Effects of Irradiation on Quality of Injected Fresh Pork Loins

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Summary and Implications

A comparison of irradiation effects on the quality of injected and uninjected pork loins was conducted. Irradiation treatments resulted in greater lipid oxidation and production of volatile compounds. However, injection treatments did not alter any of the effects of irradiation on the quality parameters measured.

Introduction

Because injection processing of moisture-enhanced pork has potential to contaminate the products with pathogens, additional antimicrobial measures may be important. Irradiation provides such additional control but may introduce quality changes as a result of the process. On the other hand, ingredients such as salt, phosphate and lactate, used for the injection brine of moisture-enhanced pork, have potential to alter some of the effects of irradiation treatments of fresh meat products.

Materials and Methods

Sixty pork loins were obtained from a commercial facility 7 days following harvest. Thirty loins were injected with a phosphate/salt/lactate solution and thirty were not injected. Twenty loins from each group were irradiated (10 at 2.2 kGy and 10 at 4.4 kGy) and 10 loins were not irradiated. Loins were stored at 0-2°C for up to 35 days while purge, shear force, color, lipid oxidation and volatile compounds were measured.

Results and Discussion

Results for purge losses are shown in Table 1 and demonstrated the greater moisture retention characteristic of the moisture enhanced injection treatment. The purge was unaffected by irradiation. Tenderness (Table 2) was also improved by injection, as expected, but unaffected by irradiation. A small amount of reddening of color was observed for the higher irradiation dosage, similar to that observed in other studies. Lipid oxidation and production of volatile compounds were both increased by irradiation but both changes were relatively small. The injection treatment reduced some of the volatile compounds in some treatments but this effect was not consistent for all of the treatments studied. In general, injection processing did not change the effect of irradiation on product quality, particularly color or lipid oxidation.

Table 1. Purge loss from injected (I) and uninjected (U) fresh pork loins after irradiation.

Irradiation/Injection Treatment	Storage time (days) 7 d	21 d	35 d
U, 0 kGy	2.99[a]	2.63[b]	4.17[a]
I, 0 kGy	0.33[c]	0.64[c]	0.85[b]
U, 2.2 kGy	1.42[b]	1.89[b]	3.26[a]
I, 2.2 kGy	0.56[c]	0.69[c]	0.96[b]
U, 4.4 kGy	3.05[a]	3.64[a]	4.54[a]
I, 4.4 kGy	0.34[c]	0.48[c]	0.96[b]
SEM	0.51	0.41	0.62

Means within the same column with different superscripts [a-d]are significantly different ($P < 0.05$). U = uninjected. I = injected. 0, 2.2 and 4.4 kGy denote the dosage of irradiation the product received in kGy.

Table 2. Shear (WBS) values (Newtons) for injected (I) and uninjected (U) fresh pork loins after irradiation.

Irradiation/Injection Treatment	Storage time (days) 1 Day	21 Days
U, 0 kGy	30.50[a]	26.56[a]
I, 0 kGy	21.67[b]	15.98[b]
U, 2.2 kGy	29.01[a]	30.40[a]
I, 2.2 kGy	17.55[b]	17.16[b]
U, 4.4 kGy	27.75[ab]	25.89[a]
I, 4.4 kGy	19.22[b]	1.71[b]
SEM	2.35	1.86

Means within the same column with different superscripts [a-b] are significantly different ($P < 0.05$). U = uninjected. I = injected. 0, 2.2 and 4.4 kGy denote the dosage of irradiation the product received in kGy.

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