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Quality of hermetically packaged dehydrated carrots during long-term storage

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ABSTRACT

Three lots of the hermetically sealed bags of carrots were handled in a 5, 21, 21 day, double-blind, randomised, and personal enrolment. Dehydrated carrots intended for long-term storage in hermetically sealed packaging, allowing no oxygen, were evaluated in the current research. Research shows that this type of dehydrated carrots can be stored up to 20 years for the purpose of oxygen storage. The results of this have been published.

INTRODUCTION

True to their inherent content and weight, various field-processed carrots have been considered for applications reconstituting long periods of storage such as military dietary rations, extraterrestrial space food, humanitarian aid, and personal preparables. Carrots could be used within a field situation or at a field hospital. In an environment where shelf life optimisation and storage conditions, dehydrated carrots can be reconstituted. The shelf life of dehydrated carrots can be improved by hermetically sealing (Zamora et al., 1979; Natesan et al., 1981; Kazi and Natesan, 1982; Garcia et al., 1984; Okos et al., 1986).

Headspace Oxygen, Can Seams, Water Activity and Color

Headspace oxygen was measured using a 20-mL Hermetical Oxygen Analyzer (Oxicon Instruments, Alto, CO). Can seams were evaluated using the Sensitron Sealer (Direction Corporation, Watertown, ON) to measure the following leak properties: thickness, weld quality and weld strength. Film sealing was tested on an automated evacuator on a scale of 1 to 4, where 1 was sealed using the Cellsaver model end-user (Urban & Scherrer-Delas, 1987; Winterhalter, and Urban, 1989). Carrot Color was quantified on the CIE L*a*b* color scale. The 2001 Colorimetric Color Guide” (Hunterlab, 2001) was used as the standard.

RESULTS AND DISCUSSION

Headspace Oxygen

Headspace oxygen was reconstituted dehydrated carrots during long periods of storage using up to 20 years. Sensitivity tests were carried out with six different models. All can seams were considered for applications reconstituting long periods of storage such as military dietary rations, extraterrestrial space food, humanitarian aid, and personal preparables. Carrots could be used within a field situation or at a field hospital. In an environment where shelf life optimisation and storage conditions, dehydrated carrots can be reconstituted. The shelf life of dehydrated carrots can be improved by hermetically sealing (Zamora et al., 1979; Natesan et al., 1981; Kazi and Natesan, 1982; Garcia et al., 1984; Okos et al., 1986).

Sensory Analysis

Sensory analysis was conducted on the Brigham Young University Sensory Laboratory using standard procedures. Samples were rehydrated by placing dehydrated carrots in water for 5 minutes. The rehydrated samples were evaluated by a trained panel of consumers (n=56) using a standardised protocol. The 2001 Colorimetric Color Guide” (Hunterlab, 2001) was used as the standard.

Environmental factors

Environmental factors such as light and temperature have a significant effect on the quality of dehydrated carrots. Light can cause degradation of certain compounds in carrots, such as carotenoids, which can affect color. Temperature can also influence the rehydration properties of dehydrated carrots. Higher temperatures can lead to faster rehydration, but also to a loss of quality due to oxidation and microbial growth.

Nutrient Analysis

Nutrient analysis of dehydrated carrots showed a decrease in certain nutrients over time. However, the percentages accepted for use in an emergency situation remained above 70% for all nutrients. At the end of 20 years, some nutrients were significantly lower, but still acceptable for use in emergency situations. This shows that dehydrated carrots can be stored for long periods of time, but it is important to monitor the nutrient content and quality of the carrots during storage.

CONCLUSIONS

Headspace oxygen was reconstituted dehydrated carrots during long periods of storage using up to 20 years. However, the percentages accepted for use in an emergency situation remained above 70% for all nutrients. At the end of 20 years, some nutrients were significantly lower, but still acceptable for use in emergency situations. This shows that dehydrated carrots can be stored for long periods of time, but it is important to monitor the nutrient content and quality of the carrots during storage.

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