

Technical Memorandum

TM 2074-1e

HOLDBAC™ YM Protective Cultures – a natural way to control yeast and mould growth in fresh fermented dairy products

DANISCO

HOLDBAC™ Protective Cultures comprise strains of bacteria that have been specially selected and developed for their ability to control the growth of pathogenic and/or spoilage micro-organisms in fermented foods. Bacteria have a long history of safe use as food ingredients and, in some cases, may enhance the sensory characteristics of the finished product.

The bacteria used in HOLDBAC™ YM Protective Cultures have a specific inhibitory effect on yeasts and moulds and are designed for use in fresh fermented dairy products such as yogurt, sour cream, sour milk, fresh cheese and cottage cheese.

BENEFITS OF HOLDBAC™ YM

Safe and natural solution

One of the advantages of protective cultures is that micro-organisms are perceived in the dairy industry as a technical prerequisite. Either they do not have to be declared at all or, if they do, they can be declared as starter cultures, which are recognised as safe.

They can replace chemical food protection solutions such as potassium sorbate, which can have a negative impact on organoleptic qualities and may delay fermentation.

Shelf life extension or maintenance

HOLDBAC™ YM cultures guard against a diversity of yeasts and moulds, making fresh fermented dairy products less susceptible to spoilage during their shelf life, reducing potential consumer returns and protecting the brand image. Shelf life can even be extended, facilitating distribution over long distances and allowing the



production of larger batches. As a result, overall costs are reduced.

Other advantages

- Easy handling
- Texture improvement under certain conditions



Figure 1. Visual assessment of HOLDBAC™ YM benefit (picture taken during one of Danisco's challenge studies).

PRODUCT DESCRIPTION

The HOLDBAC™ YM range consists of natural strains that have not been subject to any genetic modification as defined by European Directive 2001/18/EC. They have been selected for their technological qualities from a large number of strains, as documented by the following literature:

- T.H. Suomalainen, A.M. Mäyrä-Mäkinen: Lait (1999) 79, 165 pp
- A.M. Mäyrä-Mäkinen, T.H. Suomalainen: United States Patent US 5 378 458, 1995
- S. Miescher-Schwenninger, L. Meile: European patent application. Publication N° EP 1308506
- S. Miescher-Schwenninger, L. Meile: System Appl. Microbiol. (2004) 27, 229 pp

Culture composition

CULTURE	COMPOSITION
HOLDBAC™ YM-B	<i>Propionibacterium freudenreichii</i> subsp. <i>shermanii</i> <i>Lactobacillus rhamnosus</i>
HOLDBAC™ YM-C	<i>Propionibacterium freudenreichii</i> subsp. <i>shermanii</i> <i>Lactobacillus paracasei</i>



Figure 2. Microscopy picture of HOLDBAC™ YM-B (x 1000).

Dosage and addition

HOLDBAC™ YM cultures are available in frozen concentrated and freeze-dried forms for direct milk inoculation. No adjustment of the manufacturing process is required prior to use. The cultures are simply added to the process milk together with the starter culture used for fermentation.

The recommended dosages are shown in table 1.

FUNCTIONALITY

The basic functionality of HOLDBAC™ YM is to control the growth of yeasts and moulds. This is based on two main mechanisms:

- the formation of fermentation products active against yeasts and moulds such as organic acids (L+lactic acid, acetic acid, propionic acid, etc.)
- competitive exclusion by reducing the availability of nutrients and oxygen required by yeasts and moulds

Various factors influence culture activity, as illustrated by application results

- initial level of contamination
- contaminant species
- fermentation time
- storage conditions (temperature) of the final product

APPLICATION

The application of HOLDBAC™ YM in fresh fermented dairy products has been extensively tested by several challenge tests, both internal and external. Similar results have been obtained in all types of fresh fermented products (figures 3 to 8).

The cultures are also tested using the YO-RAPID test developed by Danisco to enable fast determination of the cultures' activity against different mould species. This new method not only makes it possible to standardise inhibition potential but also to check the effect of inhibition on customer-specific mould contaminants.

In addition, Danisco offers application support to help customers find the optimal solution that will secure high quality fresh fermented milk products.

SUMMARY OF BENEFITS

- Growth control of yeasts and moulds
- Can be labelled as a culture
- Shelf life improvement or extension
- Alternative to chemical food protection solutions
- Easy handling
- Cost reduction
- Opportunities for texture improvement

DO SAGE IN DCU/100L MILK	YOGURT	SOUR CREAM	FRESH CHEESE
HOLDBAC™ YM-B	10-50DCU	10-50DCU	10-50DCU
HOLDBAC™ YM-C	10DCU	10-30DCU	10DCU

10DCU = Danisco Culture Unit, representing standardised culture activity. 10 DCU is standardised to control mould growth in 100kg process milk under defined conditions.

Table 1. Recommended dosages of HOLDBAC™ YM-B and HOLDBAC™ YM-C in yogurt, sour cream and fresh cheese.

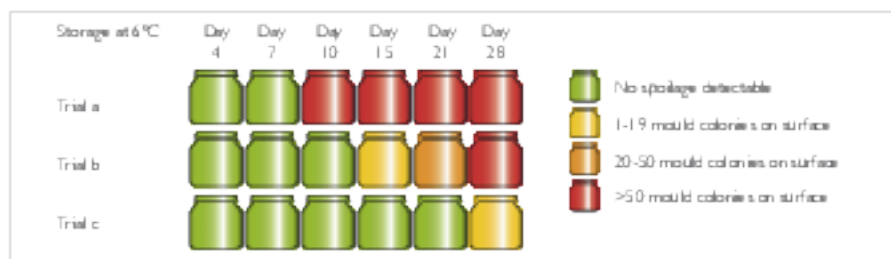


Figure 3. Influence of the fermentation time on HOLDBAC™ YM activity. Challenge test with mould pool inoculated at 1800 spores/ml.

Trial a = YO-MIX™ 500 series or 400 series as reference

Trial b = YO-MIX™ 500 series + HOLDBAC™ YM

Trial c = YO-MIX™ 400 series + HOLDBAC™ YM

HOLDBAC™ YM shows higher inhibition effect in combination with mild yogurt cultures due to longer fermentation time.



Figure 4. Influence of the storage temperature on HOLDBAC™ YM activity. Challenge test with mould pool inoculated at 1800 spores/ml.

Trial a = YO-MIX™ 400 series as reference at 10°C

Trial b = YO-MIX™ 400 series as reference at 6°C

Trial c = YO-MIX™ 400 series + HOLDBAC™ YM at 6 and 10°C

HOLDBAC™ YM improves shelf life even at mild abuse temperature.

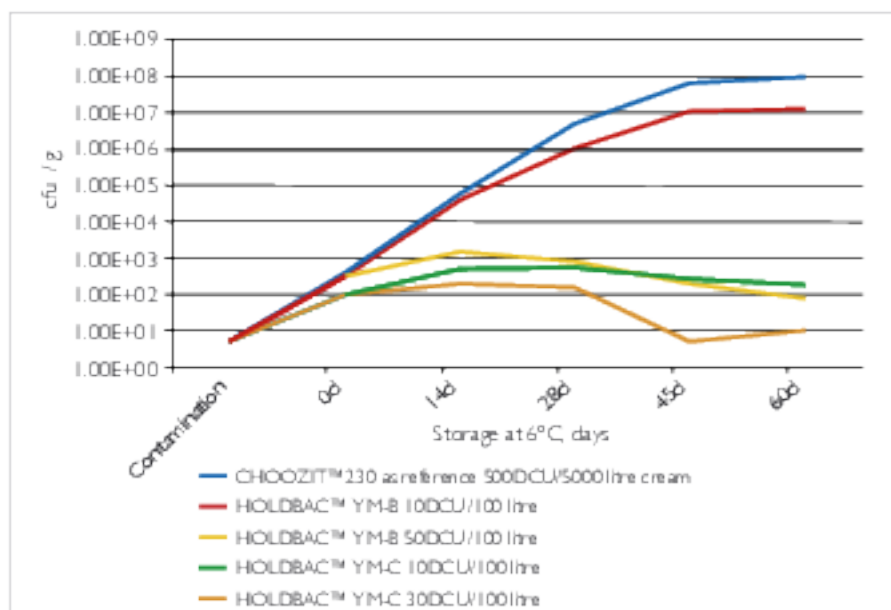


Figure 5. HOLDBAC™ YMs activity against yeasts in sour cream, 18% fat. HOLDBAC™ YM-C 10 DCU shows same activity as HOLDBAC™ YM-B 50 DCU.

GENERAL MARKET INFORMATION

HOLDBAC™ YM-B and HOLDBAC™ YM-C are a natural way to satisfy the needs of the fresh fermented dairy industry, enabling:

- the development of more complex and convenient products (including muesli, exotic fruits, etc.)
- the development of new innovations such as aerated products
- sales through long and complex supply chains
- targeted products for consumption throughout the day

All these changes increase the risk of contaminant growth and shorten shelf life. Manufacturers seek solutions that can help them maintain the good organoleptic qualities of their products throughout shelf life or, even better, over an extended shelf life. On top of that, consumers all over the world ask for natural ingredients, alternatives to chemicals and more focus on health and wellness.

That makes HOLDBAC™ YM Protective Cultures the ideal solution for controlling the growth of yeasts and moulds in fresh fermented dairy products. They can also be combined with probiotic cultures.

LEGAL STATUS

Protective cultures can be declared as starter cultures. The only restriction for use could be in yogurt applications in countries where yogurt is defined by national standards.

As yogurt standards may vary from country to country, local regulations should always be consulted before applying HOLDBAC™ YM Protective Cultures.

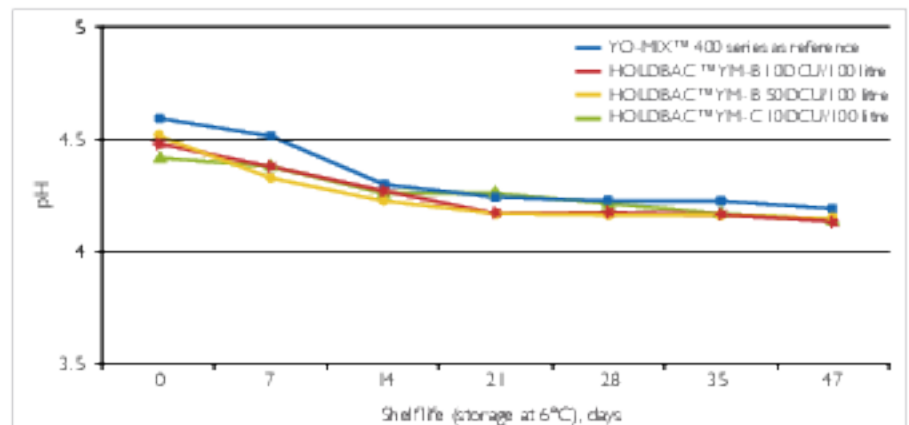


Figure 6. No post-acidification by using HOLDBAC™ YM in standard yogurt technologies if the right dosage is used.

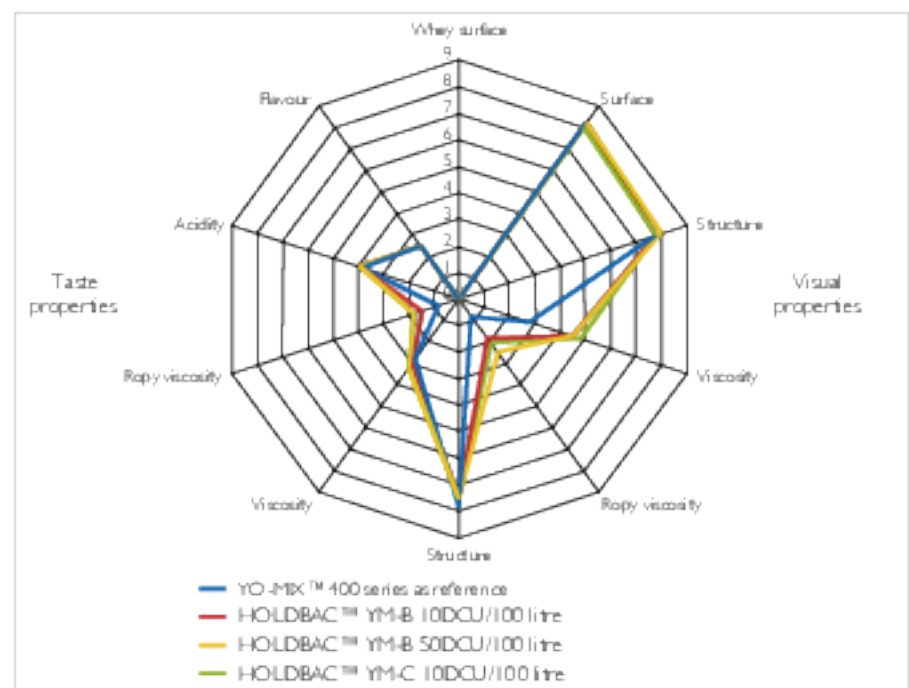


Figure 7. Some increase in yogurt viscosity can be reached by using HOLDBAC™ YM. Evaluation made by a trained panel after 45 days at 6°C.

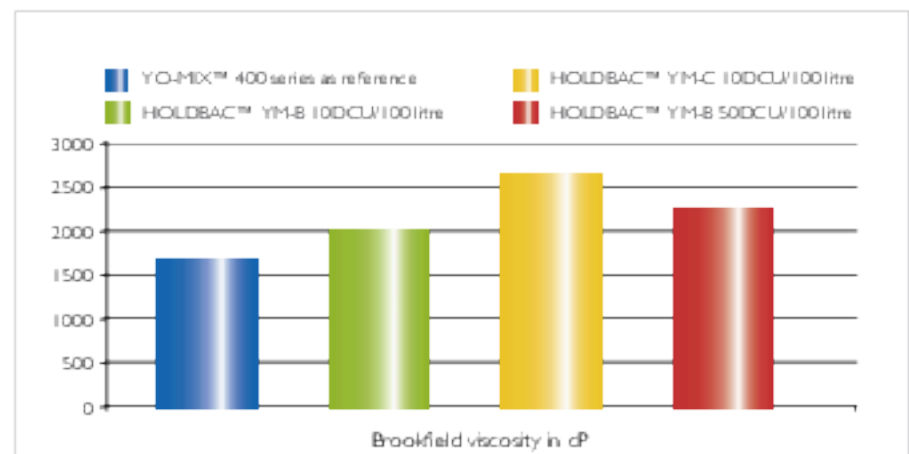


Figure 8. Influence of HOLDBAC™ YM on yogurt viscosity. Viscosity measurement made with Brookfield (Model RV DVII+) - Temperature of samples 20°C, Speed 50rpm, Time: 1 min, Spindle 04.



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