Microbial spoilers in food 28th-29th-30th 2017 June - Quimper, Paris, France

Sensorial and bacterial evolution in vacuum-packed pork meat during long term storage

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Introduction

Long term storage at low temperature is a challenge for the pig and pork industry in order to export in the Asian continent. This study aimed at investigating the evolution of the sensory quality and the bacterial flora dynamics of vacuum packed pork meat during a 12 weeks storage.

Sensory evaluation

Materials and methods

Pork loins were vacuum packaged and stored at -1.5°C for 12 weeks in a cold room. Each week we performed:

- Sensory analyses (odor, color, exudate) before and after opening packaging
- Microbiological analysis (Total flora (ISO 4833-1), lactic acid bacteria (ISO 15214), *Enterobacteriacae* (NF V08-154)
- Metagenetic analysis of the bacterial flora dynamics using Illumina Miseq (V1-V3 region of 16S rDNA)

Results

Sensory evaluation combined to metagenetics allowed to characterize three distinct periods during the storage

- **Period 1 (W0 to W4):** meat was slightly altered but always acceptable; the bacterial composition was very diverse and included more than 54 bacterial taxa.
- **Period 2 (W5 to W9):** the sensory quality of the meat was near the limit of acceptability. Two species *Carnobacterium divergens* and *C. maltaromaticum* emerged with 77% of the sequences. Global compliance to *Enterobacteriaceae criteria* was not fulfilled anymore.
- **Period 3 (W10 to W12):** meat was spoiled and sequences of *Leuconostoc gelidum, Lactococcus piscium* and *C. divergens* were predominant.

Total flora was essentially composed of lactic acid bacteria, that reached 8 Log/UFC cm² from W9.

Fig 1. Sensory evaluation after opening

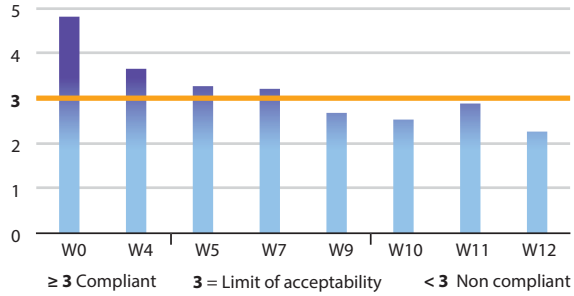


Fig 2. Evaluation of criteria Enterobacteriacae batch (n=5)

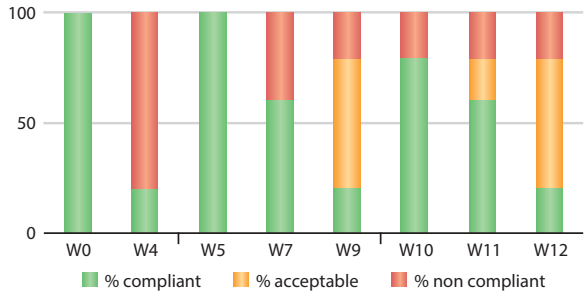
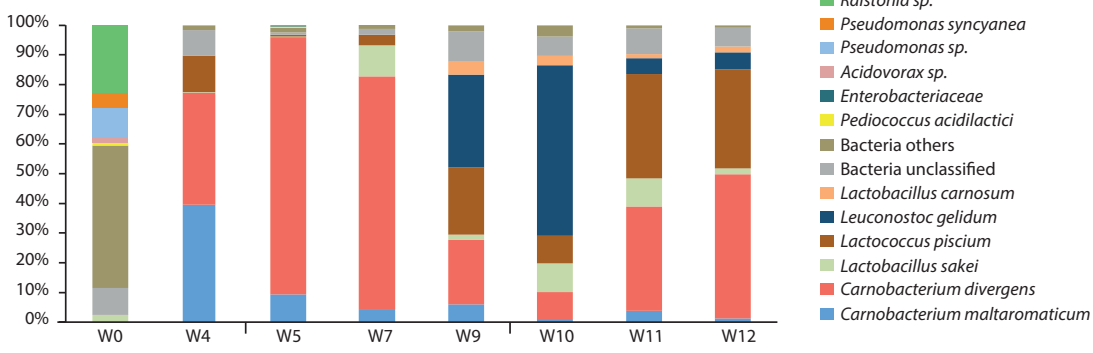


Fig 3. Proportion (%) of bacterial species in samples week 0-12



Conclusion

The sensory evaluation and the metagenetics analysis of the dynamic of the bacterial flora of the meat samples has given us a new insight in bacterial competitions taking place during 12 weeks of storage. Incidence of sensory defects was concomitant with the detection of *Carnobacterium divergens* and *Carnobacterium maltaromaticum*. Intensification of the sensory defects was associated with the detection of *Leuconostoc gelidum* and *Lactococcus piscium*. Markers related to the time of spoiling remained to be determined.