



Effect of Natural preservatives on **Quality and Shelf-Life of Hummus** **Product**

Prepared by: Reham Qatu, Nour Odeh, Abeer Hamad.

Supervised by: Dr. Mohammed Sabbah

Introduction

- Progression of food processing due to evolution of life leads to increase demand on ready to eat food



Ready to eat food

Introduction

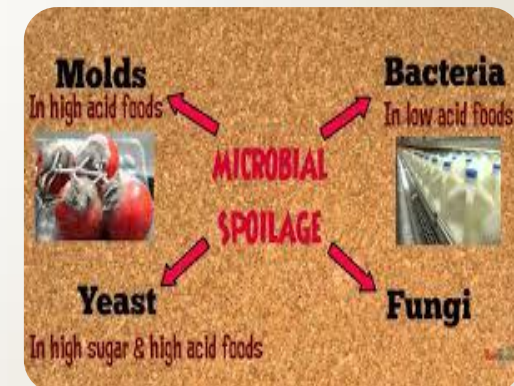
- Over time, it is normal for microbes to multiply due to their presence in a nutritious environment in the food product and leads to *(2) :
- Food borne illness
- Food spoilage



Foodborne illness



Food spoilage



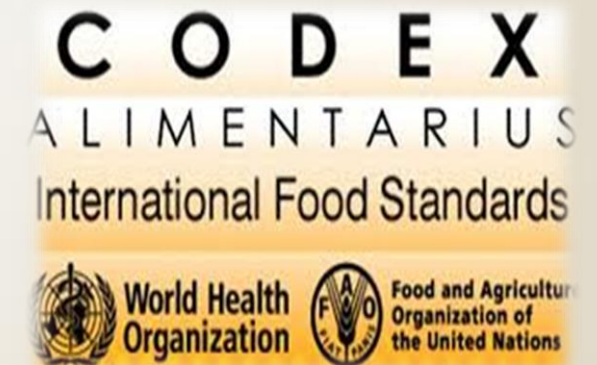
M.O. that cause problems of food

Introduction

- The addition of antimicrobial agents has become necessary in food manufacturing to^{*(3)} :
 - prevent increasing of microbial load
 - **extend the shelf life** of finished product
 - maintain the **quality and safety** of products
-
- The concentrations of preservatives in food should be regulated by international bodies to protect health consumers^{*(3)}.

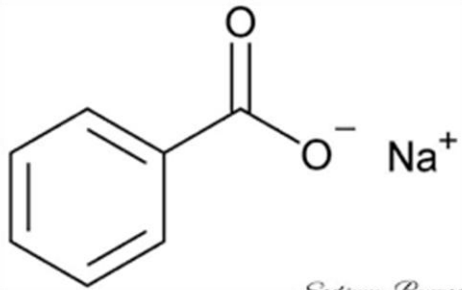


Food additives



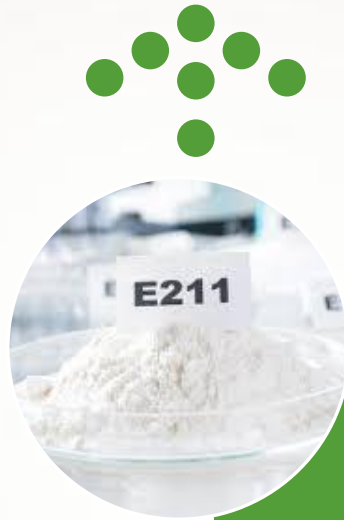
Codex Alimentarius committee

Chemical preservatives



Sodium Benzoate

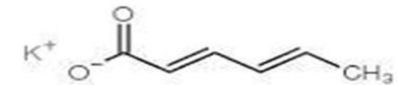
Chemical structure of E (211)



Sodium benzoate
(E211)*⁽⁸⁾



Potassium sorbate
(E202)*⁽⁸⁾



Chemical structure of E(202)

Health concerns

- ▶ But these artificial preservatives (E202, E211) can cause adversial health effect on consumers*(8)



dermatitis



Itching

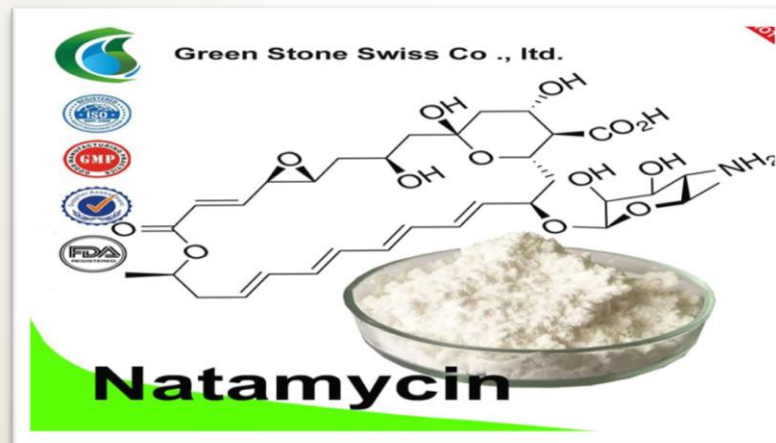


urticaria



Natural preservatives

- ▶ With growing concerns about chemical preservatives, natural preservatives could be desirable alternative.*⁽¹²⁾
- ▶ Natural preservatives come from plant origin, animal origin, microbial origin (**Nisin**, **Natamycin**).*⁽¹³⁾



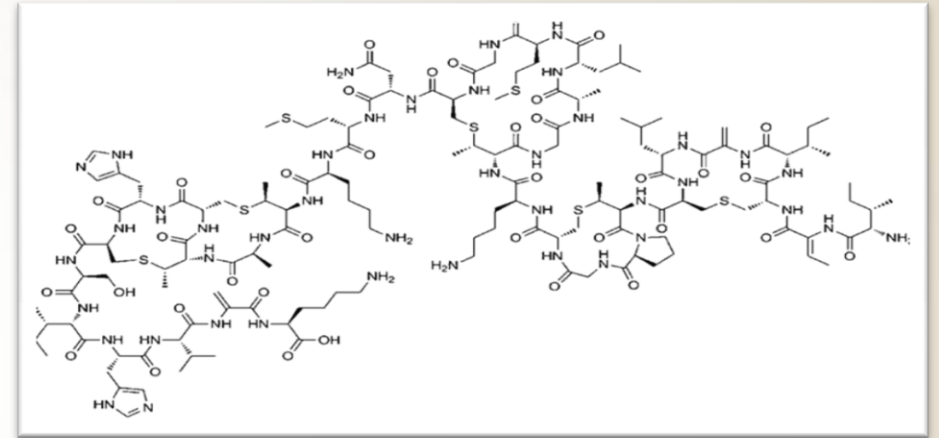
Natamycin



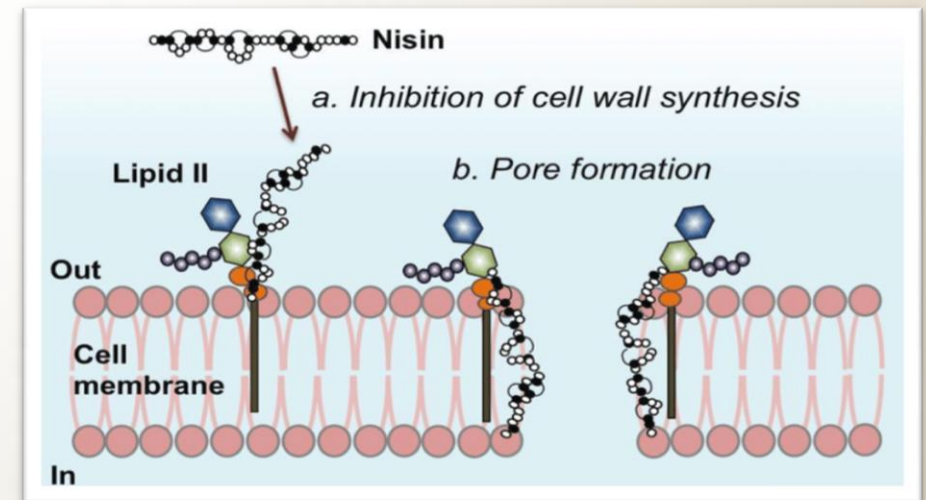
Nisin

Nisin E(234)

- is a polypeptide bacteriocin produced by LAB bacteria consists of 34 amino acids.*(1)
- Molecular formula **C₁₄₃H₂₃₀N₄₂O₃₇S₇**
- (GRAS) by FDA.*(1)
- Non toxic, high soluble, heat stable, doesn't contribute to off flavor.
- Effective against **G+** bacteria, but has no effect on G- bacteria, molds and yeast. *(10)
- Inactivation by proteolytic enzymes in GI tract*(1)



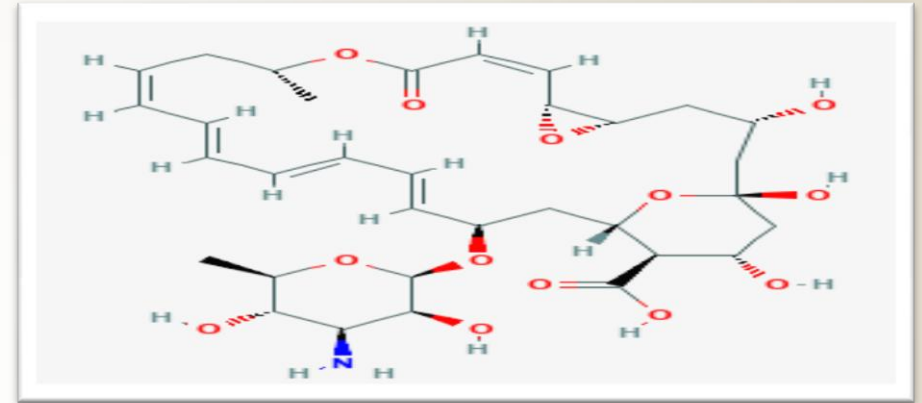
Chemical structure of Nisin



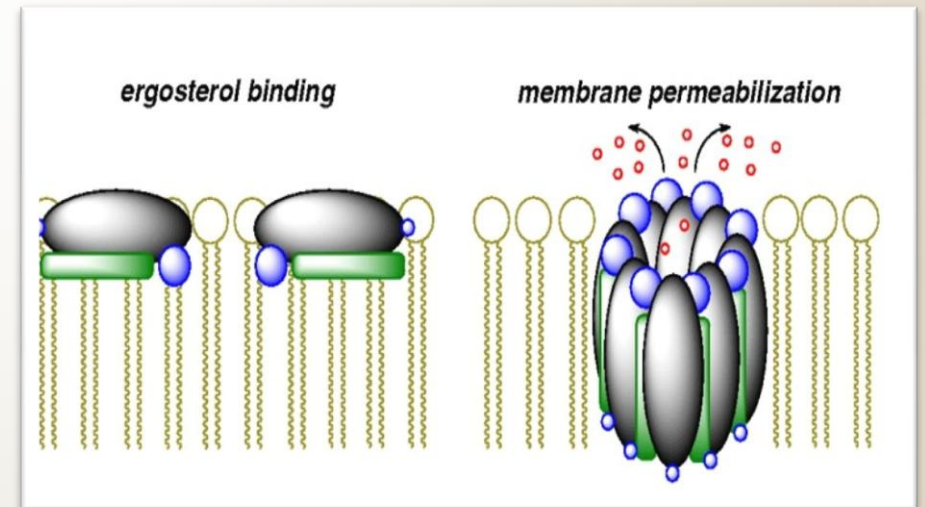
Mode of action for NISIN

Natamycin E(235)

- Polyene antimycotic macrolide produced by *Streptomyces natalensis**(1)
- molecular formula is **C₃₃H₄₇N₁O₁₃**
- molecular mass is 665.725 g/mol
- (GRAS) by the FDA*(1)
- Non toxic, no influence on taste or appearance, active at low concentration.
- Effective against **fungus** growth, not effective against bacteria.*(1)



Chemical structure of Natamycin



Mode of action of natamycin

Objectives

Add natural preservatives (Nisin, Natamycin) to hummus product

Compare new samples with control to check product stability for 30 days

Check the extend of shelf life for natural preservatives sample for 45 days



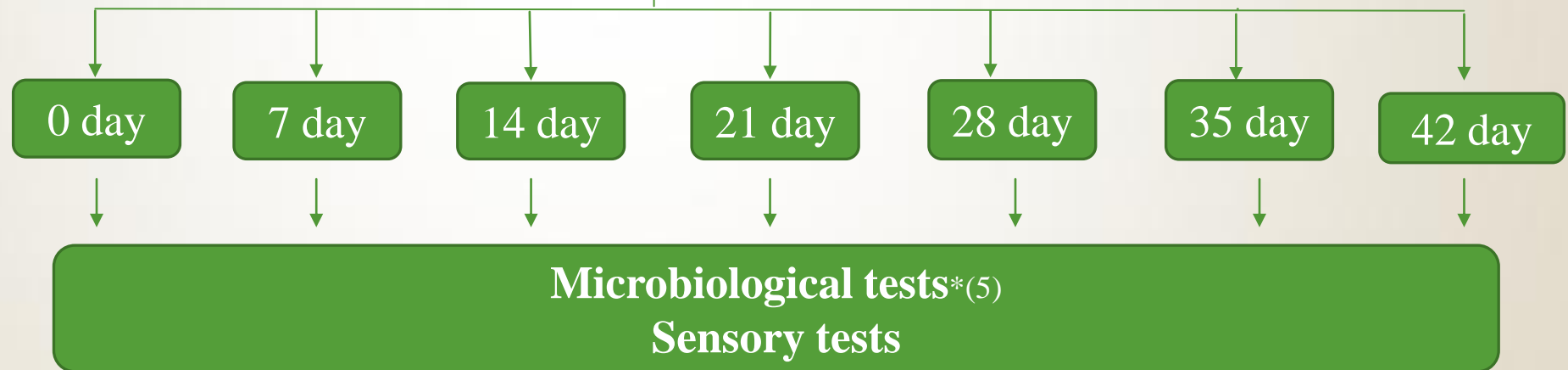
Methodology

11



50 kg of hummus mixture was made with chemical preservatives and other natural preservatives ^{*(7)}

7 samples were taken at a size of 180g and stored at 4°C ^{*(11)}



For check stability of product^{*(6)}

Check Extend of shelf life

Microbiological tests

TPC

To determine microbial quality of food product^{*(4)}



OGAY

For enumeration of molds and yeast^{*(4)}



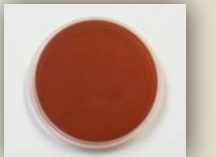
VRBA

For enumeration and identification of coliform^{*(4)}



EMP

For enumeration of E.coli bacteria^{*(4)}



*TPC: Total plate count Agar. *OGAY: Yeast Glucose Chloramphenicol Agar.

*VRBA: Violet Red Bile Agar. *Emp: Eisin Methylene Blue Agar.

Microbiological tests



During microbial examination for 2 samples of Hummus product*(4)

Sensory evaluation

- The products were sensually tested by Hedonic scale

	Gender M..... F..... Age..... Date.....				
	Like a lot	Like a little	Neither like nor dislike	Dislike a little	Dislike a lot
Appearance					
Colour					
Texture					
Flavour					
Taste					
Overall acceptability					
Note about the product					



- The results of the sensory evaluation were analyzed by ANOVA test

Results

Table 1: results of microbiological tests

	standard*	0 DAY	7 DAY	14 DAY	21 DAY	28 DAY	35 DAY	42 DAY
Control Samples (Chemical preservatives)	TPC ($< 1 \times 10^5$)	$< 1 \times 10^3$	$< 1 \times 10^3$	8×10^3				
	OGAY ($< 1 \times 10^2$)	$< 1 \times 10^2$	$< 1 \times 10^2$	$< 1 \times 10^2$				
	VRBA ($< 1 \times 10^3$)	$< 1 \times 10^2$	2×10^2	5×10^2				
	EMP (Nil)	Nil	Nil	Nil				
Treatment Samples (Natural preservatives)	TPC ($< 1 \times 10^5$)	$< 1 \times 10^3$	$< 1 \times 10^3$	1×10^3				
	OGAY ($< 1 \times 10^2$)	$< 1 \times 10^2$	$< 1 \times 10^2$	$< 1 \times 10^2$				
	VRBA ($< 1 \times 10^3$)	$< 1 \times 10^2$	$< 1 \times 10^2$	1×10^2				
	EMP (Nil)	Nil	Nil	Nil				

* According to the Palestinian standard No. (PS_134_2012) according to the sixth item (6_ health conditions)

Results

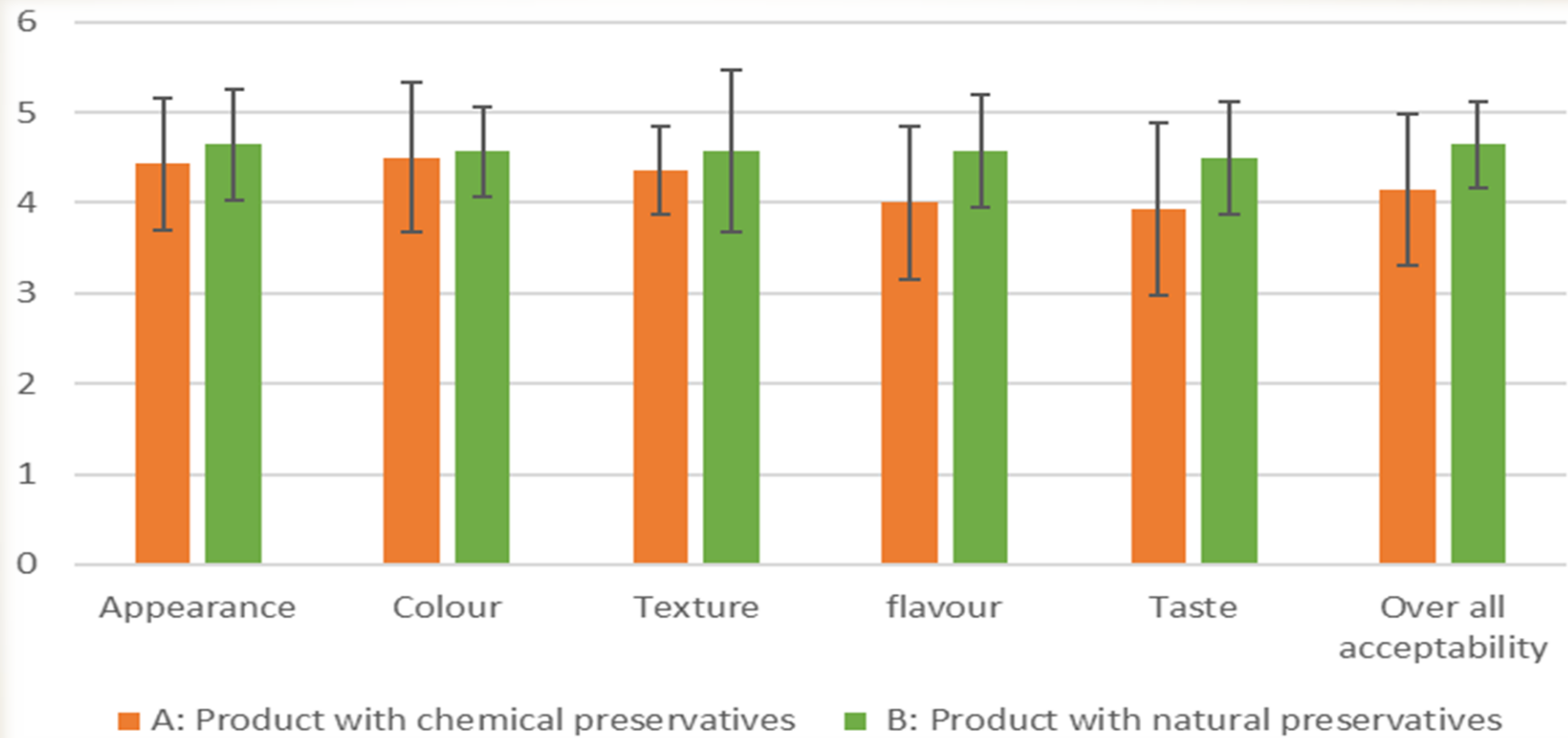


Figure 1: comparison of sensory evaluation between **A** & **B** product at (0 day)

Results

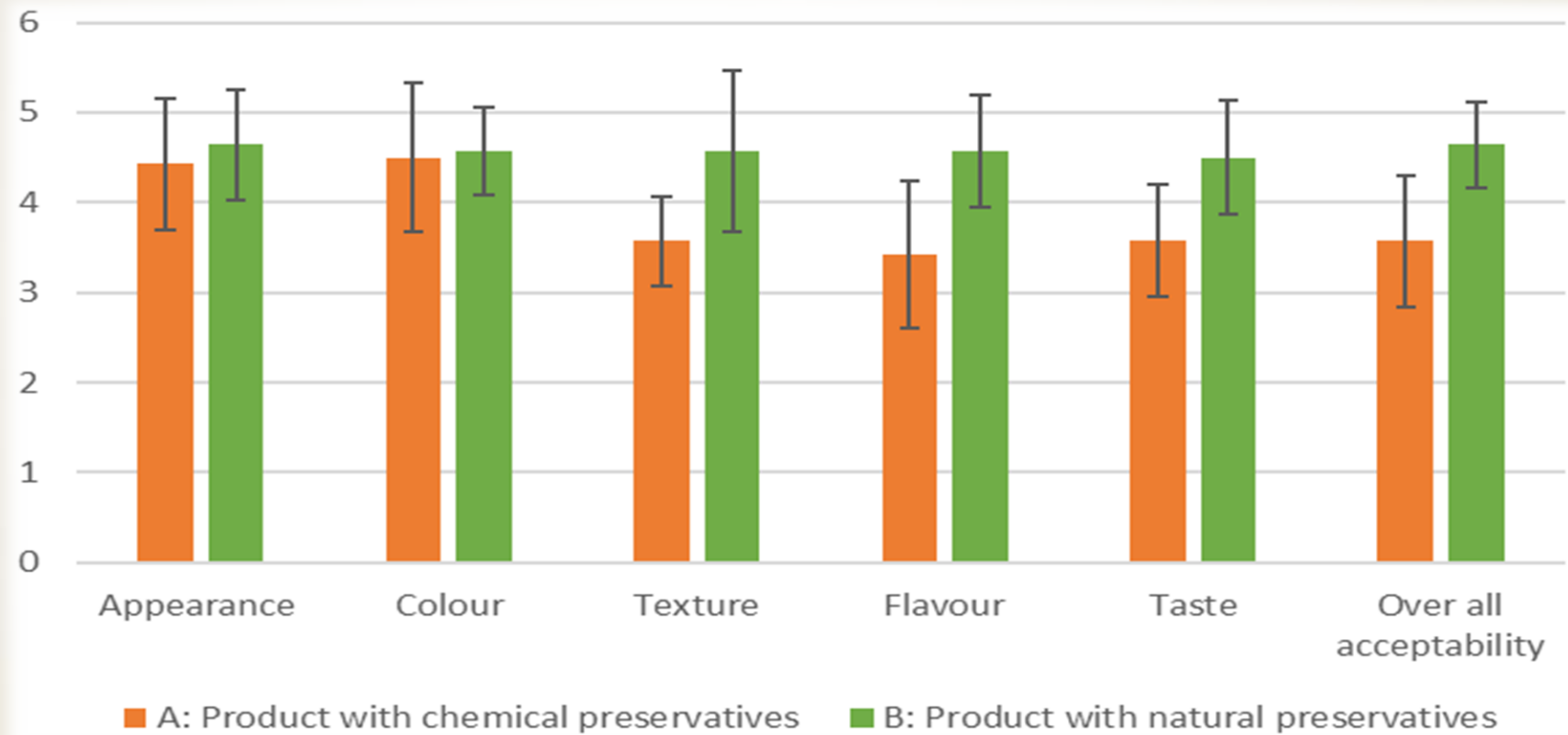


Figure2: comparison of sensory evaluation between A & B product at (14 day)

Conclusion

- Chemical preservatives have been replaced by natural preservatives due to health problems caused by chemical preservatives
- Until 14th day, natural preservatives were more effective against microbial growth than synthetic, and hummus product with natural preservatives was more sensually acceptable
- The effectiveness of Nisin and Natamycin in extend the shelf life of hummus is unclear until the experiment is completed

Recommendations

- Studying consumer demand for food products with natural preservatives
- Educating consumers about the dangers of eating processed foods frequently with artificial additives. Foods with natural additives are a better option
- Study the effect of these substances on many national food products

Thanks for



References

- (1) Francesco Contò, Matteo A. Del Nobile et.al (2018), advances in dairy products
- (2) Dongyou Liu, 2018, Handbook of Foodborne Disease.
- (3) Maria Manuela Silva^{1*}, Fernando Cebola Lidon² , 2016, Food preservatives – An overview on applications and side effects
- (4) Bacterial Analytical Manual.
- (5) According to the Palestinian standard No. (PS_134_2012) according to the sixth item (6_ health conditions)
- (6) According to the Palestinian standard No. (PS_ 59_2014)
- (7) According to Palestinian Standard No. (PS_134_2010) according to item (9_2_4) in the standard

References

- (8) European Food Safety Authority,(2015), Scientific Opinion on the re-evaluation of sorbic acid (E 200), potassium sorbate (E 202) and calcium sorbate (E 203) as food additives. (2016), Scientific Opinion on the re-evaluation of benzoic acid (E 210), sodium benzoate (E 211), potassium benzoate (E 212) and calcium benzoate (E 213) as food additives1
- (9) According to the data sheet provided to us by the supplier (Midal Import and Export Company / Nablus)
- (10) Emre HASTAOĞLU1*, Meryem GÖKSEL SARAÇ1, Zehra SEBA KESKİN1, Fazıl YOZGAT2, (2017), The Effects of Nisin and Natamycin on the Microbiological, Chemical and Sensorial Qualities of Meatballs
- (11) According to the specification No. (PS_134_2012) according to the seventh item in Related to packing and storage No. (7_6_1)