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Enhancing the Nutritional Quality of Fermented Milk Set Yogurt with Date Syrup as a Conservative and a Natural Substitute for White Sugar

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INTRODUCTION & AIM

Dairy products are one of the most advanced food processing industries in the world and has experienced rapid expansion in recent years. It contains a variety of flavoring agents, including chocolate, caramel, coffee, vanilla, strawberry, and banana, as well as refined sugars and preservatives. Youghourt has gained a lot of popularity recently as a tasty, nutritious, and useful food, and there is still a growing market for dairy products with better health and nutritional qualities. The nutritional, physiological, microbiological, and sensory quality aspects of flavored and probiotic yogurt have all been proven to be enhanced by date syrup. Thus, the purpose of this study was to evaluate the impacts of date syrup rate incorporation on the nutritional composition and microbiological quality of flavored fermented milk drink's, as well as how long it would last in cold storage.

METHOD

Collection and processing of milk Fresh cow's milk was collected from the farm located in western Algeria, transported to laboratory in a cooler, and subjected to pasteurization (72°C / 15s) in order to guarantee the microbiological safety of the product while preserving its nutritional and organoleptic properties.

Artisanal preparation of date syrup The date syrup was prepared from dates of low commercial quality. Dates of the Degla-Beida variety, of local origin, were washed to remove impurities and carefully pitted, cooked, then filtered, followed by a second cooking over low heat until the juice was concentrated into a syrup, which was then cooled and stored at room temperature.

Yogurt production Three samples were prepared following the incorporation of different concentrations of date syrup: 0%, 15%, and 30%. The samples were subjected to physical and chemical analyses, including the determination of protein, lipid, and sugar content, as well as the evaluation of viscosity and acidity.

Microbiological analysis The samples were diluted 10-fold and added to molten nutrient agar plates to determine the total number of viable microorganisms. Coliform concentrations in the youghort samples were assessed using the multiple tube fermentation technique (Fereja et al., 2023). In addition, the samples were examined for potential enteric infections suchas Salmonella, Listeria monocytogenes, and Staphylococcus aureus.

Statistical analysis Data were analyzed using a one-way analysis of variance to evaluate statistical significance. Post hoc mean comparisons were performed with Tukey's test using R statistical software (version 4.2.2). The level of significance was $p<0.05$.

RESULTS & DISCUSSION

1. Physicochemical parameters

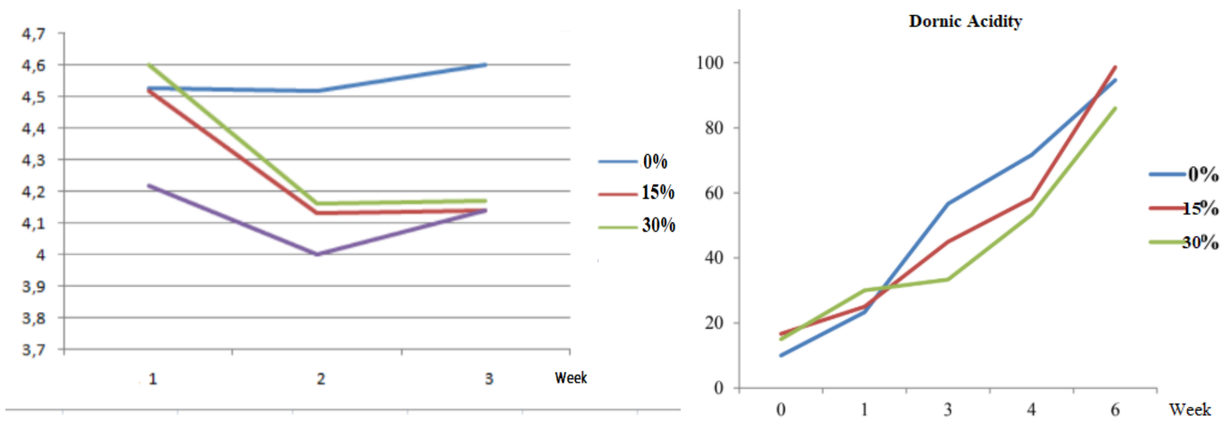

Figure 1. Evolution of the pH and organic acidity content of fermented milk enriched with date syrup during the storage period.

Changes in pH and acidity of yogurt are due to the growth of bacteria during lactic fermentation. This process involves the transformation of lactose in milk into lactic acid under the action of specific microorganisms called lactic acid bacteria, which is the main cause of yogurt acidification (***Beal and Sodini, 2023***).

2. Microbiological quality

Table 1: Effect of date syrup incorporation rate on the microbiological quality of yogurt.

Germs	Week	Date suryp rate incorpoeration			SEM	p- value
		0%	2%	4%		
Total germs	0	10 ±0.00	16.67±2.89	15 ±0.00	**13.89**	0.007 **
	1	23 ±5.77	25 ±5	30 ±2.88	**26.00**	0.23 NS
	3	56 ±5.77	45 ±5	33 ±5.77	**44.66**	0.003 *
Yeast and mold	1	71 ±2.88	58 ±5.77	53 ±5.29	**60.66**	0.01 *
	2, 3	94 ±5.033	98 ±1.52	86 ±5.29	**92.66**	0.0029 **
Coliforms	1	108 ±7.63	116 ±11.54	111 ±2.88	**111.66**	0.4 NS
	2	115±2.51	117.6±4.04	114 ±1	**117.97**	0.03 *
	~	122.33 ±3.46	127 ±4.35	132±0	**124.66**	0.002 **

* :effet significatif du facteur étudié($P<0.05$);NS : effet non significatif du facteur .
**: effet hautement significative du facteurétudié.

Our results show a complete absence of harmfull germs, which confirms the good hygienic conditions under which the various yogurt products are manufactured.

CONCLUSION

The valorization of aromatic and medicinal plants, as well as dates and their by-products, seems promising for food processing companies in the production of bio-energetic products with high nutritional value and sensory quality, targeting conditions such as gastritis and ulcers, in order to meet consumer expectations.

FUTURE WORK / REFERENCES

In terms of future prospects, this work would benefit from further research on:
- The use of a strong flavoring agent in yogurt production.
- Studying the evolution of the finished product's stability with and without the addition of preservatives, on the texture and rheology of the yogurts produced, as well as a clinical study to confirm the functional properties of date-fermented milks.