



IMPROVEMENT OF HYGIENIC QUALITY AND SHELF LIFE EXTENSION OF PORK BALL BY GAMMA RADIATION

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The effects of gamma irradiation at doses of 1-3 kGy on hygienic quality, sensory characteristics, and development of oxidative rancidity of vacuum packed pork ball from commercial producer were investigated. The shelf life at 4.8 - 5.3 °C of pork ball with sodium benzoate in combination with gamma irradiation at 0, 1 and 2 kGy was determined and compared to those of irradiated pork ball without sodium benzoate. Changes in mesophiles, psychrotrophs, *Salmonella* spp., *Escherichia coli*, *Staphylococcus aureus*, *Lactobacillus* spp., TBA number, Hunter color and sensory quality of treated samples were determined at certain intervals up to 29 days.

The results on hygienic quality, TBA number and sensory quality of fourteen pork ball samples, unirradiated and irradiated with 1, 2, and 3 kGy are shown in Table 1. Coliforms, *Escherichia coli* and *Staphylococcus aureus* were occasionally found in control samples and the greatest number of MPN/gram were 110, 9.3 and 24. The presence of *Salmonella* spp. in pork ball was never detected. Irradiation of pork ball at 1-3 kGy reduced numbers of mesophiles, psychrotrophs, *Lactobacillus* spp. and eliminated coliforms, *Escherichia coli* and *Staphylococcus aureus* without any rise in TBA number. However, significant changes in odor were observed after 3 kGy treatment.

The evaluation of the extension of the shelf life on the irradiated pork ball versus the control pork ball was based on a presence of 10^6 mesophiles/gram. The shelf life of irradiated pork ball with or without sodium benzoate was 29 days compared with 15 days for non-irradiated controls with sodium benzoate. The sensory quality of irradiated pork ball tended to decrease during storage but was within the acceptable range even after one month. The irradiation treatment did not adversely affect the sensory quality of pork ball. Dosage at 2 kGy appeared to be sufficient for improving hygienic quality and increasing the shelf life of pork ball without the addition of potassium sorbate.

Table 1 Treatment effects on bacteriological quality, TBA number and sensory quality of pork ball.

Analysis	Doses (kGy)			
	0	1	2	3
Mesophiles ¹	4.71	3.57	2.51	1.58
	2.47 - 5.60	2.04 - 4.62	1.17 - 3.39	1.17 - 1.74
Psychrotropes ¹	4.79	3.83	2.54	1.84
	2.72 - 5.69	<1.00 - 4.88	<1.00 - 2.99	1.69 - 1.97
<i>Lactobacillus</i> spp. ¹	2.82	1.74	1.02	<1.00
	<1.00-3.81	<1.00-2.51	<1.00-1.17	<1.00
Coliforms ²	15.20	<0.3	<0.3	<0.3
	<0.3-110	<0.3-0.4	<0.3	<0.3
<i>Escherichia coli</i> ²	1.24	<0.3	<0.3	<0.3
	<0.3-9.30	<0.3	<0.3	<0.3
<i>Staphylococcus aureus</i> ²	2.32	<0.3	<0.3	<0.3
	<0.3-24	<0.3	<0.3	<0.3
TBA number ³	3.56	3.49	3.43	2.48
	1.52-5.64	1.80-5.56	1.86-5.27	1.94-2.88
Color ⁴	5.14	5.05	5.11	4.97
	5.08-5.17	5.00-5.08	5.08-5.17	4.83-5.08
Odour ⁴	5.11 ^a	4.94 ^{ab}	5.11 ^a	4.69 ^b
	5.00-5.25	4.75-5.25	4.83-5.50	4.58-4.75
Taste ⁴	5.25	5.11	5.17	4.81
	5.08-5.50	4.92-5.42	5.00-5.42	4.67-4.92
Texture ⁴	5.28	5.06	5.20	4.97
	5.17-5.42	4.92-5.17	4.92-5.50	4.83-5.08

1 Means and Ranges of log₁₀ CFU/g

2 Means and Ranges of MPN/g

3 Means and Ranges of mg malonaldehyde/kg

4 Means and Ranges of sensory scores

ab Means with a common superscript are not significantly different (p>0.05)