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Charles A. Duvoisin, José C. Tremarin, Sandra Duvoisin & Diogo J. Horst

INTRODUCTION

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To ensure that production is of high quality, Brazilian researchers developed industrial pasteurizing equipment that works with electrical fields. The invention is protected under patent WO2018090110 - system and method for neutralizing pesticides or similar agents contained in food and constructive configuration for its implementation.

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Pulsed Electric Field Equipment for Electropasteurization of Dairy Products

Charles A. Duvoisin^a, José C. Tremarin^o, Sandra Duvoisin^p & Diogo J. Horst^o

Author ^a ^o ^p ^o: Brazilian Institute of Sciences and Innovations.

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In addition to standardization, the industrial production of traditional cheeses seeks to guarantee safety, minimizing contamination and the survival of undesirable microorganisms, particularly pathogenic ones.

It should not be forgotten that complex and often unpredictable microflora dynamics are responsible for important organoleptic issues among cheeses. The ideal equalized modulation of the pulsed electric field avoids affecting the proteins and organoleptic properties of the milk, which can preserve the sensory properties of the cheese. Mastery of this technology is vital to maintain these properties with quality and nutritional security.

Treatment with pulsed electric fields is an emerging technology that has gained great importance in the dairy industry as a pre-treatment technique in the pasteurization process, enhancing the inactivation of microorganisms and enzymes at temperatures lower than those used in typical thermal treatments, such as those of ultra-high temperature. Our food processing technology uses short pulses of high-voltage electricity to selectively damage microbial and plant cell membranes.

The electric field is applied at room temperature for a short period of time (in the range of microseconds) causing a potential difference across the cell membrane, inducing a marked increase in membrane conductivity and permeability and affecting cell viability. greater amounts of certain heat-sensitive nutrients, such as vitamins, proteins and other compounds, necessary to preserve and enhance the flavor of foods, including cheese, milk, juices and packaged foods in general.

The challenges of using pulsed electric fields in food electropasteurization are addressed. Furthermore, the use of the technique in the valorization processes of cheese derivatives is discussed with the aim of promoting durable agri-food systems.

The equipment proves the complete sterilization of *salmonella* and other anaerobic bacteria including gram positive and gram negative. More information about this technology can be accessed at Duvoisin et al.; (2022).

REFERENCES

1. DUVOISIN, C.A.; HORST, D.J.; VIEIRA, R.A.; BARETTA, D.; PSCHIEDT, A.; SECCHI, M.A.;

ANDRADE JÚNIOR, P.P.; LANNES, SCS. Finite element simulation and practical tests on Pulsed Electric Field (PEF) for packaged food pasteurization: inactivating *E. coli*, *C. difficile*, *Salmonella spp.* and mesophilic bacteria. Food Science & Technology, 42, e115421, 2022. <https://doi.org/10.1590/fst.115421>.

2. DUVOISIN, C. A. (2017). WO2018090110 - System and method for neutralizing pesticides or similar agents contained in food and constructive configuration for its implementation. World Intellectual Property Organization. Retrieved from: <https://patentscope.wipo.int/search/pt/detail.jsf?docId=WO2018090110>.