

scribes the results from the use of virus in well herds in the State.

Results of Simultaneous Treatment in Well Herds.		
1,756 herds	101,680 head	No loss
209 herds	15,147 head	One died each herd
112 herds	11,355 head	Two died each herd
291 herds	34,408 head	Three or more died each herd

2,368 herds, 162,590 hogs; 74 per cent. of herds no loss; 26 per cent. of herds some loss.

Notice should be taken of the average number of swine per herd, under Iowa conditions. In the first case where no loss resulted the average of each herd was 57; in the second case, where one died in each herd, the average was 72; in the third instance, 101 was the average for the herd, and in the last case each herd averaged 118 hogs.

The following will show the amount of serum and virus distributed in Iowa in 1915 and 1916. Quantities are expressed in cubic centimeters, abbreviated thus: c. c.

	Serum	Virus
Commercial Companies, 1915	26,718,925 c.c.	966,517 c.c.
State Biological Laboratory, 1915	3,607,110 c.c.	165,001 c.c.
Total	30,326,035 c.c.	1,131,518 c.c.

	Serum	Virus
Commercial Companies, 1916	32,970,632 c.c.	1,047,170 c.c.
State Biological Laboratory, 1916	2,635,125 c.c.	123,116 c.c.
Total	35,605,757 c.c.	1,170,286 c.c.

An 80 to 100-pound shote will require about 30 c. c. of serum and 2 c. c. of virus for a double treatment—a large pig more, and a smaller one less. One c. c. is equivalent to 15 drops. This and the foregoing table will convey some idea of the number of hogs annually double treated in the State of Iowa.

A Swine Breeding Proposition.

From Ames, the delegation journeyed to Davenport, Iowa, where they were met by the hospitable proprietor of Iowa Farms, Col. French, and the genial and efficient Superintendent, Dr. Smith. Pure-bred Holstein cattle and Berkshire swine have been developed to a remarkable standard of excellence at Iowa Farms, and it was indeed a pleasure to inspect such wonderful herds where the tuberculin test for cattle and double treatment for hogs is practiced so thoroughly. The herd of swine, about 500 in number, were said to be all immunized, and the writer never saw a more thrifty or healthy looking bunch of pigs anywhere. A report of the methods followed in housing, yarding and feeding would be instructive, but that is apart from this article and space will not permit. In the neighborhood of 100 sows are farrowed each year and all breeding stock sent out is guaranteed "cholera-immunized". They are shipped to practically all States of the Union and no one has suffered. When asked for an expression of opinion regarding the double or simultaneous treatment, Col. French made the following statement: "Six years ago I instructed my manager that unless some protection against hog cholera could be found to cease breeding swine. After investigation at our State College, and at Washington, we became convinced that the double treatment was trustworthy and we inoculated \$40,000 worth of hogs with serum and virus. We have had no outbreaks of the disease and none of our customers have suffered. In one year the loss from hog cholera in our State (Iowa) was reduced from \$30,000, 000 to about \$3,000,000. Washington recommends the double treatment and without it we could not maintain a large herd of swine."

The Iowa herd was itself a remarkable endorsement of the double treatment.

Swine Breeding and Laboratory Combined.

The next stop was at the farm of W. S. Corsa, Whitehall, Illinois, where Berkshires are a specialty but where a laboratory is also operated in the production of serum and virus. The immense herd yarded under ideal conditions were all double treated and gave all the evidence required in support of the method. Mr. Corsa said that he would not continue breeding if he could not double treat and that he was obliged to treat in order to sell his stock.

Farmers' Views in Indiana.

In the State of Indiana the Canadian Swine Breeders' Committee endeavored to get the views of the out-and-out farmer in respect to double treatment. Boone County, the leading County for swine in the State, was visited and there two farmers were interviewed. It was learned that the farms averaged about 100 acres, and every farmer who keeps hogs at all carries about six brood sows. The general practice is to have all sows farrow in the spring, while about half of them are bred back to litter again in the fall. This works out in the neighborhood of three litters in two years per sow. Joseph Beelar, a farmer who buys and feeds quite extensively, spoke favorably of the double treatment and said that without it as an insurance he would have to double on his money in one year, for fear of losing

it all the next. If the pigs are not immune when he brings them home they are vaccinated and kept by themselves until danger from any breaks is past. J. W. Brendel, a feeder and judge of fat hogs as well as a breeder of pure-bred stock, endorsed serum and virus. He said that for a period of 30 years prior to the advent of the double treatment farmers lost as high as thirty per cent. of their hogs, but for the last six years in treated herds the loss would not exceed one per cent. "Everyone does not vaccinate in this County," Mr. Brendel said, "but the immune herds act as a buffer, checking the spread of the scourge and thus preventing heavy loss." Following are some of the arguments and opinions advanced by these two Boone County farmers: When breeding hogs can be rendered immune, there is greater opportunity to raise the standard of quality because the stock is not periodically destroyed. The foundation of the herd can be maintained.—When the veterinarian visits the farm to inspect or treat hogs, he often points out necessary changes in sanitation and conveniences that benefit the farmer and render the industry more profitable for him.—The sentiment or belief in Boone County is that immunized hogs are not carriers of the disease.—At auction sales many make the statement in their catalogues that the hogs to be sold are vaccinated. This helps rather than injures the sale and many farmers with non-immune herds are buyers.—Mr. Brendel himself did not vaccinate in 1917 and he considered that he lost fifteen dollars per head at his fall sale because he was not able to guarantee his young hogs immune.

A State's Efforts to Increase Production.

During 1917 the State of Indiana, through the State Veterinarian, Dr. Northrop, collected 55,000 shots in the stock yards where they were being offered for sale and sent them back to the country to be fed. These pigs averaged around 100 pounds each, and if a special effort had not been made they would have been sacrificed. They were all double treated, dipped and shipped in disinfected cars to farmers who would take them to finish. These shots gained 1½ pounds per day, on the average, and were usually returned to market after they had gained 120 pounds, or at the end of an 80-day feeding period. The spread in price was satisfactory and the farmers profited. The facts of the case bearing on the matter in hand are: that the loss in these double-treated hogs thus handled was less than one per cent., and this from all causes.

A Serum and Virus Laboratory.

While in the State of Indiana, the Swine Breeders' Deputation, under the guidance of Dr. F. V. Hawkins, visited the plant of Pitman and Moore where serum and virus are produced in large quantities. Here the Superintendent, Dr. Roberts, spared no efforts to demonstrate every operation in connection with the manufacture of the product, and showed the party through all branches of the institution that they might not fail to witness any step in the production of serum and virus. The cleanliness of the plant, as well as the sanitation of the surroundings, were beyond criticism. Lengthy comment on the equipment and methods used would be out of place here and somewhat technical, but the party were impressed very much by the despatch with which every operation was performed and the exhaustive efforts made to turn out a potent and clean product. Federal Government inspection was very rigid about the plant, as evidenced by the number of officials stationed in the different branches.

A few notes as to how serum and virus are made should suffice. To obtain virus young, healthy pigs are inoculated with virus alone, in order to set up the disease. In about seven days they are killed and the blood from them is filtered. The filtrate, which contains the disease-producing properties, is mixed with a percentage of alcohol as a preservative and stored in a cool place. Every hog has a number, and a chart is kept on which are recorded the temperature and all information concerning him when both dead and alive. After being bled he is "posted" (brief for post mortem examination) and sent to the tank. Any evidence of tuberculosis or other contagious diseases would at once condemn the product of his blood. To test the potency of the virus, a pen of eight pigs is used; six receive both serum and virus while two are injected with virus alone. The two virus pigs should develop the disease if the virus is potent, and if the virus is potent any breaks in the remaining six would show something wrong with the serum.

In the production of serum the hog is first immunized in the usual way by vaccination with serum and virus. In the vicinity of one hundred days he is hypered, or hyper-immunized, by injecting into a blood vessel of his body five cubic centimeters of virus per pound live weight. This amounts to approximately one quart of virus to a 200-pound hog, and at the plant of Pitman and Moore it is injected through a blood vessel in the ear, by what is ostensibly a very simple operation. This produces a "hyper" or hyper-immunized hog, from whose blood the serum is obtained. About ten days after hypering, the hog is tail bled and four to five c. c. of blood is drawn per pound of live weight. In seven days the hyper is tail-bled again and a similar amount of blood is extracted. At the expiration of the next seven days the hyper is killed and all his blood is preserved. In killing about 2,600 c. c. of blood is obtained from a 240-pound hyper. The carcass is posted and after passing inspection goes into the cooling room and later is processed or cured for human consumption. It is Government-approved meat, healthful and wholesome in every detail. After a hog is hypered it must gain in weight until killed, in spite of the tail bleeding. The same record is kept of each individual as in the case of virus pigs. The charts are then copied into the office record and all serum and virus, which must have its serial number, can be traced to the animal from which it was taken. Laboratory-tests are then carried through and a thorough bacteriological examination made of the product. There appears to be absolutely no chance for a little germ to slip past this exhaustive system without showing his credentials, and if these are not satisfactory he is at once court-martialed. All hogs are prepared for bleeding or killing just as carefully as a human patient is "processed" before an operation. The Federal Government sits constantly on the job and cleanliness, sanitation and disinfection are a religion with Dr. Roberts.

Conclusions.

We have told the story of the investigation more or less in detail, but the impression left on the writer has not been referred to definitely. In the Corn Belt there are millions of hogs. Indiana alone last year had three and a half millions; Iowa has a hog population of around nine millions, and Illinois produces swine in great numbers. They have hogs, and consequently, hog cholera. If virus entails danger, one would expect the bad results from it to be worse where the hogs are most numerous, if it is used in correspondingly large quantities. Such does not appear to be the case. Virus is considered a protection, rather than a danger, throughout the Corn Belt. The disease has been worse in the Counties of Essex and Kent, in Ontario, simply because that is a hog district. If Canada doubled her hog population, disease would increase correspondingly, but in 1914 when the number of swine in Canada was perhaps at high-water mark, it was necessary to slaughter 34,779 hogs to keep the scourge in check and the compensation is far from satisfactory. We have had cholera in Canada for more than thirty years, so the introduction of virus is no new danger. Breeders and farmers in the United States, even those who do not treat, want a "cholera-immunized" hog when they purchase, so it is evident that they do not look on an immunized pig as a carrier of contagion.

A farmer in Canada runs considerable risk when he maintains a large herd of swine without treatment. Extensive breeders in the United States would go out of the business if they did not have this protection. We are asked for an increased production of hogs in Canada but should the farmers take this risk? In Essex and Kent they know the danger and are clamoring for this insurance.

Breeders of pure-bred Berkshires, Hampshires, Duroc-Jerseys, and Chester Whites would profit by the liberty to purchase herd sires in the United States. They cannot do so now to any extent because practically all the breeders there double-treat. Canadian Berkshires, particularly, are in need of an infusion of new blood.

The ideas expressed by the Boone County farmers are particularly applicable to Canada. Breeders of pure-bred swine should be allowed to immunize their breeding stock to avoid the danger of having it wiped out. The loss of an entire herd has happened several times in this country and there is no evidence that the present system of control will not prevent it happening many times again. Everyone knows what it means to have the foundation of a good herd shot and buried. An improvement of the breeding stock in this country could



Champion Pen of Long-Wooled Sheep at Guelph. Exhibited by E. Brien & Son, Ridgeway, Ont.