

FOSS

ANALYTICS BEYOND MEASURE

BETTER MASTITIS CONTROL WITH NEW TOOLS

How to improve your on-farm decision making and increase cow productivity with the new Udder Health Group tool.





FACTS ABOUT MASTITIS

Despite the advances of recent decades, mastitis in dairy herds remains a major problem for farmers and the dairy industry in general.

Mastitis reduces milk yield and alters milk composition

It is a costly disease leading to unwanted veterinary costs, antibiotics, milk retention, decreased yield,

poor quality and reduced payment and culling. Losses in milk production amount to billions of Euros per year.

There is no doubt that reducing milk loss and improving the longevity of cows has a financial benefit for farmers.



€32 billion annually



Somatic cell counts (SCC) and bacteriology are standard



Losses are due to subclinical mastitis



Major need for new biomarkers



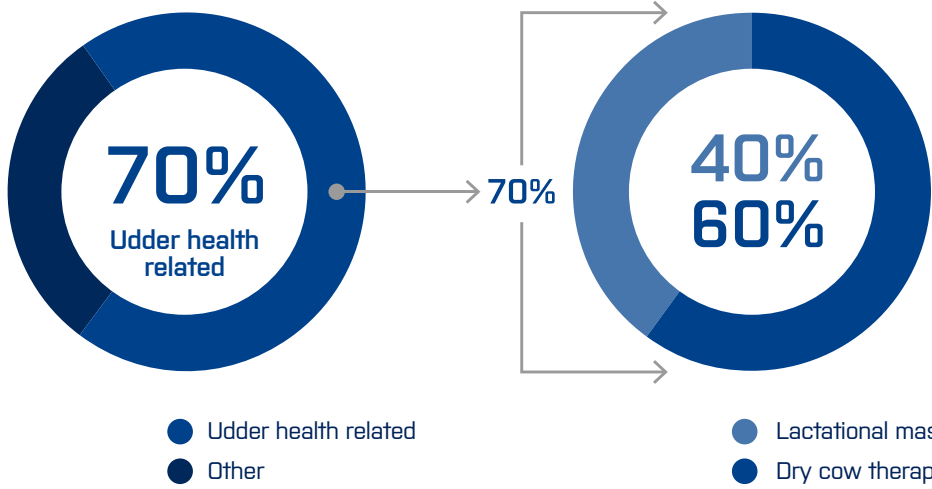
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Where are antibiotics used on Dairy Farms?

Most antimicrobials are used for the prevention and control of mastitis in dairy herds.¹

health infections, it makes sense that a reduction of this problematic disease is a huge step forward to reduce overall antibiotic use on a farm.

Considering that approximately 70% of all antibiotics on dairy farms are used for treating udder



According to Stevens et al. 2016 and van Werven, 2014

¹ Stevens et al. 2016, <https://www.sciencedirect.com/science/article/pii/S002203021600148X>, van Werven, 2014

A new tool for better mastitis control

Mastitis causes an elevated level of SCC in the milk. A commonly used SCC cut-off to distinguish between healthy cows and cows likely to be infected is at 200,000 cells/mL.²





For every cow with clinical mastitis there are 15-40 others with sub-clinical mastitis and a substantial loss of yield occurs already at this sub-clinical stage.³

One of the major problems related to the spread and persistence of mastitis within dairy herds is the sub-clinical form.

The Udder Health Group tool and Differential Somatic Cell Count

Detecting sub-clinical cows early on is very important because they act as a reservoir for bacteria, resulting in an unnoticeable spread of mastitis to healthy herd mates.⁴

The new udder health group (UHG) report, based on a combination of differential somatic cell count (DSCC) and SCC results is described in Table 1.⁵

	Group	Status	Definition	SCC [cells/mL]	DSCC [%]
	A	Healthy/normal	No indication for IMI* based on SCC and DSCC	≤ 200,000	≤ 65%
	B	Suspicious/onset of mastitis	Elevated proportions of DSCC (i.e. PMN**) as indication for IMI*, although SCC is still low	≤ 200,000	> 65%
	C	Mastitis	Indication for IMI, based on SCC and DSCC	> 200,000	> 65%
	D	Chronic/persistent mastitis	A constellation of the immune response often seen in connection with chronic IMI	> 200,000	≤ 65%

*IMI – Intramammary infection

**PMN – Polymorphonuclear neutrophils

— DSCC — SCC

Schwarz et al., 2020a (<https://doi.org/10.1016/j.prevetmed.2020.105079>), 2020b (<https://doi.org/10.1016/j.prevetmed.2020.105123>)

² Bulletin of IDF, 2013

³ More mastitis data from same milk sample, Foss Analytics 2022

⁴ Halasa et al, 2007

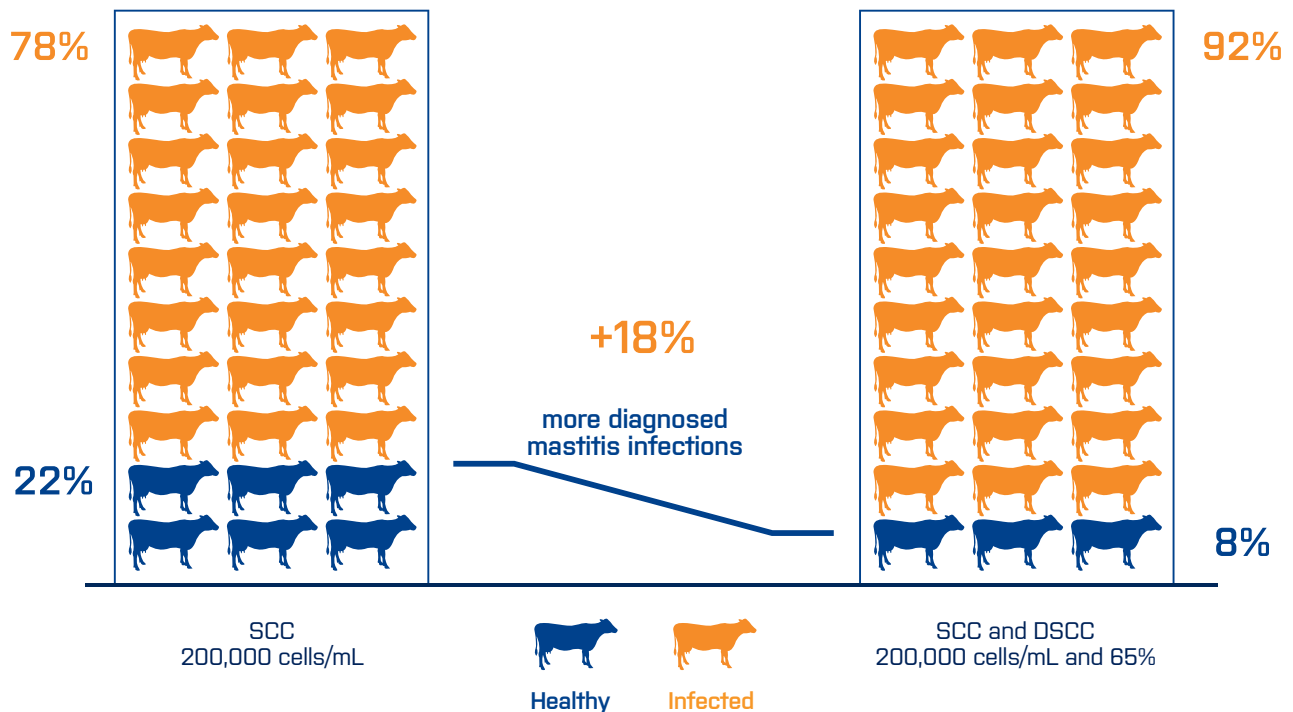
⁵ The SCC and DSCC cut-offs used for categorization were identified as ideal cut-offs in previous studies, Schwarz et al. 2020, Preventive Veterinary Medicine



THE VALUE OF COMBINING SCC AND DSCC INFORMATION

1. A combination of SCC and DSCC allows us to identify more mastitis infections

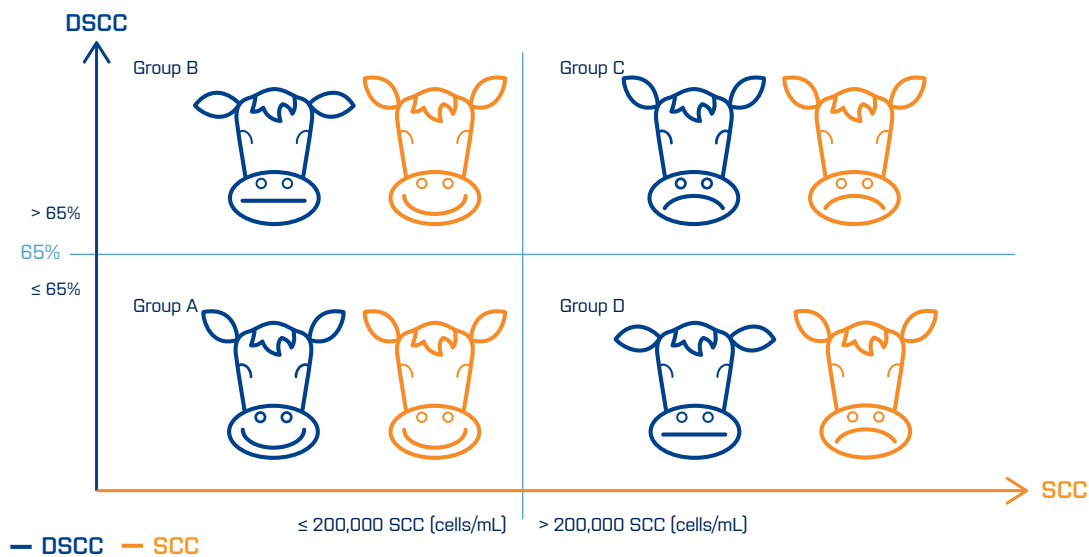
A study of 11 dairy farms in Québec, Canada, showed that a combination of SCC and DSCC allows us to identify more mastitis infections (+18%!) compared to SCC alone.⁶



Schwarz et al., 2020a (<https://doi.org/10.1016/j.prevetmed.2020.105079>), 2020b (<https://doi.org/10.1016/j.prevetmed.2020.105123>)

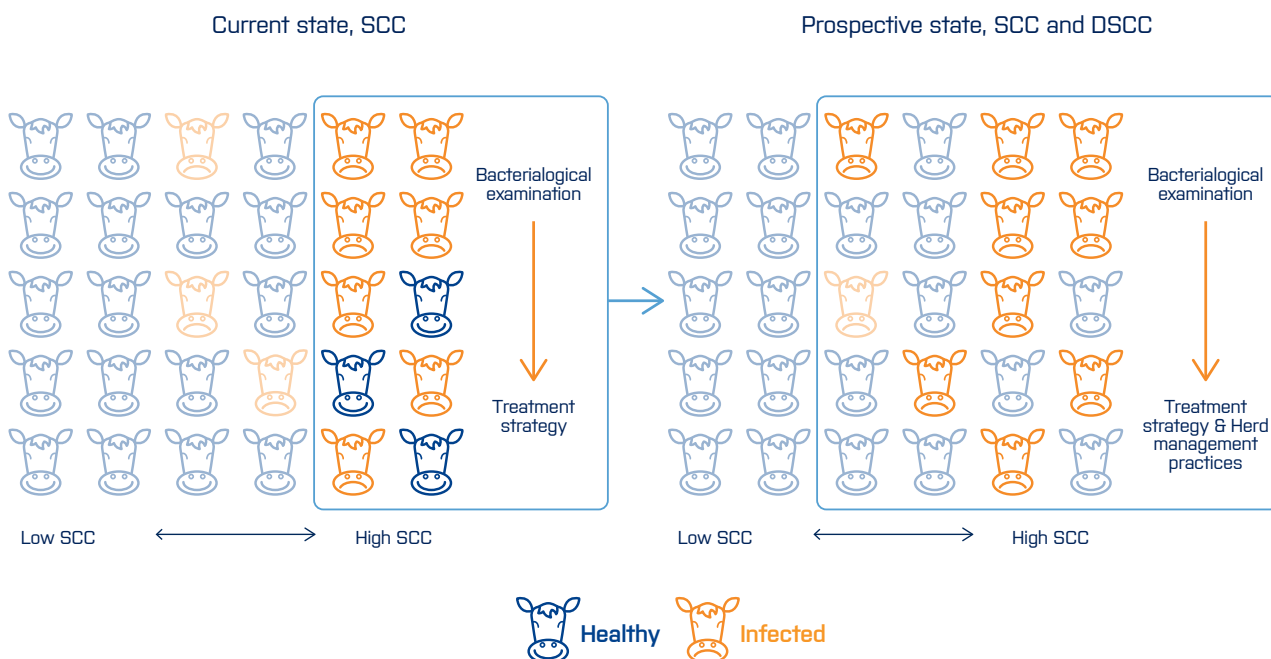
⁶ Schwarz et al. 2020, Preventive Veterinary Medicine, and The practical value of DSCC for dairy farmers

2. Early identification of mastitis even when SCC is under the 200,000 cells/mL cut-off level



! Even when the SCC is under the 200,000 cells/mL cut-off level, it does not rule out that the cow is fighting an infection and is in an early stage of mastitis already.

3. A tool to identify subclinical mastitis and support your treatment decisions helps reduce the use of antibiotics



The Udder Health Group tool – Real life practices

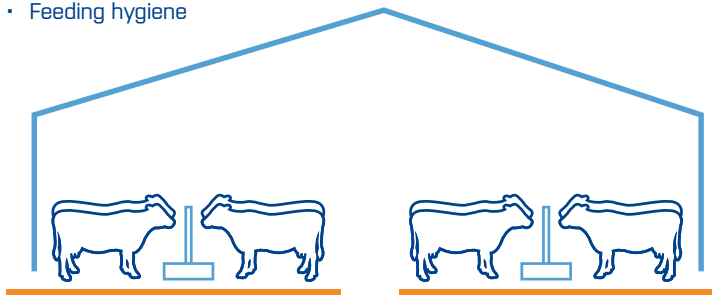
Preventive measures:

- Farms develop standard operating procedures (SOPs)
- The new tool gives farmers the warning that those procedures need reviewing:
 - Providing an understanding of whether SOPs are having the expected effect.
 - Providing insight into whether employees are following procedures and managing the herd optimally.
- This new information is a control point for farm practices, identifying situations where there is room for improvement and for preventing the spread of mastitis throughout the herd.

Herd Level

New information to help optimize

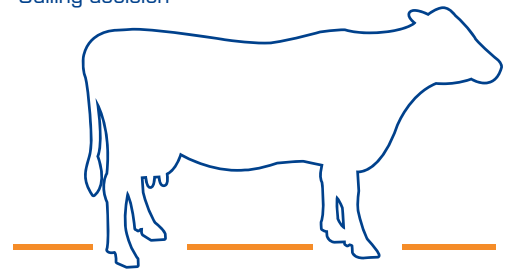
- Cubicle management
- Milking hygiene
- Feeding hygiene



Individual cow level

Better monitoring of udder health in

- Fresh lactating cows
- Earlier detection of mastitis
- Selective dry cow therapy
- Culling decision



Better cubical management

Previous studies show that biggest concentration of bacteria is in group B and C. Improved cow hygiene reduces bacteria transmission via the milking equipment, thereby reducing the spread of infections and preventing healthy cows from getting contaminated.

about 10 Euro, whereas the risk of an untreated cow becoming sick with mastitis comes with a very high cost.

- Improved data helps farmers make more informed decisions in the selective dry cow treatment.

Examples of hygiene improvements:

- Flush the milking equipment between two cows
- Milk sick cows in the end
- Use more lime disinfectant in the areas where the cows are lying

This is because:

In a study of cows before drying⁷ it was identified that there are 5 times more bacteria in group B than A even when the level of SCC is low.

- The new DSCC information helps target the selective treatment even better, helping choose the right treatment of cows that are at a high risk of infection.

Selective dry cow therapy

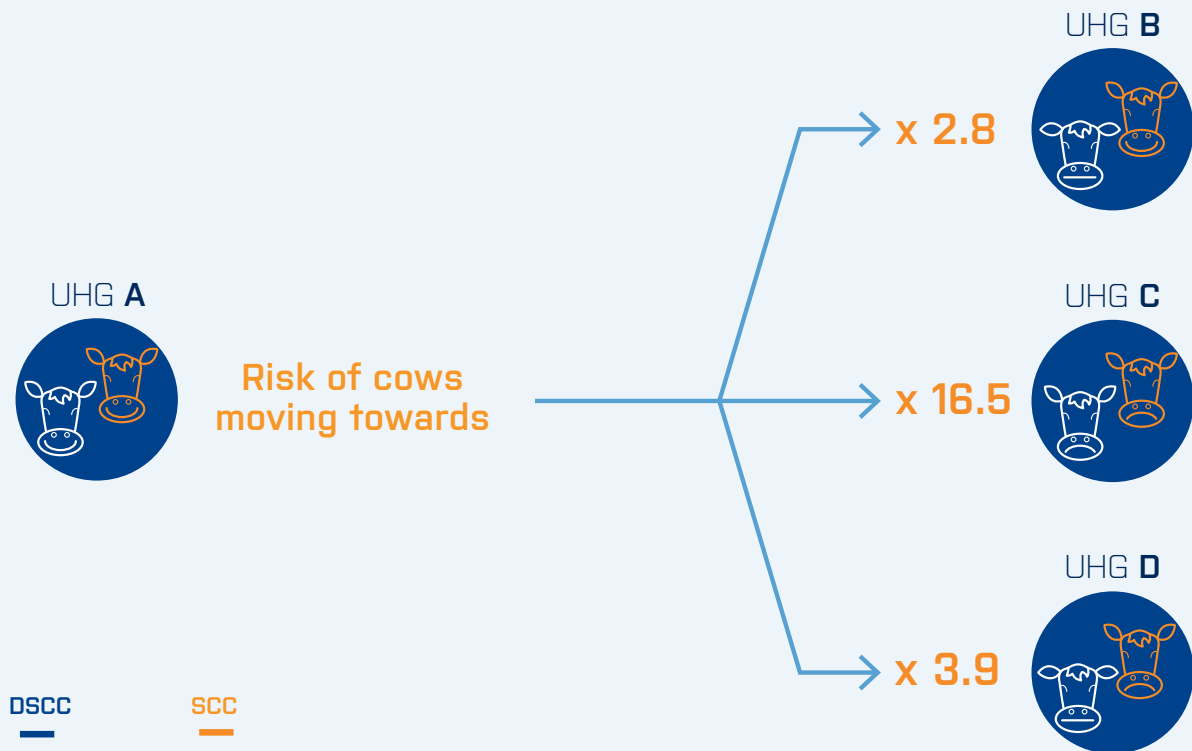
- For the farmer there is not always an economic value in saving on antibiotics as the cost is only

⁷ Investigation of differential somatic cell count as a potential new supplementary indicator to somatic cell count for identification of intramammary infection in dairy cows at the end of the lactation period. Schwarz et al., 2019, Preventive Veterinary Medicine

SUPPORT FOR HERD MANAGEMENT

– A warning system

A warning is issued when there is a risk of > 200.000 cell/mL in the next DHI report.



Schwarz et al., 2021: <https://doi.org/10.1016/j.prevetmed.2021.105374>

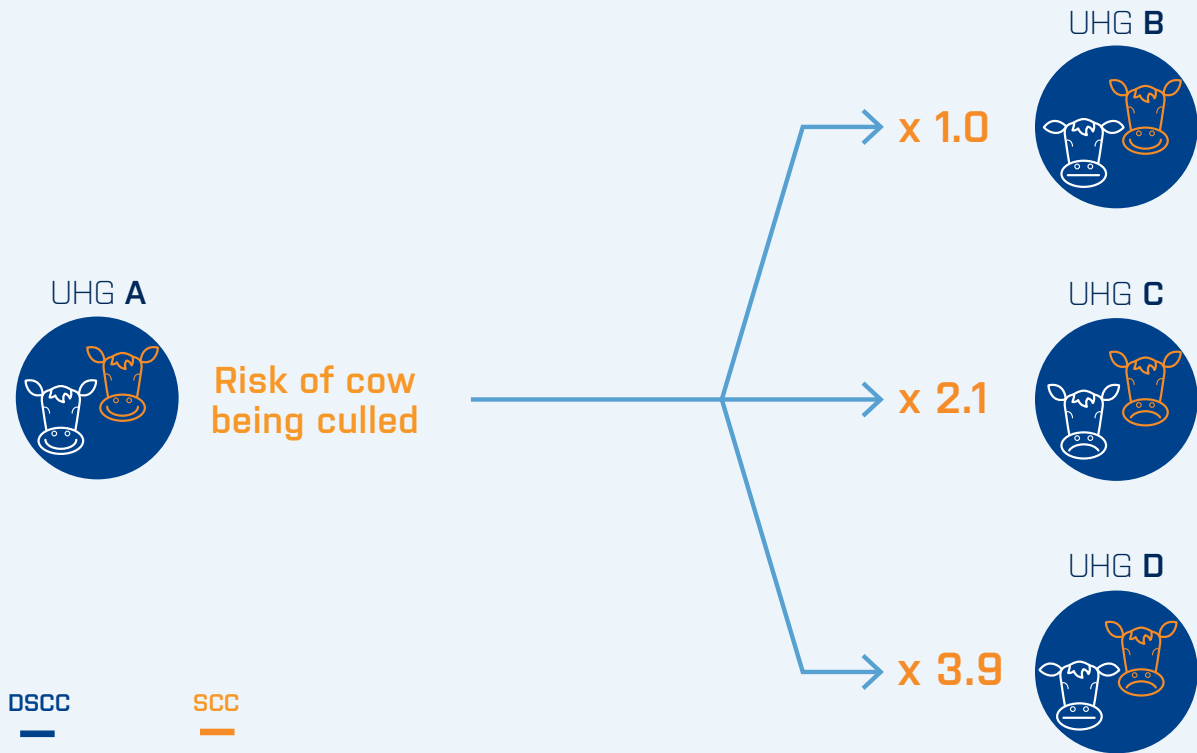
- Cows in group B have a significantly higher risk of moving to a high level of SCC in the next DHI test compared to those in group A.
- Cows in groups C and D tend to stay in the high SCC area.

Group B shows the percentage of cows in this group and serves as a warning system.

A high percentage of cows in group B in the DHI test indicates that more cows will be in Group C in the following tests if no action is taken.

THE UDDER HEALTH GROUP TOOL

– Risk of being culled



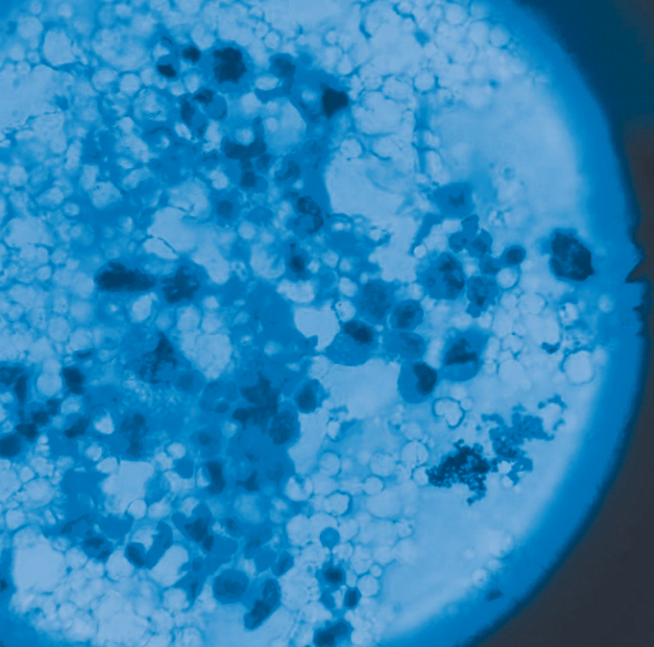
Schwarz et al., 2021: <https://doi.org/10.1016/j.prevetmed.2021.105374>

➔ Cows in group C and, in particular group D, have a significantly higher risk of being culled compared to cows in group B.

It is known that mastitis pathogens and the immune response may damage udder tissue and that this worsens with the duration of mastitis.

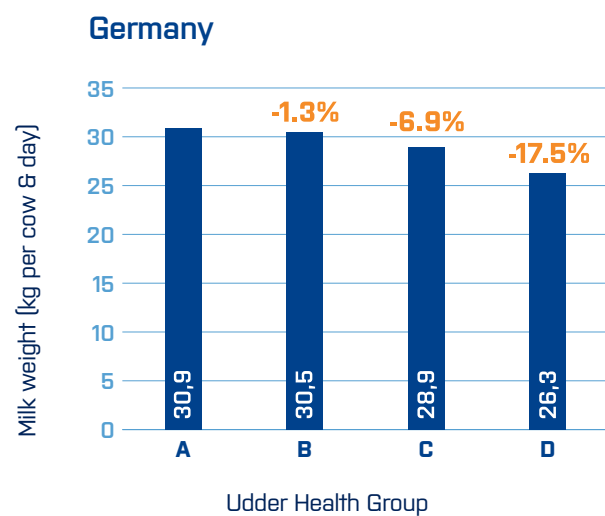
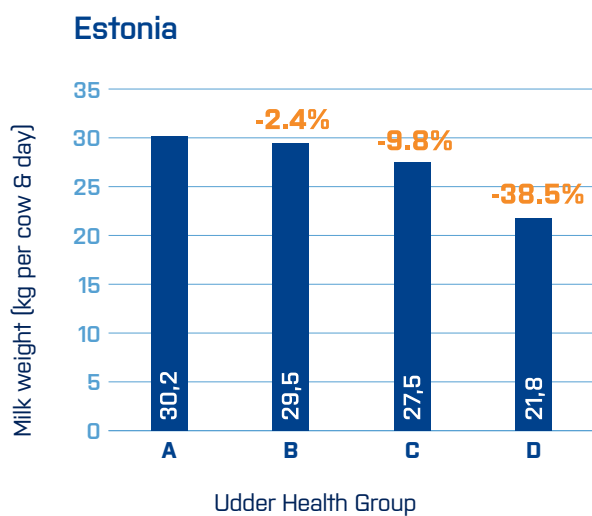
Thus, cows in **UHG D** will never recover to their previous milk productivity. Identifying the cows in UHG D helps make better decisions in terms of culling selection and eliminates unnecessary treatment costs.

FACT: For a veterinarian working with several farms, the new tool offers a base for comparison of data and practices. This makes it possible to build suggestions for best practices and transfer knowledge from one farm to another.



Productivity differences between the different Udder Health Groups

Real-life data set shows that cows in UHG A have the highest production.⁸



Schwarz et al. 2020: <https://doi.org/10.1016/j.prevetmed.2020.105123>

The immune system of cows in UHG C and UHG D is actively combating mastitis pathogens and thus consuming energy that is not available for milk synthesis⁹.

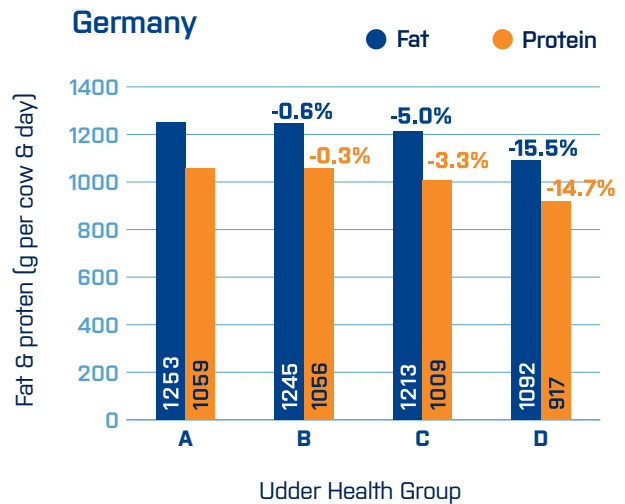
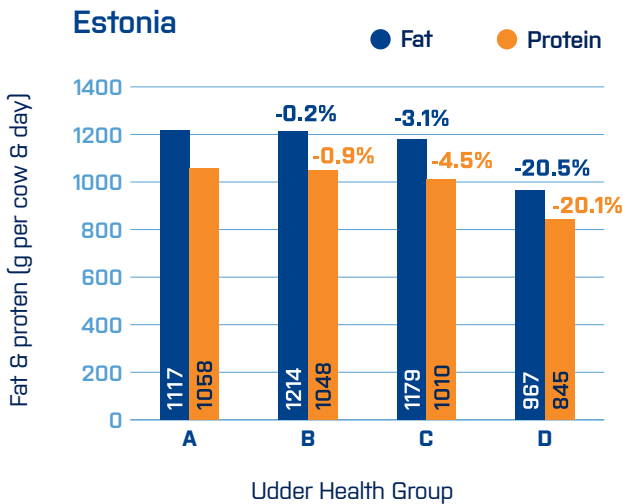
The differences between cows in groups C and D would likely be noticeable in day-to-day management on dairy farms, and particularly group D would be of high interest given the low productivity of such cows, and the significant economic losses that can be incurred by the farmer.

⁸ Schwarz et al., 2019 and 2020

⁹ Zhao and Lacasse, 2008

Differences in protein and fat across different Udder Health Groups

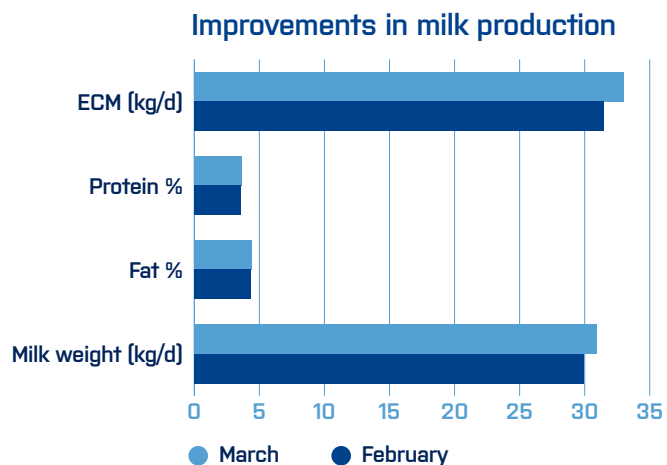
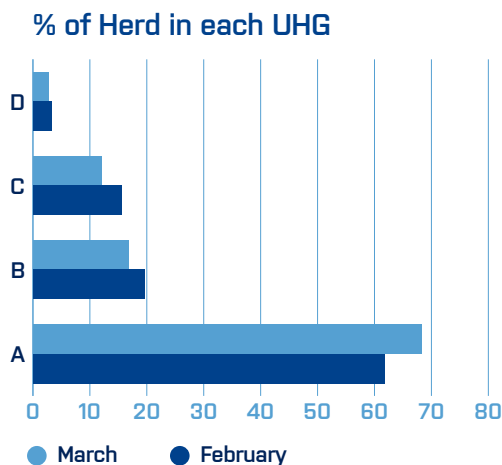
In real life examples, a similar situation can be recognized in the loss of protein and fat in milk across the different Udder Health Groups.



A real-life example of economic gains

This real-life case clearly shows that by using DSCC for monitoring mastitis there are major economic gains to be made due to better decision-making on a herd management level.

REVENUE	€
Per cow and day	0.63
Per herd and day	252
Per herd and month	7,560



What changed from February to March was the decision to disinfect a larger area of the stalls where the cows are staying.

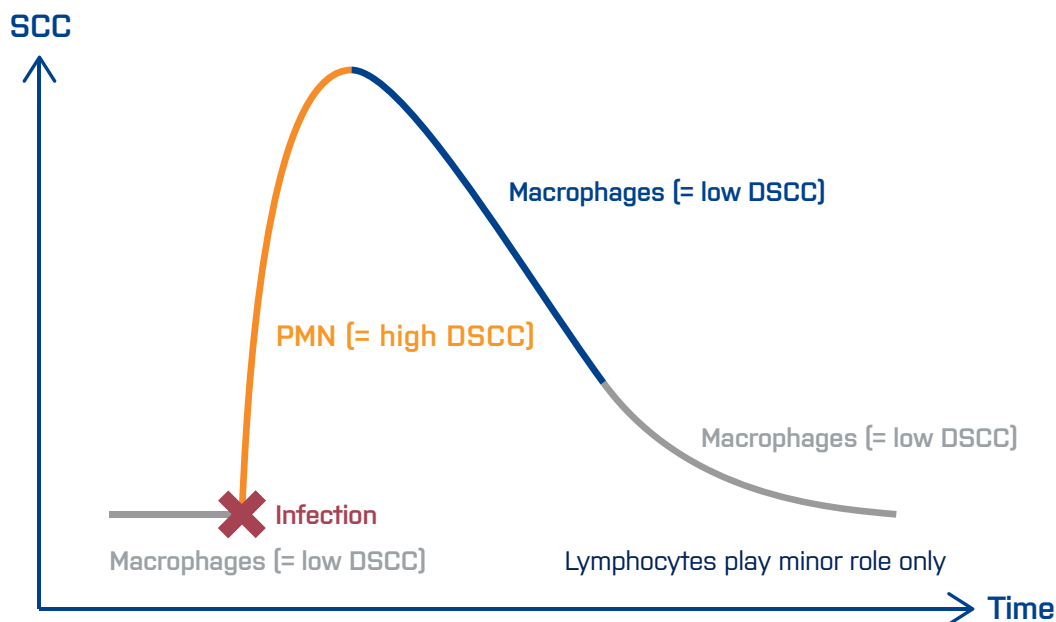
The science behind DSCC – Mastitis cascade

1. Immune cells and their role in fighting mastitis

Mastitis is an inflammation of the cow's udder and mostly caused by pathogenic bacteria.

There are three types of immune cells present in the milk: lymphocytes, polymorphonuclear neutrophils (PMN) and macrophages.

In the presence of infection, leukocytes (white blood cells) are recruited from the blood stream to fight the invading bacteria. As a result, the total number of cells in milk increases. Hence, high numbers of somatic cells (SCC) in milk provide a proxy for inflammation and / or infection.

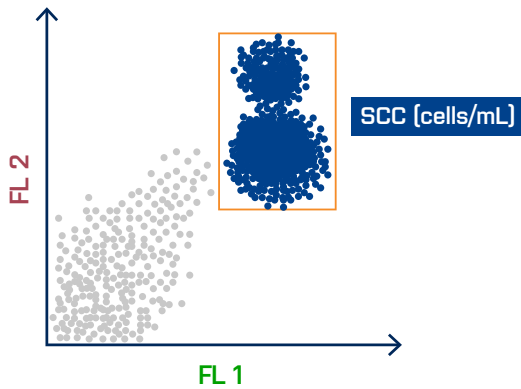


1. **Macrophages have a** surveillance role. They check for abnormalities and bacterial infections . Then they send a signal to the immune system and start collecting somatic cells from the blood to fight the bacteria.
2. Consequently, the level of somatic cells grows, and the composition of the cells change to polymorphonuclear neutrophils (**PMN**), which have the function of fighting and eliminating the bacteria.
3. Once the PMNs eliminate the infection threat, the SCC starts decreasing in number again. **Macrophages** take over and clean the residues left by the PMNs before going back to their surveillance mode.

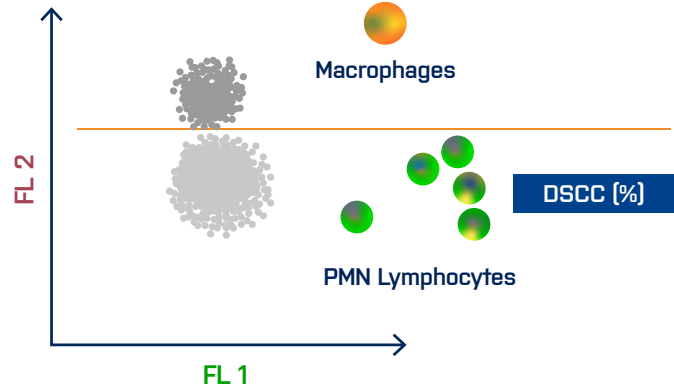
FACT: the change and the composition in cells happens before the total cell count grows. Thus, cows could experience mastitis without an increase in SCC and that is why a DSCC test is a necessary addition to the regular DHI screening.

FOSS DSCC Method – SCC and DSCC determination

1. Determine SCC



2. Determine DSCC



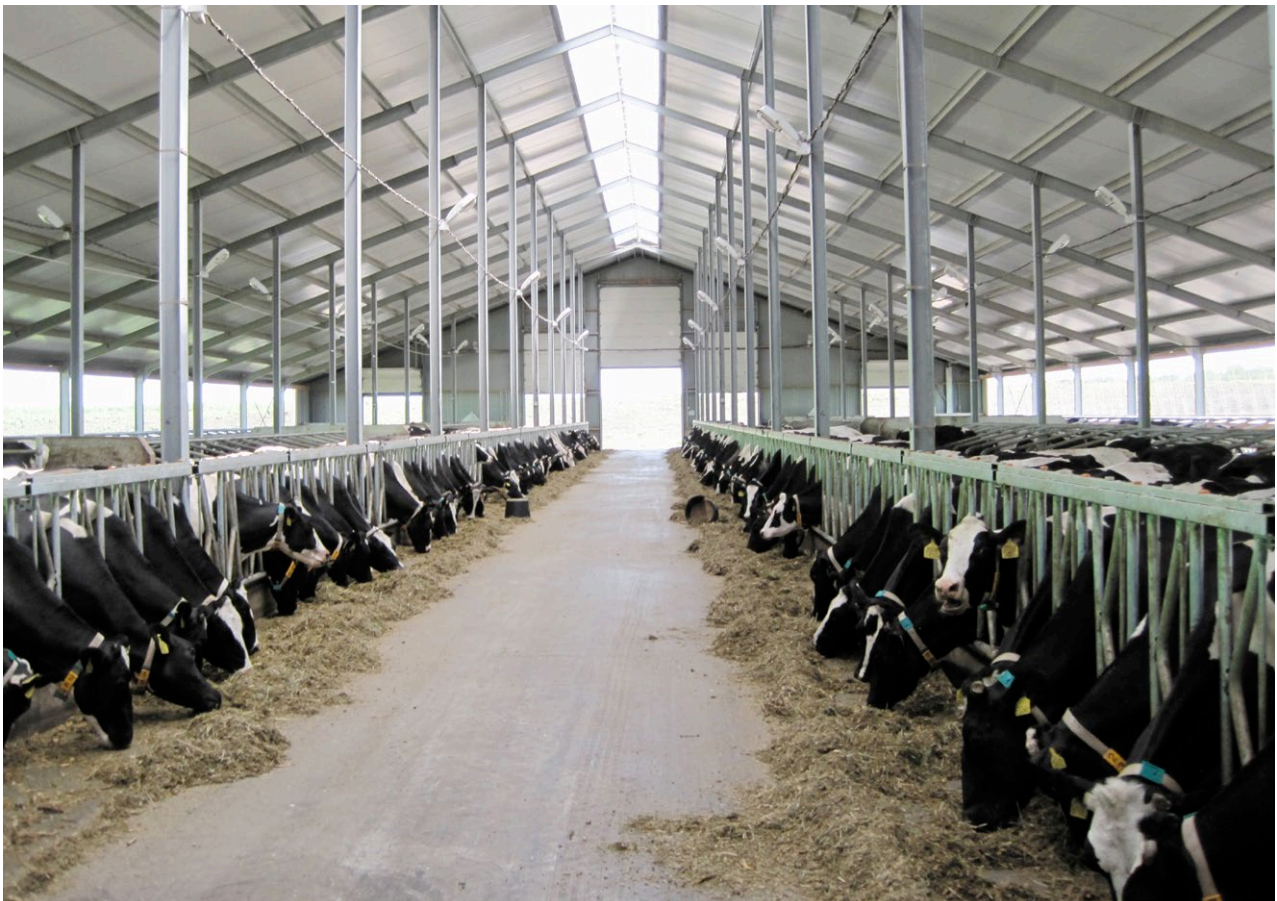
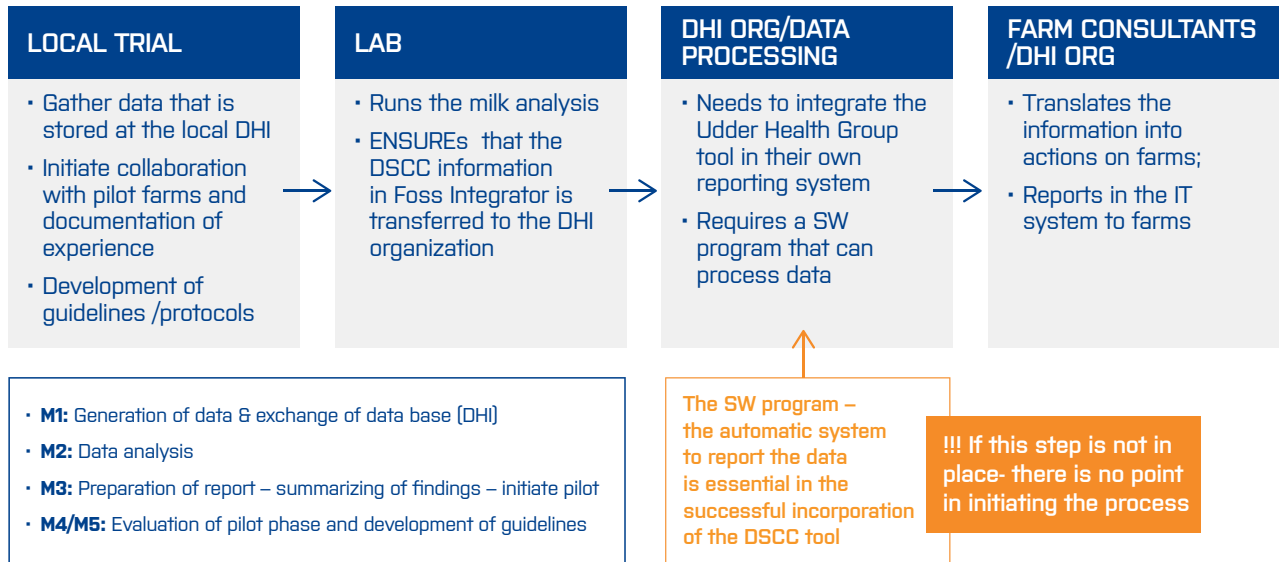
Side Scatter information used supportively for the determination of SCC

The perfect infrastructure for integrating the new UHG tool in your herd management

The Fossomatic™ 7 DC provides accurate SCC and DSCC analysis, handling up to 600 samples per hour and reported as an integrated part of normal DHI testing procedures.



Process for successful local implementation of the DSCC in DHI reporting and herd management



FOSS

FOSS
Nils Foss Allé 1
DK-3400 Hilleroed
Denmark

Tel.: +45 7010 3370
info@foss.dk

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fossanalytics.com