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## Effect of refrigerated storage on sensory properties of Pizza cheese (processed)

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### Abstract

The sensory quality parameters like colour and appearance, body and texture, saltiness, mouth feeling, flavour and overall acceptability of the Pizza cheese (processed) is very important for consumer acceptability, which play a crucial role in the market potential. The sensory characters of the cheese are determined with the help of an instrumental approach and tasting panels, in order to find its acceptability to consumers. The products packaging method and storage temperature helps to enhance the shelf life of the cheese from undesirable microorganisms and allowing metabolic activities of ripening strains. Packaging not only helps to increase the shelf life but also attract the consumers to purchase the dairy products like Pizza Cheese (processed). As compared to aerobic packaging, vacuum packaging helps to increase the shelf life of the Pizza cheese (processed). The sensory scores were decreased as the storage period increases irrespective of packaging and storage temperature.

**Keywords:** Pizza cheese, body and texture, saltiness, mouth feeling

### Introduction

Cheese, versatile food product varies in flavor, textures and end uses. As an ingredient in foods, cheese is required to exhibit functional characteristics in the raw as well as cooked forms. Mozzarella cheese curd used for processed cheese preparation did not 'string out' well. Therefore, it should be substituted with young Cheddar cheese up to 25.0-40.0%. This level helps to maintain the composition and sensory characteristics of the processed cheese. (Jana, and Mandal, 2011) [7] Processed cheese, a major fermented dairy product in Indian market having high moisture content and moderate acidic pH (5.6-5.8) favours bacterial and mold growth limit the shelf-life by development of off- flavour, browning (discoloration) and bitterness. The low temperatures help to reduce the biochemical modifications occur during refrigerated storage (Barbano *et al.*, 1993) [1]. Cheese Flavour is the one of the important parameters decides the acceptability of cheese purchase and consumption. Texture, helps to evaluate the cheese quality used to differentiate many varieties of cheese and preference of the consumers. The ingredients like plant-based omega 3 fatty acids and inulin used in emulsion and encapsulated powder helps to enhance the functional properties of this product. The absence of air in vacuum packaged fresh cheeses helps to prevent the lipolysis and rancid and soapy flavour. The vacuum packaged cheeses become firmer due to significant moisture losses (Murcia *et al.*, 2003) [9]. Therefore, there is a need for a comprehensive approach like refrigerated storage temperature and packaging materials like aerobic and vacuum helps to enhance the shelf-life of processed cheese which helps to improve the market potential.

### Materials and Methods

Milk (Standardized to 3.5% fat) casein fat ratio (0.65-0.70) for preparation of mozzarella cheese curd and cheddar cheese. The Pizza cheese (Processed) was prepared as per the procedure outlined by (Farkye & Yim, 2003) [4] with slight modifications. 75(mozzarella curd):25 (Cheddar cheese of different age groups 0-12 months) combination was used for product preparation. The required vital ingredients like plant-based omega 3 fatty acids, inulin and emulsifiers were added in the form of emulsion and encapsulated powder in the experimental cheese preparation. Then it was blended in double jacketed kettle and heated at 80-85 °C for 20 minutes then poured it in the mould, cooled to room temperature.

The sensory analysis of the products was carried out as per 9-point hedonic scale. The product was packed in aerobic packaging and vacuum packaging and then stored at refrigeration temperature for sensory evaluation at 3 days interval.

**Results and Discussion**

The control and fortified samples (experimental) were packed under aerobic packaging and vacuum packaging and stored at (4-7 °C) and analyzed for sensory parameters. Vacuum packaging helps to reduce oxidative damage and reduced the intensity of bitter taste and pungent aroma as compared to aerobic packaging. (Favati *et al.*, 2007) [5].

**Colour and Appearance**

The control sample, emulsion fortified pizza cheese (processed) and encapsulated powder fortified pizza cheese (processed) was packed under aerobic packaging & vacuum packaging and stored at (4-7 °C). There was significant difference between the samples and days during the storage period. The product stored under aerobic packaging refrigerated storage control sample (ARC) varied in the range of 9.00 (0<sup>th</sup> day) to 7.00 (45<sup>th</sup> day). In the emulsion fortified pizza cheese (processed) (ARE) scores varied from 8.83 to 6.50 at the end of storage period, whereas in encapsulated powder fortified pizza cheese (processed) (ARP) it varied between 8.25 to 6.30. The encapsulated powder fortified pizza cheese received less score as compared to others. At the end of 28<sup>th</sup> day of storage, the significant ( $p < 0.05$ ) score variation was observed between control and experimental samples. The

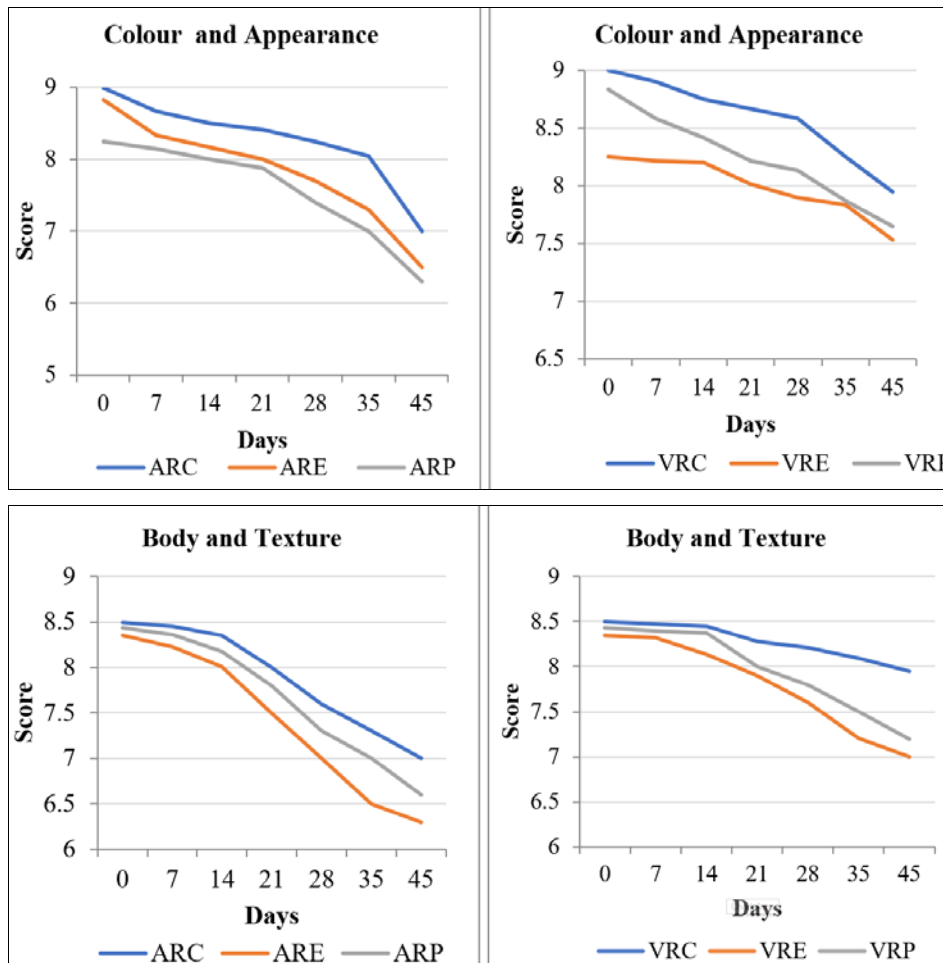
vacuum packaging samples scores were more compared to aerobic packaging samples (Fig.1). The same kind of results were reported by Eroglu *et al.* (2016) [3] that loss of moisture which led to dry and dull appearance of the product.

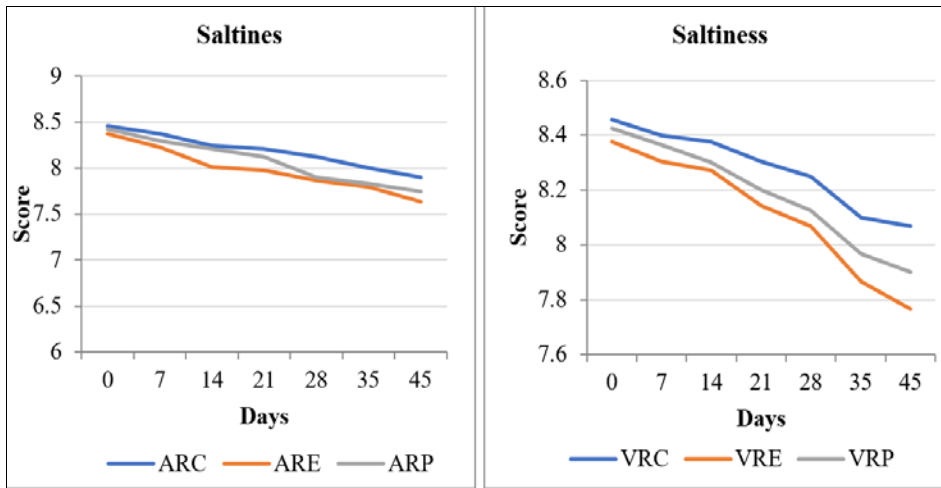
**Body and Texture**

The body and texture score decreased to 7.00, 6.60 and 6.30 for control, powder fortified cheese and emulsion fortified pizza cheese (processed) respectively during storage of 45 days. The variations in the score were significant after 28 days. The lowest score was observed in emulsion fortified cheese due to soft body and texture compared to other samples. Kindstedt *et al.* (2010) [8] reported that during storage the factors like the rate of biochemical changes, pH changes and increase of an interaction between the milk proteins during processing play an important role in body and textural properties of the cheese. The same results were recorded in the vacuum packaging samples which were less affected compared to aerobic samples.

**Saltiness**

The saltiness scores for control samples, emulsion fortified pizza cheese (processed) cheese and encapsulated powder fortified pizza (processed cheese) decreased significantly from 8.45 to 7.0, 8.37 to 6.2 & 8.42 to 6.50, respectively from 0<sup>th</sup> day to 45<sup>th</sup> day of storage. (Fig. 1). The reason for increase in salt content during storage period increase in total solids content of the cheese. (Sabikhi and Kanawjia, 1992) [10]. The aerobic packaging samples scores were less as compared to vacuum packaging.





ARC -Aerobic Refrigerated Control Product; ARE-Aerobic Refrigerated emulsion based product. ARP-Aerobic Refrigerated Encapsulated powder-based product  
 VRC -Vacuum Refrigerated Control Product; VRE-Vacuum Refrigerated emulsion-based product. VRP-Vacuum Refrigerated Encapsulated powder-based product.

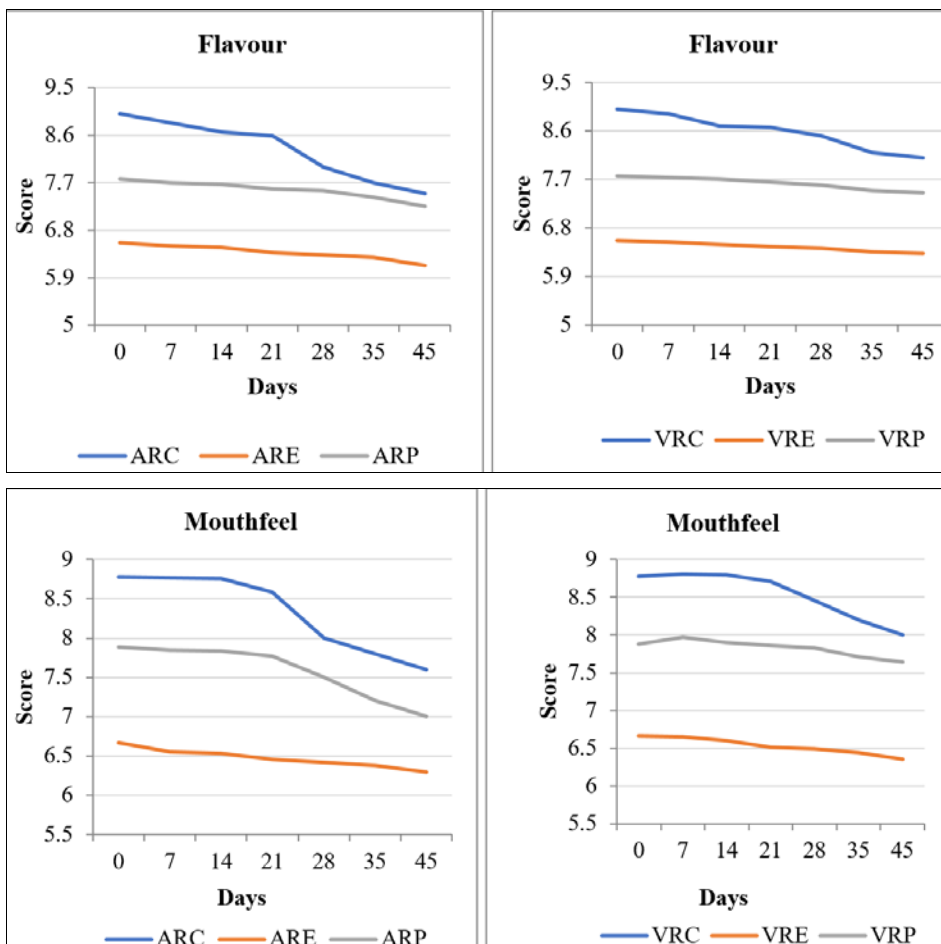
**Fig 1:** Effect of refrigerated storage (4-7 °C) on colour and appearance, body and texture, saltiness scores of aerobic and vacuum packaged pizza cheeses (processed)

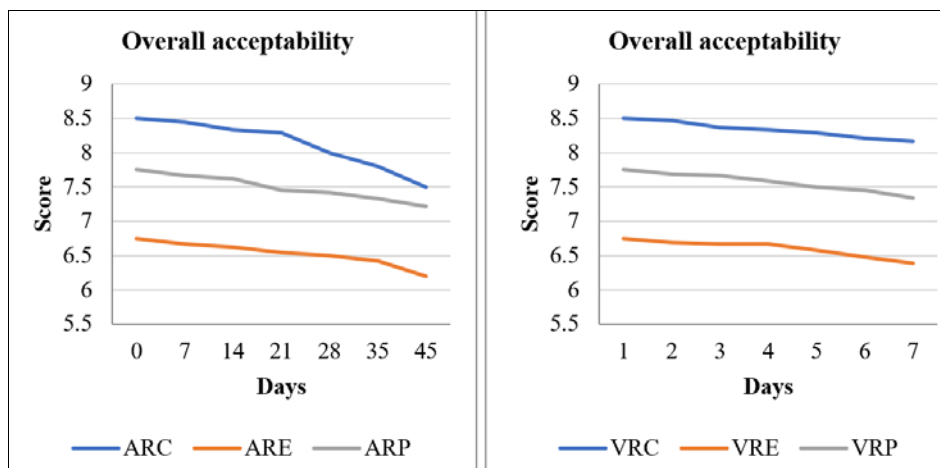
**Flavour**

The flavour score of emulsion fortified pizza (processed) cheese was the lowest 6.125 as compared to encapsulated powder fortified pizza (processed) cheese i.e 7.250. at the end 45 days storage period. (Fig. 2). Vacuum packaging scores were more due to arrest of microorganisms growth due to non-availability of oxygen. The scores were significantly affected due to oxidation of omega 3 fatty acids present in it. The same findings were reported by Horn (2012) [6] in fish oil enriched cream cheese.

**Mouthfeel**

The mouthfeel scores of the control pizza cheese (processed), emulsion fortified pizza (processed) cheese and encapsulated powder fortified pizza (processed) reached to 7.60, 6.29 and 7.0 respectively at the end 45<sup>th</sup> day of storage period. The products stored in aerobic packaging, the scores were drastically reduced after 28 days, but vacuum packaging samples scores reduced near at the end of 45 days (Fig.2). The findings of the Horn (2012) [6] also stated that addition of fish oil affected the mouth feeling.





**Fig 2:** Effect of refrigerated storage (4-7 °C) on flavour, mouthfeel, and overall acceptability scores of aerobic and vacuum packaged pizza cheeses (processed)

### Overall acceptability

The overall acceptability scores for control samples and experimental samples significantly varied from 0<sup>th</sup> day to 45<sup>th</sup> day of storage. Finally, it was concluded from overall acceptability score that control sample score and encapsulated powder fortified pizza cheese (processed) had most acceptability than the emulsion fortified pizza cheese (processed) (Fig 2). The same findings were reported by Costabel *et al.* (2007) [2] reported that increased storage period affects the overall acceptability of cheese samples.

### Conclusion

From the results, it was concluded that the product was acceptable sensorily up to 45 days at 4-7 deg c. The sensory scores of aerobic packaged samples were drastically reduced after 28 days as compared to the vacuum packaged samples acceptable up to 45 days. The increase in shelf life of the product in vacuum packaged samples might be due to non-availability oxygen prevents the growth of pathogenic organisms and also prevent the oxidation of polyunsaturated fatty acids as well.

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