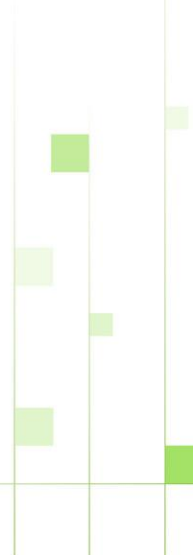


# Bio-preservation

**can control unwanted bacteria without  
reducing sensory acceptance**

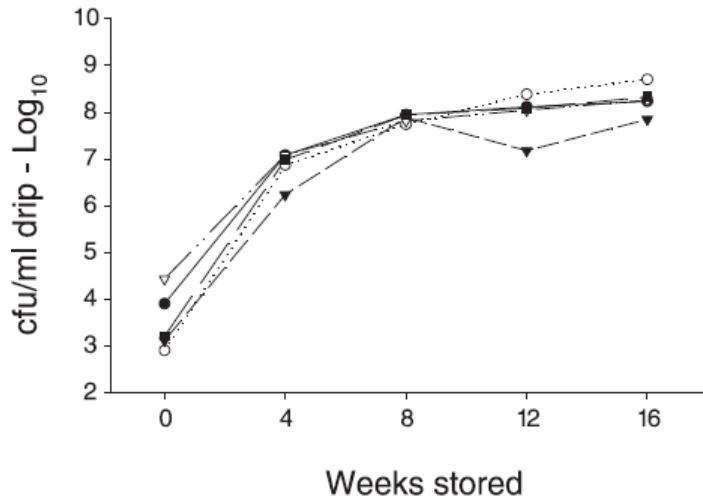
Rhys Jones  
Food Safety  
October 20, 2009



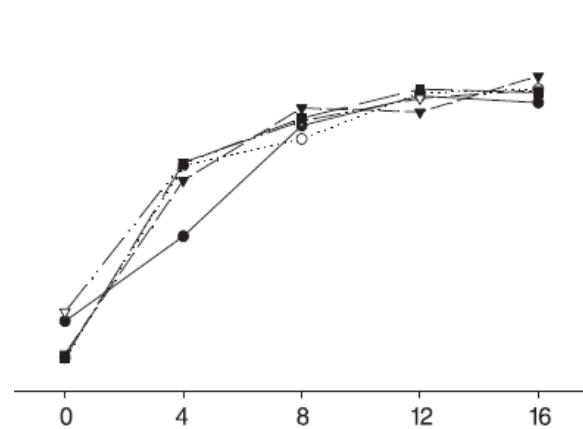
# 1. Stored meat grows bacteria

- Most contaminants are relatively harmless

APC for stored beef striploins\*



LAB (for same meat drip)



\* R.J. Jones / International Journal of Food Microbiology 90 (2004) 273-282

# 1. Stored meat grows bacteria

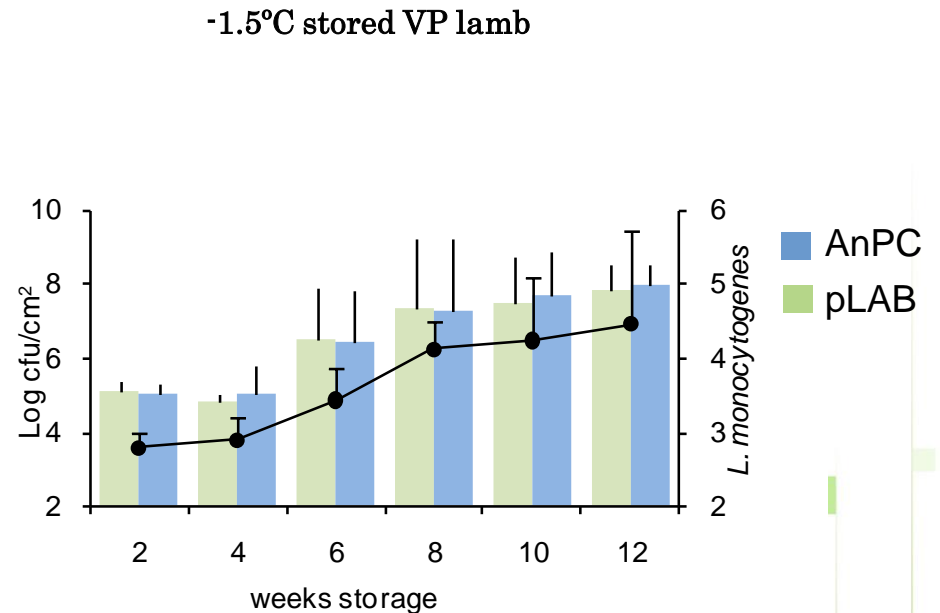
- Some contaminants are concerning

Spoilers:

*Brochothrix*, Clostridia,  
Enterobacteriaceae etc

Pathogens:

*Campylobacter*, *E. coli*,  
*Listeria*, etc

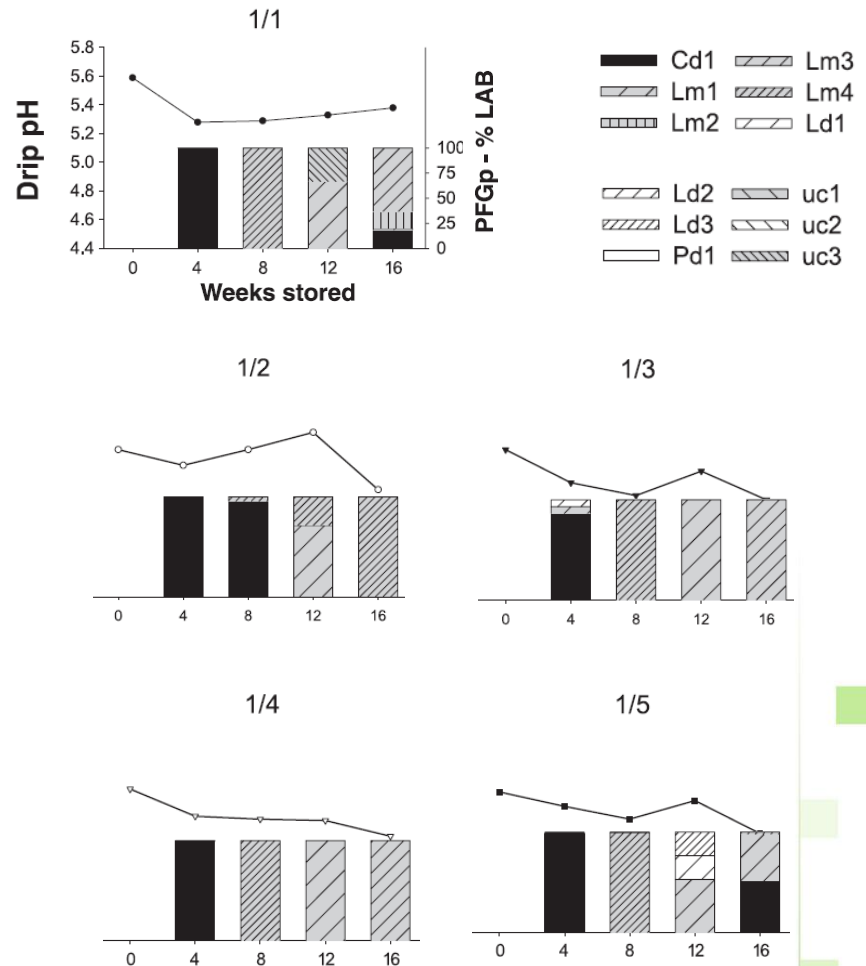


# 1. Stored meat grows bacteria

- Packs have variable flora

Otherwise identical cuts develop bacterial populations arising from different contaminants

LAB strains in beef drip



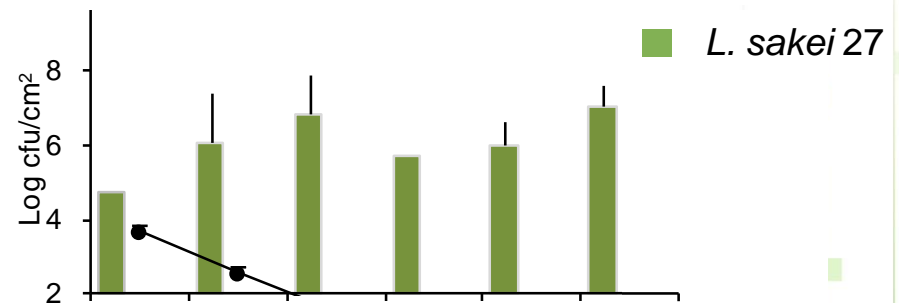
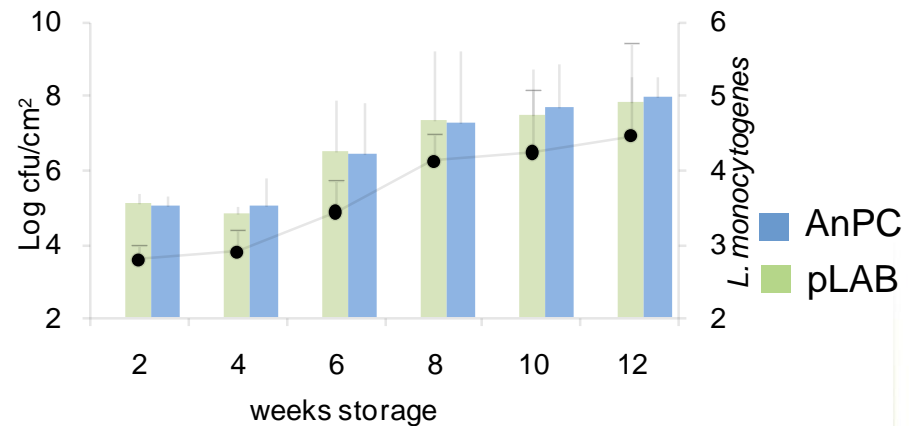
## 2. Seeding with LAB can inhibit unwanted bacteria and improve consistency

- [Inhibition of pathogens](#)

On stored meat LAB can inhibit:

- *Listeria*
- *Campylobacter*
- *E. coli* (we're still looking)

*L. monocytogenes* on -1.5°C stored VP lamb



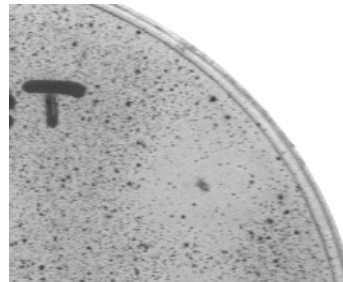
## 2. Seeding with LAB can inhibit unwanted bacteria and improve consistency

- [Inhibition of spoilers](#)

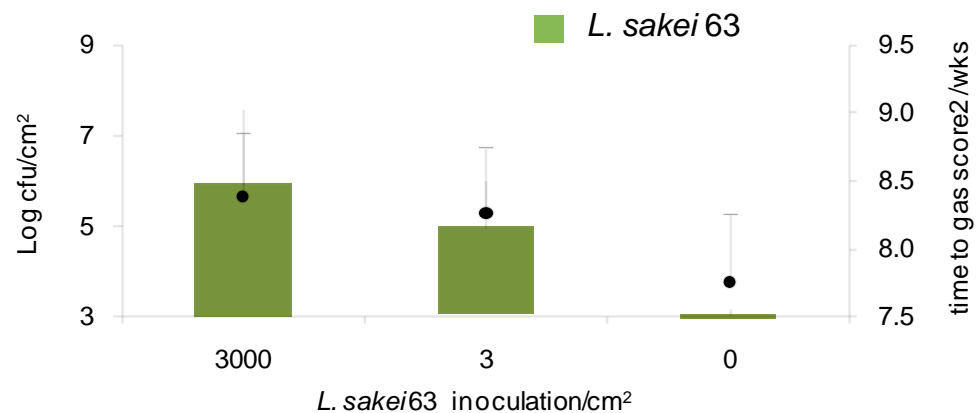
On stored meat LAB can inhibit:

- *Brochothrix*
- *Clostridia*

*L. sakei* 63 inhibits *Cl. estertheticum* in agar



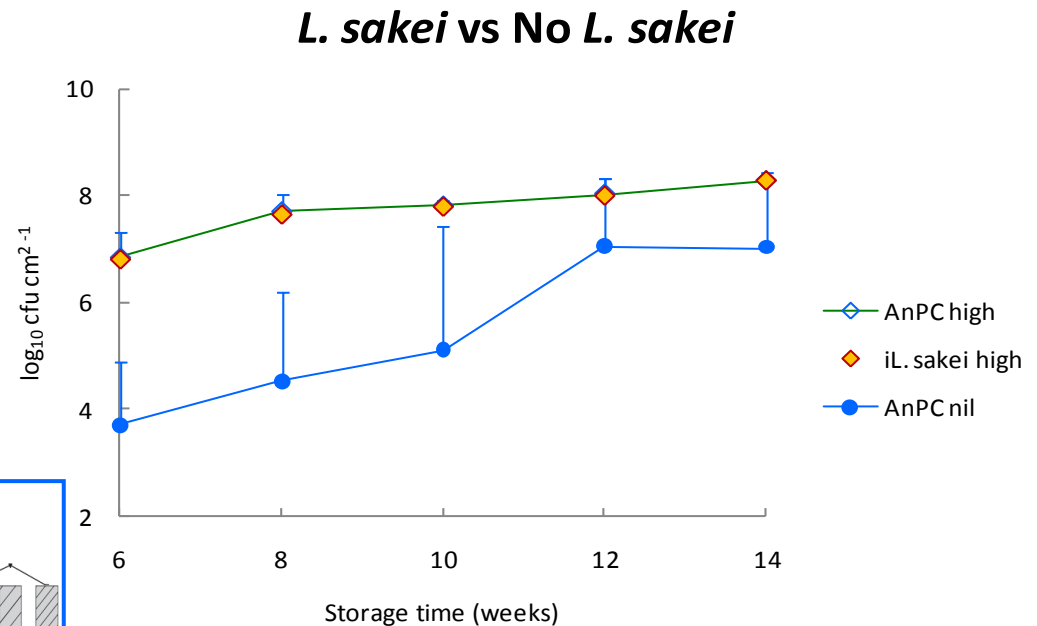
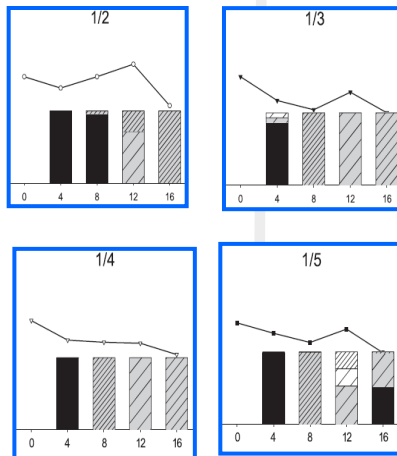
and delays gas production in stored beef



## 2. Seeding with LAB can inhibit unwanted bacteria and improve consistency

- Improves consistency

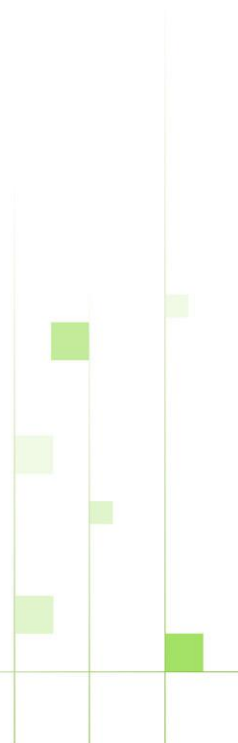
On stored lamb *L. sakei* consistently develop into majority populations



### 3. *L. sakei* –seeded lamb has minor differences in acid levels and pH

- no difference in most spoilage-associated fatty acids and alcohols

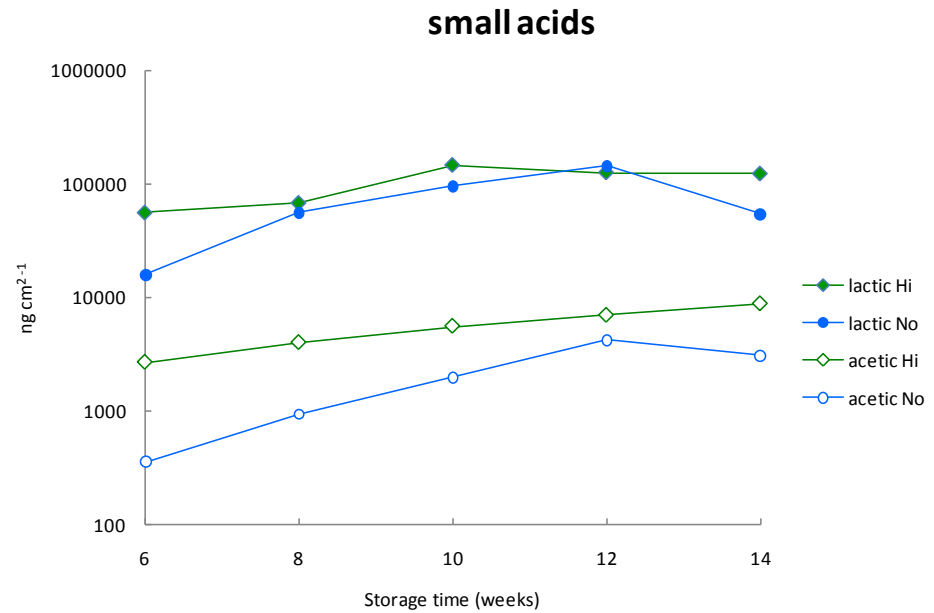
- butyric acid
- propanoic acid
- ethanol
- propanol
- butanol





### 3. *L. sakei* –seeded lamb has minor differences in acid levels and pH

- higher levels of acetic and lactic acids

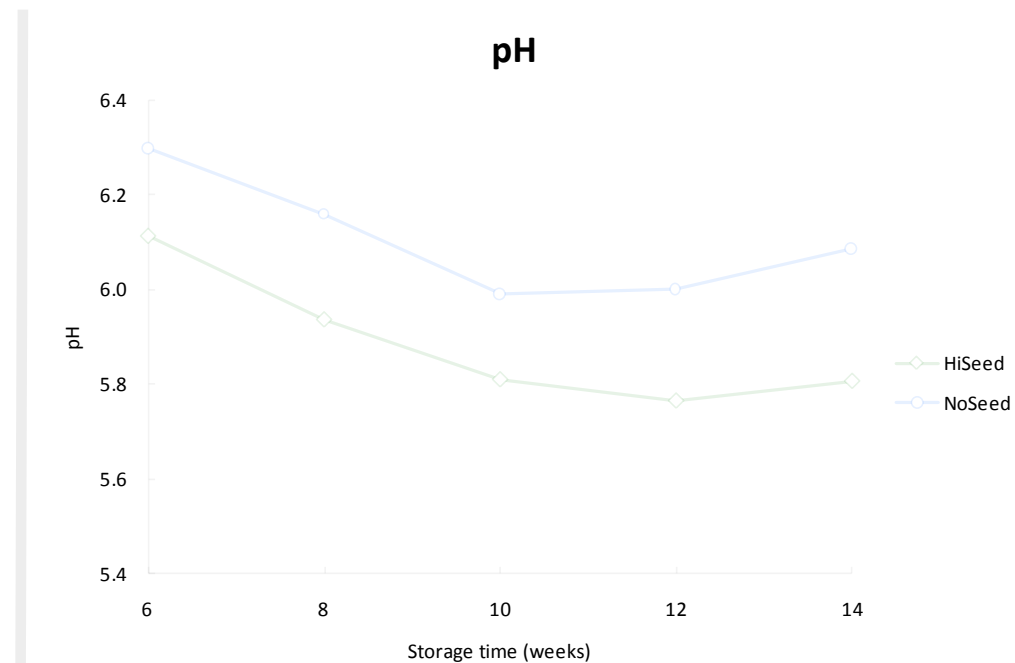


### 3. *L. sakei* –seeded lamb has minor differences in acid levels and pH

- higher levels of acetic and lactic acids

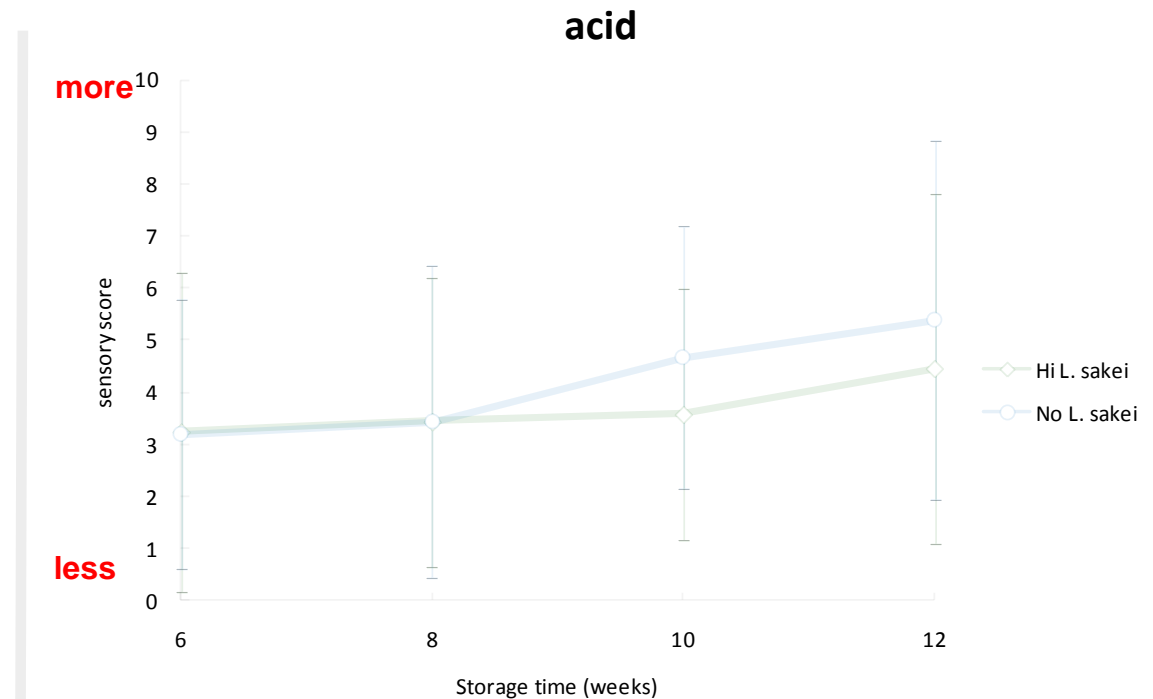
- pH lower for seeded samples

= lower potential for  
 Enterobacteriaceae  
*B. thermosphacta*



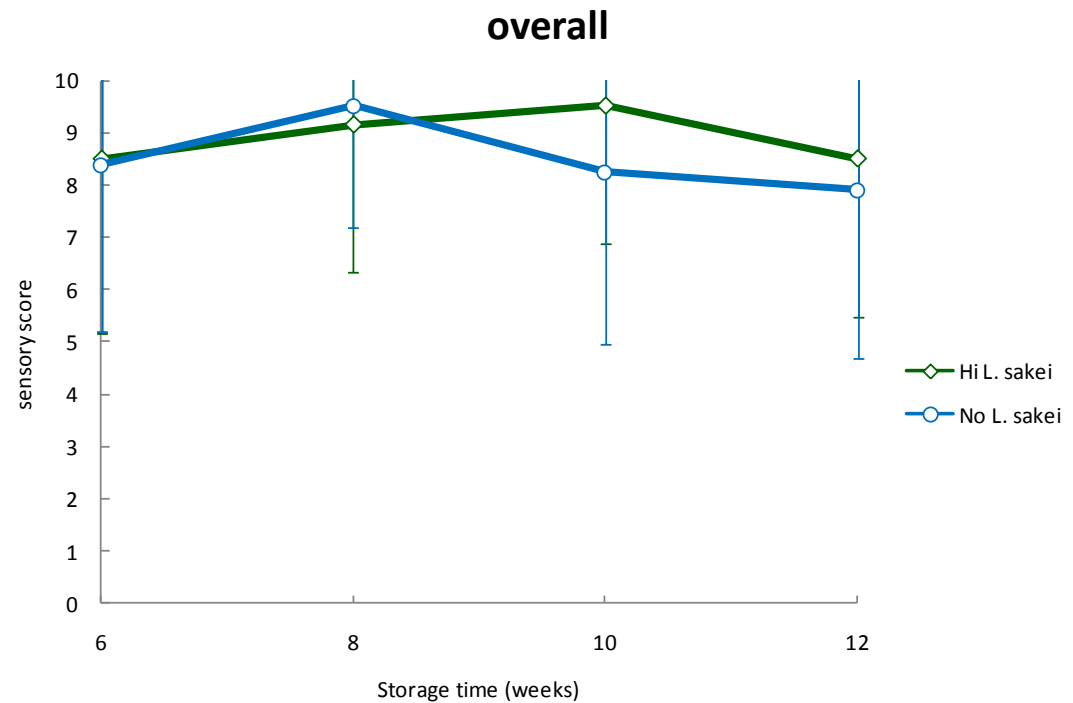
## 4. *L. sakei* –seeded lamb is no less acceptable to taste-panelists as untreated

- no differences for acidity
- no differences between means
- wide variability



## 4. *L. sakei* –seeded lamb is just as acceptable to taste-panelists as untreated

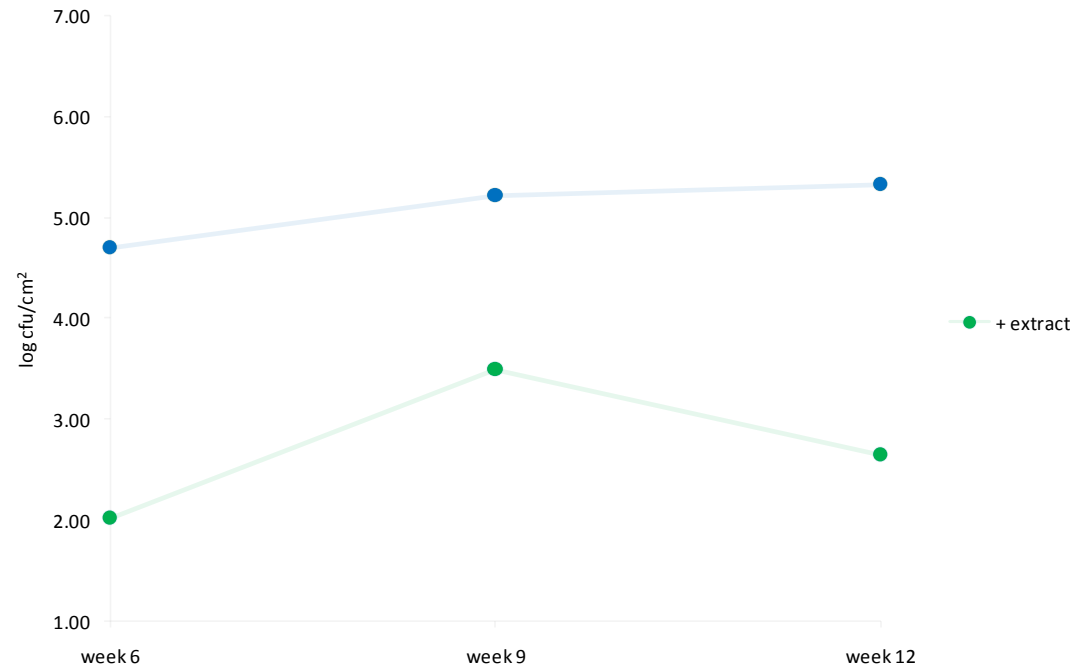
- no differences for rancidity, smell, or overall liking



## 5. LAB extracts can also inhibit unwanted bacteria

- may not be practicable to seed with some LAB
- pathogens
  - *Lc. garvieae* (anti-Cj Ce)
- poor growth on meat
  - homofermentative LAB
    - HoBT (anti-Bt)
- sensory effects?

*B. thermosphacta* growth on stored lamb  
co-inoculated with HoBT extract



## 6. Bio-preservation offers improved confidence and consistency

- reduced risk of contaminant growth
- improved pack uniformity
- minimal impact on sensory acceptance
  - scope for improving?

### wishlist

- develop delivery technology for existing strains
- widen pool of bio-preservative strains (esp *E. coli*)
- strains for improving sensory qualities and shelf life

### Question for you:

Do you regard this research as valuable to Industry?

