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Editors

W. Christopher Scruton

Stephen Claas

Layout

David Brown

Logo Design

Ruth Cronje, and Jan Swanson;

based on the original design by Dr. Robert Dunlop

Cover Design

Shawn Welch

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**MINIMUM INHIBITORY CONCENTRATIONS OF FIVE ANTIBIOTICS AGAINST
RECENT IOWA ISOLATES OF *ERYSIPELOTHRIX RHUSIOPATHIAE***

Lindeman CJ, Salmon SA, PortisES, Case CA, Bradford, JR
Pfizer Animal Health

Erysipelas, caused by *Erysipelothrix rhusiopathiae*, is a major disease of swine world-wide. The most common reservoir of infection is the carrier pig. It is spread by ingestion of contaminated feed or water. At least 3 clinical syndromes are evident. Acute swine erysipelas is an overwhelming bacteremia leading to septicemia and sudden death. Less acute cases result in a characteristic rhomboid urticarial lesion. The number and intensity of the urticarial lesion may indicate the severity of the disease and the likely clinical outcome. In the chronic form, arthritis is the major manifestation of the disease. From an economic standpoint, mortality and carcass condemnations are major producer concerns.

Vaccination with modified live bacteria or killed bacterins has been successful in reducing mortality.¹ To reduce costs of production, some producers have reduced or eliminated vaccination against erysipelas as a routine practice. Also, some producers have attempted to use only one vaccination of a killed bacterin instead of the label indicated 2 doses. Clinically erysipelas may occur in pigs of any age. Treatment with one of several antibiotics is effective at reducing mortality and condemnations. In pigs close to slaughter weight an antibiotic with a short pre-slaughter withdrawal time is preferred.

Objective

The objective of this trial was to determine the MIC⁹⁰ of ceftiofur and 4 other antibiotics against *Erysipelothrix rhusiopathiae*. This paper presents the data from those antibiotics commonly used in swine in the United States.

Methods and Materials

In a major outbreak in the summer of 2001 in Iowa, the Iowa State University Diagnostic Laboratory isolated *Erysipelothrix rhusiopathiae* from 44 different cases. The antimicrobial susceptibility of those isolates was evaluated using a broth microdilution system (Sensititre Division, Trek Diagnostic Systems, Inc., Westlake, Ohio) that conforms to the guidelines of the NCCLS. The five antimicrobial agents and range of dilutions tested are given in table 1. NCCLS recommended quality control strains were tested in addition to the test strains.

Table 1. Dilution Ranges

Antimicrobial	Dilution Range (µg/mL)
Ceftiofur	0.03 - 16
Penicillin	0.12 - 64
Tilmicosin	0.12 - 64
Tetracycline	0.12 - 64
Florfenicol	0.06 - 32

The minimum inhibitory concentration (MIC₉₀) and range are shown in table 2.

Table 2. MIC-90 of 44 Clinical Isolates of *Erysipelothrix rhusiopathiae*

Antimicrobial	MIC (µg/mL)	
	MIC ₉₀	Range
Ceftiofur	≤ 0.03	≤ 0.03-0.06
Penicillin	≤ 0.12	≤ 0.12*
Tilmicosin	≤ 0.12	≤ 0.12 - 0.5
Tetracycline	64	1- 64
Florfenicol	4	2 -8

* No range – all isolates ≤ 0.12

Discussion

The *in vitro* results presented here for penicillin, ceftiofur and tetracycline agree with those reported by Yamamoto, *et al*². *In vitro* susceptibility must be correlated with clinical results to determine breakpoints for susceptible and resistant isolates. National Committee for Clinical

Laboratory Standards (NCCLS) breakpoints have not yet been determined for the tested antibacterials against *E. rhusiopathiae*; therefore, MIC values are reported.³ Those MIC values would suggest that any of these antibiotics could be effective in treating erysipelas. Erysipelas outbreaks typically occur later in the finishing phase of production and the potential for antibiotic residue is a major concern of veterinarians and producers. Penicillin, the historic treatment of choice for individual animals, has a pre-slaughter withdrawal period of 7 or more days when used at label dose. Most veterinarians and producers use penicillin at 3-5 times label dose, necessitating an extended withdrawal time (Animal Medicinal Drug Use Clarification Act). Tilmicosin (Pulmotil®, ELANCO) also appears to be effective based on the *in vitro* data presented here. It is feed based medication necessitating a 7-day withdrawal. Feed based medications are problematic in treating acute infections as the pigs may not be eating enough to consume the therapeutic dose and they may not legally be used for an extra-label indication. Florfenicol (Nuflor®, Schering), recently approved as a water-soluble oral medication has a 16-day withdrawal period. Ceftiofur (Naxcel® or Excenel®, Pharmacia) available in two formats for injection of individual pigs has a zero day pre-slaughter withdrawal time at label dosage. The MIC₉₀ for ceftiofur would indicate that ceftiofur should be very effective against erysipelas as well. The pharmacokinetic and pharmacodynamic profiles support high efficacy against septicemic erysipelas as the active metabolite of ceftiofur is present in the serum at well above MIC levels. Field reports support the theoretical prediction of efficacy.⁴ Tetracyclines would appear to be ineffective against erysipelas based on the high MICs *in vitro*.

The use of any of the above medications excluding penicillin used at label dose constitutes extralabel use of antibacterials

because erysipelas is not indicated on the label.

1. Wood, RL, *Diseases of Swine*, 7th Edition, 475-487, 1992.
2. Yamamoto, K et al, *J. Vet. Med. B* 48, 115-126, 2001.
3. NCCLS, Performance Standards for Antimicrobial Disk and Dilution Susceptibility Tests for Bacteria Isolated from Animals, Approved Standard, M-31-A2, 2002
4. Holtkamp, A. Personal communication 2000.