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Sampling in Dairy Industry

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World Dairy Summit, Berlin

Conference 7: Analysis / Sampling, 23. September 2009

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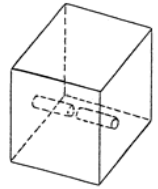
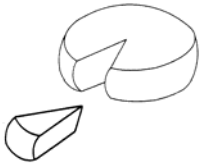
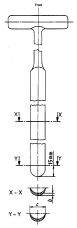
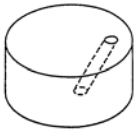
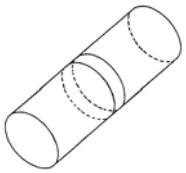

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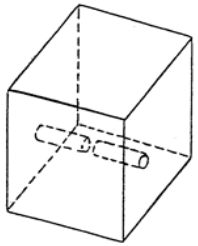
Sampling in general



- Progress in analytics resulted in lower detection limits and higher precision
- A large choice of different proficiency testings and reference materials should result in reliable, traceable and very precise analytics
- In the sector of milk and milk products, the international standardization and the definition of reference methods are well established

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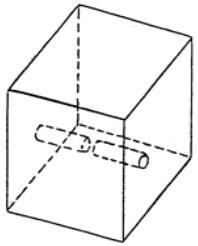
Sampling in general



- With the implementation of quality assurance and the accreditation of laboratories the validation of analytical methods, equipment control and regular checks of results have been integrated
- However, big differences between results of different laboratories or deviations from reference values still occur

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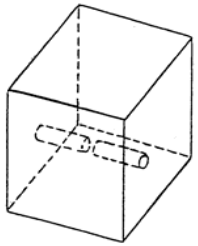
Sampling in general



- Unprecise sampling is often underestimated and represents in some cases the biggest source of error
- In many cases sampling processes are rather complex starting from sampling on-site to the test portion taken for analysis
- Alterations in the sample and the analyte originating from its handling are most often unknown

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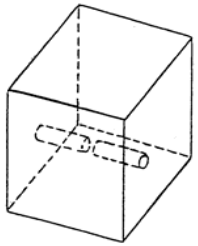
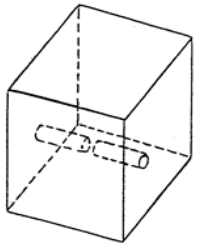
Sampling in general



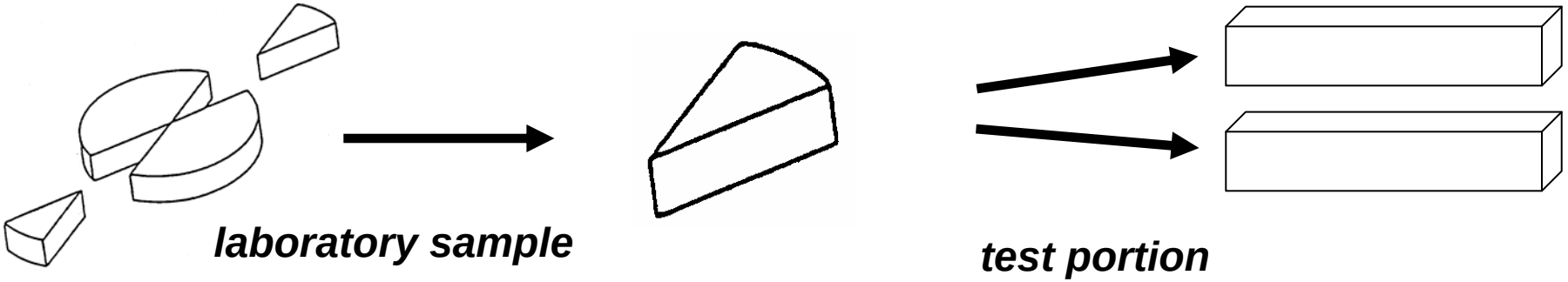
- Sampling in general means to obtain an adequate amount of sample in a condition such as to be representative for the whole lot
- Conditions for precise sampling are a clear analysis of the problem with a clear analytical question

Sampling in general



- The sampling process comprises two main steps
- Corresponding „samples“ are named accordingly:

transport *sample preparation*



laboratory sample ***test portion***

location of sampling *laboratory* *analysis*

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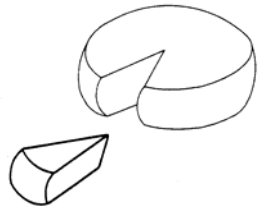
Sampling in general



- On the basis of a well defined problem follows the detailed sampling plan (fit for purpose)
- Statistical considerations have to be taken into account
- Sampling has to be taken into the quality assurance system

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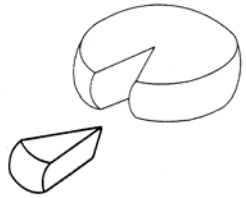
Legal framework, standards and guidance documents



- CAC/GL 50-2004, General guidelines on sampling (Codex Alimentarius, FAO/WHO)
- ISO 707 | IDF 50:2008, Milk and milk products - Guidance on sampling
- ISO/IEC 17025:2005, General requirements for the competence of testing and calibration laboratories
- REG 213/2001, Methods for the analysis and quality evaluation of milk and milk products (rules for the application of REG 1255/1999, amending REG 2771/1999 and 2799/1999)

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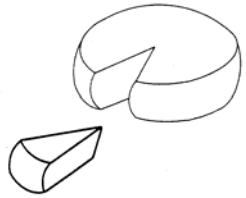
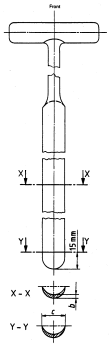
Legal framework, standards and guidance documents



- REG 178/2002, General principles and requirements of food law…
- REG 2073/2005, Microbiological criteria for foodstuffs
- diverse country- and region-specific standards
- ISO/IDF project on a guidance document for automated sampling

source: Südmo

Sampling technique, preservation, transport

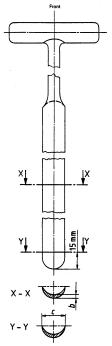


Planning of sampling

Should include the following points:

- Presettings → sampling directives, published instructions, official documents
- Preparation → statistical sampling design
- Description of the sample and the location → number of single samples, time, temperature
- Material → equipment, containers, labels

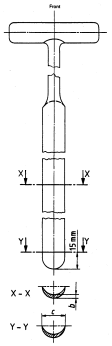
Sampling technique, preservation, transport



Planning of sampling includes to know

- that the sampling has to follow exactly the defined requirements, in case legal relevant statements have to be given
- whether the person taking the sample needs a specific training
- whether the conclusion applies for the eatable part only? → delicate point for cheese specialities because habits on eating cheese may vary from country to country

Sampling technique, preservation, transport

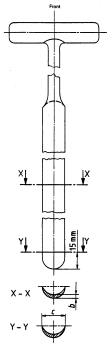


Planning of sampling

- Transport and storage → protection of the sample, temperature, packaging
- Records → sampling report

source: BWZ, Dienstsitz München

Sampling technique, preservation, transport



Homogenisation

- …a very important step, foodstuff is often a mixture of several matrices
- Necessary degree of homogeneity depends on the size of laboratory sample → identification of inhomogeneities by parallel testing
- In routine testing often only single samples can be analysed → main source of error

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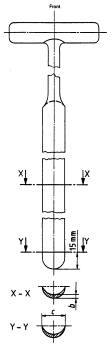
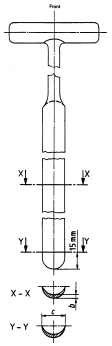
Sampling technique, preservation, transport



homogenisation

- Voluminous and tough material as well as mixed substances should be grated using proper equipments
- Cross-contamination between samples should be avoided
- Homogenisation procedure should not warm up the sample to much (e.g. loss of volatile compounds)

Sampling technique, preservation, transport



Statistical considerations

- Results refer to random samples → risk of an error of judgment
- For each sampling it is therefore essential to evaluate the relevant number and amount of individual samples
- Among other things this is related to distribution and concentration of the analyte in the sample

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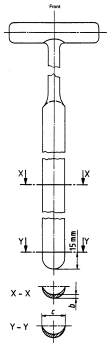
Sampling technique, preservation, transport



ISO 707 | IDF 50:2008 Guidance

- „Milk and milk products - Guidance on sampling “
- ..this International Standard gives guidance on..
- The guidance document is often mandatory stipulated in official and contractual documents
- It is therefore obligatory to fix additional specifications

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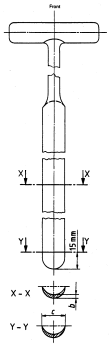
Sampling technique, preservation, transport



ISO 707 | IDF 50:2008 Guidance

Sampling equipment

- ..should not change the analytical properties of the sample
- ..should be made from stainless steel or other suitable materials
- ..should be clean and dry
- ..should be sterile for microbiological testing

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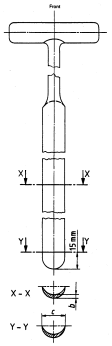
Sampling technique, preservation, transport

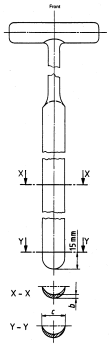


ISO 707 | IDF 50:2008 Guidance

Sampling container

- ..should conserve the analytical characteristics of the sample
- ..should be made from glass, metal, plastics
- ..should be opaque, dark if possible, clean, dry and sterile
- ..should have an appropriate airtight cap

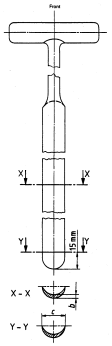
Sampling technique, preservation, transport



ISO 707 | IDF 50:2008 Guidance

- Microbiological samples to be taken first
- Sterilized/aseptic equipment should not affect sensory analysis
- Particles → enlargement of sample amount
- Immediate closure of containers
- In case of small retail packages, the sample consists of several unopened packages from the same lot
- If possible include additional samples for temperature control during transport

Sampling technique, preservation, transport



ISO 707 | IDF 50:2008 Guidance

Preservation

- ..usually none if microbiological or sensory parameters are tested
- ..only in agreement with the laboratory
- ..if there is no influence on parameters to be tested (except if it can be corrected)
- ..declaration of type and amount of preservative in the sampling report and/or on the label
- ..safety instructions have to be followed

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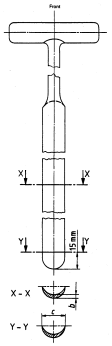
Sampling technique, preservation, transport



ISO 707 | IDF 50:2008 Guidance

Storage and transport

- ..rapid transport (max. ca. 24 h) and short intermediate storage
- ..sample must not alter
- ..if needed measures to avoid off-flavors, direct solar irradiation and other influences have to be taken
- ..compliance with cold chain
- ..analysis rapidly after receipt

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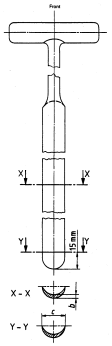
Sampling technique, preservation, transport

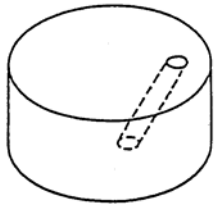


ISO 707 | IDF 50:2008 Guidance

Sampling report

- A testing result is only significant if it‘s clear to what it refers
- Report should be attached to samples
- Report contains all necessary information regarding the sampling process

Quality assurance in sampling



- Assure that the sample corresponds to the indications
- Should be a representative part of the lot
- Sampling, transport and storage must not alter the parameters to be tested
- Sufficient amount for analysis and to retain sample
- Communication and traceablility → do all concerned people have the necessary information on the sample and under which circumstances the sample was taken?

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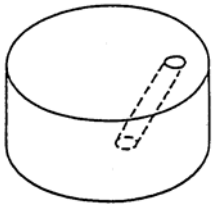
Quality assurance in sampling

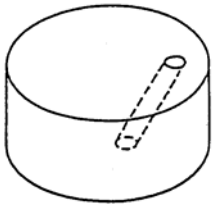


In sampling the same principles apply as anywhere else in quality assurance..

- Specifications/documents
- Validation
- Release of the procedure
- Training
- Records
- Archiving

source: BWZ, Dienstsitz München

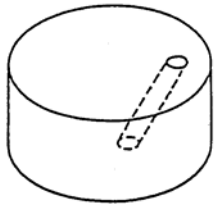
Quality assurance in sampling



Documents

- Validated procedures
- Dated and signed specifications/documents
- Records
- Control of compentences
- Assured trackability and traceability

Quality assurance in sampling



- Milk collecting trucks: person responsible for sampling has to be trained
- The official food inspection has to be executed by the authorized person
- ISO 17025 demands trained and certified persons responsible for sampling → means that testing laboratories today should offer new and extended services including the necessary competences

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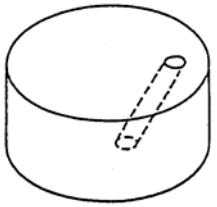
Quality assurance in sampling



Records:

- ..precise identification of the sample
- ..circumstances of sampling
- ..composition and condition of the sample
- ..possible discrepancies from sampling plan
- ..special events (sampling, transport)
- ..nature of storage until testing
- ..description of the part used for testing
- ..sample amount

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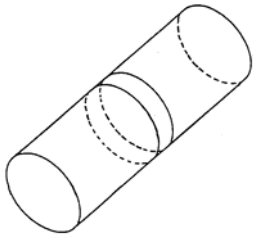
Sampling recommendations



Which and how many samples should be tested in the framework of food producers primary responsibility?

- Difficult to define
- Depends on the product, produced amount, parameters to be tested, size of enterprise etc.
- Few recommendations available, often specific for industrial branches, countries or regions
- e.g. Fromarte (artisan CH), cheese AT, InterLab (industry, artisan and alpine; in progress)

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