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LIPASE ACTIVITY OF STR. FAECALIS UNDER TEMPERATURES OF PASTEURISATION, INCUBATION AND STORAGE OF CANNED MEAT PRODUCTS

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The study of the lipase activity of microorganisms having an impact on the hygiene and storage of food products, is interesting because of the changes which could be effected in fats, containd in these products (3).

In production of canned meat products the Enterococci, which have preserved their vitality after thermal treatment, have an impact on quality and storage for these products.

In comparison with other microbial enzymes, lipase has been investigated little. First investigations of microbial lipase as enzymatic complexes date of 20 years and have been made for the needs of medical lipase preparations (2, 4).

Separate studies exist for inactivities of microbial lipase after temperature impacts. It has been established that lipase from Ps. fragi is totally inactivated after heating to 66°C for 1 hr, and to 70°C for 10 minutes (1).

There is no literature data for the lipase activity of Enterococci. The scope of the present work is the investigation of the lipase activity of Str. faecalis in relation to pH, under temperatures of incubation and storage of canned meat products and their respective change after the impact of pasteurization temperature.

METHOD and MATERIAL

The investigations have been carriad out with Str. faecalis, strain 775. The cultivation was effected in Ehrlenmeyer flasks containing 500 ml nutritive medium (meat extract - 1%, pepton - 1%, glucose - 0,5%, KH_2PO_4 - 0,04%, NaCl - 0,5%) in shuttle equipment.

As innoculum was used suspension of washed resting cells of 24 hrs culture in concentration 10^4. The material for the studies was taken during the active exponential phase of growth (the 6th hr after innoculation), with cells separated from the medium by centrifugation at 3500 r/m and consequent double washing with physiological solution.

For elucidation of pasteurization temperature impact on the lipase activity of Str. faecalis, parallel tests have been made with subsequent investigations on cultural fluid and microbial suspension method to 65,5°C for 30 min.

The lipase activity was established in the cells and culture medium (heated and not) as follows: in an Ehrlenmeyer 100 ml flask are introduced 2 ml olive oil and is added 1,5 ml puffer phosphate solution with different pH (5,2; 5,8; 6,2; 7,0; 8,0) with intensive agitation. In the obtained emulsion is added 4,5 ml culture medium or suspended in physiological solution cells and again is agitated intensively for 3 min. After this the flasks containing the investigated material are put away under different temperatures - 4°, 20° and 37°C. After a 24 hrs exposition in the flasks is added 18 ml ethanol and 15,5 ml ether and the mixture is titrated with 0,1 NNaOH in the

presence of 1% thymolftalein. As control was used a mixture of 2 ml olive oil and 1,5 ml phosphate with the same exposition , while the matherial to be investigated is introduced immediately before titration.

The lipase activity is determined by the difference in ml 0,1 NNaOH, used for the titration of the control and test sample and is calculated for 100 ml culture medium or 100 mg cell carbon for the suspended cells.

RESULTS and DISCUSSION

The changes of lipase activity in microbial cells and culture medium of Str. faecalis in relation to pH under incubation and room temperatures are given in table 1.

Influence of pH on lipase activity of Str. faecalis under incubation and room temperatures

TABLE 1

pH	Lipase activity in ml 0,1 N NaOH			
	37°C		20°C	
	On 100 ml culture medium	On 100 mg cell carbon	On 100 ml culture medium	On 100 mg cell carbon
5,2	33,34	0	21,11	4,63
5,8	32,27	0	13,88	3,86
6,2	30,02	0,98	17,82	8,23
7,0	29,86	0	25,33	6,47
8,0	26,02	0	39,61	0

Data given in the table demonstrate different lipase activity in the culture medium and the microbial cells. Highest activity of the enzyme is established in the culture medium under both temperatures.

Under temperature of 37°C the activity of the culture medium is higher than that under 20°C, while cell lipase exibits slight activity under 20°C and none under 37°C.

Changes are observed in the exibited activity of the enzyme in relation to pH. Under exposition temperature of 20°C, the optimum of the lipase activity in the culture alcalic zone medium is at pH 8,0 (39,61 units) and in the acid at pH 5,2(21,11 units). The values of the lipase activity under 37°C are close and variate insignificantly with change of pH (from 26,02 at pH 8,0 to 33,34 units of pH 5,2).

Highes lipase activity of the microbial cells is observed under temperature of 20°C at pH 6,2 (8,23 units) and negligeable under 37°C only at pH 6,2 (0,98 units). Lipase does not exibit any activity under temperature of 20°C only at pH 8,0 and under 37°C at all investigated pH with the exception of 6,2.

On table 2 are given the results of comparative investigations on lipase activity of not heated culture medium and microbial cells of Str. faecalis and heated to a temperature of 65,5°C for 30 min.

Lipase activity of Str.faecalis

as related to pasteurisation temperature, incubation and storage of meat products (pH 6,2)

TABLE 2

t°C	Lipase activity in ml 0,1n NaOH			
	not heated		heated at 65,5°C for 30 min	
	on 100 ml culturale medium	on 100 mg cell carbon	on 100 ml culturale medium	on 100 mg cell carbon
4	0	0	0	0
20	17,72	8,23	8,46	0
37	30,02	0,98	14,28	0

Data show that at pH 6,2 and temperature of storage of canned meat products (4°C) the lipase activity is not exibited after an exposition of 24 hours. Under room temperature (20°C) is established a comparatively high activity (17,82 units) for the culture medium, and 8,23 units for the microbial cells, which under temperature of incubation is established stronger in the culture medium (30,02 units) and weakest for the microbial cells (0,98 units).

The preliminary heating of the culture medium and microbial cells to 65,5°C for 30 min (temperature of pasteurization) lowers the activity of microbial lipase by 52% under both temperatures of exposition (20°C and 37°C).

These results represent a theoretical interest and have significant practical influence in connection with production and storage of pasteurized meat products.

CONCLUSIONS

1. The lipase activity of cells from Str. Faecalis is significantly lower than the one in the culture medium under the investigated temperature (20°C and 37°C) and pH values of 5,5; 5,8; 6,2; 7,0 and 8,0.

2. The optimal action of lipase in the culture medium under 20°C is exibited in the alcalic zone et pH 8,0 (39,61 units),in the acid at pH 5,2 (21,11 units) while under 37°C the lipase activity is higher and varies between 33,34 units (at pH 5,2) and 26,02 units (at pH 8,0).

3. Highest lipase activity in the cells of Str. faecalis is established at pH 6,2 under both investigated temperatures.

4. The lipase activity in the culture medium of Str. faecalis at pH 6,2 is highest under temperature of incubation of 37°C (30,02 units), weaker at room temperature of 20°C (17,82 units), while at storage temperature for pasteurized canned meat products of 4°C after a 24 hrs exposition it is not exibited.

5. The pasteurization temperature (65,5°C for 30 min) inactivates lipase in cultural medium of Str. faecalis by 52%, while microbial cells do not exibit lipase activity after a 24 hrs exposition under 20°C and 37°C, which has a significant practcal influence in the production and storage of pasteurized canned meat products.

LITERATURE

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