EFFECT OF CHEMICAL SANITIZERS ON THE BACTERIAL COUNTS OF PIG CARCASSES

E. Nanu,[1] K. Vrinda Menon [2], B. Sunil[3] and C. Latha[4]
Department of Veterinary Public Health
College of Veterinary and Animal Sciences
Mannuthy-680 651, Thrissur, Kerala

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Abstract

The effectiveness of sanitizers in controlling the bacterial load of pig carcass is studied. The effect of organic acids, viz., acetic and lactic acid, potassium sorbate in combination with lactic acid and chlorine in the decontamination of the carcasses at different concentrations revealed that all the sanitizers could reduce the bacterial load of the carcasses. However lactic acid at 2% level was the most effective in reducing the total viable count, coliform, Escherichia coli, enterococcal and sulfite reducing clostridium count of the carcasses.

Keywords: *Sanitizer, lactic acid, acetic acid, potassium sorbate, chlorine, pig carcass, bacteria*

In India, meat is generally consumed fresh, immediately after slaughter. During slaughter operations, the carcass is exposed to extraneous contamination and temperature variation which favour microbial multiplication and subsequent reduction in the shelf life of meat. Several intervention strategies have been developed to reduce the bacterial load on carcass surfaces. One such strategy that has gained relatively wide acceptance in the meat processing industry is carcass washing and sanitizing. In the present study, the effect of various sanitizers on the bacterial counts of pig carcasses have been evaluated.

Materials and Methods

During the study, a total of six pig carcasses were collected randomly from a meat processing plant in Kerala, to detect the antibacterial effect of sanitizers. Equal number of carcasses selected were treated as control samples.

The sanitizers used in the study included lactic acid (1% and 2 %), combination of Potassium sorbate (0.5%) and lactic acid (2%) and acetic acid (1% and 2%) and chlorine. The swab samples were collected from 100 cm^2 area each from jowl, shoulder, bacon, loin and ham regions of the carcasses. The samples from each carcass were pooled into 500 ml of 0.1% peptone water.

The total viable count (TVC), coliform count (CC) *Escherichia coli* count enterococcal count (EC) and sulfite reducing clostridium count (SRC) was estimated as per the procedure described by Downes and Ito (2001).The data obtained from the above study was subjected to statistical analysis following procedure described by Rangaswamy (1995).

Results and Discussion

The effect of different sanitizers on the mean bacterial count of pig carcasses is shown in the table.

Statistical analysis of data revealed a significant reduction in the mean total viable

[1] *Dean (Retd.)*
[2] *Assistant Professor*
[3] *Associate Professor*
[4] *Associate Professor & Head*

Table: Effect of sanitizers on the mean bacterial counts of pig carcasses

Sanitizer	Mean bacterial counts on carcasses log $_{10}$ cfu /ml				
	TVC	CC	ECC	EC	SRC
Lactic acid (1%)	4.18 ± 0.18^{a}	2.95±0.09^{b}	1.91±0.28^{a}	0.91±0.25^{a**}	1.62±0.20^{b}
Lactic acid (2%)	2.95 ±0.19^{a**}	1.50±0.06^{a}	0.66±0.06^{a*}	0.59±0.09^{a**}	0.54±0.08^{a**}
Acetic Acid (2%)	4.87±0.11^{a}	0.68±0.14^{a*}	0.34±0.22^{a*}	1.59±0.09^{a}	0.92±0.19^{a}
Acetic Acid (1%)	5.79±0.20^{a}	1.38±0.25^{a}	1.27±0.06^{b}	1.24±0.13^{a}	0.88±0.07^{a*}
Pot. sorbate & Lactic acid	2.92±0.23^{a**}	1.23±0.16^{a}	0.77±0.20^{a*}	1.37±0.12^{a}	0.90±0.13^{a}
Chlorine (200ppm)	4.71±0.16^{a}	0.68±0.20^{a*}	0.75±0.14^{a}	1.19±0.05^{a}	1.05±0.09^{a}
Control	6.25±0.13^{a}	2.02±0.28^{a}	1.97±0.25^{a}	2.83±0.13^{a}	2.31±0.11^{a}

*$P \leq 0.01$

- *Figures in the same column bearing the same superscript differ significantly*
- *Figures in the same column bearing different superscript do not differ significantly*

count of the treated carcasses. The total viable count (TVC) was reduced by around 4 log $_{10}$ cfu/cm^2 when carcasses were treated with lactic acid (2%) and combination of potassium sorbate and lactic acid. The significant reduction in mean TVC count on treatment with acetic acid and chlorine (200ppm) was also observed by Anderson *et al.* (2006) on application of these sanitizers on beef carcasses. Maximum reduction in coliform count of the carcasses from 2.02±0.28 $\log_{10}$ cfu/cm^2 to 0.68±0.14 and 0.68±0.20 $\log_{10}$ cfu/cm^2 was observed on treatment with acetic acid (2%) and chlorine (200ppm) respectively. The effect of acetic acid and reduction of counts by 1 log 10 cfu/cm^2 was observed by Sakhare *et al* (1999). Fu *et al.* (2006) also reported a marked decrease in TVC and coliform count on treatment with acetic acid (2%). All the sanitizers except lactic acid (1%) revealed a significant effect ($P<0.05$) on the growth of *E. coli* count which was in accordance to the results of Smulders and Greer (1998) who reported no effect of lactic acid on *E. coli* O157H9 strain even when treated with 3% lactic acid.. Enterococcal counts were significantly ($P<0.01$) reduced at both concentrations of lactic acid. However lactic acid at 1% level did not significantly reduce the growth of sulphite reducing clostridium count which was also reported by Doores (1993) who observed a reduction in the growth of *Clostridium botulinum* and *C. perfringens* at higher concentration of lactic acid.

Hence, the use of these food grade sanitizers could significantly reduce the growth of various organisms which will further help in improving the quality and shelf life of meat.

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