Traditionally, there are two main processes for ripening hard and semi-hard cheese (such as Gouda, Edam, Manchego, Emmental). The more traditional way, also known as natural ripening, is by coating the cheese after brining with Plasticcoat or Delvocoat; here, the cheese dries in air and a hard crust is formed during ripening. An alternative method is brining followed by airtight packaging, so that the cheese remains soft and does not form a crust. In addition to their known benefits, both processes also have drawbacks in terms of cost, yield and/or taste and texture. DSM Specialty Packaging has developed an innovative packaging concept for ripening semi-hard and hard cheese which combines the best features of both these traditional methods.

Breathable film

DSM Specialty Packaging has developed a special blend of polymers which has a specific permeability to moisture but is a barrier to gases such as oxygen, thus enabling a perm-selective packaging. The polymers are extruded to form a film from which pouches can be formed. In this way, the cheese can be protected by a breathable film, allowing it to ripen naturally and dry in air.

Traditionally coated cheeses, after removal from the brine bath, are provided with a coating and ripened on boards in special ripening cells. This coating treatment is repeated a number of times during the ripening process. Inside the cheesemaker’s ripening cell, cheeses are ripened at temperatures of 12 to 14 °C and an atmospheric humidity of approximately 85 per cent. Over 14 weeks of ripening, the traditionally coated cheese loses about ten per cent of its moisture. Depending on the specific composition of the polymer blend used in the Pack-Age concept and the thickness of the packaging, this moisture loss can be reduced by 50 per cent or more. Figure 1 plots the moisture loss caused by drying against the ripening time in weeks, clearly showing that cheese ripened in barrier film does not lose any moisture. The various Pack-Age curves are based on different polymer blends and different film thicknesses. If desired, the perm-selectivity of the film can be modified so that the moisture loss can be matched to the specific needs of the cheese-maker.
Proof-of-principle

At DSM Food Innovation Center in Delft, cheeses obtained from industrial producers were packaged in the new Pack-Age film and the ripening results were compared with cheese ripened using the traditional coating and cheese ripened in barrier film. The Pack-Age concept was assessed and compared with traditionally coated cheese and barrier film cheese in tests ranging in duration from a few weeks to a few months and even a year. The dry rind, taste and texture formed give the impression of a naturally ripened cheese. The new concept has been presented to various cheesemakers in The Netherlands and abroad. Experienced cheese tasters approved the good quality and stated that ‘the consumer will be unable to distinguish Pack-Age ripened cheese from natural cheese’. Ripening tests using the Pack-Age concept are currently being carried out at various international cheesemakers.

Comparative research by NIZO

During ripening, each cheese develops its own particular balance in flavour and texture. A comparative tasting session at NIZO proved that DSM’s Pack-Age cheese-ripening bags can still provide this balance even with a 50 percent reduction in moisture loss. The texture of the cheese ripened in the Pack-Age bags was about the same as that of naturally ripened cheese. As far as the overall flavour was concerned, Pack-Age ripened cheese closely followed the naturally ripened cheese. The foil-ripened cheese finished bottom of the pile. Figure 2 shows these differences.

Qualitative improvement

Applying the traditional coating involves a number of treatments during ripening. The coated cheese, which rests on wooden boards during ripening, has to be turned regularly for quality reasons. During ripening, a hard crust is formed to protect the cheese. On the other hand, when using a barrier film, there is little evolution of taste and texture; the flavour remains flat and the cheese is soft and sticky.

Possible savings

Pack-Age film presents the cheese industry with the opportunity for cost savings. The moisture balance in the warehouses and in the cheese can be better managed and controlled. Depending on its specific requirements, the cheesemaker can halve moisture losses caused by drying. This represents an increased yield of approximately 50 grams per kg of mature cheese. The Pack-Age film simply has to be removed in order for the cheese to be sold in sliced or grated form, eliminating coating costs and preventing loss of income caused by the need to remove the crust.

New cheeses

The new ripening concept can be optimized according to the cheesemaker’s specific requirements. In association with the permeability of the film, it is also possible for the cheese recipe to be modified to develop new cheeses.

Possible savings

Pack-Age film presents the cheese industry with the opportunity for cost savings. The moisture balance in the warehouses and in the cheese can be better managed and controlled. Depending on its specific requirements, the cheesemaker can halve moisture losses caused by drying. This represents an increased yield of approximately 50 grams per kg of mature cheese. The Pack-Age film simply has to be removed in order for the cheese to be sold in sliced or grated form, eliminating coating costs and preventing loss of income caused by the need to remove the crust.

Conclusion

Comparative research has demonstrated that cheeses ripened using the new breathable film have a comparable taste and texture to natural cheese. This new technology allows substantial savings in the ripening process and may given rise to the development of new cheeses. It is expected that the first cheeses ripened using this innovation will reach the shops in the coarse of 2010.

Figure 2: Spider chart representing consistency, firmness and overall flavour score

The Pack-Age film however, allows efficient ripening of cheese while producing a balanced taste and texture. When used in combination with DSM’s Delvocid, a natural yeast and mold inhibitor, the Pack-Age film offers optimum protection against yeast and mold growth.

Another option is to apply a coating first of all and then to continue ripening under controlled conditions in the Pack-Age film. On the reverse, initial ripening in the new film, followed by application of a coating at the end of ripening before the cheese is cut into pieces, is another opportunity.