

PREVENTION OF CANNED FRANKFURTERS BLOWING  
BY MEANS OF PROPIONIC ACID

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In meat canning industrie it is one of the chief problem keeping quality of canned frankfurters.

The consumption of this product increased in our soun-try in recent years very much, because by pasterisation the nutrion value and flaver is slightly changed and the-refore are frankfurters especia lly in seasen at the seaside a favorite food. Unfortunately in this condi-tion due to thermoresitant microbes the shelf life is short. It is known that canned frankfurters in areas where the dayly temperature arises to 40° C can be stored mostly for one week adding the long distances from the factory.

Previously we published /1/ an acount of pasterisati-on influencing the stability of canned frankfurters. We showed by experiments twice pasterisation at tem-perature about 96° C is not satisfactory to prevent the blowing of frankfurters and for this reason we suggested to applie beside the pasterisation the propionic acid as mean to prevent the spoilage.

In recent years food additi ves have been restricted. Public health authorithies have condemned many preser-vatives claiming that their safety was not proved. To attempt to overcome these difficulties research, work is in program to find preservatives that have exerted their micobial effect.

Levine and Feller /2/ in their study of the effect of acetic acid on microorganisms related to food spoilage found that acetic acid possessed toxicity for bacteria in excess of that which can be attributed to pH alone. There have been many investigations on the toxicity of acetic acid for microorganisms but the mechanisms of inhibition appear to be a matter of conjecture at the present time. Heseltine /3/ examined the effect of sodium propionate on 21 microbes among them on *b. cereus*. He suggested the toxic effect is produced by the molecule rather than by ion.

Rigler and Koželj /4/ investigated the inhibitory and lethal action of calcium propionate on *b. subtilis*. They stated the calcium propionate is most effective in 1% concentration at pH 6,2 and at the temperature 30° C. In this condition it kills all cells, whereas, in concentration 0,5% it inhibits the growth of microbe for six days.

Blinč /5/ applied *bac. acidii propionici* var. *rubrum* as preservative for the bread dough with good result against *b. subtilis* causing spoilage in bread.

This paper is concerned with a method of using propionic acid to extend the shelf life of canned frankfurters.

The frankfurters are taken from daily production. We took forty tins and filled them by smoked frankfurters. In ten tins we poured about 400 ml brine of usually composition.



In the brine of second batch of 10 tinns we mixed 0,8%, in the thirth 0,4% and in the forth 0,25% propionic acid.

We mesearured pH of treated and untreated brine: untreated had pH 6,3 treated: 4,0/0,8%/5,3/0,4% and 5,6/0,25% propionic acid/.pH of frankfurters was 6,3.

Befor the pasterisation all samples were axamined for their microbial count.It reached from 474-495x10<sup>4</sup>.

The canns were closed and undergone the fractio-  
nate pasterisation in interval of 48 hours.at  
the temperature 96°C.Treated and untreated samples  
are than stored in the incubator at the tempera-  
ture 38°C.In time interval of one week we took  
randomly out of incubator of each batch twe sam-  
ples and examinated them organoleptically,pH  
concentration of brine and emulsion and microbes  
count.

Table I shows obtained results.

Time of examination	brine	Count emulsion	brine	pH emulsion
I. week				
control	Ø	Ø	6,5	6,1
0,8% prop.acid	Ø	Ø	5,3	4,9
0,4% "	Ø	Ø	5,9	5,8
0,25% "	Ø	Ø	6,0	5,8
II. week				
control	495x10 <sup>4</sup>	116x10 <sup>4</sup>	6,2	6,0
0,8% prop.acid	3x10 <sup>3</sup>	Ø	5,3	5,0
0,4% "	125x10 <sup>3</sup>	Ø	5,9	5,8
0,25% "	161x10 <sup>2</sup>	94x10 <sup>4</sup>	6,3	6,2
III. week				
control	Ø	2x10 <sup>4</sup>	6,1	5,9
0,8% prop.acid	Ø	Ø	5,5	5,5
0,4% "	0	Ø	5,8	5,2
0,25% "	Ø	3846x10 <sup>2</sup>	5,9	5,7
IV. week				
control	Ø	Ø	6,0	5,8
0,8% prop.acid	Ø	Ø	5,5	5,6
0,4% "	153x10 <sup>2</sup>	122x10 <sup>2</sup>	5,9	5,9
0,25% "	323x10 <sup>2</sup>	624x10 <sup>2</sup>	5,9	5,7

The frankfurters for the taste panel were removed from tins cooked by adding tape water and served to panelists to recover the flavor.



The flavor of the untreated samples did not show any remarkable off-flavor but by cooking they were bursting.

The samples treated by 0,8% propionic acid were very sour and that by 0,4% slightly sour, whereas, the taste panel was unable to distinguish between treated and untreated samples when dosage of 0,25% propionic acid was used.

The microbial growth was by pasteurisation completely inhibited for one week that means the lag phase is prolonged. After one week came in control samples the logarithmic phase with gas formation in cans.

In the period of 3-4 weeks we could check the decreasing phase. pH remained through all phases merely unchanged though showing a little trend to sour.

From microbiological point of view 0,25% propionic acid mixed to the brine in canned frankfurters gave a completely stable product. There is the question only to find an agreeable combination between palatability and keeping quality.

We suppose the storage potential without blowing for a period of four weeks is quite satisfactory for conditions at our seaside.

The flavor of canned frankfurters differs slightly from smoked ones but we have to remark that the people eat the canned frankfurters with mustard or in sauce.

How is to explain the inhibitory respectively the lethal action of propionic acid. It is known that acetic acid is effective in very low pH 3,9-5,2. At this pH level the microorganisms are inhibited or the growth does not take at all.

In our conducted experiments it is clear that the pH difference between treated and untreated samples is at most 0,5. That means that there does exist some other factors of inhibiting or preventing the microbias growth in propionic acid.

Two theories about action of propionic acid on microbes are known: the action on aminoacids and seceud on carbohydrates of microbes. Not one theorie is definitely proved.

For the packers is more important the question if propionic acid is noxi ous for human beeigns or not.

In USA manufactured I.I. du Pont de Nemours Company as preservatives sodium propionate and others salts of propionic acid, which are very useful for addition to cream, cheese bread, etc.

For this reason we suppose propionic acid could be in our country applied too as preservatives in canned frankfurters.

#### S U M M A R Y

The propionic acid in various concentrations was investigated as preseevative against blowing of canned frankfurters.

In concentration 0,25% it may be used as additive to brine owing to its inhibitory action on microbial growth and without causing an off-fla vor of the food.



#### R E F E R E N C E S

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#### Z U S A M M E N F A S S U N G

Die Propionsäure wurde in verschiedenen Konzentrationen als Vorbeuge gegen Bombage der Würstchen in Dosen untersucht.

In der Konzentration von 0,25% kann man die Propionsäure als Zusatz zu Pökellake infolge ihrer hemmenden Wirkung auf die Mikroben anwenden, ohne dass sie einen ungewünschten Geschmack ausübt.

#### R E S U M É

Nous avons recherché l'action de différentes concentrations de l'acide propionique dans la prevention du bombage des frankfurters conservés.

On peut ajouter l'acide propionique en concentration de 0,25% au saumure par raison de son effet inhibitoire sur les microbes, sans que cela provoque un changement du goût.