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Plum Island Animal Disease Laboratory

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Dedication of the 10 million dollar Plum Island Animal Disease Laboratory on September 26, 1956, launched our most intensive fight against dangerous foreign diseases of livestock. The Laboratory is operated under special authorization of Congress to develop broader knowledge of how to combat contagious diseases that might be introduced into this country and threaten the livestock industry. The danger of these diseases has been emphasized by the increasing use of fast transportation of livestock, placing diseases of any country of the world only a few hours away from our shores. The best defense against these diseases is a complete program of preparedness based on scientific research in methods of diagnosis, prevention, control, and eradication.

Major emphasis of the laboratory research program is on foot-and-mouth disease, considered one of the most contagious foreign animal diseases, and one of the most serious in its effects. Other diseases similar in outward appearance to foot-and-mouth are being studied to the extent necessary to improve techniques of differential diagnosis.

Safety regulations on Plum Island are the most rigid ever developed among research institutions throughout the world. The purpose of these precautions is (1) to protect the livestock industry from animal diseases not existing in this country by preventing the escape of causative agents from the laboratory buildings and (2) to protect the experimental studies by preventing the spread of disease agents under study from one area of the research buildings to another, or the accidental introduction of diseases not under study.

In July, 1952, the Secretary of Agriculture officially announced that Plum Island had been selected as the site for the laboratory. In 1954 construction of the principal research building was started. Plum Island is located about 1½ miles off the eastern end of the North Fork of Long Island, New York. It is about 3 miles long and 1 mile wide at its widest point, and has an area of about 800 acres. The Island has been owned for quite some time by the U. S. Government having been the site of a Coast Artillery post, and later, an Army Chemical Corps installation.

The laboratory is a unit of the Animal Disease and Parasite Research Branch, Agricultural Research Service. Research studies of the Laboratory are organized

[Mr. Stanley Held, a senior compiled this material from government bulletins.]
The principle research building of the USDA’s new $10,000,000 Plum Island Disease Laboratory. It is located on Plum Island, 1½ miles by water from the tip of the northeast fork of Long Island, N. Y., in Long Island sound.

The program of the laboratory is divided into two parts: (1) Research and (2) Service. The program of research is directed toward study of the following aspects of animal disease:

**Viruses** that cause foot-and-mouth and other foreign diseases. Basic studies of the characteristics of various types and strains of viruses, how they are spread, and better methods of artificial cultivation for more efficient research on specific phases of disease prevention and control.

**Diagnostic procedures** and how to improve them. More efficient and exact methods of differentiating virus diseases are sought.

**Susceptibility** of different species, breeds, and classes of animals—both domestic and wild—and the part they play in spreading and perpetuating the diseases being studied.

**Disinfection** of contaminated premises and materials and how to improve methods.

**Preventive measures** including immunization.

The following services will be provided by the Laboratory.

**Diagnostic facilities** to provide rapid and positive identification of causative agents in disease outbreaks of suspected foreign origin.

**Improved disinfectants and animal biological products** for use in supplementing and supporting prevention, eradication, and control programs.

Outstanding results in the artificial culture of viruses were reported during the first 2 years of the research program.
conducted in the original one-unit re-
search building before the completion of 
the larger multiple-unit research struc-
ture. The methods developed are similar 
to those used in growing other viruses 
such as the polio virus.

The first laboratory work involved 
 studies of vesicular stomatitis. This rela-
tively mild virus was studied to train the 
staff and to test the laboratory's safety 
measures before research on dangerous 
foreign diseases was started.

In 1954 Laboratory scientists reported 
that the virus of vesicular stomatitis 
could be successfully grown on the kid-
ney cells of guinea pigs and bovine-tong-
gue tissue. This achievement is a funda-
mental contribution toward more efficient 
research methods and differential diag-
nosis of foot-and-mouth and other ves-
cular diseases.

In 1955 the Laboratory reported the 
development of a similar method of grow-
ing foot-and-mouth disease virus in cul-
tures of swine and cattle kidney cells. 
Foot-and-mouth disease virus previously 
had been grown experimentally in other 
types of tissue by European research sci-
entists, but the new method further de-
veloped and applied at the Plum Island 
Laboratory provides a lower cost method 
and uses material that is readily avail-
able. Therefore, it is an important step 
toward large-scale production of the virus 
for fundamental studies.

The safety precautions enforced at the 
Plum Island Laboratory are geared to 
control the highly contagious foot-and-
mouth disease virus. The two research 
structures, with similar safety features, 
are considered the safest in the world for 
work on animal viruses. The location — 
on an off-shore island controlled by the 
Federal Government and with no normal 
traffic facilities connecting with the main-
land — makes it possible to control move-
ment to and from the island and on it. 
Vehicles moving to and from the island 
(by water transport) are restricted to 
government owned trucks, allowed only 
as far as the fenced-in dock area. Per-
sonally owned automobiles are not per-
mitted on the island. Experimental ani-

mals are carefully introduced to the is-
land. The animals pass through a series 
of three trucks before they reach their 
quarantine enclosure on the island. Load-
ing ramps on the island are disinfected 
after each livestock transfer. Animals 
 pass into the research buildings through 
double-doored air locks. Animals that 
enter the buildings never come out, and 
no animal is ever permitted to leave the 
 island. All equiment, supplies, feed, and 
other materials arriving at the island are 
received under rigid controls. Transfer 
platforms are carefully cleaned and dis-
infected after each delivery. Equipment 
and supplies moving into the research 
buildings must pass over transfer plat-
forms and through autoclaves as well as 
the same type of double-doored air locks 
that are used to introduce the animals. 
Feeds are processed to kill insects, ro-
dents, and other vermin before being 
taken into the research buildings. Only 
authorized persons are permitted on 
Plum Island. All persons must have an 
approved pass and must be prepared to 
show it to any guard or safety represen-
tative upon request, while they are on the 
 island. They are required to read the

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safety regulations and to sign a certified statement that they will comply with them. Laboratory employees may be discharged for violation of these regulations. The Laboratory is surrounded by a double fence, the inner fence 20 feet from the outer. This inner fence is set in concrete extending 3 feet underground to prevent burrowing animals from digging their way inside. Between the fence and the research building is a large open compound devoid of vegetation to discourage birds, rodents, and other animals. Any person entering a research building must leave street clothing and personal belongings in an outer locker room and put on laboratory clothing. He may then pass through a one-way turnstile, to his assigned work area. Passage from one area of the laboratory to another is permitted only after a soap shower and another change of laboratory clothing. Animals are kept in windowless, separately ventilated isolation areas equipped with decontamination facilities. Laboratory work units are similarly divided. All rooms, corridors, and other areas of the buildings are cleaned and disinfected at frequent intervals and after the conclusion of experiments, in accordance with strict specifications. Air moving out of the laboratory is decontaminated by a system of filters. Within the building no air is allowed to move from one contaminated area to another. All liquid wastes are sterilized by heat before they are discharged as sewage from the research buildings. Sewage is then sterilized in a separate building before being discharged into the sea. Two identical sewage systems are provided in the event of a breakdown. All solid waste materials including carcasses are destroyed by incineration within the research buildings. Equipment may be removed from the research buildings only after supervised disinfection, usually by autoclaving. All persons leaving the research buildings are required to take decontaminating showers before they change again to their street clothing and exit through an uncontaminated area.

In the principal laboratory building each person, after removing work clothing and taking a soap shower, must pass through a bar gate into a deluge shower 6 feet long. When the bar gate is opened, water automatically emerges from multiple spray nozzles directed so that all areas of the shower room are sprayed. The water remains on for a period of 20 seconds after the bar gate has been closed. All means of exit are equipped with the system so that it is physically impossible to leave the building without a shower. Everyone leaving the island is required to agree not to come in contact with animals susceptible to the diseases under study, or areas where they are kept, for a specified period of as long as one week.

THE EFFECT OF CERTAIN NUTRITIONAL FACTORS INCLUDING CALCIUM, PHOSPHORUS AND ZINC ON PARAKERATOSIS IN SWINE. In the tests high calcium levels in the basal ration greatly decreased weight gains and increased the onset of parakeratosis. The addition of phosphorus to the ration did not decrease weight gains but significantly decreased the skin lesions. The addition of 50 p.p.m. of zinc to the ration did not completely prevent the appearance of the skin lesion. The addition of 50 p.p.m. of the zinc when added to the ration of the pigs with established parakeratosis produced immediate and dramatic responses in weight gains and skin condition. The addition of 500 p.p.m. did not elicit a better response. Parakeratosis pigs injected with inorganic zinc (Zn SO$_4$ . 7 H$_2$O) responded similarly to the zinc which was fed, but the injections caused severe local irritation.


There are now some 2,300 small animal hospitals in the United States.