Evaluation of the sensory quality of beef patties inoculated with *Carnobacterium maltaromaticum* strains with biopreservative potential

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Food contamination and food spoilage have always been a source of concern in food technology and microbiology!

- Some lactic acid bacteria (LAB) are known for their bactericidal and/or bacteriostatic activity.
  
  The presence of certain LAB could extend the shelf life and improve the microbial stability and safety of meat.

Selection of specific flora on meat depending on temperature and atmosphere.
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**INTRODUCTION – BACKGROUND**

Vacuum packed *longissimus dorsi* Australian origin
Commercial shelf life = **140 days** at –1 °C

Bacterial diversity in British vs. Australian beef (metagenetics)

(Imazaki et al., SFM – Colloque Ecosystèmes Microbiens et Bioprotection des Aliments, 2011)
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**INTRODUCTION – BACKGROUND**

Isolation of *C. maltaromaticum*

vacuum packed *longissimus dorsi*  
Australian origin  
commercial shelf life = **140 days** at –1 °C

Microbiological stability of Belgian fresh beef inoculated with *C. maltaromaticum*

Inoculum inhibited the growth of *Enterobacteriaceae*

(Imazaki *et al.*, 60th International Congress of Meat Science and Technology, 2014)
• To perform a sensory evaluation of beef patties inoculated with strains of *C. maltaromaticum* with potential as biopreservatives.
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**MATERIALS AND METHODS**

1. Vacuum packed *longissimus dorsi* Australian origin commercial shelf life = **140 days** at −1 °C

2. Isolation of three *C. maltaromaticum* strains
   (lab. ref.)
   CM_824  CM_827  CM_829

   Inoculation of commercial beef patties (1 % v/w) at two levels
   10^4 or 10^6 CFU *C. maltaromaticum*/g meat

   Beef patties
   (89 % beef, water, 0.9 % vegetal fibers, salt, silicon dioxide, ascorbic acid, sodium acetate and sodium citrate)
   Shelf life = **8 days** at 4 °C
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**MATERIALS AND METHODS**

### 3. Storage of raw samples

- 80% O₂ : 20% CO₂
- 5 days at 4 °C
- +
- 5 days at 8 °C
- (simulation of domestic storage)

### 4. Sensory analysis

- Untrained panel (7 to 12 members)
- Raw samples and cooked samples* (after storage)
- Six attributes (appearance, odor, color, tenderness, flavor and juiciness)
- Scoring from 1 (= dislike) to 5 (= like)

* Cooked samples were grilled (frying top Tecninox FTL35E/6/0) until they reached an internal temperature of +75 °C.
Sensory analysis of raw patties inoculated with $10^4$ or $10^6$ CFU C. maltaromaticum/g meat after 8 days of storage (5 days at 4 °C and 3 days at 8 °C) ($n = 12$)

- Non inoculated raw samples (blank) were perceived as having the best color ($P < 0.05$).
- Non inoculated raw samples and inoculated samples with strain CM_827 at $10^4$ CFU C. maltaromaticum/g meat were perceived as having the best appearance ($P < 0.05$).
- Samples did not differ statistically for odor.
RESULTS AND DISCUSSION

Sensory analysis of patties inoculated with $10^4$ or $10^6$ CFU C. maltaromaticum/g meat after 8 days of storage (5 days at 4 °C and 3 days at 8 °C) and cooking ($n = 8$)

- Non inoculated beef patties (blank) received higher scores than inoculated patties, but no statistical difference was observed with samples inoculated with C. maltaromaticum at $10^4$ CFU/g.

- Samples inoculated with the strain CM_829 at $10^6$ CFU/g received the worst scores for appearance, odor and flavor ($P < 0.05$).
RESULTS AND DISCUSSION

Sensory analysis of raw patties inoculated with $10^4$ or $10^6$ CFU C. *maltaromaticum*/g meat after 10 days of storage (5 days at 4 °C and 5 days at 8 °C) ($n = 7$)

- Samples inoculated with the strain CM_827 at $10^4$ CFU/g received the highest scores for all attributes, but did not differ statistically from blank.
Results and Discussion

Sensory analysis of patties inoculated with $10^4$ or $10^6$ CFU C. maltaromaticum/g meat after 10 days of storage (5 days at 4 °C and 5 days at 8 °C) and cooking ($n = 7$)

- Only appearance, color and odor were evaluated since samples were three days beyond commercial shelf life.

- A decrease in the sensory quality was observed during the last three days of storage.
CONCLUSIONS

• This preliminary study permitted to evaluate the effect of three *C. maltaromaticum* strains on the sensory quality of beef patties.

• Strain CM_827 did practically not change the sensory attributes of beef patties.

• Therefore, further research on the biopreservative capacity of *C. maltaromaticum* should be conducted with the strain CM_827.
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THANKS FOR YOUR ATTENTION

QUESTIONS?

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