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Can "natural" flavorings enhance the flavor of low-fat ground beef?

Abstract

Natural flavorings were evaluated for use in low-fat ground beef, which frequently lacks flavor intensity. Three lean sources, A-maturity (young), E-maturity (mature cow), and imported (cow) beef round muscles, were used to formulate 7% and 25% fat ground beef. A-maturity fat was added to adjust fat levels. Controls (no added flavors) were prepared for each lean source. No additives were used in 25% fat controls, but 7% fat controls contained water (10%), carrageenan (.5%), and encapsulated salt (.38%). Four "natural" flavorings; Dried Cream Extract (DCE, Cumberland Packing Co., Inc.); Natural Prime Beef Base WONF #224545 and #224546 (224545, 224546, Tastemaker); and Hydrolyzed Vegetable Protein (HVP, A.C. Legg, Inc.) were added to 7% fat ground beef at recommended levels. A- and E-maturity domestic 25% fat controls were scored higher (P<.05) for ground beef flavor intensity and lower (P<.05) for off-flavors than 25% fat patties from imported beef. The 7% fat patties from imported lean had greater (P<.05) beef flavor intensity and reduced off-flavors (P<.05) when flavorings 224545, 224546, and HVP were added. These flavorings also enhanced the beef flavor intensity of low-fat patties from A-maturity lean to a level similar to that of the 25% fat control. Beef flavor intensity after a 60-min holding period was not enhanced by the natural flavorings, except when 224546 was added to E-maturity domestic lean. Therefore, the "natural" flavorings were most beneficial with imported lean.

Keywords

Cattlemen's Day, 1993; Kansas Agricultural Experiment Station contribution; no. 93-318-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 678; Beef; Low-fat; Ground beef; Flavor; Juiciness; Lean source

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CAN "NATURAL" FLAVORINGS ENHANCE THE FLAVOR OF LOW-FAT GROUND BEEF?

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Summary

Natural flavorings were evaluated for use in low-fat ground beef, which frequently lacks flavor intensity. Three lean sources, A-maturity (young), E-maturity (mature cow), and imported (cow) beef round muscles, were used to formulate 7% and 25% fat ground beef. A-maturity fat was added to adjust fat levels. Controls (no added flavors) were prepared for each lean source. No additives were used in 25% fat controls, but 7% fat controls contained water (10%), carrageenan (.5%), and encapsulated salt (.38%). Four "natural" flavorings; Dried Cream Extract (DCE, Cumberland Packing Co., Inc.); Natural Prime Beef Base WONF #224545 and #224546 (224545, 224546, Tastemaker); and Hydrolyzed Vegetable Protein (HVP, A.C. Legg, Inc.) were added to 7% fat ground beef at recommended levels. A- and E-maturity domestic 25% fat controls were scored higher ($P < .05$) for ground beef flavor intensity and lower ($P < .05$) for off-flavors than 25% fat patties from imported beef. The 7% fat patties from imported lean had greater ($P < .05$) beef flavor intensity and reduced off-flavors ($P < .05$) when flavorings 224545, 224546, and HVP were added. These flavorings also enhanced the beef flavor intensity of low-fat patties from A-maturity lean to a level similar to that of the 25% fat control. Beef flavor intensity after a 60-min holding period was not enhanced by the natural flavorings, except when 224546 was added to E-maturity domestic lean. Therefore, the "natural" flavorings were most beneficial with imported lean.

(Key Words: Low-fat, Ground Beef, Flavor, Juiciness, Lean Source.)

Introduction

Ground beef, which accounts for 44% of beef consumption in the United States, is popular in many households for its low cost and convenience. Consumers select ground beef based on color and leanness.

Developing products that customers perceive as "healthy" is not as simple as just removing the fat, because as fat is reduced, palatability is compromised. Because consumers often view added ingredients as "unnatural" or "unhealthy", this study was designed to evaluate the use of "natural" flavorings to enhance flavor in 7% fat ground beef.

Experimental Procedures

Patty Production

A-maturity, E-maturity, and imported beef round muscles and A-maturity beef fat were thawed at 36°F for 24 hr before grinding through a 1/2" plate. Lean and fat were mixed to achieve desired fat levels. For 7% fat controls, carrageenan (.5%) and encapsulated salt (.38%) were incorporated by mixing in a bowl mixer for 1 min. Water (10%) was then added, and the product was mixed for 1 min. The 25% fat controls had no additives. Natural flavorings were mixed with appropriate batches at the suppliers' recommended levels. These flavorings had been screened and selected from 15 candidates by a five-member

[1]Department of Statistics.

professional taste panel as having the most potential based on ground beef flavor intensity and absence of off-flavors.

Batches were ground through a 1/8" plate. Patties (.25 lb) were formed using a manual patty press and crust-frozen at -40°F for 1 hr before vacuum packaging and storing at -40°F.

Sample Preparation

Patties were thawed at 36°F for 24 hr and cooked on preheated (302°F) electric griddles. Patties were turned every 30 sec until reaching a final internal temperature (hypodermic probe thermocouple) of 160°F. Cooked patties were either evaluated immediately or held in double boilers (147°F) for 60 min before evaluation. Immediately prior to evaluation, patties were cut into six equal pie-shaped portions.

Panel Training

The same five-member professional panel that screened the flavorings was trained in open-discussion sessions to evaluate beef flavor intensity, juiciness, mouth coating, and off-flavors. Patties with and without 60 min holding time were used for training, with the A-maturity, 25% fat control used to reference "typical" ground beef.

Sensory Evaluation

Panelists were randomly served ground beef samples in individual booths under red lighting. Nine samples were served during each of two sessions per day for a 6-day period. Responses were marked on a 10-point scale where 1 = extremely bland, no off-flavors, dry, or no mouth coating; 5 = moderately intense beef flavor or off-flavor, moderate juiciness and mouth coating; 10 = extremely intense beef flavor or off-flavor, extreme juiciness or mouth coating. Water, unsalted crackers, and apple slices were provided to clear the palate between samples.

Results and Discussion

Evaluated Immediately

A- and E-maturity 25% fat controls from domestic beef were scored higher ($P < .05$) for ground beef flavor intensity and lower ($P < .05$) for off-flavors than the imported counterpart (Table 1). Adding "natural" flavorings 224545, 224546, and HVP to 7% fat patties from imported lean increased ($P < .05$) beef flavor and reduced ($P < .05$) off-flavors. These flavorings also increased the beef flavor intensity for A-maturity domestic lean to a level similar to that of 25% fat control. Flavorings did not affect juiciness or mouth coating for the imported product.

Held for 60 Min

For mass feeding, cooked patties are frequently held before serving. Except for flavoring 224546 for the E-maturity domestic lean source, beef flavor intensity was not enhanced by the natural flavorings (Table 2). Flavoring 224545 frequently resulted in more intense off-flavors when patties were held 60 min.

"Natural" flavorings may enhance ground beef flavor in low-fat patties, particularly if imported lean is used in the formulation. Because the positive effect of "natural" flavoring 224546 carried through the 60-min holding period, this flavoring may help alleviate flavor problems associated with prolonged holding after cooking.

Table 1. Treatment Means for Sensory Evaluation of Ground Beef Patties Containing "Natural" Flavorings and Evaluated Immediately

Lean source additive	Fat, %	Beef flavor intensity	Juiciness	Mouth coating	Off-flavor
A-maturity domestic					
H_20,Salt,Carrageenan	7	6.3^{cd}	4.8^{efg}	2.7^{bcd}	2.1^{ef}
DCE	7	6.3^{cd}	5.7^{a}	2.9^{ab}	2.3^{ef}
224545	7	6.3^{bcd}	5.1^{bcde}	2.7^{bc}	3.2^{bc}
224546	7	6.5^{bcd}	5.6^{ab}	2.8^{abc}	2.6^{de}
HVP	7	6.5^{bcd}	5.5^{abc}	2.7^{bc}	2.1^{ef}
None	25	6.9^{ab}	4.4^{g}	2.6^{bcd}	1.3^{h}
E-maturity domestic					
H_20,Salt,Carrageenan	7	6.7^{abc}	5.1^{bcde}	2.5^{cd}	1.9^{fgh}
DCE	7	6.7^{abc}	4.5^{fg}	2.7^{bcd}	1.5^{gh}
224545	7	6.3^{bcd}	5.9^{a}	2.9^{ab}	3.0^{cd}
224546	7	6.4^{bcd}	5.0^{cdef}	2.3^{d}	1.9^{fg}
HVP	7	6.4^{bcd}	5.4^{abcd}	2.7^{bcd}	2.3^{ef}
None	25	7.1^{a}	5.6^{ab}	3.1^{a}	1.3^{h}
Import					
H_20,Salt,Carrageenan	7	4.6^{f}	4.7^{efg}	2.7^{bcd}	4.2^{a}
DCE	7	4.7^{f}	4.9^{defg}	2.7^{bc}	4.3^{a}
224545	7	5.5^{e}	5.0^{cdef}	2.7^{bcd}	3.6^{bc}
224546	7	5.4^{e}	4.8^{efg}	2.8^{abc}	3.6^{b}
HVP	7	5.5^{e}	4.6^{efg}	2.7^{bcd}	3.3^{bc}
None	25	6.1^{d}	4.4^{fg}	2.8^{ab}	2.3^{ef}

[a-h]Means in the same column with a different superscript letter are different ($P < .05$).

Table 2. Treatment Means for Sensory Evaluation of Ground Beef Patties Containing "Natural" Flavorings and Held for 60 Min

Lean Source Additive	Fat, %	Beef flavor intensity	Juiciness	Mouth coating	Off-flavor
A-maturity domestic					
H_20,Salt,Carrageenan	7	6.7^{ab}	4.0^{bcde}	2.8^{bc}	2.0^{fg}
DCE	7	6.7^{ab}	4.1^{abcd}	2.6^{bcd}	1.7^{fgh}
224545	7	6.4^{abc}	4.1^{abcd}	2.6^{bcd}	2.7^{de}
224546	7	6.5^{ab}	3.8^{bcdef}	2.2^{de}	2.1^{ef}
HVP	7	6.4^{abc}	3.4^{fg}	2.4^{bcde}	1.8^{fgh}
None	25	6.5^{ab}	4.3^{ab}	2.5^{bc}	1.3^{h}
E-maturity domestic					
H_20,Salt,Carrageenan	7	6.2^{bcd}	3.4^{fg}	2.2^{e}	1.7^{fgh}
DCE	7	6.5^{ab}	4.3^{ab}	2.3^{cde}	1.6^{fgh}
224545	7	5.8^{cde}	3.8^{bcdef}	2.6^{bc}	2.7^{d}
224546	7	6.9^{a}	4.6^{a}	2.6^{ab}	1.8^{fgh}
HVP	7	6.7^{ab}	4.2^{ab}	2.6^{bc}	1.5^{fgh}
None	25	6.8^{ab}	4.2^{ab}	2.5^{bc}	1.4^{gh}
Import					
H_20,Salt,Carrageenan	7	5.3^{ef}	3.8^{bcdef}	2.6^{bc}	3.6^{bc}
DCE	7	4.9^{f}	3.5^{defg}	2.4^{bcde}	3.8^{ab}
224545	7	4.9^{f}	3.5^{efg}	2.5^{bcd}	4.3^{a}
224546	7	5.1^{f}	3.6^{cdefg}	2.6^{bc}	3.9^{ab}
HVP	7	4.8^{f}	3.1^{f}	2.4^{bcde}	3.8^{ab}
None	25	5.7^{de}	4.1^{abc}	2.9^{a}	3.0^{cd}

[a-h]Means in the same column with a different superscript letter are different ($P < .05$).