

"The Acumen system has been a tremendous help in controlling a mycoplasma outbreak in our herd. Prior to purchasing the Acumen system, cows would be in the treated pen 7-14 days before the previously used testing system could identify a positive cow. Now three hours after the cow is tested we know what her status is and can make culling decisions immediately, thereby reducing the threat of spreading mycoplasma to another cow. We highly recommend this system for identifying all mastitis species rapidly."

Bret Butterfass
Rainbow Acres Dairy LLC
Swanville, MN

"I had been interested in on-farm mastitis testing for a while, but culturing was going to be difficult to do correctly for our situation. I knew that there are cost savings to be had in determining a proper treatment protocol, or simply culling before treatment begins. We invest heavily in mastitis testing, but were not satisfied with the turnaround, shipping samples out, and eventually getting results back that allowed the contagious organisms too much time to infect other cows. So, I was very interested when I saw the Acu-POLARIS at Empire Farm Days. Kent had a great sales pitch, hitting all of my concerns about the product with well documented research. He contacted me several times after the show to continue the relationship, and gave a demonstration at our farm with some of our samples. Kent's training was thorough, and he carefully went through each step. After the training, Kent has continued to check in and make sure the product is working for us. He has explained the products and how to buy them at the best rates, putting in our order to ensure we got what we needed. Kent was great to work with, and I would recommend him to anyone considering the product. All in all, a great product with excellent support behind it."

Dan Barnes, Owner
Barnes Black & Whiteface Ranch



Actionable knowledge,
where you need it, when you need it.



Actionable knowledge **where** you need it, **when** you need it.

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The Acu-POLARIS Pathogen Detection System

Quick. **Easy.** On Farm. **Cost Effective.**

Acumen Detection has developed an affordable, easy-to-use on-farm system that enables real time management decisions to control mastitis infections in herds and increase profits. The Acu-POLARIS pathogen detection system is a **PCR-based** detection system that will allow **you** to identify the specific cause of mastitis in **3 hours or less**.

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Quick. **Easy**. On Farm. **Cost Effective**.

Why choose Acumen Detection?

Acumen Detection is a US-based company located in Syracuse, NY that has developed an affordable, easy-to-use, **on-farm PCR-based** pathogen detection system. The Acu-POLARIS pathogen detection system enables real time management decisions to control mastitis infections in herds and increase farm profits. Acumen Detection is the first company to bring the power and accuracy of real-time PCR into a simple, easy, and user-friendly process that can be used on the farm. We have introduced a level of **consistency** in milk quality testing that has never been seen before by taking the guesswork out of interpreting results. The Acu-POLARIS pathogen detection system excels in analyzing even the toughest samples and helps “**see through the clutter**” in samples that are often reported as contaminated or “no growth” in the current culture-based systems. Our MYPRO assay can determine the presence of **Mycoplasma and Prototheca in 3 hours**. These pathogens both require special culture techniques, and have very long culture times (7-10 days). Knowing about possible infection quickly gives the producer **tighter control of herd health**, as well as **increased revenues**. The Acu-POLARIS pathogen detection system is the optimal solution for detecting mastitis causing pathogens because of its specificity, sensitivity, speed, and objectivity.



The Acu-POLARIS System

The Acu-POLARIS pathogen detection system is a high performance, **PCR-based**, easy-to-use, on-farm detection system that will dramatically decrease delays and inaccuracies that occur in current culture-based methods. Our detection system will give you **same day results**, so that within 3 hours, accurate and immediate treatment can begin, **saving you lost revenue**. The Acu-POLARIS pathogen detection system includes an easy-to-use tablet that walks the user through the detection system step by step, **eliminating errors**. No internet connection is required and instructions are offered in multiple languages.

How can Acumen Detection help?

Getting real time results is extremely important in identifying infected cows, so that the appropriate management decisions can be made, and there is **limited exposure to the infection**. Producers should work closely with their local veterinarian to establish proper on-farm protocol and specific treatment options. By using the Acu-POLARIS pathogen detection system, producers get results fast, can consult with their vet to make **more timely and informed treatment decisions**, provide **more humane animal treatment**, and ultimately **increase overall farm profits**.

Acumen Detection's mission is to provide a faster, more efficient way to detect pathogens. We strive to keep our people, food, and environments safe with easy-to-use, point of need technologies. At Acumen, we understand the global impact of dairy farming since many of our employees have lived, worked, and experienced farm life.

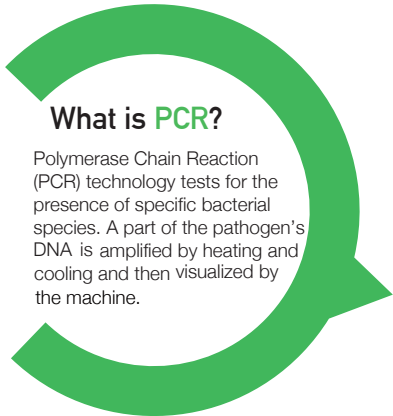
How does it work?

The technology the system uses to detect mastitis-causing pathogens is called PCR. The Acu-POLARIS pathogen detection system includes an easy-to-use tablet and app that walks the user through the PCR process step by step, **eliminating errors**. **No internet connection** is required and instructions are offered in multiple languages.



PCR

More info.



What is PCR?

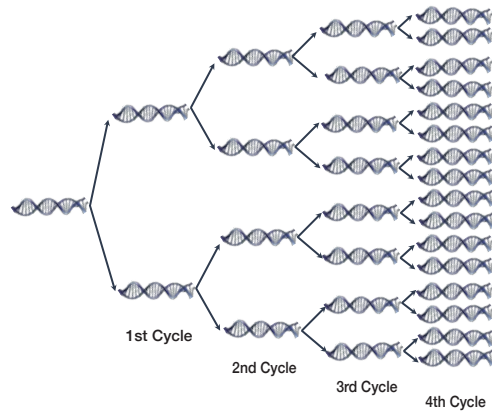
Polymerase Chain Reaction (PCR) technology tests for the presence of specific bacterial species. A part of the pathogen's DNA is amplified by heating and cooling and then visualized by the machine.



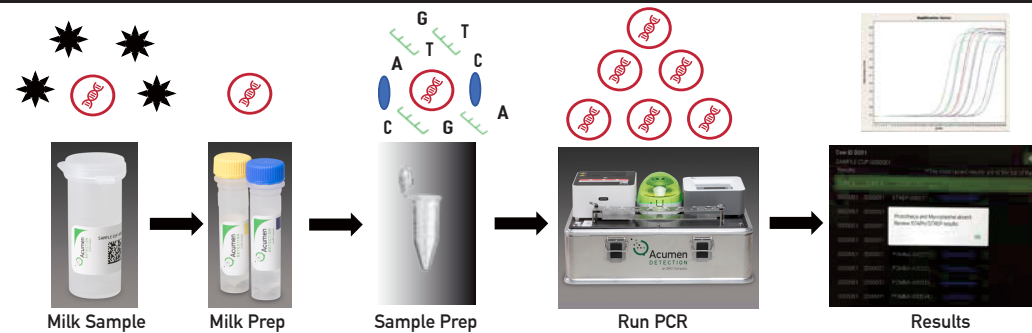
PCR Visualized

The polymerase chain reaction (PCR), is a process that can turn a single copy of a gene into more than a billion copies in a few hours. This process allows us to detect mastitis causing pathogens in very small samples of milk. PCR is very specific! When using PCR, the DNA of the pathogen you are testing for must be present for our assay to identify it. It is either there or it is not, resulting in a positive or negative result. There is no guessing as there is in culturing.

Exponential Amplification



Our Solution



PCR Key: * = Inhibitors = DNA template of pathogen = Taq Polymerase = Primer AGCT = Nucleotides

How does PCR work ?

The principle behind every PCR, whatever the sample of DNA, are the same. Five core 'ingredients' are required to set up a PCR:

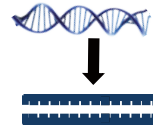
- The DNA template** - to be copied
- Primers** - short stretches of DNA that start the PCR reaction
- dNTP's** - Nucleotide Bases, (ACGT) are the building blocks of DNA and are needed to make a new strand of DNA
- Taq Polymerase** - an enzyme to add the new DNA bases
- Buffer** - ensures the right conditions for the reaction

PCR involves a process of heating and cooling called thermal cycling, which is carried out by the machine.

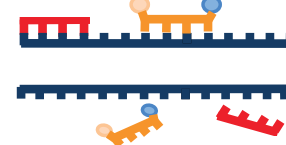
There are three main stages:

- Denaturing** - when the double-stranded template DNA is heated to separate it into two single strands.
- Annealing** - when the temperature is lowered to enable the DNA primers to attach to the template DNA.
- Extending** - when the temperature is raised and the new strand of DNA is made by the enzyme.

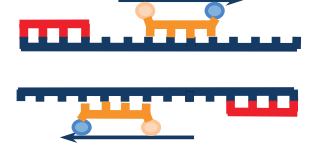
Step 1: Denaturation
90°C - 95°C



Step 2: Annealing
45°C - 55°C



Step 3: Extending
70°C - 75°C



These three stages are repeated 20-40 times, doubling the number of DNA copies each time.

The Acu-POLARIS Detection System

Actionable knowledge **where** you need it, **when** you need it.

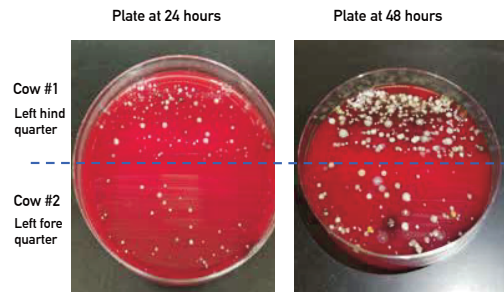
Acumen has **revolutionized** PCR so it can be performed **directly on the farm**.

The combination of our compact design, easy-to-use tablet, algorithm and app that walks the user through the process step by step. Now, anyone can run PCR to easily detect pathogens that cause mastitis. We also take the guesswork out of interpreting results—the app will tell you if a pathogen is detected or not. The real power of PCR allows you to **TEST BEFORE YOU TREAT**.

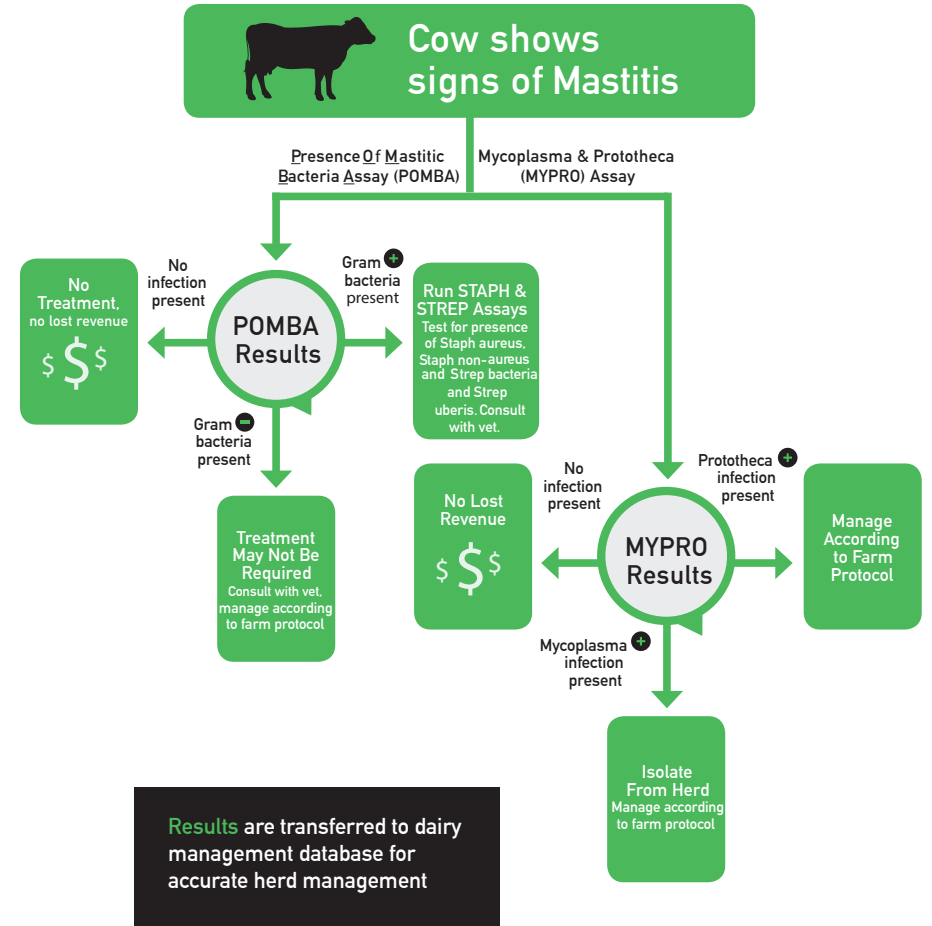
How does PCR differ from culture?

With PCR there is no subjectivity or guessing as there is in culturing. Often it is difficult to determine which colony on the culture plate is the pathogen that is causing the mastitis infection. Which colony is the culprit on the culture plate below? **Interpreting culture requires years of expertise and training. It's not obvious what colony on this plate is causing the infection.**

Current literature indicates that up to 30% of bacteria cannot be cultured, which can lead to a false negative, indicating that the cow is infection free when, in fact, she is not. "In no more than 30% of milk samples, from clinical and subclinical bovine mastitis, bacteria fail to grow even after 48 h of conventional culture. The 'no-growth' samples are problematic for mastitis laboratories, veterinarians, and dairy producers...We can conclude that all common mastitis bacteria can occur in large quantities in clinical mastitis samples that exhibit no growth in conventional culture, and that the real-time PCR assay is a useful tool for bacteriological diagnosis of such milk samples." (Taponen, S, et al. Real-time polymerase chain reaction-based identification of bacteria in milk samples from bovine clinical mastitis with no growth in conventional culturing. J Dairy Sci. 2009 Jun; 92(6): 2610-7.)



The New Mastitis Detection Paradigm



Overall Performance Statistics

Table 1 and Table 2 give overall specificity (compared to culture/MALDI-TOF) and sensitivity values for the Acu-POLARIS pathogen detection. Sensitivity values are determined by spiking clean quarter milk with known concentrations of target organisms.

Table 1. Acu-POLARIS compared with culture MALDI-TOF results for clinically mastitic cows

Assay	Percent Agreement with Results
POMBA – Gram negative	80%
POMBA – Gram positive	80%
STAPH – Staphylococcus aureus	80%
STAPH – Staphylococcus non-aureus	77%
STREP – Streptococcus spp.	97%
STREP – Streptococcus uberis	96%
MYPRO – Prototheca spp.	100%
MYPRO – Mycoplasma spp.	100%

Table 2. Acu-POLARIS assays' Limits of Detection (LOD)

Assay	Limit of Detection	Target Used in Testing
STAPH – Staphylococcus aureus	1.0x10 ⁴	S. aureus
STAPH – Staphylococcus non-aureus	4.0x10 ⁴	S. Epidermidis and S. saprophyticus
STREP – Streptococcus spp.	7.1x10 ⁴	S. uberis
STREP – Streptococcus uberis	2.8x10 ³	S. uberis
MYPRO – Prototheca spp.	2.8x10 ³	P. wickerhamii
MYPRO – Mycoplasma spp.	8.5x10 ⁴	M. bovis

Table 3. Range of Pathogens Detected by the Acu-POLARIS System *

POMBA -Gram negative	POMBA -Gram positive	STAPH	STREP	MYPRO
Acinetobacter species	Corynebacterium species	Staphylococcus aureus	Streptococcus dysgalactiae	Mycoplasma alkalescens
Citrobacter species	Enterococcus species	Staphylococcus chromogenes	Streptococcus uberis	Mycoplasma arginini
Enterobacter species	Lactococcus species	Staphylococcus species	Streptococcus species	Mycoplasma bovis
Escherichia coli	Staphylococcus aureus			Mycoplasma canadense
Klebsiella species	Staphylococcus chromogenes			Mycoplasma species
Pseudomonas species	Staphylococcus species			Prototheca species
Pasteurella species	Streptococcus dysgalactiae			
Serratia species	Streptococcus uberis			
	Streptococcus species			
	Trueperella pyogenes			

* We detect all listed pathogens, but do not identify to the species level with the exception of *Staphylococcus aureus* and *Streptococcus uberis*.

Additional Information

When should cows be tested for mastitis?

- At freshening
- At dryoff
- Baseling an entire herd
- Introduction of new cows to the herd
- High Somatic Cell Count (SCC's)
- High Bulk Tank Somatic Cell Count (BTCC's)
- Testing at organic farms
- Clinical signs of mastitis



Advantages of using the Acu-POLARIS Pathogen Detection System:

- **Easy** – Simple to run with clearly reported results
- **Specific** – Targets the exact DNA sequence of the pathogen you're testing for
- **Sensitive** – DNA can be detected even in extremely small amounts
- **Fast** – Results are reported in < 3 hours
- **Objective** – No guesswork, no result interpretation
- **Consistent** – The algorithm/computer calls results, not a human
- **Flexible** – Treated milk can still be tested

SEE FOR YOURSELF!

- Schedule a system demo today
- Learn what your dairy's ROI would be
- Save time, money, and frustration
- Take control of your milk testing

Our Products

The Acu-POLARIS Detection System

The Acu-POLARIS pathogen detection system is an **on-farm lab system** that allows the producer to test for mastitis-causing pathogens. This system is 22"x14"x16" and contains all the needed equipment to perform PCR testing. The system contains a base unit that houses the mini-computer, incubator, centrifuge and thermal cycler, as well as a tablet, and pipettors. The Acu-POLARIS pathogen detection system uses its own Wi-Fi for wireless communications between the mini-computer and the tablet, and requires **no internet**.



Assays

Currently we offer 5 different types of assays in multiple sizes.

POMBA - Tests for general presence of bacterial pathogens (Gram + or Gram -)

STREP - Tests for Streptococcus uberis and Streptococcus spp.

STAPH - Tests for Staphylococcus aureus and Staphylococcus spp.

MYPRO - Tests for Mycoplasma and Prototheca

System Check - Used to check that the system is performing correctly

Milk Prep Kit

The Milk Prep kit is used to clean the milk samples for processing. They are sold in **singles** and in **multi-packs** depending on the frequency of tests required by the user.



Complete Pack

The Complete Pack includes the following consumables:

- 25 of each assay (**POMBA, STREP, STAPH, MYPRO**)
- 25 Milk Prep Kits
- 25 Sample Cups to obtain sample milk
- 2 boxes of pipette tips 1000uL
- 2 boxes of pipette tips 200uL

Product Info

Animal Health Products

Product Number	Assay Product Name	Description	Size	Quantity
ACU-K-004000PK5	Acu-PCR® Milk Prep Kit	Milk Prep Kit - QTY 5	Each	5
ACU-K-004000PK25	Acu-PCR® Milk Prep Kit	Milk Prep Kit - QTY 25	Each	25
ACU-A-003310PK5	Acu-PCR® POMBA	Acu-PCR™ POMBA - QTY 5	100 ul	5
ACU-A-003310PK25	Acu-PCR® POMBA	Acu-PCR™ POMBA - QTY 25	100 ul	25
ACU-A-003410PK5	Acu-PCR® STAPH	Acu-PCR™ STAPH - QTY 5	100 ul	5
ACU-A-003410PK25	Acu-PCR® STAPH	Acu-PCR™ STAPH - QTY 25	100 ul	25
ACU-A-003510PK5	Acu-PCR® STREP	Acu-PCR™ STREP - QTY 5	100 ul	5
ACU-A-003510PK25	Acu-PCR® STREP	Acu-PCR™ STREP - QTY 25	100 ul	25
ACU-A-003610PK5	Acu-PCR® MYPRO	Acu-PCR™ MYPRO - QTY 5	100 ul	5
ACU-A-003610PK25	Acu-PCR® MYPRO	Acu-PCR™ MYPRO - QTY 25	100 ul	25
ACU-A-FP1010	Acu-PCR® FARM PACK 5	Acu-PCR™ FARM PACK 5 - QTY 1	Pack	1
ACU-A-FP1010PK5	Acu-PCR® FARM PACK 5	Acu-PCR™ FARM PACK 5 - QTY 5	Pack	5
ACU-A-FP1010PK25	Acu-PCR® FARM PACK 5	Acu-PCR™ FARM PACK 5 - QTY 25	Pack	25
ACU-A-003710	Acu-PCR® SYSTEM CHECK ASSAY	Acu-PCR™ SYSTEM CHECK ASSAY - QTY 1	100 ul	Pack of 8
ACU-A-003710PK5	Acu-PCR® SYSTEM CHECK ASSAY	Acu-PCR™ SYSTEM CHECK ASSAY - QTY 5	100 ul	Pack of 8
ACU-A-003710PK10	Acu-PCR® SYSTEM CHECK ASSAY	Acu-PCR™ SYSTEM CHECK ASSAY - QTY 10	100 ul	Pack of 8
ACU-K-00800	Acu-PCR® CUSTOM PACK 50	Contact Us at 866-931-1662 to Customize	Pack	1
ACU-K-00875	Acu-PCR® CUSTOM PACK 75	Contact Us at 866-931-1662 to Customize	Pack	1
ACU-K-00850	Acu-PCR® CUSTOM PACK 100	Contact Us at 866-931-1662 to Customize	Pack	1
ACU-D-001010	Acu-Apron	Milk Sampling Apron	Each	1
ACU-C-02010	Pipette Tips 1000 uL	Pipette Tips for 1000 ul Pipettor	Box	1
ACU-C-002020	Pipette Tips 200 uL	Pipette Tips for 200 ul Pipettor	Box	1
ACU-C-001010PK25	Milk Sampling Cups	Milk Sampling Cups - QTY 25	Pack	25
ACU-D-005000PK5	Counterbalance Tubes	Counterbalance Tubes - QTY 5	Pack of 5	1
ACU-U-6787B	ACU-POLARIS System®	Portable Lab & Rapid Identifier System	Each	1
ACU-K-006000	Acu-PCR® COMPLETE PACK	25 of each assay (POMBA, STREP, STAPH, MYPRO), 25 milk cups, 2 boxes each of 1000 & 200ul pipette tips	Pack	1

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