

QUALITY MILK PRODUCTION SERVICES

Microbiologist Approach to Mastitis

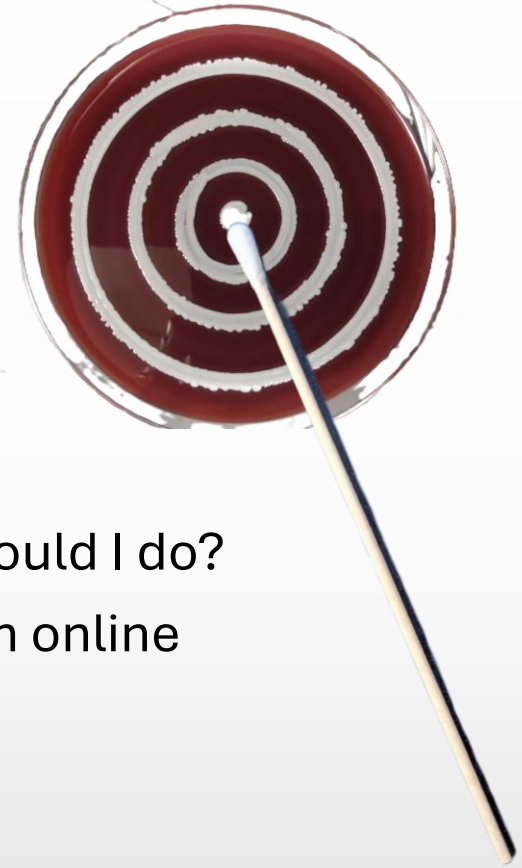
Using On-farm and In-clinic Mastitis Pathogen Detection Systems

An Online Approach

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Quality Milk Production Services
Eastern Laboratory
Cobleskill, New York
MJZ6@Cornell.edu

Objectives

- Why should we detect pathogens?
- It all starts with a good sample.
- Setting up a lab-things to consider
- Most common question with clinical mastitis-What should I do?
- Extending pathogen-based management reach through online education
- Other mastitis detection systems



Pathogen-based Management Decisions for Clinical Mastitis

Why consider this?

**Make More Money
while not compromising animal health**

- **Save money on treatment tubes and labor**
- **Decrease risk of antibiotic residues in the tank**
- **Public health/consumer concern**
 - **Someone tells you that you have to**
 - **Mitigate risk of antibiotic resistance**

Sell more milk

Economic comparison of immediate blanket treatment versus a delayed pathogen-based treatment protocol for clinical mastitis in a New York dairy herd

M. Capel, DVM¹; D. V. Nydam, DVM, PhD²; A. Vasquez, DVM²; S. Eicker, MS, DVM³;

¹Perry Veterinary Clinic, Perry, NY 14530

²College of Veterinary Medicine, Cornell University, Ithaca, NY 14853

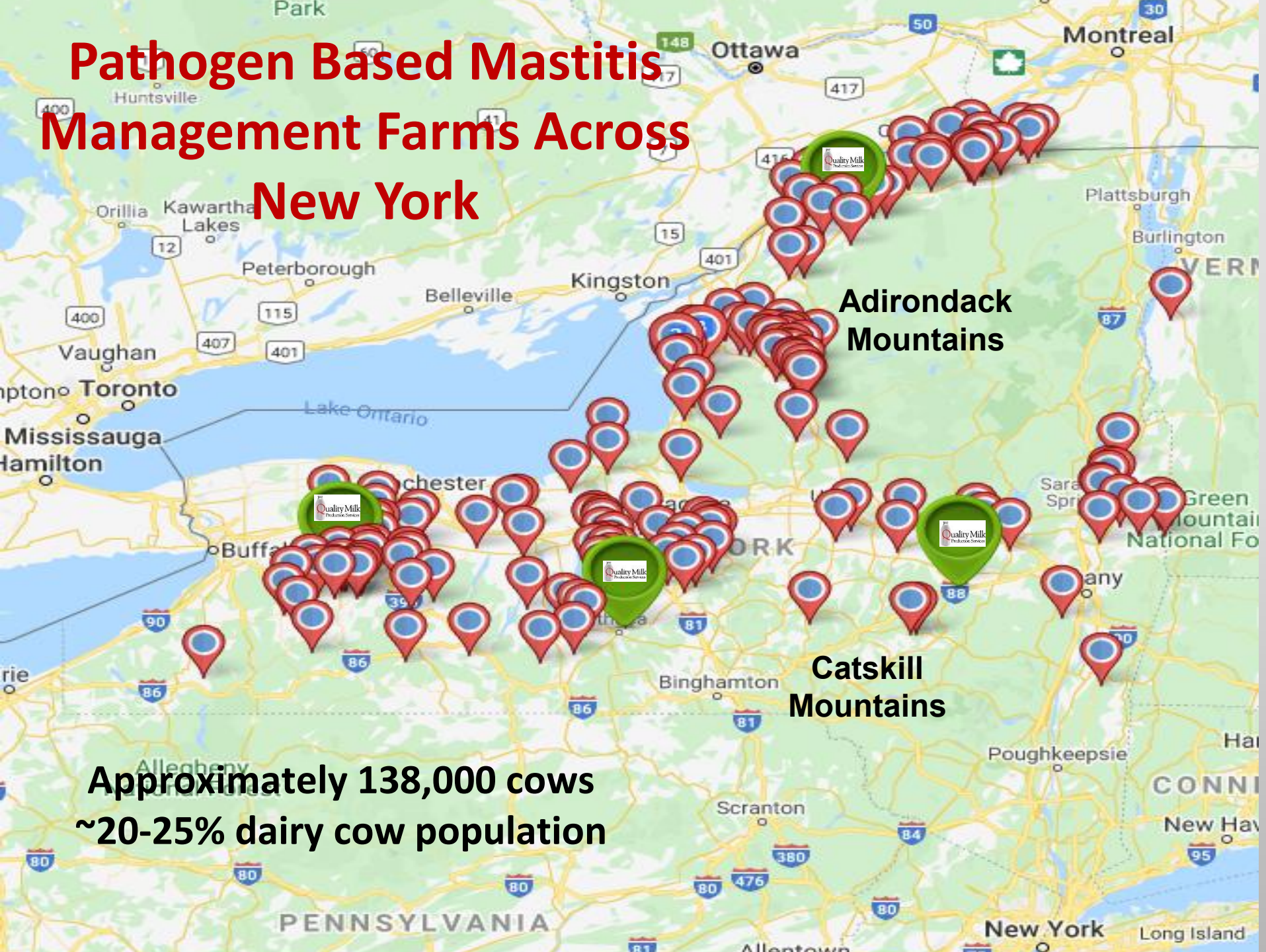
³Valley Ag Software, Tulare, CA 93274



Significance:

The use of culture-based therapy to guide the treatment of clinical mastitis resulted in reduced treatment costs, increased volume of saleable milk, and allowed for a 67% reduction in IMM antimicrobial use with no impact on therapeutic success resulting in an increase in cash flow of over \$30,000 per 1000 COWS.

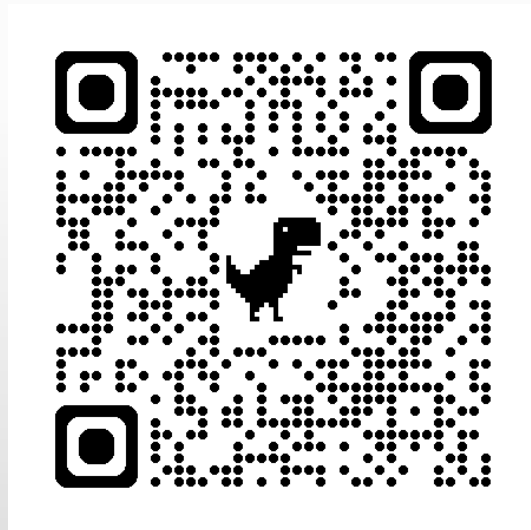
Pathogen Based Mastitis Management Farms Across New York



Limitations to pathogen-based mastitis management

- Good quality samples
- Movement of samples to the lab
- Ensuring farms are properly using culture results

Good Cultures Start With a Good Sample



<https://www.milker-training.com/english>



Listen to podcast



Watch a video



Use a quick guide



Listen to Ana & José

Learn smarter, not longer

Choose your preference

Step by step.

Lesson by lesson.

Immediate impact.

I am in. Let's go.

<https://www.milker-training.com/english>

QUALITY MILK PRODUCTION SERVICES

Choose what you learn

Every farm is unique. Select the topics most relevant for your farm. In just **2 minutes**, you'll sharpen the skills that matter most for consistent routines, udder health, and milk quality.

Choose your preference

-  Listen to a podcast
-  Watch a video
-  Use a quick guide
-  Listen to Ana & José

I'm in. Let's go!



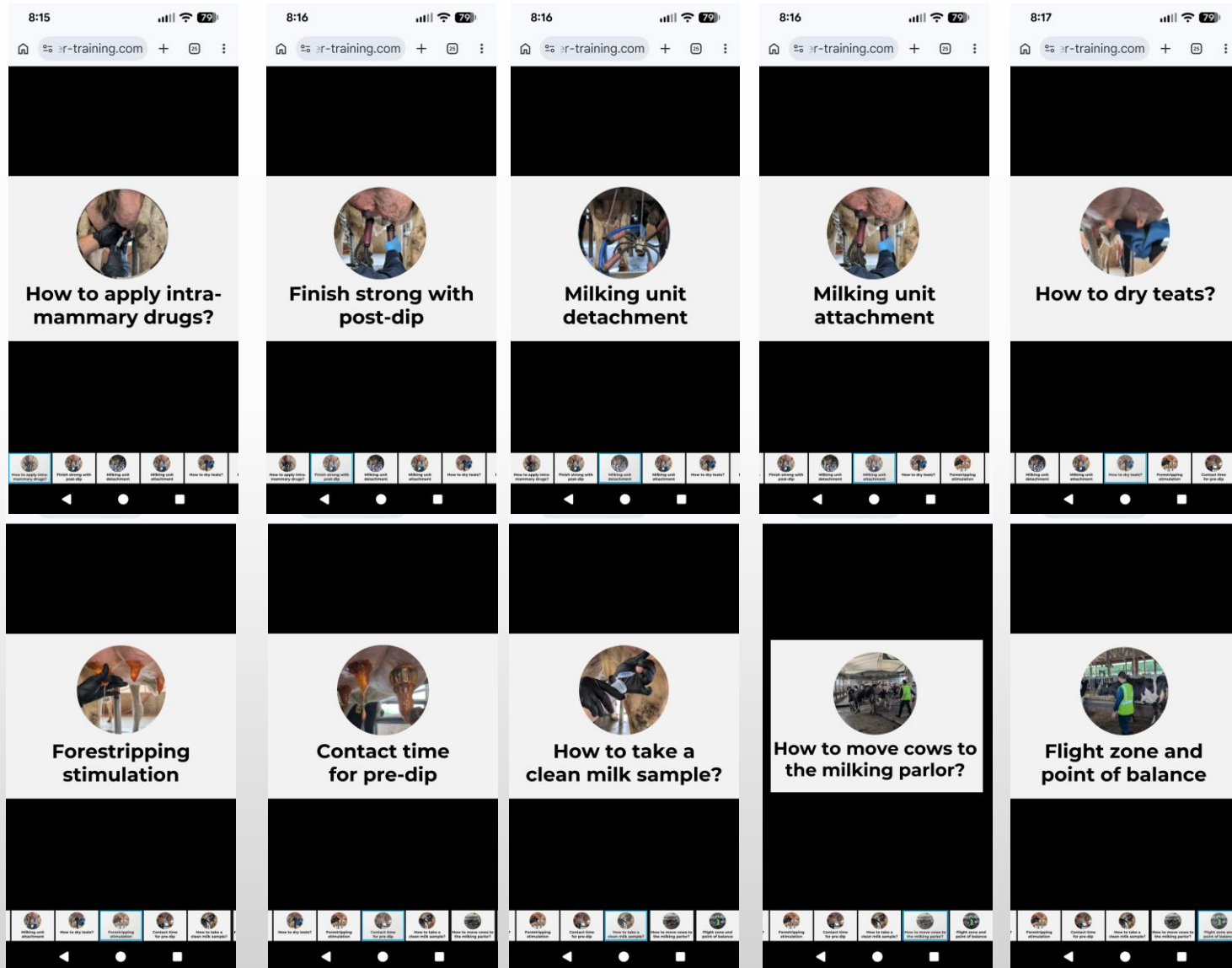
milker-training.com

WhatsApp
+1-607-280-4314

QUALITY MILK

PRODUCTION SERVICES

Cornell
Animal Health Diagnostic Center



QUALITY MILK PRODUCTION SERVICES

11:41 @ @ • 92

my.visme.co/vie + 41

How to collect a clean milk sample?

Step by step guide



1

Materials



- Gloves (Nitrile or latex)
- Teat dip
- Paper or cloth towels
- 4x4 Gauze pads soaked in alcohol
- 70% ethanol or isopropyl alcohol
- Sterile sample vials (no preservative)
- Waterproof marker
- Ice packs



Back



Next

2

Label vials



- Cow ID
- Quarter (LF, LH, RF, RH)
- Date



Back



Next

3

Check if gauze is clean



gauze is not clean gauze is clean

Gauze should be clean after wiping. If not, use another gauze to wipe again



Back



Next

11

11:43 @ @ • 91

my.visme.co/vie + 41

Do not hold vials by their lids



Holding the vial by its lid can contaminate the sample



Back



Next

13

11:43 @ @ • 91

my.visme.co/vie + 41

Sample collection



Collect 1-3 streams of milk



Back



Next

15

11:44 @ @ • 91

my.visme.co/vie + 41

Sample storage



Chill milk samples immediately after collection in a refrigerator or on ice to prevent sample contamination.



Back



Next

18

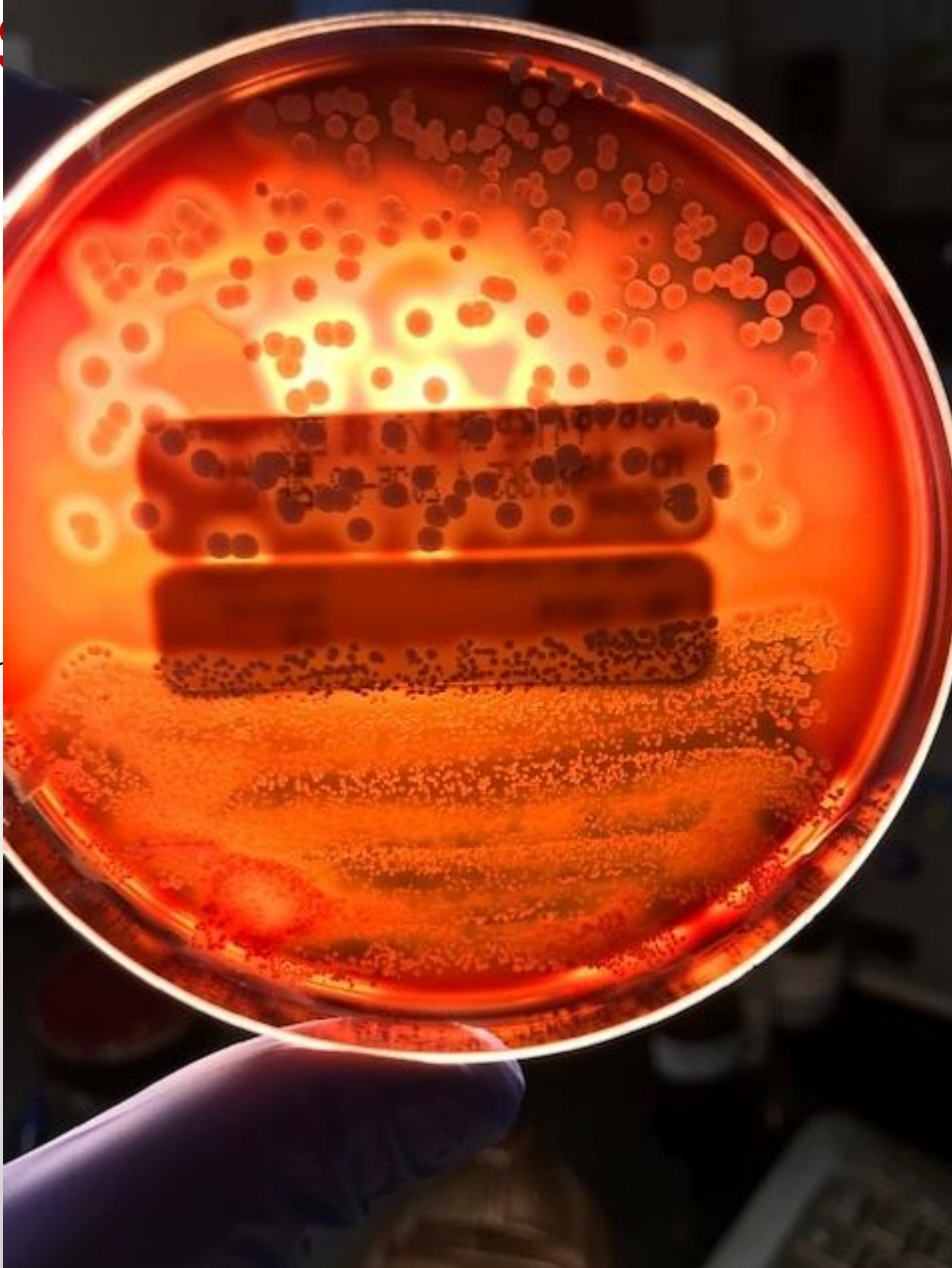
Cornell
Animal Health Diagnostic Center

Sources of contaminants in milk samples

- Teat canal
- Teat orifice
- Teat lesions
- Udder skin
- Sampler's hand
- Cow environment
- Laboratory?



Implementing an On-Farm Quality Assurance Program



A clean dedicated space



On-farm Culture Supplies

<https://www.vdl.umn.edu/submission-guidelines/packing-shipping/supplies>

COLLEGE OF VETERINARY MEDICINE

VETERINARY DIAGNOSTIC LABORATORY

View Lab Results >

Give >

Services & Fees Submission Guidelines ▾ Reports & Billing ▾ Laboratories ▾ Resources ▾ About Us ▾ Give

Home > Submission Guidelines > Packing & shipping

Supplies

Submission forms

Best practices

Packing & shipping

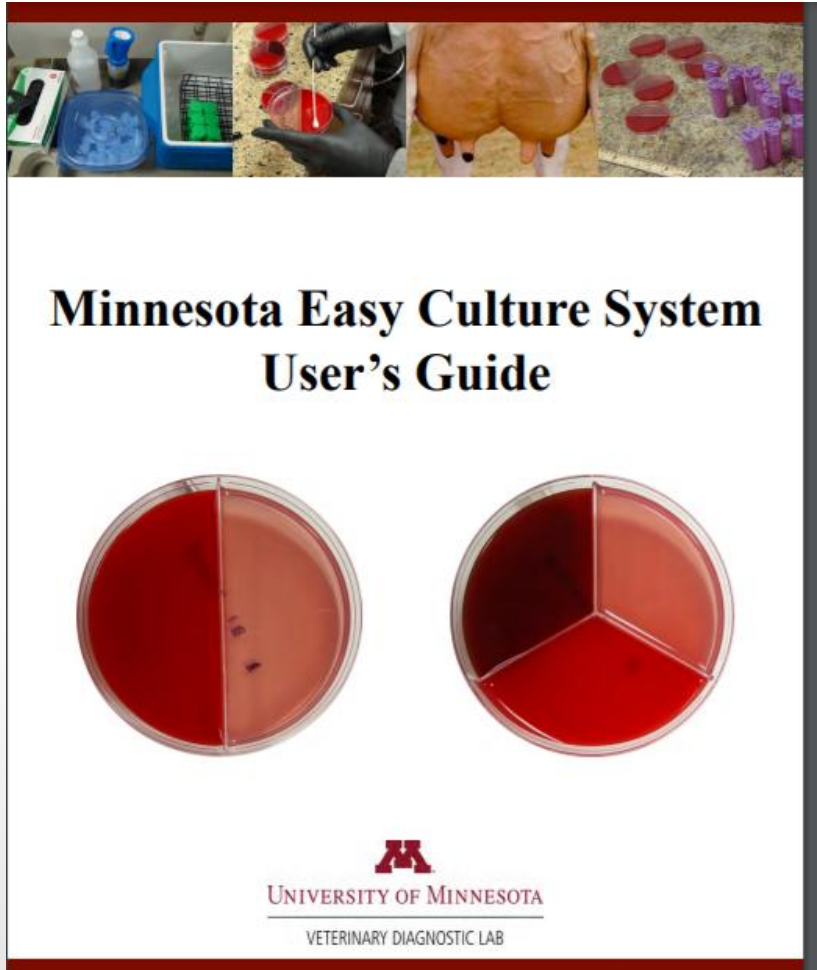
Supplies

UPS Shipping Program

*Prices listed below do not include shipping charges, which will be billed once the supplies are sent

General supplies	Unit price (\$)	How to order
Insulated Shipper: New Box	13.00	Download receiving order form By email: vdirecv@umn.edu By phone: 612-625-7095
Insulated Shipper: New Foam Inside	7.35	
Insulated Shipper: New Outer Box	5.65	
Blood Tube Rack	No charge	
Blood Tube Mailer	No charge	
CWD Collection Cups (pack of 10)	No charge	
Johne's Collection Cups, 2oz	No charge	
Tritrichomonas and campylobacter culture media	No charge	
Campylobacter Transport Media, 3ml	No charge	
Campylobacter Transport Media, 5ml	No charge	
Udder health lab supplies		
2 oz Milk Vials	.30	 By email: mastlab@umn.edu By phone: 612-625-7053 Download Udder Health order form Download Easy Culture Manual: English Spanish
Factor plate	1.75	
Focus plate	1.75	
Blood plate	1.20	
MacConkey plate	1.20	
Tri-plate (F-MTKT - Mac)	3.15	
Bi-plate (F-Mac)	2.00	
Bottle of 15ml coagulase	32.00	
Coagulase tube kit (makes 30 individual tubes)	35.00	
Easy Culture System Handbook (English or Spanish)	No charge	
Pack of 100 sterile swabs	1.50	

<https://www.vdl.umn.edu/services-fees/udder-health-mastitis/farm-culture>



HARDY
DIAGNOSTICS
A Culture of Service™

Bovine Blood Agar with Esculin/MacConkey Agar
Cat. no. J129
PACK SIZE: 10 per package
Contact us for availability
\$51.67 /pk10

- 20 +

ADD TO CART

<https://vdl.umn.edu/laboratories/laboratory-udder-health-luh/minnesota-easyr-culture>

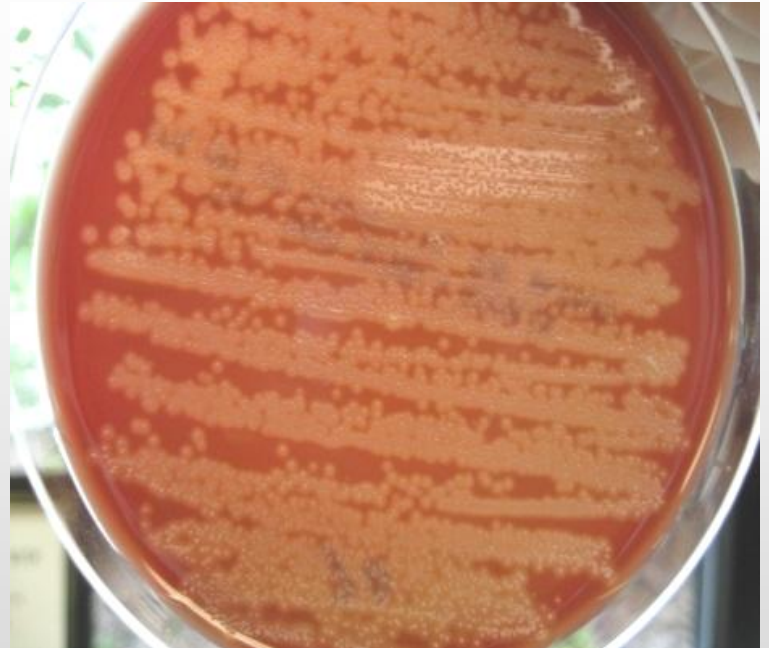
English: https://drive.google.com/file/d/1Nno-yw1qzmKXo_CYIVl3xh1JEsZga4K/view

Spanish: https://drive.google.com/file/d/1VsE-4v_DO_7aJlo3YtJ5V1sCE9dRkkSD/view



Quality Assurance

- Sampling
- Submission
- Media
- Inoculation
- Incubation
- Confirmation

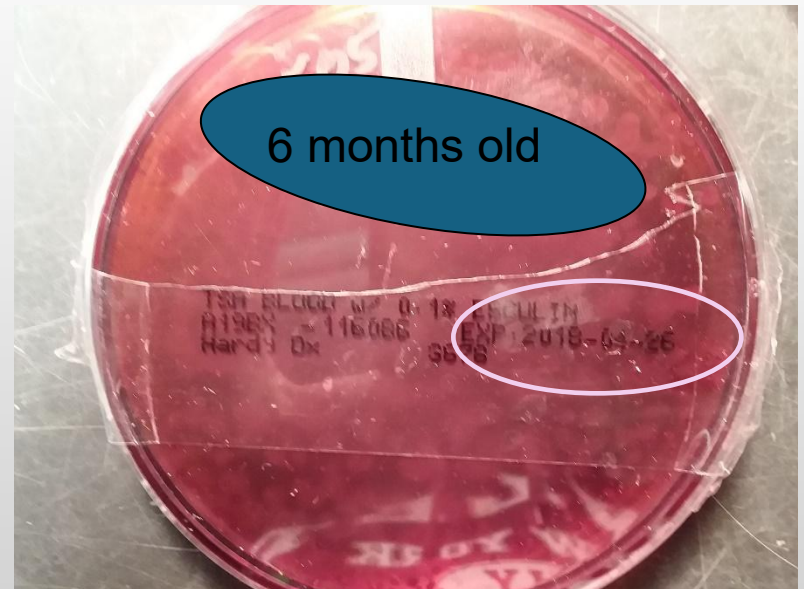
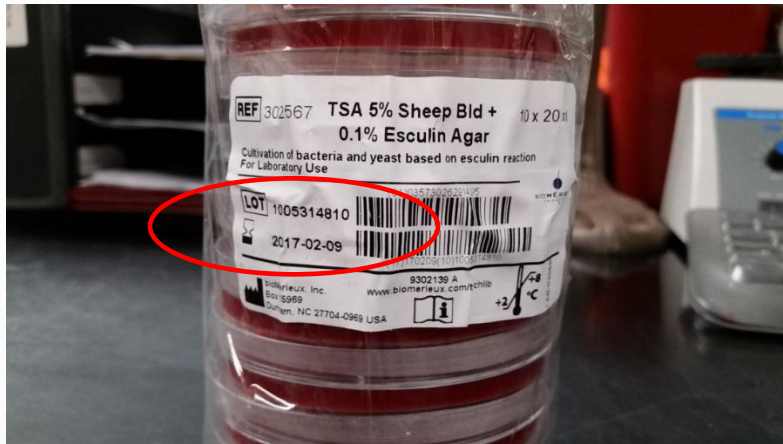


Quality Assurance



- Sampling
- Submission
- Media
- Inoculation
- Incubation
- Confirmation





rm	 006994-17 01/17 Items-5	Condition(s) per sample type: Page <u>1</u> of <u>1</u>	
		Frozen Cold Room Temp Warm	Received By: <u>ALG</u> Date: <u>1/17/17</u>
atory A 9 2555 5525 50	Northern Laboratory 34 Cornell Dr. Canton, NY 13619 Phone: 315-379-3930 877-645-5523 Fax: 315-379-3931		
of QMPS.			
inarian	N/A		

Sample Submission



qmps general submission form

AI Mode **All** Images Shopping Videos Forums Short videos More Tools

Cornell University College of Veterinary Medicine
<https://www.vet.cornell.edu/sites/default/files/PDF>

QMPs General Submission Form

Samples submitted to QMPs and organisms isolated from them become the property of QMPs. Owner. Veterinarian. Account No. Account No. Address. Address. City/ ... [Read more](#)
2 pages

Cornell University College of Veterinary Medicine
<https://www.vet.cornell.edu/sites/default/files/PDF>

QMPs General Submission Form

Feb 10, 2021 — Samples submitted to QMPs and organisms isolated from them become the property of QMPs. Owner. Veterinarian. Account No. Account No. Address. [Read more](#)

Cornell University College of Veterinary Medicine
<https://www.vet.cornell.edu/submission-guidance>

Submission Guidance

Please complete and return the QMPs General Submission Form · Milk samples should be placed on ice or refrigerated immediately for transport to the laboratory. [Read more](#)

DocHub
<https://www.docub.com/FormsLibrary>

Cornell diagnostic lab submission form: Fill out & sign online

It includes sections for the submitting veterinarian's and owner's information, clinical history, animal identification, and requested tests. The form ... [Read more](#)

Cornell University College of Veterinary Medicine
<https://www.vet.cornell.edu/programs/quality-milk-pr...>

Quality Milk Production Services

Quality Milk Production Services supports high-quality milk and consumer trust through improved management, udder health and reduced antibiotic drug use, ...



QMPs General Submission Form

Quality Milk Production Services
/animal-health-diagnostic-center/programs/quality-milk-production

Central Laboratory
240 Farmer Rd.
Ithaca, NY 14853
Phone: 607-255-4332
877-645-5522
Fax: 607-253-4000

Eastern Laboratory
111 Schenectady Ave.
Cohasset, NY 12015
Phone: 518-255-5881
877-645-5524
Fax: 518-255-5682

Western Laboratory
36 Center St. STE A
Marquette, NY 14850
Phone: 518-255-5881
877-645-5525
Fax: 518-255-5682

Northern Laboratory
34 Cornell Dr.
Canton, NY 13611
Phone: 315-379-3930
877-645-5523
Fax: 315-379-3931

Condition(s) per sample type: Page ____ of ____
Frozen Cold Room Temp Warm
Received By: _____ Date: _____

Samples submitted to QMPs and organisms isolated from them become the property of QMPs.

Owner	Veterinarian
Account No.	Account No.
Address	Address
City/State/Zip	City/State/Zip
Phone	Phone
Fax/US Mail (Circle)	Fax/US Mail (Circle)
Email	Email
DC305	Species: ☐ Cow ☐ Goat ☐ Sheep ☐ Other
Bill To: ☐ Owner ☐ Veterinarian ☐ 3 rd Party (LIMS#)	

Notes:

Sample Type:
CS = Composite, LH = Left Hind, LF = Left Front, RH = Right Hind, RF = Right Front.
OTHER: BED = Bedding, C = Colostrum, I = Isolate, T = Towel, S = Seab, F = Filter, TD = Test Dip, W = Water, B = Brush

Reason:
CM = Clinical
SUB = Sub-clinical
F = Fresh
HTO = Hospital Take-out

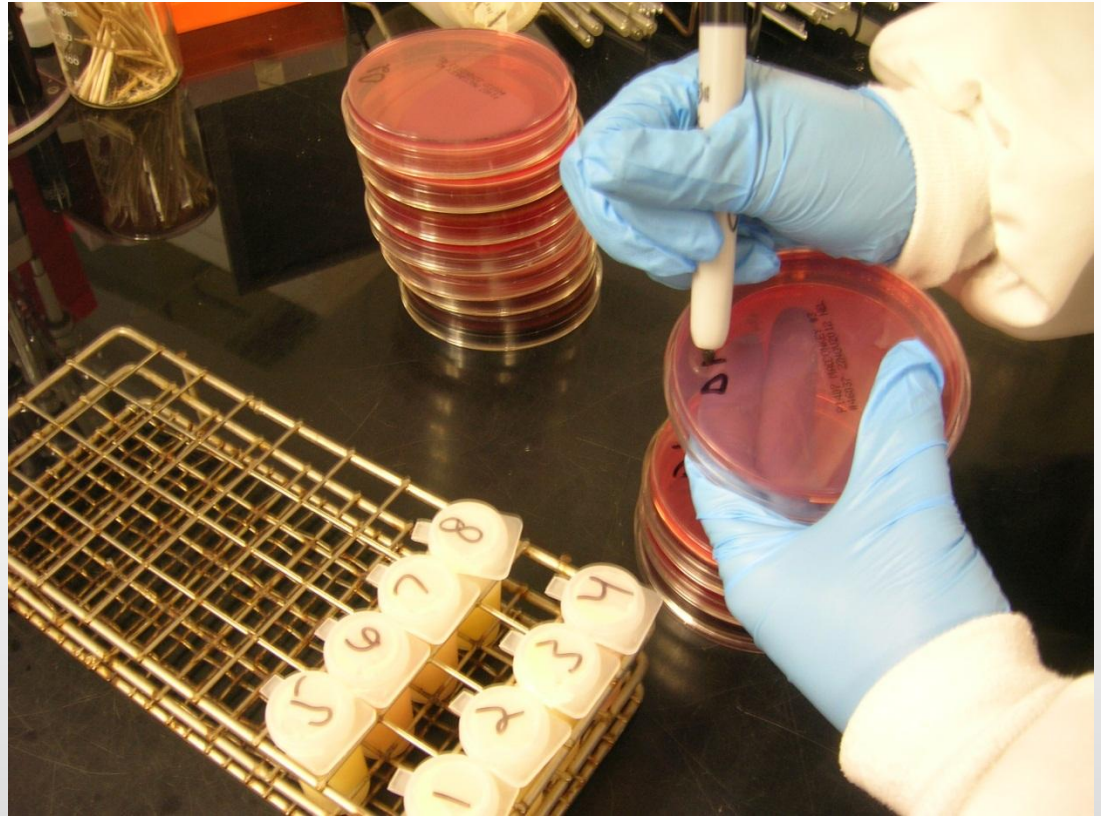
Test:
A = Aerobic Culture, M = Mycoplasma, MP = Myco Pool
SCC = Somatic cell count, AB = Antibiotic Susceptibility, BT = Bulk Tank Culture, Q = Quantification (bacteria counts)

No.	*Sample ID	LH	LF	RH	RF	CS	Other	*Sample Date	CM	Reason	SUB	F	HTO	Test(s)	No.
1															1
2															2
3															3
4															4
5															5
6															6
7															7
8															8
9															9
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Ship Monday-Thursday

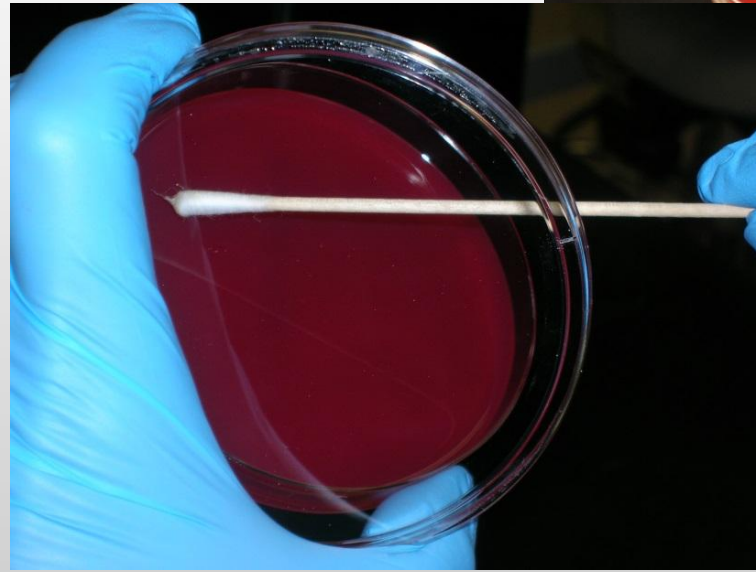
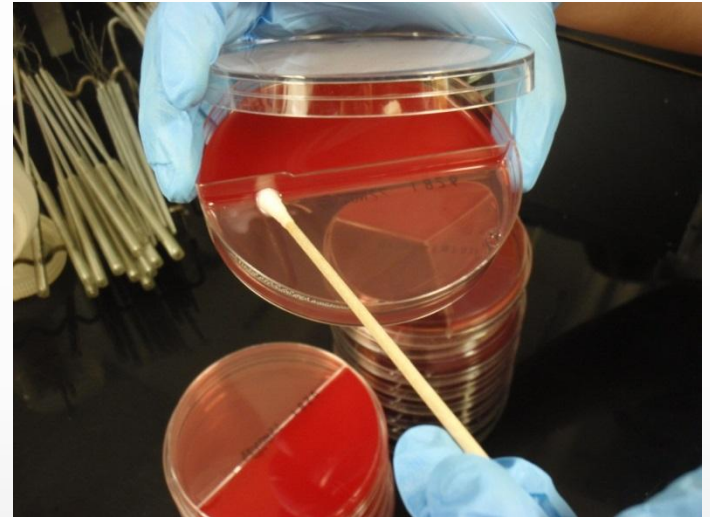
Inoculating Culture Media

Label bottom of
plate with cow
identification,
date, & time



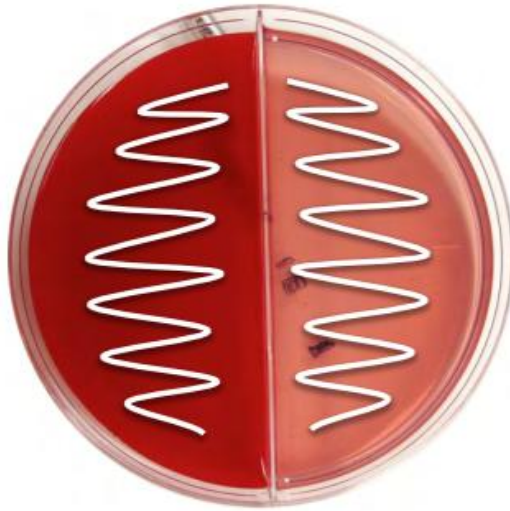
Inoculating Culture Media

- Partially open plate
- Swab milk onto plate



Bi-Plate:

1st swab Factor Media



2nd swab MacConkey Media

Inoculation Patterns

Tri-Plate:

3rd swab MTKT Media



2nd swab MacConkey Media

1st swab Factor Media

Incubating Culture Media

Incubate at 37°C



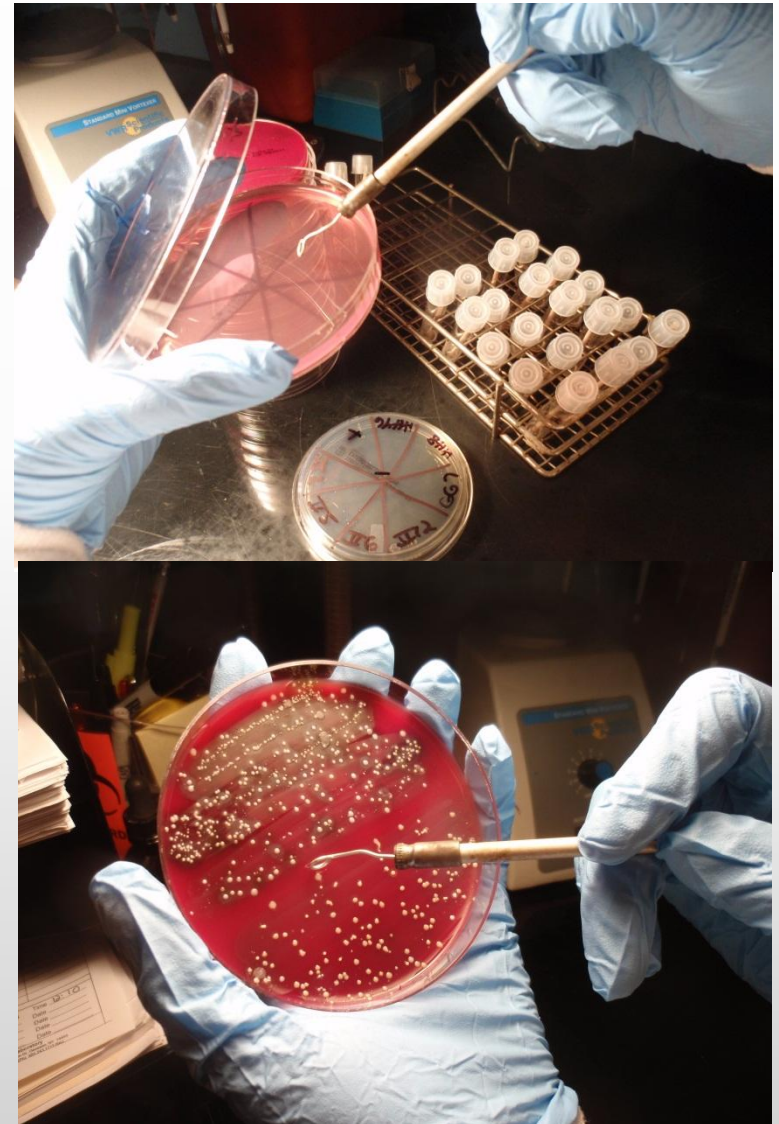
Incubation Quality Assurance

**How do we know if
conditions are appropriate
for bacterial growth?**



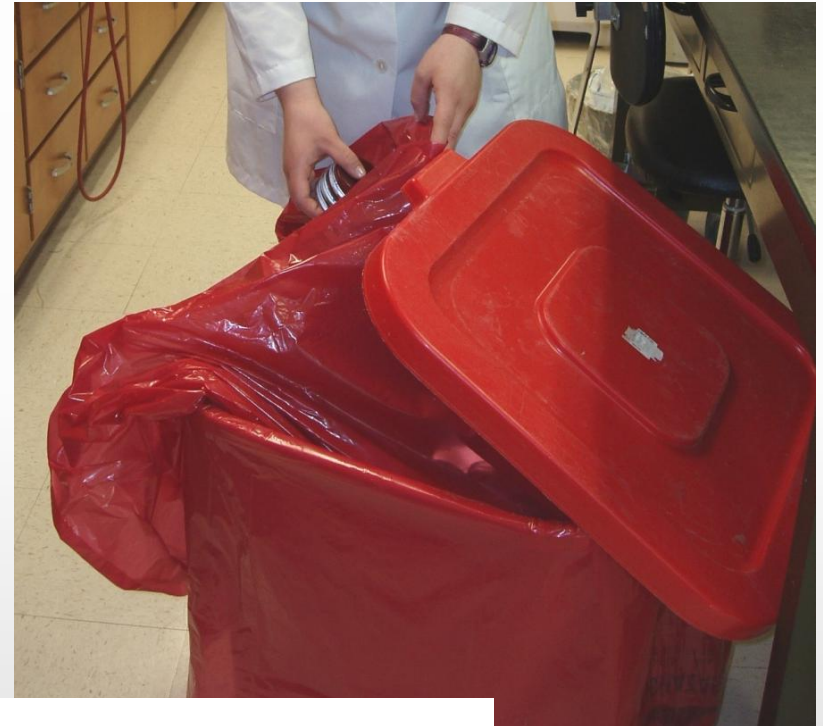
Interpreting Culture Media

- After 18 – 24 hours, set-up tests
- After 48 hours, final identification



Inoculation Quality Assurance

Dispose of
contaminated
waste properly

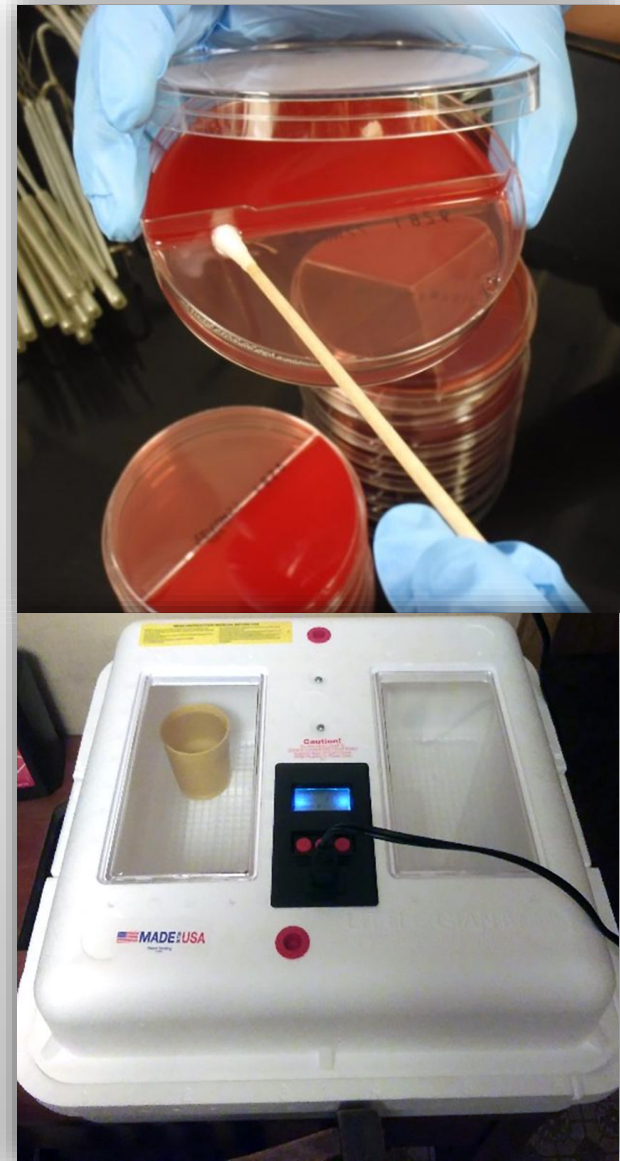
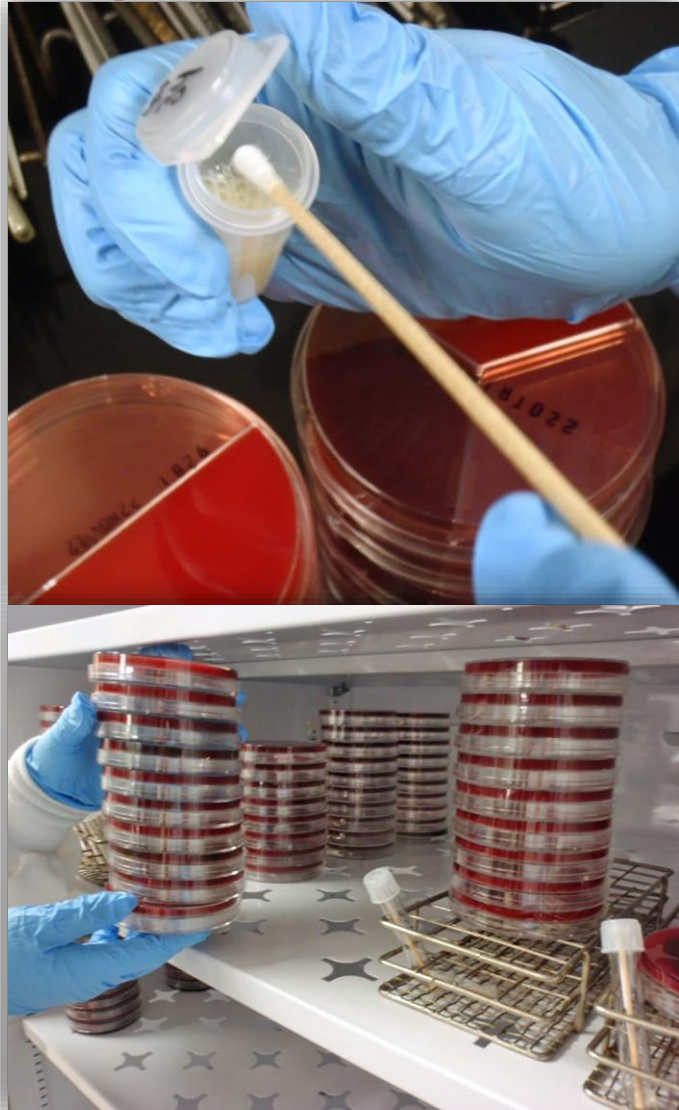


Specific Case Examples (2023-2025)

- **\$100,000 - \$125,000+**: Various firms were fined in 2024-2025 for non-compliance with hazardous waste disposal, including penalties for failing to comply with environmental protection orders.
- **\$13,000 - \$17,500**: Lower, yet substantial, fines for smaller-scale illegal storage or transport violations.

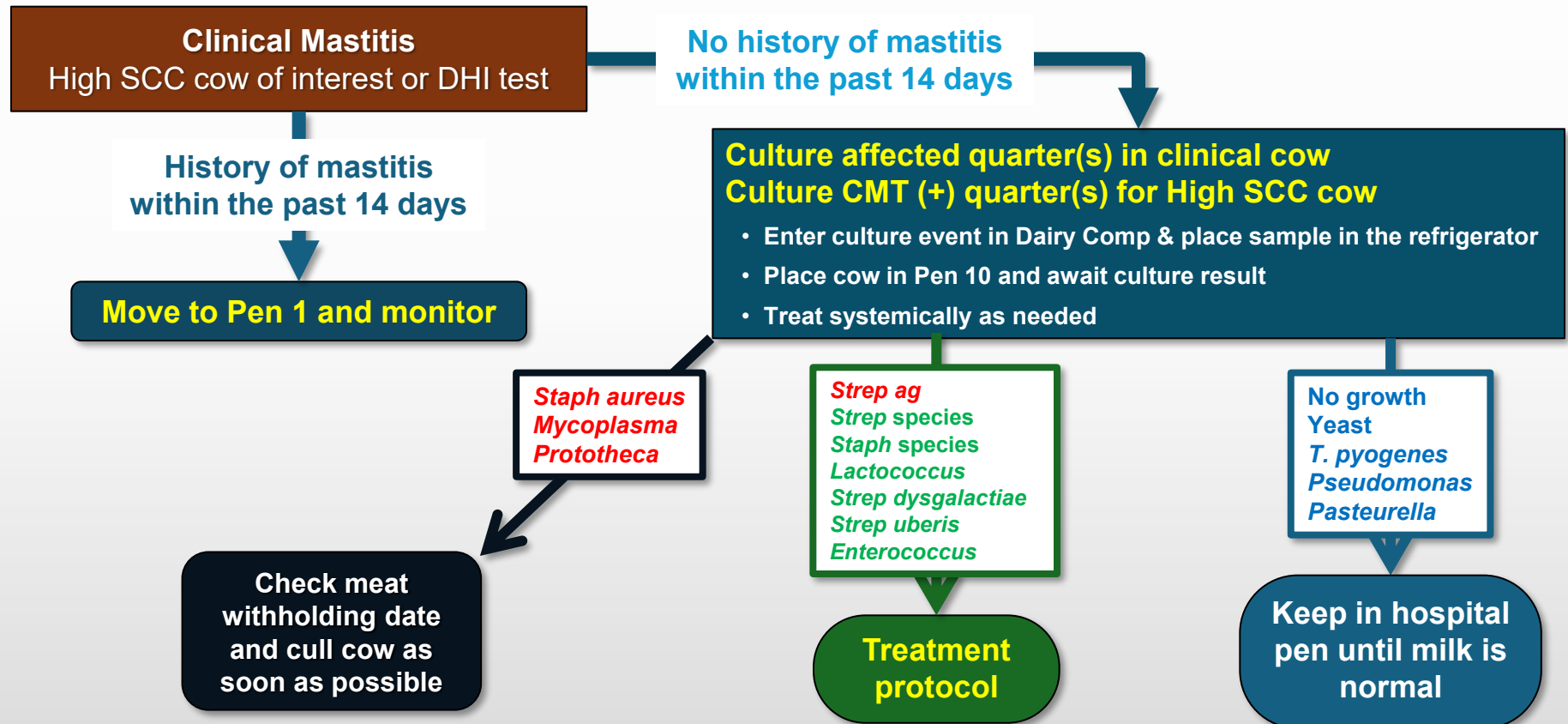
The new penalties will range from \$1,000 per day for less serious violations to \$100,000 per day for the most serious violations, and apply to both open and closed [landfill sites](#) with an approved capacity of 40,000 m³ or more.

Which Mastitis Detection System Should You Use?



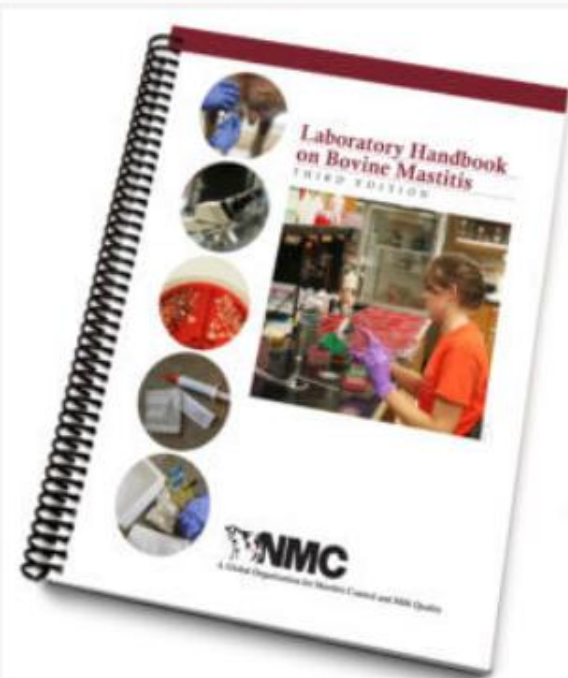
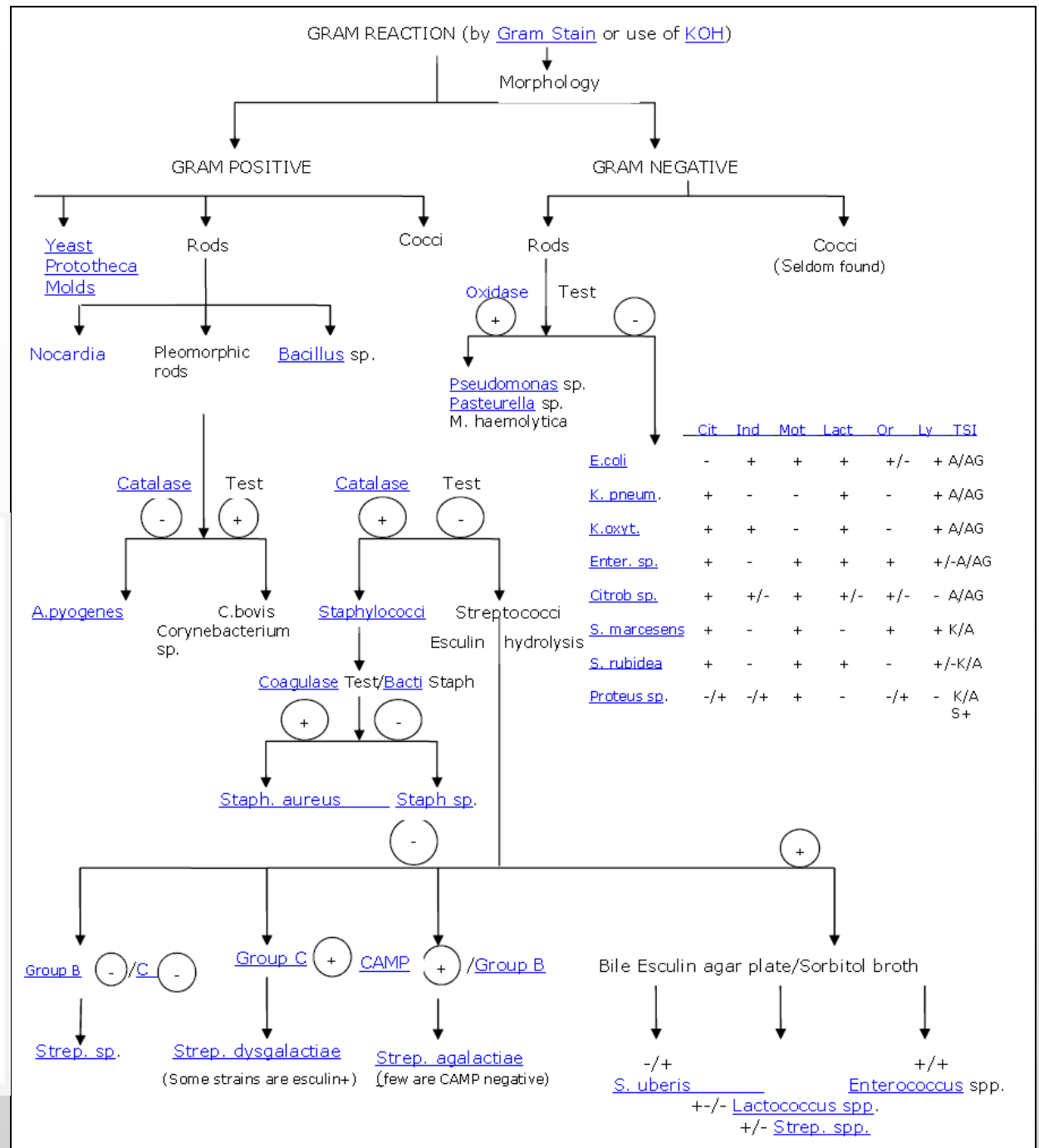
Sample Mastitis Management Protocol (from herd veterinarian)

Based on Milk Culture Results: Contagious, Environmental, and Other Pathogens



QUALITY MILK PRODUCTION SERVICES

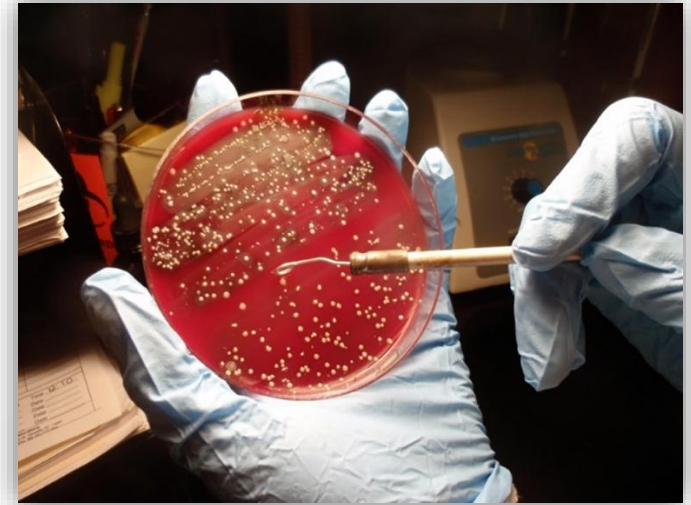
NMC Method



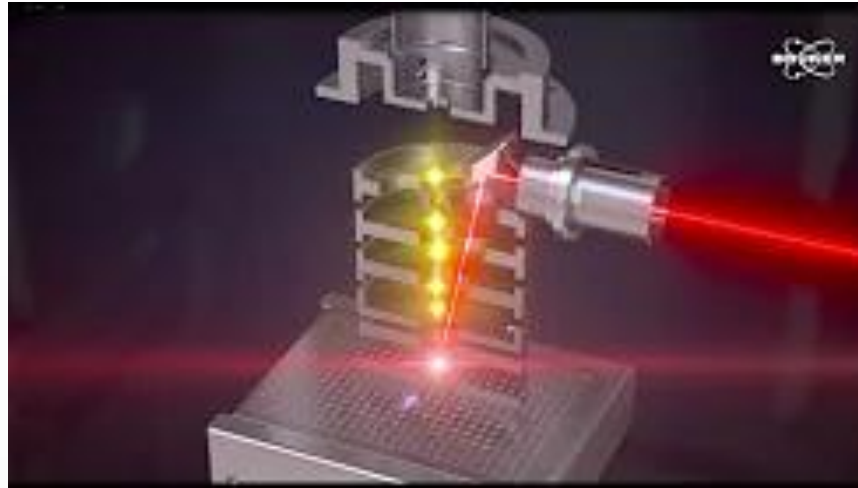
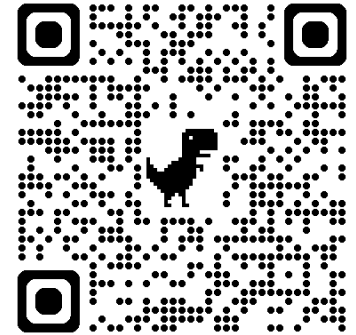
Mastitis Pathogen Confirmatory Methods

Mastitis pathogens can be identified by:

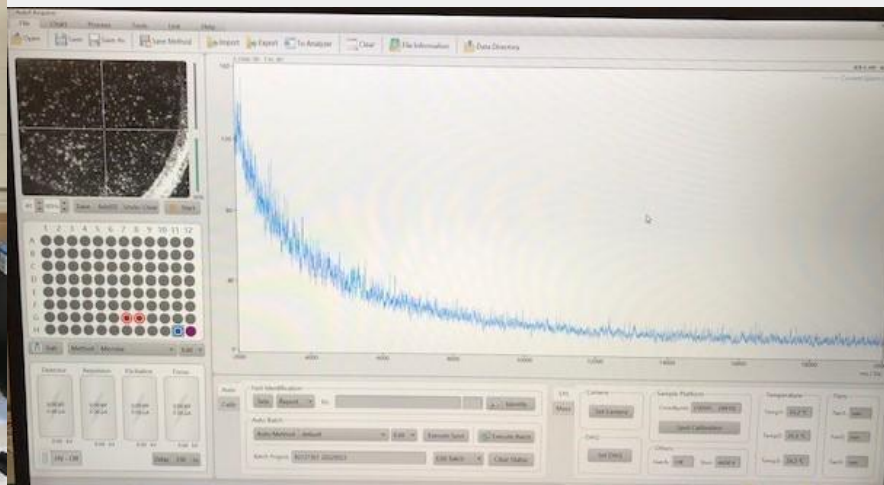
- **Morphology**
colony characteristics on blood agar
and selective media
- **Microscopic observation**
 - Gram stain
 - Wet mount preparations
- **Testing biochemical characteristics**
 - Enzymes reactions
(catalase, oxidase, decarboxylase,
etc.)
 - Fermentation of sugars
- **Immunological tests**
- **MALDI-TOF**



MALDI-TOF

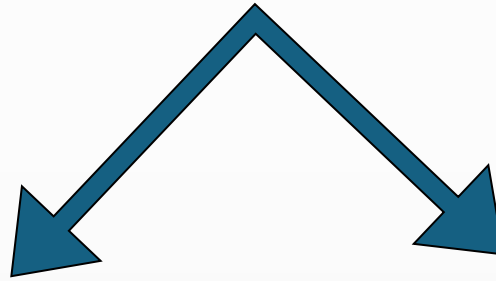


<https://www.youtube.com/watch?v=0jeFpXHZ8W0&list=WL&index=1&pp=gAQBiAQB>

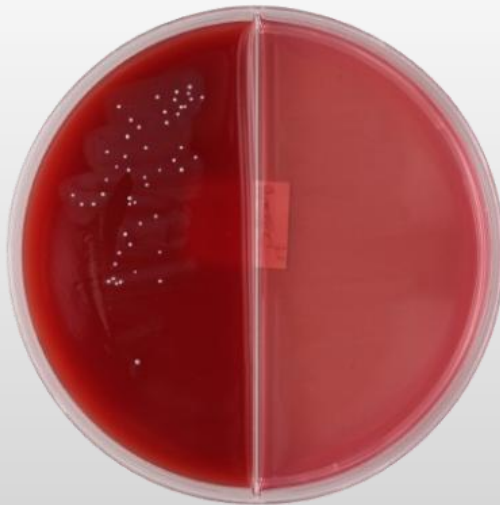


What question are you trying to answer?

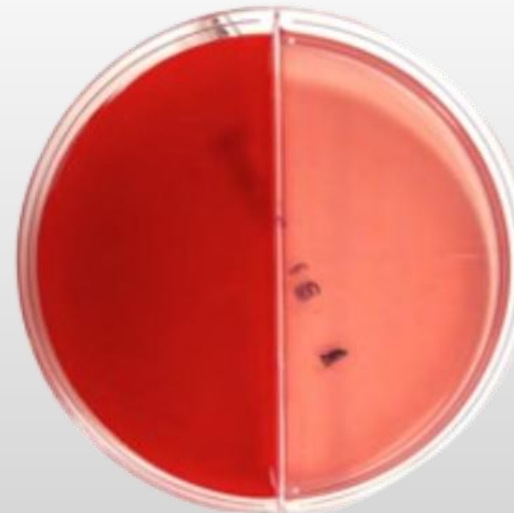
What do I do with this case of mastitis?



Treat (Growth)

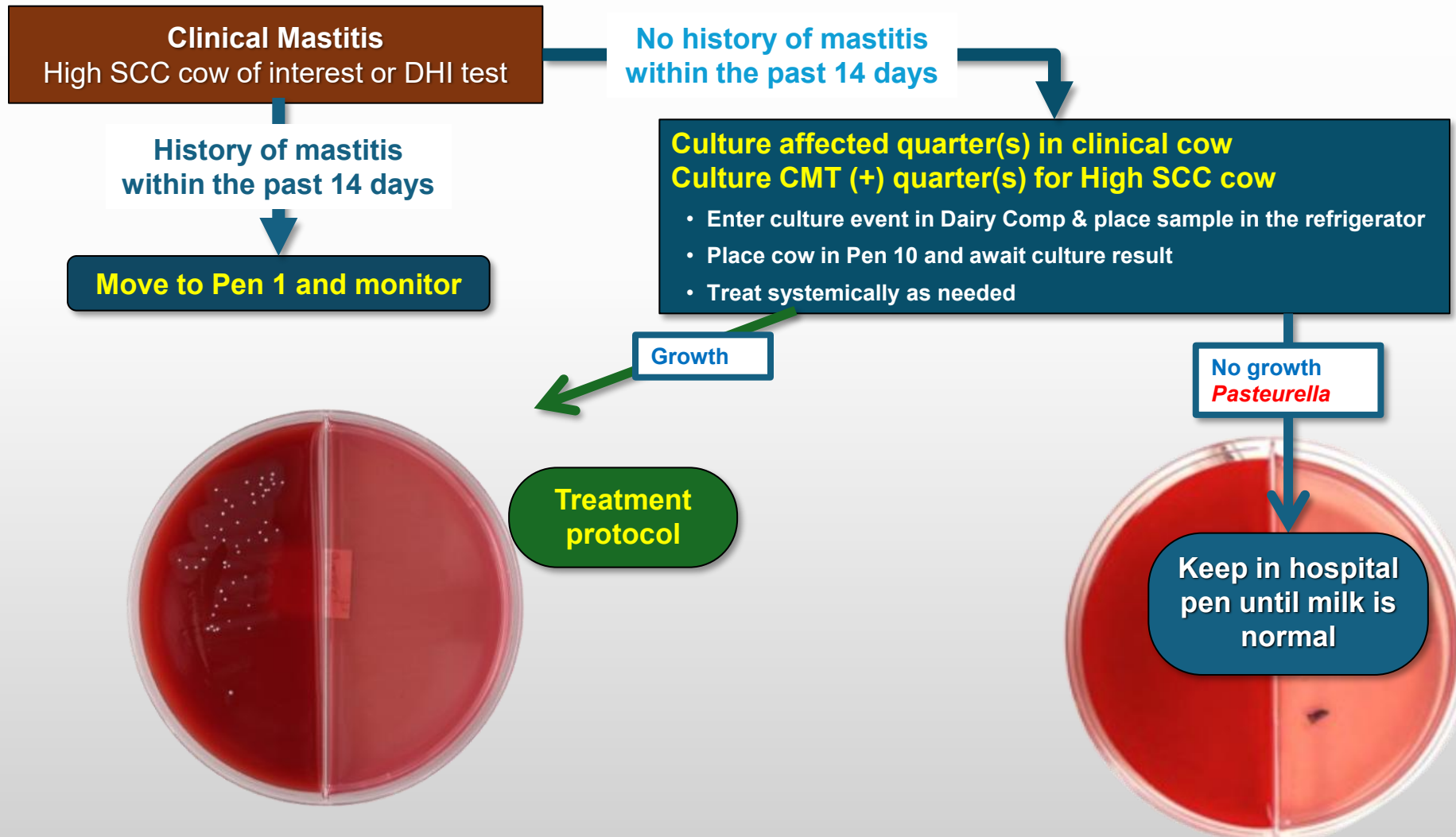


No Treat (No Growth)

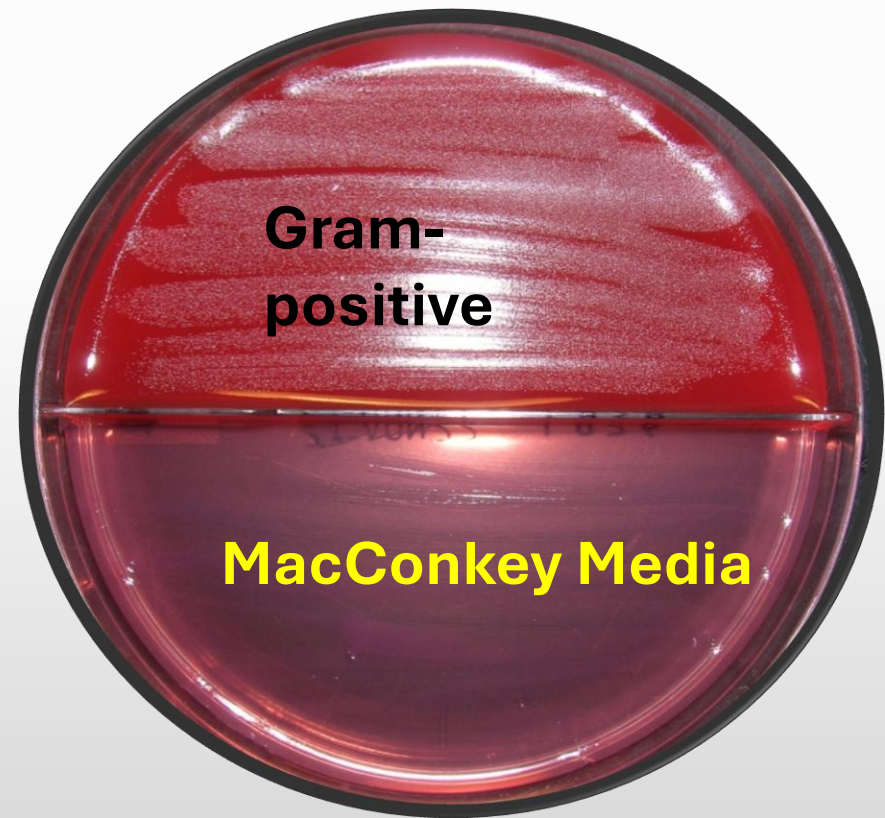


Bi-Plate Sample Mastitis Protocol (from DVM)

Based on Milk Culture Results: Contagious, Environmental, and Other Pathogens

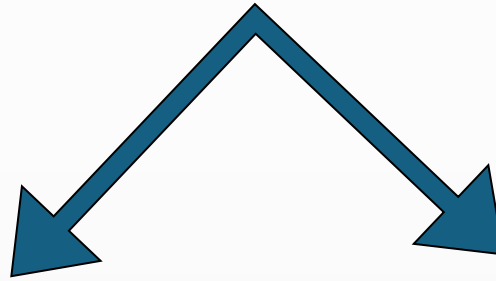


Bi-Plates

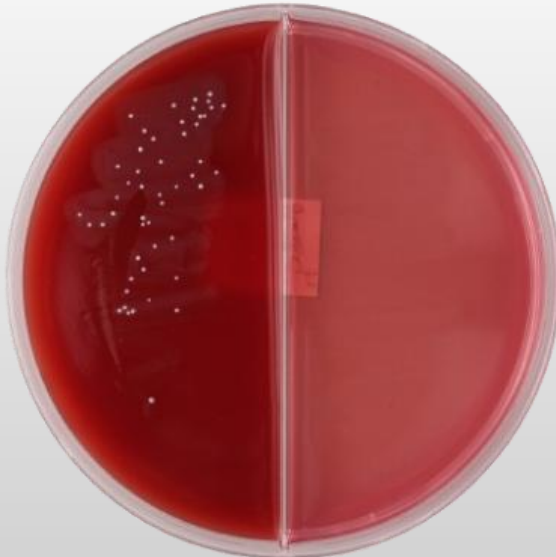


What question are you trying to answer?

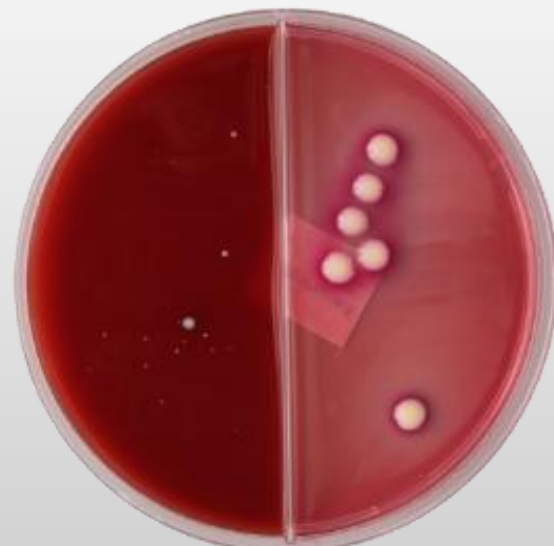
What do I do with this case of mastitis?



Treat Gram-positives

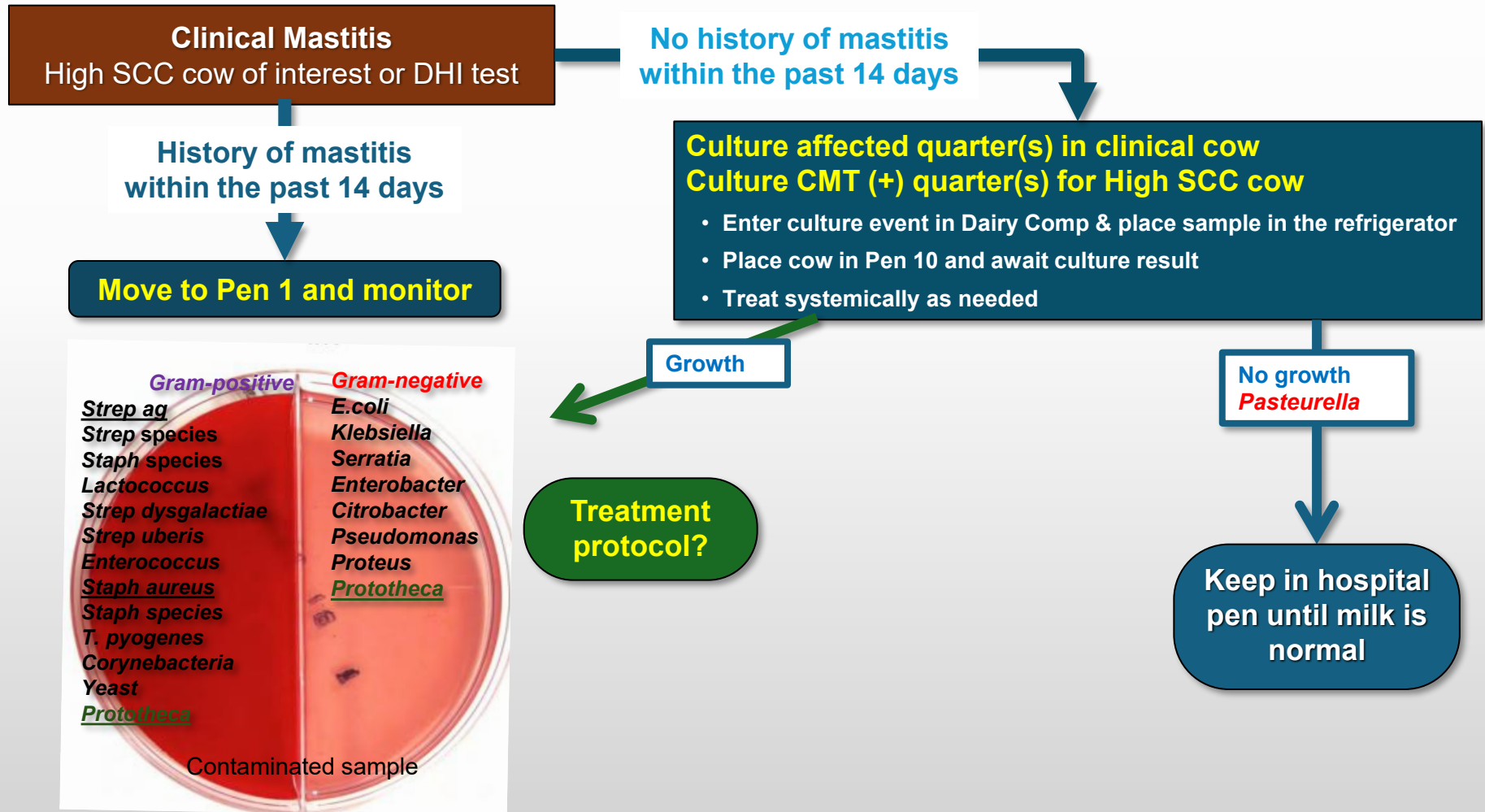


No treat Gram-negatives

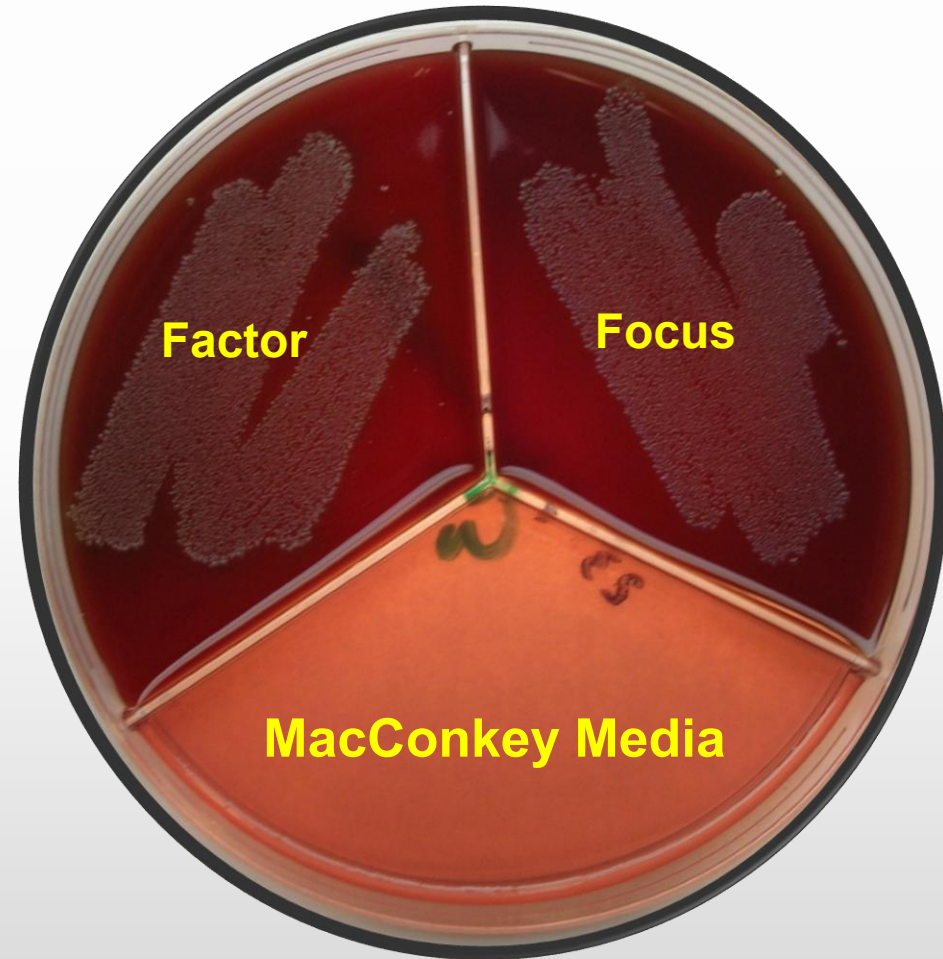
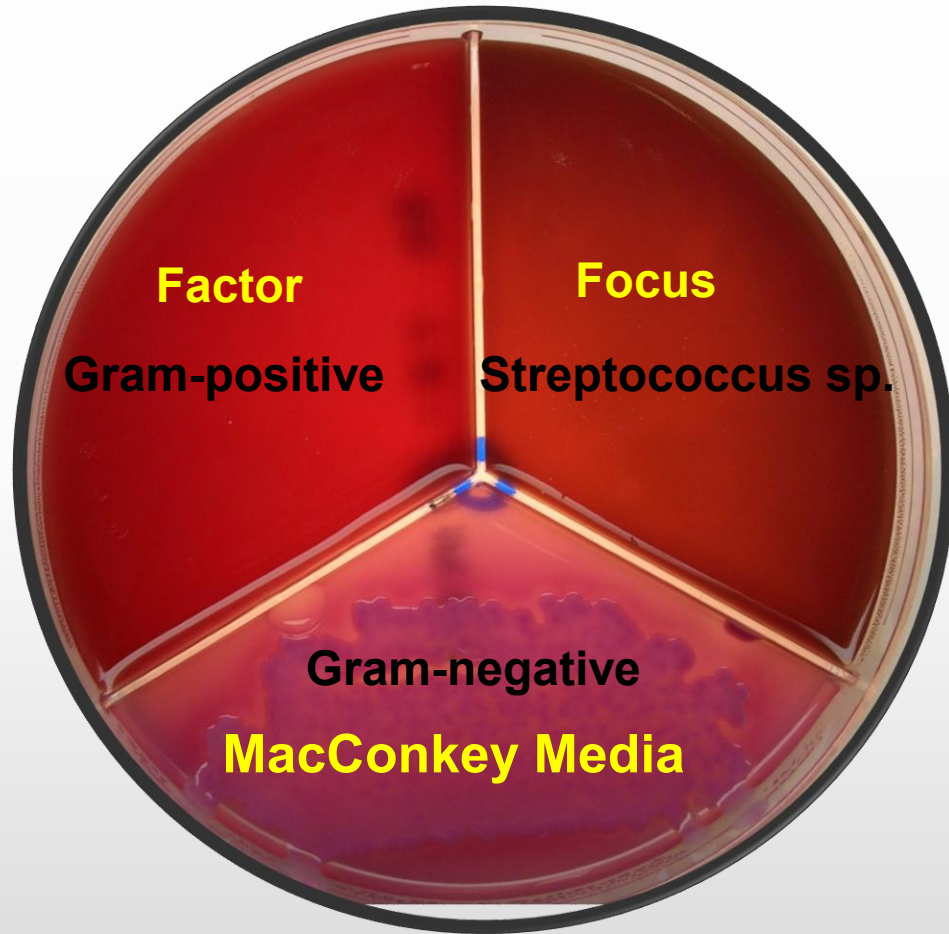


Bi-Plate Sample Mastitis Protocol (from DVM)

Based on Milk Culture Results: Contagious, Environmental, and Other Pathogens

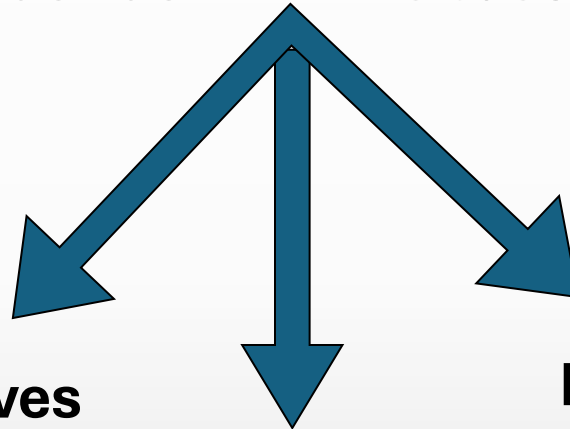


Tri- plates



What question are you trying to answer?

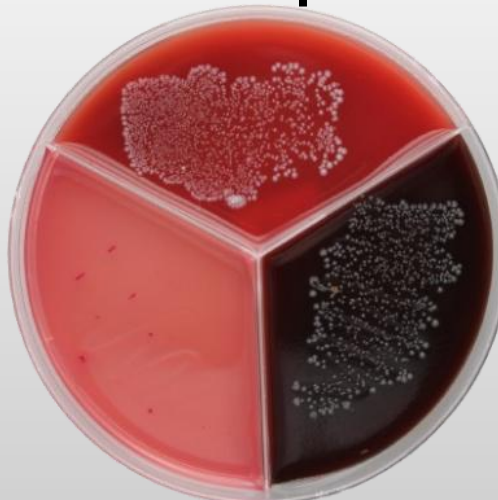
What do I do with this case of mastitis?



Treat some Gram-positives

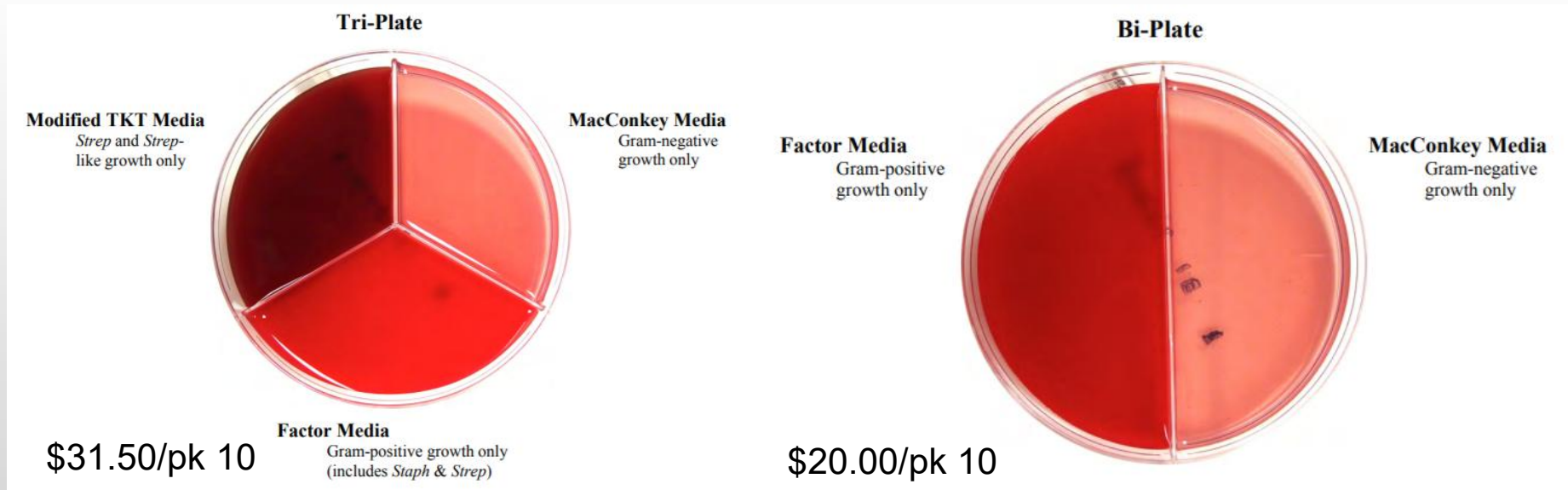
No treat Gram-negatives

Treat Streptococci



On-farm Milk Culture

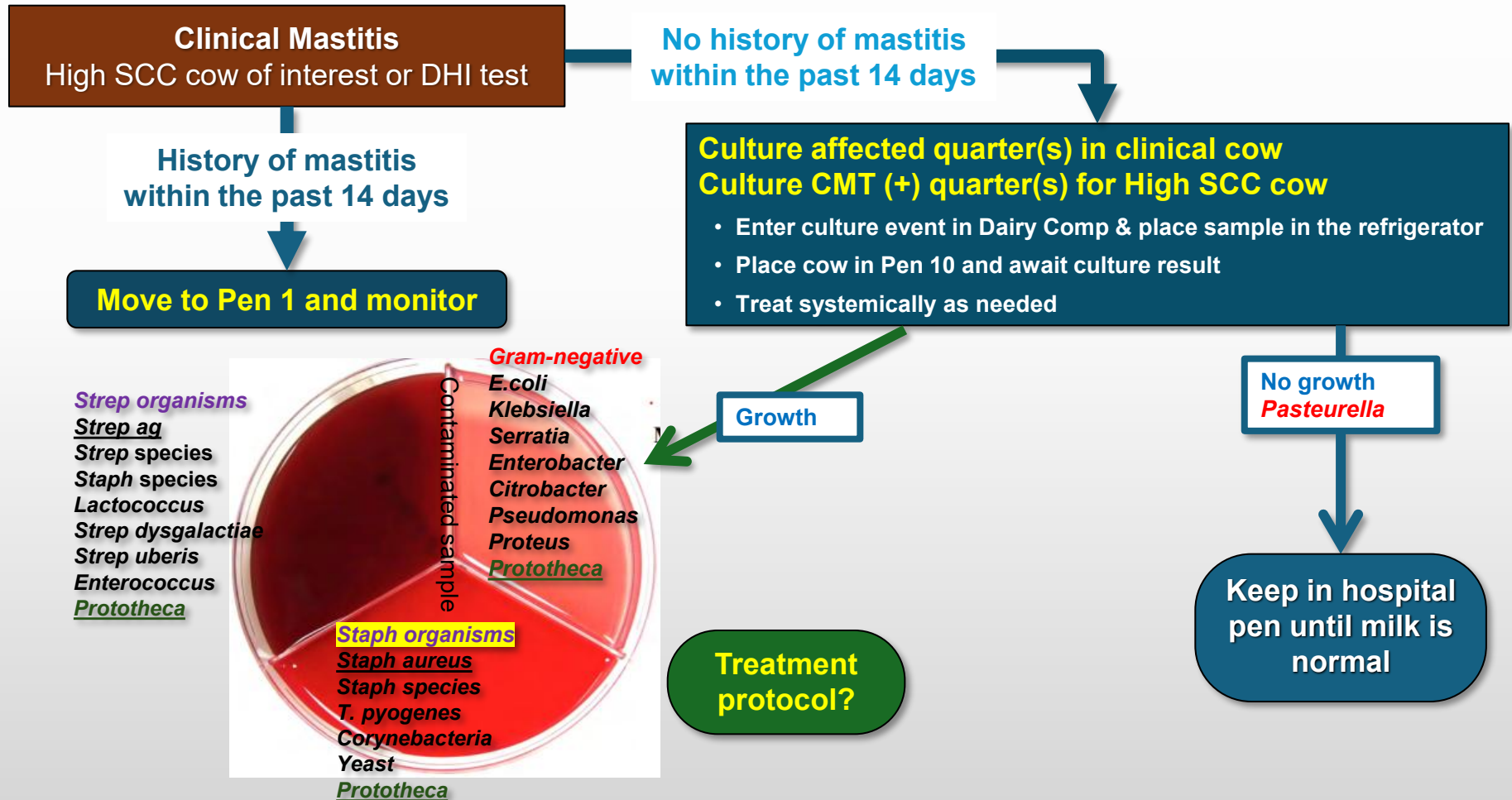
- Timely decision-making for treatment or not
- 24 hour results catered to treatment protocols
 - No growth/growth
 - Gram+/-
 - 78% PPV, 96% NPV (McCarron *et al*)
 - Streps, Staph, Staph aureus +/-



~\$2.00-\$4.00 + labor + supplies + equipment + training

Tri-plate Sample Mastitis Protocol (from DVM)

Based on Milk Culture Results: Contagious, Environmental, and Other Pathogens

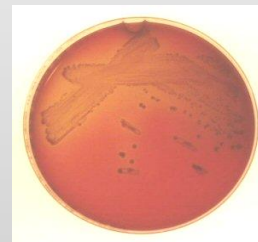


Culture Interpretation Pathogens at 24 hours

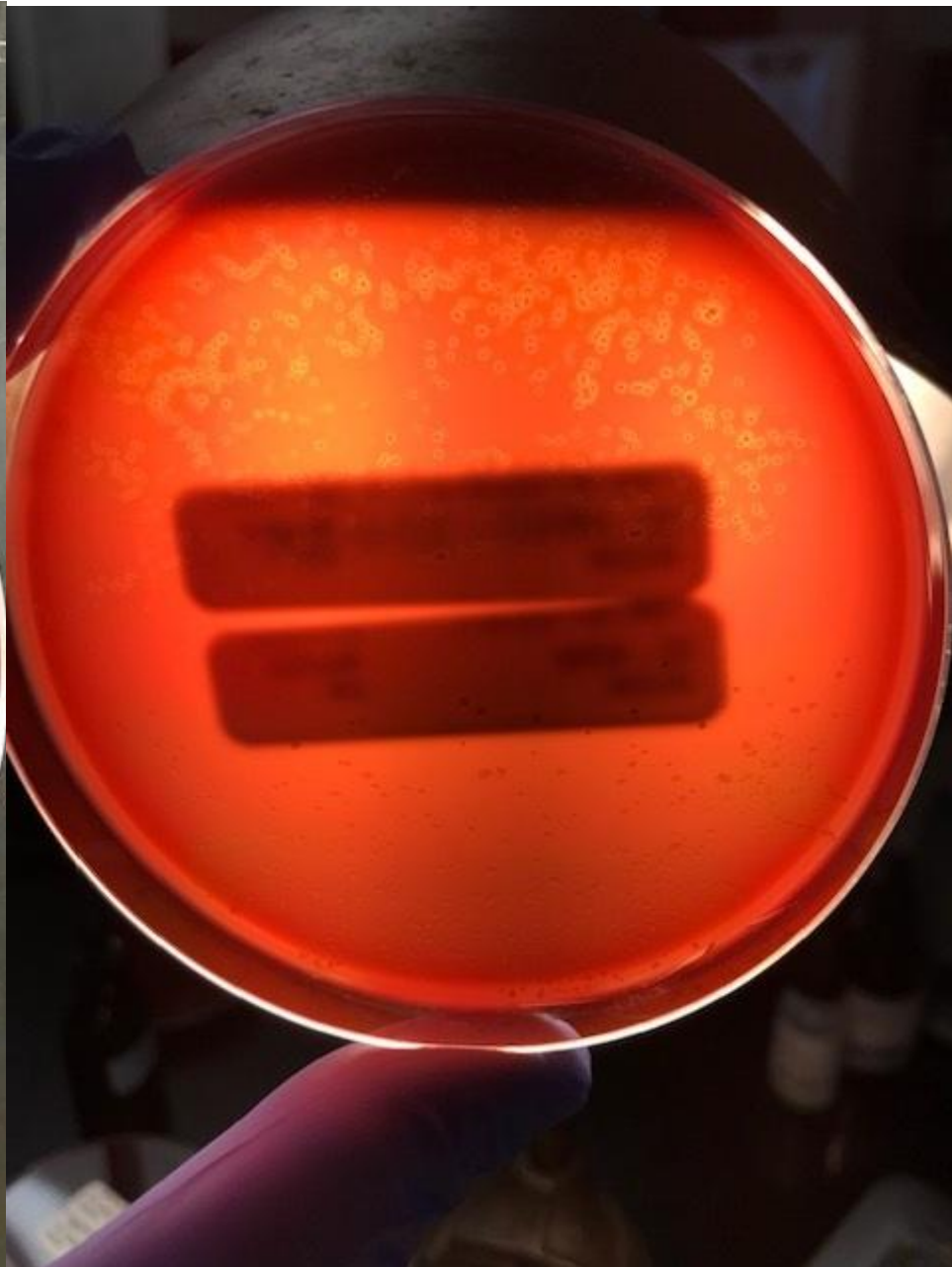
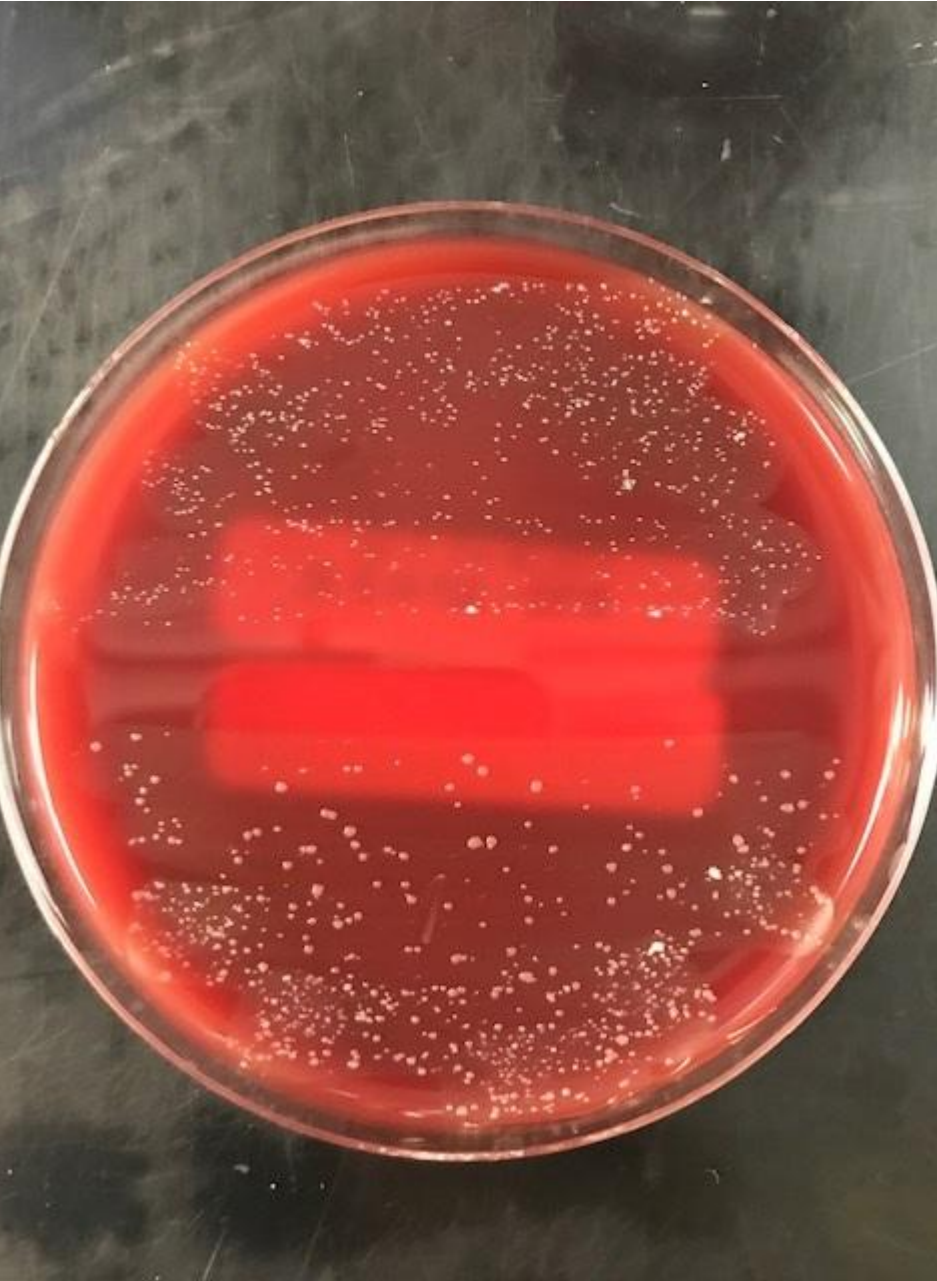
**Observation of colonial characteristics
after 18-24h of incubation**



- Hemolysis type
- Colony appearance (size, color, texture)
- Odor



Culture Interpretation pathogens



On-Farm Culture Training Module

New York Farm Viability Institute

English:



<https://bit.ly/m/OnFarmCulturing>

Spanish:



<https://bit.ly/m/CultivosEnGranjas>

On Farm Culturing



Introduction

Setting up

Storage

Collecting a clean milk sample

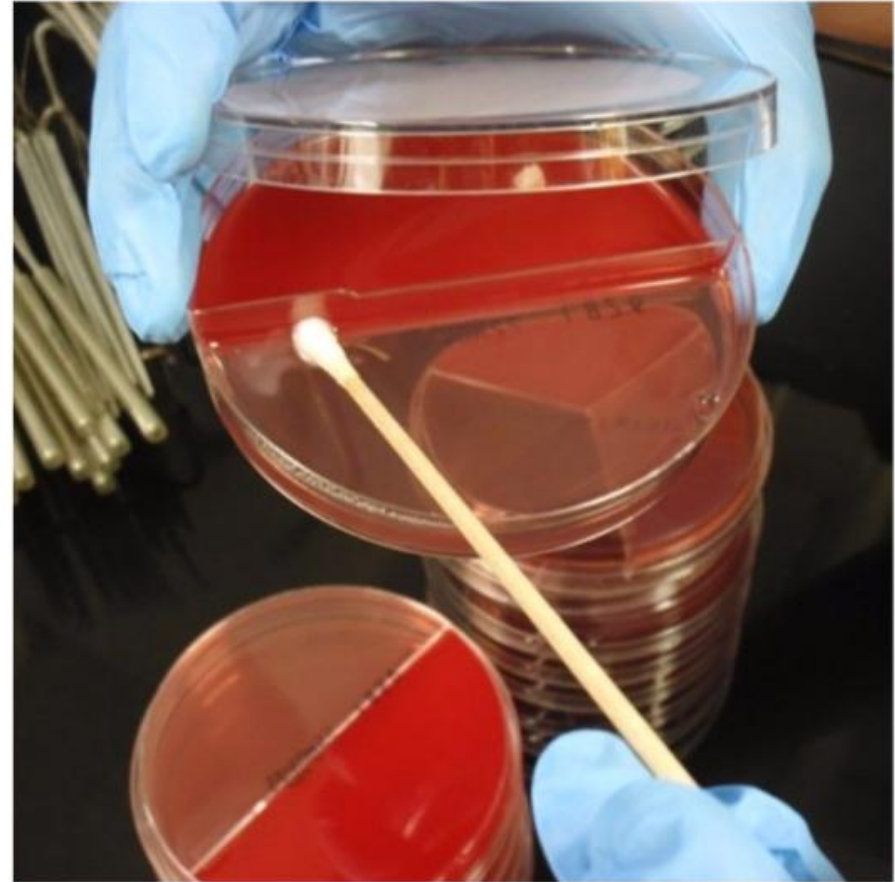
Plating procedure

Management decision: Biplate

Management decision: Triplate

Mastatest

Plating



Prevent contamination by using the top to protect the plate and minimize breathing on the plate

On Farm Culturing



Introduction



Setting up



Storage



Collecting a clean milk sample



Plating procedure



Management decision: Biplate



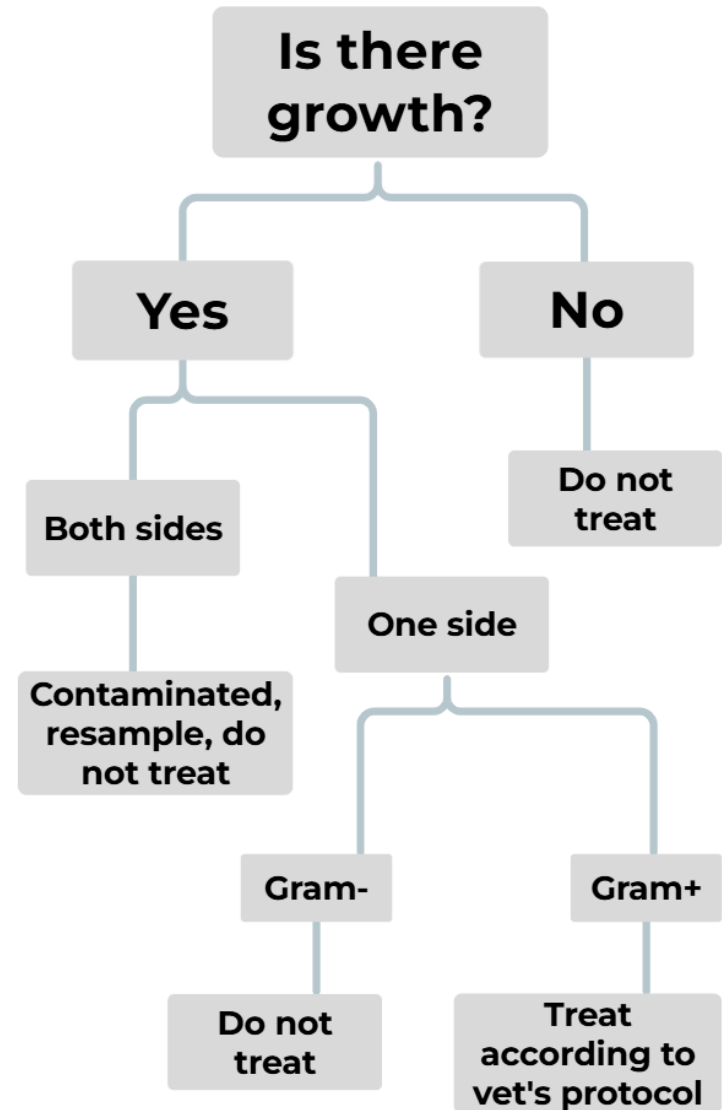
Management decision: Triplate



Mastat test



Flowchart



QUALITY MILK

On Farm Culturing



Introduction



Setting up



Storage



Collecting a clean milk sample



Plating procedure



Management decision: Biplate



Management decision: Triplate



Mastatest



Cornell

Remove Excess Milk

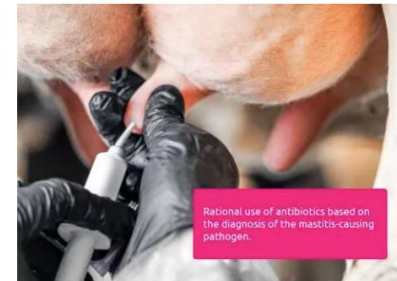


Remove excess milk
sitting on top of the wells.

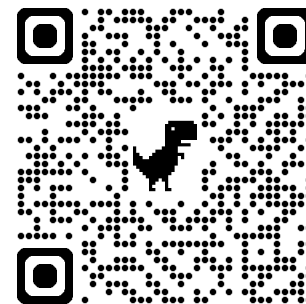
Other Mastitis Detection Systems



Starter Package - AccuMast & AccuStaph
\$700.00



Mastatest



<https://www.mastatest.com/>

Test ID	Test start	Animal ID	Quarter	Bacteria c	Benzylpen	Cloxacillin	Ceftiofur	Cephapirin	Reference	Treatment	Comment	Client name	Account name	Product	Lapbox ID
334923	16-07-202	6	FL	E. coli / Unspecified Gram-								German G	Granados	MAST1	10012.4
334922	16-07-202	6	n/a	E. coli / Unspecified Gram-								German G	Granados	MAST1	10012.4
334919	16-07-202	34	n/a	Strep. species			1 >4.0	<=0.06				German G	Granados	USP2	10012.3
334918	16-07-202	1682	FL	Strep. species								German G	Granados	MAST1	10012.2
334917	16-07-202	1682	n/a	Strep. species								German G	Granados	MAST1	10012.2
334916	16-07-202	1896	RR	CNS			4	1	0.25			German G	Granados	USP2	2239.4
334915	16-07-202	5 Derek &	n/a	E. coli / Unspecified G	>4.0		0.5	>4.0				German G	Granados	USP2	2239.3
334913	16-07-202	4	n/a	Other Gram+								German G	Granados	MAST1	2239.2
334912	16-07-202	34	n/a	E. coli / Unspecified Gram-, Strep. species								German G	Granados	MAST1	2239.2
334911	16-07-202	1904	RR	No bacteria detected	N/A		N/A	N/A				German G	Granados	USP2	10012.1
334907	16-07-202	5	n/a	No bacteria detected	N/A		N/A	N/A				German G	Granados	USP2	2239.1

<https://www.mastatest.com/how-mastatest-works>

AccuMast

<https://feraah.com/>

<https://www.youtube.com/watch?v=nwDU163CNAg>



CnFarm



Udder Health

Calf Health

You've already saved

\$660,00



ID - 211722294823 | Cornell University

Quick Releases



Launch Culture



Read Results



Charts



Reports



Synchronize



OnFarmers
Community



Tank TBC Analysis



Cow Record



Diagnostic res

#211722294823 - Cornell

Creation mzurakow... Updat



Result **Positive**

Agents: **Enterococcus spp**

SAVE DIAGNOSIS



Cow

reserved.

tion

São Paulo,

Acknowledgements

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- Mrs. Deb Pawloski



Questions?



Tie stall carts of New York

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