

DETERMINATION OF THE EFFICACY OF STEAM VACUUM TREATMENT FOR THE REDUCING BLOWN PACK CAUSING *CLOSTRIDIAL* SPORES FROM MEAT SURFACES.

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Background

Blown pack spoilage is characterised by the accumulation of gas in vacuum packs. This causes gross pack distension that is often accompanied by the presence of excessive drip and offensive off odours.(2,3)

Psychrophilic *Clostridium* spp. *C. estertheticum* and *C. gasigenes* (1,5) are recognised as causative agents of blown pack spoilage. The spores of these organisms are commonly present in soil, water and farm environments and thus on the hides of slaughtered animals from where they can be transferred to meat destined for anaerobic chilled storage. (4)

There is no evidence that the presence of these *Clostridia* on meat represents a food safety hazard. However, their malodorous metabolic by products render the product unfit for human consumption.

Previous studies (unpublished data) have shown that there is a threshold level of spores below which blown pack spoilage does not manifest its self.

Objectives

The present study was undertaken to investigate the use of a proprietary steam vacuum system in reducing the number of spores below the threshold level there by eliminating blown pack spoilage.

Method

Vacuum packed beef striploins were obtained from an export beef plant 24 hrs after slaughter. The striploins were split longitudinally to expose two similar fresh cut meat surfaces. These striploin pairs were inoculated, on the fresh cut surface, with varying levels of blown pack causing clostridial spores. One side of each pair was subjected to a steam vacuum treatment while the other side was not treated and served as a control. Both the treated and control samples were cut into steaks, vacuum packed, heat shrunk and stored at -1.0 or 0°C. This procedure was repeated with spore inoculation onto the dorsal adipose tissue surface of similar beef striploins.

The vacuum packed samples were observed initially at weekly until the first gas bubbles were noted, and then at two day intervals for the development of blown pack spoilage, as shown initially by gas bubble formation, then loss of vacuum and finally tight pack distention.

Results and discussion

Steam vacuum treatment produced a one week delay in the development of blown pack spoilage in the product inoculated either on the freshly cut surface or the dorsal adipose surface lower spore inoculation (approx. 4-6 spores/cm²) and stored at 0°C. At higher inoculations (40-4000 spores/cm²) there was little difference. When the product was stored at -1.0°C steam vacuum treatments afforded no consistent advantage over control packs. For low inoculum levels on cut surfaces stored at -1.0°C the use of the steam vacuum in some cases tends to accelerate blown pack onset. For each inoculum level the use of -1.0°C rather than 0°C storage delayed blown pack spoilage onset by approximately two weeks.

The use of a proprietary steam vacuum system to eliminate blown pack spoilage causing *Clostridial* spores was inconsistent and, therefore the treatment is considered commercially ineffective for the control of 'blown pack' spoilage in vacuum packed chilled meat.

Literature

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4. Dorota M. Broda et al Unpublished. Submitted for publication.
5. Dorota M. Broda et al Psychrotrophic *Clostridium* spp. Associated 'Blown Pack' spoilage of chilled vacuum packed red meats and dog rolls in gas-impermeable plastic casings. Int J. of Food Microbiology 29 (1996)

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Fresh cut surface incubated at 0°C

Spore inoculation	4 spores/cm ²	40 spores/cm ²	400spores/cm ²	4000spores/cm ²
Days -Blow steam	50	44	38	38
Vac				
Days -Blow control	41	44	42	50

Adipose surface incubated at 0°C

Spore inoculation	4 spores/cm ²	40 spores/cm ²	400spores/cm ²	4000spores/cm ²
Days -Blow steam	80	69	38	31
Vac				
Days -Blow control	69	69	31	31

Fresh cut surface incubated at 1°C

Spore inoculation	4 spores/cm ²	40 spores/cm ²	400spores/cm ²	4000spores/cm ²
Days –Blow steam	70	52	56	53
Vac				
Days –Blow control	67	56	56	50

Adipose surface incubated at -1°C

Spore inoculation	4 spores/cm ²	40 spores/cm ²	400spores/cm ²	4000spores/cm ²
Days –Blow steam	70	49	45	48
Vac				
Days –Blow control	45	56	45	48