



**Technical Bulletin # 006**  
**Pulse 200 Effective and Safe Application Method for Pfizer Vaccines**  
**September 18, 2002; by; David L. Cook, Ph.D.**

**Objective:** The Pulse 200 is the first needle- free method for administering swine vaccines. In this study RespiSure (Pfizer) and PrVac+ (Pfizer) were injected into weanling pigs at Iowa State University with the Pulse 200 and the immunologic response and injection site conditions were compared to weanling pigs given the same vaccine with conventional needle and syringe.

**Materials and Methods:**

1. The pigs used in this study originated from and were housed in a university research herd primarily used for genetic studies. The herd is seronegative and not vaccinated for pseudorabies virus (PRV), and seropositive for *Mycoplasma hyopneumoniae* (*M. hyo.*), although the sow herd is nearly seronegative.
2. Two weaning groups were studied and designated Trial 1 and Trial 2. Pigs were bled, tagged, tattooed and randomly assigned to treatment groups (Pulse 200, needle, none/control) at 4-5 weeks of age. In Trial 1, 3 tattoos were placed on the left neck as markers for the injection sites. In Trial 2, a single tattoo was placed in the middle of the neck and the injections were given 1 inch from the tattoo in the appropriate direction.
3. The 3 injection sites designated anterior (dorsal), posterior (dorsal) and ventral formed a triangle with the flat side parallel to the spine of the pig. The injection location was randomly assigned for each vaccine in each pig.
4. For the hypodermic needle injections, an 18 gauge X 5/8 (first vaccination) or 1 inch (second and third vaccinations) needle was used to ensure intramuscular deposition of the vaccines. Needles were changed at least every 6 pigs. For the needle-free, air-powered (NFAP) injections, the Pulse 200 a needle free injector for swine vaccines by Felton International (Lenexa, Kansas) was used and the injections were performed by company personnel. The operating air pressure was adjusted according to pig size to ensure intra-muscular deposition of the vaccines.

5. The pigs were vaccinated with two doses of a commercial *M. hyo.* vaccine (RespiSure, Pfizer Animal Health) at 5-6 weeks of age and again 2 weeks later, and with a commercial pseudorabies virus vaccine (PrVac+, Pfizer Animal Health) at 9-10 weeks of age. Blood samples were collected prior to vaccination, at 11-13 days after the second mycoplasma vaccination and 23-25 days after the PRV vaccination.
6. Serum was tested for *M. hyo.* antibodies by the Tween 20 ELISA at all sample collections (4) and test results are reported as optical density (OD) values. PRV serotesting was performed by the Iowa State Veterinary Diagnostic Laboratory using a commercially available ELISA (IDEXX, Portland, Maine, USA) and results are reported as S/P ratios.
7. For safety evaluation, the pigs were weighed periodically, and injections sites were observed and palpated 2 days after each vaccination and at each bleeding. In addition, injection sites were thoroughly dissected at slaughter. Data were subjected to analysis of variance to determine statistical significance.

**Results and discussion:**

1. Serological data are presented in Table 1. All pigs were seronegative for *M. hyo.* and PRV prior to vaccination. The serological responses of vaccinated pigs, regardless of injection type, were significantly greater than the non-vaccinated control pigs ( $P < .05$ ).

**Table 1: Results of serological testing of weanling pigs vaccinated with RespiSure and PrVac+ with the Pulse 200 or needle and syringe\***

Trial	Injection Type	<i>M. hyo.</i> OD values		PRV
		Test 1	Test 2	S/P Ratio
1	Pulse 200	.559	.407	1.259
	Needle	.515	.426	1.124
	Control	.038	.073	.016
2	Pulse 200	.449	.241	1.874
	Needle	.377	.259	2.116
	Control	.075	.047	.037

\* Data presented as group means

2. There was no difference between the two injection types with regard to the serological responses induced by either vaccine.
3. Non-vaccinated control pigs remained seronegative for both diseases, indicating the level of endemic *M. hyo.* infection was insufficient to induce seroconversion and the herd maintained the PRV-free status.
4. Regarding safety, 20 of 139 sites injected with the Pulse 200 device exhibited transient thickening of the skin (up to 1 cm in diameter) that was observed only at 2 days after injection. Similar thickening was observed in 1 of 158 needle-injected sites.
5. With regard to examination of injection sites at slaughter, 40 Pulse 200 and 39 needle injected pigs were evaluated. The number of lesions per injection sites was 3 of 117 with the needle-free injections and 3 of 114 with the needle. No abscesses or granulomas were observed and the small, mild lesions observed were of no consequence regarding meat quality.
6. There was no difference in weight gain between the three treatments.
7. The percentage of lung surface exhibiting pneumonia was low for each injection group; 0.19% and 0.16% for the needle-free and needle injected pigs, respectively.

**Summary:**

- These findings indicated that the Pulse 200 needle-free injection device is safe and effective for administering intramuscular vaccines to weanling pigs. Other studies using different vaccines in all stages of swine production have been completed with similar findings. .