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Veterinary Public Health (Food Safety)

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Combination of antibiotic treatment and skin test-based culling is a suitable strategy for on farm eradication of *Brucella suis* biovar 2

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Introduction: Swine brucellosis outbreaks due to *Brucella suis* biovar 2 (*B. suis* 2) occur sporadically in continental Europe. Control and eradication is based on O-polysaccharide (O/PS)-based serological tests and full stamping out of infected herds. However, these tests frequently return false positive serological reactions (FPSR) due to infections with other gram-negative bacteria sharing O/PS epitopes. Previously we proved that a skin test using O/PS free cytosolic proteins is highly sensitive and specific, as well as effective to differentiate FPSR from true positives. On the other hand, full depopulation of large herds and outdoor farms rearing endangered breeds is undesirable and antibiotic treatment could be a suitable alternative. Oxytetracycline (OTC) treatment is effective to reduce the clinical impact of the disease but studies about its efficacy in a quantitative way are lacking. Reproduction ratio (R) can be used to compare the efficacy of different control strategies: if $R > 1$, infection spreads; if $R < 1$, infection fades. Using R estimates, we assessed the efficacy of an OTC based treatment alone or combined with skin test-based culling for eradicating *B. suis* 2 from a farm

Materials and Methods: Data from herds affected by *B. suis* 2 were used. Two strategies were evaluated: *i*, (default strategy) OTC was given in feed at 20 mg/kg BW to all animals in the herd and removal of the sows based on the normal annual replacement rate (equalling the length of the infectious period - T : 749 days); *ii*, the same OTC treatment combined with the removal of skin test positive animals. The T for strategy *ii* was modelled based on the testing interval (ranging from 1 to 25 months) and given the estimated diagnostic sensitivity for the skin test (96.4%). A deterministic Susceptible-Infectious-Removal model was used to estimate the transmission rate parameter of *B. suis* 2 under OTC treatment (β). R for each strategy was calculated as $R = \beta * T$. Three scenarios were used: 70, 200 and 800 infected animals at the moment of the onset of the outbreak.

Results: OTC treatment alone was not effective to eradicate the infection ($R = 1.42$, 95% CI 1.35-1.49). However, if combined with skin test-based culling with a monthly interval between 1 and 10 months, R remained under 0.6 (range 0.06-0.59). The time required to eradicate the outbreak depended on the initial number of infected animals and the test interval.

Conclusion: Once the impact of the disease was minimized by the antibiotic treatment, testing and removing skin test positive animals every 4 months resulted in effective eradication in 1-2 years, offering a suitable alternative to full depopulation of infected herds.

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Keywords: *Brucella suis*, Eradication, Reproduction ratio

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