

# YOGHURT PRODUCTION

Yoghurt is produced by the controlled fermentation of milk by two species of bacteria (*Lactobacillus* sp. and *Streptococcus* sp.). The sugar in milk (called lactose) is fermented to acid (lactic acid) and it is this that causes the characteristic curd to form. The acid also restricts the growth of food poisoning bacteria and some spoilage bacteria. So, whereas milk is a potential source of food poisoning and only has a shelf life of a few days, yoghurt is safer and can be kept for up to ten days, under proper storage conditions.

Yoghurt can be easily produced at the small-scale. The procedure is as follows:

- Collect the milk in carefully cleaned, covered vessels.
- Pasteurise the milk at 80-85°C for 15-20 minutes. This is especially important if tuberculosis bacteria are thought to infect animals locally.
- Cool the milk to 40-45°C as quickly as possible and add a starter culture of the yoghurt bacteria. Keep the milk at this temperature for 3-4 hours while the fermentation takes place. If possible, then cool the yoghurt in a refrigerator until it is eaten or sold.

There are three potential problems in yoghurt making:

## Spoilage by bacteria or moulds

This is due to unclean equipment, contaminated milk or poor hygiene of the production staff. Ensure that all equipment is thoroughly scrubbed, sterilised with diluted bleach (two tablespoons of bleach per gallon of water) and thoroughly rinsed in CLEAN water before production starts. Pasteurisation should ensure that fresh milk is not contaminated, but do not use old milk. Make sure operators wash their hands before starting work and do not allow anyone with stomach complaints, coughs or skin infections (eg boils) to work with the milk.

## Maintenance of correct incubation temperature

A commercial yoghurt maker of kitchen size may be purchased, but these tend to be rather expensive for what they are. You could easily get something made locally from a shallow water bath with a small electrical element, keeping the water warm and the whole thing controlled by a simple variable temperature thermostat. An alternative way would be to fill the yoghurt mix at 40-45°C into a large commercial thermos flask. Finally, you can use a block of 4" polystyrene into which indentations are made of such a size that small cream containers fit comfortably. The warm yoghurt mixture is thus filled into the containers inside the block of polystyrene, and a polystyrene lid placed on top. The insulating effect of the block will then prevent the loss of heat sufficiently to maintain the temperature of the product at the required 40-45 °C. A similar idea consists of a hollow polystyrene box approximately .75m<sup>3</sup> fitted with a 40W electric light bulb. The heat from the bulb maintains the temperature within the required range.

## Yoghurt culture

The correct balance of the two *Lactobacillus* bacteria is important for good quality yoghurt. In practice, a dried culture can be obtained from most large towns/cities and this can be grown up on pasteurised milk and kept in a refrigerator. A part of this 'master culture' can then be used each day for a week and the last part re-inoculated into milk to form a new master culture. This method can be continued for several months, provided good hygiene is used, but eventually undesirable bacteria will contaminate the culture and it must be replaced.

If a refrigerator is not available, it is possible to add one or two teaspoonfuls of commercial yoghurt (which has not been pasteurised after the fermentation) as the starter culture for each pint of milk. This can be done each day. Finally, it is possible to add part of your

yoghurt production to a new batch of milk the following day. There is a greater risk of contamination using this method and it is not recommended unless the other methods described are not possible.

#### Product variations

Yoghurt can be either stirred or set. Stirred yoghurt is fermented in bulk, stirred and then dispensed into pots or sold into customers' containers. Set yoghurt is made by pouring the inoculated milk into pots and fermenting it in the pot. Fruit and nuts can be added to each type but care is needed to ensure that they are thoroughly cleaned and blanched to avoid contamination.

In some countries a layer of fruit syrup on the top of set yoghurt is a popular alternative. In other places a thicker stirred yoghurt is preferred. This can be made by adding dried skimmed milk (at approximately 50g/l) to the milk before pasteurising. The use of other thickeners such as starch and pectin is also possible, but generally unnecessary.

#### Quality control

The main quality control points to consider concern hygiene and are described above. Pots and other containers must also be absolutely clean before use.

#### Equipment required

Milk churns or similar containers.

Pasteurising pan (e.g. 101) preferably made from stainless steel, but aluminium is adequate.

Gas ring or other source of heat.

Thermometer (0-100°C).

Incubation box/flask.

Refrigerator (optional).

#### Equipment suppliers

Note: This is a selective list of suppliers and does not imply ITDG endorsement.

#### Cultures and equipment

##### Smallholding Supplies

Pikes Farmhouse

East Pennard

Shepton Mallet

Somerset

BA4 6RR

United Kingdom

Contempra Industries Inc

371 Essex Road

Tinton Falls

New Jersey 07753

USA

Cumberland General Store

RR3

Crossville

Tennessee 38555

USA

Braun Natural Yoghurt Maker

3269 American Drive

Mississauga

Ontario

L4V1B9

Canada

Chr Hansen's Laboratory Inc

9015 W

Maple Street

Milwaukee

Wisconsin 53214

USA

Horan-Lally Company Limited

1146 Aerowood Drive

Mississauga

Ontario

L4W1Y5

Canada

Marika Dairy Cultures

Natalex Corp. Box 3060

Weehawken

New Jersey 07087, USA

technical brief