

## **OPEN YOUR BOOKMARKS FEATURE IN ACROBAT**

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## **January 2016 BOARD APPROVED CE**

- **Continuing Education Approval Requests – Veterinarians:**

Ms. Jones moved to accept the following continuing education with changes:

- A. Michigan VMA-Animal Welfare Conference, 11/23/2015 = **Hour for Hour**
- B. Kansas State University College of VetMed-Parasitic Gastrointestinal Diseases in Small Ruminants, 12/01/2015 = 0.5 hour
- C. Nashville Academy of Veterinary Medicine-Diabetes Management, 12/08/2015 = 2 hours
- D. Vetfolio/AAHA-
  - 1. Approach to the Ataxic Horse, 12/03/2015 = 1.5 hours
  - 2. Canine Hypothyroidism: Recognition and Management, 12/04/2015 = 1 hour
  - 3. Managing the Uncomplicated Feline Diabetic, 12/07/2015 = 1 hour
  - 4. What Do You Believe: Heartworm, 12/09/2015 = 1.5 hours
- E. Veterinary Oncology-Clinical Pathologic Conference, 12/09/2015 = 1 hour
- F. Chi Institute- **Hour for Hour – Non-Scientific**
  - 1. Certified Veterinary Acupuncture
    - a. Session 1, 01/01/2016 – 02/03/2016, ONLINE = 20 hours
    - b. Session 2, 02/4-7/2016 = 30 hours
    - c. Session 3, 02/08/2016-04/13/2016. ONLINE = 20 hours
    - d. Session 4, 04/14-17/2016 = 30 hours
    - e. Session 5, 06/23-26/2016 = 30 hours
  - 2. TCVM Diagnostics
    - a. Small Animal, 01/28-30/2016 = 20 hours
    - b. Small Animal, 01/01/2016-03/30/2016, ONLINE = 8 hours
    - c. Equine, 01/21-23/2016 = 20 hours
    - d. Equine, 01/01/2016-03/30/2016, ONLINE = 8 hours
  - 3. Certified Food Therapy
    - a. 03/10-13/2016 = 28 hours
    - b. 01/01/2016-12/31/2016, ONLINE = 28 hours
  - 4. Veterinary Herbal Medicine Program
    - a. Certified Herbal Medicine Intro, 01/01/2016-12/31/2016 ONLINE = 15 hours
    - b. Certified Veterinary Herbal Gastrointestinal, 01/01/2016-12/31/2016 ONLINE = 28 hours



- c. Certified Veterinary Herbal Respiratory/Cardio, 01/01/2016-12/31/2016  
ONLINE=28 hours
- d. Certified Veterinary Herbal Med Liver/Endocrinology, 01/01/2016-12/31/2016 ONLINE=28 hours
- e. Certified Herbal Medicine  
Kidney/Geriatric/Urinary/Reproductive, 01/01/2016-12/31/2016  
ONLINE = 28 hours
- f. Certified Herbal Medicine Dermatology/Oncology/Immune-mediate  
Diseases, 01/01/2016-12/31/2016 ONLINE = 28 hours
- g. Certified Veterinary Herbal Medicine  
Kidney/Geriatric/Urinary/Reproductive, 03/31/2016-04/03/2016 = 28  
hours
- h. Certified Veterinary Herbal Medicine Cardiovascular/Respiratory,  
11/17-20/2016 = 28 hours

G. Ohio Dairy Veterinarians-Social Media, Genetics and Reproduction, 01/07-09/2016 = **Hour for Hour**

H. Kansas State University Vet Med Online Seminar Series-

- 1. Herd Dilemmas for Sheep and Goat Veterinarians, 12/15/2015 = 0.5 hours
- 2. Neurologic Diseases of Small Ruminants, 12/16/2015 = 0.5 hours
- 3. Mycoplasma Haemollamae in Camelids, 12/17/2015 = 0.25 hours
- 4. Weight Loss in Camelids, 12/21/2015 = 0.5 hours

I. VCA Great Lakes Veterinary Specialists-Fracture Management: When to Cast and When to Plate, 01/27/2016 = 1 hour

Dr. Riker-Brown seconded the motion. The motion passed by the following roll call vote: Dr. Kolb – aye, Dr. Salinger – aye, Mr. Heston – aye, Dr. Redman – aye, Ms. Jones- aye, Dr. Riker-Brown - aye.

- **Continuing Education Approval Requests – Registered Veterinary Technicians:** None

- **Continuing Education Approval Requests – Vets & RVT's:**

Ms. Jones moved to accept the following continuing education with changes:

A. Summit County VMA –

- 1. Thoracic Radiography, 01/28/2014 = 2 hours
- 2. Joint Infections, 04/29/2014 = 2 hours
- 3. The Affordable Care Act and Fair Labor Laws, 05/27/2014 = 2 hours
- 4. Strokes and Seizures, 09/30/2014 = 2 hours
- 5. Platelet Problems, 10/29/2014 = 2 hours
- 6. Dental Tips and Tricks, 11/25/2014 = 2 hours

7. Greyhound Medicine, 04/28/2015 = 2 hours
8. Upper Airway Surgery, 05/26/2015 = 2 hours
9. Glaucoma, 09/29/2015 = 2 hours
10. Food Allergy Dermatitis, 10/27/2015 = 2 hours
11. Immunosuppressive Drugs for Immune-mediated Diseases, 11/24/2015 = 2 hours

B. Central Ohio Veterinary Medical Association-The Truth About Heart Worm Disease and the New Ora Vet Chews, 12/01/2015 = 2 hours

C. Zoetis Animal Health-

1. Overview on Peri-Operative Protocols; Pain Management and Sedation, 12/01/2015 = 2 hours
2. What's Bugging the Cat, 12/01/2015 = 2 hours

D. MedVet Medical and Cancer Centers for Pets-

1. Critical Care Rounds-Comprehensive Case Discussions, weekly starting 10/14/2015 = 0.5 hours
2. Anesthesia Monitoring, 11/16/2015 = 1 hour
3. Ophthalmology Wet Lab, 11/20/2015 = 0.5 hours
4. Ophthalmology Wet Lab & Videoconference Presentation, 11/20/2015 = 1 hour
5. The Cutting Edge of Radiation Oncology, 11/25/2015 = 1 hour
6. Indirect Blood Pressure Monitoring, 11/30/2015 = 0.5 hours
7. Radiology Techniques and Safety, 12/02/2015 = 2 hours
8. Surgery and Anesthesia Seminar, 12/06/2015 = 3.5 hours
9. Ferrets: Not your Average Adrenocortical Disease, 12/09/2015 = 1 hour

E. Lima Area Academy of Small Animal Medicine/Merial-Dental Extractions, 11/10/2015 = 2 hours

F. Animal Clinic Northview-2016 Biannual Breeders Symposium, 02/20/2016 = **Hour for Hour**

G. On-Line Continuing Ed, LLC- **Hour for Hour – Non-Scientific**

1. Diagnosis and Treatment in Equine Medicine 201, on going-ONLINE = 6 hours
2. Diagnosis and Treatment in Equine Medicine 202, on going-ONLINE = 6 hours
3. Diagnosis and Treatment in Equine Medicine 203, on going-ONLINE = 6 hours
4. Diagnosis and Treatment in Equine Medicine 204, on going-ONLINE = 6 hours
5. Diagnosis and Treatment in Equine Medicine 205, on going-ONLINE = 6 hours

6. Diagnosis and Treatment in Equine Medicine 206, on going-ONLINE = 6 hours
7. Diagnosis and Treatment in Equine Medicine 207, on going-ONLINE = 6 hours
8. Diagnosis and Treatment in Equine Medicine 208, on going-ONLINE = 6 hours
9. Natural Veterinary Medicine 201, on going-ONLINE = 6 hours
10. Natural Veterinary Medicine 202, on going-ONLINE = 6 hours
11. Natural Veterinary Medicine 203, on going-ONLINE = 6 hours
12. Natural Veterinary Medicine 204, on going-ONLINE = 6 hours
13. Veterinary Acupuncture 201, on going-ONLINE = 6 hours
14. Veterinary Acupuncture 202, on going-ONLINE = 6 hours
15. Veterinary Acupuncture 203, on going-ONLINE = 6 hours
16. Veterinary Acupuncture 204, on going-ONLINE = 6 hours
17. Common Diseases of Companion Animals 201, on going-ONLINE = 6 hours
18. Common Diseases of Companion Animals 202, on going-ONLINE = 6 hours
19. Common Diseases of Companion Animals 201-202, on going-ONLINE = 12 hours

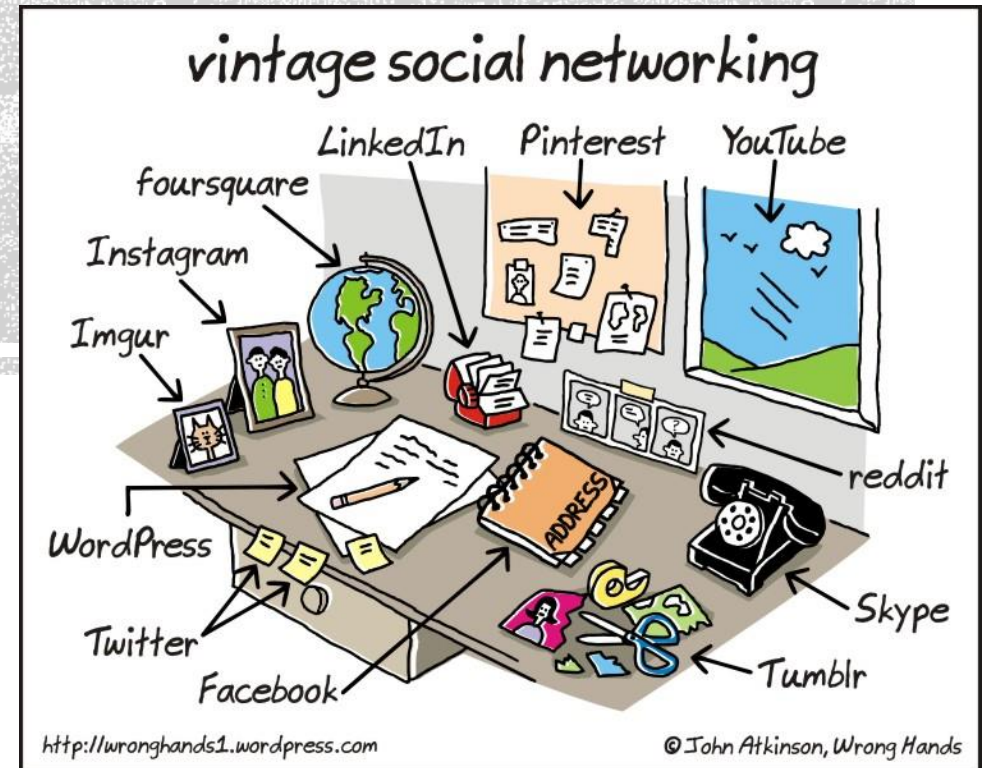
H. VCA Great Lakes Veterinary Specialists-. What To Do With A Red Eye,  
Various dates in 11/2015 and 12/2015 = 1 hour

Dr. Riker-Brown seconded the motion. The motion passed by the following roll call vote: Dr. Kolb – aye, Dr. Salinger – aye, Mr. Heston – aye, Dr. Redman – aye, Ms. Jones- aye, Dr. Riker-Brown - aye.

# MECHANICS OF SOCIAL MEDIA

Joy Sizemore  
Veterinary Student

The Ohio State University  
College of Veterinary  
Medicine



# I HAVE CROSSED OVER ...



# COMMUNICATION WEB

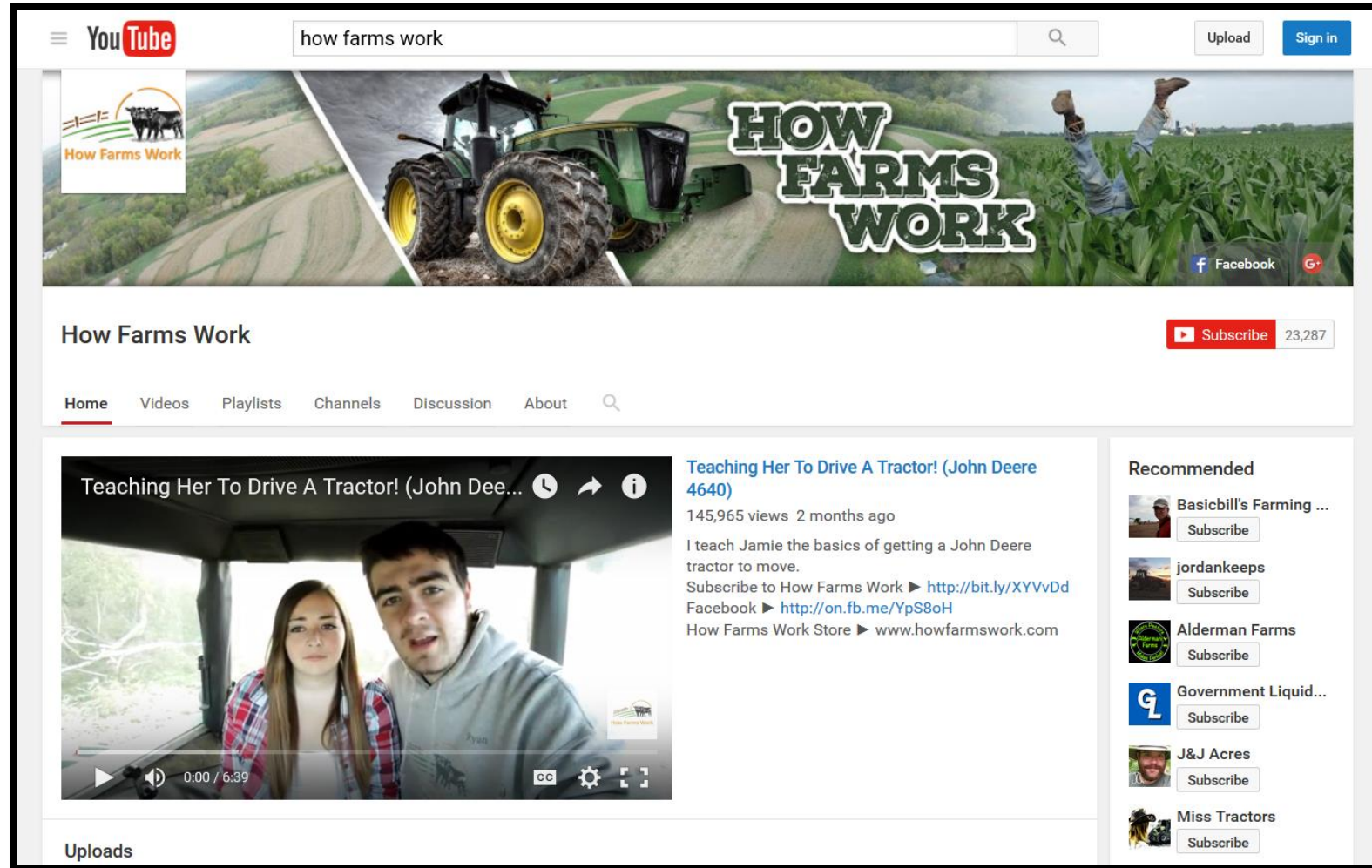


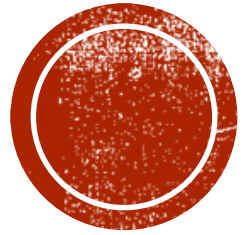


# HOW DO YOU USE SOCIAL MEDIA?

## ■ HowFarmsWork

- “We're a YouTube channel dedicated to showing people who weren't born on a farm what the farming life is like.”
- Amarillo Sky – How Farms Work
  - <https://www.youtube.com/watch?v=DVs-j3t6noQ>
- Teaching Her to Drive a Tractor
  - <https://www.youtube.com/watch?v=-Vxkrwdhsyg>





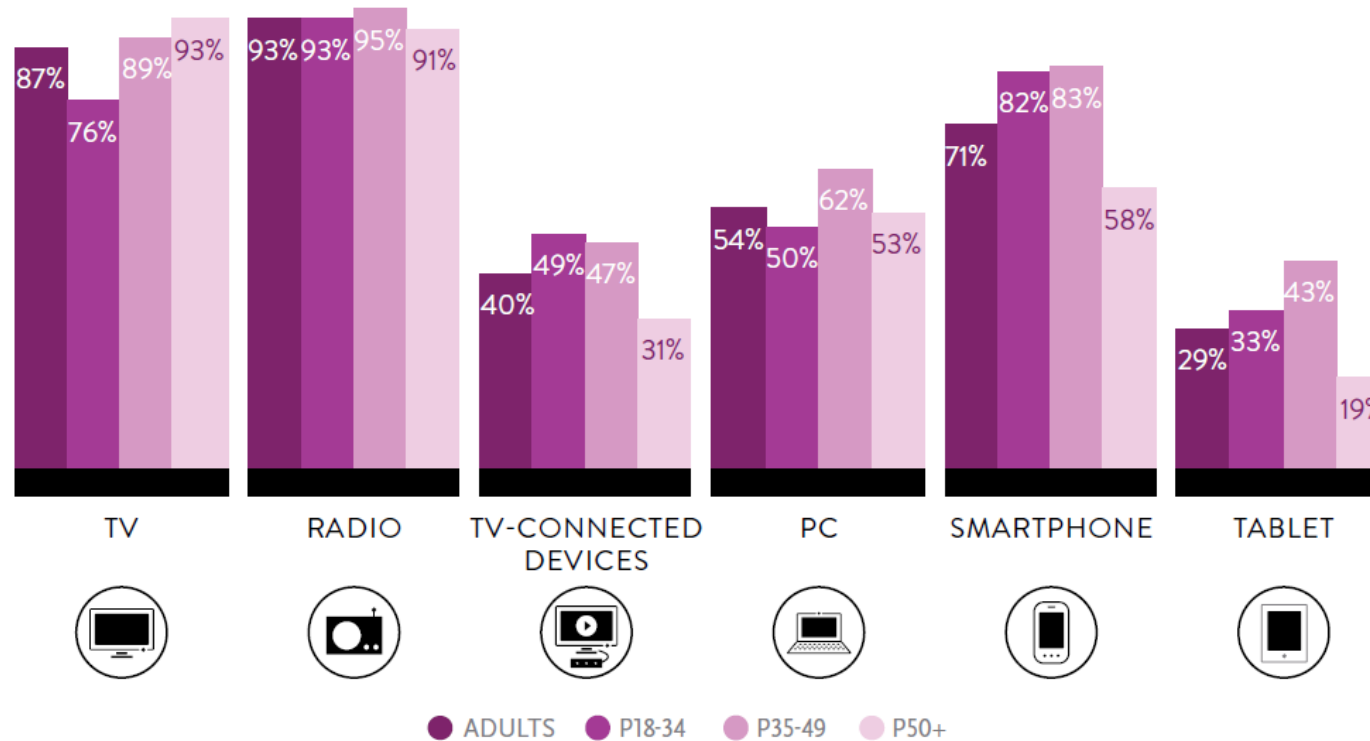
**THE STATS DON'T LIE**





# WHICH DIGITAL DEVICES?

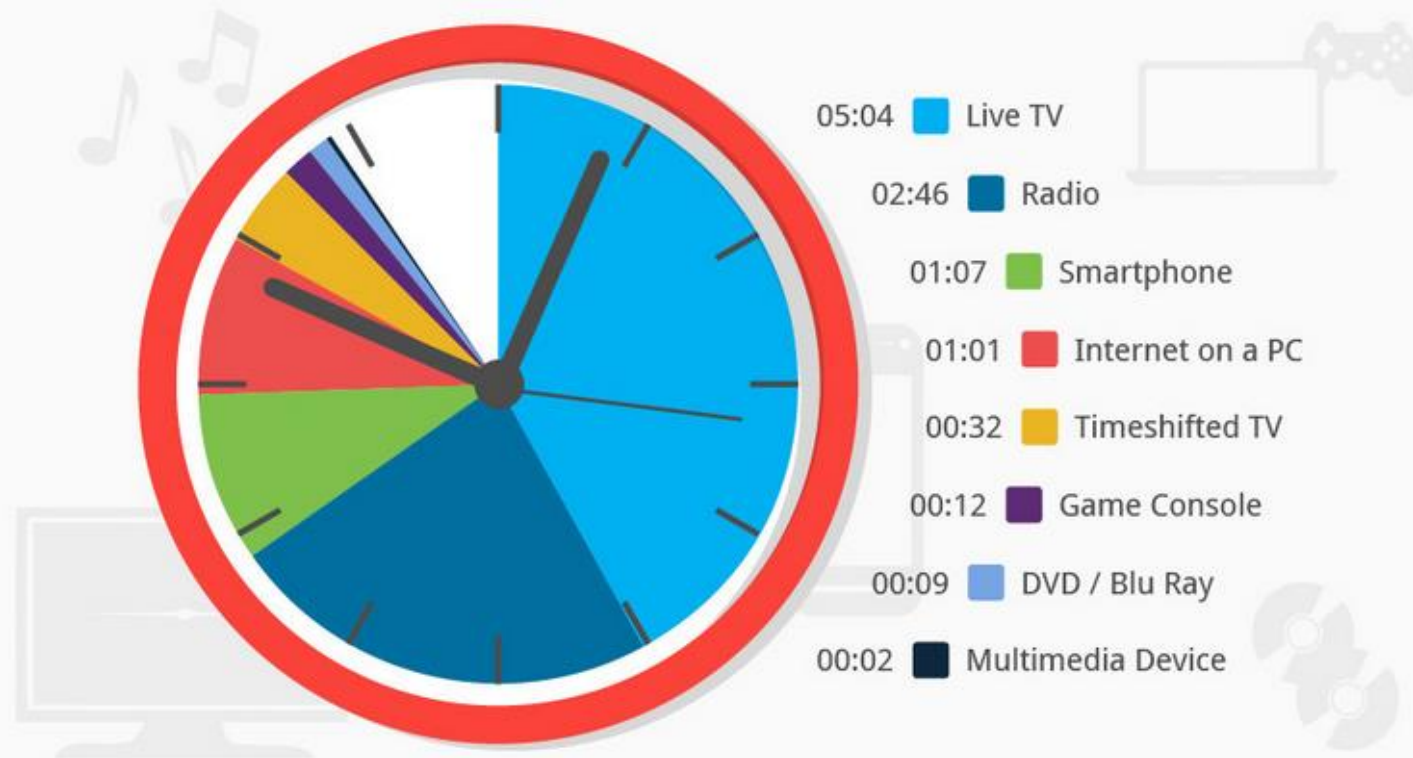
## Weekly Reach (% of Population)



# HOW MUCH TIME?

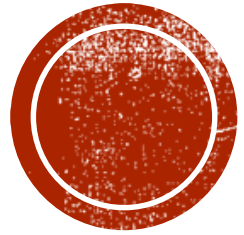
## Americans Spend 11 Hours A Day With Electronic Media

Average time American adults (18+) spend with electronic media in Q4 2013 (hours:minutes)



Source: Nielsen

Mashable statista



**HERE'S THE BASICS**



# DEFINITIONS:

## ■ Social Media Platforms





# FACEBOOK

- **Feed**

- News Feed, Pages Feed

- **Direct Message/Personal Message**

- “For sale, 20 year old tube television, please DM me for details.”

- Post

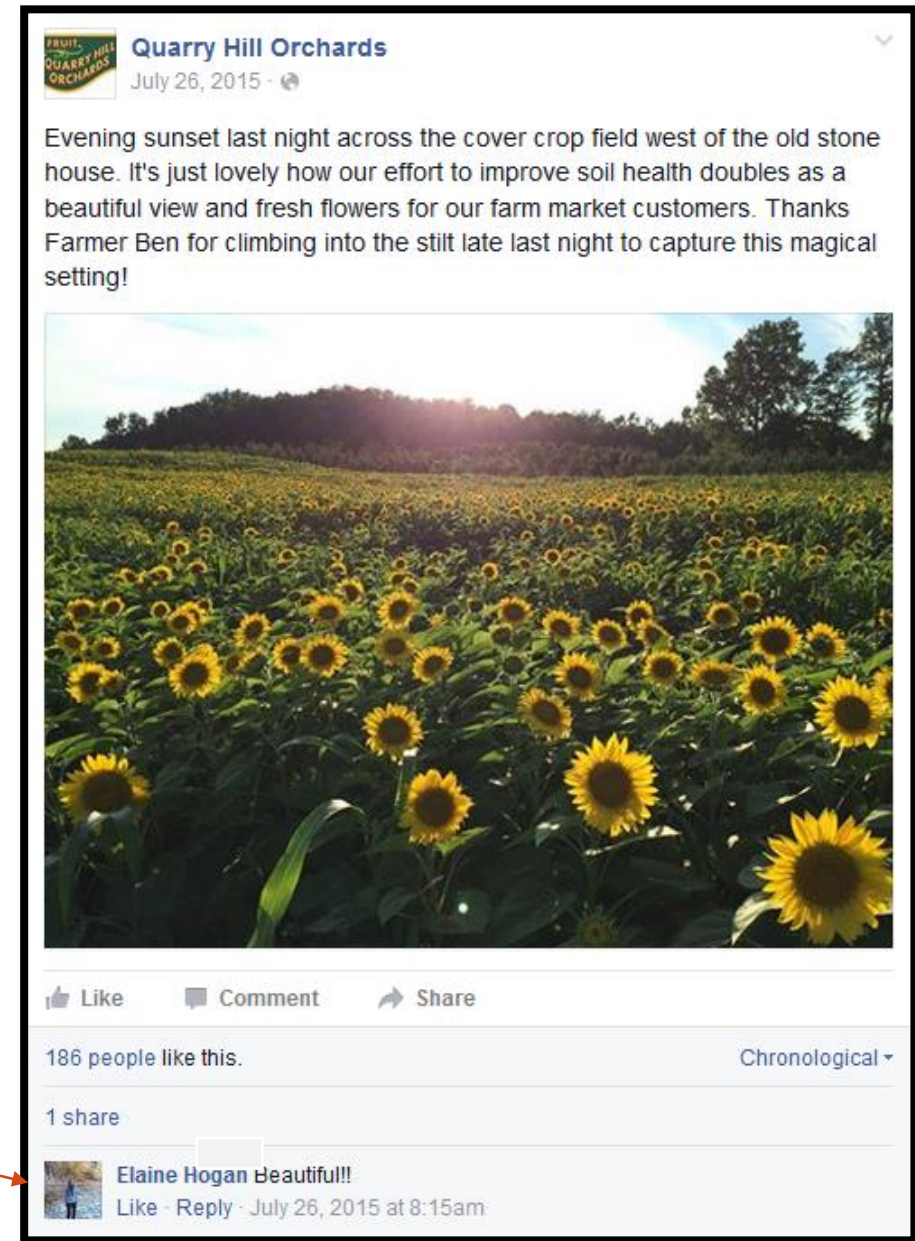
- Comment

## Badges



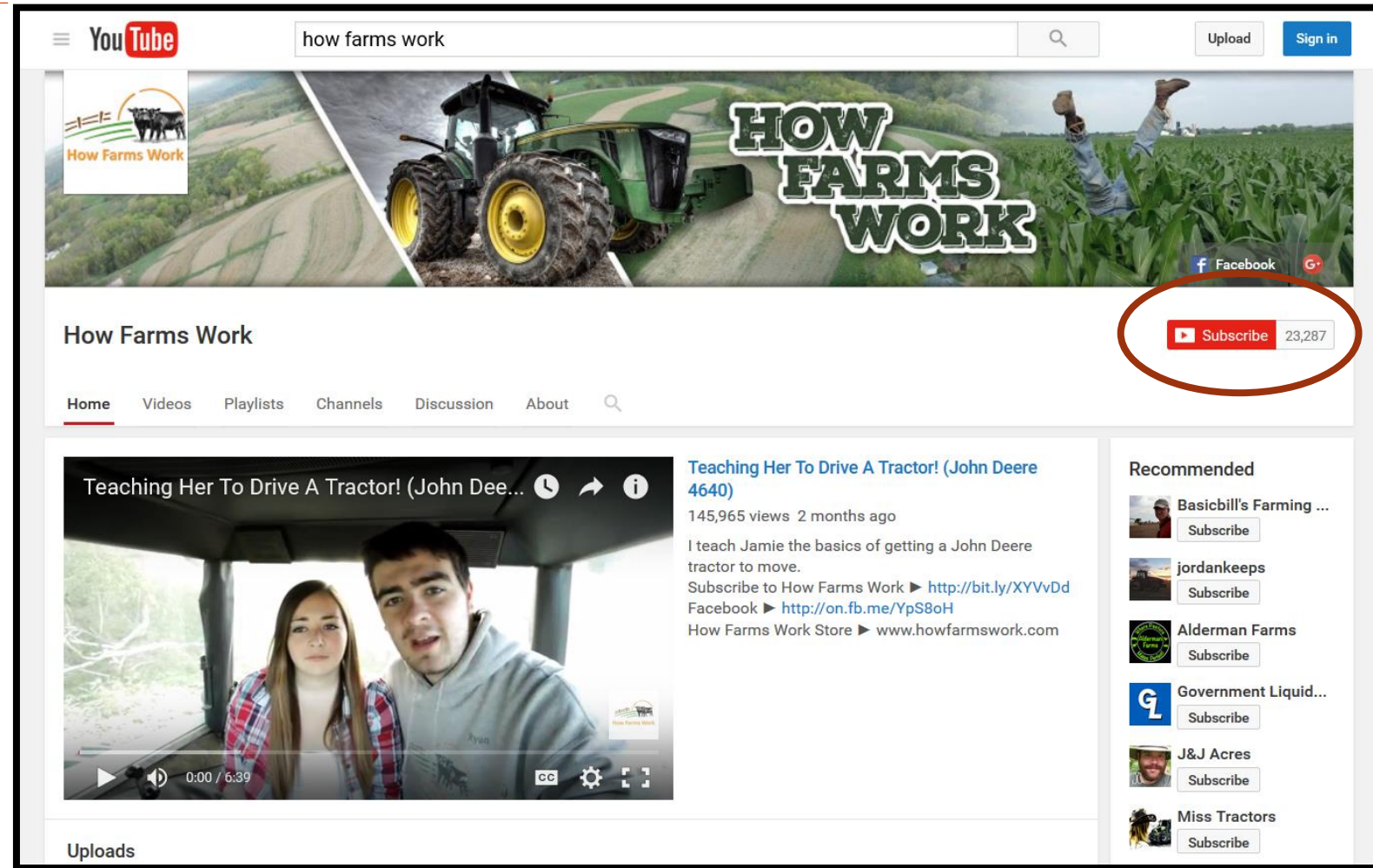
# FACEBOOK

- Feed
  - News Feed, Pages Feed
- Direct Message/Personal Message
- **Post**
- **Comment**



# YOUTUBE

- **Channel** →
- **Subscriber**
  - Subscription
- Discussion



You Tube





# YOUTUBE

- Channel
- Subscriber
  - Subscription
- **Discussion**

The screenshot shows the YouTube channel page for 'How Farms Work'. At the top, there's a search bar with 'how farms work' and a search icon. To the right are 'Upload' and 'Sign in' buttons. The channel banner features a collage of farm-related images, including a tractor and a person in a field, with the text 'HOW FARMS WORK' in large, stylized letters. Below the banner, the channel name 'How Farms Work' is displayed, followed by a 'Subscribe' button and the subscriber count '23,287'. The navigation menu includes 'Home', 'Videos', 'Playlists', 'Channels', 'Discussion' (which is circled in red), and 'About'. Below the menu, a video titled 'Teaching Her To Drive A Tractor! (John Deere 4640)' is featured. The video thumbnail shows a man and a woman in the tractor's cab. To the right of the video, the title is repeated, followed by the view count '145,965 views 2 months ago' and a description: 'I teach Jamie the basics of getting a John Deere tractor to move.' Below the description are links to subscribe to the channel, follow on Facebook, and visit the How Farms Work Store. On the right side of the page, there's a 'Recommended' section with a list of other farming-related channels, each with a 'Subscribe' button.

You Tube





# YOUTUBE

- Channel
- Subscriber
  - Subscription
- **Discussion**

You Tube



[BuildingWithDaDaandRiley](#)

Hi Ryan and Travis, we are a LEGO based channel and we love to build new things! From videos we watched on your channel we just completed a LEGO Harvestore. We would love for you to



6 months ago • 1  



[zilla2006able](#)

+How Farms Work I enjoy all of your video on your channel.



1 week ago •  



[How Farms Work](#)

This was really cool! I published a link to your video on our Facebook page here:

<https://www.facebook.com/HowFarmsWork>



5 months ago •  

# TWITTER

- **Microblogging**
- **Handle** –
  - @BovineVet, @CalfandHeifer
- **Bio**
- Hashtag
- Bitly
- Favorite/Like
- List



# TWITTER

- Microblogging
- Handle –
  - @BovineVet, @CalfandHeifer
- Bio
- **Hashtag**
  - #cowvet #agchat
- **Bitly**
  - ow.ly/WBS2L
  - Shorten links (URL) to be included in tweets.
- **Favorite/Like** ★ ♥
- **List**
  - Group members by fan club, industry, family, etc.





# INSTAGRAM

- **Friends = Followers**
- **#TBT**
  - Throwback Thursday
- #regram
  - Reshare of a photo
- #potd
  - Post of the Day



Instagram



# INSTAGRAM

- Friends = Followers
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Instagram



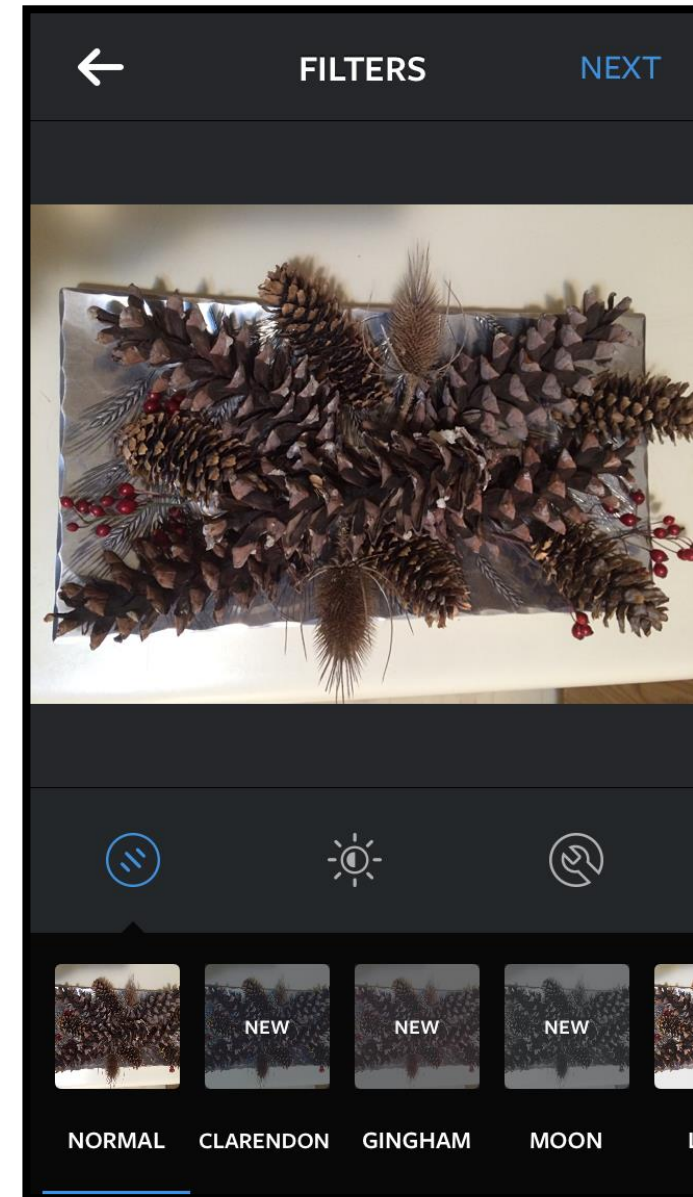
# INSTAGRAM

- Friends = Followers
- #TBT
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- **#regram**
  - Reshare of a photo
- **#potd**
  - Post of the Day

- **filter**



Instagram



# DEFINITIONS:

## ■ **Lurker**

- User that reads, explores, searches but does not write, comment, interact



## ■ **Troll**

- User that spends time in forums or chat rooms commenting trying to cause a reaction or controversy





# DEFINITIONS:

## ■ Crowdsourcing

- Question posed to a group of people to gain recommendations and opinions about a topic or product

## ■ Infographic

- Visual intended to present information clearly and quickly

“What is the difference between a latte and a mocha? Which coffee should I get?”



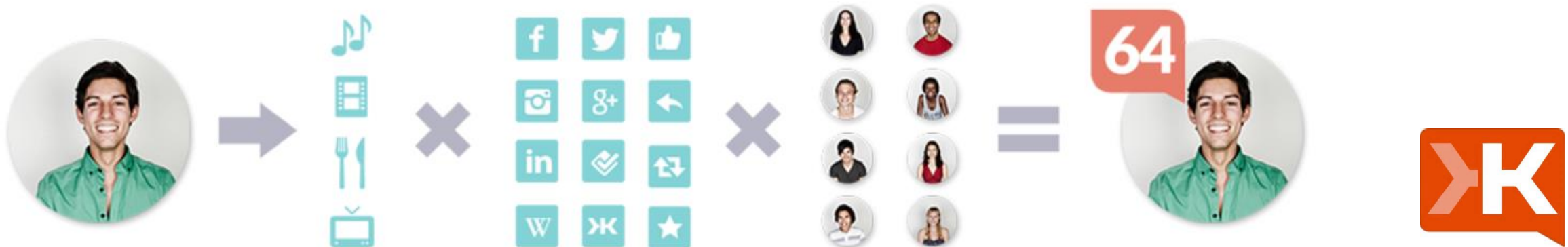


# DEFINITIONS:

## ■ Klout

=> **Klout Score, 0-100**

- How influential are you online?
- Measured from multiple pieces of data from social networking sites



# DEFINITIONS:

## ■ Web Analytics

- Collection, analysis and reporting of a single website data
  - Tracks visitors to a website and what they do

## ■ Engagement Rate

- Social media metric used to describe the amount of interaction – likes, shares, comments, a piece of content receives



# DEFINITIONS:

## ■ **SEO = Search Engine Optimization**

- Search engines like Google, Bing, etc.
  - Index every word on every website
  - Keep track of every link
- Can target different kinds of searches
  - Video
  - Academic
  - Pictures

## ■ **SER = Search Engine Ranking**

- Are you first on the list of results from the search “veterinary clinics Columbus ohio”?

**Veterinary Clinics in Columbus, Ohio** with Reviews ...

[www.yellowpages.com > Columbus, OH](http://www.yellowpages.com/Columbus,OH) ▼

60+ items · Find 364 listings related to **Veterinary Clinics in Columbus** on YP.com. See reviews, photos, directions, phone numbers and more for the best Veterinarians in Columbus, OH.

**Animal Hospital** Clintonville | **Columbus Vet** | **Beechwold Vet**

[www.beechwoldvet.com](http://www.beechwoldvet.com) ▼

Visit the preferred **animal hospital** in Columbus Ohio, **Beechwold Veterinary Hospital**.

We offer Dog Training, Pet Boarding, Grooming, and More.

[Our Staff](#) · [Boarding](#) · [Patient Information](#) · [Our Veterinarians](#) · [Surgery](#) · [Pet Gallery](#)

**Veterinary Medical Center - Ohio State University**

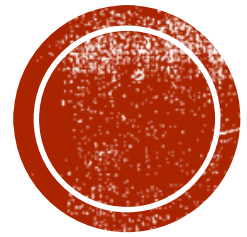
[vet.osu.edu/vmc](http://vet.osu.edu/vmc) ▼

As of May 2015, the **Veterinary Medical Center's** (VMC) campus location offers MRI services on site! ... **Ohio State Large Animal Services** at Marysville. Pharmacy

**The Vet Clinic East - Columbus, OH - Home**

[www.vetcliniceast.com](http://www.vetcliniceast.com) ▼

**Animal hospital** providing full service **veterinary** care. List of services and emergency information. **Columbus**.



# **BASIC PROBLEMS AND TIPS**



# PROBLEM – I TWEET, POST ON FB, INSTAGRAM AND...

## TIP #1 – HOOTSUITE OR BUFFER

### ■ Buffer



- 5 Levels of Plans

- Individual
- Awesome
- Business
  - Sizes Small, Medium, and Large

- ⇒ Track engagement with users
- ⇒ Build social media campaigns
- ⇒ Perform analytics

### ■ Hootsuite



- Others like Buffer and Hootsuite are
  - ⇒ SproutSocial and Hootsuite



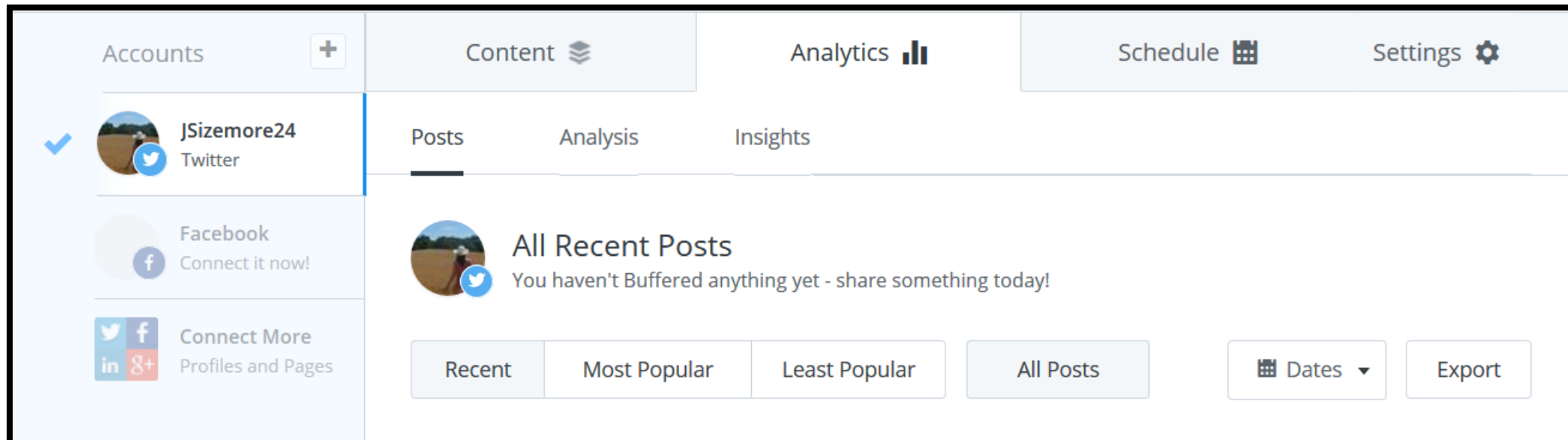
# PROBLEM – I TWEET, POST ON FB, INSTAGRAM AND...

## TIP #1 – HOOTSUITE OR BUFFER

### ■ Buffer

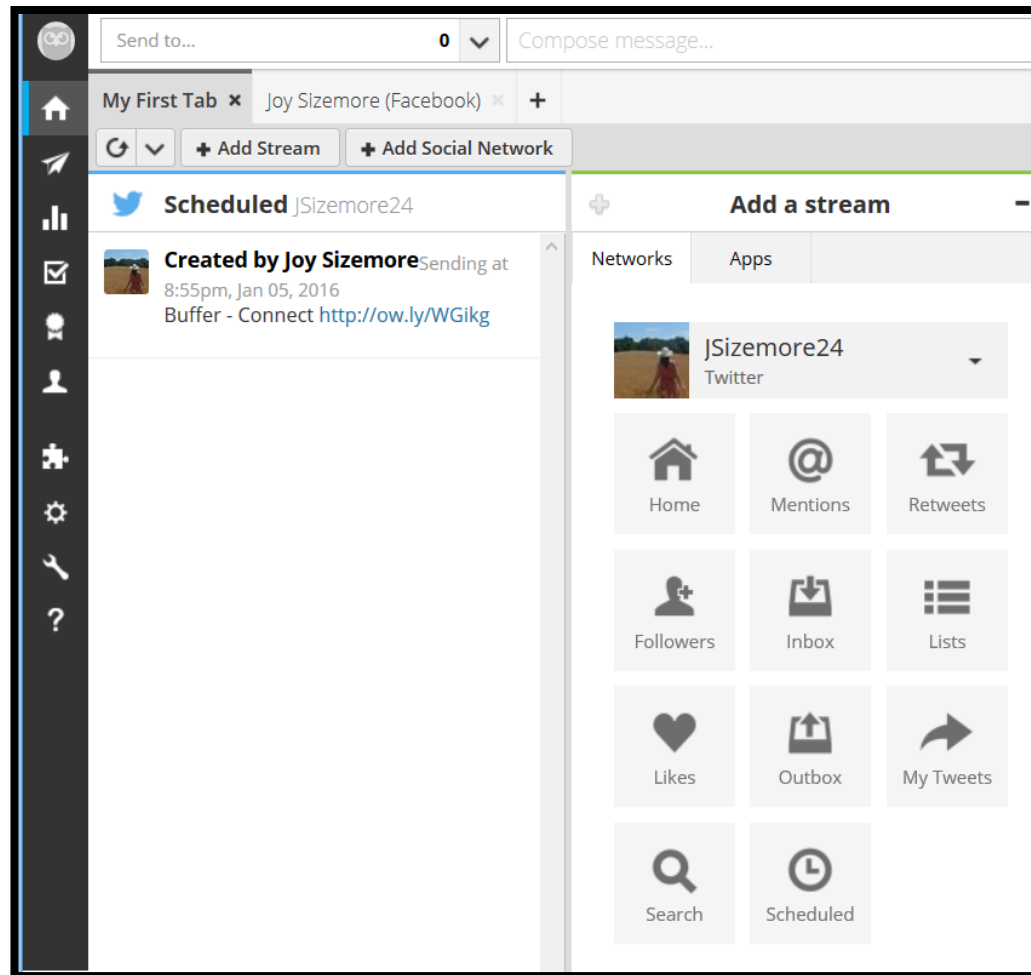


- Multiple profiles on the platforms - Facebook, Twitter, LinkedIn, Pinterest and Google +



# PROBLEM – I TWEET, POST ON FB, INSTAGRAM AND...

## TIP #1 – HOOTSUITE OR BUFFER



### ■ Hootsuite



- 3 Levels of Plans
  - Free
  - Pro
  - Enterprise
- Multiple social media profiles
- Facebook, Twitter, Instagram, LinkedIn, GooglePlus, Youtube, and Foursquare

# PROBLEM — GOT A COMPLAINT?

## TIP #2 — RESPOND, APOLOGIZE, OFFER HELP

- Respond quickly.
- Offer an apology.
- “May we talk about this more?”
  - Through PM or over the phone





PROBLEM — I WANT TO KEEP IT SIMPLE AND ONLY POST PICTURES.

TIP #3 — INSTAGRAM IS YOUR ANSWER.

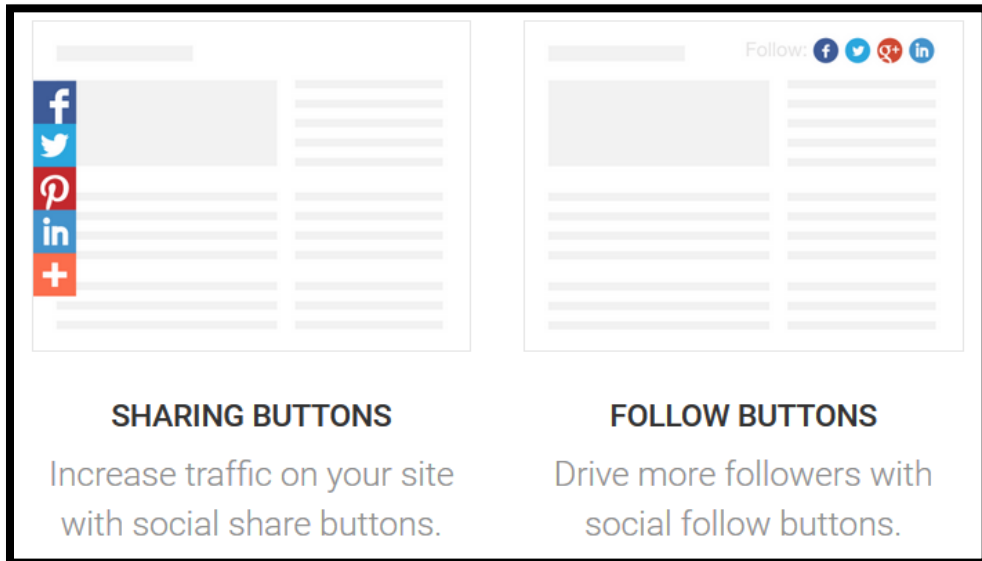


# PROBLEM – LINK WEBSITE TO SOCIAL MEDIA...

## TIP #4 – ADDTHIS OR SHARETHIS

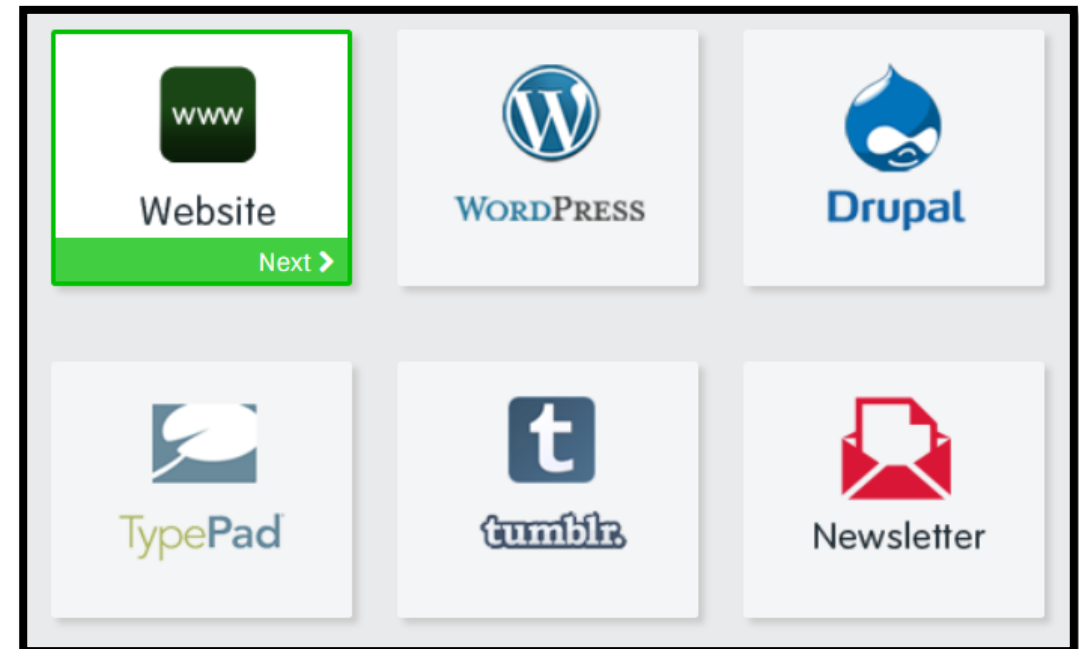
### ■ AddThis

- [www.addthis.com](http://www.addthis.com)



### ■ ShareThis

- [www.sharethis.com](http://www.sharethis.com)



# HOW YOU MIGHT GET STARTED...

- Social Media Examiner website
  - [www.socialmediaexaminer.com](http://www.socialmediaexaminer.com)
  - “Our mission is to help you navigate the constantly changing social media jungle”
- Randall Craig
  - <http://www.randallcraig.com/>
  - Social media expert, consultant, author, speaker
- [www.mashable.com](http://www.mashable.com)
  - How to's, interesting articles
- <http://www.technospot.net/blogs/>
- Social Media Today
  - <http://www.socialmediatoday.com/>
- [www.google.com](http://www.google.com)

# Elanco Pulse Institute™



# Elanco Pulse Institute™

## Why do we exist?

Elanco Pulse Institute™ (EPI) is the only real-time social media institute established for food chain and pet care and health stakeholders to protect the use of technology and innovation in animal production.

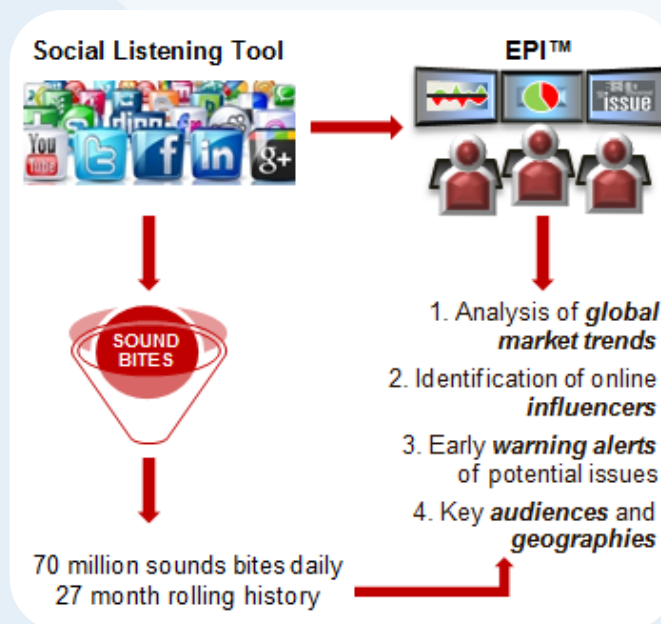
## How do we fulfill our purpose?

The mission of EPI™ is to enable every Elanco customer with valuable information on how consumers think, what motivates them and what triggers their actions by providing real-time social media monitoring, analysis and insights.

## Where are we going?

Establishing thought leadership through the creation of customizable content and influencer engagement that arms teams with information to further demonstrate EPI capabilities and value to customers.

## How EPI adds value?



# EPI Pillars™



**Listen**

Reach and engage the social media community

**Learn**



Instant access to understand consumer conversation, insights, trends and issues important to Elanco customers



**Shape**

Shape conversations and policy by engaging with customers, influencers and activists to protect the use of technology and innovation in animal production

# EPI™ Access

Antibiotics Food Safety  
Sustainability  
GMOs  
Animal Welfare  
Food Security

## Internet Forums

- Online communities where consumers post questions, answers, comments, and general discussions.
- Forums are often associated with particular topics such as hobbies, geographies, sports, lifestyles, illnesses, and more.



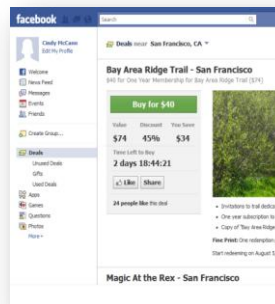
## Blogs

- Commentary or news on a particular subject; other blogs function as personal online diaries.
- Some blogs allow readers to leave comments, thus fostering discussions like those found in online forums.



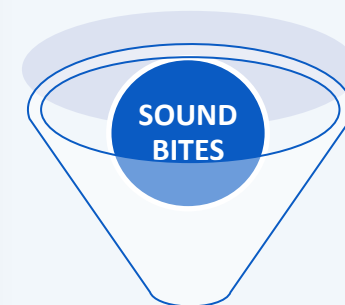
## Social Networks

- Communication platforms where users share private and public messages, photos, etc.
- The most popular social network currently is Facebook.



## Microblogs

- Communication platforms where users post short status messages.
- The most popular microblog currently is Twitter.



70 mil sounds bites daily  
27 month rolling history

**Additional Sources: Mainstream News, Consumer and Professional Reviews, and Comments**

# Animal Protein Conversation

## General

What are they saying...

What are they feeling...

What are they doing...





# Global Reach & Language Support



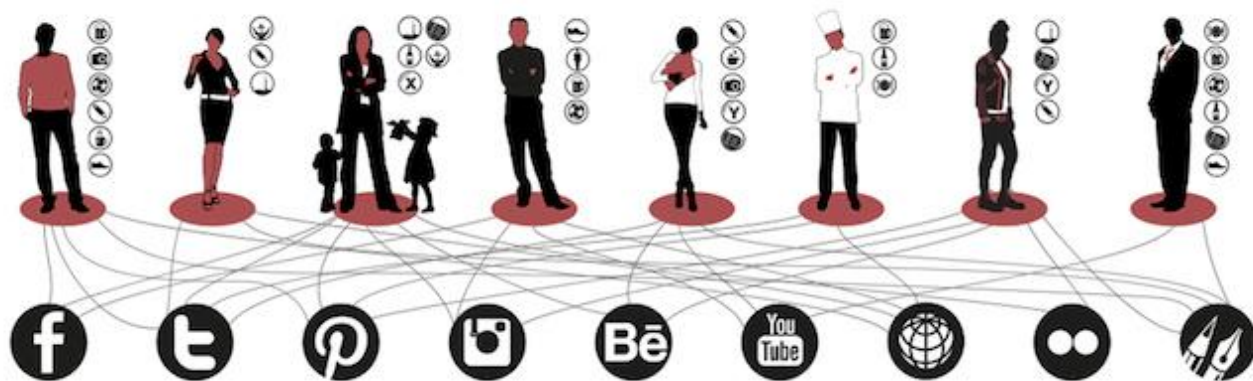
# Influencer Identification



## What is an influencer?

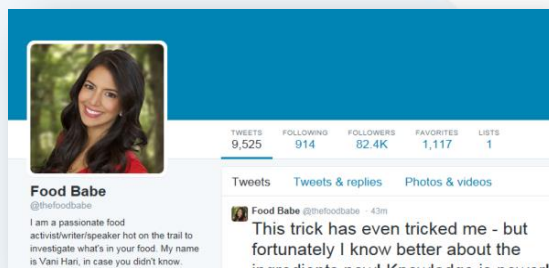
An influencer has the ability to change behaviors or impact purchase decision in a given control.

On the social web, influencers have earned an engage audience by producing content on specific topics.



# Key Influencers on Antibiotics

## Negative Sentiment



## The Food Babe

**Klout Score: 80**

**Passion drivers:** Digital Marketer posting on GMOs, against Antibiotics, FDA, Healthy Food, self proclaimed 'Foodie'.

## Neutral Sentiment



## Congresswoman Louise Slaughter

**Klout Score: 80**

**Passion drivers:** Leading Congressional advocate for increased regulation and bans on some antibiotics in animal agriculture.

## Positive Sentiment

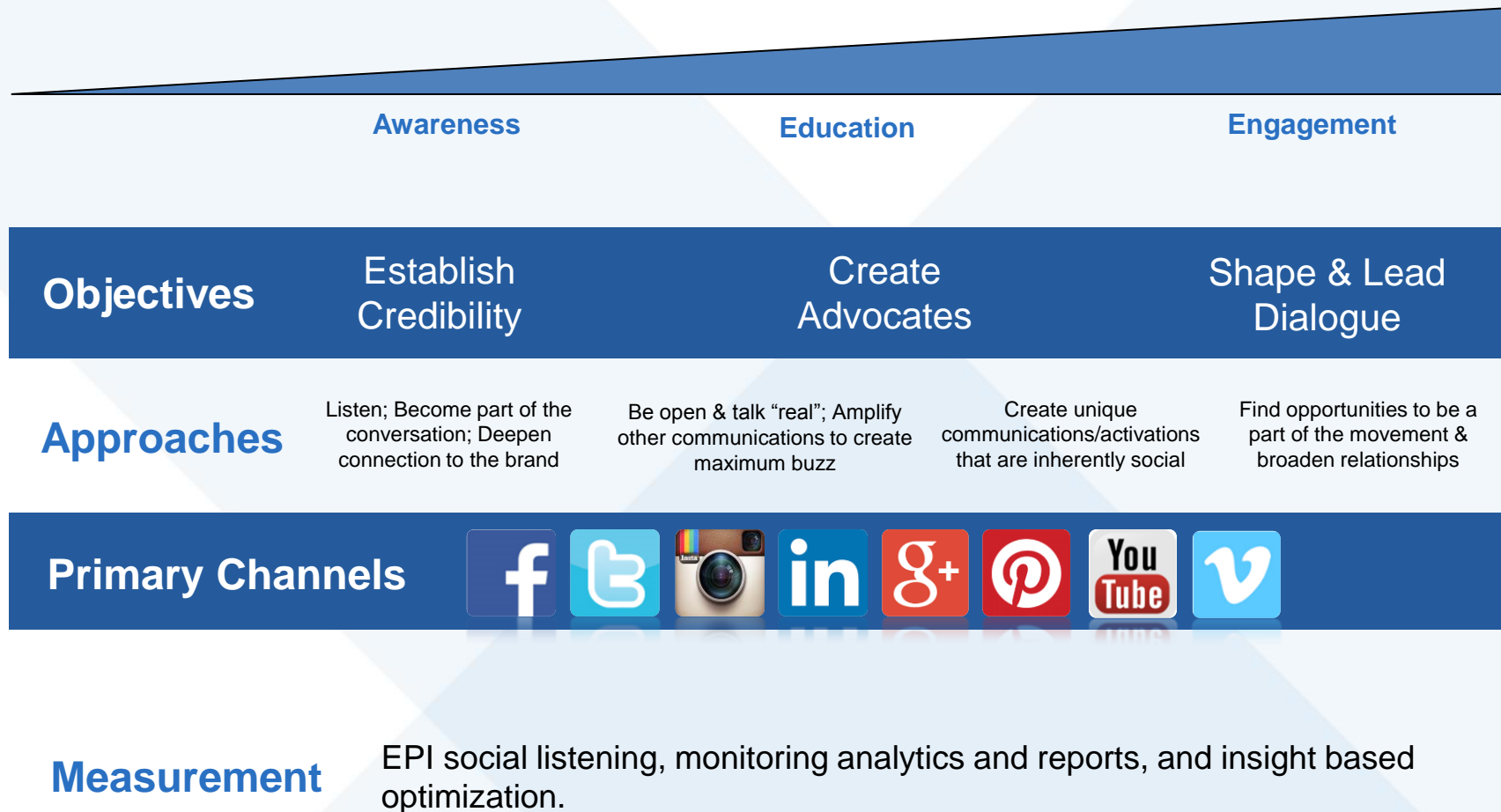


## Kevin Folta, Ph.D.

**Klout Score: 60**

**Passion drivers:** Public Scientist applying technology for food. Tweets daily about use of antibiotics in food. Very active on social media with positive sentiment on use of antibiotics in agriculture and food.

# *Growing a Social Media Presence*





# Elanco Pulse Institute™

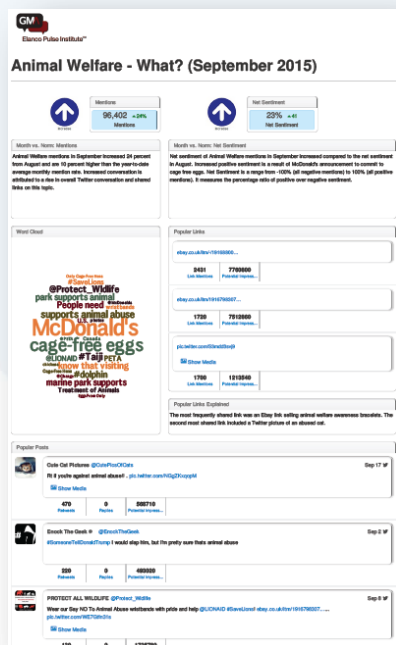
*Monthly Reports*



# Industry Monthly Reports

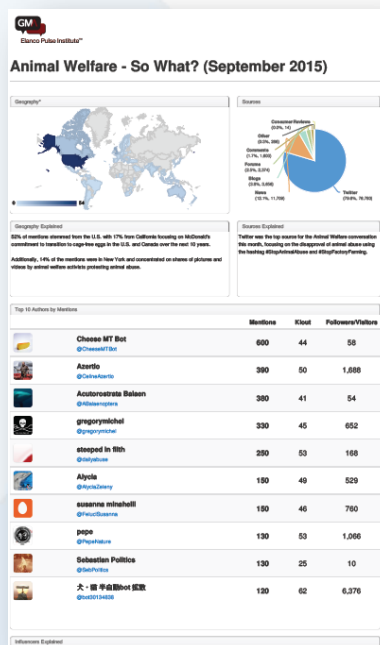
Animal Welfare, Antibiotics, Antibiotics Europe, Sustainability

**EPI™ Industry Reports focus on the following metrics of a conversation:**



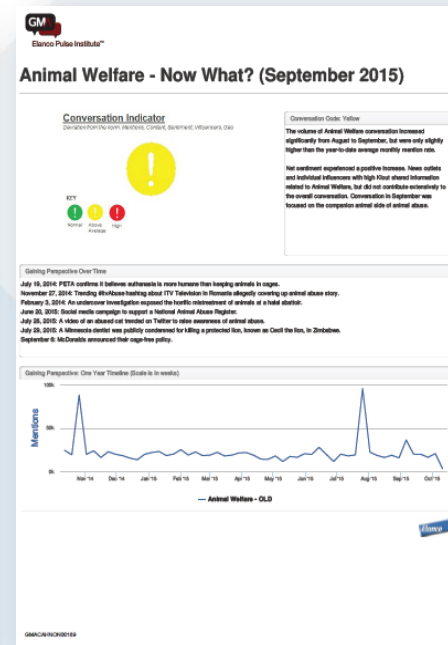
**What is the context of the conversation?**

**What** provides the total volume of mentions surrounding a topic and the analysis of the most popular links/posts.



**Who/What is driving the conversation?**

**So What** looks at the geographical reach and who the influencers are in the business or industry.



**What is the impact of the conversation?**

**Now What** puts metrics into perspective by providing an indication of whether or not the conversation volume, content, and sentiment during the month is normal or if the conversation should be flagged as unusual, high or cause for concern.

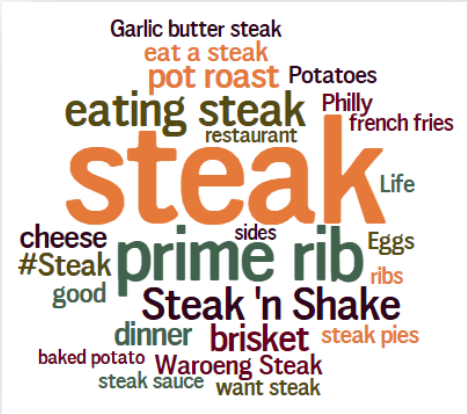
# Beef Monthly Report

**Action Items** – Advocates to follow, Conversations to join, Trending content to share by species

**ACTION ITEMS** – To shape the conversation. Although these actions may not directly correlate with monthly trends, proactively sharing the beef industry's story will help protect the use of technology & innovation.

Advocates to FOLLOW	Conversations to JOIN	Content to SHARE
<div><div>29</div></div> <div><b>Terry Drieling</b> <a href="#">@faithfamandbeef</a> Wife. Mother. Lover of coffee. Dabbler in photography. Living in the Nebraska Sandhills. Bringing up a family while raising beef.</div>	<div><b>Agriculture Proud</b> <a href="http://agricultureproud.com/">http://agricultureproud.com/</a></div> <div>"On this blog you'll find more stories about my passion for the cattle industry and the community of folks involved in producing our food. Everyone has a story to tell. America's Farmers and Ranchers have a great one. Whether it is their hard work, resilience, sense of community, or passion to keep improving upon our skills, someone is listening."</div>	<div><a href="#">Why do I agvocate?</a></div> <div><a href="#">From Chicken to Chocolate: Stop the Boycotts!</a></div> <div><a href="#">12 Ways to Improve Your Social Media Profiles in One Hour or Less</a></div>
<div><div>35</div></div> <div><b>ProgressiveCattleman</b> <a href="#">@ProCattlemag</a> Progressive Cattleman provides beef producers with management articles, timely news &amp; opinions.</div>		

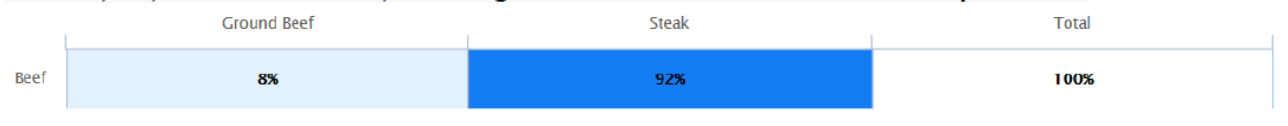
**Trending Topics** – Top keywords discussed on social media for a particular species.



**Topic Comparison** – A comparison of the volume of conversation surrounding each species.

		Mentions (Total)
1	Dairy	17,678,641
2	Poultry	16,118,950
3	Swine	4,907,600
4	McDonald's	3,851,397
5	Beef	3,129,500
6	Walmart	2,619,750

Of the 3,129,500 beef mentions, following is the % mention breakdown across products<sup>2</sup>:



# Beef Monthly Report

## BEEF ISSUES – An analysis of the beef conversation with cross-species issues and beef issues.

Of the 3,129,500 beef mentions, following is the mention breakdown of how industry issues across all species relate to beef:

INDUSTRY ISSUES	Animal Welfare	Antibiotics	Food Safety	GMOs	Sustainability
YTD Monthly Mention Average	4,004	2,963	14,204	1,233	8,571
December Mentions	950	1,800	8,300	1,300	8,850
Mention Change from November	82%↓	24%↑	75%↓	189%↑	48%↑

Of the 3,129,500 beef mentions, following is the mention breakdown of beef specific issues:

BEEF ISSUES	Beta-agonists	Greenhouse Gases	Labeling	Meat Alternatives	Nutrition	Price	Taste	Trade
YTD Monthly Mention Average	3,603	15,686	31,054	292,859	41,016	156,825	139,488	1,542
December Mentions	1,338	19,222	15,450	224,761	46,850	111,600	105,250	2,950
Mention Change from November	9%↑	16%↓	42%↓	2%↑	18%↑	15%↓	143%↓	127%↑

### KEY: Color Code

Green	Deviation from norm: Mentions, Content, Sentiment, Influencers = Normal
Yellow	Deviation from norm: Mentions, Content, Sentiment, Influencers = Above Average
Red	Deviation from norm: Mentions, Content, Sentiment, Influencers = High

## KEY INSIGHTS

- The **GMO** conversation associated with beef increased 189%. The increase was due to [online promotion of Chomp Snack Sticks, a "new health products made with 100% New Zealand non-GMO grass-fed Angus beef."](#) rather than concerns about GMOs in beef.
- The **Sustainability** conversation associated with beef increased 48% due to a frequently shared [article from the Guardian indicating that "Giving up beef will reduce carbon footprint more than cars, says expert."](#) However, although the conversation increased in December, it did not exceed the year-to-date monthly average.
- After increasing the previous three months, the **Greenhouse Gases** conversation decreased in December. Although the conversation decreased, it still remains above the year-to-date monthly average with conversation centered on livestock as a major contributor to greenhouse gas emissions.
- The **Trade** conversation associated with beef increased 127% due to shares of [news indicating that "Canada's beef and pork sectors are welcoming a World Trade Organization ruling that allows Canada and Mexico to impose \\$1 billion in annual tariffs on U.S. products."](#)

## Industry/Species Issues –

Metrics provide the total volume of mentions for conversations related to cross-species topics (**Animal Welfare, Antibiotics, Food Safety, GMOs, Sustainability**) and species issues indicating key insights for significant monthly deviations.



# Beef Monthly Report

## TOP AUTHORS

Author	Klout <sup>3</sup> Score	Post
<a href="#">@LiveScience</a>	85	Cloud Shields and Cow Pills: The Craziest Climate Change Fixes <a href="http://dvr.it/D0NGI7">http://dvr.it/D0NGI7</a>
<a href="#">@Newser</a>	83	Collecting Cow Farts: The Stupid-Brilliant Solution To Global Warming <a href="http://dvr.it/D4nvDr">http://dvr.it/D4nvDr</a> via <a href="#">@FastCoExist</a>
<a href="#">@mattocko</a>	64	Want to help prevent catastrophic climate change? Eat less meat->fewer cows->less methane
<a href="#">@heidi_coon</a>	61	U.S. Pork is banned in some Countries, due to the use of a drug Ractopamine Whats worse? Eating dead pig flesh.
<a href="#">@SmithfieldFoods</a>	56	Why are cows one of society's biggest methane producers? <a href="http://ow.ly/UVe4R">http://ow.ly/UVe4R</a>
<a href="#">@WashingtOnline</a>	56	Meat processing plant in Iowa recalls beef product #health
<a href="#">@DTPORGE</a>	54	SIGN&RT!!! TELL U.S. Pork Producers to DROP Risky Drug Ractopamine!!! <a href="https://t.co/KF2owPNyZ6">https://t.co/KF2owPNyZ6</a>

## Top Authors

Identification of the online authors with the highest social influence who have shared content during the month related to topics.

**How influence is measured?**

**True Reach**  
How many people you influence

**Amplification**  
How much you influence them

**Network Impact**  
The influence of your network

## Product Breakdown

Percentage breakdown analysis for industry issues and species issues across products.

### BEEF PRODUCTS – Informed perspective on the consumer conversation associated with Ground Beef and Steak.

A percentage mention breakdown of how industry issues across all species relate to beef products:

- Consistent with the previous month, **Food Safety** is most prominent in **Ground Beef** and **Steak** conversations.
- Antibiotics** shifted to the second most prominent issue in **Ground Beef** and **Steak** conversations due to shares of a Huffington Post UK article – “[Undercooked Meat Could Put Diners At Risk Of Antibiotic-Resistant ‘Superbugs’.](#)”

	Animal Welfare	Antibiotics	Food Safety	GMO	Sustainability	Total
Ground Beef	3%	11%	76%	3%	7%	100%
Steak	5%	19%	57%	3%	16%	100%

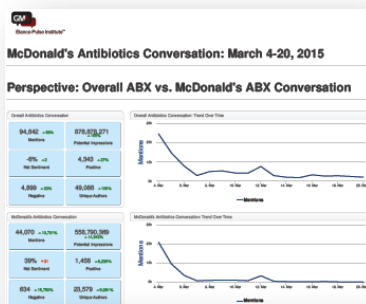
A percentage mention breakdown of beef specific issues:

- Taste** is most prominent in **Ground Beef** conversations, whereas **Price** is most prominent in **Steak** conversations.

	Beta-agonists	Greenhouse Gases	Labeling	Meat Alternatives	Nutrition	Price	Taste	Trade (U.S.)	Total
Ground Beef	0%	<1%	12%	1%	8%	28%	51%	<1%	100%
Steak	0%	<1%	5%	<1%	27%	37%	31%	<1%	100%

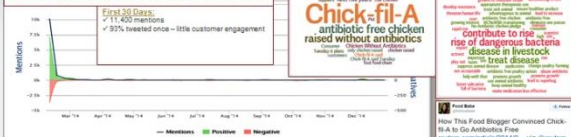
# EPI™ Issues Reports

## 2015 McDonald's Antibiotics Announcement



## Social Media Discussion: Announcement Comparison

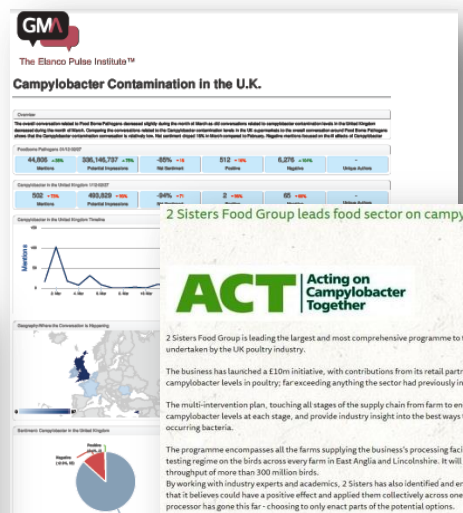
### Chick-Fil-A Antibiotic Free Announcement



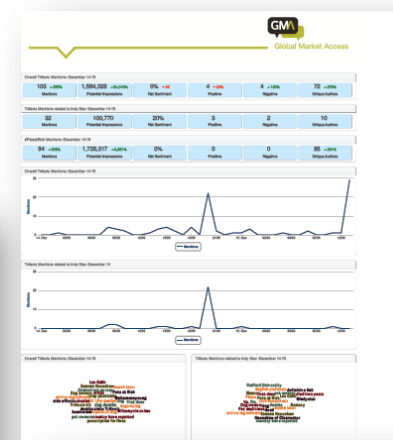
### McDonald's Antibiotics Announcement



## Campylobacter Contamination in UK



## Triflexis #PetsAtRisk IndyStar



**Jeff Simmons** 2:23 p.m. EST December 16, 2014

**1035** **45** **248** **12**

**CONNECT** **TWEET** **LINKEDIN** **COMMENT** **EMAIL** **MORE**

**There's no doubt about it, pets enrich our lives. They bring us joy, companionship and unconditional love. That's why we do what we do at Elanco, right here in Indiana. We're pet owners too. We experience those same moments of joy when our furry friend greets us at the door. We also experience the same profound sense of loss when we lose our pet. It's not something we take lightly.**

*(Photo: Robert Schree/The Star)*



# *Customers Spend More Time on Social Media*

**65% Learn more about brands/products**

**50% Express concerns about brands/services**

**47% Share Incentives**



# Elanco Pulse Institute™

## *2015 Case Studies:*

- GMO Salmon Announcement*
- Subway Announcement*
- Labeling/Consumers, Activists or Food Companies*

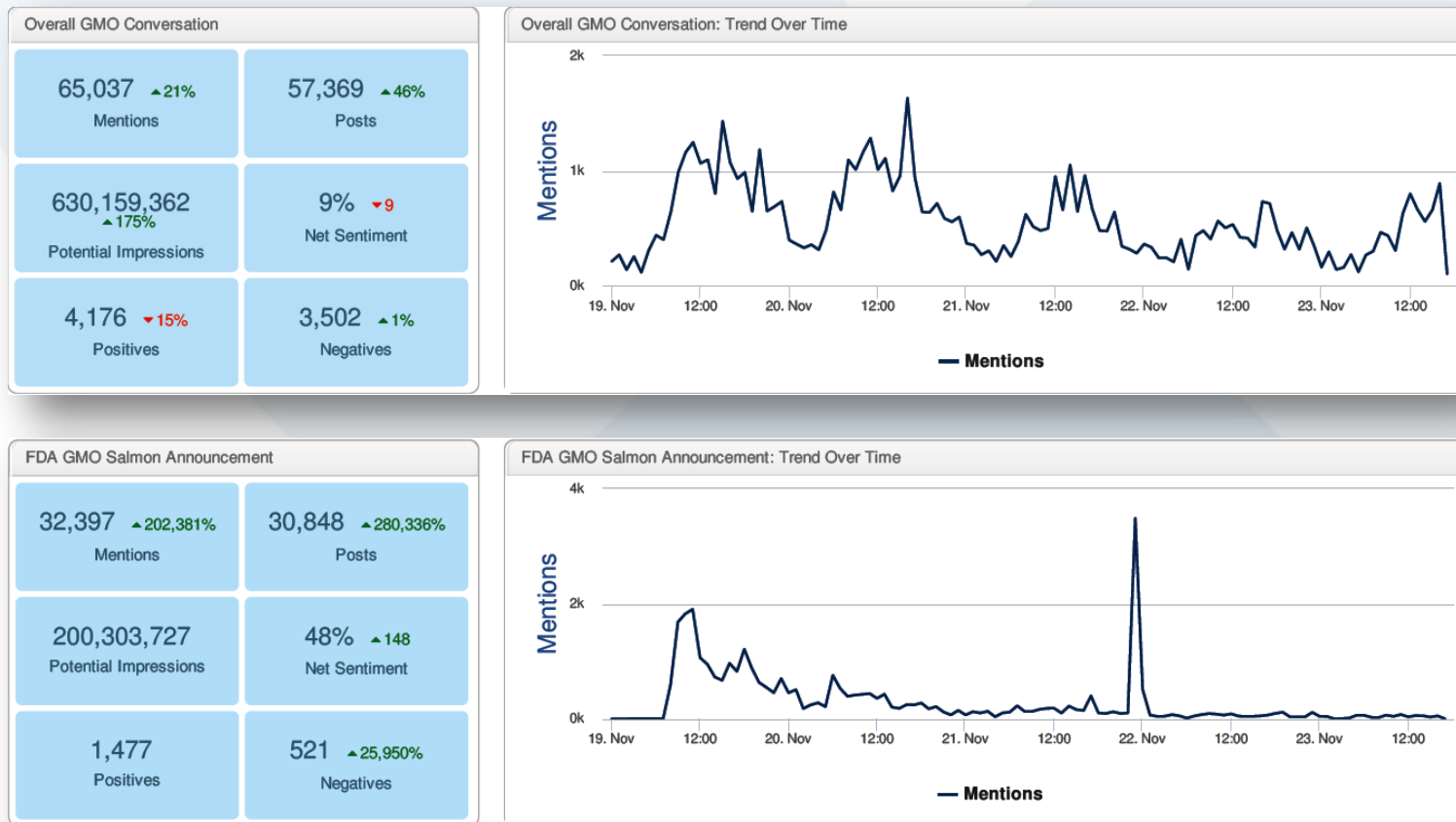




# Social Media Impact: GMO Salmon Approval Announcement

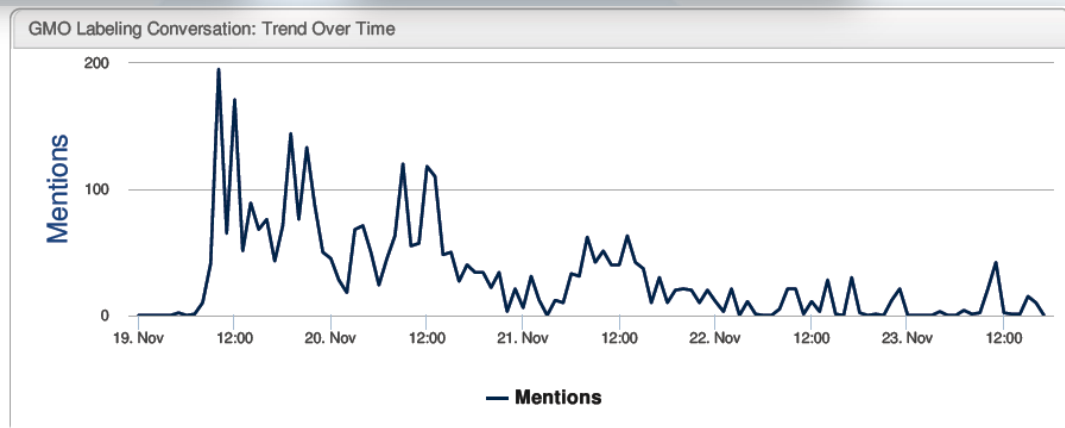
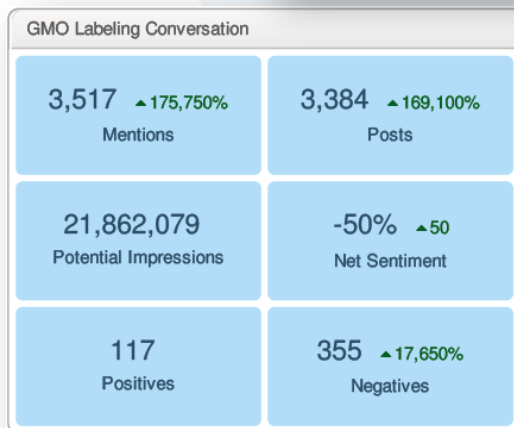
On Thursday, November 19 the U.S. Food and Drug Administration (FDA) approved a genetically engineered salmon for public consumption.

The number of mentions associated with the announcement totaled **50% of the entire GMO conversation**.



# Social Media Impact: GMO Salmon Approval Announcement

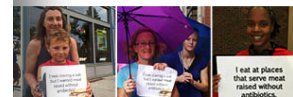
Of the 32,397 mentions associated with the FDA announcement, 3,517 mentions are related to guidelines on labeling food.



HOT ON THE TRAIL TO **INVEST**



**SIGN THE PETITION:** [foodbabe.com](http://foodbabe.com)  
#SubsNotDrugs



Organization has warned that working if we continue to up to 70 percent of all S. are sold for use on livestock of which is routinely given to

ing the consequences: Every  
Americans get sick and 23,000 die  
infections.



mitted to stop buying chicken  
ne antibiotics used on humans.  
way can be a leader in  
wing public health threat by  
ase of meat raised with critical








©2015, Elanco Animal Health, a division of Eli Lilly and Company

# Shaping the conversation: Subway Case Study

Two days following the announcement, the top authors sharing content were news media and activist groups:

Mentions		
	<b>New Mexico PIRG</b> <a href="#">@NMPIRG</a>	61
	<b>reuters-finance-yahoopartner</b>	40

		Mentions	Klout
	<b>TIME.com</b> <a href="#">@TIME</a>	1	99
	<b>Fox News</b> <a href="#">@FoxNews</a>	1	96
	<b>Chicago Tribune</b> <a href="#">@chicagotribune</a>	1	96
	<b>TorontoStar</b> <a href="#">@TorontoStar</a>	2	95
	<b>CNBC</b> <a href="#">@CNBC</a>	1	93

## McDonald's Antibiotics Announcement



- ## Subway Announcement
- ### Key Differences:

- ❖ First restaurant to make plans to eliminate antibiotics from all meat.
- ❖ Announcement did not address animal welfare.





# Shaping the conversation: Subway Case Study

The online

Andrew Da

Sub  
Choosing  
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Subway, I  
for

RETWEETS 9 LIKES 11

## Pork Farmers Want Subway to Slow Its Roll on Nixing Antibiotics

The chain's ambitious plan to stop using meat raised with drugs by 2025 hasn't been well received by livestock groups.



(Photos: Subway/Facebook; Flickr)

Bullet Is  
For

o this blog post and  
respond to each  
omments, and I plan  
ught up in the  
ank you for reading,  
our country that  
d to read a farmer's

that beginning in March  
ther, the company will  
a 10 year period. A  
minating antibiotics

Elanco

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GMACAHNON00225

# Shaping the conversation: Subway Case Study

Subway responds to “Agvocates”:

## Subway Updates Statement on Antibiotic Use in Livestock

Posted on October 23, 2015 by Ryan Goodman in antibiotics, Food // 3 Comments

31 9 Rate This

Earlier this week, Subway restaurants announced changes to their policies regarding antibiotics use in livestock, stating they would begin sourcing only protein products from livestock never receiving antibiotics. The tone in which this news was released did not sit well with livestock farmers and ranchers across the country. Frustrating the situation even more was the censoring of comments in disagreement and lack of response from the company itself.



## Subway relents on antibiotics decision

Story Comments

Print Font Size: + -

Posted: Wednesday, November 4, 2015 10:45 am | Updated: 10:49 am, Wed Nov 4, 2015.

Hub Opinion

A rose to ... Subway, which listened to the complaints of livestock industry advocates and decided to temper its decision to serve only meat from animals that were never given antibiotics. Subway's anti-antibiotic marketing idea hit a brick wall in rural Nebraska, where livestock producers rely on antibiotics to help sick animals.

Subway altered its strategy, in response to farmers and ranchers who educated the sandwich giant about the usefulness of antibiotics in caring for cattle, swine and poultry. Somehow, Subway was led to believe livestock producers use antibiotics only as growth enhancers.

## BEEF Daily

### Subway admits antibiotics have their place in animal agriculture

by Amanda Radke in BEEF Daily

Oct 27, 2015

RSS

EMAIL

in SHARE

Tweet

G+

COMMENTS 2

When Subway announced it would be going “antibiotic-free,” the agricultural industry was quick to respond. Although the chain isn’t changing its tune, it has issued a statement about the benefits of antibiotics to treat sick animals.

#### RELATED MEDIA








Last week, Subway announced it would phase out meat that comes from animals that had been given antibiotics.

is “antibiotic-free” move outraged the animal agricultural industry, with many pointing out that whether natural or conventional meat, all meat is antibiotic free, links to withdrawal times and other considerations described by Beef Quality Assurance protocols.

# Shaping the conversation: Subway Case Study

Two weeks following the announcement, the top authors sharing content include “Agvocates”:

Mentions		
	<b>Ryan Goodman</b>	66
	<b>New Mexico PIRG</b> @NMPiRG	62
	<b>reuters-finance-</b> <b>yahoopartner</b>	40
	<b>Land &amp; Livestock</b> <b>Interntional, Inc.</b>	35



**Ryan Goodman**

Working with amazing ranchers | Living the #Montana life | #OkState alumnus | #RedDirt music | #TeamBeef #Runner | I'm Agriculture Proud

Agribusiness Expert Agriculture Expert Agronomy Expert Antibiotics Expert Arkansas Expert Biotechnology Expert

## Subway admits antibiotics have their place in animal agriculture

Posted on October 28, 2015

*When Subway announced it would be going “antibiotic-free,” the agricultural industry was quick to respond. Although the chain isn’t changing its tune, it has issued a statement about the benefits of antibiotics to treat sick animals.*

# Food Label Conversation

1/1/15 – 10/22/15

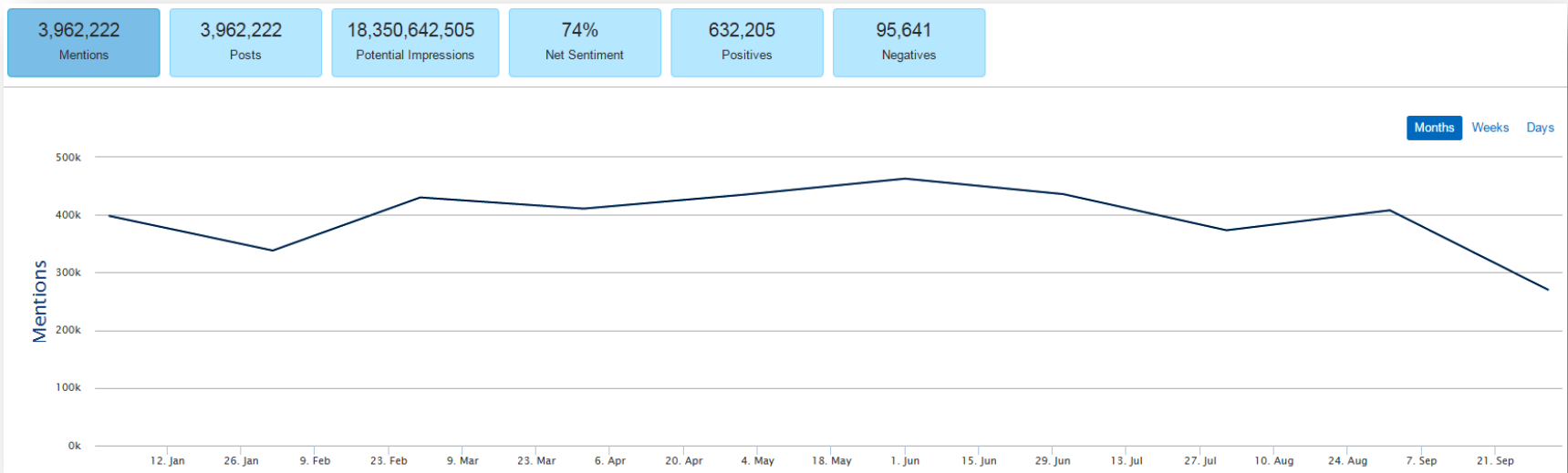


Elanco Pulse Institute™

## Food conversation on Twitter

774,285,854	774,285,854	3,228,390,321,007	68%	130,384,931	24,729,742
Mentions	Posts	Potential Impressions	Net Sentiment	Positives	Negatives

Of the 774,285,854 Food mentions, 3,962,222 mentions or **0.5%** are associated with any reference to the **PRESENCE** of food label lingo i.e. organic, natural, antibiotic-free, etc.



# Food Label Conversation

1/1/15 – 10/22/15

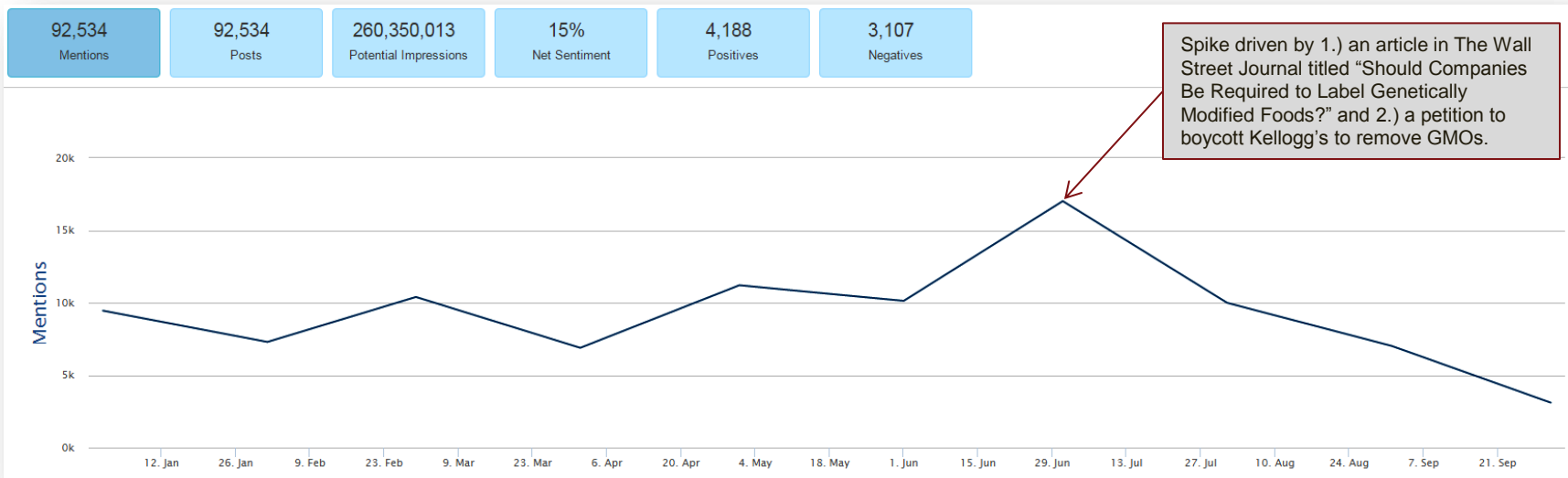


Elanco Pulse Institute™

## Food conversation on Twitter

774,285,854	774,285,854	3,228,390,321,007	68%	130,384,931	24,729,742
Mentions	Posts	Potential Impressions	Net Sentiment	Positives	Negatives

Of the 774,285,854 Food mentions, 92,534 mentions or **0.01%** are associated with any reference to the **DEMAND** for any type of food label





# Food Label Conversation

1/1/15 – 10/22/15

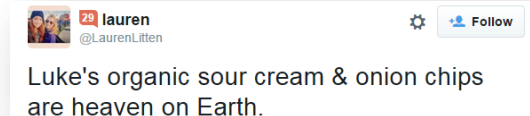


Elanco Pulse Institute™

## Food Label Presence



In conversations related to food label lingo, the primary focus of conversation is **organic** and **natural** labels.



VS.

## Food Label Demand



However, in terms of what types of labels are being demanded, the primary focus is **GMO** labeling.



# Elanco Pulse Institute™

## *Strategic Approach:*

*-Process*

*-Consumer Market Research & Messaging*



# Basic Approach Process

## Vulnerabilities Assessment (1):

- What are the critical issues
- What are the triggering events
- Who are the stakeholders
- What is our plan

## Tracking and Monitoring (2):

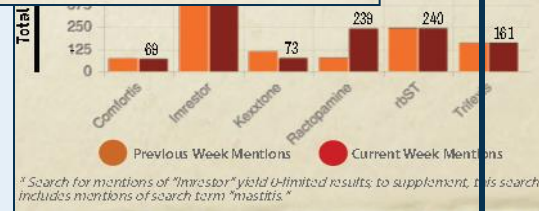
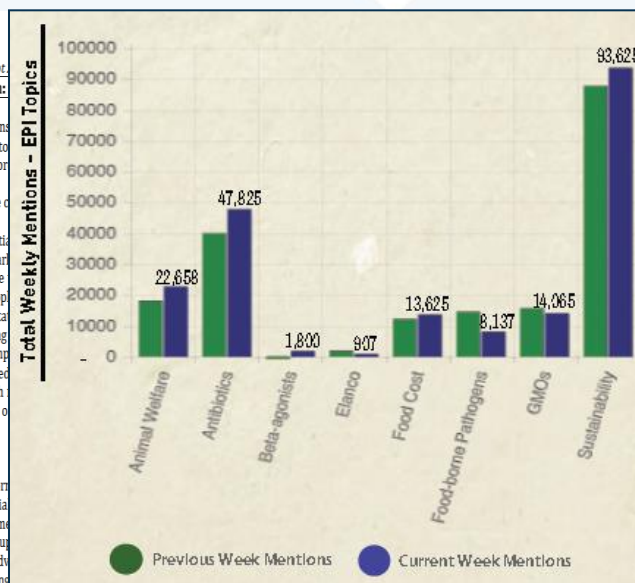
- Media Inquiries & Alerts (EPI)
- Government
- Food & Supply
- Influencers / NGOs

## Issues/Crisis Process (3):

- Prepare
- Model/Roll-play
- Activate
- Assess & Improve

ELANCO ISSUES MANAGEMENT  
Vulnerability Assessment/Issues Management Plan – Beef Business

Issue:	Probability:	Impact:	Issues Management Plan:
<b>(Productivity)</b> <b>Ractopamine</b> <ul style="list-style-type: none"> <li>Trade: China opens market for US beef. Ractopamine restriction creates significant pressure/noise directed toward packers to eliminate the use of ractopamine to grow market share in China. While volume may be slight, media noise could trigger concern in U.S. as well as exports through Hong Kong.</li> </ul>	<ul style="list-style-type: none"> <li>High possibility given Chinese beef supply and price as well as China's need for beef drives it to the top global importer. Possibility of signal in November 2014 with APEX Summit (Beijing)</li> <li>Prediction 2015</li> <li>Watch/monitor Taiwan</li> </ul>	<ul style="list-style-type: none"> <li>The likelihood of a significant amount of U.S. beef being exported to China is low, however the media attention will raise the profile as well as some packers desire to expand volumes to push segregation. This would also stimulate the activist voice. Overall, the value of Beta Ags are well established in the U.S./CAN producer segment.</li> </ul>	Continue to reinforce/demonstrate <ul style="list-style-type: none"> <li>High awareness of value to supply chain. (simple &amp; brief)</li> </ul> Articulate and balance value of open vs. closed <ul style="list-style-type: none"> <li>Monitor trade flow, negotiate value of trade to open markets relative to domestic markets (farm/open supply)</li> <li>Prepare contingency statement impact of China opening (economic &amp; market impact)</li> <li>Develop industry-backed (NCBA/Other) research, economic impact in US opening market</li> </ul>
<ul style="list-style-type: none"> <li>Animal well-being: ADE/ or alleged association of Optiflexx with lameness, handling or transportation issues at the feedyard or packing plant or from an undercover video. Stimulating undue scrutiny on Optiflexx (Beta-Ag association)</li> </ul>	<ul style="list-style-type: none"> <li>Very limited issues have been observed with a practical experience/practice in August 2014 without incident. It is very likely that there will be some report/article or activist/pseudo-science noise that will generate noise. Animal well-being is more critical and observed today.</li> </ul>	<ul style="list-style-type: none"> <li>Pressure to eliminate beta-agonists. Potential challenge or connection to food safety.</li> </ul>	Solidify data and update information <ul style="list-style-type: none"> <li>Continue to update material sheets, contingency statements, prepare and proactively support internally &amp; w/expert - advise</li> <li>Animal mobility scoring cattle in 6-7 facilities</li> <li>Mortality data from Benchmark</li> <li>Constant monitoring of activists and noise.</li> <li>Continue building network with KOLs and Expert groups</li> </ul>



- Antibiotics
- Beta-Agonists
- rbST
- Kexxtone
- Imrextor
- Triflex/Comfortis

# Message Strategy (antibiotic example)

your audience's truth	what's not working	"A" new approach
They're afraid of the unknowns of antibiotics	<i>Scientific language and big numbers</i>	<b>Align your language with theirs.</b> Bring things down to their level
They believe antibiotics are overused	<i>Justifying and defending the use of antibiotics</i>	<b>Acknowledge concerns.</b> Validate their right to an opinion <b>Accept responsibility.</b> Show you're addressing their concerns
They think your priority is making money	<i>Citing "moral obligations" as the reasoning for the use of antibiotics</i>	<b>Add context.</b> Broaden the conversation beyond antibiotics



# Align language (antibiotic example)

- + Consumers don't speak science
- + It can sound scary and raise suspicion that you're trying to hide something

language to lose – (industry speak)	language to use + (consumer speak)
<i>food supply</i>	food
<i>consume</i>	eat
<i>retailers</i>	restaurants, stores, supermarkets
<i>animal protein</i>	meat
<i>food producing animals</i>	farm animals



# Accept responsibility (antibiotic example)

- Messages that suggest the industry **isn't to blame** for problems your audience perceives fail

## language to lose -

*Transfer from person to person is the real source of most infections with resistant bacteria*

## language to use +

We must collaborate between animal health companies, farmers and veterinarians to determine when an antibiotic is really needed

Antibiotic resistance is a consequence of use and misuse, and the fault is shared by the human, animal, and environmental health communities

It's the responsibility of all to continue to find new and better ways to produce meat

# Add Context

(antibiotic example – ‘Best Language’)

Antibiotic use is more acceptable in the context of other animal care techniques as well

Treatment is widely accepted, but details about judicious use don't hurt

Communicate control as response to a specific threat

- Antibiotics, used responsibly, **along with thorough application of good animal care practices** help enhance food safety and animal well being.
- Using antibiotics responsibly means treating an animal that is sick with **the right dose of antibiotics at the right time** to help it get better. It also means using antibiotics to **control the spread of infection** among a herd when there is a threat and **identifying animals when they're at risk so that illness can be prevented.**
- Antibiotics are also sometimes used to remove harmful bacteria and **promote healthy growth** under the oversight of a veterinarian.

# Conclusions

## 1. Social Media is Shaping our Industry *(without us)*

- ✓ *Largely Negative (Anti-Ag, Industrial Ag/Food, Animal Welfare)*
- ✓ *We must provide balance and benefit*

## 2. Ag (Food) Industry Needs a Credible Voice

- ✓ *Experts, Moms and Millennials*
- ✓ *Basic trusted information from trusted relationships*

## 3. We Must Define the Benefit

- ✓ *Nutritious, Affordable, Wholesome Food*
- ✓ *Trusted and transparent information*

# Impacts of Peripartum Health and Nutrition on Reproduction in Dairy Cows

**José E.P. Santos**

Department of Animal Sciences  
University of Florida



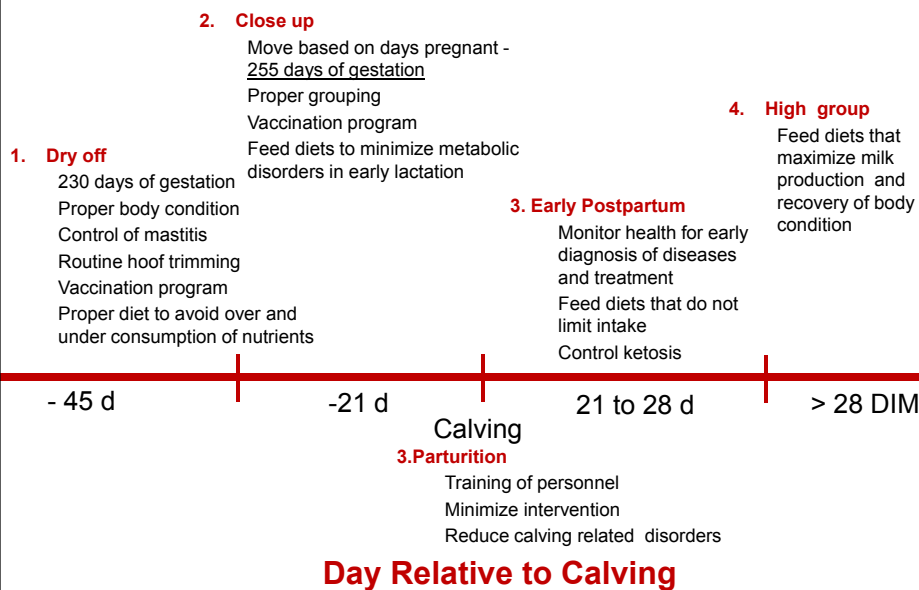
**Ohio Dairy Veterinarians Meeting**  
January 7, 8, & 9, 2016 in Columbus, Ohio  
"Social Media, Genetics, and Reproduction"  
— Registration Deadline —  
Hotel Reservation Deadline Friday, December 11, 2015



Pictures by Bonnie Mohr <http://www.bonniemohr.com/>

## Timeline Management of Dairy Cows For Successful Transition

### Provide Proper Comfort and Heat Abatement



## Conceptual Timeline for Successful First Postpartum Insemination

### 1. Prepartum period

Proper grouping  
Ration balancing  
Minimize metabolic disorders  
Minimize calving problems

### 3. Early postpartum

Monitoring cows  
Diagnosis and therapy  
of key diseases

### 4. Reproductive program

PGF<sub>2α</sub>  
Presynchronization for 1<sup>st</sup> AI

### 5. End of the VWP

Increase  
pregnancy rate  
(IR x P/AI)

- 30 d

14 to 21 d

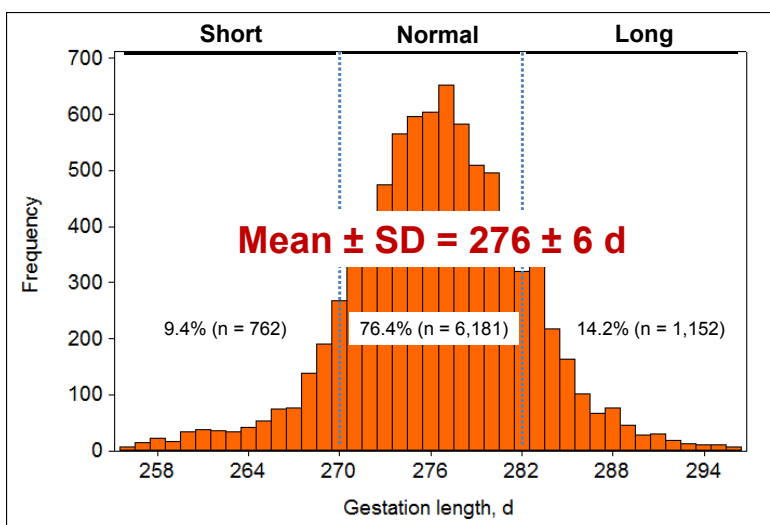
60 to 80 DIM

### 2. Calving

Proper training of maternity personnel  
Minimize unnecessary intervention

Day Relative to Calving

## Distribution of Gestation Length in Holstein Cows



Vieira-Neto et al. (2015) J. Dairy Sci. (Abstr)



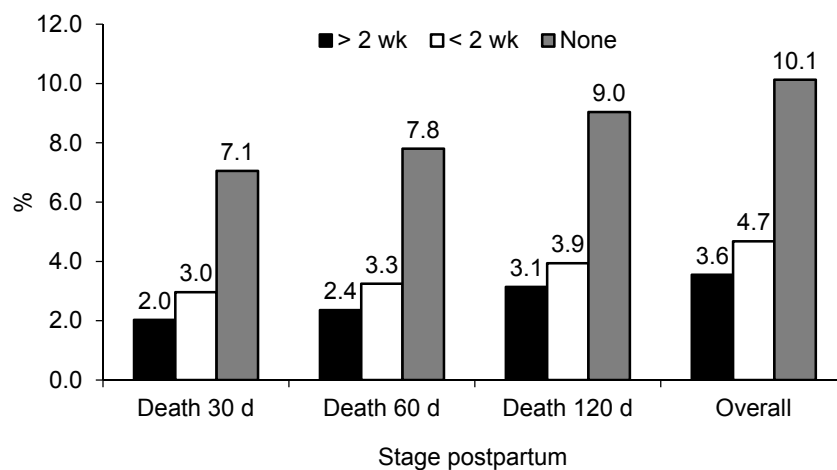
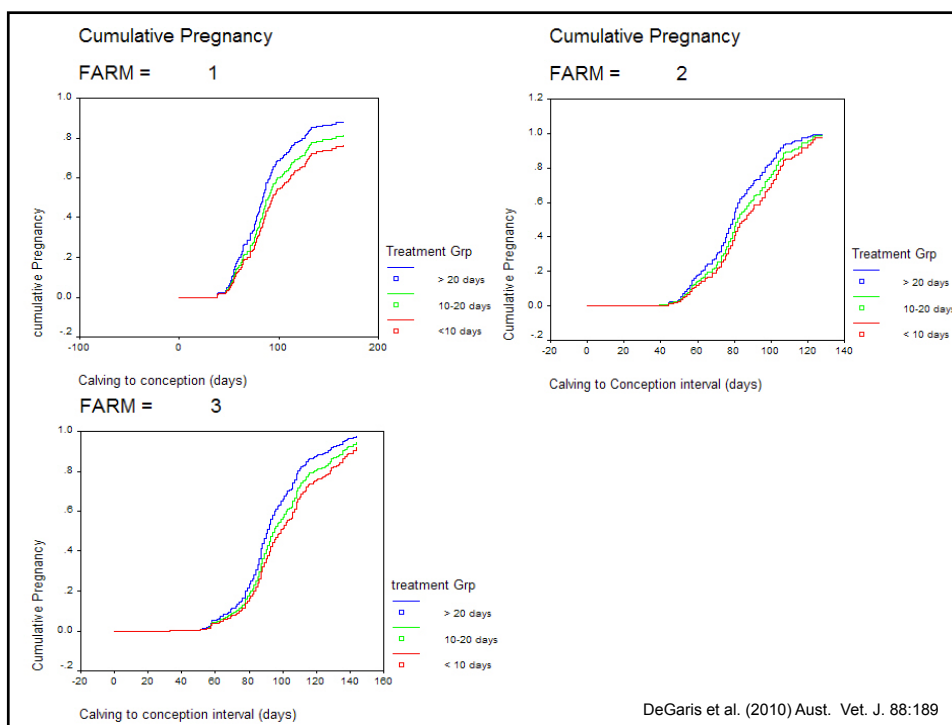
## Dry Off Cows

- Dry off cows at  $230 \pm 3$  d of gestation
  - ✓ 1<sup>st</sup> lactation cows need 45 d of dry period
  - ✓ Older cows need 28 d of dry period
- Short dry periods for 1<sup>st</sup> lactation compromise subsequent lactation
- No cow needs more than 45 days dry
- **Assure 45 days dry for all cows**

## Move Cows to Prepartum

- Weekly moves
  - ✓  $255 \pm 3$  d of gestation
- Target 3 weeks in the prepartum pen and assure that all cows spend a minimum of 14 d
- A single group dry cow pen can be used, but consider the pros- and cons at this point
  - Pros*
    - ✓ Ease of managing cows
    - ✓ No group move
    - ✓ Single dry cow ration
  - Cons*
    - ✓ Longer feeding of acidogenic salts
    - ✓ Increase in metabolizable protein needs during late gestation
    - ✓ Benefit from some additives during late gestation

## Mortality Based on Weeks in Prepartum Pen

Santos *et al.* (2013)

## Adequate Calving Assistance



**Patience, hygiene and lots of lubrication**

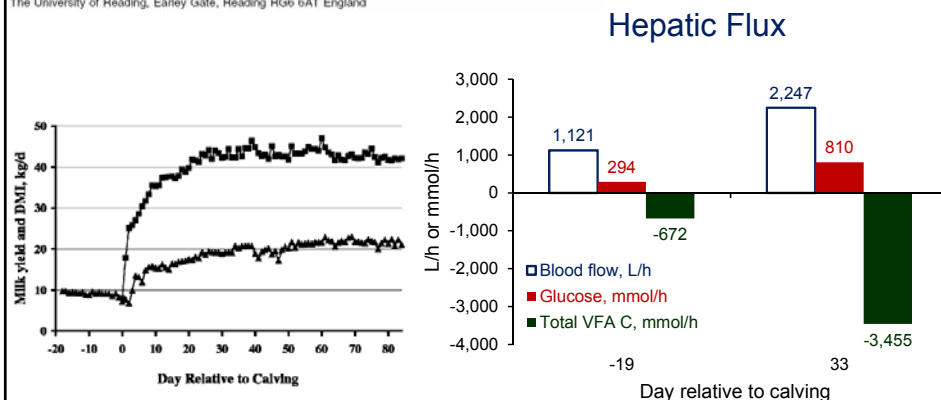
J. Dairy Sci. 86:1201–1217

© American Dairy Science Association, 2003.

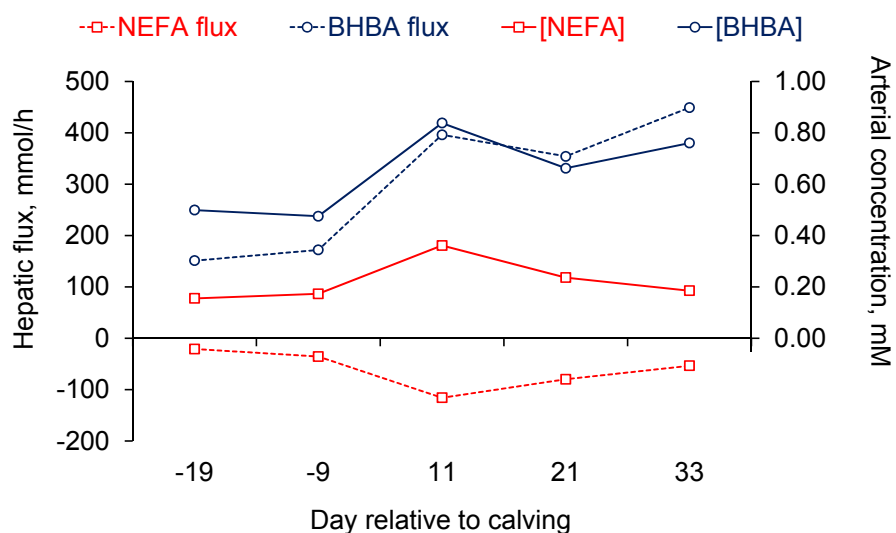
### Splanchnic Metabolism of Dairy Cows During the Transition From Late Gestation Through Early Lactation

C. K. Reynolds<sup>1</sup>, P. C. Alkman, B. Lupoli, D. J. Humphries, and D. E. Beever

Centre for Dairy Research, Department of Agriculture,  
The University of Reading, Earley Gate, Reading RG6 6AT England

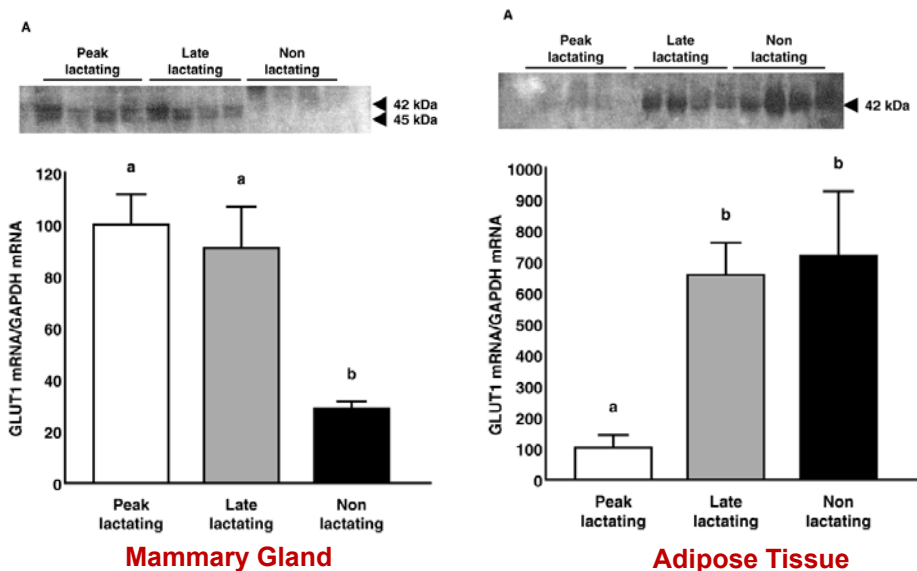


## Hepatic Flux and Arterial Concentration of Metabolites in Transition Cows



Reynolds et al. (2003) J. Dairy Sci. 86:1202-1217

## Glucose Transporter-1 (GLUT-1) in Mammary and Adipose Tissue of Cows

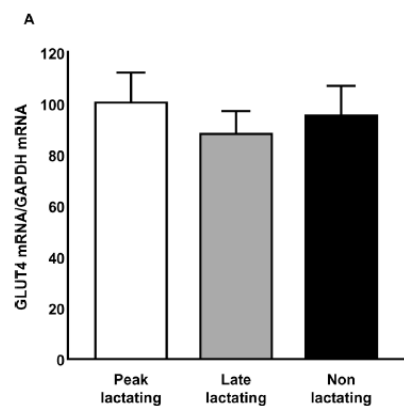


Komatsu et al. (2005) J. Anim. Sci. 83:557-564

## Glucose Transporter-4 (GLUT-4) in Mammary and Adipose Tissue of Cows

Not detected

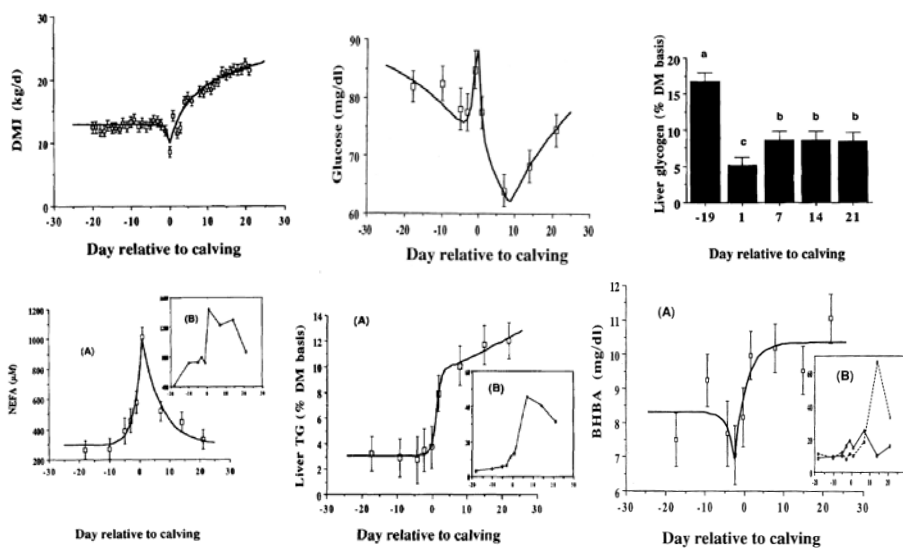
Mammary Gland



Adipose Tissue

Komatsu et al. (2005) J. Anim. Sci. 83:557-564

## Summary of Metabolic Changes with Onset of Lactation



Vazquez-Añon et al., 1994; JDS



## Energetic Signals Influence GnRH-LH Release

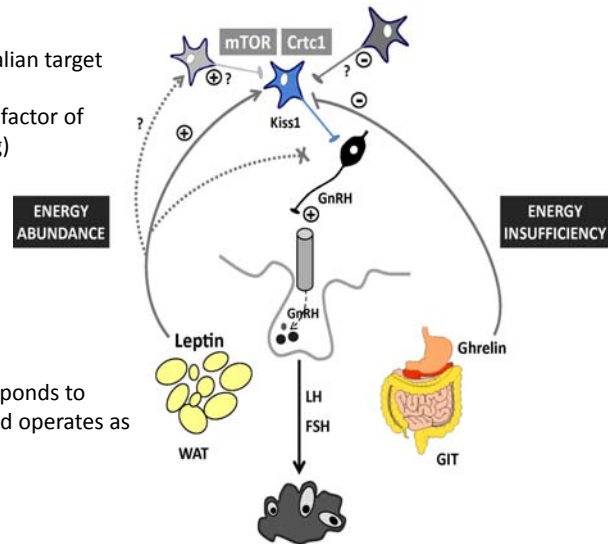
Insulin and leptin influence expression of transcription factors in the CNS

- mTOR (mechanistic or mammalian target of rapamycin)
- Crtc1 (co-activator transcription factor of cAMP response element-binding)

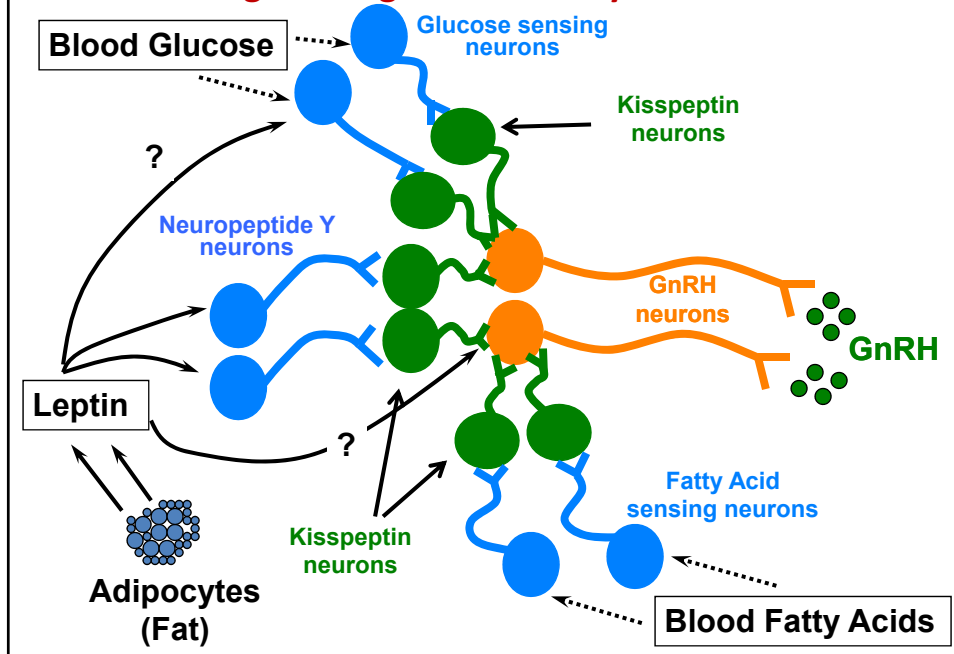
Influence Kiss1 gene expression

### mTOR

Serine/threonine kinase that responds to amino acids, insulin, or leptin and operates as sensor of cellular energy status



## Metabolic Signals Might Act Directly on GnRH Neurons



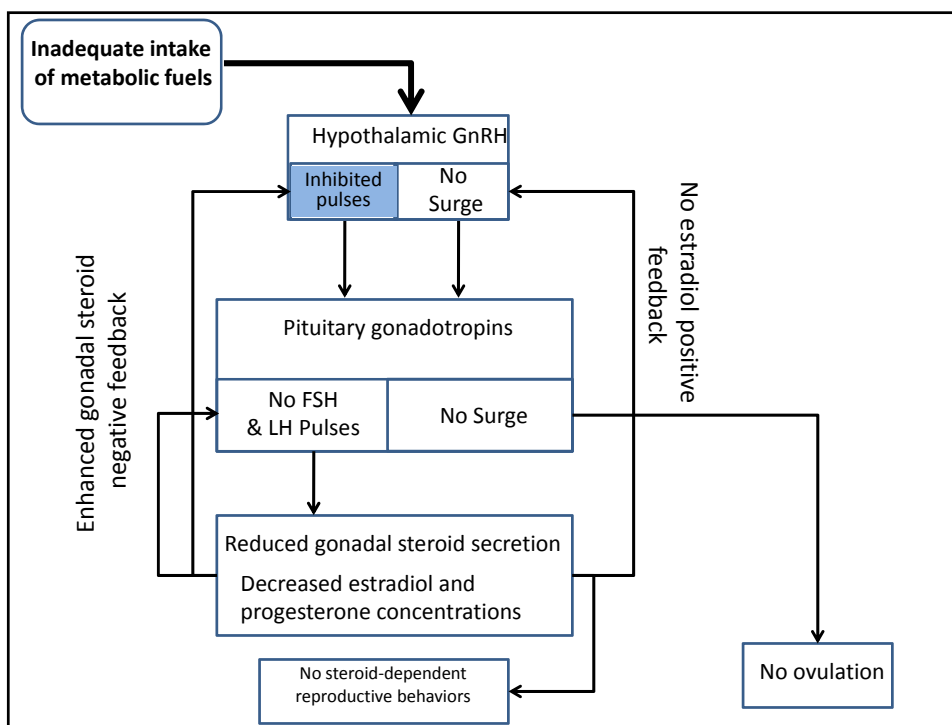
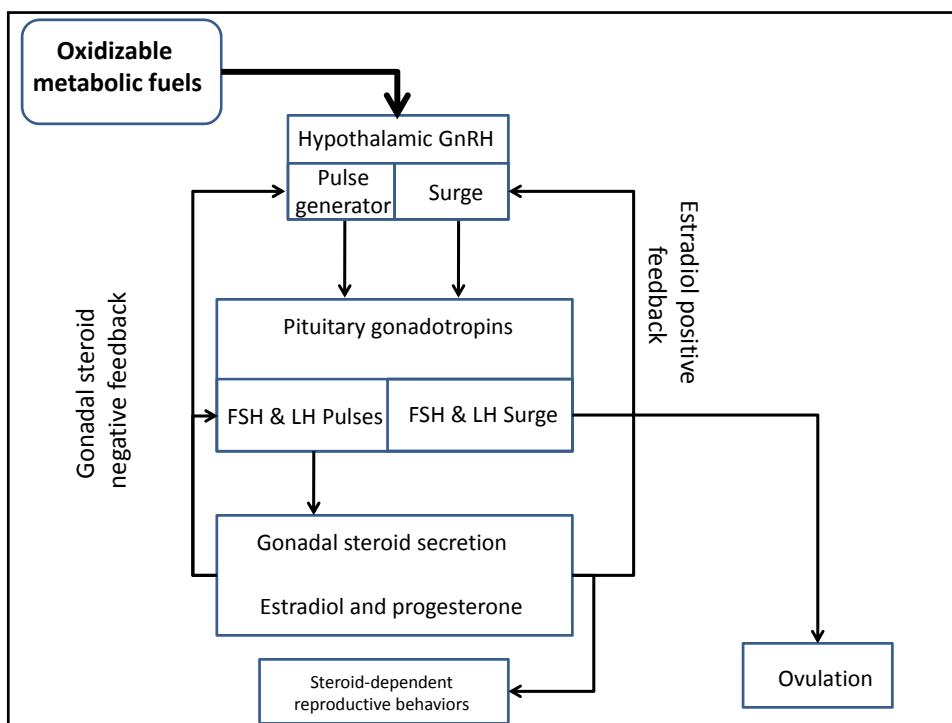
## Under Adequate Nutrition and Body Tissue Composition

- Metabolic cues that activate mTOR pathway (insulin, amino acids) or direct signals on Kiss neurons from glucose and fatty acids
  - ✓ Stimulate kiss1 neurons located in the anterior hypothalamus (PON, AHA, SCN) when the proper metabolic cues are combined with estrogen through  $E\alpha$
  - ✓ Kiss1 stimulates GPR54 in GnRH neurons
  - ✓ Results in GnRH pulsatility and surge in females
  - ✓ GnRH binds to receptors on the gonadotrophs of the pituitary that induces LH/FSH pulses and surge

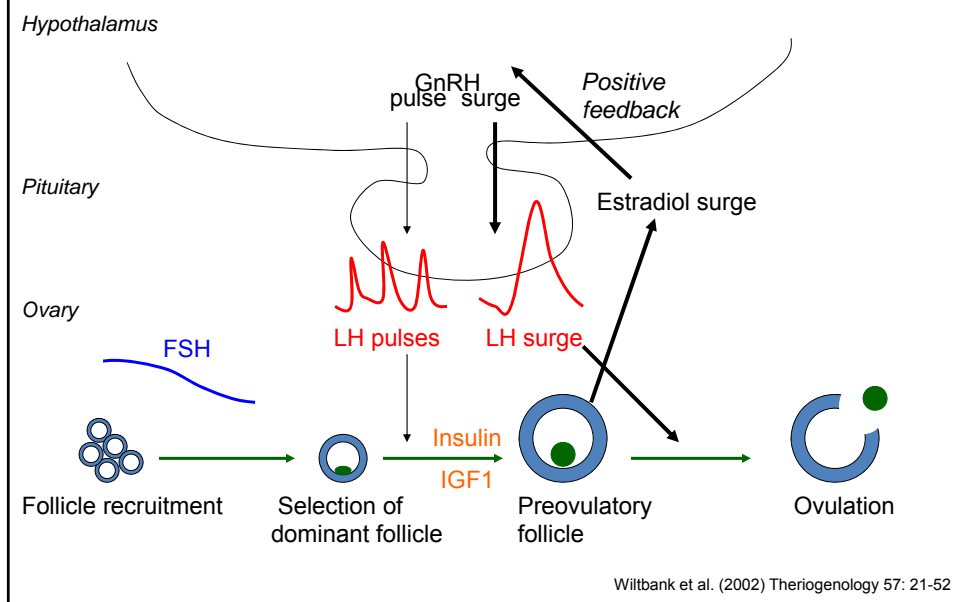
## Who is going to get pregnant???



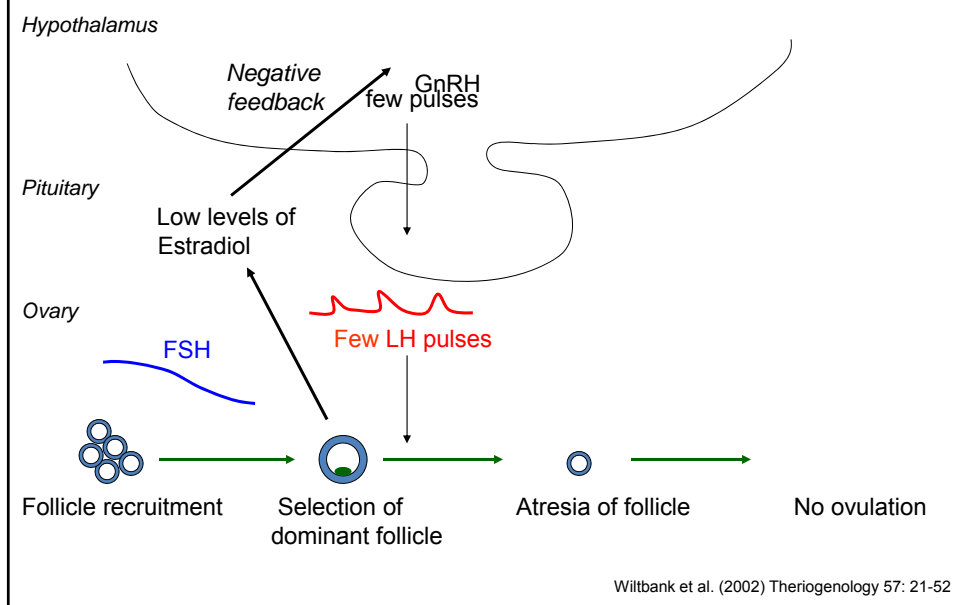
[www.blogilates.com](http://www.blogilates.com)



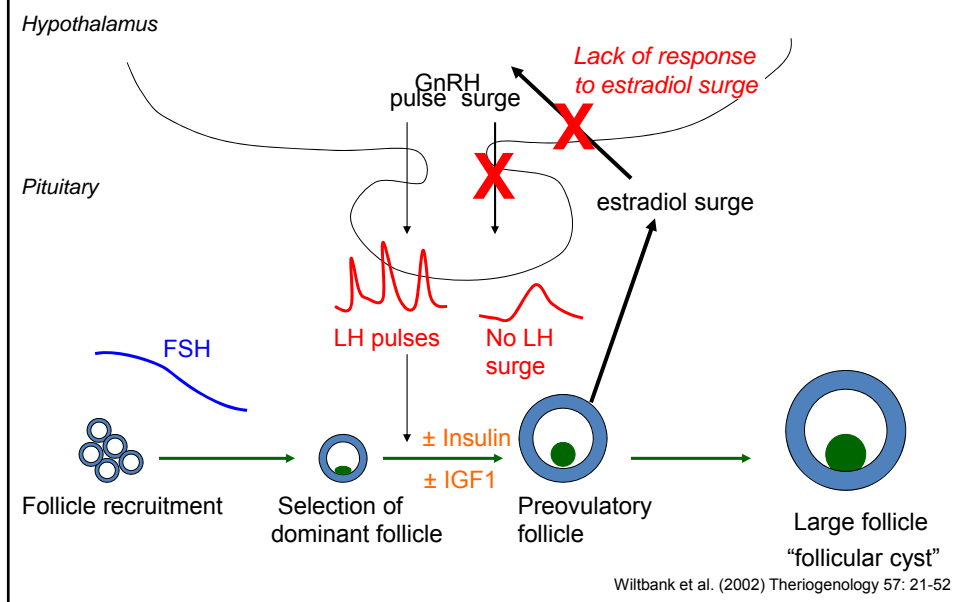
## Normal Follicle Growth and Ovulation



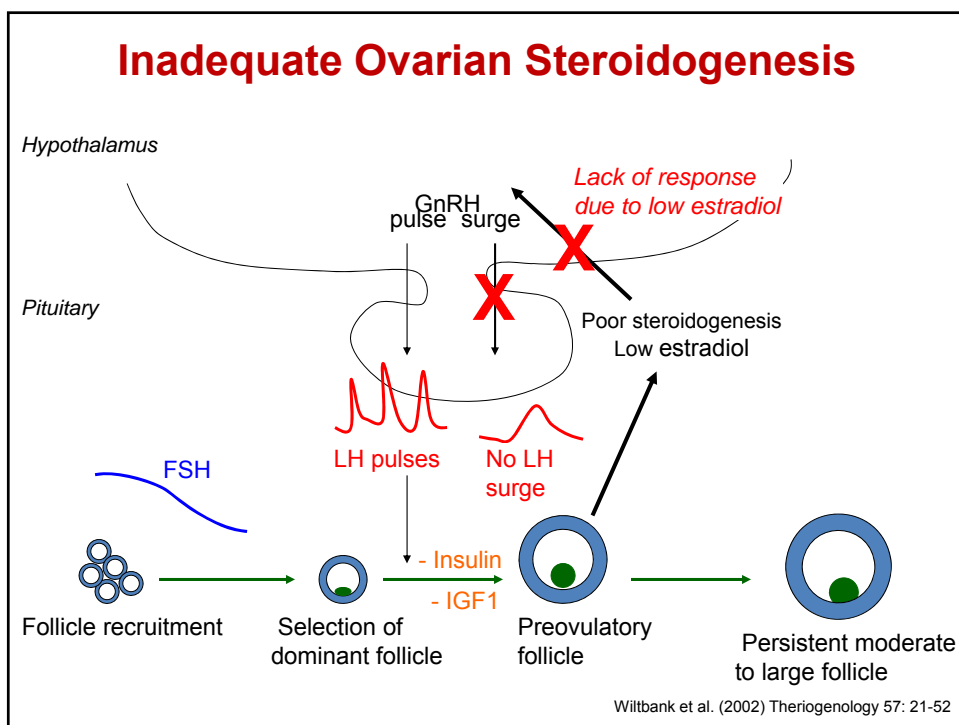
## Hypothalamic Failure to Sustain GnRH Pulses



## Hypothalamic Failure to Release a GnRH Surge

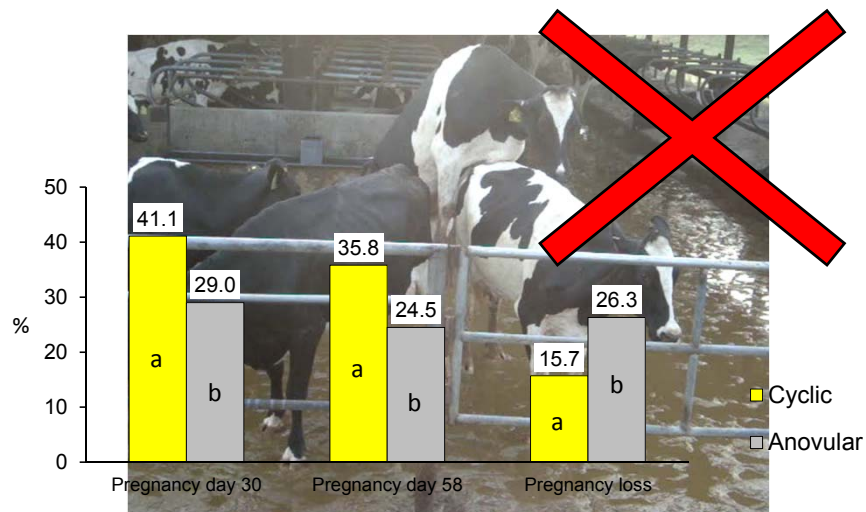


## Inadequate Ovarian Steroidogenesis





## Impacts of Delayed Cyclicity on Fertility of Dairy Cows

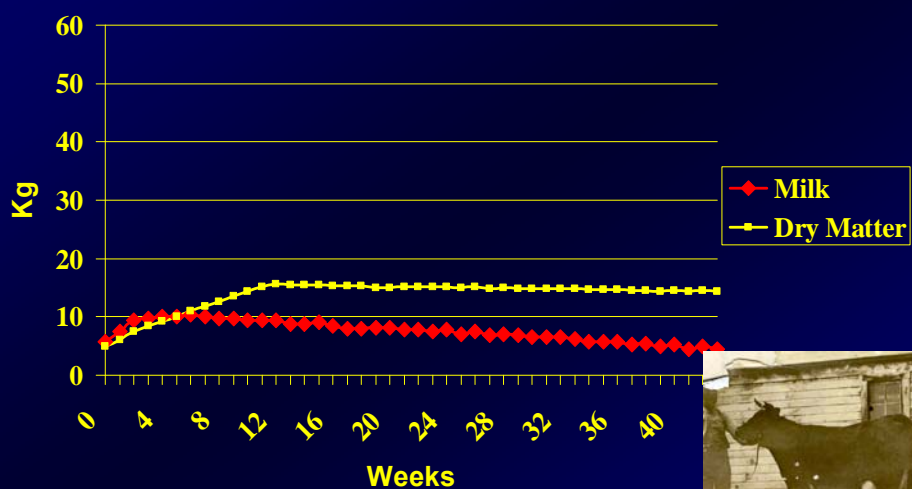


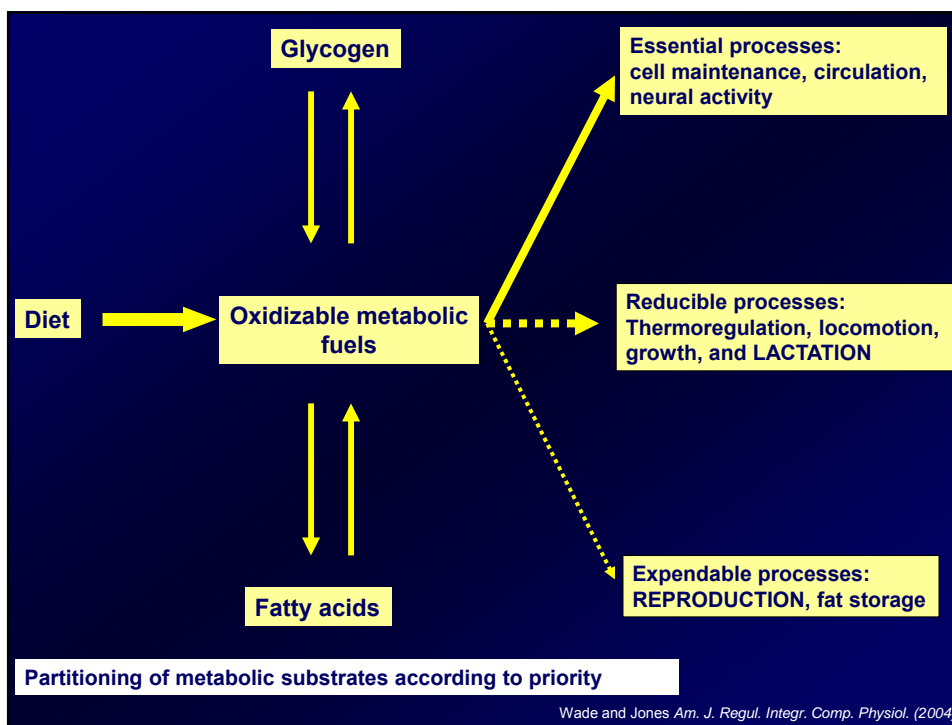
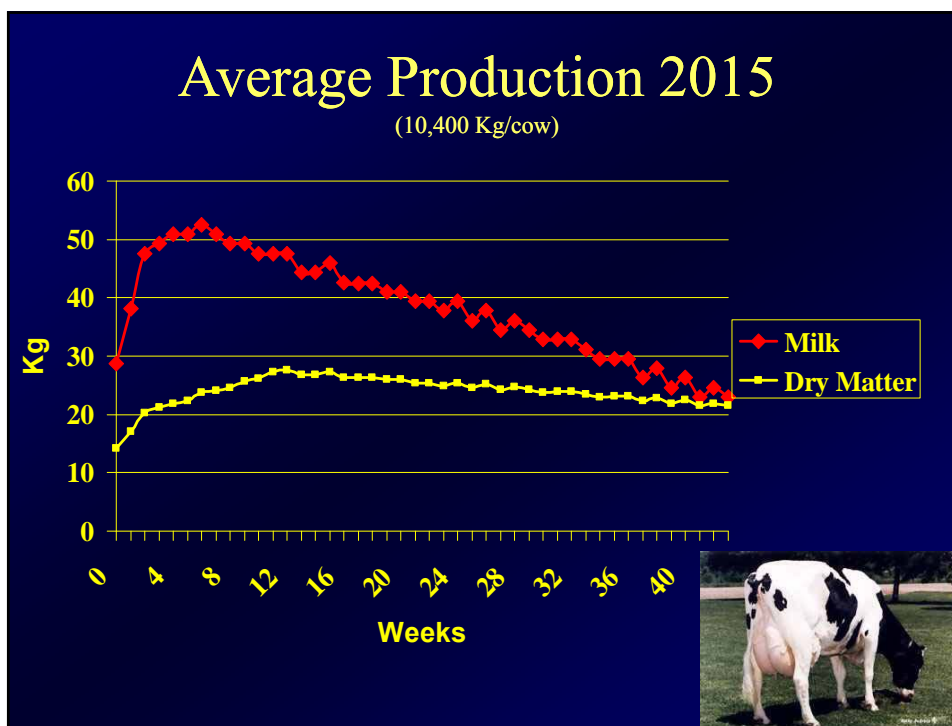
<sup>a,b</sup> Means differ,  $P < 0.05$

Santos et al. (2009). Anim. Reprod. Sci. 110:207-221  
Santos et al. (2004). Anim. Reprod. Sci. 82-83:513-535

## Average Production 1940

(2,000 Kg/cow)





## Polar Expedition or Iditarod



➤ Energy requirements increase to 6 to 8 Mcal/day



➤ Therefore working at between 2.5 and 3.5 times maintenance

Courtesy J. Huxley, University of Nottingham

## Holstein Cows at Peak Production



### Average cow at 45 kg/day

- Maintenance energy required: 15 Mcal/d of ME
- Energy for milk synthesis 55 Mcal of ME/d
- Total energy needed = 70 Mcal of ME/d
- **Therefore, consuming at 4.6 times maintenance**



### Lucinda produced 104 kg/day

- Maintenance energy required: 15 Mcal/d of ME
- Energy for milk synthesis 113 Mcal of ME/d
- Total energy needed = 128 Mcal of ME/d
- **Therefore, consuming at 8.5 times maintenance**

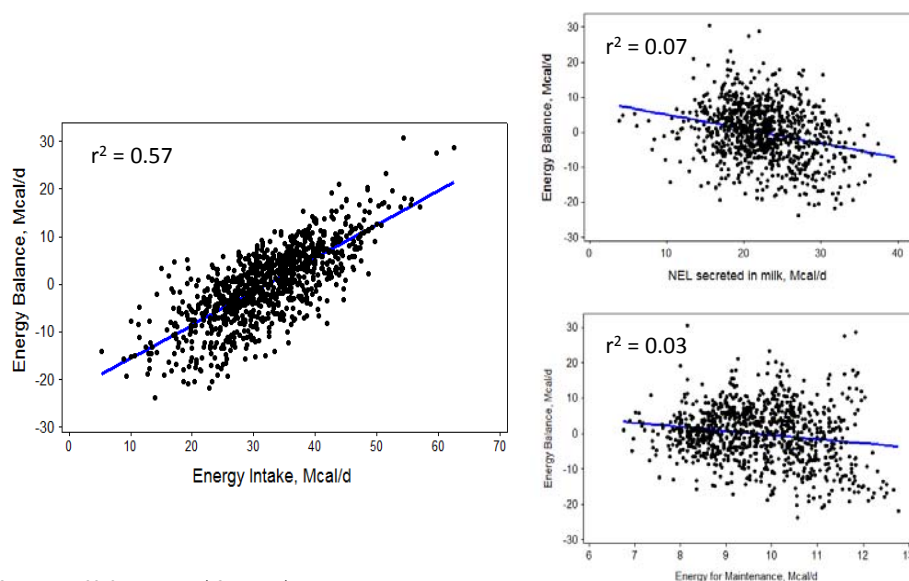
Santos, J.E.P. 2010. Rum. Reprod. Symp. Anchorage, AK

**Risk factors for resumption of estrous cycles by 65 days postpartum and pregnancy at 1<sup>st</sup> AI in lactating dairy cows**

Variable	Cyclic, % (n/n)	Adjusted OR (95% CI)	P value
<b>BCS change from calving to 65 DIM</b>			
Lost 1 unit or more	58.7 (279/475)	Referent	-----
Lost < 1 unit	74.6 (2,507/3,361)	1.96 (1.52, 2.52)	< 0.001
No change	80.9 (2,071/2,560)	2.39 (1.74, 3.28)	< 0.001
<b>Milk yield in the first 90 DIM</b>			
Q1, 32.1 kg/d	72.7 (1,011/1,390)	Referent	-----
Q2, 39.1 kg/d	77.6 (1,204/1,552)	1.34 (1.13, 1.60)	< 0.01
Q3, 43.6 kg/d	77.6 (1,350/1,739)	1.36 (1.15, 1.62)	< 0.001
Q4, 50.0 kg/d	75.3 (1,292/1,715)	1.21 (1.02, 1.43)	0.04
Variable	Pregnant, % (n/n)	Adjusted OR (95% CI)	P value
<b>BCS change from calving to 65 DIM</b>			
Lost 1 unit or more	28.9 (132/472)	Referent	-----
Lost < 1 unit	37.3 (1204/3230)	1.42 (1.13, 1.79)	< 0.01
No change	41.6 (1008/2422)	1.69 (1.32, 2.17)	< 0.001
<b>Milk yield in the first 90 DIM</b>			
Q1, 32.1 kg/d	37.2 (496/1,334)	Referent	-----
Q2, 39.1 kg/d	38.9 (576/1,481)	1.06 (0.91, 1.24)	0.42
Q3, 43.6 kg/d	39.3 (652/1,661)	1.09 (0.93, 1.26)	0.26
Q4, 50.0 kg/d	37.6 (620/1,648)	1.03 (0.88, 1.21)	0.65

Santos et al. (2009) Anim. Reprod. Sci. 110: 207–221

**If Energy Balance is a Major Drive of Reproductive Success in the Dairy Cow, then the Focus Should be on Intake and not Milk Yield**

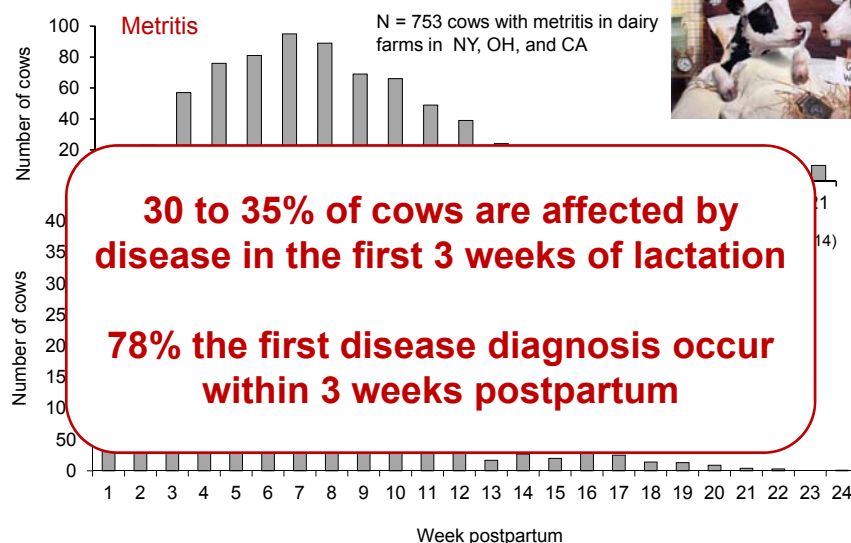


Santos, J.E.P. 2010. Rum. Reprod. Symp. Anchorage, AK

## SUMMARY

- ✓ Modern high-producing dairy cows have been selected to partition nutrients away from body reserves and to favor lactation during the first months postpartum
  - ✓ Induces a transient period of negative nutrient balance that is expected
  - ✓ If extended, exacerbated or combined with other problems such as diseases, then problems arise
- ✓ Low postpartum intake, associated with peripartum problems delays resumption of postpartum ovulation, which impairs reproduction
- ✓ Transition cow management and diets should stimulate intake and assure that every cow has a chance to eat whenever they want, particularly

## Morbidity is a Problem of Early Lactation Cows



Ribeiro et al. (2016) J. Dairy Sci. 99: doi: 10.3168/jds.2015-10337



**Incidence (%) of diseases in the first 60 days postpartum in 11,400 dairy cows from 16 herds according to region of the country and season of calving**

Disease	NE		MW		SE		SW	
	Warm	Cool	Warm	Cool	Warm	Cool	Warm	Cool
Retained placenta	8.0	5.9	7.4	5.4	15.0	7.6	4.3	2.9
<b>Mastitis</b>	26.1	16.0	6.1	5.5	18.0	21.3	12.0	8.1
<b>Displaced abomasum</b>	3.0	5.6	2.9	1.4	6.0	4.0	1.0	1.0
<b>Pneumonia</b>	1.1	1.5	1.7	1.8	3.8	13.4	7.1	3.5
<b>Clinical endometritis</b>	15.4	32.5	25.9	20.4	23.4	42.9	24.3	26.1
<b>Lameness</b>	11.3	2.6	2.1	8.1	1.7	12.1	5.4	2.0

Pinedo et al. (2015) J. Dairy Sci. Abstr. 359

**50% of the dairy cows are diagnosed with a problem in the first 60 DIM**

## Calcium in Plasma of Cows During the Transition Period

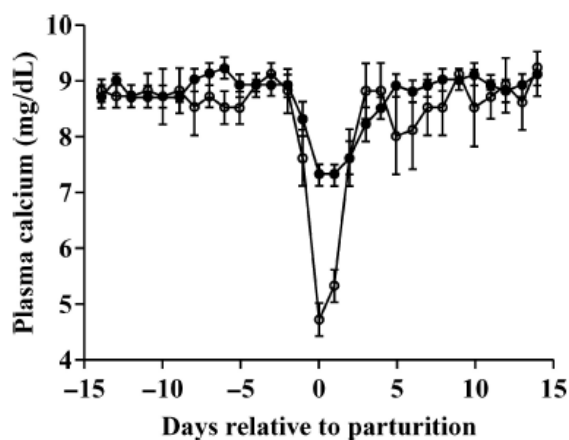
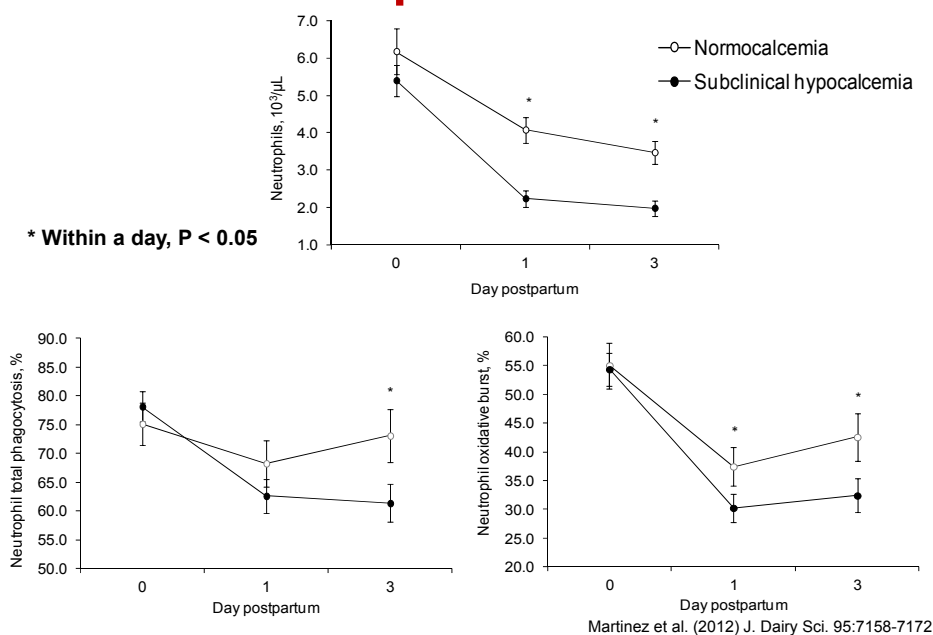


Figure 1. Plasma calcium concentrations (mean  $\pm$  SEM) around the time of parturition in milk fever (○; n = 8) and nonmilk fever (●; n = 19) cows; d 0 = day of parturition.

Kimura et al., 2006; JDS

## Neutrophil Function



## Subclinical Hypocalcemia and Metritis

	Subclinical hypocalcemia <sup>1</sup>		Normocalcemia	
	Low Risk	High Risk	Low Risk	High Risk
Metritis, % <sup>*¶</sup>	40.7 (11/27)	77.8 (35/45)	14.3 (4/28)	20.0 (2/10)
Puerperal metritis, % <sup>*¶</sup>	29.6 (8/27)	53.5 (24/45)	0 (0/28)	10.0 (1/10)

<sup>\*</sup>Effect of hypocalcemia ( $P < 0.05$ ).

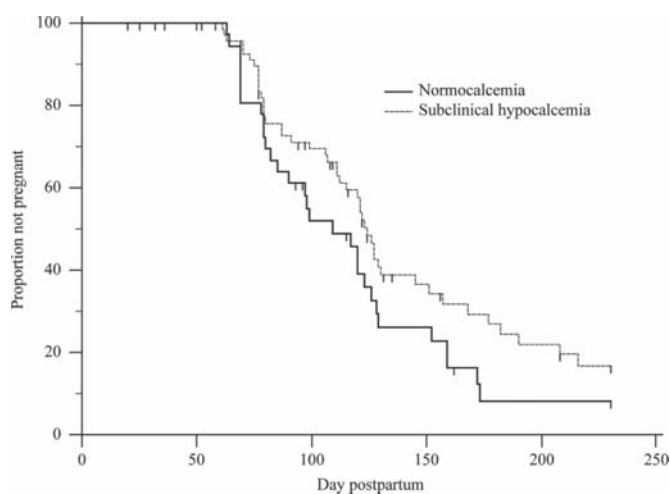
<sup>¶</sup>Effect of metritis risk ( $P < 0.05$ ).

<sup>1</sup> Serum Ca  $\leq 8.59$  mg/dL in the first 3 d postpartum.

<sup>2</sup> Puerperal metritis was defined as metritis with presence of fever ( $\geq 39.5^\circ\text{C}$ ).

Martinez et al. (2012) J. Dairy Sci. 95:7158-7172

## Subclinical Hypocalcemia and Pregnancy Rate

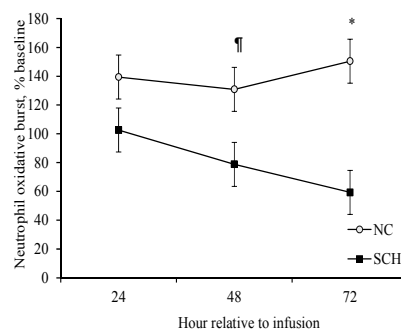
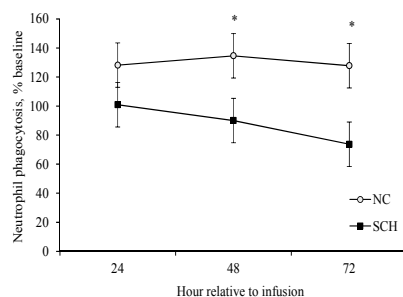
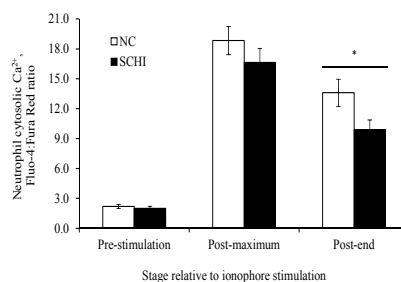
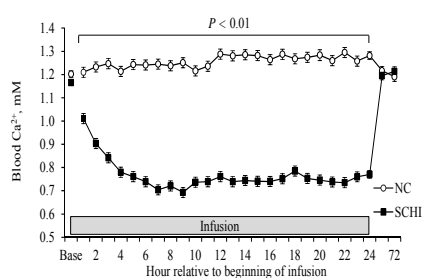


Adjusted hazard ratio = 1.61; 95% CI = 0.97 to 2.65)

Median days open: Normocalcemia = **109 d** (95% CI = 82 to 126); SBCH = **124 d** (95% CI = 111 to 145).

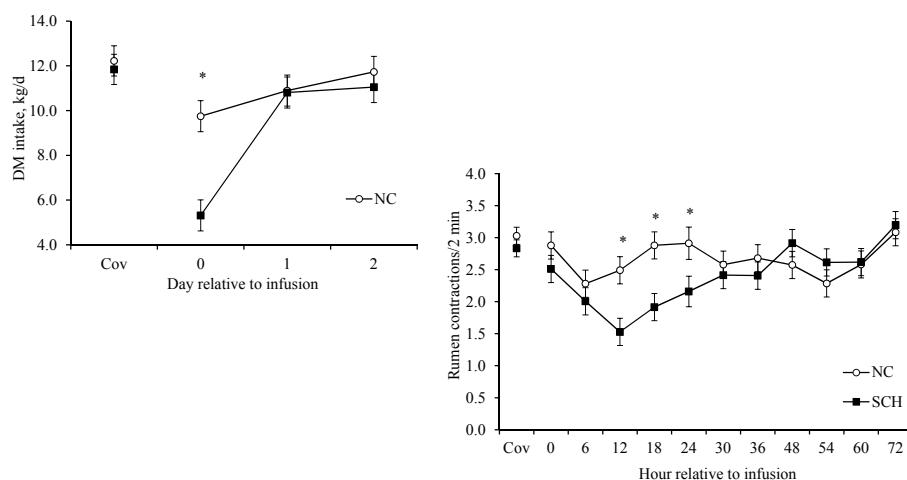
Martinez et al. (2012) J. Dairy Sci. 95:7158-7172

## Induced Subclinical Hypocalcemia in Dairy Cows



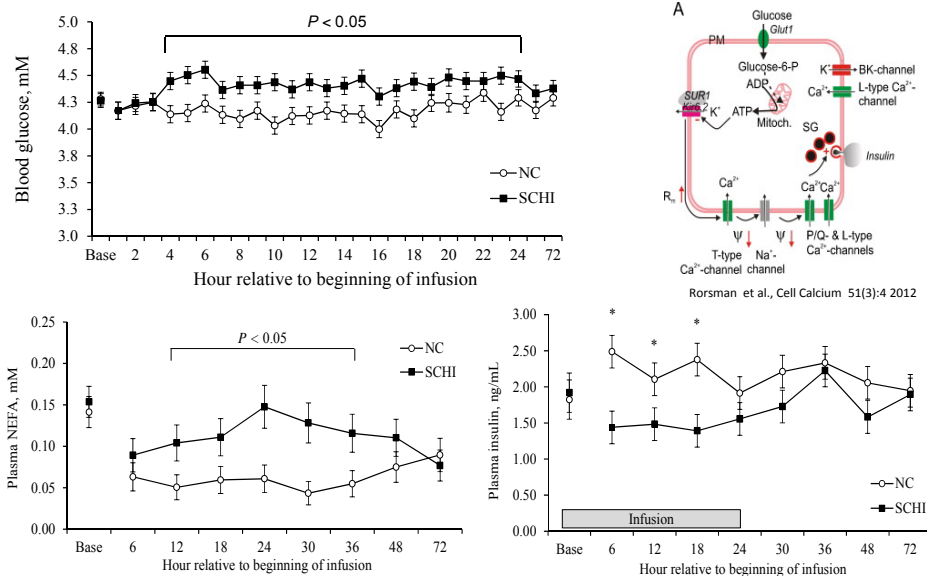
Martinez et al. (2014) J. Dairy Sci. 97 :874–887

## Induction of Subclinical Hypocalcemia in Dairy Cows



Martinez et al. (2014) J. Dairy Sci. 97 :874–887

## Subclinical Hypocalcemia in Dairy Cows



Martinez et al. (2014) J. Dairy Sci. 97 :874–887<sup>42</sup>

## Prevalence of Fatty Liver in Dairy Cows Reported in the Literature

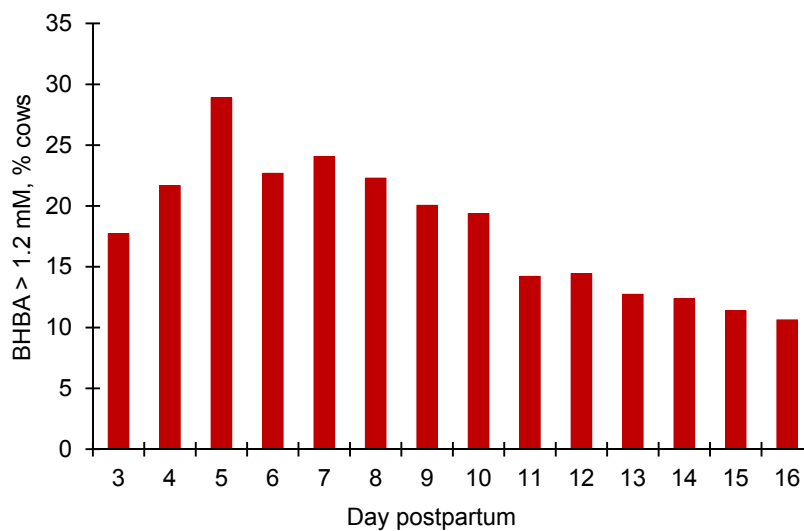
Study	Prevalence of fatty liver, %	
	Moderate (5 to 10% TAG)	Severe (> 10% TAG)
Reid (1980)	48	15
Reid (1980)	33	5

**40.6% of the early lactation cows develop moderate fatty liver**

Jorritsma et al. (2000)	45	NR
Jorritsma et al. (2000)	40	14
Gerloff et al (1986)	20	15
Herd (1991)	>24	24
Lima et al. (2013)	28	17

Adapted from Bobe et al. (2004) J. Dairy Sci. 87:3105–3124

## Prevalence of Subclinical Ketosis



McArt et al. (2012) J. Dairy Sci. 95:5056-5066

## Disease and Nutrient Flux

### ➤ Fed/Control

- Fed *ad libitum* and not challenged

### ➤ Fed/Challenge

- Fed *ad libitum* and challenged with 10 mL of  $1 \times 10^9$  mL CFU of *M. haemolytica* via a tracheal tube on h 0

### ➤ Fasted/Control

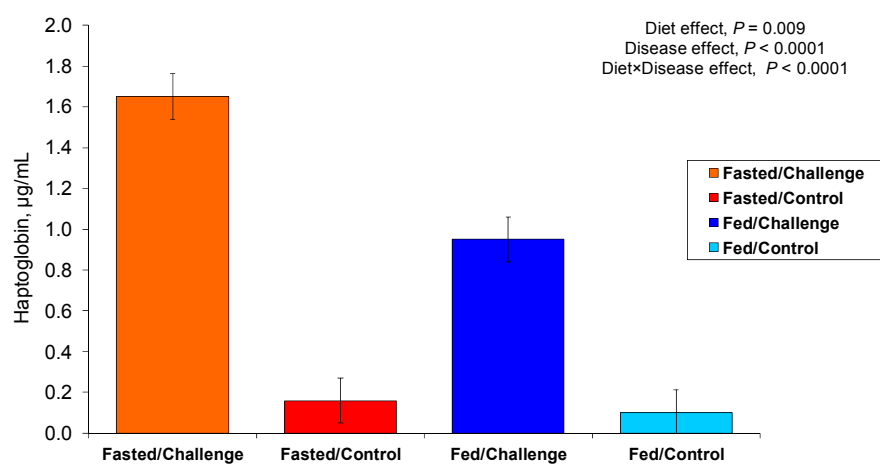
- Feed was removed 14 h before the challenged steers received *M. haemolytica* and steers Control steers remained without feed during the sampling period (total of 72 h)

### ➤ Fasted/Challenge

- Feed was removed 14 h before the *M. haemolytica* challenge and steers remained without feed during the sampling period (total of 72 h)

Burciaga-Robles et al. (2009)

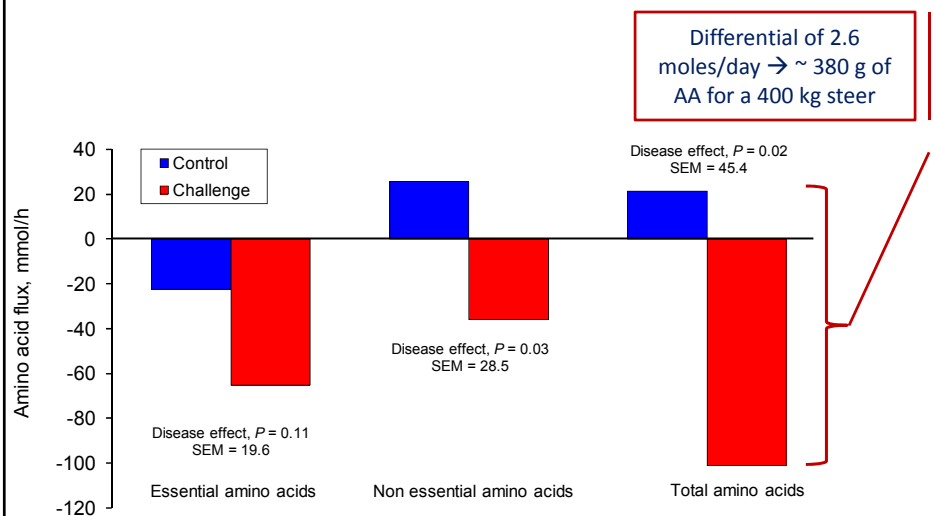
## Arterial haptoglobin concentration in steers fed or fasted with or without a *M. haemolytica* intratracheal challenge



Burciaga-Robles et al. (2009)



### Amino Acid Hepatic Flux in Steers Fed or Fasted with or without an Intratracheal Challenge with *M. haemolytica*



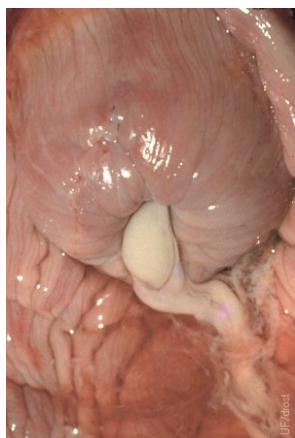
Burciaga-Robles et al. (2009)

### Metritis

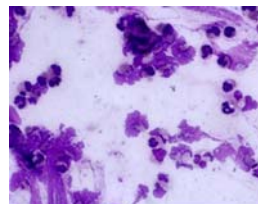
Metritis with no systemic signs  
Puerperal metritis (acute disease)

 $\leq 21$  DIM

### Clinical Endometritis

 $\geq 21$  DIM

### Cytological Endometritis

 $\geq 35$  DIM



J. Dairy Sci. 99:1–20  
<http://dx.doi.org/10.3168/jds.2015-10337>  
 © American Dairy Science Association®, 2016.

## Carryover effect of postpartum inflammatory diseases on developmental biology and fertility in lactating dairy cows

E. S. Ribeiro,<sup>\*†1</sup> G. Gomes,<sup>\*†</sup> L. F. Greco,<sup>\*†</sup> R. L. A. Cerri,<sup>‡</sup> A. Vieira-Neto,<sup>\*†</sup> P. L. J. Monteiro Jr.,<sup>\*†</sup> F. S. Lima,<sup>\*†2</sup> R. S. Bisinotto,<sup>\*†3</sup> W. W. Thatcher,<sup>\*†</sup> and J. E. P. Santos<sup>\*†4</sup>

<sup>\*</sup>Department of Animal Sciences, University of Florida, Gainesville 32611

<sup>†</sup>DH Barron Reproductive and Perinatal Biology Research Program, University of Florida, Gainesville 32611

<sup>‡</sup>Faculty of Land and Food Systems, University of British Columbia, Vancouver, BC V6T 1Z4 Canada

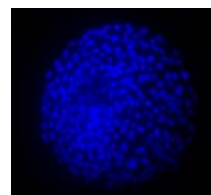
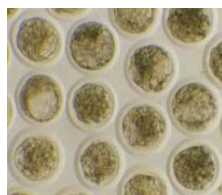
➤ The objectives were to evaluate some of the mechanisms that underlie the depression in fertility in dairy cows by inflammation in early lactation

- ✓ Developmental biology
- ✓ Pregnancy per breeding and pregnancy loss
- ✓ Cellular changes in the conceptus and endometrium
- ✓ Alterations in the composition of the uterine fluid

## Does disease influence early embryo development?

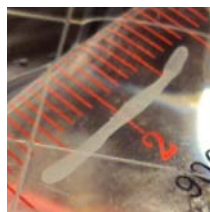
- Data from 419 embryo-oocytes from single ovulating lactating dairy cows flushed on days 5-6 after AI were evaluated for:

- ✓ Fertilization
- ✓ Embryo quality
- ✓ Cell number

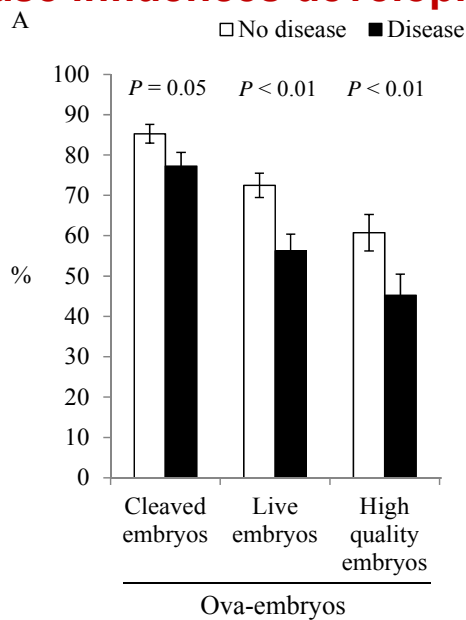


- Data from 148 lactating dairy cows flushed on days 15-16 after AI were evaluated for:

- ✓ Pregnancy
- ✓ Embryo shape and length
- ✓ Interferon-tau concentration
- ✓ Transcriptome

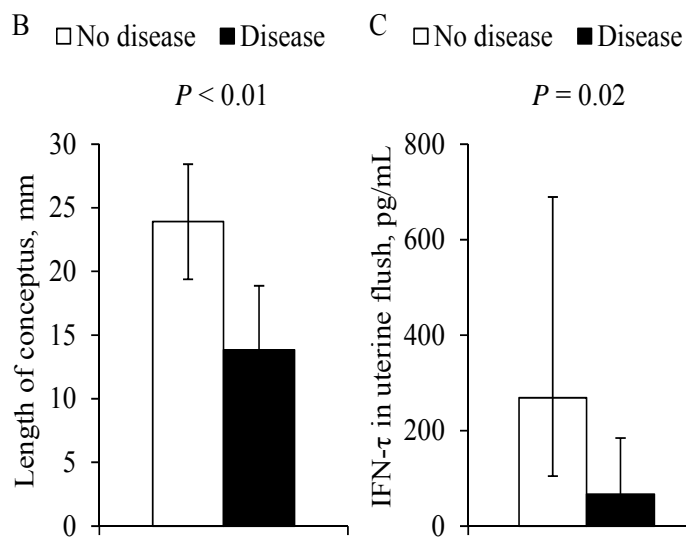


## Disease influences development to morula

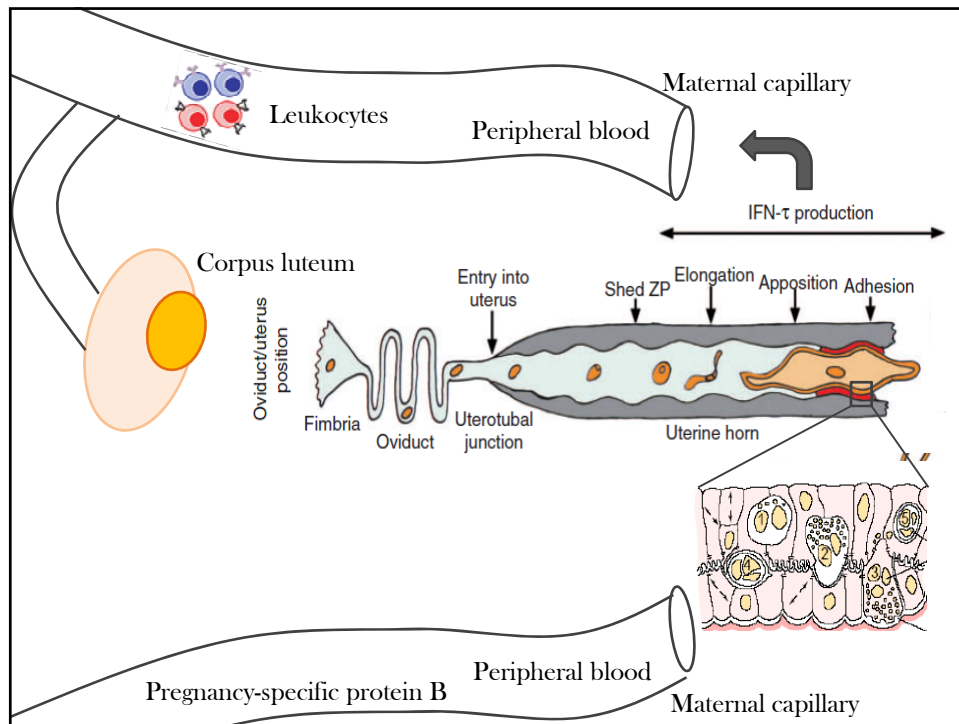


Ribeiro et al. (2016) <http://dx.doi.org/10.3168/jds.2015-10337>

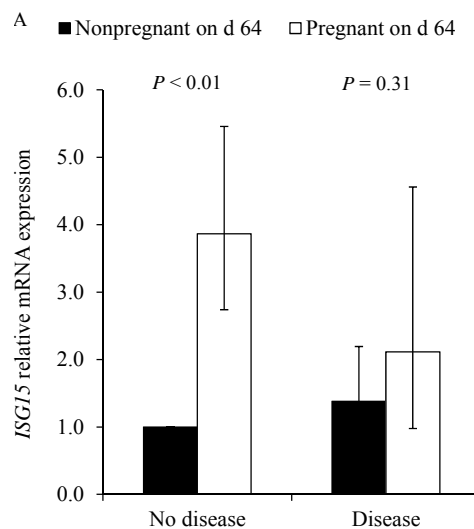
## Disease influences conceptus quality



Ribeiro et al. (2016) <http://dx.doi.org/10.3168/jds.2015-10337>



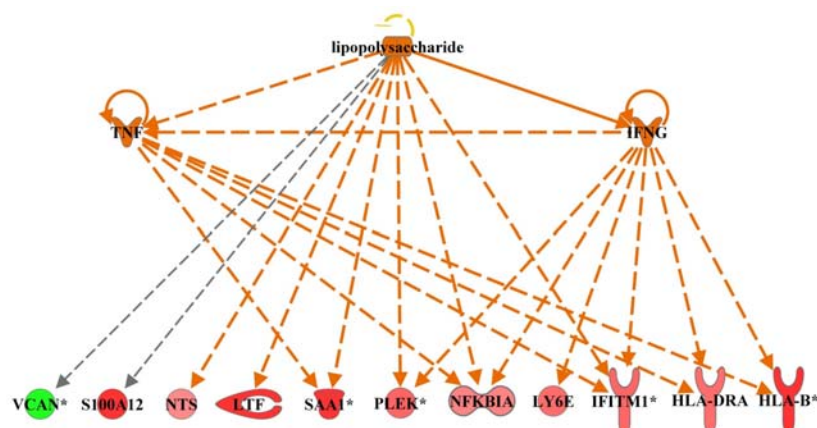
## Disease influences PBL response to pregnancy



PREG < 0.01 DIS = 0.55 INT = 0.04

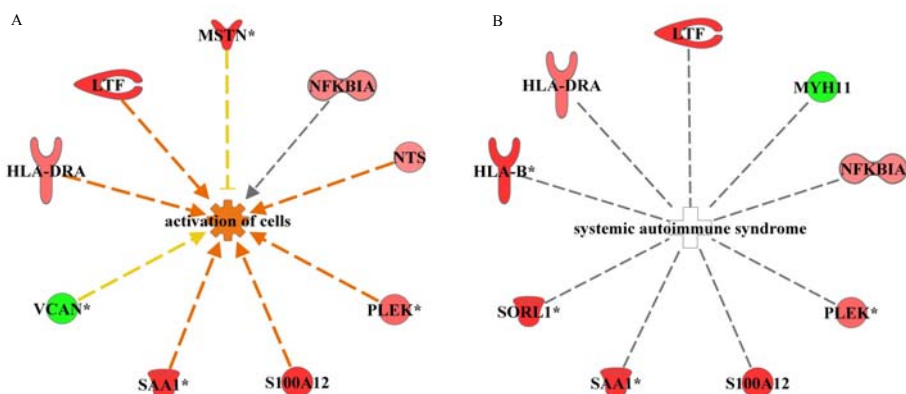
Ribeiro et al. (2016) <http://dx.doi.org/10.3168/jds.2015-10337>

### Network of Genes Differentially Expressed between Conceptuses Recovered from Cows Diagnosed or not with Nonuterine Diseases Before AI



- Red denotes genes upregulated and green denotes genes downregulated in conceptus recovered from cows diagnosed with nonuterine diseases before AI.
- The pointed and blunted arrowheads represent activating and inhibitory relationships, respectively.
- Solid and dashed lines imply on direct and indirect relationships, respectively.
- Orange represents predicted activation and relationships that lead to activation and gray represents an effect not predicted.

### Downstream Effects of Genes Differentially Expressed between Conceptuses Recovered from Cows Diagnosed or not with Nonuterine Diseases Before AI



- Red denotes genes upregulated and green denotes genes downregulated in conceptus recovered from cows diagnosed with nonuterine diseases before AI.
- The pointed and blunted arrowheads represent activating and inhibitory relationships, respectively.
- Solid and dashed lines imply on direct and indirect relationships, respectively.
- Orange represents predicted activation and relationships that lead to activation and gray represents an effect not predicted.

## Diseases Have Additive Negative Effects on Fertility

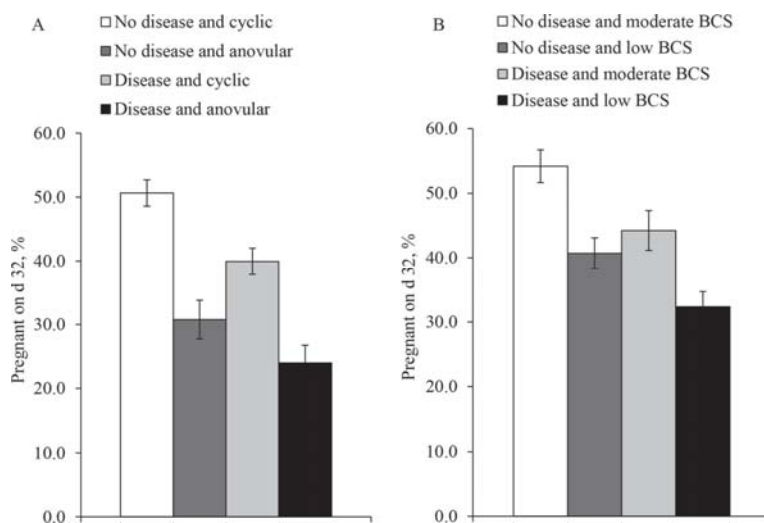
### Uterine disease (UTD)



### Non-uterine disease (NUTD)



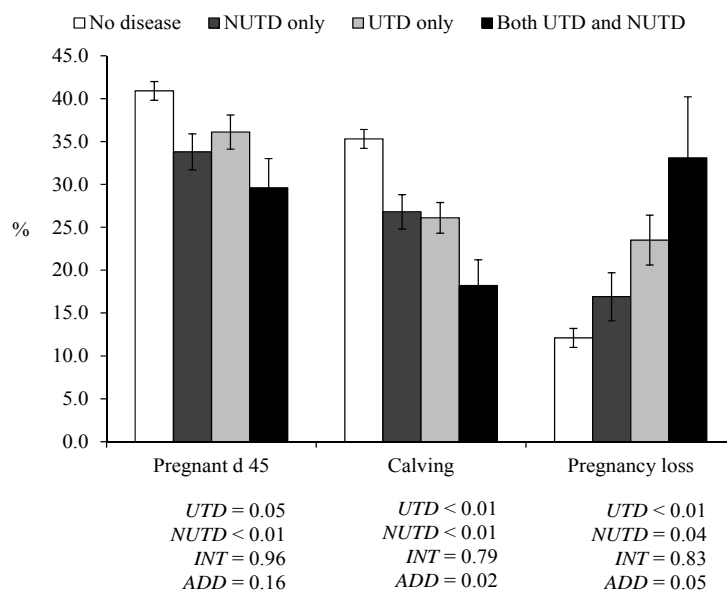
## Disease Has Additive Negative Effects on Pregnancy per AI



Ribeiro et al. (2016) <http://dx.doi.org/10.3168/jds.2015-10337>

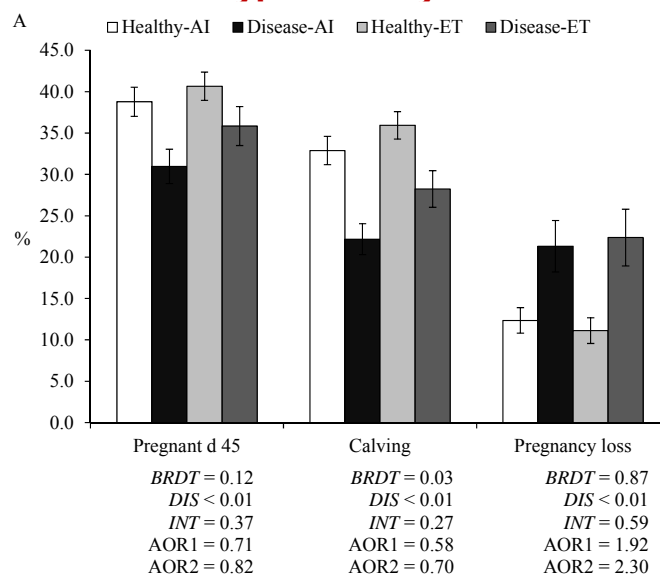


## Additive Impacts of Diseases on Fertility



Ribeiro et al. (2016) <http://dx.doi.org/10.3168/jds.2015-10337>

## Negative Impacts of Disease on Fertility are not bypassed by ET



Ribeiro et al. (2016) <http://dx.doi.org/10.3168/jds.2015-10337>

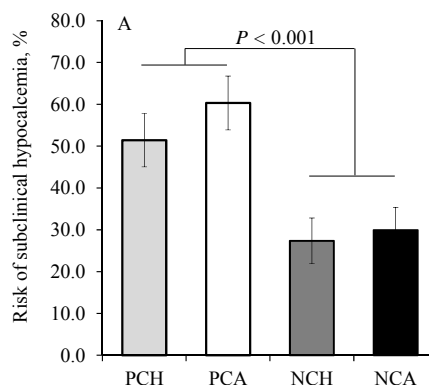
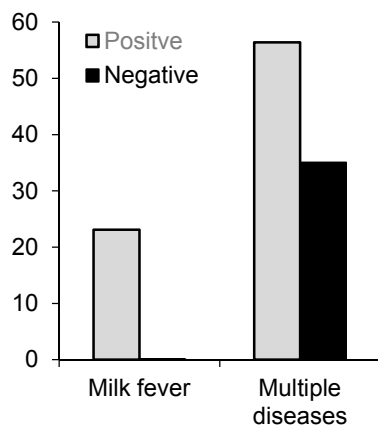
## SUMMARY

- ✓ Calving and onset of lactation pose new challenges to dairy cow and require refined adaptation to accommodate the shifts in nutrient partition
- ✓  $\text{Ca}^{2+}$  is critical for cell signaling and function
  - ✓ Marginal low  $\text{Ca}^{2+}$  impairs measures of immune function, affects metabolism and predisposes cows to diseases
- ✓ Excessive negative energy balance
  - ✓ Lipomobilization
    - ✓ Lipid metabolites can be cytotoxic
- ✓ Poor transition increases the risk of disease, which induces inflammation
  - ✓ Causes tissue damage, which alters function
  - ✓ Alters partition of nutrients to favor control of infection and tissue repair in place of tissue accretion
  - ✓ The priority shifts from production/growth towards survival
- ✓ Creates long-term negative effects on reproduction

## What Dietary Interventions Should We Make

- Definitely supply diets to alleviate metabolic and other diseases in early lactation
  - ✓ Acidogenic salts prepartum
  - ✓ Prevention of ketosis
    - ✓ Monensin
    - ✓ Rumen protected choline
  - ✓ Avoid over-consumption of calories in late gestation that might predispose to fatty liver
- Manipulations that might have a direct impact on fertility
  - ✓ CHO
  - ✓ Fatty acids

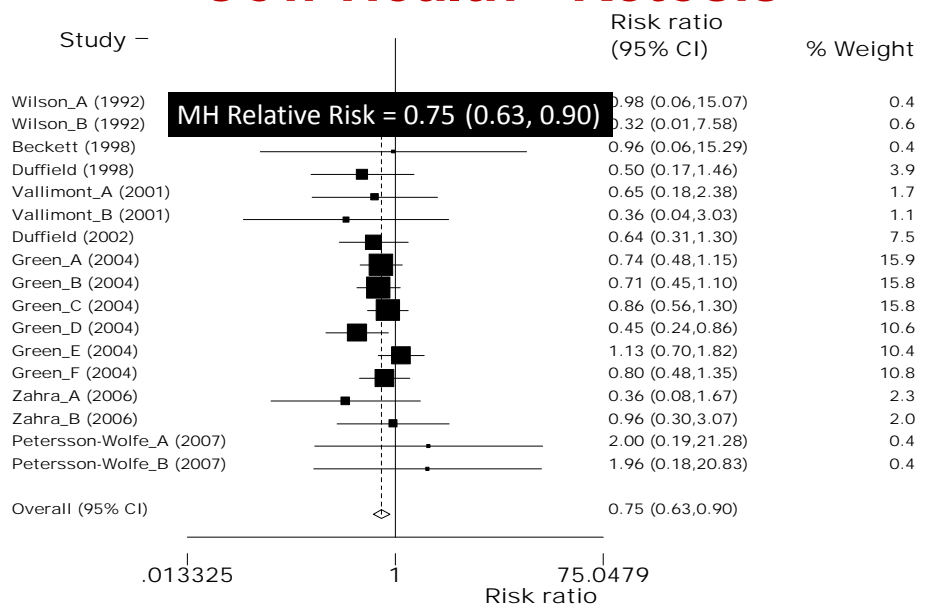
## Impact of Prepartum DCAD on Postpartum Health



80 prepartum cows were fed a diet with either +130 vs. -130 mEq/kg

Martinez et al. (2016) J. Dairy Sci. submitted

## Cow Health - Ketosis

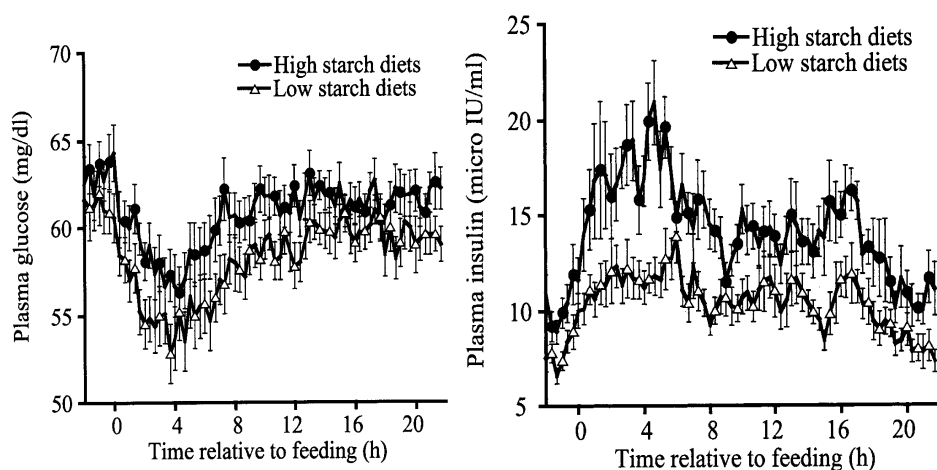


Duffield et al. (2008) J. Dairy Sci. 91:2328-2341

J. Dairy Sci. 86:174–183  
© American Dairy Science Association, 2003.

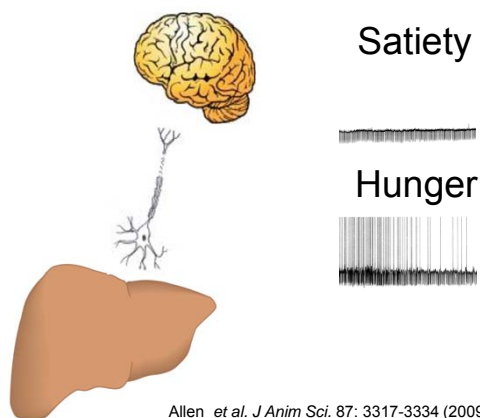
### Effects of Corn Grain Conservation Method on Feeding Behavior and Productivity of Lactating Dairy Cows at Two Dietary Starch Concentrations

M. Oba<sup>1</sup> and M. S. Allen  
Department of Animal Science, Michigan State University,  
East Lansing 48824-1225



### Nutrient Absorption Influences Feed Intake

$f$  (meal size, inter-meal interval)



Allen et al. J Anim Sci. 87: 3317-3334 (2009)

Benson et al. J. Dairy Sci. 85:1804 (2002)

## Excessive Amounts of Highly Fermentable CHO Cause Satiety Sooner in High Starch Diets

Item	Corn Type	
	High Moisture	Dry ground
DMI, kg/d	20.8 <sup>b</sup>	22.5 <sup>a</sup>
Rumen fermentable OM, kg/d	11.3	10.3
Meal size, kg	1.9 <sup>b</sup>	2.3 <sup>a</sup>
Intermeal interval, min	93.9	105.0

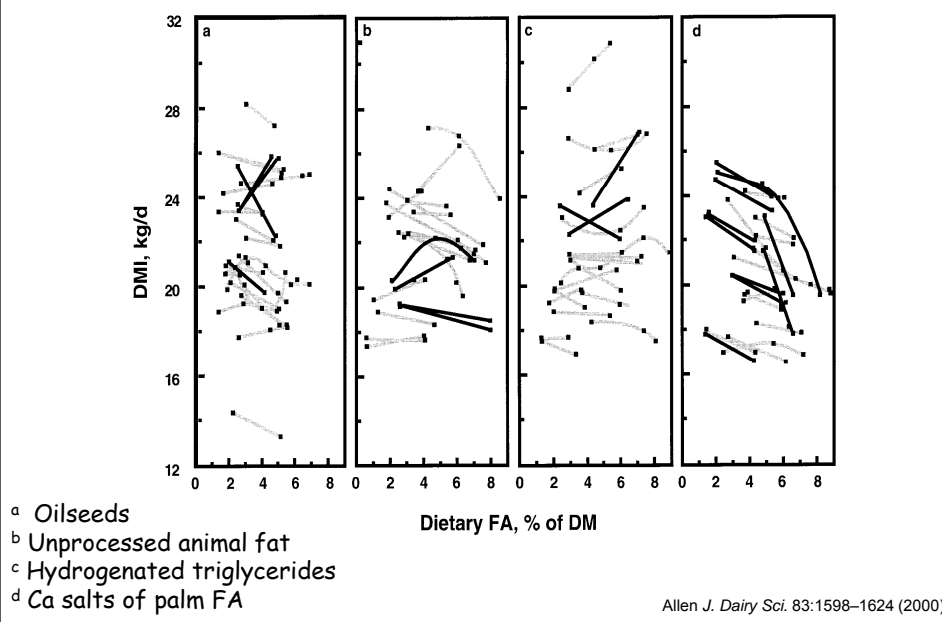
**Diets containing 31 to 32% starch**

Oba and Allen *J. Dairy Sci.* 86: 174-183 (2003)

## Early Lactation

- ✓ Intake is low, so rumen fill is less of a problem
- ✓ Feed high quality sufficient forage to rely less on highly degradable starch
  - ✓ Usually 45 to 60% forage diets depending on quality and NDF content
- ✓ Limit total starch content, particularly if the main starch source is highly rumen degradable
  - ✓ Avoid potential depression in intake
- ✓ Manipulate early lactation protein content when herds experience excessive ketosis
  - ✓ Reducing the amount of undegraded protein supply in the diet in the first 2 to 3 weeks of lactation limits production and body fat mobilization

## Certain Sources of FA Can Suppress Intake

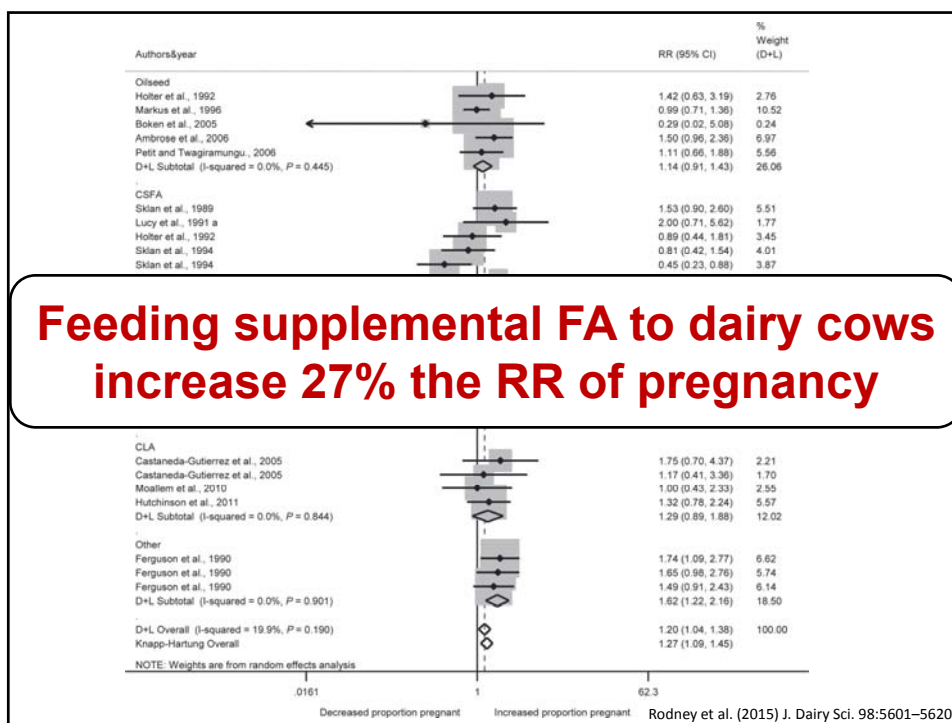


## Fat Effects on Factors Related to Energy Status in Studies Reporting Fertility

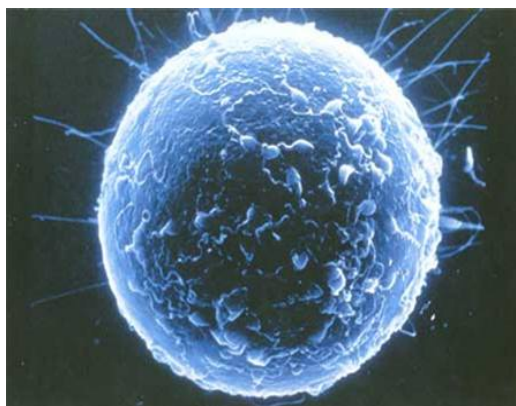
Reference	DMI, kg/day	FCM, kg/day	BW/Energ Status
Nebraska, 1996	-1.2	+0.7 <sup>a</sup>	More neg ES
Israel, 1991	-0.1	+1.7 <sup>a</sup>	Loss of BW
Wisconsin, 1995	NR	+1.3 <sup>a</sup>	No difference
Florida, 1998	-0.1	+1.6 <sup>a</sup>	No difference
Israel, 1988	-1.0	+2.9 <sup>a</sup>	No difference
Israel, 1989	NR	+1.4 <sup>a</sup>	Loss or gain BW
Penn, 1990	NR	+0.9 <sup>a</sup>	Not reported

<sup>a</sup>Significant increase for cows fed supplemental fat.





## Unsaturated Fatty Acids Improve Fertilization and Embryo Development



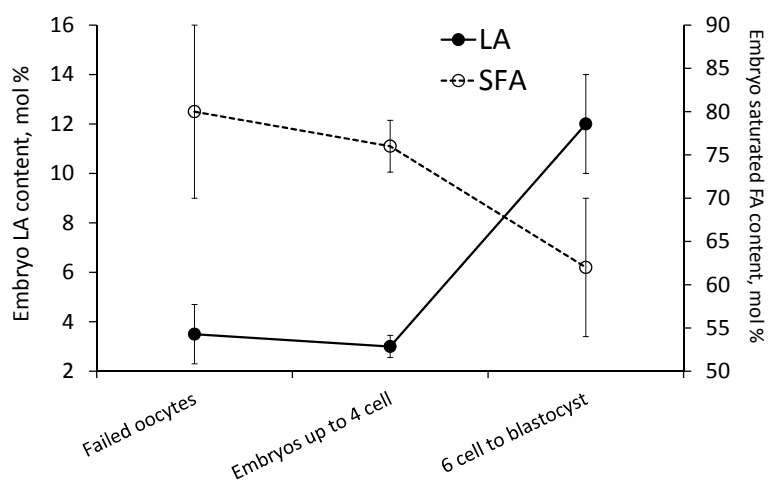
[www.vgme.com/picts/eggsperm.jpg](http://www.vgme.com/picts/eggsperm.jpg)

### Embryo Quality in Lactating Dairy Cows Fed Diets Differing in FA Profile (N = 154 cows)

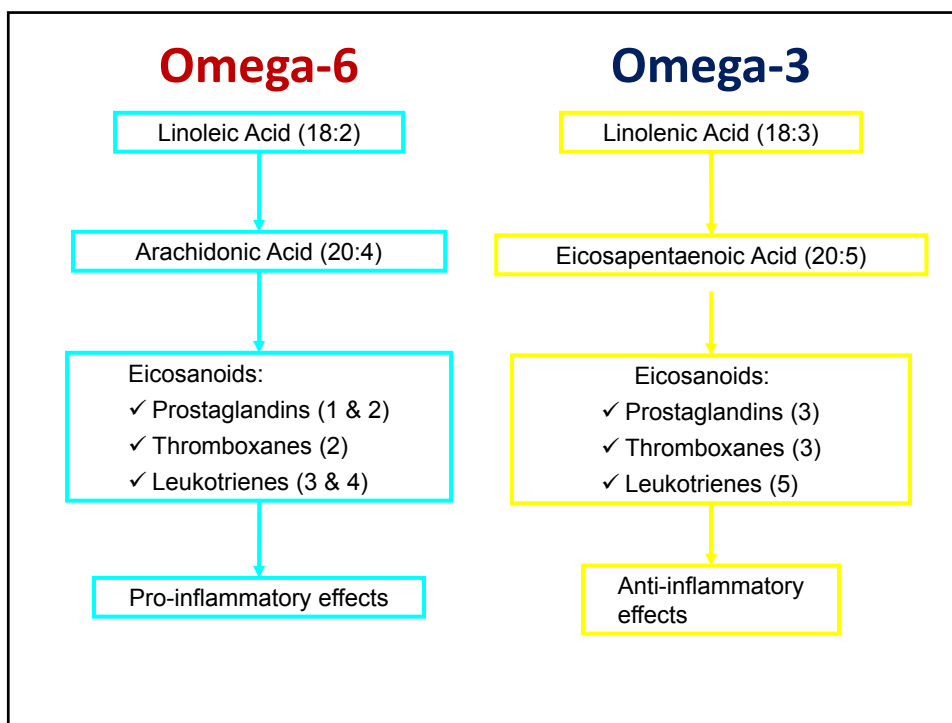
	Treatment		P value
	Low LA	High LA	
Fertilization rate, %	73.3	87.2	0.10
Accessory spermatozoa, n	21	34	0.001
Excellent and good embryos			
% Embryos	51.5	73.5	0.06
% Embryos-ova	37.8	54.1	0.01
Viable blastomeres, %	85.3	94.2	0.09

Cerri et al. (2009) J Dairy Sci. 92:1520-1531.

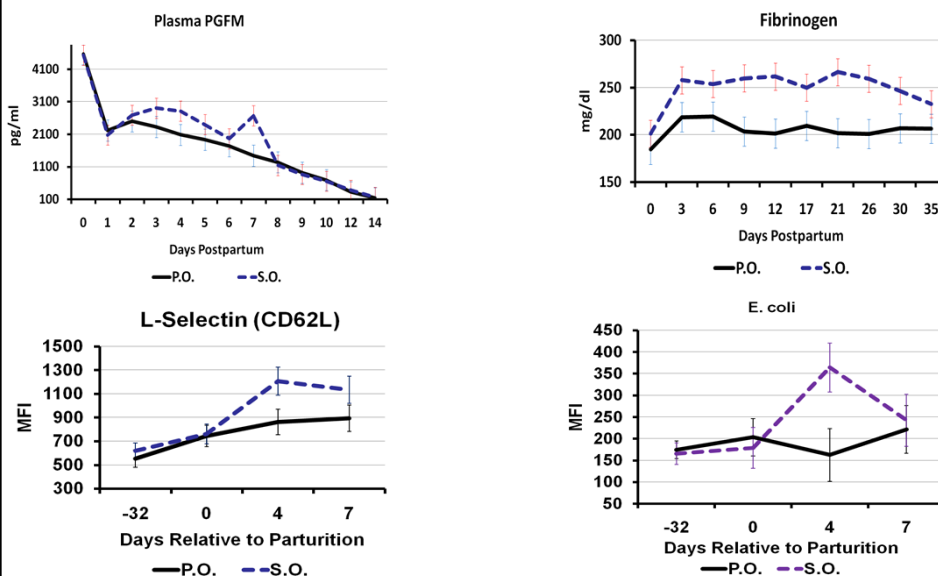
### Accumulation of C18:2 n6 in Embryos that Undergo Development



Haggarty et al. Human Reproduction 21: 766-773 (2006)

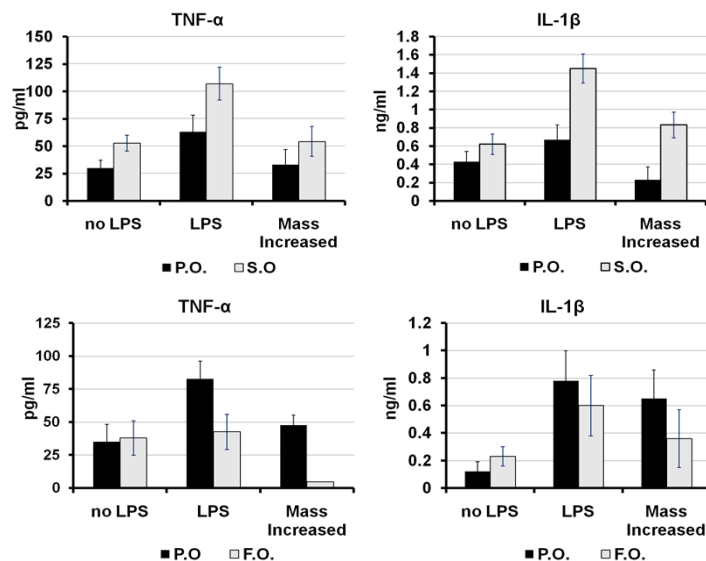


## Immune Responses to Differential FA Feeding: Ca Salts of Palm Oil vs. Safflower Oil



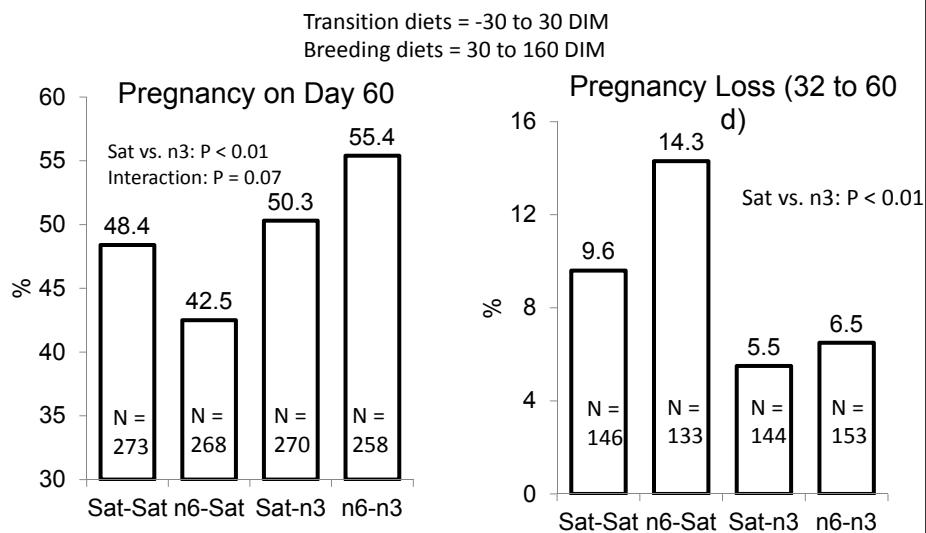
Silvestre *et al.* (2011) J. Dairy Sci. 94 :189–204

## Pro-Inflammatory Cytokine Production by Neutrophils According to Fatty Acid Feeding



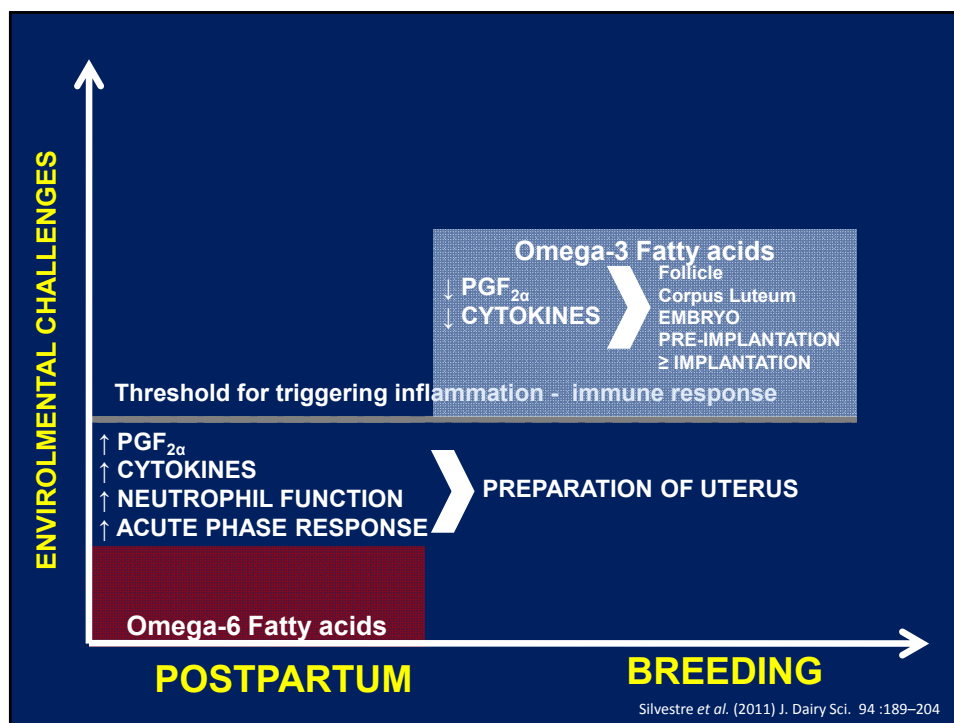
Silvestre *et al.* (2011) J. Dairy Sci. 94 :189–204

## Effects of Fatty Acid Supplementation During the Transition and Breeding Periods on Fertility of Dairy Cows



Silvestre *et al.* (2011) J. Dairy Sci. 94 :189–204

78



## SUMMARY

- ✓ Addition of fat to the diet of dairy cows has beneficial effects on measures of fertility
  - ✓ Lactating dairy cows should be fed diets with ~ 5 to 5.5% total fat or 4.0 to 4.5% total FA
- ✓ Fertility responses to fat feeding are best when moderate amounts of unsaturated fatty acids of the n-3 and n-6 families are fed
  - ✓ Sources rich in n-3 FA seem to increase pregnancy by improving embryo survival
  - ✓ Sources rich in n-6 FA improve pregnancy because of increased fertilization and embryo quality

# ***THANK YOU***

***José Eduardo P. Santos***

***Department of Animal Sciences***

***University of Florida – Gainesville***

***[jepsantos@ufl.edu](mailto:jepsantos@ufl.edu)***





# Improving Fertility of Dairy Cows through Genomic Selection

P.J. Pinedo, J.E.P. Santos, W.W. Thatcher, K.N. Galvão, R.C. Bicalho,  
R.O. Gilbert, G. Schuenemann, G. Rosa, S. Rodriguez-Zas S, C.  
Seabury, R.C. Chebel, J. Fetrow

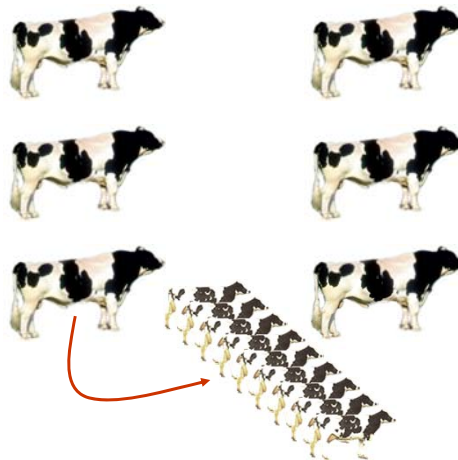
**NIFA-USDA 2013-68004-20361**



## Traditional Genetic Selection Progeny Testing

Don't know the genes  
responsible for the trait  
(milk yield)

We know that bulls with  
daughters that produce  
more milk are more likely  
to have the genes that confer  
higher milk production



Estimated genetic value reliability ----- True genetic value

P. J. Hansen, Univ. Florida

## ILLUMINA Bovine SNP50 Bead Chip

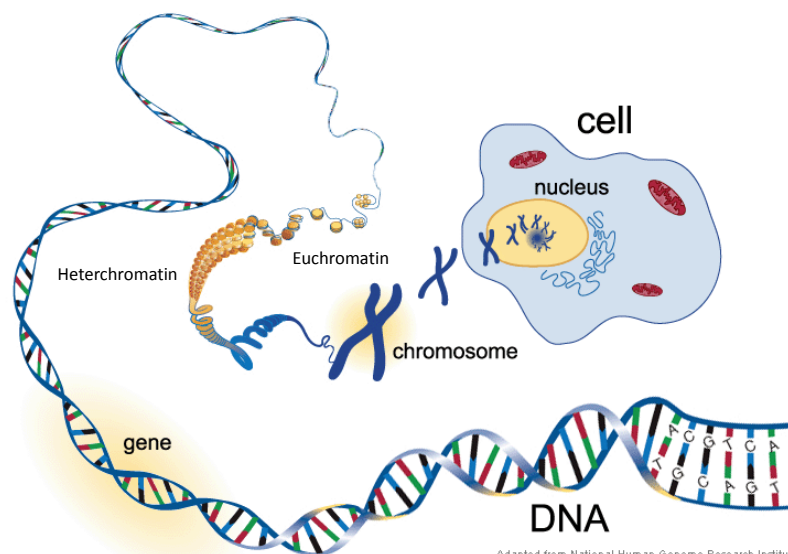


Development of Genomics in 2009 Changed Genetic Selection

**For the first time, can identify the genes responsible for the trait or genetic markers close to the genes**

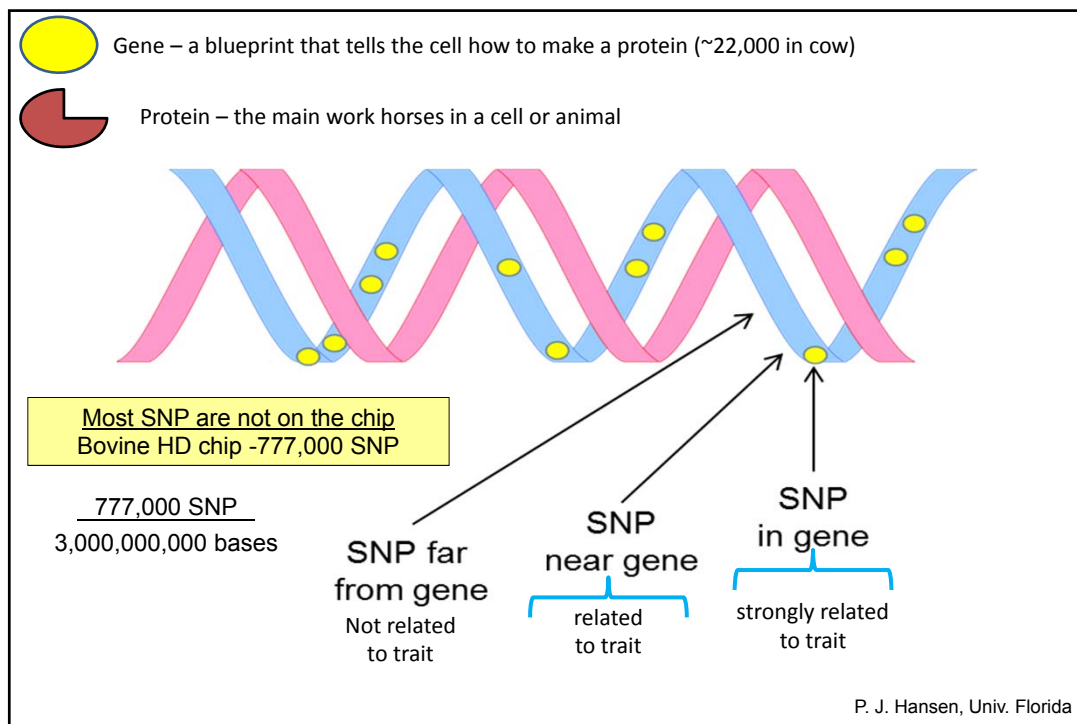
P. J. Hansen, Univ. Florida

## Genetic Code

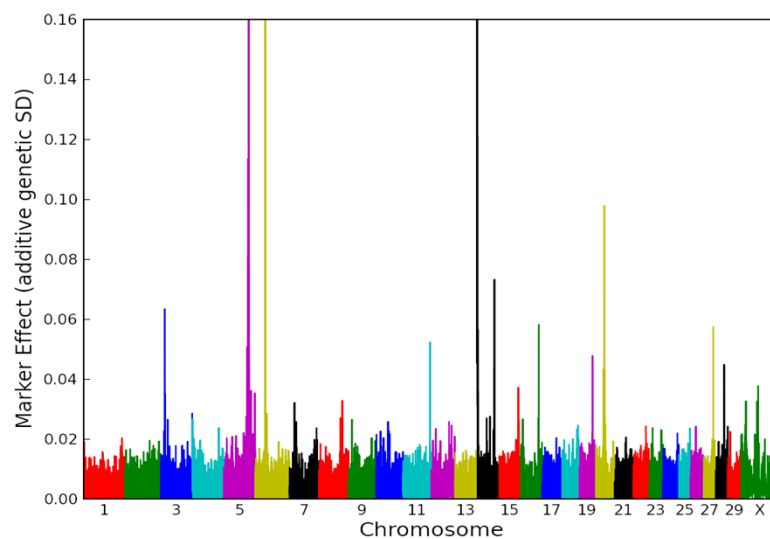


1 of the 30 chromosomes in the bovine

Adapted from National Human Genome Research Institute

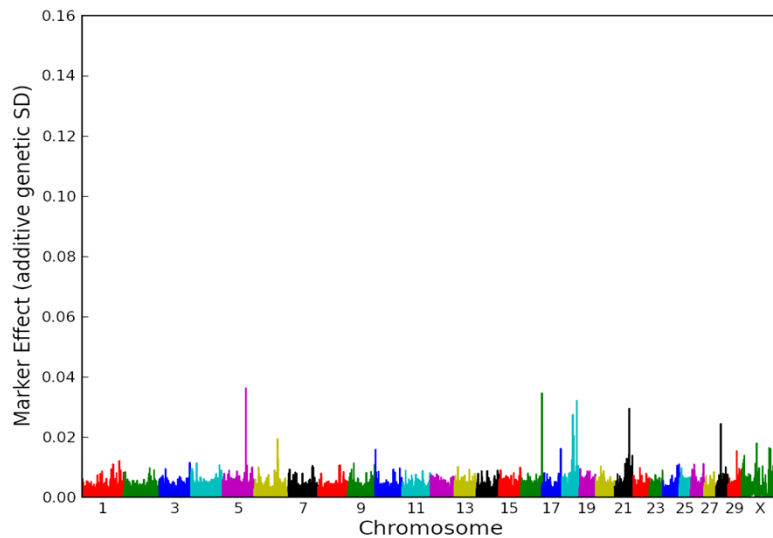


## SNP Effects on Genetic Variation in Milk Fat %



USDA, AIPL

## SNP Effects on Genetic Variation in DPR



USDA, AIPL

## Genomic Selection: Key Points

$$\Delta G_{year} = \frac{Acc. \times Int. \times \frac{Gen.Var_{add}}{Gen.Int.}}{Gen.Int.}$$

- $\Delta G_{year}$  = genetic progress in a year
- **Accuracy** = measures certainty of an individual's breeding values ( $\nabla$  with GS)
- **Intensity** = measures how restrictive we are in choosing individuals as parents ( $\nabla$  through management)
- **Genetic variation** = genetic variance in the population (= constant over a short time period)
- **Generation interval** = time in between two generations ( $\textcircled{C}$  with GS)

## Genomic Technology Today

- Decreases the generation interval up to 3-fold
  - ✓ From 6 to ~ 2 years
- Increases accuracy for trait selection
  - ✓ Gain in accuracy of 28-108% with GS

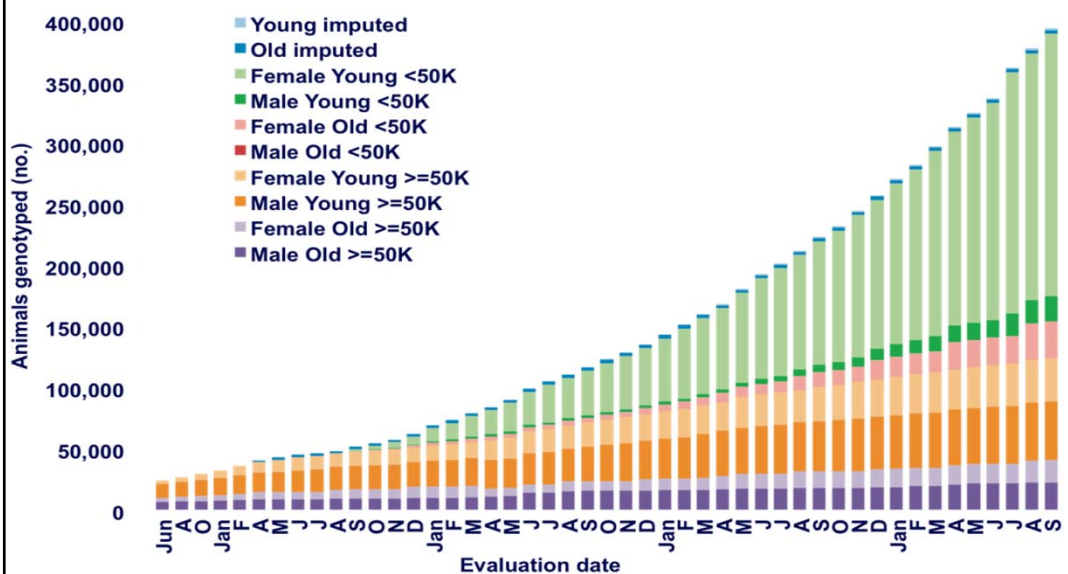
Hayes et al. (2009) J. Dairy Sci. 92:433-443

## BovineSNP50 Provides Some Improvement in Genetic Estimates for DPR

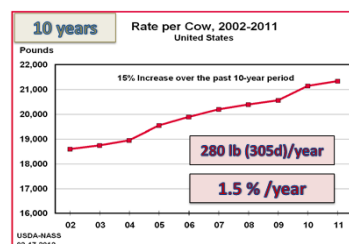
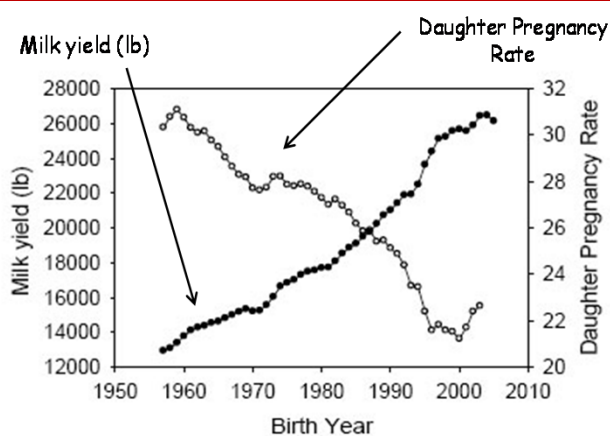
Trait	REL (%)	REL gain (%)
Milk (kg)	67.5	29.4
Fat (kg)	73.1	35.0
Protein (kg)	63.7	25.6
Fat (%)	85.7	47.6
Protein (%)	77.9	39.8
PL (months)	64.2	33.2
SCS	60.4	26.5
DPR (%)	46.8	17.0
Sire CE	40.9	13.8
Daughter CE	44.3	18.1
Sire SB	29.8	7.2
Daughter SB	29.3	2.7

Wiggans et al. (2011) J. Dairy Sci.

## Continuous increase in the number of genotyped animals

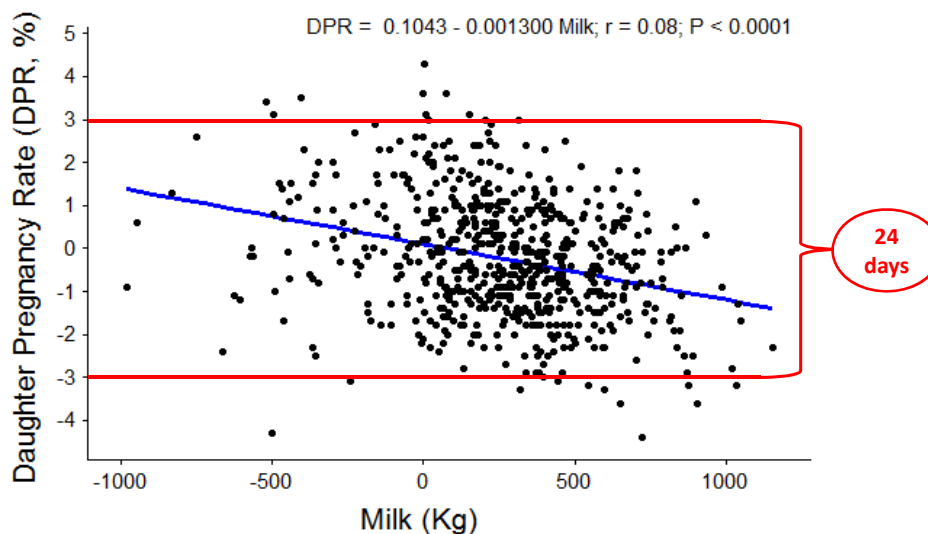


## Milk Production per Cow in the US





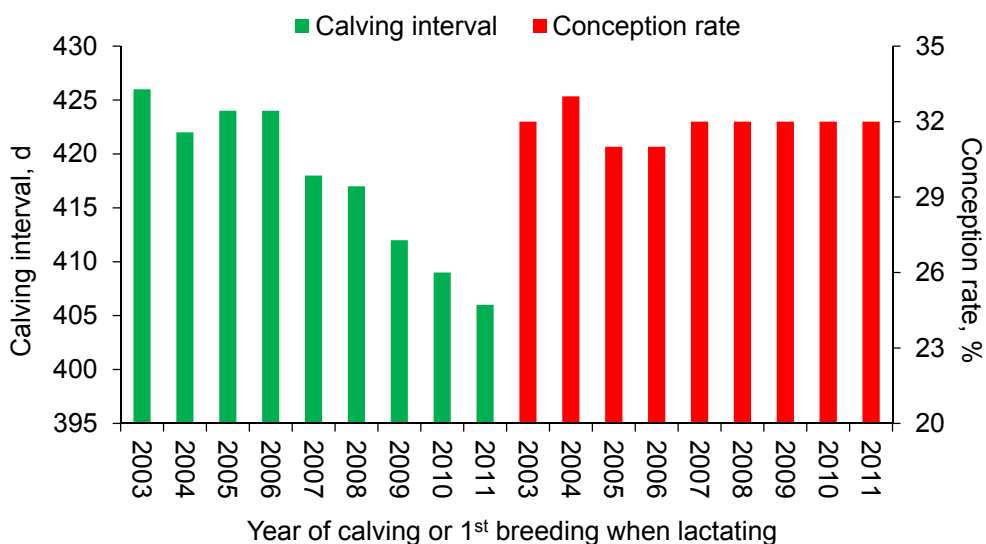
## Selection for Milk Yield and Daughter Fertility



626 active Holstein sires with proof in the US (August 2010)

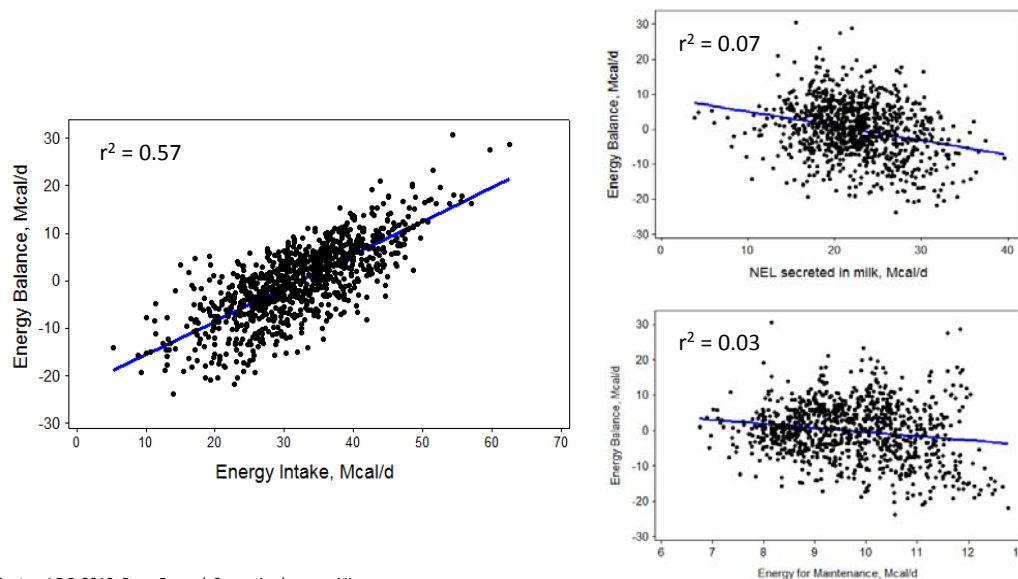
Santos *et al.* (2010) Soc. Reprod. Fertil. Suppl. 67:387-403

## Recent Evolution of Reproductive Parameters in Holstein Herds in the US

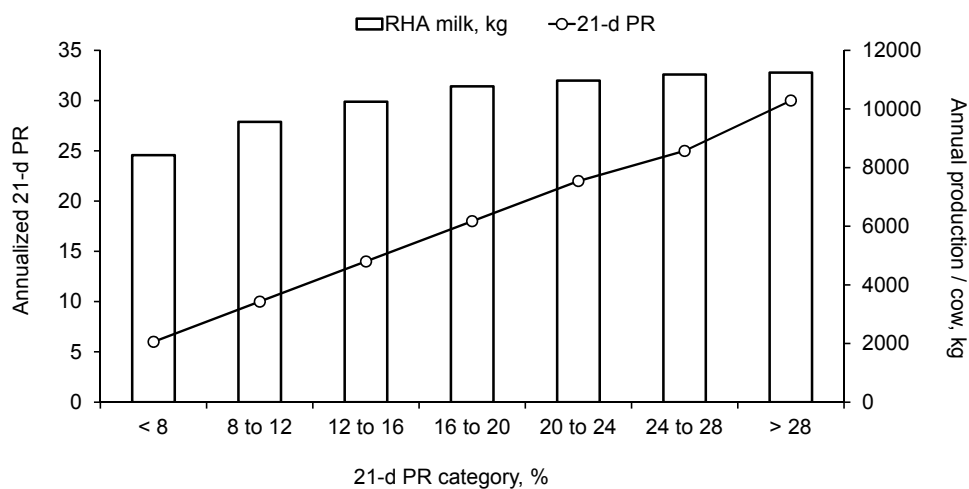


Bisinotto *et al.* (2014) Animal 8:s1, pp 151–159

**If Energy Balance is a Major Drive of Reproductive Success in the Dairy Cow, then the Focus Should be on Intake and not Milk Yield**

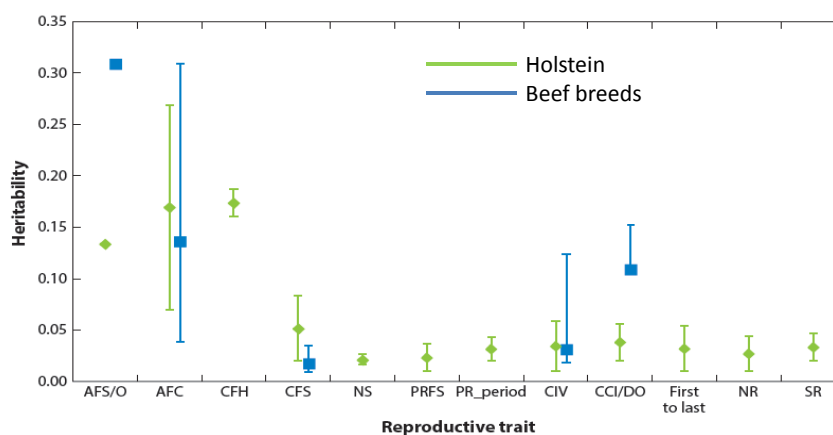


## 21-d Pregnancy Rate and Milk Production of USA Herds



Source : DRMS, DairyMetrics, April 26<sup>th</sup>, 2011

## Heritability of Reproductive Traits



AFS/O = age first service/ovulation

AFC = age first calving

CFH = calving to first heat interval

CFS = calving to first service interval

NS = Number of services

PRFS = pregnant to first service

PR Period = pregnant in a given period of breeding

CIV = calving interval

CCI/DO = calving to conception interval / days open

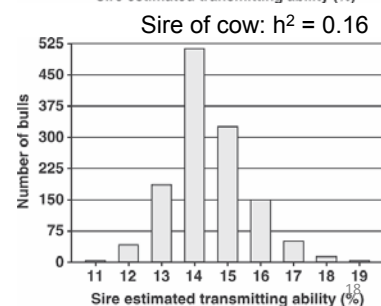
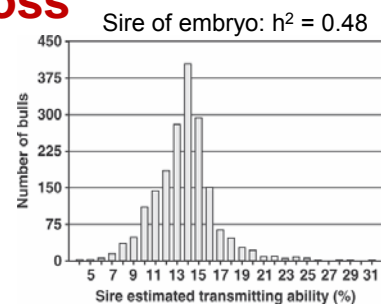
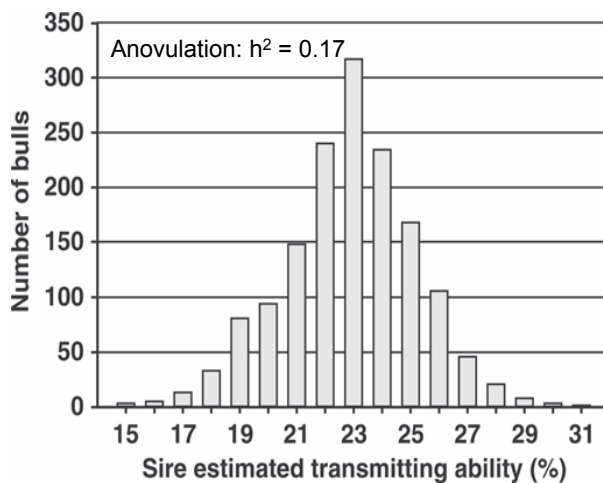
First to last = interval from first to last AI

NR = nonreturn rate

SR = submission rate

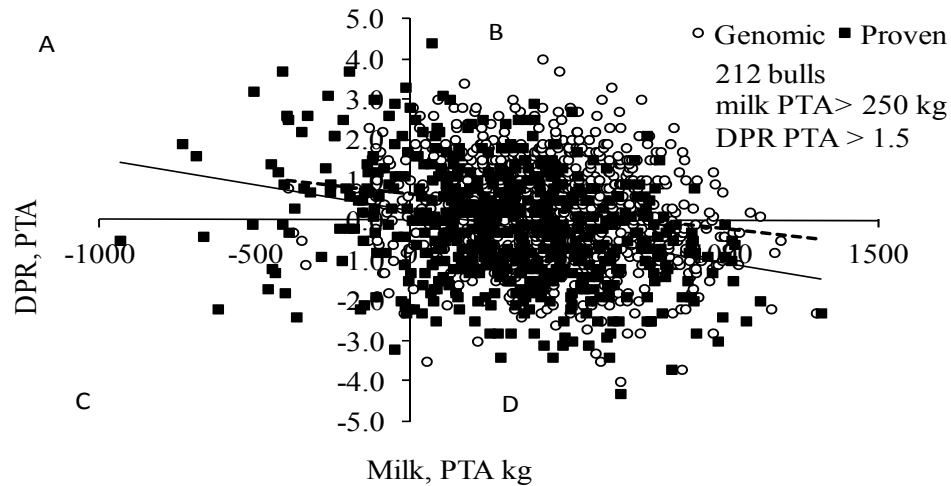
Berry et al. (2016) Annu. Rev. Anim. Biosci. 4:6.1–6.22

## Heritability of Anovulation and Pregnancy Loss



Bamber et al. (2009) J. Dairy Sci. 92 :5739–5753

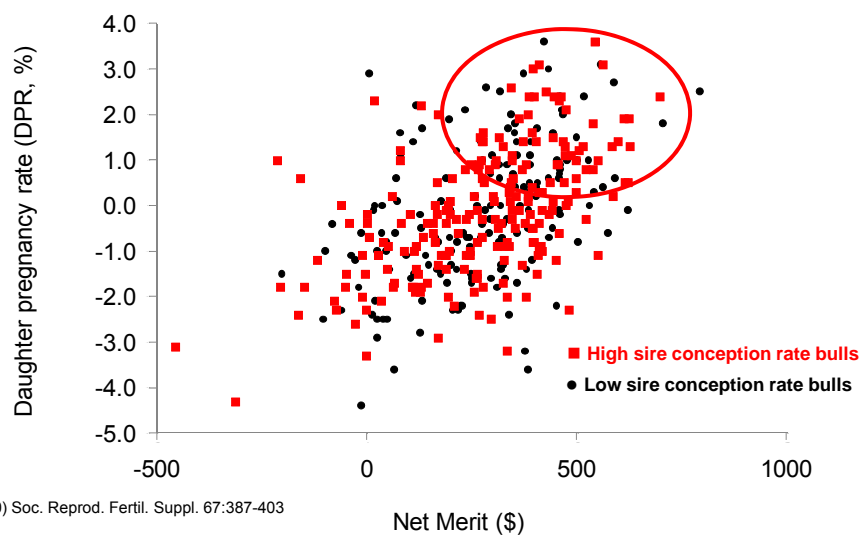
## Many Sires Have Improved Daughter Fertility and Increased PTA Milk



**Fig. 2.** Milk PTA (kg) and DPR of genomic and proven sires released in December 2011 (AIPL-USDA)

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## We Can Select for High Net Merit, Bull Fertility, and Daughter Fertility



Santos *et al.* (2010) Soc. Reprod. Fertil. Suppl. 67:387-403

382 active Holstein sires with all 3 proofs in the US (August 2010)

## Differences in fertility between high & low DPR groups from 11 FL and CA dairies

Trait	N	LSMEANS (SEM)				P value
		High DPR		Low DPR		
Services /conception (Lact 1)	2192	1.9	(0.07)	3.5	(0.13)	<0.001
Services /conception (Lact 2)	1969	2.2	(0.08)	3.3	(0.13)	<0.001
Services /conception (Lact 3)	1321	2.3	(0.10)	3.4	(0.16)	<0.001
Days open (Lact 1)	2282	105.6	(3.12)	184.7	(5.50)	<0.001
Days open (Lact 2)	2057	112.5	(3.24)	165.6	(5.40)	<0.001
Days open (Lact 3)	1370	112.7	(3.83)	162.3	(6.23)	<0.001



P. J. Hansen, Univ. Florida

**Southeast Milk, Inc.  
Dairy Check-Off**

## Genomic Selection

Based on identification of mutations in the DNA that change the regulation of a gene or the function of the protein encoded by the gene

*GeneSeek Genomic Profiler HD – 76,867 loci equally spaced on the genome*

Multiple haplotypes have been discovered that result in loss of function

mutations with negative effects on health and fertility:

- Health<sup>1</sup>: BLAD, CVM, DUMPS, SDM, SMA, Mulefoot, Weaver
- Reproduction: HH1, HH2, HH3, HH4, and HH5

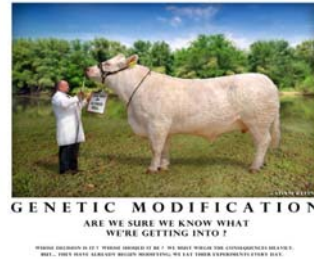
Haplotype	Frequency in the Holstein population	Reduction in conception rate
HH1	4.5	-3.1
HH2	4.6	-3.0
HH3	4.7	-3.2
HH4	0.7	-3.0
HH5	4.8	-3.5



<sup>1</sup> Bovine Leucocyte Adhesion Deficiency, Complex Vertebral Malformation, Deficiency of Uridine Monophosphate Synthase, Spinal Dismyelination, and Spinal Muscular Atrophy

## Challenges

- Limited population for a given breed
- Best sires used more intensively
  - ✓ A single sire can disseminate desirable (*an bad*) genes to a very large population
- Inbreeding and loss of health/fertility fitness



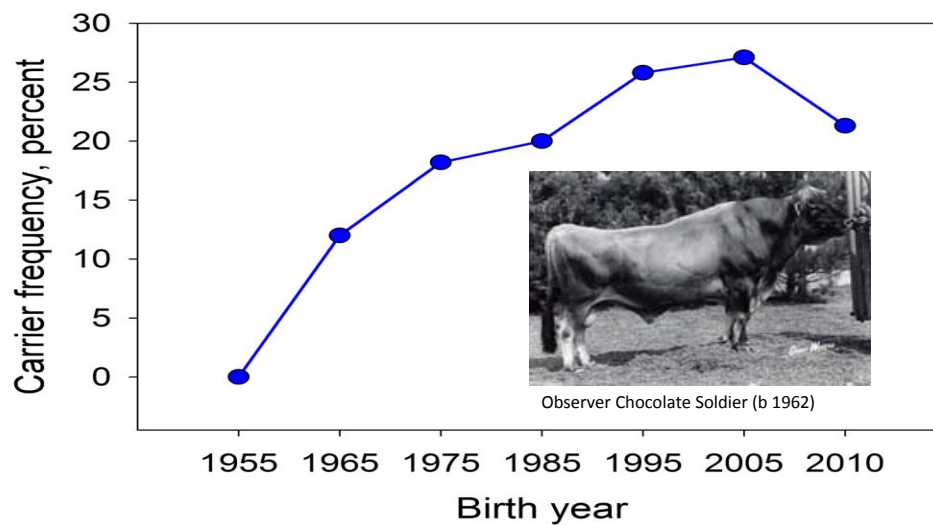
How many of you have used this sire?



How many of you are using this sire?



## Carrier Frequency of the JH1 haplotype

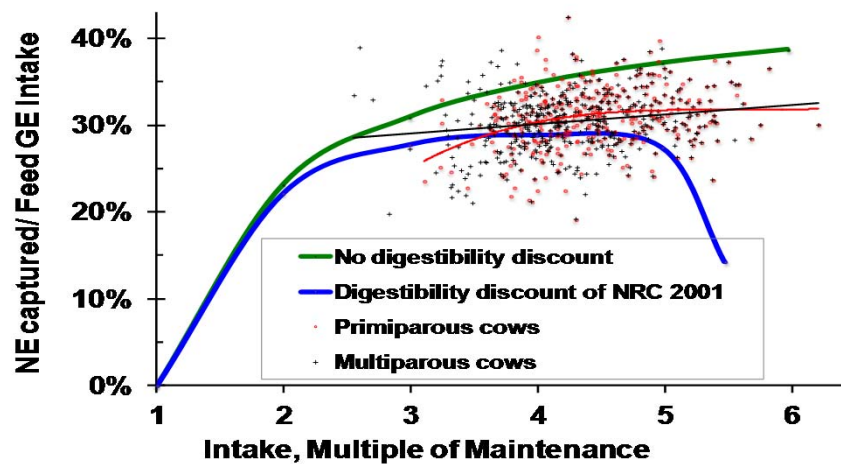




## Genomic Selection

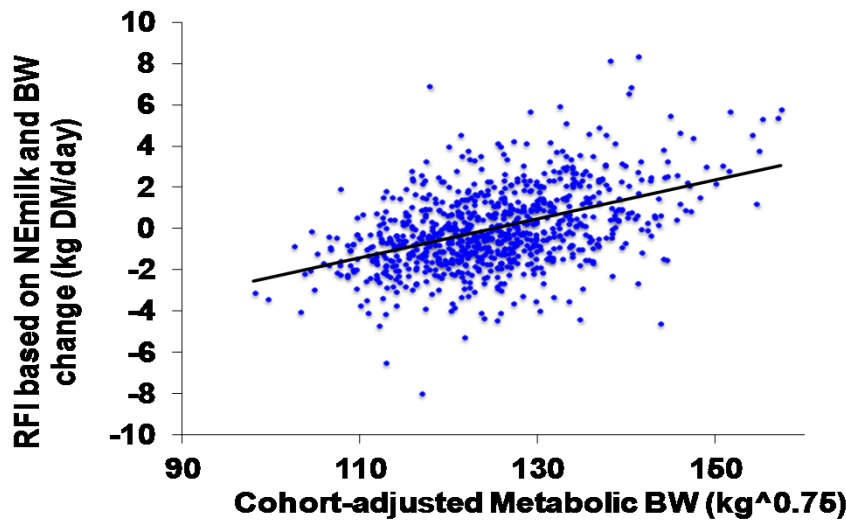
- Allows for determination of GEBV for novel traits that will be even more difficult to quantify than health and fertility traits
  - ✓ E.g. feed efficiency
- It will require continuous revision of phenotypes and genotypes

**Potential that future productivity gains will increase feed efficiency is much less than in past**



VandeHaar et al. (2012) J. Dairy Sci. 95: Abstr.

## Variability in Residual Feed Intake (RFI) in Dairy Cows



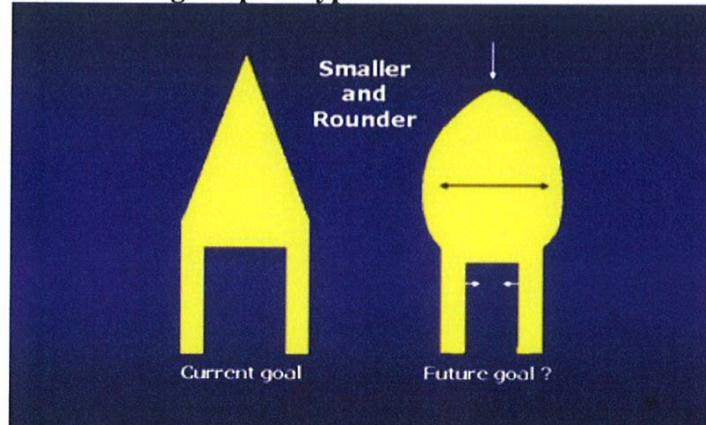
VandeHaar et al. (2012) J. Dairy Sci. 95: Abstr.

## Selection for Fertility

- Includes direct and indirect measures
  - ✓ Direct: return to cyclicity, pregnancy per AI, pregnancy loss, time to pregnancy
  - ✓ Indirect: dairy type, body condition, health

## Selection for Fertility

Fig. 14. A return to the original prototype



Source: <http://www.milkproduction.com/Library/Articles/default.htm>

## USDA AIPL Genetic Information

PTA Trait	PTA trait					
	Milk	Fat	Protein	PL	SCS	Body size
Milk	<b>0.301</b>	0.45	0.81	0.08	0.2	-0.10
Fat	0.69	<b>0.30</b>	0.6	0.08	0.15	-0.09
Protein	0.9	0.75	<b>0.30</b>	0.1	0.2	-0.10
PL	0.15	0.14	0.17	<b>0.08</b>	-0.38	-0.16
SCS	-0.10	-0.10	-0.10	-0.15	<b>0.12</b>	-0.11
Body size	0.06	0.06	0.06	0.03	-0.11	<b>0.40</b>

Genetic correlation

Phenotypic correlation

Heritability

Selecting for PTA milk, protein, fat or productive life is not expected to result in bigger cows



United States  
Department of  
Agriculture

National Institute  
of Food and  
Agriculture

**NIFA-USDA 2013-68004-20361**  
**Translational Genomics for  
Improved Fertility of Animals**

## Genomic Selection for Improved Fertility of Dairy Cows with Emphasis on Cyclicity and Pregnancy



<http://agrilife.org/afridairycowfertility/>



United States  
Department of  
Agriculture

National Institute  
of Food and  
Agriculture

NIFA-USDA 2013-68004-20361  
NIFA AFRI Translational Genomics for Improved Fertility of Animals

P.J. Pinedo, J.E.P. Santos, W.W. Thatcher, K.N. Galvão, R.C. Bicalho, R.O. Gilbert, G. Schuenemann, G. Rosa, S. Rodriguez-Zas S, C. Seabury, R.C. Chebel, J. Fetrow

Texas A&M AgriLife Research, Texas A&M University, University of Florida, Cornell University, University of Minnesota, University of Wisconsin, University of Illinois at Urbana-Champaign, The Ohio State University



## Objectives

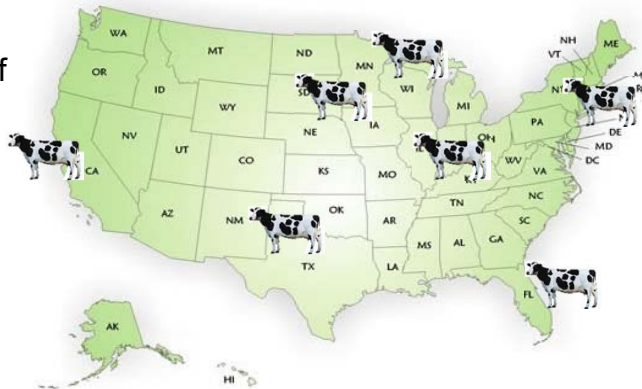
### Main objective is to identify molecular markers for genomic selection to improve fertility of dairy cattle

1. Develop a fertility database with genotypes and phenotypes based on direct measures of fertility in Holstein cows
2. Identify SNPs associated with fertility traits by use of genome-wide analyses (GWAS)
3. To obtain genomic-estimated breeding values (GEBV) that can be applied in selection for improved fertility
4. Incorporate these findings in available platforms
5. Extend the knowledge to the dairy industry
6. Educate students on animal health, reproduction, and genetics

## Approach

### Phenotypes:

- 11,733 cows
- 7 states in 4 regions of the US
- Total of 16 farms
- 1 to 3 farms/state
- Cool and hot season



## Biological Impediments to Reproduction

- Delayed return to postpartum estrous cyclicity
- Reduced intensity and duration of estrous expression
- Reduced fertilization
- Increased pregnancy loss

35

## Approach

### Phenotypes:

- Calving problems (dystocia, RP, stillbirth)
- Uterine health
  - ✓ Metritis
  - ✓ Clinical endometritis
- Resumption of postpartum ovulation
- Subclinical ketosis
- Detection of estrus





## Approach

### Phenotypes:

- Body condition and lameness score
- Pregnancy per artificial insemination in the first two AI
- Maintenance of pregnancy to d 60 of gestation
- Interval to pregnancy

#### Plus:

- ✓ Production data
- ✓ Other diseases in the first 60 DIM (DA, Respiratory)
- ✓ Death
- ✓ Culling



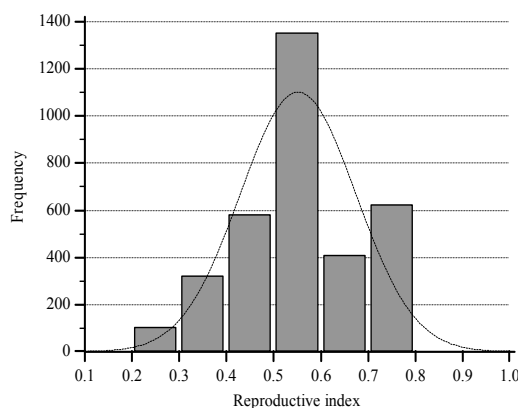
**Incidence (%) of diseases in the first 60 days postpartum in 11,400 dairy cows from 16 herds according to region of the country and season of calving**

Disease	NE		MW		SE		SW	
	Warm	Cool	Warm	Cool	Warm	Cool	Warm	Cool
Retained placenta	8.0	5.9	7.4	5.4	15.0	7.6	4.3	2.9
<b>Mastitis</b>	26.1	16.0	6.1	5.5	18.0	21.3	12.0	8.1
<b>Displaced abomasum</b>	3.0	5.6	2.9	1.4	6.0	4.0	1.0	1.0
<b>Pneumonia</b>	1.1	1.5	1.7	1.8	3.8	13.4	7.1	3.5
<b>Clinical endometritis</b>	15.4	32.5	25.9	20.4	23.4	42.9	24.3	26.1
<b>Lameness</b>	11.3	2.6	2.1	8.1	1.7	12.1	5.4	2.0

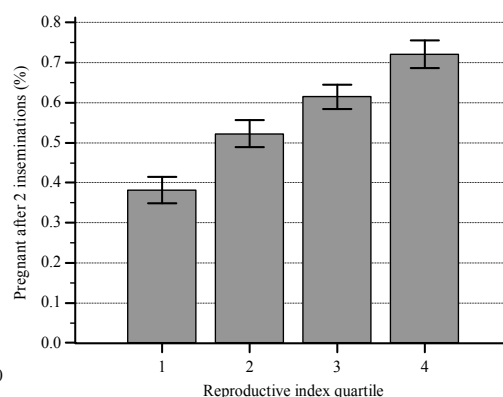
**50% of the dairy cows are diagnosed with a problem in the first 60 DIM**

Pinedo et al. (2015) J. Dairy Sci. Abstr. 359

## Developing a Reproductive Index Based on Factors of Increased Heritability



**Fig. 4.** Frequency distribution of the reproductive index to predict pregnancy after 2 AI in 3,500 lactating dairy cows



**Fig. 5.** Percent of cows pregnant after 2 AI according to the reproductive index quartiles

$$P(\text{pregnancy} | \alpha, \beta) = \frac{e^{\sum \beta_i Z_i + \mu\sigma}}{1 + e^{\sum \beta_i Z_i + \mu\sigma}}$$

### Prevalence of events that predict pregnancy after 2 AI in Holsteins Nonpregnant in Q1 of RI (low fertility) and Pregnant of Q4 of RI (high-fertility)

	Nonpregnant cows within Quartile 1	Pregnant cows within Quartile 4	P-value
	% (n/n)		
Cows	15.7 (521/3,318)	14.1 (467/3,318)	---
Disease			
1 disease	75.1 (391/521)	13.5 (63/467)	0.0001
> 1 disease	50.3 (262/521)	0 (0/467)	0.0001
Calving problem	31.5 (164/521)	8.6 (40/467)	0.0001
Uterine disease	48.6 (253/521)	4.9 (23/467)	0.0001
Anovular cows	74.3 (387/521)	0 (0/467)	0.0001
Pregnancy loss	12.1 (63/521)*	0 (0/467)	0.0001

\* Cows that became pregnant on d 32 after first or second AI, but lost pregnancy and remained open after 2 AI.

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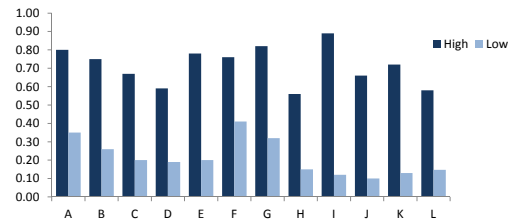
## Approach

### Genotyping:

Subpopulations for extreme high and low fertility:

- **High-fertility cows** (n=850): Pregnant cows on d 60 after first AI with the highest RI
- **Low-fertility cows** (n=1,750): Non-pregnant cows on d 60 after two postpartum AI with the lowest RI

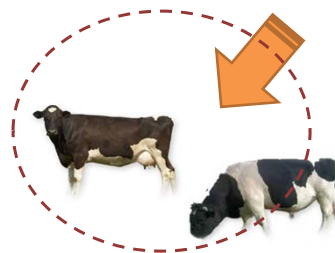
n = 2,600

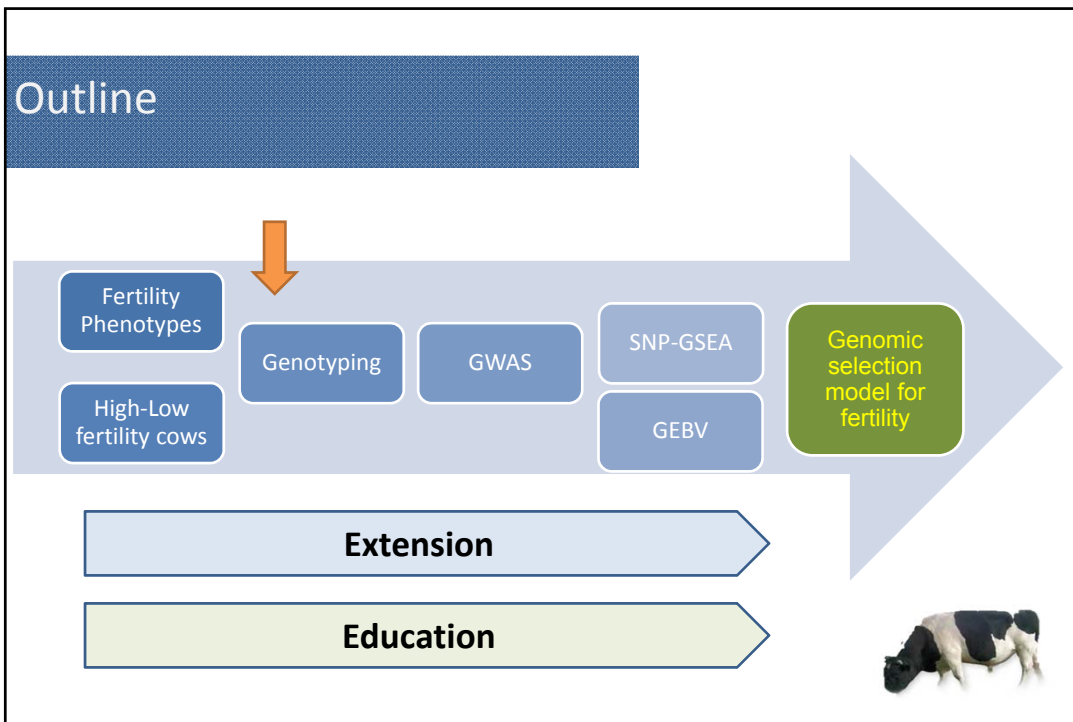


## Approach

### Validation:

New pool of **1,000 cows** based on high and low RI and a group of **200 AI sires** with extreme values for daughter fertility (high DPR > +1.5 vs. low DPR < -1.5).





## EFFECTS OF MATERNAL NUTRITION ON CALF HEALTH AND GROWTH

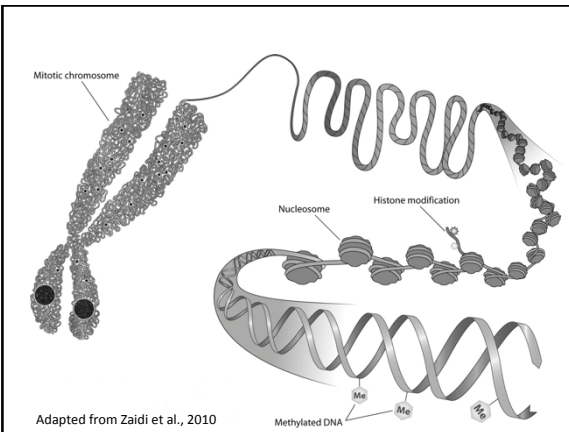
Jon Schoonmaker  
Department of Animal Sciences  
Purdue University

### Developmental programming

- Barker et al., 1993
  - Dutch famine of 1944
- Barker hypothesis: postnatal growth trajectory is sensitive to direct and indirect effects of maternal under-nutrition during prenatal development
  - Poor intrauterine conditions – fetus adapts
    - Poor post-natal environment: competitive advantage
    - Favorable post-natal environment:
      - Homeostatic mechanisms challenged
      - Development of insulin resistance, diabetes, obesity

- Fetal programming
- Neonatal programming
- Lactational programming
- Metabolic programming
- Metabolic imprinting
- Developmental programming






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- Sire genome – actively demethylated soon after fertilization
- Zygote (1 cell) is dependent on maternal mRNA and proteins
- Dam genome – passively demethylated after 2 cell embryo stage (Haaf, 2006)
- After 2-cell stage, embryo is dependent on expression of its own genome
- De-novo methylation occurs in embryo at the 8 to 16-cell stage (morula)

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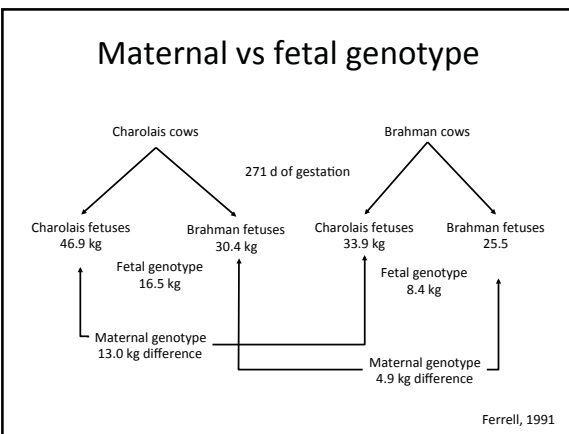
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### Developmental programming

- Poor developmental environment
  - Multiple fetuses (sheep, swine)
  - Competition between lactation and growth of fetus (dairy)
  - Young females – competition between fetal/neonatal and maternal growth (beef/dairy)
  - Heat/cold stress
  - Fetal growth during times of poor pasture quality
    - winter or summer slump
  - Excess supplementation

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### Developmental programming

- Problems arising from poor fetal growth
  - Increased neonatal morbidity
  - Decreased ADG and weaning weight
  - Metabolic disorders (eg insulin resistance)
  - Poor body composition
  - Dysfunction of specific organs (ovaries, testes, mammary gland, liver, small intestine)

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### Production status

- Dam age
  - Younger = lower birth wt
    - Sheep (Bradford et al., 1972, 1974)
  - Younger = increased BCS, milk, longevity; decreased days to conception
    - Dairy cows (Fuerst-Waltl et al., 2004; Banos et al., 2007)
  - Younger = decreased immunity in beef calves
    - Less colostrum (Odde, 1988)
  - First parity (Banos et al., 2007)
    - Early = increased milk; decreased reproductive efficiency
  - Second parity (Banos et al., 2007)
    - Early = increased milk and reproductive efficiency

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## Production status

- Dam milk production (association studies)
  - No effect on progeny (Banos et al., 2007)
  - Negative relationship (Berry et al., 2008)
  - Lack of agreement may be due to various states of energy balance (Bach, 2012)
    - Energy balance may be more correlated
- BCS
  - Thinner = decreased immunity (Odde, 1988)
  - Thinner = daughter BCS and fertility decreased, milk increased (Banos et al., 2007)

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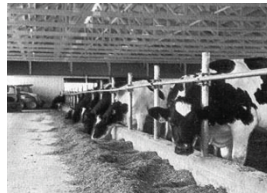
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## Diet

- “modifiable” factor
  - “Nutrient” restriction
  - Macronutrient information
    - Energy
    - Protein
  - Specific micronutrient information is scarce
    - Fatty acids
    - Amino acids
    - B-vitamins (methyl donors)




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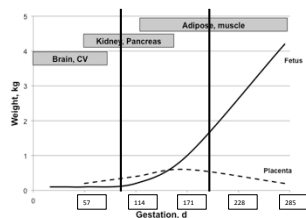
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## Bovine conceptus growth



Adapted from Symonds et al., 2010

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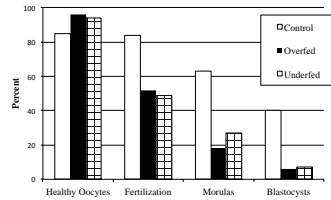
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## Diet energy at conception

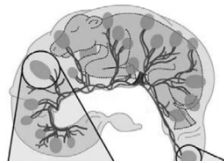


**Figure 2.** Effect of maternal nutrition before mating on oocyte quality (Grazul-Bilska et al., 2006). Underfed ewes were provided 60% of the nutrients offered controls. Overfed ewes were offered diets ad libitum.

Decreased fertilization and embryos due to under or over-feeding (Grazul-Bilska, 2006)  
 Decreased cleavage rates (Papadopoulos et al., 2001)  
 Decreased growth and survivability in lambs (Nordby et al., 1986; 1987)

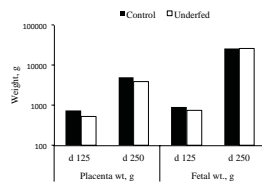
## First trimester

- Energy undernutrition compromised placental and fetal development in cattle (Vonnahme, 2007)
- Overnourished – placental growth restricted (Wallace et al., 2006)



## First trimester

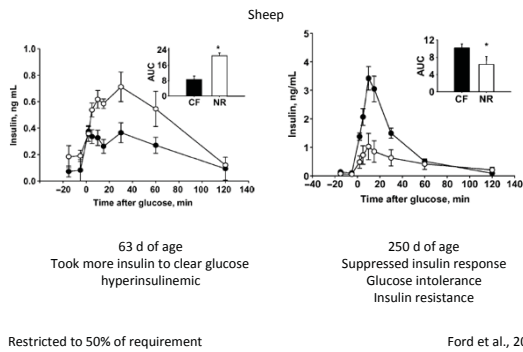
cattle



Placenta and fetal weight at d 125 and 250 of gestation in cows fed at NRC requirements (control) or fed 50% of requirements (underfed) for the first 125 d of gestation (From Zhu et al., 2007).

Early weight affected, birth weights not affected

## First trimester



## First trimester

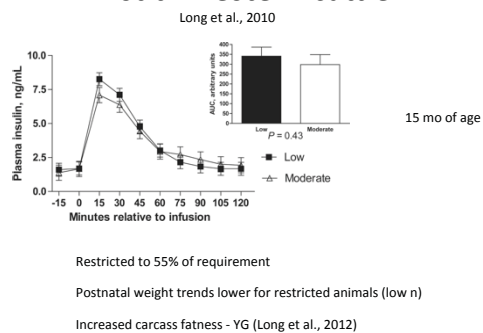
Sheep

Live weight and carcass data from 280-d wether lambs

Item	Control	Restricted
No. of wethers	8	8
Live weight <sup>a</sup> , kg	56.8	61.7
Carcass weight <sup>b</sup> , kg	28.8	31.6
Fat depth, mm	5.1	6.9
Internal fat <sup>a</sup> , kg	0.46	0.68
LM <sup>b</sup> , % of carcass	2.71	2.46

Ford et al., 2007

## First trimester - cattle



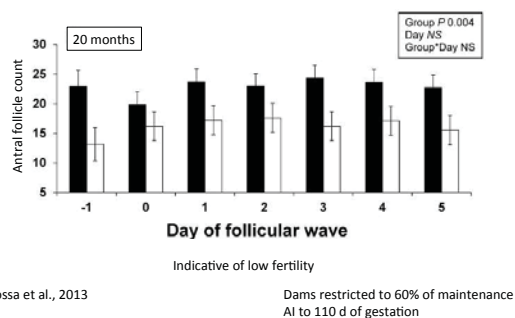
## Impact on reproduction

Sheep

- Grazul-Bilska et al. (2009)
  - Maintenance or restricted (60%) from d 50 through d 135
  - Fetal ovaries collected
    - Fetal ovarian weight was reduced 29% by restriction
    - Rate of proliferation of primordial follicles was decreased 35%

## Impact on reproduction

Beef cattle



## Last trimester

- 75% of ruminant fetal development occurs during the last 2 months of gestation (Robinson et al., 1977)
- Energy demand by the gravid uterus is greatest during the last trimester (Ferrell et al., 1976)
- Coincides with lowest resources
  - Supplemental feed fed

- Gardner 2005 demonstrated hyperinsulinemia from NR during late gestation in sheep.

Table 3. *Sheep biometry at 1 yr of age*

Tissue Mass	CS	CT	NRE	NRL
<i>n</i>	5	5	5	4
Brain weight	96.7 ± 3.5	99.7 ± 2.8	93.5 ± 1.5	94.3 ± 3.5
Heart weight	178 ± 17	195 ± 21	213 ± 14	225 ± 22
Liver weight	633 ± 32	688 ± 107	669 ± 99	672 ± 72
Kidney weight	111 ± 9	116 ± 6	119 ± 6	172 ± 35
Adrenal weight	2.90 ± 0.64	3.17 ± 0.40	3.17 ± 0.20	2.66 ± 0.66
Spleen weight	111 ± 19	110 ± 10	92 ± 15	145 ± 33
Lung weight	475 ± 19	476 ± 21	464 ± 42	478 ± 40
Pancreas weight	42.5 ± 3.5	49.0 ± 10.1	43.3 ± 7.8	29.0 ± 3.4
Perirenal adipose tissue	104 ± 23 <sup>a</sup>	189 ± 33 <sup>b</sup>	151 ± 27 <sup>a</sup>	361 ± 65 <sup>b</sup>
Omental adipose tissue	259 ± 96	295 ± 41	273 ± 31	558 ± 132 <sup>c</sup>
Relative fat mass	8.09 ± 1.89	11.24 ± 1.36	9.72 ± 0.60	17.52 ± 4.33 <sup>d</sup>

Values are means ± SE in grams for all weights and tissues, except relative fat mass, which is in grams per kilogram, for (CS; *n* = 5), CT; (*n* = 5), NRE and NRL sheep. Values arranged in individual rows with differing superscript letters are significantly different at *P* < 0.05.

## Last trimester

cattle

	Underfed	Control	P- value
Birth weight, kg	28.6	38.8	<0.001
Weaning weight, kg	174	198	<0.001
Pre-weaning ADG, kg/d	0.67	0.76	<0.001
Feedlot entry weight, kg	481	520	<0.001
Slaughter weight, kg	647	703	<0.001
Feedlot ADG, kg/d	1.48	1.62	<0.001

Greenwood et al., 2010

## Last trimester

cattle

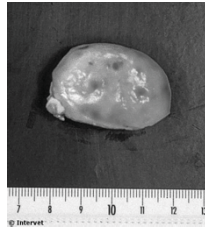
	Underfed	Control	P- value
Carcass weight	364	396	<0.001
LM area, mm <sup>2</sup>	90.4	88.9	0.25
Rib fat thickness, mm	11.5	11.8	0.35
Rump fat depth, mm	21.3	19.6	0.05
Marbling score	447	444	0.98
Peak force, N	39.2	40.5	0.26

Greenwood et al., 2010

## Last trimester

cattle

- Reproduction (Wilkins et al., 2006)
  - Nutrient restriction decreased
    - mean ovarian wt (16.6 vs 19.4 g)
    - mean size of follicles (14.0 vs 16.7 mm)



Nutrient (eg glucose) restriction is a stressor, and its effects are mediated by the stress hormone cortisol

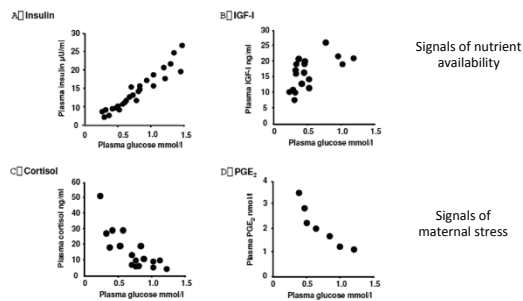
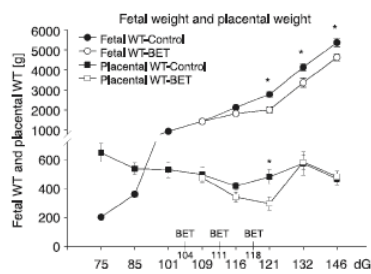


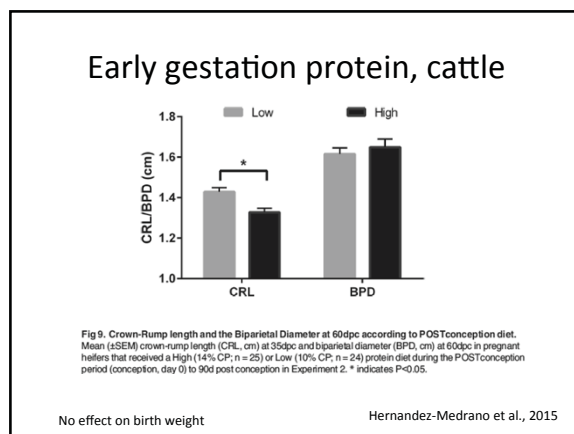
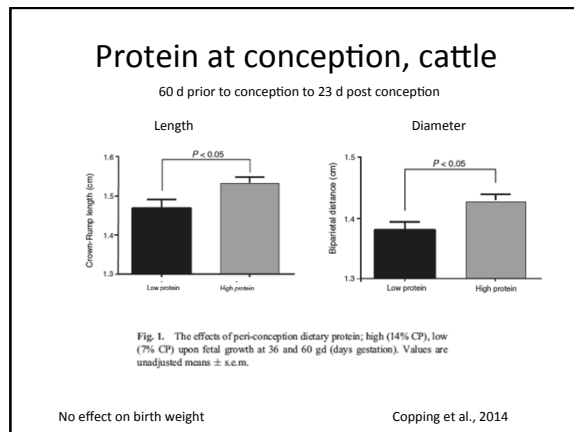
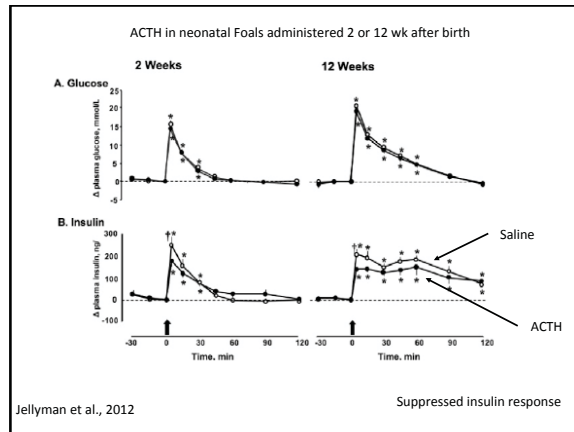
Figure 1. Relationship between concentrations of glucose and insulin (A), IGF-I (B), cortisol (C) and PGE<sub>2</sub> (D) in fetal sheep during late gestation. Data from Fowden et al. (1987, 1998a), Fowden & Forhead (2007) and Quigley et al. (2008).

## Betamethasone in Sheep



Braun et al., 2007





## Protein – late gestation

Effect of cow protein supplementation during late-gestation on progeny feedlot performance and carcass traits

	Stalker 2006		Stalker 2007		Larson 2009	
	NS	S	NS	S	NS	S
Weaning weight, kg	210 <sup>a</sup>	216 <sup>b</sup>	210 <sup>a</sup>	222 <sup>b</sup>	233 <sup>a</sup>	240 <sup>b</sup>
DMI, kg/d	8.5	8.5	11.2 <sup>a</sup>	12.1 <sup>b</sup>	9.0 <sup>a</sup>	9.2 <sup>a</sup>
Feed efficiency	5.41	5.46	6.97	7.19	5.37	5.38
Fat thickness	1.31	1.35	1.24	1.21	1.17	1.24
Marbling score <sup>1</sup>	467	479	449	461	445 <sup>a</sup>	492 <sup>b</sup>

Heavier fetuses in sheep (Camacho et al., 2010)

Long 2012 showed added protein increased leanness in NR first trimester

## Protein – late gestation

Table 1. Effect of maternal protein supplementation on heifer progeny performance

Item	Dietary treatment			
	Martin et al. (2007) <sup>1</sup>		Funston et al. (2008) <sup>1</sup>	
	NS	SUP <sup>2</sup>	NS	SUP <sup>2</sup>
Weaning BW, kg	207	212	223 <sup>a</sup>	232 <sup>a</sup>
DMI, kg/d	6.60	6.75	7.29	7.30
ADG, kg/d	0.41	0.40 <sup>a</sup>	0.81	0.77
Residual feed intake, kg/d	-16.12	9.07	-13.50 <sup>b</sup>	0.01 <sup>b</sup>
Age at puberty, d	334	339	365 <sup>a</sup>	352 <sup>a</sup>
Pregnant, %	80 <sup>b</sup>	93 <sup>b</sup>	83	90

<sup>1a</sup>Means within a study with different superscripts differ ( $P \leq 0.05$ ).

<sup>2a</sup>Means within a study with different superscripts differ ( $P \leq 0.10$ ).

## Protein

- Arginine
  - Arginine infusion prevented IUGR in ewes underfed by 50% (Lassala et al., 2010)
  - 1% Arginine between d 30 and 114 in gilts increased fetal survival (Mateo et al., 2007)
  - Stimulates GH, prolactin, and insulin
  - Involved in nitric oxide synthesis and blood flow

## Protein at conception, cattle

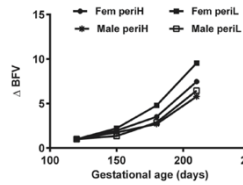


Fig 6. Mean Blood Flow Volume change according to sex and PERIConception diet. Mean Blood Flow Volume change (BFV  $\Delta$ ) over time (as a ratio of the initial measure at 120dpc) of heifers according to fetal sex and PERIConception diet (Male: PERI High  $\star$ , n = 25, and PERI Low  $\square$ , n = 20; female: PERI High  $\star$ , n = 11, and PERI Low  $\square$ , n = 8). PERIConception diet was given from day 60 prior to conception to day 23 post-conception in Experiment 1.

7 vs 14% CP

Hernandez-Medrano et al., 2015

## Arginine – early gestation dairy heifers

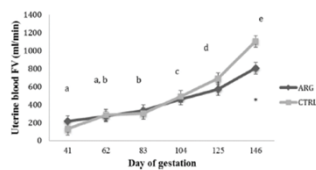


Fig. 1. Blood flow volume (FV) in the uterine artery of heifers as affected by arginine (ARG) supplementation. Values are the mean  $\pm$  standard error. Different letters indicate significant differences ( $P < 0.05$ ) between the sampling points. \*Denotes values differ ( $P < 0.05$ ) between the treatments within sampling points.

Thus protein or arginine may be acting through another mechanism

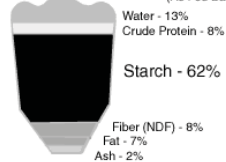
## Source of energy

- Fat in cows– no effect (Alexander et al., 2002)
- Source (isocaloric) cows (Radunz et al., 2010)
  - Grain and DDGS – increased birth wt
  - No effect on pre- or post-weaning growth



## Comparison of DDGS & Corn

Composition of Mature Corn Grain  
(As Fed Basis)



	Corn	DGS
ME (mcal/kg)	3.25	3.18
NEg	1.55	2.18
CP	9.8	30
RUP	55	52
Fat	4	11
NDF	11	46
ADF	3	21
P	0.32	0.83
S	0.11	0.45

## DDGS

- Fed to meet energy requirements (protein in excess) – Gunn et al. (2014)
  - 100 d prior to calving + 100 d after
  - 19 vs 12% CP
  - Decreased postpartum anestrous
  - Increased birth weights
  - Increased dystocia
  - Greater frame size in calves



## Gunn et al., 2012 Effect of maternal DG on male progeny

19 vs 12% CP

	No DG	DG	P-value
Weight, Kg			
Birth	34.2	39.1	0.01
215 d of age	259.3	270.6	0.11
Slaughter	563.2	574.1	0.35

dystocia

Similar results for Radunz et al., 2010, 2012; Wilson et al. 2012

No difference in ADG, DMI, glucose tolerance, or carcass characteristics ( $P > 0.05$ )

Greater conception rate to AI for DG heifers (33 vs 71%)

### Gunn et al., 2014 Fetal/neonatal DDGS

Item	CON	DG	P
Milk urea nitrogen, %	7.08	16.35	0.001
Milk fat, %	2.36	1.37	0.001
Saturated FA	64.29	47.60	0.001
Mono-unsaturated FA	32.09	44.63	0.001
Poly-unsaturated FA	3.63	7.77	0.001

PUFA can increase cell differentiation (Hurley et al., 2006) and can activate lipogenic/lipolytic transcription factors

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- Neonate
  - Continued adipogenesis
  - Mammary gland development
  - Can exacerbate or ameliorate fetal effects




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### Neonatal programming

- Intensified early nutrition
  - Increased capacity to consume dry feed (Christian et al., 1965)
  - Increased wt at 24 mo (Robelin and Chilliard, 1989; Moallem et al., 2010)
  - Increased mammary gland development (Brown et al., 2005)

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## Neonatal programming

- Milk composition
  - Increased protein
    - Increased body protein and decreased body fat (Donnelly and Hutton et al., 1976; Diaz et al., 2001)
  - Decreased fat
    - Decreased body fat % (Tikofsky et al., 2001)
- Can we feed DDGS to cows just during lactation?
  - Avoid dystocia?
  - Increase progeny growth?

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## Shee et al., 2016

	CON	DDGS	SEM	P-Value
Conception, %	50.9	81.5	0.10	0.02
Pregnancy, %	92.6	88.9	0.06	0.64



19.4% vs 11.7% CP

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## Shee et al., 2016

	CON	DDGS	SEM	p-Value
Production, kg	10.12	10.39	1.48	0.78
Protein, %	3.4	3.0	0.048	<0.01
MUN, mg/dL	8.0	12.1	0.37	<0.01
Fat, %	0.49	0.83	0.056	<0.01
Saturated FA, g/100 g	65.25	54.95	1.03	<0.0001
Mono-unsaturated FA, g/100 g	27.31	34.28	0.75	<0.0001
Poly-unsaturated FA, g/100 g	7.45	10.77	0.74	<0.01
CLA	1.05	2.25	0.12	<0.001

19.4% vs 11.7% CP

Milk composition on d 110 similar  
Cow DMI, BW, BCS did not differ

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### Shee et al., 2016

Day	CON	DDGS	SEM	P-Value
0	41.3	40.9	8.49	0.93
110	165.6	178.6	8.49	<0.05
219	262.9	277.5	8.49	<0.01



No difference in performance in feedlot

DDGS during neonatal phase decreased marbling score 14.6% in progeny (343 vs 293)

### Conclusion

- Potential exists to program growth through maternal diet
  - Insulin resistance
  - Body composition
  - Reproduction
  - Metabolic disorders??
- Neonatal nutrition may be able to overcome potential negative effects
- Specific fatty acids, amino acids, vitamins, or minerals
  - Milk replacer programs
  - Dry cow programs





# What's The Problem?

Paul Rapnicki, DVM MBA  
Elanco Dairy Business Unit  
Dairy Technical Consultant

# When are Problems Perceived on a Dairy?

- An established process breaks
- Desire to improve a process
  - Maximize efficiency, get better, change the way we do things
- “Problem Perceived” = “Presenting Complaint”

# After the Problem is Perceived

- People want solutions
- Consultant's want to provide answers



# Providing Answers

- In school the hidden message is that every major problem has already been solved
  - The answers are in text books, course notes, and from professors
- The aim of education, in this world of certainty, is to transfer these answers to the students
  - National Board Exams determine if enough answers are transferred

# Providing Answers

- In a World of Certainty...
  - If you run across a new problem, you find an “expert” to provide the answer
  - We don’t need to come up with our own answers...

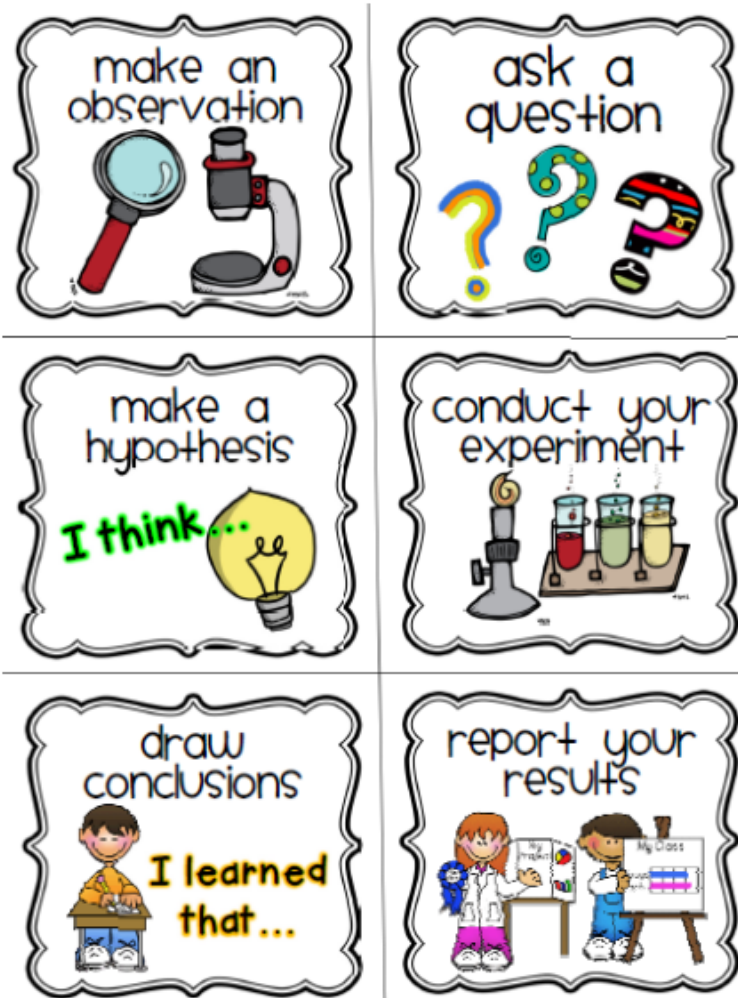
.....but we do have to wait for the  
occasional genius to solve new  
problems



# Solving New Problems...

- **WARNING:** Becoming involved in real problem solving ends your world of certainty
- The end of certainty is not welcome by most
- Real problem solving is a process

# Real Problem Solving is Grounded in the Scientific Method





# What's the Problem?

- A presenting complaint
  - is not the same thing as a diagnosis
  - it is important to the client
- Formulating the problem statement is the key to starting an effective problem solving process

# Problem Statement

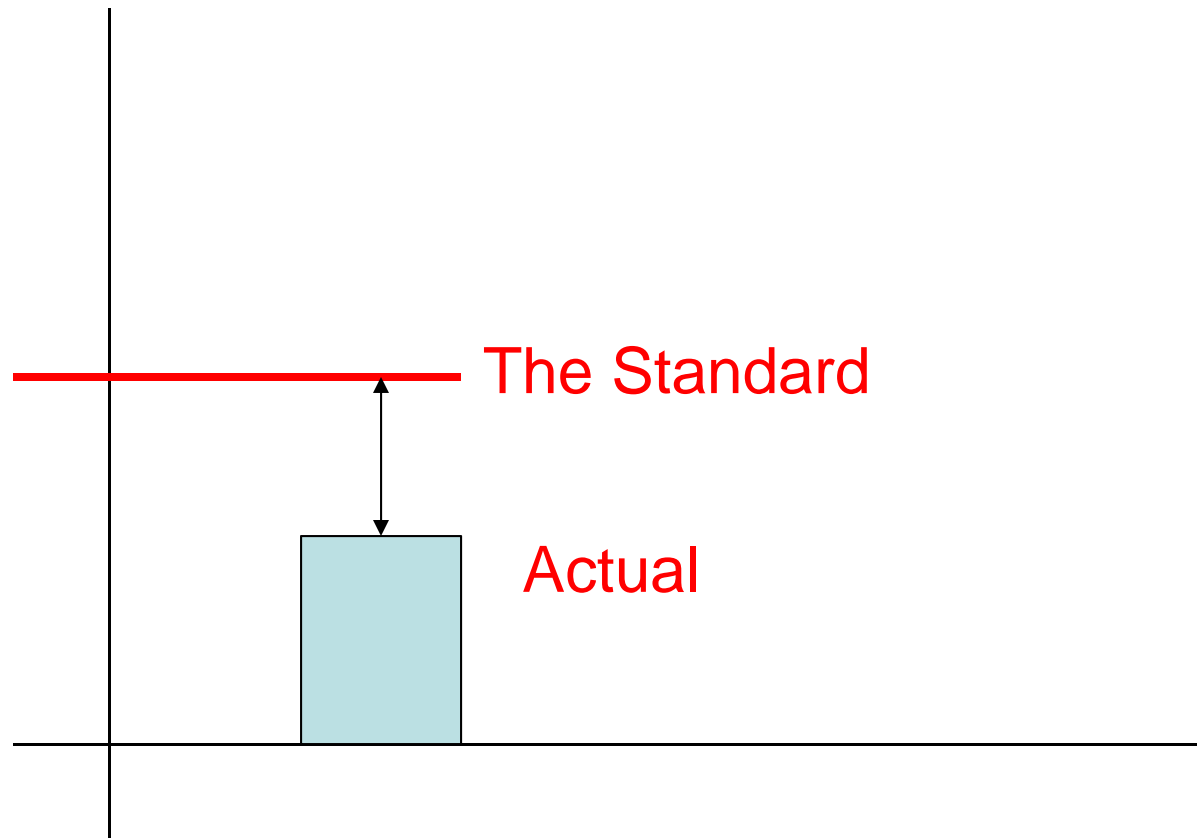
- Defines what the focus is on
  - Why are you there?
- Leads toward consensus
  - On the problem
  - On the chosen countermeasure
- Establishes a clear goal
  - You know when the problem has been solved

# Proper Problem Statement

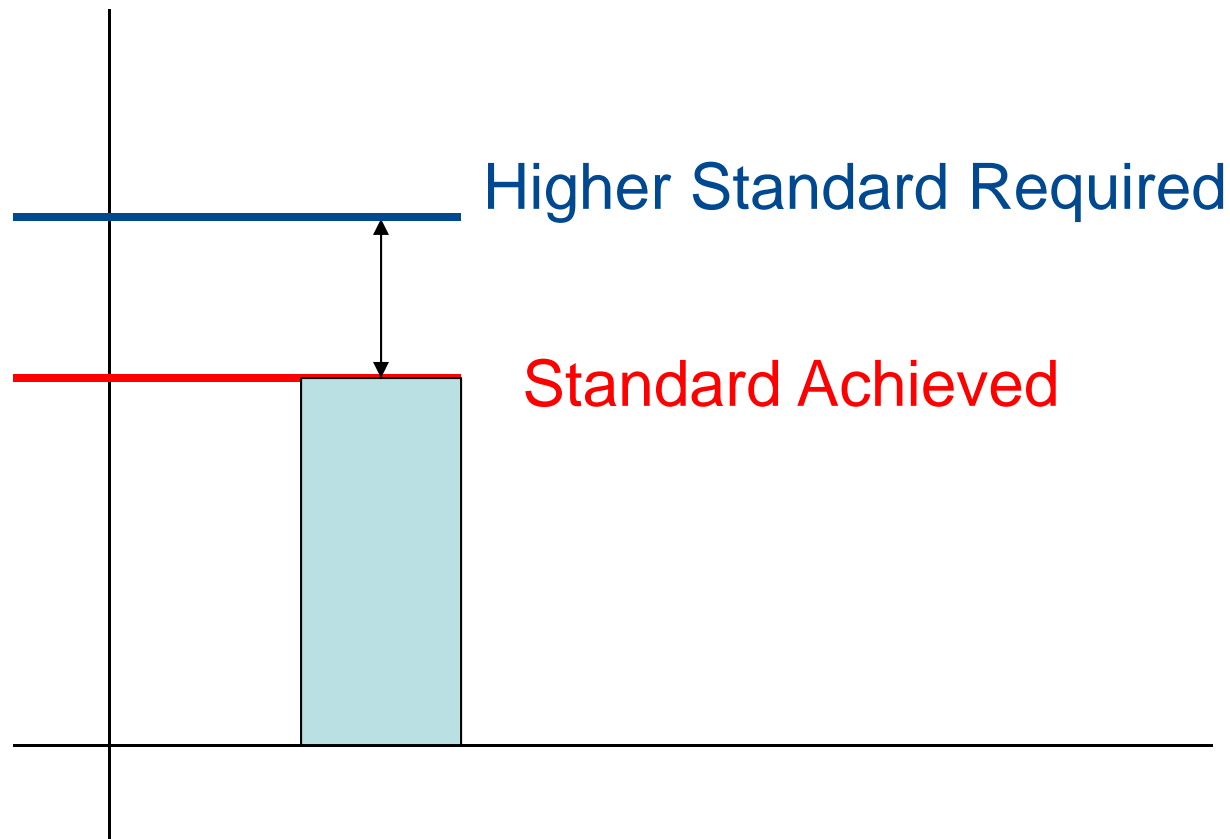
- Succinct and measureable statement of what is actually happening compared to what should be happening
- “Compared to what should be happening”



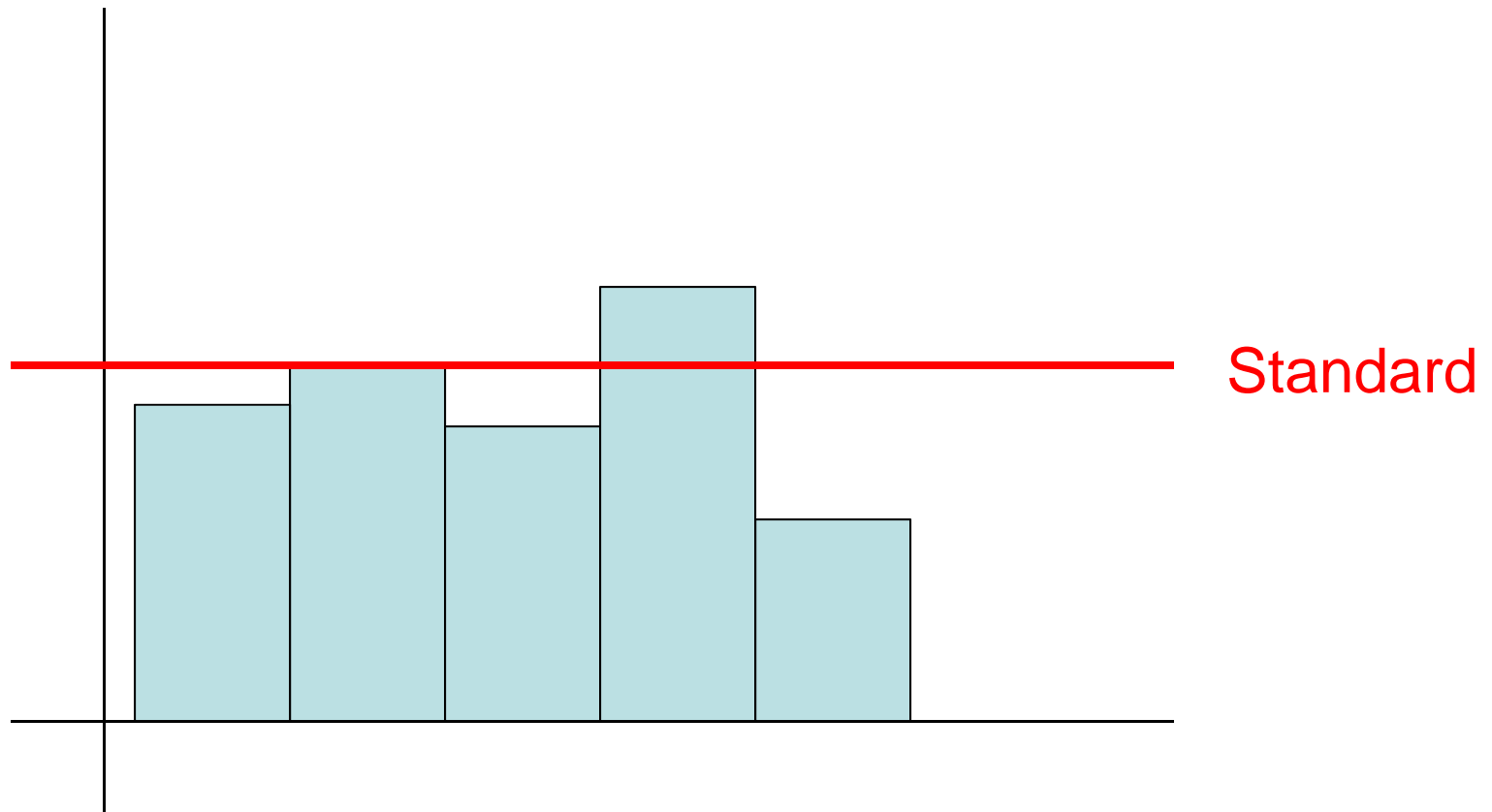
# 1. The Standard is not Achieved



## 2. The Standard is Achieved, but a Higher Standard is now Required



### 3. Performance to the Standard varies (not consistently achieved)



# Problem Statements

- The standard is not achieved
- The standard is achieved, but a higher standard is now required
- Performance to the standard varies



# Going to the Gemba

- “**Gemba**” is a Japanese word for “the real place” where the work is done

現場



# Going to the Gemba

- Travel physically to the actual location where the problem occurs
  - Observe things first hand
  - Talk with the front line people involved
  - Clarify where, when, and under what conditions the problem occurs



# The Ice Cream Problem



# Ice Cream Problem

- Presenting Complaint
- Quality family time – trip to the Ice Cream Shoppe
- Customer Question



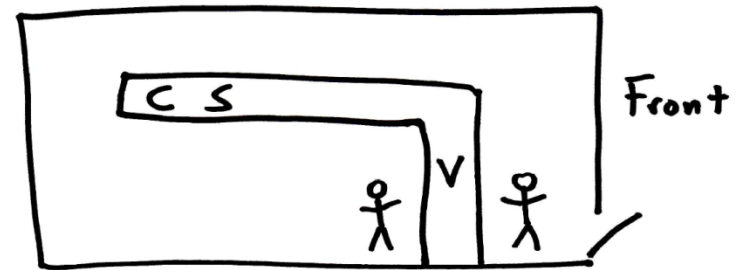
# Ice Cream Problem

- Engineer sent to check it out
  - Vanilla Ice Cream
  - Chocolate Ice Cream
  - Strawberry Ice Cream
  - Vanilla Ice Cream
- Is the car allergic to vanilla ice cream?

# Ice Cream Problem

- He noted all the data, such as:

- Time of day
- Smell of vanilla and other ice creams
- Weight of the ice cream
- Walking distance
- “in time” and “out time” of the car
- Etc, etc, etc....



- Time to buy relationship
- Why? Because of the layout of the store.
- Now he understood there was no relationship with ice cream, but there was a relationship with time

# Ice Cream Problem

- New Problem Statement:
  - The car doesn't start when it is shut off for less than 10 minutes
- Vapor lock
- The engineer corrected the vapor lock and the problem was solved





# Ice Cream Problem

## Moral of the story:

- Sometimes insane looking or illogical problems also may be real
- Take home messages
  - Don't jump to conclusions
  - Go to the location of the problem
  - Objectively observe and analyze the situation

# Going to the Gemba

- Déjà Vu
- “Think like a traveler”
  - Hyperaware state
- When everything is “new” your ability to “see” is improved
- “Vujà Dé”

# What's the Problem?

- Formulating the problem statement is the key to starting an effective problem solving process

# Proper Problem Statement

## Three Elements

### 1. Specific

- Focused on only one problem

### 2. Short

- One or two sentences long

### 3. Solution not implied

- States “what” not “why”
  - Avoids tendency to speculate
  - “Why” = Hypothetical Explanatory Construct

# Proper Problem Statement

## Words to Avoid

- Undefined words
  - Too many, too high, too long, too anything
  - Infrequently, occasionally, normally, high, low, inconsistent, etc.
- Words that point to the cause
  - Due to ...
  - Because ...



# Practice

Let's evaluate a few example  
Problem Statements

# Is this a good Problem Statement?

- We don't have a good oven because we need a new thermostat

**Stating a solution**



# Is this a good Problem Statement?

- The oven temperature is 20 degrees below the specified 350 degrees

Good

# Is this a good Problem Statement?

- The XYZ company has a too high of a reject rate on products

**“Too high” = vague**  
**Not specific**

# Is this a good Problem Statement?

- The ABC operation in XYZ company is experiencing a 15% reject rate on the 123 product

**Not specific - WSBH?**

# Is this a good Problem Statement?

- The Dairy has an increased incidence of clinical mastitis leading to an elevated somatic cell count

**“Increased” / “elevated” = vague**

**Stating why – clinical mastitis**

**Not clear what the problem is:  
clinical mastitis or SCC?**

# Is this a good Problem Statement?

- Bulk Tank SCC is 350,000 vs the goal of <200,000

Good

# Is this a good Problem Statement?

- Double the expected incidence of clinical metritis (32% vs. 16%) since April 2013 in the 30 days after calving, resulting in increased treatment costs, decreased animal well-being and potential reduction in future fertility

**Too long**

# Is this a good Problem Statement?

- Since April 2013 in the 30 days after calving the incidence of clinical metritis is 32% vs. the norm of 16%

Good

# Problem Identified

## Response Options

1. Create a work around
2. Work to solve the root cause of the problem



# Creating workarounds...

- In the rush to finish the job, a workaround is used
- The crisis is “taken care of”
- No one goes back to determine the Root Cause and mistake proof the solution
- The workaround then becomes the standard way of doing business

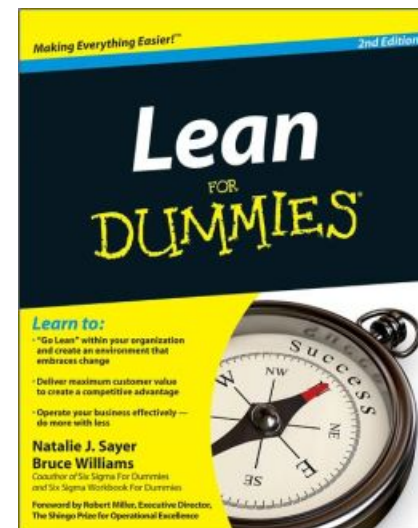
# Example



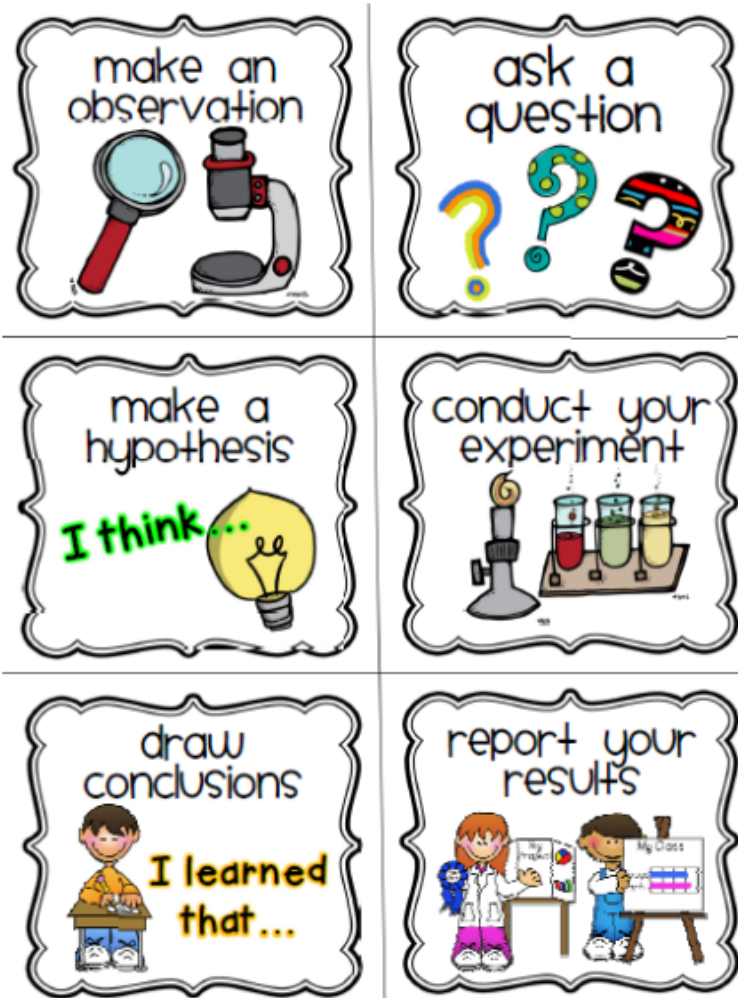
<http://www.today.com/parents/one-mom-dreams-impossible-dream-no-eating-car-1B9229442>

# Problem Perceived Response Options

1. Create a work around
2. Work to solve the root cause of the problem
  - Apply Lean Problem Solving Principles
  - There are many components to Lean
  - A3 Thinking Process



# Real Problem Solving is Grounded in the Scientific Method





Thanks!

paul.rapnicki@elanco.com






## Periparturient Immune Suppression

Paul Rapnicki, DVM MBA  
Dairy Technical Consultant  
Elanco Animal Health

**Ohio Dairy Veterinarians Meeting  
Columbus, OH**



## 2012 Elanco Science Symposium

Palmer House Hilton  
17 East Monroe Street  
Chicago, IL 60603  
312-726-7500—Hotel Phone

- Dr. Ken Leslie
- Dr. Jim Roth
- Dr. Jesse Goff
- Dr. Matt Waldron
- Dr. Marcus Kehrli
- Dr. Lorrain Sordillo
- Dr. Peter Canning

# Periparturient Immune Suppression

- Evidence
- Understanding
- Management Implications



# What is Immune Suppression?

- Literally means “*Diminished immune responsiveness*”
- Immune system is a highly diverse part of our bodies that fights disease
- Involves cellular and non-cellular mechanisms that are often interdependent
- Periparturient immune suppression is rather significant
  - Typically, this is in the area of a 25 to 40% decline in both neutrophil function (innate immunity) and lymphocyte function (acquired immunity)\*

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



DAYS

Tizard IR. Veterinary Immunology. 9th ed. St Louis, MO: Elsevier Inc; 2013:1-10, 30-40.

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# Evidence for Periparturient Immune Suppression

- Found in common disease conditions that occur in the first 30 days of lactation



Transition Disorder	Incidence Range*
Milk Fever	0.03%-22.3%
Ketosis	1.3% - 18.3%
Displaced Abomasum	0.3% - 6.3%
Ovarian Dysfunction	1.0% - 16.1%
Metritis	2.2% - 37.3%
Retained Placenta	1.3% - 39.2%
Mastitis	1.7% - 54.6%



DAYS

\*Kelton DF et al. 1998. Recommendations for Recording and Calculating the incidence of Selected Clinical Diseases of Dairy Cows. JDS 81:2502-2509

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Is this cow immune suppressed?



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# Retained Placenta (RP)

- During the third and final stage of labor, the placenta is released and the process of uterine involution begins
- Beagley et al. Review (2010) reported:
  - RP definition is varied in the literature, ranging from retention of the placenta for 8 to 48 hours postpartum
  - Most published studies define RP in cattle at 12 to 24 hours

# Retained Placenta – Role of Immune Function

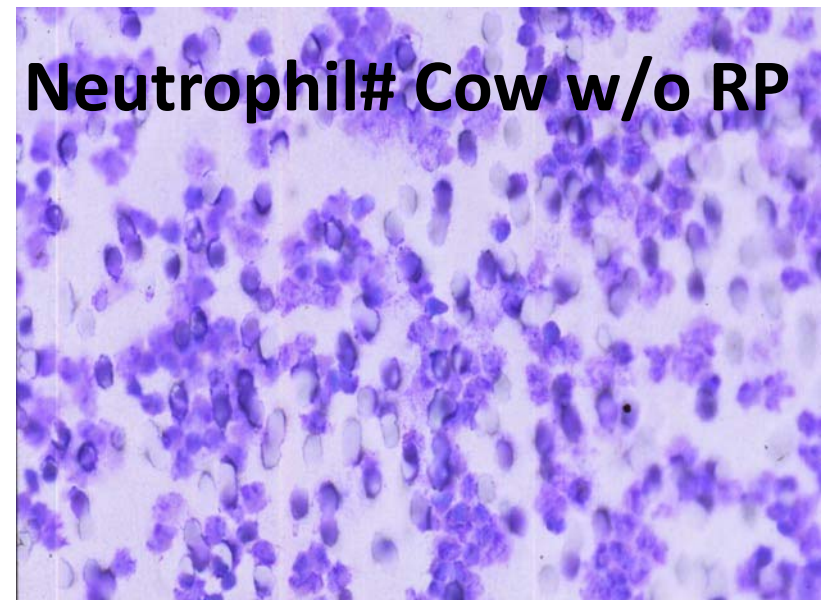
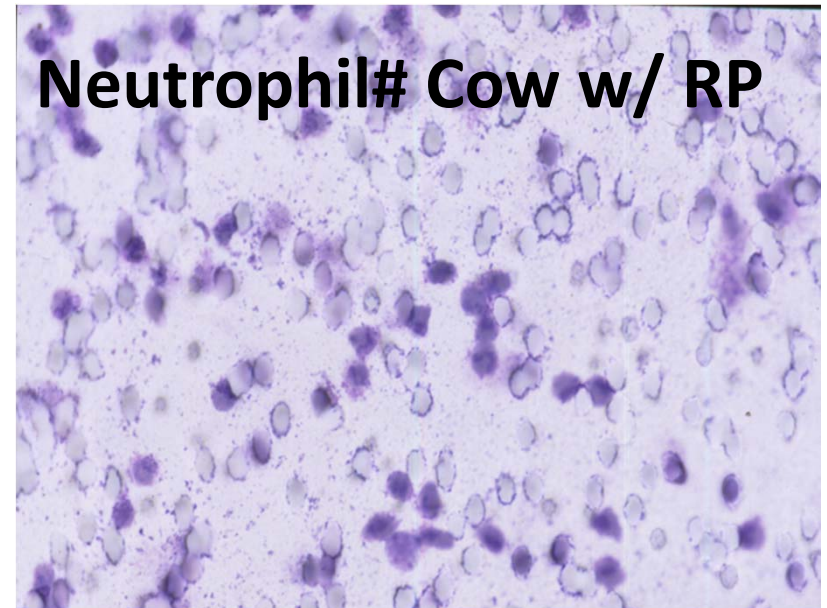
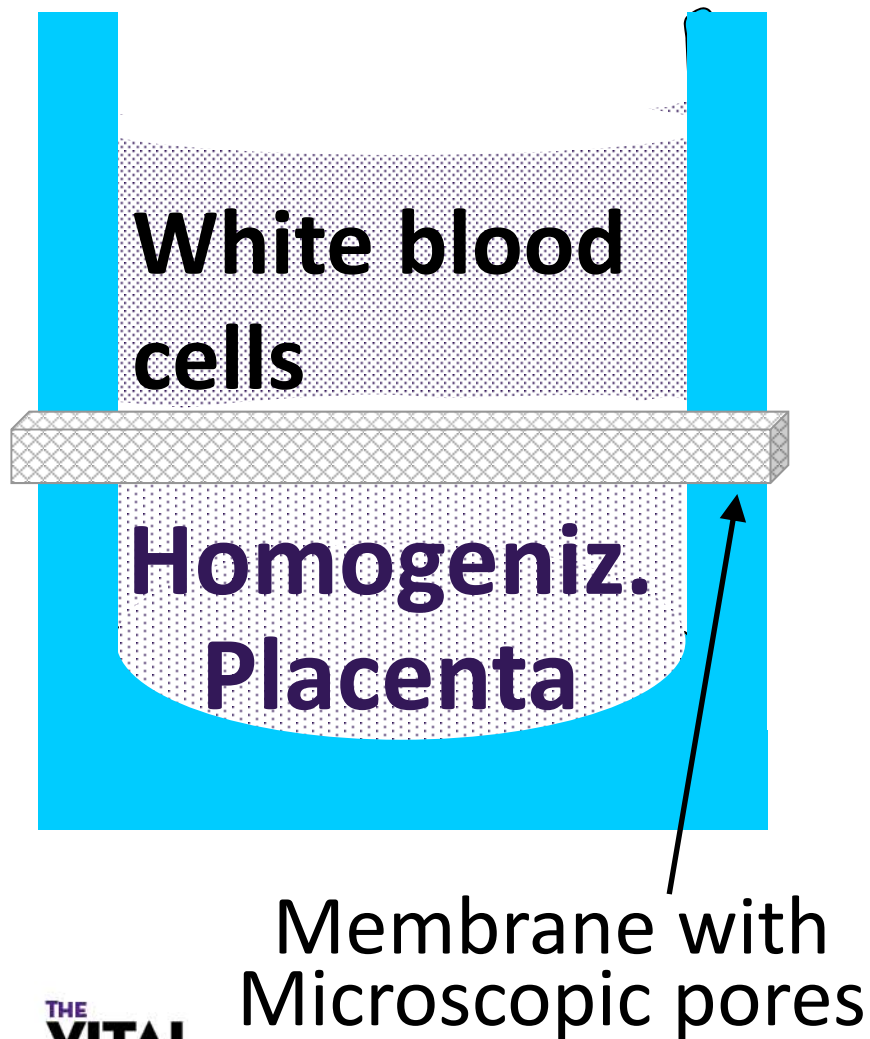
- Beagley et al. Review (2010) reported:
  - Decreases in immune function play an important role in the mechanism of placental retention
- Gunnink (1984)
  - Demonstrated differences in neutrophil function in cows that would further develop retained placenta

# Retained Placenta – Role of Immune Function

- Kimura et al. (2002)
  - RP is caused by immune dysfunction at calving
    - Unifying theory that helps explain epidemiological evidence that deficiency or excess of a variety of nutrients or hormones can affect the incidence of RP
  - Cows developing retained placenta have impaired neutrophil function, as assessed by chemotaxis toward cotyledon supernatant preparations and myeloperoxidase activity

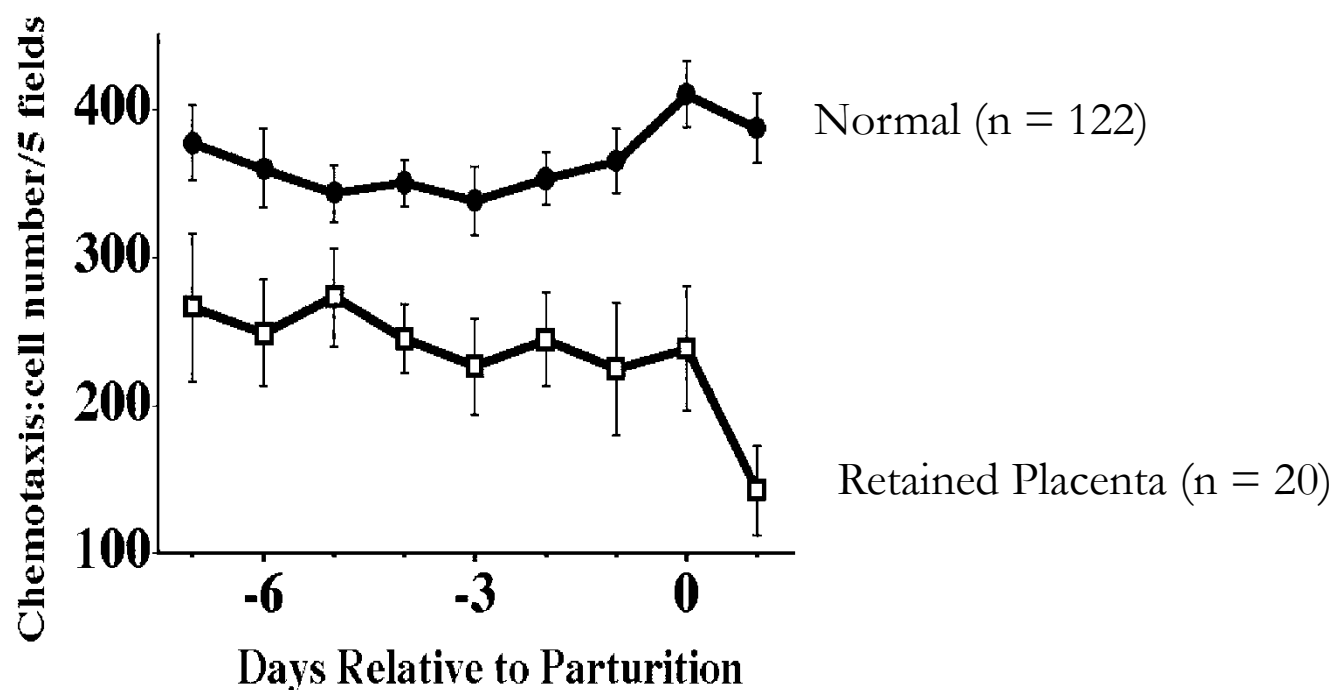


# Boyden Chamber Assay

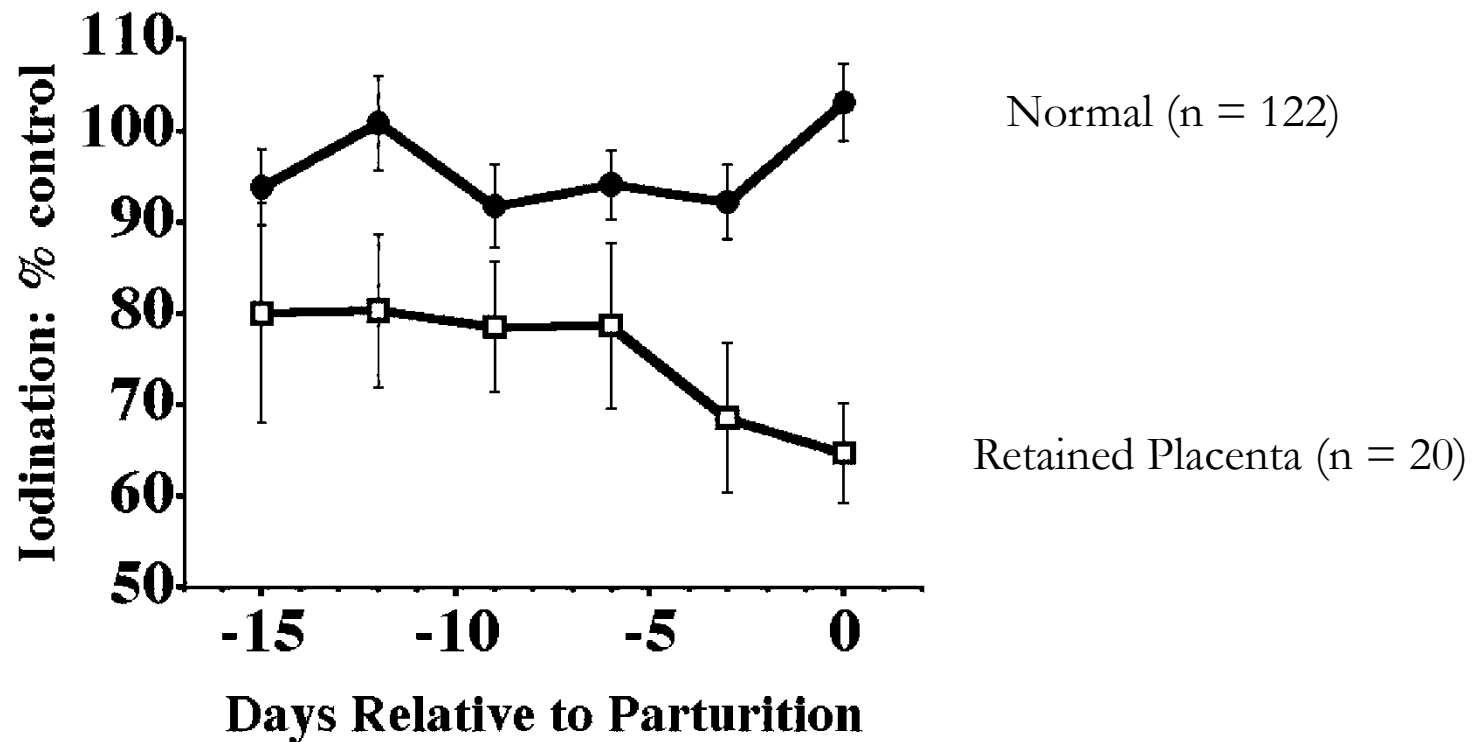




Chemotactic activity of neutrophils toward cotyledon supernatant in cows with retained placenta was significantly lower ( $P < 0.01$ ) than in cows without retained placenta before parturition



Myeloperoxidase activity of neutrophils in cows with retained placenta was significantly lower ( $P < 0.01$ ) than in cows without retained placenta before parturition



Is this cow immune suppressed?



# Clinical Metritis

- Kelton et al. (1998)
  - A cow is considered to have clinical metritis if she had a postpartum condition characterized by an abnormal (i.e., not including lochia or clear oestral mucus) cervical discharge, vaginal discharge, or both or abnormal uterine content
  - These characteristics are not an exhaustive list of clinical signs associated with this condition but rather represent the minimum criteria on which the diagnosis of the condition was based

# Clinical Illness Scoring for Metritis

Category	CIS Score <sup>a</sup>	Uterine Discharge Evaluation
Skipped	Null	No examination
No Metritis Detected	0	Examined No Odor AND No Watery discharge
Mild Metritis	1	Examined Odor Present AND Non-Watery Discharge on Metrichick or Palpation if Not Visible
Moderate Metritis	2	Examined Odor Present AND Watery Discharge on Metrichick or Palpation if Not Visible No signs of systemic illness <sup>b</sup>
Acute Puerperal Metritis	3	Examined Odor Present AND Watery Discharge on Metrichick or Palpation if Not Visible Systemic Illness <sup>b</sup>
<sup>a</sup> adapted from Dohmen et al. (1995), Overton et al. (2003), Urton et al. (2005), Sheldon (2006), Benzaquen et al. (2007), and Huzzey et al (2007).		
<sup>b</sup> Signs of systemic illness include, but are not limited to, body temperature $\geq 39.5^{\circ}\text{C}$ , decreased milk yield, dullness or other signs of toxemia, decreased dry matter intake, elevated heart rate, and dehydration (Sheldon et al., 2008; Haimeri and Heuwieser, 2014)		

Score = 2 or 2 (watery, reddish-brown)





# Clinical Metritis – Incidence

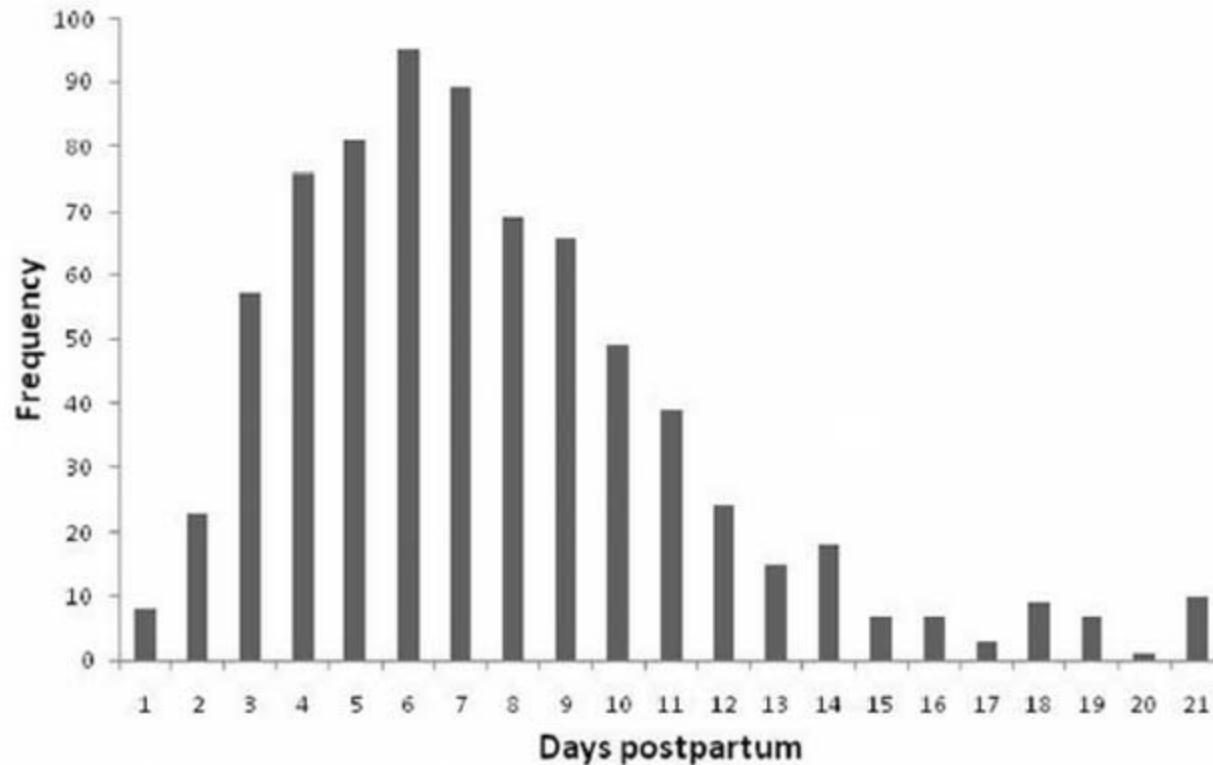


Figure 1. Frequency distribution of metritis incidence by days postpartum in a sample of 753 metritis cases that occurred over a one-year period in dairies in Ohio, New York, and California.



# Clinical Metritis – Role of Immune Function

- Nearly all dairy cattle experience bacterial contamination of the uterus for 2 to 3 weeks after calving
- Therefore.....in the immediate postpartum period, it is logical to assume that a prompt and effective response of the innate immune system is critical for bacterial clearance and prevention of clinical metritis

Sheldon, I. M., and H. Dobson. "Postpartum uterine health in cattle." *Animal Reproduction Science* 82 (2004): 295-306.

LeBlanc, Stephen J., Takeshi Osawa, and Jocelyn Dubuc. "Reproductive tract defense and disease in postpartum dairy cows." *Theriogenology* 76.9 (2011): 1610-1618.



DAYS

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# Clinical Metritis – Role of Immune Function

- Leukocytes from cows diagnosed with endometritis (cloudy discharge and enlarged uterus at 4 weeks post-calving) exhibited poor phagocytic activity at -1, 1, 2, 3, and 4 wks around calving

KIM, Ill-Hwa, Ki-Jeong NA, and Mhan-Pyo YANG. "Immune responses during the peripartum period in dairy cows with postpartum endometritis." *Journal of reproduction and Development* 51.6 (2005): 757-764.



DAYS

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# Clinical Metritis – Role of Immune Function

- Cows with metritis or cytological endometritis had worse neutrophil function than did unaffected cows



DAYS

Hammon, D. S., et al. "Neutrophil function and energy status in Holstein cows with uterine health disorders." *Veterinary immunology and immunopathology* 113.1 (2006): 21-29.

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# Clinical Metritis – Role of Immune Function

- Impairment of the immune status during the periparturient period in cattle increases the risk of uterine infection
- Infection of the uterus is largely influenced by the balance between bacterial contamination and the immune status around parturition



DAYS

Singh J, Murray R, Mshelia G, et al. The immune status of the bovine uterus during the peripartum period. *The veterinary journal* 2008;175:301-309.

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Is this cow immune suppressed?



**CHECK HER OUT FOR CLINICAL MASTITIS**  
**REVISA SI TIENE MASTITIS CLÍNICA**

## Three easy questions help check cows for clinical mastitis.



**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 (fiebre, no está comiendo, deprimida)?

**RECORD THE CLINICAL MASTITIS EVENT  
IN THE DAILY FARM RECORDS.**

**ANOTA EL EVENTO DE MASTITIS CLÍNICA 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 caso (leve, moderado ó severo)

**NOTIFY THE LEAD HERDSPERSON THAT A NEW CASE OF CLINICAL MASTITIS HAS BEEN FOUND SO THAT A TREATMENT DECISION CAN BE MADE.**

**NOTIFIKA 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 "SI" DETERMINA EL GRADO DE SEVERIDAD:

0 : no tiene mastitis clínica    1 : leve    2 : moderada    3 : severa

(800) 428-4441  
www.elanco.us

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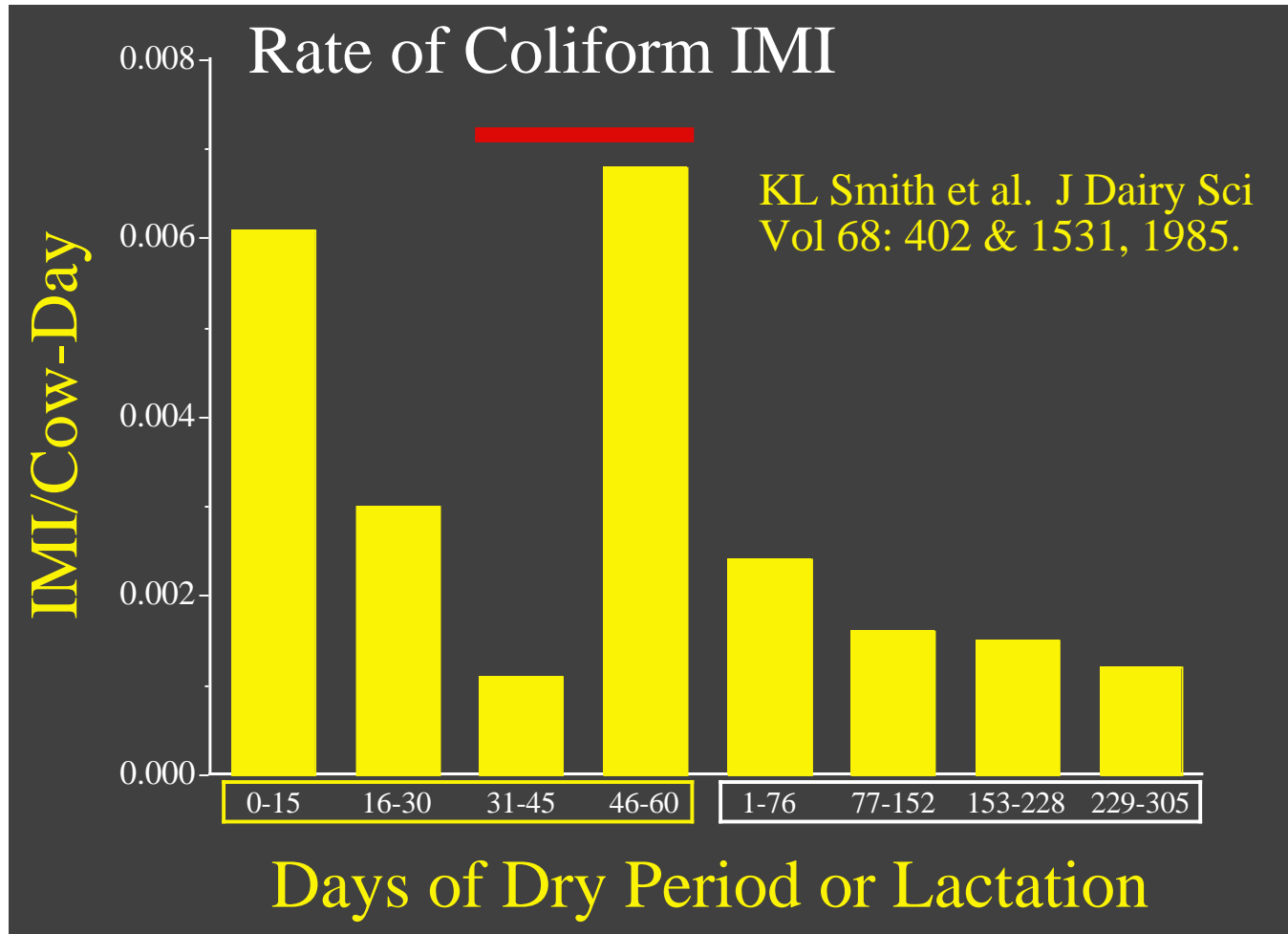


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90™**

## DAYS

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# Evidence for periparturient immune suppression



Smith, K. Larry, D. A. Todhunter, and P. S. Schoenberger. "Environmental Pathogens and Intramammary Infection During the Dry Period 1, 2." *Journal of Dairy Science* 68.2 (1985): 402-417.



DAYS

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# Epidemiology: Mastitis on Well-Managed Dairies

- > 80% of cows with DHI linear SCS <5
- Still have unacceptable frequencies of IMI and clinical mastitis
- Clinical mastitis by coliforms, bacteriologically negative (mostly coliforms) and environmental streptococci account for >80% of cases.
- 20% of clinical cases during first 7 d after calving

# Immune dysfunction linked to mastitis

- Incidence and severity of mastitis is greatest during the periparturient period in both humans and dairy cows
- During this time, the mammary gland experiences increased exposure to a plethora of mastitis-causing pathogens
- At the same time, important immunological defense of the host are compromised.

# Impact of Transition Diseases on Future Reproductive Performance

- Two of the most common clinical diseases in dairy cattle are metritis and mastitis
- Both of which have been negatively associated with subsequent reproductive performance

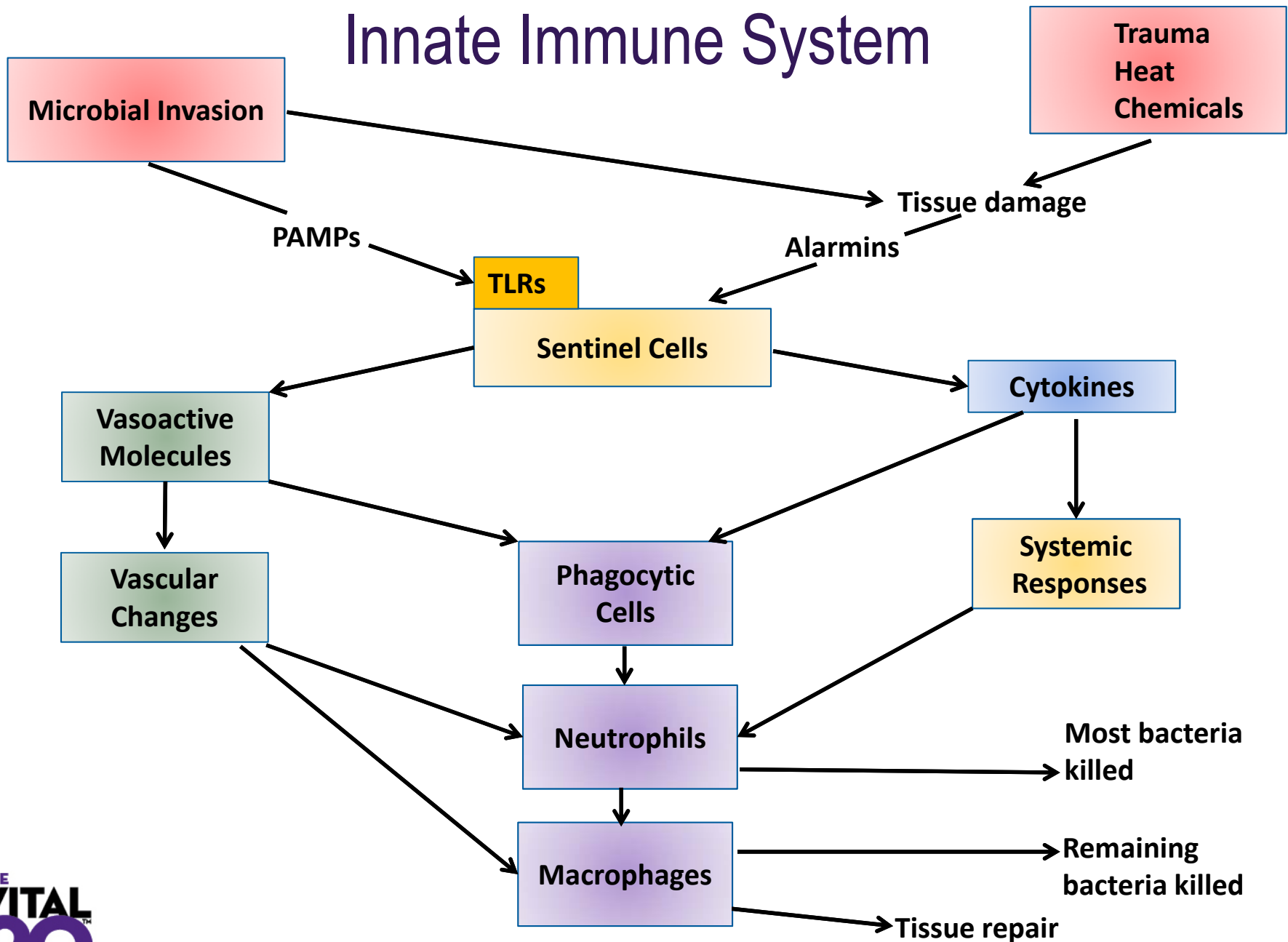
# Evidence for Periparturient Immune Suppression



# Periparturient Immune Suppression

- Evidence
- Understanding
- Management Implications

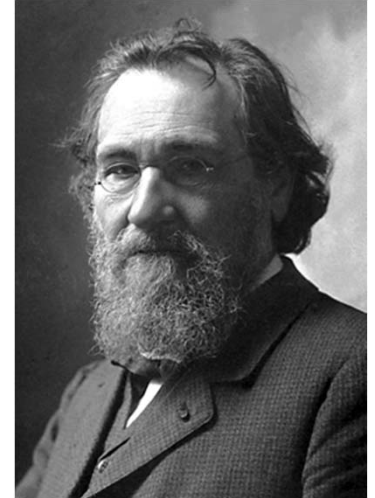
# Innate Immune System



# Founding father of modern immunology

## Elle Metchnikoff (Russian zoologist)

- Neutrophil role in mastitis has been recognized a long time.....
- In his 1908 Nobel Prize Acceptance Lecture he described disease as
- “a *battle* between a morbid agent, the external microorganism, and the mobile cells of the organism itself. A cure would represent the victory of the cells, and immunity would be the sign of an activity on their part sufficiently great to prevent an invasion of microorganisms.”





# Mastitis origins to immunology

- **Metchnikoff cited the Swiss veterinary expert, Zschokke:**
- Zschokke observed phagocytosis of streptococci in the battle against bovine mastitis was a good sign.
- If phagocytosis was insignificant or not present, cows were written off as no longer capable of producing good milk.
- Not only must phagocytes engulf the microorganisms, but that the devouring cells must utterly destroy the microorganisms.
- In some cases, streptococci of mastitis were found to "destroy the phagocytes after being engulfed by them thus liberating themselves to carry on their deadly work."

# Neutrophils are key in mastitis protection

- Early mastitis researchers work that demonstrated the importance of Neutrophils
  - Schalm O.W., Lasmanis J., Carroll E.J., Effects of pre-existing leukocytosis on experimental coliform (*Aerobacter aerogenes*) mastitis in cattle, Am. J. Vet. Res. 25 (1964) 83–89.
  - Schalm O.W., Lasmanis J., Carroll E.J., Significance of leukocytic infiltration into the milk in experimental *Streptococcus agalactiae* mastitis in cattle, Am. J. Vet. Res. 27 (1966) 1537–1546.
  - Jain N.C., Schalm O.W., Carroll E.J., Lasmanis J., Experimental mastitis in leukopenic cows: immunologically induced neutropenia and response to intramammary inoculation of *Aerobacter aerogenes*, Am. J. Vet. Res. 29 (1968) 2089–2097.
- Neutrophils predominant (97%) of cells in mastitis milk



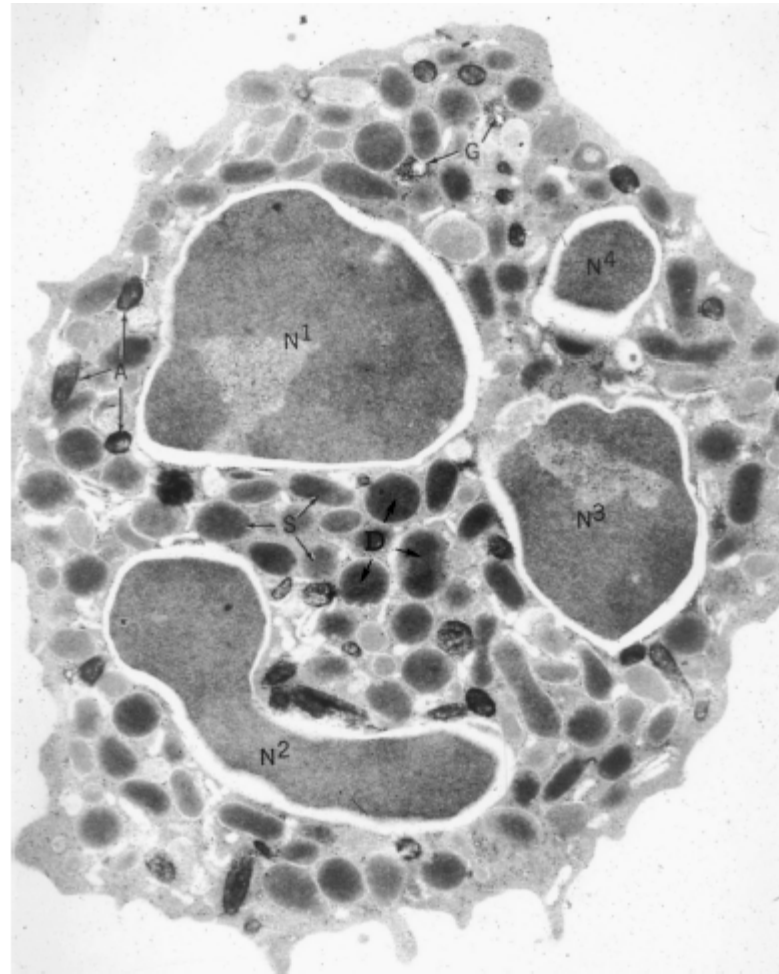
DAYS

Paape MJ, Bannerman DD, Zhao X, et al. The bovine neutrophil: Structure and function in blood and milk. Vet Res 2003;34:597-627.

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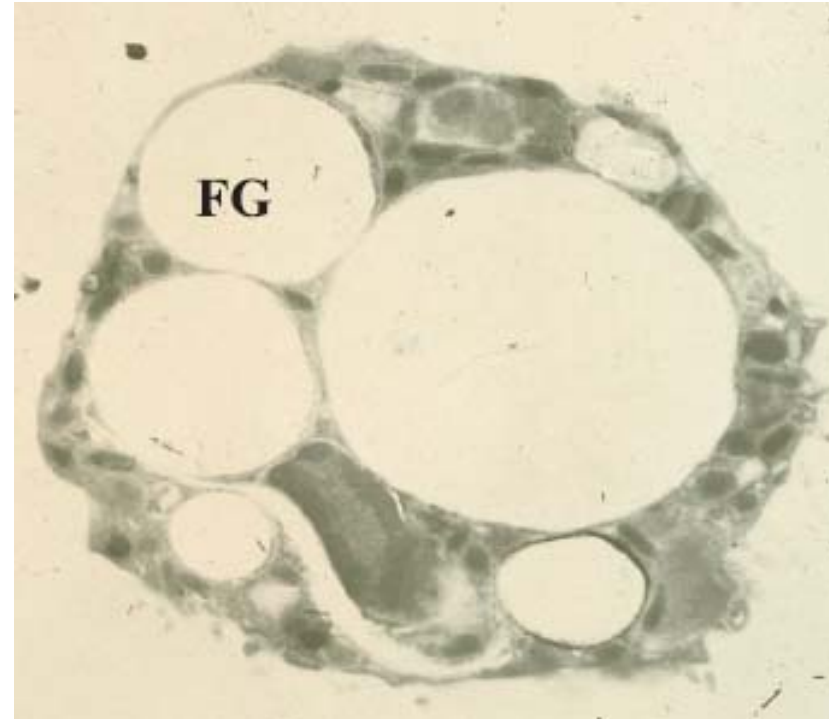
# Neutrophil Anatomy Key structures

- Nucleus
- Cytoplasm
  - Granules
    - Primary
    - Secondary
- Membrane

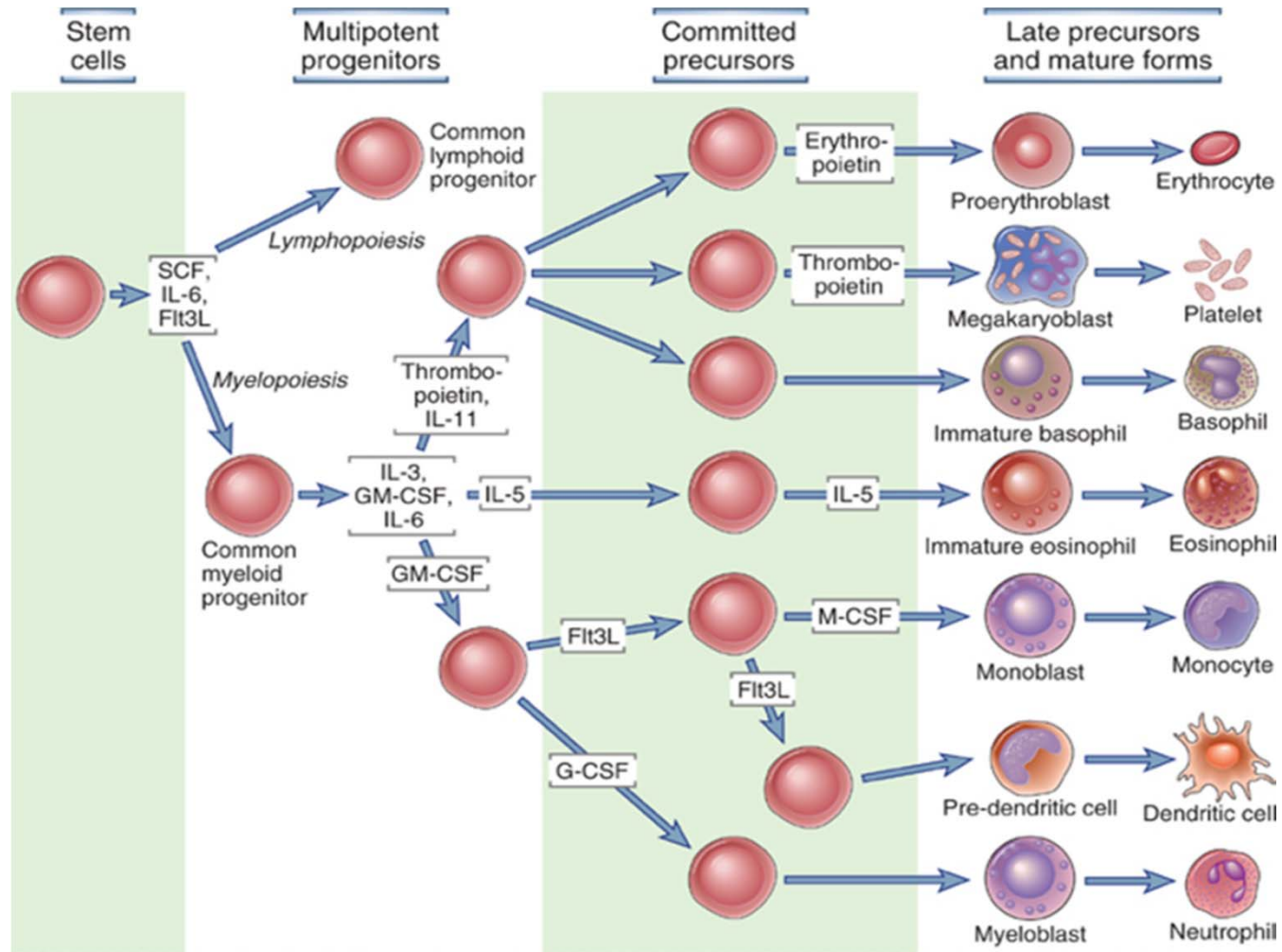


# Neutrophil Anatomy Key structures

- Nucleus
- Cytoplasm
  - Granules
    - Primary
    - Secondary
- Membrane
  - Loss of pseudopodia due to phagocytosis of milk fat globules and casein
  - Milk neutrophil less functional than blood PMN



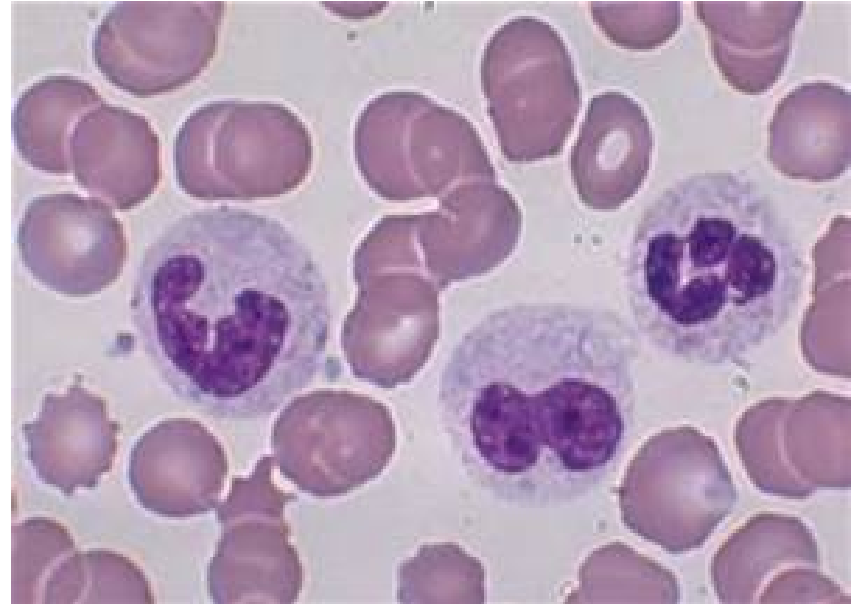
# Neutrophil Production



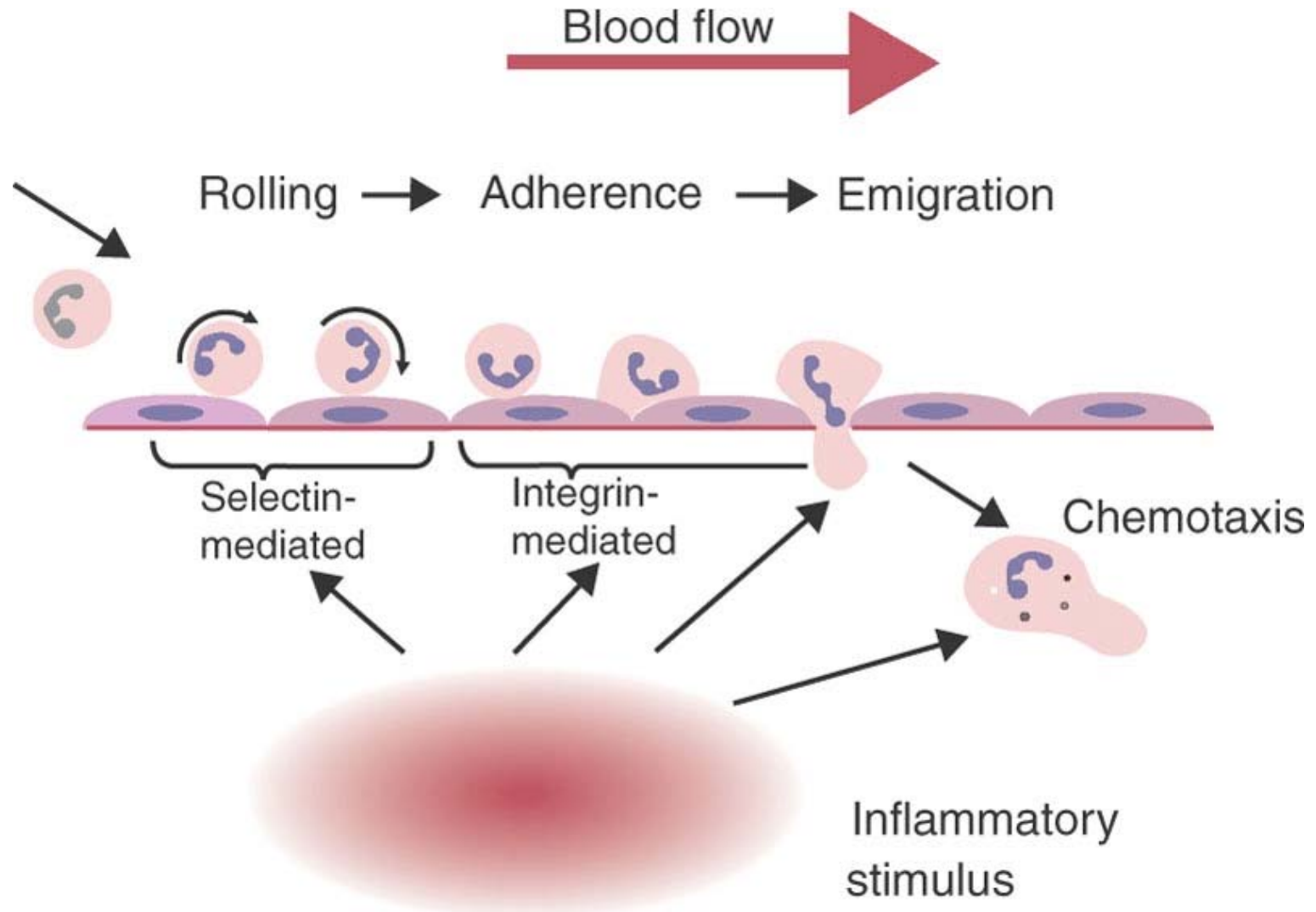
Abul K. Abbas *Cellular and Molecular Immunology*. 7<sup>th</sup> Addition C 2012 Elsevier Inc.

## Effective Neutrophil Activity Includes:

- Attachment to vascular wall, diapedesis and chemotaxis to site of infection
- Ingestion of invading bacteria
- Destruction of ingested bacteria



# Effective Neutrophil Activity Includes





# Parturition effects on $\beta_2$ integrins (CD18)

- All neutrophils express CD18 – required for egress
- Reduction of CD18 on neutrophils (basal & activated)
- Effect seen 48 hours after 1<sup>st</sup> Dexamethasone injection
- Persists for ~72 hours after last injection
- Glucocorticoids mediate

Burton, Jeanne L., et al. "Regulation of L-selectin and CD18 on bovine neutrophils by glucocorticoids: effects of cortisol and dexamethasone." *Journal of leukocyte biology* 57.2 (1995): 317-325.

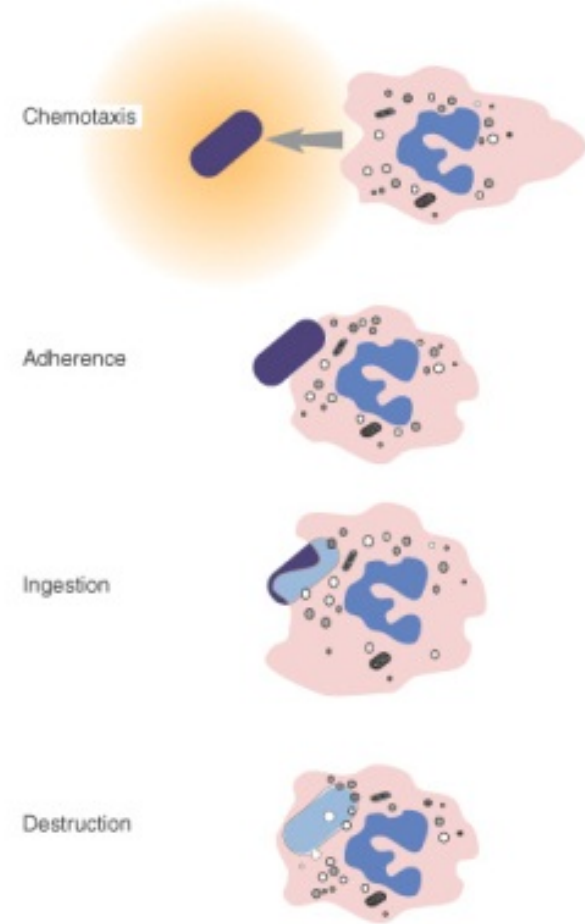


DAYS

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# Effective Neutrophil Activity Includes:

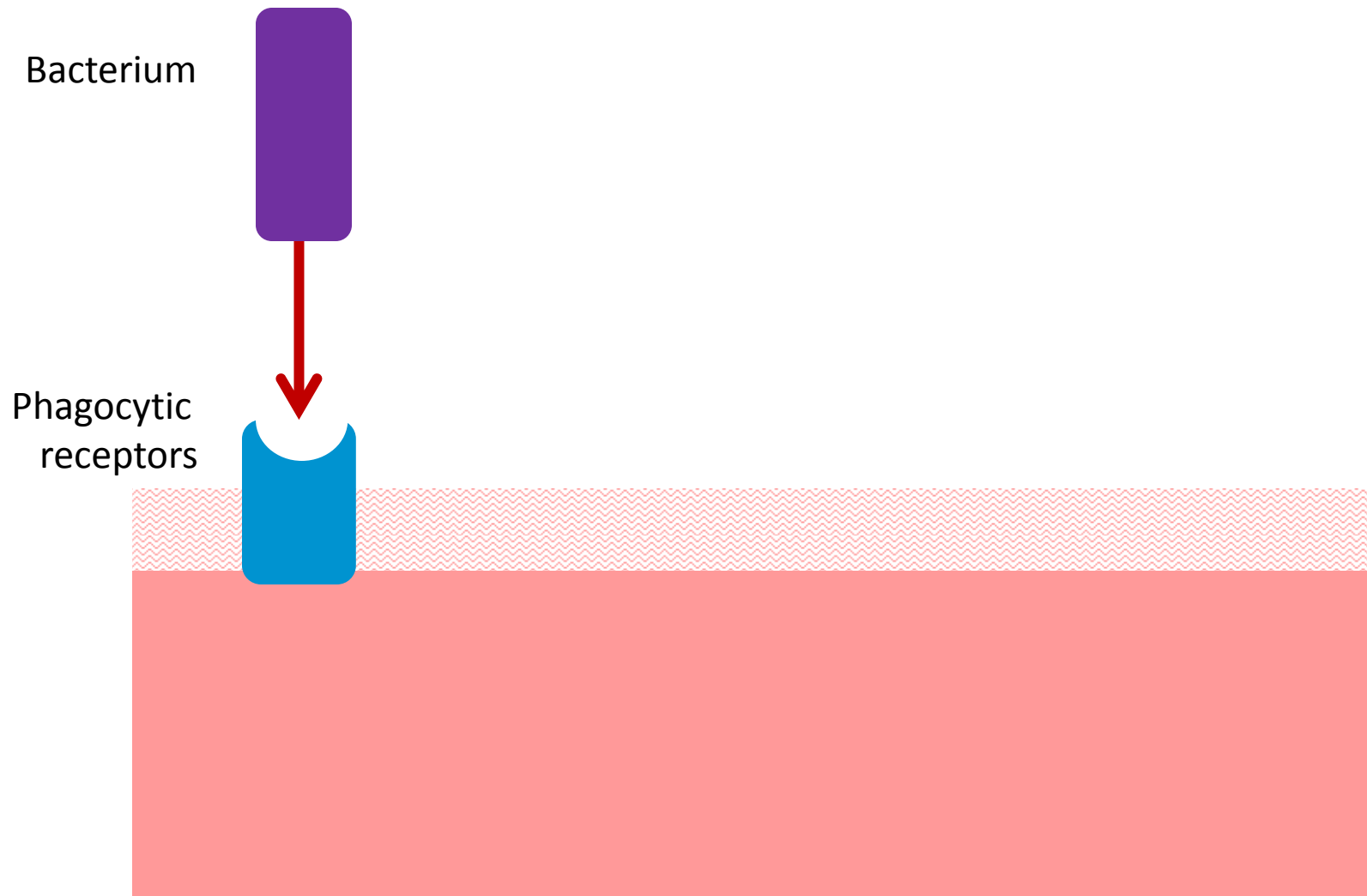
- Attachment to vascular wall, diapedesis and chemotaxis to site of infection
- Ingestion of invading bacteria
- Destruction of ingested bacteria
  - Oxidative burst (ROI)
  - MPO-H<sub>2</sub>O<sub>2</sub>-Halide
  - Defensins
  - Lysozyme
  - Lactoferrin



**FIGURE 3-9** Different stages in the process of phagocytosis.

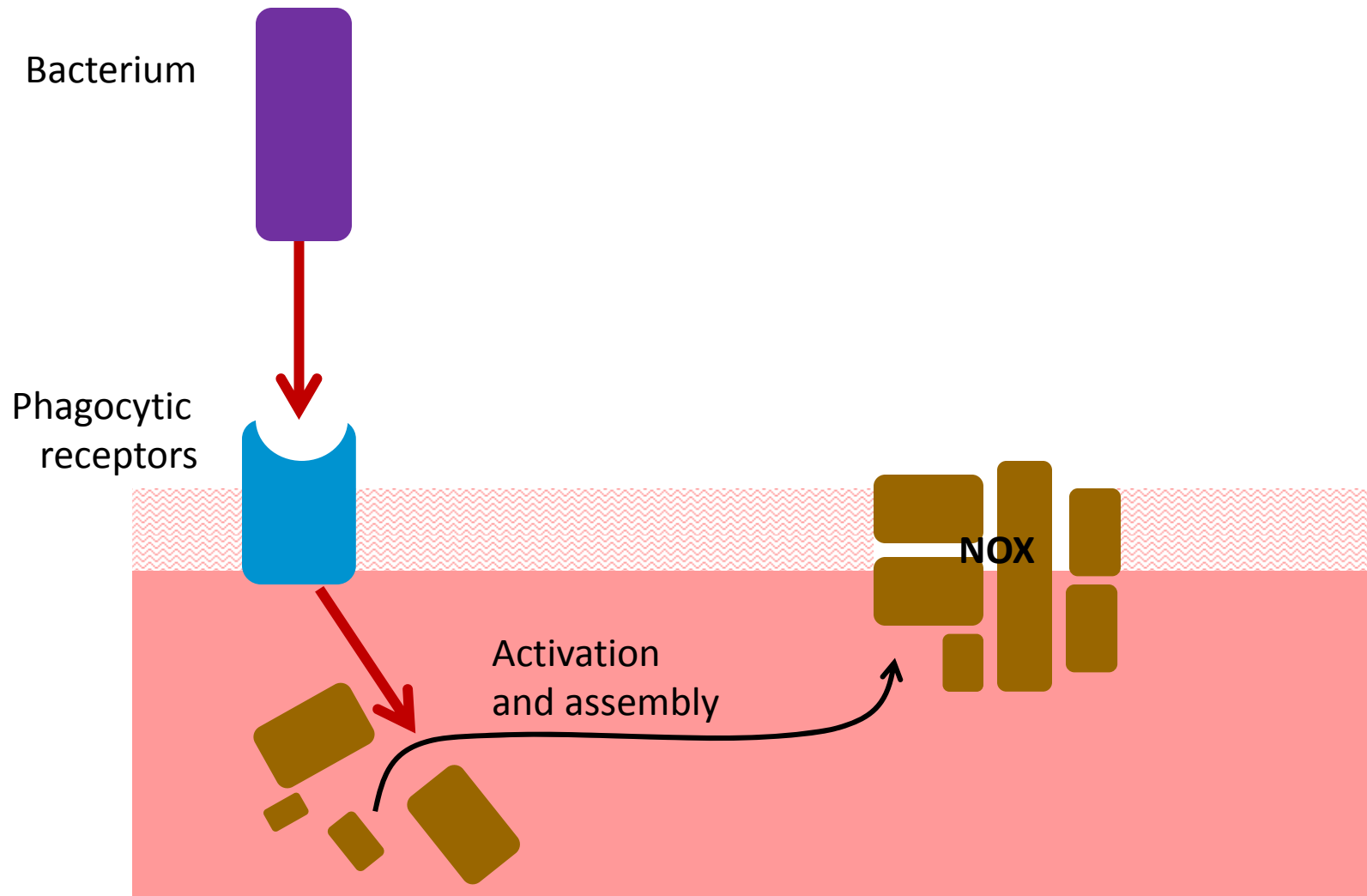
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# The Oxidative Burst

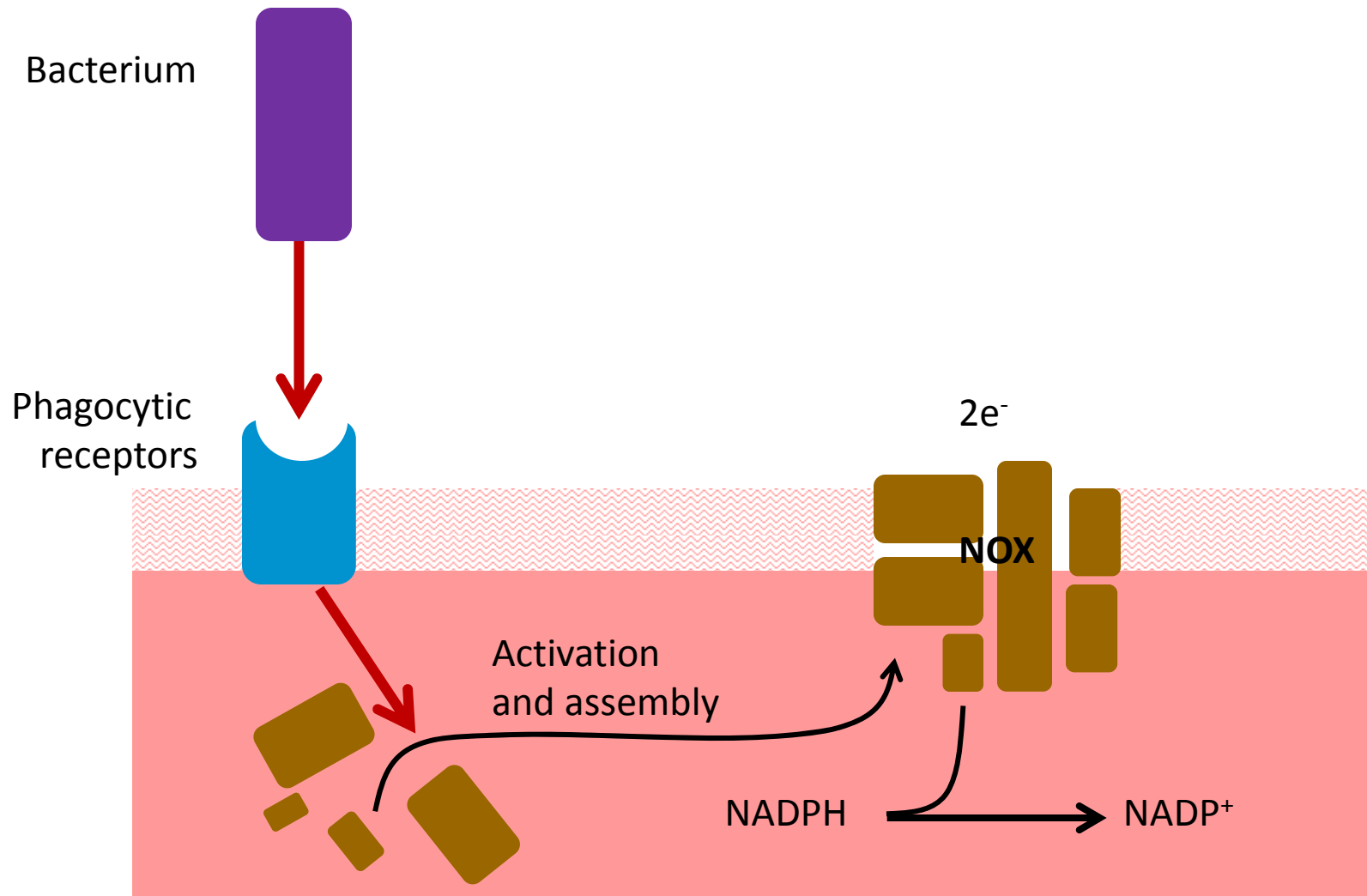


Adapted from Tizard Veterinary Immunology an Introduction 8<sup>th</sup> edition 2009 pg 35

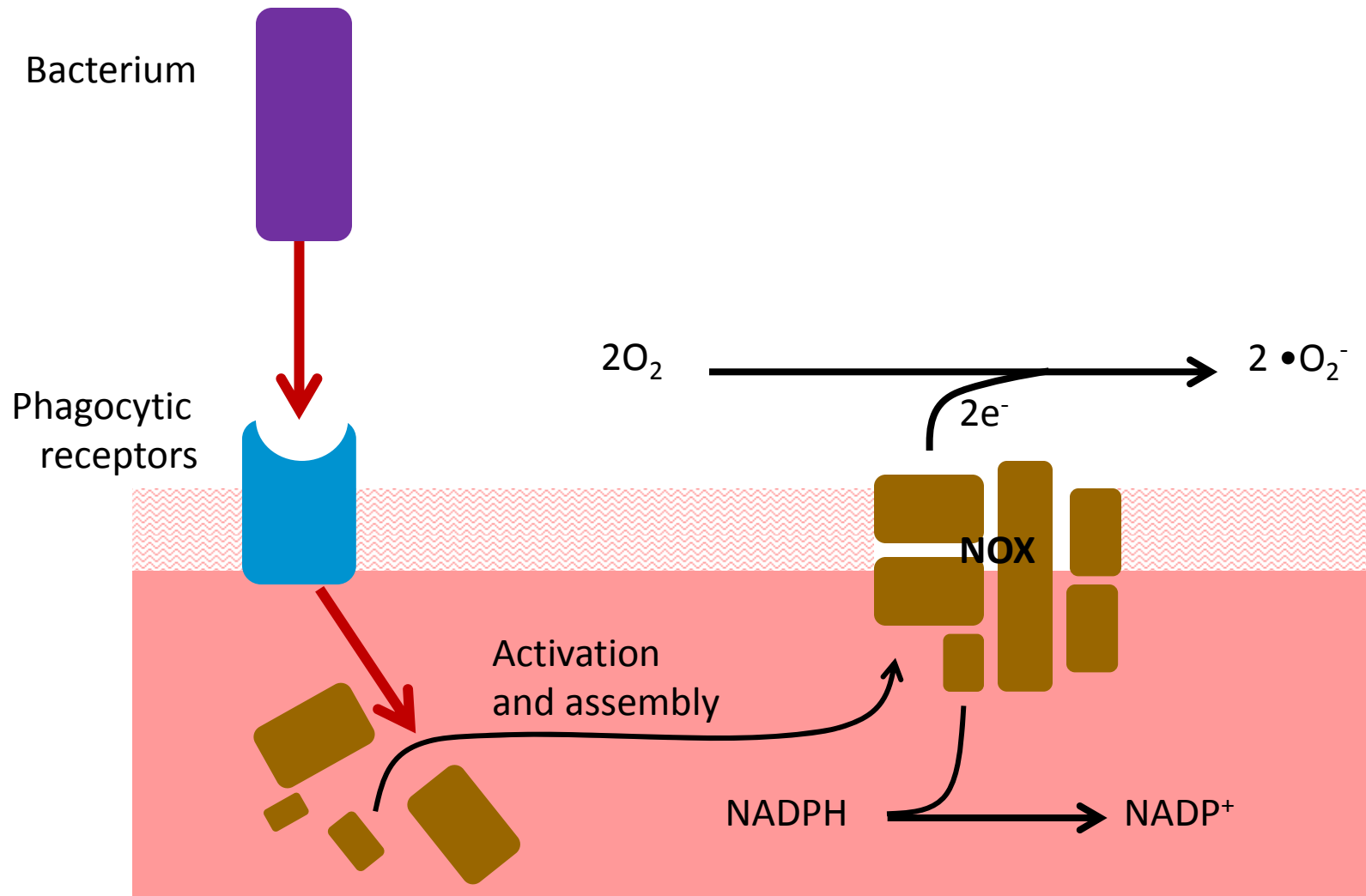
# The Oxidative Burst



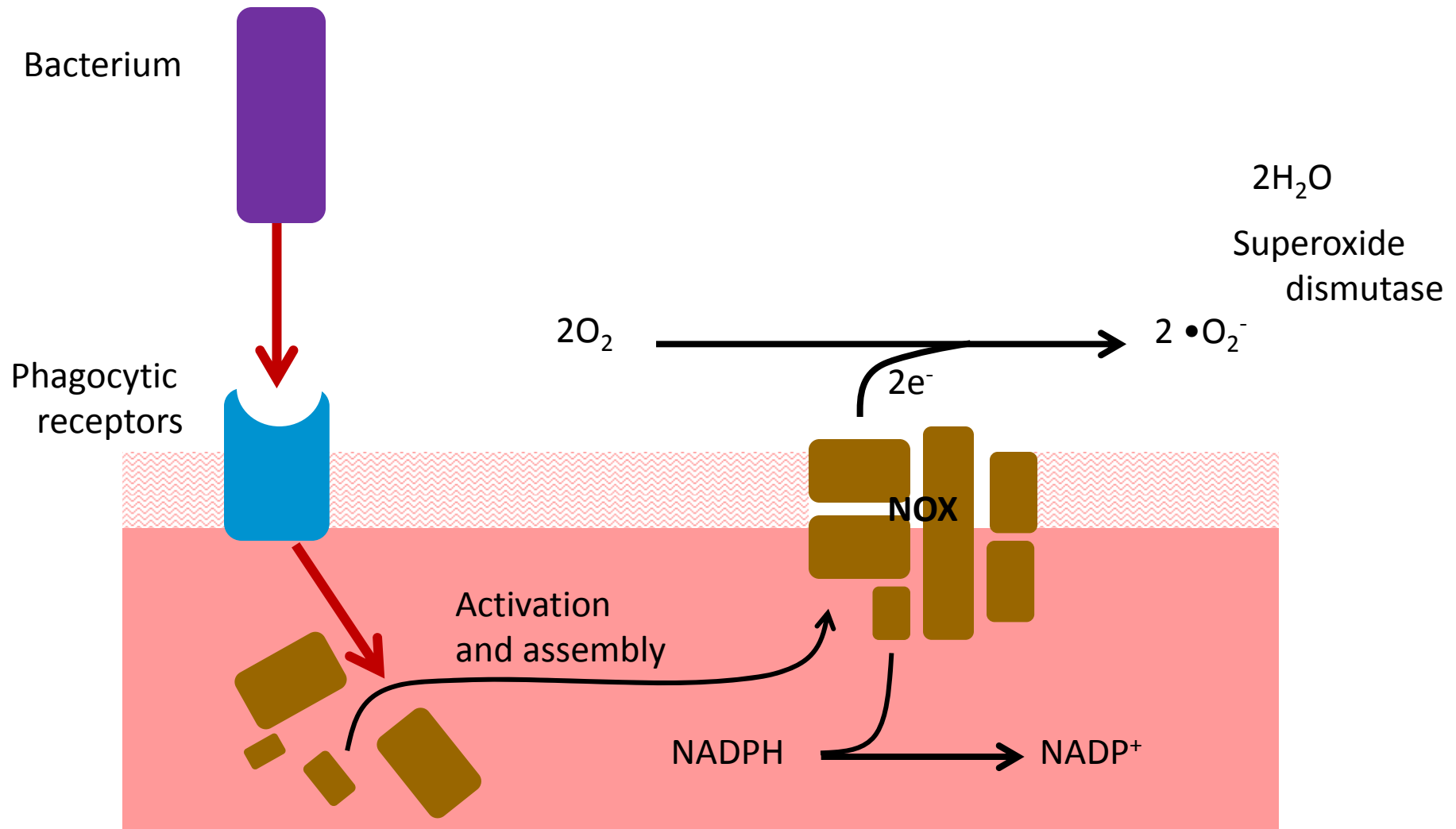
# The Oxidative Burst



# The Oxidative Burst

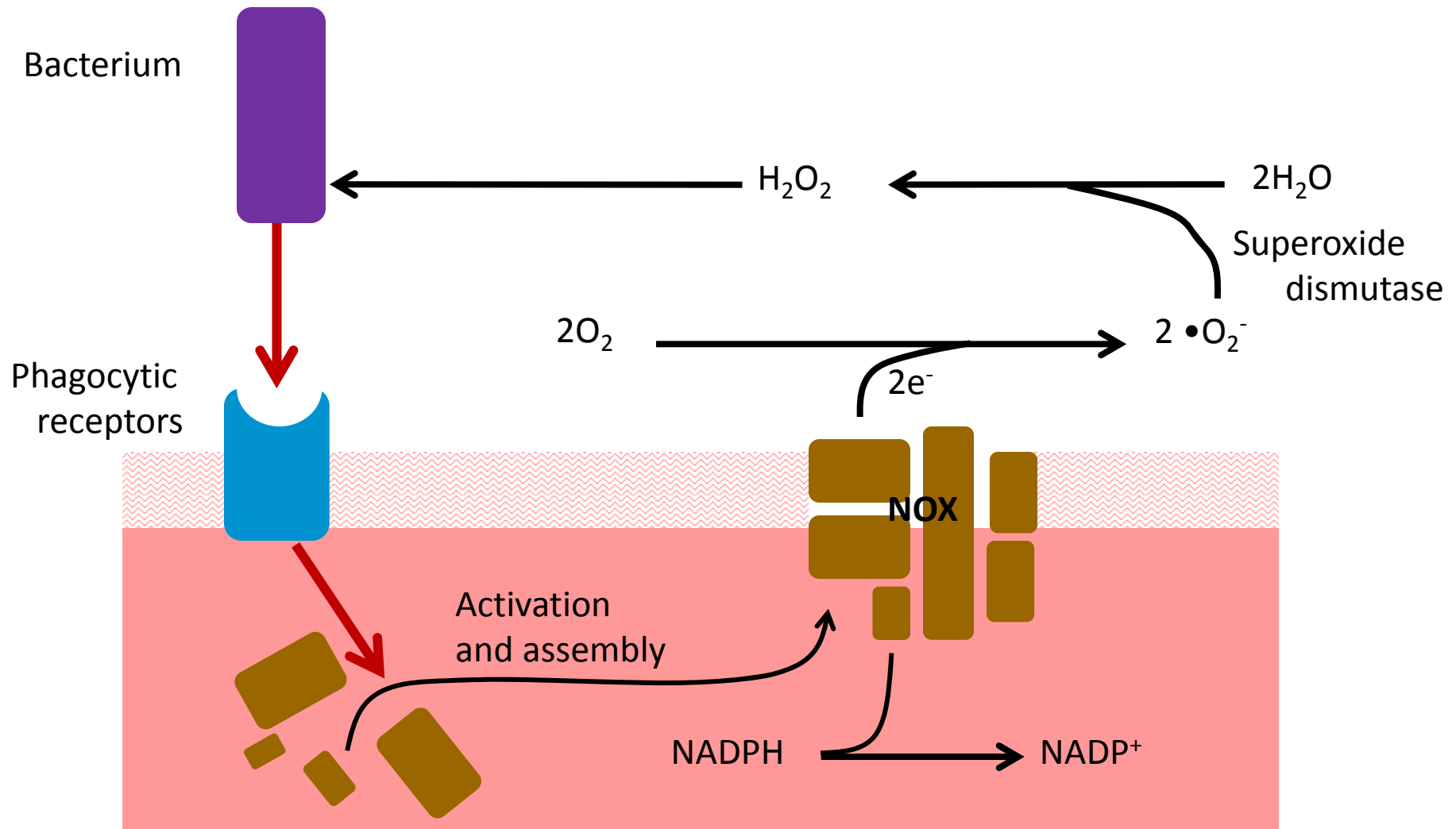


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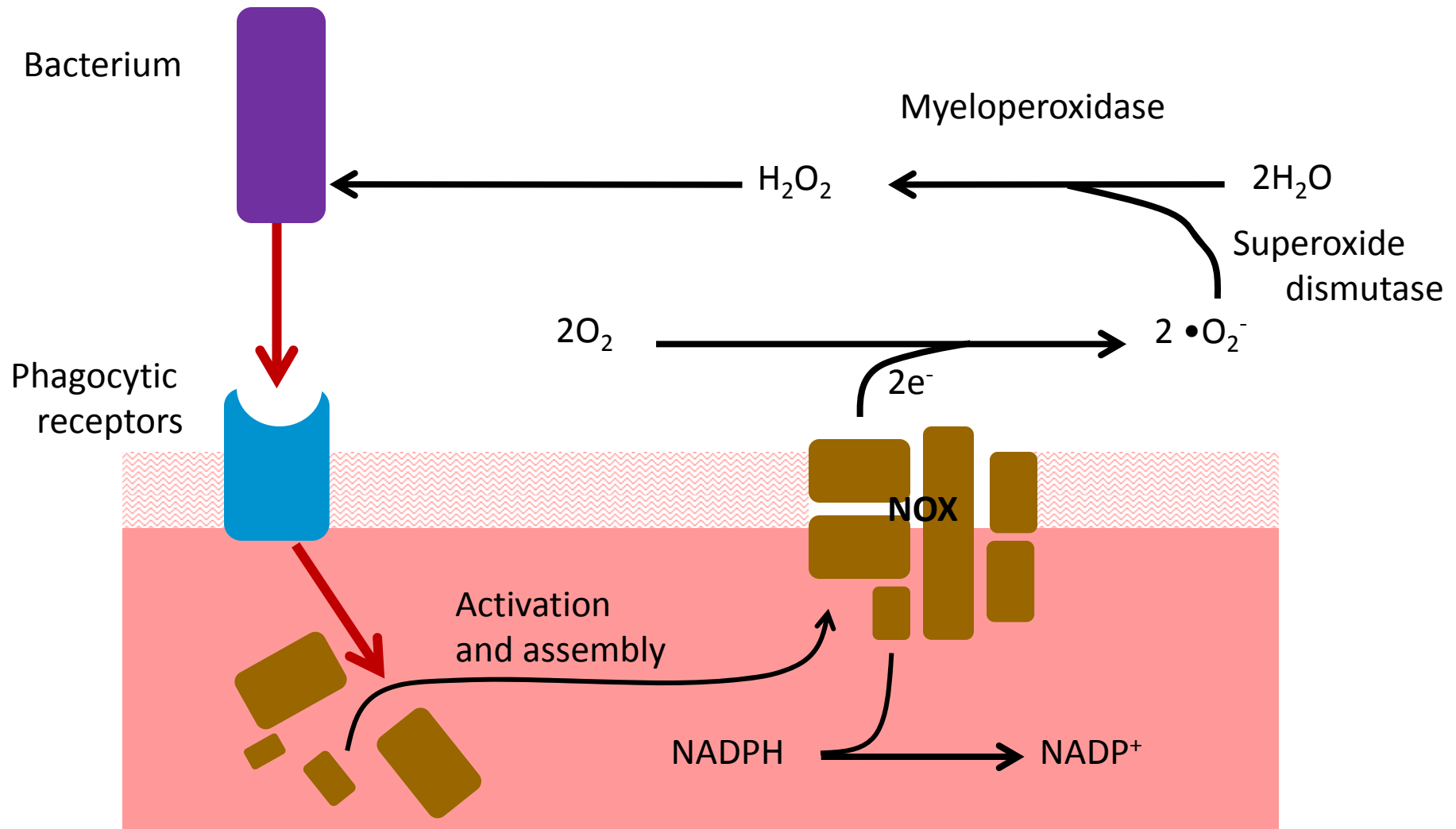




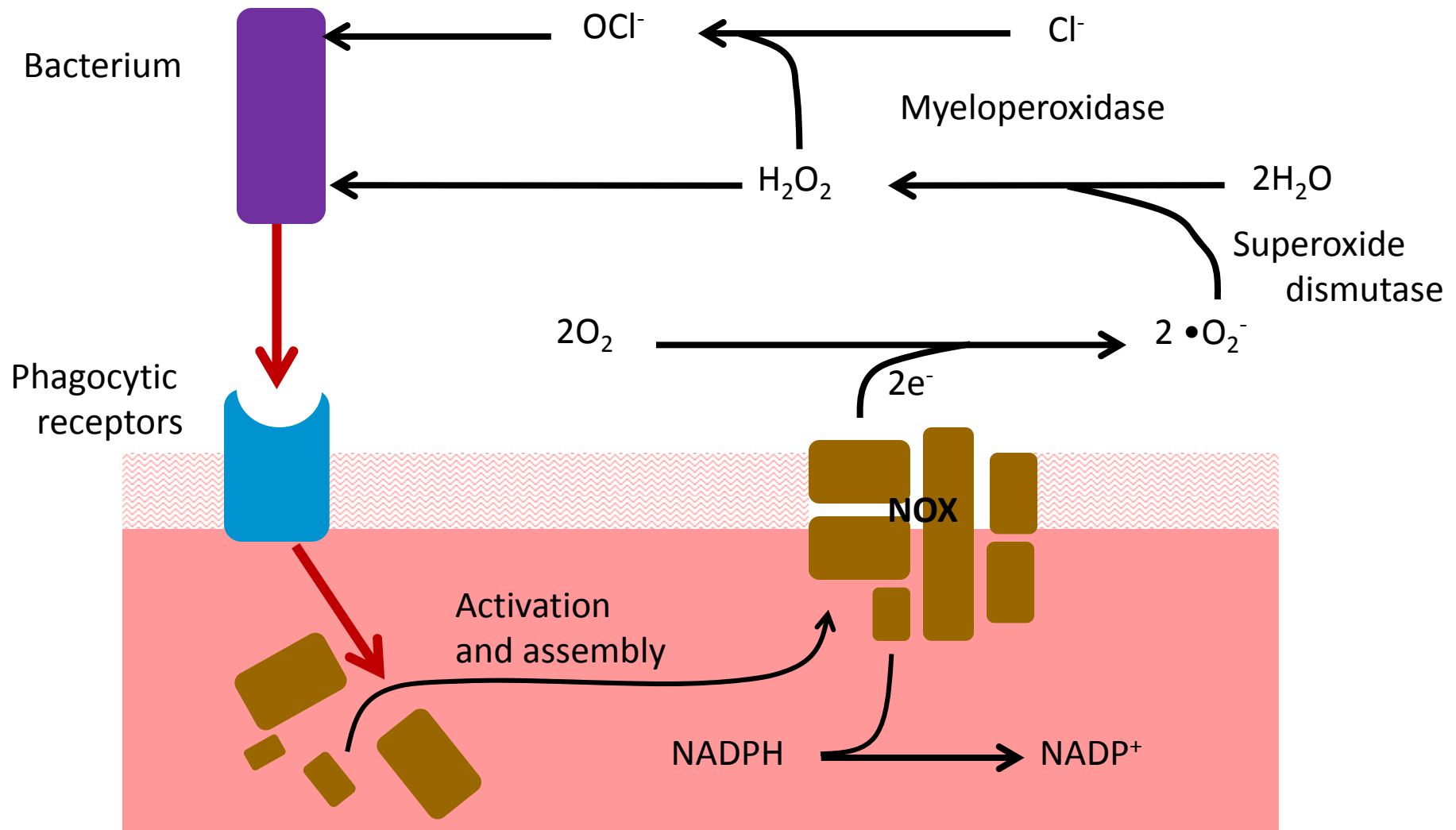
# The Oxidative Burst



# The Oxidative Burst




# The Oxidative Burst



# Neutrophil destruction of ingested bacteria

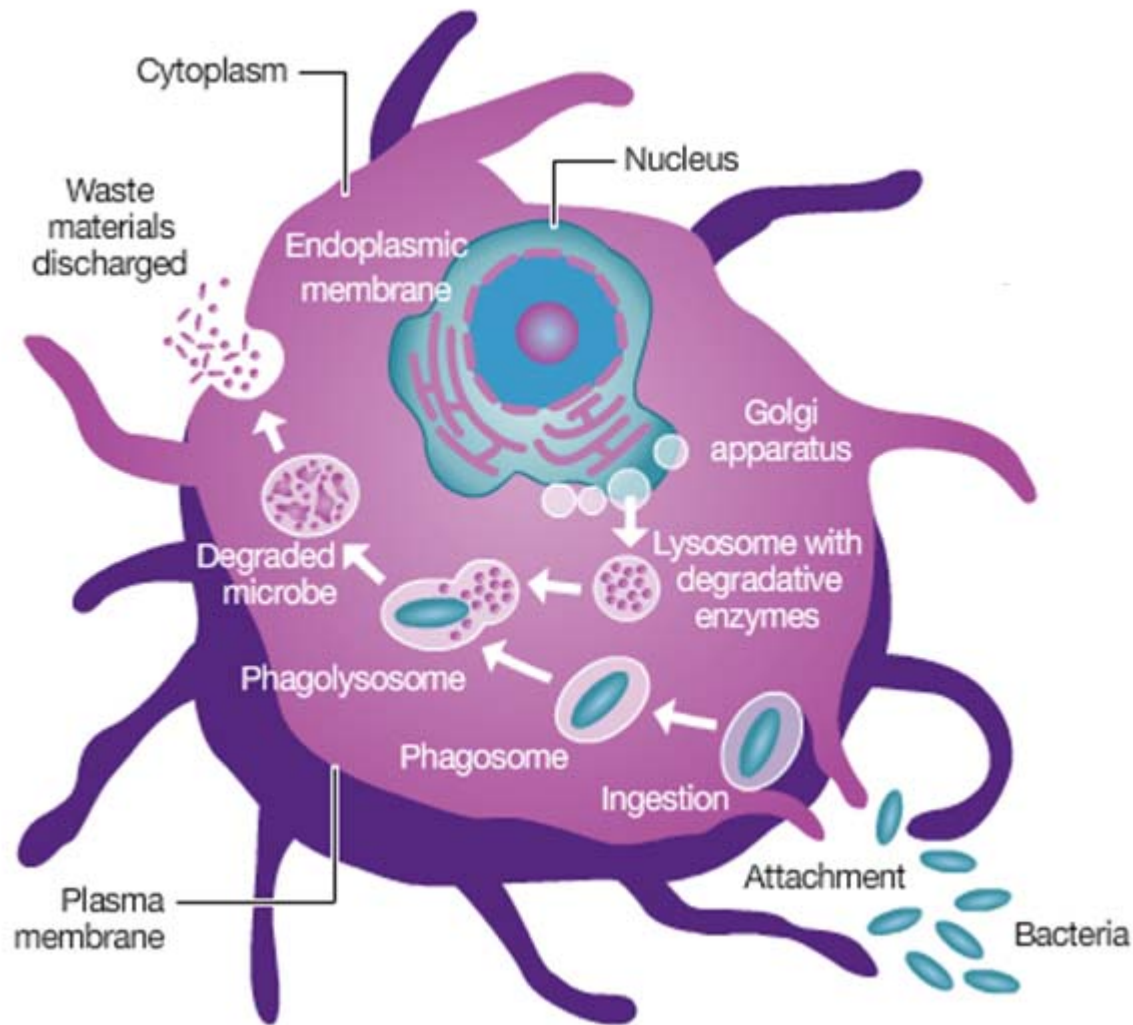
- In a process called the respiratory burst, neutrophils convert molecular oxygen to Reactive Oxygen Species - ROS
- $\text{H}_2\text{O}_2$  is a ROS
- When  $\text{H}_2\text{O}_2$  is combined with MPO and halide ions (eg  $\text{Cl}^-$ ) the reaction forms hypochlorite
- Hypochlorite is the major product of neutrophil oxidative metabolism and is a potent killing mechanism for the neutrophil

 — MPO-  $\text{H}_2\text{O}_2$  -Halide system

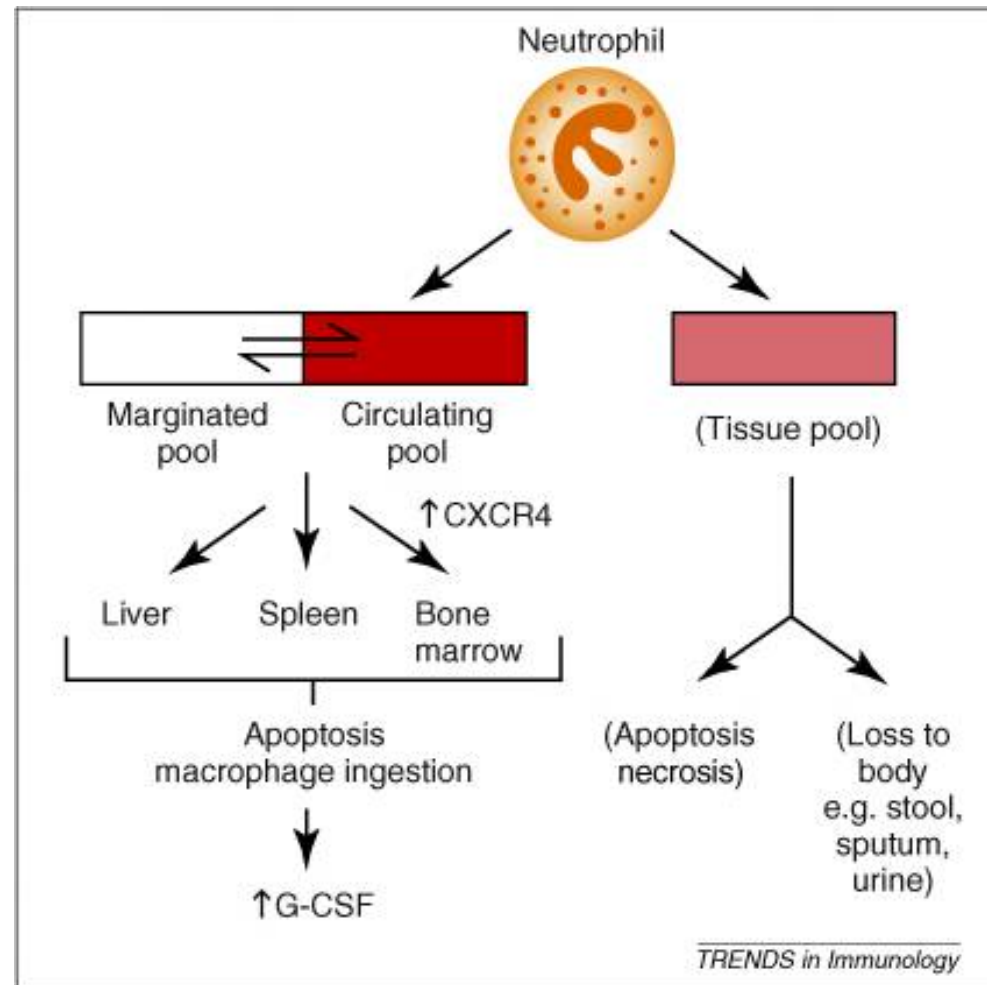
DAYS

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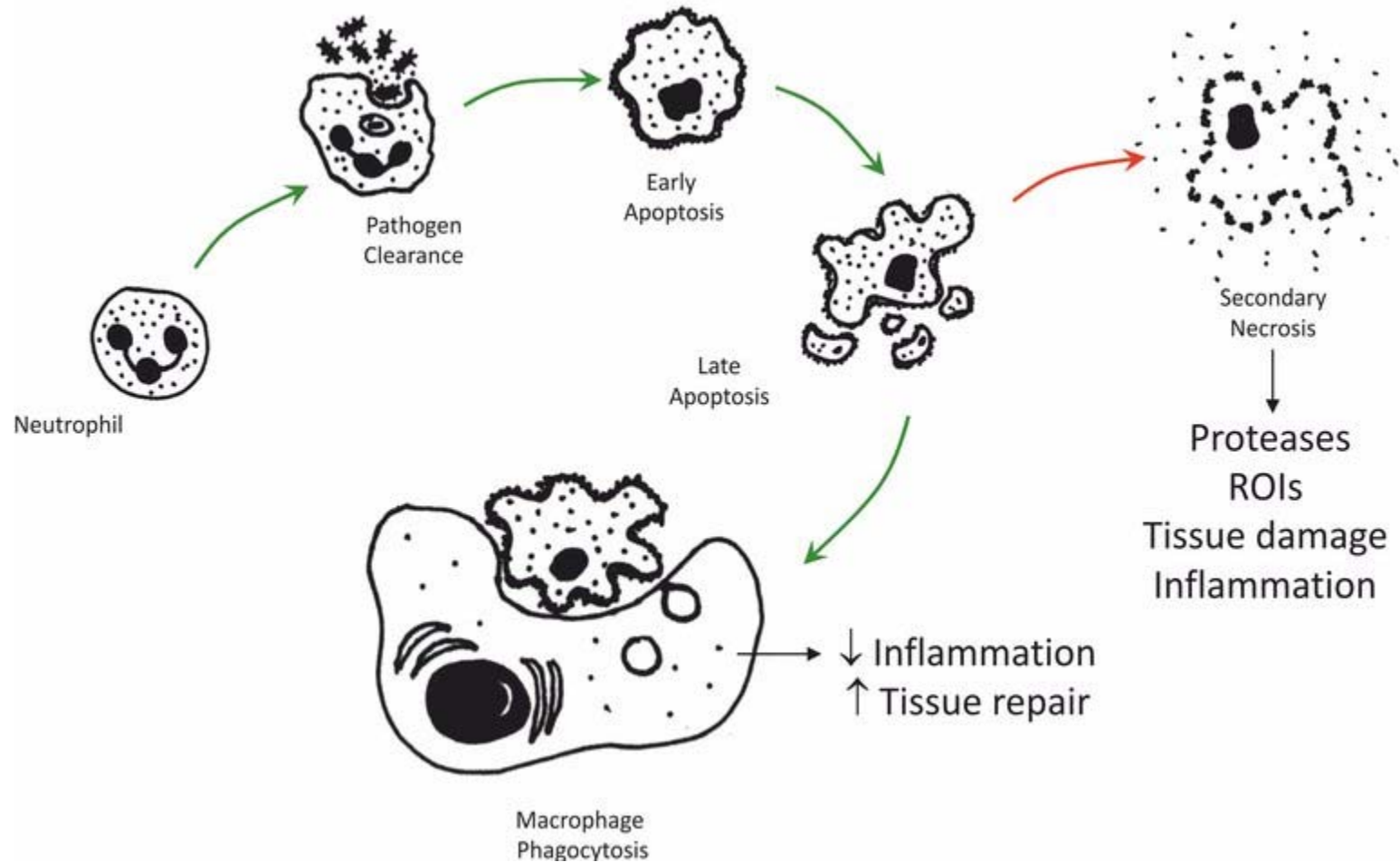
# Neutrophils: “The Professional Phagocyte”



# Neutrophil death and removal



# Neutrophil death and removal



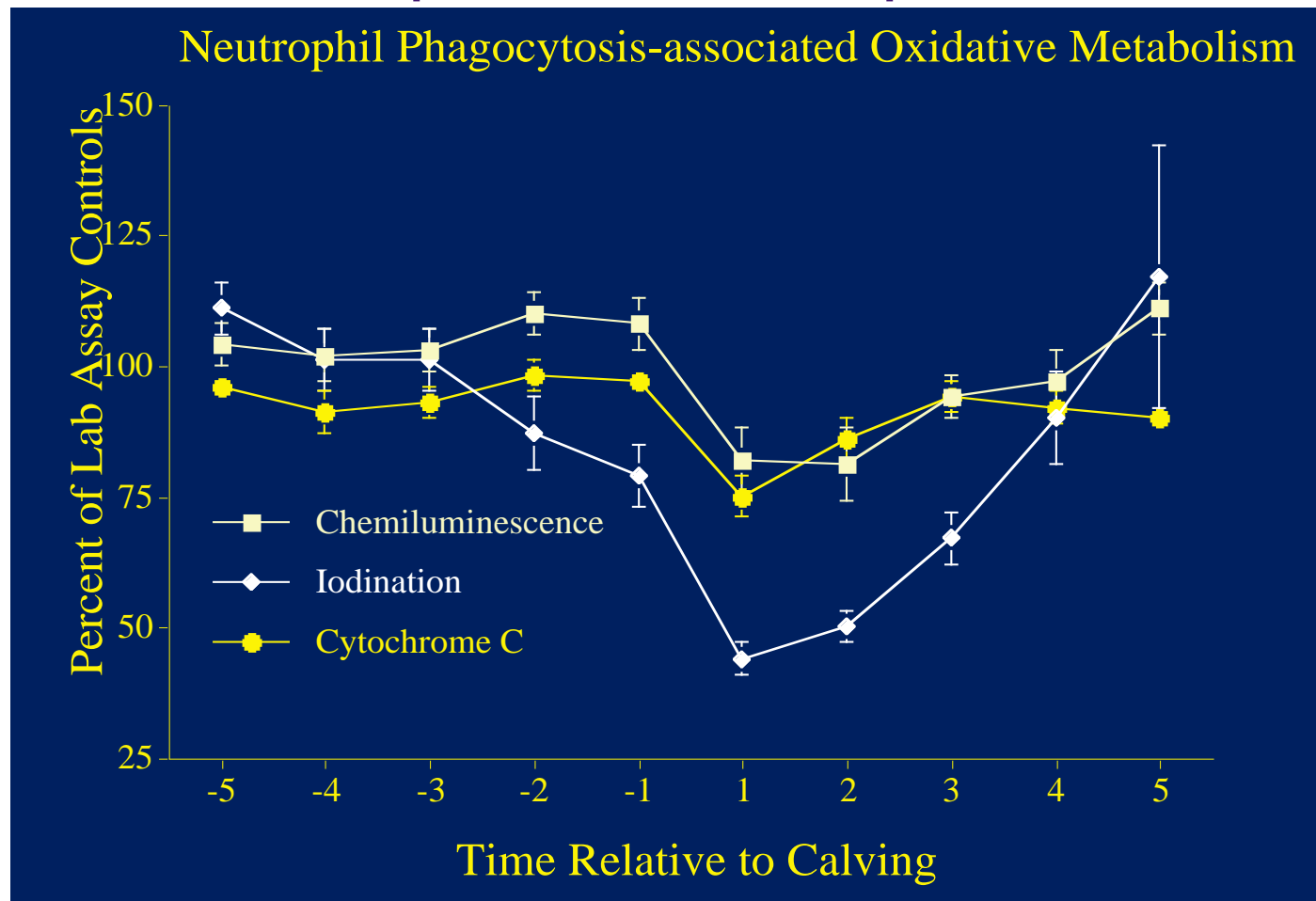


# Battery of Neutrophil assays

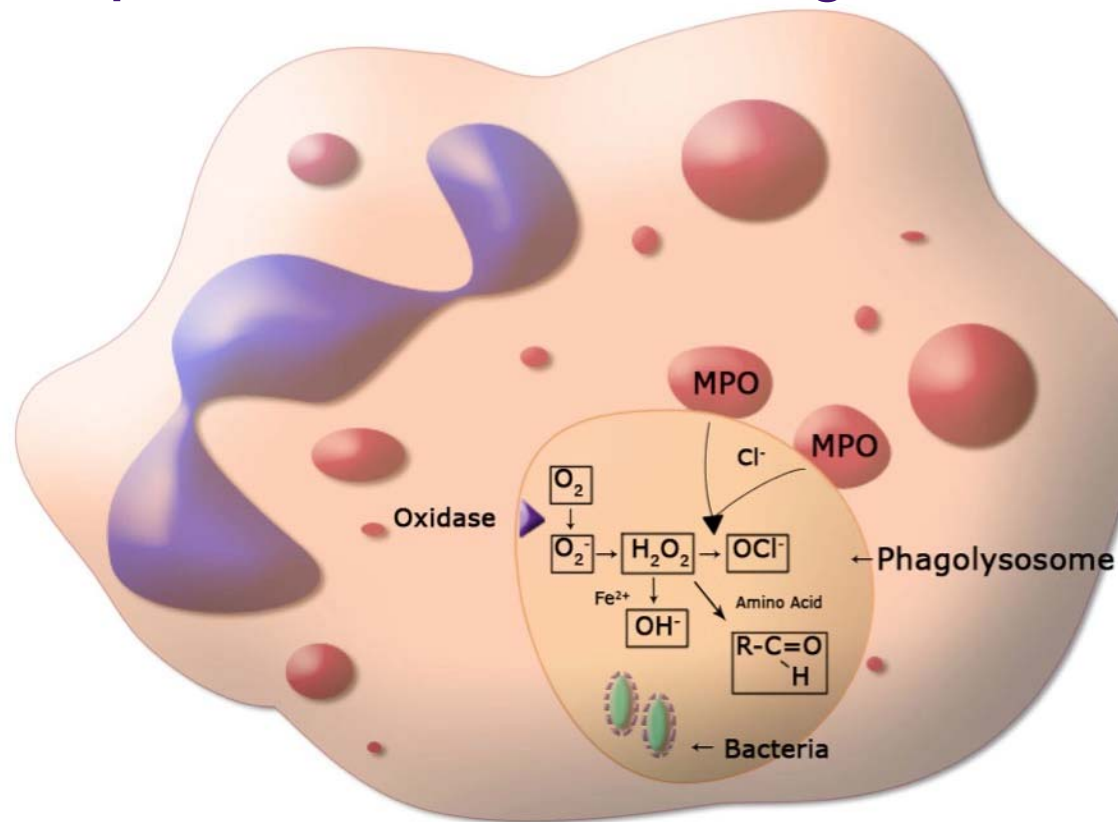
- Random Migration (adhesion)
- Chemotaxis
- Ingestion (phagocytosis)
- Oxidative burst
- Degranulation
- Antibody Dependent Cell-Mediated Cytotoxicity (ADCC)
- Release of NETs

# Periparturient Immune Suppression

## Parturition impact on neutrophil function



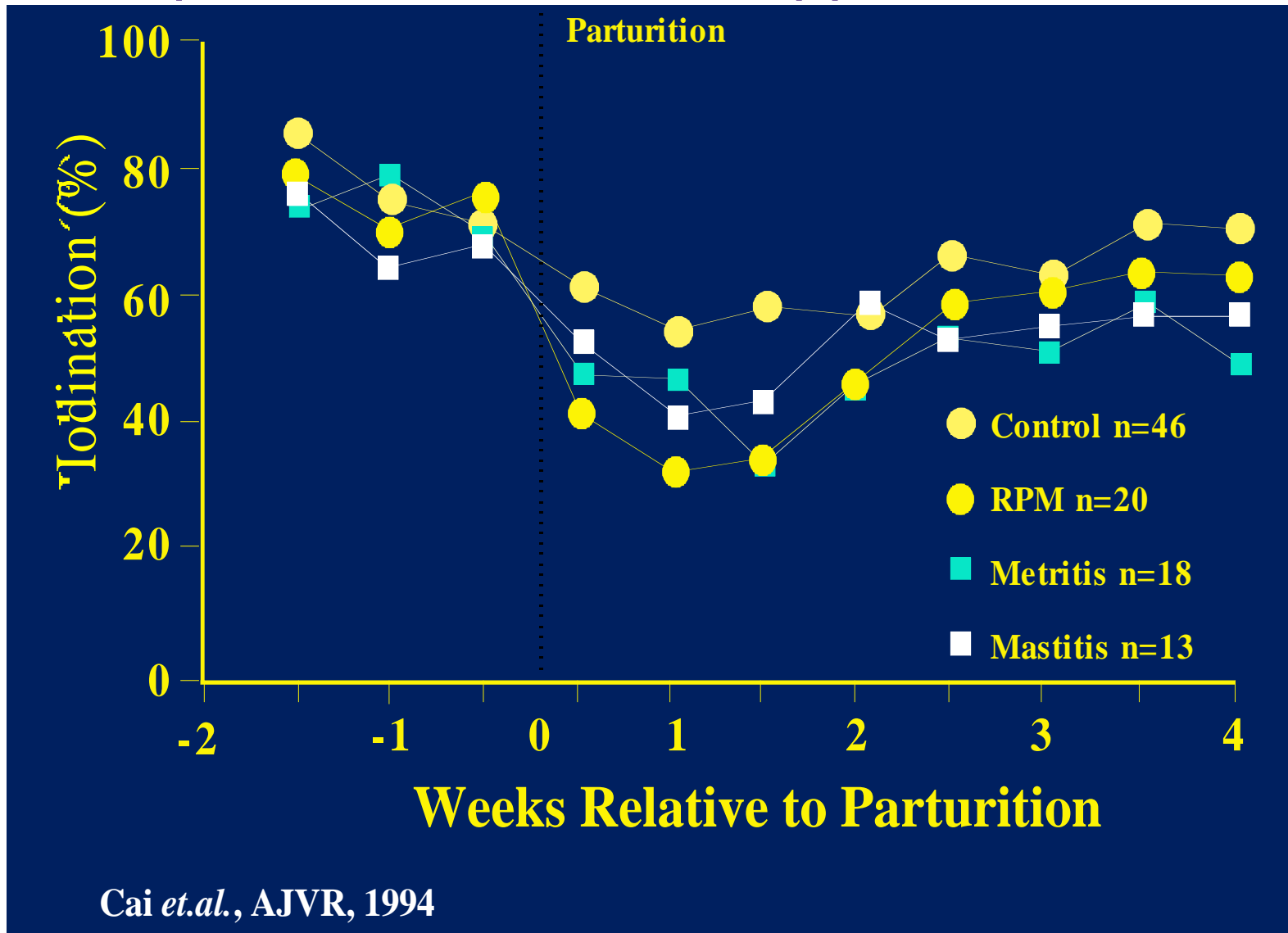
# Neutrophil destruction of ingested bacteria



$O_2^-$ = Superoxide Anion	$HOCl$ = Hypochlorous Acid	$R-C(=O)H$ = Aldehydes
$OH^\cdot$ = Hydroxyl Radical	MPO = Myeloperoxidase	

Ann Atterberry, College of Veterinary Medicine, Iowa State University, 2012

# Periparturient Immune Suppression



# Does milk production adversely affect immune function?

- Does milk production alone - regardless of level - alter immune function?
- Mastectomized cows used to address this question.
- They experience the hormone changes associated with calving but not the metabolic stress of lactation

Kimura, Kayoko, Jesse P. Goff, and Marcus E. Kehrli. "Effects of the presence of the mammary gland on expression of neutrophil adhesion molecules and myeloperoxidase activity in periparturient dairy cows." *Journal of dairy science* 82.11 (1999): 2385-2392.



DAYS

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Kimuara et al 1999

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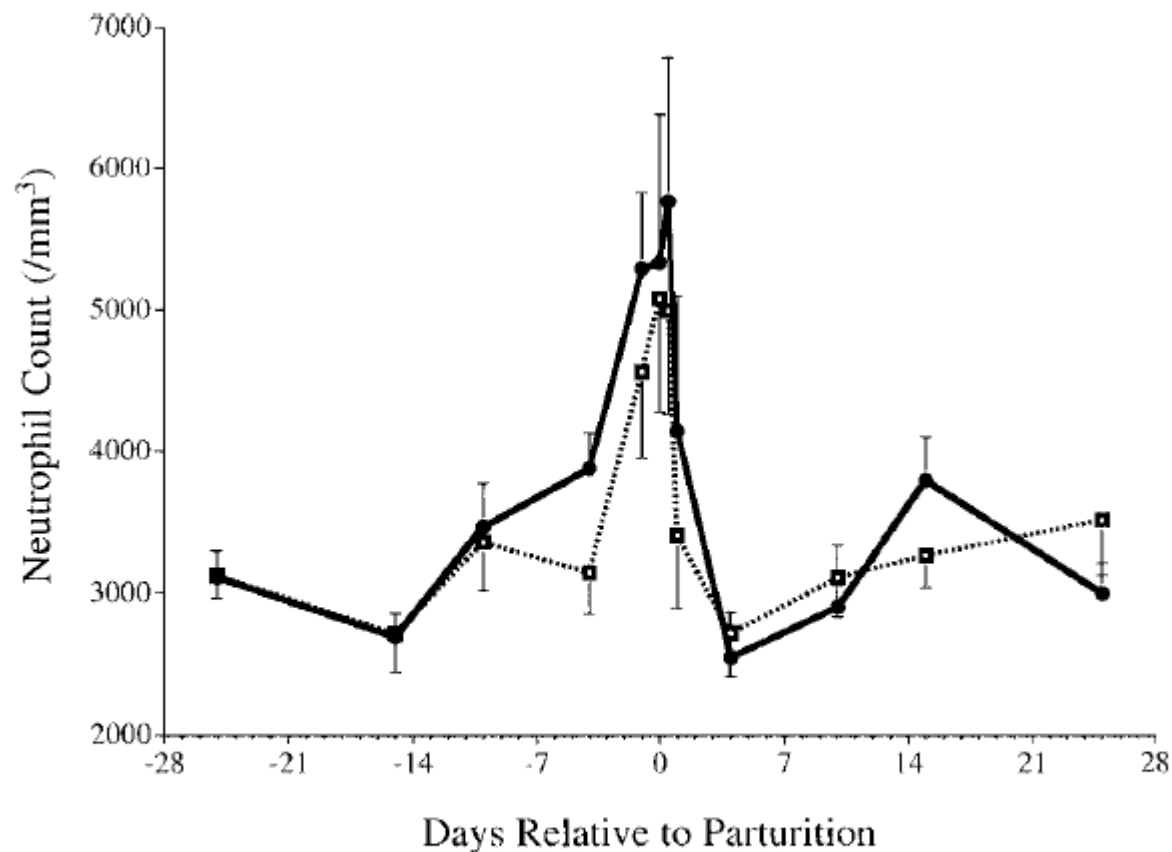


Figure 2. Mean and SEM of neutrophil count per cubic millimeter of whole blood from intact cows (n = 8; ●) and mastectomized cows (n = 10, □) during the periparturient period.

Kimuara et al 1999

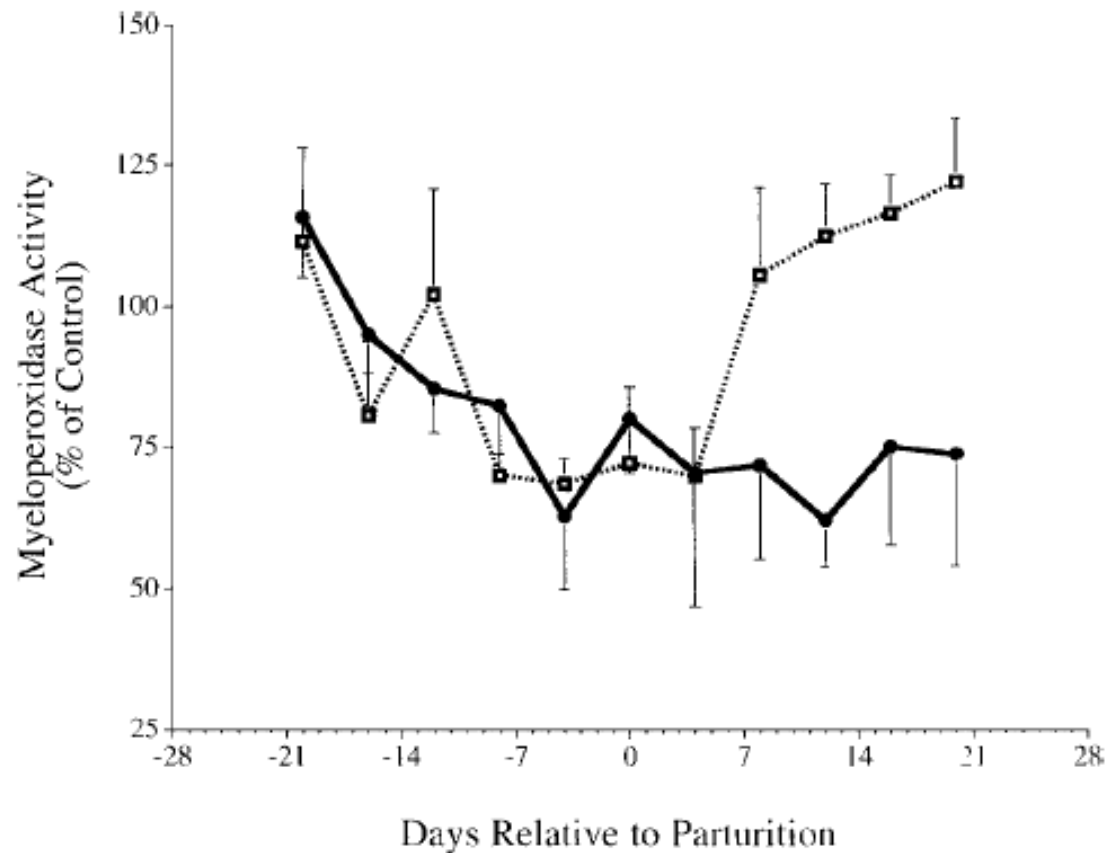


Figure 7. Mean and SEM of neutrophil myeloperoxidase activity in intact cows (n = 8; ●) and mastectomized cows (n = 10, □) during the periparturient period determined by amount of radioactive iodine incorporated in a trichloroacetic acid precipitate by neutrophils expressed as a percentage of myeloperoxidase activity of neutrophils obtained in heifers used as laboratory controls.

Kimuara et al 1999



# Does milk production adversely affect immune function?

- The elimination of milk production by mastectomy did not prevent the decline in neutrophil function at parturition
  - myeloperoxidase activity
  - down-regulation of L-selectin adhesion molecules
- The elimination of lactogenesis did allow rapid recovery of myeloperoxidase activity in neutrophils after calving

Kimura, Kayoko, Jesse P. Goff, and Marcus E. Kehrli. "Effects of the presence of the mammary gland on expression of neutrophil adhesion molecules and myeloperoxidase activity in periparturient dairy cows." *Journal of dairy science* 82.11 (1999): 2385-2392.



DAYS

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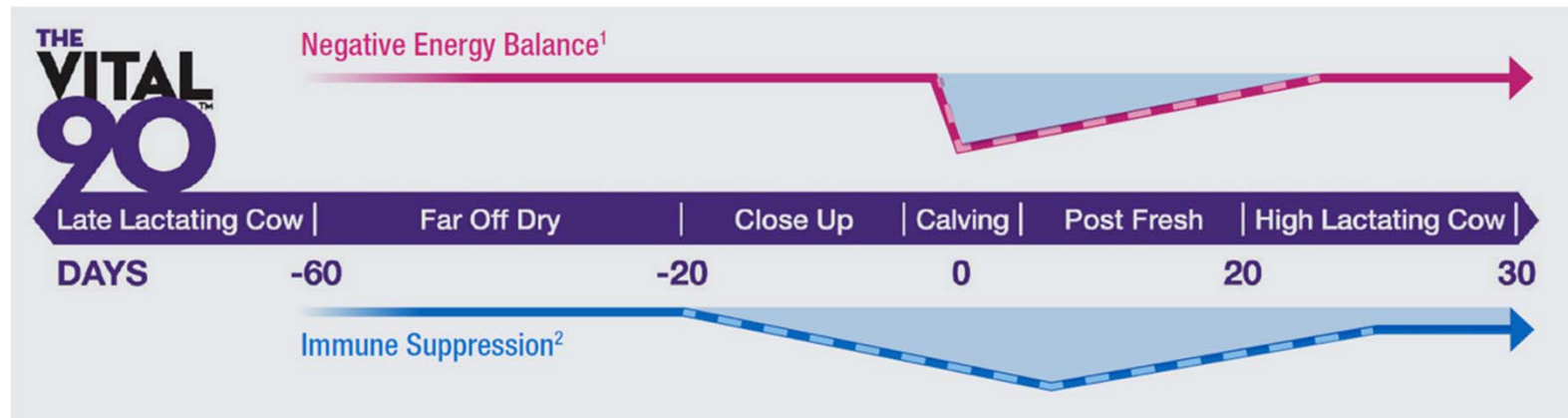
# Periparturient Immune Suppression Causes

- Cumulative effect of a multitude of factors
- Superimposed ↑ estrogen and progesterone levels
- Endorphins ↑
- Cortisol ↑ - not the sole contributor
- Negative energy & protein balance of the cow
- Genetic susceptibility
- Mother nature deliberately but transiently suppressing the immune system

# Periparturient Immune Suppression

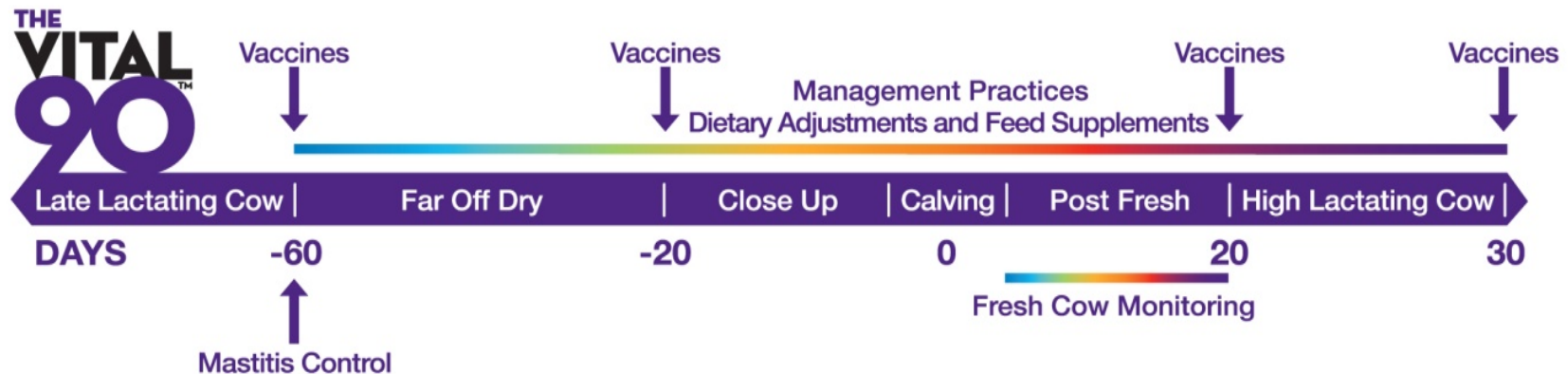
- Evidence
- Understanding
- Management Implications

# 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



- Taking action during the 60 days before calving and 30 days after helps protect the health and production potential of the entire herd
- **“Taking Action” = Making Investment Decisions = \$**

## Total Cost Per Calving Analysis





# Questions

THE  
**VITAL**  
**90**

DAYS

USDBUNON01660



## **The Vital 90<sup>TM</sup> Days and Why It's Important to a Successful Lactation**

David McClary DVM, MS, ACT; Paul Rapnicki DVM, MBA; Michael Overton DVM, MPVM  
Elanco Animal Health, Greenfield, IN

### **Transition and The Vital 90 Days**

The transition period for a dairy cow has traditionally been defined by the dairy industry as the period 3 weeks pre-calving to three weeks post-calving. An expanded period including the entire dry period, ie, 60 days pre-calving to 30 days post-calving, more completely encompasses the actual period when physiological and nutritional adjustments determine if a successful subsequent lactation will be achieved. For the purposes of this paper, this expanded period will be described as The Vital 90<sup>TM</sup> Days.

Numerous physiological and metabolic changes (ie, transitions) occur during the dry and early lactation periods in the dairy cow. These changes include:

- Cessation of milking at dry-off
- Changes in environment and ration composition
- Rapid fetal growth
- Decline in dry matter intake just prior to calving
- Initiation of colostrum production
- Hormonal changes, including declining progesterone and rising estrogen blood levels
- The process of giving birth
- Rapid increase in milk production

Along with physiological adjustments associated with transition, energy requirements essentially double overnight at the time of calving. Reynolds et al (1) showed liver glucose output doubling from 1356 gm/d 11 days pre-calving to 2760 gm/d 11 days post-calving. Those demands further increased to 3283 gm/d by 22 days post calving (Table 1). Besides the demand for additional glucose for early lactation, energy balance is further compromised by a decline in feed intake in the peripartum cow (2) (Figure 1).

Along with a glucose deficit, the periparturient cow also commonly suffers a deficit in available protein. Much of this body protein is being used to support fetal growth in late gestation and the amino acid and glucose requirements for early lactation milk production (3). Bell et al (4) demonstrated a significant negative metabolizable protein (MP) balance in cows during early lactation. During the first 7-10 days of lactation, high-producing dairy cows may mobilize as much as 1000 g tissue protein/d to satisfy the mammary gland's demand for amino acids and glucose. Bell concluded that a realistic estimate for MP requirements of a late-gestation cow was approximately 1000 g/d. Because of the significant decline in feed intake just prior to calving the suggested MP target for close-up dry cows is 1200 g/d (3,4).



The physiologic and metabolic changes occurring during transition also negatively affects immune function in the periparturient cow. Hoebe et al (5) demonstrated immune response, as measured by neutrophil respiratory burst activity, was significantly reduced in the days just prior to and immediately post-calving (Figure 2). If immune function is impaired or suppressed, the cow becomes more susceptible to a number of periparturient disease conditions, such as retained fetal membranes, metritis, and mastitis.

Immunity encompasses a number of complex interactions that are designed to protect the animal from infection by a number of microbial organisms. The immune system is characterized by two primary branches: acquired immunity and innate immunity. Acquired immunity refers to the portion of the immune system that is commonly associated with antibody generation. Immunity is developed in response to first exposure to an antigen (foreign protein), such as a microbial agent or a vaccine antigen. In fact, the term “antigen” is a combination of the words **antibody** and **generator**. The immune response can be cell mediated or humoral and usually requires days to weeks to completely develop. Acquired immunity is generally specific to the microbial agent and has “memory” or tolerance such that it specifically responds to repeat exposure to that agent. The primary defense cell associated with acquired immunity is the lymphocyte, the white blood cell involved in antibody production.

In contrast to acquired immunity, innate immunity is nonspecific and has no memory of prior exposures. However, the innate response to microbial exposure is extremely rapid and very consistent. The primary defense cells in the innate system are neutrophils and macrophages. They commonly destroy bacteria by phagocytosis, which involves engulfing and digesting an invading microbe. Macrophages commonly reside in specific tissues such as the mammary gland or lungs and serve as sentinel cells that send out warning signals in the form of cytokines at the first indication of infection. Neutrophils respond to these signals by migrating, in large numbers, from the blood stream to the site of infection. When immune function is impaired, as described in the transition cow, neutrophils demonstrate a reduced ability to destroy bacteria.

Endocrine changes and physiologic stressors during transition contribute to impaired immune responses, but not all stress-related neuroendocrine responses are immune suppressive. The catecholamine response to stressors is in fact one of the early innate responses to stress, and it is immune stimulatory. As a countermeasure, bacteria, within the host, release their own neuroendocrine hormones, potentially initiating and enhancing pathogenic processes (6).

Immune suppression during The Vital 90™ Days is multifactorial and can be related to hypocalcemia, elevated blood glucocorticoids levels, insufficient energy (hypoglycemia), and elevated ketones (ketosis) and elevated blood non-esterified fatty acids (NEFA) levels. Adequate nutrition, a clean environment, and strategic immunization are key components in restoring normal immune function and disease resistance in the periparturient period.

Negative energy balance is a normal physiological phenomenon in the early postpartum dairy cow and numerous other mammals. The primary concerns are the degree (depth) of negative balance and the cow’s ability to adapt (duration), thus minimizing the length of time before

returning to a positive balance. Successful lactations are dependent on how well energy balance is managed and immune function maintained during transition from pregnancy to lactation. Setting the cow up for a successful transition begins in the dry period, well before the initiation of the next lactation.

### **Periparturient Disease Conditions and The Vital 90 Days**

Disease conditions that occur in the first 30 days of lactation often result from physiological changes and management decisions made during the prior 60 days. These diseases can generally be divided into those associated with negative energy balance or immune suppression. Common peripartum disease conditions associated with immune suppression include retained placenta, metritis, and mastitis. Those associated with excessive negative energy balance include: displaced abomasum, ketosis, and ovarian dysfunction (cystic ovarian disease or prolonged anestrus) (Figure 3).

Calcium can play a role in both categories of periparturient disease complexes. Cows experiencing clinical or subclinical hypocalcemia have impaired muscle function, GI stasis, and reduced appetite increasing the risk of a metabolic disease problem. Erb, et al(12) showed an association between hypocalcemia and an increase in the chances for a metabolic disease condition, including displaced abomasum.

Calcium also plays a critical role in immune function in the periparturient dairy cow. Intracellular Ca is an important component in early immune cell activation (13). Activation of immune cells, such as circulating monocytes, is dependent on adequate concentrations of intracellular Ca. Reduced intracellular calcium stores negatively affect immune cells' response following an activating stimulus, thus contributing to the immune suppression seen in these animals. Periparturient hypocalcemia, with a corresponding decrease in monocyte intracellular Ca, results in immune suppression increasing the likelihood of periparturient disease such as mastitis. A New York study (14) involving 2190 cows demonstrated a very strong association between parturient hypocalcemia (milk fever) and mastitis. The odds ratio suggested that a milk fever cow was 8.1 times more likely to develop mastitis than a cow with normal blood Ca levels.

Lowered circulating Ca can itself contribute to a stress response in periparturient cows. Plasma cortisol typically increases three- to fourfold at the initiation of parturition. In cows with subclinical hypocalcemia the increase in plasma cortisol may be five- to sevenfold. If a cow develops clinical hypocalcemia, plasma cortisol levels can increase ten- to fifteenfold compared to basal levels (15).

Research has shown the incidence of retained placenta (RP) may also be influenced by immune suppression. In a study comparing neutrophil function in cows with RP compared to those without, RP Kimura et al (10) demonstrated neutrophils isolated from blood of cows with RP had a significant reduction in neutrophil function compared to those that did not retain. This

impaired function continued for 1 to 2 weeks after parturition. Their work concluded that impaired neutrophil function played a major role in the likelihood of a cow suffering retained fetal membranes.

Periparturient diseases are often multiple entities. There are numerous interactions among the conditions associated with negative energy balance and immune suppression (Figure 4). The development of one disease condition often contributes to another such that conditions associated with negative energy balance contribute to an increased risk for conditions associated with immune suppression and vice versa.

### **Periparturient Disease Prevention and Recognition During The Vital 90 Days**

Dairy producers expend considerable time and financial resources in an attempt to assure the dairy cow has a successful dry period and transition into early lactation. The exact cost of these interventions are often not known, yet when asked to detail them dairy producers soon realize the investment during The Vital 90 Days can be substantial. Failure during this period leads to an increased incidence of disease and death loss. These failures place a significant negative burden on the operation.

Transition disease problems result in tangible and intangible consequences. The most obvious tangible consequence is financial loss. Beyond the tangible consequences there are also intangible or emotional consequences such as dealing with the stress and emotional frustration associated with higher morbidity and mortality in your client's herd. Furthermore, continually dealing with sick cows can negatively impact the morale of employees. Prevention of disease problems during The Vital 90 Days has the obvious tangible economic benefits but also intangible benefits of improved pride, confidence, and peace of mind.

The degree of success during transition has direct impact at both the cow and dairy level. Several key questions can be asked of dairy producers regarding recovery, future productivity, and/or disposition for cows experiencing any periparturient disease problems. These include:

- How many cows are in the sick pen, how long are they there, and how many make it out?
- How productive are the cows after a stay in the sick pen?
- Do all of your clients have an on-farm euthanasia protocol?
- What is the impact to the welfare of a cow if there is no euthanasia protocol?
- Do we have the medical interventions necessary to save every cow that develops a periparturient disease?

In addition, transition problems impact the dairy operation in general. When problems accumulate, frustration levels increase and profitability, and long term success of the operation suffer. Key questions that can be asked at the farm level include:

- What is a typical day like for a member of the hospital pen treatment crew?

- Do farms experience protocol drift? Why is this?
- Are veterinarians frustrated by some of the treatments they see being used outside of their control?
- With the widespread use of fresh cow monitoring programs (eg, daily temps for 10 to 14 days), has a client ever treated their way out of a transition disease problem?

A key component often lacking or deficient when analyzing the incidence and associated cost of disease is inadequate disease records or no records at all. Kelton et al (16) published recommendations on recording and calculating the incidence for eight clinically identifiable diseases of economic importance to the dairy industry. The diseases addressed were: milk fever, retained placenta, metritis, ketosis, left displaced abomasum, cystic ovarian disease, lameness, and clinical mastitis. This paper is commonly referenced when introducing guidelines and standards for the reporting of data related to the health of cattle. In addition to the eight conditions identified by Kelton, pneumonia should also be considered an economically important disease condition in some herds.

There continues to be a strong interest within the dairy industry in the recording and analysis of clinical disease data, with the goal of assisting dairy producers and their advisors in making impactful decisions.

Dairy producers and their advisors need to consider two broad categories of medical decisions:

1. Individual cow decisions
2. Herd health program decisions

Using on-farm records facilitates both categories of medical decisions and results in making a positive impact on both the individual cow and the dairy business operation. Having valuable information for making critical management decisions require accurate recording, and the ability to retrieve and analyze health records. Key components of this system are being able to:

- **Define** the conditions (diseases) to be tracked
- **Describe** the clinical signs of the disease
- **Detect and Monitor**
- **Decide (Individual Cow):** Record and Treat
  - Create standard protocols available for treatment options and recording
  - Utilize decision tools to choose specific protocol for a given case
- **Analyze** the available data

Accurate and complete dairy records start with consistent recording of health events. The basis for accurate recording is standardized definitions for common health conditions. The following list provides standardized disease definitions which, if used consistently, should improve the accuracy of disease detection, recording, and analysis. These diseases commonly occur during The Vital 90 Days:

**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.

**Ketosis (KETOSIS)**

- Ketosis is recognized when animals are identified with elevated ketone bodies in the blood ( $> 1200 \mu\text{mol/L}$ ), milk ( $> 100 \mu\text{mol/L}$ ), or urine in the absence of concurrent disease. The risk period for transition-related ketosis is usually the first 30 DIM, but testing is most commonly performed during weeks 1 and 2 after calving, when the risk is highest
- Clinical ketosis is a more severe form of ketosis where the cow shows clinical signs of decreased appetite, decreased milk production, or abnormal behavior in the absence of another concurrent disease
  - Primary clinical ketosis is clinical ketosis that occurs prior to or without any other concurrent disease
  - Secondary clinical ketosis is clinical ketosis that occurs in conjunction with another disease process

**Displaced Abomasum (DA)**

- Displaced abomasum (DA) is recognized when a ping is detected by thumping or tapping the cow's body wall while simultaneously listening with a stethoscope in the area between the 9<sup>th</sup> and 12<sup>th</sup> ribs above and below an imaginary line extending from the hip to the elbow on each side of the animal on the abdominal wall. DA can occur on either the right or left side

**Retained Placenta (RP)**

- Retained placenta is recognized when the fetal membranes (placenta) are still visible hanging from the cow's vulva 24 hours or more after calving

**Milk Fever (MF)**

- Clinical milk fever is identified if a cow of lactation 2 or more displays clinical signs that include muscle weakness, nervousness, muscle shaking, cold ears, and eventually the cow being unable to rise. This condition is caused by low blood calcium levels and usually occurs within 3 days of calving.

**Clinical Mastitis (MAST)**

- Clinical mastitis is recognized by visually observing abnormal milk from a quarter. Clinical mastitis can be classified as mild, moderate, or severe based on whether the cow shows any additional clinical signs beyond abnormal milk
  - Severity score of 1, or Mild mastitis: Abnormal milk only
  - Severity score of 2, or Moderate mastitis: Abnormal milk + inflammation of udder (eg, redness or swelling)
  - Severity score of 3, or Severe mastitis: Abnormal milk + inflammation of udder + sick cow (eg, depression, poor appetite)
- Note that clinical mastitis can occur both within The Vital 90 Days and at other points in the lactation

**Ovarian Dysfunction (OVDYSF)**

- Ovarian dysfunction is recognized when a cow is examined and determined to have ovarian problems that are causing abnormal patterns of heat expression (showing heat too often or not showing heat at all)
- While ovarian dysfunction can certainly impact the future reproductive performance, its definition is not a specific disease, and it typically is not diagnosed during The Vital 90 Days. In most cases it will not be tracked as an independent event

**Lameness (LAME)**

- Lameness is recognized when a cow is observed walking or standing abnormally due to a problem in the foot, leg or hip
- Note that lameness can occur both within The Vital 90 Days and at other points in the lactation

**Pneumonia (PNEU)**

- Pneumonia is recognized when a cow is observed with altered breathing patterns and/or respiratory sounds due to a respiratory infection. Most cases of pneumonia have a fever but some do not
- Note that pneumonia can occur both within The Vital 90 Days and at other points in the lactation

When a disease condition is accurately detected, an appropriate treatment decision can be made. An important role of on-farm management software should be to facilitate guiding the delivery of treatments to the correct cows and compliance to prescribed therapies. Transition disease event entry should be promoted by veterinarians, consultants, and farm managers because it facilitates the delivery of the proper treatments to the correct cows. Farm management must define the approved treatment protocols to be used working with their farm's Veterinarian of Record. The Veterinarian of Record is the responsible party for providing appropriate oversight of drug use on the farm operation. Written protocols should include a protocol name, medications used, and specific directions for use (including duration of therapy and any milk and/or meat withdrawal periods). The primary purpose of data entry is to capture the data needed to guide the implementation of approved treatment protocols. With the

supervision of the Veterinarian of Record, on-farm software can assist the animal care workers in delivering the highest quality medical and supportive care to the animals in their production unit.

Monitoring of disease consequences that occur during The Vital 90 Days can be utilized by the Veterinarian of Record, other consultants, and the farm management team to evaluate compliance to the approved herd strategy for the necessary medical treatment of clinical disease events when they occur. In addition, complementary reports related to transition disease incidence risk may be used to provide feedback to the management team about the herd health program strategy for managing negative energy balance and immune suppression during The Vital 90 Days.

## **Conclusion**

The intent of this paper was the review of numerous concepts related to the modern dairy cow during the transition from dry to early lactation. Transition is not a single event or period but rather a progression through a multitude of events over approximately a 90-day period, thus the phrase “The Vital 90 Days.” Veterinarians and other dairy consultants should work with the producer in developing herd specific strategies for cows in this important period.

Most metabolic and infectious diseases occurring during early lactation are directly or indirectly attributable events during The Vital 90 Days. Dairy producers spend considerable time, effort, and resources during this period, yet rarely do they quantify their total economic investment or the financial consequences of failure during this period. Besides the direct costs, there are also intangible consequences impacting them and their herd. The last concept addressed identifies a practical process for identifying, treating, and recording disease problems. Management decisions during the high-risk period are key drivers for a cow’s health, wellbeing, and success in the subsequent lactation. Focusing on The Vital 90 Days can lead to a higher likelihood for reduced frustrations, higher profitability, and long-term success in a dairy operation.

## References

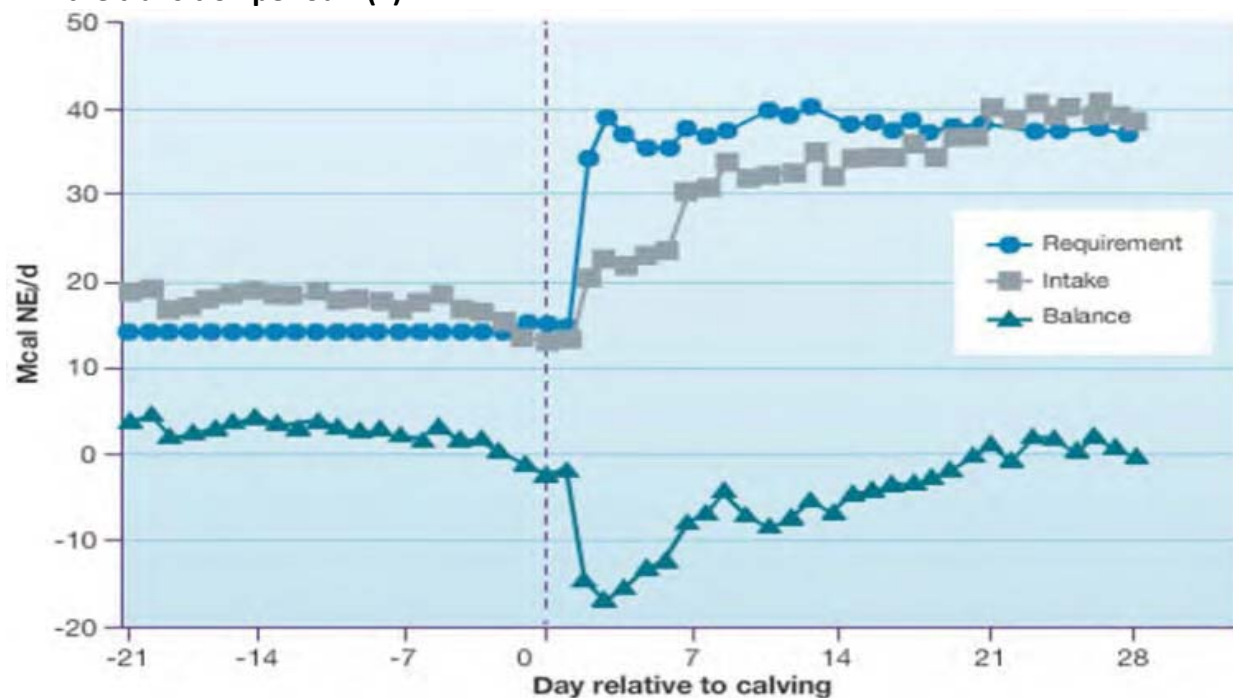
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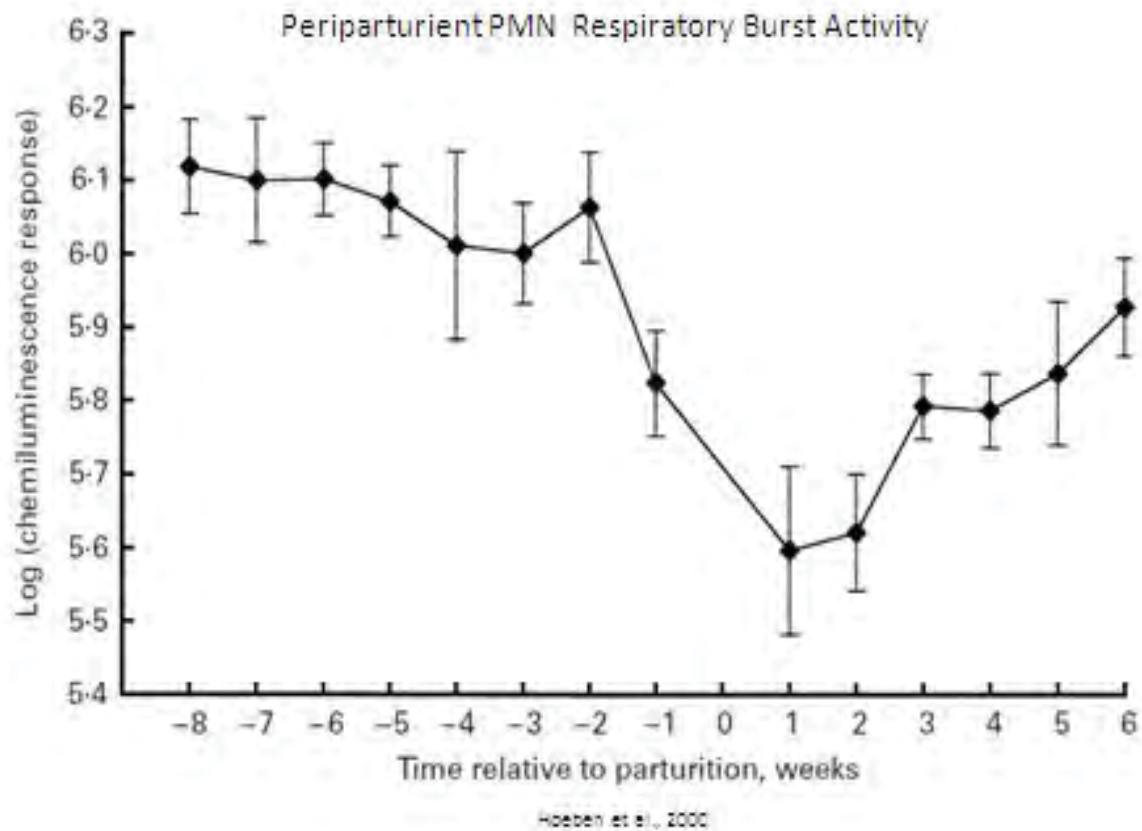
**Table 1. Energy Demand: Measured glucose supply vs. estimated demands.**  
(1)

Variable	Day relative to calving					
	-19	-11	11	22	33	83
DMI, kg	9.7	9.8	14.1	16.9	19.4	21.8
Milk, kg	....	....	36.3	41.9	44.0	41.0
Liver net glucose output, g/d	1257	1356	2760	3283	3499	3650

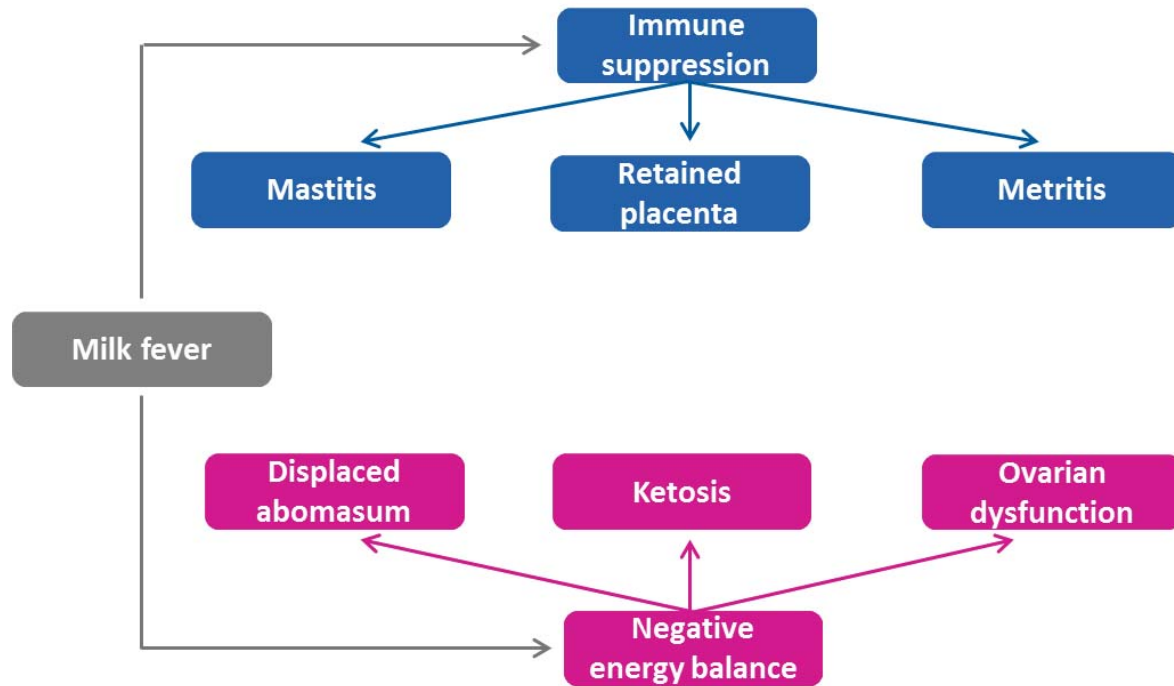
**Figure 1. Energy requirement, energy intake, and energy balance of control cows during the transition period.** (2)



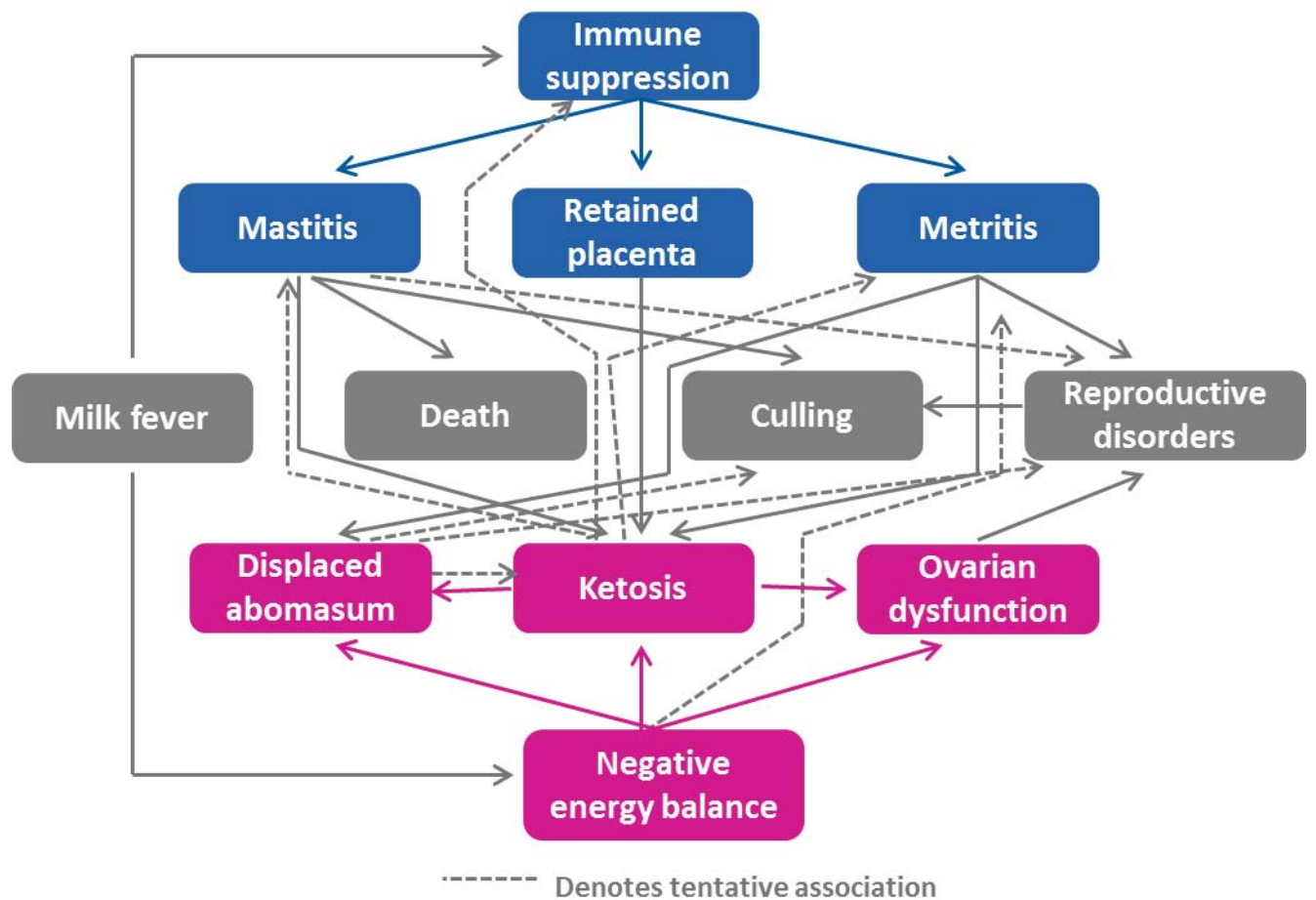
**Figure 2. Impaired neutrophil function associated with reduced PMN respiratory burst activity in the periparturient cow. (5)**



**Figure 3. Diseases related to immune suppression and energy balance in the transition dairy cow. (7-11)**



**Figure 4. Complex interactions among diseases associated with immune suppression and energy balance in the transition dairy cow. (7-11)**



Elanco, The Vital 90, and the diagonal bar are trademarks owned or licensed by Eli Lilly and Company, its subsidiaries, or affiliates.

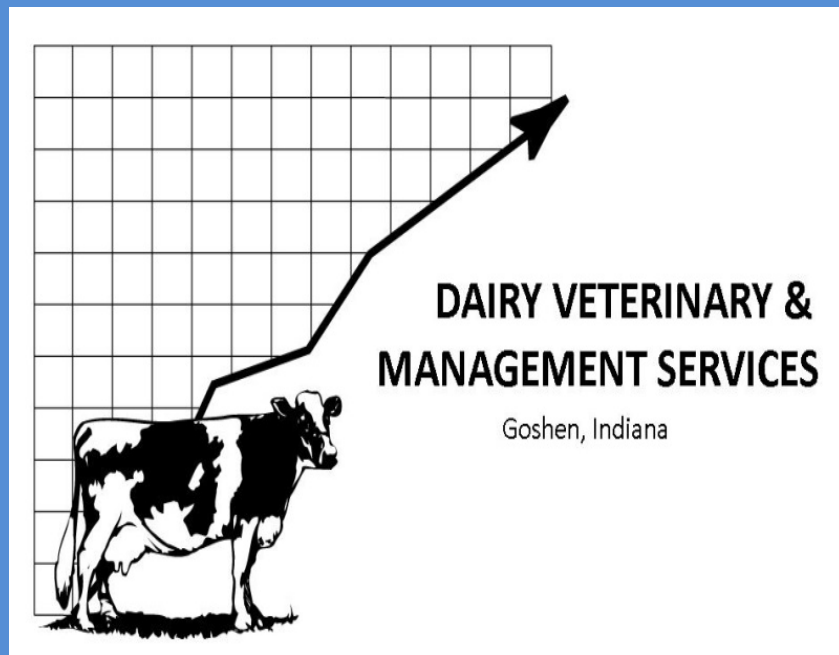
© 2014 Elanco Animal Health.

USDBUNON01205

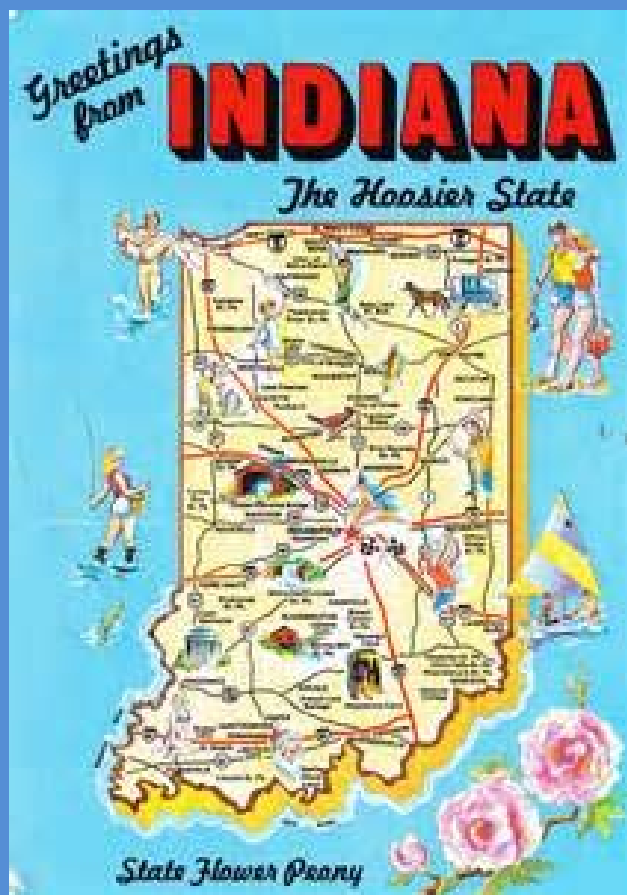
# Google Calendar in Dairy Practice

Shaw Perrin DVM

Dairy Veterinary & Management Services  
Goshen, IN







# Dairy Veterinary and Management Services

- Started in 1999
- 100% ambulatory, 97% dairy
- 6 full-time vets, 1 part-time, 4 share Oncall
- 4 Staff:
  - Office Manager
  - Assistant OM
  - Inventory Manager
  - Receptionist/Herd Data





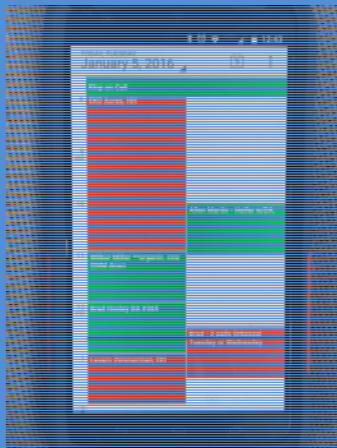




# Diversity Dairy of Clients











# Communication is Key

- In person
- Voice phone
- Paper/written

- Digital: smart phone/ computer

Clients



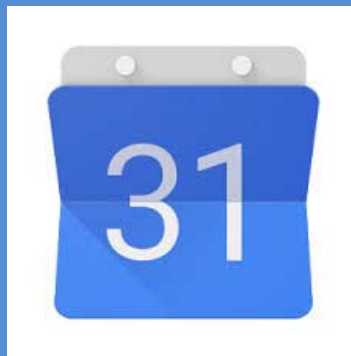
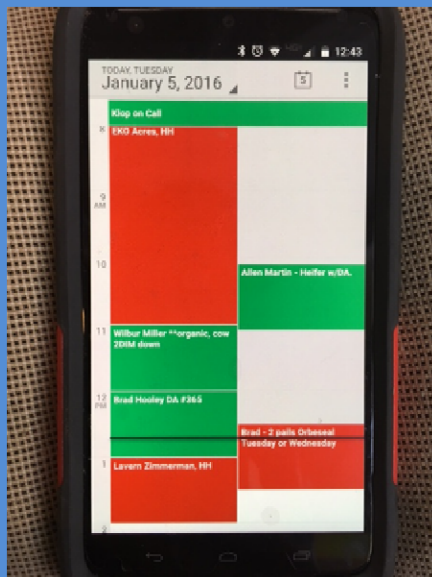
Vets

Staff



# Google Calendar

- We've used since 2010.
- Easy to use and free.
- Well liked by vets and staff.
- Schedule can be accessed and changed 24/7



# Google Calendar

- Basically a calendar on the internet
- Accessible from any computer or smart phone
- Android: download from Google Play
- iPhone: download from iTunes
- Create Calendar with Office Gmail address.
- Invite others with Gmail address



# Main advantages

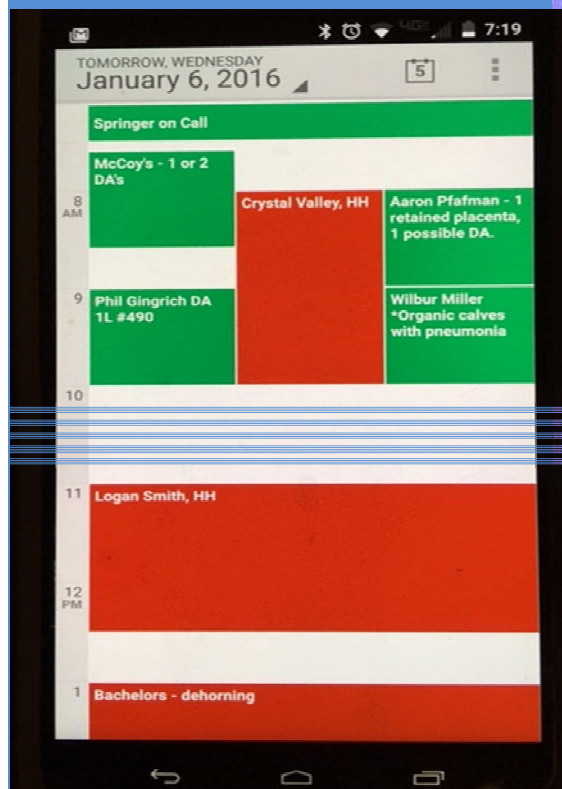
- Calendar accessible and changeable 24/7.
- Easier for vet to self-schedule.
- Changes communicated to all instantly.
- “Added info” —cow #, address, phone #, etc.
- Easier to plan long term.
- Less phone, but not less paper (for us)



[illegible]



# How to Use: Create and edit events.



https://calendar.google.com/calendar/render?tab=mc#eventpage\_6%7Ceid-dWdsaThqYzRpOXFmMGZxN2YwMXZ1MV

le Edit View Favorites Tools Help

dwd Forms and Downloads MWI Home Log In - LabResults.net GlobalvetLink Eastern Laboratory Service...

Google Search Calendar

← SAVE Discard changes Delete More Actions

**Aaron Pfafman - 1 retained placenta, 1 possible DA.**

1/6/2016 10:00am to 11:00am 1/6/2016 Time zone

☐ All day ☐ Repeat...

Event details

Where Sick Calls  
Bob Zell  
Brandon Yoder  
Dereck  
Doug  
Eldon Thomas  
Ross  
Shaw  
Change Owner...

Video call

Calendar

Created by dvmsgoshen@gmail.com

Description

Attachment Add attachment

Event color

Notifications No notifications set  
Add a notification

Show me as ☐ Available ☒ Busy

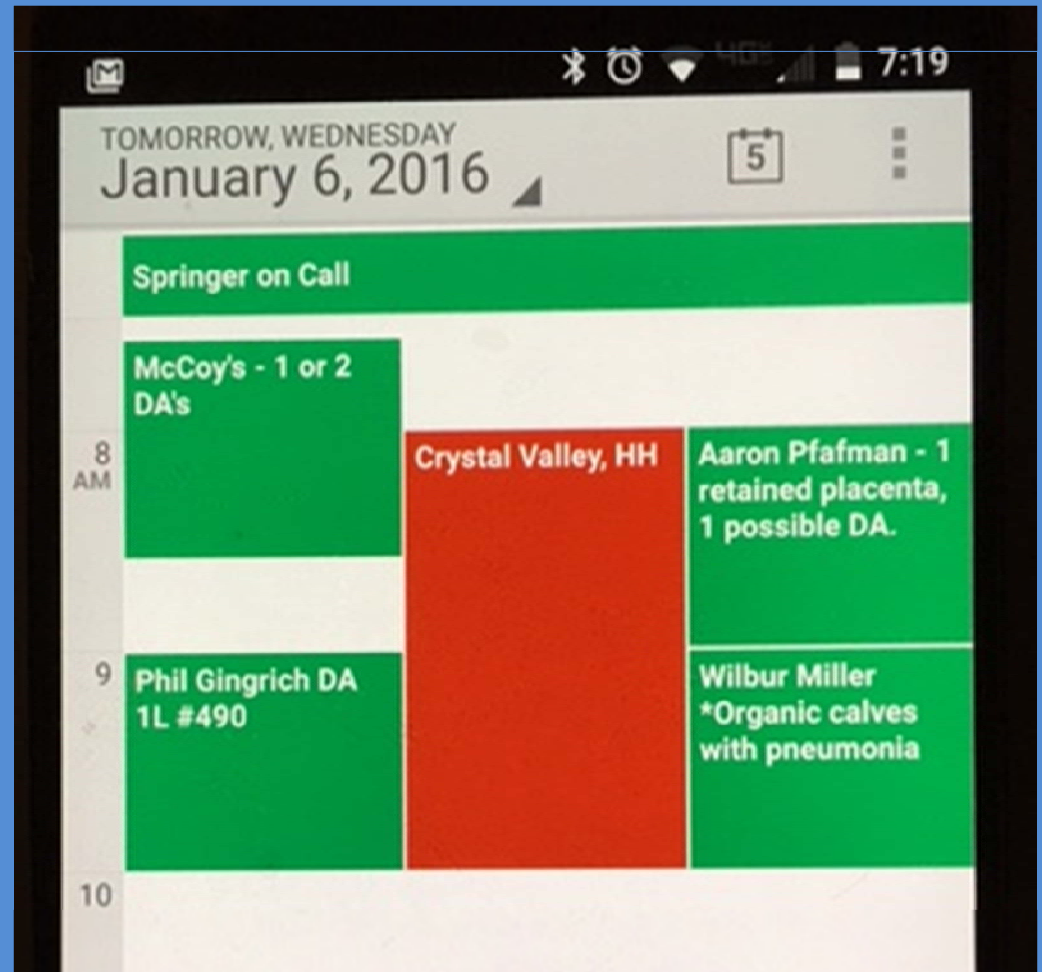
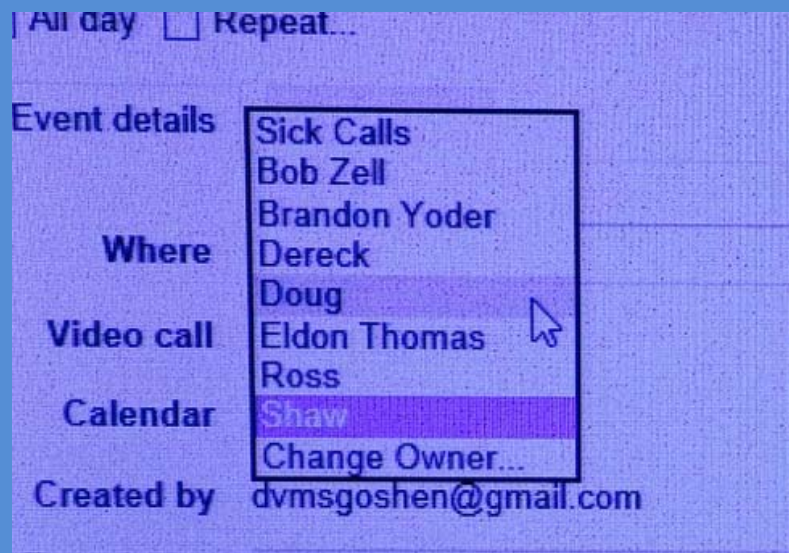
Visibility ☒ Calendar default ☐ Public ☐ Private

By default this event will follow the sharing settings of this calendar: event details will be visible to anyone



# Sick Calls

- Staff or Vet can add/edit
- Extra Info--cow #, etc.
- Move from Sick Calls to Vet Calendar once call is claimed.



FRIDAY  
April 1, 2016



Perrin on Call

Perrin on Call

8  
AM

Egg bound Ostrich, needs help ASAP

9

Bill Martin \*new client\* Dehorn 75 yearlings, needs and i  
done by 9 a.M.

# On Call Schedule

February 2016							TODAY
	SUN 21	MON 22	TUE 23	WED 24	THU 25	FRI 26	
	Doug Out - AZ						
	Perrin on Call	Yoder on Call	Klop on Call	Springer on	Perrin on Call	Yoder on Call	
	Perrin on Call				Perrin on Call		
9 AM							



	Number of Days on Call for 2015										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Dereck	7	7	7	7	8	7	8	7	7	7	10
Ross	10	5	7	8	7	8	10	7	6	8	8
Shaw	7	8	8	7	9	7	6	9	7	8	7
Brandon	7	7	8	7	6	8	7	8	10	8	8
	31	27	30	29	30	30	31	31	30	31	33

**Year 2015**

Weekends	Jan	Feb	Mar	Apr	May	Jun
Dereck	1	1	1	1	1	1
Ross	2	1	1	1	1	1
Shaw	1	1	1	1	2	1
Brandon	1	1	1	1	1	1

Weekdays	Jan	Feb	Mar	Apr	May	Jun
Dereck	4	4	4	4	4	4
Ross	5	3	4	5	4	5

Dec	Totals
10	92
7	91
8	91
7	91
32	365



# Vacation/Away Schedule

February 2016			
SUN 14	MON 15	TUE 16	WED 17
Shaw Out		Klop on Call	Springer on
Doug Out - AZ			
Springer on	Presidents'		Pe
Valentine's	Yoder on Call		

Thu 11/5	Fri 11/6
Doug Out	
Perrin on Call	Klop on Call
	Check furnace filter



# Vacation/Away Schedule

[illegible]



# Regularly Scheduled Herd Health

← **SAVE** Discard changes Delete More Actions

**EKO Acres, HH**

1/5/2016 8:00am to 11:00am 1/5/2016 Time zone

☐ All day ☒ Repeat: Every 2 weeks on Tuesday **Edit**

Event details [Find a time](#)

Where Enter a location

Video call [Add video call](#)

Calendar Shaw ▼

Created by dvmsgoshen@gmail.com

**Repeat**

Repeats: Weekly ▼

Repeat every: 2 ▼ weeks

Repeat on: ☐ S ☐ M ☒ T ☐ W ☐ Th ☐ F ☐ S

Starts on: 9/29/2015

Ends: ☒ Never  
☐ After  occurrences  
☐ On

Summary: Every 2 weeks on Tuesday

Done Cancel

January 5, 2016

Klop on Call

8 EKO Acres, HH

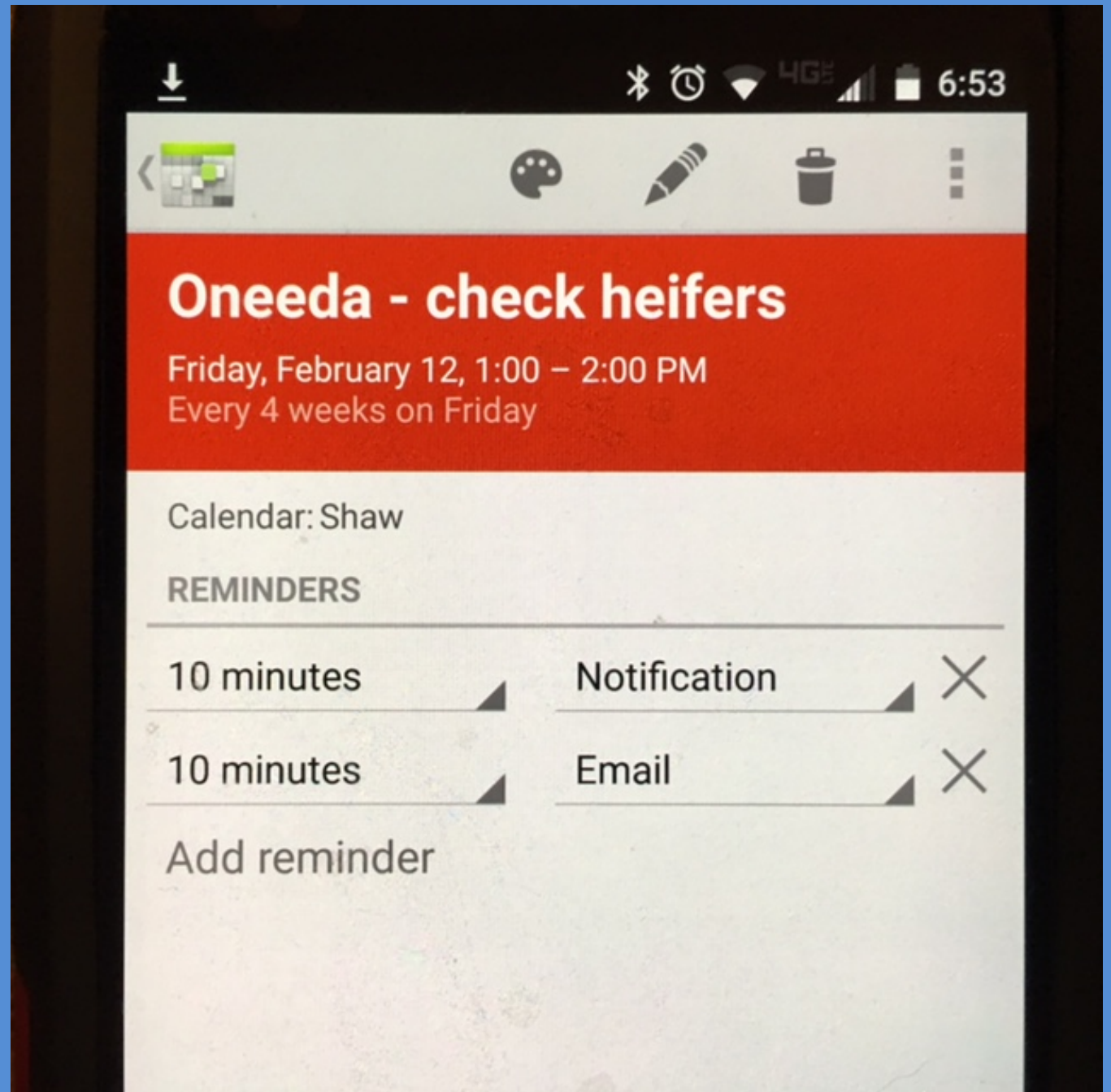
9 AM

10

\*Add reminders for VCPR renewal, medication drop offs, etc.



Notifications  
and Emails  
for each  
Event



Not  
paperless,  
however

BSE?

↑ SP

12/11 Geissinger - DO  
12/17 Heatwolves  
12/23 Herman Brinkhoff  
12/28 Leo Weaver - sick heifer calf  
12/28 Oneeda (H)  
12/28 Wilbur Eash - heifer mastitis  
12/28 Brent Martin (H)

Missing Invoices

RS

12/31 Merle Miller

DY

12/7 Westley Martin

DK

12/31 All

BY

12/31 ~~Horsier Hartland (H)~~  
12/31 ~~David Hochstetler (H)~~  
cancel 11/6/2

Date December 17, Thursday

Danielle Willenburg  
217-463-2969

BOOK	DY	OK	RS	BZ
7:00		Tara Daniels		Terrence
7:15	X Willie Yoder (H)	X Michael Zerkow (H)	X John Bontrop (H)	X New (Bontrop)
7:30			X John Bontrop (H)	X Erin Bontrop (H)
7:45		Matthew Hester (H)		3625 W 352 S 3000
8:00				240-463-2755
8:15			X Howard Mambrecht (H)	X Steve Hensley (H)
8:30	X Brenda Poulos (H)	X Isaac Komer (H)		
8:45		D. Johnson		
9:00		X Benin Shaw (H)	X Thad Koning (H)	
9:15			X drug use personal	
9:30	X Adam Martin (H)		X 1st spouse	
9:45			X 2nd spouse	
10:00		X Joe Roper (H)		
10:15		X R. Jones		
10:30			X Roy Kingard (H)	
10:45			X meeting	
11:00				
11:15				
11:30				
11:45				
12:00				
12:15				
12:30				
12:45				
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5:00				
5:15				
5:30				
5:45				
6:00				
6:15				
6:30				
6:45				

Date December 17, Thursday

BOOK	SP	DY	CT	Gill
7:00				X John Martin
7:15				X John Martin
7:30	X Thomas (H)	X Thomas Hestland		X Thomas
7:45				X Thomas
8:00				X Thomas
8:15				X Thomas
8:30				X Thomas
8:45				X Thomas
9:00			X Linda Mast	X Thomas
9:15				X Thomas
9:30				X Thomas
9:45				X Thomas
10:00				X Thomas
10:15				X Thomas
10:30				X Thomas
10:45				X Thomas
11:00				X Thomas
11:15				X Thomas
11:30				X Thomas
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4:30				X Thomas
4:45				X Thomas
5:00				X Thomas
5:15				X Thomas
5:30				X Thomas
5:45				X Thomas
6:00				X Thomas
6:15				X Thomas
6:30				X Thomas
6:45				X Thomas

Office meeting

Office meeting

W/S - base in office

69

Log - 8/1/17

Animal ID	Animal Name	Animal Age	Animal Sex	Animal Color	Animal Breed	Animal Status	Animal Location	Animal Date	Animal Time
101	101	101	101	101	101	101	101	101	101
102	102	102	102	102	102	102	102	102	102
103	103	103	103	103	103	103	103	103	103
104	104	104	104	104	104	104	104	104	104
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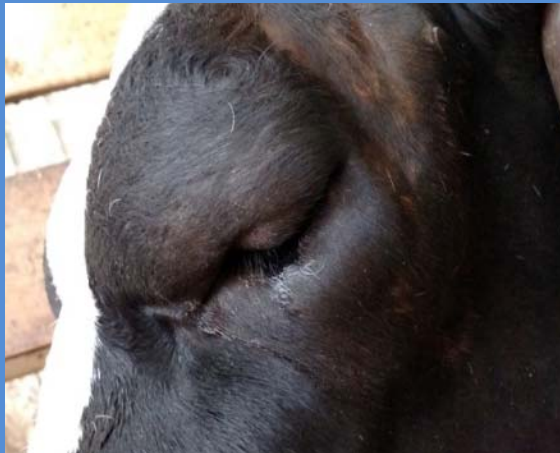
# Google Calendar for Clients

- Sync Programs
- Vaccine Schedule
- Employee Schedule
- Etc.
- Personal use



# Texting

- Appointment reminders
- Sick calls
- Schedule changes
- Lab work
- Case photos
- Vet Meeting agenda



VetScan VS2  
Large Animal Profile  
19 Dec 2015 01:00 PM  
Sample Type: Cow  
Patient ID: 1  
Doctor ID: SP  
Owner ID: Steve Heatw  
Rotor Lot Number: 5334AC3  
Serial Number: 0000V07235

ALB	3.0	2.5-3.8	g/dL
ALP	28	23-135	U/L
AST	114	66-211	U/L
CA	9.2	7.9-9.6	mg/dL
GGT	20	12-48	U/L
TP	6.5 *	6.6-9.3	g/dL
GLOB	3.5 *	4.0-5.5	g/dL
BUN	11	6-20	mg/dL
CK	674	83-688	U/L
PHOS	3.1 *	3.8-7.7	mg/dL
MG	1.7 *	1.7-2.9	mg/dL

QC OK  
HEM 0 LIP 0 ICT 0

Dairy Veterinary & Management Services  
December 18, 2015

<b>Calendar/Scheduling</b>	<b>Office Staff</b>	<b>Coming Events</b>
Dec. 16 - Dec. 22 - Brandon out	Dec. 21-24-mj out	Jan. 11 - 24 - Melinda Miller, student
Dec. 23 - Dec. 30 - Dereck out		Jan. 25-Feb.12 -Cody Anspach, student
Dec. 24 - Dec. 31 - Doug out		Jan. - date TBD -Dr. Marsh meeting
Dec. 24 - Ross out, Bob out at noon		
Jan. 4 - Brandon out		
Jan. 7-9 - Dereck, Shaw out - Off conf.		
Jan. 8 - Bob out 10am for Indy-Fair meeting		
Jan. 30-Feb. 1 - Dereck out - NMC conf.		

**Agenda Items**  
Current

- Inventory (Eva)
- Holiday office schedule -
  - Christmas: Thurs. 24<sup>th</sup> - half day, Fri. 25<sup>th</sup> - closed, Sat. 26<sup>th</sup> - closed
  - New Year's: Thurs., Dec. 31<sup>st</sup> - half day, Fri., Jan. 1<sup>st</sup> - closed, Sat. 2<sup>nd</sup> - closed
- Dr. Marsh Meeting (Doug)
  - Date chosen -- Jan. 12,13,14,26,27,28 -- Unofficially Thursday, Jan. 14
- Revised VCPR
- Protocols and Meloxicam (Shaw)
- ADM Meeting (Brandon)
  - RSVP by Jan. 6.
- Final Lab Reports (Brandon)
  - Print for client folders?
- Prevention dollars - Delaval SCC Machine?? (Brandon)
- VCPR + Drugs (Ross)

Tabled  
Case Discussion  
Items for Next Meeting  
Notes:



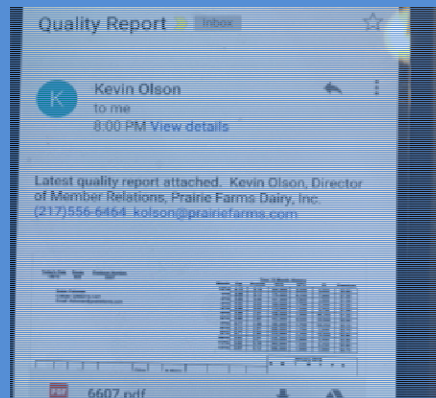






# Lab Results

- Staff can text or email to vet and client.
- Hardcopy sent to client if not emailed/texted.
- Store hard copies?
- For how long?
- Digital catalogue?
- Processor Data



VetScan VS2  
Large Animal Profile

19 Dec 2015 01:00 PM  
Sample Type: Cow  
Patient ID: 1  
Doctor ID: SP  
Owner ID: Steve Heatw  
Rotor Lot Number: 5334AC3  
Serial Number: 0000V07235

ALB	3.0	2.5-3.8	g/dL
ALP	28	23-135	U/L
AST	114	66-211	U/L
CA	9.2	7.9-9.6	mg/dL
GGT	20	12-48	U/L
TP	6.5 *	6.6-9.3	g/dL
GLOB	3.5 *	4.0-5.5	g/dL
BUN	11	6-20	mg/dL
CK	674	83-688	U/L
PHOS	3.1 *	3.8-7.7	mg/dL
MG	1.7 *	1.7-2.9	mg/dL

QC OK  
HEM 0 LIP 0 ICT 0

Final Report				Updated Section(s): Bacteriology
11/3/2015 3:00:29 PM				
<b>Bacteriology</b> by Dr. Kenitra Hammac, Section Head				
Animal ID	Specimen	Test Performed	Result	Isolate
UNSPECIFIED	Feces	Salmonella culture	negative	
<b>Molecular Diagnostics</b> by Dr. Sam Yingst, Section Head				
The following tests were performed using PCR.				
Animal ID	Specimen	Organism	Ct	Result
UNSPECIFIED	Feces	M. avium ss. paratuberculosis (Johne's)	26.23	positive
An * in the Ct field indicates that a value can't be determined at maximum number of cycles.				

- Google Calendar is great.
- Embrace digital communication for clients and staff.
- Don't lose the personal in the digital age.
- How do we advance to digital invoicing /reduce paper use?
- Go bucks!







Gettysburg, PA Oct 2015

# Mobile Scheduling

## A tale of efficiency and organization

Kayla Sweeney, DVM

Countryside Veterinary Service, P.C.

14247 E. Chicago Road  
Cement City, MI 49233





# Introduction

---

- The goal of this presentation is to share with you how mobile scheduling has helped make our practice more organized and efficient.



# Clinic Overview

---

- Countryside is located in Cement City, MI
- We service south central Michigan, north east Indiana and north west Ohio
- We have 7 large animal veterinarians and 2 small animal veterinarians
- We provide service to all species





# The Beginning

---

- One receptionist
- Incoming calls documented on paper
- Doctors had to call in to clinic to know where to go
- Phone lines would get tied up
- Two receptionists and call log kept on computer
- CB radios in the truck to communicate among Veterinarians



# Now

---

- Custom designed mobile scheduler that the veterinarians can access on their phone
  - Compatible with Android, iPhone, iPad, Laptop and PC devices
- It updates in real time
- We also have access to important info such as:
  - MSDS sheets
  - Client phone numbers
  - Account status
  - Service Call Fee
- Doctors can add appointments to the schedule





●●○○ Extended LTE 6:59 PM  
cvspphone.com

01/05/2016

**See Calendar**

**Past Due**

**New Appointment**

**MSDS**

●●○○ Extended LTE 6:59 PM  
cvspphone.com




**Cancel**

01/05/2016

Last name:

Description:

**Save**

< >   



Home Client  
Client List

Client Information

Client: Sweeney, Kayla  
Address: [2424 Emery Rd.](#)  
[Adrian, MI 49221](#)  
Primary Phone: [\(989\) 553-7050](#)  
Description:  
Note:  
Secondary Phone:  
SERVICE  
Classifications: CALL \$50 (1-25 miles)  
Description:  
Note:

Home Client

Classifications: CALL \$50 (1-25 miles)  
Description:  
Note:  
Email:  
Current Month:  
Last Month: \$0.00  
Aged 30: \$0.00  
Aged 60:  
Aged 90:  
Finance Charge: \$0.00  
Balance: \$0.00  
Contact Information: (989) 553-7050-





Extended LTE 9:37 PM

cvspnone.com



Home MSDS

MSDS Information

MSDS: Acepromazine Maleate Inj SDS 8-15 B.I.


File Name

[Acepromazine Maleate Inj SDS BOEHRINGER INGELHEIM.pdf](#)

< >  

Extended LTE 9:37 PM

cvspnone.com

 SAFETY DATA SHEET

**1. Identification**

Product Identifier: Acepromazine Maleate Injection

Other means of identification: None.

Recommended use: Tranquilization aid and preanesthetic agent in dogs, cats and horses.

Recommended restrictions: None known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer: Boehringer Ingelheim Vetmedica, Inc.

Address: 2621 North Belt Hwy  
St. Joseph, MO 64506-2002

Transportation emergency: For Chemical Emergency Spill, Leak, Fire, Exposure, or Accident Call CHEMTREC Day or Night  
Within USA and Canada: 1-800-424-9300  
Outside USA and Canada: +1 703-527-3887 (collect calls accepted)  
(866)638-2226

Medical Emergency (24HR): (800) 821-7467

Non-Emergency calls: (800) 821-7467


**2. Hazard(s) Identification**

Physical hazards: Not classified.

Health hazards: Serious eye damage/eye irritation Category 2A

OSHA defined hazards: Not classified.

Label elements



Signal word: Warning

Hazard statement: Causes serious eye irritation.

Precautionary statement

Prevention: Wash thoroughly after handling. Wear eyeface protection.

Response: If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. Store away from incompatible materials.

Storage: Store away from incompatible materials.

Disposal: Dispose of waste and residues in accordance with local authority requirements.

Hazard(s) not otherwise classified (HNOC): None known.

**3. Composition/information on ingredients**

Mixtures

Chemical name	CAS number	%
Acepromazine maleate	3598-37-6	10 mg/mL
Benzyl alcohol	100-51-6	1
Sodium citrate dihydrate	6132-04-3	proprietary
Citric acid monohydrate	5949-29-1	proprietary



Acepromazine Maleate Injection  
925373 Version #: 01 Revision date: - Issue date: 27-April-2015

SDS US 1 / 7

Water 7732-18-5 proprietary

**4. First-aid measures**

Inhalation: If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Call a physician if symptoms develop or persist.

< >   

Extended LTE 9:36 PM

cvspnone.com

MSDS: - A -

[No MSDS Required](#)

[Acepromazine Maleate Inj SDS 8-](#)

[Acepromazine Maleate Inj SDS](#)

[Acepromazine Maleate Inj SDS](#)

[Acepromazine Maleate Inj.](#)

[Acepromazine Maleate Tabs](#)

[Acepromazine Maleate Tabs UPS 250 mg](#)

[Activated Charcoal Gel VETS](#)

[Acepromazine Fly Repellant Spray](#)

[Acepromazine Fly Spray and Repellent](#)

[Acepromazine i.m. \(10 % Polysulfated](#)



# How it works

---

- The program is designed to work with the Cornerstone software the clinic already uses
  - Also compatible with Intervet
- Pulls in all our client info so the doctors can access it on the go





Create Appointments Report Calendar Today

Thursday 11/12/2015

Tentative Dr

Mark Dr. Notif

	^	A ^	T ^	Date ^	Time	Client N
	!			11/11		Alert
	!			11/11		Alert
	?			11/11		Points
	S		3	11/11		Barney Miller
	S		6	11/11	02:15 PM	Ray Liotta
	X		3	11/11	11:00 AM	Jordan Bridge
	S		5	11/11	04:00 PM	Jason Segel
	S			11/11	10:15 AM	Meg Ryan
	S		6	11/11	01:15 PM	Chris Tucker
	S		3	11/11	07:45 AM	Nick Jonas
	S			11/11		Miley Cyrus
	O	2	1	11/11	03:00 PM	Barney Miller
	S			11/11		Keith Coogan
	O	1	3	11/11		Ethan Hawke
	O	2	1	11/12		Woody Allen

## Woody Allen Client Information

Last Name:	Allen
------------	-------

First Name:	Woody
-------------	-------

Status: Active

Address:	3109 Milbourne
----------	----------------

City, State Zip Code:	Bronson, MI 49028
-----------------------	-------------------

**Directions:**

Primary Phone:	(517) 639-8039; (517) 639-8039
----------------	--------------------------------

Description:	Home; Home
--------------	------------

**Note:**

Visit Notes:	1 <sup>st</sup> Son is named Steven, normally meets you at the main barn. 2
--------------	---

Email Address:	rwallen@hotmail.com
----------------	---------------------

Preferred Dr:	
---------------	---

Contact Information:

Contact Information:	Phone	Description	Note
----------------------	-------	-------------	------

(517) 639-8039 Home

(517) 639-8039 Home

**Billing Information:**

Current Month

Last Month

Aged 30

Aged 60

Aged 90

Finance Charge

Balance

--	--

Important Documents

Audit Trail

(click here to insert Name - Date/Time stamp)

Some emergency reason description more this one is going to be really, really, really, long and should be more than one12345 message from what I can guess. one more.

Coldwater

Quincy

Mendon

Bronson



# Efficiency

---

- Utilizes staff more efficiently
  - Back to one receptionist
- Calls are added to the schedule as they come in and updated to the doctors phones immediately
  - still keep a written record of incoming calls
- Doctors can mark themselves complete on a call and then onsite for the next call
  - Eliminates unnecessary calls to clinic
  - Time stamp of onsite and completion





# Efficiency Cont.

---

- Allows everyone to know where each other is and helps plan where to go next based on who is in what area
- See any scheduled activity for today or any future dates



# Other Features

---

- Click on client address and it connects to google maps
- Create repeating appointments
- Click to dial phone numbers
- Visits not marked complete automatically move to the next day
- Alerts
  - Ex: Doctors meeting at clinic 6:30am
- Keep track of points/hours





# Other Features

---


- Track tentative and actual doctor on site
- General call tracking
- View important documents remotely
- Make field notes on client accounts
  - Ex: wife, kids and pets names
  - Ex: cattle located at 5555 Mink Rd different from billing address
- On Call




16:59


Date Picker 11/11/2015

Created: 3/9/2015 11:21 AM

**Alert -**  
 All Staff  
 Training for new drug administration. >  
 Created: 3/9/2015 11:21 AM

**Points -**  
 Judd Videto  
 Collect points for Judd Videto. >  
 Created: 2/18/2015 2:55 PM

**Meg Ryan (10:15 AM) - Scheduled**  
 Actual: , Tentative:  
 852 Schafer Street, Quincy, MI >  
 Infected eye on pig.  
 Created: 2/18/2015 2:41 PM

**Miley Cyrus - Scheduled**  
 Actual: , Tentative:  
 2002 S Dort #131, 774 Combs Rd., >  
 Quincy, MI  
 Created: 3/17/2015 4:32 PM

**Keith Coogan - Scheduled**  
 Actual: , Tentative:  
 4040 Redwing Drive, Quincy, MI >  
 Created: 4/23/2015 9:41 AM

**Barney Miller (3:00 PM) - On Site**  
 Actual: 2, Tentative:1  
 400 Harvey Drive, 11525 Reynolds Rd.,  
 Coldwater, MI

16:59

Calendar Visit Save

Name: Meg Ryan  
 Mobile Name:  
 Description: Infected eye on pig.  
 Address: [852 Schafer Street](#)  
[Quincy, MI 49082](#)  
 Phone: [\(517\) 431-2560](#)  
 Visit date: 11/11/15  
 Visit time: 10:15 AM  
 Visit status: Scheduled  
 Billing status:

Notes:

Balance:  
 Current Month: \$0.00  
 Last Month: \$0.00  
 Aged 30: \$0.00  
 Aged 60: \$0.00  
 Aged 90: \$0.00  
 Finance Charge: \$0.00

Created Created by: Erik Sabaitis on Feb 18, 2015 2:41:09 PM  
 Last Modified Last modified by: Erik Sabaitis on Nov 11, 2015 9:08:11 PM

Important File Name  
 Documents [Some Import Document.txt](#)





# Conclusion

---

- Mobile scheduling has helped improve our ability to service our clients efficiently and effectively
- It has helped us stay on top of our accounts receivable and keep our clients from getting in too deep
  - Updated daily so confident it is accurate
- Most of all it has helped keep us organized by gaining access to all our client info on the go



# Questions?

---

- Credits to our Software creator and graphics:

Erik Sabaitis

BFA Software, LLC

Coldwater MI

517-278-0196

[Erik@BFASoftware.com](mailto:Erik@BFASoftware.com)

BFASoftware.com





# TECHNOLOGY IN A MIXED ANIMAL PRACTICE

Ohio Dairy Vets Conference

Mel Wenger DVM January 2016  
Orrville Veterinary Clinic, Inc.

# ORRVILLE VETERINARY CLINIC, INC



The Standard of  
Veterinary Excellence



# SEVILLE WADSWORTH VETERINARY CLINIC





# AKRON BARBERTON VETERINARY CLINIC





# ORRVILLE PET SPA AND RESORT



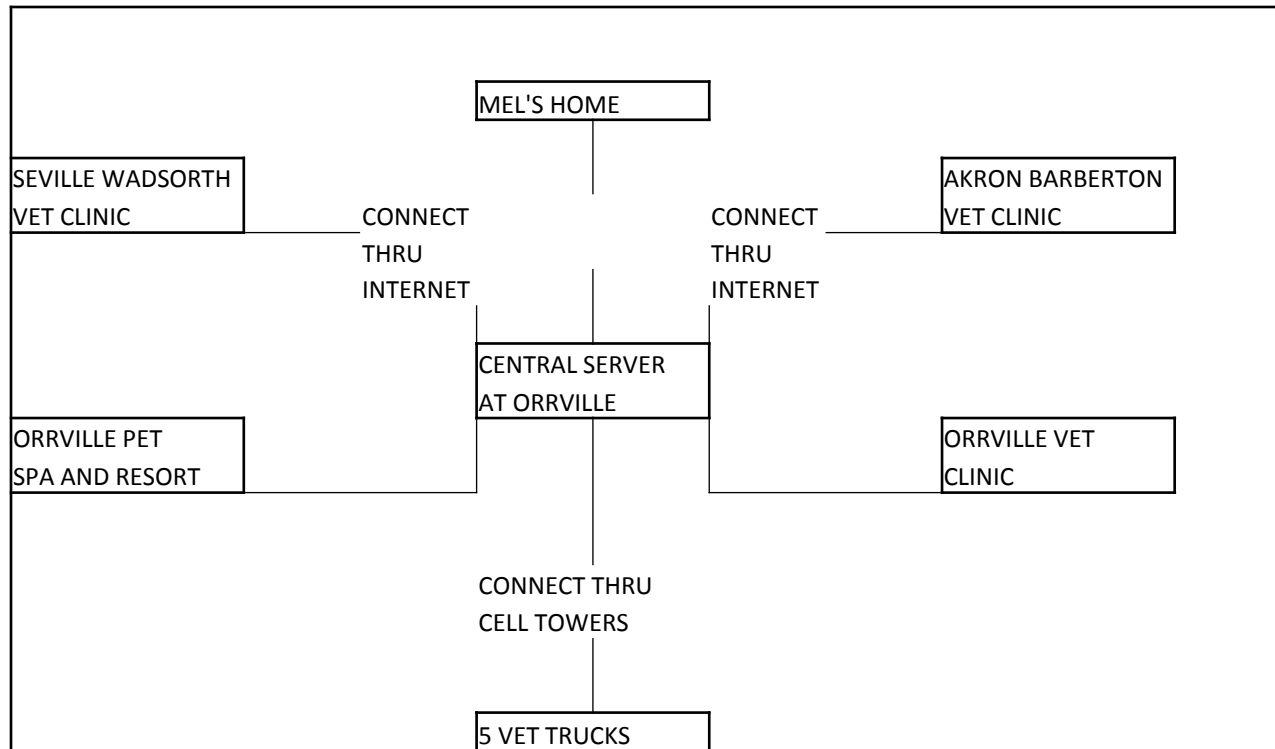
# DOGGIE DAYCARE CENTER



# ORRVILLE VETERINARY CLINIC, INC

- ◉ 5 owners, All OSU Vet School grads
- ◉ 3 associate veterinarians
- ◉ 6 registered technicians
- ◉ 8 other staff
- ◉ Orrville Pet Spa - 25 staff
- ◉ Total staff 50+
  
- ◉ ...thus the need for communication

# COMMUNICATION MAP



# PRACTICE TECHNOLOGY

- Clientrax Software

- Multi-location / one server
- Map feature
- Inventory Management



*ClientTrax*

- Appointmaster Scheduling

- On-line scheduling
- Phone app

- Google Calendar

- Keep schedules straight and communicated

- iPhone

- Group texting
- Documenting cases



# PRACTICE SOFTWARE

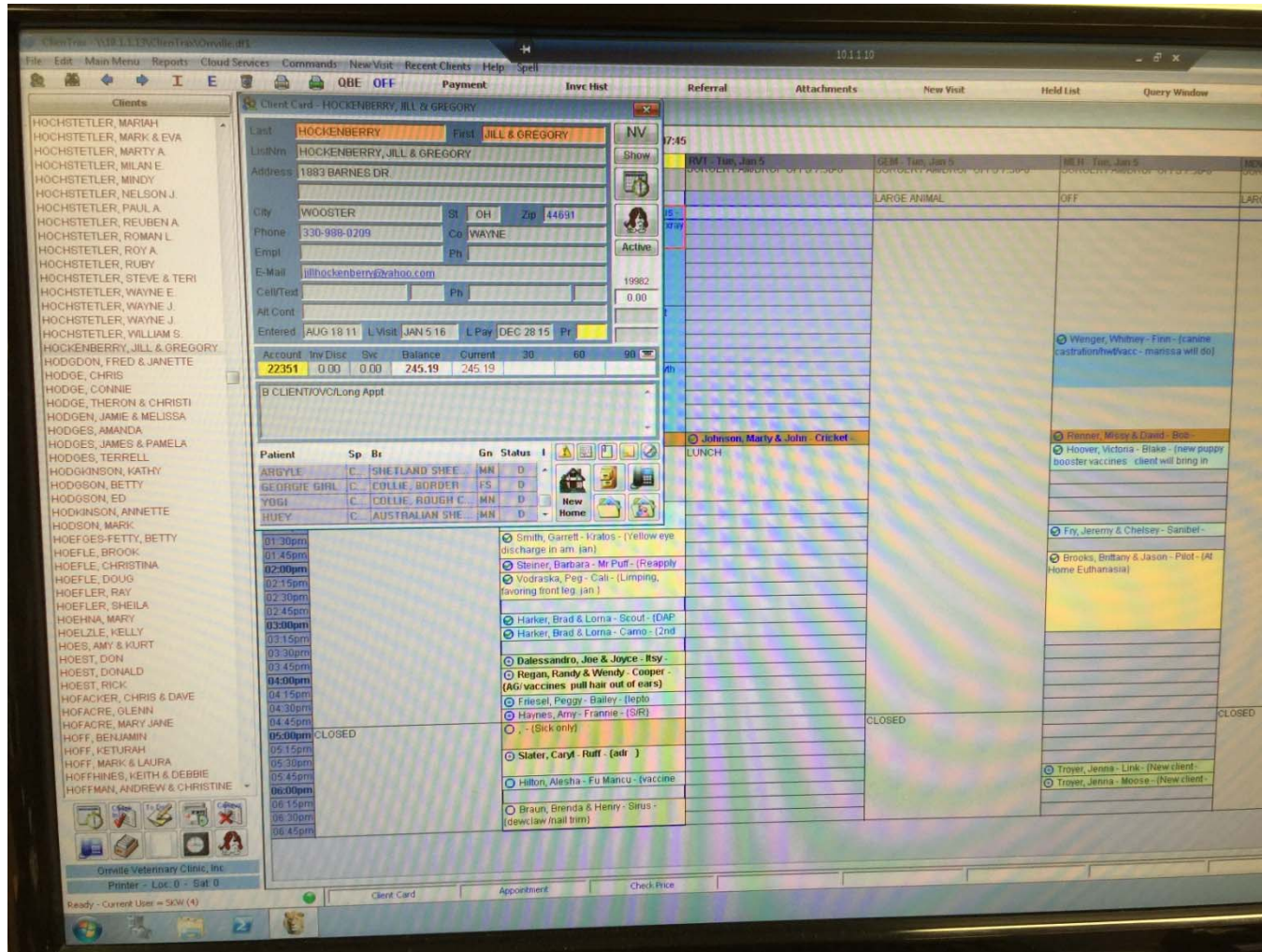


Cloud Storage

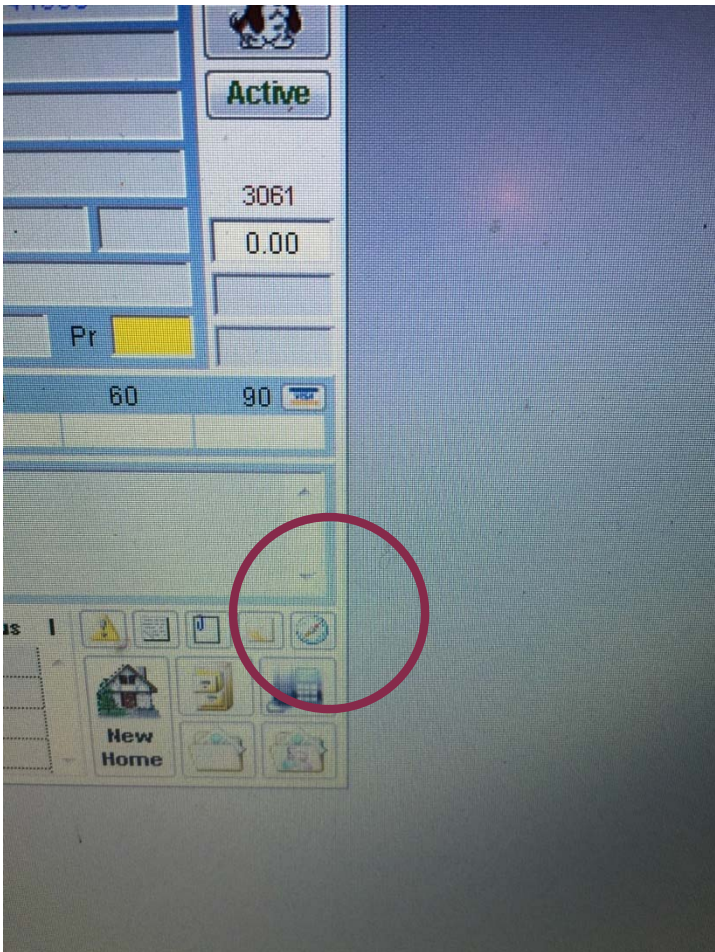


When it comes to data backup  
and storage, one solution  
rises above all others

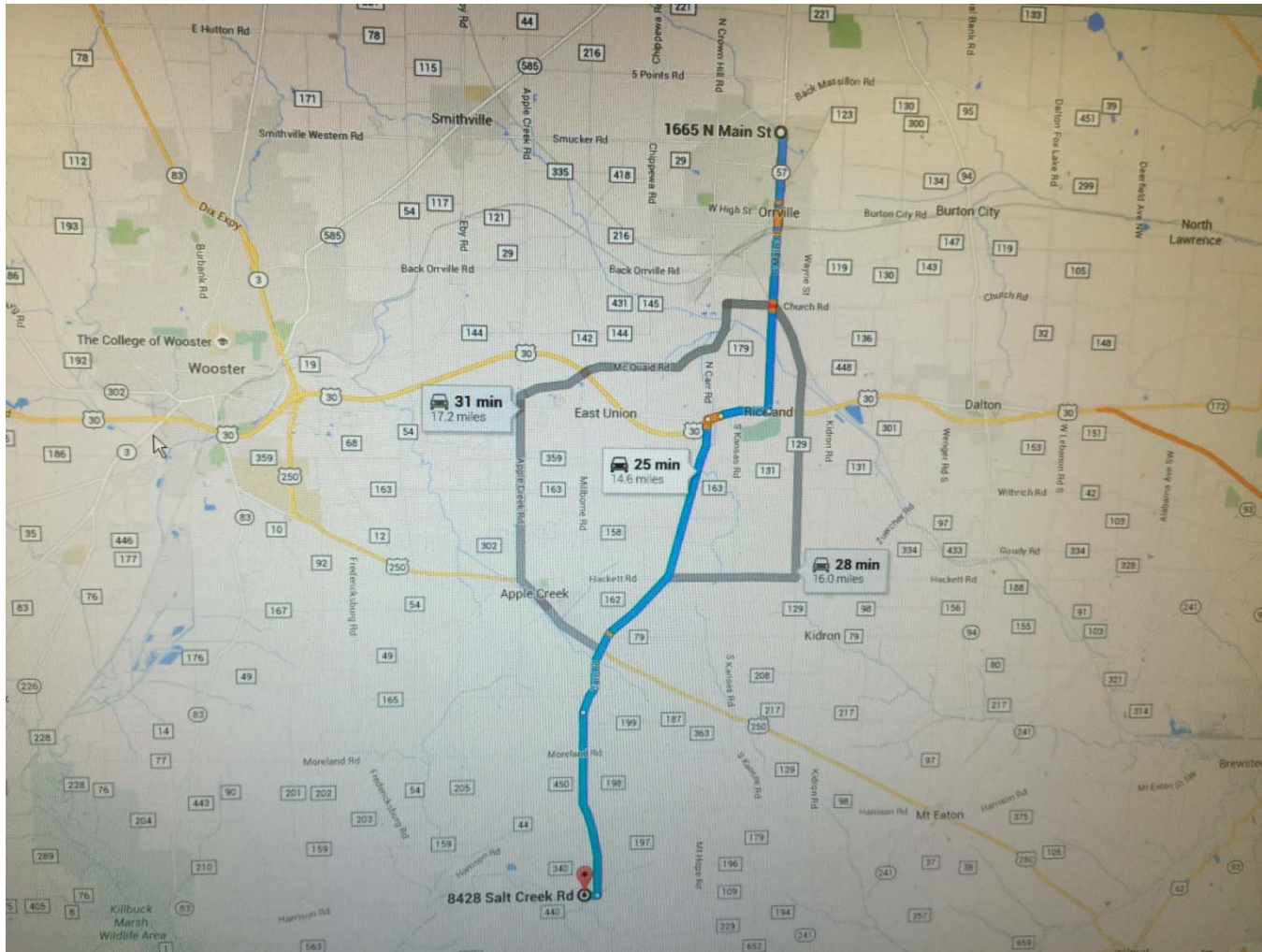
# PRACTICE SOFTWARE





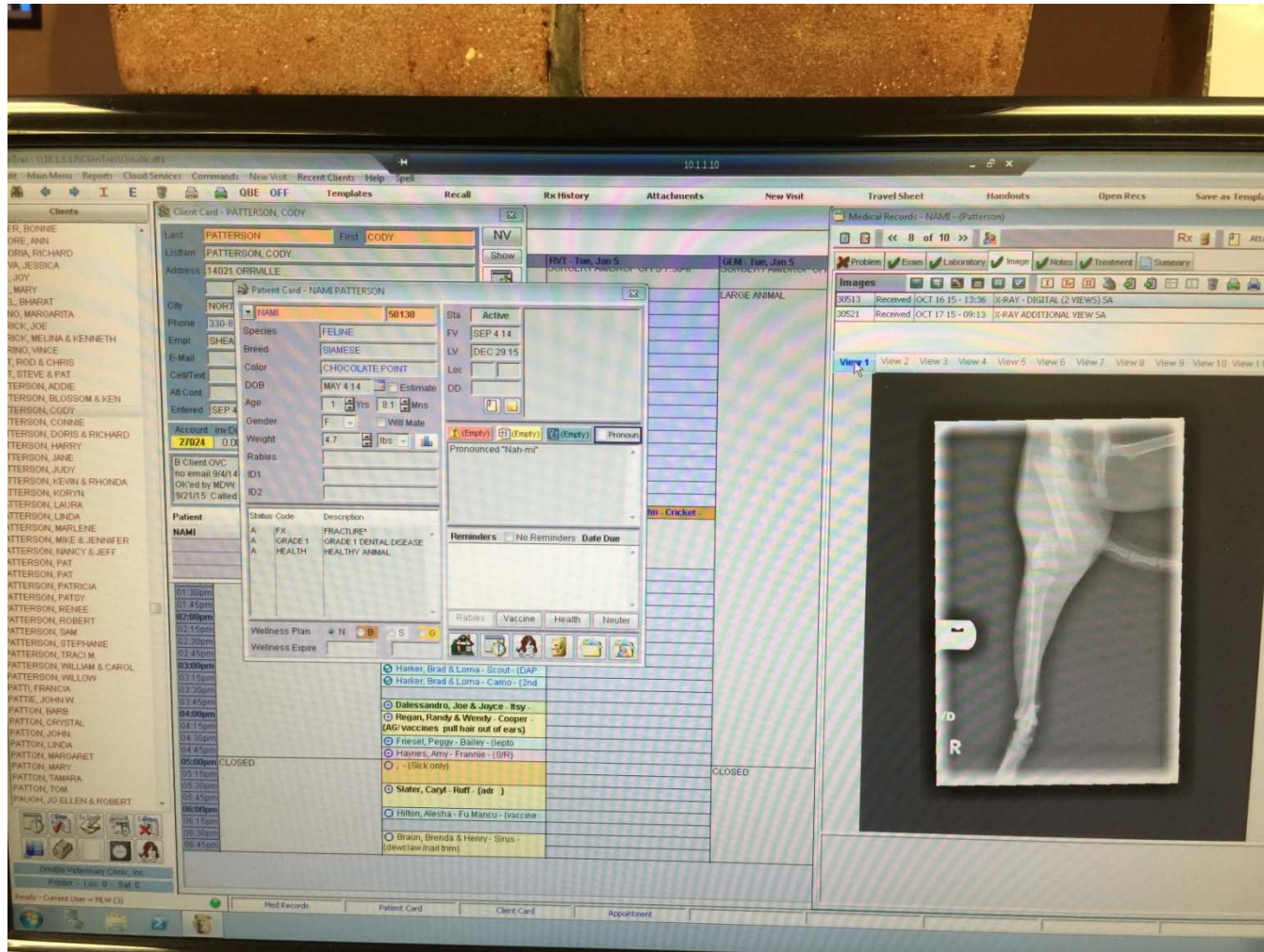


# MAP FEATURE





# RADIOGRAPHS IN MEDICAL RECORD

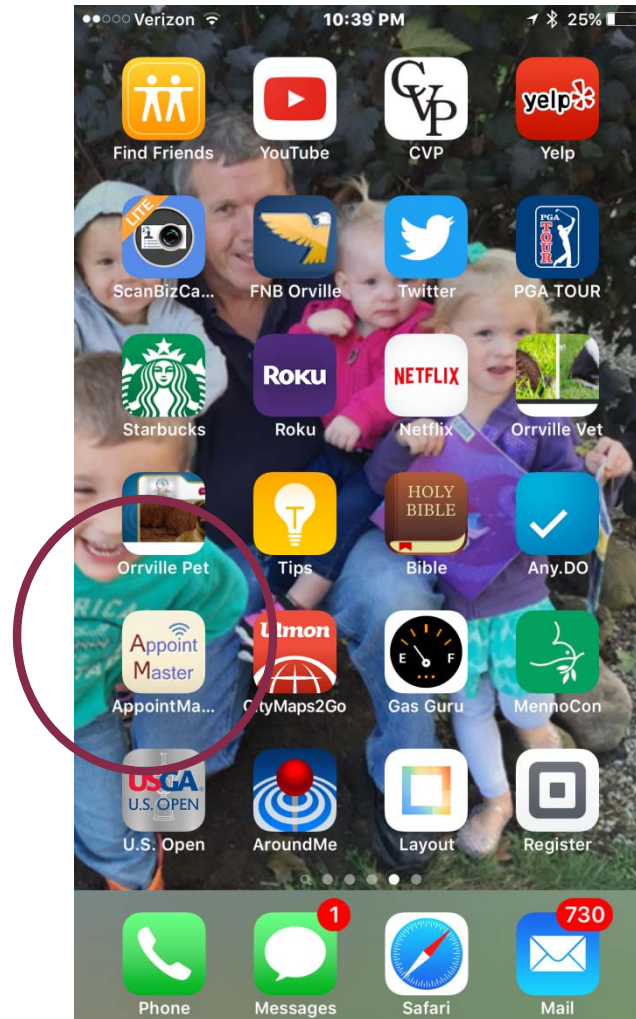




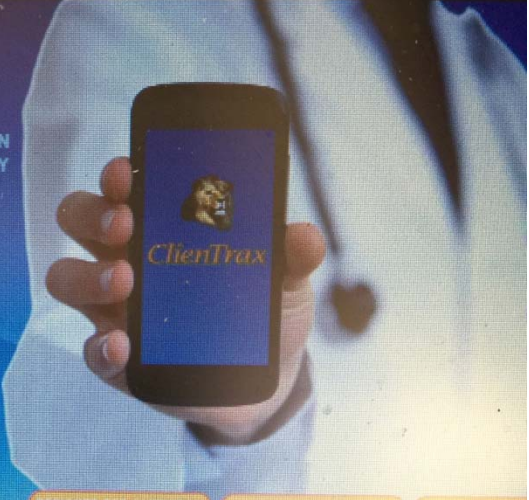
SEND X-RAYS TO MY CELL PHONE



# APPOINTMASTER APP



# APPOINTMASTER



**APPOINTMASTER**

THE ONLY CLIENT COMMUNICATION SYSTEM INTEGRATED SEAMLESSLY WITH CLIENTRAX

- Real-time Online Scheduling
- Innovative Reminder System
- Integrated Mobile Platform
- Client Surveys
- Two-way Text Messages
- Online Reputation Improvement
- Smart QR Postcards
- Create Effective Campaigns
- State-of-the-art Media Center
- Client Portals


STOP THROWING YOUR MONEY AWAY ON INEFFECTIVE REMINDER SYSTEMS AND EXPERIENCE THE POWER OF CLIENTRAX APPOINTMASTER


DESIGNED FOR CLIENTRAX | EASY MOBILE ACCESS | COMPLETELY

ClientTrax AppointMaster offers 24/7 mobile access for you and your staff. Additionally, the program is a fully integrated appointment management system that allows your clients to make appointments entirely online in real-time directly from your practice's website. It's easy, fast, dramatically reduces "no shows" – improving the overall productivity of your practice.

It's ideal for any size practice or even multiple practice locations and is entirely secure and HIPAA compliant.

WE'LL GIVE YOU 60 DAYS FREE TO GROW YOUR BUSINESS. CONTACT US TO START YOUR NO RISK TRIAL.



 **ClientTrax**



# APPOINTMASTER

Verizon 10:41 PM Client 24%





7:00 AM	C9:CLOSED
7:00 AM	C9:SURGERY AM/DROP OFFS 7:30-8
7:00 AM	<b>WILLOW SPRING FARM</b> - C0:Farm, Willow Spring - 16 Dairy Herd - {Herd Check 10:00} - 16 DAIRY HERD
7:30 AM	<b>ROY R., JR. MILLER</b> - C0:Miller, Roy R., Jr. - Horse - {health check and coggins - HORSE
7:30 AM	C9:SURGERY & DENTALS AM/DROP OFFS 8-8:30
7:45 AM	<b>NELSON J. MILLER</b> - C0:Miller, Nelson J. - 15 Dairy Herd - {1 sick calf} 15 DAIR - 15 DAIRY HERD
8:00 AM	<b>WENGER FARMS, LLC</b> - C0:Farms, LLC, Wenger - 16 Dairy Herd - {3 off milk} 16 DAIR - 16 DAIRY HERD
8:15 AM	<b>BESANCON FARMS</b> - C0:Farms, Besancon - 16 Dairy Herd - {DA on farm } 16 DAIRY - 16 DAIRY HERD
4:30 PM	C9:NO APPOINTMENTS
5:00 PM	C9:CLOSED

SCHEDULE CLIENTS PETS MENU



Verizon 10:42 PM Client 24%

**Client** Done

**CLAIR WENGER**

**Contact Information**

Client	CLAIR WENGER
Address	439 OVERLOOK CIRCLE DALTON OH 44618
Home Phone	(330) 828-8253
Work Phone	(001) 828-8874
Cell Phone	(330) 465-1657  place call
Cell Phone	(330) 465-1657  send text
Email	

ID:1059 created:9/3/2001

SCHEDULE CLIENTS PETS MENU

# APPOINTMASTER

The yellow line shows the number of appointments which have been confirmed by your practice exactly as they were requested by the patients. The higher the yellow line is, the simplest, fastest is the processing for everyone and the highest becomes your patients loyalty to online scheduling.

Charts are provided for the last six months then for the last four weeks.

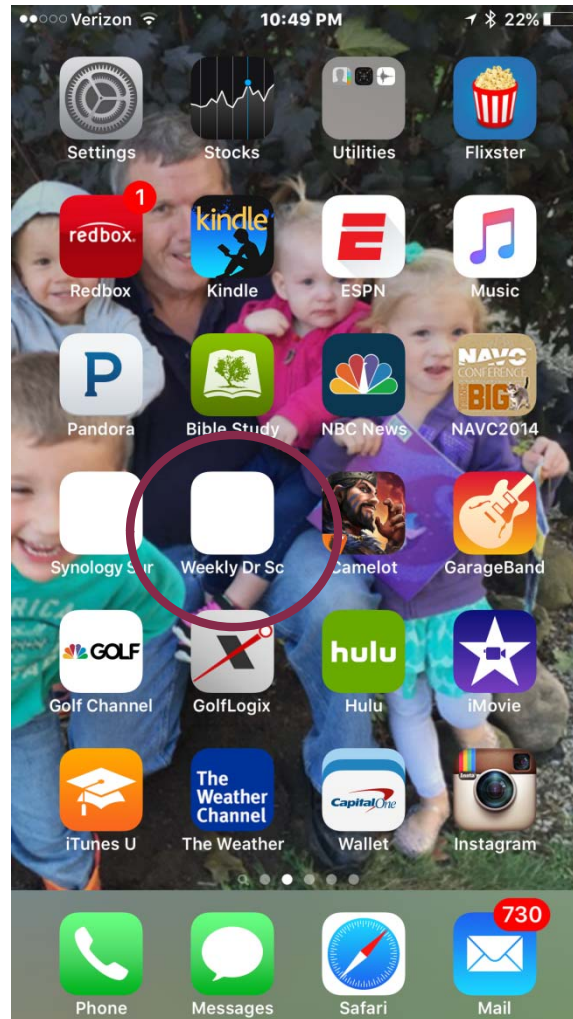


12/7/2015	KELLY & BENJAMIN DAVIS	★★★★★ 100.00%
Your clinic is excellent. I will continue to take my pet and future pets to you for care. Thank You!		
12/2/2015	CINDY MENNER	★★★★★ 94.29%
When you come into the clinic you were made to feel like family. A+ service		
11/29/2015	RITA & TODD TRACY	★★★★★ 100.00%
Wonderful job to take of our dogs. Waiting room is good. Our dogs did make loose weight. We won t give up. Otherwise, Dogs still itch it. Someday, it ll make them stop to itch. Everyone was Super jobs!!		
TRACI & ED		★★★★★

SCHEDULE CLIENTS PETS MENU



# GOOGLE CALENDAR



# GOOGLE CALENDAR

<

>

2.bp.blogspot.com

+

Synology...www.harv...Greeting...Week...www.pop...2.bp.blog...endar......

CalendarToday<>Jan 4 - 10, 2016DayWeekMonth7 DaysAgendaMore⚙

CREATE

▼

▼ January 2016<>

M	T	W	T	F	S	S
28	29	30	31	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
1	2	3	4	5	6	7

▼ My calendars

☐ orrvet@earthlink.net

☒ All Staff Schedule

☐ Birthdays

☐ Tasks

▼ Other calendars

☒ Holidays in United St...

Mon 1/4Tue 1/5Wed 1/6Thu 1/7Fri 1/8Sat 1/9Sun 1/10

SA - Marissa

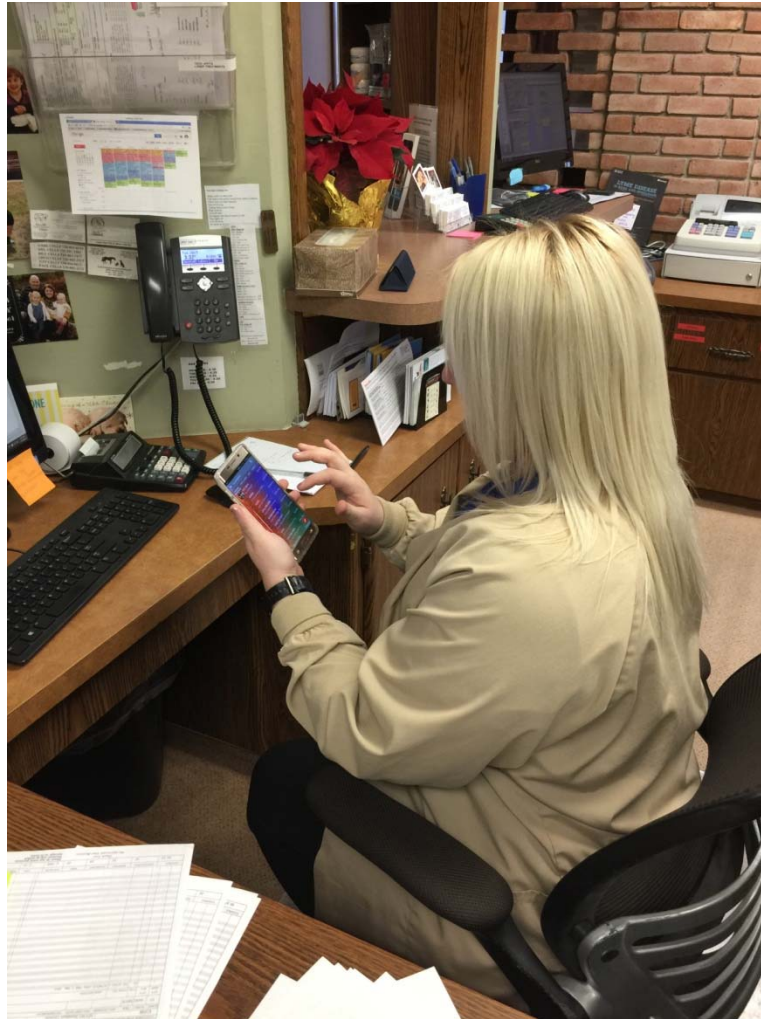
Tech - Amy

LA - Gabe

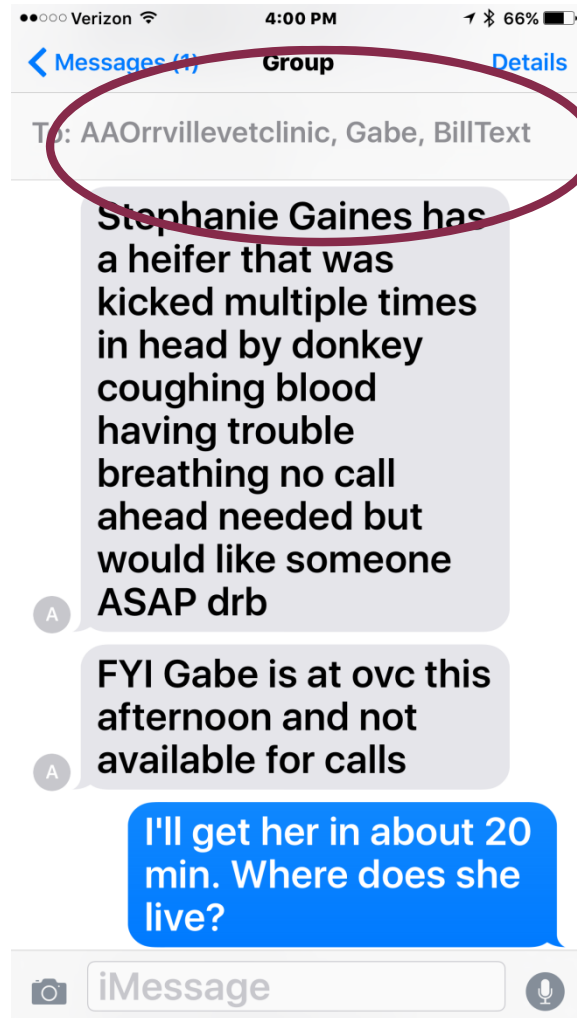
GMT-05	LA - Mel	LA - Matt	LA - Bill	LA - Jeff	LA - Gabe
12am	12 - OVC - Jeff 8-5	12 - OVC - Judy 8-7	12 - OVC - Jeff 8-5	12 - Judy 8-5	12 - Judy 8-5
	12:30 - OVC - Judy 8-12	12:30 - OVC - Marissa 12-7	12:30 - OVC - Matt 8-12	12:30 - OVC - Matt 8-12	12:30 - OVC - Jeff 9-12
1am	1 - OVC - Jenn 7-4 mgmt	1 - OVC - Jenn 7-12 tech/1-4 m	1 - OVC - Jenn 7-4 mgmt	1 - OVC - Jenn 7-4 mgmt	1 - OVC - Jenn 7-4 mgmt
	1:30 - OVC - Kayla 7-5	1:30 - OVC - Kayla 12-7		1:30 - OVC - Kayla 7:30-5	1:30 - OVC - Doug 8-12
2am	2 - OVC - Sam 8-5	2 - OVC - Samantha 8-2	2 - OVC - Samantha 7-5	2 - OVC - Samantha 7-5	2 - OVC - Samantha 8-5
	2:30 - OVC - Ann 8-5	2:30 - OVC - Amy 12-7	2:30 - OVC - Bre 8-5	2:30 - OVC - Jess 8-12	2:30 - OVC - Jess 8-5
3am	3 - OVC - Robin 7:30-5	3 - OVC - Robin 11-7	3 - OVC - Robin OFF	3 - OVC - Robin 7:30-5	3 - OVC - Robin 7:30-5
	3:30 - OVC - Jan 6:45-4	3:30 - OVC - Jan 6:45-4	3:30 - OVC - Jan 6:45-11	3:30 - OVC - Jan 6:45-4	3:30 - OVC - Jan 6:45-4
4am	4 - OVC - Suzanne 7:30-4:30	4 - OVC - Suzanne 7:30-4:30	4 - OVC - Tara 12-5	4 - OVC - Suzanne 7:30-4:30	4 - OVC - Suzanne 7:30-4:30
	4:30 - Judy - OFF pm	4:30 - Kristina - OFF	4:30 - Judy - OFF	4:30 - Marissa - OFF	4:30 - A&B - Greg OFF
5am			5 - Suzanne - OFF	5 - Amy - OFF	
	5:30 - LA - Mel	5:30 - LA - Mel	5:30 - LA - Mel	5:30 - LA - Mel	5:30 - LA - Mel OFF
6am	6 - LA - Bill	6 - LA - Bill	6 - LA - Bill	6 - LA - Bill	6 - LA - Bill
	6:30 - LA - Gabe	6:30 - LA - Gabe	6:30 - LA - Gabe	6:30 - LA - Gabe	6:30 - LA - Gabe
7am	7 - LA - Matt	7 - LA - Matt PM only	7 - LA - Matt PM only	7 - LA - Matt PM only	
	7:30 - LA - Doug	7:30 - LA - Doug	7:30 - LA - Doug	7:30 - LA - Doug	
8am	8 - LA - Jess 8-5	8 - LA - Jess 8-5	8 - LA - Jess 8-5	8 - LA - Jess 1-5	
9am	9 - S/W - Marissa 8:30-5	9 - S/W - Jeff 8:30-5	9 - S/W - Marissa 8:30-5	9 - S/W - Jeff 8:30-5	9 - S/W - Marissa 8:30-5
	9:30 - S/W - Amanda 8-5	9:30 - S/W - Amanda 8-5	9:30 - S/W - Amanda OFF	9:30 - S/W - Amanda 8-5	9:30 - S/W - Amanda 8-5
10am	10 - S/W - Kristina 8-5		10 - S/W - Amy 8-5		
	10:30 - S/W - Shelby 7:45-5	10:30 - S/W - Tara 7:45-5	10:30 - S/W - Kristina 7:45-5	10:30 - S/W - Tara 7:45-5	10:30 - S/W - Kristina 7:45-5
11am					
	11:30 - A&B - Greg 9-4:30	11:30 - A&B - Matt 9-12	11:30 - A&B - Greg 9-4:30	11:30 - A&B - Greg 9-4:30	11:30 - A&B - Matt 9-4:30
12pm					
	12:30p - A&B - Amy 8-4:30	12:30p - A&B - Shelby 9-4:30	12:30p - A&B - Shelby 9-4:30	12:30p - A&B - Shelby 9-4:30	12:30p - A&B - Shelby 9-4:30
1pm	1p - A&B - Samantha 8-4:30	1p - A&B - Jess 9-4:30	1p - A&B - Kayla 9-4:30	1p - A&B - Kayla 9-4:30	1p - A&B - Bre 9-4:30

[Terms](#) - [Privacy](#)

# TEXT MESSAGING



# TEXT MESSAGING





# CELL PHONE TO DOCUMENT





# I WATCH FROM APPLE



# TECHNOLOGY, IT NEVER ENDS.....



# MIDWEST VET CONF 2/27/16

## HOW BUYING A PRACTICE WORKS

- To become a partner one has to buy a share of the company for the continuation of the company. Older partners retire so someone has to take their share and the responsibility.
- KEY POINT: The current owners have to decide if:
  - a candidate for ownership can and will assume the additional responsibility
  - is a good decision maker
  - and has a vision for the future

QUESTIONS? [MELVET5@EARTHLINK.NET](mailto:MELVET5@EARTHLINK.NET)





# SOCIAL MEDIA IN PRACTICE



East Holmes Veterinary Clinic, Inc.

Berlin, Ohio

Eric Shaver, DVM

---



# SOCIAL MEDIA

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- ✖ Social media are computer-mediated tools that allow people to create, share, or exchange information, career interests, ideas, and pictures/videos in virtual communities and networks
- ✖ Applications must enable users to create and share content or to participate in social networking
- ✖ Must be interactive
  - + Facebook, Twitter, Instagram

Not every website is considered social media

# SOCIAL MEDIA

## ✕ Social Media at East Holmes Vet Clinic

### + Facebook only

- ✕ Main Clinic
- ✕ Boarding and Grooming
- ✕ Satellite Grooming

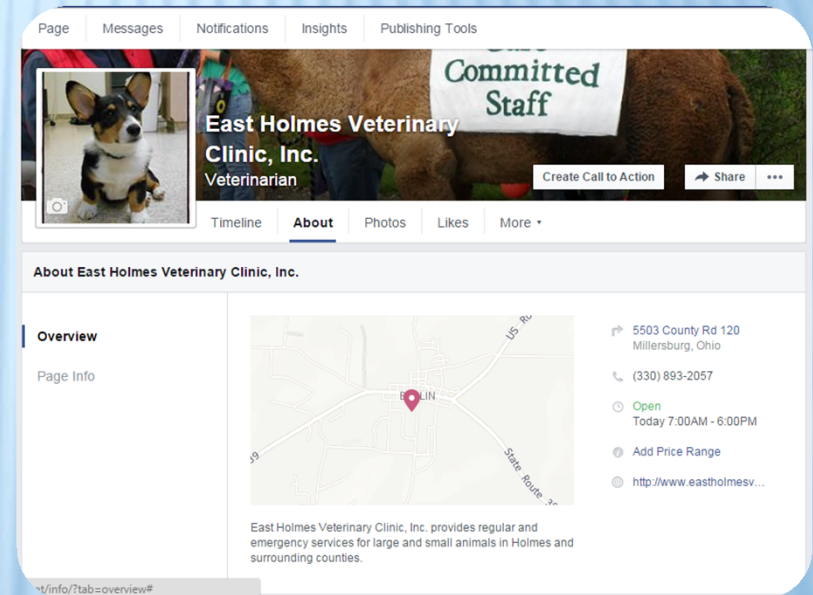


*Our Website is not interactive*



# VALUE TO OUR PRACTICE

- ✖ Provides logistical information through our “About” page
  - + Location
  - + Hours of operation
  - + Description of services
- ✖ Line of communication via messaging



# VALUE TO OUR PRACTICE

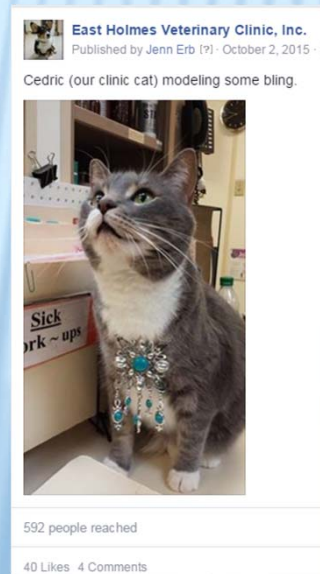
- ✖ Provides lighter factual information through our news feed
  - + Ex. Warnings about chocolate ingestion
  - + Cold weather paw care





# VALUE TO OUR PRACTICE


- ✖ Keeps Clients connected to our practice
  - + Follow clinic pets
    - ✖ Moose and Cedric
  - + Follow cases and clinic activities
    - ✖ parade





# VALUE TO OUR PRACTICE

- ✕ Introduces new staff and services
  - + Dr. Ashley
  - + Cold laser therapy

 **East Holmes Veterinary Clinic, Inc.**  
January 17, 2014 · 🌟

We are now offering laser therapy. Call us today to find out if this treatment would be right for your pet.

ADVANCED TECHNOLOGY FOR YOUR PET

**LASER THERAPY**  
A New Solution for Healing

*Did you know...*

▶ Laser Therapy has been successful in treating post surgical pain and many acute or chronic conditions.

Laser Therapy may be beneficial if your pet is in pain, has inflammation or has a wound.

▶ We are excited to offer Laser Therapy as a non-invasive, drug free treatment for healing.

196 people reached

Boost

 **East Holmes Veterinary Clinic, Inc.**  
Published by Jenn Erb [?] · June 2, 2014 · 🌟

We welcome Dr. Ashley Misner to East Holmes Vet Clinic. She is a recent graduate of OSU and is excited to join our team. Please help us welcome her to our practice.



1,956 people reached

Boost Post

91 Likes 4 Comments

Like Comment Share

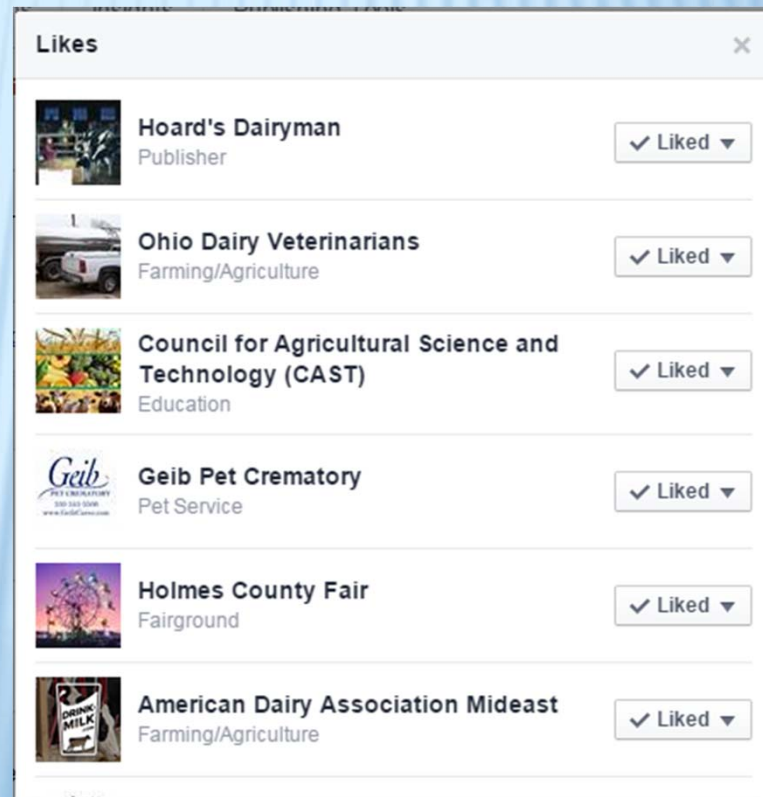
# VALUE TO OUR PRACTICE

---

- ✖ Attracts potential new clients
- ✖ Some new clients find Facebook search easier than website navigation due to familiarity with Facebook.

# VALUE TO OUR PRACTICE

- ✖ Useful links provide harder science
- + to those that are interested






# VALUE TO OUR PRACTICE

- ✖ Linked to our website
- ✖ Connects to local businesses we support and use
  - + Geib Pet Crematorium
  - + Lester's Horseshoeing

**East Holmes Veterinary Clinic, Inc.**  
Published by Jenn Erb [?] · October 22, 2015 · 🌟

Just wanted to say that we at East Holmes Vet Clinic appreciate the way that Geib Funeral Home has always handled our clients with compassion and professionalism as they assist with the final arrangements for our client's treasured pets. Thanks for all your care during these difficult times.



**920** People Reached

**50** Likes, Comments & Shares

<b>40</b> Likes	<b>40</b> On Post	<b>0</b> On Shares
<b>7</b> Comments	<b>7</b> On Post	<b>0</b> On Shares
<b>3</b> Shares	<b>1</b> On Post	<b>2</b> On Shares

**132** Post Clicks

<b>26</b> Photo Views	<b>0</b> Link Clicks	<b>106</b> Other Clicks ⓘ
-----------------------	----------------------	---------------------------

**NEGATIVE FEEDBACK**

<b>1</b> Hide Post	<b>0</b> Hide All Posts
<b>0</b> Report as Spam	<b>0</b> Unlike Page

**East Holmes Veterinary Clinic, Inc.** added 4 new photos.  
Published by Jenn Erb [?] · December 4, 2015 at 2:36pm · 🌟

Pokey the horse gets some new shoes thanks to Lester. Jill the cat felt she was qualified to be Lester's assist.



**136** people reached

**Boost Post**

# VALUE TO OUR PRACTICE

- ✖ Can establish multiple pages for entities within the practice





# VALUE TO OUR CLIENTS

---

- ✖ Mostly used for location, hours and for staying connected to our clinic and community.
- ✖ Useful links including our website
- ✖ Provides another line of communication through messaging
  - + Non-emergency inquiries
  - + Availability for grooming, boarding, reg. appt.
  - + Rescue placement

# NON-EMERGENCY INQUIRY EXAMPLE

Hello! This is Brodie and Clifford. I plan to visit a friend in Canada and Cliff need to have the following:  
The rabies vaccination certificate must:

- be written in English or French;
- be issued and signed by a licensed veterinarian;
- identify the animal (breed, sex, colour, and weight);
- state that the animal is vaccinated against rabies;
- indicate the date of vaccination;
- indicate the trade name and the serial number of the licensed vaccine; and
- specify the duration of immunity (otherwise, it will be considered valid for one year from the date of vaccination).



...btw, who is running this page?  
What do i need to do to be cuurent,



Write a reply...

Hi Brodie, This is Anne Leidigh. RVT. I'm one of the technicians and also an admin on this page. I checked Cliff's vaccine records and he is not due for any updates until November of this year. His rabies is current until October of 2016. We can get you a health paper and a written rabies certificate to go to Canada. We just need to take a quick look at Clifford and make sure he is healthy. The Health paper will be good for 30 days after its written, so you don't want to get the certificate until closer to your leaving date. Make an appointment at your convenience for the exam and health paper it will cost approximately 36.00 for everything. Hope this helps and if you have any other questions feel free to contact our office.



# COUNTY DEMOGRAPHICS

- ✖ Population: 43,898
  - + 33% < 18 years old
  - + 12.5% > 65 years old
  - + 50.1% female
  - + 49.1% Amish or Amish decent
  - + 45 % are not high school graduates

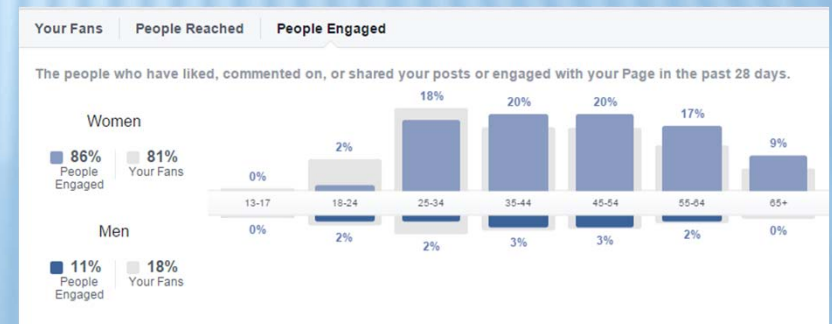
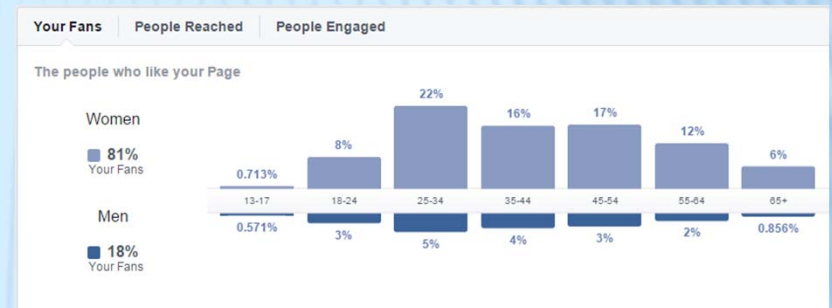
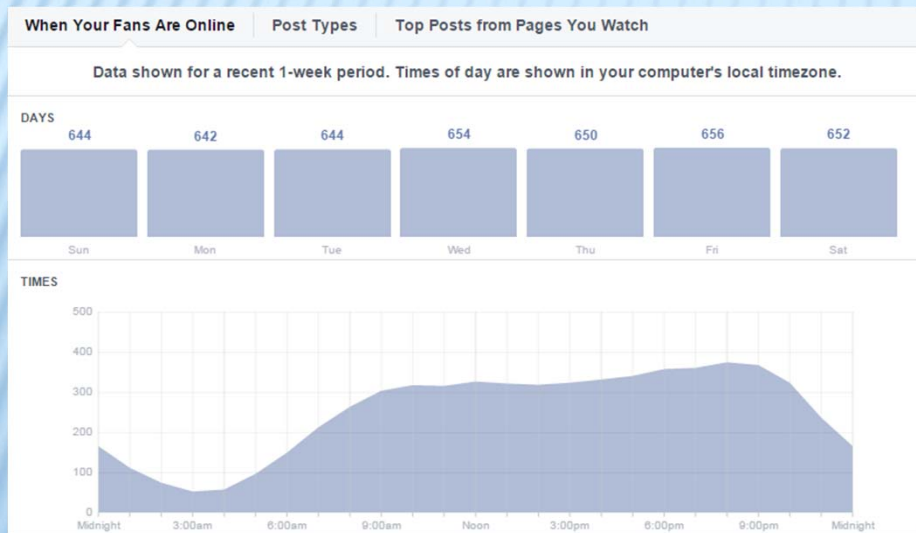


# DECEMBER'S FACEBOOK STATS

Country	People Reached	City	People Reached	Language	People Reached
United States of America	1,923	Buffalo, NY	137	English (US)	1,892
		New Philadelphia, OH	74	English (UK)	30
		Millersburg, OH	68	Traditional Chinese (T...	1
		Middlefield, OH	67		
		East Aurora, NY	63		
		Steubenville, OH	63		
		Columbus, OH	55		
		Burton, OH	50		
		Dover, OH	48		
		Chardon, OH	48		
		Tuscarawas, OH	47		
		Berlin, OH	40		
		Canton, OH	40		
		Wooster, OH	39		

# OUR FACEBOOK USERS

- ✖ Demographics of users
- ✖ Time of day for use





# OUR FACEBOOK USERS

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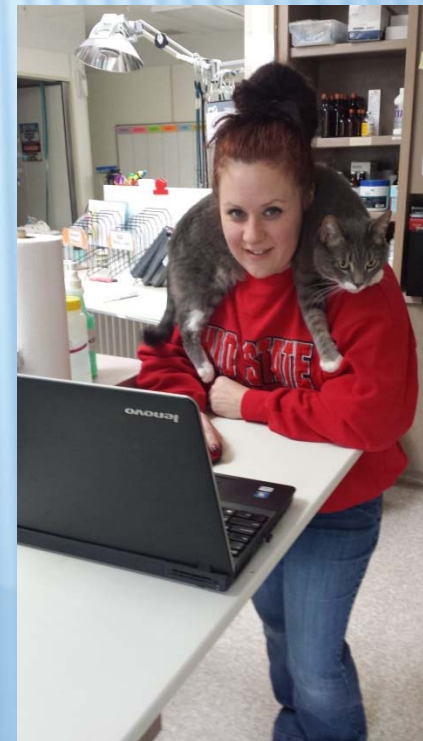
- ✖ Predominantly women
- ✖ Noon and early evening highest period of usage reflects rural lifestyle.
- ✖ Our “friends list” includes a surprising number of “farmer’s wives”. (*Guess who has the farmer’s ear?*)



# KEY TO SUCCESS

---

- ✖ Must have a “designated driver”
- ✖ Someone who understands the system and is willing to post regularly
- ✖ Recommend multiple administrators in the event that DD is not available



# KEYS TO SUCCESS

---

- ✖ Site must be kept current and relevant
- ✖ Administrator must be provided the time to post
- ✖ Staff should contribute ideas and help with photos
- ✖ Check in periodically and support the cause
  - + Even if you yourself are not social savvy



# IT'S A TWO-WAY STREET

- ✖ Administrator (DD) must alert owner about posts requiring a reply.
- ✖ Owner can use social media (through the DD) to support/educate parties involved in a complaint



# DOWNSIDE

---

- ✖ Providing DD the time to post regularly
  - + Must be prioritized
- ✖ Keeping the DD from idea burn-out
- ✖ The negative post



# HOW TO RESPOND TO THE NEGATIVE POST

- ✖ Can remove BUT ONLY if egregious
- ✖ Do not engage in a debate
- ✖ Always thank them for the comments
- ✖ Find common ground
  - + What is the real complaint


# HOW TO RESPOND TO THE NEGATIVE POST

- ✖ Remain respectful and reply generically
- ✖ Share an experience or story
- ✖ While rare, they are hurtful
  - + Fortunately many followers often respond in support




# OUR MOST SUCCESSFUL POST

- ✖ Moose saving life of golden retriever puppy  
'London'

**East Holmes Veterinary Clinic, Inc.**  
Published by Jenn Erb [?] · November 2, 2015 · 🌟

Meet London the Golden Doodle. She came to us last week extremely sick and needing to have major surgery. As her hospitalization continued and she did not improve it was time for Moose to help out. As most of you know Moose is our blood donor and through this donation has saved yet another life. Thanks to Moose, London is healing and will be heading home today.



6,643 people reached

Boost Post

277 Likes 38 Comments 17 Shares

**6,643** People Reached**401** Likes, Comments & Shares**1,115** Post Clicks

NEGATIVE FEEDBACK



	TEST	SAMPLE	LAB	Comments	COST	CONTACT INFO
BVD - PI	Elisa	Serum	ODA		\$4.50	
	PCR	Milk	Quality Milk	Send at least 200ml milk	\$63.00	
	IHC	Skin	Univ. of Nebraska	Send in 10% formalin (1 part ETOH 9 parts 10% formalin)	\$16 + \$4.50 per sample	
		Skin (Buffered Saline)	Central State KY	Need their containers/solution	\$3 per head	
		Individ. Sample	Gold Standard Lab	Pool of 5 done at lab	\$3.50 per head that will be pooled	
		Skin	U of Wisc.	Pool up to 24	\$45 if out of state submissions	
BVD - Transient infection	Virus Isolation	Serum	ODA		\$16-25	
	PCR	skin, serum, milk			\$35	
BVD - Bulk Milk Screen	PCR	Milk	Quality Milk	A one-time fee of \$200 (\$300 for non-NYS farms) is paid per year which entitles you to six bulk tank samples during a 12-month period.	\$63	
			API	?		
L. borgpertosoni sv hardjo-bovis	FA	Urine	MSU		NA	
	PCR	Urine			\$25	
	Serology	Serum (concurrent w/ urine)	MSU		\$25	
Abortion panel		Tissue	ODA	Can be slow	\$195	
		Collection of samples -> "Abortion Kit"	ODA		\$200-300 ?	
		"Bottle Necropsy"	Wisc. VDL	Receive results quicker than ODA; abortion culture done	PCR Bovine panel \$50, abortion culture \$18	
			South Dakota		\$200 full abortion workup	
			Minnesota		NA	
Abortion serology		Acute/Conv. Sera	ODA			
			Wisc. VDL			
Mycotoxins - feed		feed	North Dakota		\$150 for comprehensive result	
	5 toxin panel		Cumberland Valley	Receive results < 7dys	\$45	
	27 toxin panel		Alltech	Takes 3 wks	NA	
	5 toxin panel		Holmes Lab	Results within days	\$45	
Water Analysis		water (in amber bottle)	Dairy One			
		Water in water bottle/acid wash container	Brookside	Use due to convenience per Hardesty	NA	
			Heidelberg, Tiffin, Ohio	Considered premier in country per Edwards	\$30	
			Cumberland Valley		\$35.50	
				Water Suitability Analysis Includes: pH, Hardness(in ppm and grains per gallon), Nitrate-Nitrogen, Nitrate, Sulfate, Electrical Conductivity (EC), Total Dissolved Solids (TDS), Calcium, Magnesium, Potassium, Sodium, Chloride, Copper, Manganese, Zinc, and Iron	\$70	
			Holmes Lab			
			MWI ?		NA	
Milk Culture - Aerobic	Culture	milk	Quality Milk		\$10	
		Quarter, Bulktank	OARDC		Aerobic \$7, Mycoplasma \$25, Bedding \$50	
		Milk	Rocky Creek	Using RC for specifically myco	NA	
	PCR		DHI	Panel options (contagious, environ.,)	\$10.75	
	Culture	Bulktank	DFA	Monthly report	NA	
			Minnes.	Quantitative and Qualitative Reporting	NA	
Milk Culture - Mycoplasma	Culture	milk	Quality Milk		\$10	

	<b>LAB</b>
	Alltech
	API
	Brookside
	Central State KY
	Cumberland Valley
	Cumberland Valley
	Dairy One
	DFA
	DHI
	Gold Standard Lab
	Heidelberg, Tiffin, Ohio
	Holmes Lab
	IDEXX
	Iowa State
	Local Hospital
	Marshfield
	Minnes.
	Minnesota
	MSU
	MWI ?
	North Dakota
	Nova Vet Meter
	OARDC
	ODA
	Petlabs
	PortaCheck Strips
	Precision Strips
	Quality Milk
	Rocky Creek
	South Dakota
	U of Wisc.
	Univ. of Nebraska
	Wisc. VDL



## CONTACT INFO

Alltech – No lab information available

Animal Profiling International, Inc.  
6040 North Cutter Circle, Ste. 317  
Portland, OR 97217  
503-247-8066

BROOKSIDE LABORATORIES, INC.  
200 White Mountain Drive  
New Bremen, OH 45869  
<https://www.blinc.com/plant.htm>

Cumberland Valley Analytical Services, Inc.  
**Mailing Address:** P.O. Box 669 Maugansville, MD 21767  
**UPS/FedEx Address:** 14515 Industry Drive Hagerstown, MD 21742  
1-800-CVAS-LAB  
301-790-1980  
[www.foragelab.com](http://www.foragelab.com)  
[mail@foragelab.com](mailto:mail@foragelab.com)

Dairy One/ Agro-One Agronomy Services  
Livestock Water Analysis  
730 Warren Road  
Ithaca, NY 14850  
Ph: 607-257-1272 ext. 2172  
Fax: 607-257-6808

DHIA  
For all questions, including pricing and shipping contact Jere High at 1-877-572-4115 or email [DNA@LancasterDHIA.com](mailto:DNA@LancasterDHIA.com)

Gold Standard Labs  
1990 Louisville Road, Unit 4  
Bowling Green, KY 42101  
800-808-3552

Heidelberg University, National Center for Water Quality Research  
310 E. Market Street  
Tiffin, Ohio 44883  
**Fax:** – 419-448-2345, 419-448-2198 or 800-925-9250 Ext. 2198  
  
<http://www.heidelberg.edu/academiclife/distinctive/ncwqr/water/well>

**Holmes Laboratory, Inc.**  
**PO Box 204**  
**Winesburg, OH 44690-0204**

Samples sent via **UPS, FedEx** or **other carriers**:

**Holmes Laboratory, Inc.**  
**3559 U.S. Route 62**  
**Millersburg, Ohio 44654-8834**

IDEXX

Iowa State University  
Veterinary Diagnostic Laboratory  
Iowa State University  
1600 South 16th St  
Ames, IA 50011-1250

Michigan State University DCPAH  
4125 Beaumont Road  
Lansing, MI 48910  
517-353-1683

North Dakota State University  
Veterinary Diagnostic Laboratory  
Van Es Hall 1523 Centennial Blvd.  
Fargo, ND 58102  
Telephone 701-231-7527

OARDC Mastitis Lab  
Animal Sciences  
1680 Madison Ave  
Wooster, OH 44691

Office - 330-263-3805  
Lab - 330-263-3978  
Fax - 330-263-3603

Lab - [mastitislab@osu.edu](mailto:mastitislab@osu.edu)

Ohio Department of Agriculture ADDL  
8995 East Main Street

Reynoldsburg, OH 43068  
614-728-6220

PetLabs  
Biopsies/Histopathology:

PetLabs  
96 Grace Drive  
Powell, OH 43065

Microbiology:  
PetLabs  
2510 Substation Rd  
Medina, OH 44256  
440-465-3392

Bloodwork Coggins:  
PetLabs  
36400 Center Ridge Rd  
North Ridgeville, OH 44039  
440-327-2062

Quality Milk Production Services Central Laboratory AHDC  
240 Farrier Road Ithaca, NY 14853  
607-255-8202  
877-645-5522  
(fax) 607-253-4000  
(email) [qmps@cornell.edu](mailto:qmps@cornell.edu)

ROCKY CREEK DAIRY  
178 Holstein Lane  
Olin, North Carolina 28660  
Phone: 704-546-2210  
Fax: 704-546-3450

South Dakota State University  
Department of Veterinary and Biomedical Sciences  
Animal Disease Research and Diagnostic Laboratory (SAR)  
Box: 2175  
Brookings, SD 57007  
Phone: 605.688.5171  
Fax: 605.688.6003

University of Nebraska Veterinary Diagnostic Center – Lincoln Room 151  
VDC Fair Street and East Campus Loop  
Lincoln, NE 68583-0907  
Telephone: (402) 472-1434

Fax: (402) 472-3094  
E mail: [vdc2@unl.edu](mailto:vdc2@unl.edu)

University of Wisconsin Veterinary Diagnostic Laboratory  
1333 Gortner Avenue  
St. Paul, MN 55108-1098  
[vdl@umn.edu](mailto:vdl@umn.edu)  
612-625-8787 or 800-605-8787

Wisconsin Veterinary Diagnostic Laboratory Barron, Wisconsin  
1521 E. Guy Ave.  
Barron, WI 54812  
Phone: 715-637-3151  
Toll Free: 800-771-8387

Wisconsin Veterinary Diagnostic Laboratory Madison, Wisconsin  
445 Easterday Ln.  
Madison, WI 53706  
Phone: 608-262-5432  
Toll Free: 800-608-8387  
Fax: 847-574-8085

Neonatal Enteric Panel		feces or necropsy samples	ODA		130	
		feces or necropsy samples	Wisc. VDL		na	
Respiratory Panel		Nasal, pharyngeal, Lung tissue	Wisc. VDL		88	
		Deep pharyngeal swabs	Iowa State	Includes Mycoplasma bovis, Mannheimia haemolytica	40	
Routine Bloodwork (CBC, Chem, Lytes)			Local Hospital	Results < 2 hrs	\$5 CBC, \$22 Profile Our Cost	
			<b>Marshfield</b>	Pickup service, helpful, quick results	\$85 for CBC Profile Charge to Client	
			Petlabs	Nightly courier, Use for Coggins		
			IDEXX			
Trace Minerals/Elements - Tissue		Liver	MSU			
Trace Minerals/Elements - Blood		Whole Blood	MSU			
Trichomonas	PRC	Preputial Wash				
	Culture	Preputial Wash				
NEFA		Serum	MSU			
BHBA		Whole blood	Precision Strips			
	Porta BHBA	Milk	PortaCheck Strips			
			Nova Vet Meter	Nova Vet vs Nova Max discussion,		
Bluetongue		Serum				
Johnes - Serology		Serum				
Johnes - Fecal Culture	Broth Culture	Feces				
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Brookings, SD 57007  
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Fax: 605.688.6003

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1333 Gortner Avenue  
St. Paul, MN 55108-1098  
[vdل@umn.edu](mailto:vdل@umn.edu)  
612-625-8787 or 800-605-8787

NDSU Veterinary Diagnostic Laboratory  
Van Es Hall 1523 Centennial Blvd.  
Fargo, ND 58102

Telephone 701-231-7527

Quality Milk Production Services Central Laboratory AHDC

240 Farrier Road Ithaca, NY 14853

607-255-8202

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(fax) 607-253-4000

(email) qmps@cornell.edu

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96 Grace Drive

Powell, OH 43065

Microbiology:

PetLabs

2510 Substation Rd

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North Ridgeville, OH 44039  
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503-247-8066

DHIA

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Mailing Address: P.O. Box 669 Maugansville, MD 21767  
UPS/FedEx Address: 14515 Industry Drive Hagerstown, MD 21742  
1-800-CVAS-LAB  
301-790-1980  
[www.foragelab.com](http://www.foragelab.com)  
[mail@foragelab.com](mailto:mail@foragelab.com)

Dairy One/ Agro-One Agronomy Services  
Livestock Water Analysis  
730 Warren Road  
Ithaca, NY 14850

Fax: 607-257-6808

[illegible]

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Bluetongue		Serum				
Johnes - Serology		Serum				
Johnes - Fecal Culture	Broth Culture	Feces				
BLV	Elisa	Serum				



## **January 2016 BOARD APPROVED CE**

- **Continuing Education Approval Requests – Veterinarians:**

Ms. Jones moved to accept the following continuing education with changes:

- A. Michigan VMA-Animal Welfare Conference, 11/23/2015 = **Hour for Hour**
- B. Kansas State University College of VetMed-Parasitic Gastrointestinal Diseases in Small Ruminants, 12/01/2015 = 0.5 hour
- C. Nashville Academy of Veterinary Medicine-Diabetes Management, 12/08/2015 = 2 hours
- D. Vetfolio/AAHA-
  - 1. Approach to the Ataxic Horse, 12/03/2015 = 1.5 hours
  - 2. Canine Hypothyroidism: Recognition and Management, 12/04/2015 = 1 hour
  - 3. Managing the Uncomplicated Feline Diabetic, 12/07/2015 = 1 hour
  - 4. What Do You Believe: Heartworm, 12/09/2015 = 1.5 hours
- E. Veterinary Oncology-Clinical Pathologic Conference, 12/09/2015 = 1 hour
- F. Chi Institute- **Hour for Hour – Non-Scientific**
  - 1. Certified Veterinary Acupuncture
    - a. Session 1, 01/01/2016 – 02/03/2016, ONLINE = 20 hours
    - b. Session 2, 02/4-7/2016 = 30 hours
    - c. Session 3, 02/08/2016-04/13/2016. ONLINE = 20 hours
    - d. Session 4, 04/14-17/2016 = 30 hours
    - e. Session 5, 06/23-26/2016 = 30 hours
  - 2. TCVM Diagnostics
    - a. Small Animal, 01/28-30/2016 = 20 hours
    - b. Small Animal, 01/01/2016-03/30/2016, ONLINE = 8 hours
    - c. Equine, 01/21-23/2016 = 20 hours
    - d. Equine, 01/01/2016-03/30/2016, ONLINE = 8 hours
  - 3. Certified Food Therapy
    - a. 03/10-13/2016 = 28 hours
    - b. 01/01/2016-12/31/2016, ONLINE = 28 hours
  - 4. Veterinary Herbal Medicine Program
    - a. Certified Herbal Medicine Intro, 01/01/2016-12/31/2016 ONLINE = 15 hours
    - b. Certified Veterinary Herbal Gastrointestinal, 01/01/2016-12/31/2016 ONLINE = 28 hours

- c. Certified Veterinary Herbal Respiratory/Cardio, 01/01/2016-12/31/2016  
ONLINE=28 hours
- d. Certified Veterinary Herbal Med Liver/Endocrinology, 01/01/2016-12/31/2016 ONLINE=28 hours
- e. Certified Herbal Medicine  
Kidney/Geriatric/Urinary/Reproductive, 01/01/2016-12/31/2016  
ONLINE = 28 hours
- f. Certified Herbal Medicine Dermatology/Oncology/Immune-mediate  
Diseases, 01/01/2016-12/31/2016 ONLINE = 28 hours
- g. Certified Veterinary Herbal Medicine  
Kidney/Geriatric/Urinary/Reproductive, 03/31/2016-04/03/2016 = 28  
hours
- h. Certified Veterinary Herbal Medicine Cardiovascular/Respiratory,  
11/17-20/2016 = 28 hours

G. Ohio Dairy Veterinarians-Social Media, Genetics and Reproduction, 01/07-09/2016 = **Hour for Hour**

H. Kansas State University Vet Med Online Seminar Series-

- 1. Herd Dilemmas for Sheep and Goat Veterinarians, 12/15/2015 = 0.5 hours
- 2. Neurologic Diseases of Small Ruminants, 12/16/2015 = 0.5 hours
- 3. Mycoplasma Haemollamae in Camelids, 12/17/2015 = 0.25 hours
- 4. Weight Loss in Camelids, 12/21/2015 = 0.5 hours

I. VCA Great Lakes Veterinary Specialists-Fracture Management: When to Cast and When to Plate, 01/27/2016 = 1 hour

Dr. Riker-Brown seconded the motion. The motion passed by the following roll call vote: Dr. Kolb – aye, Dr. Salinger – aye, Mr. Heston – aye, Dr. Redman – aye, Ms. Jones- aye, Dr. Riker-Brown - aye.

- **Continuing Education Approval Requests – Registered Veterinary Technicians:** None

- **Continuing Education Approval Requests – Vets & RVT's:**

Ms. Jones moved to accept the following continuing education with changes:

A. Summit County VMA –

- 1. Thoracic Radiography, 01/28/2014 = 2 hours
- 2. Joint Infections, 04/29/2014 = 2 hours
- 3. The Affordable Care Act and Fair Labor Laws, 05/27/2014 = 2 hours
- 4. Strokes and Seizures, 09/30/2014 = 2 hours
- 5. Platelet Problems, 10/29/2014 = 2 hours
- 6. Dental Tips and Tricks, 11/25/2014 = 2 hours

7. Greyhound Medicine, 04/28/2015 = 2 hours
8. Upper Airway Surgery, 05/26/2015 = 2 hours
9. Glaucoma, 09/29/2015 = 2 hours
10. Food Allergy Dermatitis, 10/27/2015 = 2 hours
11. Immunosuppressive Drugs for Immune-mediated Diseases, 11/24/2015 = 2 hours

B. Central Ohio Veterinary Medical Association-The Truth About Heart Worm Disease and the New Ora Vet Chews, 12/01/2015 = 2 hours

C. Zoetis Animal Health-

1. Overview on Peri-Operative Protocols; Pain Management and Sedation, 12/01/2015 = 2 hours
2. What's Bugging the Cat, 12/01/2015 = 2 hours

D. MedVet Medical and Cancer Centers for Pets-

1. Critical Care Rounds-Comprehensive Case Discussions, weekly starting 10/14/2015 = 0.5 hours
2. Anesthesia Monitoring, 11/16/2015 = 1 hour
3. Ophthalmology Wet Lab, 11/20/2015 = 0.5 hours
4. Ophthalmology Wet Lab & Videoconference Presentation, 11/20/2015 = 1 hour
5. The Cutting Edge of Radiation Oncology, 11/25/2015 = 1 hour
6. Indirect Blood Pressure Monitoring, 11/30/2015 = 0.5 hours
7. Radiology Techniques and Safety, 12/02/2015 = 2 hours
8. Surgery and Anesthesia Seminar, 12/06/2015 = 3.5 hours
9. Ferrets: Not your Average Adrenocortical Disease, 12/09/2015 = 1 hour

E. Lima Area Academy of Small Animal Medicine/Merial-Dental Extractions, 11/10/2015 = 2 hours

F. Animal Clinic Northview-2016 Biannual Breeders Symposium, 02/20/2016 = **Hour for Hour**

G. On-Line Continuing Ed, LLC- **Hour for Hour – Non-Scientific**

1. Diagnosis and Treatment in Equine Medicine 201, on going-ONLINE = 6 hours
2. Diagnosis and Treatment in Equine Medicine 202, on going-ONLINE = 6 hours
3. Diagnosis and Treatment in Equine Medicine 203, on going-ONLINE = 6 hours
4. Diagnosis and Treatment in Equine Medicine 204, on going-ONLINE = 6 hours
5. Diagnosis and Treatment in Equine Medicine 205, on going-ONLINE = 6 hours

6. Diagnosis and Treatment in Equine Medicine 206, on going-ONLINE = 6 hours
7. Diagnosis and Treatment in Equine Medicine 207, on going-ONLINE = 6 hours
8. Diagnosis and Treatment in Equine Medicine 208, on going-ONLINE = 6 hours
9. Natural Veterinary Medicine 201, on going-ONLINE = 6 hours
10. Natural Veterinary Medicine 202, on going-ONLINE = 6 hours
11. Natural Veterinary Medicine 203, on going-ONLINE = 6 hours
12. Natural Veterinary Medicine 204, on going-ONLINE = 6 hours
13. Veterinary Acupuncture 201, on going-ONLINE = 6 hours
14. Veterinary Acupuncture 202, on going-ONLINE = 6 hours
15. Veterinary Acupuncture 203, on going-ONLINE = 6 hours
16. Veterinary Acupuncture 204, on going-ONLINE = 6 hours
17. Common Diseases of Companion Animals 201, on going-ONLINE = 6 hours
18. Common Diseases of Companion Animals 202, on going-ONLINE = 6 hours
19. Common Diseases of Companion Animals 201-202, on going-ONLINE = 12 hours

H. VCA Great Lakes Veterinary Specialists-. What To Do With A Red Eye,  
Various dates in 11/2015 and 12/2015 = 1 hour

Dr. Riker-Brown seconded the motion. The motion passed by the following roll call vote: Dr. Kolb – aye, Dr. Salinger – aye, Mr. Heston – aye, Dr. Redman – aye, Ms. Jones- aye, Dr. Riker-Brown - aye.