

Work protocol of hygiene and disinfection to control *Streptococcus*

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Introduction

In many cases, the production conditions require the utilization of innovative alternatives in order to try to solve certain problems on farms. That is exactly what happened in a recently opened pig farm in Spain, which began with a huge development of *Streptococcus suis* in piglets in farrowing area.



Due to piglets were slaughtered at 30 days old, the possibility of working with antibiotics was very limited, both by suppression period and tissue integrity in the inoculation areas. Therefore, it was decided to work following a specific protocol of hygiene and disinfection. Then, after demonstrating the effectiveness of this work methodology, it was decided to continue the work against *Streptococcus* in weaned piglets on a farm located in Italy. This article presents the results obtained in both field trials.

Streptococcus is a Gram-positive bacteria founded worldwide. In pigs have been isolated several species of these bacteria, including: *Streptococcus dysgalactiae*, *Streptococcus agalactiae*, *Streptococcus porcinus* and *Streptococcus equisimilis*. However, the pathogenic specie that produces the main pig streptococcal disease is *Streptococcus suis*. About 35

capsular types of *Streptococcus suis* have been identified. The capsular type 14 is an exception: although it is highly pathogenic for pigs, it was first isolated from humans. Due to *Streptococcus suis* is a zoonotic agent, its control is essential to safeguard both, human and animal health.

Streptococcus suis can be isolated from tonsils, respiratory system and reproductive system of pigs. In order to carry out an effective control of these bacteria, it is necessary to know their epidemiology and pathogenesis. Initially, the transmission of the infection is vertical, from the sow to its offspring. Later, the infection is transmitted horizontally, from piglet to piglet, mainly due to usual management operations in the farrowing room. In this regard, it should be noted that piglets coming from sows which not carry the bacteria, will not possess maternal antibodies in order to protect them from the infection.

Nowadays, it is not easy to identify the sows which carry the bacteria. Furthermore, the medication of the sows will not assure that they will remove their carrier status. Therefore, it is necessary to develop control and prevention measures in order to assure the reduction of the microbial load of the piglet from the moment of the birth.

Objective

The main objective of this work was to control the problem caused by *Streptococcus* in different circumstances.

Firstly, the effectiveness of the developed work protocol was tested in the farrowing rooms in order to control these bacteria in young piglets.

Later, the effectiveness of the developed work protocol was tested in order to control *Streptococcus* in weaned piglets with a great health problem.

In both cases, the main objective was the reduction of the number of *Streptococcus* due to the implementation of a specific hygiene and disinfection work protocol based on the use of the ecological products **OX-VIRIN**[®] (liquid biocide) and **OX-S4**[®] (powdered solid biocide).



FIELD EXPERIMENT # 1

Material and methods

The pig farm where the first part of the work was conducted is located in Spain. It is a newly remodeled farm, with 500 sows. In order to carry out the experiment, two of the farrowing rooms were randomly selected. In each of the selected room there were 14 sows. One of the selected rooms acted as experimental room, and the other one acted as control.

Hygiene and disinfection work protocol used as control:

1. **Cleaning and disinfection in the absence of animals:** Cleaning was carried out using alkaline detergent. The disinfection of surfaces, equipment and environment was carried out using biocidal products based on aldehydes and quaternary ammonium salts.
2. **Cleaning** (with water and neutral detergent) **and disinfection of sows** (with iodine based product) before entering into the farrowing room.
3. Application of powdered products based on phosphates on the heat mat and/or on the nests.
4. **Disinfection of utensils and equipments:** Application of products based on iodine or alcohol by spraying or immersion.

Hygiene and disinfection work protocol applied in the experimental rooms:

1. **Cleaning and disinfection in the absence of animals:** Cleaning was carried out using the alkaline detergent **OX-NETAL**. The disinfection of surfaces, equipment and environment was carried out using **OX-VIRIN** at 1%.
2. **Cleaning** (with water and the neutral detergent **OX-NET**) **and disinfection of sows** (with **OX-VIRIN** at 0.5%) before entering into the farrowing room.
3. **Before the birth:** The day before the birth, the mammary gland of the sow was disinfected with **OX-VIRIN** at 0.5%. The same disinfectant solution was used in order to disinfect the external part of the vulva.
4. **Day of the birth:** The day of the birth, piglets were immerse in a solution of **OX-VIRIN** at 0.5%. Later, piglets were dipped or dusted with the powdered product **OX-S4**, specially the parts of the body more inaccessible (underarm, groin, etc.).



Piglets immersion in OX-VIRIN at 0.5% and following piglets dip in OX-S4

5. Application of **OX-S4** on the heat mat and/or on the nests.



Application of the powdered product OX-S4 on heat mats and nests

6. **Cleaning and disinfection in presence of animals:** Solid residues were frequently removed and surfaces were disinfected using **OX-VIRIN** at 0.5-1%.
7. **Environmental disinfection:** Nebulization with **OX-VIRIN** at 0.5% at least two times a week.
8. **Disinfection of utensils and equipments:** Application of **OX-VIRIN** at 1% by spraying or immersion. It is necessary to maximize hygiene during all phases of animal management.

Results

The following table shows the results obtained in the control room and in the experimental room once piglets were weaned. Results refer to diagnosed cases of *Streptococcus suis*.

Room	Number of sows	Number of piglets	Number of animals treated with antibiotics	Number of dead animals	% of affected animals
Control	14	183	33	8	22.40%
Experimental	14	183	4	1	2.73%

As shown in the table, in the farrowing room where the experimental work protocol was applied, the percentage of affected animals was 2.73%. However, in the farrowing room where the control work protocol was applied there were 22.40% of affected animals. Furthermore, in the experimental room piglets showed a better growth rate than in the control room. This is believed to have been due to the great reduction of general microbial load caused by the applied experimental work protocol.

FIELD EXPERIMENT # 2

Material and methods

The second part of this work was carried out in Italy, where a semi-closed cycle pig farm with 2,000 sows was selected. The medical history of the selected farm revealed serious PRRS problems and high microbial load in farrowing and weaning areas. This high microbial load was mainly caused by *Streptococcus* as complicating agent of the recirculation of PRRS virus present the first month after weaning. The experimental group of animals consisted of 32 sows. At weaning time, piglets were placed in many weaning rooms. All of them were similar in density, ventilation, facilities, etc., with the exception of rooms 1 and 5 that were slightly larger.

Room	Number of animals	Weaning date	Batch
1	430	9 th December 2011	Control
2	362	9th December 2011	Experimental
3	369	9 th December 2011	Control
4	379	9 th December 2011	Control
5	398	9 th December 2011	Control

Hygiene and disinfection work protocol used as control:

- 1. Cleaning and disinfection in the absence of animals:** Cleaning was carried out using alkaline detergent. The disinfection of surfaces, equipment and environment was carried out using biocidal products based on aldehydes and quaternary ammonium salts.
- 2. Cleaning** (with water and neutral detergent) **and disinfection of sows** (with iodine based product) before entering into the farrowing room.
- Application of powdered products based on phosphates on the heat mat and/or on the nests.
- 4. Disinfection of utensils and equipments:** Application of products based on iodine or alcohol by spraying or immersion.

Hygiene and disinfection work protocol applied in the experimental room:

- 1. Cleaning and disinfection in the absence of animals:** Cleaning was carried out using the alkaline detergent **OX-NETAL**. The disinfection of surfaces, equipment and environment was carried out using **OX-VIRIN** at 1%.
- 2. Cleaning** (with water and the neutral detergent **OX-NET**) **and disinfection of sows** (with **OX-VIRIN** at 0.5%) before entering into the farrowing room.
- 3. Before the birth:** The day before the birth, the mammary gland of the sow was disinfected with **OX-VIRIN** at 0.5%. The same disinfectant solution was used in order to disinfect the external part of the vulva.
- 4. Day of the birth:** The day of the birth, piglets were immerse in a solution of **OX-VIRIN** at 0.5%. Later, piglets were dipped or dusted with the powdered product **OX-S4**, specially the parts of the body more inaccessible (underarm, groin, etc.).
- Application of **OX-S4** on the heat mat and/or on the nests.
- 6. Cleaning and disinfection in presence of animals:** Solid residues were frequently removed and surfaces were disinfected using **OX-VIRIN** at 0.5-1%.
- 7. Environmental disinfection:** Nebulization with **OX-VIRIN** at 0.5% at least two times a week.

8. **Disinfection of utensils and equipments:** Application of **OX-VIRIN** at 1% by spraying or immersion. It is necessary to maximize hygiene during all phases of animal management.
9. **Cleaning and disinfection of weaning room:** Before the entrance of animals, spray **OX-VIRIN** at 1%. Later, dust the powdered product **OX-S4** on surfaces and also on piglets during they arrival.

Results

The following table presents the results obtained five weeks after weaning.

Room	Number of animals	Weaning date	Control date	Days	Number of dead animals	% of dead animals
1	430	9 th Dec 2011	13 th Jan 2012	35	16	3.72%
2	362	9th Dec 2011	13th Jan 2012	35	10	2.76%
3	369	9 th Dec 2011	13 th Jan 2012	35	22	5.96%
4	379	9 th Dec 2011	13 th Jan 2012	35	19	5.01%
5	398	9 th Dec 2011	13 th Jan 2012	35	26	6.53%

As shown in the table, the application of the experimental work protocol considerably reduced the number of dead animals. In all cases dead piglets were necropsied, and as long as possible, laboratory analysis were carried out. In most cases, during necropsy it was observed increase in the size of lymph nodes and interstitial pneumonia with diffuse poliserositis, specially at cardiorespiratory level. At laboratory it was demonstrated that, in most cases, animals were PCR positive to PRRS, being *Streptococcus* the bacterial agent mostly isolated.

The group of animals treated with the hygiene and disinfection experimental work protocol, in addition to show a great decrease in mortality, showed also a significant reduction in terms of parenteral treatments and as regards to the number of animals retarded in growth.

Conclusions

Taking into account presented data, it can be concluded that **the implementation of the developed hygiene and disinfection work protocol allows effectively control of the infection caused by *Streptococcus suis***. The work guidelines proposed not only allowed a statistically significant decrease of the percentage of animals affected by *Streptococcus suis*, but also led to improve production rates, proving to be an effective, ecological and economically viable solution.