

2. CHAPTER II

2.1. SAMPLING PROCEDURES AND SAMPLE PREPARATION

2.1.1. Sampling Procedures and Sample Preparation

A problem arises in foodstuffs due to them being or being composed of relatively heterogeneous materials. As such, it can be difficult to obtain a single sample which is representative of the foodstuff as a whole for analysis. To minimise this problem, several samples can be randomly - or selectively - taken and their average result computed to a representative value for the bulk composition. Statistical sampling plans have also been published for sampling procedures.

In some cases, several random samples are taken and mixed from which a sample can be taken as representative of the bulk.

Due to both cost and practicalities of full statistical sampling, and the natural composition variation of foodstuffs, analysis is very often carried out on randomly chosen single samples.

2.1.2. Preparation of Sample

The value obtained by a chemical analysis of a foodstuff depends on how representative the sample under analysis is. Before the sampling of a foodstuff, it must be made as homogenous as possible so that, within the limits of the analytical method used, replicates analyses agree as closely as possible.

Methods available for achieving homogeneity of foodstuffs include the following:

1. Electrical mechanical devices (to reduce particle size and mix thoroughly) such as mincers, greaterers, blenders, and homogenizers.
2. Mechanical powder mills or grinders.
3. Manual mixing with rods, or spatulas, or hand mixing
4. Mixing of powders by the method of quartering (this involves dividing the bulk into four piles - removing two piles diagonally opposite, and mixing the other two piles - this portion is then divided into four piles which is treated as before - this sequence is repeated until a small sample size is left).

5. The type of foodstuff under investigation determines the types of mixing.
6. Moist, solid foods such as meats are best homogenised by chopping rather than mincing.
7. Fluid foods are best emulsified by blenders.
8. Oils and fats are easily prepared by gentle warming and mixing.
9. Fatty mixed - phase products such as cheese and chocolate are best grated and then mixed by hand.
10. Fatty mixed - phase products such as butter and margarine are best re-emulsified by shaking by hand in a jar after warming at 35 ° C to melt the fat.

This is the initial sample preparations should be carried out quickly to minimise any moisture loss or gain to the sample from the atmosphere. Once prepared , the samples should be immediately transferred to suitable containers with well - fitting tops, clearly labelled and stored at a suitable cool temperature.

2.2. PREPARATION AND SAMPLING OF FLOUR OR MILK POWDER

1. Keep the prepared material in suitable containers with air - and water - tight covers. Plastic sample jars with air-tight lids will be supplied for this purpose.
2. From the bulk into a large pile on a white card, and split into 4 equal sized piles.
3. Return 2 diagonal piles to the original container, and mix the other two.
4. Divide the new pile 4 equal sized piles, return 2 diagonal piles to the original container, and mix the remaining 2 piles.
5. Repeat this procedure until a sample of the size is suitable for analysis.
6. Immediately after this procedure transfer to an air tight container. Start analyses as soon as possible.
7. If the sample starts to show signs of dampness or of contamination, then dispose of it and prepare a new sample.
8. To dispose of solid wastes, wrap well in paper before placing in waste bins.

2.3. PREPARATION AND SAMPLING OF BREAD

1. Keep the prepared material in a suitable containers with air- and water -tight

- covers. Plastic sample jars with air-tight lids will be supplied for this purpose.
2. The whole loaf is weighed to the nearest 0.1 g (Wt. A). The loaf is then cut into slices of approximately 3 cm square, before spreading out on paper and leaving to dry in a warm room overnight. This makes the bread dry and brittle (i.e. the bread is in equilibrium with the moisture in the air, so no moisture changes occur during the grinding). The bread is then reweighed (Wt. B).
 3. Bread will normally be supplied at this stage, with Wt. A and Wt. B being supplied also.
 4. Grind the sample with a pestle and mortar, and then pass it through a sieve (no. 20). Mix the sample thoroughly by hand (use a spatula).
 5. Immediately after this procedure transfer to an air-tight container.
 6. When finished with the sample dispose of as for another solid wastes by wrapping in paper before replacing in waste bins.

N.B. REMEMBER TO CORRECT RESULT OF ANALYSES TO THE ORIGINAL BREAD - AND NOT TO LEAVE THEM FOR DRIED BREAD.

2.4. SAMPLING AND PREPARATION OF MACARONI

1. Select from the lot to be analysed enough strips or pieces to assure representative sample.
2. Break these into small fragments with hands or mill.
3. Mix well these fragments or milled sample.
4. Grind 300 – 500 g in mill until all material passed through No 20 sieve.
5. Keep the prepared samples in a suitable containers with air - and water - tight covers to prevent moisture changes.
6. Plastic sample jars with air-tight lids will be supplied for this purpose.

2.5. PREPARATION AND SAMPLING OF MILK, BUTTER AND MARGARINE

2.5.1. Milk

1. Thoroughly mix the bulk milk by pouring from one vessel to another 3 or 4 times - or by well shaking in a enclosed vessel.
2. Place samples in a non-absorbent, air tight containers and keep cool (use containers supplied).
3. Immediately before measurement of test portions ensure that the sample is well mixed by shaking
4. Fresh milk samples will be provided each practical sessions.

2.5.2. Butter and Margarine

1. Firstly melt the whole butter sample at 35 ° C in a glass jar with air -tight seal.
2. Then shake the jar vigorously before removing a sample to ensure that the sample is re-emulsified and well- mixed.
3. New butter samples will be provided each practical sessions.
4. Milk disturbed sample.
5. Immediately after mixing transfer to an air-tight container and chill. Start analyses as soon as possible.
6. If the sample starts to show signs of drying out, or of starting to decompose, then dispose of it and prepare a new sample.
7. To dispose of solid wastes, wrapped well in paper before replacing in waste bins.
8. If the fat in the sample is to be analysed, extract with petroleum ether - evaporate the petroleum ether off with as little heat treatment as possible as heat has a tendency to accelerate the decomposition of the fats.
9. Reserve the extracted fat in a cool place protected from air and light until analysed. Complete examinations as soon as possible, before rancidity occurs.

2.6. PREPARATION AND SAMPLING OF CHEESE

1. To prevent water loss during the preparation and subsequent handling, do not use very small samples.
2. Keep the prepared material in a suitable containers with air - and water -tight

- covers. Plastic sample jars with air-tight lids will be supplied for this purpose.
3. Take the cheese sample, and using a hand grater or food grater, shred the whole sample.
 4. After this shredding process transfer the whole sample to a container and mix thoroughly by hand (using a spatula) for 2-3 minutes to ensure an evenly distributed sample.
 5. Immediately after mixing transfer to an air-tight container and chill. Start analyses as soon as possible.
 6. If the sample starts to show signs of drying out, or of starting to decompose, then dispose of it and prepare a new sample.
 7. To dispose of solid wastes, wrap well in paper before replacing in waste bins.
 8. If the fat in the sample is to be analysed, extract with petroleum ether- evaporate the petroleum ether off with as little heat treatment as possible as heat has a tendency to accelerate fat in a cool place protected from air and light until analysed.
 9. Complete examinations as soon as possible, before rancidity occurs.

2.7. PREPARATION AND SAMPLING OF MEAT AND MEAT PRODUCTS

1. To prevent water loss during the preparation and subsequent handling, do not use very small samples.
2. Keep the prepared samples in suitable containers with air - and water - tight covers. Plastic sample jars with air-tight lids will be supplied for this purpose.
3. For the meat pie sample, first separate the pastry and the meat and weigh each component (top-pan balance will be accurate enough for this).
4. Then recombine for the blending stage.
5. To prepare meat pie or luncheon meat sample, place into Waring Blender (this has a bottom driven chopping blade).
6. Blend for 5 sec. periods, 10 times, with 5 sec. intervals between the blendings (this is to help prevent too much build-up in the blender, which could cause moisture loss and degradation of the fat).
7. Immediately after mixing transfer to an air-tight container and chill. Start analyses as soon as possible.
8. The recommended method of sampling and analysis of meat products is to

weigh the whole product first then separate the component parts (meat and jelly or meat and pastry).

9. Then weigh the two constituents and prepare as separate samples. For ease and convenience you will be analysing the whole product.
10. If the sample starts to show signs of drying out, or of starting to decompose, then dispose of it and prepare a new sample.
11. To dispose of solid wastes, wrap well in paper before replacing in waste bins.
12. If the fat in the sample is to be analysed, extract with petroleum ether- evaporate the petroleum ether off with little heat treatment as possible as heat has tendency to accelerate the decomposition of the fats.
13. Reserve the extracted fat in a cool place protected from air and light until analysed. Complete examinations as soon as possible, before rancidity occur.

2.8. SAMPLING AND PREPARATION OF FRUIT JUICE, JAMS AND MARMALADES

1. Keep the prepared samples in a suitable containers with air - and water - tight covers.
2. Plastic sample jars with air-tight lids will be supplied for this purpose.

2.8.1. Fruit Juices

1. Mix sample by shaking and filter.
2. If the beverage is carbonated, chill before opening; then pour it back and forth several times between two large beakers to remove CO₂ before proceeding with analysis.

2.8.2. Jellies and Syrups

1. Mix thoroughly. Dissolve a known weight of the sample in water.
2. Heat on steam to dissolve, if necessary.
3. Cool and make up to a known volume.
4. Take aliquot for determination. If insoluble material is present, filter before taking aliquot.

2.8.3. Fresh Fruits, Dried Fruits, Jams and Marmalades

1. Pulp the sample in a blender, and mix thoroughly.
2. Weigh the pulped material, add water and boil for 1 h replacing the water and cool.
3. Transfer to a volumetric flask and make up to volume. Filter if necessary.

2.9. SAMPLING AND PREPARATION OF CHOCOLATE

2.9.1. For Powdered Products

1. Mix thoroughly and preserve in tightly stoppered bottles.

2.9.2. For Chocolate Products

a)

1. Chill 200 g sweet or bitter chocolate until hard.
2. Grate or shave to fine granular condition.
3. Mix thoroughly and Preserve in tightly covered bottle in cool place

b)

1. Melt 200 g sweet, bitter or milk chocolate by placing in suitable container and partly immersing container in bath at 50 °C.
2. Stir frequently until sample melts and reaches temperature of 45-50 °C.
3. Remove from bath, stir toughly and while still the liquid, remove portion for analysis, using glass or metal tube, 4-100 mm diameter, provided with close-fitting plunger to expel sample from tube, disposable plastic syringe.