

USE OF ANTIBIOTICS/CHEMOTHERAPEUTICS TO CONTROL ATROPHIC RHINITIS IN SWINE
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Atrophic rhinitis was first described in Germany in 1830 (Pond and Maner, 1974), then was thought to have spread globally from Europe through the practice of importing breeds of swine for genetic improvement. Atrophic rhinitis was not reported in the United States until 1940 but at present is widespread. A 25 to 50 percent infection level is not uncommon in many commercial herds throughout the United States.

Experimental evidence links the bacterium *Bordetella bronchiseptica* with atrophic rhinitis in swine. Other agents have also been incriminated (*Pasteurella* sp., *Hemophilus* sp., viruses) and environmental irritants may increase severity of lesions (ammonia, pit gases).

Bordetella has been sensitive to the sulfonamide drugs, sulfamethazine and sodium sulfathiazole (Switzer, 1963) and vaccines prepared against some specific strains of the bacterium. Unfortunately, neither sulfonamide drugs nor specific vaccines are completely effective in eliminating atrophic rhinitis in infected herds. Efficacy is reduced because of the limited specificity of injectible vaccines and the occurrence of sulfonamide drug-resistance displayed by certain strains of *Bordetella*.

Data measuring the effects of feed antibiotics on atrophic rhinitis are limited. Feed antibiotics are generally not absorbed intact from the intestine and are not expected to function systemically.

Experiments have been conducted to evaluate the effectiveness of several feed antibiotics and antimicrobial compounds in controlling the occurrence and severity of atrophic rhinitis in pigs infected by natural exposure to *Bordetella*. These experiments also tested the hypothesis that drugs nonspecific for *Bordetella* might control the harmful effects of *Bordetella*.

Ninety-six weaned pigs averaging 25 pounds were allotted to one of four treatments on the basis of litter, origin, sex, and bodyweight. Each of the four treatments contained six replicate pens with four pigs assigned per pen. Treatments were assigned at random to complete blocks for statistical comparison.

Starting, growing, and finishing diets were fed until pigs assigned each treatment had attained 60, 120, 220 pounds bodyweight, respectively. Lincomycin was withdrawn six days prior to slaughter.

At approximately 125 pounds bodyweight, nasal swabs were made from one pig in each pen. Clinical tests revealed the presence of *Bordetella bronchiseptica* in 30% of the random group sampled. Following slaughter, the snout from each pig was transected at the level of the first upper premolar. Hypoplasia and/or atrophy of the turbinates in the cross-sections were quantitated by measuring the space (mm) between the turbinates and the adjacent wall of the nasal passage. Measurements reflecting turbinate shrinkage or absence are reported according to the criteria recommended for use in SPF-pig production programs. These criteria are given as follows:

| Hypoplasia and/or Atrophy (mm) | Turbinate Classification | Severity Score |
|--------------------------------|--------------------------|----------------|
| 1-3 | Normal | 0 |
| 3-6 | Mild | 1 |
| 6-9 | Moderate | 2 |
| >9 | Severe | 3 |

A snout cross-section revealing greater than 3 mm of turbinate shrinkage was accepted as positive diagnosis of atrophic rhinitis. When the snouts from all pigs within a treatment group were measured, a corresponding atrophic rhinitis index was calculated using the following equation:

$$I = \frac{\Sigma X}{N}$$

where: I = atrophic rhinitis index
 ΣX = sum of severity score (0, 1, 2, 3)
 N = number of animals in the treatment

Table 1 summarizes data from nasal turbinate measurements. The calculated atrophic rhinitis index for animals receiving control, carbadox:oxytetracycline, virginiamycin, and lincomycin treatments was 1.48, .792, .956, and .917, respectively. The number of pigs with severe turbinate hypoplasia and/or atrophy was higher ($P < .025$) in groups receiving the unmedicated diet when compared with those fed medicated treatments. The number of animals receiving normal turbinate scores and those displaying mild or moderate turbinate infection did not differ ($P < .05$) among treatments. Atrophic rhinitis indices did not differ ($P < .05$) among medicated treatments.

Claims for drugs used in this experiment do not include treatment or control of atrophic rhinitis and none of the treatments were effective in reducing occurrence of the disease. However, medicated diets containing carbadox:oxytetracycline, virginiamycin, or lincomycin significantly reduced the severity of atrophic rhinitis in swine. Beneficial effects of treatments containing drugs were independent of drug specificity against *Bordetella*. Further, these data suggest that the antibiotics/antimicrobials used do not require intestinal absorption or systemic function in order to be effective against atrophic rhinitis.

Experiments were conducted to evaluate the effectiveness of antibiotics (oxytetracycline, virginiamycin, and lincomycin) and the antimicrobial carbadox in controlling the occurrence and severity of atrophic rhinitis in pigs infected by natural exposure to *Bordetella bronchiseptica*. The number of pigs at slaughter with severe turbinate hypoplasia and/or atrophy was higher ($P < .025$) in pigs receiving the unmedicated diet when compared with those fed medicated diets. Atrophic rhinitis indices did not differ ($P < .05$) among medicated treatments. Beneficial effects of treatments containing drugs were independent of drug specificity against *Bordetella*.

Selected references: Dunn, J.W. 1969. Pneumonia and atrophic rhinitis in Nebraska swine. Proc. G.A. Young Conf. Veterinarians, p.45; Little, T.M. and F.J. Hills. 1972. Statistical Methods in Agricultural Research. Univ. of California Agricultural Extension Service, Berkeley, Calif., USA; Pond, W.G. and J.H. Maner. 1974. Swine Production in Temperate and Tropical Environments. W.H. Freeman & Co., San Francisco; Ross, R.F., W.P. Switzer and J.R. Duncan. 1967. Comparison of pathogenicity of various isolates of *Bordetella bronchiseptica* in young pigs. Can. J. Comp. Med. Vet. Sci. 31:53-57; Switzer, W.P. 1963. Elimination of *Bordetella bronchiseptica* from the nasal cavity of swine by sulfonamide therapy. Vet. Med. 58:571.