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Micrococcus varians and *Staphylococcus xylosus* used as starter in Shang-Do

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Background and Objective

Shang-Do is a popular and well-known meat products in China. It is fermented by natural microorganism and belong to a type of semi-dry fermented products It looks like red apple and its properties like salami type-pepperoni, but it must be cooked before eating.

Micrococcaceae are used in fermented meat for enhancing the color stability and preventing rancidity of the fermented meat by reducing peroxide formation via a catalase system(Andress,1977). Moreover, the activity of this microbiol group reduces spoilage, decrease processing time, and its protease and lipase activity release various aromatic substance(Nuchas and Arkoudelos,1990). Micrococcaceae are also considered responsible for an increase in the pH(Selgas et al.,1986).

The aim of this work was to investigate the change of the quality of Shang-Do inoculated with Micrococcaceae.

Material and Method

Shang-Do was made of 80% pork ham meat, 20% pork back fat and inoculated with *Micrococcus varians*(CCRC1227) and *Staphylococcus xylosus*(CCRC12930). After filling to the bladder, Shang-Do was processed by dried curing at 4℃ for 24h.and then dried at 50-55℃ for 8h. The product was incubated at 20℃ for 14 days then ripening stages were performed at 15℃ for 6 weeks The pH, water activity and the quality of microbiology were determined after filling, before drying, after drying and at 1,2,3,4,8 weeks of ripening.

Result and Discussion

pH and water activity : The changes of pH are showed in Table 1. During the ripened period, pH value of all treatments increase with incubation time. This result was the same with the conclusion of Coppla et al.,(1997) and Selgas et al.,(1986).The water activity of all treatments reduced with the ripening time(Table 2). The water activity of Shang-Do of the edge and the center reached equilibrium after ripened for 1 week.

The quality of microbiology : Data of Table 3,4,5 were expressed microbial status during ripening.The initial total plate counts of the control was 4.7 log CFU/g and significantly lower than the others due to the usage of starter cultures The total plate counts of all treatments were reduced after drying. The final total plate counts of all treatments were 3.9-5.1 log CFU/g. The change of Micrococcaceae status in Shang-Do during ripening was the same as the total plate counts of products The fungi counts of Shang-Do did not exceed 10^4 cfu/g in the initial stage and no fungi existed in the final product.

Conclusion

With the addition of *Micrococcus varians* and *Staphylococcus xylosus*, the pH value of Shang-Do remained a desirable condition in this study.

Reference

(1)Coppola, R., M. lorizzo, R. Saotta, E. Sorrentino and L. Grazia. 1997. Food Microbiology. 14:47-53.
(2)Hammes, W. P.,I. Bosch and G. Wolf. 1995. J. Appl. Bacteriol. Symp. 79(Suppl.) 76S-83S.
(3)Miralles, M. C., J. Flores and G. Perez-Martinez. 1996. Food Microbiology. 13:227-236.
(4)Rosa, M. C., M. R. Mohino, M. Mohino and M. A. Mosso. 1990. Food Microbiology. 7:207-215.
(5)Selgas, M. D., Ordonoez, J. A. and Sanz, B. 1986. In proceedings of the 32th European Meat Research Workers,Gent.
(6)Nychas, G. J. and Arkoudelos, J. S. 1990. J. Appl. Bacteriol. Symp.(Suppl.):167S-188S.

Table 1.The change of pH value* of Shang-Do with different starters during ripening

Treatment***	Ripening Time**							
	0dys	BD	AD	1wks	2wks	3wks	4wks	8wk
CE	6.21±0.02d	6.11±0.02exy	6.41±0.02cxy	6.39±0.02cyz	6.43±0.03cxy	6.61±0.03bxy	6.69±0.03bx	6.83±0.03
CC	6.21±0.02d	6.14±0.02eyz	6.38±0.02cy	6.37±0.02cz	6.38±0.03cy	6.58±0.03bxy	6.56±0.03byz	6.84±0.03
ME	6.25±0.04d	6.16±0.03dyz	6.46±0.03cxy	6.49±0.03cx	6.45±0.03cwxy	6.71±0.03bw	6.65±0.05bxy	6.85±0.03
MC	6.25±0.04c	6.19±0.03cz	6.48±0.03bx	6.45±0.03bxy	6.19±0.03cz	6.40±0.03bz	6.51±0.05bz	6.80±0.03
SE	6.28±0.03d	6.26±0.03dwx	6.49±0.03cx	6.44±0.03cxyz	6.61±0.03bv	6.71±0.03aw	6.76±0.03awx	6.79±0.03
SC	6.28±0.03e	6.29±0.03ew	6.40±0.03cdxy	6.48±0.03cdx	6.53±0.03bcvw	6.58±0.03bxy	6.69±0.03ax	6.80±0.03
MSE	6.22±0.03d	6.20±0.03dxy	6.40±0.03cy	6.47±0.03cxy	6.48±0.03cwx	6.66±0.03bwx	6.80±0.05aw	6.69±0.03
MSC	6.22±0.03d	6.25±0.03dwx	6.44±0.03cxy	6.47±0.03bcxy	6.43±0.03cxy	6.56±0.03by	6.79±0.05aw	6.73±0.03

*: Mean±S.E

**: BD means before drying ; AD means after drying

***:CE:The edges of the raw Shang-Do CC:The centre of the raw Shang-Do
ME:The edges of the Shang-Do with *Micrococcus varians* ;MC: The centre of the Shang-Do with *Micrococcus varians*
SE: The edges of the Shang-Do with *Staphylococcus xylosus* ;SC:The centre of the Shang-Do with *Staphylococcus xylosus*
MSE :The edges of the Shang-Do with *Micrococcus varians* and *Staphylococcus xylosus*
MSC: The centre of the Shang-Do with *Micrococcus varians* and *Staphylococcus xylosus*

a,b,c,d,e : means within the same row without the same superscript letters are significantly different (P<0.05).
v,w,x,y,z : means within the same column without the same superscript letters are significantly different (P<0.05).

Table 2.The change of water activity value* of Shang-Do with different starters during ripening.

Treatment***	Ripening Time**							
CE***	0dys	BD**	AD**	1wks	2wks	3wks	4wks	8wks
CC***	0.975±0.007ax	0.916±0.006by	0.855±0.006dyz	0.869±0.006cdy	0.880±0.006cy	0.863±0.006dy	0.856±0.006dwx	0.767±0.008e
ME***	0.975±0.007ax	0.956±0.005bx	0.922±0.006cw	0.888±0.006dx	0.884±0.006dexy	0.869±0.006efy	0.864±0.006fw	0.766±0.008g
MC***	0.975±0.007ax	0.898±0.007bz	0.856±0.006dy	0.889±0.006bcx	0.892±0.006bcxy	0.878±0.006cxy	0.815±0.008ez	0.771±0.008f
SE***	0.975±0.007ax	0.961±0.006ax	0.934±0.006bvw	0.901±0.006cx	0.897±0.006cx	0.887±0.006cx	0.839±0.008dxy	0.767±0.008e
SC***	0.976±0.007ax	0.923±0.006by	0.853±0.006cyz	0.889±0.006dx	0.887±0.006dxy	0.868±0.006ey	0.849±0.006fwx	0.770±0.008g
MSE***	0.976±0.007ax	0.964±0.006ax	0.933±0.006bvw	0.898±0.006cx	0.895±0.006cxy	0.875±0.006dxy	0.857±0.006ewx	0.766±0.008f
MSC***	0.976±0.007ax	0.918±0.006by	0.873±0.006cx	0.889±0.006cx	0.889±0.006cxy	0.864±0.006dy	0.827±0.008eyz	0.768±0.008f
	0.976±0.007ax	0.954±0.006bx	0.949±0.006cx	0.894±0.006cx	0.895±0.006cxy	0.876±0.006dxy	0.842±0.008exy	0.764±0.008f

*The same with table 1.

Table 3.The change of total plate counts (log (CFU/g)) * of Shang-Do with different starters during ripening.

Treatment***	Ripening Time**							
CE	0dys	BD	AD	1wks	2wks	3wks	4wks	8wks
CC	4.7±0.3bcz	5.8±0.3ay	5.1±0.3abx	3.9±0.5cdyz	4.0±0.4cd	3.3±0.5dy	3.7±0.4d	3.9±0.4cdy
ME	4.7±0.3abz	5.1±0.3ay	4.7±0.3abxy	3.5±0.4cdz	3.8±0.4bcd	3.1±0.5dy	3.6±0.4cd	4.3±0.4abcxy
MC	6.6±0.6ay	5.5±0.4aby	5.4±0.4abx	4.4±0.5bcxyz	4.0±0.4c	6.2±0.8ax	3.8±0.6c	4.0±0.5cxy
SE	6.6±0.6ay	5.3±0.4aby	3.3±0.4dz	4.8±0.4bcxy	4.3±0.6bcd	6.2±0.8abx	3.6±0.5cd	5.1±0.4bx
SC	7.3±0.3ax	7.5±0.3ax	4.2±0.3byz	3.9±0.3byz	3.9±0.4b	4.2±0.5by	4.0±0.6b	4.8±0.4bxy
MSE	7.3±0.3ax	7.4±0.3ax	5.5±0.3bx	4.6±0.4bcdxyz	4.2±0.3d	5.3±0.3bcx	4.3±0.4d	4.3±0.5cdxy
MSC	7.4±0.3ax	7.1±0.3ax	5.5±0.3bx	5.2±0.5bcx	3.8±0.5d	4.0±0.8cdy	3.2±0.6d	4.3±0.4cdxy
	7.4±0.3ax	7.1±0.3ax	5.1±0.4bxy	4.2±0.4bcxyz	4.3±0.4bc	3.9±0.6bcy	3.5±0.4c	4.3±0.4bcxy

*The same with table 1.

Table 4.The change of Micrococcaceae counts (CFU (log/g))* of Shang-Do with different starters during ripening.

Treatment***	Ripening Time**							
CE	0dys	BD	AD	1wks	2wks	3wks	4wks	8wks
CC	4.1±0.3bcy	5.4±0.2az	4.7±0.3abxy	3.8±0.4bcdyz	3.8±0.3cdxy	3.0±0.4dz	3.1±0.4dyz	3.8±0.5cdxyz
ME	4.1±0.3bcdy	5.2±0.3az	4.8±0.3abxy	3.6±0.5cdeyz	4.4±0.3bcx	3.2±0.4dez	2.6±0.5ez	3.3±0.5cdeyz
MC	7.6±0.5ax	6.7±0.4ay	5.1±0.4bwxy	4.5±0.5bcxy	4.3±0.4bcdxy	3.9±0.8bcdyz	3.1±0.5dxyz	3.3±0.5cdyz
SE	7.6±0.5ax	6.9±0.4axy	3.4±0.4cz	4.9±0.4bx	4.0±0.5bcxy	4.9±0.8bcxy	3.6±0.5cxyz	4.2±0.4bcxy
SC	7.8±0.3ax	7.7±0.3ax	4.8±0.3bxy	3.2±0.4cz	3.5±0.4cy	3.6±0.4cyz	3.4±0.4cxyz	3.9±0.5bcxyz
MSE	7.8±0.3ax	7.7±0.3ax	5.6±0.4bw	5.0±0.3bcdx	4.1±0.4dexy	5.1±0.3bcx	3.9±0.3exy	4.7±0.3cdex
MSC	7.7±0.3ax	7.4±0.3axy	4.2±0.4cyz	5.5±0.5bx	4.1±0.5cxy	4.5±0.8bcxyz	2.8±0.5cyz	2.8±0.5cz
	7.7±0.3ax	7.4±0.3axy	5.5±0.3bw	5.4±0.3bx	4.0±0.4cxy	4.1±0.5cyz	4.3±0.4cx	4.0±0.5cxyz

*The same with table 1.

Table 5.The change of fungi counts (CFU (log/g))* of Shang-Do with different starters during ripening.

Treatment***	Ripening Time**							
CE	0dys	BD	AD	1wks	2wks	3wks	4wks	8wks
CC	3.8±0.1a	3.2±0.1bz	2.5±0.2cdxy	2.9±0.2bcwx	2.4±0.2dx	1.9±0.2e	1.8±0.2e	0
ME	3.8±0.1a	3.8±0.1axy	3.3±0.2bvw	2.5±0.1cxy	2.4±0.2cx	2.2±0.2cd	1.9±0.2d	0
MC	3.9±0.2a	3.3±0.2bz	2.4±0.2cyz	1.9±0.2cdz	1.9±0.2cdy	1.9±0.2cd	1.8±0.2d	0
SE	3.9±0.2a	3.9±0.2axy	1.9±0.2cz	3.1±0.2bx	1.9±0.2cy	2.2±0.2c	1.9±0.2c	0
SC	4.0±0.1a	3.5±0.2byz	1.9±0.2dz	2.4±0.2cy	1.9±0.2dy	2.2±0.2cd	1.9±0.2d	0
MSE	4.0±0.1a	3.9±0.1ax	1.9±0.2cz	2.4±0.2by	2.2±0.2bcxy	1.9±0.2c	1.8±0.2c	0
MSC	3.8±0.2a	3.3±0.2abz	2.9±0.2bwx	1.9±0.2cz	1.9±0.2cy	1.9±0.2c	1.8±0.2c	0
	3.8±0.2a	3.5±0.2ayz	3.6±0.2av	2.9±0.2bwx	1.9±0.2cy	2.2±0.2c	1.9±0.2c	0

*The same with table 1.