THE INVISIBLE THREAT: IT'S A MENACE TO THE DAIRY

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KNOWN THREATS:

SCOURS:

- BACTERIA
  - K99 E. COLI
  - ATTACHING AND EFFACING E. COLI
  - SALMONELLA SPP.
- VIRUSES
  - ROTAVIRUS
  - CORONAVIRUS
- OTHER
  - CRYPTOSPORIDIUM PARVUM
  - COCCIDIOSIS

PNEUMONIA:

- VIRUSES
  - BRSV
  - IBR
  - BVD
- BACTERIA
  - MANNHEIMIA HAEMOLYTICA
  - PASTEURELLA MULTOCIDA
  - MYCOPLASMA BOVIS

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IMPACT OF SCOURS

- 20-25% OF US DAIRY CALVES DEVELOP DIARRHEA REQUIRING ELECTROLYTE THERAPY BEFORE 21 DAYS OF AGE. (NAHMS 2007)
- 18% OF CALVES WITH DIARRHEA TREATED WITH ANTIBIOTICS (NAHMS 2007)
- 56% OF ALL PRE-WEANED HEIFER DEATHS FROM DIARRHEA OR DIGESTIVE PROBLEMS (NAHMS 2007)
- CALVES TREATED FOR SCOURS 2.5 TIMES MORE LIKELY TO BE CULLED.
- CALVES TREATED FOR SCOURS 2.9 TIMES MORE LIKELY TO CALVE AT 30 MONTHS OF AGE. COST TO PRODUCER IS $100/MONTH OVER 22 MONTH TARGET. (LOSS OF $800 DOLLARS)
- REPLACEMENT SPRINGING HEIFERS WORTH $1500 TO $2000

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TRADITIONAL PRACTICES TO CONTROL

- SEPARATE CALF FROM DAM - LESS THAN 30 MINUTES
- DRY COW VACCINE PROGRAMS
- COLOSTRUM MANAGEMENT:
  - TIMING – LESS THAN 4 HOURS AFTER BIRTH
  - VOLUME – 1 GALLON FOR HOLSTEINS
  - QUALITY – MEASURED WITH BRIX REFRACTOMETER OR COLOSTROMETER
- MINIMIZE FAILURE OF PASSIVE TRANSFER (80% > 5.5G/DL)
- CALF VACCINE PROGRAMS
- ENVIRONMENT
  - CLEAN
  - DRY
  - QUALITY AIR FLOW

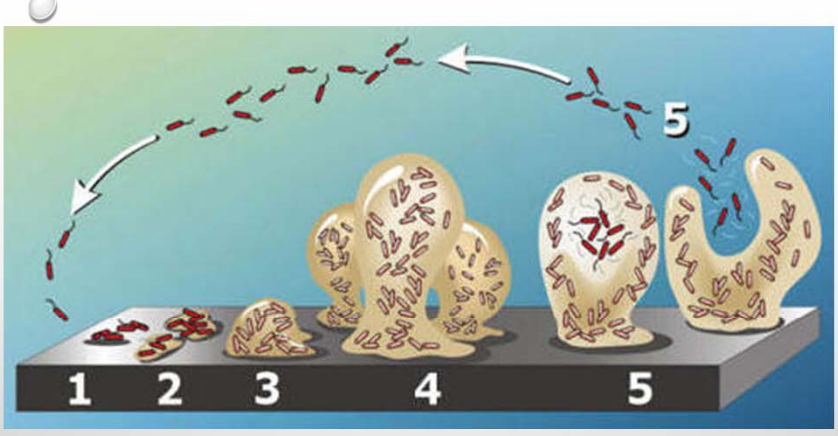
IDEA TO MOVE CALVES AND KEEP THEM CLEAN AND DRY

WHAT ARE WE MISSING?

IT IS WHAT YOU CAN'T SEE?

INVISIBLE THREAT IS: BIOFILM

- DENSELY PACKED COMMUNITIES OF MICROBIAL CELLS THAT GROW ON LIVING OR INERT SURFACES AND SURROUND THEMSELVES WITH SECRETED POLYMERS.



Planktonic – free floating/ swimming bacteria in an aquatic environment (10%)

Sessile – organisms attached to the surface (90%)

BIOFILM

- WHERE DOES BIOFILM OCCUR ON THE DAIRY
  - STAINLESS STEEL SURFACES
  - ALUMINUM
  - COPPER AND/OR BRASS
  - PLASTIC SURFACES
  - RUBBER SURFACES
  - WATER

SANITATION AUDIT – STEP 1

- IDENTIFY AREAS OF CONCERN
  - FEEDING EQUIPMENT
  - ENVIRONMENTAL
  - WATER
- LUMINOMETER (ATP METER)
  - ENZYMATIC REACTION WITH ATP (RELEASED BY ALL LIVING CELLS)
  - RELEASES A DIFFERING DEGREE OF LIGHT MEASURED AS RLU'S (RELATIVE LIGHT UNIT)
- RESULTS TO EXPECT:
  - WATER – 0 RLU'S
  - FEEDING EQUIPMENT - <10 RLU'S
  - ENVIRONMENTAL - <50 RLU'S

SANITATION AUDIT

- EXAMPLE:

7/10/2013					7/24/2013	
Location Tested	Value				Location Tested	Value
Bottle nipple - 1	9999				Nipple - cleaned 2.5hrs	904
Bottle nipple - 2	9541				Paint mixer - 3 days old	95
Pitcher	8041				Gatorade cooler	1228
Esophageal feeder	5905				Bottle	845
Bottle - 1	7263					
Bottle - 2	7198					
Bucket - 1 (newest)	486					
Bucket - 2	1822					
8/21/2013						
Location Tested	Value					
Nipple	79					
Paint Mixer	16					
Gatorade Cooler w/ Spout	23					
Gatorade Spout	45	Ranges:	<50	Goal		
Gatoarde Cooler w/o Spout	8		50 - 150	Warning Zone		
Esophageal Feeder	729		>150	Danger - too high		
Pitcher	11					
Bucket	12					

CLEAN AND SANITIZE – STEP 2

- CLEANING IS DONE IN A VARIETY OF WAYS
  - CIP – CLEAN IN PLACE
  - COP – CLEAN OUT OF PLACE
  - FOAM CLEANING
  - BUCKET AND A BRUSH – MANUAL CLEANING
- FOUR FACTORS AFFECTING CLEANING WITH DISINFECTANTS
  - CONCENTRATION
  - TIME
  - TEMPERATURE
  - MECHANICAL ACTION

CLEAN AND SANITIZE – STEP 2 cont.

- EFFECTIVENESS ALSO BASED ON:
  - ENVIRONMENTAL FACTORS
    - ORGANIC LOAD
    - SURFACE TYPE
    - HUMIDITY
    - WATER HARDNESS
    - pH
    - OTHER CHEMICALS PRESENT
- DEVELOP STANDARD OPERATING PROCEDURES FOR CLEANING
- MONITORING

DISINFECTANTS DEFINED

DISINFECTING AGENTS ARE REGISTERED BY THE ENVIRONMENTAL PROTECTION AGENCY (EPA) AS "ANTIMICROBIAL PESTICIDES" AND ARE **SUBSTANCES USED TO CONTROL, PREVENT, OR DESTROY HARMFUL MICROORGANISMS (I.E., BACTERIA, VIRUSES, OR FUNGI)** ON INANIMATE OBJECTS AND SURFACES.

- DISINFECTANTS
  - DISINFECTANT DESCRIBES A PRODUCT APPLIED DIRECTLY TO AN INANIMATE OBJECT. IT DESTROYS OR IRREVERSIBLY INACTIVATES MOST PATHOGENIC MICROORGANISMS, SOME VIRUSES, BUT NOT USUALLY SPORES.
- SANITIZERS
  - SANITIZERS DO NOT DESTROY OR ELIMINATE ALL BACTERIA OR MICROORGANISMS, BUT REDUCE THE NUMBER OF MICROBIAL CONTAMINATION ON INANIMATE SURFACES TO LEVELS THAT ARE CONSIDERED SAFE.
- DETERGENTS
  - DETERGENTS SERVE TO **DISPERSE AND REMOVE SOIL AND ORGANIC MATERIAL FROM SURFACES ALLOWING A DISINFECTANT TO REACH AND DESTROY MICROBES** WITHIN OR BENEATH THE DIRT.

Comparison Component	Ozone (O^3)	Hydrogen Peroxide (H_2O_2)	Peroxyacetic Acid (POA)	Hypochlorus Acid (HOCl)	Chlorine (CL_2)	Chlorine Dioxide (CLO_2)	Quaternary Ammonium Compounds	Phenols (C_6H_6O)	Iodoph or (I_2)
Giardia	YES	NO	NO	NO	NO	YES	NO	NO	NO
Cryptosporidium spp.	YES	NO	NO	NO	NO	YES	NO	NO	NO
Rotavirus	YES	YES	YES	YES	YES	YES	YES	YES	YES
Coronavirus	YES	YES	YES	YES	YES	YES	NO	NO	NO
Affected by pH	NO	YES	YES	YES	YES	NO	YES	YES	YES
Corrosive	YES	YES	YES	YES	YES	NO	VARIES	YES	YES
Effect on Biofilms	YES	VARIES	VARIES	NO	NO	YES	NO	VARIES	NO
EPA Approved - Water	NO	NO	NO	NO	YES	YES	NO	NO	NO
Carcinogenic	NO	NO	NO	YES	YES	NO	YES	YES	YES
Inactivated by Organic Material	NO	YES	YES	YES	YES	NO	NO	NO	YES
Use as water, sanitizer and disinfectant	NO	NO	NO	NO	YES	YES	NO	NO	NO
Commercial Brand Name	Generated by Equipment	Various	Virkon S® Oxysept 333®, Vortexx®	Chlorine and acid at a pH of 5-7 (generated)	Various (Chlorox Bleach®)	OxyMer®, Oxine®	Roccal®, Zephrin®, DiQuat®	One Stroke, Environ®, TekTrol®, Pheno-Tek II®	Various

CHLORINE DIOXIDE

- WHAT IS IT?
  - POTENT OXIDIZING AGENT
  - HIGHLY SOLUBLE GAS IN WATER
  - BOILING POINT OF 51.8°F – STORE IN REFRIGERATOR
  - 2/3 THE OXIDATION REDUCTION POTENTIAL OF BLEACH
  - 2.5 TIMES THE OXIDIZING CAPACITY OF BLEACH
  - EFFECTIVE AGAINST PLANKTONIC AND SESSILE BACTERIA
  - INFILTRATES THE BIOFILM

	Chlorine Dioxide
Giardia	yes
Crypotosporidium spp.	yes
Inactivated by organic material	no
Affected by pH	no
Corrosive	no
Effective Biofilm control	yes
EPA approved for livestock drinking water	yes

CHLORINE DIOXIDE VS. SCOURS:

- COCCIDIOSIS
- GIARDIA
- CRYPTOSPORIDIUM SPP.
- SALMONELLA SPP.
- E. COLI
- ROTAVIRUS
- CORONAVIRUS

REMOVAL AND CONTROL: ENVIRONMENT

- CLEAN FIRST(CANNOT DISINFECT FILTH)
  - BRUSH, SWEEP, SCRAPE TO REMOVE ALL ORGANIC MATERIAL
- SOAK WITH HOT WATER (>140°F) AND A DETERGENT SUCH AS A CHLORINATED ALKALINE DETERGENT TO BREAKDOWN SOME OF THE BIOFILM
- WASH USING HAND SCRUBBING, LOW PRESSURE GARDEN HOSE OR A HAND HELD FOAMER. (NEVER USE A HIGH PRESSURE WASHER WHEN ANIMALS PRESENT)

REMOVAL AND CONTROL: ENVIRONMENT

- RINSE
- DRY
- DISINFECT

- OCCUPY

REMOVAL AND CONTROL: CALF FEEDING EQUIPMENT

- PROPERLY CLEAN ALL CALF FEEDING EQUIPMENT EQUIPMENT AS FOLLOWS:
  1. RINSE OUT THE BOTTLE, BUCKET, FEEDING TUBE OR COLOSTRUM COLLECTION EQUIPMENT TO REMOVE ALL SOILS INCLUDING MILK SOLIDS WITH WARM WATER 90-100°F DUMP TO DRAIN.
  2. WASH WITH A CHLORINATED ALKALINE MANUAL/FOAM CLEANER (PH 11-12) AND 1-CUP OF BLEACH BY WAY OF BRUSH OR USE A SOAP PRODUCT FROM DAIRY SUPPLY COMPANY @ 135-140°F AND DUMP TO DRAIN.
  3. RINSE IN WARM WATER 90-100°F DRAIN.
  4. HANG UP SIDE DOWN ON A WALL (NOT THE FLOOR OR STACKED) TO AIR AND LET DRY COMPLETELY (THIS WILL STRESS OUT ANY PATHOGENS LEFT).
  5. PRIOR TO USE, SANITIZE WITH THE OXYMER™ CLO2 @ 50 PPM RESIDUAL (2.5OZ/ GALLON OF WATER). WAIT 5 MINUTES BEFORE USING AND DO NOT DRY PRIOR TO USE. USE HIGH RANGE TEST STRIPS (0-500 PPM) TO VERIFY.

NOT EFFECTIVE!

THE IDEAL WAY!

SUMMARY

- RAISING CALVES SUCCESSFULLY INVOLVES TRADITIONAL CONTROLS
- PLUS - IDENTIFY AREAS OF FILTH AND BIOFILM ON THE FARM WITH A SANITATION AUDIT
- DEVELOP A PROTOCOL TO PROPERLY CLEAN AND SANITIZE
- CONTINUE TO MONITOR BY PERIODIC EVALUATION

QUESTIONS?