

Health Benefits of ▶ Cucumber Pickles

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Functional Foods

FST/HNFE 2544

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Serving Size: ¼ pickle
Calories: 5
Sodium: 260mg (11%)

The FDA's Outdated Standards Make Shopping for Healthy Food More Confusing

Bureaucrats at the FDA would be wise to take a more holistic approach to nutrition, allowing companies that offer high-fat but high-nutrient foods a better chance to explain and market their products.

Sunday, October 6, 2019



Fermented Pickles



Brining
(6% Salt +
Vinegar)

Fermentation

Desalting
(2% Salt +
Vinegar)

Slicing

Packaging

Pasteurization

Acidified Pickles ("Fresh Pack")



Slicing

Brining
(2% Salt +
Vinegar)

Packaging

Pasteurization

Refrigerator Pickles



Slicing

Brining
(2% Salt +
Vinegar)

Packaging

Refrigeration

Fermented Pickles



- Acetic acid from vinegar (lower concentration)
- Lactic acid from fermentation
- High salt content needed to select for desired *Lactobacillus ssp.*
 - Too high to eat
 - No starter culture used
- Desalting step produces a waste water with high salt content
- Pasteurization necessary to stop fermentation

Acidified Pickles ("Fresh Pack")



- Acetic acid from vinegar
- NO lactic acid fermentation
- Pasteurization necessary for shelf stability

Refrigerator Pickles



- Acetic acid from vinegar
- NO lactic acid fermentation
- Unpasteurized
- Must be refrigerated to prevent spoilage fermentation
- Could contain live microbes, no guarantee they're beneficial

IFTNEXT | ARTICLE

Bioactive peptides identified in fermented cucumbers

Scientists have developed a novel mass spectrometry technique that allowed them to analyze pickle components to determine whether fermented cucumbers are healthier than raw ones.

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August 20, 2019



Scientists at the U.S. Department of Agriculture's Agricultural Research Service (ARS) have partnered with North Carolina State University researchers to develop a novel mass spectrometry technique that allowed them to analyze pickle components to determine whether fermented cucumbers are healthier than raw ones.

Research on the potential health benefits of fermented foods has mainly focused on ingestion of live microorganisms and the subsequent probiotic effects. Some *Lactobacillus* research found to be beneficial at the

Survival and Growth of Probiotic Lactic Acid Bacteria in Refrigerated Pickle Products

Sicun Fan, Fred Breidt, Robert Price, and Ilenys Pérez-Díaz

Abstract: We examined 10 lactic acid bacteria that have been previously characterized for commercial use as probiotic cultures, mostly for dairy products, including 1 *Pediococcus* and 9 *Lactobacilli*. Our objectives were to develop a rapid procedure for determining the long-term survivability of these cultures in acidified vegetable products and to identify suitable cultures for probiotic brined vegetable products. We therefore developed assays to measure acid resistance of these cultures to lactic and acetic acids, which are present in pickled vegetable products. We used relatively high acid concentrations (compared to commercial products) of 360 mM lactic acid and 420 mM acetic acid to determine acid resistance with a 1 h treatment. Growth rates were measured in a cucumber juice medium at pH 5.3, 4.2, and 3.8, at 30 °C and 0% to 2% NaCl. Significant differences in acid resistance and growth rates were found among the 10 cultures. In general, the acid resistant strains had slower growth rates than the acid sensitive strains. Based on the acid resistance data, selected cultures were tested for long-term survival in a simulated acidified refrigerated cucumber product. We found that one of the most acid resistant strains (*Lactobacillus casei*) could survive for up to 63 d at 4 °C without significant loss of viability at 10⁸ CFU/mL. These data may aid in the development of commercial probiotic refrigerated pickle products.

Keywords: acetic acid, acid resistance, lactic acid, probiotic, refrigerated pickles

Practical Application: The development of probiotic pickled vegetable products will be facilitated by identifying probiotics that can survive in acidified vegetable products with a proposed shelf life of 2 or more months. We analyzed the growth and acid resistance of 10 probiotic lactic acid bacterial cultures and found that cultures selected for acid resistance had superior long-term survival (up to 2 mo) in a simulated refrigerated probiotic vegetable product that included a fermentation step. These data may be useful to aid the development of a commercial process for the manufacture of probiotic pickles.

Introduction

Probiotics are defined by the World Health Organization as live microorganisms, which when administered in adequate amounts, confer a health benefit on the host (World Health Org. 2002). Probiotic microorganisms include species of the genera *Lactobacillus* and *Bifidobacterium*, and to date, have been used primarily in dairy applications (Collins and others 1998). Research on probi-

otics and inappropriate for some individuals for a variety of reasons, including those with vegan or lactose intolerant diets. Alternative means of providing probiotics in the human diet have been suggested, including meat products and vegetable and fruit juices (Sheehan and others 2007; Martins and others 2013; Rouhi and others 2013). While general health claims have been made concerning consumption of kimchi and other fermented vegetable

Food Microbiology & Safety

USDA Agricultural Research Service

- ▶ Basic & applied government research
- ▶ Largely publicly funded, focusing on agricultural issues
- ▶ Most research commodity-specific
- ▶ Many research locations located on university campuses
 - ▶ E.g. NC State University

USDA-ARS Research Projects

Saltwater waste reduction

- ▶ Fermented pickles require an unpalatable high-salt brine to control the fermentation
- ▶ The desalting step makes a lot of high-salt wastewater
 - ▶ Financial cost
 - ▶ Environmental cost
- ▶ Reduction methods:
 - ▶ Calcium chloride brine
 - ▶ Starter culture

Health benefits and marketing

- ▶ Bioactive peptides
- ▶ Probiotic pickle formulations
- ▶ Reduced salt formulations

Group Discussion

- List health benefits and risks associated with your category (based on readings and other food science/nutrition knowledge)
- What steps/ingredients would you change to create healthier pickles?
- Will those changes cause any other problems?
- Should you be allowed to label this product a health food?