Hog cholera (NC) viruses, which differed from other known NC viruses by their antigenic and immunological characteristics, were first reported in the United States in 1931 (Moore, et al.). These viruses were implicated in losses in farmers' pigs when they were used in conjunction with certain hypertensive serum in the simultaneous serum-virus test for immunization against NC. Identification of a variant virus was based on the observation that when pigs were inoculated with 2 ml of variant virus and a normal pig of identical type NC recovered; however, pigs inoculated with the same dose of this antisera and 2 ml of regular virus were fully protected.

After this initial episode, the variant virus became an event of varying degree, approximately 20 years later during the latter stages of the BC eradication program, the problem reappeared. Hog cholera was confirmed on several farms in pigs newly arrived from Arkansas. Prior to interstate movement, the pigs had been assembled at an Arkansas sale barn, where they were administrated BC antisera. Since the pigs containing BC had been given antisera, the question naturally arose as to whether the virus had been inoculated in this incident was a variant strain. Special testing by the Veterinary Biologies Division disclosed that the antisera given to the Arkansas pigs had a BC neutralization (50) titer of 1:4,55. Tests performed at the National Veterinary Services Laboratory disclosed that a special antisera, Kansas Animal Industry's BC experimental serum 1, did not protect pigs against the isolate (designated Iowa strain) when it was given in a quantity that should have protected against a regular virus. A protected infection occurred in two pigs inoculated with the antisera, and the pigs died on postinoculation days (PID) 36 and 36, respectively. Two pigs given the Iowa strain without BC antisera succumbed on PID 11 and 29. Hog cholera virus replicated to high titers, 10^9 plaque-forming units (PFU), in the spleen, lymph nodes, and brains of all four pigs. High virus titers (10^9 PFU) were also present in mucoid and fluid, spleen, kidney, liver, lung, and other organs. The pig given normal virus lived 90 days.

Following this disclosure, comparative tests were performed on pigs with the standard virulent challenge virus (Arkanas strain) and the Iowa strain. Pigs of comparable weight (average 13.6 kg) in two groups of three each were administered 2 ml of blood virus (5.75 x 10^3 TCID50/ml) prepared from either the Iowa or正常 strain along with ether 4, 16, or 32 ml of the BAL experimental serum 1. The course of infection was followed in each pig and immune-fluorescent studies were performed on blood and tissue specimens. (Mangelsing, et al., 1963; Stair, et al., 1963). Virus NC tests were performed on pigs with immune serum prepared against each strain (Carby, et al., 1962).

Of the three pigs given 4 ml of BAL serum, 3 died and 1 of the Iowa strain, an isolate, one died, one survived (PID 16) and one chronically (PID 54). The course of infection in the latter pigs was marked by frequent periods of remission of clinical signs. The third pig had an acute reaction, but recovered and appeared healthy when euthanized on PID 99. Persistent virus was a consistent lesion in all three pigs. Hog cholera virus of low titer (1.1 x 10^9 PFU/ml) was isolated from blood specimens in vivo to PID 42 and virus of high titer (1.5 x 10^9 PFU/ml) was recovered from spleen tissues collected at necropsy.

Of the three pigs given the Ames virus and 4 ml of serum, one developed a debilitative, chronic infection and died PID 64. On PID 9 and thereafter, high virus titers were demonstrable in this pig. One of the two remaining pigs had a very severe reaction, but later recovered. Hog cholera virus of low titer was isolated from this pig on PID 9 and 12. The third pig had a very slight reaction and NC virus was never isolated from it. The latter two pigs developed moderate high antibody titers (1:256) and were euthanized on PID 89.

When each virus was likewise administered with 16 ml of BAL serum 1, the 3 pigs receiving Ames virus remained healthy and by PID 68 had developed NC titers of 1:64 (1) and 1:128 (2), respectively. However, the 3 pigs receiving the Iowa strain became severely ill. One pig died on PID 9 following collection of a blood specimen, and a second pig was found dead on PID 14. Very low NC virus titers (10^9 PFU) were isolated from blood specimens of these pigs on PID 9 as well as from spleen tissues at necropsy. The third pig returned to an apparently healthy state after a prolonged illness of several days, but it remained persistently infected with NC virus until euthanized on PID 97.

Subsequently, three pigs given the Iowa strain of NC virus and 32 ml of BAL serum 1 remained healthy and NC virus was not isolated from them.

A pig inoculated with inactivated virus of the Iowa strain developed a low antibody titers (1:16). When this antisera was reacted with the Iowa strain in an indirect fluorescent antibody test, immunofluorescence of diminished intensity occurred compared to that observed with the Ames strain and homologous antisera. Also, when reciprocal cross-react tests were performed with type specific antisera, stains Ames and Iowa were neutralized to a greater degree by homologous than by heterologous antisera (Table 1). These antigenic differences were consistent with results of the pig challenge tests, and were similar to "antigenic differences in Two Hog Cholera Virus Strains" reported by Pirtle and Nisengard (1971).

In conclusion, 32 ml of BAL serum 1 was required to protect pigs against the Iowa strain, whereas 16 ml of serum protected pigs against the Ames strain. Pigs were also protected against either strain with 6 ml of serum. Whereas occasionally pigs died acutely from the Iowa strain, the saillent clinical feature was one of chronic infection characterized by persistent febrile disease. Properties of poor immunogenicity and diverse antigenic composition were properties of the Iowa strain that contributed to the NC epidemic in pigs given NC antisera and moved from Arkansas to Iowa.

Table 1. Hog Cholera Neutralizing Antibody Titers

<table>
<thead>
<tr>
<th>Virus</th>
<th>Ames</th>
<th>Iowa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ames</td>
<td>1.2</td>
<td>3.6</td>
</tr>
<tr>
<td>Iowa</td>
<td>0.6</td>
<td>5.9</td>
</tr>
</tbody>
</table>