

TECHNICAL BULLETIN

Dried Plums Extend the Shelf Life of Fresh Ground Beef

Executive Summary

Research results that confirmed the addition of dried plum mixtures to uncooked processed meats can significantly suppress (up to 99%) the growth of foodborne pathogens such as *S. typhimurium*, *L. monocytogenes*, *E. coli* O157:H7, *Y. enterocolitica*, and *S. aureus*, compelled Kansas State University researchers Dr. Daniel Y. C. Fung and Leslie Thompson to explore related applications. Based on their observations of dried plums' anti-microbial activity, they hypothesized dried plums could extend the shelf life of raw ground beef by suppressing the growth of normal product flora. As they hypothesized, their second study yielded equally convincing results.

Background

Recent research, conducted at Kansas State University by Dr. Daniel Y.C. Fung and his associates, demonstrated that the addition of dried plum mixtures can control foodborne pathogens in uncooked meat products. When compared to the control after five days, uncooked ground beef (20% fat) with dried plum puree or plum juice exhibited up to a two log suppression of total count, *S. typhimurium*, *L. monocytogenes*, *E. coli* O157:H7, *Y. enterocolitica*, and *S. aureus*.

These positive findings led Dr. Fung, a nationally recognized professor of food science, and Leslie Thompson, a Ph.D. student at the Kansas State Food Science Institute, to conduct further research into the ability of dried plums to extend the shelf life of raw ground beef. This time, they would measure dried plums' effectiveness in suppressing growth of the normal flora that occurs in ground beef.

Materials and Methods

Fung and Thompson purchased ground beef (80% lean) from a local grocery store on the day that the experiment was initiated. The meat was separated into eight 211.5g samples. To seven samples (with the eighth sample as the control), seven different dried plum mixtures were added at a 6% level. The seven dried plum samples were then separated again into eight 25g samples and placed into sterile filter stomacher bags. One sample from each dried plum product grouping would be for tested every 48 hours over a two-week period (days 0, 1, 3, 5, 7, 9, 11, and 13). The bags were then refrigerated at 7°C until sampling.

The samples were tested for total aerobic count. Sterile 0.1% peptone water was added to the samples and then the samples were stomached. This was then diluted and spread plated onto

Tryptic Soy Agar (TSA) plates. The plates were then incubated for 48 hours and enumerated and the results recorded.

The seven dried plum products evaluated versus an untreated fresh ground beef control included: Dried plum puree, dried plum juice concentrate, fresh plum juice concentrate, dried plum powder (dried plums/pears), dried plum/apple puree, fresh plum/maltodextrin powder and dried plum puree without potassium sorbate added.

Results

All fresh ground beef samples treated with dried plums showed virtually no flora growth over the entire 13-day period. Differences between the untreated control and the samples with dried plums began to appear after day three. By day 13, there was on average, a 2 log difference (99%) between the untreated control and all of the samples treated with all of the dried plum products.

Day	Control (Log CFU/g)	Dried Plum Puree (Log CFU/g)	Dried Plum Juice Concentrate (Log CFU/g)	Fresh Plum Juice (Log CFU/g)	Dried Plum/Pear Powder (Log CFU/g)	Dried Plum/Apple Puree (Log CFU/g)	Fresh Plum Juice with maltodextrin (Log CFU/g)	Dried Plum Puree w/o Pot. Sorbate (Log CFU/g)
0	6.34	6.24	6.43	6.50	6.50	6.55	6.48	6.64
1	6.51	6.41	6.26	6.32	6.75	6.94	6.66	6.67
3	7.08	6.16	6.57	6.57	6.63	6.70	6.52	6.55
5	7.34	6.23	6.52	6.20	6.65	6.57	6.42	6.55
7	7.45	6.44	6.30	6.33	6.56	6.70	6.73	6.34
9	8.02	6.21	6.38	6.45	6.55	6.68	6.89	6.35
11	8.29	6.17	6.31	6.67	6.37	6.60	6.67	6.38
13	8.46	6.06	6.35	6.49	6.38	6.33	6.39	6.23

Source: Kansas State University, Food Science Institute

Conclusions

Research conducted at Kansas State and Texas A&M Universities continues to substantiate the efficacy of dried plums as an anti-microbial and antioxidant agent in meat products. In combination with effective moisture retention properties, the addition of dried plums results in a complete, natural meat improvement system for raw and cooked red meats and poultry.

Through the cost savings realized from reduced spoilage and less waste, the ability of dried plums to extend the shelf life of raw ground beef could provide economic benefits for processors, wholesalers, retailers, foodservice operators and consumers. In raw meats, the addition of dried plums can provide an extra margin of safety from pathogens associated with food contamination. In pre-cooked meats, the ability of dried plums to minimize the effects of lipid oxidation (i.e., warmed-over flavor) on a par with BHA/BHT is a welcome advantage for the growing convenience meat and poultry categories.

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