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Fermented vegetable: Health implication

Fermented foods contribute to about one-third of the diet worldwide and cereals are particularly important substrates for fermented foods around the globe. Fermentation of cereals, fruits and vegetables, can make otherwise inedible food stuffs safe, nutritious, and palatable. From Korean *kimchi* and Indian chutneys to sauerkraut, yogurt and cheese, global cultures have crafted unique flavors and traditions around fermentation for thousands of years. Fermentation is the 'slow decomposition process of organic substances induced by micro-organisms or enzymes, of plant or animal origin,' and the changes caused by fermentation can be both advantageous and disadvantageous. Fermentation in food processing and bio-preservation is essentially the conversion of carbohydrates to alcohols and carbon dioxide or organic acids using primarily yeast or bacterial organisms. Fermentation is also employed in preservation techniques to create lactic acid in sour foods such as sauerkraut, yogurt, or vinegar. Fermented foods, as a group, are highly nutritious and digestible. Fermentation pre-digests foods, making nutrients more bio-available, and in many cases fermentation generates additional nutrients or removes anti-nutrients or toxins. Most research focuses on fermented dairy products. However, vegetables such as cabbages, carrots, garlic, soybeans, olives, cucumbers, onions, turnips, radishes, cauliflower and peppers, in addition to fruits such as lemons or berries, are fermenting probiotic foods. Lactic acid fermentation, or lacto-fermentation, is an anaerobic process where lactic acid bacteria, mainly *Lactobacillus* species, convert sugar into lactic acid, which acts as a preservative. This process preserves the food, creates beneficial enzymes, B-vitamins, Omega-3 fatty acids, and probiotic bacterial strains. Several health benefits have been associated with intake of fermented vegetables such as a reduction in hypertension and serum cholesterol levels, enhanced immune and gastrointestinal function as well as a lowering of the risk of colon cancer. Probiotic foods with live lactic-acid-producing bacteria intact are receiving increasing attention by consumers because of their suggested benefits to digestive health, immune function, and general well-being.

Biography

Pamela E Starke-Reed is the Deputy Administrator for Nutrition, Food Safety and Product Quality Agriculture Research Service, USDA. Prior to that, she had 26 years career at the National Institutes of Health (NIH), most recently 12 years as Deputy Director of the Division of Nutrition Research Coordination. Her previous positions include 10 years with the NIH National Institute on Aging as Director of the Office of Nutrition and Program Director for the Nutrition and Metabolism and Protein Structure and Function research Programs; Biologist with the Food and Drug Administration's Center for Food Safety and Applied Nutrition and Assistant Professor with the Department of Medicine of George Washington University (GWU) in Washington DC. She is currently Co-Executive Secretary of the Federal Government Interagency Committee on Human Nutrition Research (ICHNR). She serves as an Associate Editor of Nutrition reviews and on the Editorial Board of the *Journal of Nutritional Biochemistry*.

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