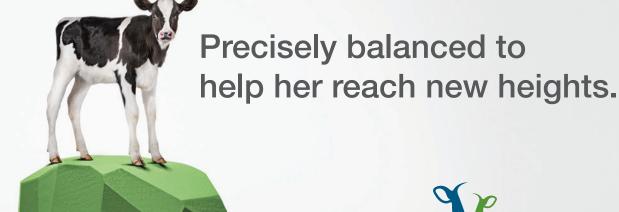


April 9-11, 2024 | Westminster, Colorado





# FORMULATION OPTIMIZED FOR EFFICIENT GROWTH.

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# WELCOME!

Welcome to the 2024 Dairy Calf & Heifer Association Annual Conference and Trade Show.

Themed "Strong Foundations for Bright Futures," this year's event celebrates the industry's strong foundation and recognizes evolving calf, heifer and beefcross management strategies, technologies and business practices — all pointing toward a more sustainable future.



## REGISTRATION

TUESDAY, APRIL 9 6:30 a.m.-5:30 p.m.

WEDNESDAY, APRIL 10 6:30 a.m.-5:00 p.m.

THURSDAY, APRIL 11 6:30 a.m.-12:00 p.m.

## TRADE SHOW

The conference trade show will kick off with a reception Tuesday evening and remain open through 9:55 a.m. on April 11. Listed below are the specific trade show activities and breaks.

#### TUESDAY, APRIL 9

4:30-6:00 p.m. Trade Show Reception

### WEDNESDAY, APRIL 10

9:45-10:00 a.m. Trade Show Open 2:15-2:30 p.m. Trade Show Open 4:45-6:15 p.m. Trade Show Reception

#### THURSDAY, APRIL 11

8:50-9:55 a.m. Trade Show Open



#### CALF WELLNESS. WHERE THE DIFFERENCE BEGINS.

A good start for calves leads to healthy, productive cows in your herd. We help make sure it's a great start with our Calf Wellness solutions: prediction, prevention, treatment and expertise that gives your calves the best possible future.

Get a free Calf Wellness Guide with tips in English or Spanish. | Calfwellness.com







# CONFERENCE AGENDA PROGRAMA DE CONFERENCIA

All times listed are Mountain time. Todos los horarios son indicados en horario de montaña.

ALL SESSIONS WILL HAVE LIVE SPANISH INTERPRETATION/TODAS LAS SESIONES SERÁN TRADUCIDAS SIMULTÁNEAMENTE A ESPAÑOL

## TUESDAY, APRIL 9

MARTES, 9 DE ABRIL

6:30 a.m.

REGISTRATION OPENS

INICIO DE REGISTRO

#### **OPTIONAL TOURS** / TOURS OPCIONALES

5280 CATTLE COMPANY

**FELDPAUSCH HOLSTEINS** Fort Morgan, CO **FIVE RIVERS CATTLE FEEDING** Kersey, CO

#### PRE-CONFERENCE SESSIONS

SESIONES PRE-CONFERENCIA

1:00 p.m

Ault, CO

**LEGACY** BALLROOM Liderazgo: desafíos y oportunidades (SPA/ESP)

Leadership Tailwinds and Headwinds **RODOLFO NAVA. NM NEWCAN** 

Sponsored by/Patrocinado por: Elanco Animal Health

2:00 p.m.

**LEGACY BALLROOM**  Evidencia Respaldada por la Ciencia: Manejo del Calostro (SPA/ESP)

Science-backed Evidence: Colostrum Management

LAUTARO ROSTOLL CANGIANO, UNIVERSITY OF WISCONSIN-MADISON

3:00 p.m.

**LEGACY BALLROOM**  The Use of Essential Oils and Oligosaccharides in Neonatal Calves

Uso de Aceites Esenciales y Oligosacáridos en Becerros Neonatos

DAVID CASPER, RALCO, INC. Sponsored by/Patrocinado por: Ralco, Inc.

4:00 p.m. **LEGACY BALLROOM** 

Crypto? Rota? Corona? When IgG isn't Enough Crypto? Rota? Corona? Cuando IgG no es Suficiente

DREW VERMEIRE, NOURICHE NUTRITION Sponsored by/Patrocinado por: Arkion Life Sciences

5:00-6:30 p.m.

WB III. IV

RECEPTION IN THE TRADE SHOW RECEPCIÓN EN LA FERIA COMERCIAL

## WEDNESDAY, APRIL 10

MIÉRCOLES, 10 DE ABRIL

7:00-7:55 a.m.

**LEGACY BALLROOM**  BREAKFAST / DESAYUNO

SHAWN JONES, PROCESS AND DEVELOPMENT MANAGER, ARKION LIFE SCIENCES

Sponsored by/Patrocinado por: Arkion Life Sciences

#### **GENERAL SESSION** / SESIÓN GENERAL

8:00-8:50 a.m.

**LEGACY BALLROOM**  **Building Your Mental Health Toolbox** 

Construyendo una Caja de Herramientas para tu Salud Mental

**ASHLEY MACHADO. M WELL CONSULTING** Sponsored by/Patrocinado por: Merck Animal Health

#### TRACK OPTIONS (SELECT ONE)

OPCIONES DE BLOQUES (SELECCIONE UNO)

8:55-9:45 a.m.

WBI

WET CALF/WEANING TRACK BLOOUF PREDESTETE/DESTETE

Best Practices for Disease Prevention

Las Mejores Prácticas de Manejo para la Prevención de Enfermedades

**GEOF SMITH. ZOETIS** 

Sponsored by/Patrocinado por: Zoetis

8:55-9:45 a.m.

WB II

POST-WEANED/REPRODUCTION TRACK BLOOUE POST-DESTETE/REPRODUCCIÓN

Optimizing Dairy Heifer Reproductive Management Strategies

Optimizando las Estrategias del Manejo Reproductivo de la Vaquilla Lechera

JP MARTINS, UNIVERSITY OF WISCONSIN-MADISON

8:55-9:45 a.m. COTTON CREEK **BEEF CROSS TRACK** 

**BLOQUE BECERROS CRUZADOS DE CARNE** 

Calf Veterinarian Perspective on Liver Abscesses

Perspectiva de un Veterinario de Becerros en Abscesos Hepáticos

TAYLOR ENGLE, FOUR STAR VETERINARY SERVICE

Sponsored by/Patrocinado por: MB Nutrition



# Good Things Come in Small Packages

EggTek®-C supports calf health with a blanket of IgY antibodies unmatched in the industry.







Visit us at booth
#1
to learn more.

9:45-10:00 a.m.

MORNING BREAK / Descanso Matutino

WB III, IV

Sponsored by/Patrocinado por: Anpario and DairyMax

#### TRACK OPTIONS (SELECT ONE)

OPCIONES DE BLOQUES (SELECCIONE UNO)

10:00-10:50 a.m.

WET CALF/WEANING TRACK BLOOUF PREDESTETE/DESTETE

WB I

**Best Practices for Disease Prevention** 

Las Mejores Prácticas de Manejo para la Prevención de Enfermedades

**GEOF SMITH, ZOETIS** 

Sponsored by/Patrocinado por: Zoetis

10:00-10:50 a.m.

WB II

POST-WEANED/REPRODUCTION TRACK BLOOUE POST-DESTETE/REPRODUCCIÓN

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10:00-10:50 a.m. COTTON CREEK

**BEEF CROSS TRACK** 

BLOQUE BECERROS CRUZADOS DE CARNE

Calf Veterinarian Perspective on Liver Abscesses

Perspectiva de un Veterinario de Becerros en Abscesos Hepáticos

TAYLOR ENGLE, FOUR STAR VETERINARY SERVICE

Sponsored by/Patrocinado por: MB Nutrition

11:00 a.m. LEGACY **BALLROOM**  **LUNCH AND DCHA ANNUAL BUSINESS MEETING** 

ALMUERZO Y DCHA REUNIÓN **EMPRESARIAL ANUAL** 

TERESIA MAINA. SR. RESEARCH SCIENTIST.

IMMUNOLOGY, CARGILL Sponsored by/Patrocinado por: Cargill

#### TRACK OPTIONS (SELECT ONE)

OPCIONES DE BLOQUES (SELECCIONE UNO)

12:30-1:20 p.m.

WBI

**WBII** 

WET CALF/WEANING TRACK **BLOOUE PREDESTETE/DESTETE** 

Transition Milk: What is it and Should All Calves be Fed Some Form of 'Transition Milk'?

Leche de Transición: ¿Qué es y Deberían todos los becerros ser alimentados con alguna forma de 'Leche de Transición'?

MICHAEL BALLOU, TEXAS TECH UNIVERSITY Sponsored by/Patrocinado por: Milk Specialties

12:30-1:20 p.m.

POST-WEANED/REPRODUCTION TRACK BLOQUE POST-DESTETE/REPRODUCCIÓN

She's Weaned, Now What?

Está Destetada. ; Ahora Qué?

THOMAS TYLUTKI, AGRICULTURAL MODELING AND TRAINING SYSTEMS LLC

12:30-1:20 p.m. **COTTON CREEK**  BEEF CROSS TRACK

BLOOUE BECERROS CRUZADOS DE CARNE

Beef on Dairy Cattle: Industry Benefits and Opportunities

Ganado Cruzado de Carne: Beneficios y Oportunidades para la Industria NICK HARDCASTLE, CARGILL

Sponsored by/Patrocinado por: Cargill

#### TRACK OPTIONS (SELECT ONE)

OPCIONES DE BLOQUES (SELECCIONE UNO)

1:25-2:15pm WB I

WET CALF/WEANING TRACK **BLOOUE PREDESTETE/DESTETE** 

Transition Milk: What is it and Should All Calves be Fed Some Form of 'Transition Milk'?

Leche de Transición: ¿Qué es y Deberían todos los becerros ser alimentados con alguna forma de 'Leche de Transición'?

MICHAEL BALLOU, TEXAS TECH UNIVERSITY Sponsored by/Patrocinado por: Milk Specialties

1:25-2:15pm

WB II

POST-WEANED/REPRODUCTION TRACK BLOOUE POST-DESTETE/REPRODUCCIÓN

She's Weaned. Now What?

Está Destetada. ; Ahora Qué?

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AND TRAINING SYSTEMS LLC



The quality your calves want.

THE PERFORMANCE YOU NEED.



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1:25–2:15pm COTTON CREEK **BEEF CROSS TRACK** 

BLOQUE BECERROS CRUZADOS DE CARNE

Beef on Dairy Cattle: Industry Benefits and Opportunities

Ganado Cruzado de Carne: Beneficios y Oportunidades para la Industria

NICK HARDCASTLE, CARGILL Sponsored by/Patrocinado por: Cargill

**2:15–2:30 p.m.** WB III, IV

AFTERNOON BREAK

DESCANSO VESPERTINO
Sponsored by/Patrocinado por: DairyMax

#### **GENERAL SESSION** / SESIÓN GENERAL

2:30-3:20 p.m. LEGACY BALLROOM Calf Care & Quality Assurance Program – Best Management Guidelines for the Calf-raising Sector

Programa Calf Care & Quality Assurance - Lineamentos para las Buenas Prácticas del Sector de Crianza de Becerros

MODERATOR/MODERADORES: EMMA MULVANEY, BEEF QUALITY ASSURANCE PROGRAMS

PANELISTS/PANELISTAS: TERA BARNHARDT, HERITAGE
VET PARTNERS, AUSTIN FLORES, GRIMMIUS CATTLE
COMPANY, AND RODOLFO NAVA, NM NEWCAN
Sponsored by/Patrocinado por: First Defense/Immucell

3:30-4:45 p.m. LEGACY BALLROOM **ROUNDTABLE DISCUSSION** 

MESA REDONDA

MODERATOR/MODERADOR: KENDALL WASSENAAR, DCHA BOARD MEMBER

**4:45–6:15 p.m.** WB III, IV

RECEPTION IN THE TRADE SHOW RECEPCIÓN EN LA FERIA COMERCIAL

Sponsored by/Patrocinado por: Esmilco

## THURSDAY, APRIL 11

JUEVES, 11 DE ABRIL

7:00-7:55 a.m. **LEGACY** 

**BALLROOM** 

**BREAKFAST / DESAYUNO** MITCH HOCKETT, DIRECTOR OF FARMFIT

PRODUCTS, STGENETICS

Sponsored by/Patrocinado por: STgenetics

#### **GENERAL SESSION** / SESIÓN GENERAL

8:00-8:50 a.m.

**LEGACY** BALLROOM

Exploring the Economics of Raising Replacement Heifers

Explorando la Economía de Criar Becerras de Remplazo

KEVIN DHUYVETTER, ELANCO ANIMAL HEALTH Sponsored by/Patrocinado por: Elanco Animal Health

8:50-9:55 a.m.

TRADE SHOW / FERIA COMERCIAL

WB III, IV

Sponsored by/Patrocinado por: DairyMax

#### TRACK OPTIONS (SELECT ONE)

**OPCIONES DE BLOQUES (SELECCIONE UNO)** 

10:00-10:50 a.m.

WB I

WET CALF/WEANING TRACK BLOOUE PREDESTETE/DESTETE

Fostering Early Calf Health for Lifetime Sustainability

Fomentando la Salud Temprana del Becerro para una Sustentabilidad de Por Vida

MODERATOR/MODERADOR: BRIAN WESEMANN, DCHA BOARD MEMBER

PANELISTS/PANELISTAS: KOLTON KREITEL. FULLMER CATTLE COMPANY, J HALL, HALL'S CALF RANCH, AND JESUS SEGURA, BARRINGTON & HIBRIGHTON DAIRY

10:00-10:50 a.m.

WB II

POST-WEANED/REPRODUCTION TRACK BLOOUE POST-DESTETE/REPRODUCCIÓN

Best Management Practices to Foster Healthy, Efficient Post-weaned Heifers

Las Mejores Prácticas de Manejo para Fomentar Vaquillas Destetadas Sanas y Efficientes

MODERATOR/MODERADOR: JASON ANDERSON, DCHA BOARD MEMBER

PANELISTS/PANELISTAS: VANCE KELLS, CIRCLE BAR HEIFER RANCH, LLC, DOUG SCHOLTEN, BRIGHTWATER CATTLE COMPANY, AND JAMIE FRANKEN, CITY VIEW FARM

10:00-10:50 a.m.

**BEEF CROSS TRACK** BLOOUE BECERROS CRUZADOS DE CARNE

COTTON CREEK

**Building Your Best Beef Cross** from Birth to Butcher

Construyendo la Mejor Cruza de Ganado de Carne desde la Concepción hasta el Carnicero

MODERATOR/MODERADOR: ELLEN CUSHING, DCHA BOARD MEMBER

PANELISTS/PANELISTAS: RODOLFO NAVA, NM NEWCAN, NICK HARDCASTLE, CARGILL, AND TAYLOR

**ENGLE, FOUR STAR VETERINARY SERVICE** Sponsored by/Patrocinado por: MB Nutrition

#### TRACK OPTIONS (SELECT ONE)

OPCIONES DE BLOQUES (SELECCIONE UNO)

10:55-11:45 a.m.

WET CALF/WEANING TRACK **BLOOUE PREDESTETE/DESTETE** 

DCHA BOARD MEMBER

WB I

Fostering Early Calf Health for Lifetime Sustainability

Fomentando la Salud Temprana del Becerro para una Sustentabilidad de Por Vida

MODERATOR/MODERADOR: BRIAN WESEMANN,

PANELISTS/PANELISTAS: KOLTON KREITEL, FULLMER CATTLE COMPANY, J HALL, HALL'S CALF RANCH, AND JESUS SEGURA, BARRINGTON & HIBRIGHTON DAIRY

10:55-11:45 a.m. WB II

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10:55-11:45 a.m. **COTTON CREEK** 

**BEEF CROSS TRACK** 

BLOOUE BECERROS CRUZADOS DE CARNE

**Building Your Best Beef Cross** from Birth to Butcher

Construyendo la Mejor Cruza de Ganado de Carne desde la Concepción hasta el Carnicero

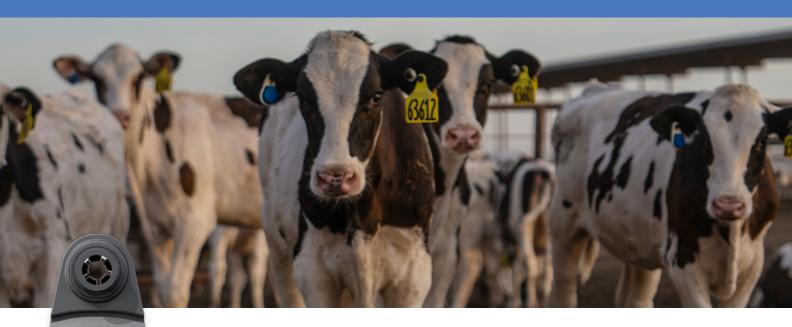
MODERATOR/MODERADOR: ELLEN CUSHING, DCHA BOARD MEMBER

PANELISTS/PANELISTAS: RODOLFO NAVA, NM NEWCAN, NICK HARDCASTLE, CARGILL, AND TAYLOR ENGLE. FOUR STAR VETERINARY SERVICE

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#### **BOOTH 38**

#### Aaron Hund

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2809 E Harmony Rd #190 Fort Collins, CO 80528

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#### **ACEPSIS, LLC**

#### **BOOTH 26, 27**

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#### **ARKION LIFE** SCIENCES, LLC

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#### BOOTH 35, 36, 37

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262-532-9094

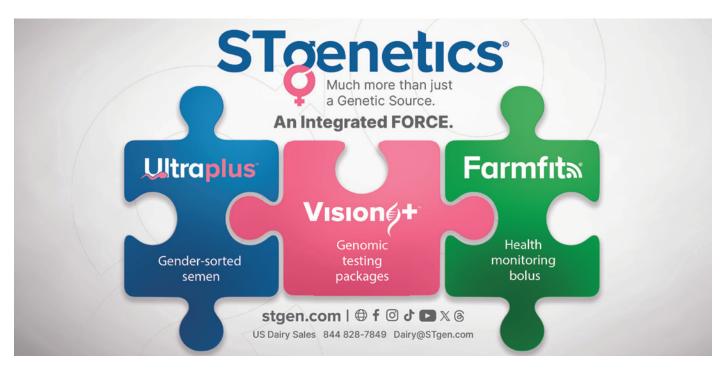
#### CAMBRIDGE TECHNOLOGIES

#### **BOOTH 24**

#### Robert Rust

rrust@cambridgetechnologies.com 1525 Bioscience Drive Worthington, MN 56187 785-477-4516





#### **CARGILL ANIMAL** NUTRITION

#### **BOOTH 16**

#### Ann Horack

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#### CASPER'S CALF RANCH, LLC

#### **BOOTH 18**

#### David Casper

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Casper's Calf Ranch No code

#### DAIRY TECH, LLC

#### **BOOTH 14**

#### Dennis Anderson

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#### **DBC AG PRODUCTS**

#### **BOOTH 44**

#### David Mathes

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#### **ELANCO ANIMAL HEALTH**

#### **BOOTH 29**

#### Ellen Cushing

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#### **ENDOVAC ANIMAL HEALTH**

#### **BOOTH 48**

#### Erik Vruwink

evruwink@endovac.com N28193 Sorlie Lane Arcadia, WI 54612 715-323-3898



#### FEEDWORKS USA, LTD.

#### **BOOTH 23**

#### Rod Riewer

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#### FIRST DEFENSE / **IMMUCELL CORP**

#### BOOTH 49, 50

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#### **HUVEPHARMA**

#### **BOOTH 5**

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#### **KEYAG DISTRIBUTORS**

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#### LAIRD MFG., LLC

#### **BOOTH 31**

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#### **MB NUTRITIONAL SCIENCES**

#### **BOOTH 3, 4**

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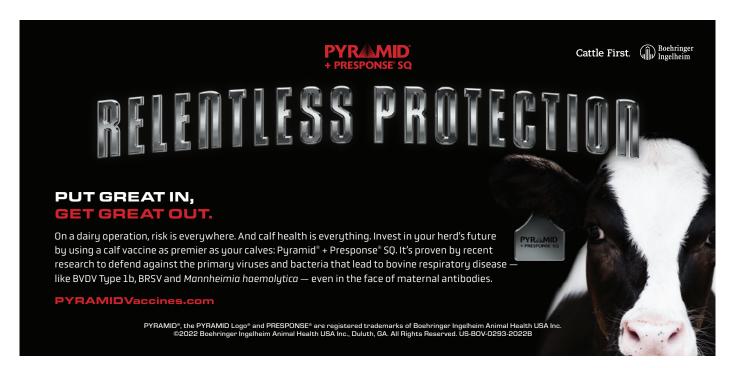
#### MERCK ANIMAL HEALTH

#### **BOOTH 34**

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#### BOOTH 7, 8, 9

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#### **BOOTH 25**

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#### **RALCO**

#### **BOOTH 17**

#### **Brad Klukas**

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#### SELECT SIRES INC.

#### **BOOTH 32, 33**

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MOTES

#### STRAUSS FEEDS

#### **BOOTH 10**

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920-261-7882



#### **TECHMIX, LLC**

#### **BOOTH 45**

#### **Bret Hobbs**

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#### THE COBURN COMPANY INC.

#### **BOOTH 21, 22**

#### Eric Baehler

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1170 Universal Blvd

Whitewater, WI 53190

262-473-0320



#### **ZOETIS**

#### **BOOTH 28**

#### Jodi Paynter

jodi.paynter@zoetis.com

10 Sylvan Way

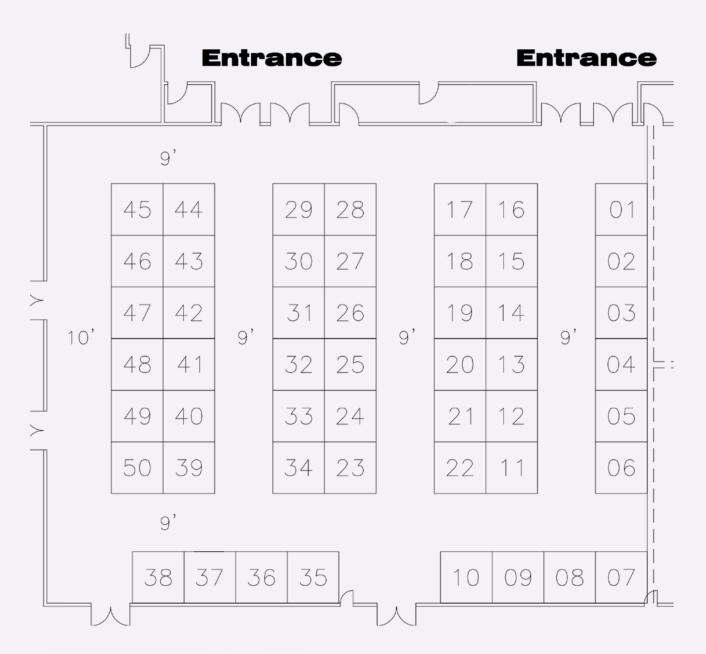
Parsipanny, NJ 07054

530-517-0432



IVOILS		

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**TRADE SHOW HOURS**  The conference trade show will kick off with a reception Tuesday evening and remain open through 9:55 a.m. on April 11.





Best Practices for Disease Prevention

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# **Best Practices for Disease Prevention**

#### **GEOF SMITH, Zoetis**

Heifer calves represent the future of the dairy and therefore management of these animals from birth through weaning should be a high priority on farms. Despite this, calf mortality remains high. The major causes of morbidity and mortality in dairy calves continue to be diarrhea, pneumonia and septicemia. These are largely management diseases that can be prevented by having a good colostrum program in place and maintaining good cleanliness and hygiene on the farm. Risk factors for disease include dirty calving pens, inadequate colostrum ingestion, nursing dirty teats, unsanitary feeding utensils (nipples, bottles), overcrowding, poor housing design, contamination of milk with bacteria, poor ventilation and failure to isolate sick calves. The primary purpose of my DCHA talk is to discuss the three key elements to avoid disease: day 1 calf care, nutrition and minimizing stress around weaning.

#### Day 1 Calf Care

Proper day 1 calf care includes both maternity pen and colostrum management. Fecal oral transmission is the primary route of infection for most causes of calf diarrhea and many calves are exposed to disease from their dam at birth. Maintaining a clean calving area and prompt removal of the calf are important steps in limiting disease transmission. On dairy farms experiencing problems with neonatal diarrhea, it is not uncommon to find evidence of a high prevalence of pathogens (i.e. Salmonella or rotavirus) in the calving area. In the case of Salmonella, you can often find significant fecal shedding in postpartum cows. Calves may be exposed to various causes of diarrhea by exposure to manure from the dam following birth when the calf contacts its environment or when calves have contact with the udder while attempting to nurse. It is important to appreciate that significant pathogen exposure can occur within the first few hours of life. In certain areas of the world, dairy cows routinely calve on pasture, whereas calving pens are more common in colder climates. Regardless of the type of maternity area used, control points are directed at minimizing contamination (time cows spend in the pen, choice of bedding material and frequency of bedding changes) and exposure risk (time calves spend in the maternity area).

A good colostrum management program ensures that all calves get an adequate volume of quality colostrum as quickly as possible after birth. This is likely the single most important aspect of dairy heifer management. Despite the emphasis placed on colostrum, surveys suggest that up to 35% of dairy heifers still don't have adequate immunoglobulin concentrations when tested.

Despite the well-documented benefits of colostrum, it should also be pointed out that colostrum can be a significant source of infection for some diseases, including Salmonella Dublin. Pooling colostrum increases the risk of Salmonella infection by disseminating the organism in a larger colostral volume and subsequently infecting a larger number of calves. An increase in the incidence of Salmonella infections in calves and an earlier onset of clinical signs following increased volume of colostrum administration to newborn calves are consistent with Salmonella contamination of colostrum. Control points for reducing the risk of disease transmission associated with the feeding of colostrum include: 1) effective cleaning of equipment used in colostrum collection and storage; 2) avoid pooling colostrum; 3) verify refrigeration units for storing colostrum are working correctly; 4) make sure colostrum is cooled rapidly if not fed immediately; 5) record date of collection on refrigerated colostrum and discard after 2 days; and 6) maintain dedicated equipment for feeding colostrum. Fresh colostrum fed to calves should contain less than 100,000 cfu/mL total bacterial count and less than 10,000 coliforms/mL.

#### Nutrition

Adequate calf nutrition is critical for host immunity and energydeprived calves are more likely to have increased morbidity and mortality due to diarrhea. There is a significant amount of new data indicating calves fed at a higher plane of nutrition are more resistant to disease as compared to calves on more conventional milk feeding programs. For example, one study showed that calves fed an accelerated growth milk program (28% protein, 20% fat) maintained hydration, had faster resolution of diarrhea, had increased body weight gain and better feed conversion after experimental challenge with Cryptosporidium parvum as compared to calves fed conventional milk replacer (20% protein, 20 fat). While many people have long recognized there was a strong correlation between calf nutrition and rates of disease, we have only recently had data to illustrate the importance of this relationship. With the plethora of new data published in the last five to 10 years, it has been hard to avoid the realization that we have been significantly underfeeding dairy heifers for a long time and that higher planes of nutrition provide multiple benefits.

When assessing nutritional requirements, it is important to factor in seasonal conditions that increase the calf's energy demands. Lack of refrigeration carries significant risk when residual milk from one feeding



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1-800-533-5306 RalcoAgricuture.com is kept for subsequent feedings. This is particularly important during hot weather when proliferation of bacteria is increased. Pasteurization is also effective at reducing bacterial contamination. When implemented properly, pasteurization provides significant risk management. Inclusion of quality control monitors is important to detect failures in the pasteurization process. Feeding utensils and personnel often play a significant role in transmitting various pathogens among calves. Adequate cleaning and disinfection of feeding utensils is necessary to remove contamination.

#### **Avoiding Stress**

Although most people understand the word "stress," it can be difficult to define. However, it is basically the calf's physiologic or behavioral response to adverse events in the environment or management system. These responses allow the calf to adapt or cope with the adverse effects causing stress. Things like heat or cold climates, overcrowding, shipping, weaning, dehorning, poor nutrition, erratic feeding schedules and improper handling can all cause stress and make the calf more susceptible to disease. We are learning that stress has a profound effect on the immune system and can dramatically increase disease rates.

A survey sent to beef producers in Western Canada identified the most common risk factors in their opinion for diarrhea outbreaks in calves. The results indicated the greatest risk factors for calf diarrhea were inclement weather (cold), poor ground surface conditions (wet, cold pasture) and overcrowding – all factors that would increase calf stress levels. Many heifer growers or veal operations say that disease exposure is expected and constant. Despite the constant exposure, disease outbreaks seem to be sporadic – often revolving around times of stress.

Recent studies have even found that bacteria can detect stress in the animal and multiply during those periods. The principle is known as "quorum sensing," where pathogens living in the host at low levels can sense changes in norepinephrine (a hormone produced during stress) and begin to multiply. Although some stress is likely inevitable in raising dairy heifers, this should be kept to a minimum. Providing good nutrition and keeping calves on a consistent feeding schedule will go a long way toward helping mitigate the deleterious effects of stress on calf health.

References available upon request.

# She's Weaned. Now What?

#### T.P. TYLUTKI, Agricultural Modeling and Training Systems LLC

Whether you are a dairy producer raising your own heifers or a custom heifer grower, the objectives are the same. Raise a heifer that weighs >80% of mature weight at calving with a body condition score (BCS) around 3, has had minimal insults to give her the best chance of longevity and at a low/reasonable cost. Unfortunately, the low-cost objective typically overwhelms many — resulting in undersized or older heifers at calving. Failure to achieve these objectives reduces her longevity and tends to be more expensive (financially and environmentally).

This paper discusses growth and growth efficiency leading to several feeding options and recommendations.

#### Growth

Before we can talk about growth, we must ask ourselves what are we trying to achieve? The first step in answering this is what is our target animal. It is well documented that body weight in relation to mature weight represents the ideal method to set growth goals. The relationship also relates to milk production in first-lactation versus mature cows. Thus, it is extremely unfortunate (and frustrating) that very few producers have animal scales. Mature weights vary by herd and over time. An example is data from the Cornell research herd where mature weights averaged 1,472 pounds in 1993. In 2016, this increased to 1,710 pounds — an increase of about 1% per year. Schmidtmann et al. (2023) reported positive genetic correlations between milk production and body depth, dairy character and stature. Guinan et al. (2023) reported that, since the introduction of genomics, the generational interval related to genetic gains has decreased more than 50%. In other words, with bulls in service between 1990 and 2010, one generation change took seven or eight years. Since 2015, generational change has averaged three to four years. This is clearly evident as we look at how milk fat and protein have increased rapidly the last several years with many herds averaging >4.2% fat and >90 pounds of daily milk. These rapid changes introduced a challenge: cows have increased in size. What do we use for target weights now?

During post-weaning, there are four discrete growth periods. They are: 6-7 months of age, 7 months through first breeding, first 190 days of gestation and the last 90 days of gestation. Manipulating age at first calving (AFC) focuses on performance up to breeding. Once they are pregnant, there are only 280 days to reach the target weight. Table 1 shows the required average daily gain (ADG), in pounds per day, from weaning through breeding for different AFC and mature weights. As mature weight increases (e.g., 1,400 to 1,600 pounds), target pre-breeding ADG for a

24-month-old AFC increases 0.2 pound per day. As Table 2 shows, for that same change in mature weight, bred heifer ADG also increased 0.2 pound per day. Knowing mature weights is critical for goal setting. Knowing body weights at several points (e.g., birth, weaning [or 90 days], first breeding and calving [or 6-8 weeks pre-calving]) are our performance measures.

Illustrating these phases, we generated metabolizable energy (ME) and metabolizable protein (MP) requirements for growing heifers with a 24-month-old AFC gaining 800 grams per day (1.76 pounds per day), utilizing AMTS.Cattle.Professional. Then, we expressed these requirements per kilogram of predicted dry matter intake (DMI; Figure 1). The discrete growth phases become apparent. Heifers from weaning through 6 or 7 months of age have requirements (on a density basis) similar to cows producing >90 pounds of milk (daily basis). Two- and 3-month-old heifer requirements are the highest of any time in their life. The first two trimesters of pregnancy represent the lowest required density of the heifers' lives - followed by the last trimester when requirements of the conceptus increase exponentially. In Table 2, there are two ADG columns. The first represents what the heifer herself must grow throughout gestation. The second represents the last trimester and is the combination of the heifer and conceptus. If heifers were weighed with scales during the last trimester, ADG calculated represents the heifer and conceptus.

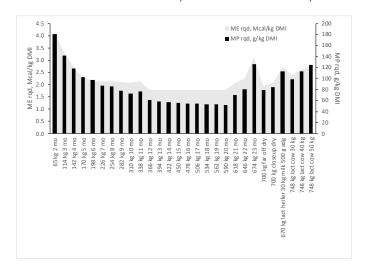


Figure 1. ME (Mcal/kg DMI) and MP (g/kg DMI) required by age for growing heifers (800 g/d) and selected dry and lactating cows

MATURE WEIGHT	BREEDING WEIGHT	90-DAY WEIGHT	AGE AT FIRST CALVING (MONTHS)		
POUNDS	POUNDS	POUNDS	22	24	26
1,200	660	180	1.58	1.32	1.13
1,400	770	210	1.84	1.54	1.32
1,600	880	240	2.11	1.75	1.50
1,800	990	270	2.37	1.97	1.69
2,000	1,100	300	2.63	2.19	1.88

Table 1. ADG (pounds/day) pre-breeding required to achieve 22, 24 or 26 months (AFC) for various mature weights

MATURE WEIGHT	BREEDING WEIGHT	CALVING WEIGHT	ADG	"ADG"
POUNDS	POUNDS	POUNDS	POUNDS PER DAY	LAST TRIMESTER
1,200	660	984	1.16	1.83
1,400	770	1,148	1.35	2.13
1,600	880	1,312	1.55	2.44
1,800	990	1,476	1.74	2.74
2,000	1,100	1,640	1.94	3.05

Table 2. ADG required of bred heifers for various mature weights

The pre-breeding phase, especially heifers less than 6 months old, is the most efficient phase for protein utilization. It is during this phase where a large proportion of muscle and skeletal growth occurs. Figure 2a, calculated from the 1996 Nutrient Requirements of Beef Cattle (NRC), illustrates body composition from birth through maturity. Where the protein and fat curves intersect is about puberty, showing that puberty is related to stage of maturity. Figure 2b illustrates efficiency of protein utilization for growth (INRA 1989). The combination of these figures reinforces how efficient and protein demanding younger animals are.

Body composition has genetic and nutritional components. The potential number of muscle cells is set at birth. Primary muscle cells are determined within two months of conception. Secondary muscle cells are set between the second and seventh month of gestation. Fat cells begin to develop with

the secondary muscle cells. Post-birth, visceral fat cells will continue to form for a couple weeks. Subcutaneous and intermuscular fat cell creation continues until about 150 days of age. Intramuscular fat cells will continue to form until about 250 days old. Thus, the number of cells is heavily influenced by dam management and nutrition via epigenetics (Costa et al. 2021). Nutritionally, we cannot alter muscle cell numbers, but their potential use can be limited via underfeeding energy and/or amino acids or environmental/health stress. Given the extended development of fat cells, it appears protein-deficient, high-energy diets may result in earlier and greater fat deposition. We observed this in Argentina with feedlot cattle.

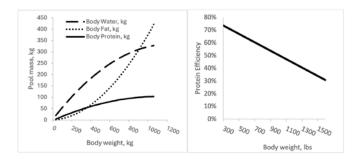


Figure 2. (a) Body composition curves generated from NRC (1996) and (b) Efficiency of protein utilization for gain (INRA, 1998)

The challenge with most heifers, primarily those post-puberty through second trimester of gestation, is the potential for them to get fat. Almost everyone thinks this is related to excessive energy intake, lack of exercise, lack of protein fed, or "you can't feed silages to heifers." There are two specific nutrients to consider, neither of which can be overcome by formulation or feeding additional protein.

First is the amount and type of starch. Starch that is fermented in the rumen is excellent (unless we overdo it and end up in acidosis). This produces microbial protein and primarily propionate, which is then converted to glucose post-absorption. Starch that escapes the rumen is a challenge, however. Here, it tends to be used primarily for adipose metabolism. Up to 40% of it never leaves the "gut" and we can see increases in body condition.

The second nutrient is one that is never discussed: lactic acid. Typically, we only think about lactic acid in clinically acidotic animals, but what about all the lactic acid an animal consumes from the diet? Silages contain 1.5 to >10% lactic acid. The level of lactic acid in silages depends on forage species, stage of maturity, moisture level and type of silage inoculant used. Some of this lactic acid will be used by specific rumen microbes. The rest will be absorbed. Smith and Crouse (1984) reported that 15-35% of the acetyl units (basically the building blocks) in intramuscular and subcutaneous fat in dairy cows comes from lactic acid. Whitehurst et al. (1981) reported that, in

cattle 11-19 months of age, subcutaneous, intramuscular and intermuscular fat synthesis from lactate increased until 17 months of age. Feedlot trials of Lomas (1979) suggested that increasing dietary lactic acid by approximately 2 percentage points (e.g., 4 to 6% dry matter) increases carcass fat by 2 units (e.g., 28 to 30%). Overall, it becomes clear that heifers fed higher-quality silages (typically high lactic acid) are prone to increased fat deposition. It is important to note that NRC (2001) and NASEM (2021) do not consider lactic acid in formulation or animal development/growth.

#### Options/Recommendations

The objective of any raiser (on a dairy or custom grower) is to produce a heifer of the correct size/BCS at the lowest cost per pound of gain. This begins before the calf is born with adequate dry cow nutrition and management. A great example of this is heat stress abatement where it has been shown that calves born to heatstressed dry cows produce less milk in first and second lactations. Birth until 3 months of age are discussed routinely and many of us are now targeting a minimum of tripling birthweight by day 90.

Returning to Figure 1, the 3- to 6-month-old heifer offers immense opportunity to maximize frame and muscle growth. The simplest for dairies raising their own heifers is to feed these animals the high-cow total mixed ration (TMR). It matches their nutrient density requirements. Using current feed prices (New York State), this equates to approximately \$0.65 per

pound of gain (2.55 pounds ADG predicted). I followed this approach on a dairy for more than 20 years and we routinely averaged 2.64 pounds ADG from day 60 through 6 months. Additionally, as a drop from a cow pen, the cost for producing the TMR (labor, equipment, fuel) was diluted versus making a dedicated batch - a cost seldom considered. Where the high-cow TMR cannot be used, formulating a diet with similar nutritional qualities is necessary. Something difficult to place is a "feed cost/animal response" value. We have observed that heifers fed the high-cow diet tended to have lower incidence of respiratory disease and ringworm versus lower spec diets. Regardless, for us to reduce AFC, pre-pubertal growth must increase. This farm averaged 21-month AFC for more than 20 years; thus, heifers averaged nearly 2.0 pounds ADG from birth to calving.

A second option is formulating a diet for a heifer that is 9-12 months of age. From weaning until 6 months of age, a top-dress grain is fed at a flat 5 pounds per head. Table 3 contains an example top-dress that when fed at 5 pounds with 3.5 pounds dry matter (DM) corn silage and 3.0 pounds DM grass silage supports 2.60 pounds ADG at 3 months. The formula includes a bypass protein source. Achieving higher rates of gain may require these ingredients. Notice that there is zero urea. Typically, urea is not required in any of these diets as it does not supply true protein. Urea only provides nitrogen (as ammonia) to the rumen microbes. The ammonia will come from silages, rumen degradable protein (RDP) and nitrogen recycled by the animal.



INGREDIENT	% MIX (AS FED)	NUTRIENT	VALUE
GROUND CORN	44.6	Crude protein	27.0 %DM
CANOLA	29.7	Starch	34.6 %DM
SOY PLUS	22.0	ME	1.1 Mcal/pound
MINERALS/ VITAMINS	3.7	RUP*	48.5 %CP

<sup>\*</sup>RUP=rumen undegradable protein

Table 3. Example top-dress formula and selected nutrients for 3- to 6-month old heifers

Starting at 6 months, my heifer diets contain higher levels of forage neutral detergent fiber (NDF). The primary source is a lower-quality grass silage. I do this so we can feed ad libitum (forage NDF % body weight between 1.1 and 1.4) and maintain desired ADG and BCS. I prefer this to limit feeding as there is research suggesting negative social behavior in limit-fed heifers (Goeller et al. 2023).

There are additional benefits to reducing AFC. First, the number of heifers a dairy requires is reduced. For every 1,000 cows with a 35% cull rate, reducing AFC by 3 months (e.g., 24 to 21 months old) reduces heifer

inventory needs by 48 animals. This would reduce total feed requirements and manure production as well. Similarly, as a grower, this increases annual animal turnover by 12.5% with no additional infrastructure.

#### Conclusions

Heifers are expensive. Raising them faster reduces fixed costs per animal and can produce a superior animal. When evaluating options, consider cost per pound of gain. The increasing environmental pressure we are under also needs to be considered. Increasing ADG appropriately (i.e. not making short, fat heifers) will also reduce nitrogen excretion, phosphorus excretion and methane production per pound of ADG.

Re-evaluate the target weights you are using, given the genetic changes in dairy breeds. Feed to capture growth efficiency and to reach the target calving weight four to six weeks pre-calving. Properly formulated diets that are high fill can be a challenge but achievable. Also, start watching lactic acid levels in diets and target less than 4% DM to avoid fat deposition.

As a dairy producer or custom heifer grower, contracts and management decisions should be performance based, not purely cost per day. A dairyman once told a tour group, "Until that heifer starts milking, we are in the beef business. We need to grow them as fast as we can without getting them fat." That is sage advice.

References available upon request.



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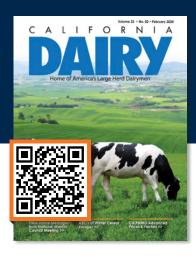
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