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Exploration of the Connection Between Porcine Necrotic Ear Syndrome and PCV2 Infection

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Abstract: This study provides an overview of current knowledge relating to porcine necrotic ear syndrome (or ear tip necrosis) associated with PCV2 infection. It is believed that Porcine Circovirus type 2 (PCV2) may be involved in etiology of porcine necrotic ear syndrome. PCV2 is the primary causative agent for Porcine Circovirus Associated Diseases (PCVAD). In cases when clinical signs of PCVAD (mainly PMWS) are present on a farm, the porcine necrotic ear syndrome is more often. Initially, the lesions of ear tip necrosis appeared at the margin of the pinna(e) as asuperficial vesicular dermatitis associated with superficial auricular trauma. These lesions are characterized by systemic necrotizing vasculitis accompanied by epidermal necrosis/ulceration and dermal haemorrhage. The purpose of this study is to investigate the connection between clinical signs of porcine necrotic ear syndrome and of PCV2.

Key words: Porcine necrotic ear syndrome, ear tip necrosis, circovirus, PCV2, PCVAD, PMWS, pig

INTRODUCTION

Porcine Necrotic Ear Syndrome (PNES)

Etiology, clinical signs, lesions: Porcine necrotic ear syndrome (or ear tip necrosis) is characterized by large erosive lesions at the margin of the pinna(e). It is evident observed in both sexes (mixed and single sex pens are equally affected) while flop-eared pigs appear more affected than prick-eared pigs. The earliest lesions are normally visible on the ears tips at 6-7 weeks old pigs. The lesions begin as a superficial vesicular dermatitis associated with superficial auricular trauma and become exudative and encrusted.

These lesions represent the point of access for bacteria that are present on the skin. After a few weeks, the ear tip slowly erodes with a blackened edge which can bleed, attractive to pen mates who may then start to bite at the lesion resulting in swelling and reddening of the ear. Localized lesions slowly healed or sporadically progressed to deep necrotic ulcers, cellulitis, vasculitis, thrombosis, ischemia (Richardson *et al*., 1984).

PNES is usually noticed when other diseases appear in a herd e.g., respiratory or enteric disease. It is likely that the lesions are the result of a mixed infection causing damage to the skin.

Staphylococcus hyicus is the most common isolated agent in lesions followed by other pathogens such as streptococci and spirochetes, resulting in necrosis and ulceration (Fraser *et al*., 1991).

PNES clinical signs associated with PCV2 infection: Porcine Circovirus type 2 (PCV2) is considered to be an important emerging pathogen associated with a number of several distinct syndromes and diseases which have been collectively named Porcine Circovirus Diseases (PCVD) in Europe or Porcine Circovirus Associated Disease (PCVAD) in the USA (Opriessnig *et al*., 2007; Gillespie *et al*., 2009). The reason for the variety of clinical manifestations associated with PCV2 is not fully understood (Chae, 2005). The most common recognized syndromes in PCV2-infected pigs are Postweaning Multisystemic Wasting Syndrome (PMWS), PCV2-associated enteritis, PCV2-associated pneumonia, PCV2-associated reproductive failure, Porcine Dermatitis and Nephropathy Syndrome (PDNS) (Gillespie *et al*., 2009). PCVAD recently replaced the older name of PMWS and it was adopted to be inclusive of all the recognized syndromes associated with PCV2 infection (Allan *et al*., 2002).

PCV2 is involved in etiology agents of the development of PNES (Madec and Rose, 2005) associated sometimes by co infection with Porcine Reproductive Respiratory Syndrome Virus-PRRSV (Choi and Chae, 2001; Thibaut *et al*., 1998), Pasteurella multocida, Streptococcus suis types 1 and 2 and other pathogens (Lainson *et al*., 2002; Thomson *et al*., 2002). Among the various syndromes of PCV2 infection only PMWS is considered to have a severe impact on global swine production which mainly affects nursery and/or fattening pigs. Wasting is considered the most representative

clinical sign of PMWS but it is also involved in signs of PNES (irregular, red-to-purple macules or papules) can be noticed (Madec and Rose, 2005).

Initially, these signs are often observed in healthy pigs in the tip of the two ears and the condition in a second step can evolve into more damage due to ear biting. In these cases the mortality is high and rapid (usually within 3 days) and the survivors pigs usually appear poor growth. Furthermore, PNES can be observed in PDNS cases characterized by systemic necrotizing vasculitis (Segales *et al*., 2005) is observed affecting the dermis and subcutis, leukocytoclastic inflammation involving capillaries, small and medium sized venules and arterioles, accompanied by epidermal necrosis and ulceration and dermal haemorrhage (Choi and Chae, 2001; Duran *et al*., 1997; Thibault *et al*., 1998).

During last years a marked increase of field cases characterized by PNES associated with PCV2 infection has been observed in the USA and Europe. Recently, Henry and Tokach (2006) reported in Kansas an increase of incidences of PNES and the percentage of PDNS at a 30% of dead pigs was noticed. Although, in Canada there is no significant prevalence of PNES associated with PCV2 infection (Desrosiers, 2007). In France, during the recent years while the clinical signs of PMWS (mainly the wasting) had dramatically declined, the cases of PNES became more prevalent (Madec and Rose, 2005). Furthermore, a study in Denmark indicated that PNES was observed in 4.44 mean prevalence (Petersen *et al*., 2008). In Greece, during last 2 years the clinical observations in field conditions suggest that when PCVAD is present on a farm, more pigs with ear tip necrosis are observed. Pigs of 3-10 weeks of age are affected through out of different batches accompanied with lesions of PNES, severe wasting, respiratory clinical signs and significant mortality (Fig. 1).

Fig. 1: Affected pigs

Fig. 2: The lesions

Initially, the lesions are appeared at the margin of the pinna(e) as a superficial vesicular dermatitis associated with superficial auricular trauma. These lesions are characterized by necrosis, vasculitis, dry gangrene and inflammation that sporadically progress in exudative or ulcers (Fig. 2). Finally, the affected pigs appear during growing/finishing stage, poor growth and secondary co-infections that lead to death.

CONTROL STRATEGIES

There is no treatment for porcine necrotic syndrome caused by circulatory disturbance (as is cases of PMWS, PDNS). However, many cases of ear tip necrosis associated with PCV2 infection are usually characterized by coinfection with bacteria (Lainson *et al*., 2002; Thomson *et al*., 2002) and exudative epidermitis (Kim and Chae, 2004).

In these cases, it is suggested injections of penicillin, ampicillin, amoxicillin, lincomycin, florfenicol or tetracyclines for at least 4-5 days in combination with local application of a skin disinfectant such as tincture of iodine, iodophore or chlorhexidine are suggested (Cameron, 1999). Also, the use of anti-inflammatory drugs is often beneficial effective.

CONCLUSION

It is believed that porcine necrotic ear syndrome co-existing with PCV2 infection, the control of PCV2 infection may hinder the development of lesions. The prevention and control of PCVAD are based on proper immunization (vaccinations) and management practices (Thomson *et al*., 2002). Now a days, at least four

commercial vaccines are available against PCV2 infection and PCVAD in piglets and sows. The vaccines have succeeded in reducing losses caused by PCV2 in Europe, Canada and the USA (Opriessnig *et al*., 2007).

In Greece, the experience by use of PCV2 vaccine in infected herds suggests that under field conditions, vaccinations of sows in cases of early PCV2 infection and/or mass vaccinations of piglets at weaning stage with can decrease the prevalence of ear tip necrosis in the herd.

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