



eXact[®]
Product Range

CHR HANSEN

Improving food & health



EAT
RAGE

VEGETABLES FROM AN ITALIAN

FRANSK
DANSK

VOLGA
wineward



Welcome to Chr. Hansen!

Since 1874, Chr. Hansen has worked to help dairy companies worldwide produce high-quality fresh dairy and cheese products. Today, Chr. Hansen is the leading global supplier of dairy cultures. We continuously engage in dialogue with our customers to ensure they have the help and inspiration they need to select the best ingredients for the foods they produce. Our customers' needs are our top priority and the driving force behind our work in research and development.

In this brochure, we provide an overview of the eXact® culture range for mesophilic dairy applications such as sour cream, kefir and quark. If further guidance is needed, please contact your local Chr. Hansen representative or local sales agent.





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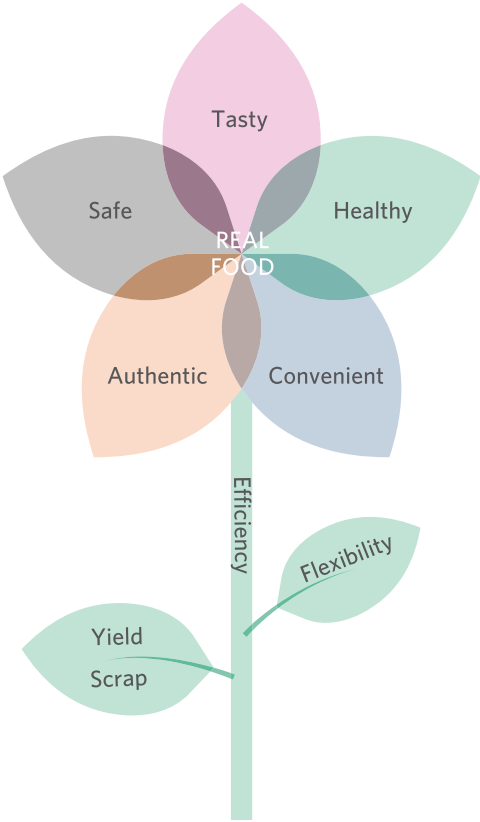
- › Addressing dilemmas in the food industry with eXact® cultures
- › A full culture range dedicated to mesophilic dairy applications
- › eXact® cultures for fermented milk and cream
 - › Dahi
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Chr. Hansen has identified the consumer drivers that are shaping the new food world

The world of food and health is changing. In this 'new food world,' consumers are increasingly demanding 'real food' that is transparently grown and sourced, high in quality, and reasonably priced. These values shape what Chr. Hansen has identified as the five drivers that will guide consumers as they negotiate this new landscape when making decisions about what to feed themselves and their families. These drivers comprise our 'flower framework,' which suggests that in order to remain competitive within this shifting space, producers must be able to offer food that is tasty, healthy, convenient, authentic, and safe — all while remaining affordable.

As consumer standards rise and demands increase, food producers will require more efficient solutions that increase their yield and flexibility.

Consumer drivers



Industry drivers

The pursuit of real food is a constant negotiation among the five consumer value drivers and addressing dilemmas through affordable solutions is key

- Tasty vs Healthy:** How can we make healthy products with rich flavors?
- Convenient vs Healthy:** How can we bridge the gap between convenient and "good for me"?
- Healthy vs Safe:** How can we make fresh foods and "ready-to" meal solutions safer and help consumers trust them?
- Tasty vs Safe:** How can we bring more flavor to foods in a safe way?
- Authentic vs Safe:** How can we help make authentic foods safe, and standardized food more relatable?

Fresh dairy plants are constantly challenged to find hidden pockets of value in their operations

- > How can we yield more product with the same amount of milk?
- > How can we reduce waste within supply chains?
- > How can we increase flexibility and efficiency in production?

Let us help you solve consumer dilemmas while increasing flexibility and efficiency in production

Our solutions can support your adaptation to changing market trends and consumer preferences while optimizing your production processes. The eXact® culture range enables you to solve consumer dilemmas by adding beneficial characteristics to your products and eliminating unfavorable ones.

Benefits of using the eXact® culture range include:

Add in

- › Taste
- › Texture
- › Appearance
- › Shelf life
- › Health benefits
- › Consistent pH
- › Yield



Take out

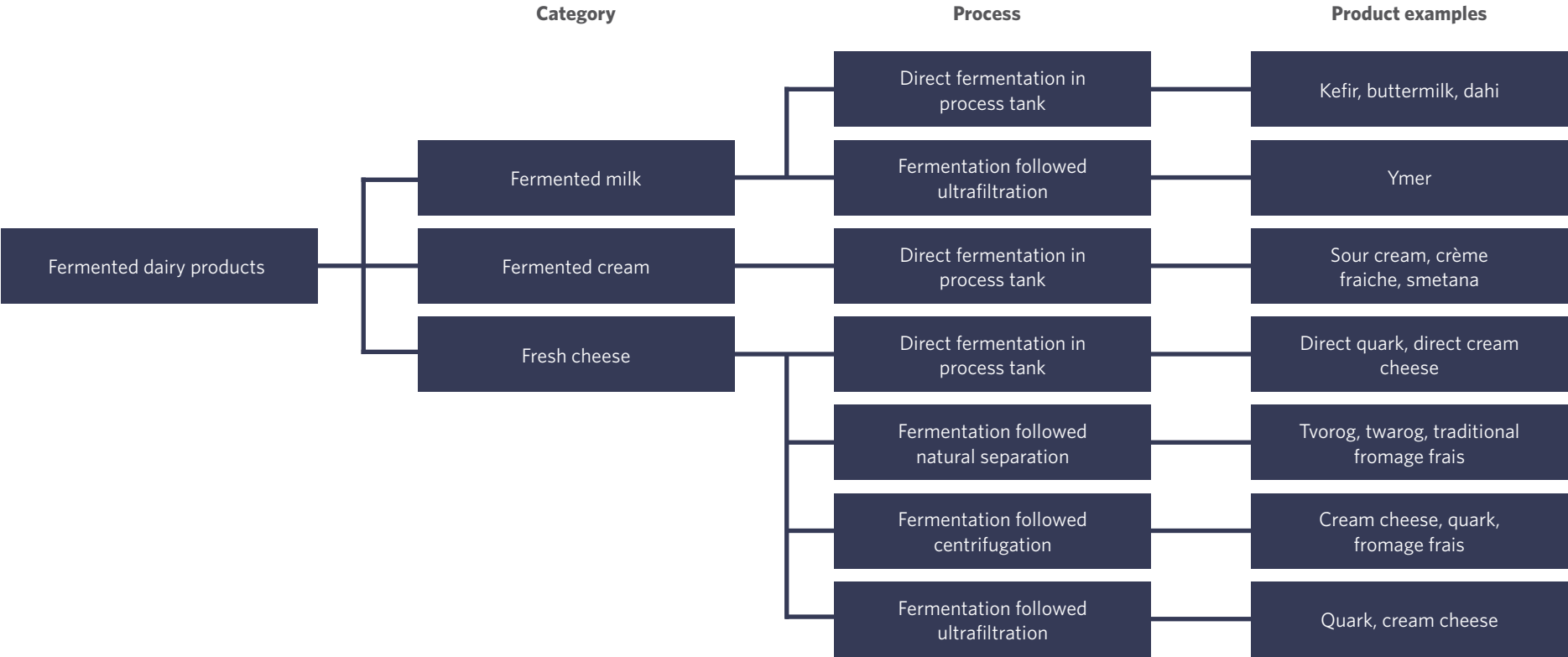
- › Sugar
- › Fat
- › Texturizers & Stabilizers
- › Milk powder
- › Preservatives



The eXact® culture range is dedicated to mesophilic dairy applications

The eXact® culture range is a series of highly concentrated cultures specifically developed for mesophilic fermented milk applications.

Typical examples of mesophilic fermented milk applications according to product category and processing conditions



In the following sections, we provide an overview of the eXact® culture range applied to a selection of product types.



Fermented milk and cream

- › Dahi
- › Sour cream
- › Kefir
- › Buttermilk

Selecting the right culture

The choice of culture for a given fermented milk or cream application depends on the final product type, the process and sensory properties preferred by the producer.

The mesophilic flavor intensity is closely linked to the level of flavor compounds produced during fermentation, and the textural properties of the final product are primarily a result of the viscosity development by the starter culture.

Several culture series from the eXact® range are particularly recommended for fermented milk and cream applications.

Charts 1a and 2a depict the recommended cultures (based on the preferred flavor and texture properties of the final product), as well as CO₂ production during fermentation and distribution.

In Charts 1b and 2b, we categorize the recommended cultures based on the preferred acidification speed during production, as well as the textural properties of the final product.

Recipes

For specific information on how best to use our cultures, see our recipes for different types of fermented milk and cream products.

You can access the recipes directly through your local Chr. Hansen representative.

Dahi

Dahi is a fermented milk product popular in South Asian countries, such as India and Sri Lanka.

Dahi is typically made by fermenting milk with a combination of thermophilic and mesophilic cultures. The fermentation and coagulation processes take place in a retail container, such as a pouch, cup, or bucket. The coagulum is generally not broken until the product is consumed.

We recommend using eXact® Dahi 2 and 3 in combination with eXact® Curd 1 and 2 for dahi production. These cultures will deliver a fast and robust fermentation, resulting in an authentic taste and gel firmness.





Sour cream

Sour cream dates back to the first half of the twentieth century and hails from cooking traditions in Eastern Europe, Germany, Ukraine and Russia. While the original production of sour cream involved allowing fresh cream to sour naturally, modern sour cream cultures and production methods allow producers to raise the standards for high-quality sour cream by creating unique flavor and textural properties.

The eXact® culture range allows for a diverse array of flavors and textures in sour cream applications.

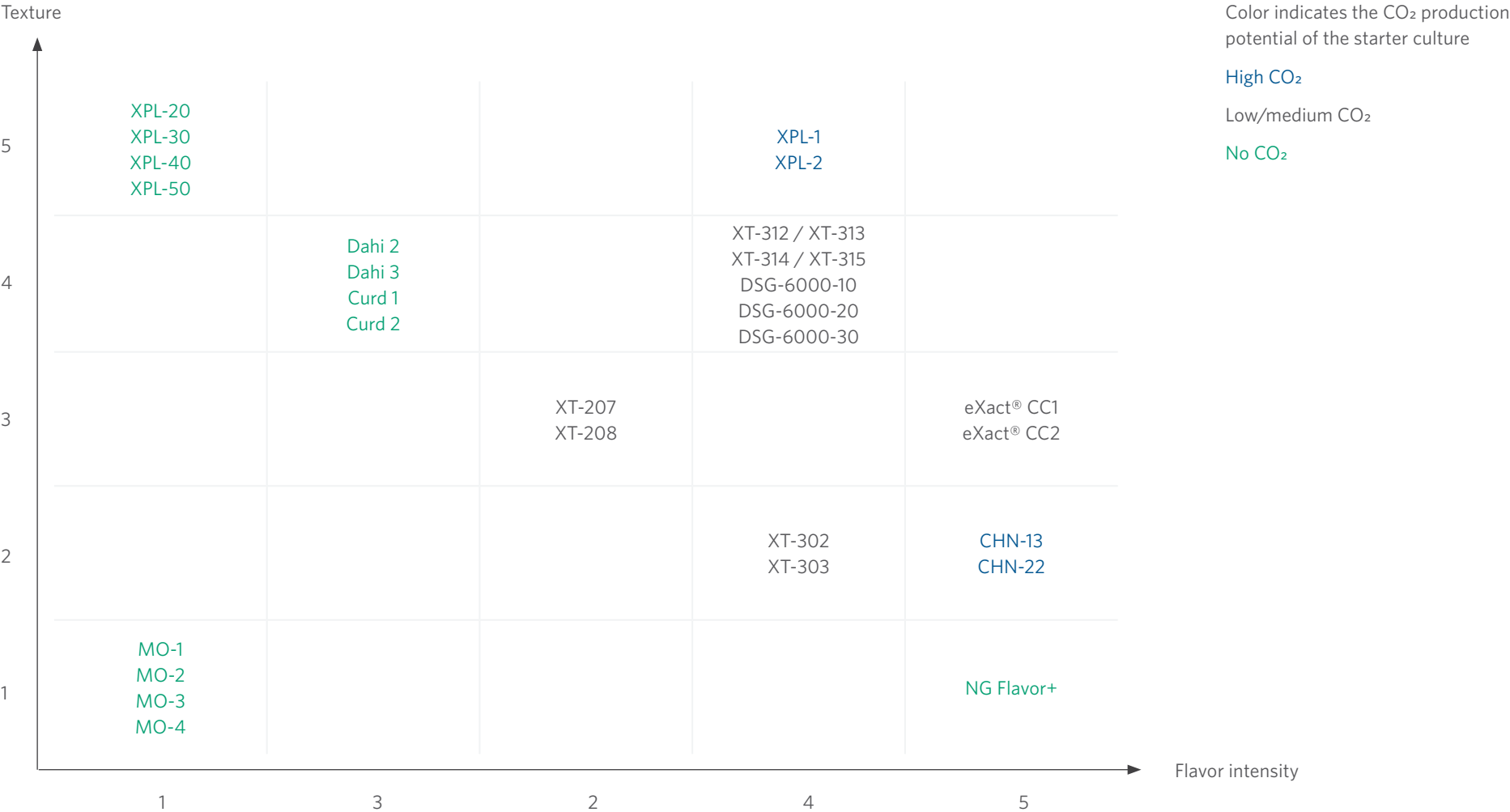
Traditionally, mesophilic flavor development in sour cream is linked to the citrate metabolism and development of CO₂ during fermentation. With eXact® NG Flavor+, however, you can enjoy flavor from diacetyl production without the CO₂ that could cause bloating of your packed fresh dairy products. Read more about our recommended cultures for specific applications in the table on the right.

Product	Product characteristic	eXact® Culture
Classic sour cream	High mesophilic flavor.	eXact® CHN-22 or CHN-13 eXact® CC1 or CC2 eXact® XT-302 or XT-303
Classic sour cream with extra texture	High mesophilic flavor with high texture.	eXact® XT-312, XT-313, XT-314 or XT-315 eXact® DSG-6000-10, DSG-6000-20 or DSG-6000-30 for a classic North America flavor eXact® XT-207 or XT-208 for a Continental “yogurt-like” flavor
Modern sour cream	Similar to classic sour cream but with even higher texture and faster fermentation time.	eXact® XPL-1 or XPL-2 Can be combined with NG Flavor+ or DSG-FLVR-1 to increase flavor production
Mild sour cream	Mild flavor generated by the culture with no CO ₂ during production or distribution.	eXact® MO-1, MO-2, MO-3, MO-4 Can be combined with eXact® NG Flavor+ to increase flavor production without CO ₂ production
Mild sour cream with very high texture	Mild flavor with very high texture generated by the culture. Fast acidification and no CO ₂ production during fermentation or distribution.	eXact® XPL-20, XPL-30, XPL-30, XPL-50 Can be combined with eXact® NG Flavor+ to increase flavor production without CO ₂ production



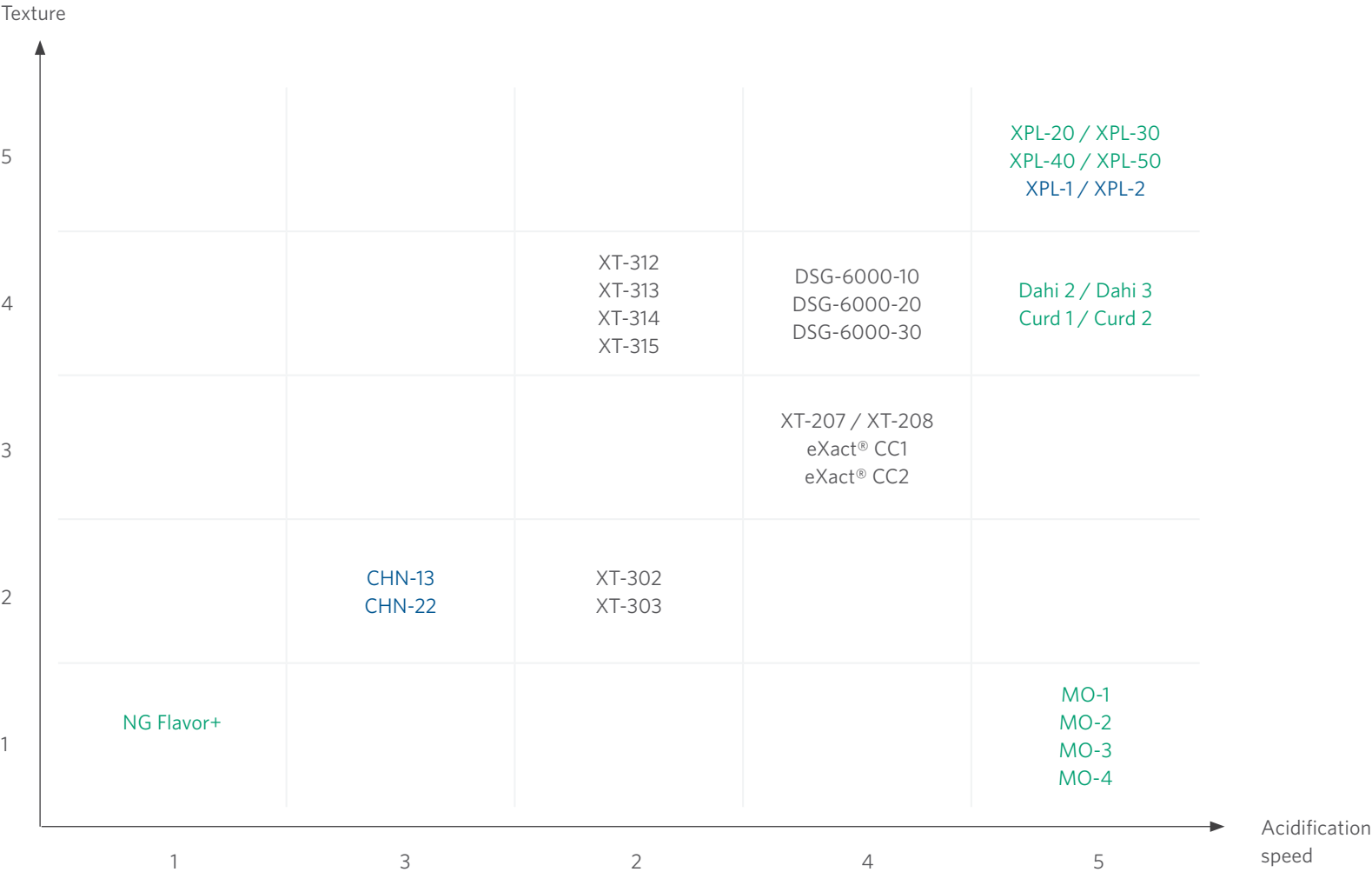
Recommended cultures for products such as sour cream and dahi based on texture and flavor preferences

Chart 1a: Texture vs. mesophilic flavor of sour cream and dahi



Recommended cultures for products like sour cream and dahi based on texture and acidification speed preferences

Chart 1b: Texture of sour cream vs. acidification speed during production of sour cream and dahi





Kefir

Kefir is a fermented milk product made using a complex mixture of lactic acid bacteria and yeast.

Kefir was originally produced with undefined grains consisting of multiple bacteria and yeast strains that were saved and reused. Early versions of kefir had a shelf life of less than two weeks, experienced significant gas formation, and had flavors that deteriorated rapidly, resulting in significant waste and disappointed consumers.

Classic kefir typically consists of starter cultures that may include the following:

- › *Lactococcus lactis* subsp. *cremoris*
- › *Lactococcus lactis* subsp. *lactis*
- › *Lactococcus lactis* subsp. *lactis* biovar *diacetylactis*
- › *Leuconostoc* spp.
- › *Streptococcus thermophilus*
- › *Debaryomyces hansenii* (yeast)

While kefir originated in Eastern Europe, modern kefir is becoming a mainstay in American and European supermarkets. In order to respect the heritage of traditional kefir and increasing consumer demand for high-quality kefir products, Chr. Hansen has developed several solutions for the kefir category, tailored to the specific product regulations and categorization approaches in different markets.

Product	Product characteristic	eXact® Culture
Classic kefir	Traditional flavor due to lactic acid bacteria and yeast.	eXact® KEFIR 1 or KEFIR 2 combined with eXact® KEFIR-12 eXact® XPL-1 or XPL-2 combined with eXact® KEFIR-12 and yeast
Mild kefir	Mild flavor adapted to the modern consumer due to the omission of yeast, but the remaining microflora resembles that of classic kefir.	eXact® XPL-1 or XPL-2 combined with eXact® KEFIR-12 eXact® XPL-30, XPL-40 or XPL-50 combined with eXact® KEFIR-12
Modern kefir	Kefir with lactic acid bacteria combined with documented probiotic strains such as nu-trish®, BB-12®, or LGG®.	eXact® KEFIR 1 or KEFIR 2 combined with eXact® KEFIR-12 and probiotics eXact® XPL-1 or XPL-2 combined with eXact® KEFIR-12 and probiotics eXact® XT-313; XT-314 or XT-315 combined with eXact® KEFIR-12 and probiotics



eXact® KEFIR 12 is a blend of 12 kinds of live and well-defined lactic acid bacteria often detected in traditional kefir made from kefir grains.

The culture contains:

1. *Bifidobacterium infantis*
2. *Bifidobacterium lactis*
3. *Lactobacillus acidophilus*
4. *Lactobacillus fermentum*
5. *Lactobacillus delbrueckii* subsp. *lactis*
6. *Lactobacillus paracasei*
7. *Lactobacillus rhamnosus*
8. *Lactococcus lactis* subsp. *cremoris*
9. *Lactococcus lactis* subsp. *lactis*
10. *Lactococcus lactis* subsp. *lactis* biovar *diacetylactis*
11. *Leuconostoc mesenteroides*
12. *Leuconostoc pseudomesenteroides*



Buttermilk

Buttermilk was traditionally a byproduct of the butter-making process that arose from leaving milk to sit, eventually allowing the cream and buttermilk to separate. From there, lactic acid bacteria fermented the milk and began the butter churning process. The final products were a rich, creamy butter and a flavorful, nutritious buttermilk. In Denmark, a country with a long history of producing high-quality butter enjoyed worldwide, buttermilk became a healthy, safe, and beloved dairy product.

Today, buttermilk is made from pasteurized milk and inoculated with cultures such as eXact® to simulate the fermentation that occurred naturally in traditional buttermilk. Buttermilk comes in many varieties and is used in cooking, traditional dishes (such as the Danish “koldskål”), as well as in modern dishes enjoyed today. In the table to the right, we highlight the recommended cultures for production, depending on the type of buttermilk preferred.

Product	Product characteristic	eExact® Culture
Classic buttermilk	High mesophilic flavor.	eExact® CHN-22 or CHN-13 eExact® XT-302 or XT-303 eExact® CH-BAN-1
Modern buttermilk	High mesophilic flavor and high texture.	eExact® XT-312; XT-313; XT-314 or XT-315 eExact® DSG-6000-10; 20 or 30
Mild buttermilk	Mild flavor and no CO ₂ production during fermentation or distribution.	eExact® MO-1; MO-2, MO-3 or MO-4 combined with eExact® NG Flavor+ eExact® XPL-30; XPL-40 or XPL-50 combined with eExact® NG Flavor+
New Nordic buttermilk	Mesophilic flavor and very high texture and fast acidification.	eExact® XPL-1 or XPL-2



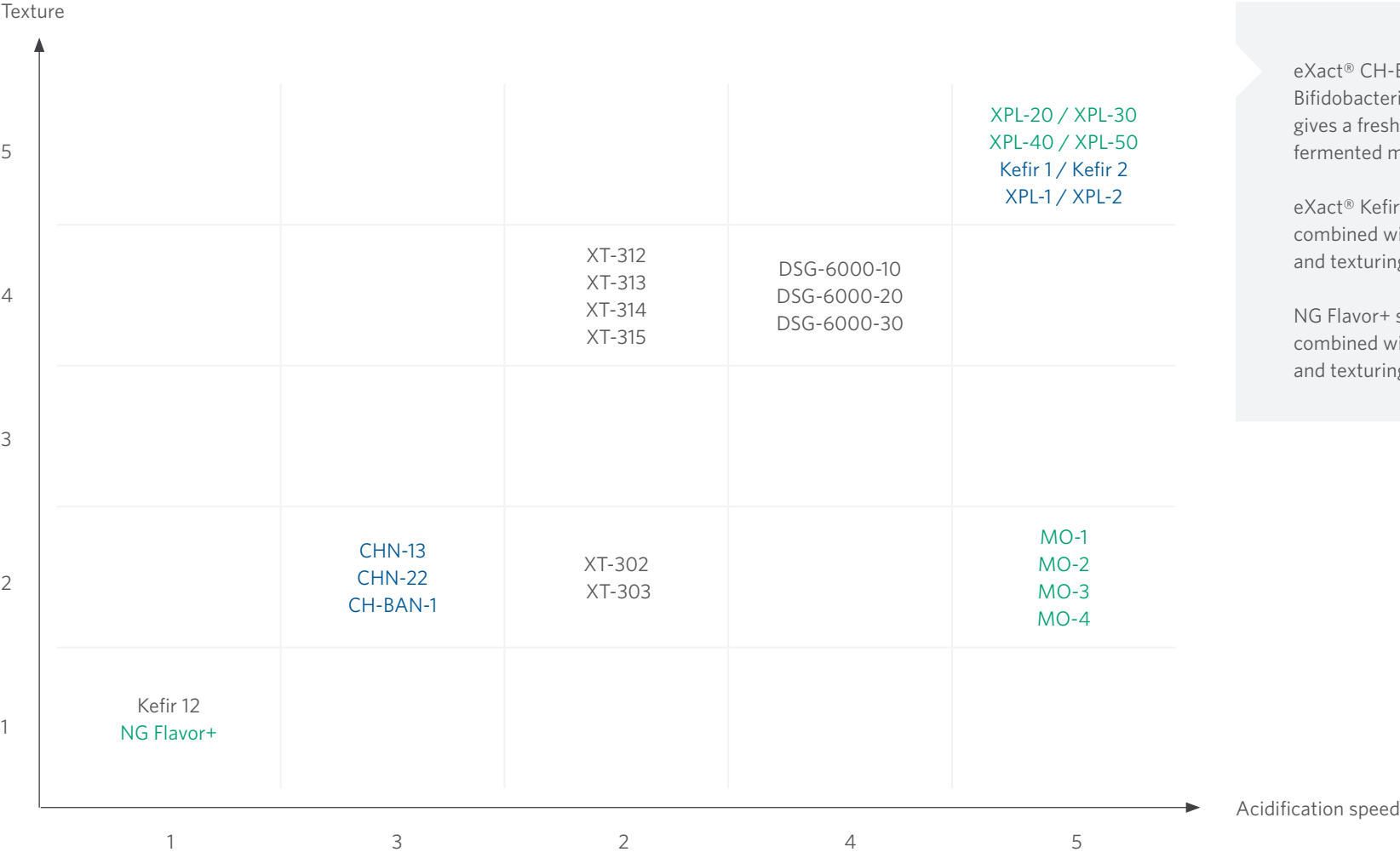
Recommended cultures for fermented milk products, such as kefir and buttermilk, based on texture and flavor preferences

Chart 2a: Texture vs. mesophilic flavor of fermented milk products (such as kefir and buttermilk)



Recommended cultures for fermented milk products, such as kefir and buttermilk, based on texture and acidification speed preferences

Chart 2b: Texture of fermented milk products (such as kefir and buttermilk) vs. acidification speed during production



eExact® CH-BAN-1 contains Bifidobacterium, BB-12® that gives a fresh flavor to the fermented milk.

eExact® Kefir 12 should be combined with an acidifying and texturing starter culture.

NG Flavor+ should be combined with an acidifying and texturing starter culture.



Fresh cheese

- › Cream cheese
- › Quark and fromage frais
- › Tvorog

Selecting the right culture

As with other fermented milk products, the choice of culture for a given fresh cheese application depends on the final product type, the process and sensory properties preferred by the producer.

The mesophilic flavor intensity is closely linked to the level of flavor compounds produced during fermentation. The textural properties are primarily a result of the viscosity development by the starter culture in the final product.

Several culture series from the eXact® range are specifically recommended for fresh cheese applications.

Chart 3a depicts the recommended cultures based on the preferred flavor and texture properties of the final product as well as the CO₂ production anticipated during fermentation and distribution.

Chart 3b lists the cultures we suggest based on the preferred textural properties of the final product and the acidification speed during production.

Recipes

For more specific information on the different applications of our cultures, we provide recipes for different types of fresh cheese, such as cream cheese and quark.

You can access our recipes directly through your local Chr. Hansen representative.

Cream cheese

Classic cream cheese, with its mildly acidic flavor and smooth texture, is widely popular for a great number of applications, such as in spreads, toppings, dips, sauces, and in baking. Cream cheese is a category that continues to renew itself with exciting product innovations.

Production of cream cheese either employs the traditional method—in which the cream is acidified and heated for whey drainage—or involves centrifugation and ultra-filtration.

We recommend using eXact® CC1 and CC2 cultures for making cream cheese, both of which enable fast acidification at low temperatures and offer high flavor production.

For producers seeking a more mild flavor, we recommend the eXact® XT-207 or XT-208 cultures. In particular, we have found these cultures to be well-suited to the flavor preferences within the Chinese market.





Quark

Quark is a strained fresh dairy product that comprises a traditional element of Nordic, German and Central and East European cuisine. Quark is a general term for fresh cheese produced by fermenting milk before separating it through centrifuge, ultrafiltration, or similar methods. Traditionally, quark is made from warming soured milk or cream until the desired texture is met before straining it to yield the final product. Quark can be considered a North and East European equivalent to the strained yogurts found in Greek, Turkish and Bulgarian cuisines.

Quark can also be produced by the direct fermentation of an already-concentrated or fortified milk base, and this category includes products such as fromage frais, fromage blanc, petit Suisse, and tvorog.

On the next page, we list the recommended cultures for producing different types of quark.

Product	Product characteristic	eXact® Culture
Classic quark	High mesophilic flavor.	eXact® CHN-22 or CHN-13 eXact® CC1 or CC2 eXact® XT-207 or XT-208 eXact® XTQ-1, XTQ-2 or XTQ-3
Modern quark	High mesophilic flavor with high texture.	eXact® XPL-1 or XPL-2 Can be combined with NG Flavor+ or DSG-FLVR-1 to increase flavor production
Mild quark	Mild quark with fast acidification and no CO ₂ production during fermentation or distribution.	eXact® XPL-20, XPL-30, XPL-40 or XPL-50 eXact® MO-1, MO-2, MO-3 or MO-4 eXact® T-04004 or T-104004 eXact® ST-39 Can be combined with eXact® NG Flavor+ to increase flavor production without CO ₂ production





Tvorog

Tvorog is a fermented milk product popular in Russia, as well as in Central and Eastern Europe. It is a high-protein, low-fat milk product without added salt that can be used in a variety of dishes and meals eaten throughout the day.

Originally, tvorog was a product that farmers produced at home. It was easy, quick, and cheap to make, but home production came with a high risk of contamination.

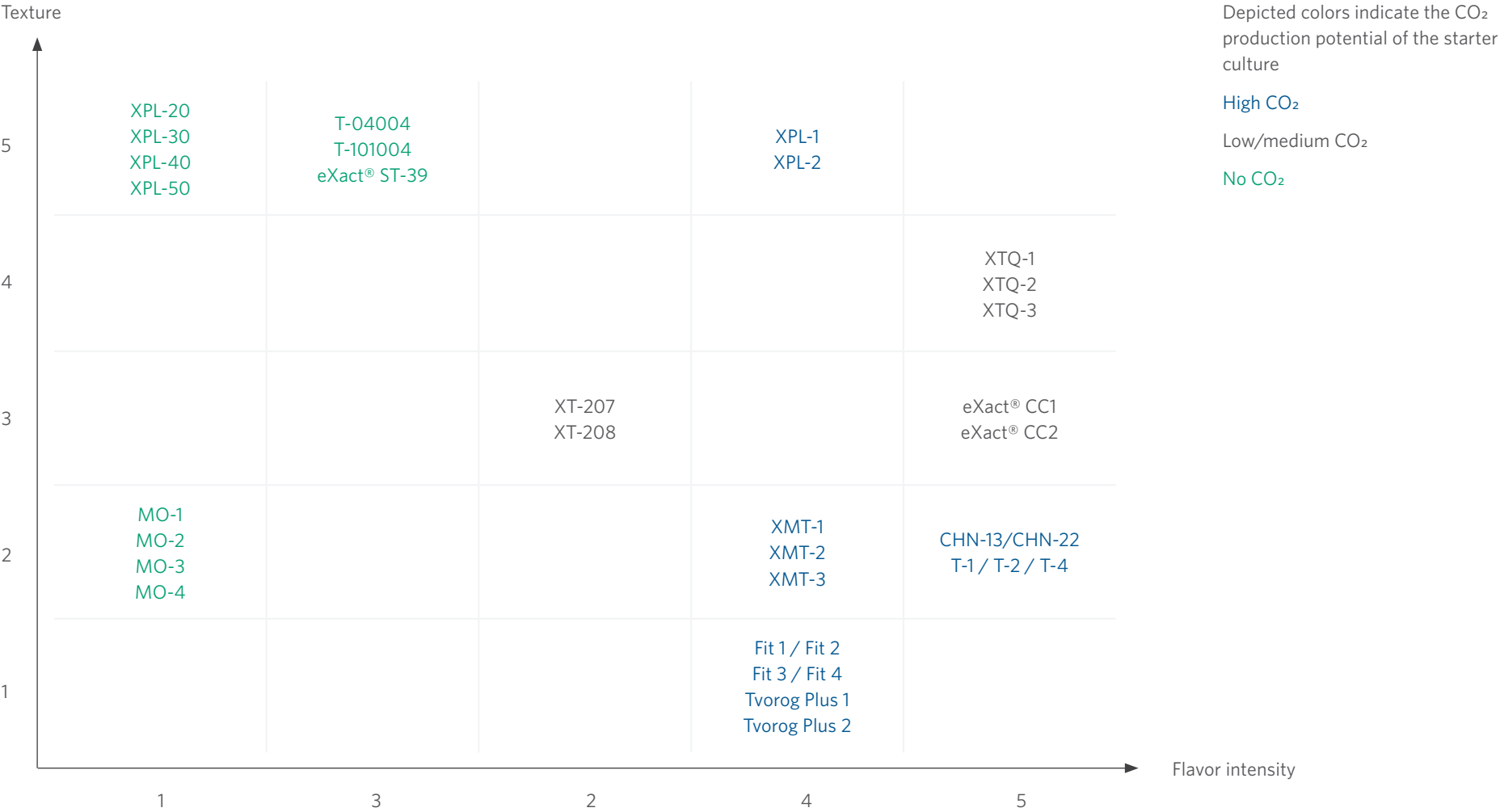
Today, modern dairy cultures and production methods make it easy to produce safe, authentic, and tasty tvorog.

Product	Product characteristic	eXact® Culture
Traditional tvorog	High mesophilic flavor.	eXact® CHN-22 or CHN-13
Modern tvorog	High mesophilic flavor, low post-acidification and no bitterness during shelf life.	eXact® T-1, T-2 or T-4
Efficient tvorog	High yield, fast acidification and high quality.	eXact® Fit 1, Fit 2, Fit 3 or Fit 4 eXact® Tvorog Plus 1 or Tvorog Plus 2 eXact® XMT-1, XMT-2 or XMT-3



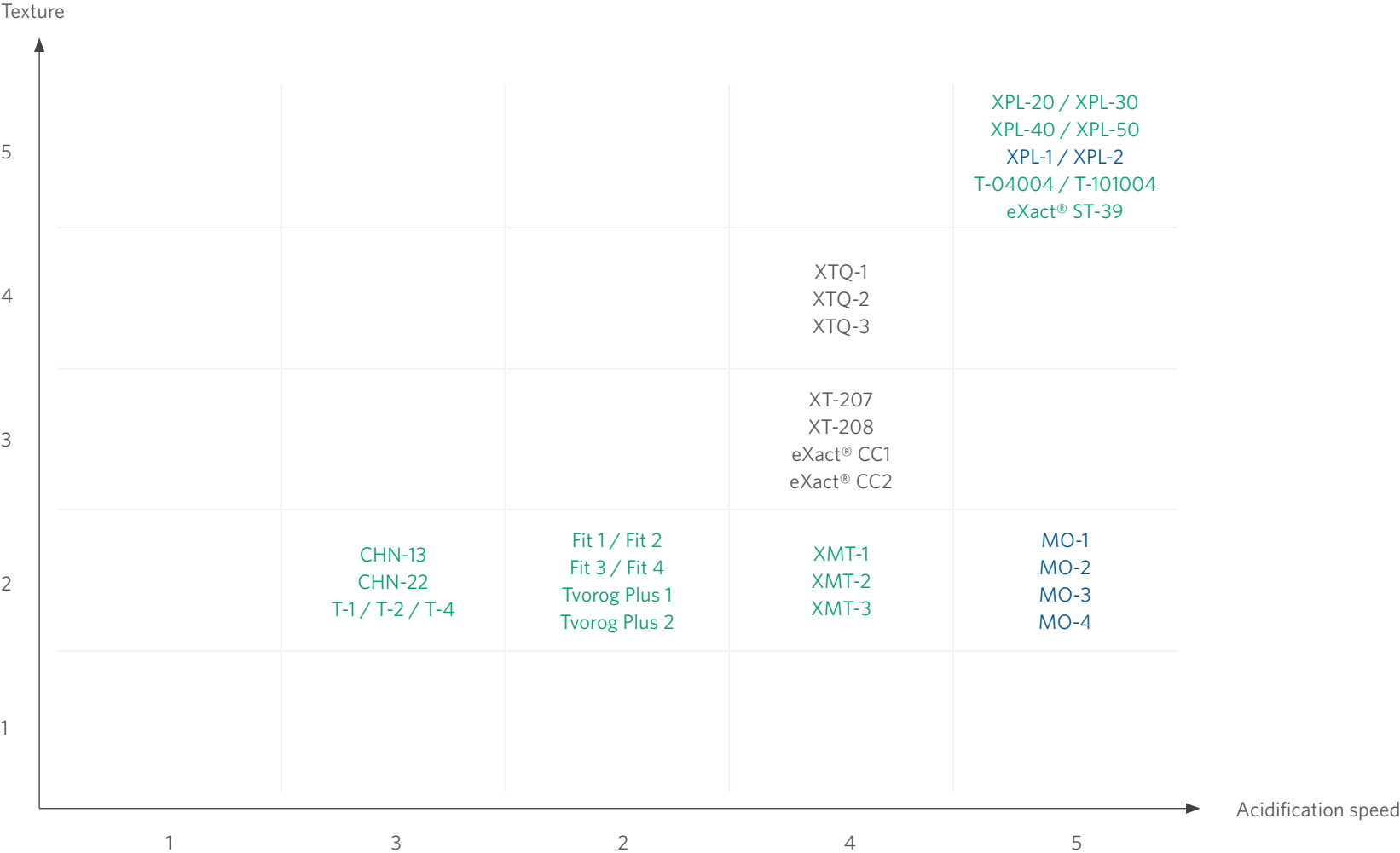
Recommended cultures for fresh cheese products, such as cream cheese, quark and tvorog, based on texture and flavor preferences

Chart 3a: Texture vs. mesophilic flavor of fresh cheese



Recommended cultures for fresh cheese products, such as cream cheese, quark and tvorog, based on texture and acidification speed preferences

Chart 3b: Texture of fresh cheese vs. acidification speed during production



The eXact® culture range summary part 1

DVS® cultures

Culture name	Culture composition								Culture performance					F-DVS®	FD-DVS®
	L. lactis subsp. cremoris/lactis	Leuconostoc sp.	L. lactis subsp. Lactis biovar diacetylactis	S. thermophilus	Bifidobacterium	Lb. rhamnosus	Lb. paracasei	Debaryomyces hansenii	Fermentation speed	Texture	Post acidification	Flavor	CO ₂ production	GIN ¹	GIN
CC1	◆	◆	◆						4	2	2	5	2	711810	
CC2	◆	◆	◆						4	2	2	5	2	713309	
CH-BAN-1	◆	◆	◆		◆				1	2	2	4	4	704760	
CHN-13	◆	◆	◆						2	2	2	5	4	704787	
CHN-22	◆	◆	◆						2	2	2	5	4	704759	100162 (20x500U); 100128 (25x200U); 713492 (30x50U)
Curd 1	◆	◆	◆	◆					5	4	3	2	1	-	720172 (25x200U)
Curd 2	◆	◆	◆	◆					5	4	3	2	1	-	720173 (25x200U)
Dahi 2	◆			◆					5	4	3	3	1	-	706272 (25x200U); 718345 (30x50U)
Dahi 3	◆			◆					5	4	3	3	1	-	717445 (25x200U); 718346 (30x50U)
DSG-6000-10	◆	◆							4	4	3	3	1	713786	
DSG-6000-20	◆	◆							4	4	3	3	1	713787	
DSG-6000-30	◆	◆							4	4	3	3	1	713438	
Fit 1	◆	◆	◆						2	1	2	4	4	706360	
Fit 2	◆	◆	◆						2	1	2	4	4	706361	
Fit 3	◆	◆	◆						2	1	2	4	4	708959	
Fit 4	◆	◆	◆						2	1	2	4	4	720131	
KEFIR 1	◆	◆	◆	◆				◆	4	5	2	4	4	-	715671 (25x100U)
KEFIR 2	◆	◆	◆	◆				◆	4	5	2	4	4	-	715672 (25x100U)
KEFIR 12	◆	◆	◆	◆	◆	◆	◆	◆	1	1	1	3	2	713005	
MO-1	◆								5	1	2	1	No	704904	
MO-2	◆								5	1	2	1	No	704930	
MO-3	◆								5	1	2	1	No	704706	
MO-4	◆								5	1	2	1	No	710397	
ST-39				◆					4	5	2	2	No	710398	

1 Pack sizes are 10X500U unless otherwise specified.

The eXact® culture range summary part 2

DVS® cultures

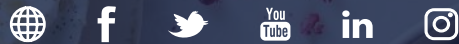
Culture name	Culture composition									Culture performance					F-DVS®	FD-DVS®
	L. lactis subsp. cremoris/lactis	Leuconostoc sp.	L. lactis subsp. Lactis biovar diacetylactis	S. thermophilus	Bifidobacterium	Lb. rhamnosus	Lb. paracasei	Debaryomyces hansenii	Fermentation speed	Texture	Post-acidification	Flavor	CO ₂ production	GIN ¹	GIN	
T-04004				◆					5	5	2	2	No	704789		
T-101004				◆					5	5	2	2	No	704794		
T-1	◆	◆	◆						1	2	1	4	4	709767		
T-2	◆	◆	◆						1	2	1	4	4	709769		
T-4	◆	◆	◆						1	2	1	4	4	714032		
Tvorog Plus 1	◆	◆	◆						2	1	2	4	4	719919 (16x250U)		
Tvorog Plus 2	◆	◆	◆						2	1	2	4	4	719920 (16x250U)		
XMT-1	◆	◆	◆	◆					4	2	3	4	5	-	698306 (25x250U)	
XMT-2	◆	◆	◆	◆					4	2	3	4	5	-	698305 (25x250U)	
XMT-3	◆	◆	◆	◆					4	2	3	4	5	-	698303 (25x250U)	
XO-1	◆	◆	◆						2	2	2	5	4	-	711934 (25x200U)	
XPL-1	◆	◆	◆	◆					5	5	2	4	4	704770	677788 (20x500U); 677787 (25x200U); 713604 (30x50U)	
XPL-2	◆	◆	◆	◆					5	5	2	4	4	704771	694996 (20x200U); 713608 (30x50U)	
XPL-20	◆			◆					5	5	2	1	No	-	686214 (25x200U)	
XPL-30	◆			◆					5	5	2	1	No	705345	707763 (25x200U); 713627 (30x50U)	
XPL-40	◆			◆					5	5	2	1	No	710997	709680 (25x200U)	
XPL-50	◆			◆					5	5	3	1	No	716511		
XT-207	◆		◆						4	3	3	3	2	704788		
XT-208	◆		◆						4	3	3	3	2	704791		
XT-302	◆	◆	◆						2	2	2	4	3	704763		
XT-303	◆	◆	◆						2	2	2	4	3	704767		
XT-312	◆	◆	◆						2	4	2	4	3	704765		
XT-313	◆	◆	◆						2	4	2	4	3	704768		
XT-314	◆	◆	◆						2	4	2	4	3	704769		
XT-315	◆	◆	◆						2	4	2	4	3	713135		
XTQ-1	◆	◆	◆						4	4	2	5	2	704792		
XTQ-2	◆	◆	◆						4	4	2	5	2	704793		
XTQ-3	◆	◆	◆						4	4	2	5	2	704795		
eXact® NG Flavor+						◆	◆		1	1	2	5	No	712710 (15x500U)		
DSG-FLVR-1		◆	◆						1	1	1	4	4	704779 (16x250U)		
CAF		◆							1	1	1	4	4	704780		
HB-3	◆								3	4	2	2	No	704766		

Chr. Hansen Experts for the dairy industry

Chr. Hansen believes in improving the quality of food and health. We believe the best results are achieved when working closely with you. Our experienced application and industry specialists provide you with the knowledge, inspiration, support, and customized solutions you need to be successful.

Contact your local Chr. Hansen representative to learn more about how we can work together to find the perfect solution for you.

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CHR HANSEN

Improving food & health