

Live-Virus PE Vaccine Limitations

dangers, advantages of new product against pneumoencephalitis

A. S. Rosenwald

Vaccinating against pneumoencephalitis—Newcastle disease, pneumo, PE—with the live-virus vaccines has been erroneously greeted as the final answer in the control of this disease. These live-virus vaccines are stop-gap measures. Little thought has been given to the many pitfalls and dangers of these products.

Some problems already have been observed. Though manufacturers of the live-virus vaccines warn against vaccination of laying birds, many poultrymen, who brood more than once a year, had susceptible pullets which were laying. When these birds were vaccinated, mortality and a drop in production occurred.

The table shows the production record, following vaccination, on one ranch. Live-virus vaccination of 12-week-old birds on this same ranch resulted in good immunity and less than 1% mortality. Other poultrymen found that production decreased from 50% to less than 25%. In still other flocks, mortality and drop in egg production among vaccinated birds was not very great.

Spread of Vaccine Infection

The vaccine sets up a spreading infection so that all unvaccinated birds on a ranch must be immune. In several cases 12-week-old pullets were vaccinated with commercial live-virus PE vaccine. Susceptible laying pullets were left unvaccinated. The vaccine infection spread to the older pullets, resulting in a greater than 10% death loss and a drop in production from 60% to under 10%.

Egg Quality

If vaccination was done after production started, egg quality has suffered. The full effect of live-virus vaccines, used before or during production, on egg quality, on future productivity or growth of birds, and on subsequent hatchability and fertility is not known. There is good evidence that a natural outbreak of pneumoencephalitis—Newcastle disease—is harmful to the birds. Live-virus vaccination probably has similar effects.

Misuse of Live-Virus Vaccine

The live-virus vaccines, like everything new, are subject to misuse. One abuse noted is the attempt to stretch the vaccine to treat more birds as is often done with

fowl pox vaccine. Both vaccines are applied by the stick method. However, it has been noted that not nearly as many so-called extra doses are provided with PE live-virus as are frequently found with pox virus. Since the PE vaccine infection spreads, if some birds are unvaccinated, considerable trouble may result. Little is known about the effect of bird-to-bird passage of the vaccine virus.

The mixing of PE live-virus vaccine and fowl pox vaccine, though successful on a few ranches, is another abuse. Such procedure results in diluting both agents with the possibility that no immunity to either disease may be obtained. Further, manufacturers recommend that only birds in good health be vaccinated, since it was noted that if another disease affected the birds at the time of vaccination the mortality rate and nervous symptoms increased.

Immunity

Although claims indicate that live-virus PE vaccines confer life-long immunity, no data have been presented to show that vaccinated birds are immune for even one year. No report to date offers proof that these vaccines protect birds against field exposure. The immunity is assumed, probably with good reason since natural infections result in solid immunity. However, the formalin-killed vaccines provided treated birds with good protection from challenge in the laboratory, but did not adequately protect the birds against field exposure. Laboratory and field trials indicate that live-virus vaccines, used on chicks under four weeks of age, may cause high mortality. Further, vaccination at that age may not provide even a good challenge immunity. Therefore, live-virus PE vaccines should be used only on birds one to four or five months of age.

Live-virus PE—Newcastle disease—vaccination is an attempt to live with the disease rather than to eradicate it. There is no record of any disease having been eradicated by the use of live vaccine. The indiscriminate use of live-virus vaccines in areas where the disease has not been definitely diagnosed—and this can be done only in a laboratory—may lead to the introduction of the disease and new problems.

Moreover, the introduction of PE—Newcastle disease—live-virus vaccines into such an area will increase the cost of production of poultry for many years as vaccination should be an annual process. These vaccines have been compared to laryngotracheitis and fowl pox vaccines but such comparisons are not sound. Laryngotracheitis and pox vaccines, as used, are fully virulent. Properly used, they are not particularly dangerous to poultry. The PE virus used is modified to lower than ordinary virulence and if it became altered to higher virulence disastrous disease outbreaks could follow its use. The mere fact that Newcastle disease or pneumoencephalitis virus varies greatly in its effect on birds, and often becomes modified under natural conditions, should provide a warning that the vaccine may readily become dangerous. It is not known how the vaccine strains of virus, which cause little mortality when first used, may behave after bird-to-bird passage in the field for a few generations. It is entirely possible that dangerous strains, causing high mortality, may develop from them.

No Visible Take

We have no convenient way of knowing whether birds develop immunity from use of live-virus pneumoencephalitis vac-

Continued on page 14

Effect of Live-Virus Pneumoencephalitis. Susceptible Birds, 5½ months old.

Pen number	Number birds vaccinated	Total mortality	Egg production								
			Per day at intervals						Depressed lay		
			Days after vaccination						Days duration	Total laid	Normal* expectancy
5	10	15	20	25	30						
1	242	23	58	76	21	43	83	93	19	889	1102
2	165	14	45	56	36	16	33	59	24	865	1080
3	241	14	99	84	30	58	103	115	21	1407	2079
4	201	16	97	2	25	75	117	145	19	894	1843
1 & 2	Vaccinated previously with 2 shots formalin-killed vaccine										
3	Vaccinated previously with 1 shot formalin-killed vaccine										
4	No previous vaccination										

* Normal expectancy represents the number of eggs which would have been laid if the birds had continued to lay at the same rate as noted on the fifth day following vaccination.

SUGARS

Continued from page 11

rated. They are now being used in the study of the mechanism of carbohydrate formation and breakdown in plants.

Radioactive glucose prepared in the laboratory is being used in the Medical School to study the problem of the utilization of glucose by diabetic animals. The problem of how a diabetic animal oxidizes sugar is still obscure.

The discovery of the enzymatic synthesis of sucrose from glucose-phosphate and fructose permits the study of the metabolism of this disaccharide in plants and animals with regard to each monosaccharide constituent. Thus far the behavior of glucose or fructose during the course of metabolism could not be observed since it has been impossible by ordinary methods to distinguish one sugar fragment from the other in their final utilization by plants and animals.

The use of the tracer technique, whereby radioactive carbon isotopes are incorporated into the molecules, permits a direct observation of the course of metabolism of individual compounds.

As sucrose now can be synthesized enzymatically from glucose-phosphate and fructose, it is possible to label each half of the molecule of sucrose at will. Radioactive sucrose with a labeled or tagged glucose molecule can be prepared by combining radioactive glucose-phosphate with inactive fructose by the aid of the bacterial enzyme. Sucrose with a tagged fructose molecule then can be synthetically made from inactive glucose-phosphate and radioactive fructose and the same enzyme.

These two radioactive sugars actually have been synthesized in the laboratory, and it is hoped to learn about the fate of each half of the sucrose molecule, by following their course of metabolism in plants and animals.

W. Z. Hassid is Professor of Plant Nutrition and Chemist in the Experiment Station, Berkeley.

The above progress report is based upon Research Project No. 1369.

VACCINE

Continued from page 6

cine because there is no readable take such as poultrymen check following laryngotracheitis or fowl pox vaccination. Like any living product, live-virus vaccines are subject to deterioration. Because there is no easily readable take, it is difficult to tell whether such loss of effectiveness has or has not occurred.

Poultrymen have been lulled into a false sense of security, thinking that live-virus vaccines provide the final answers to the control of pneumoencephalitis. This

is far from true. While much is known about the pathology of the disease, and something about the virus, little is known about the development of the disease in different species of birds, the immune reactions, and the basic source of the infection—that is, where it over-winters. In exploring these fields, improved means of control or possible eradication may be found. Poultrymen should recognize the need for continuing such basic research. The cautious, intelligent use of live-virus PE vaccine does provide an expedient method for reducing the economic losses due to this infection where it exists and is a problem. Such use gives time for needed investigations.

Other Control Measures

Poultrymen would be unwise to consider that live-virus vaccination is the only method to control PE. There are other possibilities. First, use the excellent diagnostic facilities available, promptly and adequately.

Second, sources of new infection should be eliminated; adult or started birds should not be brought to the ranch.

Third, sound sanitation—curtailed visits, free areas for loading and unloading, etc.—should be practiced. Continuous brooding should be avoided.

Fourth, formalin-killed vaccines might be useful.

Lastly, and only until better means are available, in those areas where pneumoencephalitis is known to exist or is an immediate threat, live-virus vaccines may be helpful.

Though it may be assumed that live-virus PE vaccine provides an easy-to-use method of conferring solid immunity to vaccinated birds and probably provides a short time, passive immunity to chicks hatched from vaccinated hens, there are numerous limitations. However, it is not safe or a good immunizing agent for chicks under four weeks of age; it should not be used on laying birds, and birds to be vaccinated should be in good health. Since the vaccine infection spreads, all other birds on the ranch should be immune as a result of previous vaccination

NEW PUBLICATIONS



A copy of the publications listed here may be obtained without charge from the local office of the Farm Advisor or by addressing a request to Publications Office, College of Agriculture, University of California, Berkeley 4, California.

SWINE FEEDING EXPERIMENTS, by E. H. Hughes and Hubert Heitman, Jr. *Bul. 709, October, 1948.*

The daily gain in weight of pigs is important to the swine raiser. This bulletin reports the results of four investigations, which show that (1) cooked lima beans may efficiently be added to the diet of pigs, saving some tankage; (2) potato meal can replace part of the barley in the ration; (3) soybean meal is an excellent plant protein; and (4) a good, cost-reducing practice is to allow hogs to harvest a crop of dwarf milo and cowpeas.

SPRINKLING FOR IRRIGATION, by F. J. Veihmeyer. *Cir. 388, November, 1948.*

Sprinkling for irrigation has a place in California agriculture, but it is not a cure-all. This circular covers four main questions: The kind of topography, soil, climate, and crops which make the use of sprinklers advisable. The kind of system the farm may need. The cost and the justification for the costs.

INVESTIGATIONS OF THE FLOR SHERRY PROCESS, by W. V. Cruess. *Bul. 710, October, 1948.*

or a natural outbreak. The effect of live-virus vaccine on the future of the birds is not known. The product is subject to misuse, and there is no visible take. The stability of the vaccine virulence is not fully established. Most important, live-virus vaccine perpetuates the disease or may introduce the infection into clean areas.

A. S. Rosenwald is Specialist in Poultry Pathology, Agricultural Extension Service, Berkeley.

Published evidence and papers presented at various meetings have been drawn on freely in preparing this report.

DONATIONS FOR AGRICULTURAL RESEARCH

Gifts to the University of California for research by the College of Agriculture accepted in October, 1948

BERKELEY

Dr. Gabriele Goidanich and Dr. C. M. Tompkins	A rare early Italian treatise on diseases of cereal grains, 1759	
Lederle Laboratories	10 grams special feed supplement	
National Research Council	For work in plant microbiology	\$500.00
Sugar Research Foundation, Inc.	For food technology research	\$1,000.00
Sugar Research Foundation, Inc.	For plant nutrition research	\$702.00

RIVERSIDE

California Fertilizer Association	For studies on determination of effects of various nutrient variables on absorption of phosphorus by citrus plants	\$2,000.00
-----------------------------------	--	------------