CULTURES TASTE TECHNOLOGY®
MADE IN GERMANY

Food Group

CULTURES TECHNOLOGY FOR /Milk & Cheese

We refine food.

CONTENT

M-CULTURE®

STARTER CULTURES

Starter cultures are an important aid in the production of dairy products.
They ensure a specific fermentation and have an influence on the acidification, coagulation, maturation or aroma formation of the milk products.

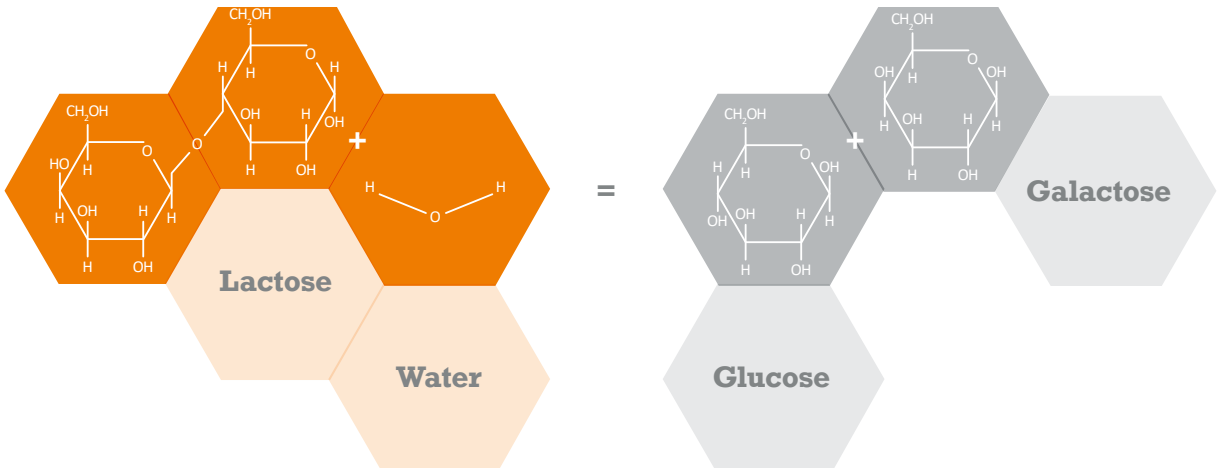
Bacteria (mainly lactic acid bacteria) as well as yeasts and fungi are used as starter cultures.

The selective use of starter cultures has a direct influence on the consistency and taste of dairy products.

During the fermentation of milk, acidification occurs, resulting in coagulation. Yeasts, fungi and in particular lactic acid bacteria lead to a microbial conversion of substances, in which the pH value drops and acidification occurs. By lowering the pH value, the milk protein precipitates and the milk coagulates.

The optimal temperature for lactic acid bacteria is between approx. 20-45°C. They are able to form the enzyme lactase, which splits the sugar (lactose) in the milk into glucose and galactose in the presence of water.

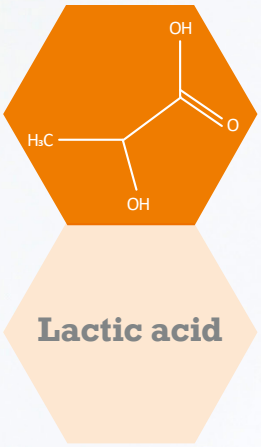
The split simple sugars are metabolised further by the bacteria and finally broken down into lactic acid. This leads to a lowering of the pH value, which in an acidic environment causes the milk protein casein to coagulate and results in a thickening or firmer consistency.

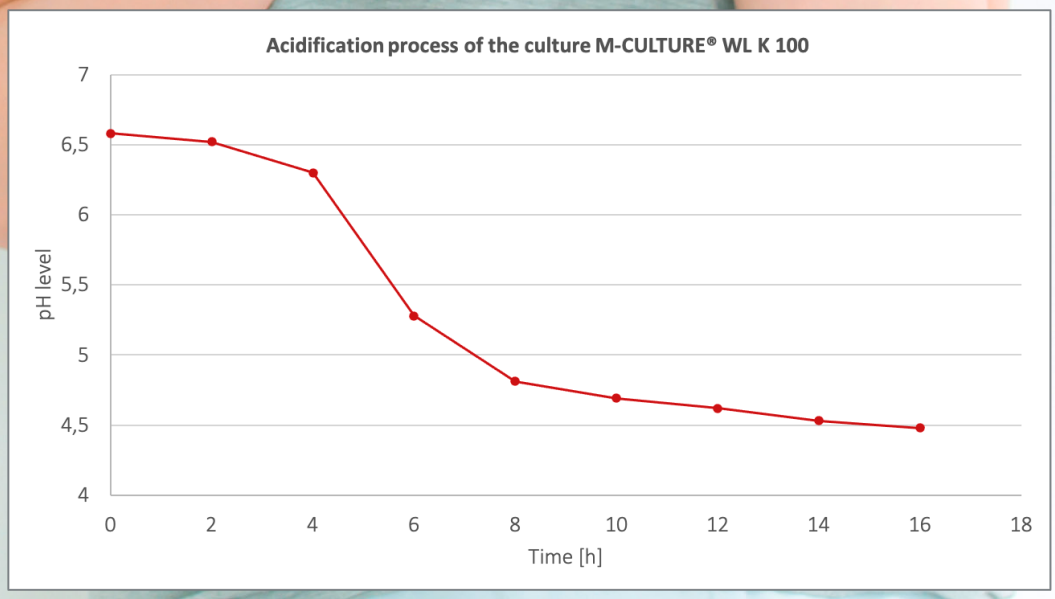


M-CULTURE®

STARTER CULTURES FOR DAIRY PRODUCTS

Art.-No.	Designation	Use	Description	Germs	Quantity
44.42000	**M-CULTURE® WL K 100**	Kefir	Culture system consisting of a strong and acid-resistant mesophilic mixed culture and reliable yeast culture	– *Streptococcus thermophilus* – *Lactobacillus delbrueckii subspezies bulgaricus* – *Lactococcus lactis subspezies lactis biovar. diacetylactis* – *Leuconostoc mesenteroides supspezies cremoris* – *Saccharomyces cerevisae* – *Kluiveromyces marxanius*	for 1.000 l
44.42100	**M-CULTURE® WL T200**	Quark	for mild, aromatic quark	– *Lactococcus lactis ssp. lactis* – *Lactococcus lactis ssp. cremoris* – *Lactococcus lactis ssp. lactis biovar. diacetylactis* – *Leuconostoc*	for 1.000 l
44.42200	**M-CULTURE® WL J 300**	Yoghurt	for mild creamy yoghurt, culture with little lactobacillus and clear slime formation	– *Streptococcus thermophilus* – *Lactobacillus delbrueckii subspezies bulgaricus*	for 1.000 l
44.42201	**M-CULTURE® WL J 301**	Yoghurt	for strong, firm yoghurt, culture with strong acid formation and stable structure	– *Streptococcus thermophilus* – *Lactobacillus delbrueckii subspezies bulgaricus*	for 1.000 ll
44.42202	**M-CULTURE® WL J 303**	Yoghurt	for drinking yoghurt with mild aromatic taste, culture with aroma and stable structure	– *Streptococcus thermophilus* – *Lactobacillus delbrueckii subspezies bulgaricus*	for 1.000 l
44.42204	**M-CULTURE® WL J 304**	Yoghurt	For strong, firm yoghurt, culture with strong and fast acid formation and stable structure	– *Streptococcus thermophilus* – *Lactobacillus delbrueckii subspezies bulgaricus*	for 1.000 l
44.42300	**M-CULTURE® WL M 400**	Whey drink	mesophilic culture with stable aroma and little structure formation	– *Leuconostoc* – *Lactococcus lactis ssp. lactis* – *Lactococcus lactis ssp. cremoris* – *Lactococcus lactis ssp. lactis biovar. diacetylactis*	for 1.000 l
44.42400	**M-CULTURE® WL S 500**	Sour milk products	aromatic mesophilic culture for soured milk	– *Lactococcus lactis ssp. lactis* – *Lactococcus lactis ssp. cremoris* – *Lactococcus lactis ssp. lactis biovar. diacetylactis* – *Leuconostoc*	for 1.000 l





KEFIR

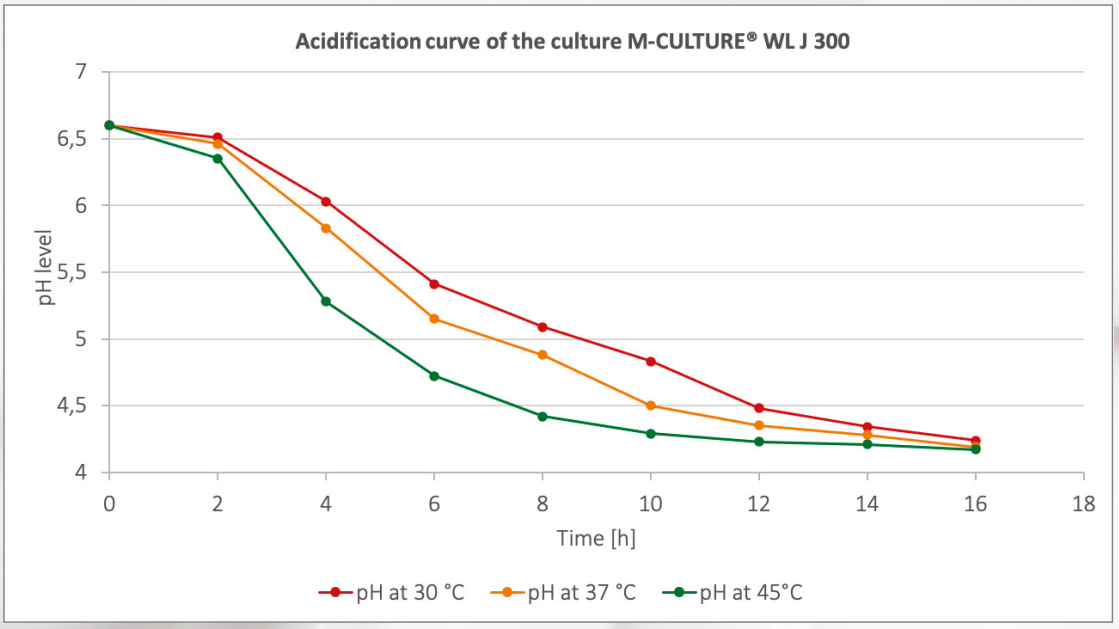
Kefir is a viscous sour milk product in which yeasts play an important role in addition to fermentation by lactic acid bacteria. Yeast fermentation predominates at lower temperatures and carbonic acid and alcohol are formed. The lower lactic acid content results in a milder product.

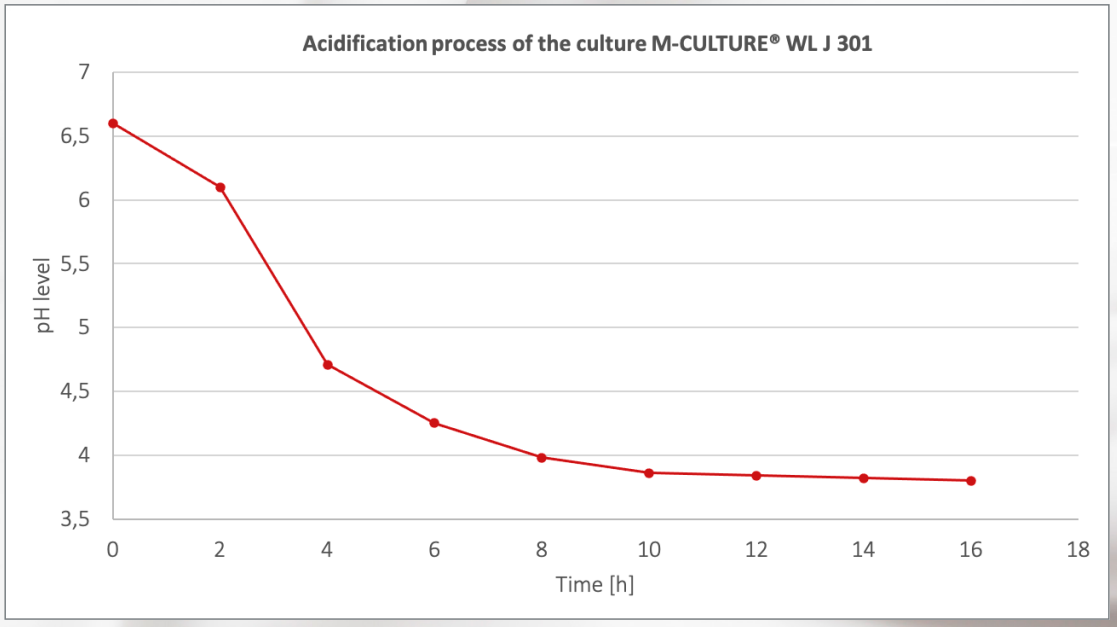
M-CULTURE®

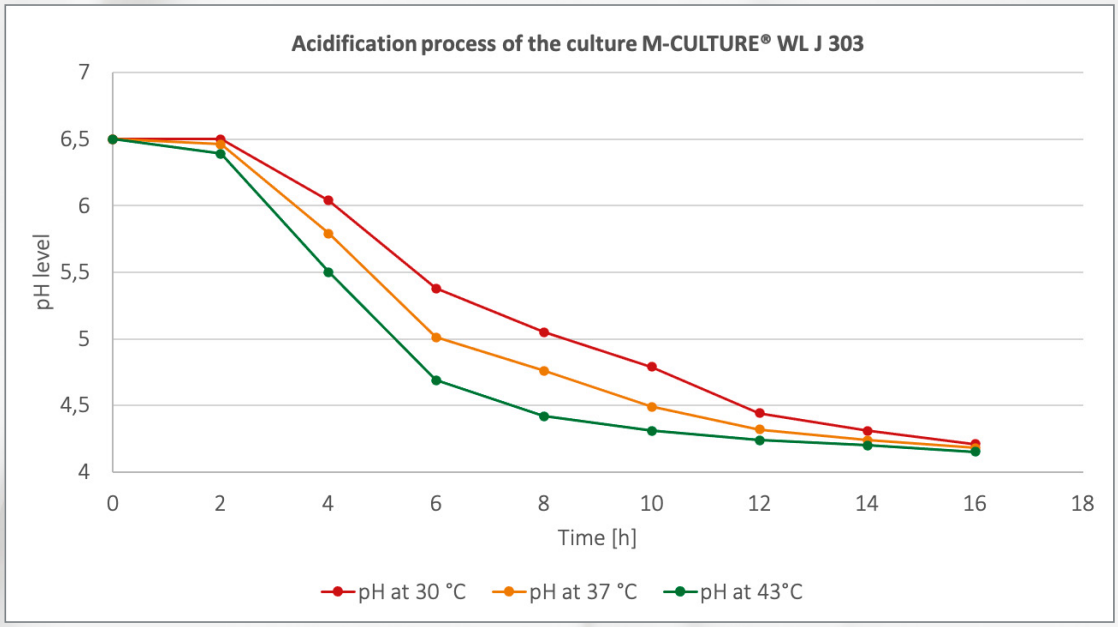
STARTER CULTURES FOR DAIRY PRODUCTS

YOGHURT

Yoghurt is a product with a long tradition. Today, as then, yoghurt is produced by acidifying and coagulating specifically selected lactic acid bacteria. Depending on the composition of the mixtures and the processing form of the milk product, a choice can be made between firm or stirred yoghurt and a mild or sour product.




Acidification process of the culture M-CULTURE® WL J 301
pH level
7
6,5
6
5,5
5
4,5
4
3,5
0
2
4
6
8
10
12
14
16
18
Time [h]

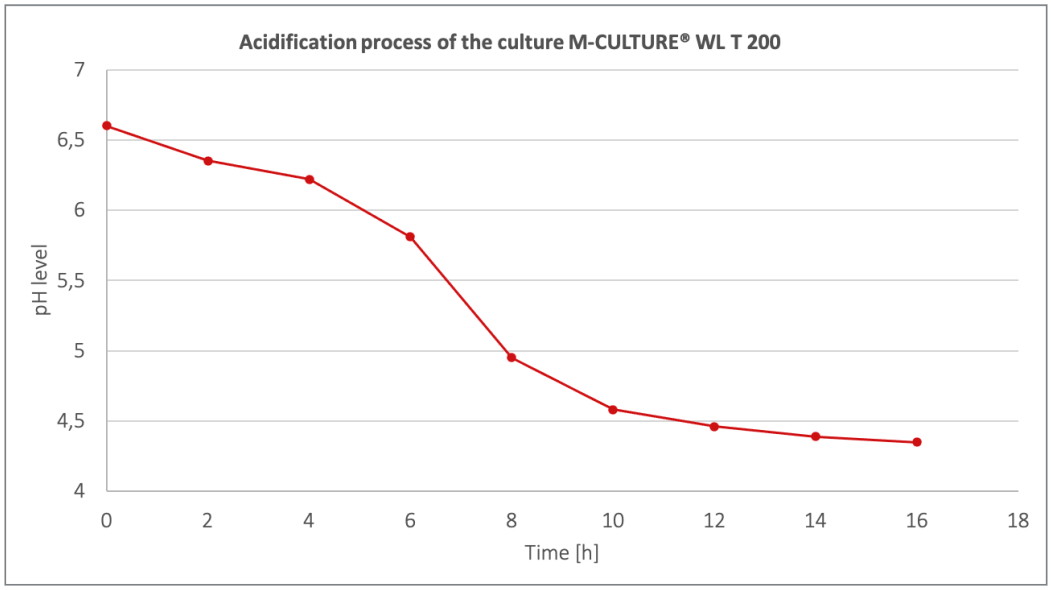

Acidification process of the culture M-CULTURE® WL J 303
pH level
7
6,5
6
5,5
5
4,5
4
0
2
4
6
8
10
12
14
16
18
Time [h]
pH at 30 °C
pH at 37 °C
pH at 43°C

M-CULTURE®

STARTER CULTURES FOR DAIRY PRODUCTS

QUARK

Mesophilic starter cultures which are active at low temperatures of 20-22 °C are used for producing quark. Curdling only becomes visible after 6 to 8 hours.

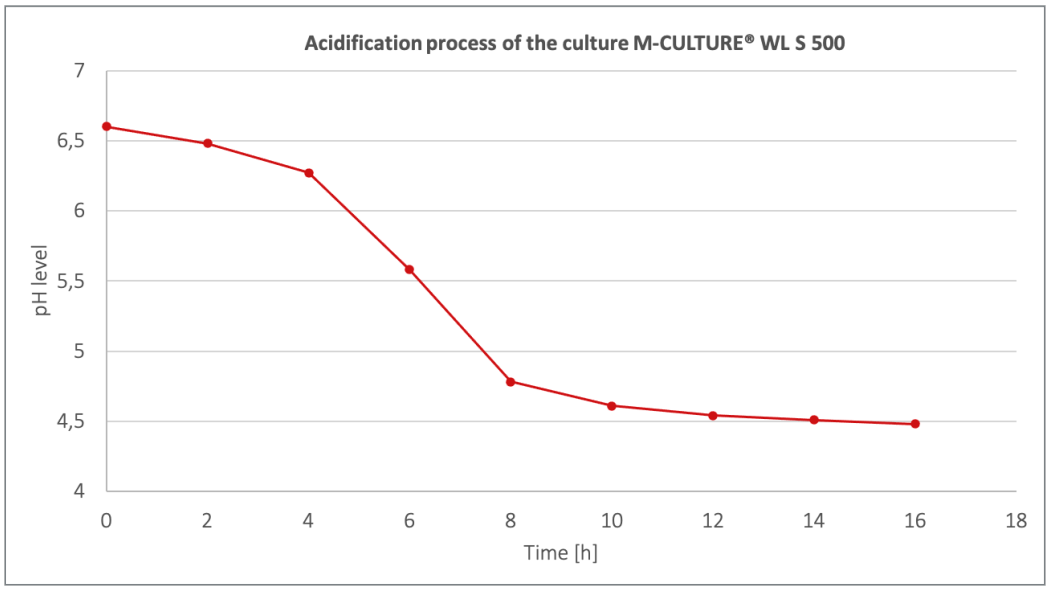


SOUR MILK

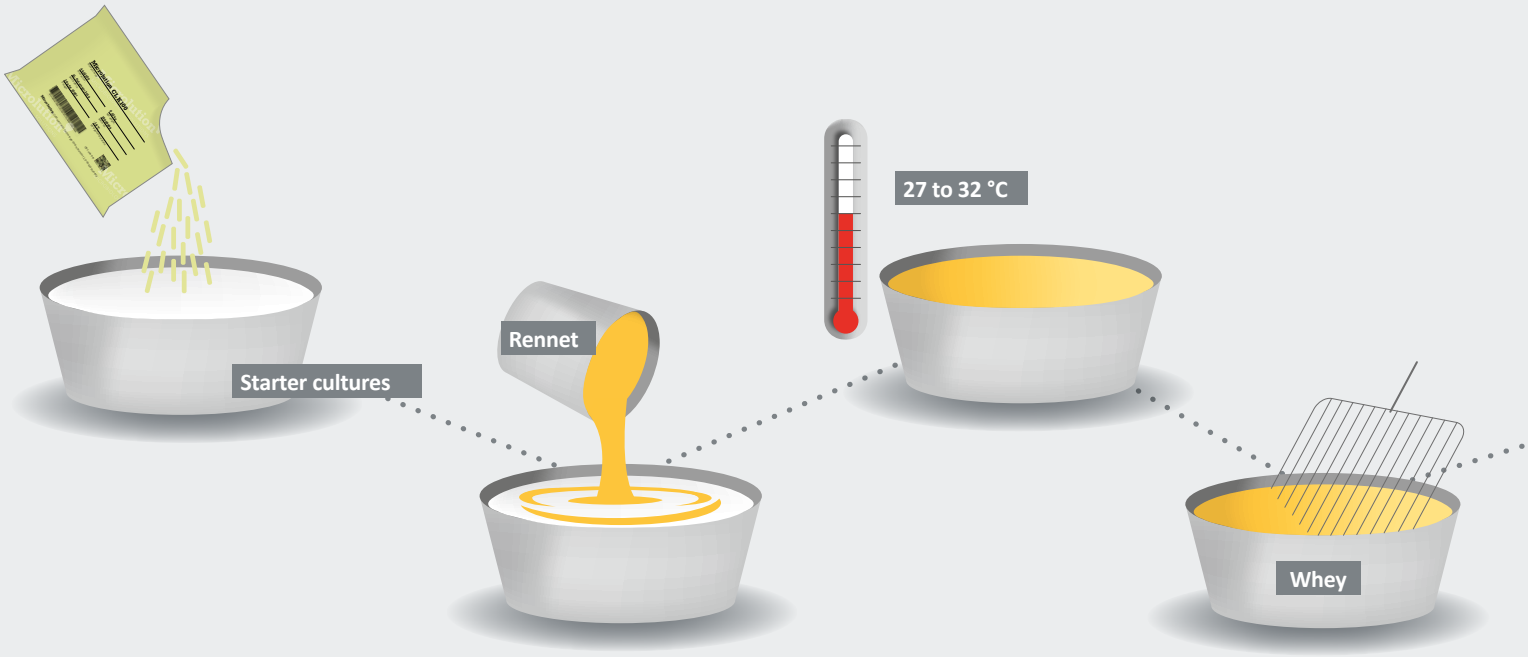
After the addition of lactic acid bacteria to pasteurised or homogenised milk, the milk is thickened after some time due to the flocculation of the casein and the curdled milk becomes sour milk. The added lactic acid cultures are mesophilic (preferred temperature between 22 and 28 °C) and lead to coagulation of the milk over a period of 15-20 hours.

WHEY DRINK

The sweet whey from the cheese dairy is pasteurised and cooled to 22-28 °C. This is the optimal temperature for mesophilic bacteria. Acidification with pH values between 4.40 and 4.30 occurs over a period of about 16 to 18 hours after adding the cultures.



FROM MILK TO CHEESE



1. CURDLING

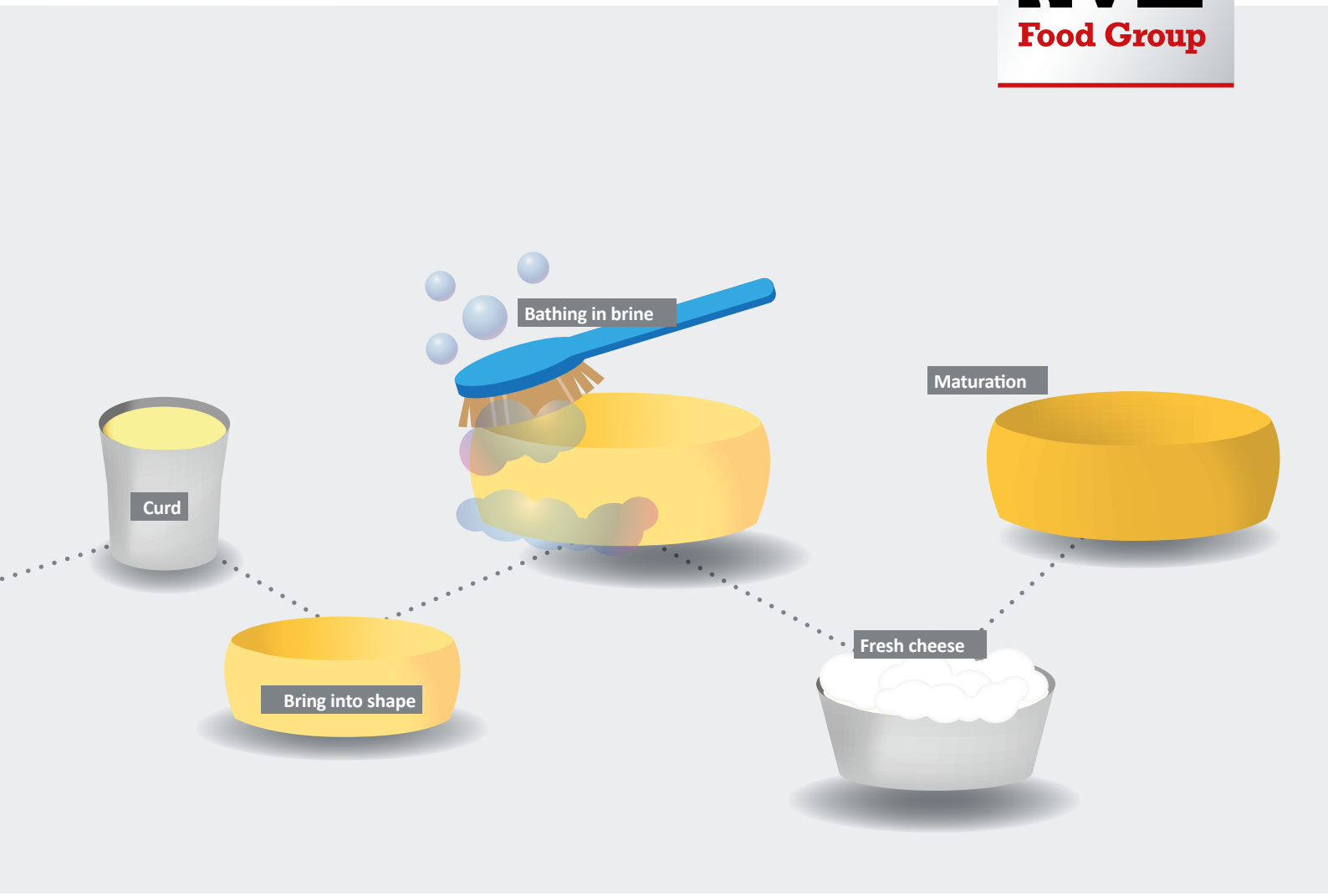
Depending on the milk used (raw milk, filtered, strained or pasteurised milk), selected **starter cultures** are added and pre-maturing takes place. By adding **rennet**, the coagulation process begins and the milk curdles

2. COAGULATION

Coagulation varies between 30 minutes and several hours depending on the type of cheese. The temperature, which usually lies **between 27° C and 32 °C**, has an additional influence. The product resulting from the coagulation process is also called “curd”

3. CURD AND SEPARATION OF THE WHEY

As soon as the “curd” has reached the right consistency or firmness, it is cut into pieces of different sizes depending on the type of cheese. The size of the crushed curd has a direct effect on the hardness of the finished cheese. The finer the **curd** is crushed, the more **whey** can settle and the harder the finished cheese becomes.



4. MOULDS AND FINAL WHEY REMOVAL

If the curd reaches the desired consistency, the mass is filled into **variety-specific moulds** and the remaining whey is separated from the curd through various processes such as draining, turning or pressing.

5. BATHING IN BRINE

Another important step is **bathing in brine**. This serves to keep away unwanted and harmful bacteria and to develop the formation of the rind.

This process is used for almost all types of cheese, except **fresh cheese**.

6. MATURATION

This final step gives each cheese its very special character and contributes to the unmistakable taste of each variety. The cheese may rest during the **maturing process**. In special ripening chambers, which provide the required temperature and humidity, the loaves can be turned regularly and treated as required. During this period, which can last from a few days to weeks and months to years, the cheese develops its full aroma.

ALL CHEESE, RIGHT?

CHEDDAR

Cheddar cheese originally comes from the county of Somerset in the south west of England and is a semi-hard or hard cheese.

The production of cheddar has a long tradition and is often referred to as “cheddaring”. The raw milk or pasteurised milk is heated to 29-31°C and then coagulated by adding rennet and starter cultures over a period of 30-40 minutes. The subsequent scalding reduces the curd to approx. 0.5-1.5 cm and heats it to 39 °C for 20-60 minutes. This separates the whey from the curd, which is then scooped into moulds so that the whey can drip off further.

After the curd has hardened, blocks of approx. 15 cm in length are cut, left to rest for 10 minutes and then two blocks are stacked on top of each other (“stacking the loaves”). These are also allowed to rest for 10 minutes. The stacking process is repeated until the desired height is reached (“cheddaring”).

It is important to turn the stacks regularly. Milling involves crushing the finished stacks again, stirring the curd to prevent it from sticking again and mixing in additional salt. The curd is then filled into moulds and pressed. The cheese is now allowed to mature for 1-15 months, sometimes longer.

HOW DO THE HOLES GET INTO THE CHEESE?

During maturation the starter cultures, i.e. bacteria, remain active. They form organic acids and carbon dioxide during their metabolism as metabolic products. The gas can no longer escape as a result of the curd being pressed and the firm cheese rind being formed. This creates small pea-sized holes in the cheese. Emmental is produced either from silage-free raw milk or thermally treated or pasteurised milk and contains additional propionic acid bacteria in addition to the starter cultures. These convert lactic acid into acetate, propionate and a lot of carbon dioxide. This results in significantly larger holes in the cheese and the cheese receives an additional sweet aroma.

PASTA FILATA – MOZZARELLA

Mozzarella is a traditional pasta filata cheese. The name derives from the Italian "Formaggio a pasta filata" which means "cheese with spun dough". Mozzarella is made by leaving the medium-size curd to rest for a while, then removing it from the whey and blanching it with water at a temperature of around 80 °C. The curd is easy to shape with this consistency and can be kneaded, drawn and formed into small balls. Mozzarella matures for 1-3 days and is then stored in brine or whey.

FRESH CHEESE – THE CHEESE WITHOUT MATURATION

The coagulation of fresh cheese is also obtained by using starter cultures and rennet. Fresh cheese does not undergo maturation and has a very high water content of approximately 73 % compared to other cheeses.

SOFT CHEESE

Soft cheese requires a maturing period of approx. 2-8 weeks. Depending on the type of soft cheese, maturing either takes place from the outside to the inside or takes place evenly. As the cheese matures, the quark-like consistency becomes firmer, resulting in an even, creamy-soft structure. The longer the soft cheese is allowed to mature, the more intense the aroma becomes. The surfaces of the various types of soft cheese can be provided with fungal or bacterial cultures as required.

M-CULTURE®

STARTER CULTURES FOR CHEESE

Art.-No.	Designation	Use	Description	Germs	Quantity
44.42500	**M-CULTURE® CL K 100**	Semi-hard cheese	Rotation for producing semi-hard cheese	– *Lactococcus lactis ssp. lactis* – *Lactococcus lactis ssp. cremoris* – *Lactococcus lactis ssp. lactis biovar. diacetylactis* – *Leuconostoc*	for 1.000 l
44.42501	**M-CULTURE® CL K 101**	Semi-hard cheese	Rotation for producing semi-hard cheese	– *Lactococcus lactis ssp. lactis* – *Lactococcus lactis ssp. cremoris* – *Lactococcus lactis ssp. lactis biovar. diacetylactis* – *Leuconostoc*	for 1.000 l
44.42502	**M-CULTURE® CL K 102**	Semi-hard cheese	Rotation for producing semi-hard cheese	– *Lactococcus lactis ssp. lactis* – *Lactococcus lactis ssp. cremoris* – *Lactococcus lactis ssp. lactis biovar. diacetylactis* – *Leuconostoc*	for 1.000 l
44.42503	**M-CULTURE® CL C 600**	Cheddar	For the production of cheddar	– *Lactococcus lactis ssp. lactis* – *Streptococcus thermophilus*	for 1.000 l
44.42600	**M-CULTURE® CL E 200**	Cheese with large holes/Emmental	For the production of cheese with large holes	– *Lactococcus lactis ssp. lactis* – *Streptococcus thermophilus* – *Lactobacillus delbruekii ssp. lactis* – *Lactobacillus helveticus*	for 1.000 l
44.42601	**M-CULTURE® CL G 12**	Cheese with large holes/Emmental	Propionic acid-forming culture for hole formation	– *Propionibacterium freudenreichii*	25 g
44.42700	**M-CULTURE® CL F 300**	Fresh cheese	For the production of classic fresh cheese	– *Lactococcus lactis ssp. lactis* – *Lactococcus lactis ssp. cremoris* – *Lactococcus lactis ssp. lactis biovar. diacetylactis* – *Leuconostoc*	for 1.000 l
44.42800	**M-CULTURE® CL W 400**	Soft cheese	Thermophilic culture for the production of soft cheeses with uniform maturing “according to French style”	– *Streptococcus thermophilus* – *Lactobacillus delbrueckii subspezies bulgaricus*	for 1.000 l
44.42801	**M-CULTURE® CL W 410**	Soft cheese	Mesophilic culture for the production of classic soft cheese maturing from the outside to the inside	– *Lactococcus lactis ssp. lactis* – *Lactococcus lactis ssp. cremoris* – *Lactococcus lactis ssp. lactis biovar. diacetylactis* – *Leuconostoc*	for 1.000 l
44.42900	**M-CULTURE® CL P 500**	Pasta Filiata/ Mozzarella	Rotation for producing Pasta Filiata	– *Streptococcus thermophilus*	for 1.000 l
44.42901	**M-CULTURE® CL P 501**	Pasta Filiata/ Mozzarella	Rotation for producing Pasta Filiata	– *Streptococcus thermophilus*	for 1.000 l

M-TEC® & M-SAFE®

TECHNOLOGY & SECURITY

Art.-No.	Designation	Use	Description	Quantity
44.44000	**M-TEC® AL MICRO 220 B1**	Microbial rennet	microbially produced, thermolabile coagulation enzyme (rennet substitute)	Bottle per 1 kg
44.44001	**M-TEC® AL MICRO 220 C6**	Microbial rennet	microbially produced, thermolabile coagulation enzyme (rennet substitute)	Canister per 6 kg
44.44002	**M-TEC® AL MICRO 220 C16**	Microbial rennet	microbially produced, thermolabile coagulation enzyme (rennet substitute)	Canister per 16 kg
44.44003	**M-TEC® AL REN N**	Natural rennet powder	natural calf rennet in powder form	Can per 500 g
44.44004	**M-SAFE® AL CID 500**	Natamycin	natural antimycotic for the surface treatment of cheese	Can per 500 g
44.44005	**M-SAFE® AL CID 100**	Natamycin	natural antimycotic for the surface treatment of cheese	Can per 100 g

MICROBIAL RENNET

Microbial rennet is a rennet substitute obtained from the fungus Mucor Miehei. Microbial rennet has a high thermal stability and purity, which means that it can be used for all types of cheese and that no bitter peptide formation occurs even during long maturing periods.

NATURAL RENNET POWDER

Rennet is a mixture of the enzymes chymosin and pepsin and is used to coagulate milk. Traditionally, it is obtained from the stomachs of calves, where it helps digest breast milk.

NATAMYCIN

Natamycin acts as an antimycotic through the active ingredient pimarizine, which is derived from actinobacterium *Streptomyces natalensis.* Due to its effectiveness against many types of mould and yeast, it can be used for surface treatment of hard cheese, semi-hard cheese and semi-hard cheese.

CULTURES TASTE TECHNOLOGY®

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DOWNLOAD CENTER

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