

Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 1 *Cattleman's Day (1993-2014)*

Article 248

2003

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Recommended Citation

Thompson, L.K. and Fung, Daniel Y.C. (2003) "Effects of dried plum mixtures on total aerobic growth in uncooked ground beef," *Kansas Agricultural Experiment Station Research Reports*: Vol. 0: Iss. 1. <https://doi.org/10.4148/2378-5977.1651>

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Effects of dried plum mixtures on total aerobic growth in uncooked ground beef

Abstract

Spices and plant components are being used more often in food products as natural antimicrobials. Dried plums are effective antimicrobials against foodborne pathogens including *Escherichia coli* O157:H7. The objective of this experiment was to determine the ability of dried plum mixtures to increase the shelf life of ground beef at refrigeration temperatures. Ground beef (80% lean) was mixed with 6% dried plum mixtures and stored at 45°F. Ground meat containing any of the seven dried plum mixtures remained at the initial total aerobic count of 6 log CFU/gram after 13 days compared to 8.5 log CFU/gram at 13 days for controls (without dried plum).

Keywords

Cattlemen's Day, 2003; Kansas Agricultural Experiment Station contribution; no. 03-272-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 908; Beef; Dried plum mixtures; Aerobic growth; Uncooked ground beef

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EFFECTS OF DRIED PLUM MIXTURES ON TOTAL AEROBIC GROWTH IN UNCOOKED GROUND BEEF

L. K. Thompson and D.Y.C. Fung

Summary

Spices and plant components are being used more often in food products as natural antimicrobials. Dried plums are effective antimicrobials against foodborne pathogens including *Escherichia coli* O157:H7. The objective of this experiment was to determine the ability of dried plum mixtures to increase the shelf life of ground beef at refrigeration temperatures. Ground beef (80% lean) was mixed with 6% dried plum mixtures and stored at 45°F. Ground meat containing any of the seven dried plum mixtures remained at the initial total aerobic count of 6 log CFU/gram after 13 days compared to 8.5 log CFU/gram at 13 days for controls (without dried plum).

Introduction

The greater surface area of ground meat enables increased natural flora, particularly psychrotrophic spoilage organisms. One approach for controlling spoilage organisms is to use natural food ingredients. Approved food additives with dual function as antioxidants and antimicrobials, such as phenolic antioxidants, spices, flavoring agents, phosphates, and lactates, are potentially beneficial and allow a lower amount and fewer types of food additives to be used. They also eliminate the need for toxicological studies to establish the safety of the additive. Secondary components of many spice plants are powerful antimicrobials. For example, garlic and cinnamon have reduced *E. coli* O157:H7 in liquid media and ground beef.

Commercial prunes and prune extracts contain phenolics, such as hydroxycinnamates, neochlorogenic acid, and chlorogenic acid, which can inhibit the oxidation of low-density lipoproteins. Dried plum puree at 3% worked equally well as some chemical antioxidants to prevent warmed-over flavor caused by lipid oxidation in precooked pork sausage. This study dealt with the effects of dried plum on aerobic plate counts in uncooked ground beef.

Experimental Procedures

Dried plum mixtures used in this experiment were USDA prune puree, classic prune concentrate, plum juice, lighter bake powder, lighter bake puree, prune puree without potassium sorbate, and prune powder with maltodextrin.

Ground beef (80% lean) purchased from a local grocery store on the day that the experiment was initiated was separated into 211.5-gram samples. Dried plum mixtures were added at 6% for each of the seven different dried plum mixtures. Samples without added dry plum mixtures served as the control. Samples of 25 grams each were placed into sterile filter stomacher bags and held at 45°F for testing at 0, 1, 3, 5, 7, 9, 11, and 13 days.

At appropriate test times, sterile 0.1% peptone water was added to the samples, and then samples were stomached. Samples were diluted and spread plated onto Tryptic Soy Agar plates. The plates were then incubated for 48 hours at 95°F, and colony forming units (CFU) were enumerated.

Results and Discussion

All samples had an initial aerobic bacterial load of about 6 log CFU/gram and grew very little by 24 hours. From day 3 until day 13, the control sample with no added dried plum mixture steadily increased to 8.5 log CFU/gram while the other samples had static growth and remained at an aerobic count of approximately 6 log CFU/gram. The ground

beef sample without any dried plum mixture also exhibited an off-odor after 9 days. Samples with dried plum mixture had no off-odor at day 13.

Dried plum mixtures were effective at controlling aerobic bacteria on ground beef (80% lean) stored at 45° F.