

Application Report

Annual ring test, Switzerland

A cantonal laboratory in Switzerland organizes a ring test every year. Participants receive three unknown water samples and are asked to determine the total cell count (TCC/ml). This report presents the results of the ring test of 2018. One laboratory received and measured the samples after one day. Six laboratories measured after two days. Three laboratories measured three days and one laboratory four days after the samples were picked. One laboratory measured one week later. The samples were delivered by mail and were asked to be stored in a fridge before measuring. Despite the variability around this test the results are impressive.

Instruments used for the test

In order to measure the total cell count of the samples (results shown in Figure 1) 13 participants used traditional bench-top laboratory flow cytometer (A, C, D and E) while three used an industrial flow cytometer (B). In contrast to the other instruments, the instrument B depicted in Figure 4 offers a fully automated measurement from sample picking to data analysis.

The Measurement Process

The essential steps to determine the TCC using flow cytometry are illustrated in Figure 2. The sample is taken (1) and a dye is added (2). Most commonly the dye SYBR green 1 is used. The dye attaches to the DNA of microbial cells. In a next step the sample is mixed (3). This distributes the dye evenly throughout the samples and guarantees reproducible results. The sample is then heated to a specific temperature of 37 degrees for 10 minutes (4). This procedure is commonly known as incubation phase and allows the dye to attach to the DNA. Finally, the sample is measured using flow cytometry (5). Last, the system needs to be cleaned (6) and rinsed (7). This avoids that a sample will affect subsequent measurements.

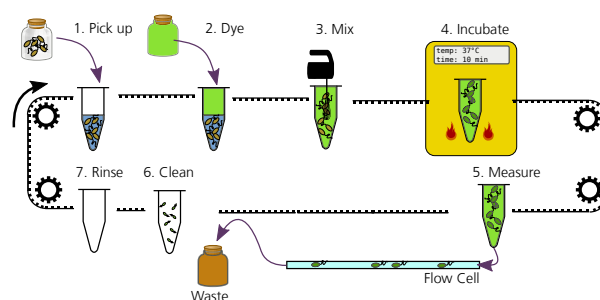


Figure 2: Sample preparation process

No.	Instrument	Sample 1	Sample 2	Sample 3
1	A	5226	19036	98467
2	A	5577	18125	95474
3	C	4020	16435	62748
4	B	4874	16422	66189
5	A	6170	22380	89323
6	A	4920	18823	76177
7	C	2960	13030	74620
8	C	5667	17633	79900
9	A	4047	15973	66513
10	B	3987	16414	56296
11	A	4240	17083	73717
12	A	4293	16867	70913
13	D	3953	15687	62013
14	E	3589	12686	41097
15	B	4421	18234	72119
16	D	2887	13973	58307
Average		4427	16800	71492
Standard deviation		930	2399	14780
Coefficient of Variation [%]		21	14	21

Figure 1: Results

Application Report

Annual ring test, Switzerland

The BactoSense (B) is the only instrument that automates the complete sample preparation and measuring process (1-7). All other instruments listed in the table of Figure 1 only perform the measurement step (5). The other steps are executed manually by trained laboratory specialists.

Results

The results show that different laboratories and instruments reach very similar values. Figure 3 depicts the results returned from the 16 participants. Sample 1 is the cleanest. Sample 2 and 3 contain significantly more bacteria. The results provided by the BactoSense are very close to the overall average measured by all participants. Moreover, the three BactoSense show much more consistent results than other instruments. It is likely that the automated sample preparation is less error prone than manual sample preparation.

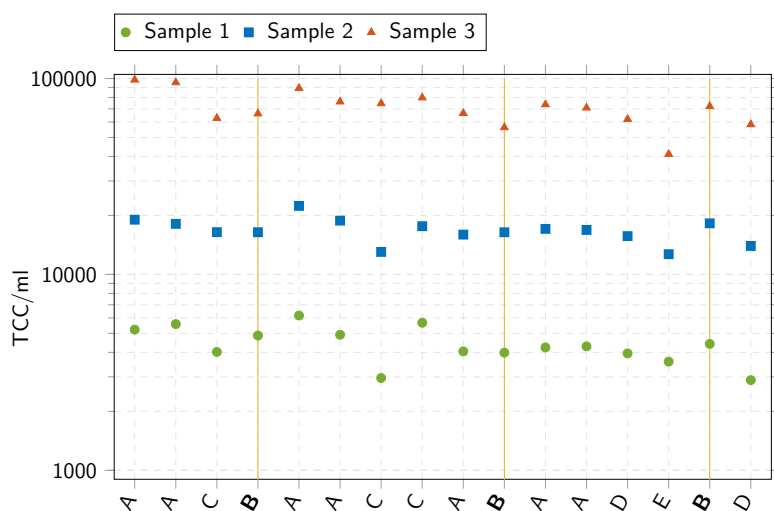


Figure 3: Graphical representation of results

Conclusion

This ring test shows that even when measured at different times and with different instruments, the TCC value measured with flow cytometry gives similar results. The BactoSense is optimised for industrial environments and online use, yet it proves to deliver comparable, reproducible and reliable data. It is the only instrument capable of automatic sample preparation.

Product

Configuration:

- BactoSense with manual sampler



Figure 4: BactoSense TCC

Advantages of the SIGRIST BactoSense

Customer benefits

- Fully automatic flow cytometer
- Sampling, incubation, analysis and cleaning are carried out automatically
- Results available 20 minutes after sampling
- Easy handling due to safe-to-handle cartridge system. No handling of chemicals and no sample preparation necessary.
- Compact instrument with a small footprint
- Allows various applications and easy transport
- Detection of more than 99.9% of microbial cells
- Low operation costs
- Easy system integration thanks to multiple interfaces
- User-friendly operation and maintenance concept
- Selectable measuring interval (30min to 6h)
- Integrated color screen shows results, graphs and hints directly
- Freely selectable gating

SIGRIST
PROCESS-PHOTOMETER

SIGRIST-PHOTOMETER AG
Hofurlistrasse 1 · CH-6373 Ennetbürgen
Tel. +41 41 624 54 54 · info@photometer.com
www.photometer.com