MASTILINE

On-line ATP monitoring instrument LUCI® and variability shown for individual cows

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Aim

To improve the health of cows in dairy farming via on-line monitoring of ATP in milk.

Introduction

Previously, we have shown a linear relationship between our measurement of ATP and the measurement of somatic cells by flow cytometry in milk (SCC)*. Here, we present more than 12.500 ATP measurements in an Automatic Milking System (AMS) at a test farm in the Netherlands. There are vast differences between the individual cows and collected data trends. Both average and extraordinary examples are shown here.

Methods

A small sample of milk was collected from the local milk reservoir of an individual cow at each milking during the months of November, December and January. Each sample was autonomously analyzed for both free and intracellular ATP in our LUCI® instrument.

The instrument is rinsed after each measurement and cleaned three times a day together with the AMS regime. Each measurement is calibrated against an internal standard. This calibration technique accounts for temperature variation during the winter in the northern hemisphere. No additional data processing or correction was necessary.

Results

Our data indicate that increased frequency of ATP sample measurements offers a clear improvement for monitoring the health of individual cows. We were able to identify individual cows returning from their “dry-off” period, those new to the herd, those with clinical infections, and those recently treated for infection.

Conclusions

Data shown here is based on statistical differences and anecdotal evidence. A more quantitative study is being conducted with our research partners in the context of an ongoing EuroStar project.

Based on the evidence we have, LUCI® is shown to be a powerful tool for the monitoring and maintenance of a healthy herd.

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Poster presentation: IDF World Dairy Summit November 2017 Belfast Ireland: Khatami et. al. Comparison of milk somatic cell counts by On-line ATP monitoring instrument LUCI and Flow Cytometry.

Europese Unie

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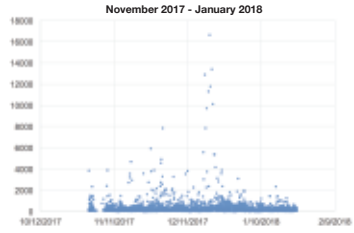

Figure 1. Shown here are data collected from the beginning of November 2017 through the end of January 2018. The y-axis is reported in nM ATP. The x-axis in time. Note the y-axis is scaled to the equivalent of nearly 18 million SCC/mL equivalents. This is due to two individual cows, one of which is described below in Figure 3.

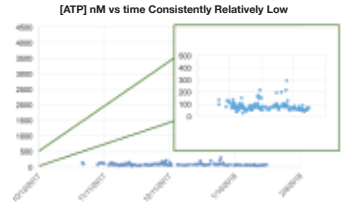

Figure 2. The y-axis is reported in nM ATP. The x-axis in time. Note the y-axis is scaled to the equivalent of nearly 4.5 million SCC/mL equivalents. The inset shows the average ATP concentration is less than 100, but in the course of a single day can vary by nearly a factor of three.

Figure 3. The y-axis is reported in nM ATP. The x-axis in time. Above you see two different cows both coming back to the AMS after a period of “drying off”. As anticipated, the ATP is higher in the first days after calving and then settles quickly to less than 200 nM.

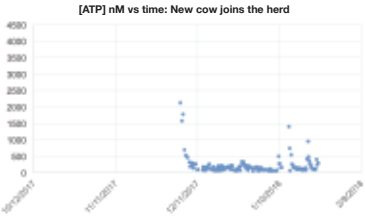

Figure 4. The y-axis is reported in nM ATP. The x-axis in time. Here we see a new cow join the herd. She starts off high and then settles down to less than 200 nM in the space of a few days. One month later, there is evidence of some health-related stress.

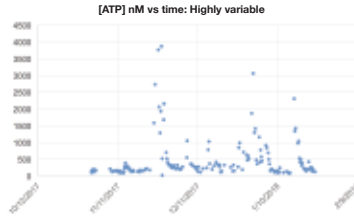

Figure 5. The y-axis is reported in nM ATP. The x-axis in time. This cow has periodic high ATP values but appears to be improving in time.

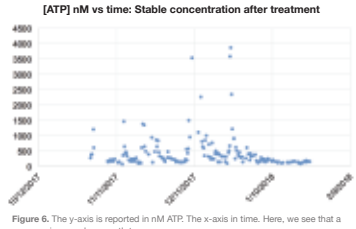

Figure 6. The y-axis is reported in nM ATP. The x-axis in time. Here, we see that a cow requires nearly a month to recover.

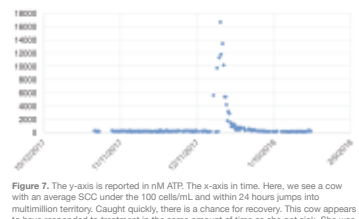

Figure 7. The y-axis is reported in nM ATP. The x-axis in time. Here, we see a cow with an average SCC under the 100 cells/mL and within 24 hours jumps into multimillion territory. Caught quickly, there is a chance for recovery. This cow appears to have responded to treatment in the same amount of time as she got sick. She was treated for an Ecoli bacterial infection.