Sustainability, Agri, Food and Environmental Research, (ISSN: 0719-3726), vol 13, 2025
http://dx.doi.org/

Packaging and shelf life of dairy products

Envasado y periodo de conservación de los productos lácteos

[1]K. Sivashree [2]Reethika Ravi [3]Abirami.S.P

Sivashreekarthik003@gmail.com reethoo08@gmail.com abiramisp.fsm@mopvaishnav.ac.in

Department of Food Science

M.O.P. Vaishnav College for Women (Autonomous), Chennai

ABSTRACT

Aim: The aim is to understand the packaging and shelf - life conditions required for dairy products.

Objective: To give an overview of the packaging systems and shelf-life period of currently available dairy products. To study consumers' choice in packaging of the everyday usage of dairy products. To understand the consumers' awareness in determining the storage and shelf-life conditions of the product.

Materials and Method: This study was done through Google forms, where questions were raised about different packaging preferences and shelf-life period.

Result and Conclusion: This study was focused on awareness and consumer preference on the available and subsequent needs in dairy packaging systems. It revealed that 93.5% people use dairy products everyday and prefer packet forms and bottle over any other packaging methods.

Keywords: Packaging conditions, Storage conditions, Consumer, Food, Product

RESUMEN

Propósito: Conocer las condiciones de envasado y el periodo de conservación de los productos lácteos.

Objetivo: Ofrecer una visión general de los sistemas de envasado y del periodo de conservación de los productos lácteos disponibles en la actualidad. Estudiar la elección de los consumidores en cuanto al envasado de los productos lácteos de uso cotidiano. Conocer el grado de concienciación de los consumidores a la hora de determinar las condiciones de almacenamiento y conservación del producto.

Materiales y método: Este estudio se realizó a través de formularios de google, donde se planteaban preguntas sobre las diferentes preferencias de envasado y periodo de conservación.

Resultados y conclusiones: Este estudio se centró en el conocimiento y las preferencias de los consumidores sobre las necesidades disponibles y posteriores en los sistemas de envasado de productos lácteos. Se reveló que

el 93,5% de las personas utilizan productos lácteos todos los días y prefieren la leche en bolsa y en botella sobre cualquier otro método de envasado.

Palabras clave: condiciones de envasado, condiciones de almacenamiento, consumidor, alimento, producto

INTRODUCTION

Food packaging plays an important role in ensuring food safety, hygiene and consumer protection while also providing for a smooth food supply. Recently, interest has shifted towards novel applications such as smart or intelligent packaging, modified atmosphere and active packaging, and sustainability. Some of the recent trends in Packaging of dairy food.

Intelligent Packaging - Intelligent packaging contains a device that can monitor the condition of the product, package or packaging environment. Mostly used in dairy packaging are time-temperature indicators and indicators of ripening. Intelligent packaging features special functions resulting in safer and more nutritious or appealing products also ensuring to be environment friendly.

Active Packaging - These packaging techniques can extend the shelf life of food and give information on its freshness, provided it does not adversely affect its composition.[1]

Packaging of dairy products develops continuously along with advances in material technologies, which are in turn a response to demands of consumers. It is well known that, depending on numerous internal and external factors, the growth of microorganisms during the storage of dairy products results in their sensory changes, i.e. spoilage. Product's, package, and the environment interact in a positive way to extend shelf-life of products and/or to enhance safety or sensory properties while maintaining the quality of the foods [2]. This is due to the fact that under the inadequate storage conditions, nutrients in the milk products are a good medium for the growth and development of individual groups of microorganisms [3].

Modified atmosphere packaging (MAP), for example, can be applied to dairy products to control some of the fungi problems and extend their shelf life. MAP is being used with high carbon dioxide (CO_2) concentration as well as CO_2/N_2 gas mixes [4].

DURABILITY OF DAIRY PRODUCTS

The period of time each dairy product stays fresh varies significantly. For example, pasteurised milk will keep for 10-12 days if kept below 5°Celsius, while yoghurt and similar products that went through fermentation, should remain of a good quality for 35–40 days under the same storage conditions. It is important to keep an

eye on the shelf life of each dairy product to avoid waste and spoilage [5]. Avoid temperature fluctuation at higher temperatures, store product in constant, controlled temperatures.

MATERIALS AND METHOD

It is a prospective observational study achieved by Randomized Sampling Techniques. Google forms were used in collecting various data and opinion of the consumers. This study was conducted by sharing google forms through social media and personal contacts. The eligibility criteria were people aged 20 and above. The exclusion criteria include children, disabled people and people (who were) disinterested to participate in the study. The target sample size was 60 and achieved sample size were 62.

RESULTS AND DISCUSSION

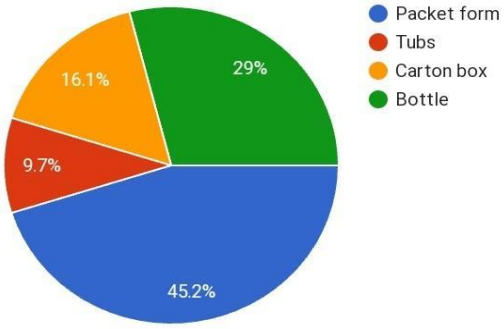
The questionnaire was divided into three sections with a total of 23 questions. The first part of the questionnaire includes Demographic data such as name and age of the person. To add on, the next 6 questions were on consumer's awareness and preferences on packaging system of dairy products. And the remaining 15 questions were on the shelf-life and storage conditions of the dairy products. The 62 responses reviewed showed that the people below 30 contributed more (69.4 %) and people between 31-40 being the least (3.2%).

EXISTING PACKAGING SYSTEM

When choosing packaging material for dairy products, various important factors need to be considered such as toxicity, compatibility with the product, impact resistance, maintenance of sanitation, odour and light protection, chemically inactivity, shape and weight requirements, marketing appeal, printability and cost [6].The type of packaging material for dairy products is of critical importance because of its impact on quality, safety, cost and marketing of the commodities to consumers [7].

Among 62 responses received, 45.2% of the consumers prefer dairy products in package form, 29% of the consumers prefer bottle, 16.1% carton boxes and 9.7 % prefer tubs.

Figure 1: Kind of packaging people prefer to buy

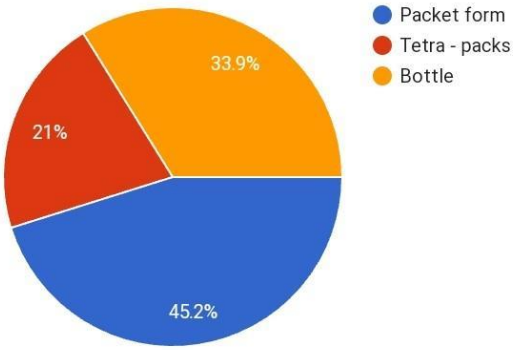


CONSUMERS' PREFERENCE

While extending the survey to packaging conditions preferred for everyday using dairy products such as milk and curd, the responses were different.

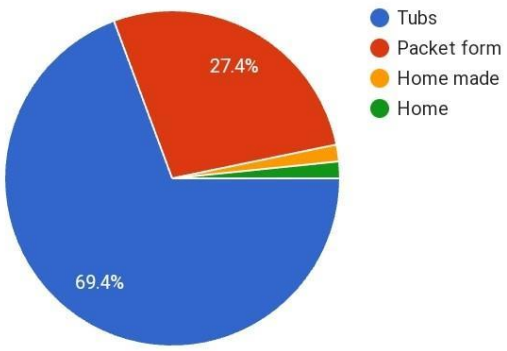
From fig.2, As for milk, 45.2% preferred packet forms, 33.9% preferred bottles and 21% preferred tetra-packs.

Figure 2: Milk Packaging



Also from fig.3, for curd packaging, majority of the survey population (69.4%) preferred tubs over packet forms (27.4%). Whereas, 3.2% of the populations preferred home-made curd. The majority of the respondents suggested to improve dairy product packaging and to reduce the usage of plastic and increase recycling packages in order to entertain eco-friendliness.

Figure 3: Curd Packaging



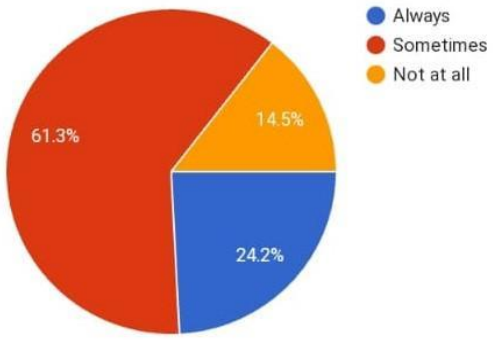
STORAGE AND SHELF-LIFE OF DAIRY PRODUCTS

An important commercial goal for soft and un-ripened dairy products is to keep them fresh (i.e.,) to maintain some peculiar sensory characteristics such as a white and 'brilliant' colour, creamy visual texture and spread ability, milky aroma and flavour and low acidity [8]. The survey was questioned on all these aspects.

From fig 4(a), While observing the flavour change, 61.3% of the consumers detect flavour change sometimes during shelf-life, while 24.2% consumers always find a flavour change during shelf-life and 14.5% people never found any flavour defects in the product.

Figure 4: Flavour and colour change during shelf-life

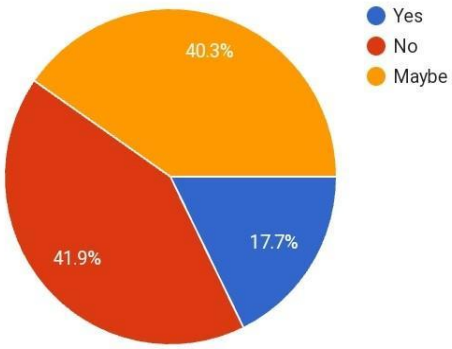
[a] Flavour



From fig 4(b), On the aspect of colour change, only 17.7 % consumers noticed the change in colour during their shelf-life, while 41.9 % did not find any colour change and 40.3 % may found a colour change in the product.

Figure 4: Flavour and colour change during shelf-life

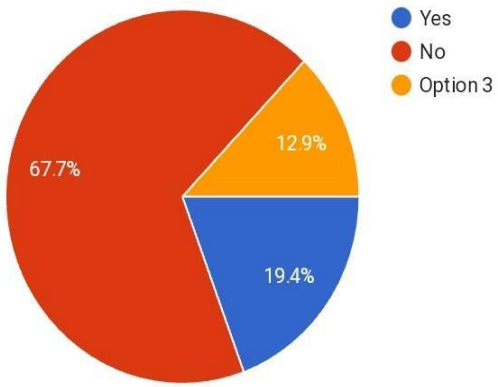
[b] Colour



From fig 5(a), As microorganisms grow once after or nearing the expiry date, only 19.4% of the consumers had noticed them on the product before the expiry date, 67.7% did not find any microorganisms and 12.9 % consumers are ambivalent.

Figure 5: Microorganisms detected and odour change during shelf-life

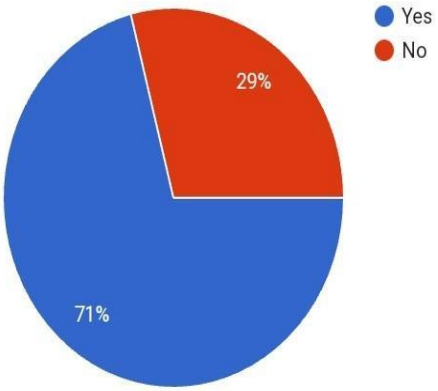
[a]Microorganisms



From fig 5(b), With respect to odour change, 71% of the consumers found odour change and 29% did not find any odour change during the long shelf-life of the product.

Figure 5: Microorganisms detected and odour change during shelf-life

[b] Odour

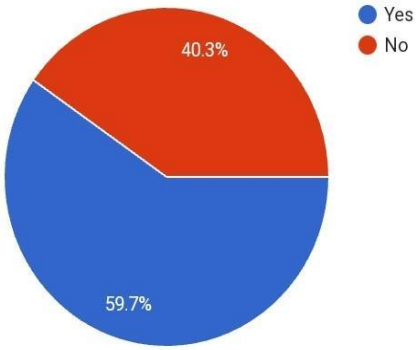


CONSUMERS' RELIANCE ON LABEL

As far as for label,creating truthful and informative dairy product labels increases the chance of selling the product. Consumers are more informed about food contents nowadays and they like to know what they are consuming, so providing enough information about a product and highlighting its nutritional strengths will certainly result in more customers and more sales [9].

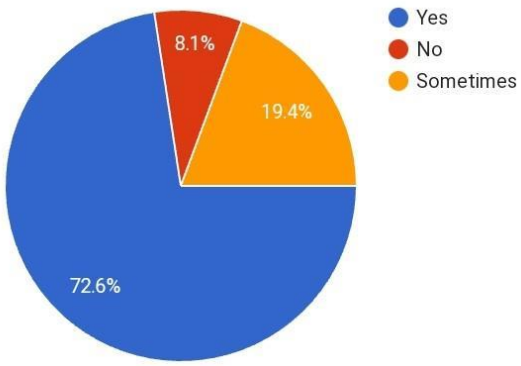
From fig.6, According to the survey, 59.7% of the consumers trust the label is true always, while 40.3% oppose it.

Figure 6: Consumers' trust on label



From fig.7, 72.6% of the people check the label before buying the product and 67.7% of the people's buying choices are impacted by the label. And also, people suggested their opinions as shelf-life given on the label are just an approximation and not perfect date/time and have to check the appearance, odour, colour before consuming despite the date given.

Figure 7: Shelf-life' impact on buying choices



CONCLUSION

This study focused on awareness and consumer preference on the available and subsequent needs in dairy packaging systems. It revealed that 93.5% people use dairy products every day and prefer packet forms and bottle over any other packaging methods. The survey was also questioned on aspects such as colour change, flavour change, microorganisms detected and odour change during the long shelf-life of the product. According to the survey, 59.7% of the consumers trust the label is true always and also, 72.6% of the people check the label before buying the product. To add on, more than half of the consumers in the market follow the label for storage and shelf-life conditions. The study also showed the various packaging forms preferred and opinions on the existing storage and shelf-life conditions as per label were evaluated.

LIMITATIONS

Since the questionnaire was majorly answered by the people below 30 years, it was difficult to gather more information from old and experienced people. Using the social media platform was challenging as many of them are not yet used to answering questions through them. Also, gathering answers and opinions from housewives was very difficult.

REFERENCES

A. D. Karaman, Barbaros Ozer, Melvin A. Pascall, V. Alvarez; Recent Advances in Dairy Packaging; Food Reviews International; February 2015.

Gogliettino M, Balestrieri M, Ambrosio RL, Anastasio A, Smaldone G, Proroga YTR, Moretta R, Rea I, De Stefano L, Agrillo B and Palmieri G (2020); Extending the Shelf-Life of Meat and Dairy Products via PET-Modified Packaging Activated With the Antimicrobial Peptide MTP1; *Frontiers in Microbiology;* 09 January 2020.

Mario Scetar, Irena Barukčić, Mia Kurek, Katarina LisakJakopović, R. Božanić, Kata Galić; Packaging perspective of milk and dairy products; Research Gate; December,2018.

Nurgin R. Memiši1, Slavica M. Vesković Moračanin2, Marija M. Škrinjar3, Mirela D. Iličić3, Mira Đ. Ač3; STORAGE TEMPERATURE: A FACTOR OF SHELF LIFE OF DAIRY PRODUCTS; International Journal of Dairy technology; January 2014.

Nicoletta Sinelli; Monitoring the shelf life of dairy products; New Food; 6 November 2006.

PREETI SINGH, ALI ABAS WANI, A A KARIM, HORST-CHRISTIAN LANGOWSKI; The use of carbon dioxide in the processing and packaging of milk and dairy products: A review; International Journal of Dairy technology; 31 October 2011.

Rinkal Patel1, Prajapati JP and Smitha Balakrishnan; Packaging Trends of Dairy and Food Products; Research and Reviews- Journal of Food and dairy technology; 29 January 2018.

TeddWittenbrink; Keep an eye on dairy product quality; Dairy Foods; June 3, 2021

DAIRY LABELS, September 2020

European Dairy Association (EDA) Sep 2020; Packaging in the dairy industry; Eda Factsheet; September 2020.

Received: 16th May 2022; Accepted: 18th January 2023; First distribution: 25th April 2023