The Natural and Efficient Way to Prevent Butyric Late Blowing in Cheese
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.

Use of inovapure to reduce the Risk of Butyric Fermentation in Cheese

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 *Cl. tyrobutyricum* once the spores germinate. *inovapure* has been found to retain its activity for greater than two years in cheese such as Parmesan. 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. 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)

Effect of inovapure on vegetative cells of *Clostridium tyrobutyricum*

![Image of vegetative cells without inovapure](image1)

![Image of vegetative cells with inovapure](image2)

(Source: Inovatech data)

Biochemical Phenomenon of Butyric Fermentation

![Biochemical diagram showing lactose fermentation](image3)

Butyrate + hydrogen + carbonic gas

Unpleasant smell and taste

Increase of pressure in the cheese

Cheese blowing + abnormal opening

Appearance defects

Butyric defects

Organoleptic defects
**inovapure**: A Natural Alternative

**A Successful Track Record for 15 Years of Use in Europe**

In Various Types of Cheese:

- **Hard Cheese**
  - Grana Padano
  - Emmental/Swiss

- **Semi-hard Cheese**
  - Gouda
  - Edam
  - Manchego

- **Soft Cheese**
  - Brie

- **Processed Cheese**

**Product Description**

**inovapure** is a standardized preparation of lysozyme which is extracted from fresh chicken egg white in government inspected facilities and refined in accordance with cGMP requirements of the FDA.

Acting as an anti-microbial agent, **inovapure** effectively ruptures certain gram positive bacteria cell walls. It occurs naturally not only in eggs, but also in several mammal secretions (milk, saliva, tears). This natural enzyme plays a key role in the human immune system, making it a natural choice for use in foods, as well as in many pharmaceutical applications.

**inovapure** has been used by some of the world's famous cheese houses in Europe for more than 15 years. Both large and small artisanal cheese producers in Italy, France, The Netherlands, Denmark, Germany, Spain and Portugal prefer the natural antibacterial benefits of **inovapure** over the use of nitrates and other chemical preservatives. **inovapure** has been used in cheese in the United States since 1998, when it received GRAS approval.

**inovapure** is used in a variety of food products and beverages to reduce chemicals such as nitrates in meat, sulfites in wine and phosphates in fresh fruits and vegetables. **inovapure** is used because of its natural antimicrobial properties in throat lozenges, toothpastes and mouthwashes. **inovapure** is readily soluble in water and, because it is a granular product, there is reduced dusting.
Packaging, Storage & 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.

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 new 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.

Additional References


Pilatte, E.; Nygaard, Mai; Gao, Yun Cai; Krentz, Sheri; Power, Jennifer; Lagarde, G. Étude de l’effet du lysozyme sur différentes souches d’Oenococcus oeni. Applications dans la gestion de la fermentation malolactique. *Revue Française d’Enologie* 2000, 185, 26-29


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