5 - 7 HOT DEBONING IN CUBA. MICROBICLOGICAL ASPECTS

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INTRODUCTION

The microbial contamination of meat during primary processing is of paramount importance to its overall quality. Contamination levels have both a quantitative importance- counts ranging normally between 10^4 cells cm^{-2} and 10^6 cell cm^{-2} for normally good and deficient hygienic practices- and a qualitative one, as several species of potentially dangerous pathogenic microorganisms may be present.

Microbial growth, usually hindered by refrigeration, must be carefully considered in the hot boning situation, where cutting and handling swear bacteria all over the several-fold extended meat surface.

This paper deals with microbiological results obtained in hot deboning trials on a pilot plant scale, in order to assess the feasibility of this technology in Cuban sub-tropical conditions.

MATERIALS AND METHODS

Slaughtering was carried out according to industrial standards. Primary operations included captive-bolt stunning and mechanical dehiding. One side of each of 4 cattle slaughtered was inmediately debone and the hot meat packed into plastic trays and corrugated cardboard cartons covered in either case with polyethylene film and chilled in air at 4°C und 1 ms^{-2} air velocity.

The four remaining sides were conventionally chilled, deboned after 24 hours refrigeration, the meat hung in stainless steel trees and cloth covered, as usual under commercial conditions in Cuba.

A transport stage was also simulated, letting the refrigerated meat stand in air at 28° - 30° for 5 hours, which would be equivalent to transport in a closed non-refrigerated truck or van, not uncommon in our conditions.

Samples for microbiological analysis were taken using the swabbing technique of Kitchell *et al* (1). Total counts for mesophiles and psicrotrophs were obtained on PCA, incubating at 30°C, 48 hr. and 4°C for 7 days, respectively. Coliform counts were obtained on Red violet bile agar, at 37°C, 20-24 hr. Standard dilution plate counts were made in all cases.

RESULTS AND DISCUSSION

Table 1 shows typical microbial counts in normal industrial operation in Cuban slaughterhouses. These results indicate quite acceptable hygienic conditions even by literature standards (2,3,4), and so hot deboning was considered potentially feasible, at least fromm the point of view of primary operations. Similar conclusions could be derived from data for refrigerated carcasses (Table 2).

Sampling point	Total viable mesophile count	Total psicrotroph count	Coliform count
Collar	4,08	2,42	2,62
Diaphragm	4,02	2,33	2,44
Leg	3,92	2,72	2,10
Side average	4,01	2,49	2,39

Table 1- Microbial counts on recently slaughtered beef sides. Average log $_{10}$ values

Sampling point	Total viable mesophile count	Total psicrotroph count	Coliform count
Collar	4,33	2,66	2,69
Diaphragm	3,69	2,96	2,17
Leg	4,21	2,58	2,52
Side average	4,08	2,57	2,43

Table 2- Microbial counts of refrigerated beef sides, 24 hours post mortem. Average $\log_{10}$ values.

In preliminary hot deboning trials (Table 3) unacceptably high counts were obtained for hot deboned meat in packaging options. Cardboards cartons were eliminated, since core temperature could not be brought down as rapidly as required, which is an essential (5).

Sampling point	Total viable mesophile count	Total psicrotroph count	Coliform count	Deboning System
Collar	4,04	2,00	2,17	
Diaphragm	3,69	1,00	2,07	
Leg	3,77	2,37	1,00	Conventional
Side average	3,83	1,78	1,74	
Plastic tray	6,72	5,96	4,47	
Cardboard carton	8,72	7,77	5,47	Hot

Table 3- Hot vs conventional deboning. Preliminary results. Average $\log_{10}$ values of 4 replicates.

The plastic tray option was given a second trial, taking special care regards handwashing and utensil desinfection. Results are present in Table 4, showing the effectiveness of stringent requirements for hygienic operation. Results are good, even after the abuse of simulated transport.

Sampling point	Total viable mesophile count	Total psicrotroph count	Coliform count	Deboning System
After deboning	3,16	2,83	1,61	
After refrigeration	4,33	4,52	2,82	Hot
After "transport"	4,98	4,81	3,37	
After deboning	3,83	3,69	1,39	
After "transport"	4,83	5,44	2,85	Conventinal

Table 4- Hot vs conventional deboning. Average $\log_{10}$ values of 4 replicates.

ACKNOWLEDGEMENT

Thanks are due to Dr Charles L. Cutting for helpful advise.

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