing animals early in the disease on which specific tests can be performed can be a crucial step to correctly diagnose Mycoplasma pneumonia.

Because of the unique characteristics of this disease, identification of *M. bovis* as the primary pathogen in respiratory outbreaks is necessary to initiate appropriate preventive and treatment programs. *M. bovis* is neither a bacterium nor a virus; commonly used vaccines and antimicrobial medicinals are of limited value. Most antimicrobials currently approved in the United States for use in treating BRD do not include efficacy data or approval for use against *M. bovis*. Veterinary involvement is essential in developing a strategy to treat infected animals since early intervention, appropriate selection of an antimicrobial, duration of treatment and metaphylactic (strategic treatment of cattle at high risk) use of medicinals is critical and restricted to use by veterinarians. Even though bacterins (commercial or autogenous) are licensed for marketing in the US, no data demonstrating clinical efficacy are available. In fact field studies in calves infected with *M. bovis* prior to vaccination identified increased disease severity after vaccination.

Controlling mycoplasma pneumonia in young calves is best done by implementing excellent calf management strategies. First and foremost is maintaining a clean, dry and well-ventilated environment for all calves. Second, providing a nutrient rich diet along with a feeding management program is essential not only for good growth rate but also to stimulate development of immune response to respiratory disease. Finally, establishing health programs with your veterinarian to minimize respiratory disease risk from bacterial and viral diseases is critical. When non-responsive respiratory disease persists, appropriate intervention to apply *M. bovis* diagnostic and treatment specific processes is required.

ANIMAL WELFARE MANAGEMENT CONSIDERATIONS

Threats of animal welfare activist groups against animal agriculture are well documented. These pose significant risk to individual operations and potential harm to the entire animal agriculture industry.

1. From: "***Mycoplasma bovis*** Infections in Cattle": ACVIM Consensus Statement. J Vet Intern Med 2011;25:772-783

Heifer replacement operations owners and managers have two distinct options to ameliorate risk. One is to be protective, defensive and cautious of whom they permit to enter and work on their premises. Managers who choose this option even when there is nothing to hide, expend considerable energy and expense into programs to reduce exposure that could be judged or misconstrued to demonstrate perpetuities against even the best welfare of their animals. A second option is to elevate the standards of animal and personnel management to a level acceptable to animal industry standards, to consumers and to those who promote animal welfare principles.

Management principles to organize work, train workers and monitor results to improve standards were described earlier. Within the context of implementing these principles for animal welfare, consider the following two scenarios:

Scenario 1

With appropriate animal health and safety precautions, visitors are allowed into a heifer replacement facility. They identify no significant animal welfare concern; or concerns are explained through clarifying each standard operation procedure (SOP) or protocol developed with the appropriate animal welfare principles as its basis. The operations manager and staff are focused on routine work; there is no additional pressure and it is "business as usual".

Scenario 2

An animal welfare concern is identified and allegations made. The operations manager identifies that a worker followed a prescribed protocol, but acknowledges the need to change that protocol and does so immediately. Or the manager identifies that a worker did not follow a correct, prescribed protocol and retraining (or other appropriate disciplinary procedure) is undertaken.

According to either scenario, animal welfare issues are a significant component of the management strategy of the owner, manager and staff. Management principles are in place and animal productivity is at the heart of implementing animal welfare principles.

SUMMARY

The basis for baby calf and heifer replacement operations owners and managers to be productive and profitable is to understand and implement management principles. Designing health management programs are critical to reduce losses from health risks, especially the risk of respiratory disease due to mycoplasma infection. And as animal welfare critics target the animal agriculture industry, owners and managers of dairy calf and heifer operations can reduce the risk of attacks on their businesses by incorporating animal welfare principles into their animal and staff management programs.

NOTES

ADDRESSING MILLENNIAL PERCEPTIONS OF BEEF PRODUCTION AND FACTORY FARMING

by Rick Husted

MBA, Vice President-Strategic Planning and Market Research

Presented by Chase DeCoite, National Cattlemen's Beef Association

SUMMARY

Millennials are concerned about factory farming in relation to beef production in the U.S. While generally uninformed and lacking familiarity, they are still able to identify specific aspects of the beef production process that concern them most, including inhumane/crowded conditions, food borne illness, hormone use, GMO's and disease. Further, Millennials tend to associate the entire beef process with factory farming rather than singling out specific stages like feedyards, packing plants or cow/calf operations.

When it comes to addressing these concerns, fact-based stimuli presented in a visually appealing, credible format work best. While other stimuli like articles and blogs are also effective, the research found that a narrated video, showing the entire beef production process, resonated most with Millennials and most effectively addressed concerns. Additionally, Millennials are most likely to seek this type of information online and consider sources like the FDA, USDA, academics, family farm owners and veterinarians to be most credible.

BACKGROUND

Consumers have varying degrees of interest in knowing where their food comes from and how it is produced or raised. With increasing online access to this type of information, consumers are much more readily finding "answers" (factual or otherwise) to food-related questions. Given advancements in the ability to communicate broadly and find information quickly, activists have become much more adept at spreading propaganda that can negatively impact perceptions of agriculture and related production practices.

One theme that encompasses many of the concerns related to beef production is what takes place at the feedyard, or "factory farm." According to one checkoff funded market research effort, feedlots/feedyards are either not understood or perceived negatively. Out of concern that these perceptions could have a lasting negative impact on consumer confidence, the beef industry needs to consider being more proactive and transparent when communicating the facts about the beef production process.

RESEARCH PURPOSE

The purpose of this checkoff funded research was to understand perceptions of the beef production process and identify effective means of communicating to Millennial consumers about main concerns related to the process, the feedyard and factory farming. A two-phased approach (i.e., qualitative followed by quantitative) was used to gather these insights from Millennials, who were the focus of the study based on their importance to the future of beef consumption.

CONCLUSIONS

Understanding Millennial Perceptions

Knowledge of the beef production process, feedyards and factory farming is very limited. One-in-four Millennials are familiar with the beef production process and only 17% are familiar with feedyards. Further, while Millennials have heard of factory farms, familiarity is very low. Top concerns related to the entire beef production process include inhumane/crowded conditions for cattle, food borne illness, hormone use, GMO's and disease.

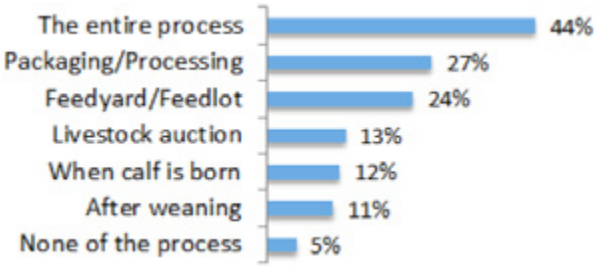
See research conclusions on next page

Which one item is most concerning to you in relation to beef production? (Top five listed)

Animal abuse/inhumane treatment	17%
Food borne illnesses (E.coli)	16%
Hormone use	13%
Genetically modified organisms (GMOs)	12%
Mad cow disease (BSE)	12%

Roughly one-third of millennials are concerned (extremely/very) about factory farming and when defining it tend to associate the entire beef production process with factory farming rather than any individual stage or activity.

Which part(s) of the beef production process do you most associate with factory farming? Select all that apply.



While clearly not unanimous, this insight implies that simply addressing a single aspect or two of the beef production process will not fully address Millennial misperceptions about factory farming.

Exploring Millennial Reaction to Stimulus

Once general perceptions about factory farming and the beef production process were assessed, Millennial's were exposed to stimuli communicating information in a variety of formats to determine which, if any, would most positively impact perceptions and/or concerns about beef production.

The results to this exposure found that information carrying fact-based messages about the overall production process, packaged in an engaging, visual manner, were most effective at improving Millennial perceptions. While all stimuli had a positive impact on Millennial perceptions, the most positive treatment was a short video that used a narrator and examples to communicate the facts about the entire beef production process, from cow-calf operations through the channels, ultimately reaching the consumer.

The treatments, which also included two articles, a blog and a myth-specific video, all improved perceptions about concerns specific to the beef production process (e.g., inhumane treatment, hormone use, etc.). Results also showed a considerable increase in positive perceptions of factory farming (i.e., accepting, hopeful, trusting) and a considerable decrease in negative perceptions of factory farming (i.e., suspicion, worry and uncertainty). Again, the narrated video was most effective at eliciting improved perceptions about specific aspects of beef production and factory farming.

How concerned are you about the following items in relation to beef production? (Narrated video)

Very/Somewhat Concerned	Pre-Stimuli	Post-Stimuli	% Point Improvement
Food borne illnesses	63%	50%	13
Inhumane treatment	63%	47%	16
Hormone use	60%	45%	15
What cattle are fed	60%	41%	19
Genetically modified organisms	57%	41%	16
Crowded conditions	53%	42%	11
Antibiotics	51%	41%	10

Regarding the most effective stimulus, the narrated video, millennials had this to say: The main message to me in the video is that there are regulations in place to prevent mistreatment of

animals and the spread of diseases. The beef is carefully cared for and produced with the consumer in mind. I am somewhat relieved to know that the cows have access to fresh air, clean water and food.

PREFERRED SOURCES OF INFORMATION

Millennials are most likely to get information about the beef production process from the internet search engines (47%), television news channels (39%), online news sources (35%), special TV programs (32%) and food and health blogs (31%). Regarding credibility, Millennials state that the following are most credible when it comes to receiving information about the beef production process.

Thinking about sources from which you may receive information about the beef production process, how credible do you believe the following are? (Top five listed)

Source	Extremely/Very Credible
A researcher/academic, such as a Ph. D.	56%
USDA	51%
A family farm owner	51%
A veterinarian	51%
FDA	50%
A human health or medical professional	50%

ADDITIONAL RESOURCES

2014 Millennial Perceptions of Beef Production 1

Tags: Beef Issues Quarterly,Research Findings,Winter 2014,Year in Review 2014

NOTES

FACILITIES DESIGNED FOR CALF HEALTH

Ken Nordlund, DVM

Emeritus Clinical Professor

School of Veterinary Medicine,

University of Wisconsin-Madison, USA

For over some twenty years, our clinical group has investigated calf health problems in dairy herds across the United States. In 2004, we conducted a research trial to explore the air quality in naturally ventilated calf barns and to study the factors associated with reduced prevalence of calf respiratory disease1. In the past 7 years, our clinical service has designed hundreds of positive pressure ventilation systems for a wide variety of calf barns. Most have been installed to supplement naturally ventilated barns, but others have gone into in a variety of barn types. From this perspective acquired from a vast number and variety of calf barns, we have developed preferences for certain design features that are associated with improved calf health. We view the well-managed individual calf hutch as being the optimal housing for a calf, but it can be a brutal environment for the calf caretakers. With careful design and management, we believe that calf barns can equal hutches as excellent environments for nursing calves.

FEATURES PREFERRED IN BOTH GROUP AND INDIVIDUAL PEN BARNS

Space per calf or calf pen

Provision of sufficient space per calf is the single most important determinant of air quality in a calf barn. Based upon airborne bacterial density studies1, we have recommended that calf pens should provide a minimum of ~30 square feet (2.8 square meters) of bedded area per calf. We have clinical experience with repeated failures to successfully ventilate calf pens that provide 15 square feet (1.5 square meters) per calf.

Bedding in cool weather

Deeply bedded resting surfaces are critical for very young calves in cold weather. The thermoneutral zone of newborn calves is 50-78°F (10-26°C), but drops to 32-73°F (0-23°C) by one month of age[2]. A newborn calf lying on top of a bare floor at 45°F (7°C) will lose core body temperature without some thermal support. Deep bedding allows the calf to build up a layer of heat within the bed and minimizes heat loss. We developed a scoring system to evaluate the sufficiency of bedding called "Nesting Score"[1]. It is a simple visual evaluation of the visibility of the rear leg of a calf lying down in the bedding. If the entire leg is visible, it is scored as Nesting Score 1. If partially obscured by loose bedding, it is Nesting Score 2. If the rear leg is completely obscured by bedding, it is Nesting Score 3.

Provision of sufficient bedding is an important factor in preventing respiratory disease in cold weather. It is our opinion that calf blankets are equivalent to approximately one unit of Nesting Score. In other words, provision of Nesting Score 2 plus calf blankets is approximately equal to Nesting Score 3 without blankets. While Nesting Score 1 is satisfactory during warm weather, the addition of calf blankets to a Nesting Score 1 surface does not appear to achieve the desired level of thermal support.

Drainage below bedding

To maintain a deeply bedded surface, it is critical that the pen has good drainage so that urine, spilled milk and water can move out of the pen rather than soak the bedding. Excellent drainage has been achieved using a tiled gravel bed approximately 1.5 feet (0.5 meters) deep below the bedded area. The area should be fitted with drainage tiles leading to a collection area outside of the calf barn. With this base, operators typically report that the straw usage to maintain an equivalent bed is half that used to maintain beds over a concrete surface. The tile is covered with gravel and bedding is applied on top of the gravel. Sand is to be avoided as the straw bedding becomes churned into the sand as calves walk on the surface.

Recently, some producers are experimenting with deep straw bedding placed over traditional slatted flooring, allowing urine and water to drain quickly from the bed. While we have little experience with the technique, it would appear to accomplish a similar end.

If the surface below the bedding must be solid concrete, three issues must be addressed through floor slopes. First, the floor needs to be sloped to move liquids out of the pen as efficiently as possible. Second, liquids move from the pen should not move into an area exposed to the foot traffic of the calf caregiver. Third, it needs to prevent water

used in service alleys from draining into the pen and bedding. This can be accomplished with a crowned central work alley and a gutter at the immediate front of the calf pen. The pen itself can be sloped toward the front of the pen, or it could be sloped to the rear of the pen with a second drainage gutter at the rear. Drainage gutters would be designed to carry liquids to collection points outside of the building.

Multiple smaller barns that allow for "all-in, all-out" groupings, allow for complete cleaning and down-time between uses

We have developed a strong preference for multiple, smaller barns compared to large capacity single units. The optimal system appears to be four or more individual calf nurseries that allow for "all-in, all-out" management systems. With four separate barns, each single barn is filled with newborn calves over a 2½ week period. At an average age of 7 weeks, the entire group of calves in the barn are weaned and moved to another space. The entire barn can be dismantled, cleaned, and allowed to dry for several days before being re-assembled and used again.

There are at least two significant benefits from the practice. First, young and vulnerable calves are not directly exposed to older calves that may be shedding infections pathogens. Second, the ability to clean and let a barn dry out for a week between uses appears to be a powerful tool in breaking infectious disease cycles.

Natural ventilation with supplemental positive pressure tube ventilation

Natural ventilation has obvious advantages in that natural forces are used to ventilate buildings, reducing costs for both fans and electrical power. Natural forces include wind moving against and over buildings and thermal buoyancy of warmed air rising inside a building. However, natural ventilation has a number of shortcomings, especially in calf housing. Sometimes, the winds are still. Wind roses that summarize wind conditions are available for most parts of the country and can be accessed through the USDA at the following website:

http://www.wcc.nrcs.usda.gov/ftpref/downloads/climate/windrose/

When the wind is still, naturally ventilated barns are dependent upon thermal buoyancy for ventilation. Unlike adult cows, calves do not generate sufficient heat to effectively warm the air that surrounds them and natural ventilation becomes insufficient.

Further limitations of natural ventilation occur when outside air is warmer than the air inside the barn, a situation that occurs for a period of several hours almost every day as the sun warms the air outside the barn more quickly than inside. During these periods of time, air entering the cooler interior of the barn through eaves will rise and leave the barn without good mixing near the floor.

Translucent panels in the roof can allow the barn to accumulate heat more quickly as the southerly sun ascends during winter months, but they must be mounted on relatively vertical southerly walls so that they do not become a source of excess heat during the summer.

Because of these occasional limitations, we have advocated the use of positive pressure tube ventilation systems to supplement natural ventilation of calf barns.

The supplemental positive pressure tubes systems are usually sized to provide four changes of interior air per hour. This ventilation rate assumes a "normal" stocking density and was recommended as the minimal winter ventilation rate by Bates and Anderson3. The tube fan never stops, running 24 hours a day and 365 days per year. If designed properly, the tube systems will deliver fresh air without a draft into microenvironments within the calf barn. The air introduced through the tubes is distributed around the barn and then exits passively through the typical ridge and eave openings.

During the coldest period of the year, the sidewalls of the barn can be closed except for the eaves and ridge opening. As the weather warms, the sidewalls are opened more and more to allow winds to enter the barn. In hot weather, the sidewalls are completely opened. With opened sidewalls in windy conditions, the fresh air exiting the tubes gets carried away by the winds entering the barn. While the tubes are not effective in these conditions, it is generally believed that it is preferable to simply let the tube fan run continuously rather than stopping and starting the tube fans depending on outside wind conditions.

Concerns are frequently raised about whether the tube fans should be shut down in cold weather. We had an opportunity to compare winter temperatures between two identical naturally ventilated calf barns on the same dairy, one with a supplemental tube system and the other without. Over a two week period, the average temperatures were identical at 23°F (-5°C). However, the barn with the tube would usually get 2°F (1°C) colder during

the middle of the night and 2°F (1°C) warmer during the middle of the day. The tube system results in a modestly higher ventilation rate that causes the barn interior to track slightly more closely with the outdoor ambient temperature, both up and down.

Typical systems are relatively inexpensive and require modest electricity for operation. For example, a tube system in a 100 ft x 35 ft (30 m x 11 m) calf nursery might require a single 20-inch (50 cm) fan. Depending on materials chosen, the fan and tube might cost $1,000 plus system design, installation and wiring bringing the total to approximately $2,000. The 20-inch (50 cm) fan may consume 500 watts or 0.5 kWh of electricity, which would yield 12 kWh per day or 4,380 kWh per year. If electrical costs are $0.10 per kWh, the annual electrical costs would total $438 per year.

The reported benefits have been remarkably consistent. We have designed literally hundreds of supplemental tube systems and the expected comment from the owners is a substantial reduction in the number of calves with respiratory disease, usually reporting reductions of 50 to 75 percent. In addition, calf barn workers report that floors dry out more quickly and that odor is reduced inside the barn.

Many times people say that "yeah, we had tubes like that in the seventies." Yes, they may have had the same fan and a polyethylene tube, but these are a new generation of tube systems. In the traditional tube system, the fan and tube were recirculation devices designed to mix air and equalize temperature within a barn. Typically, the tube fan would be located about a meter inside the barn wall and near an intake louver. The discharge holes were usually located to discharge air straight out to the sides at the 3:00 and 9:00 o'clock positions and the diameter of the holes was of minimal concern. While these systems were effective in equalizing temperature within the space, they also recirculated pathogens within the barn. This is not what we are recommending!

The "New Generation" tube systems will distribute small quantities of 100% fresh air from outside the building into the microenvironment around the calf without a draft. Said again, small quantities of fresh air to the calf without a draft!

The fans are mounted in an exterior wall. The fan or fans are chosen to change the interior air within the barn approximately four times per hour. There will be one fan and tube for approximately every 25 to 30 feet (8 to 10 m) of building width with the tubes running parallel to the length of the barn. There are general recommendations to limit the length of individual tubes to a maximal length of 100 feet (30 meters), we have monitored excellent performance of tubes of more than double that length. The diameter of the tube relative to the capacity of the fan is critical. Almost always wider than the fan on which it is mounted, the tube should be sized so that the calculated velocity of air in the inlet portion of the tube is less than 1,200 feet per minute (6.2 m/s)[4]. Tubes that do not meet this guideline will usually suffer from very unequal air discharge along the length of the tube.

The tubes can be made of a variety of materials that range from very inexpensive clear polyethylene, moderate cost woven polyethylene or vinyl, and relatively expensive PVC or drainage pipe. Each material has advantages and disadvantages related to cost, durability, and flexibility in options for discharge hole sizing and location. We find the best overall value in the moderately priced woven polyethylene tubes that are supported with double-cable supports on each side of the tube. These tubes cost between $5 to 12 per linear foot ($16 to 40 per linear meter), depending largely on diameter of the tube.

The diameter and spacing of the holes are designed specific to each installation. The fundamental requirement is that the tube delivers fresh air to the calves without creating a chilling draft. The technical terms are "throw distance" to "still air." Still air is defined as air moving at a speed of less than 60 feet per minute (0.3 m/s) or less than a foot per second[2]. The throw distance of air from a tube is determined by the static pressure inside the tube and by the diameter of the holes or perforations in the tube[4]. At a given static pressure, air exiting a larger diameter hole will travel further than air exiting from a small hole.

The desired throw distance will be determined by how high the tube is located above the floor and how far to the side the air needs to travel. Our guidelines are to achieve "still" air at a point approximately 4 feet (1.2 meters) above the floor. The location of the discharge holes are specified by clock positions such as 5:00 o'clock and 7:00 o'clock, or 4:30, 6:00, and 7:30 o'clock, depending the height of the tube and the desired width of the throw pattern. The throw distances to desired points of still air are calculated using trigonometry, and the diameters of the discharge holes are sized based upon these distances and the estimated static pressure within the tube.

These calculations require the use of principles of fluid mechanics that are beyond the scope of this paper. Training sessions to operate a spreadsheet used to design these systems are

offered periodically through the Dairyland Initiative series of workshops < https://thedairylandinitiative.vetmed.wisc.edu/>.

Minimal solid sidewalls limited to approximately 2 ft (70 cm) height

To optimize natural ventilation in warm weather, we prefer a minimal solid sidewall for naturally ventilated calf barns of approximately 2 feet (60 cm) above the floor. During warm weather when the sidewall curtains are fully open, the low sidewall allows wind to move directly into the calf pens and maximize ventilation. However, the traditional sidewall of 3-4 (1-1.25 m) feet high may prevent winds from reaching the calf pens, particularly if the air temperature of the wind is higher than the interior temperature of the barn. Especially problematic is when warm exterior winds pass over the high solid wall, fail to drop into the calf pen, but travel across the calf barn and carry away any fresh air emerging from a positive pressure ventilation tube. In this situation, the traditional high solid wall interferes with both natural and positive pressure tube ventilation.

If an existing barn has a traditional high solid sidewall, ventilation of the calf pens can be improved by mounting a "baffle-board" on the sidewalls to deflect winds downward into the pens. The baffle board can be as simple as a wide plank of 8-10 inches (20-25 cm) hinged to support posts, positioned just above the concrete sidewalls, and held on a downward angle using cables from the board to the rafters.

Features Specific to Calf Barns With Individual Pens

Calf barns with individual calf pens have some special characteristics for optimal calf health and comfort. These features include an East-West orientation, barns with 1 or 2 rows of pens, solid panels between each calf, and a walkway between the pens and the outside wall.

East-West Orientation

In larger group pens, the calves can move to shaded areas during mid to late afternoon. In contrast, a calf confined to a pen near an outside wall may be unable to find shade when the sun is relatively low in the afternoon sky. Therefore, it is important to orient barns with individual calf pens in an East-West orientation.

Narrow barns with 1 to 2 rows of pens

The overall rule is the narrower the barn, the better. Narrow barns are easier to ventilate by wind forces in warm weather. Our experience with supplemental tube systems is that when barns get wider than 40 feet (12 m), the owners frequently want to install additional mechanical ventilation for summer.

In addition, it is easier to limit the spread of disease from calf to calf in a longer narrow barn. In single-row calf barns, new calves are placed in freshly cleaned pens and there is usually a space between them and the oldest calves in the barn. In barns with two rows of pens, both rows can be filled simultaneously and parallel, similar to a single row, leaving the new arrivals in freshly cleaned pens with a few empties between them and the oldest calves about to be weaned. In barns with 3 or more rows, the situation is almost always present where vulnerable young calves are directly across a service alley from older calves that are potentially shedding pathogens.

The optimal situation is a series of four or more barns that allow for "all-in, all-out" management systems, as discussed in the general barn section above.

Individual calf pens separated 3 feet (1 meter) from outside wall

During periods of time when the temperature inside the barn is warmer than outside, air entering through the eaves will fall at relatively high "draft" speeds into calf pens adjacent to the outside walls. Because of this phenomenon, it has been a common practice in cold climates to place a cover over individual calf pens during the winter. However, our field study showed that a pen cover was associated with tremendous increases in total airborne bacteria counts which was a risk factor for respiratory disease[1]. While a cover can eliminate the draft, it also ensures that the air quality in the pen will become very poor. Neither the draft nor the cover is desirable.

The optimal solution is to separate the pen from the outside wall with a walkway about 3 feet (1 m) wide. There should be a solid vertical rear panel about 20-24 inches (50-60 cm) high between the calf and the outside walkway. Cold air can fall over the curtain and into the walkway without chilling the calf. If the outside walkway is impossible to install, an acceptable solution is to close the eave on the windward side and install a well-designed positive

pressure tube system that delivers four changes of air per hour on a non-stop basis. The pens will be ventilated sufficiently by the tube system and the curtain sidewall can be opened slightly for natural ventilation when the extreme conditions have passed.

Solid side panels with mesh panels on front and rear

In the field trial reported in Lago, et al., the prevalence of respiratory disease was reduced with lower airborne bacterial counts in the pens, by greater depth of loose bedding, and the presence of a solid panel between each calf. However, the solid panels between each calf tended to increase the airborne bacterial counts, a confounding finding1. Because of this finding, we have recommended solid panels between each calf and the use of positive pressure tube systems to deliver fresh air between the solid panels.

The optimal individual calf pen has solid side panels with relatively open mesh to the front and rear. The rear panel can have an open mesh on the upper portion with a solid base panel to a height of 2 feet (60 cm) as it provides a solid barrier that the calf may nest against in cold weather.

With the open front and rear panel, there is greater opportunity for breezes to move through the pens in warm weather when the sidewall curtains are open. Solid panels on all sides of a calf pen create extreme impediments to natural ventilation. We have done investigative work in open-sided calf barns during the summer where solid panels on all sides of the calf pen prevented prevailing winds from ventilating the pen, but the wind would pass over the top of the pen and carry away the air discharge from the positive pressure tube before it reached into the pen.

CONCLUSION

Our experiences in the past decade have shown us that calf barns designed and constructed using the techniques described in this paper can produce calves as healthy as those produced in hutches, and also improve the working conditions of the calf caregivers.

REFERENCES

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2. Wathes CM, Jones CDR, Webster A JF. 1983. Ventilation, air hygiene and animal health. Vet. Rec. 113: 554–559.
3. Bates DW, Anderson JF. Calculation of Ventilation Needs of Confined Cattle. 1979. JAVMA 174: 581-589.
4. Wells CM, Amos ND. 1994. Design of Air Distribution Systems for Closed Greenhouses. Acta Horticulture 361: 93-104.

NOTES

RISK MANAGEMENT: WHAT DOES IT MEAN IN THE CALF AND HEIFER BUSINESS?

Dr. Greg Bethard, Pagel's Ponderosa Dairy, Dairy Dreams & Rons Cheese

Risk Management: What Does That Mean in the Calf and Heifer business?

Greg Bethard, Ph.D
CFO
Pagel's Ponderosa Dairy, Dairy Dreams,
Ron's Wisconsin Cheese
Kewaunee, WI

Perspectives

Risk for heifer grower

Risk for dairy producer with heifers

Not a lot of great ideas here, just some thoughts

Assumptions

You like to make money

You don't like to lose money

You also like making more money than you are now

Probabilities are fun?

Business risks

Risk of losing money

Risk of losing equity

Risk of losing business

Risk of not making adequate return on capital

What is Risk?

Risk is personal and unique to each business and person

Most all decisions involve some element of risk

Definitions of Risk:

- 1. The possibility of suffering harm or loss; danger.
- 2. A factor, thing, element, or course involving uncertain danger; a hazard.
- 3. The danger or probability of loss to an insurer.

Where is there more risk?

"Low Equity"

- $1,000,000 in assets
- $400,000 in equity (40%)
- Net Income = $100,000
- ROI = 25%

"High Equity"

- $1,000,000 in assets
- $800,000 in equity (80%)
- Net Income = $100,000
- ROI = 12.5%

Can we calculate risk?

Probabilities allow risk to be quantified; it becomes a math exercise

Distribution must be known to calculate risk.

Examples of risks that can be computed…

50:50 Raffle is a random probability

Your risk is relative to # tickets you purchased relative to # tickets sold

Example – 100 tickets sold and you purchase 1:

- Probability of success is 1 in 100 or 1%

If you wanted to improve probability of success, purchase more tickets

Random Probability of an Event

$$\frac{\text{Number of Ways Event Can Occur}}{\text{Total Number of Possible Outcomes}}$$

Example: die has 6 sides, what is probability of rolling a 3

$$\frac{\text{Number ways to land on 3}}{\text{Total number of sides}} = \frac{1}{6} \ (16\%)$$

Heifer Probabilities

What is the probability of a heifer getting pregnant?

- Probability is not random, can be quantified by conception rate

What is the probability of a heifer getting a broken leg?

- A random probability

Random Probability of Independent Events

Example: What is probability of getting heads on the coin and 6 on the die?

Die: 1/6 = 16.6%

Coin: 1/2 = 50%

1/2 x 1/6 = 1/12 or 8%

Random Probability of Dependent Events

Example: card is chosen from a deck; a second card is chosen from the remaining deck.

What is probability that both are a king?

P (king on 1st pick) = 4/52 = 7.7%

P (king on 2nd pick if 1st pick is king) = 3/51 = 5.9%

P (both picks king) = 7.7% x 5.9% = 0.4%

Lottery Probability

49 balls to choose from

Winner must get 6

P of getting 1 number = 1/49 = 1 in 49

P of getting 2 = 1/(49x48) = 1 in 2352

- After 1st ball is chosen, 48 are left

P of getting 6

- = 1/(49x48x47x46x45x44)= one in 10 bil
- Given any set of 6 numbers, there are 6x5x4x3x2x1 possibilities or 720 orders that the balls could be in
- 10 billion / 720 = 1 in 10 million

What is the probability of Risk?

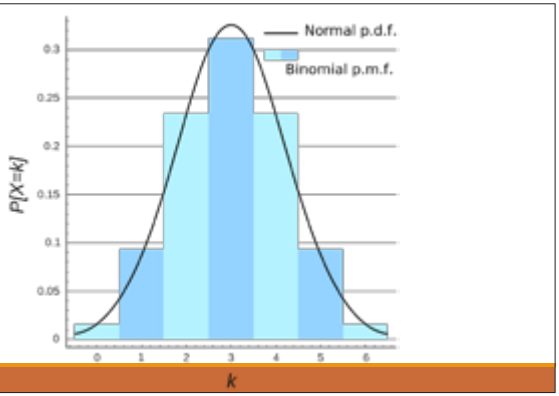
Coin Toss

Heifer/Bull

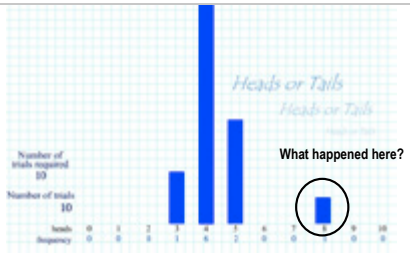
Binomial distribution

Probability = 1 in 2 or 50%

Source: Dr. Brian Perkins, Diamond V



10 coins flipped 10 times



What happened??

Did the coins not "work"?

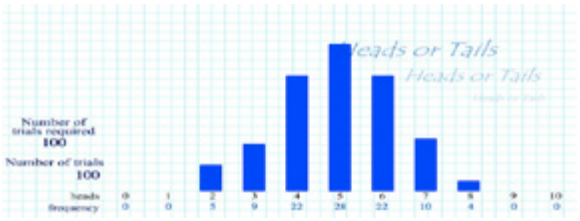
Was it the weekend flipper?

Did the weather affect the flipping?

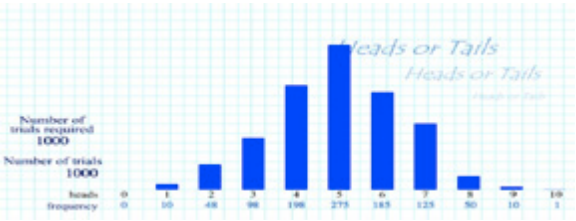
Well, what happened???????

We need an explanation!

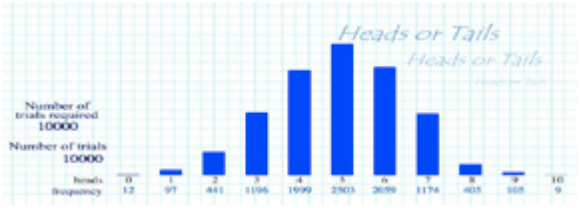
10 coins flipped 100 times



10 coins flipped 1000 times



10 coins flipped 10,000 times



What is the probability that a heifer will grow poorly?

Biological variables are presumed to have normal distribution or "bell curve"

Can define probability of poor growth, average growth, etc

Need to know average and standard deviation or standard error

Example: Heifer Growth Rates

Average = 2.0 lbs per day

Standard Deviation = 0.2 lbs per day

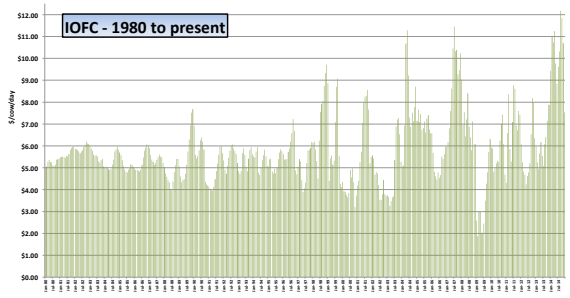
- 68% within 1 SD: 1.8 – 2.2 lbs/d
- 95% within 2 SD: 1.6 – 2.4 lbs/d
- 99% within 3 SD: 1.4 – 2.6 lbs/d

Individuals outside of 3 SD are outliners

The more you know about the population (more observations), the smaller the Standard deviation.

This is the classic trap for non-normal distributions.

Where is there more risk?



What is a Black Swan?

The Black Swan: The Impact of the Highly Improbable. Nassim Nicholas Taleb

Nobody sees it coming, but it has a monstrous impact.

Not Predictable

Seems clear in hindsight

We live in a world of the Bell Curve, and we think in Standard Deviation terms.
- This doesn't apply to financial Markets

Where are we vulnerable to Black Swans?

Distributions that are scalable
- Wealth vs height
- Rare events are not impossible
- The more data you get, the more unlikely an outlier (SD shrinks)

When we know a lot about what we know (knowledge) but *little about what we don't know*
- Turkey
- Library

The Events that impact distribution are complex, varied, and unpredictable

Population of 10,000

Height (non-scalable)
- 70 inch average
- Add 1 outlier, a 7.5 footer (90 inches)
- Average changes to 70.002

Outlier has little impact

Population of 10,000

Wealth (scalable)
- $100,000 average per person
- Add 1 outlier (Bill Gates) , worth $72 Billion
- Average changes to $7,299,270

Outlier has monstrous impact

What if we alter a non-scalable population? (n=10,000)

Height – 70 inch average

Each person grows 2 inches

1 Outlier grows 36 inches (Growth hormone)

Outlier represents 0.2% of total gain

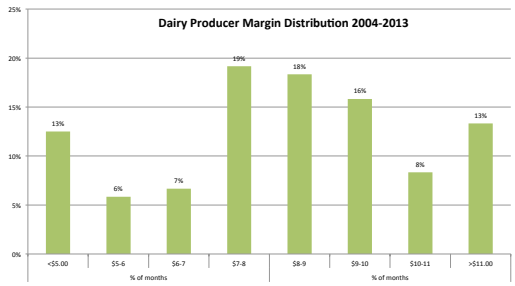
What if we alter a scalable population? (n=10,000)

Invest $100,000

Average gain is $20,000

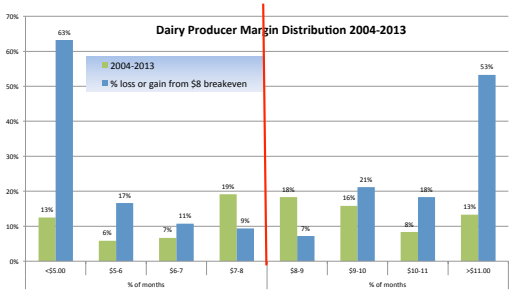
1 Outlier hits the lotto and wins $100 million

Outlier represents 50% of total gain



Green Bar: distribution

Blue Bar: % each increment represents of total gain or total loss assuming $8 breakeven



Hedging Strategy

Can your business absorb a Negative Black Swan? Typically only for a year.

Will you capture all of the Positive Black Swan?

What is your insurance?

- Insure against every nick and bruise?
- Or against a catastrophe?

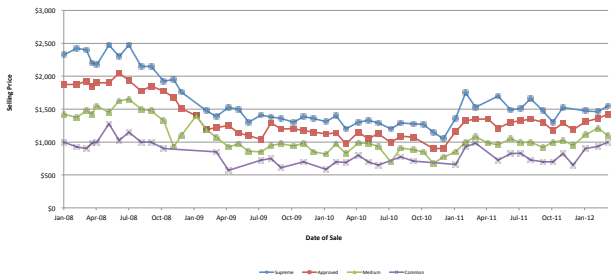
Milk Hedging Strategy

If a "really good" margin is there, take it

If your strategy involves out-guessing the market, it is doomed to average out.

An inexpensive Put Option will protect against the Negative Black Swan but capture all of the Positive Black Swan.

Risk Exposure from a Hedging Strategy



Controlling Risk by Hedging or Contracting for any business

Are there opportunities to hedge:

- Output (sales)
- Input (Supply chain)

Dairy Producer

Output

- Milk price

Supply chain

- Feed cost
- Heifer Herd: ability to replace dairy herd
- Fuel

Capital

- Depreciation or declining value
- Interest rate

"Best" risk strategy for Dairy Producer relative to heifers

Heifer herd is a hedge for cow flow

100-105% of milking animals allows 40-42% cull rate

Hedge Feed Prices

How many heifers do you need?

	Survival				
	70%	75%	80%	85%	90%
Cull Rate	Heifers needed <= 24 mo, % of milking cows				
30%	77%	75%	73%	73%	72%
32%	83%	80%	78%	77%	76%
34%	88%	85%	83%	82%	81%
36%	93%	90%	88%	87%	86%
38%	98%	95%	93%	92%	91%
40%	103%	100%	97%	97%	96%
42%	108%	105%	102%	102%	100%
44%	114%	110%	107%	106%	105%
46%	119%	115%	112%	111%	110%
48%	124%	120%	117%	116%	115%
50%	129%	125%	122%	121%	120%

Biological Risks to Dairy Producer

Biosecurity risks: custom grower vs closed herd

Quality of animals

Relative Risks – which have higher risk?

- Wet calves
- Weaned calves
- Open Heifers
- Pregnant heifers

Dairy Producer: Risk of using capital inefficiently

Do heifers make money for a dairy?

Risk of spending too much to raise heifer

Can you get someone else to raise them for a similar price?

Dairy Producer: Risk of using capital inefficiently

Example: You have a permit for 2500 animal units.
- If you don't have heifers you can milk more cows

Example: You have a limited amount of land to grow forage
- If you don't feed heifers, you can milk more cows

1000 milking cows, 200 dry cows, 1000 heifers,

Option to move heifers offsite and milk more cows

Animal Units
- Cows: 1200 x 1.4 = 1680
- Heifers 1000 x 0.8 = 800
- Total = 2480

2480 / 1.4 = 1771 x .80 = ~1400 milking

1000 milking cows versus 1400

$600/cow/yr marginal cows x 400 cows = $240,000/yr

Risk exposure to 1400 heifers
- Probability of disease, morbidity, mortality?
- Dependent and independent probabilities that are not normally distributed
- $240K/365/1400 heifers = $0.47/d

Does it cost more to have someone else grow heifers?

Budget to see what it looks like on paper

Custom Feeder risks

Output
- Getting paid
- Is contract responsive to changing market?

Supply chain
- Feed cost

Risk relative to how a Custom Feeder gets paid

Static contracts:
- $/day
- $/lb gain
- $/heifer
- Feed price variation huge risk, even with hedging

Dynamic contract:
- Feed plus yardage contract
- Best way to reduce risk

Suppose heifer growers margin is 30 cents/d

What is the probability of feed costs increasing 30 cents/d?

How much would corn or SBM have to rise?

Speculator – owning heifers

Output
- Heifer market in 1-2 years
- Demand

Supply chain
- Feed cost

Highest Risk?
- Control risk by hedging feed and heifer price
- How do you hedge heifer price?

Summary

Many types and forms of risk

Consider output and supply chain risk

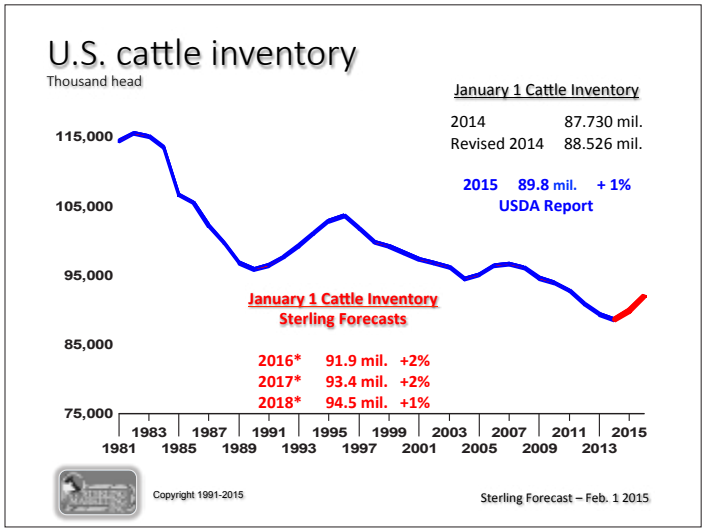
Don't expect to outguess markets

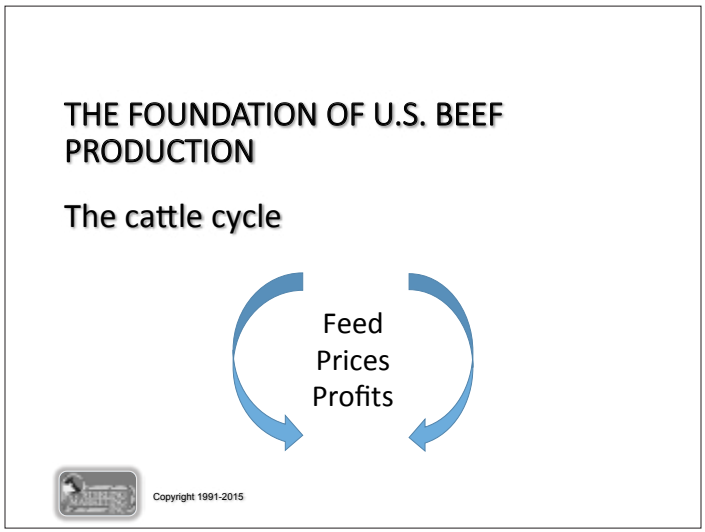
Questions??

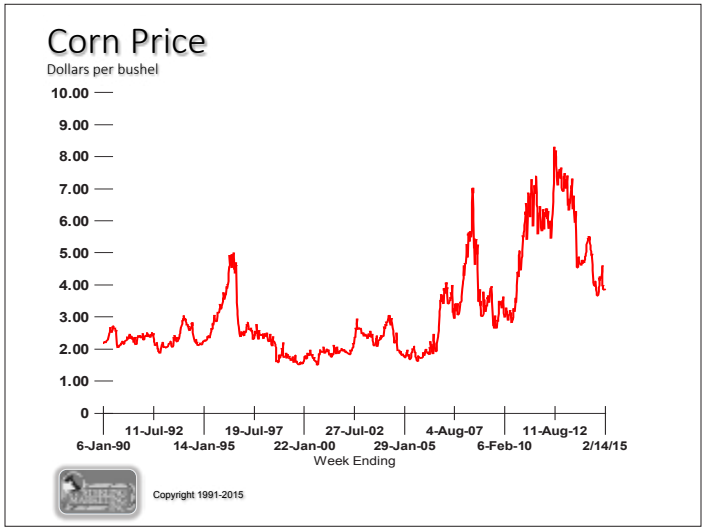
NOTES

MARKET PERSPECTIVE: WHERE IS DAIRY BEEF HEADED?

John Nalivka

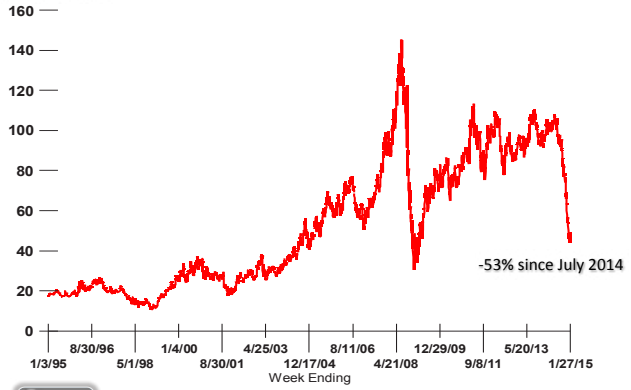






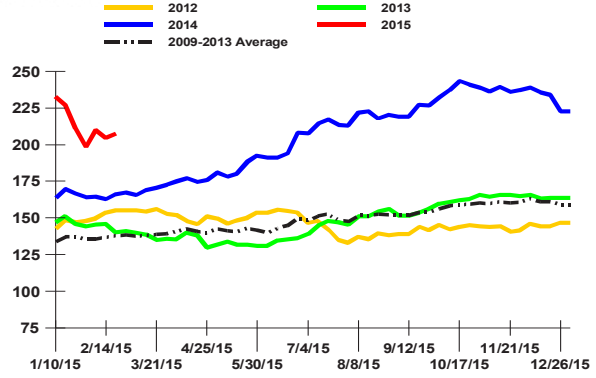
Crude Oil Price – Cushing, OK

Dollars per barrel



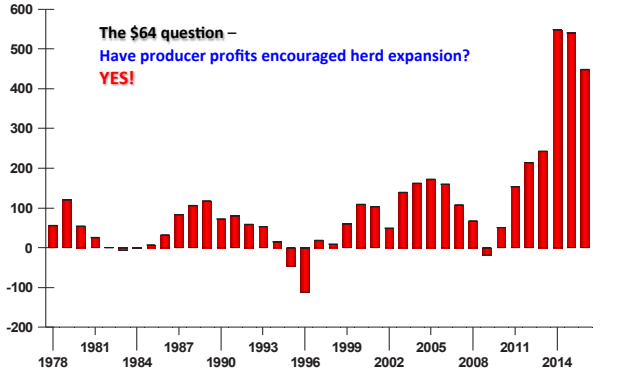
Feeder Cattle Price

Dollars per cwt



Returns to Cow-Calf Producers

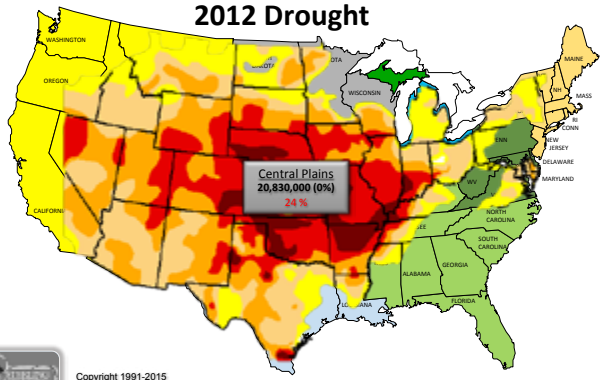
Dollars per head

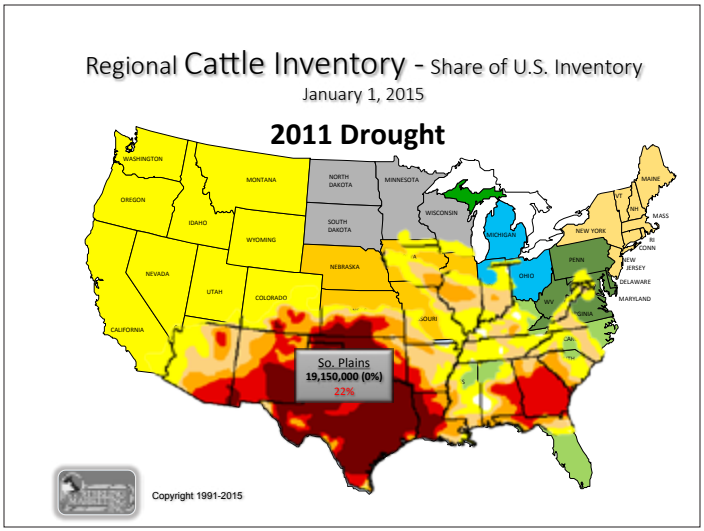


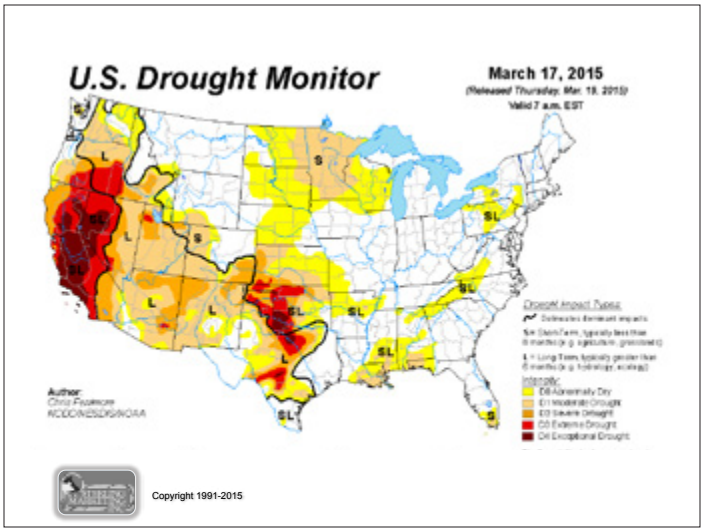
Sterling Forecast – March 13, 2015

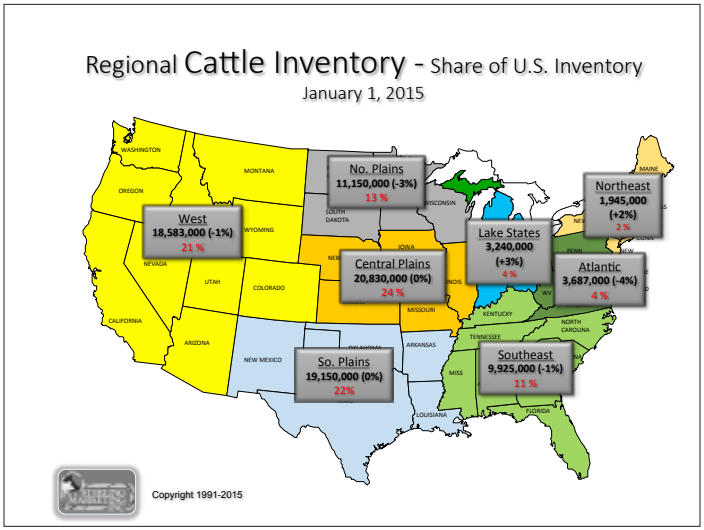
Regional Cattle Inventory - Share of U.S. Inventory

January 1, 2015




Regional Cattle Inventory - Share of U.S. Inventory
January 1, 2015
2011 Drought
So. Plains
19,150,000 (0%)
22%
Copyright 1991-2015


U.S. Drought Monitor
March 17, 2015
Copyright 1991-2015


Regional Cattle Inventory - Share of U.S. Inventory
January 1, 2015
No. Plains
11,150,000 (-3%)
13 %
West
18,583,000 (-1%)
21 %
Central Plains
20,830,000 (0%)
24 %
Lake States
3,240,000
(+3%)
4 %
Northeast
1,945,000
(+2%)
2 %
Atlantic
3,687,000 (-4%)
4 %
So. Plains
19,150,000 (0%)
22%
Southeast
9,925,000 (-1%)
11 %
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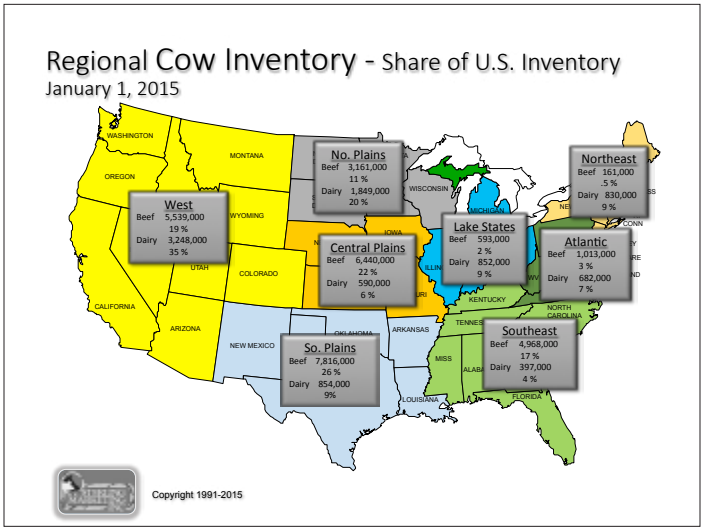
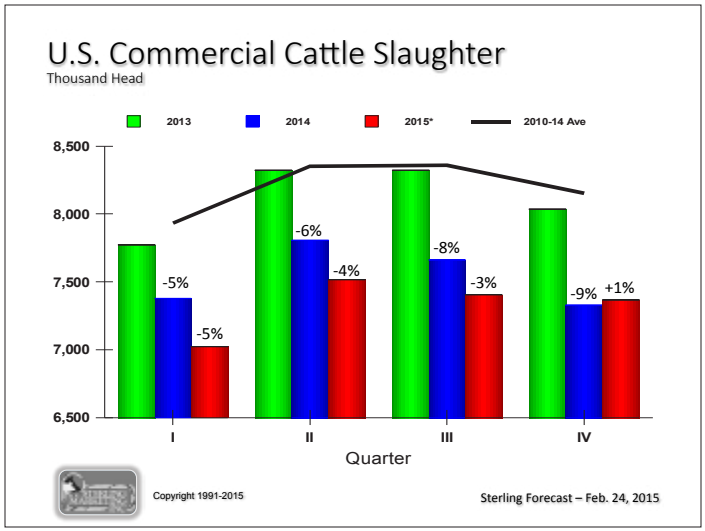
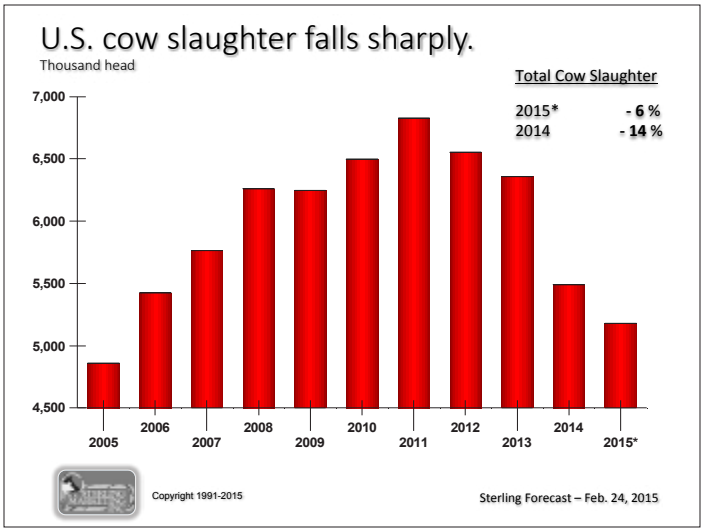
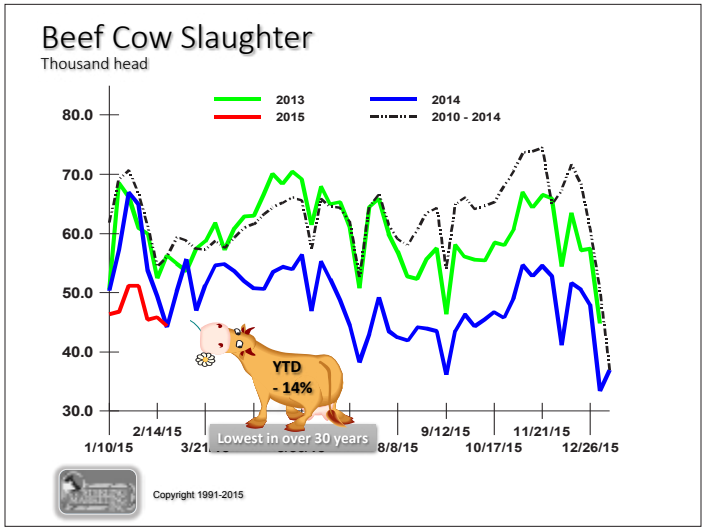
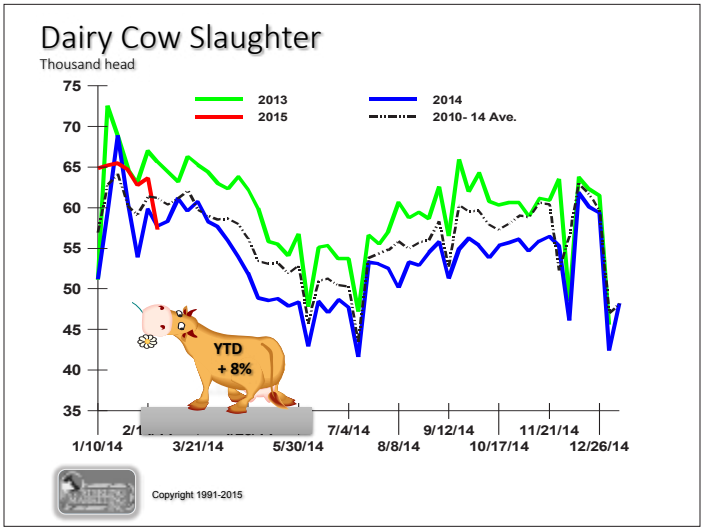

Regional Cow Inventory - Share of U.S. Inventory
January 1, 2015
No. Plains
Beef 3,161,000
11 %
Dairy 1,849,000
20 %
West
Beef 5,539,000
19 %
Dairy 3,248,000
35 %
Central Plains
Beef 6,440,000
22 %
Dairy 590,000
6 %
Lake States
Beef 593,000
2 %
Dairy 852,000
9 %
Northeast
Beef 161,000
.5 %
Dairy 330,000
9 %
Atlantic
Beef 1,013,000
3 %
Dairy 682,000
7 %
So. Plains
Beef 7,816,000
26 %
Dairy 854,000
9%
Southeast
Beef 4,968,000
17 %
Dairy 397,000
4 %
Copyright 1991-2015

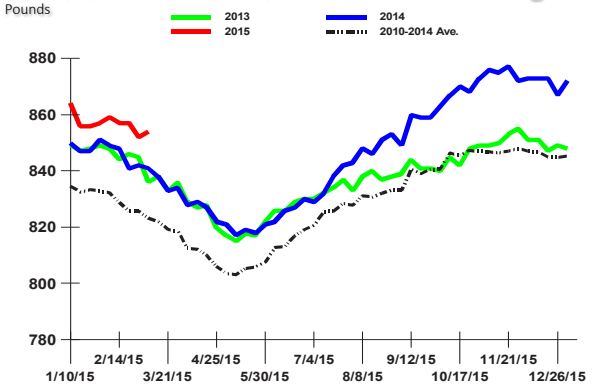

U.S. Commercial Cattle Slaughter
Thousand Head
2013
2014
2015*
2010-14 Ave
8,500
8,000
7,500
7,000
6,500
-5%
-5%
-6%
-4%
-8%
-3%
-9%
+1%
I
II
III
IV
Quarter
Copyright 1991-2015
Sterling Forecast – Feb. 24, 2015


U.S. cow slaughter falls sharply.
Thousand head
Total Cow Slaughter
2015* - 6 %
2014 - 14 %
7,000
6,500
6,000
5,500
5,000
4,500
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015*
Copyright 1991-2015
Sterling Forecast – Feb. 24, 2015

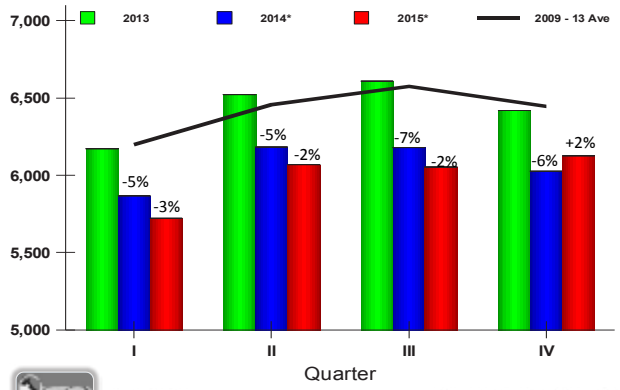

Beef Cow Slaughter
Thousand head
2013
2015
2014
2010 - 2014
80.0
70.0
60.0
50.0
40.0
30.0
YTD
- 14%
Lowest in over 30 years
1/10/15
2/14/15
8/8/15
9/12/15
10/17/15
11/21/15
12/26/15
Copyright 1991-2015


Dairy Cow Slaughter
Thousand head
2013
2015
2014
2010- 14 Ave.
75
70
65
60
55
50
45
40
35
YTD
+ 8%
1/10/14
3/21/14
5/30/14
7/4/14
8/8/14
9/12/14
10/17/14
11/21/14
12/26/14
Copyright 1991-2015

Combined Steer & Heifer Carcass Weights

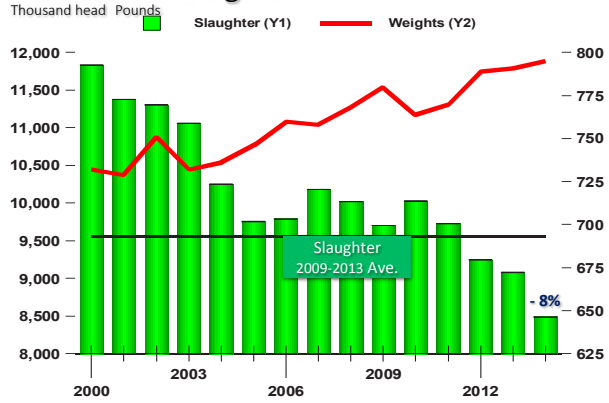


U.S. Commercial Beef Production



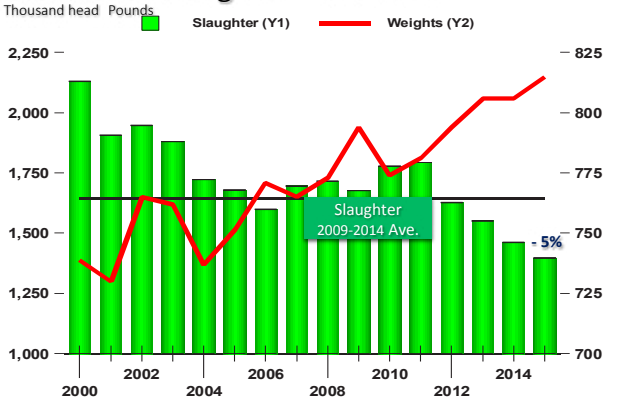
Sterling Forecast – Feb. 21, 2015

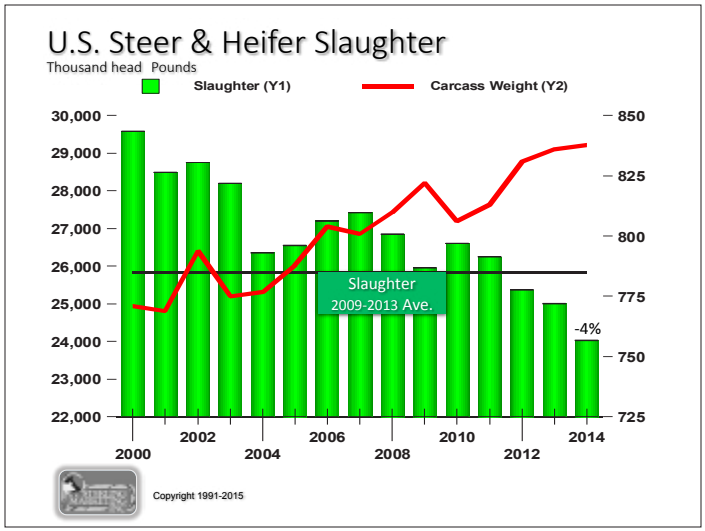
U.S. Heifer Slaughter



Lowest heifer slaughter in over 25 years

U.S. Heifer Slaughter – thru March 7




U.S. Steer & Heifer Slaughter
Thousand head Pounds
Slaughter (Y1)
Carcass Weight (Y2)
30,000
29,000
28,000
27,000
26,000
25,000
24,000
23,000
22,000
850
825
800
775
750
725
Slaughter
2009-2013 Ave.
-4%
2000
2002
2004
2006
2008
2010
2012
2014
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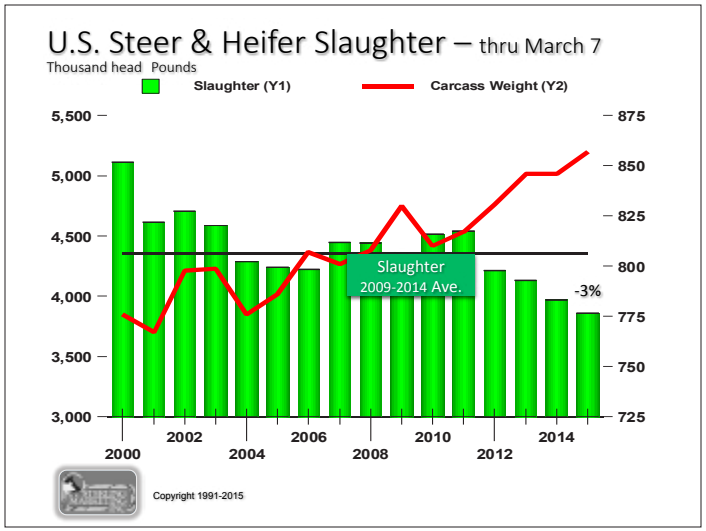
U.S. Steer & Heifer Slaughter – thru March 7
Thousand head Pounds
Slaughter (Y1)
Carcass Weight (Y2)
5,500
5,000
4,500
4,000
3,500
3,000
875
850
825
800
775
750
725
Slaughter
2009-2014 Ave.
-3%
2000
2002
2004
2006
2008
2010
2012
2014
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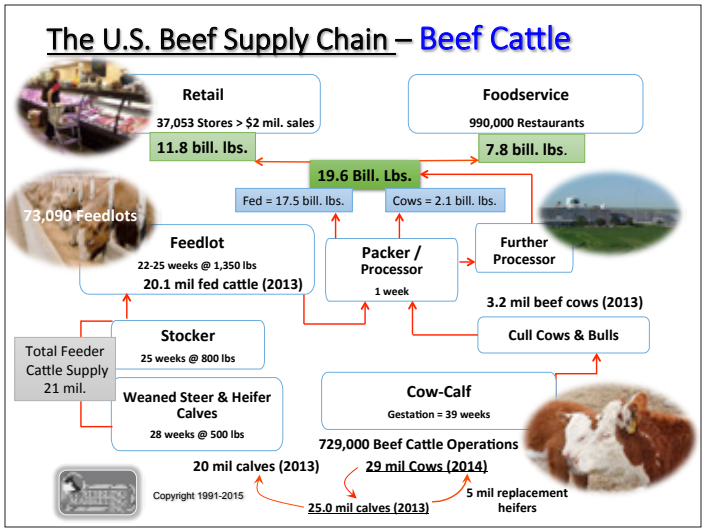
The U.S. Beef Supply Chain – Beef Cattle
Retail
37,053 Stores > $2 mil. sales
11.8 bill. lbs.
Foodservice
990,000 Restaurants
7.8 bill. lbs.
19.6 Bill. Lbs.
Fed = 17.5 bill. lbs.
Cows = 2.1 bill. lbs.
73,090 Feedlots
Feedlot
22-25 weeks @ 1,350 lbs
20.1 mil fed cattle (2013)
Packer / Processor
1 week
Further Processor
3.2 mil beef cows (2013)
Cull Cows & Bulls
Total Feeder Cattle Supply 21 mil.
Stocker
25 weeks @ 800 lbs
Weaned Steer & Heifer Calves
28 weeks @ 500 lbs
Cow-Calf
Gestation = 39 weeks
729,000 Beef Cattle Operations
20 mil calves (2013)
29 mil Cows (2014)
25.0 mil calves (2013)
5 mil replacement heifers
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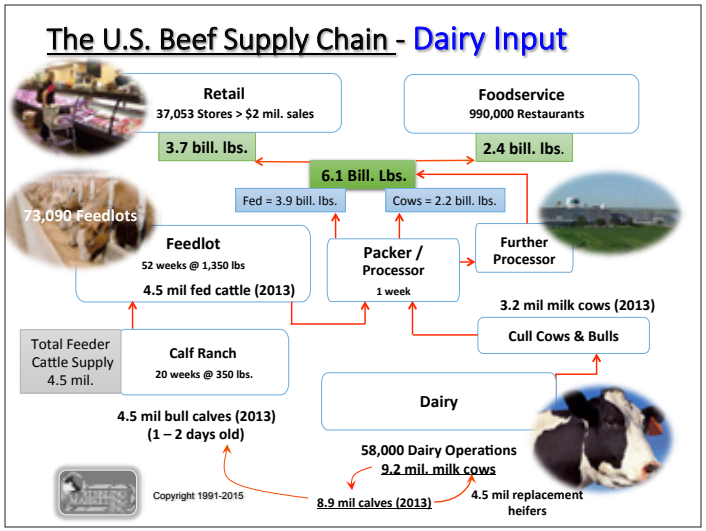
The U.S. Beef Supply Chain - Dairy Input
Retail
37,053 Stores > $2 mil. sales
3.7 bill. lbs.
Foodservice
990,000 Restaurants
2.4 bill. lbs.
6.1 Bill. Lbs.
Fed = 3.9 bill. lbs.
Cows = 2.2 bill. lbs.
73,090 Feedlots
Feedlot
52 weeks @ 1,350 lbs
4.5 mil fed cattle (2013)
Packer / Processor
1 week
Further Processor
3.2 mil milk cows (2013)
Cull Cows & Bulls
Total Feeder Cattle Supply 4.5 mil.
Calf Ranch
20 weeks @ 350 lbs.
Dairy
4.5 mil bull calves (2013)
(1 – 2 days old)
58,000 Dairy Operations
9.2 mil. milk cows
8.9 mil calves (2013)
4.5 mil replacement heifers
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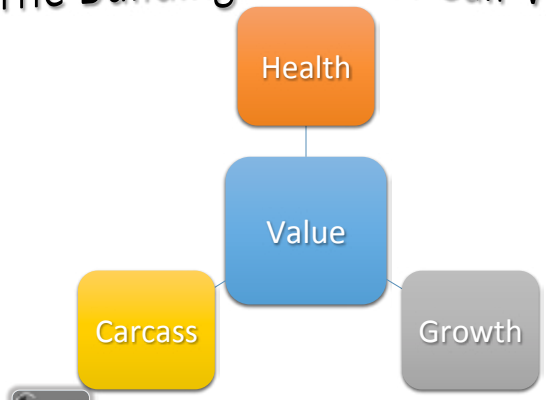
The Building Blocks of Calf Value



Converting a By-Product
into a
Value-Added Product

This is not a new idea!

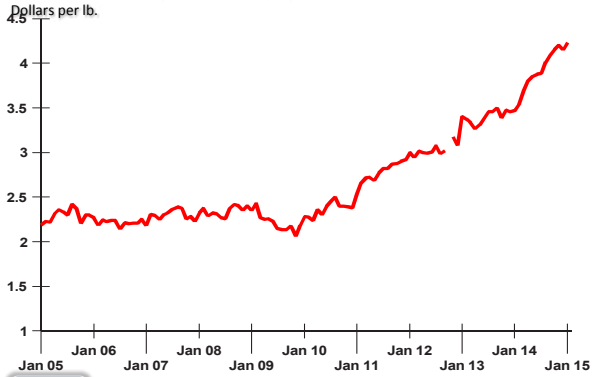
An example: cull cow sales

2006-2010 Ave. price = $53.85 / cwt.
Value of 1,500 lb. cow = $807.75

2014 Ave. price = $103.33 / cwt.
Value of 1,500 lb. cow = $1,549.95

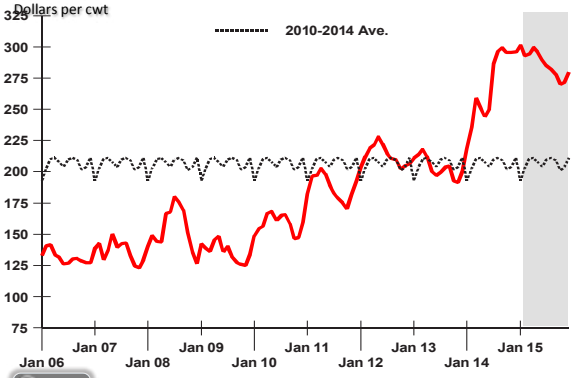
At these values, cull cows account for a significant share of your total revenue stream!

Retail Ground Beef Price



Source: Bureau Labor Statistics

90% Lean Cow Beef Price – Fresh



Sterling Forecast: March 2, 2015

Adding Value

requires

Added Investment

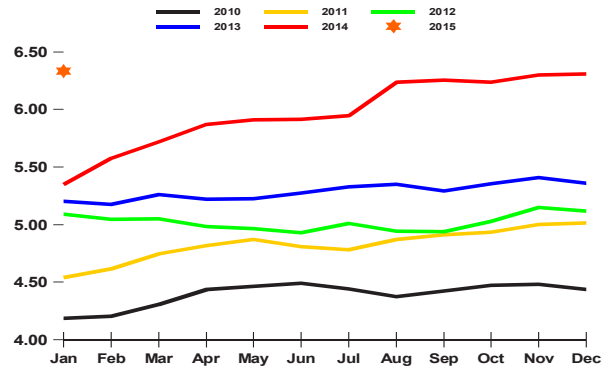
Quality & Consistency

are what differentiates the product from other generic commodity beef.

Prices Down the Supply Chain

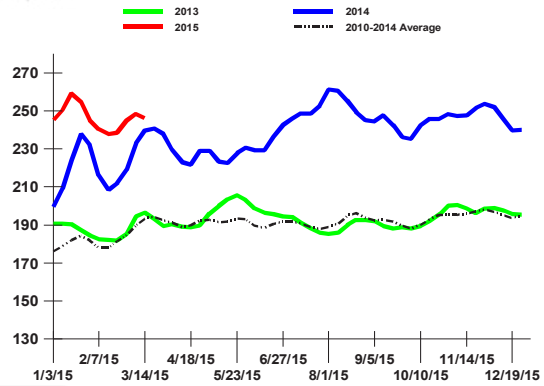
Choice Retail Beef Price

Dollars per lb



Wholesale Beef Price

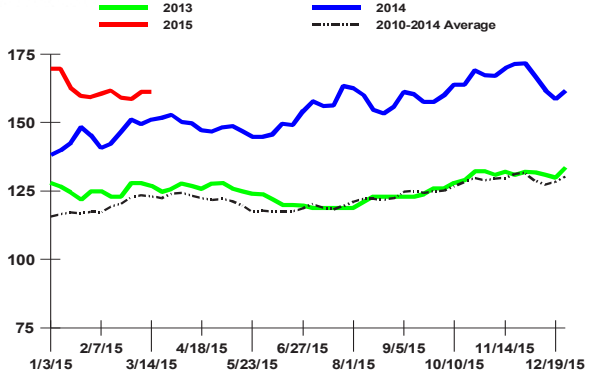
Dollars per cwt.



Beef Cutout Value, Adjusted for Beef Grade

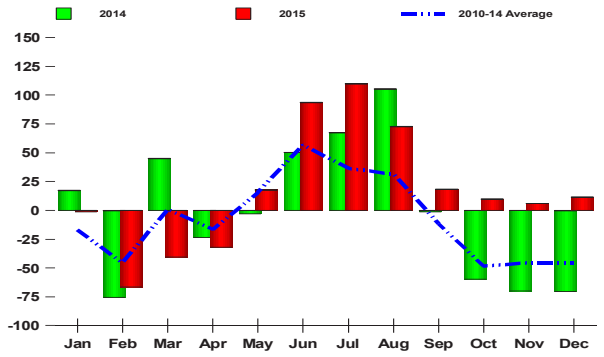
Choice Steer Price

Dollars per cwt



Beef Packer Margin

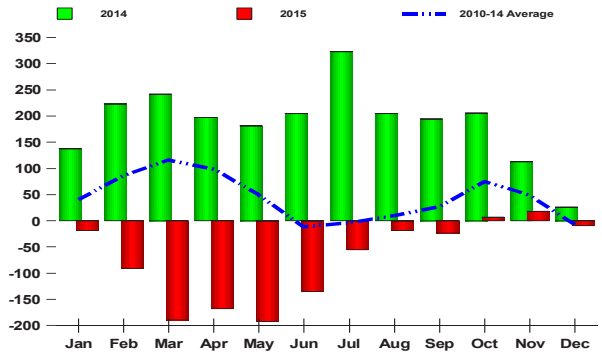
Dollars per head



Sterling Forecast – March 13, 2015

Feedlot Margin

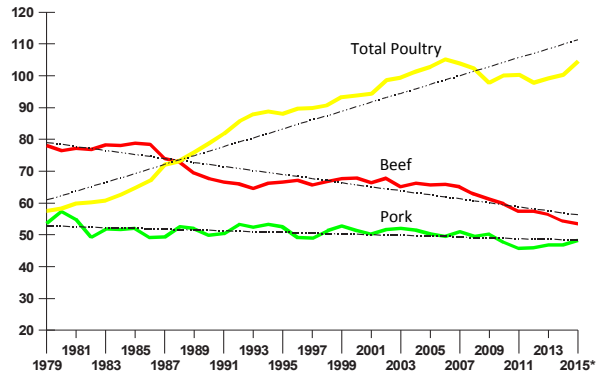
Dollars per head



Sterling Forecast – March 13, 2015

Per Capita Red Meat & Poultry Consumption

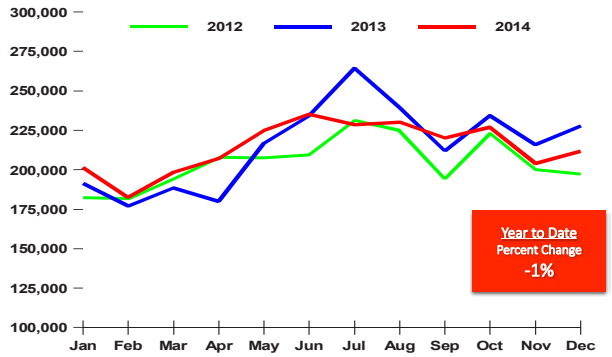
Pounds

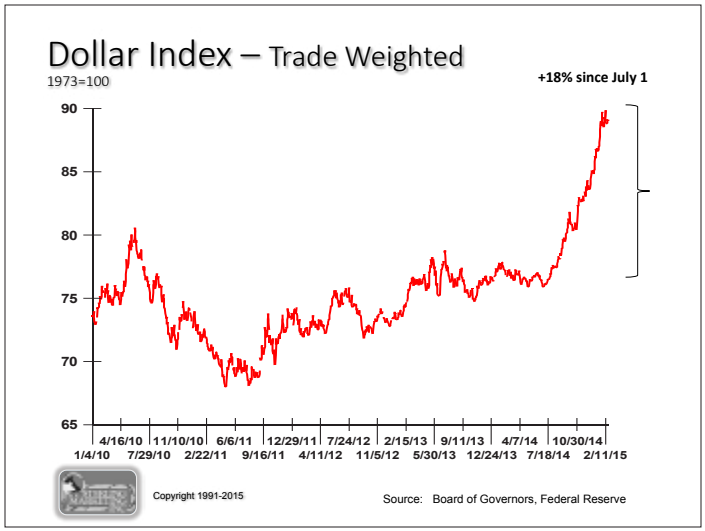


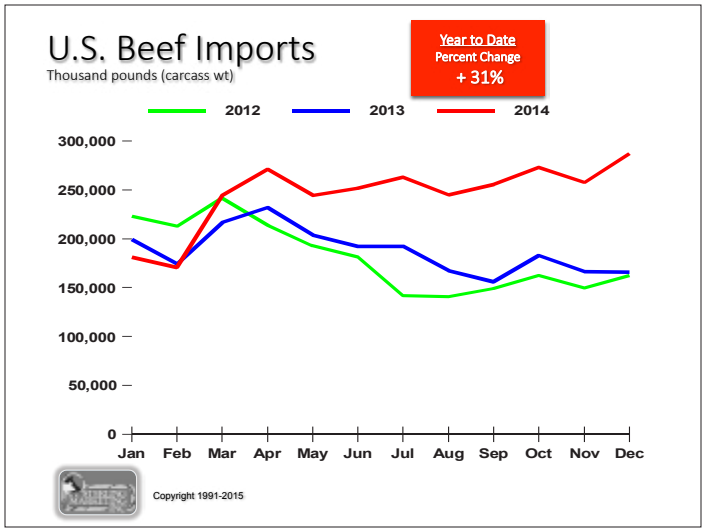
Sterling Forecast – Feb. 24, 2015

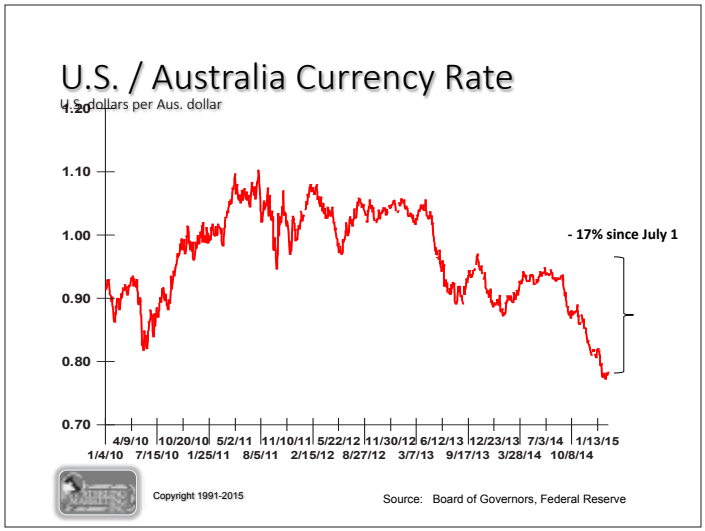
U.S. Beef Exports

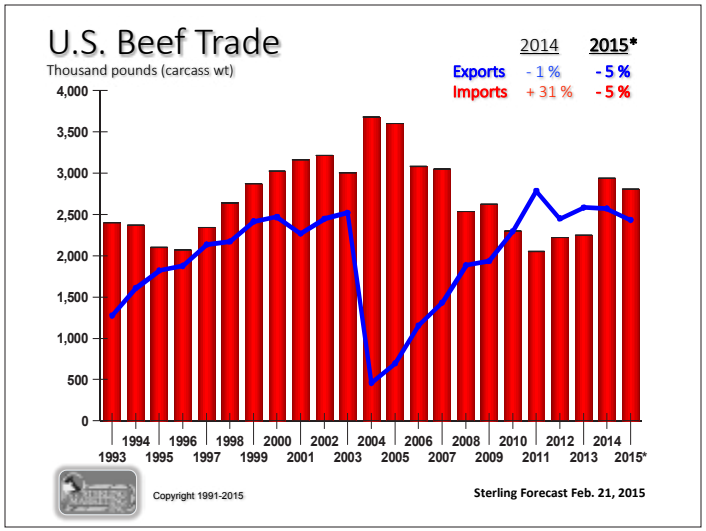
Thousand pounds (carcass wt)




Dollar Index – Trade Weighted
1973=100
+18% since July 1
90
85
80
75
70
65
4/16/10 11/10/10 6/6/11 12/29/11 7/24/12 2/15/13 9/11/13 4/7/14 10/30/14
1/4/10 7/29/10 2/22/11 9/16/11 4/11/12 11/5/12 5/30/13 12/24/13 7/18/14 2/11/15
Copyright 1991-2015
Source: Board of Governors, Federal Reserve


U.S. Beef Imports
Thousand pounds (carcass wt)
Year to Date
Percent Change
+ 31%
2012
2013
2014
300,000
250,000
200,000
150,000
100,000
50,000
0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Copyright 1991-2015


U.S. / Australia Currency Rate
U.S. dollars per Aus. dollar
1.20
1.10
1.00
0.90
0.80
0.70
- 17% since July 1
4/9/10 10/20/10 5/2/11 11/10/11 5/22/12 11/30/12 6/12/13 12/23/13 7/3/14 1/13/15
1/4/10 7/15/10 1/25/11 8/5/11 2/15/12 8/27/12 3/7/13 9/17/13 3/28/14 10/8/14
Copyright 1991-2015
Source: Board of Governors, Federal Reserve


U.S. Beef Trade
Thousand pounds (carcass wt)
2014 2015*
Exports - 1 % - 5 %
Imports + 31 % - 5 %
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015*
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Sterling Forecast Feb. 21, 2015

Companies that target their products at the *circumstances* in which customers find themselves rather than at the *customers* themselves, are those that can launch predictably successful products.

"*The Innovators Solution*"
Clayton M. Christensen
Michael E. Raynor

NOTES

NOTES

MADE POSSIBLE BY

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