



**Animal and Plant Health Inspection Service**  
**Consideration of the Status of Rinderpest in South**  
**America**

August 2011

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## **Abbreviations**

|       |                                            |
|-------|--------------------------------------------|
| APHIS | Animal and Plant Health Inspection Service |
| CFR   | Code of Federal Regulations                |
| FAO   | Food and Agriculture Organization          |
| FMD   | Foot-and-Mouth Disease                     |
| GREP  | Global Rinderpest Eradication Campaign     |
| RPV   | Rinderpest Virus                           |
| USDA  | United States Department of Agriculture    |

## **Executive Summary**

Historically, rinderpest was a prominent disease in U.S. laws, regulations, and trade matters because of its global distribution and incidence. The Tariff Act of 1930 mandated that imported animals and meat products only come from countries that were free of rinderpest and foot-and-mouth disease (FMD).

Currently, the Animal and Plant Health Inspection Service (APHIS) continues to evaluate the FMD and rinderpest status of foreign regions, as requested by the competent authority of the region. Regions that APHIS recognizes as free of these diseases are listed in title 9 of *Code of Federal Regulations* (9 CFR) part 94.1 and 9 CFR 94.11. Once listed, imports of susceptible live animals and products from susceptible species originating in or transiting these regions are no longer prohibited (or are permitted with restrictions) because of FMD or rinderpest.

In-depth evaluations assessing the FMD status of South American countries are necessary because of the presence of FMD in certain regions of South America. However, rinderpest has never been established in South America and no South American countries have ever reported the disease except Brazil, which had an outbreak in 1921 that was limited in scope and quickly eradicated. Furthermore, the global distribution of rinderpest has diminished significantly in recent years as a result of the Food and Agriculture Organization's (FAO's) Global Rinderpest Eradication Program (GREP). The last known cases of rinderpest occurred in the southern part of the "Somali pastoral ecosystem" consisting of southern Somalia, eastern Kenya, and southern Ethiopia. In May 2011, the World Organization for Animal Health (OIE) announced its recognition of global rinderpest freedom.

Given that rinderpest has never established in South America, an incursion of rinderpest into that region would likely result in the classical, acute form of the disease, due to the availability of naïve susceptible populations. Given the overt clinical signs of acute rinderpest, such an outbreak would likely be detected.

APHIS therefore proposes to recognize South America free of rinderpest. The countries of South America would be added to the list of countries that APHIS considers free of rinderpest. Upon request, APHIS will continue to evaluate the FMD status of South American countries or regions in accordance with 9 CFR 92.2.

## **Introduction**

The United States Department of Agriculture's (USDA's) import regulations and trade policies for animals and animal products are rooted in a number of Acts, including multiple Tariff Acts of the early 1900s (e.g. the Underwood Tariff Act of 1913 and the Fordney-McCumber Tariff Act of 1922) [1]. Of particular significance was the Smoot-Hawley Tariff Act of 1930, which expanded previous restrictions on animals and meat by prohibiting the importation of cattle, sheep, swine, and meats from countries in which rinderpest or FMD existed [2]. At that time, and well into the mid-1900's, rinderpest was widespread throughout Asia, parts of Europe, and Africa [3, 4].

Currently, when requested to do so by the competent authority of a potential or existing international trading partner, APHIS evaluates and codifies in 9 CFR 94.1 the rinderpest and FMD status of foreign regions. APHIS uses an animal health evaluation process, outlined in 9 CFR 92.2, which includes assessments of the region's veterinary infrastructure, disease status and controls, surveillance efforts, diagnostic capability, and related factors. Where appropriate, the evaluations outline constraints, hindrances, or limitations in the foreign region, and identify any mitigations for associated risks. If the evaluation results are favorable APHIS proposes a rule to recognize a country or region as "free of both rinderpest and foot-and-mouth disease" or "free of rinderpest." If recognized as free of rinderpest and FMD, imports of live susceptible species and products from these animals originating in or transiting these regions are no longer prohibited (or are permitted with restrictions) because of FMD or rinderpest. In Section 94.11 of the CFR, APHIS further designates regions of the world recognized as free of rinderpest and FMD but subject to certain restrictions because of their proximity to or trading practices with rinderpest or FMD-affected regions.

## **Rinderpest Virus and Epidemiology of the Disease**

Rinderpest virus (RPV), a Morbillivirus, exists as a single serotype [5]. The virus is molecularly grouped into three distinct lineages (African lineage 1, African lineage 2, and Asian lineage 3) based on evolutionary divergence [5, 6]. Close contact is required for viral spread. The virus is not vertically transmitted, and there are no arthropod vectors [7]. RPV has a short infectious period; it has no latency period and does not result in persistent infection [8]. RPV infection does not induce a carrier state [5], and vaccination against RPV yields a long duration of immunity [5]. The virus is fragile and rapidly inactivated by heat and light, but does remain viable for long periods in chilled or frozen tissues [9]. RPV detectability is low in products, but so is RPV survivability. A single waste-feeding incident with rinderpest has been documented [5].

Rinderpest disease is characterized by fever, necrotic stomatitis, gastroenteritis, profuse diarrhea, dehydration, and high mortality [9, 10]. Rinderpest typically presents as an acute disease with overt signs including fever, oculo-nasal discharges, mucosal necrosis and erosions, and ulcerations in the digestive and upper respiratory tracts [10]. Although cattle are the primary reservoir, RPV causes severe disease in many species of wildlife and susceptible game species [5]. The acute form of disease has been observed in cloven-hoofed animals such as the buffalo, eland, giraffe, lesser kudu, and warthog [11].

However, there is no evidence that wildlife serve as a reservoir for the virus. Rather, it is believed that cattle are the maintenance hosts, and if the virus is not present in cattle, it will disappear in wildlife [7]. The disease is associated with high morbidity and mortality; the classical acute form of the disease can result in 80-90% mortality in cattle, buffalo, yaks, and many wildlife ungulate species [12, 13].

A mild form of rinderpest, with wide variations in disease frequency and intensity, has been observed. Morbidity and mortality rates vary, both ranging from 0 – 10%, and classical clinical or epidemiological features may be lacking [10], which poses a challenge for disease detection. The mild form of rinderpest is most clearly demonstrated in lineage 2 viruses from East Africa [14], but has been observed with all three RPV lineages [5]. Outbreaks of the mild form of rinderpest have occurred in Egypt (African lineage 1), Kenya (African lineage 1), northern Iraq (Asian lineage 3), and the Somali pastoral ecosystem (African lineage 2) [5].

The mild form of rinderpest has been observed in highly endemic areas and in populations with some inherited resistance [10]. When rinderpest first occurs in a naïve population, its virulence increases, and when the virus becomes endemic, its virulence decreases [5]. Accordingly, the selection pressure for rinderpest virulence is affected by the disease situation and immune status of potential hosts in an area, with populations of naïve cattle presenting a selection pressure for virulence, and populations of partially immune cattle presenting a selection pressure for attenuation [5]. It is highly unlikely that the mild form of rinderpest exists in South America, because rinderpest has never established itself in that part of the world. Further, because wild and domestic susceptible species there would be naïve, any future RPV introduction into South America would likely result in the acute, classical form of disease, which, by way of high morbidity and/or mortality, would be detectable.

### **Global Distribution of Rinderpest**

Historically, rinderpest has been widely distributed throughout Europe, Asia, and Africa but has never been established in North America, Central America, the Caribbean Islands, South America, Australia, or New Zealand. Virtually the entire history of rinderpest occurrence is in Europe, Russia, the Middle and Far East, India and Pakistan, Africa, and the Arabian peninsula [5]. As evident in Appendix 3, the incidence of rinderpest has declined significantly over the course of the last 20 years and its geographic distribution has been confined over the last decade. As reported by GREP, the only remaining known focus for rinderpest is the southern part of the ‘Somali pastoral ecosystem’ (southern Somalia, eastern Kenya, and southern Ethiopia) [8, 15-18]. In May 2011, based on the conclusion that rinderpest has ceased to circulate in animals, the OIE announced its recognition of global rinderpest freedom [19].

#### *Rinderpest in South America*

In addition to significant decline in the global distribution of rinderpest in recent years (Appendix 3), rinderpest has never established in South America. Rinderpest has never been detected in any South American country with the exception of a single incursion in Brazil in 1921. Zebu cattle infected in Belgium were shipped to Brazil and introduced the

disease, which occurred first in work oxen, and then spread to dairy herds and wild deer. By use of quarantines, movement controls of livestock, and slaughter of all sick and in-contact animals, the outbreak was limited in scope and eradicated within 3 months. The last official report of a case of the disease was on May 23, 1921, and restrictions were lifted in August of that year [4, 5, 20, 21] with no subsequent disease occurrence.

Given that rinderpest has not occurred in South America since 1921 and the wide host range of susceptible domestic and wildlife species in South America, the most likely expression of a rinderpest incursion would be the acute, classical form of the disease. It is therefore likely that, if introduced into South America, rinderpest would be detected.

### **Conclusion**

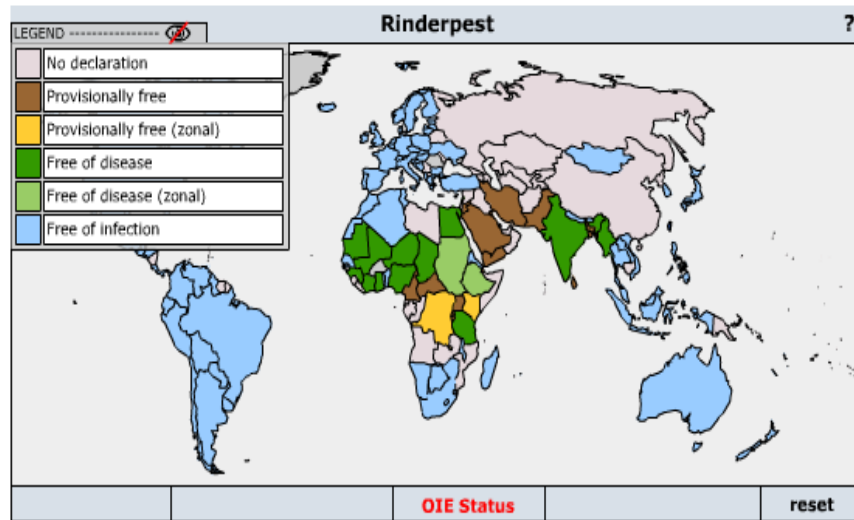
APHIS concludes that the historical absence of rinderpest in South America supports recognition of South America as free of rinderpest. APHIS also concludes that a future incursion of rinderpest into South America would likely manifest as the acute, classical form of the disease, and would likely be detected. APHIS therefore proposes to recognize South America free of rinderpest. The countries of South America will be added to the list of countries that APHIS considers free of rinderpest. APHIS will continue to evaluate the FMD status of South American countries or regions upon request and in accordance with 9 CFR 92.2.

### **Appendix 1: Rinderpest in South America, 1996 – 2004; Handistatus II**

| Country/Territory | 1996   | 1997   | 1998   | 1999   | 2000   | 2001   | 2002   | 2003   | 2004   |
|-------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Argentina         | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   |
| Bolivia           | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   |
| Brazil            | (1921) | (1921) | (1921) | (1921) | (1921) | (1921) | (1921) | (1921) | (1921) |
| Chile             | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   |
| Colombia          | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   |
| Ecuador           | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   |
| French Guiana     | 0000   | 0000   | 0000   |        | -      | -      | -      | -      | -      |
| Guyana            |        |        | 0000   | 0000   |        |        |        |        | 0000   |
| Paraguay          | 0000   |        | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   |
| Peru              | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   |
| Suriname          |        | 0000   |        |        |        |        | -      | -      |        |
| Uruguay           | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   |
| Venezuela         | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   | 0000   |

Note: Rinderpest status of South American countries as reported to the World Organization for Animal Health (OIE). 0000 = disease never reported. - = disease not reported (date of last outbreak not known)

### **Appendix 2: Current Rinderpest Status of Africa, Asia, and Europe\***



Source: [http://www.fao.org/ag/againfo/programmes/en/empres/disease\\_rinderpest.asp](http://www.fao.org/ag/againfo/programmes/en/empres/disease_rinderpest.asp)

\*Freedom/provisional freedom defined by the procedures laid out in the OIE's Terrestrial Animal Health Code [22]. OIE-recognition is not always reflected in Handistatus data. For example, Rwanda is recognized "free from infection" by OIE yet Handistatus II has no available data on Rwanda.

### Appendix 3: Remaining Rinderpest Foci, 1980s - 2000

Figure 1: Distribution of rinderpest in Africa, Europe, and Asia in the early 1980s [15]

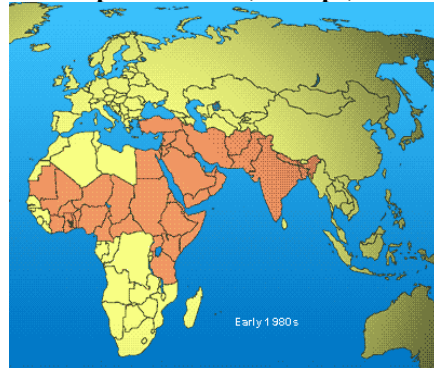
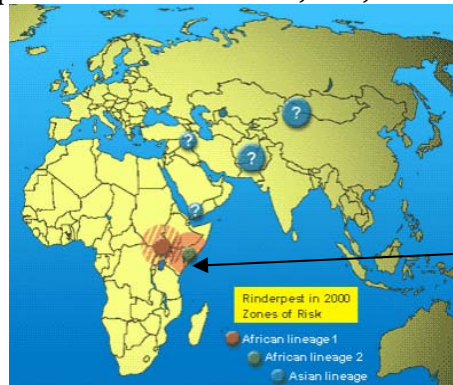


Figure 2: Distribution of rinderpest in Africa, Asia, and Europe in the late 1990s [15]



Figure 3: Rinderpest zones of risk in Africa, Asia, and Europe as of 2000 [15]



Somali pastoral ecosystem

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