ACTION OF NITRATES AND NITRITES IN CONCENTRATIONS AS USED IN THE PRACTICE OF MEAT PROCESSING ON LIPASE ACTIVITY OF SOME STARTER CULTURES (micrococcus strain 199/10 and lactobacillus strain 4669/6)

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Knowledge about the different microbial enzymes are not altogether equal.While microbial amylases,proteases and clulases are studied very minutely, other enzymes, like lipases are studied very little (2,3).

The level of the lipase activity depends on the components and environment as well as from the reaction mixture in the exposition of the enzyme.It is determined that decrease in the nitrigen content is followed by double decrease of the lipase activity in comparison with controls,without hinderingthe growth of C.lypolitica,strain 528 (5). The decrease ofthe lipase activity is observed also in magnesium and phosphorous insufficiencies. Significant increase in the activity is observed with the introduction of phosphorous,desoxycholat,sodium cholate and acetate in the medium. It is determined;that glutation, cistein,ascorbic and palmitic acids have a stimulating effect on the lipase.Inhibition of the lipase activity is observed in the presence of KCN,NaF,capronic,lauric and oleic acids (1).

The growth and activity of the starter cultures depends from the substances added to the meat products.The presence of nitrates and nitrites in these products,acts on the activity of the useful microflora (4).

The scope of the present paper is to establish the influence of nitrates and nitrites in concnetrations used in the practice on the lipase activity of the isolated in the Institute of Meat Technology - Finland, starter cultures, micrococcus strain 199/10 and lactobacillus strain 4669/6.

Material and Method

The microorganisms are cultivated in 500 ml nutritive medium (meat pepton broth and yeast exaract) at 37°C on a shuttle mixer.The investigated material is taken in the exponential phase of growth (12th hour after innoculation for 199/10 and the 16th hour for 4669/6).The culture medium is separated from the cells by centrifugation for 30 minutes and 3500 r/m.

The activity of the exoenzyme,separated in the culture medium is determined after the following, adapted by us methodics: in 1,5 ml phosphate puffer with pH 5,8 is introduced $NaNO_3$ or $NaNO_2$ in quantities equal to the ones used in practice - 0,025%, 0,08%, and 0,25% of $NaNO_3$

and 0,0125% and 0,125% of $NaNO_2$. This solution is mixed well with 2 ml olive oil, after which is introduced 4,5 ml of the culture medium. The flask are shaked intensively for three minutes and are stored at a temperature of 37°C. After a 24 hours exposition is added 18 ml ethanol, enough to prevent the hydrolytic dissociation of the soaps and 15,5 ml ether to break foaming. The control falsks are prepared the same way, with the exception of that, the culture medium is introduced immediately after the exposition, just before titration. The samples are titrated with 0,1 N NaOH in the presence of 1% solution of thymolftalein, for the neutralisation of the obtained in the desintegration of the olive oil, fatty acids. The difference in mililiters between thused for titration of the samples and the control NaOH is calculated to 100 ml culture medium and is nominated as units activity.

Results

The influence of the used in the practice concentrations of $NaNO_3$ and $NaNO_2$ on the activity of the starter cultures is given in table 1.

Table 1.

Influence of nitrates and nitrites on the lipase activuty from micrococcus strain 199/10 and lacto bacillus strain 4669/6 at pH 5,8

Substance	Concentration %	Lipase activity in mililiters 0,1 N NaOH					
		Strain 199/10			Strain 4669/6		
		on 100 ml cultural medium	%		On 100 ml cultural medium	%	
			Stim.	Inhib.		Stim.	Inhib.
$NaNO_3$	0,025	21,8	10,1	-	22,6	-	19,2
	0,080	18,0	-	9,1	25;6	-	8,6
	0,250	16,7	-	15,7	30,4	8,6	-
$NaNO_2$	0,0125	22,5	16,4	-	33,8	20,7	-
	0,125	18,2	-	8,1	17,8	-	36,5
Control		19,8	0	0	28,0	0	0

Data show that $NaNO_3$ and $NaNO_2$ exibit inhibiting or stimulating properties and act on the lipase activity depending from their concentrations. The influence of these substances on both strains is different. The low concentration of $NaNO_3$ - 0,0125% acts as stimulant on the lipase activity of micrococcus strain 199/10 with 10,1% and on lacyobacillus strain 4669/6 as inhibitor with 19,2%. The concentration of 0,08% has inhibing avtion for both strains and their lipase activity, while 0,25% inhibits strain 199/10 with 15,7% and stimulates strain 4669/6 with 8,6%.

The used quantities of $NaNO_2$ have equal influence on the lipase of both strains - stimulation with concentrations of 0,0125% and inhi bition with 0,125%, but the influence on strain 4669/6 is stronger with 4,3% stronger stimulation and with 28,4% stronger inhibition.

These data represent an interest in connection with the use of the starter cultures in the production of raw dried meat products.

Conslusions

1.It is established that $NaNO_3$ and $NaNO_2$ act on the lipase activi ty of the starter cultures micrococcus strain 199/10 and lactobacillus strain 4669/6 either as stimulators or inhibitors as related to their concentrations, which has a significance for the production.

2.Lipase from both strains exibits different sensitivity towards $NaNO_3$.The lowest concentration of 0,025% acts on strain 199/10 as sti mulator and on strain 4669/6 as inhibator.On the other hand the highest concentration - 0,25% acts inhibiting on strain 199/10 and activating on strain 4669/6. The concentration of 0,08% inhibits the lipase activities of both strains.

With both starter cultures $NaNO_2$ stimulates the lipase activity with the low concentration of 0,0125% while with the high of 0,125% inhibits its action, which is better exibited for lactobacillus strain 4669/6.

Literature

1. Arends I.M.- Tr.Vses.NIIn-ta productov brojenia,vip.19,139,1970
2. Narasaki T.,Tamura J.,Arima K. - Agric.Biol.Chem.32,12,1453,1958
3. Ota Y.,Yamada K. -Agric.Biol.Chem. 30,4,351,1966
4. Stoychev M.,Djejeva G.,Niinivaara F.P. - Symp.für Btarterkulturen Helsinki,1972
5. Zviaissteva I.S. - Microbiologia vip.1,24,1972