

EFFECT OF NATURAL ANTIMICROBIALS AGAINST *CLOSTRIDIUM PERFRINGENS* OUTGROWTH DURING COOLING OF TURKEY BREAST

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I. OBJECTIVES

The study objective was to investigate the efficacy of 2 natural antimicrobials in uncured deli-style turkey breast meat on outgrowth of *Clostridium perfringens* during chilling and consumer acceptance.

II. MATERIALS AND METHODS

Four treatments of low-sodium, deli-style turkey breast products with standardized levels of 1.5% salt and 1% sugar were prepared. The treatments included a control, 1.0% fruit/spice extract (FS) (Natpre T-10 Plus S, Prosur, Inc., Naperville, IL), 1.0% dried vinegar only (DV) (Durafresh 2016, Kerry Ingredients, Beloit, WI), and 1.0% fruit/spice extract and 1.0% dried vinegar (FS & DV). Treatments were inoculated with a 3-strain mixture of *C. perfringens* spores (ATCC 13124, ATCC 12915, and ATCC 12916) to target an inoculation level of 2.0-log CFU/g. Individual 11-g portions were vacuum packaged, cooked to 71°C, and chilled from 54.4°C to 26.7°C in 5 h and from 26.7°C to 7.2°C in an additional 10 h. Triplicate samples were analyzed for growth of *C. perfringens* after heat shock and at 0, 5, 10, and 15 h during the cooling cycle by plating on tryptose-sulfite-cycloserine agar. The study was replicated 3 times. Consumers ($n=96$) evaluated 4 uninoculated samples (1/treatment) in random order and recorded ratings on an electronic tablet (Model 5709 HP Stream 7; Hewlett-Packard, Palo Alto, CA) using a digital survey (Qualtrics Software Version 2417833, Provo, UT). Panelists were asked to rate each sample for traits of appearance, texture, flavor, aftertaste, and overall liking on 100-mm line scale. Anchors were located at 0 mm and 100 mm, with 0 mm labeled as dislike extremely and 100 mm labeled as like extremely. Panelists also evaluated each trait as either acceptable or unacceptable.

III. RESULTS

There was a more than 4-log outgrowth of *C. perfringens* ($P < 0.05$) in the control treatment compared to treatments containing antimicrobials after 15 h of cooling. FS & DV inhibited outgrowth by nearly 0.6-log than FS and 1.5-log than DV ($P < 0.05$). Treatments did not affect ($P > 0.05$) consumer liking for palatability ratings of appearance, texture, flavor, aftertaste, and overall liking. Consumers did indicate that FS and FS & DV were more acceptable ($P < 0.05$) for flavor and expectation acceptability over other treatments.

Table 1.

Effect of treatment by hour interaction on *Clostridium perfringens* population means on uncured turkey breast during 15-hour cooling cycle.

Hours				
Treatment ¹	0	5	10	15
Control	1.92 ^{gfh}	5.39 ^b	6.42 ^a	6.37 ^a
FS	1.89 ^{gfh}	1.56 ^{ih}	233 ^{ed}	1.96 ^{gh}
DY	2.10 ^{ef}	2.54 ^d	3.10 ^c	2.91 ^c
FS & DV	2.06 ^{ef}	1.60 ^{gh}	1.59 ^{gh}	1.39 ⁱ
SEM	0.1420	0.1420	0.1420	0.1420

¹ FS - fruit and spice extract. DV - dried vinegar

^{a-l} Least square means without a common superscript differ (P<0.05) due to treatment x hour interaction

IV. CONCLUSION

There is a synergistic effect against the outgrowth of *C. perfringens* when using FS & DV together, and the addition of these ingredients did not diminish the acceptability of the final product for consumers.

Keywords: *Clostridium perfringens*, natural, turkey