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VIABILITY OF MICROORGANISMS IN FREEZE-DRIED STARTER PREPARATIONS UNDER

REFRIGERATION CONDITIONS

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Starter preparations, regardless of the form in which they are supplied (broth cul-tures preparations) have a limited useful lif tures, frozen concentrates, or freeze-dried preparations) have a limited useful life time (Liepe, 1984). This proceeditates to determine the conditions and the length of their storage.

their storage. Jpon long storage or under unsuitable conditions, the counts of the microorganisms inefficient. Usually for commercial preparation, a temperature of -18°C is required ad a storage period of about 4 months (Liepe, 1984). freeze-drying depends not only on the time of storage, but also on the temperature. Vated starter cultures to restore their activity completely after a 6 months storage.

Ansela et al. (1978) proposed a method of determining the activity of starter cul-dures by studying metabolic activity from the viewpoint of desirable metabolite pro-ducts: the nitrate reductase activity of micrococci and acid production by lactoba-In the different cultures, however, variations in activity are observed, which do In the different cultures, however, variations in activity are observed, which do The Blways depend on the cell content of the culture.

The prospectus publications of the Hansen's Kulturen company state that their prepa-rations have a low water activity. This contributes to the number of cells being preserved high for a longer time under normal refrigeration conditions (5°C), while

similar preparations from other companies require low temperatures of storage (-18 -"208" c). dried bjective of the present work was to determine the possibilities to store freeze-dried lectoburilli and micrococci forming parts of our starter preparations. dried bjective of the present work was to determine the possibility preparations. La in the second methods

In the experiments, use was made of starter preparations derived from representatives or the tribe to be the t In the experiments, use was made of starter preparations derived from representatives or the experiments, use was made of starter preparations derived from representatives in, freeze-dried in the presence of dry skinmed cow milk, and from 2 Lactobacillus ration strains. The dry preparations were stored for 2 to 7 months under refrige-under conditions at a temperature of 4-5°C, packaged in polyethylene bags in air or the vacuum

and cr vacuum. The number of viable cells was determined per 1 g of preparation immediately after determined by the method of Kunsela et al. (1978). The results obtained were expres-the number of viable cells and estimated in relation to the number of viable cells. (1970) The nitrate reductase activity of micrococci was determined by Egami and Taniguchi's amount Method modified by Puolanne et al. (1977). It was expressed in terms of the the number of viable cells per 1 g of preparation. Activity was activity of micrococci was determined publications of the the number of viable cells per 1 g of preparation. Activity was activity of micrococci was determined qualitatively using H₂O₂.

Activity was estimated immediately after reconstitution of the preparation using the stilled was estimated immediately after reconstitution of the reconstituted preparation. Activity was estimated immediately after reconstitution of the preparation using the technological qualities of the preparations under investigation were found in trials with spin causages. trials with fast-ripening (withholding

The period of retaining (withholding) frozen cultures before freeze-drying was also into consideration in the studies. I. S. Station activity

I. Survival and fermentation activity of freeze-dried lactobacilli after storage. Analyses were made of 4 lots of L. plantarum strain $L_{\rm B}$ after storage for 3, 4, 6 and 7 months, and of 2 lots of strain $L_{\rm D}$. Fig. 1 shows the changes in the counts of does not exceed one log cycle. The initial counts of strain $L_{\rm D}$ microorganisms were ^{Adeta} months, and of 2 lots of strain ^D_D decrease in the number of viable correction does not exceed one log cycle. The initial counts of strain L_D microorganisms were The retention of frozen cultures before freeze-drving took 3, 6, 8, or 12 days. Re-

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sults indicate that no substantial changes set in within those periods, capable of affecting the number of surviving cells

suits indicate that he substantial changes set in wright chose periods, affecting the number of surviving cells. Figure 2 presents data on the fermentation activity of lactobacilli after storage, rem With the exception of variant 5, the activities of the preparations are similar, rem constitution by incubation exerting little effect on the values obtained.

II. Survival and nitrate reductase activity of freeze-dried micrococci after storage The work was performed using 2 storage and a The work was performed using 3 strains of freeze-dried micrococci after Burnin Figure 3 demonstrate different preservation of the strains work of condition Figure 3 demonstrate different preservation of the strains under different conditions and it follows as a consequence that the micrococci studied over different rible ad Figure 3 demonstrate different preservation of the strains under different condition and it follows as a consequence that the micrococci studied are more susceptible the lactobacilli. The better results in variants 1, 4, 5, and 7, which were packaged and stored under vacuum, point out the necessity of vacuumizing before storage. No The cultures were retained after freezing before freeze-drying for 5 to 18 days. No rage.

Results indicate that the length of storage up to 4-5 months depends on the condition ons and on the state of the microorganisms upon freeze-drying. For instance, in strate in M₁₀, after 4 months of storage under vacuum, the counts of the microorganisms higher than upon storage for 3 months in air. The results on the nitrate reductase activity of the storage to a gre pre-

The results on the nitrate reductase activity of the microorgent of the microorgent sented in Figure 4. It is obvious that reconstitution by a 24-hour incubation of E. preparation affects the values obtained. A wide variation of results is observed. g., strain M₁₉ (variant 3) and strain M_D (variant 6) have preserved a high activity irrespective of the fact that the numbers of cells in the preparations have decrease al. (1978).

The catalase activity of the preparations under investigation was detected qualitatively: it is preserved in all the variants. Some of the samples packaged in air were left at room temperature for more than four years. The investigations on these samples indicated that some 10 000 loctobacili Jome of the samples packaged in air were left at room temperature for more than it years. The investigations on these samples indicated that some 10,000 lactobacilli and 100 micrococci per gramme of preparation preserved their viability. Using combinations of the freeze-dried microorganisms, fast-ripening sausages were prepared and compared to one another and to controls, salami without the introduction of a preparation. No substantial differences were observed in the major sensory char fracteristics among the individual experimental variants. This suggests that, once hack to their natural environment, the microorganisms are entirely reconstituted, which supports the statements of Years. back to their natural environment, the microorganisms are entirely reconstituted,

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The preserved viability of starter cultures under normal conditions of storage reduction and transportation before their application in meat products.

References

Egami, F., S. Taniguchi, 1970 - Nitrat in Bergmeyer Methoden der Enzymatischen Ana-lyse. Band II, 2179 Hansen's Laboratory Inc. - Patent No. 1 469 218 Hopfe, U. et al., 1983 - Fleisch, 37, 5, 94-95 Kunsela, K. et al., 1973 - 24th Eur.Meet.Meat Res.Work., Kulmbach, G 6:1 Liepe, H., 1984 - Fleischerei, 4, 223-225 Puolanne, E. et al., 1977 - Lebensm. Wiss. und Technolog., 10, 7-11 .

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