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| Lesson 5 **New York Times Reading:** Is there a disease that affected the buffalo population? |

# **Rinderpest, Scourge of Cattle, Is Vanquished By** [**DONALD G. McNEIL Jr.**](https://www.nytimes.com/by/donald-g-mcneil-jr) **JUNE 27, 2011**

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On Tuesday in a ceremony in Rome, the United Nations is officially declaring that for only the second time in history, a disease has been wiped off the face of the earth.

The disease is rinderpest. Everyone has heard of [smallpox](http://health.nytimes.com/health/guides/disease/smallpox/overview.html?inline=nyt-classifier). Very few have heard of the runner-up.

That’s because rinderpest is an epizootic, an animal disease. The name means “cattle plague” in German, and it is a relative of the [measles](http://health.nytimes.com/health/guides/disease/measles/overview.html?inline=nyt-classifier) virus that infects cloven-hoofed beasts, including cattle, buffaloes, large antelopes and deer, pigs and warthogs, even giraffes and wildebeests. The most virulent strains killed 95 percent of the herds they attacked.

But rinderpest is hardly irrelevant to humans. It has been blamed for speeding the fall of the Roman Empire, aiding the conquests of Genghis Khan and hindering those of Charlemagne, opening the way for the French and Russian Revolutions, and subjugating East Africa to colonization.

Any society dependent on cattle — or relatives like African zebu, Asian water buffaloes or Himalayan yaks — was vulnerable. As meat and milk, cattle were and are both food and income to peasant farmers, as well as the source of calves to sell and manure for fields. Until recently, they were the tractors that dragged plows and the trucks that hauled crops to market. When herds die, their owners starve.

The long but little-known campaign to conquer rinderpest is a tribute to the skill and bravery of “big animal” veterinarians, who fought the disease in remote and sometimes war-torn areas — across arid stretches of Africa bigger than Europe, in the Arabian desert and on the Mongolian steppes.

“The role of veterinarians in protecting society is underappreciated,” said Dr. Juan Lubroth, chief veterinary officer of the [Food and Agriculture Organization of the United Nations](http://www.fao.org/), at whose headquarters Tuesday’s ceremony is being held. “We do more than just take care of [fleas](http://health.nytimes.com/health/guides/disease/fleas/overview.html?inline=nyt-classifier), bathe mascots and vaccinate the Pooch.”

The victory is also proof that the conquest of smallpox was not just an unrepeatable fluke, a golden medical moment that will never be seen again. Since it was declared eradicated in 1980, several other diseases — like [polio](http://health.nytimes.com/health/guides/disease/poliomyelitis/overview.html?inline=nyt-classifier), Guinea worm, river [blindness](http://health.nytimes.com/health/guides/symptoms/blindness/overview.html?inline=nyt-classifier), elephantiasis, measles and iodine deficiency — have frustrated intensive, costly efforts to do the same to them. The eradication of rinderpest shows what can be done when field commanders combine scientific advances and new tactics.

In 1998, a longtime leader of the effort, Sir Gordon R. Scott of the Center for Tropical Veterinary Medicine at the University of Edinburgh, wrote an article saying he had reluctantly concluded that it would fail.

“The major obstacle,” he wrote, “is man’s inhumanity to man. Rinderpest thrives in a milieu of armed conflict and fleeing refugee masses. Until world peace is secured, the nays win the argument.” He cited Somalia, Sudan, Sri Lanka, Yemen and Kurdish parts of Iraq and Turkey as areas where war drove animals and their owners over borders and life was risky for vaccinators.

Dr. Scott will not be in Rome for the ceremony; he died in 2004. Yet perhaps without realizing it, he did outlive rinderpest. The last known case was in a wild buffalo tested in Mount Meru National Park in Kenya in 2001.

**An Ancient Battle**

The modern eradication campaign began in 1945, when the Food and Agriculture Organization was founded. But it became feasible only as vaccines improved. An 1893 version made from the bile of convalescent animals was replaced by vaccines grown in goats and rabbits and finally in laboratory cell lines; a heat-stable version was developed in the 1980s.

How long the ancient battle went on is uncertain. Although cattle die-offs did affect all the historical events mentioned above, there is uncertainty about which were from rinderpest and which were something else, like [anthrax](http://health.nytimes.com/health/guides/disease/anthrax/overview.html?inline=nyt-classifier).

Death from rinderpest is rapid and nasty. Animals get feverish; their eyes and noses run. Their digestive tracts are inflamed from mouth to anus, and they die of [diarrhea](http://health.nytimes.com/health/guides/symptoms/diarrhea/overview.html?inline=nyt-classifier) and protein loss. But other diseases have overlapping symptoms, and a rapid diagnostic test that could be used next to a dying animal was not developed until the 1990s.

Until recently, it was assumed the disease existed as long ago as 10,000 B.C., when cattle were domesticated in the Indus Valley in what is now Pakistan. It was blamed for an epidemic in Egypt in 3,000 B.C. and for the widespread die-offs that starved the Roman Empire in the face of fourth-century invaders. In the ninth century, it was the chief suspect in the “mortality upon the horned animals” in the British Isles.

Last year, however, Japanese geneticists studying rinderpest’s mutation patterns estimated that until about A.D. 1000, it was virtually identical to measles — making it likely that **pandemics** that killed only animals before that time had other causes, like anthrax or possibly an ancestor virus from which both measles and rinderpest evolved.

Some experts now believe the disease arose in the gray oxen of the Central Asian steppes and was swept forward in the trains of baggage and beasts that followed the Mongol armies in the 1200s as they conquered Eurasia from China to Poland. (The Mongols are also suspected of importing [bubonic plague](http://health.nytimes.com/health/guides/disease/plague/overview.html?inline=nyt-classifier) from South Asia in flea-bitten rats hiding in grain sacks.)

Like smallpox, rinderpest settled into a pattern of irregularly recurring pandemics, sometimes touched off by imports of Russian steppe cattle, in which the disease smoldered but rarely killed. The longer between waves, the more victims died.

With the exception of a brief, contained outbreak in Brazil in 1920, it did not reach the Americas. It touched Australia in 1923, but the authorities there stamped it out by slaughtering 3,000 animals. Despite its proximity to Eurasia, Africa was spared until 1887, when the Italian Army, struggling to conquer Abyssinia, imported Indian cattle for food and draft power.

From the port of Massawa in present-day Eritrea, the virus exploded so fast that it reached South Africa within a decade (and is considered one of the factors that impoverished Boer farmers as war with the English approached). It doomed East Africa’s wandering herders, subsisting on milk mixed with cow blood. Historians believe a third of them or more starved to death.

The disease was still leaping water barriers as late as the 1980s, when Indian [peacekeepers](http://topics.nytimes.com/top/reference/timestopics/organizations/u/united_nations/department_of_peacekeeping_operations/index.html?inline=nyt-classifier) in Sri Lanka imported sick goats. Until 1999, war-torn Sri Lanka was one of the world’s last pockets of rinderpest.

**Finding a Vaccine**

As rinderpest advanced and receded over the centuries, it led to some important scientific advances.

In 1713, when it threatened the papal herds, Pope Clement XI asked his personal physician, [Dr. Giovanni Maria Lancisi](http://www.britannica.com/EBchecked/topic/329075/Giovanni-Maria-Lancisi), to stop it. Dr. Lancisi was familiar with the work of [Dr. Bernardino Ramazzini](http://www.shhofi.org/inductees/Bios/ramazzini95.htm), a scholar at the University of Padua who accurately deduced that rinderpest spread by the “virulently poisoned breath of an ox” and its excretions and hide — not by fogs, astrology or other popular theories. According to Dr. Scott, Dr. Lancisi prescribed quarantine measures that were nearly as brutal to humans as to cattle.

Charlatan “cures” were banned; priests were ordered to stop relying on prayer alone and to preach from the pulpit that all herds with any sick members were to be slaughtered and buried in lime, while healthy herds were to be kept isolated. Any layman who resisted or cheated was to be hanged, drawn and quartered. Any disobeying priest was to be sent to the galleys for life.

Within nine months, the outbreak in the [Papal States](http://www.britannica.com/EBchecked/topic/441848/Papal-States) was snuffed. In the rest of Europe — where Protestants disdained papal orders — it persisted for a century and killed 200 million cattle.

By the 1750s, dairymen in England and the Netherlands were experimenting with a crude early form of inoculation: soaking a cloth in a diseased cow’s mucus, then sewing it into a cut in a healthy cow. It did not always protect, and sometimes killed.

**The Last Frontier**

The intractable problem was Africa. The disease was in 32 countries there, and many had pastoralist tribes like the Fulani, Masai, Dinka and Afar, who lived on the borderless fringes and drove cattle up to 50 miles a day, having virtually no contact with governments and getting no veterinary bulletins.

“In the ’60s and ’70s, the biggest problem we had was to convince farmers to bring in their animals,” said Dr. Protus Atang, a former director of the African Union’s veterinary institute. “They believed vaccination brought disease.” Others had a traditional prevention method — smearing feces from infected animals in the mouths of healthy ones.

Just reaching them was hard. Land Rovers broke down, gasoline and cash ran short. Vaccine was packaged with salt so it could be dissolved in saline, but in remote areas salt was so valuable that it would be stolen.

Announcing vaccination days “was advertising to rustlers where the herds would be that day,” said John Anderson, former chief of laboratory testing for the eradication drive. African veterinary officers were paid so poorly that they survived only through second jobs like breeding chickens or mending watches.

Despite all the drawbacks, by 1979 the effort looked successful, and was ended. By the mid-’80s, rinderpest returned. “I think they just stopped too early to celebrate,” Dr. Anderson said. “No one’s exactly sure where it came back from.”

Smallpox eradication boosted morale, Dr. Atang said, and a second effort was mounted in 1986, followed by a third in 1998.

A crucial advance was a new vaccine that survived a month without refrigeration. That let herders who could be recruited do their own vaccinating. An education campaign using comic books, flip charts and lecturers who spoke local languages was begun.

“The way we previously did it was really mindless,” said Dr. Peter L. Roeder, who directed the final eradication drive after working on the two earlier ones. “We’d get up before dawn to drive long distances. We’d be wrestling the animals to the ground, it’d get stinking hot, and pretty soon the locals would get fed up and walk away.”

The cattle were nervous and hard to handle, and no wonder, he said: They lived day and night with their owners and now were being roped and tackled by white men wearing khaki and reeking of unfamiliar soaps and deodorants.

“But someone local, dressed as a local, with mutton fat rubbed in his hair, could walk among them and stick in a needle and barely be noticed,” Dr. Roeder said. “We’d be lucky to get 20 percent immunity in a herd; our local guys could get 90, 95 percent.”

His epiphany, he said, took place in 1991, as Ethiopia’s civil war ended and he could finally drive north. “We were driving up the edge of the Rift Valley, dropping down into the bottom to meet the Afar people,” Dr. Roeder said, “and almost everywhere we found rinderpest and people crying out for vaccination.

“Later, sitting in a restaurant, it came to us: It wasn’t necessary to constantly be doing mass [vaccinations](http://health.nytimes.com/health/guides/specialtopic/immunizations-general-overview/overview.html?inline=nyt-classifier). We were trying to get 30 million cattle and never getting more than nine million. We needed to concentrate on these lowland areas where the virus was persistent. We could vaccinate two million and do better.”

While the upland had large, visible outbreaks, he explained, between them the virus lurked in the lowland herds as it had centuries before in steppe oxen. Since the older animals were all survivors and the 1-year-olds were protected by maternal [antibodies](http://health.nytimes.com/health/guides/test/antibody-titer/overview.html?inline=nyt-classifier), he reasoned, only the 2- to 3-year-olds were vulnerable, and their age could be estimated by looking at their teeth. If all members of that group were vaccinated, the virus would slowly disappear.

**Rapid Diagnostic Test**

In the same way presidents denied that their citizens had [AIDS](http://health.nytimes.com/health/guides/disease/aids/overview.html?inline=nyt-classifier), they denied that their citizens’ cattle had rinderpest. Dr. Roeder said he once loaded a dead cow onto his pickup and drove it to the capital to insist it be tested. (He declined to name the country.)

The new tests, similar to [pregnancy](http://topics.nytimes.com/top/news/health/diseasesconditionsandhealthtopics/pregnancy/index.html?inline=nyt-classifier) kits, but using an eye swab instead of urine, empowered local veterinary officials, said Dr. Anderson, their inventor. Officials in the capital could no longer just dismiss reports as misdiagnoses. Even though the last known case was in 2001, officials waited 10 years to declare success, since surveillance is harder with animal diseases because usually dying animals would just be left behind instead of taking them to a veterinarian.