

Improvement of shelf-life of beef using lactic acid, Na-ascorbate mixture, and potassium sorbate

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Introduction

Consumers evaluate meat colour as a fundamental factor for determining meat quality and acceptance [1]. The main problems causing shelf-life quality deterioration of meat and meat products are microbial growth and oxidative rancidity. As a result, the meat industry and researchers have been on the lookout for new substances or additions to help extend the colour stability of fresh meat [2]. In this work the effect of lactic acid, Na-ascorbate, and potassium sorbate treatments was evaluated with spraying method in beef surface on meat quality parameters like colour and microbiological load. The aim of this work was to define a shelf-life and storage recommendation for beef.

Methods

- A mixture of 2% lactic acid (LA) + 0.5% Na-ascorbate (NA), 2% LA + 1% NA, 2% LA + 2% NA, and 1%, 2%, and 3% potassium sorbate (PS) were applied to beef samples.
- After treatment samples were vacuum packed.
- The samples were stored at 0.5-3 °C for 20 days.
- Quality parameters was measured on days: 0, 4, 11, and 20.
- Beef surface colour was determined using a colorimeter. L*, a* and b* values were measured and colour differences (ΔE^*_{ab}) were calculated.
- In microbiological testing after treatments samples were examined for mesophyll aerobes and Enterobacteriaceae cell counts.

Results

1. Colour measurement

Colour difference ΔE^*_{ab} was calculated for each sample. Colour measurement data indicate that there was noticeable changes during storage 20 days for all samples. The L*, a*, and b* values of samples treated with LA, NA, and PS significantly ($P < 0.05$) decreased in the end of the experiment period. Changes in CIE L*, a* and b* values throughout the display of beef steaks are shown in Table 1.

Results



Figure 1. Difference between (a) day 0 and (b) day 11 treated samples with 2% lactic acid+2% Na-ascorbate mixture.

Table 1. Effects of lactic acid (LA) with Na-ascorbate (NA), and Potassium sorbate (PS) on CIE L*, a* and b* of beef steaks surface measured on the day 0 and 20 of vacuum-storage at 0.5-3°C

| Treatments | day 0 | | | day 20 | | |
|-----------------|-------|-------|------|--------|-------|------|
| | L* | a* | b* | L* | a* | b* |
| 2% LA + 0,5% NA | 41.60 | 12.74 | 5.02 | 33.65 | 13.06 | 2.08 |
| 2% LA + 1% NA | 42.37 | 13.58 | 4.44 | 33.41 | 12.87 | 1.90 |
| 2% LA + 2% NA | 44.40 | 13.66 | 3.83 | 36.53 | 10.53 | 1.28 |
| 1% PS | 42.63 | 13.91 | 2.45 | 34.27 | 10.82 | 0.99 |
| 2% PS | 42.09 | 14.10 | 1.85 | 34.77 | 11.41 | 1.44 |
| 3% PS | 42.82 | 12.89 | 1.83 | 38.39 | 10.00 | 0.84 |
| Control | 40.82 | 13.34 | 1.93 | 34.77 | 10.66 | 0.71 |

Conclusion

Result from this study indicate that the treatment of lactic acid combined with Na-ascorbate and potassium sorbate had significant advantages to maintaining shelf-life. Therefore, lactic acid, Na-ascorbate, and potassium sorbate treatments may be an alternative to extend beef shelf life.

References

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