

**FOSS**

Analytical solutions for the dairy industry



Dedicated Analytical Solutions





**FOSS has been developing innovative analytical solutions for dairy production for over 50 years.**

# Add value throughout your manufacturing process

Innovation in analytical technology over the past few decades has led to many new opportunities to control the dairy manufacturing process for improved profit and quality and happily, the pace of development only gets faster. Let's take a look at the options available to you in the production of different dairy products.



1

**RAW MATERIAL**



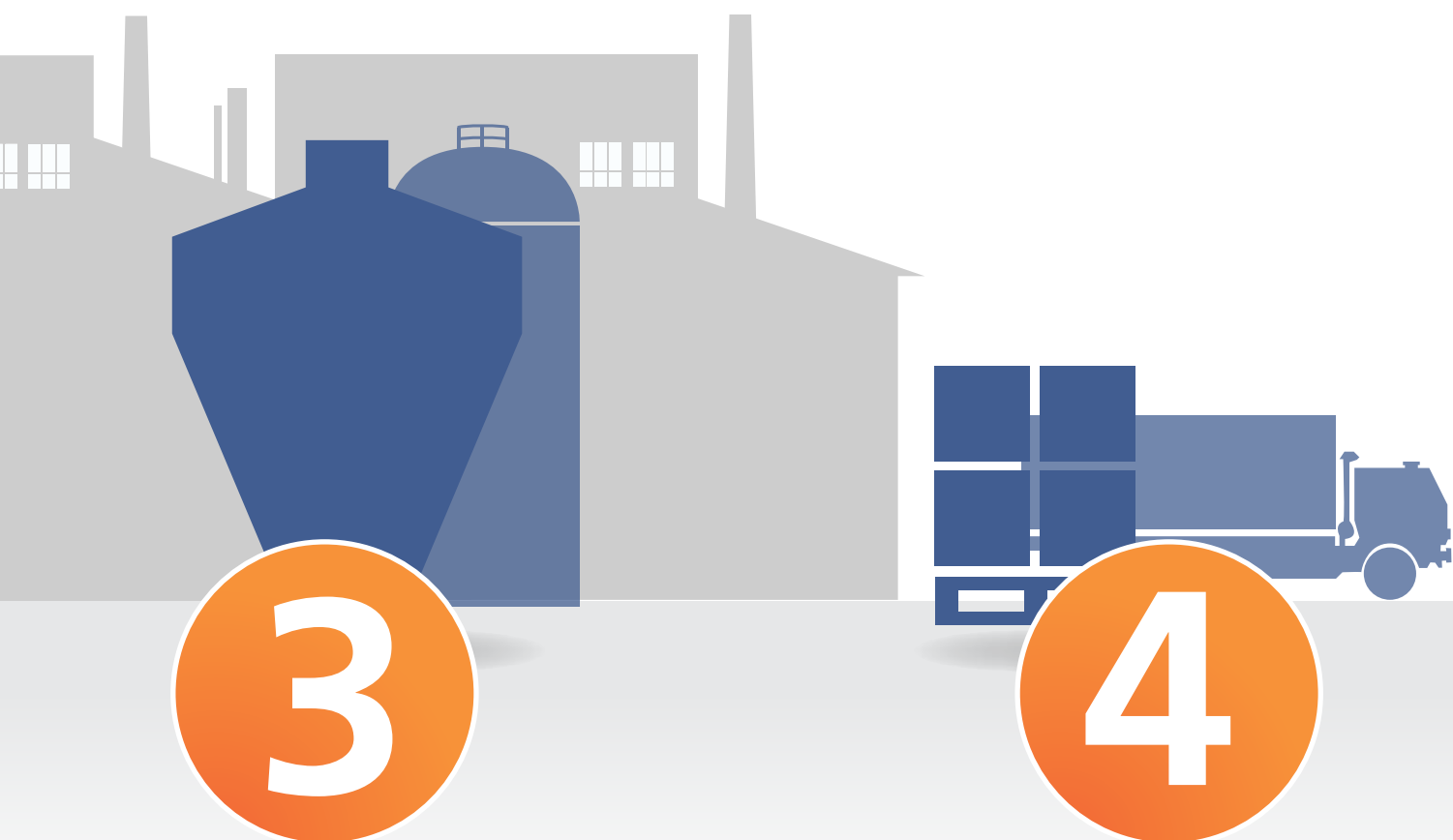
2

**STANDARDISATION**

## Get more from your resources

At FOSS we understand that success in the dairy industry is dependent on being able to deliver consistently high quality products. Our versatile range of analytical solutions has been designed to give you rapid access to accurate data throughout the production cycle - from intake of raw material to process control and end-product specification. With this information, you can supply the high quality products your customers expect and make the best possible use of your valuable resources.

FOSS has over 50 years of experience in developing analytical instruments for dairy production. We know that you are working in an industry that faces continually changing consumer demands, concerns over food safety and rising regulatory requirements. Our solutions help you increase operational efficiency so you can meet these challenges.



**PROCESS CONTROL**

**END-PRODUCT**



**FOSS dairy solutions can test for:**

Fat, Protein, Lactose, Total Solids, Solids-non-Fat, Casein, Urea, Density, Freezing Point Depression, Sucrose, Fructose, Glucose, Galactose, Total Sugar, Lactic Acid, Citric Acids, Free Fatty Acids, Saturated and Unsaturated Fatty Acids, Salt, Moisture and Screening for Abnormal Milk (Untargeted and Targeted adulterants).



## Know your raw material and improve quality

Another tanker of milk arrives, but what is it worth, how are you going to use it, and is it safe?

Rapid testing directly at intake with purpose-built FOSS analytical solutions helps you make best possible use of a milk supply that is ever-changing from supplier to supplier, from season to season and in some cases, also prone to accidental or deliberate contamination within the supply chain.

The accurate information allows fair payment to suppliers and by knowing exactly what is on the way in, you can segregate before standardisation and production starts, so saving valuable time and resources.

For consumer milk production, Fat and Protein content are likely to be the main parameters of interest for payment purposes. Your suppliers will naturally want to know why measurements are accurate to fractions as small as .05% and how

that accuracy can be maintained. Here, comprehensive FOSS global calibrations backed by FOSS support, ensure that instruments deliver accurate results consistently.

If you are producing cheese, you can also test for additional payment parameters such as Casein content to ensure that you pay just the right price for your raw material.

And, whatever you are producing, a screening for possible adulteration gives you peace of mind and brand protection. The screening is performed simultaneously with the other tests and highlights samples that may require further examination, thus limiting expensive and time-consuming laboratory tests to priority samples.

### Tools for intake control

Bench top Fourier Transform Infrared (FTIR) instruments such as MilkoScan™ Mars, MilkoScan™ FT1 and MilkoScan™ FT2 are ideal for intake control, for example in a laboratory or control room close to both intake and production.

The instruments can be set up for use by anyone with no special training, giving you rapid results for multiple parameters.





## Standardise and increase profitability

By standardising the components in your milk supply you can produce consistent quality regardless of the scale of your operation or seasonal variations in your raw material. Our solutions let you monitor and adjust the relationship between the different milk components, such as Fat, Protein, Solids and Casein for improved production.

Standardisation at this early stage has been shown to improve yield, reduce wastage and increase profit margins. For instance, in the production of whole milk with a required minimum 3.5% fat content, fat standardisation is necessary as cows' milk typically contains 3.8% fat.

With knowledge about the fat content of the skimmed milk and the cream after the separator, it is possible to standardise by blending cream back into the skim line to reach exactly 3.5% fat. Not only does this standardisation bring composition in line with specified legal limits, it also ensures that you do not give away valuable components, which could have otherwise been sold at a much higher price.

Similarly, the profitability and the quality of cheese production begins with correct standardisation of the milk. Specifically, the Fat to Protein ratio in the cheese milk (or even better the Fat to Casein ratio) can be adjusted to reach the specified fat in the dry matter in the finished cheese.

Likewise, standardisation of milk powder starts with the ratio between Fat and Solids in the milk according to specified proportions for the finished powder. The protein concentration in the milk may be elevated through the addition of skimmed milk powder, condensed skimmed milk or ultra-filtrated milk. Alternatively, the protein content can be lowered with extra lactose or permeate from an ultra-filtration process.

As Protein is the highest priced milk powder component, the tight control afforded by standardisation at the start of the production process can be a major boost to profitability.

### **Profit improvement:**

A dairy plant producing 10,000 tons of milk powder per year can decrease the Protein/Solids-non-Fat ratio by 0.6% and save up to € 250.000 per year.

### **Tools for standardisation**

Standardisation requires rapid, accurate and routine analysis. The faster results, the sooner the process can be adjusted. The more accurate the results, the closer adjustments to target values can be made. The more frequent the results, the better adjustments for sudden variations in composition.

For high volume production, a process control instrument such as ProceScan with regulation software, is exceptional, providing virtually real time adjustment of the milk flow into production.



# 3

## Improve yield through process control

FOSS offers a range of at-line and in-line analysis solutions for use at different stages throughout the production process. With rapid and reliable measurements of crucial parameters, you can leverage real-time production data and take action that saves costly rework and wastage of valuable resources.

### Better yield in butter

If you are making butter, you will need to follow legislation stating that your butter must contain a maximum of 16% moisture or minimum 80% fat. The final composition of butter is adjusted by mixing more or less water, salt brine or starter culture into the butter at the last stage of the automatic churning process. Here, instant information about moisture content allows timely adjustments to get the mix just right. In turn this makes it possible to improve yield by increasing the average moisture content of the butter produced.

For continuous butter churns, the tightest control is obtained with a real-time in-line sensor at the exit providing a constant stream of analysis results.

**Profit improvement:**

With a butter price of Euro 3.10 and a yearly production of 4,500 tons, a moisture increase of 0.3% yields Euro 50,000 per year.

### Effective evaporation for profitable powder

When making milk concentrates and powders, the ratio between fat and solids in the milk must first be standardised to reach the specified proportions in the finished powder. Then it is all about increasing yield and revenue by checking and adjusting the Protein to Total Solids ratio in the concentrate coming out of the evaporation process.

Using process control solutions you can analyse and control the degree of concentration after the evaporator by measuring the Total Solids concentration. Checking here ensures that the majority of the water is evaporated under vacuum, which is much less expensive and more sustainable than trying to remove the water in the next step, the spray drying tower. Additionally, the moisture content can be fine tuned after

spray drying. At this stage, rapid and reliable results can be used to retain as much moisture in the powder as possible and yet be within legal limits.

FOSS at-line and in-line solutions offer the instant moisture results required for controlling flow rates and temperatures of spray dryers and fluid beds, so you can fine adjust your powders to match specifications precisely.

**Profit improvement:**

A powder production with output of 70,000 tons per year moves moisture closer to target by 0.1% leading to a yield increase worth Euro 147,000.





## Towards the perfect cheese making process

During cheese making, rapid information about the moisture content of the intermediate cheeses is essential for controlling the various processing steps. Cutting, stirring and especially pressing processes all have great impact on the moisture content of the finished cheeses.

### Hard cheese

The closer you can follow product composition during the production, the faster you can make corrective actions on subsequent batches. A rapid at-line analyser can substantially enhance the profitability of any cheese production.

### Fresh cheese

In cream cheese or quark production, controlling the efficiency of the separator optimises the Totals Solids contents of the final product. Installation of in-line sensors directly on the separator lines will provide ultimate control and the highest yield. Alternatively, an at-line analyser can serve several process lines.

### Processed cheese

Knowledge about the composition of blends is a prerequisite when producing processed cheese. A rapid at-line analyser is the answer, but as pre-blends tend to be very inhomogeneous, installing probes directly at various stages of the process flow will provide quick feedback for recipe optimization.

### Profit improvement:

Moving closer to target by a decrease in Total Solids of 0.2%, gives € 50,000.00 per year for a plant with an annual production of 4500 tons.

### Greek yoghurt

Install in-line sensors directly in the separator line to control your manufacturing process. In-line control allows you to minimise the variation of Protein, Total Solids and Fat in your final product.

## Tools for process control

From bench top instruments for use by production operators at the production line to integrated analysis and control systems handled from a computer in the control room, the choice of analytical solutions is broad according to your needs and budget.

Bench top Fourier Transform Infrared (FTIR) instruments for testing liquid and semi-viscous products include the MilkoScan™ FT1 and MilkoScan™ FT2 or MilkoScan™ Mars analysers. For products such as cheese or yoghurt, the FoodScan™ near infrared (NIR) analyser is a versatile and robust option for use at the production line or in the laboratory. And for powder, the NIRS™ DS2500 instrument is ideal for analysis of moisture content at the end of the drying process.

In all forms of production, a stage is reached where volume determines whether an integrated process control system such as ProFoss™ or ProcesScan™ is worthwhile. Where a benchtop solution might be used once an hour, these increasingly popular process options provide a continuous flow of analytical results and thereby a greater opportunity to push the process ever closer to specified targets.



# 4

## Comply with end-product specifications

Analysis at the critical final stage of production helps you to limit liabilities and potentially damaging product recalls. Instead you can enjoy the peace of mind that comes from knowing your products meet specifications and you are building and maintaining your competitive advantage.

The majority of this testing can be performed using rapid routine analysis instruments, but certified chemical analysis methods are also often required for validation of compliance with certain end-product criteria.

Furthermore, all indirect measuring methods, for example based on near infrared technology, require reference data for calibration purposes. Such data must be based on approved methods to ensure accuracy and stability in the subsequent predictions.

### Tools for end product control

FOSS supplies both indirect (infrared) and chemical analysis solutions for end product control. For chemical analysis we can provide a complete range of solutions aimed at automating steps for speed and safety while minimising use of chemicals.





**Ice cream:**  
Get your mix right on target, for example, 10% Fat means just that and not 10.3% which will loose you money over time



**Butter:**  
Make timely adjustments to your butter with a real-time, in-line sensor



**Consumer milk:**  
Avoid wasting fat and improve profit



**Powder:**  
Fine tune your moisture content for higher yield



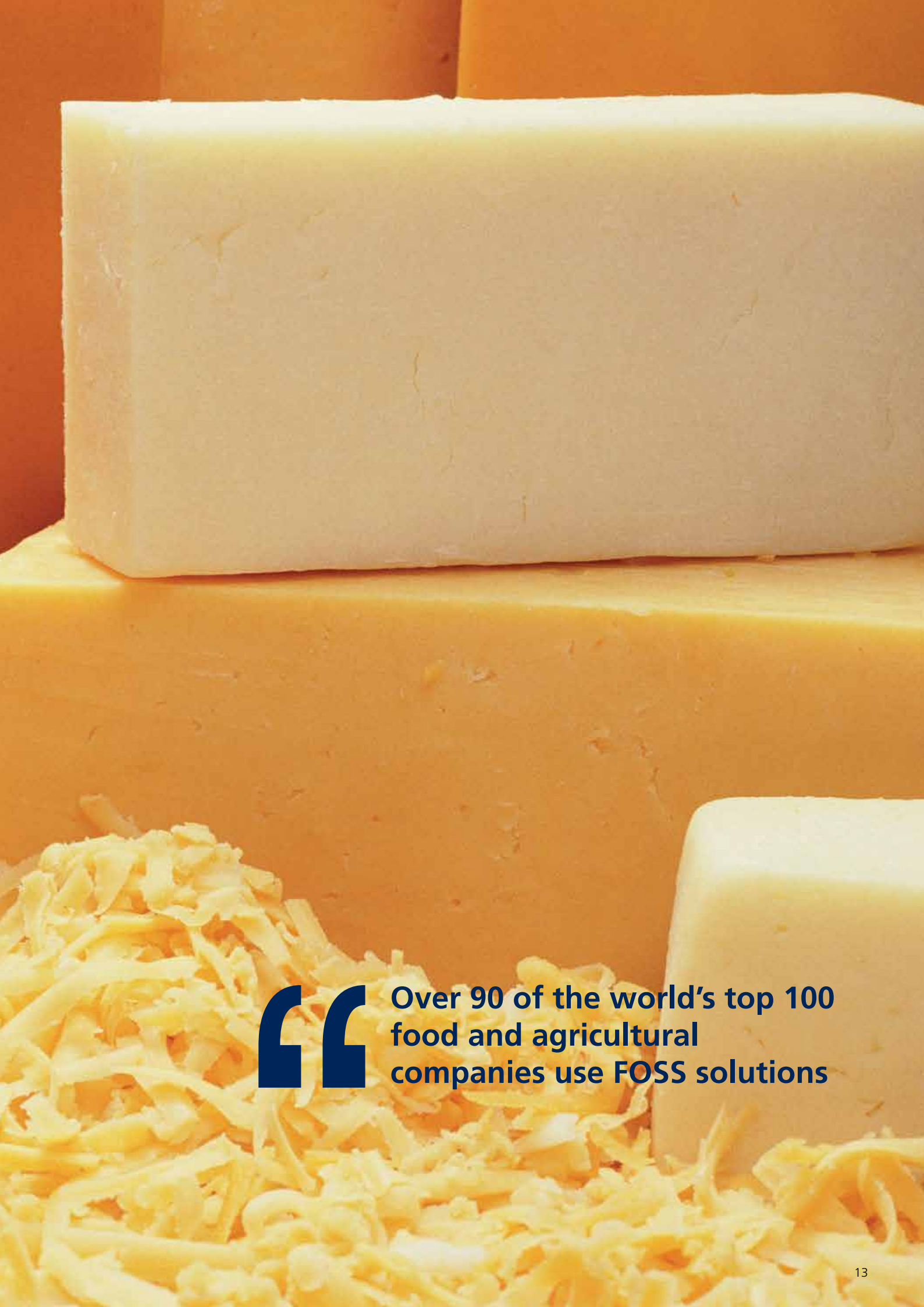
**Cheese:**  
Take advantage of rapid analysis for improved profits



**Yoghurt:**  
Follow composition more closely for rapid corrective actions







**Over 90 of the world's top 100  
food and agricultural  
companies use FOSS solutions**



# Accurate information for all types of production

FOSS solutions are available for all types and sizes of dairy production; from efficient laboratory instruments for smaller dairies to state-of-the-art multi-parameter technological analysis using NIR infrared technology and Fourier Transform Infrared (FTIR). Regardless of the instrument you choose, you can be sure that it is highly accurate, complies with relevant regulations and meets all hygiene standards.

For larger production facilities our sophisticated in-line process solutions continuously measure material directly in the process stream. Easy to install and maintain, these solutions are finely calibrated according to international standards and can withstand even the most demanding production environment.

Our at-line analysers are designed for use in smaller production lines and provide rapid and accurate sample measurements. These smaller instruments are designed to meet the needs of smaller plants by being easy to operate, clean and maintain.



## MilkoScan™ Mars

is an easy to run and cost effective milk analyser. In just one minute, powerful FTIR analytical technology enables analysis of up to 6 parameters from a single sample as well as detection of deliberate or accidental adulteration of the milk supply.

Applications include raw milk testing, milk and cream standardisation for consistent final products based on parameters such as fat and protein.



## MilkoScan™ FT1

is a rapid and accurate FTIR dairy analyser that gives fast analysis results on raw milk, intermediates and final products. It analyses a variety of parameters including fat, protein, casein, lactose, total solids, urea, freezing point, density, total acidity, free fatty acids as well as milk adulteration screening.

A range of applications include milk, cream, whey, concentrated milk and whey, yogurt, desserts and ice cream.



## MilkoScan™ FT2

is a versatile FTIR milk analyser capable of handling a variety of sample types and parameters such as Fat, Protein, Total Solids, Fatty Acids, Urea and Casein.

A range of applications include milk, cream, whey, concentrated milk and whey, yogurt, desserts and ice cream.



## ProcesScan™

is an on-line analyser providing high accuracy data for standardisation of milk. Together with a regulation software, ProcesScan™ provides a solution that optimises both production economy and product quality of the milk for use in other dairy products.



### ProFoss™

is an in-line NIR analyser that monitors multiple quality parameters such as Moisture, Protein, Total Solids and Fat in dairy products. Simple to install directly in the production line, it has a number of applications in dairy production where it enables targets to be met more closely with significant cost savings.

A number of applications are available including cream, butter, MPC/WPC, milk/dairy powder, cream cheese, greek yogurt, mozzarella and ricotta.



### FoodScan™

offers accurate and rapid analysis of a wide variety of solid and semi-solid dairy products with minimal or no sample preparation. FOSS offers ready to use ANN calibrations.

It is ideal for cheese, butter and yogurt.



### InfraXact™

is an easy to use instrument designed for everyday use in the dairy plant. Based on a large database, FOSS offers ANN calibrations which reduce cost and start-up time of new installations considerably.

It can be used for measuring milk/dairy powder and ice cream.



### NIRS™ DS2500

is a practical NIR analyser ideal for routine production control and monitoring of final product quality. Based on a large database, FOSS offers ANN calibrations which reduce cost and start-up time of new installations considerably.

It can be used for measuring milk/dairy powder and ice cream.



### Kjeltec™ Series

consists of three models; 8100, 8200 and 8400; for simple and safe distillations with different levels of automation. The Kjeltec 8400 in combination with 8420 or 8460 sampler and Tecator Auto Lift digestors provides the ultimate in automated Kjeldahl analysis.

For protein analysis of dairy products.



## Secure your investment with a FossCare™ Support Agreement

Let FOSS take care of you for a maximum return on your analytical investment. Get a four year warranty as part of the new FossCare Premium Preventive Maintenance Agreement or two years as part of any other FossCare agreement. In addition to the peace of mind afforded by the warranty period, the continual preventive maintenance pays off by keeping your analytical instruments working perfectly every day, year after year.

### Why preventive maintenance?

As with any analytical solution, it is essential that your FOSS instrument receives regular maintenance to ensure optimal performance and extended lifetime. Avoiding expensive downtime is a matter of following factory standards and preventively replacing parts before they wear out. In turn, this helps ensure reliable and consistent results at the highest level.

Preventive and predictive maintenance combined with global support from 300 dedicated service, application, software and calibration specialists keeps your instrument running perfectly all year round.



### Benefits of a FossCare™ Support Agreement:

- Extended Warranty (two or four years depending on the chosen agreement)
- Regular maintenance; the instrument is diagnosed, cleaned, adjusted, tested, fine tuned and recalibrated
- Minimal downtime from replacing components before they are worn out
- Consistent, accurate and reliable results you can always trust
- Preventative maintenance visits when it suits you (your business)
- 24/7 phone support - no need to worry about closing hours or PO
- Low, fixed service budget prevents unexpected expenses
- Discounts on additional services, spares, training, reagents, consumables and software upgrades

## Centralised calibration, management and configuration of instruments

For larger production plants, our sophisticated networking tools enable internet-based remote instrument monitoring and diagnostics. With this software, internal or external experts can precisely configure and monitor FOSS instruments regardless of their location. Calibration updates and bias corrections are easily and safely handled centrally through the network and the system can be monitored on a daily basis.



“Because the machine has the ability to link directly to FOSS via the internet, and receive and transmit data, I have confidence of ongoing back-up support for the machine”

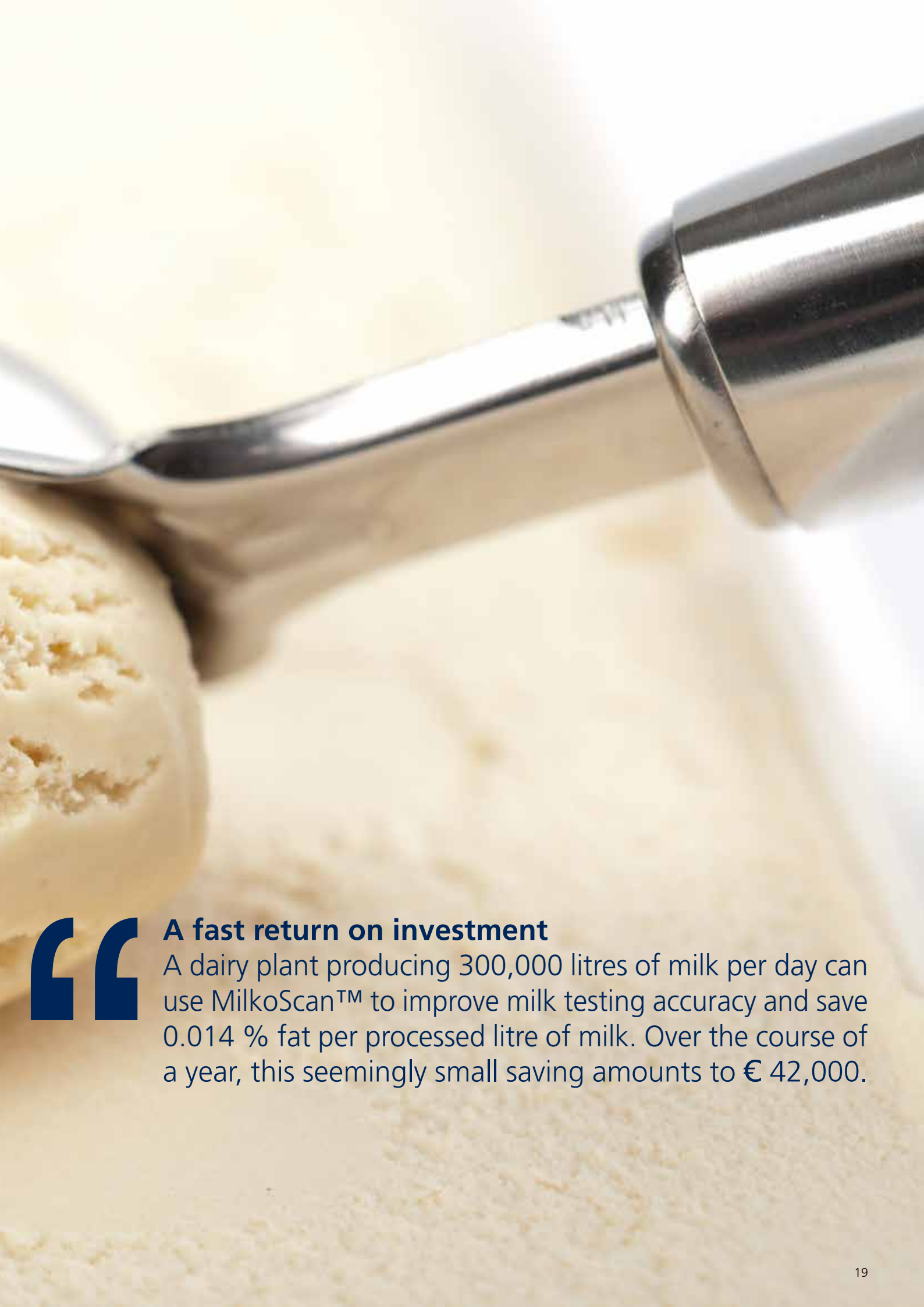
“... Networking with FOSS first of all provides us with “peace of mind” as we know there is a FOSS specialist managing and doing surveillance on our instrument. We have outsourced all complexity related to running our instrument, calibrations, diagnostics, etc. Networking makes sure that the performance of our entire setup is optimised at all times, thereby allowing us to focus on our real business.”

“... Adjusting slope/intercept, etc., is surely not my expertise, so it is valuable having FOSS do this.”

“... Having a large population of instruments, the central security and management aspect of networking is extremely important. Operating our instruments is no longer dependent on having on-site specialists as all complexity is handled by our contact at FOSS.”







### **A fast return on investment**

A dairy plant producing 300,000 litres of milk per day can use MilkoScan™ to improve milk testing accuracy and save 0.014 % fat per processed litre of milk. Over the course of a year, this seemingly small saving amounts to € 42,000.

# FOSS solutions – the gold standard in dairy analysis

In the mid 1960s FOSS developed the first testing equipment for milk fat analysis. This developed into the global brand of MilkoScan™ instruments for compositional milk testing. Over the past 50 years, our portfolio of proven solutions has widened and moved towards in-line analysis. Many of our technologies and applications are now considered to be the gold standard for rapid testing methods in the dairy industry.

As the worldwide leader in dairy analysis equipment, we are proud to say that we have sold more than 5000 analytical solutions. Our solutions are approved by all the main authorities and are in full compliance with all major directives.

Trends such as increasingly sophisticated consumer tastes and the relentless pressure for profit improvement mean that increasing numbers of dairies all over the world are relying on FOSS dedicated analytical solutions. Our solutions create time, labour and cost savings and enable faster market responsiveness. In short, with FOSS you can produce the consistent quality your business and customers need hour after hour, day after day.

To find out more about FOSS, please contact your local sales office or visit [www.foss.dk](http://www.foss.dk)

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