2
Sampling

Foods and food products are variable in composition, e.g., plant foods are more variable in composition than flesh foods. Processing methods cause additional changes in composition.

In sampling foods and food products, sufficient material must be taken to compensate for the variability involved. It is also advisable to analyze replicate samples considering the variability and the requirements of certain analytical techniques. The amount of material to be selected for analysis can be estimated statistically when the extent of variability of the individual sample is available. When repeated chemical analyses are done, it is advisable to make a preliminary determination of the variability of the sample. The number of individual samples to be selected may be found from the following expression:

$$n = C\sqrt{N}$$

where n = number of individual samples to be selected; C = a factor which represents the degree of accuracy desired in the sample; and N = lot size (where the extent of variability is not known. It is advisable to select at least ten times the amount to be taken as a sample for analysis).

Since most foods are relatively heterogeneous in their nature, it is important to ensure that, prior to compositional analysis, samples of the food taken for analysis are truly representative of the product to be analyzed. Sampling procedures vary from food to food and ISO standards have been set out for various foodstuffs. In general, dry foods should be brought to a powder by means of a mechanical grinder, moist solid foods should be homogenised by using equipment such as a domestic food processor, and fluid foods should be emulsified using blenders. Once prepared, food samples should be transferred as quickly as possible to dry glass or rigid plastic containers and sealed to avoid moisture loss or gain, and then clearly labeled and stored in a cool environment.

Prior to each analysis, a representative sample of the food material must be carefully prepared. The method of sampling is related to the nature of the food and should follow the guidelines indicated below:

1. Dry foods

Normally, the food should be passed through a grinder and then mixed in a mortar. Hard foods such as chocolate should be grated.

the analysis should be of a quality appropriate to the degree of precision required.

2. **Handling and cleanliness of equipment:** Glassware and equipment should be handled in the correct manner; for example, volumetric flasks, which are calibrated to specified temperatures, should not be heated. Thorough cleaning of glassware is also important for obtaining meaningful data. This may be achieved using cleaning reagents such as chromic acid or a mixture of concentrated sulfuric and nitric acids. followed by efficient rinsing first with tap water and finally with distilled water. Excessive use of detergents should be avoided.
3. **Blank analyses:** In order to ensure that background interferences from materials used in an analysis are not occurring, the analysis of a reagent blank should be carried out wherever possible. This blank should contain all the reagents used in the test sample but exclude the sample itself. Values obtained in the blank analysis should then be subtracted from those obtained with the sample being analyzed.
4. **Replication:** As many replicates as possible shall be performed in order to minimise the effects of random errors.
5. **Recovery experiments:** To measure the efficiency with which a food component, such as an additive, is being determined, samples of a food should be 'spiked' by the addition of a known amount of the component. These samples should then be analyzed to determine the percentage recovery of the added component.
6. **Reference samples:** The validity of an analytical procedure may be estimated by carrying out analyses on foods of known composition. Such standard food samples are available commercially and are an invaluable measure of the effectiveness of methods such as in the estimation of dietary fiber.
7. **Collaborative testing:** By collaboration with a number of laboratories, the results obtained by a particular laboratory may be compared with those being achieved by others using the same method. This allows the detection of any routine errors within anyone laboratory where the results are consistently different from those of other participants in the scheme.
8. **Confirmatory analysis:** The results obtained by any particular method being used should be compared against those obtained by a reference method chosen from one recognised internationally and published by bodies such as BIS, FSSAI and ISO. This allows a measure to be made for the validity of the method being used for routine purposes.