

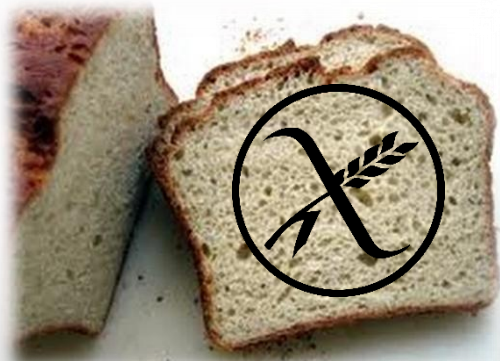


INULIN—TYPE FRUCTANS AS ADDITIVE TO GLUTEN— FREE BREAD

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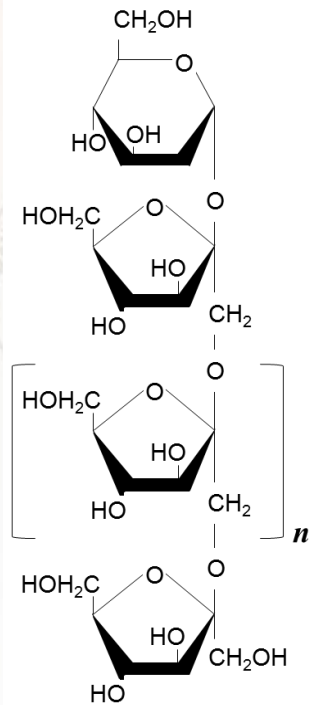
Gluten-free bread

- ✓ Nutritional quality (vitamins, minerals, dietary fiber)
- ✓ Sensory quality
- ✓ Technological properties (crumbling texture, staling)



GLUTEN FREE

Inulin-type fructans (ITFs)



FOS
($3 \leq n \leq 10$)

Inulin
($11 \leq n \leq 65$)



Chicory



Jerusalem artichoke



Garlic

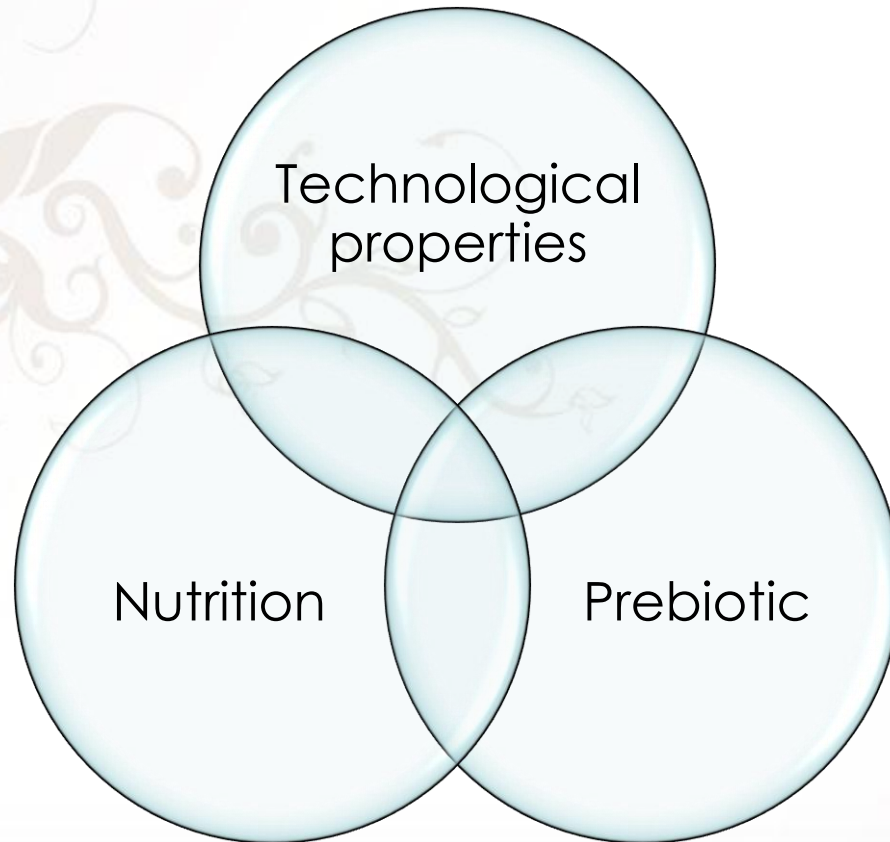


Leek



Onion

Role of ITFs in breadmaking

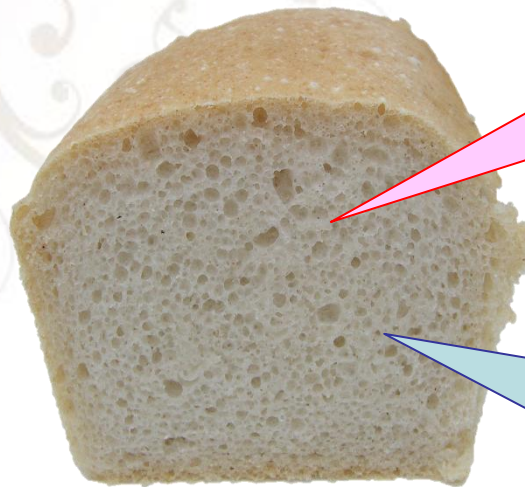


Technological properties



Gluten-free bread

5% addition

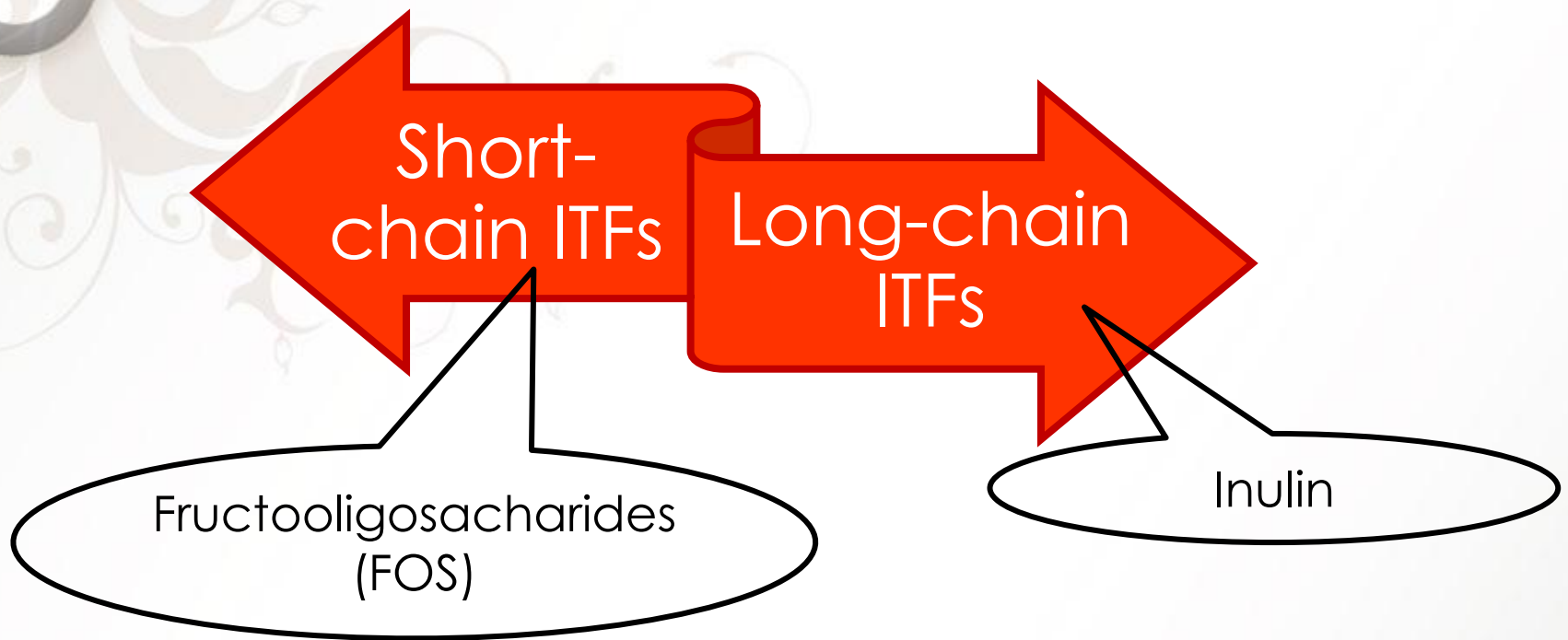


**Gluten-free bread
with ITFs**

- Increased volume
- Decrease in crumb hardening
- Better porosity
- Darker crust
- Sensory properties

- Wrinkling of the crust
- Reduction of crumb cohesiveness and springiness
- Increase rate of staling

Degree of polymerisation



Sensory quality

Table 4

Means obtained for the acceptance test for gluten-free bread samples ($n = 65$).

Attribute	Samples						Std
	Raw sugar	Sucralose	Fructose	Stevia	FOS	Inulin	
Appearance	7.15 a	5.76 c	5.71 c	5.25 d	6.52 b	5.92 c	0.23
Aroma	4.99 a	3.38 d	3.21 d	3.76 c	4.09 b	3.74 c	0.31
Flavor	7.41 a	6.07 b	6.09 b	6.19 b	7.32 a	6.16 b	0.54
Softness	5.11 a	3.57 b	3.71 b	5.07 a	5.09 a	3.60 b	0.67
Crumb color	8.03 a	6.26 c	6.56 b	5.77 d	7.83 a	5.00 e	0.28
Overall liking	8.01 a	7.15 b	6.35 c	6.12 c	8.18 a	6.23 c	0.32

*Means with letters in common in the same line do not differ statistically ($p < 0.05$) according to Tukey's test.

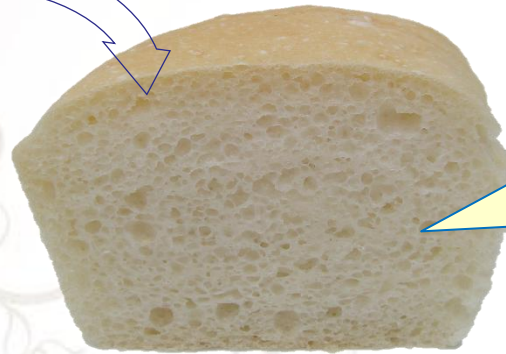
Improved:
Crust colour
Porosity
Texture
Taste and aroma

ITFs as prebiotics



Prebiotic = a non-viable food component that confers a health benefit on the host associated with modulation of the microbiota (Food and Agriculture Organization, 2007).

Calcium



Increased volume
Softer and more elastic
crumbs
Higher calcium content
Crumble
Acceptable sensory
quality

Krupa-Kozak, et al. 2011; Krupa-Kozak et al., 2012



- ITFs increased cellular calcium uptake from Ca-enriched gluten-free bread
- ITFs intensify SCFA production by intestinal bacteria

Krupa-Kozak, et al. 2016

*SCFA – Short chain fatty acid

Concluding remarks

- ITFs can be considered as valuable ingredient, affecting rheological and technological properties of gluten-free bread
- ITFs can improve sensory quality, shelf-life and texture of gluten-free bread
- Degree of polymerisation has great influence on technological properties of enriched bread
- ITFs-enriched gluten-free bread can be considered as functional food because of prebiotic activity and capacity to improve absorption of deficient nutrients in gluten-free diet



THANK YOU
FOR YOUR
ATTENTION