ENVIRONMENTAL SOURCE OF MYCOBACTERIUM AVIUM FOR INFECTION OF SWINE

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Mycobacterial infections in swine are caused primarily by serotypes of Mycobacterium avium, most by serotypes 1 and 2, although many other serotypes have been isolated from swine in the United States and worldwide. Nearly one percent of swine slaughtered annually under federal inspection in the United States are found to have lesions of tuberculosis.

A problem of increasing importance to the swine industry in the United States and elsewhere is that of tuberculosis in confinement units. This is often caused by serotypes 4 and 8, although serotypes 1,2,5, 9, and 10 have also been isolated from affected pigs. In most cases, these outbreaks are associated with the use of woodshavings for bedding of newborn pigs.

Swine production in Arizona has been characterized by rapid growth and by a high proportion of large confinement units among the state's approximately 100 producers. Swine tuberculosis was first diagnosed in slaughter hogs in Arizona in May, 1975. Most problems have occurred in two herds, although swine from at least thirteen others have been condemned entirely or in part due to the presence of tuberculous lesions. The purpose of this report is to present findings of our studies of the epidemiology of this disease in two herds.

Chosen for study were the two most severely affected herds, designated here Herds A and B. Herd A is a 400 sow farrow-to-finish unit located in southeastern Arizona at 1310 m elevation in an area which receives about 30 cm of rainfall yearly. The warmest month of the year is June, with high temperatures averaging 35C; about 70 days per year have a low temperature below 0^0 C. Farrowing and nursery facilities are of the total confinement type. Herd management is excellent; no serious disease problems have existed in the herd and most pigs reach market weight by five and one half months of age.

Herd B is a 350 sow farrow-to-finish operation located in northeastern Arizona at 1585 m elevation and receiving 23 cm of rainfall yearly. July is the warmest month of the year, with high temperatures averaging 35^0 C; about 152 days per year have a low temperature below 0^0 C. Farrowing, nursery, and growing facilities are of the total confinement type. Erysipelas, pleuropneumonia, and leptospirosis occur sporadically in this herd.

The pattern of occurrence in both herds was seasonal. Populations of pigs born during the months of November through May had the highest incidence rates of tuberculosis. The condemnation rate was as high as 130 pigs condemned per 1000 pigs slaughtered; the total financial loss for both herds has been $70 - $90,000.

Lesions in pigs from these herds were found only in lymph nodes associated with the gastrointestinal tract, and were most frequent by far in mesenteric lymph nodes. Bacteriological examination of lymph nodes from these pigs yielded isolates of M. avium serotypes 1,2,4,5,8,9, and 10. Cultures of woodshavings used as bedding in the farrowing stalls yielded no isolates of M. avium.

Based on evidence of others that woodshavings may be a source of M. avium infection, use of this material was stopped in both herds and the monitoring of the infection rate continued. The last pigs born on woodshavings were the last found to be infected.

To test the ability of naturally infected pigs to transmit M. avium infection to susceptible contact pigs, 12 tuberculin reactors, each three to four weeks of age, were obtained from Herd B. These were divided into four groups of three each, and a contact pig from a herd with no history of M. avium infection was placed with each group. Fecal samples were collected twice weekly for ten weeks from each pig and cultured for M. avium. Post mortem examination of all pigs after the ten week exposure periods revealed tuberculous lesions in at least one naturally infected pig in each group. Among contact pigs, no tuberculin reactions, no tuberculous lesions, nor isolates of M. avium were found.

Conclusions:

The immediate source of infection in these two herds has been shown to be woodshavings used for bedding pigs in farrowing houses. Although others have isolated M. avium from woodshavings, we have not. Nonetheless, all epidemiologic evidence suggests that this material is the source. The ultimate source remains a matter of speculation, although M. avium has been isolated from other environmental sources such as soil and water which may act to contaminate woodshavings. Better methods for culture of M. avium from highly contaminated sources are needed.

The ability of infected pigs to transmit the infection has long been a matter of speculation. Ellsworth et al (1980), using experimentally infected pigs, demonstrated fecal shedding of M. avium and transmission of the infection to contact pigs. Our results, using naturally-infected pigs and following the same protocol, fail to substantiate this. This may be due to differences in serotype or other properties of infecting organisms. In any case, our results add to the evidence that the pig is usually a dead-end host for M. avium.

The environment is an important source of M. avium infection for pigs. This must be considered in further research efforts as well as in management practices.

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