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GUELPH - C A N A D A

STUDIES ON LIPASE ACTIVITY OF SOME STARTER CULTURES (MICROCOCCUS-STRAIN 199/10 AND LACTOBACILLUS-STRAIN 4669/6) AT TEMPERATURES USED IN THE MANUFACTURE AND STORAGE OF RAW-DRIED MEAT PRODUCTS

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Lipase activity of starter cultures exerts an influence on the quality of raw-dried meat products.

There are data about temperature effect on microbial lipase activity. At an equal pH (4,7 and 7,0) lipase activity of C. lipolitica-strain 528 is higher at 20°C than at 30°C (5). For the lipase of Ps.fragi the optimum temperature of action is 54°C (3).

The duration of microorganism cultivation and the term of enzyme exposure are essential for the rate of lipase activity. All straines of genes Aspergillus exhibit a maximum lipase activity on the third day, which decreases on the fifth day of cultivation (1, 2). A purified enzyme preparation of lipase derived from Ps. fragi, is inactivated above 50% on storage for three days at 4°C, and completely, for 24 hours at 15°C. A non-purified preparation of microbial lipase preserves ist activity under those conditions (3).

The object of the present work is to determine the rela-

tionship between temperature and the length of exposure period of lipase from microbial cells and culture medium of Micrococcus strain 199/10 and Lactobacillus strain 4669/6.

MATERIAL AND METHODS

In the studies use was made of washed microbial cells, suspended in physiological solution and culture medium of the starter cultures, Micrococcus strain 199/10 and Lactobacillus strain 4669/6, isolated in the Finnish Institute of Meat Technology. The material was taken in the active exponential phase of development (12th hour after inoculation for strain 199/10, and 16th hour for strain 4669/6)(4).

Lipase activity was determined by the following methods: 2 ml of olive oil and 1,5 ml of phosphate buffer with a pH of 5,8 (characteristic of the initial and final process of ageing and drying of raw-dried meat products) are shaken vigorously. In part of the flasks of that mixture, 4,5 ml of microbial suspension of culture liquid is intoduced to each one, and the remaining ones are kept as controls. The samples are shaken again for 3 min. and allowed to rest at different temperatures: 4°C, 12°C, 20°C, and 37°C. After an exposition of 24, 48, 72, and 96 hours prior to titration 4,5 ml under investigation are introduced in each control flask, 18 ml of ethanol and 15,5 ml of ether are added to each sample, and they are titrated parallely with 0,1N NaOH with 1% thymolphtalein as indicator. The presence of lipase activity is judged by the difference in ml of 0,1 N NaOH consumed for the titration of the samples and the corresponding controls. The obtained values are re-calculated against 100 mg of cell carbon or 100 ml of culture medium,

and marked as units of lipase activity.

RESULTS AND DISCUSSION

The change in lipase activity, depending on temperature and exposition period, is shown in Table 1.

The results indicate that at a temperature of refrigerated storage (4°C) the lipase activity of the two strains does not exhibit activity on exposition till the 96th hour.

At the ageing and drying temperature of raw-dried meat products (12°C), lipase activity of the rwo strains in microbial cells is manifested on the 72nd hour, and in the culture medium a beginning of activity is observed already on the 24th hour.

The lipase activity of both strains is well manifested at room temperature (20°C), being observed on the 48th hour in microbial cells, and already on the 24th hour in culture medium.

The lipase of the two starter cultures is most active at the temperature of meat product incubation (37°C). Lipase activity is highest after a 24 hour exposition. A longer remaining of samples at that temperature leads to a decrease of activity, which is better pronounced in Lactobacillus strain 4669/6 (from 4,62 to 3,91 units for microbial cells and from 28,00 to 20,05 units for culture medium).

Lipase in culture medium displays a higher activity and is manifested in a shorter period of exposition than lipase in the microbial cells of Micrococcus and Lactobacillus.

The results obtained have an important significance for the practice in production and storage of raw-dried meat products.

Effect of temperature and exposition time on the lipase activity of Micrococcus strain 199/10 and Lactobacillus strain 4669/6 at pH 5,8

TABLE 1

T	Material	Lipase activity in ml of 0,1N NaOH							
		Strain 199/10				Strain 4669/6			
		24h	48h	72h	96h	24h	48h	72h	96h
4°C	100 mg of cellular carbon	0	0	0	0	0	0	0	0
	100 ml of culture medium	0	0	0	0	0	0	0	0
12°C	100 mg of cellular carbon	0	0	0,68	1,18	0	0	0,81	1,34
	100 ml of culture medium	traces	4,20	5,13	5,50	traces	6,30	10,40	8,93
20°C	100 mg of cellular carbon	0	1,74	1,81	1,84	traces	1,81	2,00	2,12
	100 ml of culture medium	7,10	7,93	8,15	5,12	26,80	25,20	23,47	22,10
37°C	100 mg of cellular carbon	1,83	1,70	1,79	1,66	4,62	4,72	4,03	3,91
	100 ml of culture medium	19,80	19,04	16,70	15,01	28,00	27,40	21,62	20,05

CONCLUSIONS

1. At a temperature of refrigerated storage of meat products the lipase activity of the two starter cultures under investigation, does not display activity on exposition of up to 96 hours.

2. At the storage temperature of raw-dried meat products (12°C), lipase activity is insignificant (5,50 units for strain 199/10 and 10,40 for strain 4669/6) and is observed after a 48-hour exposition of culture medium, and 72-hour exposition of microbial cells.

3. The lipase activity of the two strains under investigation was determined at room temperature (20°C): 7,93 units on the 48th hour for strain 199/10, and 26,80 units on the 24th hour for strain 4669/6, which decreases upon longer exposure.

4. The lipase activity of the two strains is highest at 37°C on the 24th hour, and is better manifested in strain 4669/6.

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