Irradiation of Pork - Quality Fact Sheet

General Fact Sheet

Although the advantages of irradiation in controlling microorganisms like *Trichinella spiralis* and *Salmonella* in pork are well known, its effects on pork quality and consumer acceptance are not clear. Ultimately, consumer acceptance of irradiated pork products will depend on the consumer’s continued confidence in its quality. Irradiation has the potential to enhance microbial safety of pork while not affecting its quality, according to a research project conducted at Kansas State University, in Manhattan, Kansas. In the study, researchers evaluated the quality changes in irradiated pork, as measured by sensory panel, as well as the overall acceptability of irradiated boneless pork chops.

How Irradiation Works

Irradiation is a physical food treatment similar to heat pasteurization, canning or freezing. Food passes through an enclosed chamber called an irradiator where it is exposed to one of three types of ionizing energy: gamma rays, machine generated electrons or X-rays. However, only gamma rays from cobalt-60 and accelerated electrons are currently commercially available. The duration of exposure to ionizing energy, density of food and amount of energy emitted by the irradiator determine the amount or dose of irradiation to which the food is exposed.

In 1983, the Codex Alimentarius Commission, a group that develops international food standards, said that food

Pork Irradiation & Pork Quality

In the study, researchers looked at the effects of three irradiation levels in combination with aerobic or vacuum-packaging on the flavor, aroma, color and product life of chilled or frozen boneless pork chops. Using three levels of irradiation from either accelerated electrons produced by a linear accelerator or from gamma rays from the decay of cobalt-60, the sensory quality of chilled and frozen pork chops was evaluated. Researchers found that irradiation at ≤ 3.85 kilogray (kGy) had minimal to no effect on the flavor, texture and aroma of chilled or frozen pork chops. The study also showed that cooking losses were not affected by dose level, irradiation source or package type in chilled, boneless pork chops. For frozen pork chops, cooking losses were lowest for samples irradiated by electron beam and packaged aerobically compared to all other treatment combinations.

The investigators also discovered that aerobically packaged irradiated pork chops were slightly more bitter, tougher and displayed less of the desired browned/roasted attribute than non-irradiated pork chops, although this did not affect the overall acceptability of the product. In contrast, vacuum-packaged irradiated pork chops produced a product that was more stable in color. Researchers determined that using the right combination of packaging conditions and packaging film would make irradiation a viable pathogen and quality intervention technology for the pork industry.
Irradiated below 10 kGy presents no toxicological hazard. Irradiation disrupts the organic processes that lead to food decay. By interacting with water and other molecules that make up food, gamma rays, X-rays or electrons are absorbed by the molecules they contact. Radiation processing does not make food radioactive. During the process, microbial cells, such as bacteria, yeast and molds, are killed, as are parasites, insects or their larvae and eggs. Thus, food irradiation holds great promise in the control of food-borne diseases, which is a worldwide health problem. With irradiation, energy simply passes through the food, but unlike chemical treatments, irradiation leaves no residue.

In the United States, the Food and Drug Administration (FDA) requires that all irradiated foods must bear the “radura” symbol on the product label. The radura symbol signifies that the product has been subjected to irradiation treatment. The product label must also state that the product has been treated by ionizing radiation or by irradiation. Since irradiation is a cold process, it does not significantly increase the temperature of treated foods. Thus, irradiated products can be shipped, stored or eaten immediately after treatment.

### Consumer Acceptance of Irradiated Pork

In the study conducted at Kansas State University, consumers found no differences between irradiated and non-irradiated pork samples for overall acceptance, meatiness, freshness, tenderness or juiciness. (Table 1) Approximately 84% of the consumer panelists were between the ages of 26-55, and over 50% had at least a college education. Consumers who ate pork and beef at least three times per week were included in the study. Based on the consumer acceptance study, researchers believe the potential market acceptance of irradiated, vacuum-packaged, chilled, boneless pork chops is promising.

### The Future of Pork Irradiation

Historically, consumers have rejected irradiated products, but consumer attitudes toward irradiation seem to be changing. However, consumer studies consistently demonstrate that, when provided with science-based information, a high percentage of consumers are willing to buy and prefer irradiated foods. Thus, with suitable consumer education on the benefits of food irradiation technology, the potential food safety and product quality gains by the pork industry could be significant.

### References


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<tr>
<th>Trait</th>
<th>Dose, kGy</th>
<th>SE</th>
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<tbody>
<tr>
<td>Overall Acceptance</td>
<td>6.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Meatiness</td>
<td>7.3</td>
<td>0.1</td>
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<tr>
<td>Freshness</td>
<td>5.8</td>
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<tr>
<td>Tenderness</td>
<td>5.8</td>
<td>0.2</td>
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<tr>
<td>Juiciness</td>
<td>5.5</td>
<td>0.2</td>
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Mean ratings and standard errors (SE) for traits on boneless pork chops evaluated by consumers.