Evaluation the Sensory and Probiotics Properties of the Yogurt Supplemented with Carrot Juice

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ABSTRACT
This study aimed to develop a new type of yogurt through addition of carrot juice. Yogurt is a fermented milk product obtained from fermentation of Lactobacillus bulgaricus and Streptococcus thermophilus strains. The effect of carrot juice at different levels (0%, 8%, 16%, 24%) on sensory properties and the viability of probiotic bacteria in yogurts during storage (21 days) at refrigerated temperature (4°C) was evaluated. The yogurt supplementation with 24% carrot juice significantly improves the stability of the lactic acid bacteria, that contained the recommended levels of $10^7$ cfu/g probiotic bacteria at the end of 21-days shelf life. The yogurt with 24% carrot juice was the most appreciated (7.07 points), followed by the classic yogurt (6 points), yogurt with 8% (5.28 points) and yogurt with 16% carrot juice (5.5 points).

Keywords: yogurt, lactic acid bacteria, carrot juice.

INTRODUCTION
Fermented dairy products are popular because of the health benefits provided by the ingestion of probiotics generated by the consumption of these products and among all of the fermented dairy products yogurt is the most consumed (Cruz et al., 2013), due to the positive perception on the market as being seen by the consumers as a functional dairy product containing living microorganisms like lactic acid bacteria (LAB) (Rotar et al., 2015). The yogurt, to be considered as a probiotic product, Streptococcus thermophilus and L. delbrueckii ssp. bulgaricus, as starter cultures, must be at a daily dose of $10^9$ CFU/g. Several authors have indicated that a minimal concentration of $10^6$ CFU/g of a product is required for a probiotic effect (Irkin and Eren, 2008). Yogurt is also widely used as a carrier for food components such as fibers, fatty acids, and antioxidants that are believed to improve physiological functions in the body. In addition, carrots are considered to be very nutritious, containing vitamins, minerals, and dietary fiber, as well as flavonoids and carotenoids, all of which are beneficial in preventing diseases (Cliff et al., 2013).

AIMS
In this study, it was investigated the effect of yogurt supplementation with four different levels (0% (Y0), 8% (Y8), 16% (Y16), 24% (Y24)) of carrot juice on growth of the lactic acid bacteria. Also, sensory properties of the final product were investigated to establish the optimal quantity of carrot juice addition based on consumer preferences.

MATERIALS AND METHODS
Yogurt is made by fermenting milk 3.5% fat with the starter culture of yogurt consisting of Lactobacillus delbrueckii subsp bulgaricus and Streptococcus salivarius subsp. thermophilus (TIPO YOGUR FERLAC II).

The viability of lactic acid bacteria of yogurt samples were assessed in 4 stages of the storage
period, stage 1 - at the beginning of storage; stage 2 - at 7 days of storage; stage 3 – at 14 days of storage and stage 4 – at 21 days. All samples were analysed in duplicate.

The number of lactobacilli was determined on the MRS agar and the number of streptococci was determined on M17 agar medium after 48 h, respectively 72h of incubation (Pop et al., 2015; Rotar et al., 2014). Sensory analyzes of the samples, as well as the control sample were evaluated by 25 untrained panelists using a 9-point hedonic scale.

RESULTS AND DISCUSSION
The addition of 24% carrot juice resulted in an increase of the viable cell counts of *L. bulgaricus* from $4.36 \times 10^7$ CFU/mL on day 0 to $6.85 \times 10^7$ CFU/mL on day 21, whereas, *S. thermophilus* increases from $3.96 \times 10^7$ CFU/mL on day 0 to $6.23 \times 10^7$ CFU/mL on day 21 (Tab. 1).

Results showed that the yogurt supplementation significantly improves the stability of the lactic acid bacteria, due to the carbohydrates, vitamins and minerals found in high quantity in carrot.

The addition of carrot juice influences the sensory properties of yogurt. However, panelists prefer the yogurt with 24% carrot juice as is shown in Figure 1.

CONCLUSION
This research identified that the rich additions in polyphenolic compounds, fibres and vitamins could be potentially considered as a source of ingredients for yogurt supplementation.

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REFERENCES