Quality of retail packaged whole egg powder during long-term storage

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ABSTRACT

Whole shelf-life or whole egg powder (WEP) would ideally extend no more than a year, while the generally accepted shelf-life for shelf-stable egg powder is 2 years. Egg products are available in the retail capitol world as long term ready to eat foods for emergency use. Further research is needed to understand if long-term shelf-stable egg powder can be used in like fresh whole egg during everyday and emergency situations. The objective of this study was to evaluate the quality of whole egg powder (WEP) at elevated temperatures and humidity.

Seventeen samples with three replicates of WEP package include 30 cans were obtained from donors across the U.S. Samples ranged from 2 months to 2 years in age. Acceptance for the samples was determined. Whole egg powder for evaluation was stored at room temperature or below. When received, cans of WEP were placed in the refrigerator and samples were sealed, the date of manufacture or purchase was verifiable, and the cans were obtained from donors across the U.S. Samples ranged from 2 months to 2 years in age.

Sensory analysis included an eight-member panel utilizing a 1-9 hedonic scale with 1 = dislike extremely, 9 = like extremely for regular diet and in an emergency situation. Mark whether or not you would eat each sample.

Headspace oxygen for most samples was <0.5% but five samples ranged from 11.2 to 20.8%. Can seam quality was good for the majority of the samples, with 10% exceeding 10% oxygen. Can seam quality was usually not, but generally was an indication of high headspace oxygen levels. Marked Fresh is an egg gel made from a fresh shell egg. The dashed line represents the USDA value for riboflavin in stabilized WEP.

The data indicates that long-term storage of WEP can cause changes in functional properties such as gelling and dispersibility. Functional properties are not well maintained during long-term storage of WEP. In contrast to other functional properties, gelling ability changed during long-term storage.

The results indicate that WEP is not capable of retaining a high percentage of consumer acceptance and should not be recommended for long-term storage purposes.

INTRODUCTION

In the USA, the United States Armed Forces require egg powder to be available after a disaster or at any time for public relief, emergency planning, and humanitarian use. The military also utilizes shelf-stable egg powder for its ability to provide an adequate amount of egg powder as a food source. A method of storing white or brown eggs in jars with bran, paper, and lye creates an environment that minimizes the growth of both aerobic and anaerobic microorganisms. The jars of eggs are sealed to prevent the entry of oxygen and moisture, and stored in a cool, dry area. The shelf life of these eggs is about 1 year, with an estimated shelf life of 85 to 100 years. However, not all methods of preservation are successful in retaining the nutritional quality of the eggs. In addition, shelf-stable egg powder is available from a wide variety of sources, and not all manufacturers maintain the quality of their products. Among the factors affecting the quality of shelf-stable egg powder are the method of manufacturing, the age of the egg, and the conditions to which the egg powder is exposed during storage.

METHODOLOGY

SAMPLE ACQUISITION

Seventeen samples with three replicates of the U.S. military egg powder package included 30 cans were obtained from donors across the U.S. Samples ranged from 2 months to 2 years in age. Acceptance for the samples was determined. Whole egg powder for evaluation was stored at room temperature or below. When received, cans of WEP were placed in the refrigerator and samples were sealed, the date of manufacture or purchase was verifiable, and the cans were obtained from donors across the U.S. Samples ranged from 2 months to 2 years in age.

HEATDDSPACE OXYGEN, CAN SEAM QUALITY, WATER ACTIVITY, AND COLOR

Headspace oxygen was obtained using a Miles model oxygen analyzer (Illinois Instruments, Inc. Johnsburg, IL) calibrated to atmospheric oxygen. Water activity was measured using an Analyzer (Illinois Instruments, Inc. Johnsburg, IL) calibrated to atmospheric oxygen. Headspace oxygen for most samples was <0.5% but five samples ranged from 11.2 to 20.8%. Can seam quality was good for the majority of the samples, with 10% exceeding 10% oxygen. Can seam quality was usually not, but generally was an indication of high headspace oxygen levels. Marked Fresh is an egg gel made from a fresh shell egg. The dashed line represents the USDA value for riboflavin in stabilized WEP.

In order to evaluate the effect of long-term storage on the quality of WEP, a method of storing white or brown eggs in jars with bran, paper, and lye creates an environment that minimizes the growth of both aerobic and anaerobic microorganisms. The jars of eggs are sealed to prevent the entry of oxygen and moisture, and stored in a cool, dry area. The shelf life of these eggs is about 1 year, with an estimated shelf life of 85 to 100 years. However, not all methods of preservation are successful in retaining the nutritional quality of the eggs. In addition, shelf-stable egg powder is available from a wide variety of sources, and not all manufacturers maintain the quality of their products. Among the factors affecting the quality of shelf-stable egg powder are the method of manufacturing, the age of the egg, and the conditions to which the egg powder is exposed during storage.

The data indicates that long-term storage of WEP can cause changes in functional properties such as gelling and dispersibility. Functional properties are not well maintained during long-term storage of WEP. In contrast to other functional properties, gelling ability changed during long-term storage.

The results indicate that WEP is not capable of retaining a high percentage of consumer acceptance and should not be recommended for long-term storage purposes.

SENSORY ANALYSIS

Sensory analysis included an eight-member panel utilizing a 1-9 hedonic scale with 1 = dislike extremely, 9 = like extremely for regular diet and in an emergency situation. Mark whether or not you would eat each sample. It is important to note that all WEP samples had tested positive for the presence of salmonella, a common foodborne pathogen.

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