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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 1 1/2 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...
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.

into the following groups: (1) Microbiological Investigations; (2) Chemical and Physical Investigations; (3) Immunological Investigations; (4) Cytological Investigations; and (5) Diagnostic Investigations.

In addition to the new research building, facilities on the island include: a one-unit research building, sewage decontamination building, administrative offices, firehouse, cafeteria, electrical and other workshops, powerplants, warehouses, residences, a health unit, facilities for holding and breeding small laboratory animals, and facilities for holding large animals in quarantine before they enter the research building.

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.

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conducted in the original one-unit research building before the completion of the larger multiple-unit research structure. 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 relatively 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 kidney cells of guinea pigs and bovine-tongue tissue. This achievement is a fundamental contribution toward more efficient research methods and differential diagnosis of foot-and-mouth and other vesicular diseases.

In 1955 the Laboratory reported the development of a similar method of growing foot-and-mouth disease virus in cultures of swine and cattle kidney cells. Foot-and-mouth disease virus previously had been grown experimentally in other types of tissue by European research scientists, but the new method further developed and applied at the Plum Island Laboratory provides a lower cost method and uses material that is readily available. 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 mainland — makes it possible to control movement 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. Personally owned automobiles are not permitted on the island. Experimental animals are carefully introduced to the island. The animals pass through a series of three trucks before they reach their quarantine enclosure on the island. Loading 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 equipment, supplies, feed, and other materials arriving at the island are received under rigid controls. Transfer platforms are carefully cleaned and disinfected after each delivery. Equipment and supplies moving into the research buildings must pass over transfer platforms 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, rodents, 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 representative upon request, while they are on the island. They are required to read the
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 lesions. The addition of 50 p.p.m. of zinc to the ration did not completely prevent the appearance of the skin lesion. One hundred 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 SO₄ . 7 H₂O) 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.

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