

# Alternative preservatives tools to promote healthier traditional fermented sausages

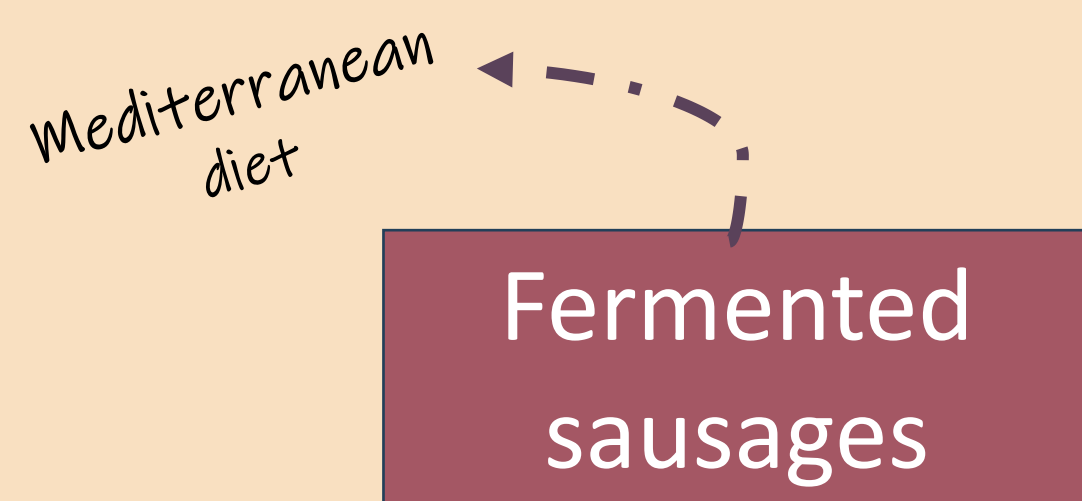


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## Introduction



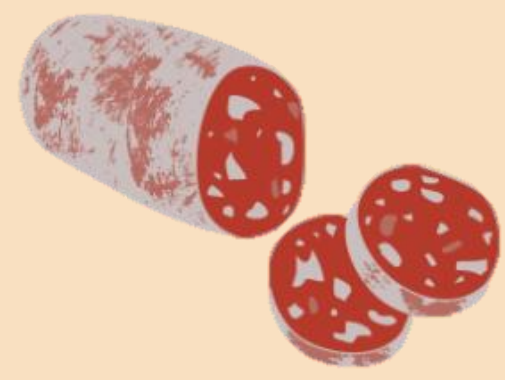
The preservation of these products is obtained by the fermentation process and the use of **Nitrates and Nitrites**

Reduce pathogens incidence *but* Potential health risks for human health

New alternative strategies:

- + bioprotective starter cultures
- + botanic extracts

## Strains selection



*L. curvatus* + *S. xylosus*

Autochthonous bacteriocin-producing lactic acid bacteria were characterized from naturally fermented sausages

Replica plates methods to screen the inhibitory properties of a high number of strains. The better one was *L. curvatus* 2C, isolated from artisan pork sausage

## Botanic extracts

- Thyme
- Sage
- Nutmeg
- Cloves
- Black rice
- Grape seeds

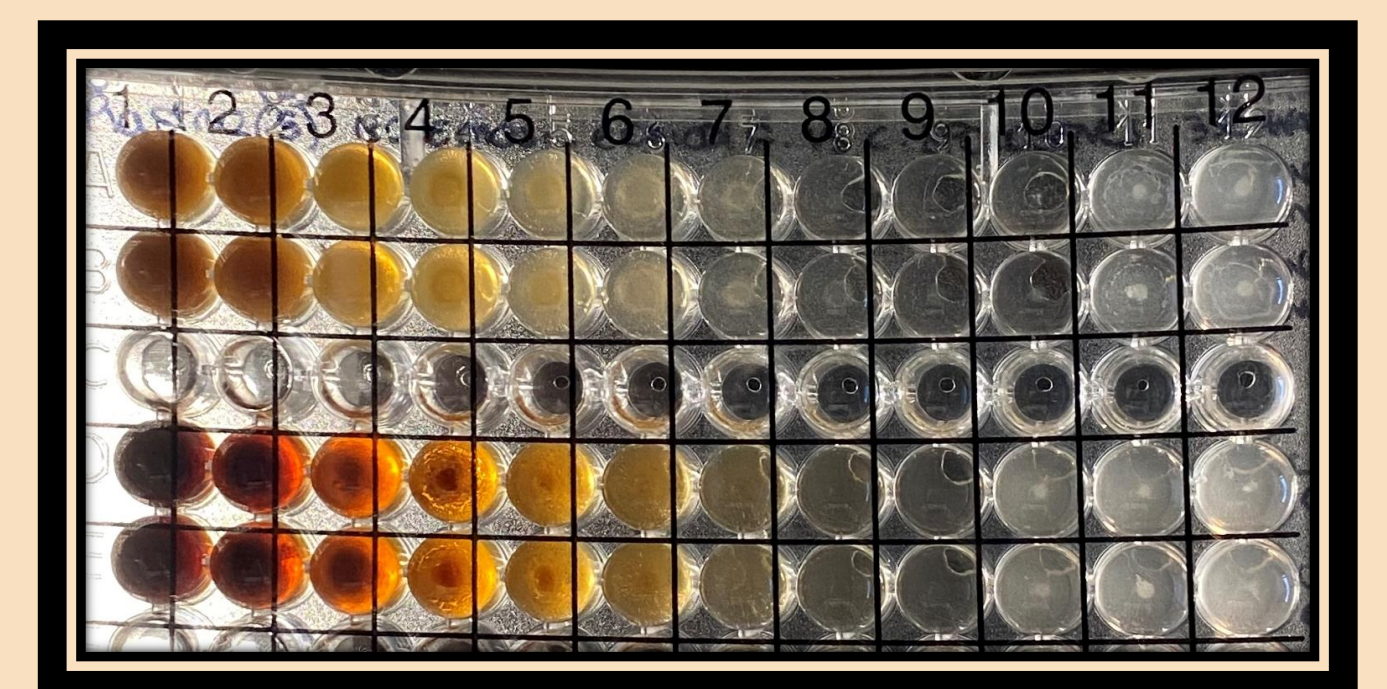


Better inhibitory capability especially against *S. aureus* and *C. sporogenes* *in vitro*

## Minimal inhibitory concentration (MIC)

Bacteria strains	MIC (% v/v botanic extract)			
	Thyme	Sage	Cloves	Nutmeg
<i>Staphylococcus aureus</i>	0.78%	0.097%	0,048%	50%
<i>Listeria monocytogenes</i>	6.2%	0.195%	0,78%	n.e.
<i>Clostridium sporogenes</i>	0.39%	0.024%	0,195%	0,195%
<i>Lactobacillus curvatus</i> 2C	> 25%	> 25%	1,56%	n.e.
<i>Staphylococcus xylosus</i>	n.e.	0.048%	0,195%	n.e.

n.e. = combination not test base on the preliminary screening



MIC determination by dilution in microplate. In the Figure thyme extract tested against *C. sporogenes* Dilution scheme from the right: 50%, 25%, 12.5%, 6.25%, 3.1%, 1.56%, 0.78%, 0.39%, 0.195%, 0.097%, 0.048%, 0.024%

*L. curvatus* 2C and thyme extract were screening *in situ* for their potential antimicrobial activities against *Listeria monocytogenes*, *Staphylococcus aureus* and *Clostridium sporogenes*

Characteristic of the challenge tests performed:

- Six different antimicrobial combinations were prepared using the same sausage mixture: Pork meat + White pepper 1 gr/Kg + Salt 25 gr/Kg + Dextrose 3 gr/Kg
- Strains: *L. curvatus* 2C 10<sup>7</sup> CFU/g; *S. xylosus* 10<sup>5</sup> CFU/g; *C. sporogenes* 10<sup>6</sup> CFU/g; *L. monocytogenes* 10<sup>5</sup> CFU/g; *S. aureus* 10<sup>5</sup> CFU/g
- Commercial starter culture was used as a control

The samples were collect and analysed after

0, 7, 15 and 21 day of fermentation

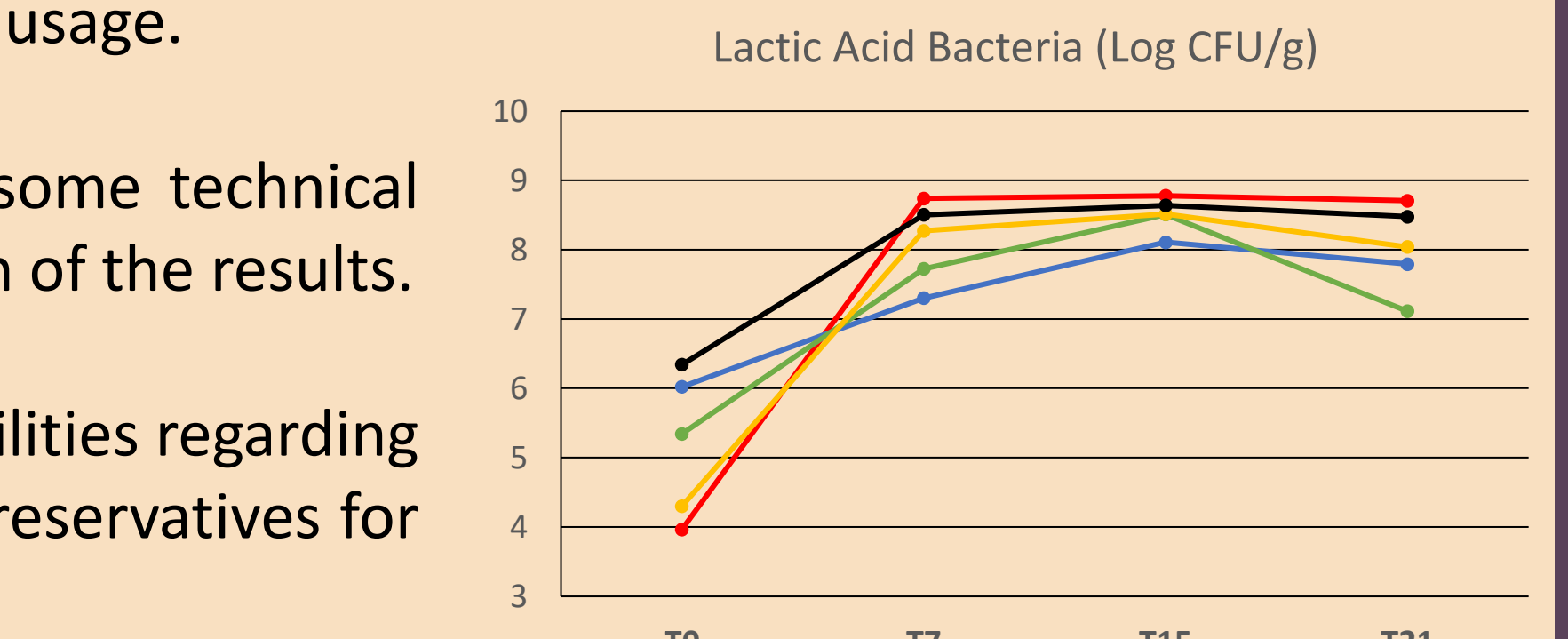
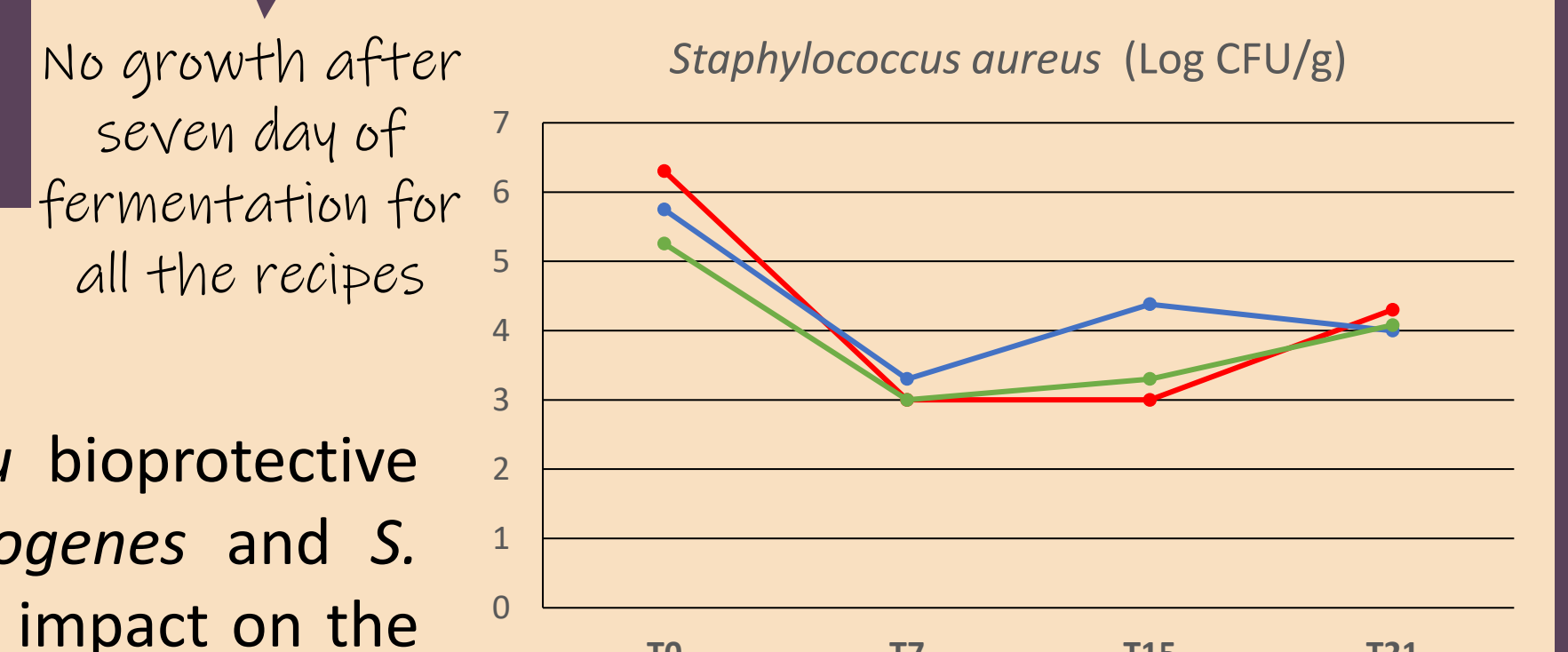
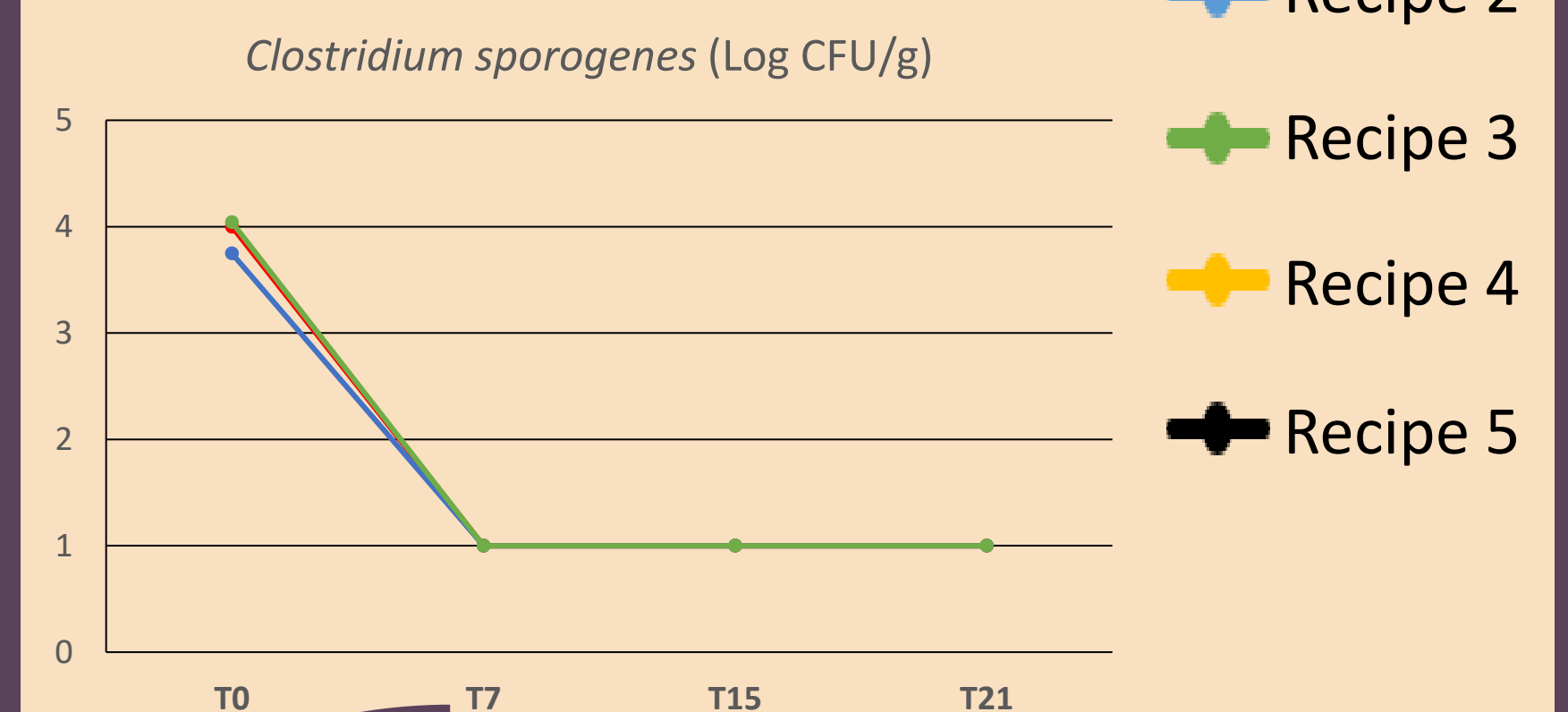
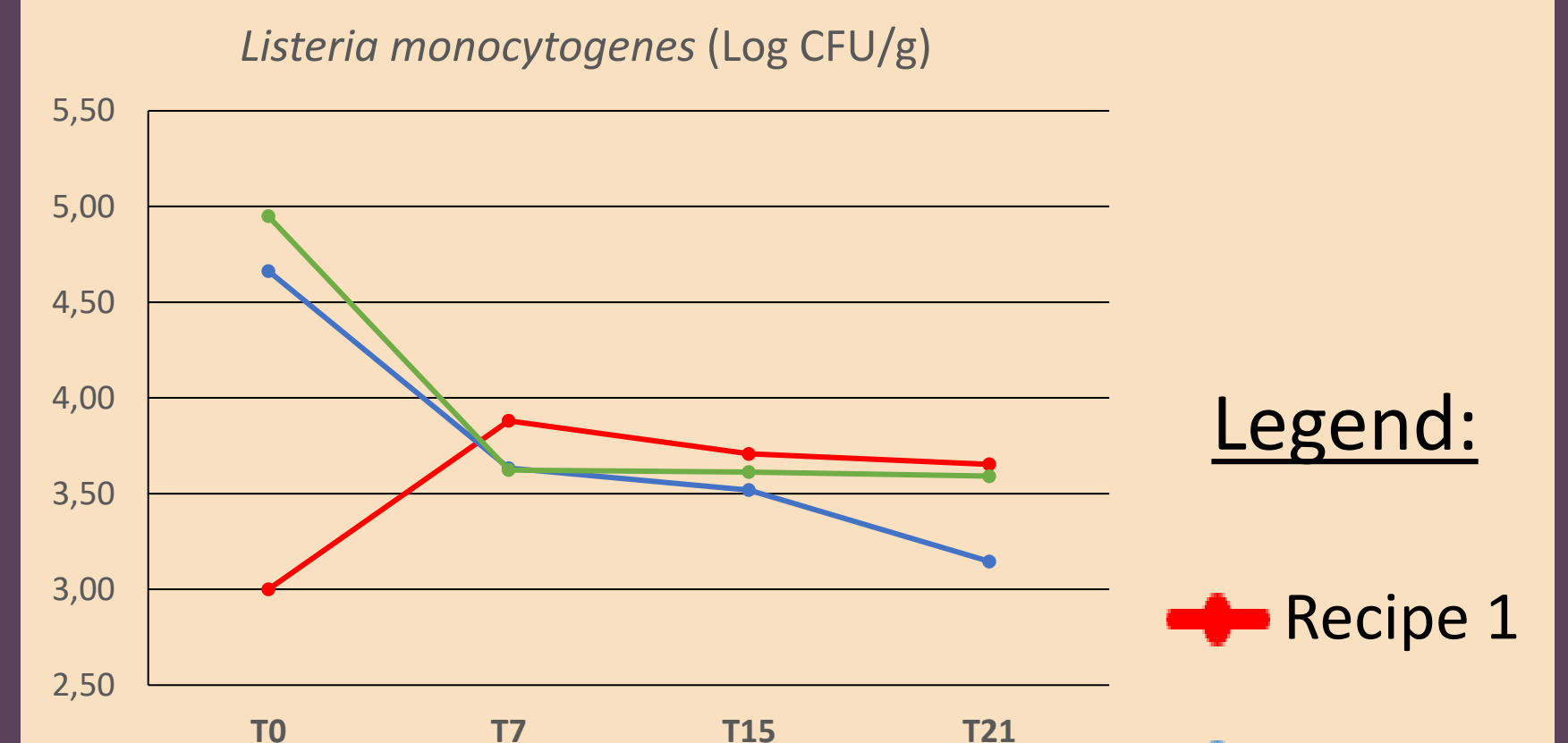
Recipe	Thyme	Nitrate	Nitrite	Starter	Pathogen
1	30.88 g/Kg*	20 mg/Kg	40 mg/Kg	Commercial	+
2	-	20 mg/Kg	40 mg/Kg	Bioprotective	+
3	-	20 mg/Kg	40 mg/Kg	\	+
4	-	20 mg/Kg	40 mg/Kg	Commercial	-
5	-	20 mg/Kg	40 mg/Kg	Commercial + Bioprotective	-

\* powder composed of 85% dry thyme extract and 15% maltodextrin



## Results

*In situ* microbial load, during sausages fermentation



No growth after seven day of fermentation for all the recipes

## Conclusions

- *L. curvatus* 2C display the better *in situ* bioprotective effect, in particular against *L. monocytogenes* and *S. aureus*. Thyme extract showed a negative impact on the colour and aroma properties of the pork sausage.
- *C. sporogenes* challenge test underlined some technical problem which forbid a clear interpretation of the results.
- The findings of this study open new possibilities regarding the implementation of these alternative preservatives for meat industry.

Challenge tests



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