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NATAMYCIN COMPOSITION FOR SHREDDED CHEESE

Abstract

A composition is disclosed which comprises

- natamycin or a salt thereof; and
- an anti-caking agent

whereby the anti-caking agent prevents caking of shredded cheese particles when the composition is added to shredded cheese particles.

Moreover, the use of the composition in shredded cheese production is disclosed.

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NATAMYCIN COMPOSITION FOR SHREDDED CHEESE

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The following statement is a full description of this invention, including the best method of performing it known to applicant(s):

NATAMYCIN COMPOSITION FOR SHREDDED CHEESE

The present invention relates to a novel natamycin composition and its use in shredded cheese preparation.

The prevention of mould growth is an important topic to the food industry. Fungal spoilage can lead to serious economic losses. Some foods can be considered as a good substrate for fungal growth. Cheese is an examples of such a product. Apart from the negative appearance of fungal growth on cheese, fungal spoilage is also a health risk. Some mould species which grow on food products, such as cheese, can produce mycotoxins [J.C. Frisvad & U. Thane; "Mycotoxin production by food-borne fungi" in Introduction to food-borne fungi, 4th edn, (ed. R.A. Samson et al.), 251-260, (1995)]. Mycotoxins can penetrate into the food. Therefore superficial removal of moulds gives no guarantee of safety to the consumer.

For more than 30 years natamycin has been used to prevent fungal growth on cheeses and sausages. Natamycin is on the market under the brand name of Delvocid®, a powder composition containing 50% (w/w) of natamycin.

Cheeses and sausages can be treated by dipping or spraying with a suspension of natamycin in water [C.B.G. Daamen & G. van den Berg "Prevention of mould growth on cheese by means of natamycin" Voedingsmiddelentechnologie, 18 (2), 26-29, (1985); H.A. Morris & H.B. Castberg "Control of surface growth on Blue cheese using pimaricin" Cultured Dairy Products Journal, 15 (2), 21-23, (1980); P. Baldini, F. Palmia, R.G. Raczynski, M. Campanini, "Use of pimaricin for preventing mould growth on Italian cured meat products" Industria Conserve, 54 (4), 305-307, (1979); R.A. Holley, "Prevention of surface mould growth on Italian dry sausage by natamycin and potassium sorbate" Applied and Environmental Microbiology, 41 (2), 422-429, (1981)].

Natamycin can also be added to the polymer dispersion that is applied to the cheese rind as a coating [C.B.G. Daamen & G. van den Berg "Prevention of mould growth on cheese by means of natamycin" Voedingsmiddelentechnologie, 18 (2), 26-29, (1985)].

A cheese product, which is very sensitive to fungal spoilage, is shredded cheese. The production process of shredded cheese is as follows: cheese, e.g. Mozzarella, pizza cheese or Cheddar is shredded and conveyed to a revolving tumbler. An anti-caking agent, mostly cellulose (microcrystalline or powdered) is metered onto the cheese in the first part of the tumbler. At the end of the tumbler a suspension of natamycin (e.g. Delvocid®) is sprayed onto the shredded cheese. The spray nozzles deliver a fine spray or mist of the fungicide onto the cheese. Finally the cheese empties onto a conveyor to be transported to the filling equipment.

The natamycin suspension is prepared by mixing Delvocid® and water, mostly at the ratio of 2-4 grams of Delvocid® to 1 litre of water. The suspension is stored in a liquid container. To prevent sedimentation of the suspension a small amount of the suspension, which is pumped under pressure to the spray nozzles, is recirculated to the liquid container via a jet agitator. Alternatively to prevent sedimentation a stirring device can be used.

To prevent fungal growth on shredded cheese it is desirable to have a concentration of 3-20 ppm of natamycin, preferably 4-10 ppm of natamycin, on the cheese. Mostly approximately 6 litres of Delvocid® suspension is sprayed onto 1000 kg of cheese. Mostly this treatment is effective to prevent fungal spoilage.

Up to now it was thought that spraying natamycin onto the cheese was the best way to obtain a homogeneous distribution of natamycin on the shredded cheese. The anti-caking agent, e.g. cellulose, has to be added first to the shredded cheese and subsequently the natamycin, because cellulose forms a film around the cheese particles which prevents caking of the shredded cheese. The natamycin suspension which is then added during the production process

and will attach to the cellulose layer which has been formed around the cheese particles where fungal spoilage can be expected. This production process prevents both caking of the cheese particles and fungal growth on the shredded cheese.

The above discussion of documents, acts, materials, devices, articles and the like is included in this specification solely for the purpose of providing a context for the present invention. It is not suggested or represented that any or all of these matters formed part of the prior art base or were common general knowledge in the field relevant to the present invention as it existed in Australia before the priority date of each claim of this application.

Throughout the description and claims of the specification the word "comprise" and variations of the word, such as "comprising" and "comprises", is not intended to exclude other additives, components, integers or steps.

The objection of the present invention is to provide a chemically, physically and microbial stable formulation containing natamycin and an anti-caking agent, preferably microcrystalline or powdered cellulose. Preferably the formulation is in dry form containing not more than 10% w/w of water, preferably less than 5 and more preferably less than 2% w/w of water. The powder formulation is ready-to-use. The new formulation replaces both the cellulose powder composition and the aqueous natamycin suspension.

Unexpectedly it has been found that a powder formulation containing natamycin and an anti-caking agent, in particular cellulose, can be prepared, which is effective in preventing fungal spoilage of shredded cheese. With said new formulation a good distribution of the natamycin through the shredded cheese is achieved. The new composition is effective for combatting moulds and yeasts on shredded cheese. In one aspect the present invention provides a composition, completely free of bentonite, containing

- natamycin or a salt thereof; and
- cellulose

whereby cellulose prevents caking of shredded cheese particles when the composition is added to shredded cheese particles.

The new formulation is of great convenience for the producers of shredded cheese. Equipment for the preparation and storage of the aqueous natamycin suspension is not necessary any more. Equipment for preventing sedimentation of the natamycin suspension, e.g. a stirring device or a recirculation system, is not needed. Furthermore aqueous suspensions of natamycin are chemically less stable and are susceptible to undesirable bacterial contamination.

The present invention provides a powder formulation containing natamycin and an anti-caking agent. Also salts of

natamycin, e.g. the calcium salt, may be used. The formulation may also contain components, which are already present in a natamycin preparation. For example, when Delvocid-Instant® or Natamax® is used as a source of natamycin, lactose will also be present in the final composition. The amount of natamycin in the powder composition may be up to 2% (w/w). Preferably the amount of natamycin is between 0.02 and 0.5% (w/w).

Any anti-caking agent which is known in the art or any combination of anti-caking agents may be used. Examples of suitable anti-caking agents are microcrystalline or powdered cellulose, sodium-, potassium-, zinc- and magnesium silicate, silicium-dioxyde, talc, potassium and magnesium carbonate, magnesiumoxide, kaolin, phosphates (di, tri and poly phosphates including sodium, potassium and calcium salts).

For shredded cheese application preferred anti-caking agents are those which have oil absorbing properties. The oil absorbing properties of such anti-caking agents result in a substantial reduction of surface oil. In shredded cheese production the surface oil causes cheese particles sticking together. An example of such an anti-caking agent is cellulose. The invention also includes products containing cellulose, such as the commercial cellulose compositions Keycel® or FloAm®.

- The new powder composition may be prepared by mixing natamycin with the anti-caking agent, e.g. cellulose. All equipment known in the art can be used for the preparation of said composition. Examples of such equipment are a tumbler or convective mixer.
  The new powder composition can also be prepared by spraying a natamycin suspension on the anti-caking agent, e.g. using a convective or intensive mixer or in a fluidized-bed.
- Alternatively the new powder composition can be produced in such a way that a complex between the anti-caking agent and natamycin is formed, e.g. by linking the compounds together. This can be achieved by dissolving both natamycin and cellulose in an

aqueous solution by increasing the pH using well known methods. After the compounds are dissolved the pH is neutralised using well known methods. The complex can be isolated using well known drying methods.

- Of course the natamycin can also be added at any suitable step in the production process of the anti-caking agent.

Compositions of the invention may be used for the treatment of food, feed and agricultural products by methods known perse. The new compositions are particularly suitable for the treatment of shredded cheese.

The new formulation can be handled and applied the same way as the anti-caking agent, mostly cellulose, is applied now.

Example 1

Formulation A is prepared by mixing natamycin with powdered cellulose in a two steps mixing procedure.
The premix is prepared by mixing 110 gram of natamycin with 1890 gram of Keycel® 200-CT (powdered cellulose) during 30 minutes in a Nauta DBY 10 mixer.

The final formulation is made by mixing 40 gram of the premix with 1960 gram of Keycel® 200-CT during 30 minutes in the Nauta DBY-10 mixer which results in a powder composition (A) with a natamycin concentration of 0.1% (w/w).

Example 2

Formulation B is prepared by spraying 2% (w/w) of a 10% (w/w) Delvocid® suspension into powdered cellulose.
The Delvocid® suspension is prepared by adding 15 gram of Delvocid® to 135 gram of tap water under continuous stirring. This suspension is sprayed into a 50 litre Lödige mixer, loaded with 7350 gram of Keycel® 200-CT, in 10 minutes and under continues mixing. After spraying, another 5 minutes of mixing is sufficient to produce formulation B with a natamycin concentration of 0.1% (w/w).

Example 3

The formulations (A and B) described in example 1 and 2 were tested by adding 1% (w/w) of the formulation to 100 gram of shredded Mozzarella cheese.

As a control (C) the well-known procedure used in cheese industry was executed: adding 1% cellulose to shredded cheese and spraying 0.8% (w/w) of a 0.25% Delvocid® suspension to the mixture.

As a control (D) a shredded cheese sample was treated with only cellulose (without natamycin) in the same concentration as the other formulations.

In all cases the formulations were mixed well through the shredded cheese.

In all treated samples the natamycin was homogeneously distributed through the shredded cheese. In all samples the concentration of natamycin was 10 ppm.

After 7 days of incubation in the refrigerator (6-10 degrees C) on the cheeses sample which was not treated with natamycin (D) visible mould growth was observed. On the shredded cheese samples treated with formulations A, B and C no visible mould growth was observed after 21 days of incubation.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A composition, completely free of bentonite, containing
- natamycin or a salt thereof; and
- cellulose

whereby cellulose prevents caking of shredded cheese particles when the composition is added to shredded cheese particles.

2. A composition according to claim 1, which comprises less than 10% w/w of water.

3. A composition according to claim 1 or 2 which comprises 0.02 to 2% w/w of natamycin or a salt thereof.

4. A process for the production of shredded cheese, which comprises
- shredding cheese; and
- mixing the formed shredded cheese particles with a composition according to claim 1 to 3.

5. A process according to claim 4 whereby 3-20 ppm of natamycin or a salt thereof is added to shredded cheese.

6. Use of a composition according to claim 1 to 3 to prevent mount growth on shredded cheese.