FRITSCH

# FOOD & FEED WITH FRITSCH

## Mastering variety in sample preparation and analysis

**Food and feed analytics form the foundation of food safety, product quality, and regulatory compliance along the entire value chain. They encompass the examination of food and feed for ingredients, contaminants, residues, as well as quality and process relevant parameters. Regardless of the analytical method applied later, sample preparation has a decisive impact on the validity of the results. It is not an accessory step, but a necessary prerequisite to the actual analysis. A representative, homogeneous, and unadulterated sample is essential for reliable results, whether classical wet chemistry, chromatography, or rapid spectroscopic methods such as NIR or FTIR are used in the final stage.**

The challenge lies in the wide variety of matrices. Raw materials and products such as grain, tea, coffee, milk powder, chocolate, or feed pellets differ significantly in structure, moisture, fat content, and mechanical properties. These differences directly affect comminution, homogenization, and subsequent analysis. This is where FRITSCH comes in. Based on in depth application expertise in sample preparation and particle analysis, solutions are developed that are aligned with real samples rather than ideal conditions. The objective is to systematically reduce analytical uncertainties before measurement and to establish stable, reproducible workflows.

FRITSCH does not view sample preparation as a necessary inconvenience, but as a strategic lever for valid analytics. We speak the language of laboratories and understand the challenges that arise in daily operations, from fluctuating raw materials to strict regulatory limits.

**ANYONE WHO WANTS TO ANALYSE FOOD & FEED RELIABLY MUST MASTER THE SAMPLE. FRITSCH PROVIDES THE FOUNDATION FOR THIS.**

**Contact us!**

*We will find the perfect laboratory equipment for your application.*

# SAMPLE PREPARATION AS THE BASIS OF REPRODUCIBLE ANALYTICS

Sample preparation is more than a mandatory step before measurement, it is the moment when a heterogeneous product becomes a reliable, measurable basis. Depending on the matrix, this is not only about homogeneity, but also about representativeness, clean divisibility, protection of sensitive components, and reproducible conditions to ensure comparability of analytical results. A consistently well designed sample preparation process makes the difference.

## THE FRITSCH CONTRIBUTION LIES PRECISELY IN MAKING SAMPLES CONTROLLABLE SO THAT DOWNSTREAM METHODS CAN FULLY REALIZE THEIR POTENTIAL.

Particularly in the case of unevenly distributed contaminants or residues, larger sample quantities and controlled comminution are crucial to avoid sampling errors. This is exemplified by pyrrolizidine alkaloids in raw tea, which can vary significantly within a batch and can be assessed far more reliably through representative, homogeneous sample preparation. In practice, many analyses fail not because of the method itself, but because samples cannot be cleanly divided, extracted, or measured reproducibly. Nutrient analysis, such as fat determination according to Soxhlet or Weibull Stoldt, nitrogen determination according to Kjeldahl or Dumas, as well as moisture and ash determination, requires uniform comminution to obtain representative sub samples and enable complete extraction.

For chromatographic methods, fine and homogeneous samples often help stabilize extraction yields, for example in pesticide analysis using QuEChERS, but also in the determination of mycotoxins, vitamins, or flavor compounds. For volatile or temperature sensitive components, the coolest possible sample processing is critical, as it minimizes losses and keeps the sample closer to its original state. NIR and FTIR methods also frequently benefit from standardized particle sizes, as scattering effects can be reduced and calibration models become more robust. For physical parameters such as rheology or particle measurements, defined particle sizes and sample geometries are often the key to comparability.

# MASTERING FOOD & FEED SAMPLE PREPARATION

FRITSCH mills are specially designed to meet the challenges of feed and food analysis. Cutting mills such as the P-19 enable safe comminution of large, fibrous, or inhomogeneous sample quantities and are therefore ideally suited for raw tea, herbs, or feed. For dry, brittle materials, the P-14 provides precise fine grinding with a defined particle size distribution. Moist or fatty samples such as chocolate, meat, or dairy products can be processed efficiently and gently with the P-11 without unnecessarily stressing the sample. This supports a homogeneous sample basis under controlled temperature conditions, particularly where everyday practicality and reproducibility must go hand in hand.

The decisive factor is not the machine alone, but its adaptation to the specific analytical question. FRITSCH supports users in selecting the appropriate mill, suitable grinding materials, and optimal parameters. The result is a reproducible process that integrates seamlessly into everyday laboratory workflows. This is complemented by intentionally designed hygiene concepts that prevent cross contamination and ensure safety, particularly where low detection limits apply.

## FRITSCH TRANSFORMS COMPLEX SAMPLES INTO CONTROLLABLE PROCESSES, REPRODUCIBLE, CLEAN, AND PRACTICAL.

*Milling hay with the P-19. Even large samples can be easily fed through the funnel.*

*Green tea in the collection vessel of the P-14 after being milled with the cutting rotor.*

*The fruit jellies were first embrittled with liquid nitrogen and then comminuted with the P-11.*

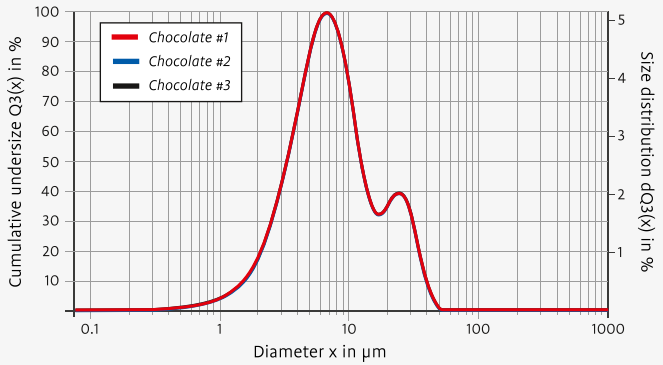
# PARTICLE SIZE AND PARTICLE SHAPE ANALYSIS AS QUALITY PARAMETERS

The analysis of food and feed comprises a wide range of measurement methods. A clearly defined part of this spectrum is physical characterization via particle size and particle shape. This approach is particularly valuable because it provides objective metrics that can be directly utilized in product development, quality control, and process monitoring, provided the sample has been properly prepared and representatively divided.

In everyday laboratory practice, this approach becomes especially relevant where quality is clearly perceptible but must be secured in accordance with standards through reliable metrics. Particle size and particle shape make deviations comparable and provide parameters that function reliably in quality control. FRITSCH operates precisely at this interface, translating typical practical questions into measurement routines tailored to the respective matrix. The A-22 NeXT enables determination of particle size distributions down to a few nanometres, while the A-28 covers shape parameters such as roundness, breakage, or morphology from the micrometer to the millimetre range.

With the A-22 NeXT, particle size analysis can be performed either dry or wet, depending on the sample and analytical question, and if necessary also in oily dispersion media. This means that coffee beans containing oil – which can be challenging to handle and disperse – can be measured reproducibly for quality control purposes using a dry method and a standardised procedure. In milk, whose particles consist of proteins and fats, wet measurement under suitable conditions can promote a distribution in which both fractions can be differentiated.

**A-22 NeXT**
**PARTICLE ANALYSER**




| % < | Ø µm | CV (%) | Chocolate #1 | Chocolate #2 | Chocolate #3 |
|---|---|---|---|---|---|
| 10.0 | 2.8 | 0.1 | 2.76 | 2.75 | 2.76 |
| 50.0 | 7.0 | 0.1 | 6.99 | 6.98 | 6.99 |
| 90.0 | 22.8 | 0.2 | 22.69 | 22.78 | 22.83 |

*In chocolate, particle size of sugar is a relevant factor for melt and mouthfeel, and the A-22 NeXT, with the option of dispersion in oil, creates suitable conditions to reliably capture this parameter.*

*The overview of all measurements shows that the results are representative and consistent, with a low coefficient of variation (< 1 %). A homogeneous and stable suspension is essential for this.*

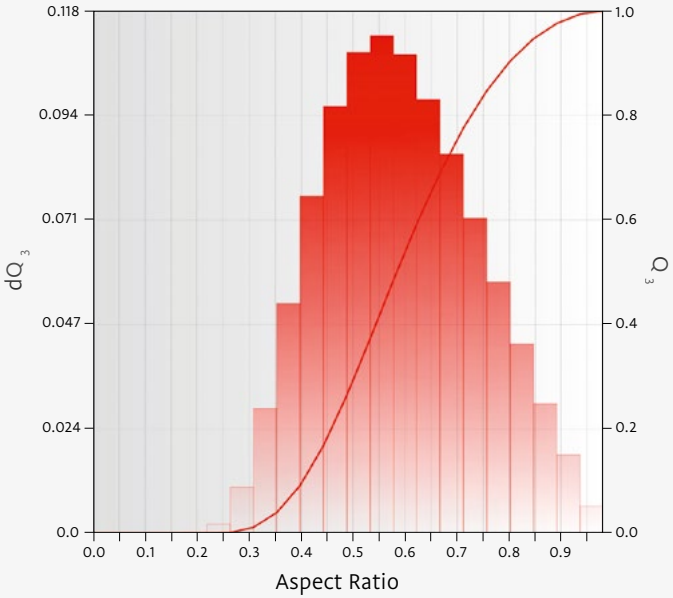
Where not only size but shape determines quality and classification, the A-28 complements the workflow with metrics for morphology, roundness, and breakage. For example, the proportion of broken grains in rice can be reliably quantified as a basis for quality grading. Sugar can be classified by particle size and distribution, and in feed pellets, roundness becomes a process indicator for pressing behaviour and reject rates in quality control. This provides exactly the metrics required to support decisions in food and feed, practical, traceable, and reproducible.

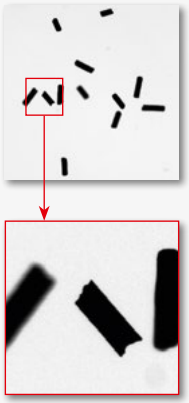
In combination with controlled sample preparation, this results in robust data that serve as a basis for quality decisions and process evaluation, without replacing or assessing other analytical methods. FRITSCH contributes not only measurement systems, but also a practical understanding of the upstream process chain, because particle size and shape analysis are only truly comparable when the sample has been reliably prepared, handled, and measured.

## A-28

**PARTICLE ANALYSER**

**FRITSCH MAKES PARTICLE SIZE AND PARTICLE SHAPE ANALYSIS IN FOOD & FEED MEASURABLE, CONTROLLABLE, AND PROCESS RELIABLE.**



*Analysis of the aspect ratios of feed pellets using the A-28.*

*Based on the principle of dynamic image analysis, the A-28 offers all the benefits of microscopic analysis, but captures a significantly larger number of particles thanks to its fully automated process, which captures up to 75 images per second.*

*With a selection of telecentric objectives for dry and wet measurement, you'll find exactly the right equipment for every application.*

**Food and feed analysis is a complex interplay of materials, processes and research questions. Reliable results can only be achieved when sample preparation and analysis are understood as a continuous workflow and the sample is taken seriously as the connecting element. This is precisely where FRITSCH demonstrates its strength. We combine robust, adaptable instruments with in depth application expertise and support our customers from the initial analytical question through to established routine in the laboratory, ensuring that methodological requirements evolve into stable processes.**

FRITSCH stands for solutions that work, even when samples are challenging, detection limits are low, and requirements are high. Our objective is to reduce analytical uncertainty and transform complex samples into clear results.

## FRITSCH TAKES A HOLISTIC APPROACH TO FOOD & FEED – FROM THE SAMPLE TO THE RESULT.

*Sunflower seeds; milled with the P-14's impact rotor*

FRITSCH

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EASY WORKING. GREAT RESULTS.