

REFERENCE MANUAL FOR THE DAIRY QUALITY RT10 SCC DEVICE



Head Office:

Dairy Quality Inc.
1598 Queensville Sideroad
P.O. Box 187
Queensville, ON, CA
L0G 1R0
N.America 1 (855) 232.4797
World Tel +1 (905)769.0389
Email:
info@dairyquality.com
www.dairyquality.com

Operations:

Dairy Quality Inc.
210 Pony Drive, Unit 5
Newmarket, ON, CA
L3Y 7B6
Tel: 1 (905) 954.1881
Fax: 1 (905) 954.1671



This is a comprehensive guide to Dairy Quality Inc.'s RT10 SCC device. If you have just purchased an RT10 device, we suggest starting with the Quick-Start guide:

Quick-Start Guide (English)

http://dairyquality.com/usercontent/documents/DQInc_RT10_Platinum_QS_Guide_ENG.pdf

Una Guia Rapida (Espanol)

[http://dairyquality.com/usercontent/documents/DQInc_QuickStartGuide\(SPA\).pdf](http://dairyquality.com/usercontent/documents/DQInc_QuickStartGuide(SPA).pdf)

Guide de Demarrage(Francais)

http://dairyquality.com/usercontent/documents/DQInc_RT10_Platinum_Complete_QS_Guide-FRE.pdf



The RT10 Device from Dairy Quality Inc. is an incredible new innovation in milk quality testing. Somatic Cell Count testing can now be done right in the milking parlor. Using the Dairy Quality device and, amazingly, an iPhone/iPod Touch, SCC readings can be determined in seconds, without the expense and time it takes to send samples off to the lab.

This guide discusses in detail, setting up and using the RT10 device.

Indication for Use

The RT10 iPhone/iPod microscope accessory and Dairy SCC app provide images of stained somatic cells in the milk of dairy animals to provide a preliminary estimate of the somatic cell count in the milk sample. The RT10 microscope accessory and Dairy SCC app is not intended to be a primary means for diagnosis of any disease or condition.

How It Works

The RT10 and the Dairy SCC app work using the well-known principles of optical fluorescence. Dairy Quality is, however, very different from traditional testing. The method and apparatus for reading and presenting the sample, analyzing the sample, and providing the results are all now available on one simple to use mobile platform (patents pending).

To measure somatic cells in a sample, the cells are stained with a fluorescent dye. There are a number of chemicals that can accomplish this, and they are absorbed by the nuclear DNA of the cell. The cells are then caused to fluoresce by activating them with a high intensity light of a specific wavelength. Finally, through a series of lenses and special filters (including emissive filters, absorption filters, and dichromatic filters), the cells are projected to the camera lens of the Apple® iPhone or iPod Touch device.

The Dairy SCC app has specialized imaging routines that view the image and count the cells within the field of view of the camera. By knowing the fluid volume being measured, the app can derive the SCC value, and both the image and SCC value is displayed to the dairyman.

Depending on the characteristics of the image, Dairy SCC can also attempt to provide an indication of pathogen possibly contributing to a high SCC (see the '**Pathogen Indication**' section in this guide).

Smart-devices supported

Because of the different sizes of the various smartphones, different RT10 models are required to properly align the camera lens of the phone to the output of the device. The RT10 device is currently available in versions for:

- iPhone 4/4S
- iPhone 5/5S
- iPhone 5C
- iPhone 6
- iPod Touch 5th Generation with rear facing camera

A note about the iPod Touch: some earlier versions of the iPod Touch 5th generation - the 16GB size - did NOT have the necessary rear-facing camera. Current versions of the 16GB iPod Touch 5th generation do have the needed rear-facing camera. Before making any purchase or advising the dairyman about the iPod Touch, please confirm that the device indeed has the proper camera.

Setting up the Device

- Remove the device from the shipping box
- Remove the battery from the shipping box
- With a screwdriver, remove the back plate of the RT10 and install the 9 volt battery/cell, paying close attention to the polarity
- Re-affix the back plate



Installing the Dairy SCC App

Ensure that you have setup your iPhone/iPod Touch with Apple and created an iTunes account to permit you to purchase music, books, and of course, apps. You'll also need a Wi-Fi connection

to the Internet or a cellular data connection via your cellular carrier (you ONLY briefly require Internet to install the app).

To install the App:

- Tap the App Store app button
- Tap '**Search**' at the bottom of the screen and type **dairy scc** and tap Search. You should see the Dairy SCC app by mpengo Ltd.
- Tap the button that shows the app's price.
- Verify the purchase by tapping ('**Install**' or '**Buy Now**')
- A dialog box should appear asking for your iTunes password. Once you enter your password, the app will download to your iPhone or iPod Touch

Setting up the Dairy SCC App

Settings / Contact Information: Enter your farm name, contact name, and email address (useful for technical support)

Settings / Preferences / Cow Selector Preference: If your herd size is under about 50 cows, select Cow List; otherwise, use Keypad Entry – it's more efficient and you just key in the cow tag number instead of selecting from a very large table.

Creating or adding to the Cow File and Sample History

To add cows to your table:

- Tap the large '+' to add a cow to the table
- Enter the Cow Tag #
- Notes, Birth Date, Lactation #, and Breeding Date are entirely optional (entry of Breeding Date will calculate for you the cow's 'Dry Date')
- Tap Done to create the new Cow Tag in the table
- Continue adding cows: when finished, return to the main screen

You are now ready to start using the Dairy Quality system.

Taking a Milk Sample

- Collect the milk to be sampled into a separate clean container
- **DO NOT** press the white piston plunger on the slide until after you have inserted the slide tip into the milk
- Insert the slide tip into the milk sample, and press firmly on the white piston: a small quantity of milk will be drawn up: allow a second or two for the milk to enter the slide. Note that the milk does NOT go all the way up to the viewing chamber at this time

(After use, dispose of slide according to local waste management requirements)




Analyzing the Milk Sample

iPod 4:03 PM

< Dairy SCC Milk Sample

Date Oct 10, 2014 04:03 PM

QUICK-TEST

 CHOOSE COW

1 FL 2 FR No Quarter indicated

3 RL 4 RR UNDO

Extra Comments:

Start by lining up your slide with the image below & matching the dots



 ANALYSIS

PHOTO ANALYSIS



- Insert the iPhone into the RT10
- Start the Dairy SCC app on your iPhone, and tap **Take Milk Sample and Analyze**
- Before inserting, line up your slide with the slide image displayed at the bottom of the screen, aligning the slide

with the large black dot on the right. Match the dot pattern of the slide by tapping the appropriate 3 dots on/off (this optimizes the calibration of the app to the volume of milk in the viewing chamber)



- Insert the slide into the Dairy Quality device and firmly “seat it”. When inserted, the device will power on and you will notice a slight green glow inside the slide chamber (make SURE you see the green glow that illuminates the sample)
- Tap **‘Choose Cow’** and select the cow. You can also tap **‘Quick-Test’** if you do not wish to record the sample against any particular cow.
- Add Extra Comments if desired.
- Tap **‘Analysis’**. After a countdown period to permit the milk & reagent mixture to incubate, the iPhone/iPod will take an image of the sample, review the background, make note of the highlighted cells, and analyze any patterns. More than one snapshot may be taken to account for fluid and cell (Brownian) motion.
- Within a few seconds, the sample image, the SCC value, and if a high count, a possible indication of type of pathogen appear. You can also **‘Tap for Raw Image’** to see the actual image created by the RT10 device.
- Tap **‘Save’** to keep a record. You will find that over a period of time you’ll start to see the relationship of the

image to the SCC value and be able to visually confirm the quality of the milk. You'll also learn over time the visual image and the likely pathogen present based on your historic evidence as well as experience & learned knowledge

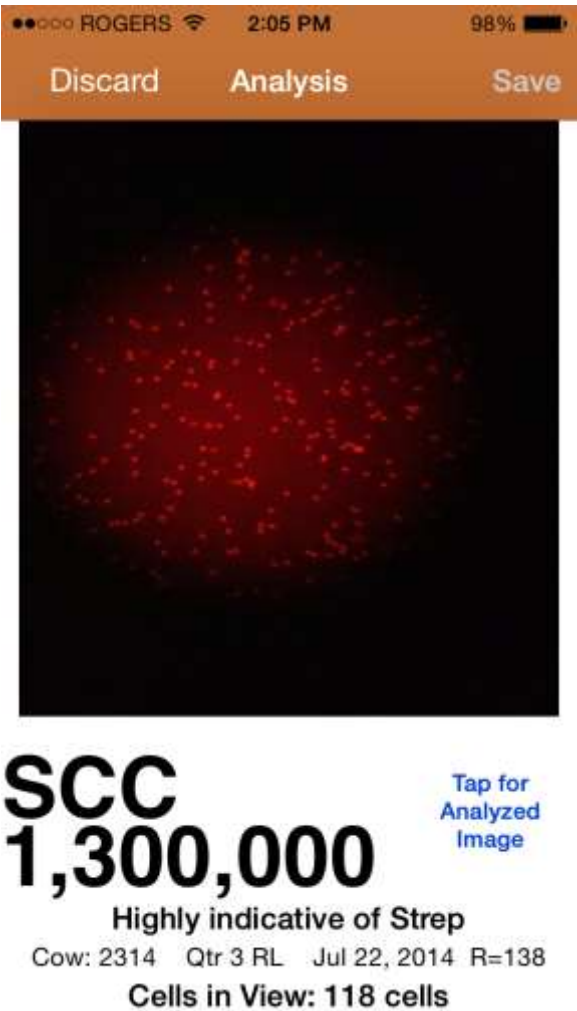
When you tap Save, a record of the sample is placed into cow history along with a low-res copy of the image. You can see this history later in **Cow File and Sample History** by selecting the cow, and tapping the row with the desired sampling

Quarter Sampling: you can record and keep track of individual quarters: quarter info will be stored with all the SCC results

- Indicate the cow, and extra comments as before
- To indicate a specific quarter, tap the appropriate button (they are labeled FL, FR, RL and RR)
- To cancel and return to a standard composite sample, tap UNDO

Understanding the results

After the analysis you are presented with an image of the sample and other information:



- **Image:** You'll see a circular red background of the image from the microscope and the cells highlighted. 2 views are available: Analyzed Image (default) – cells

counted are highlighted in yellow; Raw Image - the actual image projected by the RT10 device (note that the app does not always analyze the 'entire' image)

- **SCC:** the calculated value of somatic cells / ml
- **Pathogen indication:** if a high SCC value and enough parameters are presented, the app will offer a suggestion of the pathogen present that might account for the high SCC. If the app has, for example 6 indicators (instead of 3), the app will say 'Highly indicative'
- **Cow:** the cow tag number (or QT if a quick-test)
- **Qtr:** If you did quarter sampling, the quarter tested
- **R value:** an indicator of the relative brightness of the image (useful only for technical support)
- **Cells in View:** the number of cells actually counted by the analysis routine in its particular image region. Cells in View provides a direct correlation with the resulting cell count. As a rough rule of thumb, one cell in view equates to about 10,000 SCC (the app refines this extrapolation considering other factors)

Why results sometimes vary (motion of cells)

It is unlikely that you will get exactly the same result twice if you re-analyze the sample. Since cells float and move about in the sample (Brownian motion), a microscopic view of the same sample may contain different numbers of cells. At low SCC counts, one or two cells will make quite a difference (one cell might change a 40K count by 10K): At high counts, the effect is dramatically reduced. This is true of ALL SCC reading technologies. Dairy SCC reduces this effect by making several analyses and averaging. Nevertheless, there will be a variance.

The sample degrades rapidly after a few minutes as the cells lose their brightness and are destroyed, so be sure to test your sample within a few minutes of drawing up the milk.

If you try to re-test the same slide later, the SCC will be lower due to the degrading cells in the sample.

Tips for best analysis results

- Set the device in a level position prior to starting the test: this will ensure a representative sample and a more even distribution of cells in view
- Make sure that your iPhone/iPod is set to maximum brightness. Set your brightness in **Settings / Wallpapers & Brightness**.
- Test only relatively fresh milk. Although the RT10 will successfully analyze milk that has been sitting for a while, eventually the fat separates, and you no longer have a representative sample
- If you have preserved your milk sample with a preservative, don't wait an excessive period to test. Of the common preservatives, bronopol appears to be less invasive on test results than potassium dichromate.

Testing Tip:

- Create a Cow record called **Tank** (or **0000** if you prefer numbers), and periodically check your overall tank reading. This may be interesting historical information for you.

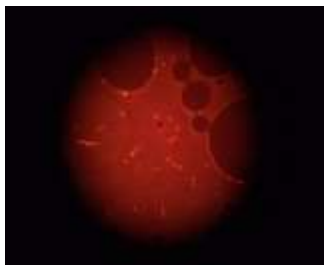
When to reject a test

Blotches – sometimes you will find an uneven distribution of reagent through the milk, resulting in 'blotches' or 'clouds' in the image. Although the app does a good job of ignoring these 'clouds' and reads the cells inside them perfectly, you should consider rejecting the slide result if you find images with large clouds and an extremely high SCC that does not

seem to be justified by the number of visible cells in the sample



Bubbles – if the milk sample has been shaken unduly, it is not unusual to see large bubbles in the image. These bubbles have the effect of pushing out of view many of the cells that otherwise should have appeared. You should reject slides with one or more large bubbles



Too Dark – as the battery/cell weakens, the contrast between the image background and the illuminated cells is reduced. When there is insufficient contrast, the app itself will reject the sample and suggest replacing the battery/cell, but there is a small possibility of insufficient contrast just before the battery condition gets weak enough. Look for a dark image that appears to have many cells, but few of them identified by the app.

What NOT to do

- Don't shake the milk sample (resulting in air bubbles in the image):
- Don't test the sample with the RT10 in a peculiar position (on its side, or standing on end). Keep the device horizontal to allow the milk to evenly distribute itself throughout the viewing chamber of the slide
- Don't attempt to put the slide in backwards or force the slide. The slide tip should be pointing out... See the photo on the cover page.

Pathogen Indication

The Dairy SCC app is excellent at providing an indication whether a milk sample contains Staphylococci or Streptococci, and the display of the SCC image can also help the dairyman to determine other pathogens. In a typical milk sample with high SCC (i.e. high number of somatic cells), the cells tend to align themselves in the general pattern of the bacteria they are attacking, so 'copy' the pattern of the underlying bacteria. It is

under this basis that the app provides an indication of pathogen by analysis of the arrangement of somatic cells in the sample

The most common infections leading to high SCC are Strep and Staph. Both are readily determinable based on their patterns. The following are excerpts from pathology texts :

“When Streptococcus is seen through a microscope, it is shaped spherically, remaining attached and growing in beadlike pairs or chains.... Staphylococcus looks like a bunch of grapes or little round berries often found in clusters or pairs....”

“..the arrangement of cells is different due to a different binary fission. Streptococci form a chain of round cells, because their division occurs in one linear direction, whereas Staphylococci divide in various directions forming grape-like clusters...”

“Staphylococcus consists of gram-positive, spherical bacteria which typically divide in two or more planes to form clusters of cells..... Streptococcus cells are gram-positive, catalase-negative and spherical or ovoid in shape. Because the cells divide in one plane, they are usually seen in pairs or short to long chains..”

(There are many more examples of pathology manuals with the same or similar differentiating findings of Staph and Strep)

What Pathogen is Indicated?

The app considers Streptococcus when:

- There is an elevated SCC
- The cells are individual, clearly defined
- There are little or no clusters
- In higher counts, organization of some of the cells into chains or snake-like strings
- Depending on frequency of these and other elements, the app will declare ‘an indication’, ‘a high indication’, or remain silent (not enough data for a clear answer)

The app considers Staphylococcus when:

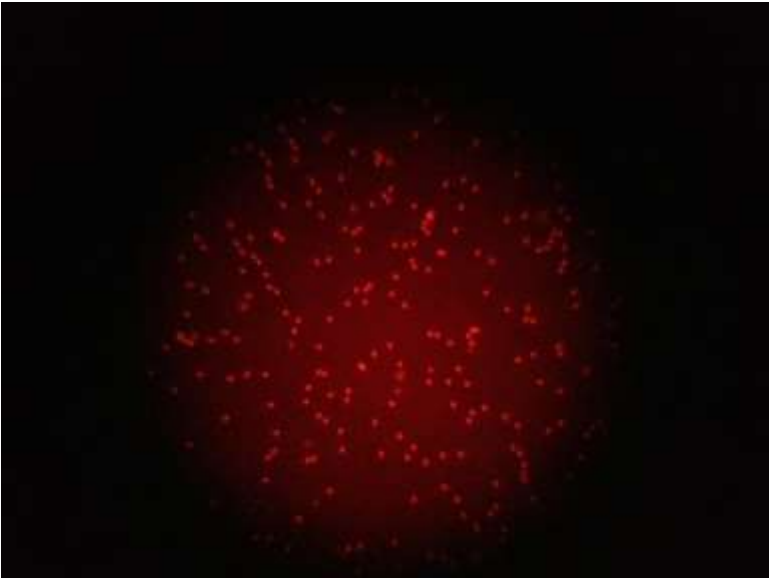
- There is a high SCC (statistically, Staph is most prevalent at very high levels)
- A high percentage of the cells are grouped into clusters
- Depending on frequency of these (and other) elements, the app will declare 'an indication', 'a high indication', or remain silent (not enough data for a clear answer)

There are quite a few more factors that the app uses in suggesting pathogen, but these are the primary tests used before considering other factors to support the indication.

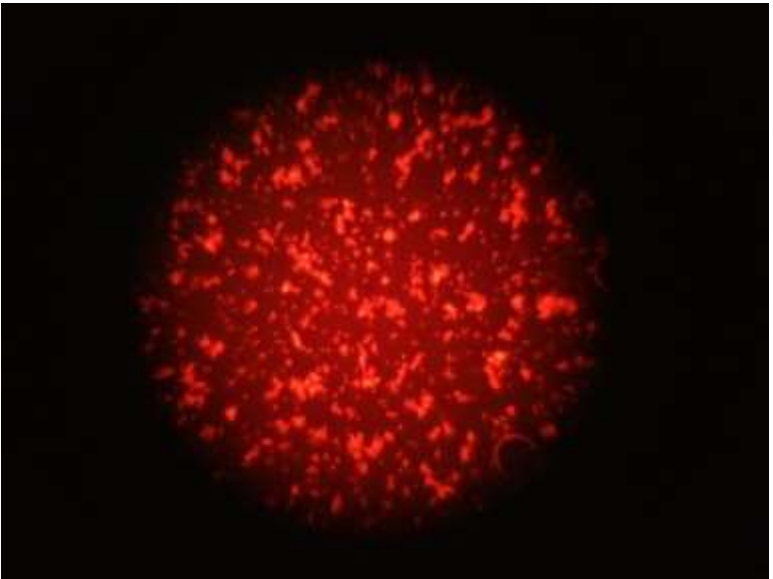
In summary, the cell phone micro lens pixel technology takes cell morphology a step further than bright or dark field microscopy. It adds color to the technique creating new phenomena showing unique patterns of background color and distinction of cells representative of specific pathogens. This makes pattern recognition a tool for analysis. On staph and strep infections the current version of our app averages about 70 % sensitivity.

The dairyman can use these visual clues for reference toward analysis based on historic evidence as well as experience & learned knowledge.

The following images by the Dairy Quality RT10 device show typical pathogens:



Sample of Streptococcus - Note the clearly defined cells, and the chaining of cells into strings



Sample of Staphylococcus - High number of cells, organized into many clusters

The Dairy SCC App

Who is mpengo?

mpengo Ltd. is the software development company that is responsible for the Dairy SCC app that provides the analysis of the milk samples. Founded by Gary & Mary Jonas (who are also co-founders of Dairy Quality), the company is based on decades of experience providing software solutions to firms throughout the world. Currently, along with the Dairy SCC app, mpengo offers mobile solutions on Apple iPhone and iPads and cloud products for a variety of industries. More information can be found on mpengo's website at www.mpengo.com.

Using the Dairy SCC App



Settings

Contact Information: enter the Farm/Company name, address, and your Business ID number or farm registration number. This information will be displayed on reports. Also enter your name,

email, and telephone. We need this information only if you have a support question.

Slide Type: please keep this setting as 'Preloaded Cassettes' (the 'Manual' slide is an alternate type of slide that is occasionally used by Dairy Quality).

In **Preferences**, enter the acceptable SCC (somatic cell count) target (or threshold) for your area. This is used to warn you of readings over this target value.



Selector' methods in the Analysis program: Cow List, and Keypad. With Cow List, you pick your cows from a table: with Keypad, you enter the cow tag #. Keypad is faster for larger herds.

Calc Method: Optimized uses functions that simulate a sample area 4X greater than the standard RT10. It helps remove any bias created from imperfect cell distribution within the viewing area.

There are two '**Cow Calibration (Advanced)**': not intended for casual use, the Calibration settings shown are based on the type of smartphone you are using in the RT10. It contains settings for acceptable sizes (in pixels) of somatic cells, a general extrapolation ratio (based on the capabilities of the particular iPhone camera), reagent mix time countdown, contrast standard deviation, and a cap value for red brightness color. If by accident you cause

problems by altering calibration values, reset back by tapping
RESET TO DEFAULT

Self - Calibration (Advanced): Self Calibration permits you to fine tune your RT10 and app to match the SCC calculation to a special slide or milk sample of known and verified value. To Calibrate:

- Indicate the slide 'dot pattern'
- Enter the known SCC value of the milk sample
- Tap CONTINUE: the app will take an image, calculate the SCC and make a slight percentage adjustment to calibration settings to 'shift' the SCC result to match the known sample.

(If you wish to undo the self-calibration at a later time, just return to the regular calibration table and tap RESET)

Importing a Cow Herd Table

If you have your cow herd information already available on your PC or another source (such as in a herd management software system) and would like to use that data for your Cow (Herd) file, use Import.

Use **Excel** to create a table with these columns:

Col 1 = Cow Tag #

Optional Information:

Col 2 = Comments

Col 3 = Birth date YYYY-MM-DD [e.g., 2010-05-31]

Col 4 = Breeding date YYYY-MM-DD

Col 5 = Number of lactations

Click '**Save As**' in Excel to save the file as a tab-delimited text file (.txt)

Email the file to your iPhone

On your iPhone, open the email message and tap and hold the attachment icon until you see '**Open in Dairy SCC**'. Tap this option. Dairy SCC will merge the data into your Cow File

Syncing

Synchronize Data: If you have more than one iPhone with Dairy SCC, you can sync the data on both devices (to make sure that your 2 herd managers each have the complete Settings and Cow table). The sync will create and email a data file to the other iPhone. To sync the files, open the email with the file attachment on the second device. Tap and hold the file attachment and the data from the first iPhone will be merged.

Reports and Sending Data

This option lets you produce detailed milk sample reports that can be emailed or printed to an Air Print supported printer, as well as create data files which you can send to your computer, herd management software, or other software.

To create reports, select the following options:



Choose Cows: Tap here to indicate which cows you wish on the report/data file. You can also tap 'Select/Un-Select All'.

Date Range: Tap the dates to set up the range you are interested in

Type of Report: Indicate if you want a report, or a tab-delimited (**.txt**) text file. The report is displayed on the screen, with options to email or print. The tab (data) file is available for email only.

For a quick report, simply tap **'Today's Samples'** to select all cows for the day, and you'll get a report or tab file of just today's samples.

Dairy SCC Cell Analysis

Oct 01 2014 - Oct 31 2014

mpengo Farms Ltd.

SCC Threshold 400,000

Cow Tag	Date	Time	Qtr	Cell Reading	Pathogen	Comments
1QT	Oct 01, 2014	01:34 PM	2 FR	258000		
1QT	Oct 01, 2014	04:03 PM		344000	Strep	
1QT	Oct 02, 2014	12:40 PM		421000	Strep	
1QT	Oct 03, 2014	11:16 AM		333000	Strep	
1QT	Oct 04, 2014	12:38 PM		388000	Strep	
1QT	Oct 04, 2014	02:10 PM		321000	Strep	
003	Oct 03, 2014	11:48 AM		277000		
003	Oct 03, 2014	12:04 PM		268000		
11	Oct 03, 2014	04:39 PM	3 RL	310000	Strep	

Cow File and Cow History

As you sample milk with the RT10 and the Dairy SCC , you are able to store history of each of your samples when you tap Save: a record of the sample is placed into cow history along with a low-res copy of the image. You can see this history later in **Cow File and Sample History** by selecting the cow, and tapping the row with the desired sampling.

ROGERS 4:44 PM 50%

< Dairy SCC Cow File +

Search

Cow Tag	Last Tested	
1QT	Oct 04, 2014	>
001	Apr 18, 2013	>
002	Aug 23, 2014	>
003	Oct 03, 2014	>
004	Feb 13, 2014	>
005	Jul 06, 2013	>
0133	Feb 13, 2014	>
1	Oct 02, 2012	>
102	Feb 12, 2014	>

SORT BY DATE

ROGERS 4:44 PM 50%

< Cow File Cow File Done

Cow Tag # 003

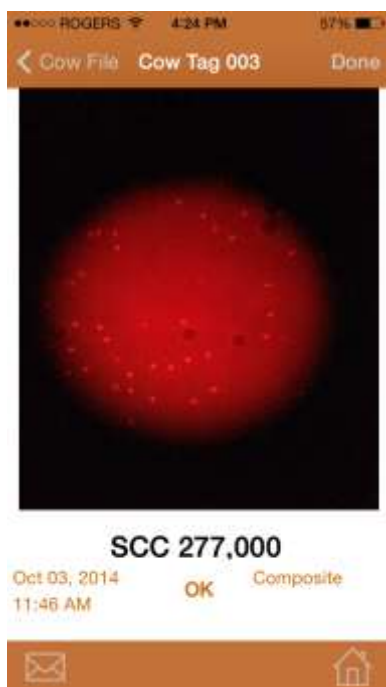
Notes

Breeding Date Mar 11, 2014 Birth Date

Dry Date Jan 13, 2015 (308 days) Lactation #

Sample Date	Qtr	SCC	Path.
Oct 03, 2014		277,000	>
Oct 03, 2014		288,000	>
Sep 03, 2014		1,780,000	^Strep >
Aug 28, 2014		1,520,000	^Strep >
Mar 02, 2014	1 FL	10,000	>

Trash Home



Customer Support for the App

mpengo Ltd. offers a 24/7 no charge support service for all of their apps, and they pride themselves on very quick response. If you have an issue with the app tap the Support button at the top of the main screen, enter a brief subject, followed by a more detailed description of your problem, and tap Send. The support team will review the issue and your inquiry will be addressed by mpengo if it is an 'app' issue or by the Dairy Quality staff if it is a milk sampling question or RT10 problem.

Languages

The Dairy SCC app currently runs in English, Spanish and French. The language used is based on the settings of your iPhone/iPod. To switch to a different language, go to **Settings / General / International / Language**

Other languages are expected shortly.

Other Details About the Device and Sampling

When to Sample

To help ensure ongoing low SCC, we recommend using the RT10 device in different routines:

- Test bulk tank daily.
- Test fresh cows shortly after calving.
- Monitor treated cows for a quicker return to production when an acceptable level of SCC has been obtained
- Easily check SCC level for cows at auction
- Test suspicious cows anytime:
 - when milking equipment shows high milk temperature, or when physical changes are noted: for example, swelling, redness, hardness of the udder or other abnormalities, when milk has a watery appearance, flakes, or clots



Lining up the 'dots'

The Dairy Quality milk sampling slides (manufactured for Dairy Quality by DeLaval International) offer a high quality, efficient method of extracting a sample of milk, mixing it with the appropriate chemical reagents, and presenting the mixture to our RT10. As with any product, there are sometimes slight variances in production, including thickness of the slide and the resulting volume of fluid that fits in the viewing chamber. Knowing exactly much fluid is in the sample is important, since even very small differences can introduce a potential variance of a few percent in the SCC count.

To compensate for this, you'll note that there are dots along one side of the slide: there can be as many as 3 small dots, followed by the one large dot. The presence (or absence) of the dots provides a more accurate reading of the volume of milk that is in the viewing chamber. By tapping the corresponding dot pattern prior to analyzing, a much better calculation is achieved.



Before inserting the slide with the milk sample into the RT10, first start the Dairy SCC app and tap 'Take Milk Sample and Analyze'. Align your slide to the slide image displayed at the bottom of the screen, lining up the slide with the large black dot on the right. Match the dot pattern of the slide by tapping the appropriate three dots on/off (this optimizes the calibration of the app to the volume of milk in the viewing chamber). Insert the slide into the RT10, and continue with the analysis using the app.



Re-Testing a Slide

Because it is so easy to do so, the dairyman is often tempted to re-test a slide that is already inserted in the device. Your first analysis should always stand as the test result for the following reasons:

- The sample deteriorates quickly as the reagents break down the cell, and subsequent or further testing will result in different cell count readings caused by residual fluorescing and cell deterioration. The loaded sample should be analyzed within 3 minutes of loading
Cells in liquid float about and cells will move in and out of the field of view of the microscope (Brownian motion). Slight variation from time to time will occur

Quick-Test

Quick-Test provides a quick way to test a sample of milk without having to go through all the steps. The major differences are:

- The analysis results are stored in a Cow labeled QT
- Tapping Quick-Test will immediately proceed to countdown and analysis, so be sure that you first have indicated the proper slide 'dot pattern' prior to tapping.

Why the timer countdown?

By default, there is about a 45 second delay between tapping Analysis and actually taking an image of the milk sample and performing the cell count. This time has been calculated to be the optimal period to allow the chemical reagents in the slide to interact with the raw milk, break down the nuclear DNA, and stain the cell.

The Battery/Cell

The average 9-volt battery used in the RT10 can supply 500 mAh. At a 35 mAh draw, the battery will last continuously for 12 to 14 hours (if, for example, you left the slide in mistakenly). You can expect around 1400 tests on one good battery under normal use.

The RT10 does not have a battery low indicator. However, the Dairy SCC app has a routine that monitors light levels and the contrast of the cells against the background. If the contrast and light levels are too low, the app will display the advice that the battery should be replaced.

Re-Focusing

Although the Dairy Quality Device has been carefully assembled and focused, it might become necessary to refocus the lens and image:

- Use a small screwdriver to loosen the locking setscrew along the side of the device near the lens assembly
- Insert a loaded milk sample slide and your iPhone into the device, and use Apple's Camera app to view the image
- Slide out the iPhone a few inches/centimeters, and adjust the outer lens ring in or out with the screwdriver (there is an inner and an outer ring), re-inserting the iPhone to see if the adjustment is sufficient: repeat as necessary (it shouldn't be necessary to turn the lens more than 1/3 of a turn, and if turned 'in' too far, the lens will block the slide area, and the slides will not load)
- When you are happy with the image, use the screwdriver again to lock the lens assembly



For more help, watch the re-focusing video in the link below.

Using Apple's Camera App

Although you won't get the benefits of analysis of the Dairy SCC app, Apple's Camera App can also be used to display raw sample results. The Camera App can also help you focus (or re-focus) the lens.

Sample Images

A number of different sample images can be found on the Dairy Quality website at:

<http://dairyquality.com/dairy-quality-image-library.html>

Although the Dairy SCC does not currently indicate some of the pathogens shown, they are good examples of the kinds of image patterns that other pathogens present to the RT10.

Links to Other tools

RT10 Demonstration Video

<http://youtu.be/KIEmFpCiLkl>

mpengo Dairy SCC app Demonstration Video

<http://youtu.be/lfWNlPvJtm8>

Quick-Start Guide (English)

http://dairyquality.com/pdf/quickstartguides/DQInc._QuickStartGuide7.2014%28ENG%29.pdf

Una Guia Rapida (Espanol)

http://dairyquality.com/pdf/quickstartguides/DQInc._QuickStartGuide%28SPA%29.pdf

Guide de Demarrage(Francais)

http://dairyquality.com/pdf/quickstartguides/DQInc._QuickStartGuide7.2014%28FRE%29.pdf

Refocusing a device

<http://youtu.be/VGmfE4NDhAw>

Selling Tips for the Dealer/Reseller

Why it makes sense to have an RT10 device (ROI)

As the costs of monitoring herd health and low SCC vary from dairy farm to dairy farm, we believe the best way is to let the dairyman arrive at his own conclusions based on what he is paying now

Ask your dairy-farming customers the following questions:

How much money could you save if:

- You had instant, accurate, and early SCC detection?
- You had a good indication of a suggested pathogen?
- You could limit the spread of infection with early detection and treatment?
- You could reduce the number of culled cows?
- You weren't always required to use third party testing?

How much does it cost you when:

- You lose production from high SCC?
- You get penalized or lose premiums due to high SCC?
- You lose production from suspect cows being pulled from production while awaiting lab results?
- You experience losses from rejected bulk tanks?
- You lose time awaiting outside testing before returning a treated cow to production?
- You pay for third party testing, shipping costs, and fees?
- You get errors and waste time manually recording SCC data for reporting and trend analysis?

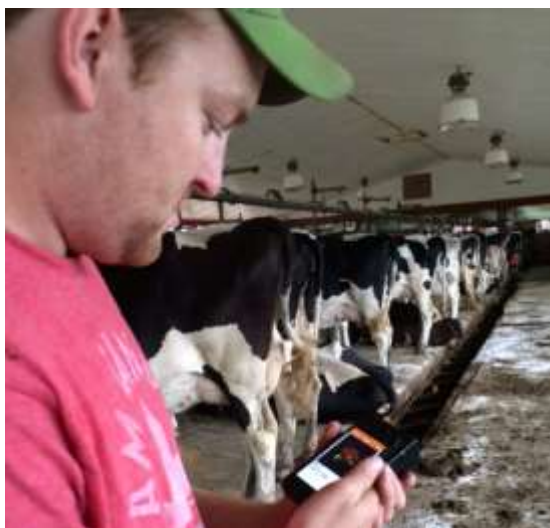
Hot Points: What we do that the others do not

- Provide instant SCC measurement results
- Provide an indication of pathogen if available
- Provide better information of SCC at the critical 250-600K region: other portable systems are excellent at very low SCC, and at very high SCC, but inconclusive at the important mid-range region
- Ability to test treated cows

- Automatic electronic storage of data and images for interface with herd management systems
- Ability to immediately send SCC images via email to dairyman's vet for opinion and recommendation

Benefits

- Increase milk production by lowering SCC
- Improve milk quality by lowering SCC
- Protect premiums and/or reduce penalties by lowering SCC
- Reduce culling rates and decrease treatment costs by administering treatment immediately
- Speed cow recovery with earlier treatment
- Improve herd management with instant, accurate testing performed right in the milking parlor
- Reduce the spread of mastitis through the herd
- Keep better cow history with data and images stored automatically on the iPhone or iPod Touch with the Dairy SCC app.
- Share data via email or by electronic interface with herd management software



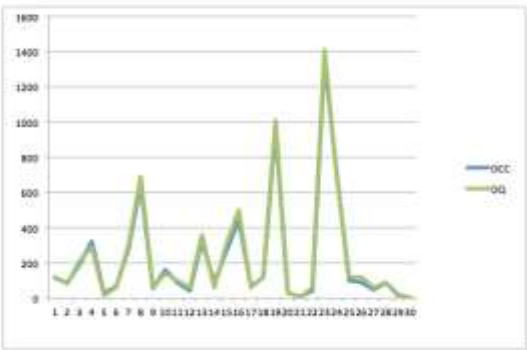
Some Sample Results & Graphs

Dairy Quality is currently compiling all the reports and tests performed over the last 3 years into one meaningful summary.

Here are some early examples of typical (small) reports that reflect the power and performance of the RT10 SCC device

Herd 4

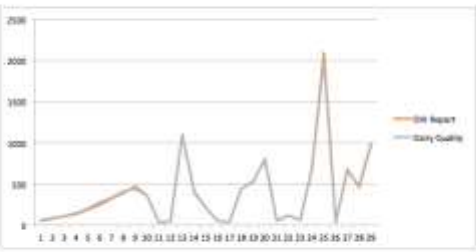
Cow Tag	DCC	DQ
1	114	120
2	87	80
105	190	210
8	322	290
11	30	15
17	66	60
22	277	300
64	644	690
108	55	60
97	161	140
106	88	100
110	42	60
119	322	360
141	88	60
111	270	310
142	442	500
53	66	60
no tag	118	120
no tag	963	1010
no tag	30	30
no tag	10	5.5
no tag	40	60
no tag	1352	1410
no tag	701	600
no tag	101	120
no tag	90	120
no tag	47	60
no tag	88	90
no tag	19	10
no tag	5	5.5



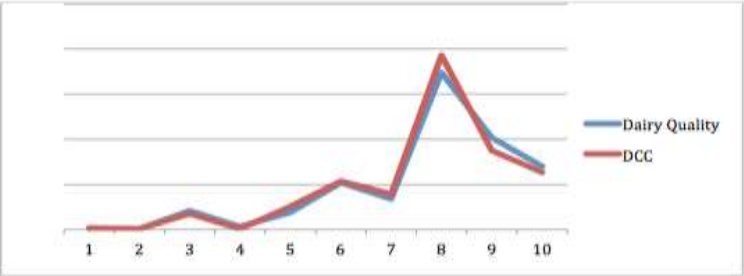
R2 Correlation 0.99627717

Cow ID	DHI Report	Dairy Quality
1130	58	50
875	88	75
330	106	130
258	133	145
1040	169	200
6732	243	281
49	319	397
58	388	430
622	470	480
457	355	360
953	30	30
891	64	45
1679	1888	1100
1657	410	395
890	212	230
931	48	50
340	38	31
521	440	440
675	530	520
811	706	830
8811	94	90
1310	120	121
305	58	60
387	809	730
229	2100	2000
117	30	80
21	878	855
570	454	480
938	880	1000

DHI & Dairy Quality Comparison



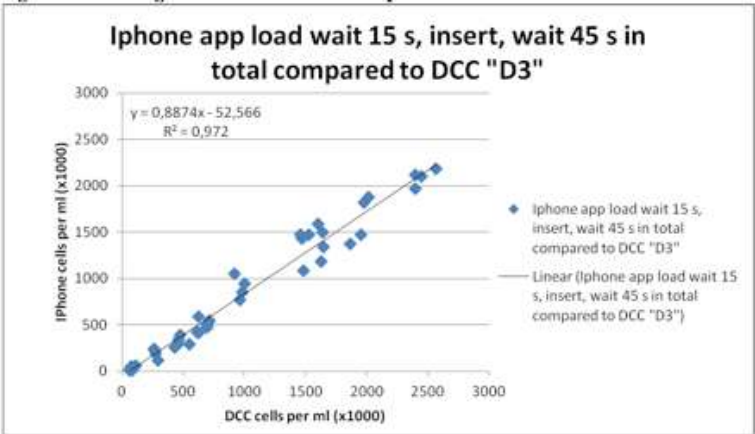
R2 Correlation 0.9977851



For better clarity:

Blue: Dairy Quality device

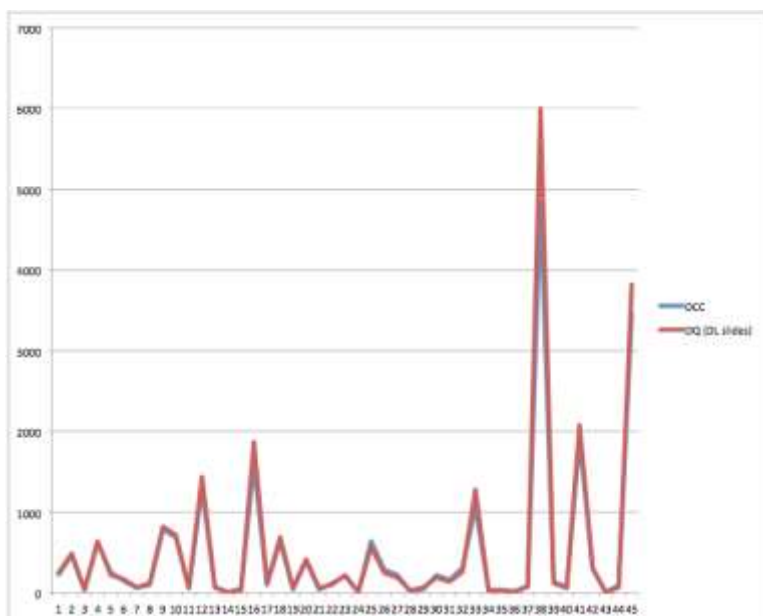
Red: DeLaval DCC



September 10 PM milking

			Ratio 11,100			
Cow	DCC	DQ (DL slides)		Cow	DCC	DQ (DL slides)
Tank	228	250		11	394	420
98	464	490		31	42	60
14	33	40		120	121	100
223 RR	519	640 strep		110	210	220
223 three quarters	256	220		131	11	10
37	146	170		101	640	570
44	64	70		55	288	250
171	99	120		67	223	190
1	785	820		58	22	30
Red Cow FR	691	720 strep		Fresh Cow RF	44	70
Red Cow RR	62	60		Fresh Cow RR	220	190
Red Cow LF	1,301	1440		Fesh Cow LR	162	140
Red Cow LR	71	70		Fresh Cow LF	310	260
21	10	5.5		47	1065	1280 strep
77	56	30		71	33	30
88	1604	1870 strep		183	38	30
69	99	120		29	22	10
12	642	690		145	77	90
23	44	60		20	4820	6000
162	293	310		155	138	120
3	10	5.5		144	72	60
86	92	70		56	1908	2080 strep
91	3460	3820 strep				

Correlation R2 0.9988



A Letter Supporting the Device

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Department of Animal Sciences

Mammalian NutriPhysioGenomics Laboratory
498 Animal Sciences Laboratory
1207 West Gregory Drive
Urbana, Illinois 61801



April 16, 2013

Re: Dairy Quality milk testing device

Our group within the Department of Animal Sciences at the University of Illinois has been testing the Dairy Quality milk testing device over the last six months.

In samples collected from the herd here at the University, the Dairy Quality device consistently provides results similar to traditional somatic cell count (SCC) measuring techniques. Statistical analysis of these results demonstrates an excellent correlation coefficient of greater than 0.97.

In addition to the comparative testing of SCC additional work is now underway to use the images provided by the Dairy Quality device to attempt to determine using molecular techniques based on Polymerase Chain Reaction (PCR) the type or types of pathogens causing the high SCC readings. Since the image is the exact display of the fluoresced milk sample after staining, our investigation is exploring the arrangement (including clustering or dispersal) of cells in the image with typical pathogens. The results are being shared with the creators of Dairy Quality. This is expected to lead to a next generation of the device's software to provide the dairyman more tools to better identify types of infection within their herd and thereby better react to herd and cow health issues.

Based on the analyses conducted to date, we believe the Dairy Quality device can be a valuable tool in the dairyman's arsenal for fighting against mastitis and, through appropriate treatment, help ensure cow health.

Sincerely,

A handwritten signature in black ink, appearing to read 'J. Loor', with a long horizontal flourish extending to the right.

Dr. Juan J. Loor

Associate Professor of Animal Sciences & Division of Nutritional Sciences
Mammalian NutriPhysioGenomics Laboratory
498 Animal Sciences Laboratory
Department of Animal Sciences

Statistical Correlation of Dairy Quality Sampling

To describe the accuracy of the RT10 device with that of other milk quality testing protocols including lab tests and other devices, Dairy Quality has collected extensive testing data over the last few years. Somatic Cell Counts were derived from the different methods using the same milk samples to compare the results.

Many statistical tests can be done to compare the data and determine the similarity of the testing and the results. A random sample of 200 tests were taken from our database and compared. The following are the results of different tests:

Descriptive Statistics

	Mean	Std. Deviation	N
Other Device	272,687	546,4113	201
DQ RT10	278,826	620,6307	201

Correlations

		Other Device	DQ RT10
Other Device	Pearson Correlation	1	,992**
	Sig. (2-tailed)		,000
	Sum of Squares and Cross-products	59713071,25	67302380,53
	Covariance	298565,356	336511,903
	N	201	201
DQ RT10	Pearson Correlation	,992**	1
	Sig. (2-tailed)	,000	
	Sum of Squares and Cross-products	67302380,53	77036487,91
	Covariance	336511,903	385182,440
	N	201	201

**, Correlation is significant at the 0.01 level (2-tailed).

T-Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Other Device	272,6868	201	546,41134	38,54088
	DQ RT10	278,82587	201	620,630679	43,775913

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Other Device & DQ RT10	201	,992	,000

Paired Samples Test

		Paired Differences			
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval
					Lower Upper
Pair 1	Other Device - DQ RT10	-6,139303	103,556702	7,304327	-20,542677

Paired Samples Test

		Paired ...			
		95% Confidence Interval of the ...			
		Upper	t	df	Sig. (2-tailed)
Pair 1	Other Device - DQ RT10	8,264070	-.841	200	,402

Summary of Results:

The mean count from the RT10 device across this set of results was 272.687 with a standard deviation of 546.41. The same mean from the other devices 278.826 with a standard deviation of 620.63. Thus, in determining counts, the two sets of testing data are almost the same.

The correlation of the results – how similar the two sets of data are – was 0.992 (out of 1.00). Here again we see that the two sets of results are almost identical.

The T-test analysis measures if the difference between the 2 means is significant. The resulting T value of $-.841$, $p = .402$, indicates that the two means are not statistically different. (A difference is indicated if $p < .05$). Also, the T-test confidence levels ranging from -20.54 - 8.26 indicate that there is no difference. (When the confidence interval crosses 0, the data are not statistically different).

These results **confirm** that the accuracy of testing using the RT10 is the **same or better** as using other legacy testing methods, including DeLaval's DCC, DHI testing and old fashioned laboratory testing.

Why only Apple?

When mpengo Ltd. first starting developing smartphone and iPad apps in 2011, it was intended that all apps would also be compiled to be compatible with the Android series of smartphones and tablets. However, it was later found that only 15-20% of the code was compatible between the 2 systems, so mpengo made the decision to invest the added costs into higher quality Apple apps.

The only rationale to support an Android version now would be to take advantage of an Android smartphone's generally lower price. However, with the availability of an RT10 device for the Apple iPod Touch, that objection is no longer applicable, since the iPod is even less expensive than an Android smartphone.

Handling Objections

Price: In the price, one must consider:

- The high cost of the specialized lens / excitation / filter system (an over 800x microscope with high resolution and specialized filters has been miniaturized into a lens assembly under 1inch or 2cm long)
- The special acetyl resin that can resist all the chemicals in today's dairy barn
- Each device is individually machined to close tolerances, which is more difficult than injection molding (injection materials won't hold up as well in the dairy barn)
- The extensive testing process over 2 years

Our dealers are starting to shift a lot of sales towards the iPod Touch version. We recently launched the iPod touch version so that non-iPhone users could access the solution with a very low cost alternative.

What we are finding is that there is some bundling and extra 'value-add' opportunities for our dealers and distributors. With the iPod Touch version, a dealer can pre-load the SCC Dairy app into the iPod and present the dairyman with a ready to go, dedicated testing tool. There is also a price point drop as the iPod Touch retails for ~\$200.00 USD.

I already have a cell phone: Some responses:

- Determine if the user's cellular contract is due for renewal: it may be that the user is eligible for a free smartphone upgrade as part of a renewal contract
- Suggest the iPod Touch as an excellent alternative:
 - it's cheap
 - it works very well
 - you can throw it into the RT10 and just leave it in there
 - no worries about lending your personal phone (with personal information) to your workers

Where's all your scientific reports and all your test results:

Although we have done extensive testing of our RT10 device, both in-house and by outside firms, we have yet to compile all the thousands of test sample results into one good report. It's planned, and hopefully will be completed soon. The nature of our tests included:

- In-House tests of thousands of samples compared against other commercially available systems
- We engaged the services of the University of Illinois at Champlain to evaluate and run two separate tests of the device on their 150 herd dairy cattle research unit (see earlier letter).
- Independent tests by large dairy distribution companies to determine the validity of the device
- Independent testing by microbiologists in other countries
- Ad-hoc tests of local farmers, and farmer groups

It's not certified by a government agency:

It doesn't need to be!

The RT10 was not intended to be used 'for scale': our goal was to develop a device for the dairyman that could give excellent results quickly in the parlor so that he could immediately react and run his dairy business more efficiently. If we had undertaken to have the RT10 further certified as a device suitable for scale, the cost and subsequent price would easily have doubled or tripled.

As a side note, the device is built and certified to ISO 9001 and European CE standards, and except for finishing off some of the paperwork, soon in the USA as a Class I device under the existing 864.3600 Fluorescence Microscope category. When the RT10 is combined with the iPhone and the Dairy SCC app, the combination becomes a cell counter - which the FDA categorizes as a Class II device under the existing 864.5220 Automated Differential Cell Counters category.

If You Have Questions

If you have any questions, problems, suggestions, or more sections you'd like to see added to this guide, please contact us at info@dairyquality.com