EFFECT OF CHITOSAN-ORGANIC ACIDS COMBINED SOLUTIONS ON THE INHIBITING EFFICIENCY FOR *S. AUREUS, E.COLI* AND *S. TYPHI* INOCULATED ON THE SURFACE OF BROILER CARCASSES

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Introduction

Different pathogenic and spoilage types of organisms may be introduced into the meat during slaughtering and processing, which causes rapid spoilage, great loss of valuable protein and also affects human health. Therefore, it is very important to reduce the initial microbial load to increase the shelf-life of meat. Several intervention strategies have been developed to reduce the level of bacteria on animal carcass surfaces such as washing and sanitizing with chilled water, hot water, chlorinated water, food grade acids, chitosan and salts, alone and in combination. The objective of this experiment conducted to evaluate the effect of two organic acids (acetic acid＋lactic acid and acetic acid＋propionic acid were 2:1;v/v) combined with chitosan (1000 ppm) on the antibacterial activity for *Staphylococcus aureus, Escherichia coli and salmonella typhi* when these solutions were applied on broiler carcasses.

Materials and methods

Each 5 broiler carcasses were inoculated with target bacteria such as *Staphylococcus aureus, Escherichia coli and Salmonella typh*, individually, by spraying way. The inoculated number of target bacteria is 3 log CFU/cm^2. Then two solutions consisted of two organic acids (acetic acid＋lactic acid and acetic acid＋propionic acid, v/v, 2:1 and adjusted to pH 3) and chitosan (1000 ppm), respectively, were used to spray on the surface of whole broiler carcasses then stored at 4℃for one hour. Only distilled water was used in the control to spray on the carcasses. At the end time point, the swab method was used to take samples from breast and thigh skin of broiler carcasses. Then the inhibiting efficiency of *Staphylococcus aureus, Escherichia coli and Salmonella typhi* inoculated on the surface of broiler carcasses was evaluated, individually in the present study.

Results and Discussion

The results were showed in Table 1. A significant inhibiting efficacy for target bacteria inoculated on the skin of the broiler carcass was found when those two organic acids combination with1000 ppm chitosan spraying on broiler carcasses and stored at 4 ℃ for one hour. In this experiment the skin of breast and thigh part of carcass will be used to determine target bacteria count and no significant difference on inhibiting efficacy was found between the two parts in broiler carcasses. On the breast skin, the bacteria count can be reduced 1.63,

1.86 and 1.74 log CFU/cm^2, individually, for *S. aureus, E. coli and S. typhi.* Additionally, on the thigh skin part, the reduced number was 1.51, 1.82 and 1.46 log CFU/cm^2 for *S. aureus, E. coli and S. typhi*, respectively. In control treatment, although only distilled water was used to spray on the broiler carcasses, a little inhibiting efficacy also can be found in Table 1 and approximate 0.78-0.81 CFU/cm^2 of target bacteria can be reduced.

Table1. The inhibiting bacteria effect of chitosan and two organic acids combination spraying on the surface of broiler carcasses at breast skin and thigh skin part for *S. aureus, E. coli and S. typhi*.

Acid combination / Inoculated	part: Breast skin (Reduced log CFU/cm^2)				part: Thigh skin (Reduced log CFU/cm^2)			
	control	A+L	A+P	SEM	control	A+L	A+P	SEM
S. aureus	0.81^b	1.63^a	1.74^a	0.31	0.78^b	1.51^a	1.46^a	0.22
E. coli	0.73^b	1.86^a	1.67^a	0.27	0.66^b	1.82^a	1.31^a	0.34
S. typhi	0.78^b	1.74^a	1.52^a	0.22	0.71^b	1.46^a	1.54^a	0.18

$^{a-b}$Different superscripts at the same row indicate significantly different($p < 0.05$)

A+L: chitosan and acetic acid＋lactic acid combination

A+P: chitosan and acetic acid＋propionic acid combination

Conclusions

In conclusion, 1000 ppm chitosan combined with two organic acids (acetic acid＋lactic acid and acetic acid＋propionic acid, v/v, 2:1 and adjusted to pH 3) spraying on the surface of broiler carcasses had a significantly inhibiting efficacy for *S. aureus, E. coli and S. typhi* in this research.

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