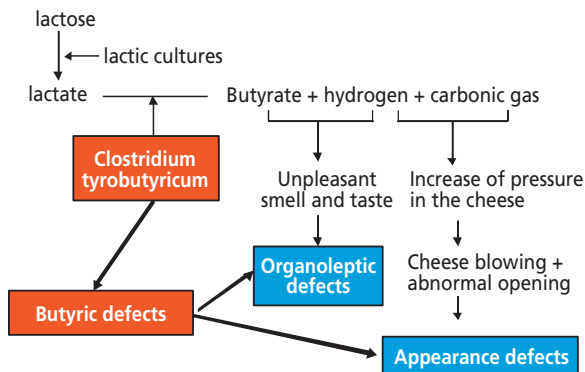
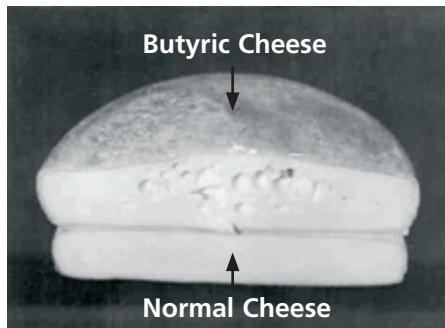


Dairy

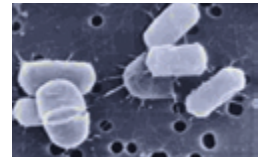
Using inovapure to Reduce the Risk of Butyric Fermentation in Cheese

Butyric fermentation in cheese is a ripening default caused by the gram positive bacteria *Clostridium tyrobutyricum*. The growth of this bacteria leads to excessive H₂ and CO₂ gas formation which causes cracks and slits in the cheese (late blowing) and abnormal cheese flavour due to the production of butyric acid. This bacteria has spore forming abilities, and is therefore resistant to standard pasteurization temperatures. Only the vegetative form of *Clostridia* has the ability to produce butyric acid and H₂.

Clostridium tyrobutyricum occurs widely in nature and is typically introduced into the milk through contamination of the silage. If silage is not properly prepared, *Clostridia* growth is not inhibited. When the cow consumes this contaminated silage, the bacteria is passed through the cow's digestive system into the dung. A very small amount of dung contamination on the cow udder is sufficient to contaminate a very large quantity of milk during the milking process.

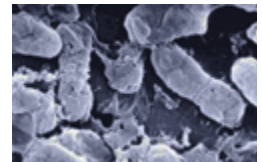


The use of inovapure in cheese will prevent the growth of *Clostridium tyrobutyricum*. inovapure is able to lyse the cell walls of the vegetative form of *Cl. tyrobutyricum* through the enzymatic cleavage of the bacterial cell wall. inovapure binds to the casein prior to the clotting of the milk, remains active in the curd throughout the entire ripening process and can disrupt the vegetative cell walls of once the spores germinate. inovapure has been found to retain its activity for greater than two years in cheese such as Parmesan.



Cl. tyrobutyricum before lysozyme

The diagnosis for the butyric late blowing defect can be made through a technique known as a volatile fatty acid analysis. In this method, free fatty acid testing is done via a GC method on cheese with defects and without defects.



Cl. tyrobutyricum after lysozyme

Comparison of the fatty acid levels and profiles between defective and non-defective cheese will determine the origin of the cheese blowing defect. Testing of cheese samples is a service offered by Inovatech to its customers.

The use of inovapure will improve the organoleptic qualities of the cheese through:

- lowered production of butyric acid (no off flavors)
- greatly reduced production of gas (less cracks and less openings)
- a longer ripening time (better flavor and better texture)
- overall better grading of the cheese (higher value)



Packaging, Storage and Directions for Use

inovapure granulate is available in 1 and 5 kilogram packages. When stored in cool, dry conditions in its original packaging, inovapure has a shelf life in excess of one year.

To prepare a 10% solution of inovapure, simply sprinkle the inovapure on the water surface and allow to sit until completely dissolved. This solution can be stirred gently prior to being added to the milk in the cheese vat.

inovapure is also available in a liquid form. Contact us for more details.

Factors Affecting inovapure Activity in Cheese

- Choosing the optimal inovapure dosage
- Checking the starters' sensitivity (*Lb. helveticus*) at this dosage
- Preparing the inovapure solution carefully at the proper pH (above 4.6)
- Adding the inovapure solution to the milk at the right stage:
 - after all heat treatments
 - as early as possible before the addition of rennet and of cultures

Advantages of inovapure

- inovapure is a natural and harmless product which has positive evaluations from international regulatory agencies:
- JECFA (FAO / WHO)
- FDA
- Scientific Committee for Food of the European Union
- Very selective spectrum of action: usable in all types of cheese
- Easy to implement without specific equipment: usable by all dairies of any size
- Flexible: can be used in combination with other curative treatments (bactofugation and nitrates)
- Very efficient against butyric blowing
- Successful track record of use for 20 years throughout Europe in different types of cheese (hard, semi hard, soft and processed cheeses).

Regulatory Issues

Lysozyme was affirmed as Generally Recognized as Safe (GRAS) for use in cheese by the U.S. Food & Drug Administration (Federal Register, March 13, 1998 - Tentative Final Rule).

Lysozyme has approval as a preservative(E1105), in the E.U. Directive on food additives.

Amendments to the Canadian Food & Drug regulation to allow the use of lysozyme in cheese appeared in the Canada Gazette Part II on December 20, 2000.

Inovatech BioProducts Inc.

31212 Peardonville Road
Abbotsford, BC V2T 2K8, Canada
Telephone: (604) 857-0695
Toll Free: 1-877-707-3447
Fax: (604) 857-2679
E-mail: info@inovatechbio.com
Website: www.inovatechbio.com

Inovatech BioProducts B.V.

Landbouwweg 83, 3899 BD Zeewolde
The Netherlands
Telephone: +31 (0) 36-522-6300
Fax: 31 (0) 36-522-6833
E-mail: info@inovatechbio.nl