VACCINAL PROTECTION OF PREGNANT SWINE AGAINST LEPTOSPIRA INFECTION

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Leptospirosis is a worldwide cause of reproductive failure in pigs and is of increasing importance as a zoonotic disease in man. In Australia, the serovar associated with this disease in pigs is L. interrogans serovar pomona (Sullivan, 1974). Commercial vaccines are available to pig farmers for the protection of their herds. This paper reports the results of a protection trial on 43 pregnant gilts vaccinated by either of two commercially available L. pomona/tarassovi bacterins.

Methods

The bacterins were formalin-inactivated, aluminium salt adjuvated vaccines each dose containing 3×10^8 pomona and 3×10^8 tarassovi organisms (vaccine A) and 5×10^8 pomona and 3×10^8 tarassovi (Vaccine B).

Vaccinated gilts were given two doses of either vaccine A or B at 3, 6 or 12 months prior to natural challenge with serovar pomona. Sixteen gilts acted as unvaccinated controls. All animals were between 32 and 77 days pregnant when they were exposed for 33 days to other pigs actively excreting serovar pomona.

Results

Serological responses to challenge, renal leptospirosis and leptospiruria in the gilts is shown in table 1.

Table 1

	Controls	Vacc.A	Vacc.B
Number (n)	16	20	23
M.A. titres (mode)			
Prechallenge	< 50	< 50	< 50
Postchallenge	6 400**	< 50	< 50
Renal leptospirosis			
leptospiruria (n)	11**	0	1
gross lesions (n)	14	16	14
micro. lesions (W&S) (n)	4/7	3/13	0/14

Vaccination did not invoke high M.A. titres. The highest vaccination titre was 400. Natural challenge resulted in a rise in M.A. titres in unvaccinated control gilts within 33 days of challenge (range 800 to ≥12 800). In contrast vaccinated gilts only showed a small rise in titre (< 50 to 1 600). Vaccination significantly reduced the leptospiruria following kidney colonization but it did not prevent renal leptospirosis.

The reproductive performance of the gilts is shown in Table 2.

Table 2

	Controls	Vacc.A	Vacc.B
No. aborted	11**	1	0
Total piglets	144	180	244
n. stillborn	42	12	10
n. mascerated	40	30	7

Vaccination significantly reduced the abortions associated with leptospirosis. Vaccination reduced but did not prevent foetal mortality. There was a significant difference in foetal protection between vaccines A and B with the vaccine having higher pomona organisms giving better protection. The protection lasted for at least 12 months although there was a significant decline in the degree of protection between 3 months and 12 months post vaccination.

Litter pathology, serology, histology and microbiology are shown in table 3.

Table 3

	Controls	Vacc.A	Vacc.B
No. of litters	16	20	23
No. aborted	11**	1	0
% born dead	57**	23**	7**
Serology of stillborns			
M.A. titres	<50	<50	<50
Ig. range (mg.ml)	0 to 20	0 to 10.5	0 to 9
Leptospirosis identified			
by culture	7	0	0
by micro. (W&S)	6/12	0/15	1/15

** Significantly different at ($P < 0.001$)

Microscopic examination of stillborn piglets showed that leptospires invaded the foetus via the umbilical circulation. Piglets from all treatment groups had liver lesions which varied from mild changes to severe haemorrhage, diffuse focal necrosis and mononuclear cell infiltration. Six of 12 piglets from the control group had observable leptospires in the livers whilst only 1 of 30 piglets from vaccinated gilts had observable leptospires. Nine of the 30 did however have pathological changes consistent with infection. Kidney pathology which varied from mild interstitial nephritis to diffuse interstitial nephritis and mononuclear cell infiltration was present in piglets from all treatment groups but in general was not as severe as the liver changes. Ig. levels were raised in the sera stillborn piglets from all treatment groups but no piglets had detectable M.A. titres despite some having observable leptospires in liver section stained with W&S stain. Cultural methods were not a reliable method of diagnosing leptospirosis as a cause of reproductive failure.

Conclusions

Inactivated leptospira bacterins are capable of providing partial protection against the effects of leptospirosis for at least 12 months. They provide complete protection against abortion and reduce but do not prevent foetal mortality. There is significant differences between vaccines in preventing foetal mortality which may be related to the number of organisms included in the vaccine.

Neither vaccine protects against renal leptospirosis but they do reduce leptospiruria. Vaccination does not cause a significant rise in M.A. titres which is an advantage in distinguishing between infected and immunized pigs. Vaccines do however reduce the serological response to natural challenge and they may promote the spread of disease by serologically "masking" carrier animals and in addition can complicate the diagnosis of leptospirosis associated reproductive failure even in vaccinated herds.

Reference

Sullivan, N.D. (1974) Aust. Vet. J. 50:216