

**FOSS**

# FOSS IN DAIRY

ANALYTICS BEYOND MEASURE





# ANALYTICS BEYOND MEASURE

Today even the most accomplished dairy producers face the challenge of getting more and more out of their raw materials while still improving their product quality. That is a tall order in an industry built on highly variable raw materials and quickly changing markets. But where nature is unpredictable, data harvests never fail.

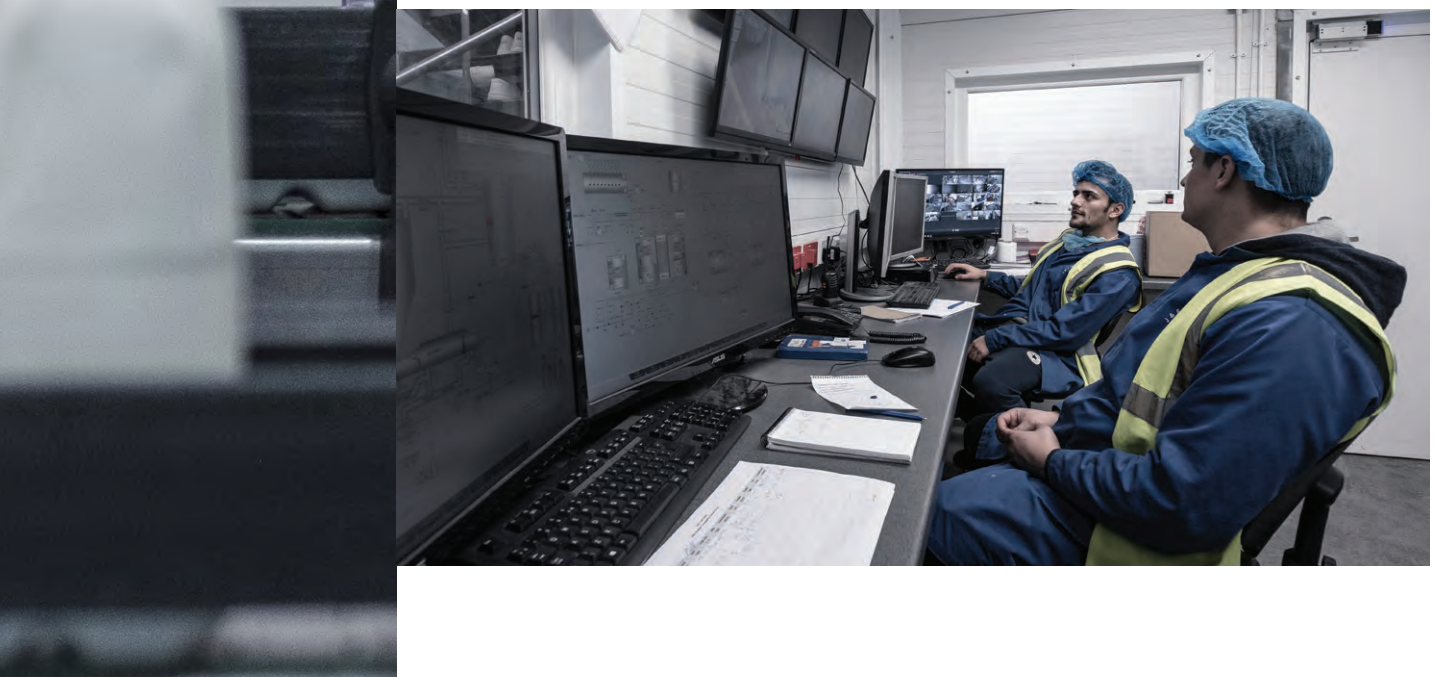
By driving digitalisation forward, you can add a new level of automation to your business and secure quality and consistency. You will be able to limit the number of human errors that slow you down. Scale your business faster. And reduce manual labour and labour costs.

A lot can be lost and a lot can be won on the journey from raw

material to finished product. That is why we have spent the last 60 years developing and refining instruments that measure every little step of the way. We translate measurements into mathematical algorithms that power automated systems, optimise your manufacturing process and make you grow. Securing and improving food quality is what we do.

Neither natural resources nor knowledge go to waste. Intelligent information management can turn existing production into efficient processes that generate less waste, bigger yields and higher quality.

We call it:  
Analytics Beyond Measure



Raw material



Standardisation



# ADD VALUE THROUGHOUT YOUR MANUFACTURING PROCESS

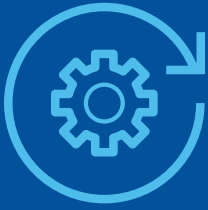
Innovation in analytical technology over the past few decades has led to many new opportunities to control the dairy manufacturing process for improved profit and quality and, happily, the pace of development only gets faster. Let's take a look at the options available to you in the production of different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

## 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.

## Process control



## End-product



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.

## 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).



## Raw material

# 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, MilkoScan™ FT2 and BacSomatic™ are ideal for intake control, for example in a laboratory or control room close to both intake and production.

## Tools for standardisation

Standardisation requires rapid, accurate and routine analysis. The faster the 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 MilkoStream™ with regulation software is exceptional, providing virtually real time adjustment of the milk flow into production.







# STANDARDISE AND INCREASE PROFITABILITY

## Standardisation

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 waste 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.

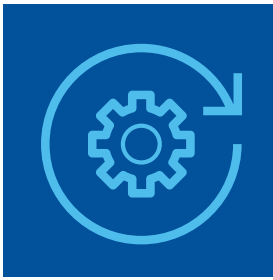
Likewise, standardisation of milk powder starts with the ratio between fat and solids in the milk according to specified proportions for the finished powder. The protein concentration in the milk may be elevated through the addition of skimmed milk powder, condensed skimmed milk or ultra-filtrated milk. 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 tonnes of milk powder per year can decrease the protein/solids-non-fat ratio by 0.6% and save up to €250.000 per year.



# IMPROVE YIELD THROUGH PROCESS CONTROL

## 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

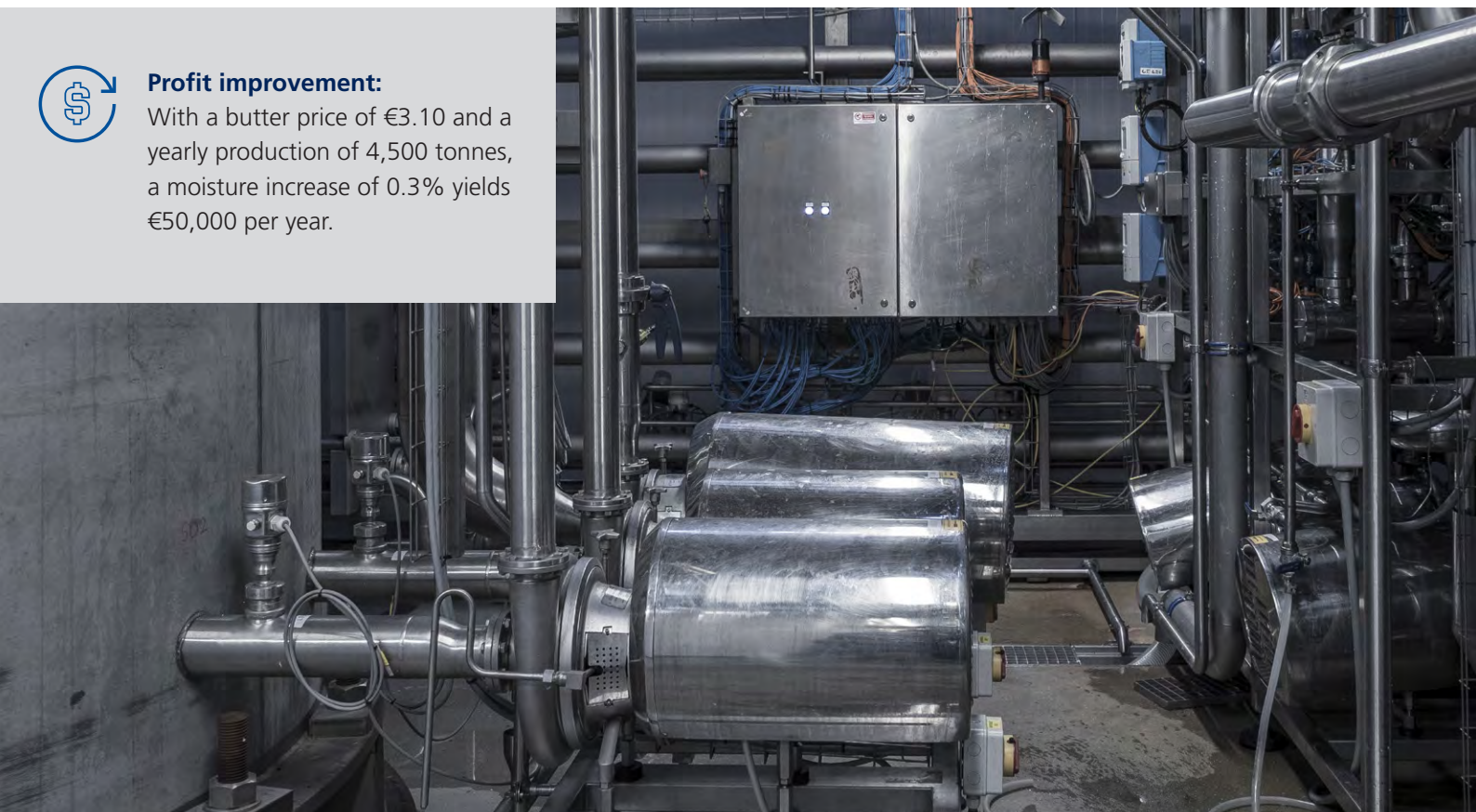
the mix just right. In turn this makes it possible to improve yield by increasing the average moisture content of the butter produced.

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:

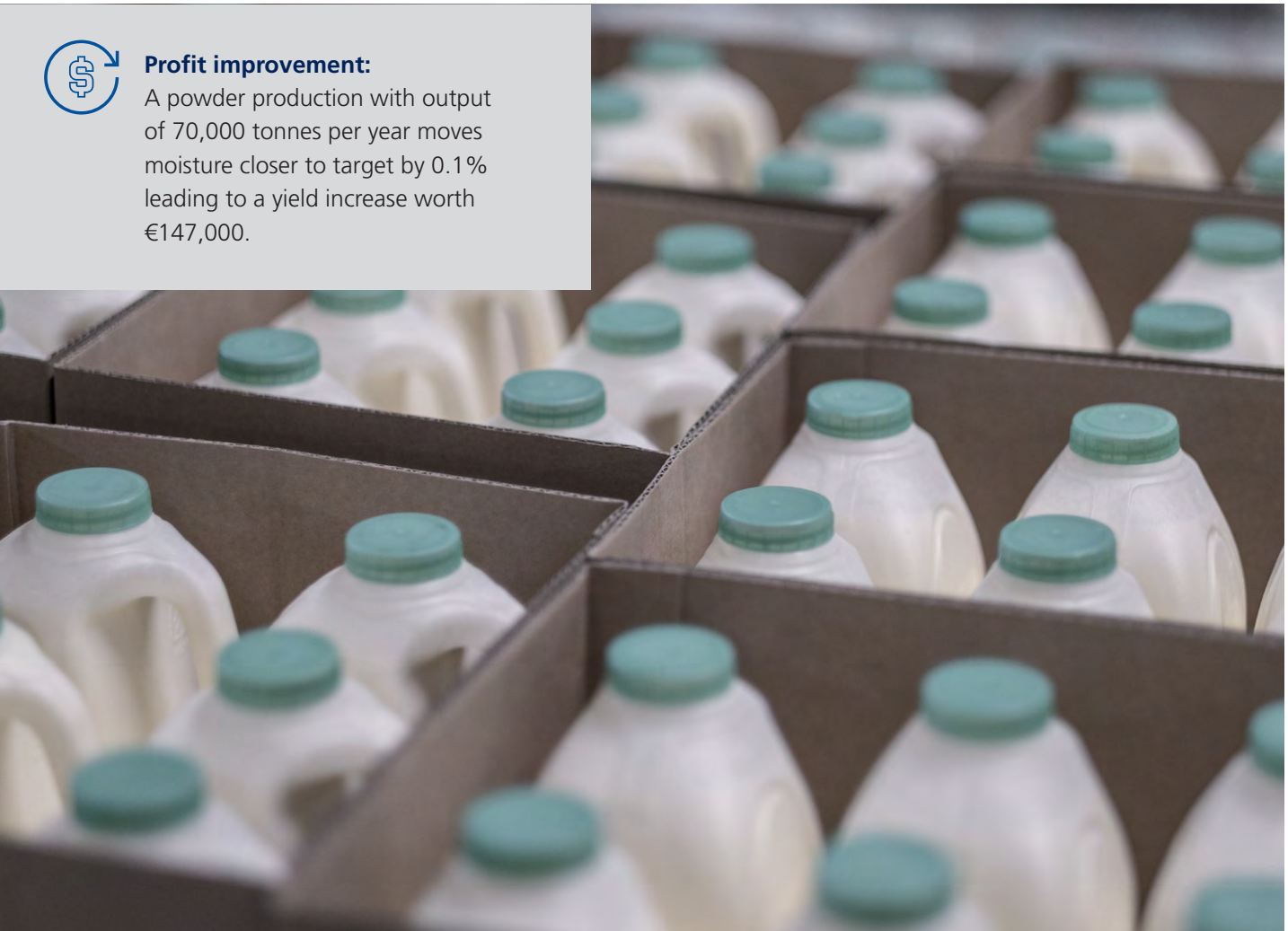
With a butter price of €3.10 and a yearly production of 4,500 tonnes, a moisture increase of 0.3% yields €50,000 per year.





### Profit improvement:

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



## 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.

## 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 total 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 optimisation.

### 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.



### 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 4,500 tonnes.

## 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™ 2 near infrared (NIR) analyser is



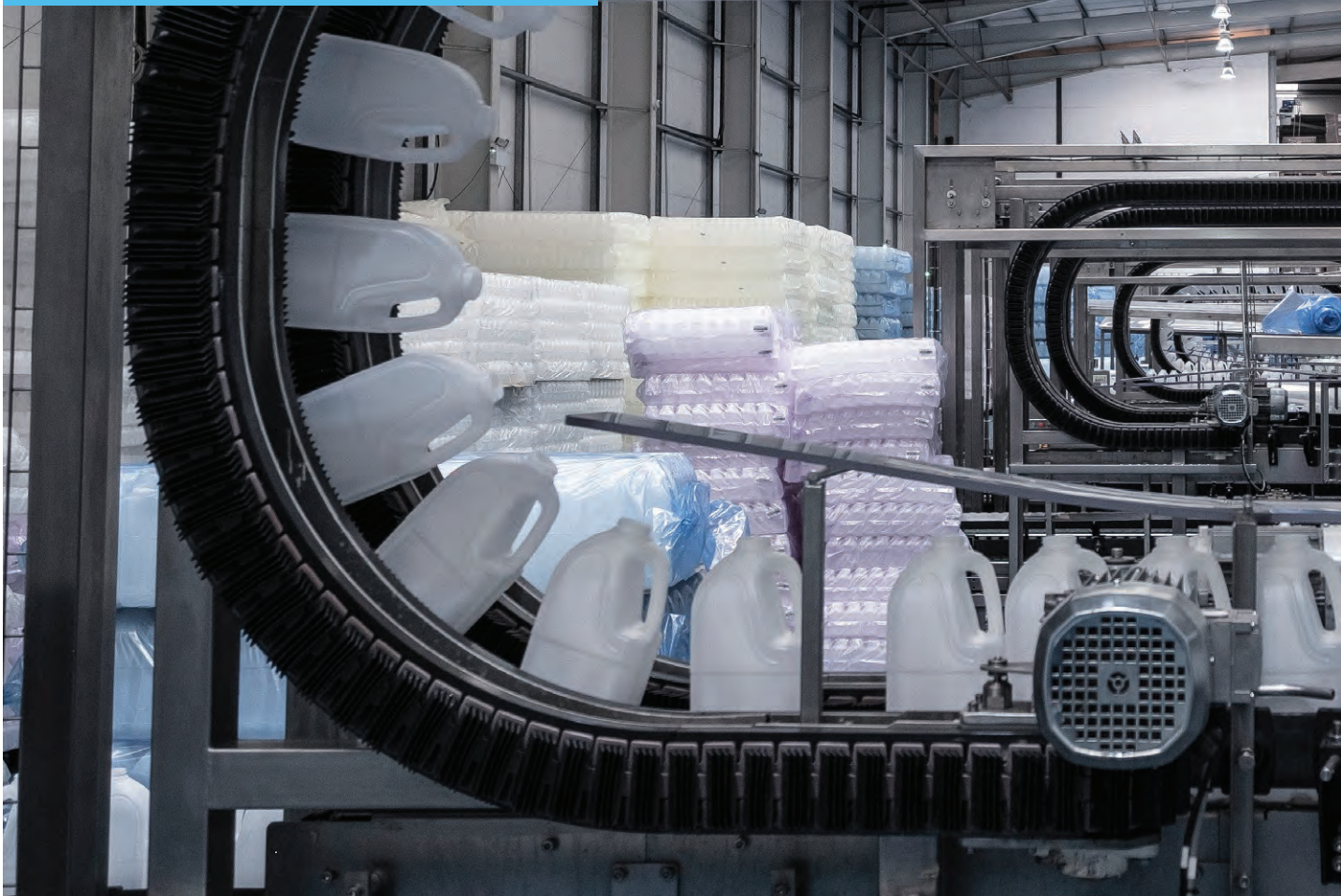


versatile and robust for use at the production line or in the laboratory. The DairyScan™ is also ideal for cheese. And for powder, the NIRStm DS2500 instrument is ideal for analysis of moisture content at the end of the drying process.

In all forms of production, a stage is reached where volume determines whether an integrated process control system such as ProFosstm or MilkoStreamtm 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.

## 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.



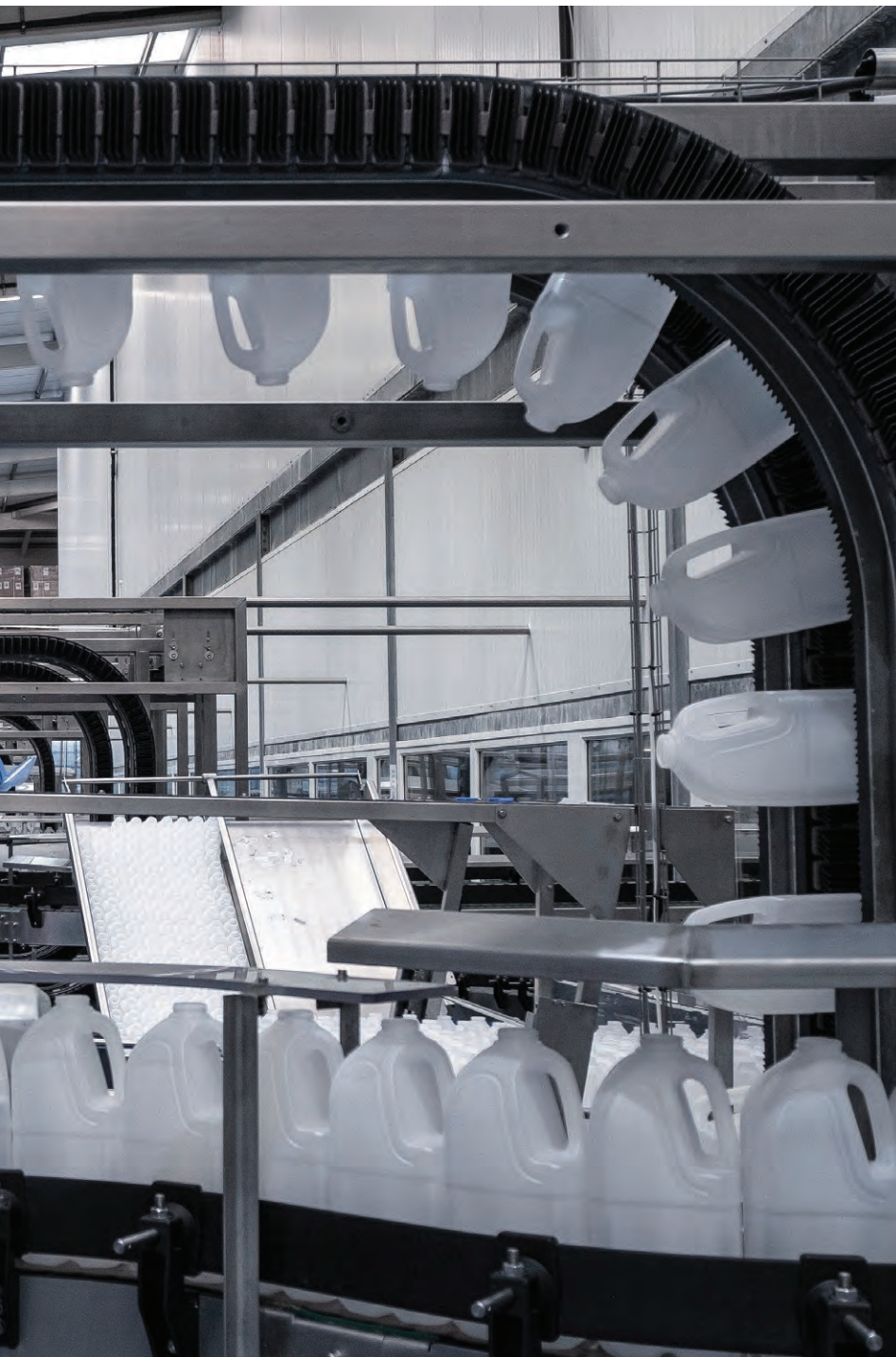
**End-product**

## COMPLY WITH END-PRODUCT

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



# SPECIFICATIONS

required for validation of compliance with certain end-product criteria.

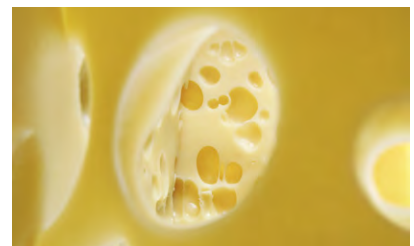
Furthermore, all indirect measuring methods, for example based on near infrared technology, require reference data for calibration purposes.



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



**Ice cream:**  
Get your mix right on target, for example, 10% fat means just that and not 10.3%.



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



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



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

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