

EFFECT OF GAMMA RADIATION ON PH OF COMERCIAL SALAD DRESSINGS

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ABSTRACT

The demand for salad dressing has evolved significantly in recent years, and has been a frequent choice of meal. This can be attributed to the increasing consumption of healthier foods, low fat, convenience, availability and variety. Salad dressing is an oil-based emulsion in water (O/W) stabilized by proteins, phospholipids, and polysaccharides. It can be defined technically as a liquid medium used to add flavor, moisture, taste and adjust the appearance and texture of culinary preparations. Considering the positive effects of gamma irradiation in foods, such as improved security and stability of food products on shelves, pH is a key factor in addition to conservation as well. The objective of this study was to evaluate the effects of ionizing radiation in the pH of 10 varieties of salad dressings, ready for consumption on the market in Sao Paulo, submitted to doses of 3.0 and 5.0 kGy in the irradiator Multipurpose IPEN / CNEN-SP. The irradiated samples were compared to control samples. The results showed no statistical difference by ANOVA and Tukey test at the 5% level of significance, which demonstrated that the application of radiation in addition to providing greater security to the product, do not interfere with their quality while maintaining a constant pH after irradiation.

1. INTRODUCTION

The salad dressings are an active category item in product development, with over 260 new products introduced in the U.S. in 2003, according to Mintel's Global New Products Database (GNPD, Chicago) [1].

The demand for salad dressings and salads has evolved significantly in recent years, what was once considered as a follow-up is now more a popular meal option, this could be attributed to the increasing consumption of healthier foods with low-fat, convenience, availability and variety [2].

The growing social and economic importance of food production, along with the complexity of production technology, processing, manipulating, and acceptance of these perishable foods require a broad knowledge of their physicochemical properties [3].

The rheological behavior or viscosity and pH play an important role as a quality attribute and the manipulation of minimally processed foods such as salad dressings. Most sauces are a complex system with multiple components. Many such systems exist in the form of emulsions, for example, mayonnaise, ketchup and some salad dressings. Salad dressing is an oil-based emulsion in water (O/W) stabilized by proteins, phospholipids, and polysaccharides. [4].

The processing of emulsions is a very complex operation with many variables that influence the performance of the process and the final form of the product. For the development of industrialized foods such as sauces physical and chemical properties are very important in the projection of processing operations such as mixing, pumping, heating and cooling [5].

In order to understand and eventually improve the handling and performance of food in the form of emulsion is required a good understanding of their physical property physical-chemical and rheological properties. These properties are important aspects such as product acceptance by consumers [6].

The application of the irradiation process is recommended by the World Health Organization (WHO) and two agencies of the United Nations (UNO), the Organization for Food and Agriculture Organization (FAO) and International Atomic Energy Agency (IAEA) [7].

Due to the commercial importance of food in the form of emulsions ensuring the safety of these has been studied for possible contamination or damage by pathogens and bacteria that may be present [8].

The gamma irradiation has positive effects on preventive sterilization by micro-organisms and improves security and stability of food products on shelves [9]. It has been a good alternative since it has the advantage of not raising the temperature which could lead to changes in physical and chemical properties of food, unlike some post-production business processes such as heat treatment and microfiltration are known to lead to low productivity, increased cost, and the destruction of various nutrients in addition to causing undesirable changes in sensory quality and secondary cross-contamination during repackaging [10, 11].

The taste and presentation are so characteristic of some of the most important factors in food quality. The process of gamma irradiation can bring positive changes in the security of salad dressings. However, it is important to check the physical and chemical properties for chemical safety and acceptability.

The purpose of this study was to check the pH value of salad dressings subjected to different doses of gamma irradiation.

2. MATERIALS AND METHODS

2.1. Materials

It was used ten national varieties of salad dressings according Table 1. These were purchased in the national market in São Paulo and sent to the IPEN / CNEN-SP.

Table 1. Types of salad dressings used in analyses.

Salad Dressings	Type	Characteristics
D1	Homemade	Vinager, onion and garlic
D2	Honey and mustard light	Mustard and honey
D3	Oriental	Ginger, soy and sesame oil
D4	Parmesan	Parmesan cheese and spices
D5	Honey and mustard	Honey and mustard
D6	Yogurt	Yogurt and spices
D7	French	Mustard, tomato and paprika
D8	Homemade	Garlic, onion and parsley
D9	Lemon	Lemon and sesame
D10	Mustard with honey	Mustard prepared with honey

*Although some salad dressings have the same composition they are different because they are from different trade / processor.

2.2. Treatment: Irradiation

The dressing salads were irradiated in the Multipurpose Gamma Source (IPEN, Sao Paulo - Brazil) and were divided in three groups (treatments): Control (C), 3 kGy dose and 5 kGy dose. Amber Perspex Batch 3042 S 603-651nm dosimeters were used for the measurement of radiation dose.

2.3. pH

The pH was Measured using a potentiometer (Micronal brand - model B274) from the Laboratory of Food Irradiation - CTR / IPEN-SP.

The electrometric processes was chosen in this study. The pH was carried out at 25°C in triplicate for each salad dressing. For each measured was used 50 ml of dressing. It was mixed and placed in a beak subsequently; the electrode and the thermometer from potentiometer were placed in the samples under magnetic stirring to obtain the values [12, 13].

3. RESULTS AND DISCUSSION

3.1. pH

The pH values of the different salad dressings are shown in Table 2. All salad dressings showed the pH value between 2.76 and 4.06. Similar values were found in a study of commercial Italian salad dressings [14]. The preparation and long-term physicochemical stability of salad dressing emulsions depend on the presence of egg yolk in the system[15].

Yolk-based emulsion stability against droplet flocculation and creaming depends, on the strength of droplet–droplet interactions which in turn are influenced by pH and NaCl conditions. Both bridging and depletion flocculation phenomena appear to influence the physical stability of the yolk emulsions at the neutral pH, but at pH 3.8 and 0.15M NaCl content, on the other hand, the droplet–droplet interaction forces are very weak due to the relatively increased zero potential of the droplets [16] This highlights the importance to keep the acidity of emulsions as salad dressings.

Table 2. Averages of pH measurements for salad dressings subjected to different doses of gamma radiation.

	Control	3 kGy	5 KGy
D1	3.12 ± 0.05 ^a	3.11 ± 0.01 ^a	3.15 ± 0.01 ^a
D2	3.72 ± 0.02 ^a	3.75 ± 0.01 ^a	3.76 ± 0.01 ^a
D3	3.64 ± 0.03 ^a	3.66 ± 0.03 ^a	3.67 ± 0.02 ^a
D4	2.94 ± 0.05 ^a	3.01 ± 0.01 ^a	3.03 ± 0.10 ^a
D5	2.76 ± 0.02 ^a	2.75 ± 0.01 ^a	2.81 ± 0.01 ^a
D6	3.31 ± 0.03 ^a	3.34 ± 0.03 ^a	3.39 ± 0.02 ^a
D7	4.06 ± 0.01 ^a	4.07 ± 0.01 ^a	4.09 ± 0.02 ^a
D8	3.21 ± 0.03 ^a	3.23 ± 0.00 ^a	3.23 ± 0,01 ^a
D9	3.5 ± 0.02 ^a	3.53 ± 0.01 ^a	3.54 ± 0.01 ^a
D10	3.54 ± 0.01 ^a	3.54 ± 0.01 ^a	3.58 ± 0.00 ^a

*Averages followed by the same letter on the line or column do not differ by Tukey test at 5% level of significance.

The determination of acidity can provide a valuable data in assessing the conservation status of a food product. A process of decomposition, either by hydrolysis, oxidation or fermentation, usually changes the concentration of hydrogen ions (12). In this study both doses of gamma radiation, 3.0 kGy and 5.0 kGy the pH values of all samples showed no significant variance, according to Fig. 1.

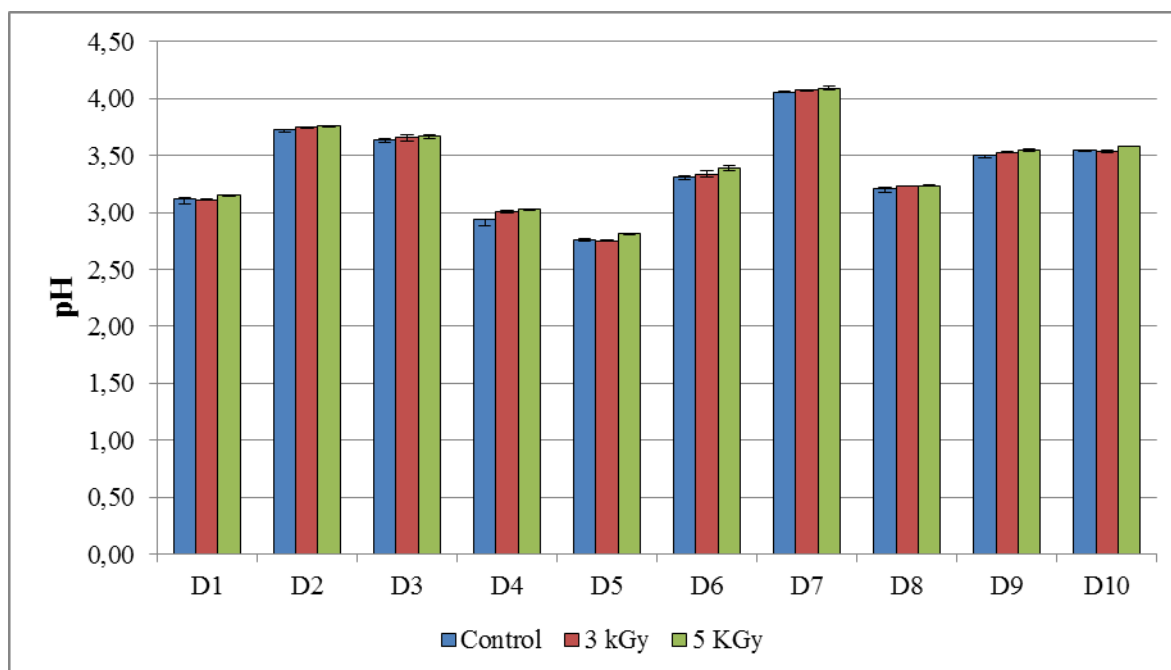


Figure 1. Values of pH for salad dressings subjected to different doses of gamma radiation: Control, 3.0 kGy and 5.0 kGy.

4. CONCLUSIONS

The pH of ten different salad dressings studied were not affected after irradiation. So the process of irradiation can be a good alternative to improve good handling practices.

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