To Ensure a More Successful Lactation, The Vital 90™ Days Make a Difference

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Transition Cow
Transition Period

- Has been defined as the period of 3 weeks prepartum to 3 weeks postpartum
Transition Period

Going Through a Change...

- Fetal growth
- DMI dropping
- Colostrum production
- Hormonal changes
- Calving
- Rapid increase in milk production

Energy Balance

- Energy requirements for lactation essentially double after freshening

Energy Demand

<table>
<thead>
<tr>
<th>Variable</th>
<th>-19</th>
<th>-11</th>
<th>11</th>
<th>22</th>
<th>33</th>
<th>83</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMI, kg</td>
<td>9.7</td>
<td>9.8</td>
<td>14.1</td>
<td>16.9</td>
<td>19.4</td>
<td>21.8</td>
</tr>
<tr>
<td>Milk, kg</td>
<td>...</td>
<td>...</td>
<td>36.3</td>
<td>41.9</td>
<td>44.0</td>
<td>41.0</td>
</tr>
<tr>
<td>Liver net glucose output, g/d</td>
<td>1257</td>
<td>1356</td>
<td>2760</td>
<td>3283</td>
<td>3499</td>
<td>3650</td>
</tr>
</tbody>
</table>

1 Reynolds, C.K. et al., 2003. Splanchnic Metabolism of Dairy Cows During the Transition. JDS 86 1201
### Energy Demand

Measured glucose supply vs. estimated demands

<table>
<thead>
<tr>
<th>Variable</th>
<th>Day relative to calving</th>
</tr>
</thead>
<tbody>
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<td></td>
<td>-19</td>
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Transition Period

Going Through a Change...

- Fetal growth
- DMI dropping
- Colostrum production
- Hormonal changes
- Calving
- Rapid increase in milk production

Energy Balance

- Energy requirements for lactation essentially double after freshening\(^1\)
- Feed intake is inadequate to support milk production\(^2\)

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1 Reynolds, C.K. et al., 2003. Splanchnic Metabolism of Dairy Cows During the Transition. JDS 86 1201
2 Grummer RR. 1995. Impact of changes in organic nutrient metabolism on feeding the transition dairy cow. JDS 73: 2820-2833
Energy requirement, energy intake, and energy balance of control cows during the transition period

2 Grummer RR. 1995. Impact of changes in organic nutrient metabolism on feeding the transition dairy cow. JDS 73: 2820-2833
Early Lactation Energy Balance in Dairy Cows on a Low vs. High Starch Diet, Weeks 1-9

Main effect $P < 0.001$

- High Starch
- Low Starch

Trt $\times$ Wk $P < 0.001$
Transition Period

Going Through a Change...
- Fetal growth
- DMI dropping
- Colostrum production
- Hormonal changes
- Calving
- Rapid increase in milk production

Immune Function
- Dysfunctional immune response
- Impaired neutrophil function

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Impaired Neutrophil Function

Transition Period

Going Through a Change...
• Fetal growth
• DMI dropping
• Colostrum production
• Hormonal changes
• Calving
• Rapid increase in milk production

Immune Function
• Immunity is more than just vaccines
• It is a whole-body system that protects the cow from disease
• There are two main branches of the immune system
  – Innate
  – Acquired
Immunity is a whole-body system that protects the cow from infections

Two Major Branches of the Immune System

Acquired Immunity
This is what most producers think about for their herd – things like vaccines and antibodies

Innate Immunity
This is the first cellular line of defense against bacterial invasion, where macrophages and neutrophils respond to quickly kill bacteria

Tizard IR. Veterinary Immunology. 9th ed. St Louis, MO: Elsevier Inc; 2013:1-10, 30-51.
Immunity is a whole-body system that protects the cow from infections.
Immunology – Innate vs. Acquired

- Innate Immune System
  - Non-specific
  - Immediate
  - No memory
  - Phagocytes
    - Neutrophil
    - Macrophage

- Acquired Immune System
  - Specific
  - Days to weeks
  - Memory and tolerance
  - Lymphocytes
    - Humoral immunity
    - Cell mediated immunity
Innate Immune System

Phagocytic Cells

• Macrophage
  – Sentinel Cell

• Neutrophil
  – End stage cell, 1-2 day lifespan

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Periparturient Immune Suppression

- Endocrine changes & physiologic stress during transition lead to dysfunctional immune responses
- This immune dysfunction is multifactorial and is related to:
  - Hypocalcemia
  - Glucocorticoids
  - Insufficient energy (glucose)
  - Elevated ketones and non-esterified fatty acids (NEFA)
- Adequate nutrition, a clean environment, and management decisions help manage immune function in the periparturient period

1 Vet Clin Food Anim 29 (2013) 267-278
Management Implications

• All transition dairy cows go through a period of Negative Energy Balance and Immune Suppression

• The issues are:
  – the degree (how much)
  – the success of adaptation (how long)
Management Implications

• Successful lactations are the result of well-managed energy balance and immune function around calving.

• Setting the cow up for a successful lactation begins at dry off, well before the next lactation.
Management Implications

• The cow goes through many transition periods over approximately a 90 day timeframe
  – Not a single time period
  – A 90 day collection of transition periods that have interrelated events influencing either productive or non-productive outcomes in the lactation

• The critical period from dry-off to early lactation is known as The Vital 90™ Days
• Disease that occurs in the 30 days after calving can be a result of how the cow is managed in the 60 days before calving

• What diseases are a concern to you and your dairy clients in the 30 days after calving?
The Impact and Consequences of Negative Energy Balance and Immune Suppression

The Impact and Consequences of Negative Energy Balance and Immune Suppression¹⁻⁵

The Impact and Consequences of Negative Energy Balance and Immune Suppression

The Impact and Consequences of Negative Energy Balance and Immune Suppression\textsuperscript{1-5}

**Negative energy balance**

- **Immune suppression**
  - **Mastitis**
  - **Retained placenta**
  - **Metritis**

- **Death**
- **Culling**
- **Reproductive disorders**

- **Displaced abomasum**
- **Ketosis**
- **Ovarian dysfunction**

**Denotes tentative association**

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Dairy producers devote a considerable amount of time and effort to prevent and treat disease during The Vital 90 Days.

What Can You Do to Minimize Negative Energy Balance and Immune Suppression During The Vital 90 Days?

- Management Practices
- Vaccination Programs
- Dietary Adjustments and Feed Supplements
- Mastitis Control and Prevention Practices
- Monitoring Programs
The Vital 90 Days Timeline Activity

• What actions....
  ....do dairy producers take to prevent and treat disease during The Vital 90 Days?
  ....what do you estimate these actions cost (per cow calving)?
  ....are you considering taking?
The Vital 90 Days Timeline Activity
The Vital 90 Days Investment Activities

• Taking action during the 60 days before calving and 30 days after helps protect the health and production potential of the entire herd

• Nearly all of these actions are attempts to address either
  – Negative Energy Balance\(^1\)
  – Immune Suppression\(^2\)

Negative Energy Balance and Immune Suppression Impacts

Impact on the Cow
- Health
- Well-being
- Production

Impact on the Farm
- Frustrations
- Profitability
- Success
The Vital 90 Days Are Critical

• It begins with a clear understanding of the interrelated risks and challenges she encounters during The Vital 90 Days

60 days before calving + 30 days after calving

• Look beyond the traditional transition period, and focus on managing The Vital 90 Days – when multiple transitions occur
• Disease that occurs in the 30 days after calving can be a result of how the cow is managed in the 60 days before calving
Recommendations for Recording and Calculating the Incidence of Selected Clinical Diseases of Dairy Cattle (Kelton et al 1998)

• What diseases?

• A survey of 13 agencies, organizations, and systems in the recording of the diseases of dairy cattle was conducted in 1996

• 326 independently named conditions

• 1,600 literature citations

Recommendations for Recording and Calculating the Incidence of Selected Clinical Diseases of Dairy Cattle (Kelton et al 1998)

What diseases?

- Milk Fever
- Retained Placenta
- Metritis
- Ketosis
- Left Displaced Abomasum
- Cystic Ovarian Disease
- Lame - Foot and leg problems
- Clinical Mastitis

Recommendations for Recording and Calculating the Incidence of Selected Clinical Diseases of Dairy Cattle (Kelton et al 1998)

What diseases are associated with The Vital 90 Days?

- Milk Fever
- Retained Placenta
- Metritis
- Ketosis
- Left Displaced Abomasum
- Cystic Ovarian Disease Ovarian Dysfunction
- Lame - Foot and leg problems
- Clinical Mastitis

50% of cows experience at least one of these conditions during transition.
Disease Records for Impactful Decisions During The Vital 90 Days

- Define
- Describe
- Detect and Monitor
- Decide: Record and Treat
- Analyze
- Decide: Herd Health Program
Define Disease

CHECK HER OUT FOR CLINICAL MASTITIS
REvisa si tiene MASTITIS CLínICA

Three easy questions help check cows for clinical mastitis.
Tres preguntas sencillas ayudan a comprobar si las vacas tienen mastitis clínica.

1. Is the milk abnormal in appearance (watery, flakes, clots)?
   ¿La leche se ve anormal (grumos, coágulos, se ve aguada)?

2. Does the udder have signs of inflammation (pain, swelling, redness, heat, firmness)?
   ¿La ubre tiene signos de inflamación (dolor, hinchazón, enrojecimiento, calor)?

3. Is she acting sick (fever, not eating, depressed)?
   ¿La vaca actúa como enferma (fiere, no está comiendo, deprimida)?

RECORD THE CLINICAL MASTITIS EVENT IN THE DAILY FARM RECORDS.
- ID of the case and date of the event
- Note which quarter is affected
- Note the severity (mild, moderate, or severe) of the case

ANOTA EL EVENTO DE MASTITIS CLINICA EN EL SISTEMA DE INFORMACIÓN DIARIA DE LA LECHERÍA.
- Número de identificación de la vaca y fecha del evento
- Anota cuál es el cuarto afectado
- Anota el grado de severidad del cuarto (leva, moderado o severo)

NOTIFY THE LEAD HERDSPERSON THAT A NEW CASE OF CLINICAL MASTITIS HAS BEEN FOUND SO THAT A TREATMENT DECISION CAN BE MADE.
NOTIFICA A LA PERSONA ENCARGADA QUE SE HA ENCONTRADO UN NUEVO CASO DE MASTITIS CLÍNICA PARA TOMAR UNA DECISIÓN SOBRE EL TRATAMIENTO.

NUMBER OF "YES" ANSWERS DETERMINES SEVERITY:
0: no clinical mastitis  1: mild  2: moderate  3: severe

El número de respuestas con "Sí" determina el grado de severidad:
0: no tiene mastitis clínica  1: leve  2: moderada  3: severa

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The VITAL 90

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Metritis (METR)

- Clinical metritis is recognized by an abnormal (smelly and watery) uterine discharge within 21 days of calving. On palpation per rectum, the uterus appears flaccid, not contracting normally, and fluid filled.
  - Mild Clinical Metritis is metritis without a fever or other clinical signs apart from the uterine changes.
  - Severe Clinical Metritis is metritis with the presence of clinical signs that may include fever, depression, and lack of strong appetite.
Summary

- Dairy producers make significant investments in their cows during The Vital 90 Days
- Every cow experiences some degree/duration of Negative Energy Balance and/or Immune Suppression
- Every cow is at-risk for transition disease consequences related to Negative Energy Balance and/or Immune Suppression
- Successful strategies during The Vital 90 Days lead to successful dairy operations
Thank you!

Questions?