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Utilization of Raw Pork Skins in Reduced Fat Fresh Pork Sausage

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Summary and Implications

The effects of fat, raw pork skin and added water on the color, yield, texture and palatability of fresh pork sausage were investigated. Fresh pork sausage was produced to contain 8 percent and 20 percent fat, 10 percent or 20 percent pork skin and zero percent or 10 percent added water. Three controls were produced at 8 percent, 20 percent and 35 percent fat with no added pork skin or water. Sausage with added pork skins had increased pH values. The 8 percent fat sausage and sausage without added water had the greatest cook yields, while the addition of pork skin did not affect cook yield. Pork skins and added water caused sausage to be lighter in color. Redness of the sausage was similar for 20 percent fat/20 percent pork skin sausage compared to the 35 percent fat control. Kramer shear values indicated added water made sausage softer. Added pork skin did not affect Kramer shear values. A sensory panel rated 10 percent pork skin sausage more tender than sausage with 20 percent pork skin. Sausage with 8 percent fat and 10 percent pork skin was rated higher for juiciness and overall acceptability when compared to 8 percent fat sausage with 20 percent pork skin and 20 percent fat sausage at both added pork skin levels. Pork skins were successfully incorporated into reduced fat-fresh pork sausage. Production of acceptable reduced-fat pork sausage with added pork skins would increase the demand for this pork sausage and add value to a by-product of the pork industry.

Introduction

Fresh pork sausage is a comminuted meat product that has remained relatively unaffected by the drive to reduce-fat content in processed meats. United States Department of Agriculture regulations state fresh pork sausage may contain no more than 50 percent fat. Technology to reduce fat for this product is being investigated.

Reduced- or low-fat meat products tend to be less juicy, less desirable in flavor and less tender when compared to higher fat products. Consumers, however, continue to demand lower fat content in foods. The challenge is to produce reduced-fat meat products that also maintain acceptable sensory characteristics so consumers can purchase meat products meeting both their dietary and palatability desires. The reduction of fat in fresh pork sausage offers new products for consumers who demand less fat in meat products. The functionality of pork skins (a by-product pork processing) may be important for use in reduced-fat meat product technology through improved palatability. Utilization of this by-product would increase profitability for operations generating pork skins.

The purpose of this study was to determine the effects of fat, pork skin and added water on fresh pork sausage yield, color, texture and palatability.

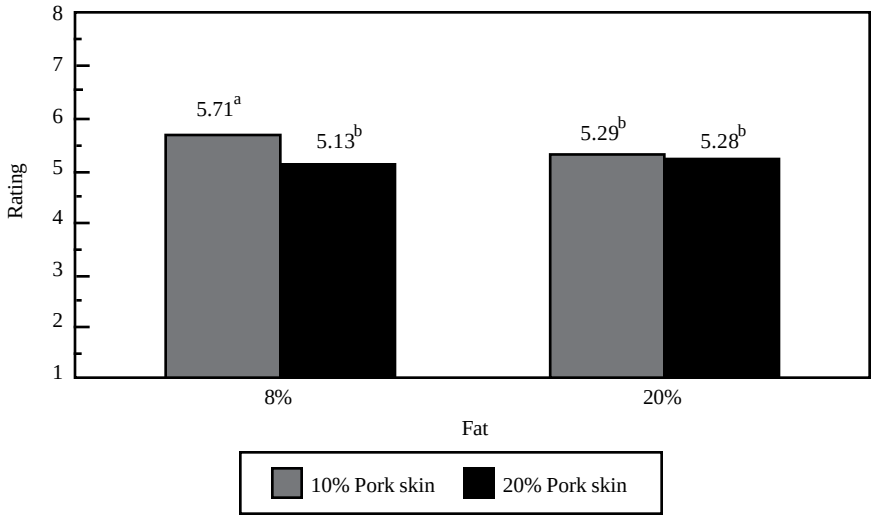
Methods

Fresh pork skins from hams were obtained from a commercial processor. The skins were cut into strips, ground to .5 in, spread on plastic-lined metal trays and frozen (-18°C) overnight. They were then broken apart and fed through a 1.5 mm head on a Comitrol flaker. Flaked skins were kept frozen (-23°C) until utilized in the

Table 1. Effect of fat, pork skin, and added water on pH, color and cook yield

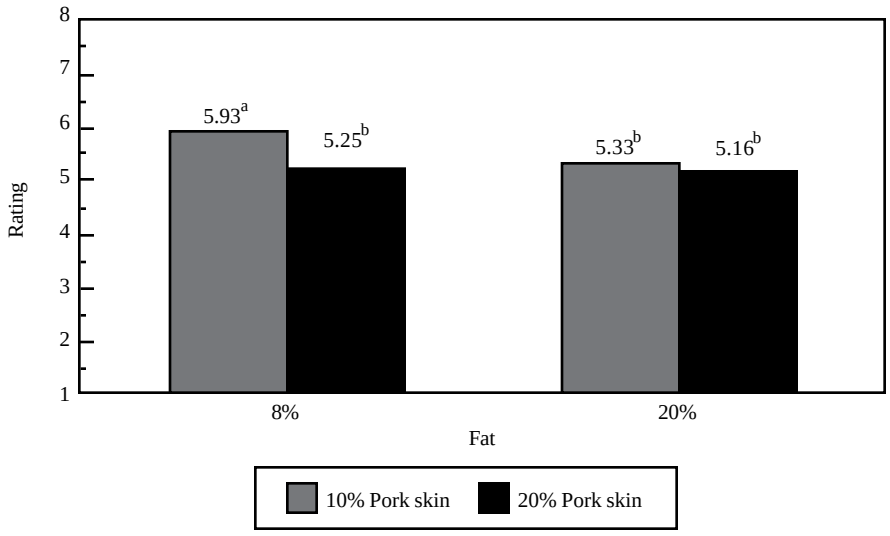
	Fat		Pork Skin		Added Water	
Variable	8%	20%	10%	20%	0%	10%
pH	6.07	6.04	6.03[a]	6.08[b]	6.03	6.07
L* (lightness)	51.91[a]	60.45[b]	55.10[a]	57.27[b]	54.94[a]	57.42[b]
a* (redness)	23.39[a]	20.01[b]	22.01	21.40	22.30	21.10
b* (yellowness)	19.47	19.45	19.65	19.27	19.74	19.18
Cook yield (%)	76.16[a]	67.65[b]	71.02	72.79	73.91[a]	69.90[b]
Peak force (N/g)	29.42	32.84	29.84	32.42	34.40[a]	27.86[b]
Total energy (J/g)	0.36	0.37	0.35	0.38	0.40[a]	0.33[b]

[ab]Means with unlike superscripts are different (P < 0.05).



[ab]Means with unlike superscripts are different (P<0.05).

Figure 1. Effect of fat and pork skin on juiciness.



[ab]Means with unlike superscripts are different (P<0.05).

Figure 2. Effect of fat and pork skin on overall acceptability.

pork sausage.

Sausage was manufactured by grinding lean and fat trimmings to .5 in. Batches were mixed with a commercial seasoning blend for five minutes then ground to .2 inches. The mixture was stuffed into 2.5 inch casings and frozen (-23°C) for 24 hours. Chubs were sliced with a bandsaw into .5 inch-thick patties weighing approximately 43 grams. Patties were vacuum packaged and kept frozen (-23°C) until further analysis.

The experiment was replicated three times. Sausage was analyzed for proximate composition, pH, cook yield and raw color. Objective texture measurements were obtained through Kramer shear peak force and total energy. A sensory panel evaluated sausage samples for tenderness, juiciness, flavor and overall acceptability.

Results and Discussion

The addition of pork skin in fresh pork sausage caused increased (P<0.05) pH (Table 1). Pork skins have a pH of 7.06, compared to 5.6 - 5.7 for normal meat. Higher pH in meat products usually results in greater water-holding capacity, which could increase juiciness of the sausage.

Table 1 also shows L*, a* and b* values for uncooked sausage. The L* measures lightness (higher value indicates lighter color), a* measures redness (higher value indicates redder color) and b* measures yellowness (higher value indicates more yellow color). Higher fat, pork skin and added water levels resulted in lighter colored sausage, due to dilution of lean pigments by increased fat, pork skin or added water. Lower-fat sausage was redder (higher a* values) because less fat was present in the sausage, allowing for lean color to predominate. Added pork skin and water did not affect (P>0.05) redness of the sausage. No differences were detected for yellowness (b*).

Lower-fat sausage had higher (P<0.05) cooking yields (Table 1). The 35 percent fat control sausage had the

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lowest ($P<0.05$) cooking yield (56.58%; data not shown). Increased added water also decreased ($P<0.05$) cook yield because more moisture is available to lose during the cooking process. Addition of pork skins into sausage did not affect cook yields.

Kramer shear measurements (Table 1) indicated sausage with added water required less force and energy to shear. Added water also caused a softer-textured sausage. Added pork skins did not affect Kramer shear values.

A sensory panel evaluated the sausage for tenderness, juiciness, flavor and overall acceptability on an eight-point hedonic scale. Panelists rated 8 percent fat sausage more tender ($P<0.05$) than 20 percent fat sausage, which is contradictory to the tenderness problem commonly associated with reduced-fat meat products. Panelists rated 8 percent fat sausage with 10 percent pork skin higher ($P<0.05$) in juiciness (Figure 1) and overall acceptability (Figure 2) than 8 percent fat sausage with 20 percent pork skin and 20 percent fat sausage at both levels of pork skin addition.

Conclusions

Increased levels of pork skin increased sausage pH. Added pork skin caused sausage to be lighter in color but did not influence redness. Sensory panelists preferred sausage with 10 percent pork skin over sausage with 20 percent pork skin. Pork skin not only can offer improvements in sensory characteristics of reduced-fat pork sausage, but also identifies a possible use for a by-product of the pork industry.

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