

EVALUATION OF HAEMOPHILUS PLEUROPNEUMONIAE BACTERINS IN
VACCINATION AND CHALLENGE STUDIES IN SUSCEPTIBLE SWINE

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Since disease attributable to Haemophilus pleuropneumoniae (HPP) was first recognized by Biberstein and Cameron in Sweden (1961) the disease has spread to world-wide significance.

Pigs of all ages are susceptible. The disease may occur in acute or chronic forms. Mortality may be up to 100% of the infected pigs.

The organism has generally been grouped by agglutination and precipitation tests into five (5) serogroups. In the U.S., based on isolation and serology, it is felt that serotypes 1, 3, 4 and 5 are present with type 5 the most predominant (Schutz, 1980).

Because of the apparent rapid spread and serious consequences of the disease, control measures are needed. Vaccination studies with variable success rates using killed HPP bacterin have been reported from Denmark (1976), Holland (1978), Taiwan (1976) and Switzerland (1978).

Because of the multiplicity of serotypes and the possibility of multiple infections in a herd, an efficacious bacterin should contain all the serotypes common to the area.

Two (2) multi-strained bacterins were produced: Bacterin A containing 3 types (1, 4 and 5) of HPP designed for use in feeder pigs and Bacterin B containing the same 3 types of HPP with Bordetella bronchiseptica and Pasteurella multocida designed for use in sow-pig operations.

The first study was conducted with Bacterin A in 72 - 8 week old 30-40 lb. feeder pigs. The pigs were HPP-seronegative. Forty (40) pigs were vaccinated twice with 2 ml of the test bacterin 3 weeks apart. Twenty (20) animals were vaccinated subcutaneously (SC) and 20 animals were vaccinated intramuscularly (IM). Thirty-two (32) pigs were reserved as non-vaccinated control animals.

All pigs were challenged 2 weeks post-second vaccination. The pigs were divided into 4 groups of 18 pigs each (5 SC vac; 5 IM vac; 8 controls) and challenged respectively with serotype 1, str. 4074-4.2x10⁸CFU/dose; serotype 3, str. 1421-6.8x10⁸CFU; serotype 4, str. M62-5.2x10⁸CFU and serotype 5, str. K-17-6.8x10⁸CFU. Animals challenged with serotypes 1, 4 and 5 were evaluated according to survival or death over a 14 day post-challenge period. Only mortality was considered as a positive reaction.

Since serotype 3 does not routinely kill pigs but produces a more chronic debilitating type of disease, the challenge was evaluated according to disease symptomatology, such as respiratory distress, swollen joints and arthritis, and weight gains rather than death.

The results of the challenges are summarized in Tables I and II.

Table I: Results of Serotypes 1, 4 and 5 Challenge in the Immunogenicity Studies of Haemophilus Pleuropneumoniae Bacterin in Feeder Pigs

Serotype	Vaccination Route	# Pigs	Positive/Total	% Protection
1	SC	5	1/5	80
	IM	5	0/5	100
	Total Vaccinates	10	1/10	90
4074	Controls	8	6/8	25
	SC	5	2/5	60
	IM	5	1/5	80
M62	Total Vaccinates	10	3/10	70
	Controls	8	8/8	0
	SC	5	1/5	80
5	IM	5	0/5	100
	Total Vaccinates	10	1/10	90
	Controls	8	6/8	25

TABLE II: Results of Serotype 3 Challenge in the Immunogenicity Studies of H. pleuropneumoniae in Feeder Pigs

Treatment	Neg/Tot Challenged	% Protection	Ave. Weight Start	Finish
SC Vaccinates	5/5	100	70 lb	82 lb
IM Vaccinates	5/5	100	70 lb	82 lb
Controls	0/8	0	70 lb	85 lb

The second study was conducted with Bacterin B in susceptible gilts and their offspring. Nineteen (19) gilts were vaccinated in a 2 dose regimen at approximately 4 and 2 weeks prior to farrowing. Piglets were vaccinated at 5-7 and 24-28 days post-farrowing. Several piglets from each litter were left unvaccinated. Nine (9) gilts and their piglets were left as unvaccinated controls. All piglets were weaned at 5 weeks of age and challenged at approximately 8 weeks of age or 30 days post-second vaccination. Each litter was divided into 3 groups and challenged with either HPP serotype 1, 4 or 5. All groups were monitored for 14 days post-challenge and deaths recorded. The results are listed in Table III.

Gilt Piglet	Type 1	TABLE III		
		Type 4	Type 5	
Var Vac	5/1 89	5/1 89	5/1 89	
SC	8/9 89	6/7 86	5/6 83	
SC none	2/5 40	0/3 0	1/1 100	
IM	6/9 67	7/8 88	5/7 71	
IM none	-	0/1 0	1/4 25	
none none	2/10 20	0/10 0	2/9 22	
vaccinates				
(piglets)	14/18 77.7	13/15 86.6	10/13 76.9	

Challenge levels ranged from 2x10⁸-3.5x10⁹. Serological studies in micro-agglutination test systems showed no antigen interference between the bacterin components. The challenge results showed that vaccinated piglets were significantly protected.

Conclusions:

Bacterin A protected feeder pigs against severe challenge with HPP serotypes 1, 3, 4 and 5. Bacterin B protected piglets against severe challenge with serotypes 1, 4 and 5. It appears that for adequate protection in young pigs, sows or gilts and their piglets must be vaccinated. The studies show that a vaccination program with a multi-strained bacterin can be used to control disease due to HPP in feeder pigs and in sow-piglet operations.

Selected references: Biberstein et al, Ann. Rev. Microbiol. 15, 1961, DeJong, M.F., 5th World Int. Pig Vet. Cong. Perc., 1978, Gunnarson, A., Thesis 1980, Univ. of CA, Davis, Nulesen, Nord. Vet. 28, 1976, Olander, H.J., Ph. D. Thesis 1963, Univ. of CA, Scholl, E., 5th World Int. Pig Cong., 1978, Schultz, R., Proc. G.A. Young Cong. 1980, Weng, C.N., J. Sv. Chin Soc. Vet. Sci. 2, 1976.