

Microorganism control in packed tofu manufacture using electrolyzed water

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Objectives

As a traditional food, tofu is an important part of Asian diets and has now achieved popularity worldwide due to its nutritional value, as it is high in protein, with essential amino acids and isoflavone. However, tofu products decay easily and have a very limited shelf life. To control microorganisms in tofu manufacture, electrolyzed water (EW) was applied at the soybean soaking phase of packed tofu processing. The available chlorine in EW, which is a mixture of hypochlorous ions, hypochlorous acid and chlorine, acts as a sterilizer. The Division focused on the anti-microbial activity of available chlorine and on the distribution pattern in response to pH levels. Under weak acidic conditions around pH 6.5, concentrations of chlorine and hypochlorous ions become minimal, making EW more stable and active as a bactericide.

Results

Acidic EW (pH 2.1; oxidation reduction potential, 1185mv; available chlorine, 100 ppm) and alkaline EW (pH 11.7; oxidation reduction potential, -120mv) were prepared by electrolysis of 0.075% sodium chloride solution. Mixed EW (pH 6.5; oxidation reduction potential, 891mv; available chlorine, 50 ppm) was prepared by mixing acidic and alkaline EW to adjust pH levels to 6.5. Sterilization effects during soybean soaking and the quality of soymilk and tofu produced from soybeans soaked in three types of EW were analyzed. Acidic EW and mixed EW were very effective in killing all microorganisms in soybeans and kept the soaking water aseptic (Fig. 1).

Tofu consistencies produced from acidic EW and alkaline EW soaking were lower than the those obtained from mixed EW and sterilized water soaking (Table 1). We conclude that mixed EW is the most effective disinfectant among the three types of electrolyzed water due to weak acidic pH values, stability, and the lack of damage to soymilk and tofu.

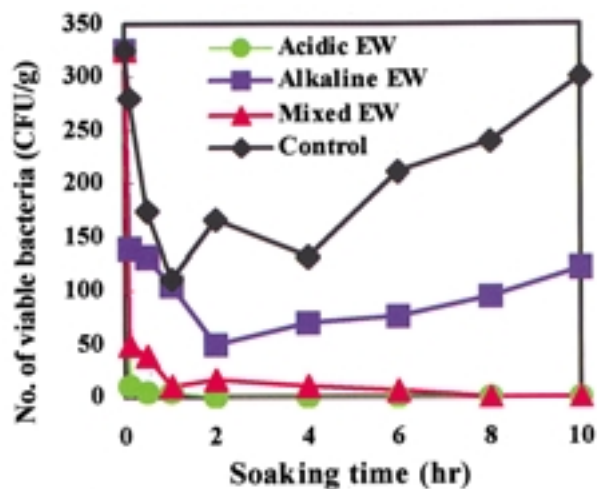


Fig. 1. Changes over time of viable bacteria counts in soybeans after soaking in EW.

Table 1. Effects of soaking soybeans in four types of solutions on soybean, soymilk and tofu quality

	Alkaline EW	Acidic EW	Mixed EW	Sterilized water
Solids content in wastewater (%)	0.51	0.47	0.37	0.32
Soymilk (ml)	232.9	230.6	229.1	227.4
Solids content in soymilk (%)	10.85	11.04	10.6	10.64
Tofu gel strength (kPa)	15.14	15.9	17.68	17.78

Reference

Z. Zhao, M. Saito, T. Yoshihashi, K. Nakahara and E. Tatsumi (2002) : Microorganism control in packed tofu manufacture with electrolyzed water. JIRCAS Journal, 10, 13-20.

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