SALMONELLA STATUS IN SWINE UNITS CHARACTERIZATION: COMPARATIVE STUDY OF SEROLOGY AND BACTERIOLOGY

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Introduction andObjectives

The aim of this study is to estimate the number of farms not classified correctly by serology on meat juice regarding their salmonella cæcal contamination in abattoir.

Materials and Methods

5 batches of 20 closed farms were studied. The salmonella cæcal contamination of 20 pigs per batch at the slaughter was measured by bacteriological search for salmonella in their cæcal contents. Muscle was sampled on the same pigs for serologic analysis using the IDEXX method (cut-off=10%).

Results and Discussion

20.6% of pigs were salmonella carriers. 15.9% of them were serologically positive. Serotype derby was the more isolated (69% of all salmonella isolated) followed by typhimurium (20.5%). A “time spend in lairage” effect was observed: batches waiting less than 3h had a mean bacterioprevalence (10%) significantly lower than batches waiting more than 6h (28.7%). No difference in seroprevalence was found between these two groups. A “feed type effect” was found: pigs fed with dry food during fattening had a significantly higher bacterioprevalence (28.5%) than pigs fed with wet food (12.7%). This difference was found in seroprevalences as well (21.5% vs. 10.3%).

Serological and bacteriological results for each batch are presented Figure 1. The coefficient of Spearman, equal to 0.42 illustrates a great dispersion of the results.

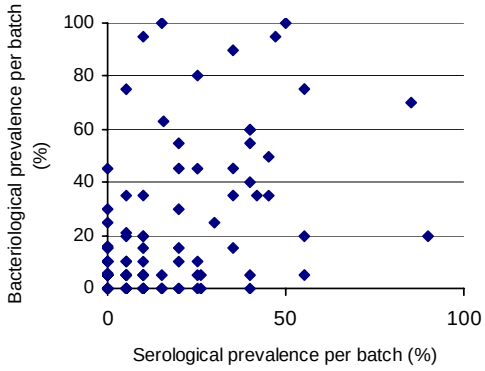

Figure 1 Batches salmonella prevalences

Analysis of batch results, according to 3 serological classes (class 1 = <20%; class 2= from 20 to 40% and class 3 >40%) shows that mean bacterioprevalence increases in accordance with the class of serological results (13.6%, 32% and 50.5% respectively); class 1 mean bacterioprevalence was significantly lower than class 3 one. This was more clearly demonstrated by Sorensen (1) on a larger type of serological classes. Salmonella control programs objective is to class farms regarding their seroprevalences. We used the thresholds previously described (20 and 40%) to class our 100 batches and analysed the link between their potential excretion risk (measured by cæcal carriage) and their serological classification.

Table I shows this classification.

Table I Serological and bacteriological prevalences per batch with 20% et 40% thresholds

Serological prevalence (%)	Bacteriological prevalence (%)			
	≤ 20	]20; 40]	> 40	Total
≤ 20	59	6	7	72
]20; 40]	8	3	7	18
> 40	3	2	5	10
Total	70	11	19	100

We can see that:

-82% (59/72) of batches with serological prevalence ≤ 20% have a bacteriological prevalence ≤ 20%;

-50% (5/10) of batches with serological prevalence >40% have a bacteriological prevalence >40%;

-84% (59/70) of batches with bacteriological prevalence ≤ 20% have a serological prevalence ≤ 20%;

-27% (5/19) of batches with bacteriological prevalence >40% have a serological prevalence >40%.

Finally, on the batch level, we can say that the serological method has a good negative predictive value and a good specificity but a bad positive predictive value and a bad sensibility.

Thus, it would be better to consider a farm as salmonella risky regarding the serology on meat juice only if this farm has repeatedly bad serological results. This is what the main countries in Europe choose by classing farms regarding the mean result of several batches. This study used only 20 farms and 100 batches; it would be necessary to complete similar work on a larger scale in order to validate these results. Other studies often present average results (like mean bacterioprevalences related to serological classes) but rarely classified results (such as in table 1). In addition, analysis was made for a threshold of classification of 40%. It’s possible that this threshold is too low and that the results would be a little different if the highest thresholds used had been 60 or 80 %. We couldn’t use these thresholds because not enough farms had such high seroprevalences.

References

1. Sorensen et al. (2004) Vet Microbiology.101.131-141.