DECONTAMINATION OF SWINE CARCASSES WITH CHLORINE

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Background

The increased consumer concern about microbiological foodborne diseases has resulted in intense efforts to reduce contaminations of many foods, including meat and meat products.[1, 2, 3] Traditional approaches of food preservation, try to stop microbial growth but leads almost always to extensive changes of organoleptic properties. Modified atmosphere packaging, high-pressure and spray-chilling treatments, sous-vide cooking and active packaging, are modern techniques that provide sufficient shelf life to foods to allow their distribution, while still meeting the demands of the consumers for convenience and fresh-like quality. These techniques are known by the term "minimal processing" [4], which covers a large range of technologies and methods for preserving food that change the inherent fresh-like quality attributes of the food as little as possible (minimally) but at the same time endow the food product with a shelf life sufficient for its transport from the processing plant to the consumers.
Methodologies have been developed for surface microbial decontamination of carcasses by spraying, washing, rinsing with water of low or high pressures and temperatures or with added authorized chemicals.[5, 6, 7, 8, 9]
Chlorine and other substances are added to water used on poultry carcasses to reduce microbial contamination in many countries. The Scientific Veterinary Committee agreed to this application as supplementary measure which must not compromise the use of Good Hygiene Practices.[11]

Objective

To evaluate the microbial load of swine carcasses sprayed on line with a solution of "Blitzene", a 5% stabilized solution of chlorine dioxyde (Viscona Ltd., 28 Linkwood Place, Lawthorn, Irvine, KA 11 2 BN Scotland).

Methods

In a pig slauthering line (throuput 300/h, output 2400-2500/day) dressed EA grade pig carcasses were sprayed by 24 nozzles (12 in each side) with a "Blitzene" active solution, prepared according to the producer instructions for an yeld of 700-800 ppm of free ClO_2.
Air blast (3 m/s) refrigeration (-10ºC, 95 % RH) was imediately applied on line for one hour.
Samples were taken using sterile swabbs in areas of 100 cm^2 limited by metalic sterile frames on each carcass shoulder, before and after "Blitzene" spraying and immediately transferred to test tubes containing 1/4 strenght Ringer solution.
Aerobic plate count and *Enterobacteriaceae* count were perfomed by plating 1 ml above mentioned bacterial suspension into plate count agar OXOID and incubating at 30ºC for 72 h and into Violet Red Bile Glucose Agar OXOID and incubation at 37ºC for 24 h, respectively. Results were reported as colony forming count units (CFU) to 100 cm^2 or < 10 CFU/100 cm^2 when the number of colonies in a plate were less than 10.

Results and Discussion

Table I reports the results of assays with groups of five, eight and ten carcasses. The results always showed the killing effect of "Blitzene" over the bacteria on the rind surface, which are the most relevant contaminants of dressed carcasses [10] and thereof of meat boned cuts.
This effect is of paramount importance on the reduction of *Enterobacteriaceae* load as shown by the results of these specific counts.

Conclusion

"Blitzene" solution applied on an industrial slaughtering line as a spray is effective for the rind surface decontamination of swine carcasses, on *Enterobacteriaceae*, including mostly.

Pertinent literature

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TABLE I
Total aerobic and *Enterobacteriaceae* counts from three groups of pigs carcasses

CARCASSES N°	TOTAL PLATE COUNT (CFU 100/cm^2)		*Enterobacteriaceae* (CFU/100cm^2 *)	
	UNSPRAYED	BLITZENE SPRAYED	UNSPRAYED	BLITZENE SPRAYED
726	3,8 x 10^3	2,7 x 10^3	1,3 x 10^3	< 10
731	1,1 x 10^4	2,7 x 10^3	2,6 x 10^3	< 10
735	1,3 x 10^3	5,2 x 10^2	< 10	< 10
743	6,5 x 10^3	1,4 x 10^3	2,1 x 10	< 10
748	6,6 x 10^3	5,5 x 10^3	6,0 x 10	2,0 x 10
577	9,3 x 10^3	5,3 x 10^2	4,3 x 10^2	< 10
582	7,0 x 10^3	9,1 x 10^2	1,0 x 10	< 10
586	5,2 x 10^3	1,4 x 10^2	6,0 x 10	< 10
590	7,8 x 10^3	1,1 x 10^2	4,9 x 10	2,0 x 10
595	8,5 x 10^3	5,1 x 10^2	7,8 x 10^2	6,0 x 10
597	7,8 x 10^3	1,6 x 10^3	3,2 x 10^2	< 10
600	3,5 x 10^3	3,0 x 10	1,0 x 10^2	< 10
606	2,8 x 10^3	1,6 x 10^3	3,2 x 10^2	< 10
1645	4,0 x 10^2	1,0 x 10	< 10	< 10
1649	2,8 x 10^3	3,0 x 10	< 10	< 10
1656	3,8 x 10^3	1,5 x 10^2	< 10	< 10
1662	3,0 x 10^3	8,0 x 10	2,7 x 10	1,3 x 10
1665	1,9 x 10^3	2,0 x 10	1,0 x 10^2	< 10
1668	1,9 x 10^3	1,8 x 10^2	2,0 x 10^2	< 10
1671	4,5 x 10^3	3,0 x 10	8,0 x 10	< 10
1675	2,7 x 10^3	1,1 x 10^2	6,1 x 10^2	1,2 x 10
1679	5,0 x 10^3	1,8 x 10^2	4,8 x 10	< 10
1685	1,0 x 10^3	1,6 x 10^2	1,9 x 10	< 10

* When less than 10 colonies were retrieved we assumed a result of < 10 CFU per 100cm^2