

# Your Organic Dairy Herd Health Toolbox

Hubert J. Karreman, V.M.D.

July 16, 2012

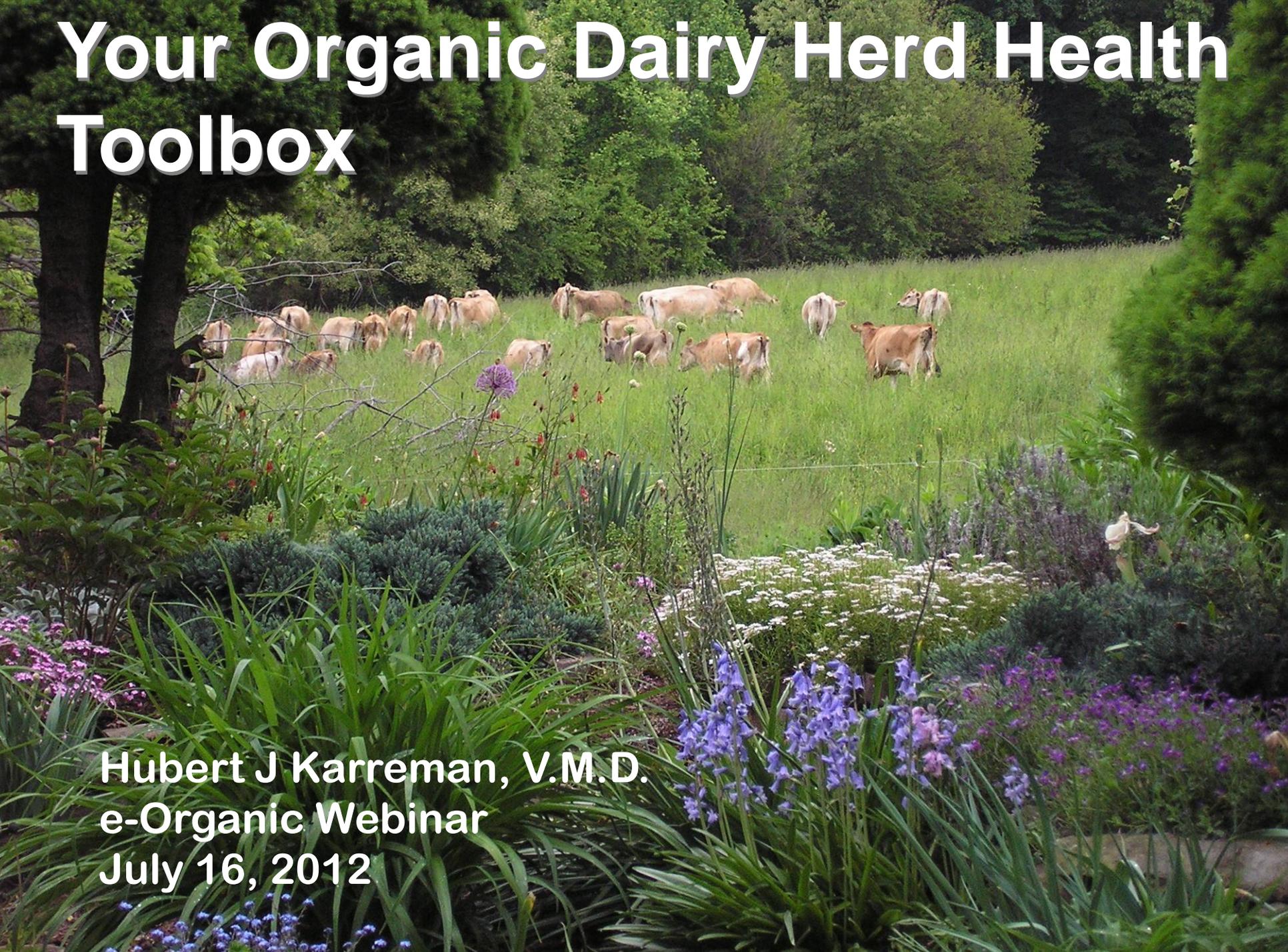
[http://www.extension.org/organic\\_production](http://www.extension.org/organic_production)





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# Your Organic Dairy Herd Health Toolbox

A herd of brown and white cows is grazing in a lush green field. The field is surrounded by dense green trees and bushes. In the foreground, there are various plants, including purple flowers and green foliage. The overall scene is a peaceful, natural setting for a dairy herd.

Hubert J Karreman, V.M.D.  
e-Organic Webinar  
July 16, 2012

# Goals of this Presentation

- (1) Basics of organic livestock health and care**
- (2) Challenges associated with treating organic livestock**
- (3) Modes of treatment**
- (4) Approaching problems & real cases**

# THE IDEAL

A farm is **biologically alive** and **self-sufficient**,

There is **biodiversity** within the farm ecosystem,

**Well mineralized soils** provide high quality forage,

**Feed and management** create **HEALTHY ANIMALS**,

The food product is **nutrient dense**,

The farm interacts with the **local community**



# Organic Goes Best if you...

**# 1 Mimic mother nature as closely as possible**

**# 2 Be Mindful: Observe + Adapt**

**# 3 Optimize Biological Carrying Capacity**



# Formula for healthy livestock:

## Dry bedding

+ Fresh air & Sunshine

+ Well managed pastures

+ High forage rations

+ Appropriate housing and ventilation



# Who decides about animal care?



What motivates us?

How do we go about doing things?

**Utilitarian**: focus only on usefulness rather than inherent beauty.

**Egoism/Hedonism**: do things mainly for self; not taking into account others.

**Altruism**: live to serve others, often at personal sacrifice.

**Mindfulness**



**vs.**

**Numbness**



# Animal Welfare in Food Production

- Assessment of **whole herd** as a group
- Assessment of **individual animals** within the whole herd

# Whole Herd Evaluation

- **Outcome-oriented**
- **Can objectively analyze** (yes/no questions)
- What **% of herd** is affected by condition of interest
- Allows farmer to figure out “how to get there”



# Individual Animal Evaluation

- Intention-oriented
- Duration of observed conditions
- Can objectively analyze (yes/no questions)
- Reveals underlying philosophy towards animals
- Might be difficult to change a person's attitude / motivation.

3 day old “emergency”





# CHALLENGE in USDA Certified Organic

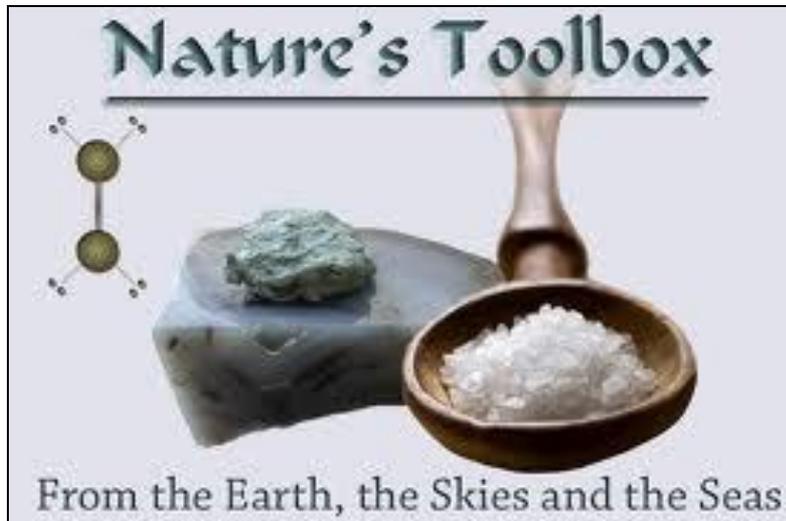
7CFR 205.238(c)(7) USDA NATIONAL ORGANIC PROGRAM

“The producer of an organic livestock operation must not withhold medical treatment from a sick animal in an effort to preserve its organic status.

All appropriate medications must be used to restore an animal to health when methods acceptable to organic production fail. Livestock treated with a prohibited substance must be clearly identified and shall not be sold, labeled, or represented as organically produced.”

# Which therapy do we utilize?

Always?



Never?



# The Antibiotic “Silver Bullet”

- “Regulations that hinder antibiotic use means animals will suffer!”
- True healing is based on the immune system
- Antibiotics aren’t *always* indicated (coliform, salmonella)
- Assumes conventional farms *always* use them right away
- **Safe statement:** Withholding an antibiotic, **IF** it is the appropriate treatment, can compromise animal welfare.  
**DON’T WAIT UNTIL ITS TOO LATE!!** (conventional or organic)



**For USDA Certified Organic Production:**

**Natural materials are allowed**

**unless petitioned to NOSB and subsequently prohibited by USDA**

**&**

**Synthetics materials are prohibited**

**unless petitioned to NOSB and subsequently allowed by USDA**

This is independent of FDA CVM; but FDA CVM is consulted by USDA



# SYNTHETIC SUBSTANCES ALLOWED FOR USE IN ORGANIC LIVESTOCK PRODUCTION

§7CFR205.603 as of June 2012

Extended Milk & Meat Withholding on certain items\*

- Alcohols (ethanol, isopropyl alcohol)
- Aspirin
- Biologics
- Butorphanol\* (via AMDUCA)
- Chlorine materials
- Calcium hypochlorite
- Chlorhexidine (alt. dip & vet. surgical use)
- Chlorine dioxide
- Copper sulfate
- Electrolytes
- FDA approved trace minerals
- Flunixin\* – as labelled
- Furosemide\* – as labelled
- Glucose/ Dextrose
- Glycerin (available in non-synthetic forms also)
- Hydrated lime (externally only)
- Hydrogen peroxide
- Iodine
- Lidocaine\*
- Magnesium sulphate
- Magnesium Hydroxide
- Mineral oil (topical and as a lubricant; not as a dust suppressant)
- Oxytocin (only in parturient emergencies)
- Parasiticides\* (ivermectin, moxidectin, fenbendazole; not routine use; only emergencies; not in slaughter stock)
- Phosphoric acid
- Poloxalene – for emergency use only
- Sodium hypochlorite
- Tolazoline\* (via AMDUCA)
- Xylazine\* (via AMDUCA)



# Petitioned but not approved by USDA (in consultation with FDA CVM)

No NADA for these, therefore also not allowed for conventional livestock.....

- **Calcium borogluconate** C/O: call them electrolytes, same CMPK, for hypertonic saline, lactated ringers solution, sodium iodide, etc, etc.
- **Propylene glycol.** C/O: use **glycerin**, if from plant sources
- **Activated Charcoal.** C/O: only if from plant sources
- **Bismuth subsalicylate.** C/O: If they eat...feed dry hay!
- **Kaolin pectin.** Natural should never have been petitioned

“**Regulatory Discretion**” is key, but it can’t be written into regs

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- **Epinephrine** – Secretary determined to be natural

What methods do we look to with restrictions upon commonly used inputs such as antibiotics ?

- Prior to the antibiotic era, people and animals **lived through challenges with infections.**
- People and animals **died** from infectious disease. **They still do...** *even with antibiotics.*
- When we look at the approaches used, we see **Biologics and Botanicals predominated**

# US Certified Organic regulations provide a **STRONG INCENTIVE** to try natural treatments in livestock



- **Complementary and Alternative Veterinary Medicine (CAVM)**

AVMA encourages CAVM modalities to be studied in order to demonstrate merits

- **Biologics**

Rational basis in therapeutics

- **Botanicals**

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- **Acupuncture**

Fairly well accepted

- **Homeopathy**

Not accepted



# BIOLOGICS:

STIMULATE and/or MODULATE THE IMMUNE SYSTEM

- Biologics are **derived from living organisms** (bacteria, fungi, viruses, and animals)
- Most widely used biologics are **vaccines** to stimulate IgG, IgA, etc. **Earliest vaccine: rabies.**
- **Therapeutic biologics** confer “passive” immunity, giving antibodies and anti-toxins to the recipient.
  - **Historical:** human diphtheria, human measles, hemorrhagic septicemia, equine influenza, hog cholera, white calf scours.
  - **Modern:** antitoxins and antibodies against rabies, snake bites, tetanus/lockjaw

# BIOLOGICS: HYPER-IMMUNE PLASMA

Antibodies and anti-toxins against gram-negative associated conditions (mastitis, pneumonia, salmonella)



# THERAPEUTIC BIOLOGICS

- **Plasmapheresis products:** Botulism antitoxin, Hyper-immune plasma, Plasma Gold
- **Serum products:** Bovi-Sera®, Bo-Bac 2X®, PolySerum® (conventional veal growers often use these)
- **Colostrum-whey products** (ultra-filtered whey): Biocel CBT®, Impro®
- **Bacterial cell wall fractionates:** Immunoboost®  
β-glucans (from mushrooms)
- **IgY**  
hyper-immune eggs (use free range)



# Immunoboost<sup>®</sup> (Bioniche Animal Health)

## Study at Vet Infectious Disease Organization in Saskatoon



- **Calves**: proven **immune stimulant**
- Stimulates **interferon  $\gamma$  +  $\beta$**
- Overcomes the natural immune suppression in calves at birth
- A **single dose** significantly increases the activated T-cells in the blood of newborn calves
- Lasts 10-15 days – the usual time span of neonatal E.coli & Rota/Corona infection
- 
- **Useful for high somatic cell count (SCC)**
- Dose: 1cc per 200 lbs SC, IM or IV

# Enhancement of Neutrophil Function by Ultra-filtered Bovine Whey

(Roth, et. al., J. Dairy Sci. 84:824-829)

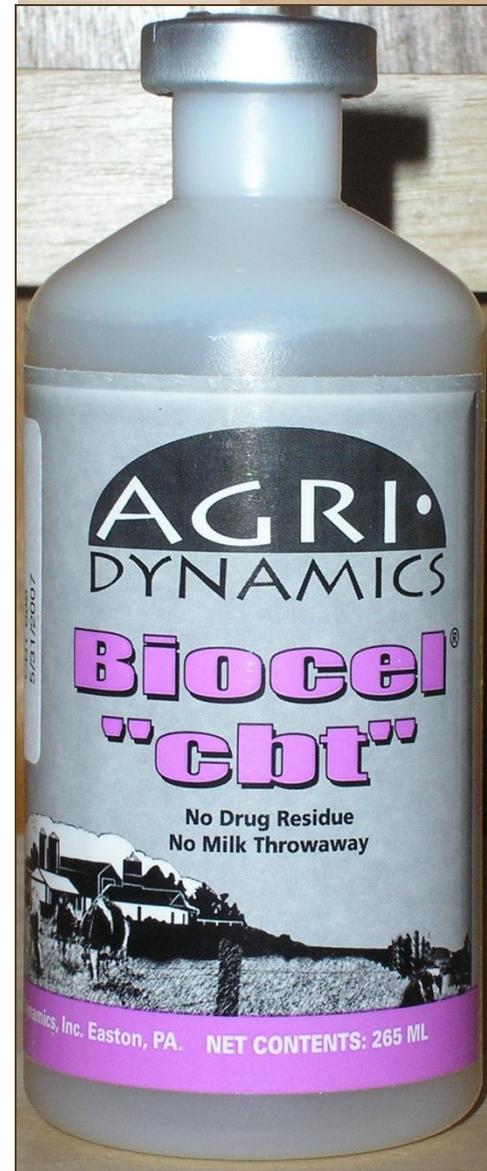
➤ **Goal:** Assess Impro product for influence on neutrophils from normal and dexamethasone treated cattle

## Calves' neutrophils *in vitro* :

➤ Significantly ↑ random migration, cytochrome C reduction, iodination activity, antibody dependent and independent cell-mediated cytotoxicity

## Peri-parturient cows *in vivo* :

➤ Significantly ↑ erythrocyte count and significantly ↑ neutrophil iodination activity (previously shown to be depressed in peri-parturient cows)





# Autogenous Biologics

Autogenous = derived from same patient into which it is then injected

**Cow's own milk** against Strep mastitis  
(A.S. Alexander, 1929):

**20cc clean looking milk subcutaneously every other day over 10 days, early in course of infection**

(know by monthly somatic cell count)

Sometimes hot reactions, but if so, will go away after 24 hours.

**\*\*\*Cows showing no reaction tended to cure\*\*\***

**Autogenous vaccines**: herd vaccines  
(killed): Staph, strep, coliform, pinkeye

# Plants: Nutrition & Medicine

Food

Herbs

Drugs



**NUTRITION**



**ZOOPHARMACOGNOSY**

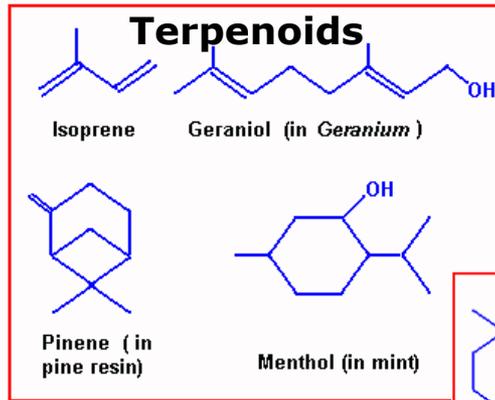
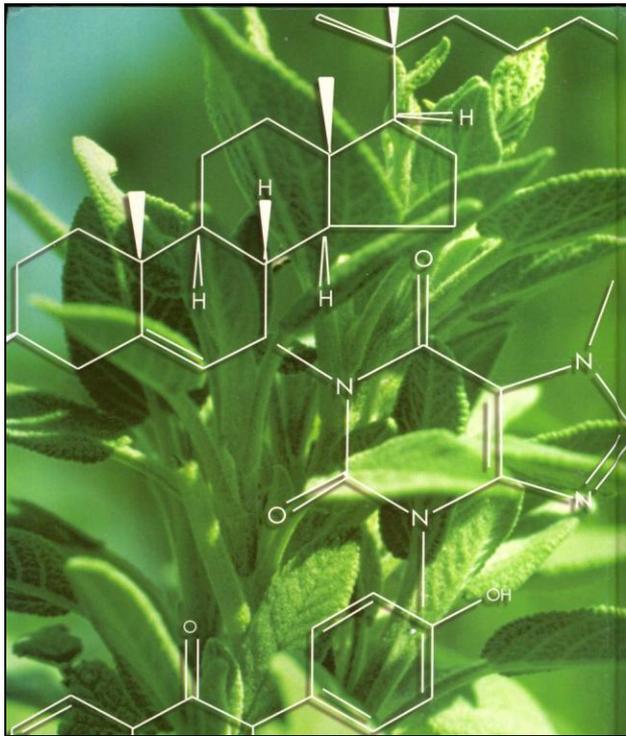


# PLANTS: Sources of Nutrition

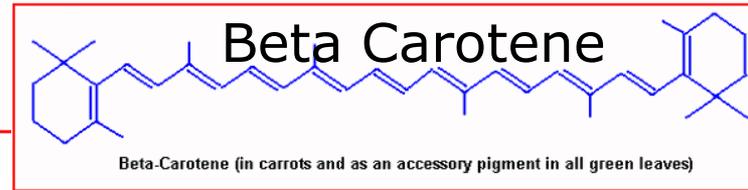
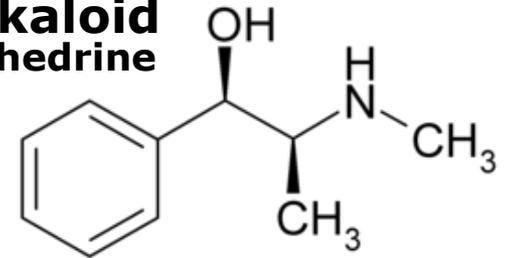
courtesy of Jerry Brunetti [www.agri-dynamics.com](http://www.agri-dynamics.com)

	Alfalfa	Dandelion	Chicory	Comfrey	Plantain	Nettle (leaf)	Burdock	Cleavers	Curly Dock	Yarrow (bloom)	Purslane
<b>Protein</b>	20.97%	25.00%	19.5%	23.7%	19.6%	25.7%	29.0%	11.7%	32.7%	15.2%	18.6%
<b>N:S</b>	11:1	10:1	8:1	14:1	6:1	4:1	5:1	7:1	15:1	14:1	12:1
<b>ADF</b>	32.1%	19.2%	32.8%	29.8%	34.1%	22.6%	25.1%	40.6%	19.5%	34.6%	26.4%
<b>NDF</b>	43.6%	30.0%	46.8%	42.2%	45.8%	34.4%	36.5%	49.1%	44.7%	43.0%	38.5%
<b>Relative feed value</b>	136.2%	229.0%	126%	145%	127%	193%	177%	108%	153%	134%	165%
<b>TDN</b>	63.89%	80.90%	63.5%	66.8%	64.4%	74.5%	71.8%	57.1%	77.8%	61.7%	72.9%
<b>ME (mcal/lb)</b>		1.33	1.04	1.10	1.06	1.22	1.18	0.94	1.28	1.01	1.2
<b>NE/Lact.</b>	0.65	0.85	0.65	0.69	0.66	0.77	0.75	0.58	0.81	0.63	0.76
<b>Calcium</b>	1.58%	1.04%	0.89%	2.73%	1.84%	4.38%	2.10%	1.3%	0.83%	0.99%	1.3%
<b>Phosphorus</b>	0.37%	0.33%	0.31%	0.20%	0.26%	0.41%	0.34%	0.39%	0.37%	0.43%	0.38%
<b>Potassium</b>	2.05%	4.46%	3.59%	3.94%	2.97%	3.01%	3.28%	2.46%	3.53%	3.25%	3.17%
<b>Magnesium</b>	0.46%	0.26%	0.26%	0.39%	0.17%	0.39%	0.43%	0.25%	0.64%	0.29%	0.8%
<b>Sulfur</b>	0.31%	0.41%	0.37%	0.27%	0.53%	0.94%	0.90%	0.26%	0.35%	0.17%	0.24%
<b>Iron ppm</b>	171	657	195	176	83	349	149	70	111	100	4419
<b>Cu ppm</b>	15	15	14	29	12	11	26	13	13	17	37
<b>Zinc ppm</b>	30	34	43	46	44	40	32	127	38	40	265
<b>Mn ppm</b>	23	35	36	192	30	36	47	66	36	71	163
<b>Boron ppm</b>	50	30	28	42	29	67	32	15	31	26	29

# PLANT SECONDARY METABOLITES: Sources of Medicine

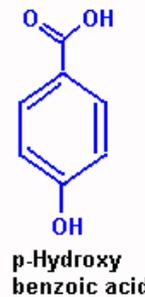
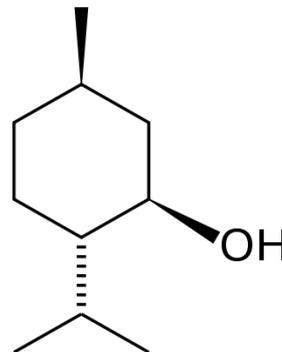


**Alkaloid**  
**Ephedrine**

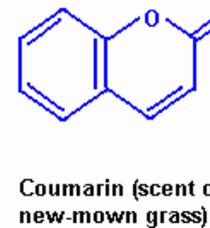


**Essential Oils**

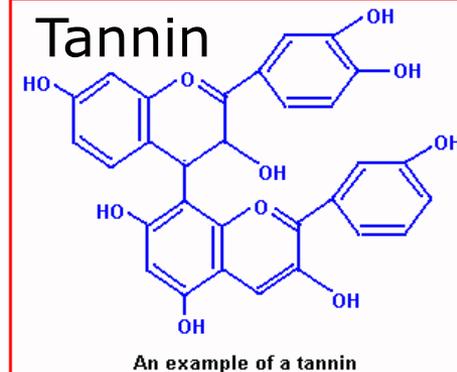
**Menthol**



**Phenolics**



**Tannin**



# Forms of plant medicine

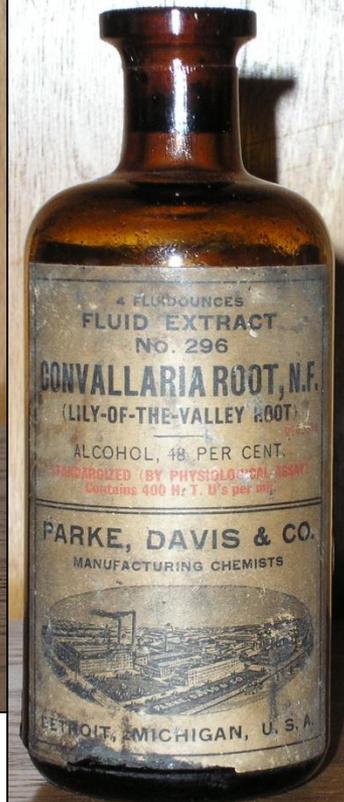


- Dry herb
- Infusions/decoctions (tea): water
- Syrups: alcohol, but sweetened
- Extracts: evaporation alcoholic and aqueous
- Fully dehydrated extracts: powdered solid extracts
- Tinctures: percolation with alcohol (1:2 – 1:10)
- Fluid extracts: percolation with alcohol (1:1)
- Essential Oils: distillation



# Plant medicines were basis of pharmaceutical company success

(Lilly, Wyeth, Parke Davis, Sharp & Dohme)



# CONVENTIONAL VETERINARY DOSES

Dr. Pierre Fish, 1930, Dean of Cornell Veterinary School

	<u>Horse &amp; Cattle</u>	<u>Sheep &amp; Swine</u>		<u>H&amp;C</u>	<u>Sh&amp;Sw</u>
<u>Oral doses (cc)</u>					
• Aconite T	0.2-6	.25-1	• Nux vomica T.	4-24	1.3-2.6
• Arnica T.	15-30	4-8	• OpiumT/paregoric	60-120	15-30
• Belladonna T.	15-30	4-8	• Phytolacca F.E.	4-8	1.3-3
• Bryonia T.	15-30	2-4	• Pomegranate	30-60	4-12
• Calendula T.	15-30	4-8	• Pulsatilla F.E.	2-8	0.3-0.6
• Chenopodium O.	6-12	0.6-1.3	• Quercus alba F.E	15-30	4-8
• Cimicifuga T.	30-90	8-15	• Ruta Oil	2-4	.13-.6
• Colchicum Root T	15-45	4-6	• Sabina F.E.	30-60	2-4
• Convallaria T.	4-8	0.6-1.3	• Sabina Oil	8-15	0.5-1
• Cotton Root Bark	15-60	4-8	• Sanguinaria F.E.	4-24	0.6-2
• Digitalis T.	12-24	3-10	• Santonin	15-30	4-8
• Ergot T.	15-60	4-15	• Stramonium T.	4-8	0.6-2
• Eucalyptus <u>Oil</u>	8-15	1.3-3.3	• Taraxacum F.E.	30-60	8-15
• Fennel T.	30-60	8-12	• Thymol	2-8	0.3-2
• Gelsemium T.	15-60	4-12	• Ustilago F.E.	15-60	2-4
• Gentian F.E.	15-30	4-8	• Veratrum vir. T.	8-12	2.6-4
• Glycyrrhiza	15-60	4-15	• Vinegar	30-120	2-8
• Hydrastis T.	30-60	4-15	• Wintergreen Oil	8-30	2-8
• Male Fern F.E.	12-24	4-8	• Zingiber T.	30-60	8-15
• Mentha piper. O.	1-2	0.3-0.6	• Zingiber F.E.	8-30	4-8
• Morphine	.2-.6g	<0.13g			



# USP & NF 2002

- USP –

- aloe
- belladonna
- capsicum
- colloidal oatmeal
- elm
- eucalyptol
- eugenol
- ipecac
- juniper tar
- myrrh
- opium
- paregoric
- plantago seed
- Podophyllum
- psyllium
- pyrethrum
- quinine
- rauwolfia
- senna
- thymol
- tolu balsam
- witch hazel
- yohimbine

- NF –

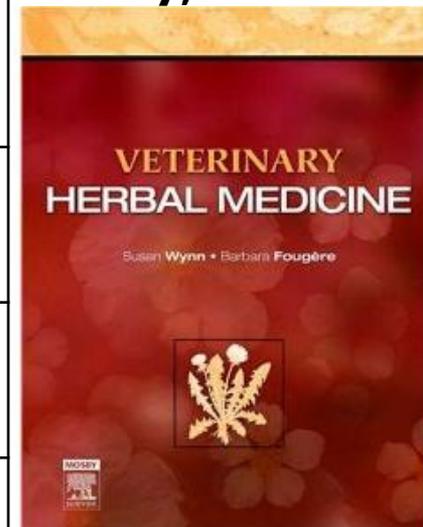
- Acacia
- carnauba wax
- chamomile
- feverfew
- garlic
- ginger
- ginkgo
- ginseng
- licorice
- milk thistle
- olive oil
- peppermint
- rose water
- saw palmetto
- St. Johns wort
- tragacanth
- valerian
- white wax
- yellow wax
- zein



## Common Dosages for HERBIVORES

Preparation	Goat	Cow	Horse
Decoction	4 oz	12 oz	8 oz
Extract powder	1 tsp	2 T	2T
Extract tablet	3-5	10-15	10-15
Freeze-dried granules	1 tsp	2 T	2 T
Tincture	1 tsp	2 T	2-3 T

Wynn + Fougere  
Mosby, 2007



**T = Tablespoon roughly = to 15cc**

Herbivores may respond more efficiently!



# Dr. Duke's Phytochemical and Ethnobotanical Databases

[www.ars-grin.gov/duke/](http://www.ars-grin.gov/duke/)

**GARLIC**: ALLICIN **Bulb** 1,500 - 27,800 ppm; ALLIIN Bulb 5,000 - 10,000 ppm; ALLYL-PROPYL-DISULFIDE Bulb 36 - 216 ppm

Amebicide 30 ug/ml;  
Antibacterial 500 ug/ml MIC=27 ug/ml;  
Antioxidant 1.8 ug/ml;  
Antiprostaglandin IC67=50 uM  
Antistaphylococcic MIC=27 ug/ml;  
Antitubercular MIC=1.67 mg/ml;  
Candidicide MIC 7 ug/ml;  
Gram(+)icide 8-12 ppm;  
Hepatotoxic 100 mg/kg/day (=500 cloves a day)  
Mycobactericide MIC=1.67 mg/ml;  
NO-Inhibitor IC50=2.5-5 uM;

**GOLDENSEAL**: BERBERINE **Root** 5,000 - 60,000 ppm; HYDRASTINE Plant 15,000 - 40,000 ppm

Antibacillus MIC=200 ug/ml  
Antibacterial GMJ 100 mg 4x/day  
Anticholera 150 mg/man/day  
Antigiardial 10 mg/kg/day  
Antimalarial 0.14-0.36 ug/ml  
Antiplasmodial IC50=0.14-0.36 ug/ml  
Antipyretic 3 x aspirin  
Antiseptic PMP23:51 25 ug/ml  
Antishigellitic 12.5 ug/ml  
CNS-Stimulant 1/6 Caffeine  
COX-2-Inhibitor 100 ug/ml  
Fungicide 12.5-150 ug/ml  
Larvicide 9 ppm  
Lipoxygenase-Inhibitor IC23=5 mM  
Mycobactericide MIC=25-50 ug/ml  
Prostaglandin-Synthesis-Inhibitor 25 mg/kg ivn rbt  
Vasodilator 2 mg/kg cat

**BARBERRY**: BERBERINE **Plant** 10,000 - 30,000 ppm

Amebicide 200 ug/ml  
Antibacterial 20 ug/ml 100 mg/4x/day  
Antigiardial 10 mg/kg/day  
Antiinflammatory 411 20-150 mg/kg  
Antioxidant 4.7 x Vit. E; 1/3 quercetin  
Antipyretic 3 x aspirin  
Antistreptococcic ID50=120 ug/ml  
Bacteristat 10 mg/ml  
Fungicide 20 ug/ml  
Larvicide 9 ppm  
Larvistat 8,000 ppm diet  
Mycobactericide MIC=25-50 ug/ml

**WILD INDIGO**: BAPTISINE **Root** GENISTEIN **Leaf**

Antibacterial MIC=500 ug/ml  
Antiinflammatory 1-10 ug/ear  
Antiviral 11-23 ug/ml  
Fungicide ED50=250-350 ug/ml  
Fungistat IC34=200 uM  
Immunostimulant 2-20 mg/kg

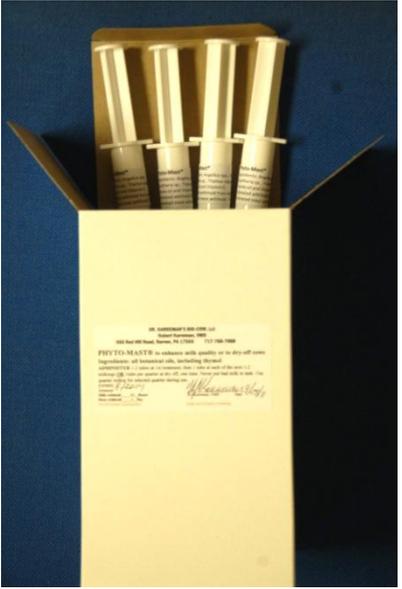
**RED GINSENG** GINSENOSIDE-RC **Flower** 2,000 ppm;  
Fruit 1,000 ppm; Leaf 2,000 ppm; Root 3,000 ppm

Antibacterial MIC=625-1,250 ug/ml  
Antiinflammatory 10-200 mg/kg orl  
Antimalarial IC50=70-89 ug/ml  
Antioxidant BCI28:735 3/4 quercetin  
Fungicide 20 ug/ml  
Prostaglandin-Synthesis-Inhibitor 500 ug/ml

# Herbal Vitality:

GMP facility

Sedona, Arizona



# CLINICAL MASTITIS

**Phyto-Mast®** *Gaultheria, Glycyrrhiza, Thymol (10%) Radix Angelica sinensis, Radix Angelica dahuricae, Oleum Brassica campestris q.s.* intramammary tubes

**Phyto-Mast:** All ingredients are GRAS

Available in 15cc infusion tubes

2 tubes 1<sup>st</sup> dose then 1 tube at the next 2 milkings.

Withhold milk: 12 hours

Withhold meat: 1 day

## CLINICAL STUDIES:

- 1) NC State / FARAD residue study with lactating goats (Student Case Sessions at AABP 2010)
- 2) Aurora Organic Dairy in Colorado and U. of Florida clinical trial with lactating cows (poster at AABP 2010)
- 3) NC State clinical trial for dry cows (Goldsboro)
- 4) NC State 2<sup>nd</sup> clinical trial dry cows (Goldsboro)
- 5) NC State 3<sup>rd</sup> clinical trial dry cows (private farms)
- 6) UVM and U Conn doing in vitro work
- 7) Wageningen, NL clinical trial on an organic farm with lactating cows



Needs a vet label





# Efficacy of a Botanical Preparation for the Intramammary Treatment of Clinical Mastitis on an Organic Dairy Farm

P. Pinedo<sup>1</sup>, H. Karreman<sup>2</sup>, H. Bothe<sup>3</sup>, C. Risco<sup>1</sup>, J. Velez<sup>2</sup>

College of Veterinary Medicine, University of Florida<sup>1</sup>, Gainesville, FL; Penn Dutch Cow Care<sup>2</sup>, Narvon, PA; Aurora Organic Dairy<sup>3</sup>, Platteville, CO

## INTRODUCTION

Clinical mastitis is an economically important disease and constitutes a major reason for antibiotic use in conventional dairy farms. In contrast, organic dairy farms are restricted in the use of antibiotics, resulting in a reduced availability of therapies for treatment of clinical mastitis. Consequently, alternative medications to antibiotics for effective treatment of clinical mastitis would be beneficial to organic dairies.

## OBJECTIVE

The objective of this study was to evaluate the efficacy of a botanical preparation (PHYTO-MAST<sup>®</sup>) in the treatment of clinical mastitis in dairy cows.

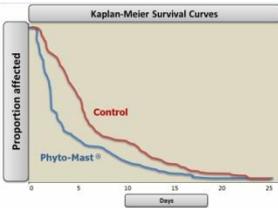
## MATERIAL AND METHODS

**Study Population:** 1200 Holstein cows in an organic dairy farm located in Platteville, Colorado (USA).

**Treatment allocation:** The study included 194 cases of clinical mastitis from February to September, 2009 in 163 cows. First to 6<sup>th</sup> lactation cows with clinical mastitis were randomly assigned to treatment (PHYTO-MAST<sup>®</sup>; n=88) or control (n=75) groups, resulting in 101 quarters allocated for treatment and 93 quarters allocated for control.

**Treatment:** Treatment was applied for 3 days and cows were evaluated for clinical cure on day 4. Cows that continued to have mastitis on day 4 were evaluated daily until the resolution of the clinical condition.

**Statistical analysis:** Outcomes consisted of mastitis resolution at day 4, time to resolution, somatic cell score (SCS) after recovery, and bacteriological cure at 14 and 28 d after treatment. Data were analyzed by Chi square test (PROC FREQ, SAS) and logistic regression (PROC GLIMMIX, SAS). Time analyses were performed using the PROC LIFETEST and PROC PHREG procedures (SAS). Reduction in SCS was tested by analysis of variance (PROC GLM, SAS).



**Figure 1** Kaplan-Meier survival curves for the interval between end of treatment (d 3 after CM onset) and recovery in control and treated cases

## CONCLUSION

Treatment with the botanical preparation (PHYTO-MAST<sup>®</sup>) had a positive effect on the time to recovery from clinical mastitis and increased the rate of bacteriological cure (day 14) together with improving the reduction of SCS post treatment. This preparation may represent an alternative for the treatment of clinical mastitis in organic dairy farms.



NC STATE UNIVERSITY  
Abstract #39570

# Effectiveness of an herbal remedy compared to control or traditional therapy in dry off treatments

K. A. E. Mullen,<sup>a</sup> K. L. Anderson,<sup>b</sup> S. P. Washburn<sup>a</sup>

<sup>a</sup>College of Agriculture and Life Sciences, <sup>b</sup>College of Veterinary Medicine, North Carolina State University Raleigh, NC



## Introduction

Dry cow therapy at the end of lactation is aimed at eliminating current and preventing future intramammary (imm) bacterial infections. Dry cow therapy conventionally uses antibiotics. Certified organic dairies are restricted from antibiotic use and thus must use an alternative or no dry cow therapy. Here we used 150 Holstein, Jersey, and crossbred cattle to compare an herbal treatment (Phyto-Mast, imm, Penn Dutch Cow Care, Narvon, PA) to conventional treatment (Quartermaster, imm + Obeseal, internal teat sealant, Pfizer Animal Health) or no dry cow therapy.

## Objective

To compare the efficacy of three different dry off treatments by evaluating (1) milk production, (2) somatic cell score (SCS) and (3) milk microbiology for all animals in the study.



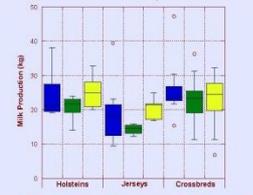
## Materials and Methods

Holstein, Jersey, and crossbred cattle were assigned to three treatments of 40 cows and 10 heifers each, balanced by breed, age, and date.

- Milk production and SCS:
- Obtained from Dairy Herd Improvement Association (DHIA) monthly tests
- Used last test before dry off and first test postpartum
- Analyzed using SAS statistical software (Cary, NC) MIXED procedure for effects of treatment on production and SCS
- Milk microbiology:
- Duplicate quarter samples were aseptically collected immediately before treatment and three days postpartum
- Samples were assessed at the Mastitis and Milk Microbiology Laboratory in the College of Veterinary Medicine
- Culture results were analyzed by comparing presence of bacteria in pre- and post-treatment samples
- Differences between treatments were analyzed using the SAS LOGISTIC procedure

## Results

First Test Date Milk Production by Treatment and Breed



Treatment did not significantly affect (p>0.05) subsequent milk production for cows or heifers.

Milk Microbiology: quarters cured or with new bacteria per # quarters treated	Treatment		
	None	Phyto-Mast	Conventional
Cure: bacteria present pre-treatment but not present post-calving	14/30 = 47%	11/27 = 41%	28/41 = 68%
New bacteria present post-calving; number of quarters with 2+ new bacteria	31/75 = 41%	28/75 = 37%	12/75 = 16%

<sup>a</sup>Values with different superscripts (within a row) differ significantly (p<0.05)



## Summary

- No significant differences were observed among treatments in first postpartum test day milk production or SCS.
- Conventional treatment had a higher cure rate and a lower new infection rate.
- When compared to no treatment, Phyto-Mast had fewer new infections during the dry period.

## Conclusion

Cows treated with the herbal preparation, Phyto-Mast, at dry off had fewer new infections than no preparation. Conventional antibiotic therapy is effective, but not an option for certified organic dairies. Although not as effective as conventional antibiotic therapy, Phyto-Mast could be a potentially useful dry off treatment for organically certified dairies currently not using dry therapy.

## Acknowledgements

- Dr. Hue Karreman, Penn Dutch Cow Care, Narvon, PA
- Roberta Lyman, Mastitis and Milk Microbiology Laboratory, NCSU CVM
- Southern Region SARE, Program
- Windy Wainwright and James Cooley, Center for Environmental Farm Systems, Chery Research Farm, Goldsboro, NC

# Efficacy of Two Herbal Remedies as Alternatives to Antibiotics in Dry Cow Therapy: Preliminary Microbiology Results

Keena A. E. Mullen<sup>1</sup>, Roberta L. Lyman<sup>2</sup>, Steven P. Washburn<sup>1</sup>, and Kevin L. Anderson<sup>2</sup>  
<sup>1</sup>Animal Science Department <sup>2</sup>Department of Population Health and Pathobiology



## Introduction

Mastitis, or udder inflammation, is a costly disease for the dairy industry that causes economic losses of \$1.8 billion annually<sup>1</sup> and is often caused by bacterial infection. Dairy cows are often treated with intramammary antibiotics during the non-lactating, or "dry" period, to cure existing infections and prevent future infections. An internal teat sealant can be used with an antibiotic to seal the teat from bacterial entry during the non-lactating period. Few thoroughly studied alternatives to antibiotics for dry cow therapy exist. Two herbal products, Phyto-Mast<sup>®</sup> and Cimnabute<sup>®</sup>, are commercially available and could be viable replacements for traditional antibiotic + teat sealant dry cow therapy.

Phyto-Mast is a blend of botanical oils, including thyme, labeled for intramammary use in lactating or dry cattle to improve milk quality. Cimnabute is a blend of botanical oils, including cinnamon oil, labeled for intramammary use in dry cows as an internal teat sealant.

## Objective

To compare the efficacy of two herbal remedies separately and used together as dry cow treatment versus positive (Quartermaster<sup>®</sup> antibiotic + Obeseal<sup>®</sup> internal teat sealant) and negative (no treatment) controls.

## Materials and Methods

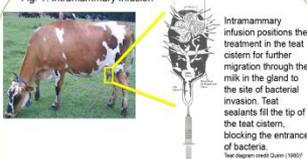
216 Holstein, Jersey, and Holstein x Jersey crosses were assigned to one of 5 treatments: 1) Positive control = Conventional; 2) Cimnabute; 3) Phyto-Mast + Cimnabute; 4) Cimnabute; or 5) no treatment.

Duplicate milk samples were aseptically collected from each functional quarter of each cow immediately before treatment and three to five days postpartum.

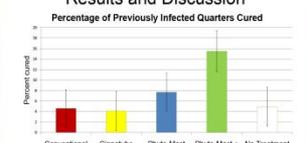
Samples were assessed at the Mastitis and Milk Microbiology Laboratory in the College of Veterinary Medicine. Culture results were analyzed by comparing presence or absence of bacteria in pre- and post-treatment milk samples.

Differences between treatments were reported using the GLIMMIX procedure of SAS. Means reported are least-squares means.

Fig. 1. Intramammary Infusion

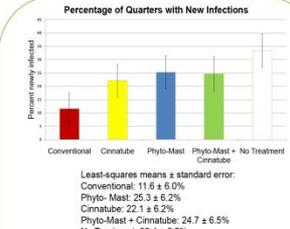


## Results and Discussion



Least-squares means ± standard error:  
 Conventional: 4.6 ± 3.0%  
 Phyto-Mast: 7.7 ± 3.7%  
 Phyto-Mast + Cimnabute: 15.5 ± 3.9%  
 Cimnabute: 4.1 ± 3.7%  
 No Treatment: 4.9 ± 3.7%

The combination of Phyto-Mast + Cimnabute was significantly (P<0.05) better than all other treatments at curing existing infections. It is possible that the two herbal treatments worked synergistically to eradicate bacterial presence. Thymol and trans-cinnamaldehyde, a component of cinnamon oil, have both shown antibiotic activity against mastitis pathogens *in vitro*. Percentages given are the percent of quarters per cow infected at time of treatment that were not infected post-calving.



Conventional treatment was most successful at preventing new infections post-calving. Its numerically lower percentage of quarters infected indicates that the antibiotic plus teat sealant was the most effective at preventing bacterial entry into the teats. Percentages given are the percent of quarters per cow not infected at time of treatment that were infected post-calving.

## Conclusions

Based on preliminary microbiology results, Phyto-Mast and Cimnabute used together was the best option for curing existing infections during the dry period whereas conventional treatment was more successful in preventing new infections.

## Acknowledgements

Southern SARE Graduate Student Grant GS10-094 "Evaluation of Herbal Remedies as Alternatives to Antibiotic Therapy in Dairy Cattle"

## References

- <sup>1</sup>Current Concepts of Bovine Mastitis, #1 ed. 1996. National Mastitis Council, Verona, WI
- Phyto-Mast is a product of Penn Dutch Cow Care, Narvon, PA
- Cimnabute is a product of New Northstar Enterprises, Locke, NY
- Quartermaster and Obeseal are products of Pfizer Animal Health, United States
- Quinn, T. 1980. Dairy herd management. New York: Reinhold Publishing Co., New York
- Keena A. E. Mullen, S. P. Washburn, B. M. Anderson, and K. L. Anderson. 2009. Antibacterial effect of plant-derived antimicrobials on major bacterial mastitis pathogens *in vitro*. Journal of Dairy Science 92: 3423-3429

## Introduction

- The organic dairy industry is growing at approximately 20% per year and currently comprises about 3% of dairy milk sales.
- Organic dairy animals may not be given antibiotics or dewormers.
- Producers are not to withhold treatment from sick animals.
- There are no FDA approved mastitis treatments for organic production.
- Antibiotics, bactericidal products, herbal medicine, homeopathy, where products, vitamin supplements.
- Phyto-Mast is a plant-based mastitis treatment used in organic dairy animals (Table 1).
- Indicated for use in lactating cows with clinical mastitis.
- Approved by the Ohio Ecological Food & Farm Association (OEFA).
- Many farms known about the uptake, distribution, and clearance of this product in milk.

## Hypothesis

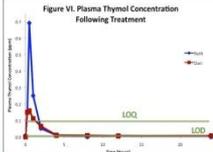
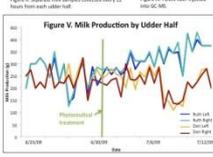
- Phytochemical levels in milk and blood are quantifiable using volatile active ingredients as biomarkers of exposure.
- Phyto-Mast + Cimnabute used together will be more effective at curing existing infections during the dry period.
- To determine appropriate withdrawal time for milk following treatment using gas chromatography with mass spectrometry (GC-MS).

## Materials & Methods

- Animals and Treatment**
  - Two healthy, lactating Holstein dairy goats (as a model for dairy cows).
  - Collected baseline milk and plasma to determine background levels of thymol and other active components.
  - Treated with phyto-mast (100 µl per udder half) via intramammary infusion (Figure 1).
- Sample Collection**
  - Blood samples taken collected at 3, 30, and 60 minutes, and at 2, 4, 8, 24, 36, 48, and every 24 hours for 10 days after treatment.
  - Milk samples every 12 hours from 30 minutes (Figure 2), and samples for culture at 0, 24, 72, and 120 hours.
  - Culture Mastitis Test (CMT) at every milking (Figure 3).
  - Goats monitored for changes in vital signs and udder inflammation.
- Analytical Chemistry**
  - Developed headspace assay with a 100µm polydimethylsiloxane fiber to detect thymol in milk and plasma.
  - Samples heated to 37 °C and agitated for 5 minutes, fiber exposed to headspace above a 1 ml sample in sealed vial for 20 minutes, then injected into chromatograph with mass spectrometry (GC-MS) via a column temperature of 280 °C and run for 17.5 minutes (Figure 4).
  - Purified chemical standards for thymol and methyl salicylate, active ingredients in Phyto-Mast, were used to create a standard curve for quantification.

# Finding Phyto-Mast: Determining Withdrawal Time of a Phytochemical Mastitis Treatment in Lactating Dairy Goats

McPhee CS, Anderson KL, Baynes RE  
 Department of Population Health and Pathobiology, College of Veterinary Medicine, NC State University, Raleigh, NC



## Results

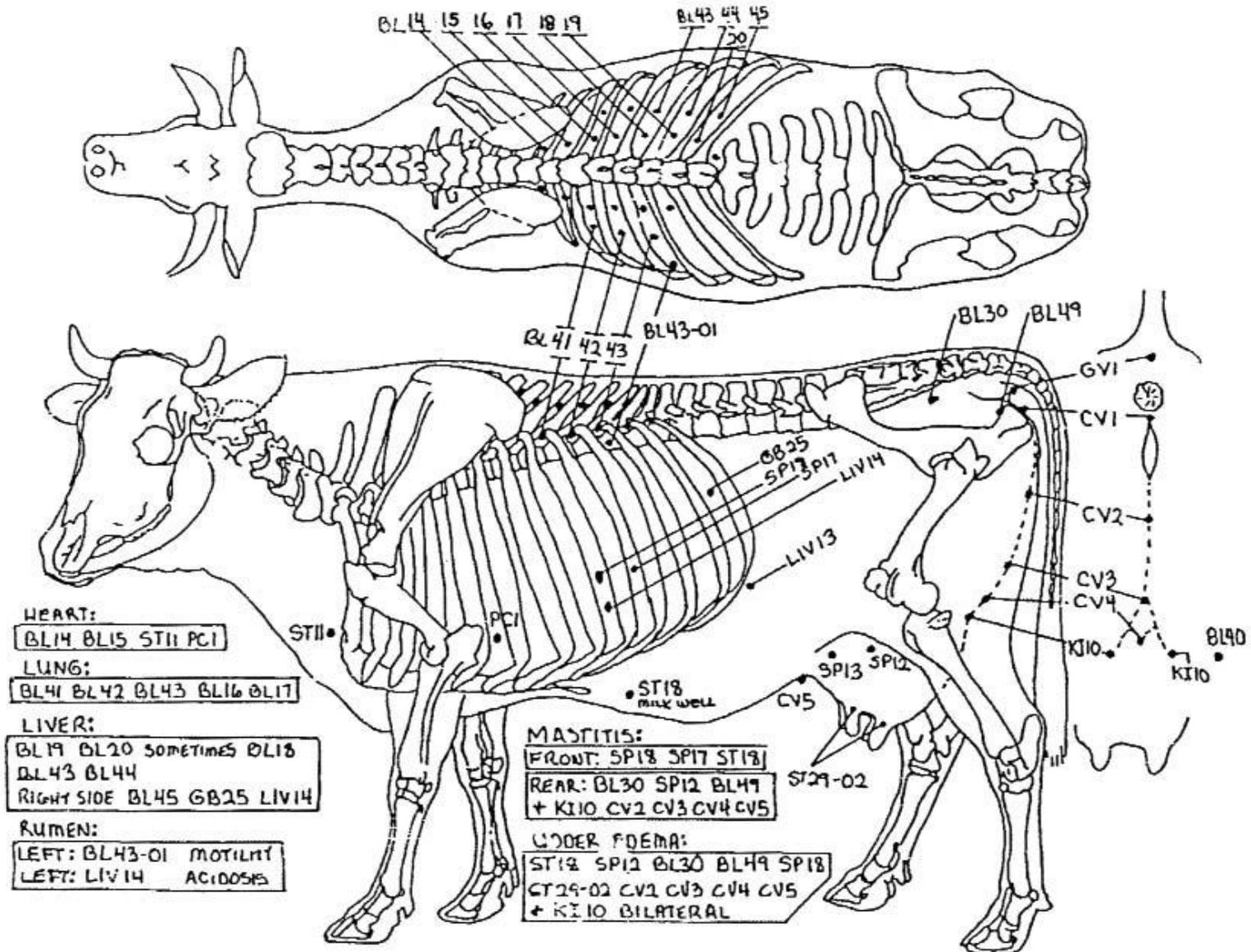
- Following Phytochemical Treatment**
  - Animals displayed no clinical signs of illness, and vital signs remained within normal limits.
  - No perceptible change in udder conformation.
  - Milk samples remained culture negative.
  - CMT results were not substantially altered by treatment.
  - No marked change in milk production (Figure V).
- GC-MS Analysis**
  - Thymol detected at retention time = 7.44 min.
  - For thymol, limit of quantification (LOQ<sub>thymol</sub>) was = 0.1 parts per million (ppm); limit of detection (LOD<sub>thymol</sub>) = 0.005 ppm, LOQ<sub>ms</sub> = 0.01 ppm.
  - Methyl salicylate detected at retention time = 7.53 min, (LOD = 0.01 ppm). Not detected in any study milk or plasma samples.
  - Thymol detected in plasma samples beginning at 15 minutes post treatment (Figure VI).
  - Maximum plasma levels at 30 minutes post-treatment.
  - Thymol levels detected in 12-hour post-treatment milk samples (Figure VII).
  - Apparent half-life of thymol in plasma = 30-40 minutes
  - Thymol only detected in 12-hour post-treatment milk samples (Figure VIII).

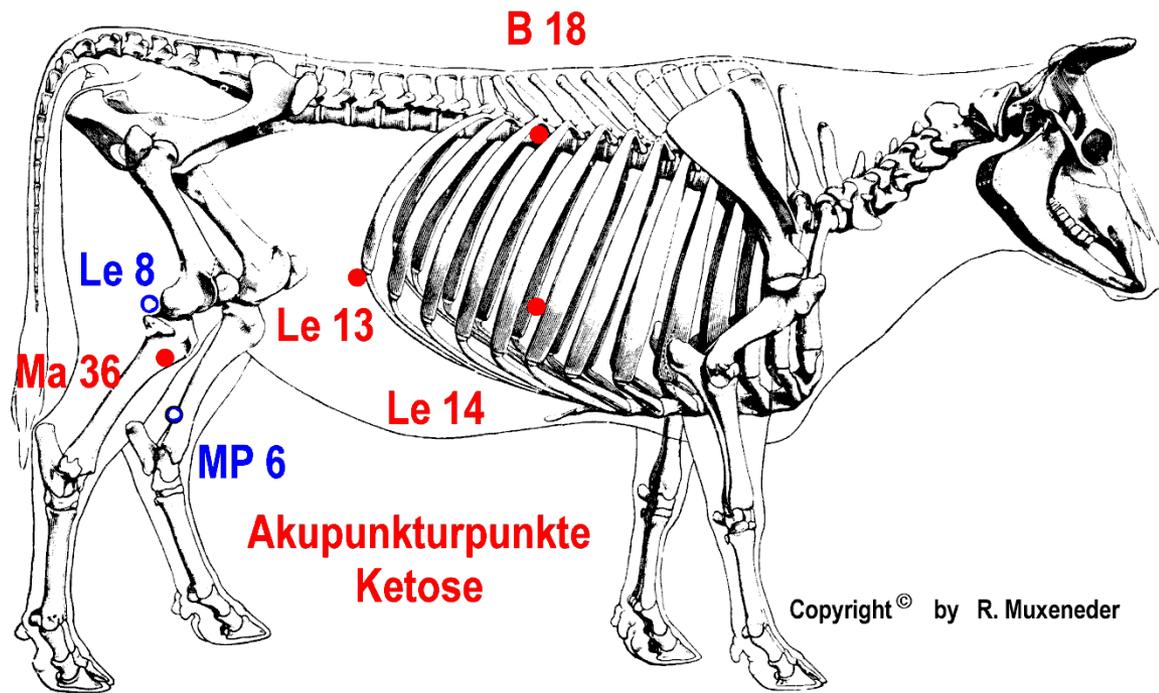
Ingredient	Chemical name	Activity
Thymus vulgaris	Carvacrol	Antibiotic
Thymus vulgaris	Thymol	Antibiotic
Quercus agrifolia	Oil of wintergreen	Masking
Quercus agrifolia	Salicylic acid	Antiseptic, anti-pyretic
Glycyrrhiza glabra	Chicoric acid	Anti-inflammatory, astringent
Salvia officinalis	Salicylic acid	Anti-inflammatory, astringent
Angelica sinensis	Angelica glycerol	Anti-inflammatory, antimicrobial, irritant

## Conclusions

- Demonstrated that a phytochemical can be traced in the milk and plasma following intramammary treatment using thymol as a marker.
- Headspace analysis with GC-MS is a useful tool in quantifying thymol in biological matrices.
- Based on use of thymol as a biomarker, other ingredients in this phytochemical with similar chemical properties are less likely to remain in the plasma or milk beyond 24 hours.
- Future work:
  - Follow pilot study with 4 or 5 more doses to ensure repeatability.
  - Investigate other Phyto-Mast chemical in milk and plasma samples, (ie. Glycyrrhiza, methyl salicylate).
  - Test in dairy cows with recommended dose (12 cc per quarter for a consecutive milking).
  - Investigate other products to develop and advocate safe withdrawal times for mastitis treatment used in organic dairy production.
- Approaching the issue of the human health safety of trace phytochemicals in organic milk would be difficult and costly. A useful alternative is to analyze biological markers in animals following treatment. Understanding the pharmacokinetics of active ingredients used in dairy production will lead to accurate withholding recommendations and improve organic milk safety.
- Acknowledgements**
  - George H. Hitching, New Investigator Award (Burroughs Wellcome Foundation)
  - USDA National Research Assistance Dashboard
  - NCU Center for Chemical Toxicology Research and Pharmacokinetics Laboratory Staff
  - Goats and care were supported by a donation to "Revive Research and Development Fund" (Dr. Kevin Anderson) from Robert E. and Rebekah Karaman of Penn Dutch Cow Care, Narvon, PA. (Developer & distributor of Phyto-Mast)
  - USDA Metabolism Educational Unit
- References**
  - Organic Trade Association. (2009). "Organic Dairy Production." Retrieved July 6, 2009. From <http://www.ota.org/Organic/>
  - Dairy Production. (2009). "Organic Dairy Production."
  - Runge, P. L. (2009). "Management of mastitis in organic and conventional dairy farms." *Journal of Dairy Science* 92: 43-55.
  - USDA Agricultural Marketing Service. (2008). Milk Sales Data, Monthly Reports.

# ACUPUNCTURE: Dry needles, Vit B12, Electro AP





**Ketosis**

**BI 18**

**Le 13**

**Le 14**

**Ketosis**

**BI 18**

**Le 13**

**Le 14**

# HOMEOPATHY

- Uses extremely diluted substances to help stimulate the vitality of the patient.
- 1X...2X...3X...12X....12C....30C....200C
- Clinical prescribing and assessment is very individualized and takes into account behavioral, emotional and psychological indications.
- Lots of cases of information regarding successes attributed to it.

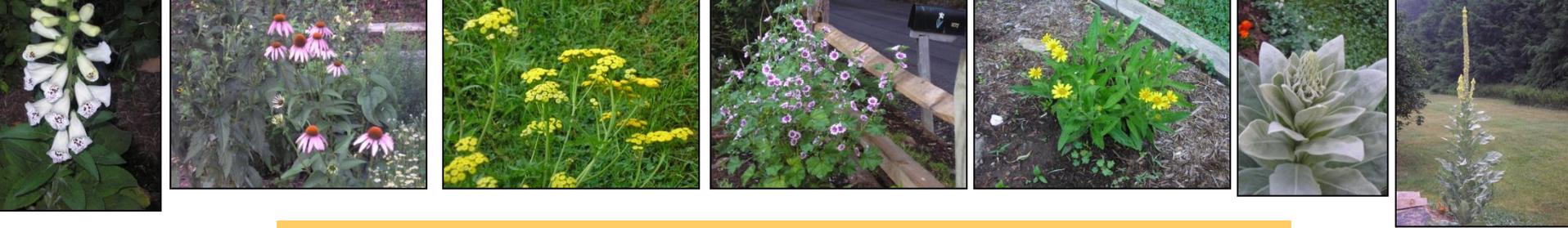
# Common Homeopathic Remedies used by dairy farmers

- Aconite
- Arnica
- Belladonna
- Calc Carb
- Calc Phos
- Echinacea
- Ferrum Phos
- Folliculinum
- Hepar Sulph
- Hydrastis
- Hypericum
- Lycopodium
- Merc Corr
- Nux vomica
- Ovarian
- Phos
- Phytolacca
- Pulsatilla
- Sabina
- Sepia

# Mucous membranes & nerve senses



- Mucus membranes: nose, eyes, mouth and intestines are best targets for therapeutic drug delivery due to their large surface area, rich blood supply, and connections with lymph nodes.
- Senses of awareness are at the front of the body at head

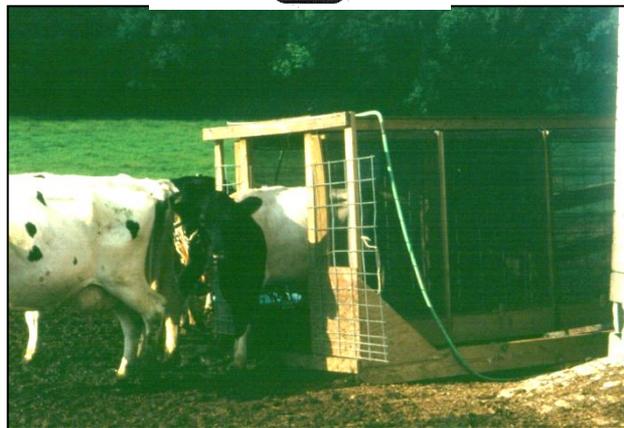
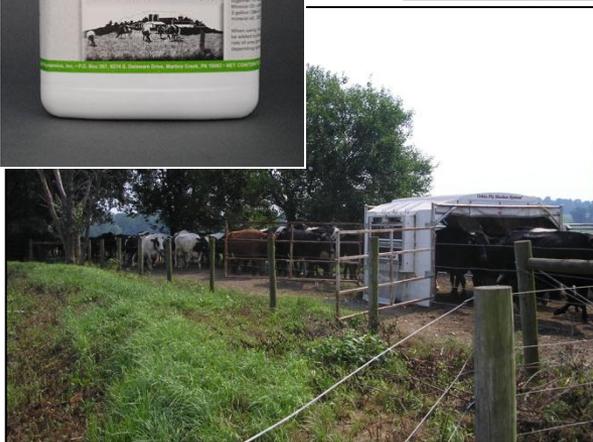
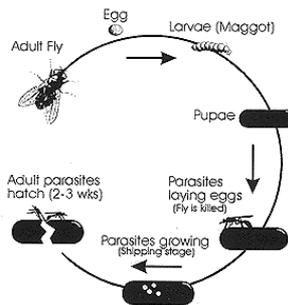
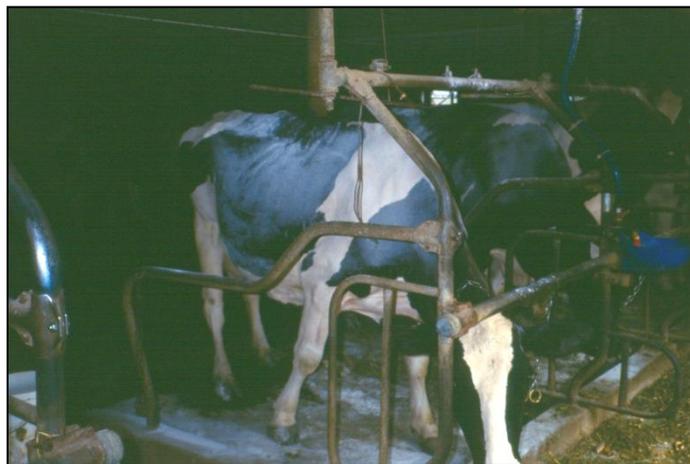
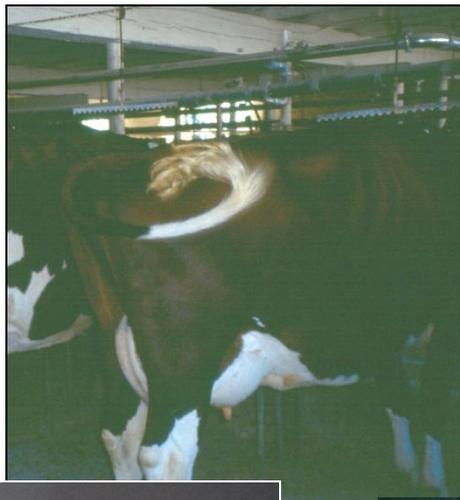


## The multi-prong approach to problem solving

- A variety of approaches will give a better chance of success
- If one approach isn't working, the other approaches are still in place
  - Complementary and Alternative Medicine then does not have to be 100% effective.
  - Less chance of developing resistance



# FLIES: Multi-prong approach to ecto-parasites



# Multi-prong approach to Internal Parasites

Parasiticide Always?

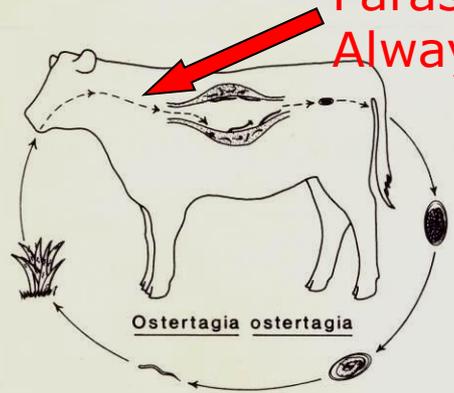
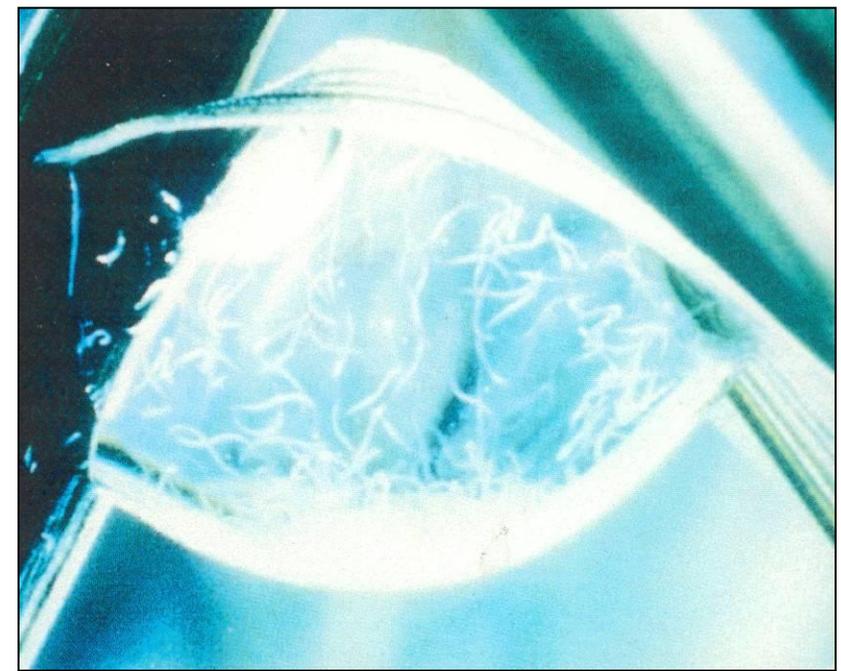


Fig 83a. *Ostertagia ostertagi* (cattle)  
*Teladorsagia circumcincta* (sheep)  
Prepatent period = 16-23 days



# Multi-prong approach to internal parasite control:



Birdsfoot trefoil



Grazing chicory



Ferric phosphate



*Dudingtonia  
flagrans*



# Natural Parasite Formulas

**Allicin-based** (garlic) product used in Holstein calves had no effect of altering duration of crypto diarrhea but high doses did delay its onset  
(Olson, 1998)

**Clemson University** study (2004):

Cayenne, Garlic, Diatomaceous earth (Fertrell Co.)

Fed daily to yearling heifers, fecal counts checked daily:

by 6 weeks treated animals had significantly less Fecal Egg Counts than controls.



# Coccidia

**Ferro** – Hematinic & constipates calves

**Ingredients:** Ferrous sulphate, Ferric sulphate, Manganese sulphate, Zinc sulphate, Cobalt sulphate, Nickel sulphate, Copper sulphate

**Give 5 - 15 cc's orally daily for 5-7 days**

**Severe giardia calves cured and documented by U Penn Vet parasitology lab**



**Chico State University clinical trial**

# Lameness



Cut away  
necrotic area  
between digits  
or outermost  
layer of a  
hairy heel  
wart

Allow to bleed

H<sub>2</sub>O<sub>2</sub> cleanse



# Foot Rot Treatment

Thick paste of **Betadine®**  
+ sugar (or thick, raw  
honey alone)

- Wrap with digits spread apart
- Must re-wrap 2-3 days later



After 1<sup>st</sup> treatment



After 2<sup>nd</sup> treatment  
(4 days later)



# Non-Antibiotic Treatment of Systemic Infections

## Principles & Protocol

### **BIOLOGIC: PLASMA-GOLD** – plasmapheresis product:

For Coliform mastitis, colibacillosis in calves, or salmonella:

**Cows** – 250cc IV ; **Calf** 100cc SQ, follow-up if needed

### **BIOLOGIC: IMMUNOBOOST®** - 1cc/200 lb IV / IM / SQ

### **PLANT: PHYTO-BIOTIC** IV or orally

Garlic, Ginseng, Goldenseal, Wild Indigo, Barberry

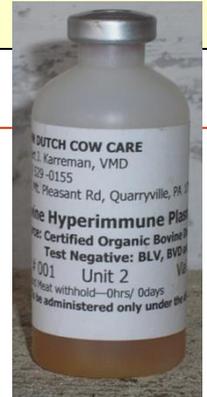
**Cows:** 90cc loading dose in bottle of dextrose then  
15cc orally three times daily

**Calves:** 10 cc orally 3 times daily

### **ANTI-OXIDANTS: VITAMIN C** IV or IM 250-500cc IV or 5cc/100 lbs IM once a day for 3 days (<30cc/site)

### **ELECTROLYTES CMPK, Hypertonic saline, etc** as needed for circulation

### **ANTI-SEPTICS: Betadine, hydrogen peroxide, sugar, honey, etc**



**A valid Veterinary-Client-Patient-Relationship (VCPR)  
is critical for administering, dispensing and labelling medicine**

**Bovinity Health, LLC**

Hubert Karreman, VMD

555 Red Hill Road

Narvon, PA 17555

717-768-7088

NAME OF MEDICINE:

for:

ADMINISTER:

EXPIRES \_\_\_\_\_

*Estimated:*

Milk withhold \_\_\_\_\_ Hours

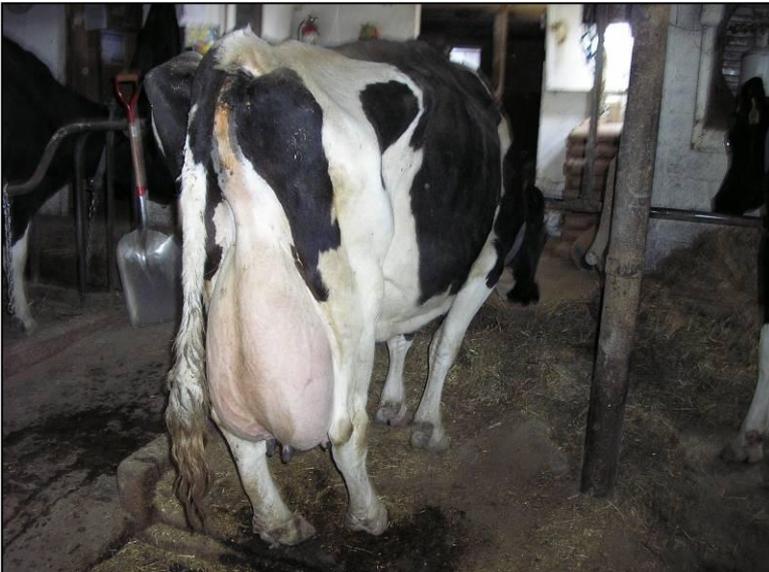
\_\_\_\_\_  
H.J.Karreman, VMD    Date

Meat withhold \_\_\_\_\_ Days

Not for human consumption

Keep out of reach of children

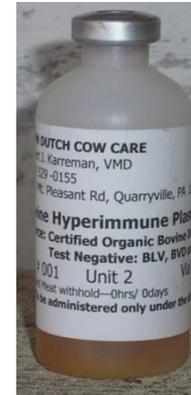
# Bunny



- **13 yr old Holstein, fresh about 3 weeks**
- **Subjective**
  - bright and alert; eats some
- **Objective**
  - T = 103
  - enlarged kidney; uterus OK
  - Slow rumen; pong on right; no pings
  - RH quarter, dilute looking milk, CMT +++ with some swelling but not hard
  - heart and lungs OK
  - humped back, head down
- **Assessment**
  - DDX
- **Plan?**

# Bunny Treatment Plan

- IV – electrolytes, 500cc dextrose + 90 cc antibacterial PhytoBiotic (fluids & botanicals)
- 250cc hyperimmune plasma (biologic)
- 5cc Immunoboost® (biologic)
- 500cc vitamin C (anti-oxidant)
- Follow-up  
Hyper-immune plasma  
Magnet  
PhytoMast



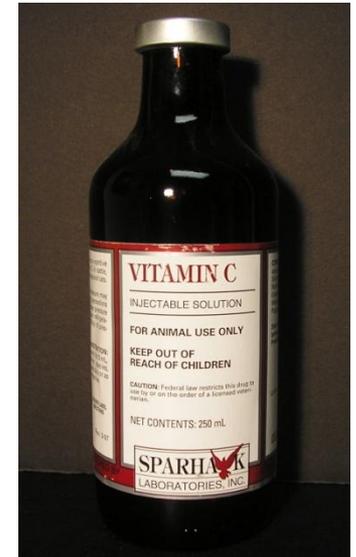
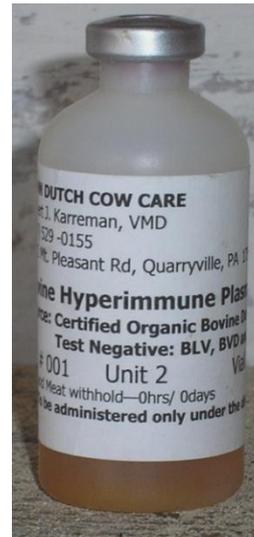
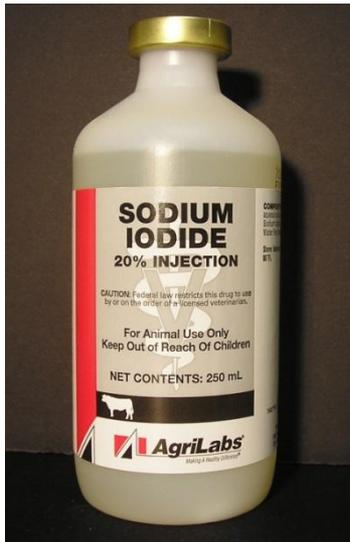
Bunny went on to celebrate her 14<sup>th</sup> birthday

# Mona

- **Signalment:** 2 lactation Holstein, fresh Nov. 2005; bred about 60 days
- **History and farmer's observations:** she was eating fine and milking OK until the morning; hasn't touched a thing to eat.
- **Physical Exam:** T = 104, heart rate increased, lungs OK, rumen slow, no pings, lump on right lower jaw somewhat firm
- **Presumptive diagnosis:** lumpy jaw (actinomycosis)



# Treatment for Mona's lumpy jaw



- **Anti-pyretics?** Animal is pregnant
- **Rx:** 15cc herbal antibiotic tincture orally 3 times daily until finished (~3 days); topical peppermint essential oil lotion

Day 0



Day 4



Day 10<sub>(iodinism)</sub>



# Dora



- Fresh 3 days
- Temp 107 – thoughts?
- Bright and Alert
- Not eating a thing
- Decent hydration
  
- RF is hot and hard
- RF quarter has gas when stripped out
  
- Told farmer to use an antibiotic;
  
- Took into consideration her being bright and alert and high fever...

# Dora's Treatment

- IV dextrose, 90cc herbal antibacterial tincture, 500cc vitamin C, 250cc hyperimmune plasma
- Farmer had used a tube of PhytoMast prior to examination
- 15-20cc herbal antibiotic tincture 3 times daily for 4 days
- Left bottle of penicillin at farm to use if needed at slightest sign of worsening



Dora at next herd check:  
doing well, but 3 teated  
(returned bottle of penicillin)



# Retained Placenta – lavage / cleanse



- 1) Manual, gentle removal after day 5 but \*not\* separating placentomes
  - 2) Lavage / infuse uterus until normal discharge or until cervix closes
- Therapeutic flush - metritis
    - Repeated physiologic saline until clear drainage
  - Antiseptics – endometritis or pyometra
- IODINE** 1 gram infused or placed as pill sid x 5+ days in first 4-10 days fresh
- DEXTROSE** 300 cc infused at day 18-20

# REPRODUCTION TX:

**HEAT SEEK**: to help cows show behavioral estrus that haven't been showing heats – used clinically in cows that are >120 days in milk and normal body condition (positive energy balance) with CL and follicle

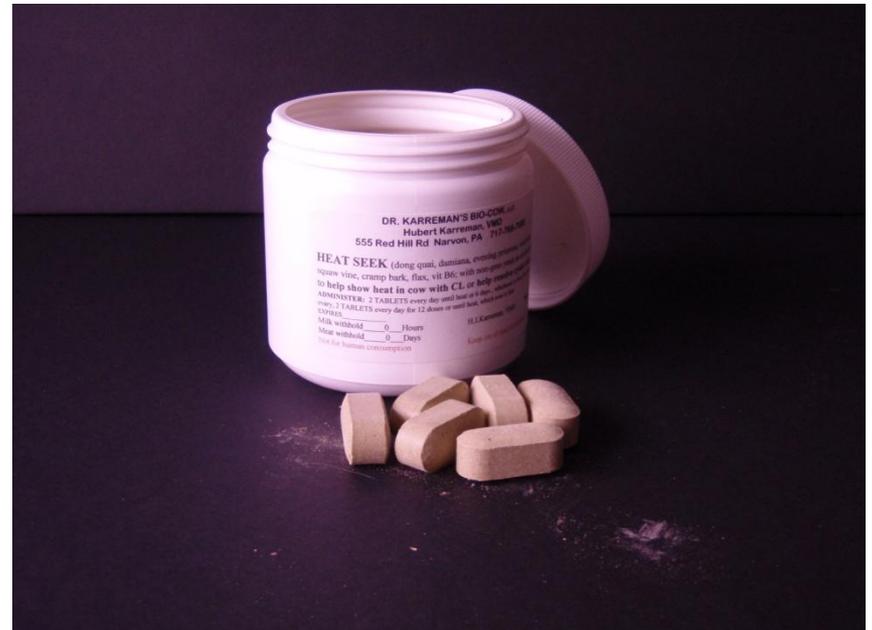
Ingredients: *Angelica sinensis*, *Turnera diffusa*, *Oenothera biennis*, *Dioscorea villosa*, *Mitchella repens*, *Viburnum opulus*, *Linum usitatissimum*, vit B6; with non-gmo yeast as excipient)

(NC State masters degree student thesis)

Cysts: Gently try to rupture, homeopathics, acupuncture, Heat Seek

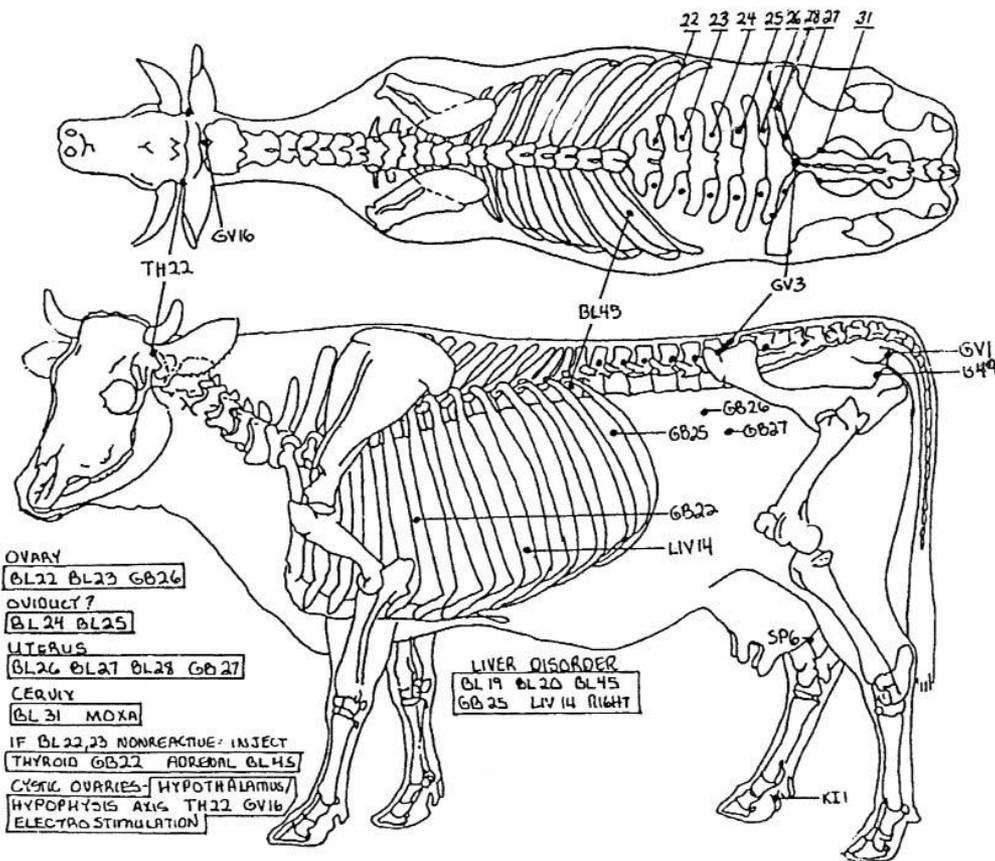
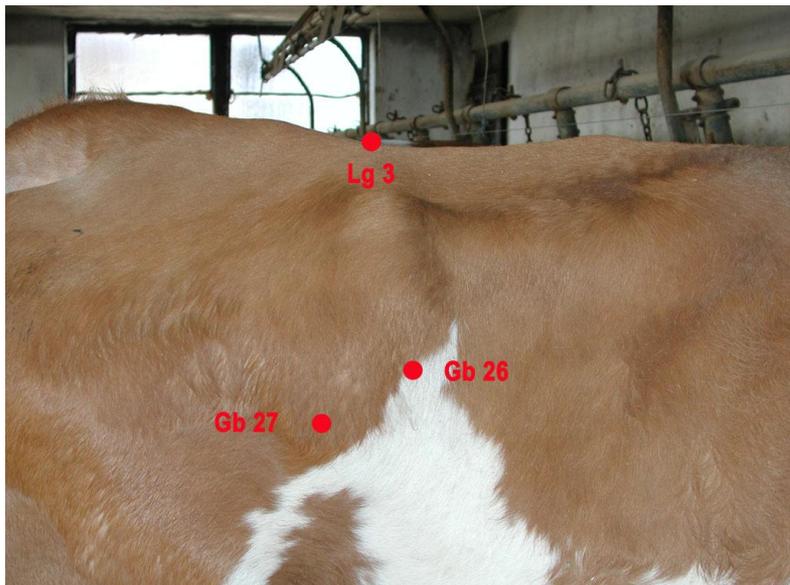
**Pyometra – PREVENT!**

Infuse 140 - 300cc dextrose depending on size, 1- 3 times as needed  
based on OSU study 2010

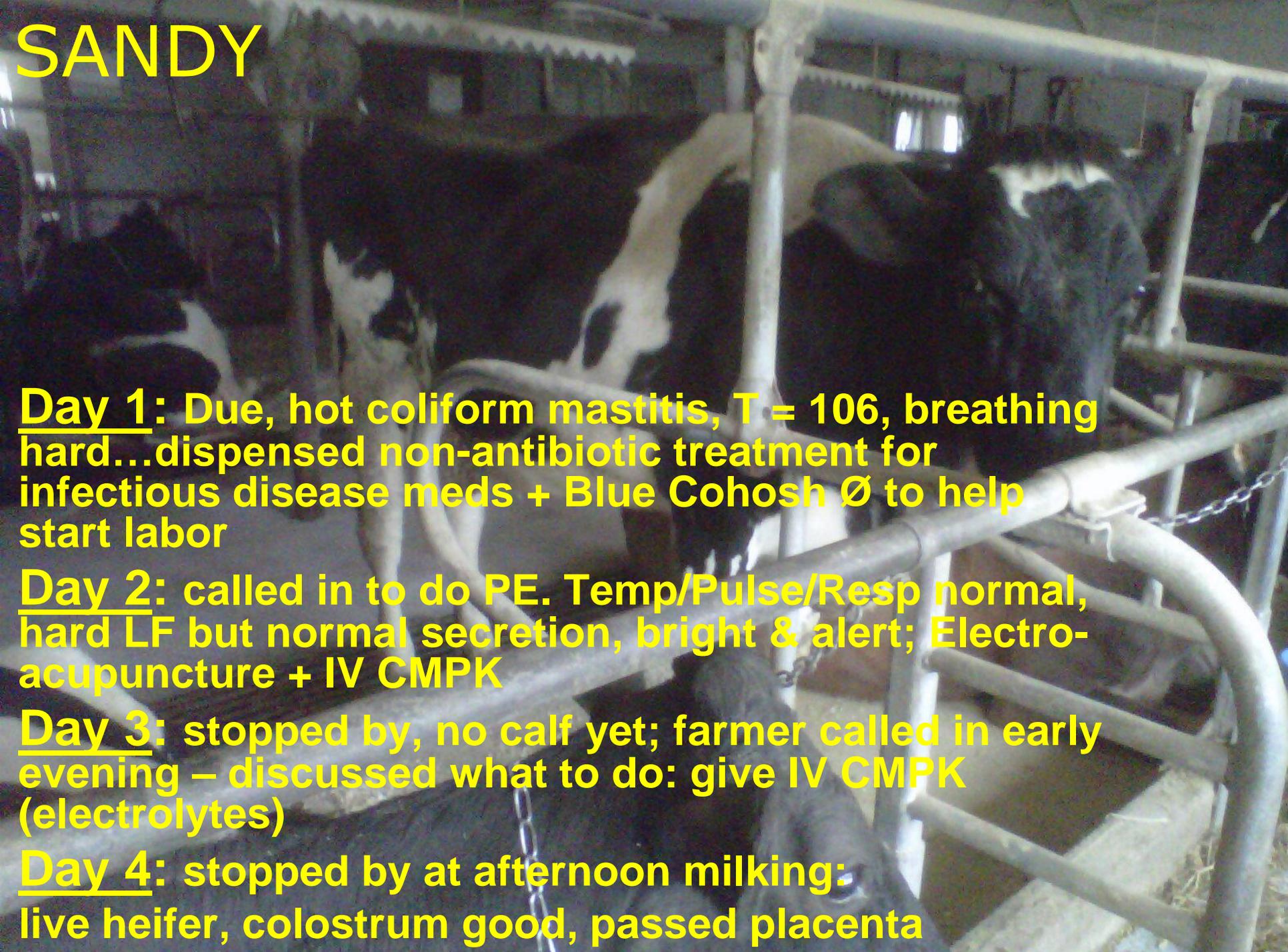


# Reproductive Points

Cystic Ovaries:  
5cc Vit.B<sub>12</sub> into each point:  
BL 22, 23, 24, 25, 26



# SANDY



Day 1: Due, hot coliform mastitis, T = 106, breathing hard...dispensed non-antibiotic treatment for infectious disease meds + Blue Cohosh  $\emptyset$  to help start labor

Day 2: called in to do PE. Temp/Pulse/Resp normal, hard LF but normal secretion, bright & alert; Electro-acupuncture + IV CMPK

Day 3: stopped by, no calf yet; farmer called in early evening – discussed what to do: give IV CMPK (electrolytes)

Day 4: stopped by at afternoon milking: live heifer, colostrum good, passed placenta

# 3 situations where antibiotics are definitely needed sooner than later:

- Peritonitis (generalized)
- Bone infections
- $\geq 2$  organ systems are involved and the animal is depressed



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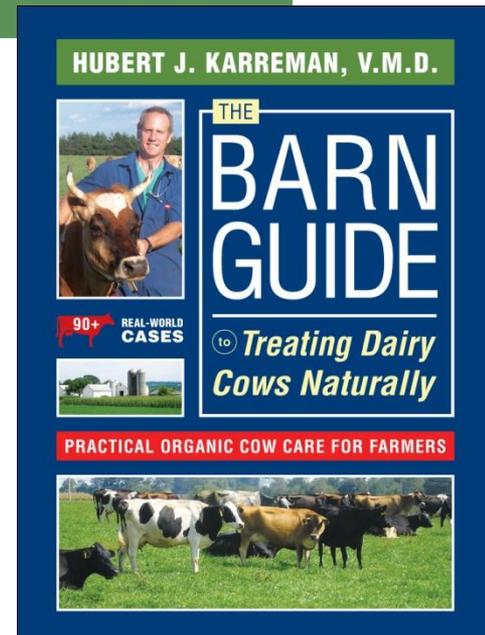
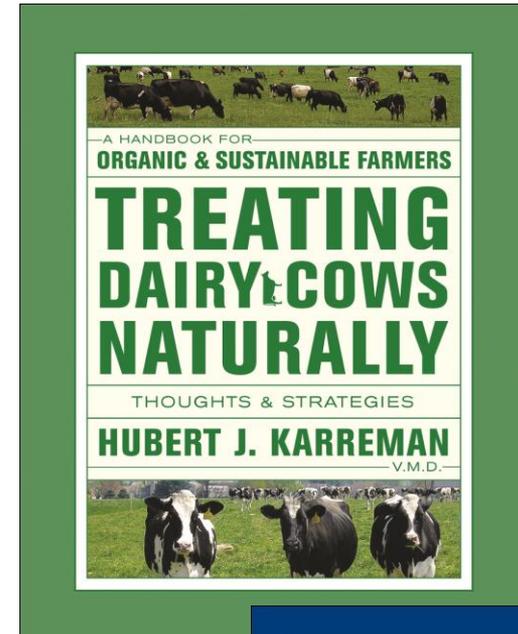
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# Participatory On-Farm Research

Beyond the Randomized Complete Block  
Design

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