MICROBIOLOGICAL CHARACTERISTICS OF SOUR MEAT, AN ABORIGINAL FERMENTED MEAT PRODUCT IN TAIWAN

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Key Words：Sour meat, Fermentation, Microbiology

Introduction

Sour meat, a fermented raw meat product, has traditionally been manufactured by the people in some aboriginal tribes of Taiwan. Most are made from pork, and a few are from pig intestine or fish. Although the history of curing this product is lost in antiquity, the main purpose was to extend the storage life. In the traditional method of its preparation, raw meat was cut into cubes, covered tightly with several layers of steamed millet, rice and wine, and fermented at room temperature for 14-20 days.

To our knowledge, sour meat has not been scientifically investigated the microbiological characteristics so far. The aim of this study was to compare the differences of microbiological count and microflora of the sour meat from different regions in Taiwan.

Materials and Methods

Samples：10 samples of sour meat from different regions were purchased; nine of them were collected from different counties around the Taiwan Island. Each product was manufactured by different aboriginal person. Sources of sour meat product collected were shown on the table 1.

Table 1. Sources of sour meat collected

No.	sources	curing time	meat
1	Hualien	6 months	intestine
2	Nantou	2 weeks	pork
3	Hualien	6 months	intestine
4	Hualien	6 months	pork
5	Miaoli	2 weeks	pork
6	Miaoli	4 months	pork
7	Kaohsiung	3 months	pork
8	Keelung	3 weeks	intestine
9	Yilan	2 weeks	pork
10	France（Vietnam sour meat）	unknown	pork

PH value： Ten grams of sample blended with 20 ml distilled water for 15 seconds, and pH of the slurry was determined using a pH meter (Type S20, Mettler Toledo) (AOAC, 1990).

Titration acidity (lactic acid)：After determined the pH value, the samples was diluted with distilled water to flask until total volume was 100 ml. Titration of acidity was calculated by titrating the filtrate of the homogenate sample with 0.1N NaOH to an end point of phenolphthalein (AOAC, 1990).

Bacterial counts：Bacterial culture method was according to the Method of test for food microbiology-Test of Standard Plate Count（CNS 10890-N6186）and Method of test for milk and milk product-test of lactic acid bacteria. (CNS 14760-N6317). Media of Standard Plate Count Agar (SPC, aerobic culture) and Lactobacilli MRS agar (anaerobic culture) were used and incubated at 37℃ for 48-72 hours.

Bacterial isolation and identification：Before identification, we screened the cultured bacterial colonies with Gram's stain and catalase test. Gram's stain positive and catalase test negative were recognized as lactic acid bacteria (LAB). LAB colonies were identified with BIOMÉRIEUX® API 50CH strips and API 50CHL medium. After reacted with the BIOMÉRIEUX® strips of biochemical reagents for 48 hours, the bacterial medium showed the color development. Identification of the LAB colonies was determined by the API software.

Results and Disscussion

PH value & titration acidity (lactic acid)：Result of the pH value and acidity were shown on the Table 2. As the result showed, pH value is correlation with acidity of lactic acid. LAB are responsible for contributing to the flavour and preservation of fermented foods by producing antagonistic substances such as lactic and acetic acids,

hydrogen peroxide, diacetyl, antibiotics and bacteriocins (Aymerich et al., 2000). In our samples, different additives and its amount not only affected the taste of the product, but also affected the acidity of lactic acid. Addition of much rice wine, such as No. 2 and No. 3, increased the acidity of lactic acid more than pH value.

Table 2. Result of the pH value and acidity

No.	pH value	acidity of lactic acid(%)
1	4.38	0.36
2	3.91	1.21
3	4.58	0.85
4	5.30	0.09
5	4.31	0.45
6	5.27	0.72
7	5.96	0.09
8	4.84	0.31
9	5.65	0.09
10	4.81	0.31

Bacterial counts and identification：Result of bacterial counts and identifications were shown on the Table 3. From the results of the LAB counts showed, samples which curing time less than 4 weeks, were more than 10^7. Identification of LAB, *Lactococcus lactis* ssp. *lactis* and *Lactobacillus paracasei* ssp. *paracasei* was the predominant bacterial colony in the samples. *Pediococcus acidilactici* , which was cultured from sample No.8 and 9, is a common sausage fermentation bacteria.

Table 3. Result of bacterial counts and identifications

No.	Medium	Counts	Identification
1	SPC	1.5×10^3	*Lactococcus lactis* ssp. *lactis*
	MRS	7.9×10^4	
2	SPC	8.0×10^9	*Lactobacillus plantarum*
	MRS	9.9×10^9	
3	SPC	2.1×10^8	*Lactococcus lactis* ssp. *lactis*
	MRS	7.7×10^3	
4	SPC	2.1×10^8	*Lactococcus lactis* ssp. *lactis* *Lactobacillus pentosus* *Lactobacillus paracasei* ssp. *paracasei* *Lactobacillus brevis*
	MRS	2.4×10^8	
5	SPC	1.5×10^8	*Lactococcus lactis ssp. lactis* *Lactobacillus plantarum* *Lactobacillus paracasei* ssp. *paracasei*
	MRS	2.2×10^7	
6	SPC	2.1×10^7	*Leuconostoc mesenteroides* *Lactobacillus paracasei ssp. paracasei*
	MRS	1.51×10^7	
7	SPC	3.9×10^5	*Lactococcus lactis* ssp. *lactis*
	MRS	6×10^2	
8	SPC	3.9×10^8	*Lactobacillus plantarum* *Pediococcus acidilactici*
	MRS	2.6×10^7	
9	SPC	9.4×10^8	*Pediococcus acidilactici*
	MRS	1.4×10^7	
10	SPC	8.6×10^7	*Lactobacillus curvatus* *Leuconostoc mesenteroide* *Lactobacillus brevis*
	MRS	7.8×10^7	

Conclusions

In this study, sour meat samples from different regions of Taiwan were analyzed and cultured lactic acid bacteria were identified. *Lactobacillus*, *Lactococcus, Pediococcus* and *Leuconostoc* were main dominant organisms. The results may be helpful for understanding the microbiological characteristics and process of sour meat.

References

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