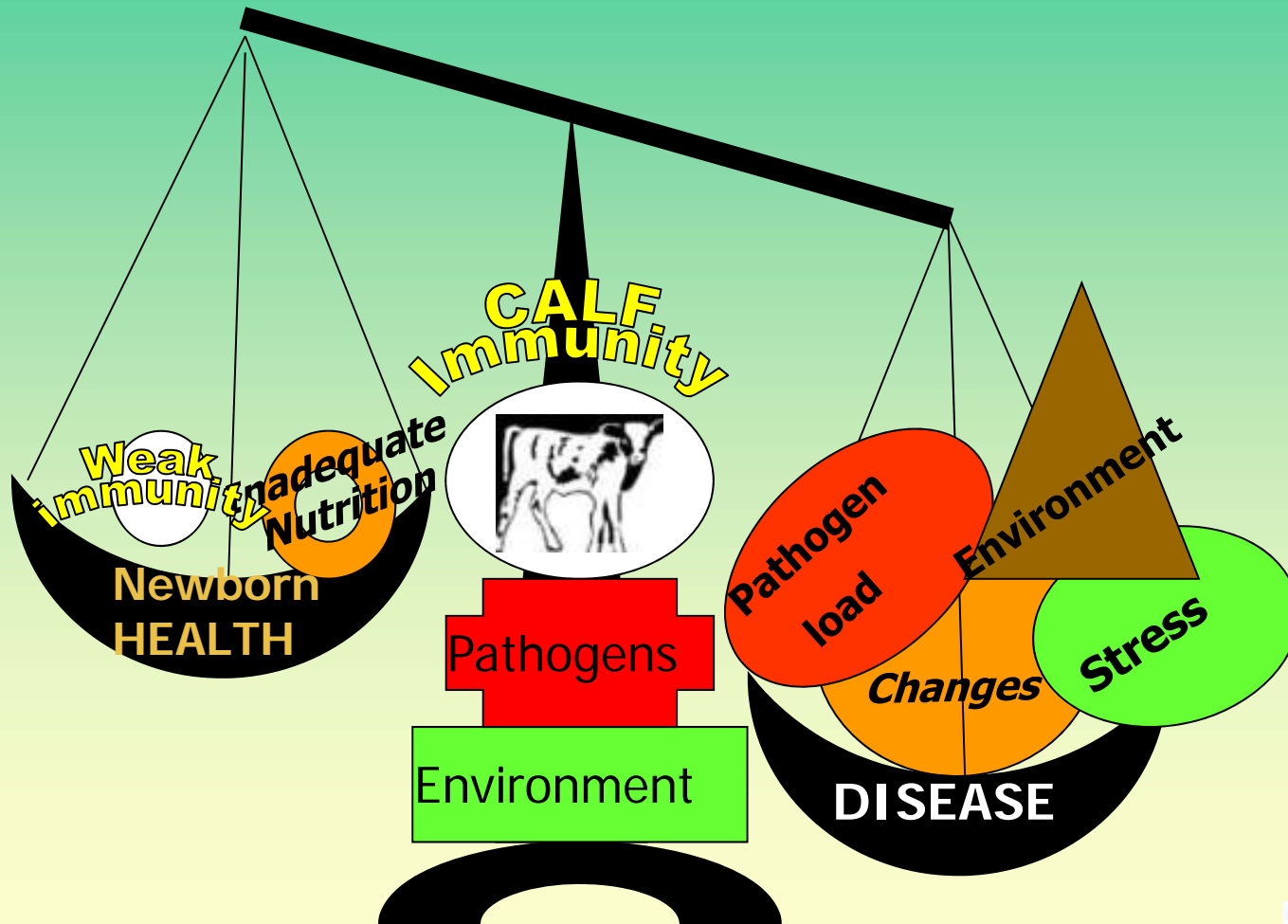


HEIFER HEALTH & DISEASE

tipping the scale in our favor



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*with special thanks to Dr. Chris Rossiter, Poulin Grain
and Dr. Sheila McGuirk, U. of Wisconsin for the use of
slides and materials in this presentation*

Health Triad

Environment



Disease Agent

Immunity

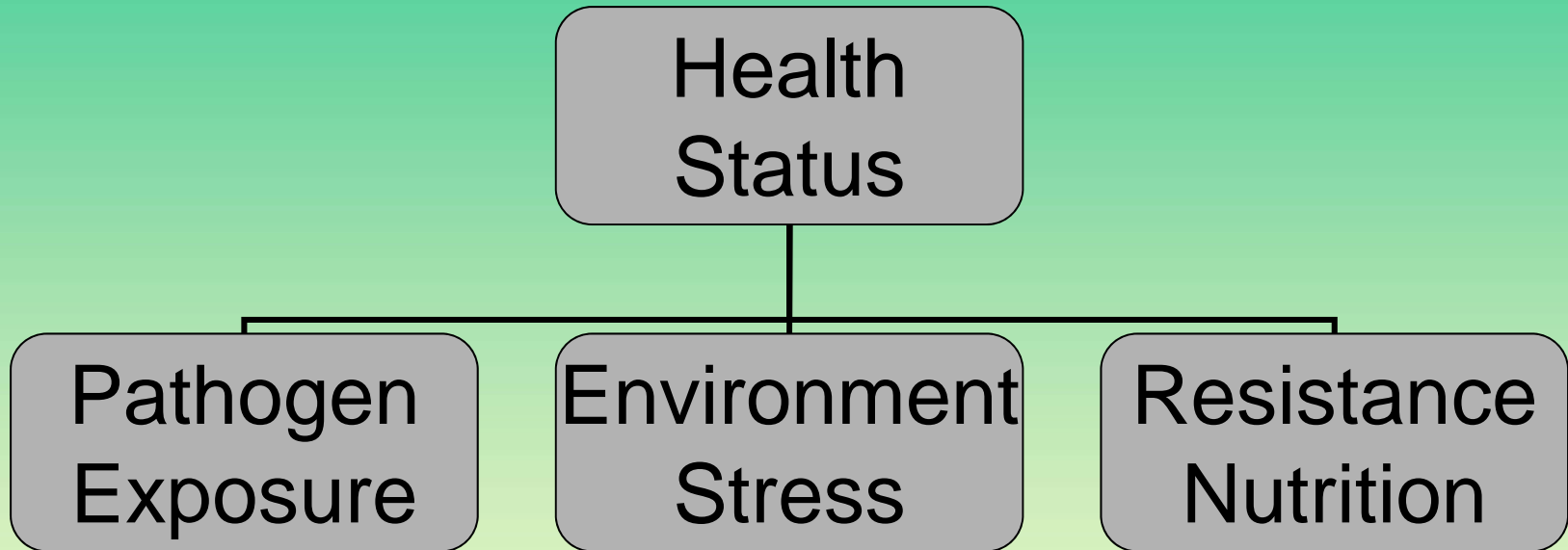
“If you always do, what you’ve always done,
You’ll always get, what you’ve always got.”

You have a starring role!

- ➔ Develop SOP's, train and check for compliance
- ➔ Identify and record key observations & treatments
- ➔ Investigate direct and indirect factors including the use of diagnostics and necropsies!
- ➔ Implement appropriate practices and procedures for treatment and prevention



The Picture of Calf Health



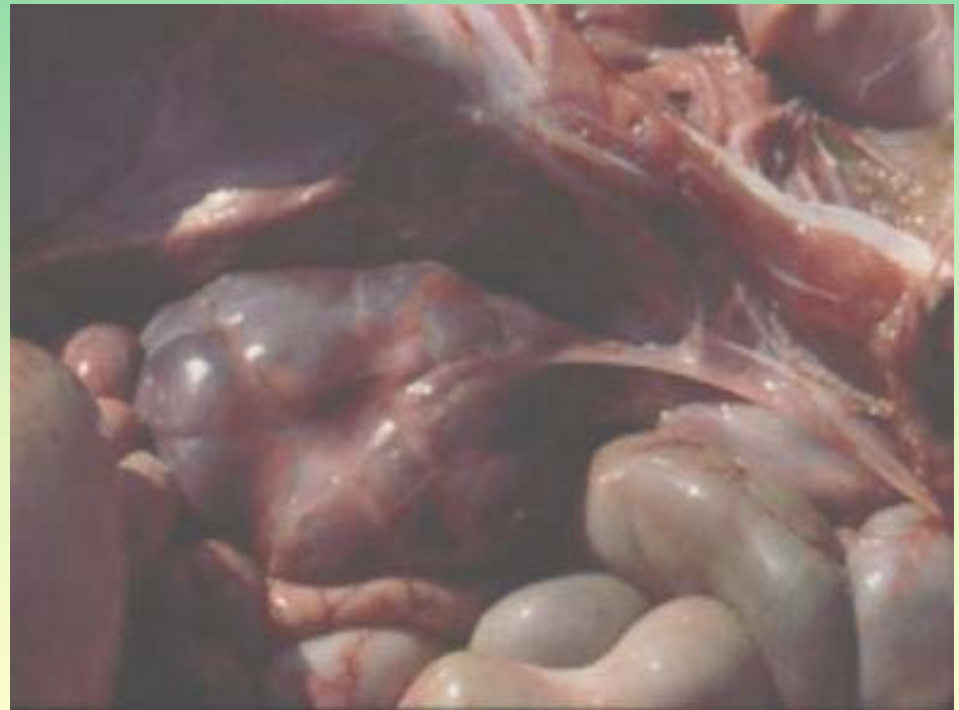
The Reality

- ⇒ 9% of unweaned calves nationwide (excluding the DOA's) die, primarily of diarrhea diseases
- ⇒ Dystocia calves (3/5 score or higher) are 3.8 times more likely to get sick and 4.5 times more likely to die than ones having a normal birth
- ⇒ These represent 60% of all calf deaths

Most wanted calf killers

The most common findings on a young stock necropsy ?

- ⇒ Dehydration
- ⇒ Under-nutrition



Metabolic Impact of Dystocia

poor awareness & underrated

- ➔ Physical trauma, inactivity and congestion
- ➔ Low blood oxygen levels
- ➔ Hypothermia (<101°F)
- ➔ Respiratory acidosis
- ➔ Transient hypoglycemia
- ➔ Poor IgG absorption
- ➔ Poor innate response



The Source of Disease

- ➔ Adult cattle are "hotels" for most disease pathogens
- ➔ Sick calves and stressed adults are the "factories"



In Utero Diseases

- ⇒ BVD (PI or persistently infected)
- ⇒ *Leptospira hardjo-bovis*
- ⇒ Neosporosis
- ⇒ Brucellosis
- ⇒ Johnes
- ⇒ Leucosis



Diseases from Adults around calving

- ➔ BRSV - nasal discharge
- ➔ Mycoplasma - nasal and vaginal discharge, colostrum
- ➔ Leukosis - colostrum, in utero
- ➔ Johnes - colostrum, manure, in utero
- ➔ Salmonella - manure, colostrum, saliva
- ➔ E. coli, Rotavirus, Coronavirus, Coccidia, Cryptosporidia - manure

Understanding Pathogen Risk

- ⇒ Adult world bugs present a risk to young stock which decreases with age
- ⇒ *Scour* microbes infect via the organic matter/feces to mouth route
- ⇒ *Respiratory* ones rely on nose to nose or aerosol transmission
- ⇒ Mutations guarantee pathogen change despite a closed herd situation

Disinfectants

- ⇒ Work better after dirt and organic material has been removed
- ⇒ Effect logarithmic reduction in pathogen load
- ⇒ Affected by temperature, concentration, pH, water hardness, presence of organic material

Characteristics of Disinfectants

- ⇒ Iodophors active at acid pH but not alkaline
- ⇒ Sodium hypochlorite (bleach) most active at pH 6
- ⇒ Increase in temperature rapidly increases effectiveness of alcohols
- ⇒ Dilution of phenolics significantly decreases strength of activity

Household bleach

⇒ Sanitizing strength

- ❖ 200 ppm, 1 Tbsp/gal
- ❖ 10 min contact, rm. temp., pH 6-7

⇒ Disinfecting strength

- ❖ 2400 ppm, 6 oz (3/4 C)/gal; 2 min

⇒ Tuberculocidal (hospital) strength

- ❖ 5000 ppm, 1 ½ C/gal
- ❖ 1 min contact, rm. temp., pH 6-7

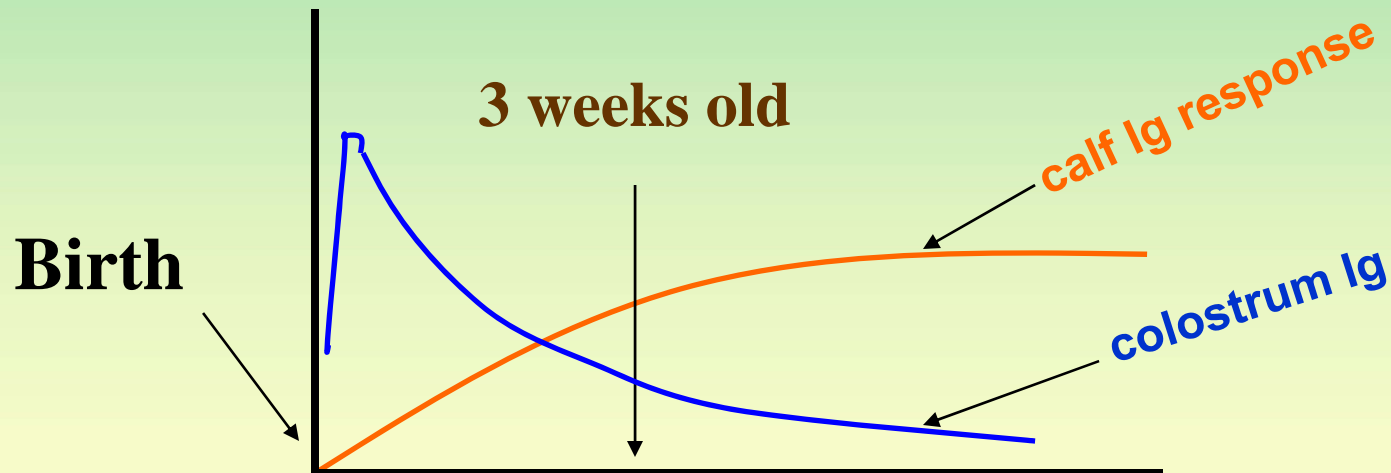


The Everyday Challenge

- ➔ “Wet” calves followed by weaned ones present the majority of replacement health issues on the dairy.
- ➔ 80% of calfhoo disease is enteric with respiratory problems majority of the rest
- ➔ Local, surface lung immunity is good by 6 weeks of age, the gut takes several months to get to the same stage

Passive Immunity from Colostrum

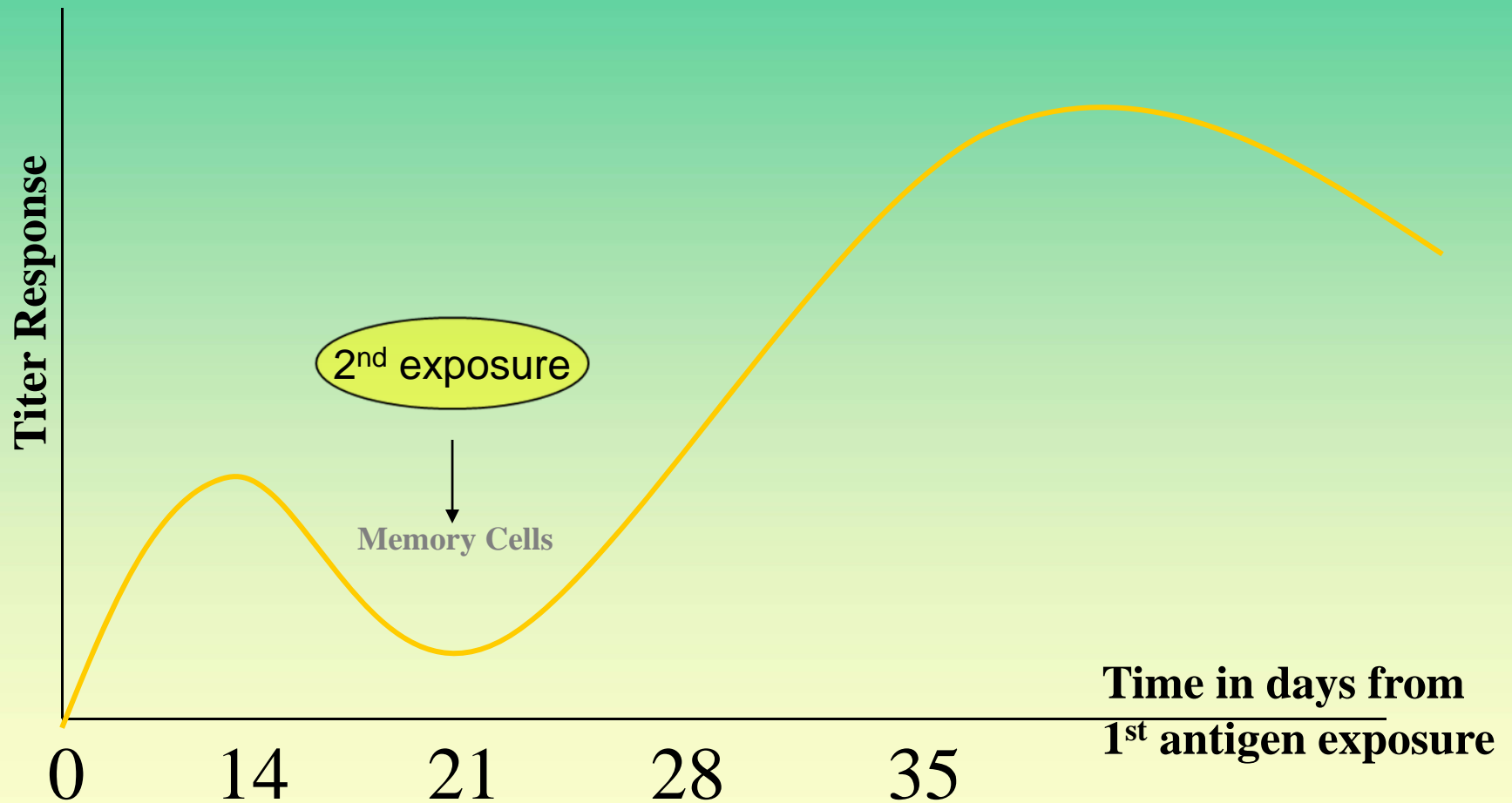
- ➔ Immediate
- ➔ Short-lived Ig (11.5-16 day half-life)
- ➔ Antigen specific



Active Immunity

- ⇒ Newborns have 20-25% of the adult level of immune "machinery"
- ⇒ Only limited response possible in first 7-10 days of life
- ⇒ Natural exposure and vaccines use same pathway to protection
- ⇒ Age is no guarantee of immune progress

Primary and Secondary Immune Response (Anamnestic Response)



How to Ruin a Good Immune Response

➔ Increase stressors - cortisol release

- ❖ Dystocia
- ❖ Discomfort
- ❖ Excessive heat (>85°F) or cold (?°F)
- ❖ Rough handling/increase fear
- ❖ Isolation from other calves
- ❖ Mingling of wide range of age and sizes
- ❖ Multiple procedures at one time

How to Ruin a Good Immune Response

➔ High endotoxin exposure

- ❖ Vaccines from gram-negative bacteria such as E. coli, salmonella, pasturella, hemophilus, moraxella, leptospira
- ❖ Coliform laden milk whether pasteurized or not

➔ Chronic disease exposure

- ❖ Coccidia
- ❖ Parasitism
- ❖ BVD PI's in herd

Got scours?

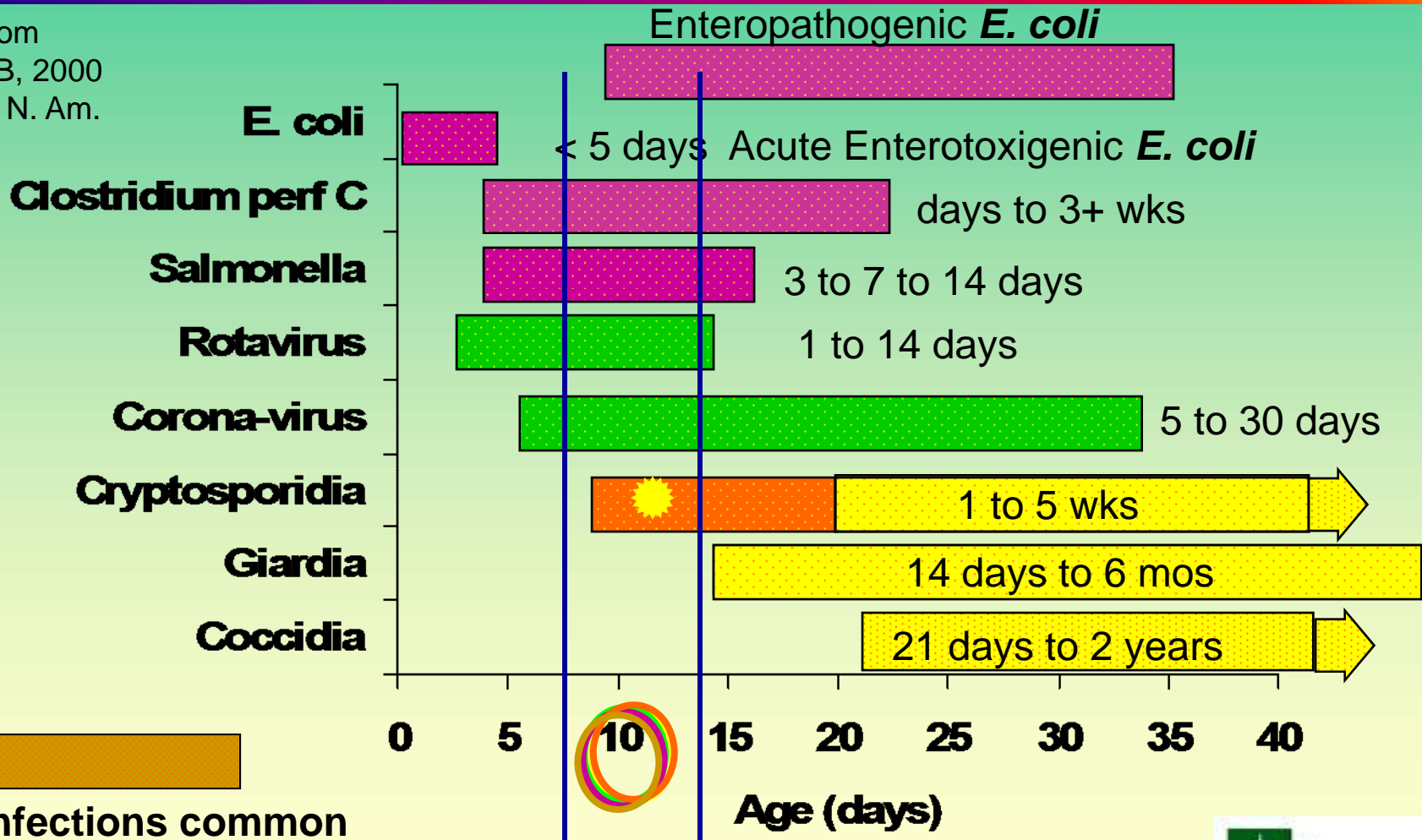


Scour Facts

- ⇒ Most prevalent between 5-14 days
- ⇒ 2/3 of preweaned deaths
- ⇒ Colostral protection in gut last only 5-7 days, but can be prolonged with whole milk feeding
- ⇒ Always a “mixed bag” of pathogens
- ⇒ Calving pen hygiene and prompt calf removal is key to control

Age - Clue to agents involved

Adapted from
 Navarre CB, 2000
 Vet Clinics N. Am.
 FAP p37



Common 'agents' incriminated in calf scours

1. *Enterotoxigenic E. coli* Gram (-) bacteria
2. *Salmonella* (typhimurium, newport) cousin to *E. coli*
3. *Clostridium perfringens* type C, B (A?)
Gram (+) spore-former - *Sarcina* - oddball
4. Non-specific 'environmental' bugs
E.coli , Gram (+) *Staphs*, *streps* - drain on immune system?

Bacteria

5. *Rotavirus*

Ubiquitous
Viruses

6. *Coronavirus*

7. *Cryptosporidia parvum*

8. *Giardia*

9. *Eimeria coccidia*



Protozoal
Parasites

1. "Non-specific" bacterial scours

➔ Feeding Sam Leadley's "*Bacterial Soup*"

- ❖ Contaminated colostrum, milk, feeding utensils, etc
- ❖ Streps, staphs, ***E. coli* - from cows and feces



➔ Persistent, mild to moderate scours, slow calves

➔ We can feed calves overwhelming levels of bugs

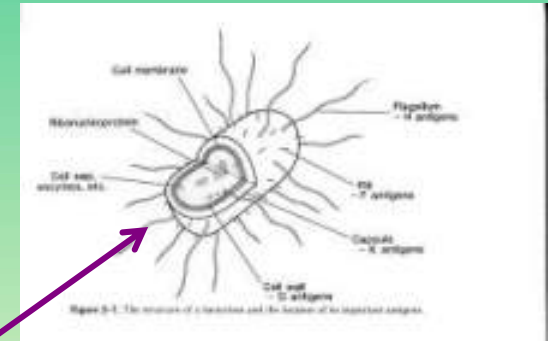
- ❖ Room temp milk - *E.coli* generation time is ~ 20 minutes.
- ❖ Millions in a couple of hours is easy.



2. Enterotoxigenic *E. Coli*

➔ Acute death in healthy calf at 1-5 days.

- ❖ Often before scours appears.
- ❖ Intestine is susceptible only first few days.
- ❖ Calf septicemia, *E. coli* mastitis,



➔ Bacteria adhere by hairy fimbria (K99)

- ❖ Toxins cause severe secretory diarrhea, dehydration and death.
- ❖ Many *E. coli* strains - vaccines against a major strain, K99, are effective.
- ❖ Source: cow, environment, infected calf



3. Salmonella



⇒ Cousin to *E. coli*

- ❖ Affects calves later - 6 days to 2 weeks
- ❖ Severe diarrhea; *S. dublin* - respiratory disease
- ❖ Some species multi-drug resistant
- ❖ High morbidity or mortality

⇒ Highly contagious

- ❖ Different strains, different signs
- ❖ Inflammation and necrosis of intestinal tract
- ❖ Septicemia with
- ❖ **Strict animal, pest and worker biosecurity necessary to break cycle of spread**

4. *Clostridium perfringens*

Types C, A & Sarcina

- ➔ Usually 7 days - 4 weeks; typically acute weakness, bloat and death in healthy calves; hemorrhagic enteritis.
- ➔ Overgrowth of normal inhabitant of environment and gut
 - ❖ Anaerobic spore forming, gas producing bacteria
 - ❖ Overgrows in favorable conditions – carbohydrate, high pH
 - ❖ Produces multiple toxins
- ➔ Associated with 'large volume' meals (2x), early starter intake, hard water, milk replacer vs. whole milk
- ➔ Perforating abomasal ulcers, abomasal crepitus (like bubble wrap) may indicate Sarcina
- ➔ *Need feeding management and vaccination strategy*

5. Rota and Corona Viruses

➔ Ubiquitous - probably the most common causes of scours.

- ❖ Almost always mixed with other infections
- ❖ Calves appear bright until dehydration; wt. loss, acidosis

➔ Rota - 5 to 21 days of age is common.

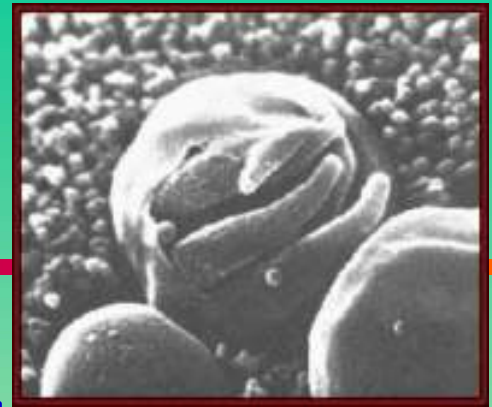
- ❖ Damage heals with support in 5 days
- ❖ Colostral antibody in blood and gut lumen protective for 4-5 days
- ❖ Many strains of Rota that easily change

➔ Corona - 5 to 30 days - more severe gut villi damage.

- ❖ Depression, protracted scours, often mild respiratory bout
- ❖ Damage from corona infection takes weeks to recover
- ❖ More common in colder climates

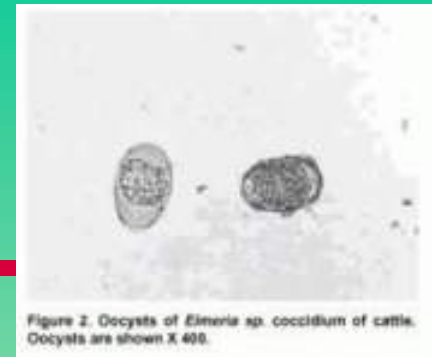


6. *Cryptosporidium parvum*



- ➔ 1-4 weeks of age; peak shedding at 12-14 days
- ➔ Mild scours to severe cases requiring aggressive fluid support.
 - ❖ Often mixed infection; 6-10 day duration. Calves lose wt.
 - ❖ Multiples in gut (auto-infective) and re-infects intestinal cells
 - ❖ VERY CONTAGIOUS - Shed in extremely high numbers
- ➔ Most farms infected
- ➔ Mortality low, frustration high
- ➔ No effective treatment ***
- ➔ Survives in environment, hard to destroy.

7. Eimeria spp. - Coccidia



- ➔ Clinical disease after 17 days (21 day life cycle)
 - ❖ often post-weaning, stress related disease
 - ❖ 2 common species; several minor ones
- ➔ 95% of infections are subclinical
 - ❖ Unthrifty, poor gains
 - ❖ Manure rings on tail
 - ❖ Immunosuppression leads to respiratory problems
- ➔ 5% are clinical
 - ❖ Blood in manure
 - ❖ Risk of death
 - ❖ Stunted by intestinal damage

7. Eimeria spp. - Coccidia (cont.)

➔ Prevention trumps treatment!

- ❖ Must not rely on starter medication to prevent infection
- ❖ Normal starter and milk replacer doses will not rid a clinical infection
- ❖ Medicate milk or milk replacer from day one!
- ❖ Medication through weaning must be seamless

➔ Not all products are the same

- ❖ Rumensin®, Bovatec®, amprolium *kill*
- ❖ Deccox® *inhibits*



8. Giardia (water borne)

➔ 2 weeks to 6 months.

❖ Very contagious; on most farms.

➔ Giardia-associated scours - likely seen with mixed infection with cryptosporidia, coccidia, coronavirus

❖ Trials did not show significant affect on growth

❖ May “tip” the balance with mixed infections causing persistent scours

➔ *Fenbendazole strategy reduces scours and shedding if significant.*



9. "Nutritional" Scours

⇒ Not a "disease"

- ❖ Can occur at any age
- ❖ No, mild, or temporary loss of appetite with a change in feces consistency, color, or amount

⇒ Adaptation to 'change' in the diet ?:

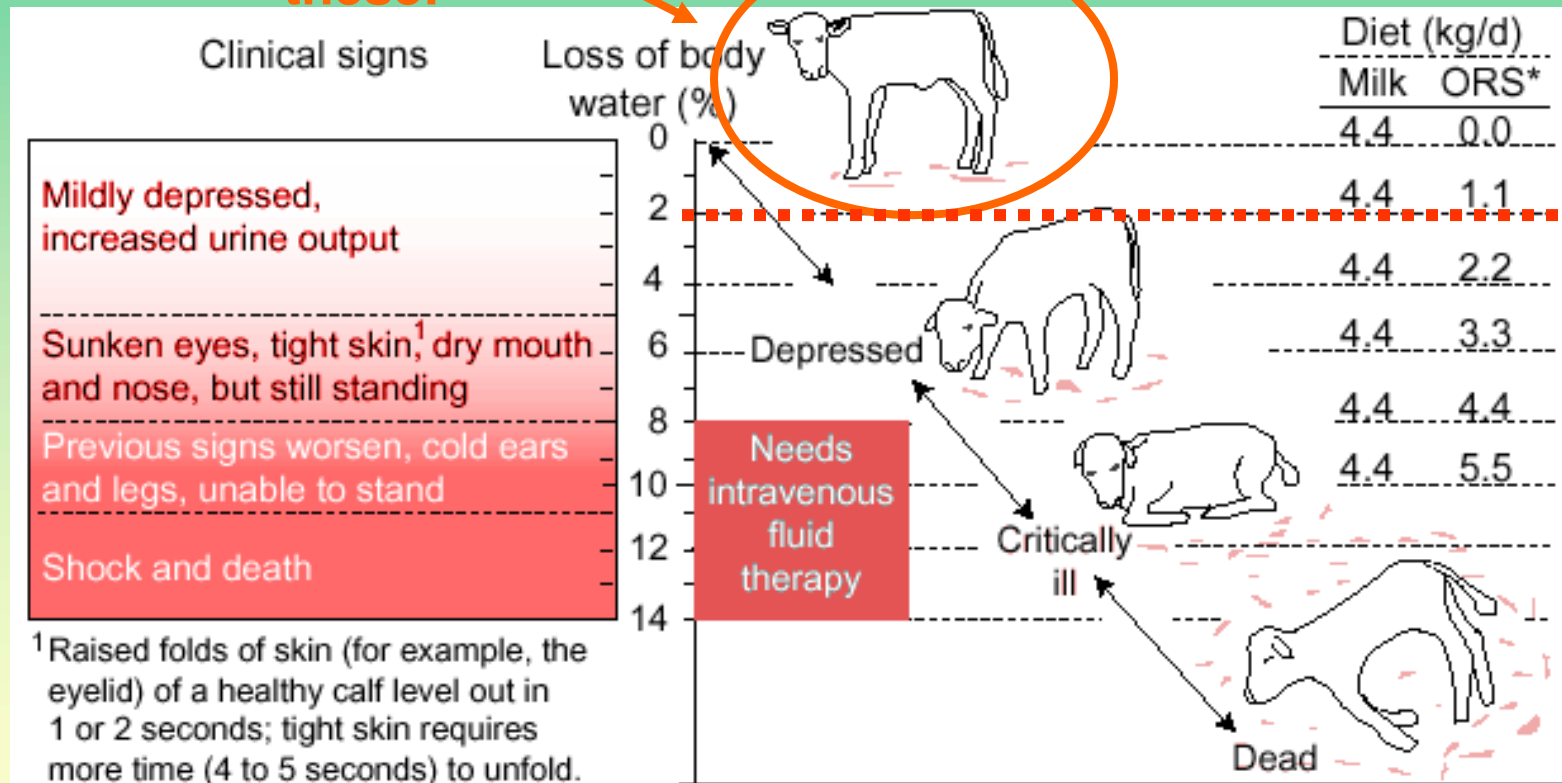
- ❖ Density, volume, timing, milk temperature, ambient temperature, the feeder
- ❖ Fat, protein, carbohydrate,, etc.

⇒ *May be an indication you need to reduce the feeding level or amount, assess the routine - consistency, timing, frequency, or assess product quality.*

Signs and severity of dehydration

If scours have started.. you are late to the party

Focus on detecting these!



Acidosis

ORS = Oral replacement solution; works best 2-6% dehydration

Oral Replacement Fluids - Basics

➔ BASICS (water!)

- ❖ Any commercial electrolyte, before she scours, calf temperature (102F)
- ❖ Get comfortable using the tube feeder

➔ Finer tuning

- ❖ High glucose, bicarbonate or acetate, glycine, especially if depressed
- ❖ Switch to simple electrolyte after 1-2 days
- ❖ Part as subcutaneous fluids (warm)

Approx. fluid replacement for scouring calf (100 lbs)

% Dehydration	Amt fluid to replace body water Qts/d	Amt. for maintenance water requirement Qts/d	New daily diarrhea loss Qts/d	Total fluid required per day Qts/d
2	1	2.5	2-4	5.5-7.5
4	2	2.5	2-4	7.5-9.5
6	3	2.5	2-4	9.5-11.5
8	4	2.5	2-4	11.5-13.5
10	5	2.5	2-4	13.5-15.5

Maintenance water requirement estimated by McGuirk, 1992 ~ 25 ml/ lb /d

Oral replacement fluids most effective @ 2-6% dehydrated

Antibiotics?

- ➔ Depends on severity and if infection is systemic
- ➔ Most of scour agents are not susceptible
- ➔ Effective antibiotics are usually extra label or the dosage needed is
- ➔ Little attention to normal gut flora restoration



Respiratory Disease

- ➔ Usually a post-weaning problem unless poor colostral immunity; 1/4 of preweaned deaths nationwide
- ➔ Better, longer IgG protection than for scours
- ➔ Pneumonia less than 3 weeks of age is indicative of low blood selenium, poor ventilation, airborne allergens, improper tube feeding, large nipple holes or hot BRSV infections in freshening heifers

Respiratory Disease

- ➔ Pre-weaning usually viral
- ➔ Post-weaning heavily bacterial with mixed infections common
- ➔ Coccidiosis can be a potent predisposing factor to disease after weaning
- ➔ Cold air increases the penetration of microbes into the lung (Grandma was right about those drafts!)



Respiratory Disease Impact

- ⇒ Much greater impact on height and weight gains than scours
- ⇒ Calves with pneumonia <90 days of age are 2.5 X more likely to die before calving
- ⇒ Fresh heifers having pneumonia histories show higher rates of acute pneumonia and sudden death



Addressing Respiratory Disease

- ➔ Preventative use of Terramycin™ Aureo-S™, Aureomycin™ feed additives often effective "band-aid"
- ➔ Antibiotics are more effective for lung disease than for scours, BUT select based on farm experience and diagnostics AND go high on doses and long on treatment days!!
- ➔ Early identification and prolonged therapy is rewarding especially for mycoplasma

Addressing Respiratory Disease

- ⇒ Isolating sick animals for treatment and biosecurity
- ⇒ Give easy access to feed and water
- ⇒ Provide supportive therapy i.e. fluids, drenches, anti-inflammatory drugs, vitamin/min supplements



Respiratory Pathogens

⇒ Viral

- ❖ IBR (uncommon w/ vaccination programs)
- ❖ BVD (usually a stressor)
- ❖ BRSV (primary)

⇒ Bacterial

- ❖ *Pasteurella multocida*/ *Mannheimia hemolytica* - primary
- ❖ *Mycoplasma* – secondary?
- ❖ *Salmonella dublin* - new, primary, weaned +
- ❖ *Hemophilus* (*Histophilus*) - secondary, chronic
- ❖ *Arcanobacter* (*Actinomyces*) – secondary, chronic

Vaccination Strategies

- ⇒ Do no harm!
- ⇒ No earlier than 3 months if closed herd OR poor colostrum management OR no serious problems
- ⇒ Avoid combination vaccines early with unnecessary components - e.g. 4/5-way w/Lepto
- ⇒ Vaccines given before 3 months of age provide dubious "primary" protection

Vaccination Strategies

- ⇒ Use modified live virals at least by breeding age
- ⇒ Include type 2 BVD always
- ⇒ Add *Lepto hardjo* before/at move to group pens with or without tetracycline "firewall"
- ⇒ Avoid more than two gram-negative vaccines at a time regardless of age

Example Calf & Heifer Vaccination Schedule

<i>VACCINATION</i>	<i>CORE YES/NO</i>	<i>TIME/AGE</i>	<i>BRAND EXAMPLE</i>
Clostridium C&D	NO	1-5 days of age	UltraChoice C&D
Intranasal IBR-PI3	NO	Newborn, pen moves; as needed	TSV-2
MLV –IBR, PI3, BRSV, BVD killed?	NO	7-14 days if early respiratory infections; repeat at 5-6 weeks	Bovi-Shield 4 Prism 4
Pasteurella Mannheimia	NO	5-8 weeks (and older) if weaning age pneumonia	One-Shot Once PMH
Lepto hardjo bovis	NO	At or just prior to weaning; repeat in 4 weeks	Spirovac Vista line
Haemophilus	NO	5 weeks and older if other vaccines not controlling pneumonias	Somubac
MLV – IBR, PI3, BRSV, BVD killed?	YES	1 st dose 12-16 weeks old Repeat in 4-8 weeks	Bovi-Shield 4 Prism 4

Example Calf & Heifer Vaccination Schedule

<i>VACCINATION</i>	<i>CORE YES/NO</i>	<i>TIME/AGE</i>	<i>BRAND EXAMPLE</i>
MLV – IBR, PI3, BVD, BRSV + 5 way Lepto	YES	1 month prebreeding	Bovi-Shield 4 + L5 Prism 9 Titanium 9
Lepto booster	YES	At pregnancy check	Lepto-Ferm-5
Neospora	NO	At pregnancy check Repeat in 3-4 weeks	Neoguard
E. coli, Rotavirus, Coronavirus	NO	4 and 8 weeks precalving	ScourGuard 4KC
Live or killed 9 way	YES	4-8 weeks precalving	CattleMaster 4 + L5
J-5	NO	4 and 8 weeks precalving	J-Vac
Clostridium 7 way	YES	4-8 weeks precalving	Vision 7

Consider....

- ⇒ Antiserums, immune modulators (vit C Immunoboost), intranasal vaccines, oral vaccines and antibodies, endotoxin vaccines instead of conventional vaccines on newborns
- ⇒ Injectable iron dextran, selenium, vitamin E, multi B-vitamins

Internal Parasites

Nematodes

- ➔ Not a problem in total confinement except for bedded packs with larval contaminated manure
- ➔ Larvae need 2-3 days to be infective
- ➔ Any lot with grass to eat can be a problem



Economic Loss

- ⇒ Depressed growth
- ⇒ Weakened resistance
- ⇒ Possible 500-1000# first lactation milk loss



Strategic Deworming for Heifers (no previous Rx)



Don't overlook wormers like fenbendazole (Safeguard/Panacur) for safety, economy and ease of use

Deworm replacements

SPRING

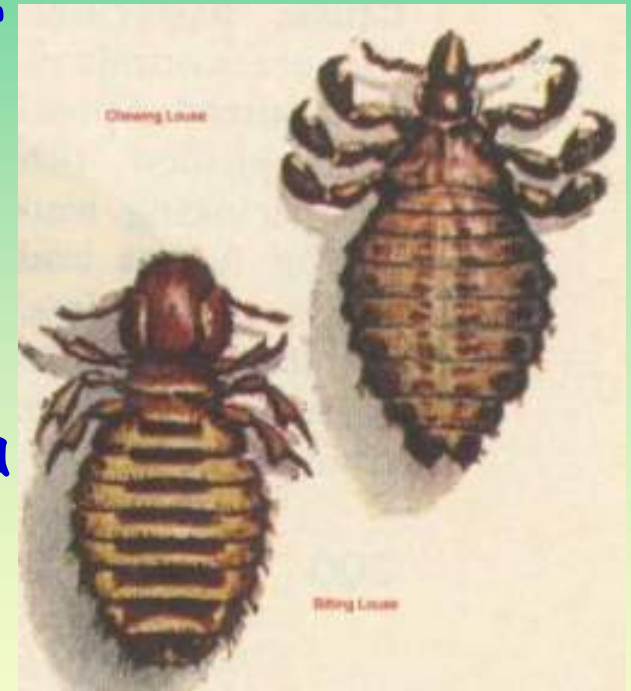
SUMMER

FALL

WINTER

The forgotten parasite - lice!

- ➔ Less of a problem where calves are remote from older animals
- ➔ Difficult to eliminate
- ➔ Cold weather surge
- ➔ Sucking lice can cause anemia
- ➔ Older alcohol based pour-ons at lower dose offer good, cheap control



Investigating Problems



- ⇒ Records of who, what, when and how are invaluable; memory only goes so far!
- ⇒ Work with your veterinarian; push if necessary!
- ⇒ Don't make excuses for what went wrong

Diagnostics



- ➔ Why? Valuable information if used to make more appropriate management and treatment decisions.
 - ❖ More likely to be effective at reducing disease. Reduce frustration.
 - ❖ Justification for treatment choice
 - ❖ Reduces indiscriminate and unwarranted treatments, time, cost and frustration

Take 'selected' diagnostic samples

⇒ *Representative* animals - early in process - preferably not treated.

1) **Total serum proteins** on 12 calves!!

2) **Fecal** samples on live calves – parasitology, culture, gram stain

3) **Post-mortem** representative calves!

⇒ Euthanize calf for best samples

⇒ Submit **fresh, frozen & fixed tissue** samples

4) **Tracheal washes**

Calf Resources on the Web

www.atticacows.com - Sam Leadley - Calving Ease

www.calfnotes.com - Jim Quigley's Calf Notes

www.das.psu.edu/dcn/CALFMGT/ - PSU

www.ansc.purdue.edu/dairy/calves/calfpub.htm

Purdue University

www.babcock.cals.wisc.edu/ - Babcock Institute

They're counting on you!



Thank you

Nail Biological Growth Targets

- 55% mature weight @ breeding
- 82 - 85% mature weight
@ 1st calving
≥90% achieving
- *Breeding: Avg. 56% MW
(67% Achieving)
- *Calving: Avg. 79% MW
(67% Achieving)
(Koval)

What Makes a “Quality Heifer” -- (Koval) Maintaining Management Momentum

- 1st Calf “Treated” as Calf/Heifer* ≤ 30% ?
24 hrs. → 3 mos. _____ 4 mos. → fresh _____
- DOAs in first calf heifers ≤ 9% 7.5%
Male DOAs 7% Female DOAs 8%
- 1st Calf avg. peak ≥ 80% of Mature 77%
or total lactation ≥ 80% of Mature 85%
- 1st Calf Culls ≤ 60 Days in Milk ≤ 5% 3%
- 1st Calf ME’s ≥ Mature > (+601)
- 1st Calf “Treated” in Lactation* ≤ 15% ?
- ≥ 85% retention (any herd) to 2nd lactation 88%
- Reduce #1 reason for 1st lactation culls
(continuous improvement) Mastitis

Questions

