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FOOT-AND-MOUTH DISEASE IN UNITED STATES POLICY*

On May 13, 1959, the United States Department of Agriculture suspended the importation of certain cured meats from countries where rinderpest and foot-and-mouth disease exist, under authority vested in the Secretary of Agriculture by Section 306(a) of the Tariff Act of 1930 (*46; 53*). The Secretary already had full authority to prohibit entry into the United States of animals, meat, and other livestock products which in the opinion of departmental specialists might introduce diseases into the country (*63a; 63b*). In fact fresh, frozen, and chilled meat imports from regions where the two diseases named in the 1930 tariff law— rinderpest and foot-and-mouth disease (FMD for convenience)— were known to be present had been banned since January 1, 1927 by the so-called Sanitary Embargo.[1]

Neither the Sanitary Embargo nor Section 306(a) of the Tariff Act of 1930 attracted much attention domestically at the time they went into effect. Subsequently a considerable body of opinion developed that Section 306(a) is as protectionist in purpose as the statute in which it is incorporated, i.e., that it is essentially an economic embargo. This belief is reinforced by the fact that under the

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Drs. Jesse D. Clarkson, R. J. Anderson, F. J. Mulhern, H. W. Johnson, and L. C. Heemstra of the Agricultural Research Service, U. S. Department of Agriculture, and Dr. M. S. Shahan, Director of the Plum Island Animal Disease Laboratory of the Agricultural Research Service, have provided me with information and materials which it would have been laborious and time-consuming to search out elsewhere. I am particularly grateful to Drs. Heemstra and Shahan, who in addition to wholehearted co-operation in other respects, have read the manuscript and corrected some factual details, this despite their lack of enthusiasm for some of the interpretation.

[1] The following is a reproduction of the order, dated September 17, 1958 (*56a*), furnished by Dr. L. C. Heemstra, Agricultural Research Service, U. S. Department of Agriculture:

UNITED STATES DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY

Order Prohibiting the Importation of Fresh Meat from Regions in which Rinderpest and Foot-and-Mouth Disease Exists

(Effective on and after January 1, 1927)

It having been determined by the Secretary of Agriculture that there exists in most of the countries throughout the world the contagious and infectious diseases of animals known as rinderpest and foot-and-mouth disease, and to prevent the introduction of the contagion of such disease into the United States, *It is ordered,* under authority conferred upon the Secretary of Agriculture by section 2 of the act of Congress approved February 2, 1903 (32 Stat. 791), that on and after January 1, 1927, no fresh or frozen beef, veal, mutton, lamb, or pork shall be permitted entry into the United States from any region in which either of the said diseases exist. This order, for the purpose of identification, is designated as B.A.I. Order 298.

earlier statute the Secretary had discretionary power to limit the area from which imports were prohibited to the region or regions within a country where the disease was known to prevail. The Tariff Act of 1930 made it mandatory upon the Secretary to bar imports from the entire area of any country, even in cases of mild and localized incidence of one of the proscribed diseases.

In practice, however, there was little difference between the Sanitary Embargo and Section 306(a) of the 1930 tariff; in most instances the Department of Agriculture made import prohibitions country-wide in application because of the difficulty of ascertaining from a distance and at a given time how much of any country could be said to be free of either disease. The Sanitary Embargo had the effect of discontinuing imports from all of Argentina, Brazil, Czechoslovakia, Denmark, England, Hungary, France, Italy, Luxembourg, the Netherlands, Paraguay, Scotland, Spain, Switzerland, Uruguay, and Wales (*59a*, p. 72).[2]

ARGENTINE REACTIONS TO THE SANITARY EMBARGO

Argentina was only one of a number of countries affected by the Sanitary Embargo. It was also the only one in which the reaction made FMD a *cause célèbre* in the relations of the two countries.

Argentina was the world's largest exporter of meat. The whole country was overwhelmingly proud of its beef, which it considered to be the best in the world. The very volume produced left large exportable surpluses, and both the Argentine government and meat exporters regarded the United States market as essential to the disposal of these surpluses to the greatest advantage.

Actually, the United States had never figured prominently as an importer of Argentine beef. Between 1913, when the Underwood Tariff Act abolished customs duties on refrigerated meats (*63c*), and 1915, a promising trade had developed, but this was interrupted by World War I. Argentina looked forward to resumption of trade on an even larger scale after the war. These hopes were given a set-back by the Tariff Act of 1922—The Fordney-McCumber tariff—which restored the duties. If the Sanitary Embargo did not entirely doom those hopes, Section 306(a) did. Since the Argentine was the country of all others in the world capable of providing damaging competition for domestically produced meat in the United States, either as to the quality or price of its beef, the Argentine government considered that both measures had been devised to prevent that competition. Its opinions on that score can be inferred from the terms of a resolution introduced by the Argentine delegation at the Sixth International Conference of American States held at Havana, January 16–February 28, 1928, for the purpose of adopting a constitution.

Honorio Pueyrredón, the head of the Argentine delegation (also the Argentine ambassador to the United States), recommended in behalf of his government that the conference

[2] These were countries to which the Sanitary Embargo applied at the date of the order. The Secretary of Agriculture was required to publish a monthly revision of the list of countries where FMD existed. For example, England was declared to be free of the disease in December 1927 (*59b*, p. 107), but was removed from the "free" list in January 1928 (*59c*, p. 5) when another outbreak occurred in that country. At the same time Finland was added. These were countries in which outbreaks appeared from time to time. Most of the countries listed were those in which FMD was endemic.

take measures to reduce high customs barriers which hamper the freedom of circulation and participation in commerce of agricultural products [and that such barriers] be eliminated with respect to those articles in which such elimination does not constitute a danger to the vital interests of the country and its workers; *and that for the purpose of exercising the rights of sanitary police and plant quarantine the signatory countries adopt an organic rule guaranteeing that the measures that might be taken should in no case be of an arbitrary nature* (*61*, p. 5).[8]

The resolution was not adopted. In the meantime, the Argentine government had been making direct representations to the United States government in an attempt to have the Sanitary Embargo modified to permit meat imports from Patagonia, that part of Argentina that lies south of the Río Negro, where no cases of FMD had ever been reported. It did not even give up hope when the United States Congress in Section 306(a) canceled the power of the Secretary of Agriculture to grant any such concessions. To get around the country-wide application of the new measures, Argentina argued that in interpreting Section 306(a), Patagonia should be treated as a separate country geographically (*68*, p. 5). (The idea was suggested by the breakdown of the United Kingdom into four parts—England, Ireland, Scotland, and Wales—in applying the Sanitary Embargo.)

Once more Argentina took its case to the Pan American Union in a resolution offered at the Fourth Pan American Conference, and ratified by it, in October 1931 (*62*, p. 3):

1. To acknowledge as fundamental principles that sanitary police regulations effective at the present time, or enacted in the future to regulate the inter-American traffic of vegetable and animal products, must not have in their practical application the character of protective customs measures.
2. That in the application of all restrictions of a sanitary nature in the inter-American traffic of animal and vegetable products . . . the term 'infected zones' be used instead of 'infected countries.'
3. To recommend to the American coutnries the negotiation of agreements for the regulation of the foregoing principles.

There was nothing in the United States statutes at that date that would have made such agreements possible, but in 1934 the Congress in the Trade Agreements Act gave the President power to make adjustments in the terms of the tariff laws, within limitations (*63d*). Accordingly, Secretary of State Cordell Hull negotiated a sanitary convention with the Argentine Ambassador to the United States, signed on May 24, 1935, which would have permitted the United States to import meat from Patagonia so long as it remained free of FMD.

The Sanitary Convention was never ratified by the Senate; indeed the Senate Committee on Foreign Affairs never held hearings on it. Nevertheless, not until 1939 did the State Department give up hope of ratification (*68*, pp. 17–21). Its efforts to gain support for the convention stirred up enough controversy to create public awareness of the measures relating to FMD, which to that time had attracted little notice.

[8] Italics added.

The most vehemently contested issues in the controversy were quite beside the point so far as the Sanitary Convention was concerned. Opponents of its adoption maintained that ratification would lead to relaxation of the prohibition on fresh and refrigerated meats from regions where there was foot-and-mouth disease, although it is clear from the text of the convention and supporting arguments by the State Department that no such action was contemplated. Supporters of the convention contended that Section 306(a) and the Sanitary Embargo were protectionist subterfuges because meat could not transmit FMD, and that to say it could was a gratuitous insult to Argentina. The heat that centered around the question of whether meat could convey FMD caused Joseph S. Davis to observe that it was not the kind of issue that can be resolved by debate; he suggested research (*10*, p. 403).

As a matter of record, a great deal of research had already been done on FMD. Germany had established a research center for that purpose in 1896, France followed suit in 1901 and in due course other countries did likewise (*64*, pp. 28–29). The Sanitary Embargo of 1926 was ordered because English scientists had reported findings which indicated that meat could transmit the virus of the disease, and the evidence was strong enough to require, under law, that the Secretary of Agriculture prohibit entry of fresh and refrigerated meats from known FMD-infected areas. Furthermore, the cumulative record of experience, scientific research, and empirical observation presented impressive evidence of the desirability of preventing the disease from gaining a foothold in the United States.

KNOWLEDGE OF FMD TO 1926

Foot-and-mouth disease[4] is one of the most contagious of all diseases. This has been known for a long time in Europe, in parts of which it has been endemic (enzoötic) for centuries. A circular issued by the French Ministry of Agriculture in 1883 remarks upon the "insidious nature of the disease. [It is] perhaps, of all contagious diseases, the one which has hitherto been the most injurious to agriculture . . ."[5]

In contrast with rinderpest, mortality rates in FMD are not normally high. During virulent epidemics (epizoötics), which are relatively infrequent, the death rate may run as high as 30–50 per cent of the cattle infected, but normally it does not exceed 3 per cent in the case of cattle, slightly higher for sheep and hogs, which however appear not to be as susceptible as cattle. It is the aftereffects of the disease that are so costly. They may bring total losses in a typical outbreak to as much as 30 per cent of the productivity of the infected animals (*25a*, p. 9; *49*, pp. 340–48).

Young animals are peculiarly susceptible, and make up the larger part of those that succumb. Also there are losses through abortion. Infected animals lose condition and weight during the entire disease syndrome, including lame-

[4] Rinderpest is not considered in this article because there has never been an outbreak in the United States. At present it is endemic only in India, parts of Southeast Asia, and in northern Africa (*13a; 33*, p. 327). It is coupled with FMD in the export prohibitions for precautionary purposes, Rinderpest is "a virulent eruptive fever" (*13b*) which runs an "unusually rapid course" (*13a*). In regions where it is not endemic almost all ruminants exposed to it become infected, and mortality rates are high. It produces a "durable" immunity (*13a*) and the virus apparently can survive for only short periods outside of the animal body (*49*, pp. 336–39).

[5] Reprinted, together with a translation in *22*.

ness, sore mouths, and reduced feed consumption. Fever sometimes precedes but usually follows the appearance of the lesions of the tongue, mucous membrane of the mouth, and skin around and between the clefts of the hooves. In light or normal cases an animal usually regains its normal appetite "and spirits" in 10 to 20 days, but in severe cases it may take from three months to a year for it to recover, if it ever does recover fully.

The most costly after-effects of FMD occur in dairy herds. There is a temporary reduction or stoppage of milk secretion as the infection progresses, and occasionally during the entire period of lactation. The worst after-effect is the temporary or permanent sterility of cows and heifers, in which cases the animals are slaughtered. In the case of dairy cattle this means a heavy loss, the more so because sterility cannot be detected immediately.

Losses from FMD are compounded by the frequency with which it recurs, once established in an area. To the extent that animals build up immunities, they are of short duration, varying from as much as two years at one extreme, to less than five weeks at the other.

The prime objective of the first research teams was to identify the causative organism and to find an immunizing agent. It took little time to discover that the cause of the disease is an ultramicroscopic, filterable virus. A vaccine was developed quite early, but the immunity it conferred was of no greater duration than the immunity produced by the disease itself. Another discovery made at about the same time, the full significance of which was not realized until later, was that the FMD virus was regularly present in the blood stream of infected animals (*64*, pp. 31–32). Scientific advances were retarded for several decades by the inadequacy of laboratory techniques and equipment for dealing with viruses[6] and the difficulty in finding animals for laboratory experiments because most of those used habitually were not susceptible to natural infection by the FMD virus.[7]

Successful infection of guinea pigs in 1920 through inoculation marked the first important laboratory break-through. Methods of obtaining filtrates had been worked out and were being used in a wide range of experiments, one of which produced in 1922 the most important finding to date: that there were two types of the FMD virus which did not immunize against each other. (A third was reported later in the decade by German scientists, which had the same characteristics: such immunity as was created only protected for a limited period against reinfection by the same type; animals which had been immunized against the other two strains could still be infected by the third—*64*, pp. 84–87). Results of other investigations confirmed what had already been demonstrated empirically, especially by the British experience with FMD.

[6] For example, it was impossible to identify the FMD virus until after the electron microscope was invented (*6*, pp. 619–21).

[7] It had long been known that FMD attacked cattle, sheep, hogs, and goats, and it was assumed that other animals were likewise susceptible to it. It has since been learned that almost all except cloven-footed animals are normally immune. "Dogs and cats, especially young ones, are susceptible to artificial infection. Rats have been experimentally infected, and rare cases of natural infection of rats have been reported in England. Rabbits have been infected artificially. The European hedgehog may be readily infected experimentally . . . , and natural infections have been observed in England" (*44*, p. 187). A special treatment was developed in 1920 which finally made it possible to adapt guinea pigs for laboratory experiments of FMD. Similar adaptation and later discoveries with regard to white mice have made it possible to use them also (*43*, p. 870).

The British experience is related in greater detail than may appear relevant because it explains the dread which FMD inspires in U. S. veterinary authorities.

THE BRITISH AND FMD

The first recorded outbreak of FMD in Britain was in 1839, and between then and 1852 there were only a few years in which the disease did not appear there. Then for more than ten years the country was free of it. The government thereupon decided that it would not permit it to become re-established. The island kingdom became a kind of laboratory in that records and observations have been carefully and fully maintained since 1878. These were to be invaluable in widening knowledge about the disease. Like the clinical experiments elsewhere, the results contributed little toward its control and eventual eradication.

When Britain first embarked upon its policy of preventing FMD from being re-established in the country, the method adopted was to halt importation of livestock from regions of the Continent where there were known outbreaks, and at home to isolate areas where FMD appeared. Nevertheless, an outbreak occurred in 1863, and there were recurrences in 1865–66 and frequently thereafter through 1886. A Contagious Disease (Animals) Act was passed in 1878, which tightened the measures already in use and made local authorities responsible for the reporting and quarantine of all cases within their respective jurisdictions, and required maintenance of full records of all cases "in which Foot-and-Mouth Disease has been imported from foreign countries" or which had occurred in the British Isles (*22*, pp. 133, 314; *23*, pp. 5–6). When FMD once more broke out in 1892 after three years of non-incidence, the government resorted to slaughter of infected animals to halt the spread of infection. An 1896 statute went even further: livestock from foreign countries, the "loading of which was not prohibited" at the port of embarkation, were required to be slaughtered "at the point of landing . . ." (*23*, p. 5).

From 1895 through 1899 no FMD cases were recorded. Twenty-one initial outbreaks were reported in 1900, twelve in 1901, and one in 1902.[8] Then for five years, 1903–07, inclusive, there were none, the last time that such a record was achieved. In only two years since 1907 has Great Britain been free of the disease, 1909 and 1917 (*23*, pp. 5–6; *24*, p. 77; *27*, p. 23).

In each recurrence the same routine was followed: quarantine of the infected area; slaughter not only of obviously infected animals but those exposed to the contagion; burial of slaughtered animals in trenches with a covering of lime and dirt; all-out efforts to trace the source of infection. The accounts of the thoroughness of these attempts to pin down the carrier in each case are at once impressive and depressing; few of the findings were ever conclusive.

Of the outbreaks which had occurred prior to 1910, only two were attributed to imports. The one in 1892 was thought to have been caused by animals imported from Denmark. Cases which occurred in the vicinity of Edinburgh in 1908 were traced to imported contaminated hay. Hay was immediately added to the list of prohibited imports. It had been noted that a large majority of the initial

[8] The British FMD Committee uses the term "primary" outbreak to refer to one in which no connection had been established with any known outbreak within the country (*27*, p. 11). It is assumed that "initial," as used here, has the same meaning.

outbreaks had occurred near the eastern and southern coasts of England. Some trading vessels carried meat animals as ship's stores, and such vessels usually berthed in ports along those coasts. From time to time, it was learned, such animals were carried ashore by crew members for sale or other disposition. Although no outbreak had ever been traced to them or even implicated them, the practice was forbidden in 1910. (The prohibition was easily evaded—*24*, p. 3). Importation of all livestock except horses and dogs was prohibited, and for those a period of quarantine was forced. (By that time most meat imports were as such rather than on the hoof.) Nevertheless the outbreaks continued.

A report published in 1912 by a committee which the British government had appointed to investigate the 1910 outbreak emphasized one item of paramount importance in the spread of FMD:[9] anything coming into contact with infected animals or their excreta can act as intermediate agents. It had not yet been ascertained how long the virus could survive in nature outside an animal host,[10] but a later British report gave alarming evidence on this score. The report summed up 20 years of trying to track down the source of FMD outbreaks in Great Britain, and recounted the history of 42 cases of lengthy survival of the virus, three of which were regarded as "stupefying" by the eminent French scientist H. P. M. Vallée, the most cited FMD authority of that period (*64*, p. 67).[11] Three farms where FMD had occurred were restocked 108, 135, and 176 days, respectively, after all the animals had been slaughtered. The replacements had been procured from farms which had been certified as free of the disease, yet in 25, 81, and 104 days, respectively, FMD again broke out on each—an indication of how long the virus could survive in natural conditions outside of the animal body. Vallée regarded the findings as a much better explanation than others that had been advanced to account for the frequency of FMD outbreaks in Britain and elsewhere.

By the beginning of the 1920's the British government was obviously concerned with the pyramiding of cases. In the three years 1919–21 more outbreaks were recorded than in the two preceding decades.

[9] The FMD committee report and appendixes form a lengthy document. It expressed some confidence that the methods in use were the correct procedure and the belief that through them the disease was being brought under control. Attempts to trace the 1910 and 1911 outbreaks were inconclusive. A number of possible carriers was enumerated, with hay, prohibited since 1908, heading the list. Imported milk and milk products could serve as direct carriers, or milk of domestic cattle which might have come in contact with imported contaminated materials; contaminated milk or milk products thrown into swill pails could infect hogs. Hoofs, horns, bones, and offals were listed as possible carriers. Hides and skins, through contact with foodstuffs during shipping or by contaminating ships' holds or stevedores' clothing, might serve as intermediate agents. People could introduce the virus either on their persons or their clothing. (The pros and cons of whether man can contract FMD have been argued for years. Man is extremely resistant to the virus, and very few suspected cases of infection have been scientifically authenticated—*15–1*, p. 2.) To the extent possible, the report continued, controls had been established to eliminate the probability that these carriers might introduce the virus in the future. Because hides and skins could also carry anthrax, disinfection at the port of origin was ordered. Nothing could be done about individuals entering the country, but disinfection was required of the clothing and persons of all who came in contact with infected animals in the course of outbreaks in Great Britain. That the lack of success in tracing the source of recent outbreaks might have created suspicion that FMD had become endemic in the country may be inferred from the following statement: "Whenever outbreaks have occurred in this country the disease has been more prevalent on the Continent" (*23*, pp. 6–9).

[10] Organisms can be kept alive in culture media in the laboratory for considerable periods, but the length of time they can do so on clothing, hay, in fields, or in barns is another matter.

[11] Vallée and his colleague, H. Carré, made the 1922 discovery that there were two types of the FMD virus (*54*, pp. 75–76).

Up to that time, Great Britain had not undertaken to set up research laboratories lest it be inadvertently responsible for spreading the disease. A committee had been appointed in 1912 to conduct experiments in India to determine the characteristics of FMD, but after six months it ended the project because the "indigenous cattle, sheep, and pigs of the plains of India were in a high degree insusceptible to the disease . . ."[12] In 1920 a second FMD research committee was appointed, this one being assigned to investigate "(a) the viability of the virus under varying conditions inside and outside of the animal body; (b) the identification and artificial cultivation of the virus; and (c) practicable methods of prevention and immunization." In order that the research should not create a hazard for the livestock population of the country, it was to be conducted on an abandoned warship in the estuary of the River Stour. This experiment was suspended after eight months because of the almost insuperable difficulties inherent in doing the necessary experiments with animals in such an awkward working situation (*18*, p. 5).

The most devastating FMD epidemic ever experienced in Great Britain occurred in 1922–24, during which 136,000 cattle, 76,000 sheep, and 61,000 hogs were destroyed by official action. Protests against the slaughter policy of the government took on the character of a ground swell; the government was hard put to find replacements of the breeding stock sacrificed. It was constrained to agree in 1923 to partial abandonment for the time being of slaughter as a sole method of stamping out the disease and substitution of the so-called circling method of isolation. It was impossible to trace the primary outbreak, although, as remarked earlier, it was concurrent with even more virulent epidemics on the Continent (*24*, p. 225; *27*, pp. 22–23). The government therefore finally overcame its disinclination to conduct experiments on land, and ordered a research station to be built at Pirbright, Surrey, fenced about with every conceivable safeguard against accidental dissemination of the disease.

On the empirical side nothing of consequence had been added to the list of possible carriers since 1910 except birds. Subsequently, there has been definite evidence that the virus can be air-borne (*15*, pp. 490–98; *27*, pp. 12–14). It had been observed quite early that the virus could not survive heat or intense sunlight for long, but that cold at sub-freezing temperatures was a preservative—common knowledge now, but contrary to general belief at that time, although these observations had been confirmed scientifically. Some of the disinfectants which had been used with the greatest confidence were discovered to be useless. It had been proved that the virus was highly sensitive to acid. And in this connection it was "classic knowledge that meat, after rigor mortis has transpired, is notably acid" (*64*, pp. 51–52).

This classic knowledge was responsible for the argument that meat could not transmit FMD that was advanced in the United States in the late 1930's in support of ratification of the Sanitary Convention of 1935. However, some doubt already existed in 1920 as to how valid the classic knowledge actually was, in consequence of an earlier epidemic of FMD in the United States.

[12] Yet a discussion on FMD research reprinted in *40*, pp. 192–93, gives quite a different report.

FMD IN THE UNITED STATES

Prior to 1914 there had been five outbreaks of foot-and-mouth disease in the United States. Three had occurred in the nineteenth century—in 1870, 1880, and 1884 during a period when breeding stock was being imported on some scale to up-grade the herds of the Western ranges. Outbreaks in 1902[13] and 1908 were traced to cowpox vaccine made in Japan (*49*, pp. 343–44), in which animals in the incubation stage of FMD were presumably used. Importation of such vaccines was therefore prohibited. The 1914 outbreak occurred at Niles, Michigan, and led to the most serious and widespread FMD epidemic the United States has ever experienced.[14] The cause of the outbreak was not determined, although there was evidence that the disease first appeared in "hogs fed trimmings and offal from a packing house that handled foreign meats" (*44*, p. 190; *48a*, p. 14). However, because there was no scientific evidence to support the suspicion, "the outbreak was recorded as of unknown origin" (*57*).

FMD again made its appearance in 1924, this time in two widely separated locations, the first in California, the second in the vicinity of Houston, Texas. In the Texas case, introduction was attributed by U. S. Department of Agriculture investigators to infective material brought ashore on the persons and clothing of stevedores from cargo ships which carried live animals as ship's stores (*48b*, pp. 4–5), although the origin is now listed as unknown (*44*, p. 190). The California outbreak, which reached epidemic proportions,[15] involved a more extensive search.

The first California case to come to the attention of health authorities was at a small dairy farm in West Berkeley early in 1924. Soon afterwards, enough dispersed cases began to be reported to alert the authorities for serious trouble ahead. Two experienced inspectors were assigned to track down the source of the outbreak.

[13] This is as it was announced in earlier publications. An article in the *Yearbook of Agriculture, 1956* (*44*, p. 190) states that vaccine was considered as the likely cause, but that other intermediate articles—imported hay, hides, etc.—may have introduced the infection.

[14] It took 18 months to bring it under control. Twenty-two states, from coast to coast, and the District of Columbia, were affected; 172,000 cattle, sheep, hogs, and goats were slaughtered; the cost of eradication was in the neighborhood of $9,000,000 (*57*).

[15] Before the California epidemic was brought under control six months later, the disease had spread to sixteen counties, including Los Angeles, San Francisco, and others important for livestock production. Several aspects of the epidemic make the dread which FMD inspires in veterinary authorities understandable. A shipment of infected animals to a Los Angeles packing plant introduced the disease to Southern California, where its spread was rapid. All infected and exposed animals were slaughtered, among them "one of the most valuable Holstein herds in the United States . . ." All of the packing plants in the county had to be closed, cleaned, and disinfected (*48b*, pp. 3–7).

The most serious situation of its kind ever encountered in this country developed in the course of the epidemic when herds thought to be free of FMD were driven to summer pastures on the Stanislaus National Forest. FMD soon developed and, before recognized, deer had become infected. Deer, goats, and other wild ruminants are as prone to FMD as domesticated cloven-hoofed animals, and in them detection usually comes too late to check the spread. "Never in our history had foot-and-mouth disease invaded a region so rough and never before had it attacked deer or other wild animals." An additional complication was "public sentiment against destruction of such captivating creatures." At one point deer lovers threatened the eradication team with violence if the plans for destroying the deer were pursued. The plans were followed through nevertheless, and the disease eradicated through controlled hunting and use of strychnine pellets. Some 22,000 deer were destroyed, on 2,700 of which FMD lesions were found (*48b*, pp. 18–19).

There were recurrences of the disease in 1925 in both California and Texas. The one in California was confined to one ranch. In Texas the spread was wider and took 30 days to eradicate. In both, the recurrence was attributed to fever ticks (*48b*, pp. 67, 69, 77).

Some possible means of entry already had been eliminated through operation of federal statutes: the importation of animals, hides, and other animal by-products from countries where FMD existed had been prohibited earlier. Control in such cases was exercised at the port of origin; packing materials—hay, straw, and the like—were burned or disinfected at the port of entry under federal supervision; permitted imports of livestock and livestock products were subjected to veterinary inspection upon arrival.

Clues checked by the investigators were coconut meal fed to cattle, salt removed from imported hides and subsequently sold to hog breeders, and the possibility that garbage from foreign ships might have been dumped offshore and washed onto coastal pastures. Records of foreign ships were scrutizined for cargo or stores which might have served as carriers and inquiry was made into the numbers and kinds of mascots carried. None of these investigations proved to be fruitful. The most suspicious of all possible agents investigated, and the first to come to mind, was garbage from naval vessels at the Mare Island Navy Yard.

In checking back for the origins of the Berkeley and other early cases, a direct connection was traced between several of them and a hog-feeding operation outside Vallejo, to which Mare Island is also tributary (or vice versa). It was customary for ships of the fleet to buy meat at ports of call along their scheduled routes, and uncooked meat scraps went into garbage, which was dumped at sea when far from shore, but was retained as the ship approached port and sold for hog feed upon arrival. Several ships from the Pacific fleet had recently put into Mare Island for repairs following a cruise which had touched at Far Eastern ports, and the introduction of the virus was therefore attributed to meat procured there (*48b*, pp. 4–5). Nevertheless, no immediate action was taken to halt imports from FMD-infected regions because, as in the 1914–16 epidemic, no scientific proof as yet existed to implicate meat.

Lacking safe facilities for conducting scientific experiments on highly communicable foreign diseases such as FMD, for the same reason which until recently had deterred the United Kingdom from doing the same thing, the United States government dispatched a commission of three experts[16] to Europe in 1924 to study the disease and conduct research in the laboratories of France and Germany.

The Pirbright Experiments

In the meantime, the Pirbright Laboratories of the British FMD Research Committee had been put into operation and were ready to act when reports were received early in 1925 of three primary outbreaks of the disease near Edinburgh. FMD lesions were found around the hooves of fresh hog carcasses imported from the Continent for processing in a plant there, and these were taken to Pirbright immediately. Live cattle were inoculated with material from the lesions; infection resulted.

Other experiments conducted in the committee's laboratories indicated that

[16] P. K. Olitsky of the Rockefeller Institute for Medical Research; Jacob Traum, Associate Professor of Veterinary Medicine, the University of California; and H. W. Schoening, Associate Veterinarian, U. S. Department of Agriculture (*54*).

tissues from infected laboratory animals may remain infective even after rigor mortis if the carcasses are held in cold storage; that the blood remained infective after 36 days and bone marrow as long as 96 days in refrigerated carcasses which had not been bled after slaughter; and that in drained carcasses the bone marrow remained infective for at least 36 days (*19*, p. 12).

The experiments were repeated promptly, this time using hogs, likewise slaughtered in the early stages of the disease, dressed for market, then chilled or frozen; also in hog carcasses preserved by dry and wet salting. No evidence of infection was found in the skeletal muscle of the chilled and frozen carcasses, but the blood, whether the carcasses had been frozen or chilled, was infective for 30 or 40 days, and the bone marrow for still longer periods—in two instances for 76 days. After dry and wet salting the virus was recovered from the bone marrow after 42 days. Also, the "disease was readily conveyed to pigs by feeding them on crushed bones from the frozen carcasses containing infected marrow" (*19*, pp. 12–13).

As soon as the results of these experiments were made known to the British government, it immediately (June 1926) prohibited the importation of all fresh meat carcasses or parts thereof from Europe (*20*, p. 515). It was on the basis of the same findings that the United State Secretary of Agriculture issued B.A.I. Order No. 298, the so-called Sanitary Embargo, on imports of fresh and refrigerated meats from countries where FMD is known to exist,[17] which Arthur P. Whitaker has labeled "this offensive measure . . ." (*66*, p. 103).

AN ARGENTINE ON THE SANITARY EMBARGO

In the published sources consulted, there is no indication that Argentina at that time regarded the Sanitary Embargo as a slur on Argentine meat. In fact one Argentine writer, Juan E. Richelet,[18] was quite emphatic that it was not:

> The B.A.I. Order No. 289 [sic] neither mentions the Argentine nor any other country. It is applicable to all countries where rinderpest or foot-and-mouth disease exists. These restrictions have not been raised as the need for them is still present, but the Argentine Ambassador in Washington was acquainted in March, 1927, with the procedure necessary to be followed by the Argentine or any other country to comply with this order.
>
> The procedure involved includes a special certificate showing that the animals come from a region where rinderpest or foot-and-mouth disease did not exist during 30 days preceding slaughter and also specifying that slaughter had been accomplished without contact with any infected animals.

The Argentine government, according to Richelet, had considered it "unnecessary" to comply with the stipulation because it already required a certificate from exporters which it considered covered the position adequately.

[17] One wonders why the landing of garbage from offshore sources was not likewise prohibited.

[18] Richelet was the veterinary officer of the Argentine government in London and had been the Argentine delegate to an international conference on epidemics held in Paris in May 1928; he was also a member of the Veterinary Exports Committee of the League of Nations in 1929. He therefore felt qualified to speak with authority on the various issues at stake.

> It is clear, therefore, that Argentine meat is not prevented from entering the United States..., and although since the beginning of 1927 meat exports to that country have practically ceased, this is due exclusively to the fact that the Argentine authorities have not considered it expedient to issue a new certificate as required by the United States Government (*40*, p. 134).

In any event Richelet did not regard the Sanitary Embargo as permanent. He believed that meat production in the United States already was so much below demand that the country was going to have to import Argentine meat, whether the politicians wanted to or not (*40*, pp. 25, 83–85, 122–28).

Richelet on FMD and Meat

Dr. Richelet's book was written for a British audience. The Sanitary Embargo was an embarrassment to the Argentines because it was being used as an argument by British livestock and meat interests and their supporters who wanted their government to extend its prohibition on uncooked meat imports to include all areas where foot-and-mouth existed, as the United States had done. They argued that home and empire producers could make up the quantities lost by prohibiting shipments from South America. If the government would not halt all imports of refrigerated meats from South America, it should at least ban the entry into Great Britain of chilled beef.

British and empire cattle producers have never been able to supply all of the meat England needs. That was as true then as it is today. Then, however, Argentine meat arrived in such unprecedented amounts that prices were depressed. Prohibiting imports of chilled beef would not necessarily have lowered the quantities of beef received, because it would have been frozen instead, but that would have improved the competitive position of British beef. British-grown beef was marketed fresh, and the consumer preferred his meat that way. On the other hand, the British consumer tended to prefer Argentine beef to British beef of the type he could afford. Argentine beef was better than all but the best produced in England (*17*, p. 176; *25b*, pp. 79–80), and in chilled form, as most Argentine beef imports were, closely resembled fresh beef. It was argued in Parliament that chilled beef posed a greater threat than frozen beef as a possible carrier of FMD because more of the retained blood was released in cutting up the carcass on the butcher's block (*20*, col. 762).

An added grievance to British livestock producers had long been that, regardless of the fact that FMD is not itself usually a killer on a big scale, it had become one in Great Britain by virtue of the official stamping-out policy, which in recent years had taken a heavy toll of livestock annually, most of which, had it not been for the policy, might have been expected to recover.[19] "If such severe precautions were taken against infected carcasses from Northhamptonshire farms, perhaps

[19] "It is frequently urged that the disease is curable, that its effects are transitory . . . that in the outbreaks which occurred some half century ago when no restrictions were enforced losses were few, etc.—The assumption underlying all these propositions being that it is unnecessary to impose irksome and costly restrictions, to slaughter animals in order to combat a curable disease. This is obviously true, and it is still more obvious that it cannot be profitable to slaughter an animal to save its life . . . The real trouble with foot-and-mouth disease is its extraordinary infectivity . . ." (*25a*, p. 9).

the Government will tell us why no similar precautions are used for infected carcasses from South American ranches?" (*20*, col. 10–19). The policy seemed even more unfair when carcass meat imports from the Continent were banned after the discovery that FMD virus retained its virulence in bone marrow. In Parliament and in the press the question began to be raised as to whether South American meats might not have been responsible for the growing incidence of FMD outbreaks. Richelet's book was written to " 'nip in the bud' this absurd and unjust campaign . . ." (*40*, p. IX):

> My purpose, in publishing the present information, is to refute the numerous atacks which have been made recently against the chilled and frozen beef trade—attacks behind which there is a world of ignorance and misunderstanding . . .
>
> Suggestions have been put forward from many quarters recently . . . that the dreaded Foot-and-Mouth Disease . . . had been propagated through chilled or frozen meat imported from South America. . . .
>
> My brochure will show that there is no justification whatsoever for the suggestion that Foot-and-Mouth [sic] can be propagated through our chilled and frozen meat—will show, indeed, that of all the imported products susceptible of carrying the virus, they are the least open to attack (*40*, p. VII).

Richelet cited the same research findings by the British FMD Committee which had led to the British prohibition of fresh meat imports from Europe and the United States Sanitary Embargo as proof that chilled beef from South America could not have been responsible for the FMD outbreaks in England: "It is contrary to the highest scientific opinion" (*40*, p. 25, 137).[20]

> Actually, for many reasons, chilled beef is in itself a guarantee of healthy conditions. Firstly, and in accordance with the legislation of meat-producing countries, all cattle intended for exportation are submitted to three successive inspections during the period of eight days immediately before they are slaughtered. Secondly, the lactic acid produced after the death of the animal neutralises the action of the virus. The possibility of the virulence being preserved in blood and the marrow should not give rise to concern, inasmuch as all meat for exportation is first drained of blood so that it may keep better, while the internal bones of slaughtered cattle never enter into contact with livestock; they are invariably boiled or cremated. *In cases where there is any doubt as to the bones having been boiled, the remote danger of contagion can be removed by the simple process of making cremation compulsory.* Bones with marrow intact form part of the skeleton, and butchers should experience no difficulty as regards their immediate destruction (*40*, p. 151).

Carcasses are customarily drained of blood in the process of dressing them for market. Yet Vallée, in a series of lectures delivered in Buenos Aires before the Faculty of Agronomy and Veterinary Science of the University of Buenos

[20] To Richelet's credit, he produced verbatim the report of the committee in which the research results were presented (*40*, pp. 175–78).

Aires, reported that experiments conducted by the British Committee and by a research team in Uruguay had demonstrated that small amounts of blood remained in the larger blood vessels of chilled and frozen carcasses of infected animals and that such blood retained its virulence from 30 to 40 days (*64,* pp. 58–59).

ARGENTINE MEAT AND THE 1929 OUTBREAK IN CALIFORNIA

Another FMD outbreak had occurred in the United States early in 1929. A passenger liner, the *City of Los Angeles,* had loaded 18,000 tons of meat in Buenos Aires in November 1928. When it docked at San Pedro, California, in December, several thousand pounds remained in the cold storage holds. Refused permission to land it, the company arranged for its transfer to a ship destined for Hawaii. Before transfer the meats were trimmed, and the scraps were put into the garbage and sold as hog feed.[21] The garbage was traced to the farm where the outbreak occurred through broken crockery marked *City of Los Angeles.* The disease was detected and reported promptly, and hence was quickly contained. Only five farms were affected—two hog and three cattle (*51,* pp. 1–9).

This was the only incident in which a direct connection was established between meat from Argentina and an outbreak of FMD. Richelet brushed it aside (*40,* p. 133):

> One can see by reading the declarations of the American authorities that the cause to which the new foot-and-mouth outbreaks was attributed was not a serious one, nor was it based on any scientific fact.[22] The researches made by all of the men of science, including the findings of the American Committee working in Strasbourg, establish the fact that the foot-and-mouth disease virus in animals slaughtered in the virulent period of the sickness is only localized in the marrow of the bones and in the blood. Therefore it is uncertain whether it can be established that the remains of meat can retain the state of virulence of the disease and be thus contagious material.

[21] The landing of garbage from ships was not prohibited until January 25, 1929 (B.A.I. Order #315), after the new FMD outbreak.

[22] Salera (*42,* pp. 257–60) also raises a question as to the validity of the findings which caused the Bureau of Animal Industry to attribute the 1929 FMD outbreak in California to Argentine meat, on two points: the long interval between the landing of garbage containing scraps of meat purchased in Buenos Aires and the outbreak, and the fact that, although garbage from the *City of Los Angeles* was also sold to another hog farm, no outbreak occurred in the second. In respect of the latter, it does not necessarily follow that all of the meat in the shipment carried the virus. All that was needed was enough infected meat to infect one animal. As to the interval between the landing of the meat scraps, which could have occurred between December 20 and 29, 1928, and the date of detecting the disease, January 10, 1929, Salera makes the point that the incubation period is "usually of from 3 to 6 days duration." More recent knowledge puts the period "following natural exposure . . . [at] from 2 days to a week but [it] may be longer, depending on the particular strain of virus and the nature and extent of exposure to infection" (*44,* pp. 187–88). The virus most prevalent in Argentina is not a highly virulent type, but if it were in an attenuated state, it might have had to pass through several animals before attaining enough virulence to produce the typical symptoms of the disease. In the Mexican outbreak of 1946, the first detected case appeared more than six months after the most recent arrival of imported cattle to which the outbreak was traced (cf. p. 173). Mr. Salera also cites the British record of having imported large amounts of Argentine meat for several decades, but with no case of FMD attributed to Argentine meat. Until 1926 there was no basis on which to attribute an outbreak to imported meat. In the entire period since British authorities have been trying to find the causes of each appearance of the disease, relatively few cases have been definitely traced to FMD; between 1910 and 1926 in no instance did an official publication attribute a single outbreak to an imported factor. [But see also Fn. 37, p. 170.]

Later he was more categorical: "As we have established elsewhere, meat scraps cannot be carriers of foot-and-mouth disease in any form whatsoever" (*40,* p. 146).

The report of the American Commission had been published in June 1928. It gave as the joint opinion of the three members, based on their research in Europe, that the "carcasses of animals slaughtered in the febrile state of the disease should be considered as dangerous" (*54,* p. 8).[23]

Richelet never conceded that any meat could be responsible for an outbreak of FMD, Argentine chilled and frozen meat least of all. Argentine meat had not been used in any experiments which had produced the adverse findings. This same argument appears to have been put to Vallée in Buenos Aires. He obviously did not consider that it was likely that meat could have been a significant factor in the outbreaks in Great Britain, basing his opinion on a report made to the International Office of Epizoötics in Paris by Sir Ralph Jackson, head of the British Veterinary Services. But, Vallée continued, "it cannot be denied that a peril exists and that which we in Europe call the policy of the ostrich is the least of arguments. To resort to it would be repugnant to Argentine honor. Your tradition has always been one of fidelity to your commitments and your duties" (*64,* p. 61).

The lectures Vallée gave in Buenos Aires were published in book form by the University of Buenos Aires in 1929, but there is no reason to believe that it was more widely read by non-veterinarians than the reports of the United States Bureau of Animal Industry. Richelet was a political veterinarian and a publicist. His books reached a wider audience, as is evidenced by the number of times they are cited by Argentine and United States authors, although there is no way of knowing how much influence he had on public opinion in Argentina. It would be more to the point to accept his assertions as typical of the general Argentine reaction to anything that seemed to reflect on its meat.

As a United States correspondent later commented: "Argentina has what Freud would call a meat fixation" (*35a,* p. 4). It is more than a matter of economics. Argentina's beef is a source of national pride, still strong, but at that time intense. Argentines were convinced that their meat export industry was as modern as any in the world, and their sanitary regulations completely modern. From reading between the lines in Richelet and others, it would seem that one reason the Sanitary Embargo came to be regarded as such a slur by Argentines was that it was interpreted as a reflection on the system of sanitary inspection of animals and meats destined for the export trade.[24] Quite advanced veterinary regulations had been adopted early in the century, when the export trade in refrigerated meats began to make important contributions to the economy. Argentine officials were proud of their inspection service (*30,* pp. 273–83), and several foreign authorities have given it high marks. In 1912 one

[23] In the course of rigor mortis a chemical reaction occurs which produces lactic acid which in most, but not all cases, inactivates the virus in muscle tissue. If the process of rigor mortis is interrupted by freezing, the formation of lactic acid is likewise interrupted. Later research has demonstrated also that in certain circumstances the disease virus is not killed in fresh meats: if the pH level does not drop below a certain point or if for one reason or another a sufficient amount of lactic acid is not produced (*8,* pp. 288–90).

[24] For another explanation see p. 159.

pair wrote: "The measures taken by the Government of Argentina to ensure that frozen and chilled meat exported shall be in all respects sound, free from disease, and of first class quality, are most thorough" (*9*, p. 119).[25] A British mission under Lord Bledisloe, sent to the Argentine in 1928 to survey inspection procedures, was likewise impressed with the precautions, although it did suggest additional safeguards.

Unfortunately, veterinary inspection is not enough. The most infectious period of FMD is the systemic phase before the disease has revealed itself. This had been reported by the United States research team in 1928 (*54*, p. 7), and was emphasized by Vallée, in his Buenos Aires talks. "The animal infected with foot-and-mouth disease is most dangerous . . . before the sickness is manifested by any sign whatsoever . . . often even before the temperature begins to be registered . . ." (*64*, p. 36). As enlarged upon in a later United States statement: "Neither ante-mortem inspection nor post-mortem inspection of the carcasses, can disclose the disease in animals slaughtered before they show visible symptoms of foot-and-mouth disease. . . . No inspection services, in any country, can be expected to accomplish something recognized as impossible" (*57*, p. 2).

As to the livestock producers and the Argentine government, it would have been no more reasonable to expect them to accept the findings of the scientists which imputed a connection between meat and the spread of FMD than it would be today to expect the cigarette and dairy industries not to challenge medical findings prejudicial to the sale of their products. Moreover, the readiness of Argentines to believe that scientists of the U.S. Department of Agriculture would permit themselves to be used to further the protectionist aspirations of the cattle interests lends itself to the inference that they were reflecting what was customary with them. That is, they appeared to have taken it for granted that the Bureau of Animal Industries was as much the creature of the livestock interests as the Argentine Ministry of Agriculture, and that one of the B.A.I. functions was to provide the industry such protection as its mandate made possible, in line with the national policy of economic protectionism.

The Tariff Act of 1930 merely strengthened the Argentine conviction that the Sanitary Embargo had been political from the outset.

THE POLITICAL EMBARGO

In the United States there seems to have been only limited awareness of the Sanitary Embargo or the circumstances which caused it to be ordered, even among the interests which benefited from it. It would appear from a debate in the House of Representatives on the proposed revision of tariffs on cattle and beef to be incorporated into what was to become the 1930 tariff law, that the members did not know that imports of cattle and fresh and refrigerated meats from South America had been halted since 1922 and 1927, respectively,

[25] The administration had tightened up its inspection laws considerably in 1927, requiring inspection of the premises from which animals were to be shipped to the Buenos Aires markets and *frigoríficos*, the large freezing and packing establishments engaged in the meat export trade. Cattle cars and other vehicles used in transporting animals to markets were required to be disinfected after each shipment. Earlier regulations required that animals be inspected for signs of disease upon arrival at market or packing house and that viscera be examined after slaughter. Standards of hygiene are prescribed for packing houses and packing house personnel and frequent inspections are ordered to insure conformity with the regulations.

or that meat animals had at no time been imported from South America in quantity. Speaking in the interest of the cattle and sheep men of the 15 western states who were sponsoring a 100 per cent increase in duties on cattle and meat, Representative O. B. Burtness of South Dakota stated that if the duties were raised as requested "farmers and stockmen will not fear ruinous competition from Argentina, Canada, or any other place." One speaker, Representative Ralph Lozier of Missouri, spelled out the threat of South American beef (*47a,* pp. 1882–84):

> For years the American cattle raiser has been facing what looked like inevitable disaster . . . Millions of cattle are grown and fattened at a low cost on the great pampas or plains of Argentina, Paraguay, Uruguay, and Brazil. On these far-flung ranges the pampas grass [sic] is exceedingly nutritious, and the cost of producing beef much less than in the United States. The packing houses of Montevideo and Buenos Aires, owned principally by the great Chicago packers, are superbly equipped and are the last word on packing-house construction and appliances. These cattle, grown and fattened on cheap wild land, on grasses that hardens the fat as perfectly as corn, are slaughtered in these South American packing plants, their carcasses frozen, and in refrigerator ships carried across the equator to England and other European countries, where this meat enters into competition with beef grown on high-priced farms in the Middle West and fattened on corn grown on high-priced land.

The latter speaker seemed unaware that throughout the American West, whose producers were to the forefront in pressing for passage of the measures under discussion, much of the livestock was grown on similarly wild and cheap public domain land. Nor did he know that the United States had exported comparatively little beef to Great Britain since 1909, when the high demand and good prices paid in the United States brought to an end what had been a flourishing export trade. Fresh beef exports from the United States to Britain had revived slightly during World War I, but were noteworthy in one year only—1918—when the demand for shipping space following the entry of the United States into the war necessitated a diversion of refrigerator ships from Southern Hemisphere waters. The larger amounts of meat exported that year had to be made to compensate Britain for the loss of Southern Hemisphere supplies which the diversion necessitated, and were a drain on United States supplies because the United States had an expeditionary force to feed in addition to the domestic market.

An illuminating debate took place in the Senate on Section 306(a) of the tariff bill which was to take away the discretionary power of the Secretary of Agriculture to limit the area to which the Sanitary Embargo on meat animals and fresh and refrigerated meats could apply. When the article first came into discussion, Senator Arthur T. Robinson of Arkansas asked if it were not the one which had produced so many protests from the Argentine government to the effect that the Sanitary Embargo had been imposed by the Secretary of Agriculture "for the purpose of preventing limited competition" from Argentine meat (*47b,* pp. 3569).

Actually the debated focused on amendments of sub-sections 306(a) and

306(d) of the 1922 tariff, the latter sub-section of which related to the plant quarantine law. In both cases, constituents of the Congressional sponsors of the amendments were dissatisfied with the "capricious exercise of authority by the Agricultural Department" under existing law. In the case of plants and plant products, the department was considered to have been too rigid in interpreting the law, and the purpose of the amendment was to require that the Secretary be more lenient. The dialogue follows (*47b*, pp. 3569–70):

> Mr. Robinson . . . I would like to know why the committee adopted one policy with respect to meats and went to the trouble of writing into the law a different policy with respect to plants. Now it appears that in the discretion given him the Secretary of Agriculture has been too strict and has shut out plants because they were feared to be infected which the committee would like to see admitted. In the exercise of the discretion which the law gives him with respect to meats, he has apparently not been strict enough to suit the committee, and they are requiring him to do what they are forbidding him to do with respect to the plants.
>
> Mr. Reed [Pennsylvania]: Mr. President, may I explain that?
>
> Mr. Robinson: Somebody ought to explain it, if it can be explained.
>
> Mr. Smoot [Utah]: Under the act as construed by the Secretary of Agriculture, the Secretary has placed an embargo on numerous classes of nursery stock and plant products, even though the particular articles are not diseased or infected.
>
> Mr. Robinson: That is true of the meats from Argentina and other foreign countries. The test is not whether the particular imports are infected with disease; the test made by the committee in this bill is that if the Secretary finds the livestock in foreign countries are afflicted with foot-and-mouth disease, he is required to shut off all importations. The manifest purpose of this is to provide an embargo on certain products from foreign countries.
>
> Mr. Smoot: Providing they are diseased.
>
> Mr. Robinson: No, that is the very point. The imports do not have to be diseased. There are countries which are very large in area which produce livestock, and if the Secretary of Agriculture, under this provision finds that in such a country livestock are afflicted with a disease, without regard to whether the particular products are infected, he must exclude the products from the markets of this country; but as to plants, he must find that the particular plants being imported are infected before he can exclude them. In other words, the committee is attempting to apply one rule to the importation of plants and the contrary rule to the importation of meats. They may be justified in doing it, but I would like to know why they are taking that unusual course.
>
> Mr. Smoot: I felt we are justified in doing it, for this reason, that meats are human food, and I think it is very easy for the Secretary of Agriculture to determine whether there is a disease among cattle in any country in the world that exports cattle to his country, and if there is, it is better for us not to take the chance of importing the same into the United States. That is of great importance compared with allowing an infected plant to come in.

(Although human beings have been infected with FMD in rare instances, the disease generally has been inconsequential and has never become a public

problem. One writer attributes the Argentine feeling of having been stigmatized by the Sanitary Embargo to the "popular misconception" in the United States that Argentine meat is barred from entering the country "because it is unfit for human consumption—not because of the risk of contaminating American cattle. Many American housewives refuse to buy Argentine canned beef. They are victims of a sly propaganda which has succeeded in linking Argentine meat with the notion of disease . . . —*65*, p. 203.)

Senator Robinson continued the debate:

> I merely want to point out [that] paragraph (a), relating to foot-and-mouth disease . . . [invests] power in the Secretray of Agriculture, sanctioned by law, to impose an embargo. We might as well understand, whatever the merit of the policy is, that we are writing into the bill a provision which will unquestionably result in bitter controversy between the United States and foreign countries. . . .
>
> Mr. Connally [Texas]: Senators will recall that we had an outbreak of foot-and-mouth disease in Texas a few years ago, which cost the government millions of dollars.[26] . . . As I understand it, the disease now exists in Argentina and there is an embargo here against it. My information is that the Argentine Republic has not taken any adequate steps to exterminate it and if we do not have an embargo there will be no inducement to the Argentine government to exterminate it in that country. It is such a virulent disease that it is instant death to cattle and in order to remove the possibility of its spread we have to destroy the cattle and burn their bodies and burn all the stables and pastures and every other thing with which they have come in contact. It would manifestly be impractical to admit cattle relying upon the examination of the individual animal to determine whether or not it had the foot-and-mouth disease. . . . If the foreign country wants to exterminate it, then we can bring in the cattle later.

Senator Connally apparently did not know that meat was imported in any other manner than on the hoof, as from Mexico.

Incidentally, the remarks quoted represent practically the entire discussion on the floors of Congress in the course of the debates leading to the passage of the 1930 tariff bill; Senator Connally's was the only one in which mention was made of FMD as a hazard to domestic herds.

"BUY FROM THOSE WHO BUY FROM US"

When the Hawley-Smoot Tariff bill was under discussion, its terms were communicated by the embassies in Washington to their respective governments,

[26] As stated earlier, the Texas outbreaks of 1924–25 were confined to a small area and were quickly controlled. It is doubtful if the cost exceeded $500,000. Costs to the governments of the United States and California in the same year, largely in indemnity payments for cattle and other property destroyed in stamping out the disease, were around $3.8 million (*55a*, p. 16). Direct costs of eradicating the disease in all of the outbreaks which had occurred in the United States between 1870 and 1926, including the widespread epidemic of 1914–16, came to some $20 million, with direct and indirect cost to growers estimated at $150 million (*31*, p. 378). The direct cost of the 1914–16 epidemic between October 1914 and November 1, 1915, reached $5.7 million. Yet FMD was not listed separately among the losses from animal diseases and pests for the fiscal year July 1, 1914–June 30, 1915. Aggregate losses for the year come to $219.9 million. Of the total, hog cholera accounted for $75 million and Texas fever and cattle ticks for $40 million (*32*, p. 160). By comparison, other losses were low, and the FMD item so small as to be submerged in the miscellaneous category.

and hence received wider currency than in the United States. Upon receipt of the proposed tariff rates on livestock and agricultural products and word that the meat embargo in all likelihood would be strengthened, the politically powerful Argentine Rural Society held an indignation meeting to determine what could be done to counteract them. The discussion was largely in terms of retaliation. The society gave its support to a "buy from those who buy from us" policy and issued a warning that, if the United States continued to discriminate against Argentine meat, the members would withdraw land from cattle production and plant it to cereals in order to create larger export surpluses with which United States cereals would have to compete in foreign markets (*35b*, p. 7:3). (Whatever the intentions may have been on the latter score, the threat was not carried out—*12*, pp. 62, 287.)

There had been suspicion earlier that a "buy from those policy" was being followed by at least one branch of the Argentine government. On the same day the Sanitary Embargo was ordered—September 17, 1926—the State Department approached the Argentine government on the subject of a new commercial treaty to supersede the Treaty of Commerce of 1853, to include a most-favored-nation clause. (The 1853 treaty included only a conditional most-favored-nation clause.) The Argentine reaction was one of complete indifference. In October the State Department encountered another disconcerting incident in its relations with Argentina. Several months earlier the Argentine Navy called for bids for construction of three submarines. Two United States firms signified interest. However, in mid-October the United States Ambassador to Argentina informed Secretary Kellogg that apparently the United States firms were not to be given a chance to compete. Kellogg was nonplused; the ambassador was likewise puzzled. He felt that he was being given a run-around by Argentine Minister of the Marine, who at the same time was trying to obtain a United States loan for the project. The ambassador inferred that a "buy from those who buy from us" policy might determine the placing of the contract (*62a*, pp. 421–24).

A remark by Pueyrredón at Havana in 1927 also can be interpreted as meaning that such a policy was contemplated (*35c*, p. 3:2):

> "It will be quite as beneficial for the United States [as for other countries] to lower its tariff restrictions, in my opinion. The supposition in some quarters is that Argentina is chafing under the sanitary embargo imposed by the United State Government on Argentine cattle and beef. The fact is . . . that we do not export any beef to America. It may surprise you to know that 82% of the [imported] beef consumed in England is Argentine beef. It is natural that England buys from us because we do not erect tariff barriers which prevent us from buying English goods."

Argentina had revised its tariff structure in 1922, primarily to increase revenues, but with a "general increase of 60 per cent . . . in ten basic official tariff valuations" (*37*, p. 203). These hit certain British export commodities, and were regarded by the British government as protective in intention. Furthermore, Argentina was not buying as much from Great Britain as from the United States and, except for the three years 1922–24, had not been doing so since World War I

(*5*, pp. 56, 62). At the time Pueyrredón was speaking the Argentine government was under steady pressure from the British to restore the trade relationship which had prevailed earlier. They used the same arguments advanced by Pueyrredón at Havana: the large and favorable market which Argentine products and particularly Argentine beef enjoyed in England in consequence of the absence of trade barriers there, while Argentines favored United States products to the detriment of British manufacturers, despite United States tariffs on farm products which were prejudicial in Argentina.

Also speaking at Havana, the president of the Argentine Rural Society, Luis Duhau, predicted that the Argentine government would take strong

> "retaliatory measures, which should effectively shut out American goods from Argentine markets, if the United States should refuse to depart from her protective tariff policy. . . . At present we are selling almost nothing to the United States. If the United States should refuse to depart from its present tariff policy her exports of automobiles and farm machinery will soon disappear" (*35d*, p. 8:2).

Although the Sanitary Embargo was not mentioned by Duhau in the quoted passage, it is clear from the context and timing of his remarks that he placed it in the same policy category as the protective tariffs.[27]

Notwithstanding hints such as these, Argentina's imports of United States products flourished through 1929. Imports from Britain, on the other hand, continued to slide. In 1930 imports from both countries fell with the depression, as the following tabulation shows (the amounts represent millions of U. S. dollars —*5*, p. 35):

	Great Britain	United States
1929	144	216
1930	122	135
1931	71	54
1932	46	30

The more precipitate decline in the United States column during the first three depression years was not unrelated to the reduction in Argentina's exports to the United States, to which the higher duties imposed in the 1930 tariff contributed:[28]

	Great Britain	United States
1929	292	89
1930	186	49
1931	164	26
1932	118	11

Exports to Great Britain, on the other hand, were better sustained than Argentina's imports from its traditional trading partner, which together with other

[27] Duhau became Minister of Agriculture in the Administration of President Augustin P. Justo, which took office in 1932.

[28] It should be recalled, however, that most of Argentina's exportable commodities affected by the tariffs are competitive with those of the United States, and would not have been imported in any event. Industrial raw materials such as linseed would have been as much affected by the industrial slow-down as by the higher tariffs.

depression-engendered circumstances, strengthened the already insistent tone of its "buy from those" arguments.

Argentina's Office of Conversion had been closed in December 1929 to halt the fall of the peso, which had been deteriorating in value since the government had resumed gold payments in December 1927 for the first time since the war. Because of the slump in exports, "there was a growing shortage of exchange with which to service the external debt and to pay for essential imports" (*42,* p. 51). The suspension of gold payments and the shortage of foreign exchange also made it impossible for British-owned companies in Argentina to make remittance to their shareholders in the United Kingdom. The situation was not improved when the Argentine government established exchange control in October 1931, following devaluation of the pound sterling, to prevent further depreciation of the peso.

A system of priorities was established by the Exchange Control Commission for the allocation of available foreign exchange, with payments on account of government indebtedness abroad and essential imports, in that order, heading the list. Remittances abroad received third priority; travelers' expenses, fourth; non-essential imports, fifth; unpaid balances for imports prior to October 31, 1931, sixth and last (*42,* pp. 60–61). For the time being, the last four categories represented little more than a record of intentions; there was hardly enough foreign exchange to cover the first two, let alone to take care of remittances abroad.

"Altogether, the situation for the British investor in Argentina was very bad" (*38,* p. 231). The pressures exerted in his behalf by his government were no more successful than earlier attempts to improve the balance of trade. In fact, they were no more successful than the pressures which British and Commonwealth meat producers had been exerting on the British government to limit imports of chilled and frozen meat from Argentina and other South American countries. The latter agitation had contributed to a two-pronged movement for abandonment of free trade and adoption of a general import policy which would guarantee preferential treatment to empire producers. The time had come when the British government could no longer withstand it.

Great Britain reluctantly abandoned free trade in February 1932 and "grudgingly" accepted imperial preference in August at the Ottawa Imperial Economic Conference (*14,* p. 969). By so doing the mother country provided itself with a fulcrum with which to dislodge Argentina from its previously adamant refusal to grant any of the concessions the British needed. No duties were imposed on fresh or refrigerated meats in the new tariff schedules but in the Ottawa agreements with Australia and New Zealand, Great Britain committed itself to reduce imports of chilled and frozen beef from non-empire sources by 35 per cent between January 1, 1933 and June 30, 1934.[29] As was admitted by Walter Runciman, President of the Board of Trade, in the House of Commons when reporting on the treaty, the British government had previously "no means of exercising pressure [on Argentina]) We are now in a position to do that" (*21,* col. 1544).

[29] The reduction was to be made on a quota basis assigned to each exporting country, based on the quantities received from it in each quarter of the year July 1, 1932–June 30, 1933, and was to go into effect on January 1, 1933, with a reduction of 10 per cent in the first quarter, and a progressive reduction of 5 per cent in the remaining five quarters.

They were prompt to take advantage of it.

> Owing to a sharp fall in the price of beef it was found desirable to introduce emergency arrangements with regard to chilled beef and a "gentlemen's agreement" was negotiated, under which importers from South American countries undertook to reduce their marketing of *chilled beef* by 10 per cent. on their current programme as from the middle of November, 1932, rising if necessary to 20 per cent. during the months of November and December (*17,* p. 353).

Runciman's statement to the Commons gave the clue to that action: "chilled beef is their [Argentina's] principal commodity. If that importation is checked, it strikes a blow at their major agricultural industry" (*21,* col. 1548).

Lord D'Abernon, head of an unsuccessful commercial mission to Argentina in 1929, suggested in his report that the complete dependence of Argentine meat exporters on the British market made it vulnerable to any such action, and continued: "The export of beef is one of the Republic's most important industries, and the one which binds it closest to the United Kingdom" (*16,* pp. 19, 21). The threat to that trade inherent in the unilateral reduction of import quotas of chilled beef below the levels agreed to by the Ottawa pact signatories led to even closer ties.

The Roca-Runciman Agreement

When the Argentine government learned of the arrangement made by the British Board of Trade with the meat importers, it immediately dispatched a trade mission to England to try to prevent further reductions of chilled beef quotas. The result was the Roca-Runciman Agreement of May 1, 1933, in which Argentina agreed to exempt foreign exchange obtained from exports to Great Britain from the priorities system established by the Exchange Control Commission. All except "a reasonable sum annually to be set aside for servicing of Argentine public external debts" was to be used to take care of current remittances to the United Kingdom, any surplus to be deposited into a fund to be applied against balances outstanding on May 1, 1933. In exchange, Argentina received a qualified assurance that Great Britain would not reduce its imports of Argentine chilled beef below "Ottawa year" quotas unless "such a step becomes necessary to insure a level of remunerative prices in the markets of the United Kingdom . . ."[30] (*26,* Articles I, II).

The remaining points of the treaty were handled in protocols to it, but the essential feature was the exchange clause. Argentina had always maintained that the pertinent relationship in its commercial dealings with Great Britain was not the balance of trade, always adverse to the latter, but the balance of payments, always adverse to Argentina. By the exchange clause, however, it committed itself to bilateralism in its trade with Great Britain, the "buy from those who buy from us" policy the latter had been advocating for almost a decade.

[30] That is, "unless necessary to secure a remunerative level of prices in the United Kingdom . . ." In practice it turned out that chilled beef prices were reduced below "Ottawa year" quotas in every quarter beginning January 1933 through June 1934. In two of the six quarters, the added reductions were 2 and 3¾ per cent respectively; in the others they ranged between 10 and 15 per cent (*17,* p. 353).

The Argentine public was outraged by the price its government had paid to protect the country's most "politically supersensitive commodity" (*42*, p. 89) —the price being interpreted as a compromise of Argentina's sovereignty. Some of the antagonism was extended to include the United States, partly because of the Sanitary Embargo. The progressively lower quotas for Argentina's refrigerated meats resulting from the Ottawa meat agreements made new export outlets appear a necessity, and the United States was the one country which could have absorbed the amounts made surplus without, in Argentine opinion, seriously prejudicing United States livestock and meat interests.

Economically, the Roca-Runciman Agreement did not damage Argentina seriously. Indeed, Argentine fiscal authorities were quick to use it to their advantage. The exchange feature of the Roca pact was incorporated, at least in modified form, into a series of reciprocal trade agreements during the course of the next few years which were to be detrimental to countries such as the United States whose existing commercial treaties with Argentina were on a conditional most-favored-nation basis and which were unable or unwilling to meet Argentina's terms for new agreements (*37*, p. 209; *67*, p. 216).

It did not take great perspicacity on the part of the United States Departments of State and Commerce to foresee at the outset how the Roca-Runciman Agreement would impede the recovery of the U. S. export trade with Argentina and to realize the necessity of negotiating a new commercial treaty with Argentina to offset some of the advantages which would accrue to Great Britain from the new pact.

Conversations were opened late in 1933 following the Montevideo Inter-American Conference but nothing came of them, presumably because Argentina insisted that it be a bilateral arrangement, instead of multilateral, as insisted by Hull. Also Argentina appears to have made modification of the Section 306(a) of the Hawley-Smoot Tariff Act the *sine qua non* of any agreement it would be willing to consider (*37*, p. 244; *67*, p. 221); hence the Sanitary Convention of 1935.

EXCHANGE CONTROL AS ECONOMIC DISCRIMINATION

Even before the subject of a new trade agreement was taken up, Argentina had announced an innovation in the allocation of foreign exchange that was "frankly bilateralistic" in intention. As of January 1, 1934, there were to be two rates of exchange, the official and "free market," the latter amounting to official sanction of the earlier unofficial, or black market, in currency. Imported merchandise

> could be paid for at the official rate . . . only in the event that permits for the required amount of exchange had been obtained from the [Exchange Control] Commission at the time orders were placed abroad. Such orders were thus assured official exchange as soon as the goods had been cleared through customs . . . They would be granted to applicants subject to sufficient exchange being available for the country of origin of the goods (*42*, pp. 113–14).

Importers denied "prior permits" had to obtain foreign exchange to cover the landed cost of merchandise on the anomalously labeled "free market," where

prices were subject to manipulation by the Control Commission.[31] When the margin between official auction rates and free market rates dropped below the average of 20.6 per cent which prevailed for the first seven months of the new stage of exchange control, to 11.8 per cent during August 1934–March 1935, the Argentine Congress authorized an exchange surcharge of 20 per cent above the official selling rate for all imports for which prior permits had not been granted.

Toward the end of 1936, when Argentina's recovery from the depression had so advanced that there began to be talk that exchange control might be terminated, an unofficial source attributed the continued retention of the 20 per cent surcharge to the government's hope that it could be used in bargaining for ratification of the Sanitary Convention.[32] Because of the rebound in Argentina's economy, there were enough purchasers for preferred United States imports that, despite the costs added by exchange discrimination, the market for them improved. Whereupon the Argentine government resorted to quantitative limitations, on a quota basis, in November 1938. More than 100 tariff classifications of U. S. merchandise were affected. These were items already subject to the restraints imposed by denial of eligibility for official exchange treatment. For example, automobile importers were informed that they could import in 1939 only one-fifth of the number received in 1938.[33] Aside from Japanese and Italian textiles, the items affected were preponderantly those which Argentine importers continued to look to the United States to supply. Later, additional U. S. items were made subject to quotas while others, previously eligible for prior permits, were transferred to the 20 per cent surcharge group. Some items were virtually exluded by the manner in which the quota system was applied.

Under the Roca pact, all imports from Great Britain were assured official exchange treatment (*63–1,* p. 18). It has been estimated that less than half the United States imports were similarly treated (*42,* p. 145). Yet in all but a few years between 1932 and 1941 the peso value of Argentine exports to the United States was well over 50 per cent of the import totals. In three years, 1935–37, Argentine exports to the United States exceeded imports from the United States by 29 million, 41 million, and 44 million pesos respectively. Argentina's fiscal authorities nevertheless made 65 per cent of United States imports subject to the 20 per cent surcharge in 1935, 54 per cent in 1936, and 40 per cent in 1937 (*42,* p. 168).

With the dollar exchange which accrued to Argentina from its favorable exchange balances in 1935–37, it redeemed $40 million of dollar bonds. "Surely no more discriminatory treatment could be devised, for by this means the authorities could increase the quantum of favored exchange to its European trading partners while simultaneously decreasing by a sizable multiple that allocated to importers of the United States merchandise" (*42,* p. 178).

These were the major means used by the Argentine government to retaliate for exclusion of Argentine carcass meats by the United States. "Argentina was

[31] Neither rate was fixed. Holders of prior permits who qualified for the official rate were required to submit bids, but the blocks of foreign exchange available at any given time were not all put up for sale at once. Exchange was rationed, in effect, to insure that the official price would fluctuate in a narrow range.

[32] *The Times of Argentina,* Dec. 14, 1936, p. 14, cited in *42,* p. 186n.

[33] But see *42,* pp. 203–04.

getting the benefit of the most-favored-nation clause . . . and was profiting not only from its own treaties but also from all treaties made by the United States, without having to give anything in exchange. Argentina had obtained United States tariff reductions on at least two dozen articles by the automatic operation of the most-favored-nation clause" (*67*, p. 222).

The refusal of United States authorities to permit Argentine beef to enter the country to be served at the Argentine pavilions at the New York and San Francisco world fairs in 1939–40 did not help the situation. Argentine indignation knew no bounds. It had been hoped that the Norteamericanos would have the opportunity to sample and enjoy Argentine beef, identified as such, which was denied them by embargo. Because Argentina did not receive even the token modification of the meat exclusion which ratification of the Sanitary Convention would have made, United States industries which customarily did business with Argentina were subjected to progressively harsher penalties. Yet, a recent writer who considers that the State Department was acting in behalf of a "non-national interest" in pressing for ratification of the Sanitary Convention, says that there "do not appear to be any real grounds for deploring its demise. In view of the later issues which divided Argentina and the United States, the ratification of the Convention would hardly have been of much importance one way or another" (*68*, p. 21).

Costs of Argentine Retaliation

It is not possible to express statistically the adverse effects of the measure adopted by Argentina after 1932 to retard the importation of United States merchandise in consequence of the failure of the Sanitary Convention in the United States Senate. Actually, United States exports to Argentina made a better recovery after 1932 than British exports. This statement is based on United States and British export data. The critical effect of the post-1932 measure was to prevent the United States from recovering the trade losses incurred during the first three depression years.

In 1932, the United States share of the value in paper pesos of Argentine imports was 13.5 per cent; the average for 1925–29 was 24.6 per cent. The 1934–38 average was 15.1 per cent of a smaller total, and the proportion was actually smaller than it appears because of the exchange discrimination against United States products in the latter period. The British share was 21.5 per cent in 1932 as well as for the five years 1934–38, in contrast with an average of 19.6 per cent for 1925–29.[34] The relatively slight improvement in Great Britain's position is explained by the larger volume of imports from other countries with which Argentina negotiated bilateral agreements on the pattern of the Roca-Runciman treaty.

The volume of most principal United States exports to Argentina was reduced by at least 50 per cent between 1929 and 1937–38, a number much more drastically. Some showed an increase—petroleum, refined copper, radio tubes, track-laying tractors, automobile engines for assembly or replacement, caustic soda, and

[34] Calculated from tables in *5*, pp. 5, 56, 63.

motion picture film—but these were not on the whole important earners. The significant data are the following (*63-1*, pp. 70–71):

	1929	1932	1936	1937	1938
Principal exports (in million U. S. dollars)	121.0	13.4	36.4	67.4	64.2
Total U.S. exports to Argentina (in million U. S. dollars)	209.9	31.0	56.7	93.8	86.5
Principal exports expressed as per cent of total	57.7	43.3	64.3	71.8	74.2

Lesser exports in the aggregate accounted for $89 million of the 1929 total—a higher figure than the total value of all United States exports to Argentina in 1938. To repeat: it is not intended to attribute all of these losses to retaliation. The drop between 1929 and 1932 was depression-induced. United States imports of Argentine products fell even more in value than the decline in Argentine imports from the United States, and the merchandise balance was highly adverse to Argentina. Nevertheless, the failure of the Sanitary Convention in the Senate had an impact on U. S. manufacturing interests which makes one wonder that anyone could believe that there "do not appear any real grounds for deploring its demise."

The "later issues which divided Argentina and the United States" were not unrelated to the "demise" of the Sanitary Convention. One U. S. correspondent in Argentina was "almost persuaded that the pro-Germanism of certain generals one has met, the hesitation about collective defense and the warning against 'Yankee imperialism' given on national posters, are all attributable to the fact that certain members of Congress from the Western plains log-rolled Argentine meats out of the United States market" (*35a*, p. 4).

The State Department in pressing for ratification was not concerned exclusively with reviving United States trade with Argentina. The aim of the Good Neighbor policy was to overcome Argentine suspicions of the United States built up during three decades of intervention in the internal affairs of Latin American countries and grievances of individual countries which felt themselves hurt in some way by the United States. In the special case of Argentina, hostility created by the meat issue contributed to an ambience of ill will toward the United States which was exploited by Hispanists and fascist sympathizers. The pro-German elements in the military services might have been pro-German in any event. The general public may not have been but the meat question made it anti-American, and hence susceptible to Nazi propaganda to the extent at least of being apathetic toward efforts to counteract it.

A trade agreement was ultimately arrived at by the United States and Argentina in October 1941, even without ratification of the Sanitary Convention, but not until Argentina had found itself in urgent need of United States imports which the United Kingdom could no longer supply. The new treaty did not erase the bad feelings engendered by the meat exclusion.

Ratification of the Sanitary Convention would have been a concession to Argentina. Furthermore it would have put the emphasis on the Sanitary Embargo where it belongs, i.e., on FMD as a highly contagious animal disease. So

long as the embargo applies to areas where foot-and-mouth disease does not exist, the contention that its purpose is prevention and not economic protection does not ring true in Argentine ears. So long as exceptions are made when they are to the interest of United States cattle breeders, their opinion is reinforced.

In 1938, Great Britain was off limits as a source of cattle and meat imports into the United States under Section 306(a) of the Tariff Act of 1930. Yet in order to make it possible to import breeding stock from the Channel Islands of Guernsey and Jersey, which administratively are parts of Great Britain but physically separate from it, the United States Department of Agriculture ruled that they should be considered as separate countries within the meaning of Section 306(a). Both islands were free of FMD; Great Britain was experiencing an outbreak. On the basis of this precedent, Argentina requested the United States government to treat the FMD-free island of Tierra del Fuego, off the southern tip of Argentina, as a separate country for purposes of administering Section 306(a). Sheep are grown in Tierra del Fuego and it was proposed to ship mutton and lamb from there to the United States. The matter dragged on until 1943, when the request was finally denied (*65*, pp. 200–203).

THE 1959 IMPORT BAN

Argentina had no actual need of the United States as a market for its beef for some years thereafter. In 1939 it had entered into the first of what was to be a series of agreements with the United Kingdom which were to govern the meat trade between the two countries for the next fifteen years, during the greater part of which Britain could have used more meat than Argentina could supply. Beginning with 1950, Argentina's meat problem was not the absence of market outlets but a shortage of meat. The cause of the shortage was a combination of drought and producer resistance to the Perón plan to make the agricultural and livestock sectors of the economy pay for an ambitious program of industrialization. In order to counteract the resistance, the government finally offered inducements which proved to be more advantageous to cattle growers than to cereal farmers, causing many of the latter to turn to cattle. Therefore, when the cattle cycle pulled out of the trough in 1955 there were more cattle than could be disposed of at prices the producers considered lucrative.

Again British producers began to complain about Argentine competition; again as in the mid-1920's there were pointed couplings of large imports of Argentine meat with continued outbreaks of FMD in Great Britain. The bright spot in the picture was that the United States, in addition to taking good quantities of Argentine chilled beef, had begun to accept shipments of beef in another form which was finding a ready sale. The meat in question consisted

> of pieces (a fraction of an ounce to a pound or more in weight) of boned beef taken from carcasses which had been ripened at 4C for three days. The meat was salt-cured, meaning that about 4 per cent salt was added as the meat was packed in barrels for shipment. The barrels of meat were held at about 4C during the shipment and prior to use by the U. S. packers. This imported meat was used along with domestic meat in frankfurters and other types of sausages (*15–1*).

Small amounts of such meat were shipped in 1955. Shipments in 1956 and

1957, though still small, were almost double the 1955 figure. Then in 1958 a number of new firms entered the trade. The physical volume exported was almost 500 per cent larger than in 1957; earnings were in excess of $29 million. 1959 prospects were brighter, but did not have a chance to develop. Suspension of the imports was ordered by the United States Department of Agriculture on May 11, to become effective May 15 except for orders still in transit. Quantities shipped until the effective termination of the trade amounted to 40 per cent of the 1958 record, the value to 55 per cent (*4*, p. 129); little wonder that the order created dismay among exporters, producers, and government alike.

Consternation was added to dismay by the fact that boneless meat so prepared was not excluded either by the Sanitary Embargo or the Tariff Act of 1930. Yet the urgency of the situation was such that the new regulation was made effective less than 30 days after publication in the Federal Register in order to provide, in the words of the order, "necessary safeguards against the introduction into the United States of dangerous communicable diseases of livestock, such as foot-and-mouth disease and must be made promptly to protect the public" (*46*).

When the shipments of the cured and frozen meat first began to reach the United States, they were admitted because the meat seemed safe. During the period 1955 to 1958, the increased use of quick-curing procedures, the increasing volume of cured meat being imported, and increasingly rapid transit became of great concern to the authorities of the USDA. Even though a great deal of research had been done on meat in relation to FMD, no one had investigated the survival of the virus in salt-cured meat prepared according to modern commercial practices (*15–1*).[35]

Uneasiness created by the circumstances described prompted the United States Department of Agriculture to undertake a study of the survival of the FMD virus in cured meat. The only place in the United States where FMD research could be conducted was at the Department's Plum Island Animal Disease Laboratory, which had been established between 1952 and 1956 to study FMD and other foreign diseases of animals. Tests demonstrated that infective FMD virus survived in the lymph nodes of salt-cured meat for at least 50 days when the meat was prepared in a manner similar to that used for the imported cured meat.[36]

These findings, coupled with earlier research (*8*, p. 295), led to the decision of the department to prohibit importation from FMD-infected countries of cured meats of the type described (*15–1*).

Coming as the order did after the first year in which the trade had become really important, it was inevitable that Argentines would have suspected the motives behind it, even if they had not been predisposed to do so. As had happened in the 1920's when the Sanitary Embargo was first ordered, there were those who regarded "the loss of prestige suffered by Argentine meat . . . as

[35] "Each shipment was carefully watched from the time it arrived until it was finally processed as sausage. Furthermore, inspectors were finding foreign materials in the barrels of imported meat; it was evident that some of the South American packers were careless in handling the meat" (*15–1*).

[36] "Virus also was found in rib-bone marrow of stored beef carcasses for as long as 73 days, and in large blood clots, in lymph nodes and in certain muscles for as long as 60 days. Virus was not found in muscle tissue or blood vessels of the stored cured meats" (*15–1*).

hardly less injurious than the direct economic loss . . ." (*39a*, p. 16).[37] The Argentine Secretary of Agriculture declared that there was no FMD in Argentina, as did also several newspapers (*11*, pp. 256–66). This too has a familiar sound. John W. White, writing in 1942, remarked that "Every time anyone mentions foot-and-mouth disease, a great howl goes up from Argentine officials and newspapers that there is no foot-and-mouth disease in the country" (*67*, p. 195). The complaint aired in connection with the 1926 embargo was also heard: that the experiments had not been conducted with Argentine meat (*34a*, p. 3).[38]

In order to persuade the Argentine government of the validity of the findings, Argentine scientists were invited to Plum Island to see the experiments and the methods by which they were conducted. The report of technicians upon their return was that the experiments had not been made in accordance with practices followed in Argentina and hence did not represent Argentine conditions.[39]

Numerous exchanges of scientific personnel have been made subsequently. Discussions have taken place between the presidents of the two countries as to the possibility of doing something about the prohibition. Every effort has been made to make it clear to the Argentines that it was not a political action, that it was mandatory under the laws of the United States. Yet as late as July 1, 1961, the Argentine Secretary of Agriculture in an important public address said that the Argentine position "had been clearly explained to the United States authorities, especially the insistence that the 'obstructing' of Argentine access to the Amer-

[37] The inclusion in the order of the phrase "to protect the public" must have been responsible for the revival of the prestige issue. No such complaint was aired when the British FMD Committee, in its 1952–54 report, stated that, in the opinion of the Ministry of Agriculture, chilled and frozen beef from Argentina, Brazil, Uruguay, and Chile was responsible "for more primary outbreaks in England than any other cause."

As a matter of fact, comparatively few primary outbreaks were attributed directly to "contact with imported meat or bones": 50 of 540 primary outbreaks in the period 1938–1953, or 9 per cent of the total. 264 outbreaks were attributed directly to swill, and indirectly to meat, and in addition 36 outbreaks of "completely obscure" origin were also attributed indirectly to swill (*27*, pp. 11, 14–15).

[38] White also states that the grand champion Shorthorn bull at the 1925 livestock exhibition of the Argentine Rural Society at Palermo, which was sold at auction for the highest price ever paid for a Shorthorn to that date, later died of FMD "which he had at the time of the exposition, and the purchaser got his money back, that having been one of the conditions of the sale" (*67*, p. 190). Several years earlier a veterinarian employed by the Argentine Rural Society wrote of the bad impression created by the number of FMD cases that developed annually during the course of the Palermo shows. All of the animals at the outset were apparently well but nevertheless one or more were usually in the early infective stage; the very circumstances of an exposition were conducive to rapid spread, so that almost before the eyes of the visiting public, animals developed the fever-glazed eyes, the repulsive drool of spittle, and wobbly legs of FMD. In 1919, when there was a virulent epidemic in the country, 605 head of breeding stock were inoculated; of these, 273 head (45 per cent) came down with FMD in the course of the show. Five hundred were not inoculated; 90 per cent developed FMD. All entries in 1920 and 1921 were required to be inoculated with the Loeffler anti-FMD vaccine at the exposition grounds; few contracted FMD. In 1922 there was only partial inoculation, with a high incidence of cases in consequence. None of the animals in the 1923 exposition received the Loeffler vaccine; 44.4 per cent of the entries had FMD before the show was over (*41*).

[39] "Actually, the criticisms were that the carcasses were not washed as they do it, that all lymph nodes are removed in Argentina and that bone fragments and large blood clots would not be present in meat from Argentina. They were also critical about the use of artificially infected animals, and the fact that they were slaughtered during the course of the disease. They were not critical of the general laboratory procedures and isolation of the test animals" (*15–1*). It is impossible to remove all lymph nodes; some are too small to detect. Also the question at issue is not whether Argentine meat as such can transmit the virus, but whether the virus can survive in meat which has been ripened for three days to permit rigor mortis to take its course, then packed in salt and chilled; and if so, how long.

ican market should cease." Certain important trade commodities, notably salted beef "had been unjustifiably excluded or restriced by sanitary regulations and complex bureaucratic regulations which were at variance with normal trade practice" (*39b*, pp. 21–22).

Argentines clearly do not understand the alarm with which FMD is viewed in other countries. The disease has been endemic there since 1900, possibly earlier. Nevertheless, in the course of the last 75 years the country's cattle population has grown from around 22 million head of predominantly criollo animals[40] (*2*, VII, VIII, XII), to about 43 million head of some of the finest cattle in the world (*62*). In general producers look upon the losses incurred in the recurring epidemics in the same manner as they regard other natural disasters, i.e., as one of the risks of the business. Losses are not usually heavy because, even with the limited immunity which the virus confers, a certain number of animals are always protected against it. Virulent outbreaks are rare. Vaccines are used frequently—three times a year—by the more knowing producers (*27*, pp. 28, 29; *34b*, p. 15). The losses might be more severe if the concentration were not so largely on beef herds, rather than on dairy cattle, where the disease is always more damaging.

Nevertheless, FMD had been troublesome even before the U.S. order of 1959 because in addition to the protests of British producers, certain European countries where FMD is endemic but which are striving to eradicate the disease had begun to curtail imports of Argentine meat, using FMD as an excuse. Advances in animal genetics and more efficient cultural practices have added to their cattle numbers and better cut-out rates are being achieved, adding to the concern aroused in Argentina by European Common Market plans for increased intra-regional trade and self-sufficiency. For this reason one suggestion advanced shortly after the ban went into effect has been acted upon:

> The time seems ripe to ask whether it would not be as much in Argentine's interest as those of her clients if an intensive campaign were directed to reduce foot-and-mouth disease and conceivably eradicate it altogether from limited areas . . . Since the United States Department of Agriculture collaborated in freeing Mexico of the disease a few years ago, it might not be too much to hope that this grave problem should receive the attention of the committee of Argentine and American experts at present conducting the technical study known as "Operation Beef" (*39c*, p. 20).

Such a program has been in progress for the past two years, the plan being to eradicate the disease from one region at a time. The hope is, of course, that the United States in the meantime will have revised its laws to permit imports to be made from regions which are free of the disease.

FMD AND UNITED STATES POLICY

What the Argentine government would like the United States government to do is to permit limited imports of refrigerated meat from Argentina, and if not from all of Argentina, at least from Patagonia and Tierra del Fuego. Meat

[40] Descendants of imports in the early years of Spanish settlement.

has become Argentina's most important earner of foreign exchange, but it is not earning as much as is needed. The fear is that it will earn less if Great Britain joins the Common Market. A main purpose of President Frondizi's trips abroad was to find new customers for his country's meat outside the Common Market area, and to persuade countries within that area to accept more than they have been permitting. Argentina is not precluded from selling canned and cooked meats to the United States, and does so, but the market is limited. It is asking that the order affecting the salted, boneless type of beef be modified to permit sales to urban markets. There appears to be an idea that this can be accomplished through "the personal intervention of President Kennedy."[41]

There has been no essential change since 1930 in the United States laws relating to imports of cattle and fresh or refrigerated meat imports from countries where FMD exists. It goes without saying that the range livestock industry opposes any such change. This is likewise true of the scientists of the Animal Disease and Parasite Research Division of the United States Department of Agriculture.

No one who has talked with government specialists on livestock diseases or has read even a small part of official British literature on FMD can fail to be impressed by the sincerity of their belief that introduction of FMD must be resisted at all costs. They estimate that the productivity of U. S. livestock would be reduced by around 25 per cent if the disease should ever become established. Yet the awe which FMD inspires appears not to be shared universally by livestock producers, except in the countries where the stamping-out policy causes whole herds to be slaughtered.

Opposition by veterinary officials of the United States to a modification of the sanitary laws has been heightened by increasing knowledge about the FMD virus and, more emphatically, by outbreaks in Mexico and Canada within the past twenty years.

It has been discovered that there are not three, but at least seven distinct types of the virus, none of which produces an immunity against the other. Three of the strains are found in Europe, the Americas, and parts of Asia, another three only in Africa to date, and one, recently discovered, only in Southeast Asia (*36*). There are variants and mutations within types which do not immunize against the parent strain. Recent experiments have uncovered a remarkably heat-resistant variant (*10–1*, p. 510); formerly it had been thought that the virus was readily destroyed by heat.

The epidemic of FMD which broke out in Mexico in 1946 was the first in North America since 1929. The outbreak in Canada in 1951–52 is said to have been the first that country had ever experienced (*27*, p. 24).[42] In neither case was the virus introduced by meat.

Although detected early and easily contained, the Canadian outbreak in one respect was cause for as much apprehension as the one in Mexico. It was attributed to infected material brought into the country on the clothing or person

[41] The opinion of *La Nacion*, Buenos Aires, as cited in *28*, pp. 929–30.

[42] "According to James Law (Cornell Veterinarian, 1915), FMD spread in 1870 from Quebec and Ontario into New York State" (*15–1*).

of a German immigrant. According to some reports, when the immigrant went to work in Canada he wore clothing he had worn previously on an infected farm in Germany.

In the Mexican outbreak the disease was brought in by zebu cattle imported from Brazil. United States authorities had prior knowledge of the shipments and had tried to persuade the Mexican government not to permit them to land. The request was made in conformance with a 1930 treaty between the two countries in which each engaged not to admit livestock which the other had reason to believe had been exposed to a contagious disease, upon formal notification to that effect by the other signatory. The Mexican government refused to honor the request and its treaty commitment.

The first consignment of zebus arrived in Mexico in December 1945, the second in May 1946. The United States thereupon restricted the importation of ruminants and swine from Mexico, with quarantine and inspection required, but these orders were lifted later in the year when no evidence of the disease had appeared. Shortly thereafter the Mexican government decreed that none of the zebus imported from Brazil could be exported for one year beginning October 25, 1946, and that after that date such exports could not be made without a special permit issued by the Minister of Agriculture.

The first suspected case was not detected until December 26, 1946, and shortly afterwards was positively identified as FMD (*60*, pp. 3–5; *15–1*). Fortunately the virus involved was of low-grade virulence, which probably explains why the disease took so long to proceed from the mild, undetectable form caused by the attenuated strain, to the more active stage. As it was, there had been ample time for it to gain a foothold; by the end of January the disease had appeared in nine states in east-central Mexico and in the Federal District.

At the invitation of the Mexican government, U.S. scientists joined in the campaign to eradicate the disease. The direct cost was borne largely by the United States. Alarm that the disease would spread to the United States was so great that the Department of Agriculture urged that funds be appropriated to build "a substantial fence along the entire United States–Mexican border" (*60*, p. 2). Before the epidemic was finally arrested in 1954, close to a million head of cattle had been slaughtered.[43]

The method followed was the stamping-out procedure adopted by the British early in the century and later by the United States. All infected and exposed animals were shot and buried in trenches; infected premises were disinfected. These methods were fiercely resented by small farmers who saw their oxen killed off, even when they had only been exposed to the disease. These were draft animals; usually there was only one head per farmstead and upon it the livelihood of the owner was largely dependent. Resentment of the outbreak and the methods used was not confined to the livestock owners affected, and has created a doubt that the Mexican government would tolerate the stamping out method should a similar oubreak occur in the future.

The Mexican and Canadian outbreaks and the earlier British experience

[43] The United States contribution toward the indemnities and costs of eradication, including production, testing, and production of vaccine, was in excess of $134.5 million (*35–1*, p. 12).

clearly demonstrated that such safeguards as treaties and sanitary embargoes can not always prevent the importation of the FMD virus. United States authorities were finally persuaded that the time had come to join the search for an effective vaccine against FMD, the decision that led to establishment of the Plum Island Research laboratories.

Importation of Breeding Animals

The Mexican epidemic brings up an inconsistency on the part of those who advocate retention of the country-wide application of Section 306(a). As early as 1924 the American National Livestock Association, the trade organization of the range cattle industry, had been urging a treaty between United States and Mexico which would bind both countries not to import animals from any country "harboring dangerous diseases of livestock."[44] Fortunately for them, the terms of the 1930 treaty were not so stringent. In the past several decades there has been a growing interest in such disease-drought-heat resistant cattle breeds as the zebu. These breeds can be procured more cheaply from countries from which importation of cattle is prohibited under Section 306(a) of the 1930 tariff law than from the few United States breeders who had introduced the breeds previously. It has been possible to do so through Mexican agents acting as importers or by purchase from Mexican ranchers, thereby contributing to the proliferation of zebus in the southwestern states during the past quarter century.

Recently there has been criticism of the embargo on cattle imports from FMD-infected countries by breeders interested in direct importation of the French breed of Charolais cattle, currently prized above British breeds for its greater yield of meat, more even marbling, and thinner shirt of fat.[45] A fair number of Charolais have reached the United States by way of Mexico and some by way of Canada, so that there is a scatter of breeding farms around the country,[46] but the demand is great and prices are high. Hence the desire to import directly from France. However, FMD is endemic in France, although sections of the country are said to be free of it from time to time.

To illustrate the current interest in the Charolais, one has only to say that Great Britain recently relaxed its decades-old prohibition of livestock imports from all foreign countries except Ireland in order to admit a consignment of 30 Charolais bulls for breeding experiments. Three of them developed leptospirosis, a disease which had never occurred in Britain before (*39e*, p. 31).

In the opinion of United States veterinary officials the importation of new breeding stock is more than desirable; it is necessary. However, so great is their dread of FMD that they, like the range livestock industry, oppose any revision of Section 306(a) of the Tariff Act of 1930 which would make it posssible to import uncooked meats from FMD-free parts of countries in which FMD exists. Any attempt on their part to have the cattle import prohibition repealed would make it difficult to justify retaining the country-wide application of the meat

[44] Reprinted in *47–1*, p. 2482.

[45] A tabulation published in *39d*, p. 33, gives the comparative weight of calves of British breeds and of experimental crosses of Charolais and English cattle of approximately the same age, which show substantially larger gains for the latter. The location of the experiment is not given.

[46] This statement is based on listings in *1* and *7*.

ban. In either case, there would still be protection against imports from parts of countries where there is FMD; the Sanitary Embargo and the statutes under which it was authorized are still in force. On the other hand, the possibility remains that the supposedly FMD-free areas within a country might not be entirely so and that the disease might be introduced from them.

There would appear to be less fear on the part of government scientists of importing FMD in cattle than in meat because of the long periods the virus can survive in frozen media. Cattle can be quarantined; in fact, federal regulations require that those imported from any country except Canada, Mexico, Central America, or the West Indies be quarantined for 30 days, other ruminants and swine for 17 days (*56b*). Recent British findings suggest that the periods need to be longer: "animals may remain infective for a very long time" (*27*, p. 9). (Formerly it was believed that the infective stage had all but passed when the eruptive symptoms disappeared.) And not to be forgotten is that cattle were responsible for the Mexican epidemic, the worst in North American experience. Nonetheless, it is time once more to reconsider whether the national interest might not be better served by repealing Section 306(a).

As in the 1930's, the United States is having balance-of-payments difficulties. It is spending abroad for imports and foreign aid, and by way of tourism and military expenditures, more than it is receiving from offshore sources. Preferably it should export less capital as foreign aid and more as merchandise.

For strategic and political considerations, the United States has been spending vast sums to bolster the economies of other countries on the theory that strong economies contribute to politically stable allies. It does not necessarily follow that such is the case but, on balance, countries with strong economies have not moved into the communist or other totalitarian camps. Argentina, the most advanced country of South America, is in a bad way economically and politically, and unless the economic situation is stabilized the political situation from the standpoint of the United States is precarious. The United States has extended financial and technological assistance to Argentina but, however much they may serve to strengthen the economy, the results will not be fully realized until some future date. Argentina's problems are of the present.

Argentina's basic industries are agricultural and the principal commodities are competitive with those of United States agriculture, as also with those of some of the countries of the European Common Market which are Argentina's best markets. One of the bitter facts of the present world for such countries as Argentina is that the agriculture of the industrial giants among nations has kept pace with manufacturing in efficiency and productivity. Cereals are a case in point. Argentina's cereals were formerly its foremost earner of foreign exchange. Now they are secondary, a situation not unrelated to the surplus production and stocks of the United States. Now that Argentina is faced with a possible further contraction in the foreign demand for its meat, it is being assisted by the United States to increase the volume of meat produced and to eliminate FMD.

It is unlikely that Argentina can ever completely eliminate FMD; no country in which it has been endemic has been able to do so. The best that can be expected is that it should be eliminated on a zone-by-zone basis, as planned, with the movement of cattle from infected zones into cleared zones prohibited. Prog-

ress at best will be slow—if there is going to be any progress. Argentina needs the incentive that the United States could provide by admitting meat from the zones from which FMD has been wiped out at such time as that is accomplished. Only Patagonia and Tierra del Fuego are said to be free at present. As a contribution to good will and the stabilization of a turbulent situation which could turn into another Western Hemisphere defeat for the United States, Congress might well find such action justifiable, even at the risk of introducing FMD into the United States.

If such a decision were made, it would have to be in full knowledge that FMD is much more devastating in herds which have had no prior contact with it. In regions where FMD is endemic a certain proportion of the animals usually have partial immunities, although the 1952–54 report of the British FMD Committee makes the point that the number of infected livestock in England during the past quarter century was lower than in European countries where the livestock had built up a measure of resistance (*27*, p. 8). In view of the changes in medical opinion during the past quarter century in favor of acquiring natural immunities to the extent possible, one cannot help wondering if Great Britain would not have been farther ahead financially and in terms of production if it had not killed off so many cattle in its unremitting campaign to prevent the disease from gaining a foothold.

That has been a hard battle. Not a year since 1917 has been without an outbreak. Between 1927–52, there were fewer than 100 outbreaks annually in 15 years, and in 8 of the 15, fewer than 50. This situation the British FMD authorities describe as "sporadic with occasional epidemics." During the last 15 of the 25 years, outbreaks totaled 2,500, of which 1,960 were secondary, i.e., "regarded as arising from established infection . . ." (*27*, pp. 10, 15).

The number of outbreaks does not indicate how many animals were infected.[47] One cannot help wondering if the losses, including losses in productivity, would have been as severe if one of the alternative methods followed on the continent had been used: slaughter of diseased animals and inoculation of all others in the quarantined zone with the vaccine for the virus type involved, or merely vaccination and quarantine, letting nature take its course—death or recovery—in the case of those infected. As was said earlier, the greatest residual losses in FMD are in cows. In France, where outbreaks during the 25 years 1927–52 were numerous, it is estimated that around 5 per cent of the cows that survived the disease had to be slaughtered later because they were unproductive. At the opposite extreme was Italy, where the percentage is said to have reached as high as 50 per cent (*27*, p. 8). Such information from accessible sources suggests that more precise tabulations from official sources of countries where FMD is endemic would help in weighing the risk of repealing Section 306(a) of the Tariff Act of 1930.

The British FMD Committee has expressed the fear that if FMD were permitted to become endemic in Great Britain the dairy industry would be wiped out completely. What has happened to dairy herds in Denmark, Germany, and France where the disease has been endemic for a long time?

[47] Average slaughter per annum, 1929–53, including exposed animals, was 5,800 cattle, 6,300 sheep and 3,000 pigs (estimated livestock count: 10 million cattle, 22 million sheep, 4 million pigs) (*27*, p. 10 and insert). No reports have been indexed for years subsequent to 1953.

From the experience of the latter countries, could the possible direct and indirect losses in dairy production in the United States be estimated? There can be no precise answers to any of these questions, but one would like to have an educated guess as to whether the gains, economically and otherwise, of permitting admission of uncooked meats from FMD-free areas of FMD-endemic countries into the United States would offset the cost of eradicating the disease if introduced.

Of course there is always the possibility that it will be imported in any event —witness the Canadian outbreak of 1951.

Also, "Cuba is suspected of having foot-and-mouth disease, probably from infected meat brought in from the Soviet Bloc countries, or from South America. This puts the disease only 90 miles from the United States and poses a serious threat to our animal industry" (*29*, p. 18). There is always the additional possibility that however introduced, it may be impossible to prevent the disease from becoming endemic. The British experience is not reassuring.

The foregoing explains the urgency of the research being conducted at Plum Island to obtain a satisfactory vaccine against FMD. What had been hoped for was a single vaccine that would immunize against the three main strains of the FMD virus which are found in American and European herds. As is typical of earlier FMD research, the results have postponed a satisfactory solution: in combination the three vaccines are less effective than when administered singly. The race of the scientists against time is to arrive at an antidote for the familiar FMD-virus types before the three from Africa and the newly discovered strain from Asia find their way to America and Europe. In these days of constant travel between Africa, Asia, and the rest of the world, and with the FMD virus accommodating itself to almost all kinds of surfaces and media, that time may not be far off.

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