

pH

pH together with temperature rank as the most important indicators of food quality and safety. pH of raw material such as milk and meat is measured to ensure that quality standards have been properly met. pH is also monitored at different stages of food preparation and processing to guarantee safety, improve production and enhance quality. Along with temperature and water activity, pH also determines the shelf life of foodstuff. For example, by bringing the pH value below 4.5, growth and multiplication of pathogens such as clostridium botulinum are inhibited.

Meat

pH of carcasses constitutes an important initial test to determine condition of the animal prior to slaughter, quality of the breeding and any signs of stress during slaughter. The typical pH value, ranging from 5.4 to 7.0, can also provide an indication of whether fresh meat was properly stored as well as presence of lactic acid. During aging, the pH value drops by 1 or more pH units. Furthermore, by simply checking the pH, carcasses can be divided into tenderness groups. The acidification process varies in different parts of the animal based on the muscular mass, for example, the loin has a lower pH value. Too high a pH value induces a loss of aroma and a visibly darker meat resulting in a lower market value. In addition to meat, ingredients used in the production of ham and sausages are often refrigerated. By simply checking the pH at the liquefier's intake and drainage points, one can determine if any ammonia has leaked out.

Drinks

Even small changes in the pH value of spring or well waters can indicate a possible fouling of the natural strata. Where municipal water is used, it is often pre-treated and its pH monitored.

In making fruit juices, the pH of sugar extracts, as well as those of juices during purification and refining are checked.

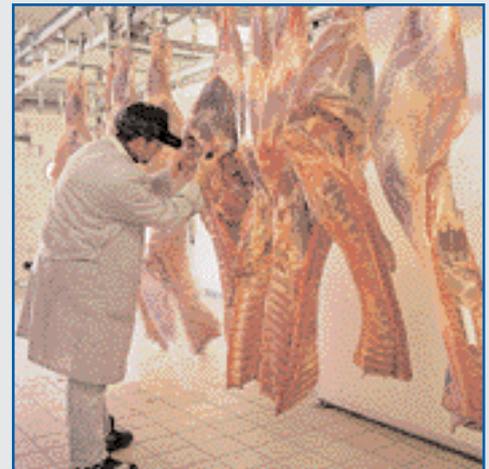
pH plays a crucial role in the production of beer. For example, the pH value of crushed malt is around 5.8, whereas its ideal value for protein decomposition is around 5.5. To ensure a consistent quality, the pH of brewed beer prior and after bottling is regularly monitored.

pH of wine normally ranges from 2.8 to 3.8 with the pH influencing various stages of the process, including fermentation and conservation. With the pH exceeding 3.5, certain bacteria can attack the wine. However, taste of wine also depends largely on its pH value with acidic wines becoming dry.

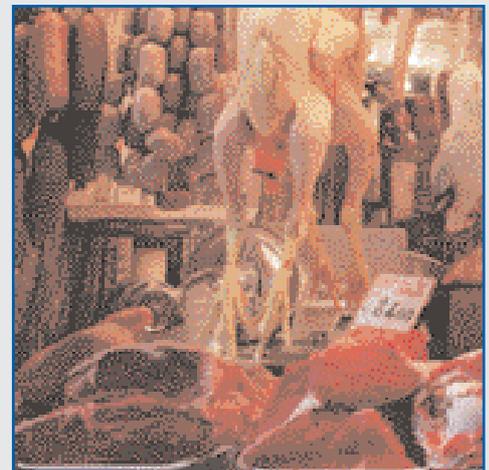
Milk and Dairy Products

pH of milk is around 6.8 and it is tested for impurities and signs of infection upon collection, as well as at point of delivery. In processes such as sterilization, pH is checked, since a lower value helps to speed up the process. However, lower pH levels can indicate that the cattle carried leukocyte infections such as mammites. Milk used for cheese manufacturing must be of excellent quality and its pH value contributes to whether the cheese will be soft or hard. pH is also checked during cheese preparation, souring of milk and cream maturation. Pathogen multiplication of the fresh and soft variety, is slowed down considerably by ensuring that the pH stays in the 4.1 to 5.3 region.

Controlling the pH value is very important in butter manufacturing processes. For example, cream is cooled after pasteurization at a very strict pH value of 6.70 to 6.85 to generate sweet butter. In order to manufacture sour butter, citric acid extracts are added to acidify the cream to 4.6-5.0 pH. With butter having a high diacetyl content, a starter is added to bring the pH value to around 5. As with other products, a lower pH value enhances the shelf life of the product.



pH is the best indicator in ascertaining meat quality.





pH control is important to ensure a longer shelf life of bread and pasta.



With yogurt production, the cooling of cultured milk can start only once acidification has reached a pH value of 4.4 to 4.6. As for fruity yogurts, the pH value of the added fruit must be the same as the yogurt itself to avoid undesirable reaction at the end of the cycle. The finished product should ideally have a pH of 4.0 to 4.4 for longer conservation.

Bread and Pasta

A pH value of 4.0 to 5.8 is recommended for baked bread in order to prolong its shelf life. Batter has to be acidified to a pH of 4.1 or less to ensure that pathogens are not multiplied. Otherwise it must be kept at temperatures below 5°C.

Marmalades and Syrups

The pH of the finished product influences the length of storage time of these products. For marmalades and syrups, this is around 3.5, whereas for caramels, it is in the 4.5-5.0 pH range. pH is also checked during the various processes including the gelatinization of jams and marmalades, as well as purification and refining of juices in pre-separation and saturation phases.

Shellfish

Polluted water can pass on toxins, even fatal ones, to shellfish. The fact that shellfish, such as oysters, are often consumed raw poses a greater health hazard. As a result, farmed or natural shell fish is detoxified with several wash cycles. The pH of the wash water is an excellent indication whether the process has been properly completed.

Fruit and Vegetables

A pH value of 2.5 to 5.5 tends to prolong the shelf life of fresh fruit and inhibit the multiplication of micro-organisms. Likewise for vegetables with a more neutral pH in the 4.6 to 6.4 range.

Ready-made Food

A pH value of around 4.5 is the simplest way to ensure the stability of the product.

Added Water

Checking the pH of water, prior to adding it to different food processes, provides a quick and simple way to guarantee the quality of the end-product. This is particularly so since the quality of water taken from the municipal water system or underground water tables vary considerably over time. Consequently, lack of proper control at an initial stage can have a detrimental effect on the consistency of the end-product.

Sanitization of Machinery

Regulatory bodies such as the departments of health often impose a certain value for the pH of the sanitization solution to be used. For example, the pH should be between 8 and 10 based on the chlorine concentration. Similarly, an iodine solution is meant to have a pH value of 5 or lower.