USES OF ACETIC AND LACTIC ACIDS TO CONTROL THE MICROBIAL LOAD ON LAMB CARCASES

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In

Meat Hygiene

By

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استخدامات حمض اللاكتيك و الخليك للسيطرة
على الكم الميكروبى الموجود على ذبائح الضأن

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دكتور الفلسفة فى العلوم الطبية البيطرية

فى

الرقابة الصحية على اللحوم و منتجاتها

مقدمة من

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بسم الله الرحمن الرحيم

و ما أوتيتم من العلم إلا قليلاً

صدق الله العظيم
سورة الإسراء الآية رقم 85

"The Angels Spread Their Wings (out of satisfaction about what he/she does) for the Figure who is seeking Knowledge"

I dedicate my work for those who ask for Knowledge and ask Allah for his reward…

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

PAGE

1.0 INTRODUCTION

Meat is an important vehicle for food–borne disease such as salmonellosis and campylobacteriosis. Lactic acid decontamination (LAD) of fresh meat surfaces can be used as a part of hazard analysis and critical control point (HACCP) schemes to reduce the number of pathogens on freshly slaughtered meat carcasses. Lactic acid is suitable for this purpose because it is a natural constituent of meat and a substance generally recognized as safe.

Preservation of foods has long employed a combination of factors in which acids have played an important role ***(Knochel and Gould, 1995)***.

Other acids including acetic, fumaric, propionic and lactic, are often added to foods to prevent or delay the growth of pathogenic or spoilage bacteria. The inhibitory effect of acids on microbial growth has long been used to preserve foods from spoilage. While much of the effect can be accounted for by pH, it is well known that different organic acids vary considerably in their inhibitory effects ***(Podolak et al., 1996)***.

It is of considerable interest to efficiently use the combined effects of several factors that impose barriers to the growth of microbes. Whatever different organisms have demonstrated different ranking for the inhibitory effects of organic acids ***(Chirife and Favetto, 1992*** and ***Matsuda et al., 1994)***.

Acetic acid acts as a preservative and commonly known as vinegar, has effective antimicrobial capabilities due to its ability to lower the pH and cause instability of bacterial cell membranes. ***(Luck and Jager, 1998)***.

The external contamination of meat constitutes a constant problem in meat developing countries where the abattoir itself there are large numbers of potential sources of contamination by microorganisms ***(Davis et al., 2000)***.

Organic acids as antimicrobial agent for surface treatment of fresh meat have been used to prevent the growth of bacteria during chill storage ***(ICMSF, 1980)***. Similarly, in Europe it is considered a harmless constituent ***(Lueck, 1980)***. This widely acknowledged absence of acute and chronic toxicity has led to the choice of lactic acid as decontaminating agent in food industry. Data are available on the potency of lactic acid sprays as carcass decontaminants for lamb and beef carcasses ***(Fatema–Ali, 2001)***.

When cross contamination occurs, it is recommended that effective trimming be conducted to reduce visible contamination combined with a decontaminating lactic acid spray ***(Prasai et al., 1995)***.

Moreover, the application of treatments to the same surface has been found to give greater reductions of bacterial numbers than any of the treatments alone ***(Graves Delmore et al., 1998)***. Lactic and acetic acids are generally recognized as safe food additives ***(Anon, 1982)***.

It is generally recognized that the microbiological effects of decontaminating treatments must be regarded as trivial when the numbers of bacteria recovered before and after a treatment do not differ by at least 0.5 log unit ***(Jarvis, 1989)***.

Organic acids were more effective as decontamination than many other techniques or compounds. In beef–processing facilities, both lactic acid and acetic acids are extensively used as a part of meat decontamination procedures ***(Gorman et al., 1997)***.

Dickson and Anderson (1992) concluded that a decontamination step during the slaughtering process can reduce contamination and possibly contribute to improvement of shelf–life and safety and should be an essential part of the slaughtering/dressing process. In general, washing and sanitizing agents have been effective in reducing bacterial populations and presence of pathogens on carcasses.

Organic acids are typically applied as a rinse to the entire surface of the carcass. Acetic and lactic acids have been most widely accepted as carcass decontamination rinses. Additionally, it has become widely accepted that the effectiveness of organic acids is best achieved shortly after hide removal, when the carcass is still warm ***(Castillo et al., 2002)***.

Numerous studies have reported on the effects of organic acids on general bacterial populations as well as certain pathogenic organisms ***(Snijders et al., 1985; Dickson and Anderson, 1992; Hardin et al., 1995; Dorsa, 1996*** and ***Castillo et al. 2001)***.

The globalization of the economy has resulted in meat and meat products being shipped over ever increasing distances to reach foreign markets. This has created a demand for efficient packaging concepts and technologies which will guarantee that products remain safe and wholesome over long periods of time. Significant progress has already been made in this respect by changing the gaseous environment at the product surface, in a way that hinders the growth of pathogenic or spoilage bacteria. Although the use of organic acid washes does not offer a "magic bullet" for the meat in eliminating pathogenic hazards, acid washes are effective in reducing the initial microbial load on the carcass. This reduction makes acid washing an effective critical control point in reducing microorganisms on the carcass.

An effective and inexpensive way to reduce the growth of pathogens on carcasses is the application of organic acids after the final trim wash. Two examples of commonly used organic acids are lactic acid and acetic acid.

The object of the current research was to evaluate the effectiveness of acetic and lactic acids on microbial loads and characteristics of lamb carcasses treated. Consumer demand for a safe meat supply obviates the need for antimicrobial measures in the manufacturing process. So, the present study was planned to throw light on the uses of acetic and lactic acids to control the microbial load on lamb carcasses.