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CONSUMER EVALUATION OF RETAIL HAMS FROM DIFFERENT PRODUCTION PROCESSES

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Summary

Consumers evaluated hams from the four minimum protein-fat-free categories labeled 1) ham (H), 2) ham with natural juices (HNJ), 3) ham-water added (HWA) and 4) ham and water product (HWP) for juiciness, flavor, and overall acceptability. Shear force and cooking loss data were also obtained. The HNJ product was rated higher for flavor and overall acceptability, whereas the H and HWP were found to be the least desirable. The HWP was rated the most juicy; the H product was scored the least juicy. Peak shear force was lower for the HWP than for the other ham types; however, all hams were acceptably tender. The HWA and HWP had the least amount of cooking loss.

(Key Words: Ham, Pork, Consumer, Evaluation.)

Introduction

New regulations were adopted in 1985 to monitor ham production according to minimum levels of protein rather than water content. Prior to the new regulations, processors had three categories in which to effectively market their product. One was a product labeled "ham", which could contain no added water. The other two categories were required to be labeled with a statement as to the amount of water that had been added to the product. A ham containing up to 10% added water was labeled "ham-water added", and those containing more than 10% added water but less than 20% were labeled "ham and "X" percent added water". The new regulations specify a minimum meat protein content on a fat-free basis (PFF), instead of water content, with each class of pork product having a minimum protein requirement. The USDA labeling and minimum PFF regulations for protein percentage of ham products now read as follows: ham, 20.5%; ham with natural juices, 18.5%; ham-water added, 17.0%; ham and water product, <17.0%. These new regulations allow processors to produce numerous products ranging from the more expensive dry cured hams to the high added-water, 95% fat-free hams that are relatively inexpensive.

With the wide variety of ham products resulting from the new regulations, recognizing consumer preferences for them is important. Currently, some products contain up to 35% added water, which results in an economical product to consumers. However, consumer preference for these products when compared to the more "traditionally" cured ham products is not known. This study was designed to evaluate consumer preference for juiciness, flavor, and overall acceptability of hams from the four minimum PFF categories and to possibly identify those segments of the population that have differing attitudes about these products.

Procedures

On six different days of sampling, one ham from each of the PFF categories was purchased at a retail market and prepared for consumer evaluation, cooking-loss determination, and shear force analysis.

Samples for sensory analysis were sliced 3/8 in. thick, cut into 3/4 x 3/4 in. squares, and refrigerated at 40°F until evaluated. During the six sampling periods at two retail markets, consumers (n=301) were asked to evaluate each of the four ham products; 1) ham (H), 2) ham with natural juices (HNJ), 3) ham - water added (HWA), and 4) ham and water product (HWP). Samples were served in random order, and panelists were asked to evaluate hams for juiciness, flavor, and overall acceptability (Table 1).

Table 1. Sensory Evaluation Scoring Scale

Juiciness	Flavor	Overall Acceptability
1 very juicy	1 like very much	1 like very much
2 moderately juicy	2 like moderately	2 like moderately
3 slightly juicy	3 like slightly	3 like slightly
4 slightly dry	4 dislike slightly	4 dislike slightly
5 moderately dry	5 dislike moderately	5 dislike moderately
6 very dry	6 dislike very much	6 dislike very much

Shear force samples 3/4 in. thick were removed after every fourth sensory slice. Six 1/2 in. diameter cores were removed from each slice, perpendicular to the slice surface, and peak force was measured using the Instron Universal Testing Machine (model 4201, Instron Corp, Canton, MA 02621) with a Warner-Bratzler shear attachment.

Cooking losses were determined on 2 lb butt portions and whole hams. Samples were weighed, cooked to 135°F in a gas oven and reweighed to determine cooking loss by difference.

Results and Discussion

The ham with natural juices (HNJ) product was rated highest ($P<.05$) for flavor and overall acceptability, whereas the ham (H) and ham and water product (HWP) were found to be the least desirable (Table 2). The HWP was rated the most ($P<.05$) juicy of all hams; the H was scored the least ($P<.05$) juicy.

Table 2. Means for Juiciness, Flavor, and Overall Acceptability of the Four Ham Types

Ham type	Juiciness	Flavor	Overall Acceptability
Water added	2.60 ^a	2.36 ^a	2.37 ^a
Water product	2.12 ^b	2.59 ^b	2.62 ^b
Natural juices	2.83 ^c	2.02 ^c	2.08 ^c
Ham	3.40 ^d	2.70 ^b	2.74 ^b

^{a,b,c,d}Means within the same column with different superscripts differ significantly ($P < .05$).

Table 3. Means and Standard Deviations for Shear Force and Cooking Losses of the Four Ham Types

Ham type	Peak Force(lb)		Cooking Loss(%)	
	Mean	Std Dev.	Mean	Std Dev.
Water added	2.42 ^a	1.63	6.70 ^a	1.34
Water product	1.89 ^b	1.39	7.70 ^a	1.12
Natural juices	3.52 ^a	1.56	10.2 ^b	2.78
Ham	4.64 ^c	2.38	14.3 ^c	3.11

^{a,b,c}Means within the same column with different superscripts differ significantly ($P < .05$).

Peak shear force was lowest ($P < .05$) for the HWP among all ham types (Table 3). The HWA and HNJ hams were intermediate in shear force values, whereas the H product had the highest ($P < .05$) values. It should be noted that shear values for all hams were quite low, indicating that they were all acceptably tender. Many consumers suggested that the HWP ham was too soft and that a little more texture would be desirable. Although the HWP is an economical product, there appears to be a limit to the amount of water that can be added before producing an undesirable mouthfeel. The HWP apparently had reached that limit.

Cooking losses were significantly lower for the HWA and HWP than the other two ham types. This indicates, that although these products do contain a considerable amount of moisture, it is tightly bound within the product and is not released to any great extent during cooking. On the other hand, those products that have not been extensively processed, i.e., tumbled, massaged, defatted, or deboned, will tend to lose more weight in the cooking process. These products will more than likely be less moist and may seem more salty, as comments have suggested.

In summary, it appears that, although no single segment of the population can be targeted for a specific ham product, the ham with natural juices is the product of choice for most consumers when evaluating for flavor and overall acceptability. Although the more moist products may be perceived as desirable from an economical standpoint, the ham and water product not only rated poorly for flavor and overall acceptability, but also received comments that it was too soft and too bland. On the other hand, the dry and more expensive ham product received similar ratings and was described as being too dry or salty and containing too much fat. Therefore, it appears that such products as the ham with natural juices and ham-water added optimize flavor and juiciness, low fat, and low salt, which will meet consumers needs for an economical, tasty, and healthy alternative in the meat case.