

Study of Technology for the Manufacture of Chinese Fermented Sausage

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SUMMARY: To select starter-culture is very important composition for the manufacture of chinese fermented sausage besides other materials added on it in our study. Mixed culture-Streptococcus thermophilus and Lactobacillus bulgaricus were selected by us for producing chinese fermented sausage under these conditions at temperature 35°C(94°F) for about 18 hours. The results for analysis of variance from overall acceptability were significant differences. Chinese fermented sausage we studied has an extension of storage life besides a fragrant flavour as compared with traditional chinese sausage products because the final pH of chinese fermented sausage were decreased to 5.2 from initial 6.5 by the effect of mixed culture. So chinese fermented sausage manufactured with mixed culture fermentation will be developmental sausage product in China.

INTRODUCTION: Sausage product manufactured has had a long history in China. Chinese meat products are known from time immemorial. Sausages are the most common eaten as well in China. These sausages are made from selected cuts of fresh or chilled meats-the most popular in China being pork only, or with beef also commonly used by the processed meat industry. We have also many kinds of meat products which are exported to some countries abroad every year, especially traditional chinese sausage products. We made full domestic investigation on the processing technology of meat products in China before we study. We considered that we should ought to develop some new processing technology of meat products produced on the basis of traditional chinese sausage. Therefore, we studied a new experiment of fermented sausage produced in our laboratory.

The aim of this paper is mainly to discuss processing technology on chinese fermented sausage we studied with starter-culture-Lactic acid bacteria in our laboratory. A litter microbiology study to be done as well during our experiment. Our experimental studies revealed different results of pH value, flavour and acidity in chinese fermented sausage. The results of analysis of variance obtained in our experiments were significant differences.

MATERIALS and METHODS: Media-A milk medium was prepared by reconstituting 12 g low heat Non-Fat Dry Milk Powder (NDMP) in 100 ml tap-water. Media were sterilized at 121°C for 15 min and aseptically dispensed in 10 ml amounts into sterile test tubes.

Starter-culture-Lactic culture from China Dairy Research Institute 1 ml was aseptically dispensed in 10 ml sterile NDMP and incubating at 41°C consistently the NDMP for about 1 hour.

Determination of pH-Ten grams of chinese fermented sausage samples were blended with 70 ml distilled water for 60 seconds. The pH of the slurry was measured using a pH Meter

was calibrated against 2 standard buffers (pH values of 3.57 and 4.00).

Sausage manufacture-Porks which were "skin-off" (fresh or chilled pork) were obtained from local abattoir in Tianjin. And other materials including sucrose, Glucono-delta-lactone, sodium chloride, sodium nitrite, spices, emulsifier and starter-culture were obtained from different cities in China. All materials are placed in together and they were comminuted until the desired texture and particle size of fat is achieved. Then they are stuffed immediately into sheep gut casings in a diameter of 80 mm. They are then removed to fermenting room with 80% relative humidity and fermenting temperature are 30°C (86°F), 35°C(94°F) and 40°C(104°F) respectively controlled for 18 to 24 hours. During the fermentation, sausage product is allowed to develop the colour. After fermentation, sausage goes to smokhouse and cooks at the same place for about 1 to 2 hours. The processing procedure of chinese fermented sausage is decribed above.

Sensory evaluation-Our experimental chinese fermented sausage samples were evaluated as compared with traditional chinese sausage using scoring method and randomly selected panelists for testing.

RESULTS and DISCUSSIONS: During our experiments, we selected three kinds of starter-cultures, in which, they are Streptococcus thermophilus, Lactobacillus bulgaricus and mixed culture-Streptococcus thermophilus and Lactobacillus bulgaricus respectively. The results were shown in Table 1. We used fermenting temperature at 30°C(86°F), 35°C(94°F) and 40°C(104°F) respectively and different fermenting time. The experimental results of pH value, acidity and flavour are desirable. In which, mixed culture-Streptococcus thermophilus and Lactobacillus bulgaricus is much better than others, especially fragrant flavour developed at 18 hours for 35°C(94°F) controlled is more desirable.

The quality of chinese fermented sausage products were decided by Lactic acid bacteria. The generation of special fragrant flavour and high nutritional value in chinese fermented sausage are mainly by Lactic acid bacteria as well. So the pH value and acidity related to quality of fermented sausage products. Our experimental study is to choose a desirable conditions of acidity and pH value during fermentation. The results of a change of pH value and acidity during our experiments is shown in Fig 1.

Finally, we carried out sensory evaluation and statistics analysis of experimental fermented sausage sample and randomly selected panelists for being evaluated sample using the scoring methods. The contents evaluated is mainly colour, appearance, texture and flavour. The results of sensory evaluation for both experimental fermented sausage sample and traditional chinese sausage were no significant differences. But from overall acceptability point of view, they were very significant differences.

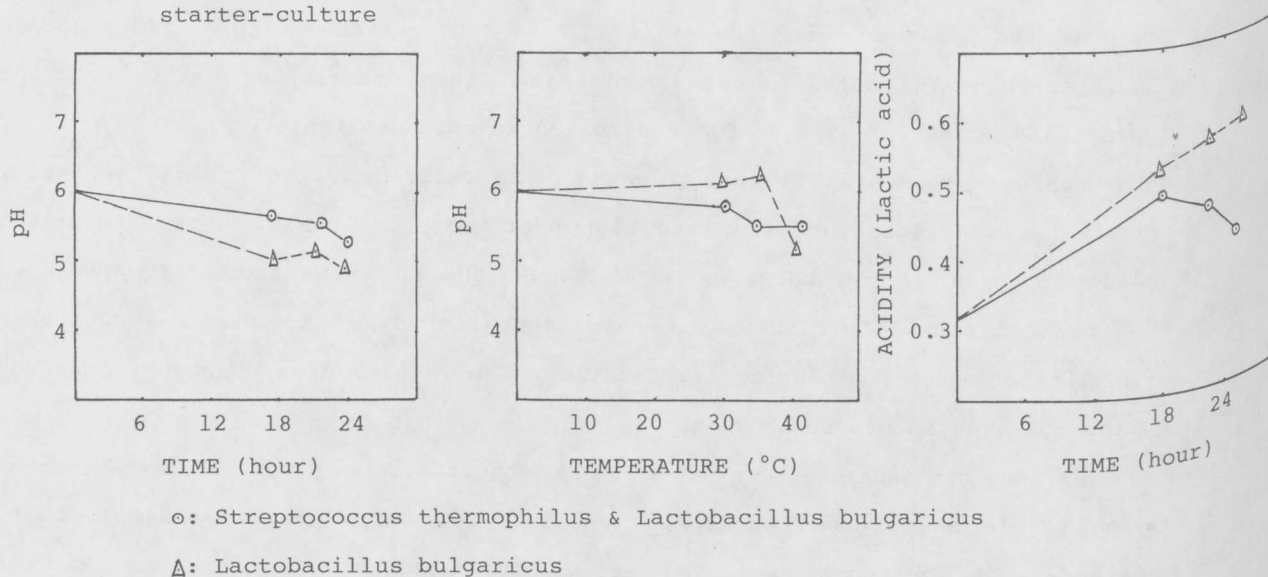
Table 1. Selected starter-culture with different fermenting time and temperature by the results of acidity, pH and flavour

Starter-culture	Fermenting time(h.)	Fermenting Temperature (°C)	Acidity (Lactic acid)	pH	Flavour
Streptococcus thermophilus	0	0	0.33	5.83	NSF ^a
	24	35	0.31	6.2	NSF
		40	0.26	6.5	NSF
Lactobacillus bulgaricus	0	0	0.38	6.0	NSF
	18	30	0.54	5.4	NSF
		35	0.60	6.2	NSF
		40	0.31	5.19	NSF
	24	35	0.37	4.95	NSF
		40	0.55	4.4	NSF
Streptococcus thermophilus and Lactobacillus bulgaricus	0	0	0.33	5.90	NSF
	18	35	0.52	5.5	SF ^b
		40	0.54	5.5	SF
	24	35	0.60	5.6	SF
		40	0.41	5.2	SF

a: No special Flavour

b: Special Flavour

Fig 1. A change of pH and acidity of experimental fermented sausage with different starter-culture



CONCLUSIONS: In our experiment, no antioxidant was added. We only added a little sodium nitrite which is less than International Food Activity Standard. We found that manufacture fermented sausage with Lactic acid bacteria is to be able to develop a red colour during fermentation in the presence of nitrite. The development of a red colour in fermented sausage sample is very desirable. In addition, fermented sausage could retain the ability to produce

the inhibitory substance. Mixed culture-*Streptococcus thermophilus* and *Lactobacillus bulgaricus* we used is suited to make fermented sausage products. We used mixed culture and Glucono-delta-lactone to produce chinese fermented sausage so that multiplication of pathogenic bacteria was inhibited. In addition, because chinese fermented sausage product we studied was cooked during processing, so we found that no pathogenic bacteria in our experimental sausage sample was observed. We also found that no fluorescing bacteria and fungi were observed within 20 days storage at between 20°C to 30°C. Therefore our experimental fermented sausage had more longer shalf-life than other non-fermented sausage products. Chinese fermented sausage product will be a good meat product, especially with special fragrant flavour. But there are still a lot of works to be done for us in the future even so. Further studies on microbiology of chinese fermented sausage are advisable.

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