

INFLUENCE OF SCALDING, SKINNING AND BONING PROCESS ON MICROBIOLOGICAL QUALITY OF PORK MEAT

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INTRODUCTION

At the pig abattoir, carcasses are scalded frequently in a vat containing hot water. This method is criticized from a hygienic point of view since scalding water is very microbially contaminated and is also dirty in other ways. Another scalding method used at the pig slaughter is scalding tunnel. The carcasses, suspended by a hind leg, pass through a scalding.

Skinning may be an potencial alternative to the energy-intensive scalding process. Besides, the meat inspection service has looked favorably upon skinning as a means to reduce the microbial load found on pork carcasses.

Total Enterobacteria Counts and Total Mesophilic Counts tests have been normally used to evaluate the hygienic conditions of the meat plant industries.

The present investigation was undertaken to evaluate the influence of scalding (vat or tunnel), skinning combined with cold and hot bonning on the microbiological quality of pork meat.

MATERIAL AND METHODS

The experimental step of this study was developed in two commercial abattoirs located in Santa Catarina in November, 1993 and February, 1994. Thirty-two animals Landrace x Large White were utilized in each experiment. Four treatments were compared: A scalding and hot boning B: Scalding and cold boning; C: Skinning and hot boning and D: Skinning and cold boning.

The microbiological evaluation was done by the swab technique and the methodology of the contained in VANDERZANT *et alii* (1992). Mesophilic Total Count, Enterobacteria Total Count in the carcasse and Psychotropic Count and *Salmonella*, in the vacuum packed meat cuts: *Longissimus dorsi* (LD) and *Semimembranosus* (SM) stored at 5°C during seven days, were performed.

RESULTS AND DISCUSSION

As it can be seen in Tables 1 and 2, concerning to the results of the kind of scalding (tunnel and vat), the initial population of mesophilic and enterobacterial were kept at the same level, before and after the scalding, i.e., 10^2 CFU/cm² for the mesophilic total count and 10^1 CFU/cm² for enterobacteria.

Concerning to the scalding and skinning the mesophilic total count at scalding were at the level of 10^3 CFU/cm², showing a homogeneous count at the three sampled area (loin, ham and shoulder) while in the skinning, a population of mesophilic at the level of 10^2 CFU/cm² was found but heterogenously distributed, i.e., the loin and shoulder region showed higher counts than the ham (10^1 CFU/cm²) for the mesophilic total population. Concerning to the enterobacteria tests the results showed that for scalding and skinning the counts were similar and very low ($<10^2$ CFU/cm²) as it can be seen on Tables 1 and 2. SCHAEFER - SEILDER *et alii* (1984) studied the differences between scalding and skinning process relating to the microbial contamination and found similar results.

In all studied treatments, it was observed that the hot bonning presented higher counts, i.e., 10^3 CFU/cm² and 10^2 CFU/cm² for total mesophilic count and enterobacteria respectively if compared with the cold boning, where it was found the result of 10^2 CFU/cm² and 10^1 CFU/cm² for the same microbiological exams. In according to van LAACK *et alii* (1991) the hot boning requires more manipulation and this fact leads to a increasing in the initial microbiological load.

In the Table 4 it can be seen the results for *Salmonella* sp psychotropic bacterias counts in the vacuum packed meat samples stored at 5°C/7 days. The psychotropics population in all treatments studied was very low (10^1 - 10^2 CFU/g), and no *Salmonella* sp was detected in all samples investigated.

Table 1. Mesophilic Total Count and Total Enterobacteria Count in Pork Carcass after Scalding (Vat)*

Boning	Sampled Region of the Carcass	Total mesohilic count (CFU/cm ²)**			Enterobacteria Total Count (CFU/cm ²)**		
		Before Scalding	After Scalding	After Boning	Before Scalding	After Scalding	After Boning
Cold	Loin	2.4×10^2	1.4×10^2	4.6×10^2	< 10	< 10	2.0×10^1
	Shoulder	1.8×10^2	2.0×10^2	2.8×10^2	< 10	< 10	2.1×10^1
	Ham	2.0×10^2	8.0×10^2	6.5×10^2	< 10	< 10	1.2×10^1
Hot	Loin	1.0×10^2	4.6×10^2	2.0×10^2	< 10	< 10	3.2×10^1
	Shoulder	4.0×10^1	8.8×10^2	6.5×10^2	< 10	< 10	4.0×10^1
	Ham	4.0×10^1	1.2×10^2	3.6×10^2	< 10	< 10	4.3×10^1

* Arithmetic Average of tree repetitions

** CFU/cm² = Colony Form Unities per Square Centimeter

Table 2. Mesophilic Total Count and Enterobacteria Total Count in Pork Carcass after Scalding (Tunnel)*

Boning	Sampled Region of the Carcass	Total mesophilic count (CFU/cm ²)**			Enterobacteria Total Count (CFU/cm ²)**		
		Before Scalding	After Scalding	After Boning	Before Scalding	After Scalding	After Boning
Cold	Loin	1.8×10^2	1.0×10^2	1.1×10^2	< 10	< 10	< 10
	Shoulder	2.6×10^2	1.3×10^2	1.2×10^2	< 10	< 10	< 10
	Ham	7.0×10^1	1.4×10^2	1.5×10^2	< 10	< 10	< 10
Hot	Loin	1.3×10^2	1.7×10^2	2.1×10^2	< 10	< 10	1.0×10^3
	Shoulder	1.4×10^3	1.8×10^3	4.3×10^3	< 10	< 10	1.4×10^3
	Ham	1.1×10^1	2.1×10^2	2.0×10^3	< 10	< 10	1.5×10^2

* Arithmetic Average of tree repetitions

** CFU/cm² = Colony Form Unities per Square Centimeter**Table 3.** Mesophilic Total Count and Total Enterobacteria Count in Pork Carcass after Skinning*

Boning	Sampled Region of the Carcass	Total mesophilic count (CFU/cm ²)**			Enterobacteria Total Count (CFU/cm ²)**		
		Before Skinning	After Skinning	After Boning	Before Skinning	After Skinning	After Boning
Cold	Loin	1.0×10^2	8.0×10^1	1.0×10^1	< 10	< 10	< 10
	Shoulder	1.1×10^2	2.0×10^1	2.5×10^1	< 10	< 10	< 10
	Ham	1.8×10^3	1.6×10^1	5.0×10^1	< 10	< 10	< 10
Hot	Loin	9.0×10^1	1.0×10^1	5.0×10^1	< 10	< 10	< 10
	Shoulder	3.0×10^1	1.0×10^1	1.8×10^2	2.0×10^1	< 10	2.8×10^1
	Ham	2.0×10^3	5.0×10^1	8.0×10^1	< 10	< 10	< 10

* Arithmetic Average of tree repetitions

** CFU/cm² = Colony Form Unities per Square Centimeter**Table 4.** Psychotropic Total Count and *Salmonella* sp in pork meat cuts.

Muscle	Treatment	Psychotropic Total Count (CFU/cm ²)*	<i>Salmonella</i> sp (25g)
LD	A	3.0×10^2	absent
LD	B	1.3×10^2	absent
LD	C	1.0×10^3	absent
LD	D	1.0×10^3	absent
SM	A	3.6×10^2	absent
SM	B	3.0×10^1	absent
SM	C	5.6×10^2	absent
SM	D	2.0×10^1	absent

A = (Scalding in vat/hot deboning)

B = (Scalding in vat/cold boning)

* (CFU/cm²) = Colony Form Unities per Square Centimeter

C = (skinning/hot boning)

D = (skinning/cold boning)

CONCLUSIONS

The results observed in this study lead to the following conclusions:

The hot boning process showed a microbial contamination slightly higher compared to the cold boning process even the total mesophilic counts and total enterobacteria counts were low in both cases (10^2 CFU/cm² in average).

There was no difference between the two kind of scalding (tunnel and vat).

The psychotropic Total Count of the studied vacuum packed meat cuts stored at 5°C/7 days in all treatment was very low (10^2 CFU/cm² in average). No *Salmonella* sp was detected in all samples examined.

The obtained results showed a satisfactory hygienic conditions, of the abattoirs where this study was performed.

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