THE OCCURRENCE OF TOXIN-PRODUCING STRAINS OF PASTEURELLA MULTOCIDA IN SPF HERDS

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The aetiological significance of Pasteurella multocida in atrophic rhinitis of swine has been uncertain for many years. However, de Jong and coworkers (1) found that only strains that produce a heat-labile toxin could cause turbinate atrophy in SPF pigs. Recently, Pedersen & Barfod (2) showed that combined infection with Bordetella bronchiseptica and a toxin-producing strain of P. multocida produced atrophic rhinitis corresponding to the progressive natural disease.

The purpose of the present work was to study the occurrence of P. multocida in SPF herds with no history of atrophic rhinitis, and to examine isolated strains for toxin production. For comparison, a number of SPF herds reinfected with atrophic rhinitis were studied in order to see if the condition might be associated with toxin-producing strains of P. multocida.

Nasal swabs were examined bacteriologically as described previously (2). In addition to attempts to isolate P. multocida by direct culture, mice were injected intraperitoneally with 0.2 ml volumes of nasal swab suspensions. Mice that died after inoculation were opened aseptically and blood agar cultures made from their livers. Surviving mice were killed one week after injection.

Strains of P. multocida were examined for toxin production as described by de Jong et al. (1). Briefly, an overnight culture (37°C) in trypticase soy broth (BBL) was centrifuged and filtered through a membrane filter (0.45 µm). Volumes of 0.2 ml were injected intradermally on depilated guinea pigs. Skin lesions were recorded after 24 and 48 hours. Strains producing an area of swelling and hyperaemia with a diameter exceeding 10 mm after 48 hours were recorded as toxin positive. Strains giving no or smaller reactions were regarded as negative. Doubtful (10 mm) reactions were repeated.

Pasteurella multocida was isolated from 5 of 11 SPF herds with no signs of atrophic rhinitis. Thirty-one strains examined for toxin production by the guinea pig skin test all gave a negative reaction (Table 1). P. multocida was isolated from all of 6 SPF herds reinfected with atrophic rhinitis. Of 32 strains examined 30 were toxin-producing, two gave a doubtful reaction. For the recovery of P. multocida the mouse test was much more sensitive than direct culture, in that only 18 out of 74 isolates were obtained by direct culture on blood agar.

As appears from the above, in this investigation toxin-producing strains of P. multocida were not isolated from SPF herds with no history of atrophic rhinitis. On the other hand, toxin-producing strains were regularly found in SPF herds reinfected with atrophic rhinitis. These findings suggest that the presence of toxin-producing strains of P. multocida may be essential for the possible development of clinical atrophic rhinitis.

Apparently, P. multocida requires predisposing conditions to become established, and the mere presence of toxin-producing strains of P. multocida in a herd does not necessarily result in atrophic rhinitis. Under experimental conditions B. bronchiseptica has been shown to be able to pave the way for P. multocida (2). Since B. bronchiseptica is a common potential pathogen among pigs, such an interaction may often be found under field conditions. However, not all herds with atrophic rhinitis are heavily infected with B. bronchiseptica, and it may therefore be suggested that under natural conditions factors other than B. bronchiseptica (e.g., climatic and environmental conditions) may render the nasal mucosa susceptible to the damaging effect of toxin-producing strains of P. multocida. Therefore, under practical conditions, atrophic rhinitis must be regarded as a disease with a complex multifactorial aetiology involving both infectious agents and environmental determinants.

Selected references: (1) de Jong, M.F., H.L. Oei & G.J. Tetenburg: AR-pathogenicity-tests for Pasteurella multocida isolates. Proceedings of the IPVS Congress, Copenhagen, Denmark 1980, p. 211. (2) Pedersen, K.B. & K. Barfod: The aetiological significance of Bordetella bronchiseptica and Pasteurella multocida in atrophic rhinitis of swine. Nord. Vet.-Med. 1981, 33, 513-522.

Table 1. Recovery of P. multocida from clinically normal SPF herds and SPF herds reinfected with atrophic rhinitis, and results of toxin determinations

	Number of herds	Number of samples	P. multocida isolates	P. multocida Tox+	P. multocida Tox−	P. multocida Doubtful
Normal SPF herds	11	195	31	0	31	0
AR reinfected SPF herds	6	100	43	30	0	2