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Prevalence and genetic diversity of *Salmonella* in organic and conventional pig productions in France

Annaëlle KEROUANTON, Valérie ROSE, Maxime EVEN, Emmanuelle HOUARD, Martine DENIS
ANSES, Hygiene and Quality of Poultry and Pig Products Unit, BP53, site des Croix, 22440 Ploufragan, France

INTRODUCTION

The objectives of this study were 1) to assess the occurrence of *Salmonella* in organic and conventional pig productions, 2) to evaluate the genetic diversity of strains isolated from these two productions, and 3) to estimate the cross-contamination on slaughter line between conventional pigs and organic pigs.

MATERIAL AND METHODS

26 organic herds and 31 conventional herds were considered in one slaughterhouse. Two pigs per herds were sampled if possible. For each pig, *Salmonella* detection was realized from colon content and from swabs of carcass using the NF EN ISO 6579 method. Two isolates per positive samples were serotyped and genotyped by PFGE using *Xba*I enzyme (*1*). PFGE profiles were analysed with BioNumercis® software (Applied Maths).

RESULTS

A total of 227 samples were analyzed: 114 colon contents and 113 swabs of carcass. Prevalence of *Salmonella* in colon content was higher for organic pigs, 37,9% $_{IC95\%}$[25.5-51.6], than for conventional pigs, 32.7% $_{IC95\%}$[19.5-44.5], but the difference between these two productions was not significant ($\chi 2$; p= 0,563). *Salmonella* prevalence was lowest on carcasses and very close between the two productions: 10.7% $_{IC95\%}$[4.0-21.8] for organic carcasses and 10.3%$_{IC95\%}$[3.9-21.2]) for conventional carcasses.

One hundred and four isolates were collected and distributed in 7 serovars: Derby (48), Brandenburg (18), Typhimurium (13), 2 types of monophasic variant of serovar Typhimurium 4,12:i:- (11) and 4,5,12:i:- (10), Infantis (2) and Mbandaka (2).

Sixteen PFGE profiles were obtained (figure 1): 1 per serovar for Mbandaka, Infantis, and Brandenbrug, 2 for monophasic variant 4,5,12:i:-, 3 for Derby, 4 for Typhimurium and 4 for monophasic variant 4,12:i:-. Seven PFGE profiles (84% of the strains) were common between organic and conventional pigs. A major profile gathered 79% of the *S.* Derby strains. *S.* Brandenburg strains presented only one PFGE profile which was detected in 5 different herds.

With the 20 strains isolated from 12 carcasses, it has not been possible to show with certainty *Salmonella* cross-contamination between organic and conventional pigs during the process. Indeed, only one *S.* Typhimurium PFGE profile was evidenced for organic and conventional carcasses during the same sampling day.

DISCUSSION

In this study, the prevalence in colon is highest in organic pigs. As organic pigs are slaughtered before conventional pigs, they could contribute to contamination of the conventional carcasses during process. This can explain similar prevalences on carcasses thereafter. But PFGE profiles analysis of carcass isolates didn't permit to conclude to a transfer of *Salmonella* between both productions at the time of the slaughter. Predominance of the serovar Derby in organic pigs was observed as for conventional pigs (*2*). Monophasic variants of *S.* Typhimurium were particularly isolated, with a high genetic diversity for 4,12:i:-.These variants are known to increase in the human salmonellosis cases these last years (*3*).

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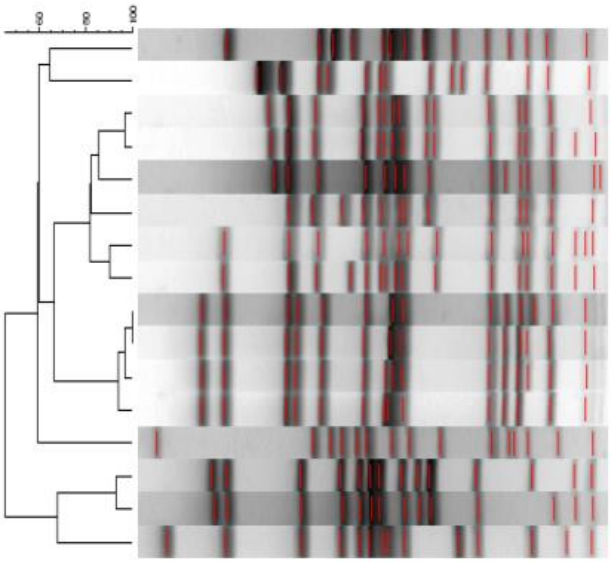
REFERENCES

(*1*) Ribot *et al*. Foodborne Pathog Dis 2006; 3:59-67.
(*2*) Valdezate *et al*., Emerg Infect Dis 2005;11:694-8.
(*3*) Report from the French NRC for *Salmonella* 2011.

Figure 1: PFGE profiles obtained for the 104 strains isolated in organic and conventional pigs at slaughter from colon contents and swabs of carcass.



PFGE profile number	Serovar	Organic		Conventional	
		colon	carcass	colon	carcass
SBRGXB001	Brandenburg	2	2	8	6
SMBAXB001	Mbandaka			2	
S4,5,12:i :-XB002	4,5,12:i :-	2			
S4,5,12:i :-XB001	4,5,12:i :-	6		2	
S4,12:i :-XB002	4,12:i :-	2			
S4,12:i :-XB001	4,12:i :-			2	
S4,12:i :-XB003	4,12:i :-		2		
S4,12:i :-XB004	4,12:i :-	2		3	
STYPXB003	Typhimurium				2
STYPXB004	Typhimurium		2		2
STYPXB001	Typhimurium	4	1	1	
STYPXB002	Typhimurium		1		
SINFXB001	Infantis	2			
SDERXB032	Derby			2	
SDERXB039	Derby	4	2		2
SDERXB001	Derby	20	2	16	