

# Severe outbreak of pasteurellosis in sows: a case description



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## SUMMARY

Sow mortality represents a relevant issue in the modern pig industry and can negatively impact the profitability of farming. Sow mortality rate should range between 3-6% on a yearly basis, but higher rates are quite commonly reported. Disease conditions of the locomotor, digestive, reproductive and urinary systems are most frequently observed in dead/euthanized sows. On the other hand, respiratory diseases are rare in this category of animals, the most severe episodes resulting from the introduction of a “new” infectious agent into the breeding stock, thus in absence of an adequate level of herd immunity.

We describe herein the main clinical, pathological and microbiological findings observed during a severe outbreak of respiratory disease, which occurred in a breeding pig herd in Central Italy. The respiratory syndrome affected a very high percentage of pregnant and lactating sows (around 30%), both primiparous and multiparous. Within two weeks, the mortality rate reached 15%. At necropsy, serous-fibrinous pleuritis, along with large foci of acute bronchopneumonia, affecting the cranio-ventral parts of both lungs, represented the most relevant pathological findings in animals under study. In depth bacteriological investigations identified a capsular type D and hgbB-positive *Pasteurella multocida* strain as the sole causative agent.

Pneumonic pasteurellosis usually affects grower/finishing pigs and represents the final stage of the so-called porcine respiratory disease complex. As a matter of fact, *Pasteurella multocida* rarely acts as the primary cause of porcine pneumonia, rather being considered an opportunist which complicates primary infections caused by other bacteria and/or viruses. The co-factors which likely contributed to determine such a severe respiratory syndrome in sows are largely unknown. Speculatively, we hypothesize that resulted from the introduction of a “new” strain of *P. multocida*, which infected immunologically naïve sows. The poor level of biosecurity adopted, as well as the kinetics of this outbreak, argue in favour of such a scenario.

## KEY WORDS

Sow, respiratory syndrome, *Pasteurella multocida*, capsular serogroup, virulence factors.

## INTRODUCTION

In the modern pig industry, sow mortality represents a relevant issue, which can negatively impact the profitability of farming<sup>1</sup>. Ideally, the sow mortality rate should range between 3-6% on a yearly basis. However, higher rates are quite commonly reported, usually tied to farm-specific management strategies<sup>2</sup>. Most sow mortality occurs during pregnancy or within the weaning-to-oestrus interval. It is often challenging to obtain reliable diagnostic data, as necropsy and laboratory investigations are not routinely performed in sows. According to literature, disease conditions of the locomotor, digestive and urogenital systems are most frequently observed in dead/euthanized sows. On the other hand, respiratory diseases are rare in this category of animals, the most severe episodes resulting from the introduction of a “new” infectious agent into the breeding stock, thus in absence of an adequate level of herd immunity<sup>2-4</sup>.

We report herein the main features of an unusual and particularly severe respiratory syndrome, which recently affected a pig breeding farm in Central Italy.

## MATERIALS AND METHODS

The present outbreak occurred in a medium-sized pig breeding farm (“site 1”), which remained unused for over two years. In October 2017, one hundred and fifty sows were introduced therein, all coming from the same herd of origin. The sows were routinely vaccinated against *Aujeszky's* disease, porcine parvovirus, erysipelas and colibacillosis. Reproductive activity was organized in a three-week batch schedule. Piglets were weaned at 28 days and remained at this site until reaching two months of age. Thereafter, they were transferred to a different farm (“site 2”) and raised to the market weight. The two farms were 5 km away from each other and shared the same personnel and equipment. Fattening pigs coming from other farms were simultaneously reared in site 2, no all in/all out strategy being implemented. In December 2017, a severe respiratory disease occurred in

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**Figure 1**  
Sow. Abundant discharge of bloody-tinged foamy fluid from the nostrils.

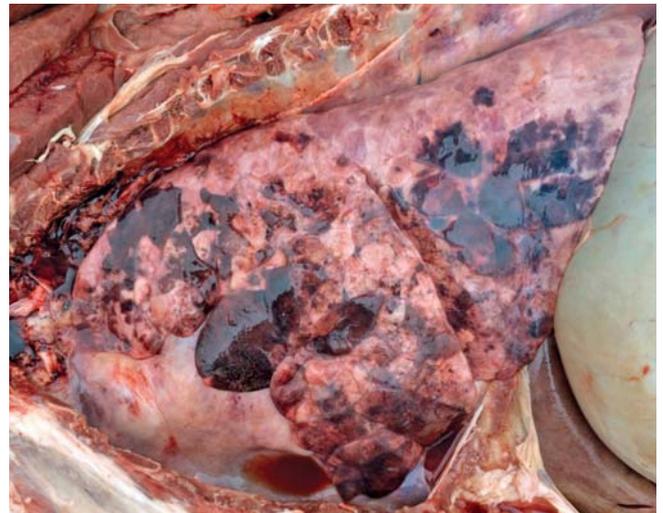
the above breeding stock. Six sows were necropsied for diagnostic purposes. Pulmonary and lymph node samples were routinely processed for histopathological investigations. In depth bacteriological culture tests and biomolecular investigations for *Mycoplasma* spp.<sup>5</sup>, *Influenza A virus*<sup>6</sup>, *Porcine Reproductive and Respiratory Syndrome virus*<sup>7</sup>, *Porcine Circovirus type 2*<sup>8</sup> and *Coronavirus* spp.<sup>9</sup> were also carried out.

## RESULTS

The respiratory syndrome affected a high percentage of pregnant and lactating sows (around 30%), both primiparous and multiparous. Anorexia, fever, dyspnoea, coughing, cutaneous and snout cyanosis and agalactia were the most relevant signs and symptoms. Within two weeks, the mortality rate reached 15%. At the same time, the mortality of suckling piglets notably increased, as a result of sow agalactia.

At necropsy, abundant discharge of frothy and bloody fluid was observed from the nostrils (Figure 1). Serous-fibrinous pleuritis, along with large foci of acute bronchopneumonia, mainly affecting the cranio-ventral parts of both lungs, represented the most relevant pathological findings (Figure 2). Microscopically, fibrinous pleuritis, fibrinous-purulent and necrotizing broncho-pneumonia were mainly observed. Bacteriological investigations yielded the isolation of *Pasteurella multocida* (*P. multocida*) as pure culture from all the lungs under study. In one sow, *P. multocida* was additionally isolated from the spleen. On the contrary, samples always tested negative for all other pathogens. The antibiotic sensitivity was evaluated by agar diffusion test; all the isolates proved to be sensitive to marbofloxacin, amoxicillin, ceftiofur e florfenicol. One isolate of *P. multocida* was tested according to Cucco et al.<sup>10</sup>, in order to identify its capsular serogroup and its major virulence. As a result, *P. multocida* demonstrated to belong to the capsular serogroup D and to be hgbB-positive.

Overall, laboratory investigations identified *P. multocida* as the sole infectious pathogen responsible for such a severe



**Figure 2** - Sow. Multifocal areas of acute pneumonia, showing a lobular pattern. Few petechiae are also present at the level of the visceral pleura and on the outer surface of the pericardium.

respiratory disease. The outbreak was resolved over a two-week timespan and no further cases were reported in the following months. However, the poor reproductive performances led the farmer to remove the entire breeding stock one year later.

## DISCUSSION

In pigs, *P. multocida* rarely plays a role as primary causative agent of pneumonia; conversely, it usually acts as an opportunistic pathogen, worsening infections sustained by viruses or *Mycoplasma hyopneumoniae*. As a matter of fact, pneumonic pasteurellosis usually represents the end stage of the so-called “porcine respiratory disease complex”, a multifactorial and costly syndrome mainly affecting growing/finishing pigs worldwide<sup>11,12</sup>.

Considering that, the present outbreak of pneumonic pasteurellosis shows some unusual features. First of all, it affect-

ed a category of animals usually spared by severe respiratory diseases, with unexpected high morbidity and mortality rates. Moreover, it was caused by *P. multocida* as the sole and primary agent. We consider unlikely that this was due to a particular combination of the capsular serogroup with one or more virulence factors. In fact, *P. multocida* capsular serogroup D/hgbB-positive strains are not uncommon in Italy, nor in the rest of the world<sup>10,13</sup>. It seems difficult to assign a role to additional predisposing factors. The involvement of lactating sows, along with the mild environmental temperatures, lead us to rule out the climate as a relevant predisposing factor. Likewise, the exposure to mycotoxins was considered improbable, as their levels were within the range of tolerability (data not shown).

Speculatively, we hypothesize that the disease resulted from the introduction of a “new” strain of *P. multocida*, which probably originated from site 2 and then infected immunologically naïve sows. The adoption of a poor level of biosecurity, as well as the kinetics of this outbreak, argue in favour of such a scenario.

To conclude, we consider that the present case description implies at least three, as simple as relevant “take home messages”:

- a) *P. multocida* can primarily cause severe outbreaks of pneumonia in adult animals, at least under intensive rearing conditions. This further highlights the importance of performing a rational and full diagnostic *iter*;
- b) in spite of recent reports<sup>14,15</sup>, the pathogenic variability of *P. multocida* strains is still poorly understood and goes well beyond the presence of a single virulence factor. Filling this knowledge gap sounds of particular relevance, due to the compelling restrictions to the use of antimicrobials;
- c) suitable biosecurity strategies are crucial to properly manage the health of livestock.

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