Luminometer: Using One to Improve Sanitation for Calves

- **What is a "Luminometer?"**
- **What information does a "Luminometer" give me?**
- **What are critical control points for Luminometer testing?**
- **Organizing my Luminometer observations**

What is a Luminomter?

This instrument measures the presence of adenosine triphosphate (ATP). We know that ATP is present in all living microbial cells. Thus, we can use it as an indicator of the microbiological content of a deposit or fluid. We can swab a surface, expose this swab to a chemical (luciferase) and light is produced. The luminometer measures the intensity of this light and calculates the amount of ATP present.

We now have a quantified estimate of the overall microbiological contamination of the surface we swabbed. The measurement is in relative light units or RLU's. A low value equals a small amount of contamination; a high value equals a large amount of contamination. Your veterinarian or pharmaceutical representative may have this instrument to use for your calf enterprise.

What information does a "Luminometer" give me?

In a sanitation program for calves we are interested in the lowest optimal bacterial contamination possible. Ideally, our dairy enterprise has cleaning protocols that ensure biologically-based procedures are used to clean equipment and premises.

Nevertheless, training lapses happen. Protocol drift happens resulting in less than ideal sanitation. We, therefore, want to check periodically to see how well the sanitation procedures are working.

What are acceptable on-farm values for calf feeding equipment? In the food processing industry (e.g. deli, restaurant), thresholds of ≤10 RLU's is usually acceptable for surfaces in direct food contact (e.g., meat slicer). For a deli food preparation counter ≤50 RLU's would be expected.

What about on-farm readings? Each calf enterprise may have to set their own acceptable thresholds. My clients often use ≤100 RLU's as their "food surface" upper limit – and, I have seen my clients routinely reach this threshold when following appropriate cleaning procedures. Lower values are possible when cleaning routines used consistently.

What are critical control points for Luminometer testing?

A "critical control point" represents a place in the calf feeding system where residues (fat, protein) may accumulate unless cleaning routines are used consistently. Examples include:

- Bottom of lid, colostrum collection bucket

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- Shoulder of colostrum collection bucket (inside surface where bucket goes from straight up and down to sloping)
- Nursing bottle, inside surface at top shoulder, especially on square bottles in the corners
- Nursing nipple, inside surface of nipple
- Esophageal tube feeder, inside surface of ball at end of tube
- Tube feeder, inside surface of tube where bottle or bag attaches
- Tube feeder bottle or bag, any interior surface difficult to brush

Organizing my Luminometer observations

Organizing can be done manually on paper marked with a grid. Alternatively, the same grid is available using an Excel spreadsheet on a computer.

The first step is to work out for your calf enterprise the necessary critical control points to swab for the ATP collection. I often use the list of points shown above at a starting point. You may wish to add points where colostrum and milk contact is made – discharge surface of a feeding nozzle, underside of tank top used to transport milk. Note that my example above has enough detail so that samples can be taken from the same site every time.

Then, record each value for today in the next column. Depending on the rate of failures (urgent need to improve cleaning procedures), sample again as needed to feel comfortable that cleaning is working. If all the values are lower than your threshold you may wish to wait two or three months before retesting.

When you test, again record these values in the next column. Note in my example, occasionally the values were **very** high indicating a major cleaning failure.

On 1/26/2018 we had an astronomically high RLU at the ball end of the tube feeder (4837). The small brush used to clean the inside of the tube was missing – we replaced the brush – in March the reading was back down to 12.

Sample Site	Swab Site	10/27/2017	12/29/2017	1/26/2018	3/1/2018
milker bucket newer	inside 1/3 down	0	13	8	5
milker bucket older	inside 1/3 down	0	41	6	0
plastic lid	underside, under gask.	5	**1010**	**729**	2
Tube feeder	inside bottle 2" - refrig	7	11	**172**	0
Tube feeder (ss)	inside tube - top 2"	16	in use	**173**	0
Tube feeder (ss)	inside tube - ball 2"	36	in use	**4837**	12

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