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An outbreak in France in the XVIIIth Century: Rinderpest

Une épizootie en France au XVIII^e siècle : la peste bovine

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ABSTRACT

Long regarded as the major disease of cattle, rinderpest is now eradicated. It was inflicting from 60 to 90% mortality on livestock. Installed in Asia, it arrived in France in waves, but never became endemic there. Four outbreaks of rinderpest hit the country during the eighteenth century. Their geographical extension has been reconstituted. They forced the State to devise the consistent set of health actions the nineteenth century benefited before the advent of microbiology.

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R É S U M É

Longtemps considérée comme la maladie majeure des bovins, la peste bovine est actuellement éradiquée. Elle infligeait au cheptel une mortalité de 60 à 90 %. Installée en Asie, elle arrivait en France par vagues, sans jamais s'y implanter. Quatre épizooties de peste bovine ont touché le pays au XVIII^e siècle. Leur extension géographique a pu être reconstituée. Elles ont contraint l'État à inventer l'ensemble cohérent de mesures sanitaires dont le XIX^e siècle a bénéficié avant l'avènement de la microbiologie.

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1. Introduction

The recent eradication of rinderpest from its last African strongholds cannot diminish the major historical role played by this disease. Due to serious economic consequences in Western Europe from 1712 to 1871 it led to the outline of current disease control legislation on animal health. This article addresses two issues, factual and theoretical, of rinderpest. After noting its clinical and epidemiological characteristics, we consider the timing and extent of the incursions of the disease in France in the XVIIIth century. Then, the management of the 1774 to 1776 contagious wave in the Southwest is used as an example to show the theoretical and practical obstacles that opposed the resolution of such crises. The sources/references cited

belong to the archive collection of the Alfort National Veterinary School's Library, the series F/10, F/12 (151–152) and H (684) National Archives, as well as departmental Archives, Gironde series C (63 and 71). The intentionally limited references can be found in full in the work from which this article is inspired [1].

2. A terrible virus

Rinderpest is a highly contagious disease, caused by a virus of the *Paramyxoviridae* family and *Morbillivirus* genus, which includes human measles and *Canine distemper* disease [2]. It has recently been found that the shepherds of the Neolithic cattle contracted the virus that adapted to Man and gave rise to measles.

Eliminated from Europe in the nineteenth century, rinderpest has been, for the past two years, the first eradicated animal disease, as was smallpox in humans. Its

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introduction to a previously disease free area exterminated cattle of all ages: morbidity (number of sick subjects in a population) could reach 90%, and mortality (deaths in a population) 30 to 90%. It would often go unnoticed in other *Artiodactyles* (sheep, goat and pigs), which also carried the virus.

After a 4- to 6-day incubation period [3], the *acute form* began with a 3-day prodromal phase with high fever and extreme exhaustion. This was followed 2 to 5 days later with an erosive or mucosal phase, with erosion of the oral mucosa, purulent eyes, nose and cough. At this stage, the animals suffered from constipation.

The fall of fever announced the diarrheal phase, at about 4 to 5 days. From the beginning of fever, death occurred in less than a week. In the end, thinness and dehydration were extreme, with sunken eyes, covered in a mucosal discharge. The animals that survived entered a long convalescence.

So, three signs dominated the clinical picture, which can be memorized with words beginning with “D”: *discharge*, *diarrhea* and *death*. In fact, the disease is expressed differently in different individuals, each with some of the symptoms listed.

In the wild, the rinderpest virus resisted for 48 hours, but the cold promoted its preservation. Infected animals excreted the virus two days before the onset of fever, and remained contagious until the end of the disease.

These recent data are not consistent with the existence of healthy animals, which, nevertheless, excreted the virus. But many accounts of the eighteenth and nineteenth century invite one to think that certain Steppes cattle (Fig. 1), from the Hungarian Puszta or the Russian plains, were asymptomatic carriers [1]. They were responsible for spreading the disease via trade routes or through the armies they were supplying, since rinderpest was never an indigenous disease in Western Europe. Each outbreak was imported from Asia.

Clive A. Spinage, confronted with the same source as ours, has not seen fit to completely contradict the current data, “But such carriers states are transient, and it is considered that development of a persistent carrier state, if it ever occurs, is rare” [4, p. 15]. For our part, we are in favor of a persistent carrier state in Steppes cattle, an opinion certainly questionable, but with the advantage of being consistent with the texts [5].

No specific treatment has ever been known. Before the disappearance of the disease, more effective vaccines were developed [6]. However, when there was an outbreak, the early slaughter of sick and contaminated animals remained the only resort.

3. Attempt to reconstruct the major epidemics in Western Europe in the XVIIIth Century

Four outbreaks of rinderpest hit France in the XVIIIth Century. They did not get beyond a line that divided the country from the northeast/southwest, arresting the contagion where the cattle trade from east to west no longer existed. Their chronology is as follows:

- beginning of 1714 to June 1715;
- June 1743 to 1746 with a few outbreaks until 1748;

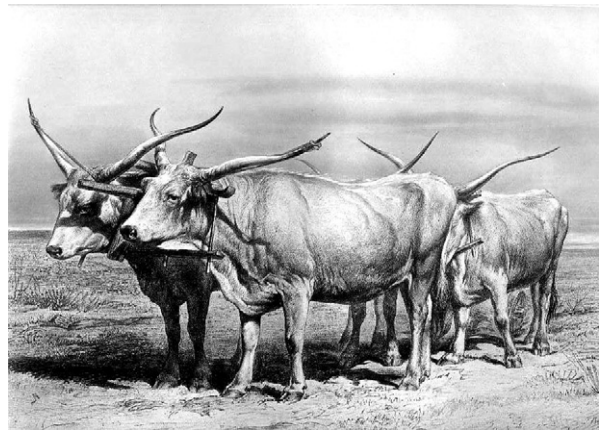


Figure 1. Steppes cattle of Hungarian breed. Émile Baudement, *Les Races bovines au Concours universel agricole de Paris en 1856*, Paris, Imprimerie Impériale, 1861, pl. LXI.

- 1769 to 1776, combined with the exceptional outbreak in the South West in 1774 to 1776;
- 1795 to 1802.

3.1. The first episode of the Century: 1710–1717

This outbreak, originating in Central Asia, began in early 1709 in Russia. It hit France in 1714 (Fig. 2).

Alsace and Lorraine were affected by April, followed by Champagne. The outbreak then spread out to Burgundy, Franche-Comté, Lyonnais, Savoie, Dauphiné, Bourbonnais in July; and to Brie, Ile-de-France, the Orléanais and the Auvergne in August. It is recorded to have then hit Beauce, Velay, Vivarais and Camargue.

The disease disappeared from France in June 1715. Burgundy had certainly suffered the most. In November 1714, out of 87,360 adults, 59,923 deaths were

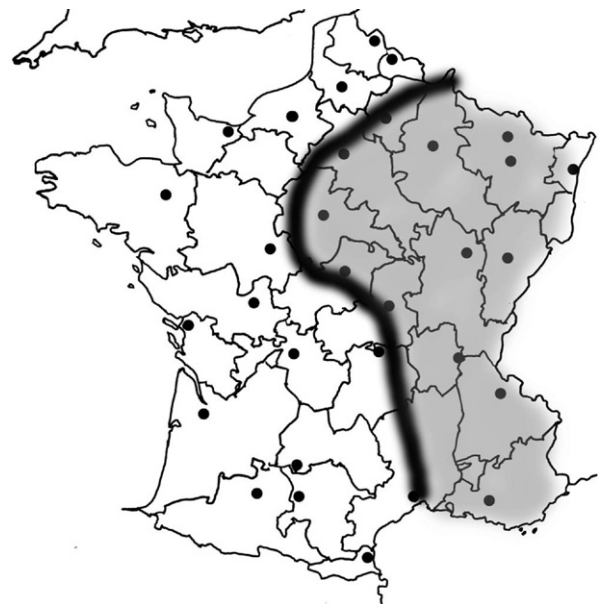


Figure 2. Maximal spread of rinderpest in France during 1714–1717.

recorded in 16 unspecified bailiwicks, a total loss of more than 68%.

3.2. From 1743 to 1747: half of the kingdom devastated

The new outbreak developed in Hungary in 1738 and reached Central Europe thanks to the Austrian war of succession. A French army, after escaping from Prague where it was besieged in 1742, reached the Rhine in June 1743, with an infected herd. Trade also spread the disease which, entering simultaneously in the east and north, reached essentially the same regions in 1744. Contagion ended in 1748 (Fig. 3). The Auvergne was the only area to escape the scourge thanks to strict isolation measures taken by the superintendent at the province borders from late 1744 to 1749.

3.3. The European outbreak 1761 to 1779: by the shores of the Baltic Sea and the North Sea

The end of the Seven Years' War (1756–1762) played an undeniable but not exclusive part in the expansion of the contagious wave. Leaving Central Asia in 1758, it crossed Russia from 1760 to 1761, along the Baltic Sea, spreading into Prussia and Poland, before heading down to Austria. In 1762 it spread to Denmark, from which it invaded the whole of Germany. The Netherlands became a dangerous source of origin.

Northern France was reached in 1770. The initial source was limited to the North of the country. After affecting the Soissons and Champagne areas, the disease died out over six years (Fig. 4).

An unexpected event occurred in May 1774: to everyone's surprise, the Southwest, which had remained untouched by the waves of rinderpest, was hit by contagion.

3.4. The paradoxical extension in southwestern French, 1774 to 1775

Rinderpest most likely reached Bayonne by ship, with animals from Flanders or the Netherlands. In June 1774, it left Bayonne and took two directions (Fig. 5). To the north, it skirted the Landes to the Condomois, then, from Agen, it followed the Garonne to reach Bordeaux in September. To the southeast, having devastated the Labourd country, it penetrated successively the Pyrenean valleys, settling in July on the Lannemezan plateau. In August it reached Auch by the Gers. Auch was also infected from Marsan. In late August, L'Isle-Jourdain began to suffer from livestock losses, followed by Toulouse, where the infection died out. In November 1774, the plague stopped heading north when it got to La Rochelle and the Quercy. The outbreak of the South West therefore was restricted to two catchment areas, Bordeaux and Toulouse, from which too few animals were exported to the rest of the kingdom for the disease to expand. In contrast, trade with Spain spread the disease. For the single year of 1774, losses in the Southwest were estimated at 80,000 animals [7] and a total of 150 000 for the duration of the outbreak [8, pp. 212–213].

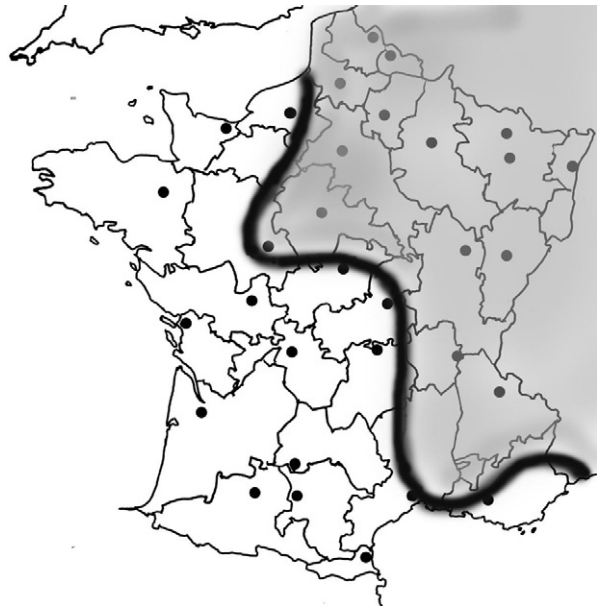


Figure 3. Maximal spread of rinderpest in France during 1743–1748.

3.5. The revolutionary period

The Republic and Empire wars scattered rinderpest in Western Europe from 1792 to 1817. In 1796, the virus attacked the French army's herd supplies on the Rhine. It spread with alarming rapidity to all cattle in the department of Bas-Rhin as its contagious properties were still misunderstood [9]. Soon Alsace, Lorraine and Franche-Comte, were infected. Crossing the Jura, the disease spread to Switzerland, returning to Burgundy where it advanced on Champagne, Picardy and the gates of Paris. The North was affected via the border from 1797 to 1798 (Fig. 6). In

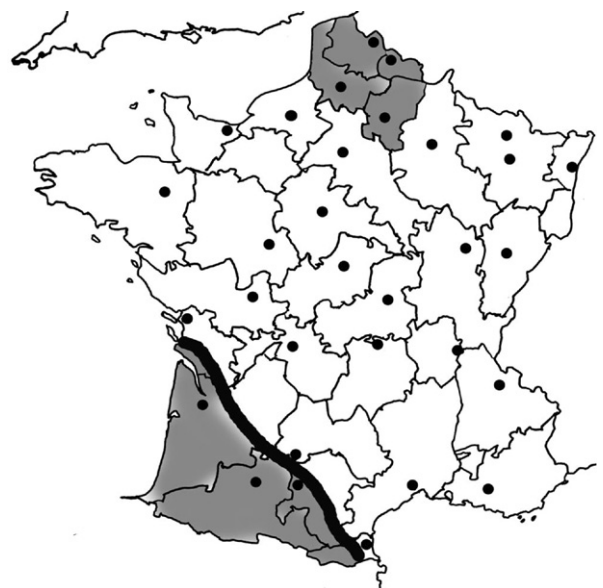


Figure 4. Maximal spread of rinderpest in France during 1770–1776.

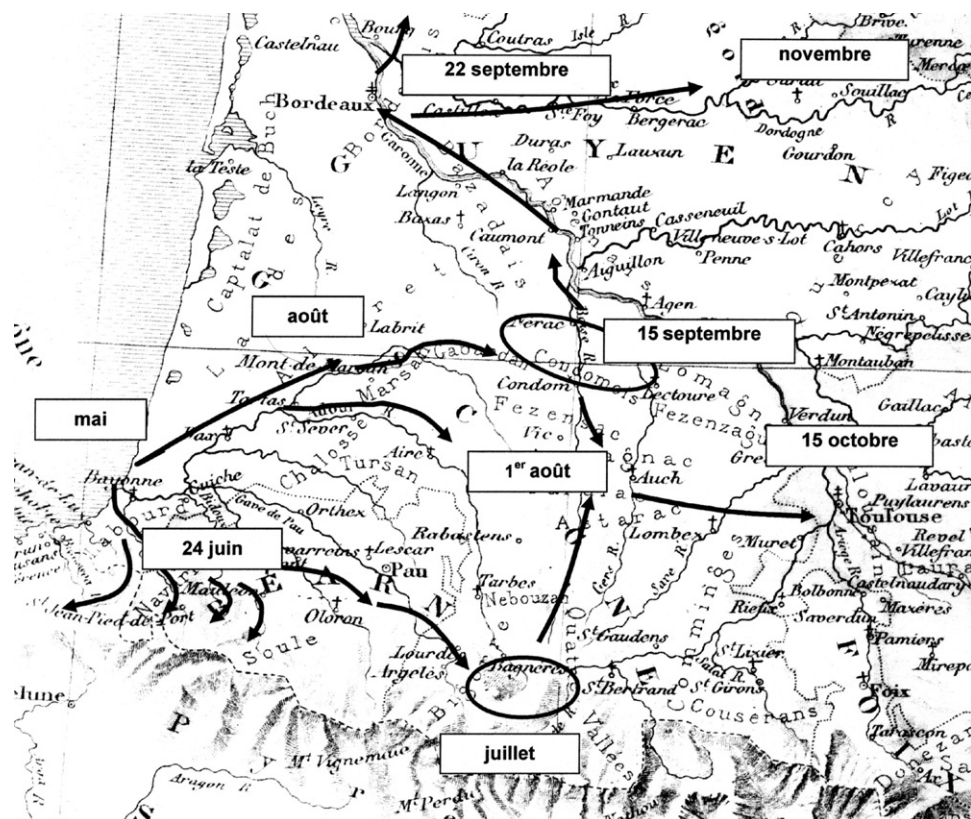


Figure 5. Advance of rinderpest in the South West of France during 1774.

1800, France was almost virus free. Approximately 130,000 cattle died in the twenty-seven affected departments.

4. Evolution of control methods

The treatment was not only deceptive but also harmful in that it would postpone the slaughter of sick and infected animals, which was the only way to stop the contagion. Following the neo-Hippocratic principles in force, the treatment aimed at removing the disease by all means, involved bleeding, purging, fires, setons and diuretics.

In 1712, the papal physician Giovanni Maria Lancisi established the first good practices in animal health. His suggestion was to isolate and kill sick animals as well as those suspected of infection, to disinfect the premises, to bury the corpses and manure, and to provide health workers with different oilskins in each barn. But no certainties substantiated this program, along with the possibility that the disease could revive spontaneously with favorable epidemic conditions, that is to say the meeting of certain environmental factors. Why extinguish the contagion at the price of costly slaughter, when it could resurface somewhere else?

In 1714, the State's financial destitution prohibited slaughter. Doctors, confined to their role as therapists did not advocate any method of biological control. When rinderpest recurred in 1743, only livestock movement is regulated. It took the 1774 to 1775 disaster in the Southwest for drastic measures to be taken.

4.1. 1774: the first phase of the fight against the disease and its limits

At the beginning of the epidemic, in Bayonne, no action was taken as the disease failed to be recognized. The rapid viral progression signaled the failure of the authorities but how they managed this type of crisis could only lead to failure for three reasons that current experience of disease control shows us.

4.1.1. Lack of experts in the field

To combat the disease it is important to identify it as quickly as possible, and this requires careful and well-trained professionals. But veterinary schools were, in 1774, too recent; in ten years, they had issued few degrees and the rare practitioners in the field only played an anecdotal role. So much so that in June, at the request of officials and with an unfortunate delay, Claude Bourgelat, Controller of veterinary schools, sent only a few students. Meanwhile, Doazan, a Bordeaux doctor, after studying the disease in the outskirts of the city, belatedly recommended the isolation of the diseased and disinfection [10,11]. Yet an existing statutory text could have prevented the situation: the *Judgement of the Council of 31 January 1771*. Published for the north of the kingdom, its simple isolation measures would have been sufficient in the Southwest to nip the infection in the bud. But the Bayonne officials scrupulously followed the recommendations given by Henri-Léonard Bertin, Minister for Agriculture. He thought



Figure 6. Maximal spread of rinderpest in France during 1795–1802.

it better to wait for evidence of contagion before enforcing the Judgment of 1771.

4.1.2. Uncertainty about the nature of diseases and their mode of appearance

Accustomed as we are to the prospect of contagion and the omnipresence of the microbe, it is difficult to question the need for animal health. But the XVIIIth Century always emphasized the Hippocratic-galenical pathology. Diseases still emerged from a combination of environmental factors (the epidemic constitution: climate, air, water, food) acting on individuals weakened by a humoral imbalance. And so the first cases arose. The illness, when contagious, spread to the rest of the population. Moreover, the specificity that we nowadays recognize in a disease was then unknown. No outbreak was exactly similar to the previous one due to new conditions leading to its appearance.

4.1.3. The lack of centralized information and decisions

At the end of June 1774, failing to organize a coherent struggle, the Secretary of State Henry Leonard Bertin persisted in sending printed “consultations” in which his friend Claude Bourgelat pointed out remedies and preservatives to strengthen the resistance of the remaining unscathed animals.

4.2. From late 1774 to 1776, the unnecessary escalation of control methods

Anne-Robert Turgot, Controller-General of Finances since August 1774, only became aware of the seriousness of the situation in November [12, pp. 137–138]. He then spoke to Condorcet and asked for the support from the Academy of Sciences in order to form a commission to study the necessary measures. Felix Vicq d’Azyr was the only Academician to be appointed; he went to Bordeaux on 2nd December 1774 in order to “research the cause and the vehicle of contagion, the means to destroy and to slow the progress” [12, pp. 579–580].

Upon arrival, Vicq d’Azyr thought that the only possibility was to “kill the diseased at the first sign of contagion” offering farmers compensation for all that had to be done to prevent the dissimulation of affected animals [12, p. 139]. Turgot, hampered by financial reasons, opted for the slaughter of ten animals in each city or village newly infected, which finds no justification on an epidemiological point of view, compensating one third of the value of the animals. The bodies were buried. As the epidemic did not subside, he mercilessly ordered the sacrifice of all the diseased. The improvement was temporary [13]. For Turgot, this was the result of the

resistance of the peasant mentality, combined with the blunders of those responsible, like the official of Auch, M. Journet, who once removed, committed suicide.

In November 1775, a new method was adopted. A cordon of troops was set up around the affected provinces. Other inner cordons successively surrounded each of the affected cantons, searching every barn to gradually get closer to the source of the outbreak [14,15, pp. 133–136]. The failure prompted him to attempt a more radical solution.

The last episode of the fight against the disease was so ambitious it seems unreal. In January 1776, Jean Etienne de Clugny, the new administrative official of Guyenne and certainly advised by Vicq d'Azyr himself, suggested killing the sick and contaminated animals of the right bank of the Garonne. The rest of the cattle had to pass on the left bank, leaving a strip of land completely empty of cattle. The reversal was executed in the Languedoc, but the enormity of the expense prohibited its application in Agenais and in Toulouse. Everything was abandoned on 26 February 1776 when slaughtering came back into use [12, p. 486], and in April, the fight died out for a lack of combatants.

5. The controversial report of the fight against rinderpest in the Southwest

Did the work of Henri-Léonard Bertin, Claude Bourgelat, Anne-Robert Turgot and Félix Vicq d'Azyr, all known to be men of the Enlightenment, have any effect on the disease it intended to fight? Nothing is less certain. Some commentators have given total credit to the effectiveness of the regulations and their enforcement [16], while others, such as Onésime Delafond [17, pp. 132–133], believe in the natural extinction of the epidemic. The latter rightfully believed that the slaughter, the only effective solution, was inapplicable once the disease had spread, for a lack of both human and financial resources. Having suffered setbacks, Vicq d'Azyr seemed to prove him right [17, p. 319].

Moreover, killing clinically affected cattle meant following the contagion rather than preceding it. Total slaughter, which requires that *all* animals in an affected herd (infected and contaminated) be eliminated, is recommended today in the fight against highly contagious diseases such as rinderpest or Foot and Mouth Disease. However, when rinderpest was in full swing in 1775, it would have been better to refrain from slaughter, and rather wait for each animal to fall to the disease. The few survivors, then immune, acquired an obvious value. This approach, combined with the inoculation of a low pathogenic strain [1, pp. 271–289], was probably better once the region was totally affected. Otherwise, when a number was reached in a locality which had so far been spared, *all* animals in the herd would have had to be killed. Since 1769, De Berg had—on the scale of the Austrian Netherlands (now Belgium)—proved the effectiveness of the process. It was copied in England. In France, the idea was only accepted in February 1776, at the time of a migration from one bank of the Garonne to the other, at the instigation of the belatedly convinced Vicq d'Azyr [18; 15, pp. 577–579].

An additional reservation concerns the 1775 veterinary health measures. We now know that shooting only the cattle and sparing other susceptible species such as sheep, goats and pigs, undermines the effectiveness of this practice, as the flock carries the virus and allows it to remain active. This was one reason for the revival of the disease, while Vicq d'Azyr put the blame on a lack of disinfection.

Finally, the crucial cooperation of farmers cannot be obtained with legal sanctions but with an effective compensation. However, no grant was awarded for the slaughter of cattle in 1774, and this brought up many complaints [19]. In these circumstances, how could there be a climate of trust?

We will not conclude on such a negative note. The experience of young Vicq d'Azyr, published in 1776, was far from useless. The book was a reference on the subject for a century. When Turgot planned to establish a state advisory council on epidemics and outbreaks, he logically appointed — with the agreement of François de Lassone, first king's physician—Félix Vicq d'Azyr to lead the new institution. The *Judgement of the Council of 29 April 1776* instituted the *Royal Commission of epidemics and outbreaks*, composed exclusively of physicians, consequently excluding Bourgelat. Vicq d'Azyr retained his title of permanent secretary when the Commission was promoted to the rank of *Royal Society of Medicine* in August 1778. While the outbreak of the Southwest in 1774 can not be considered as the origin of the Royal Society of Medicine (now the Academy of Medicine), it is obvious that Félix Vicq d'Azyr, a major figure of that institution, was acknowledged thanks to his role during this major crisis in agriculture.

Ultimately, the 1770 to 1776 French outbreaks led France to set up new regulations regarding the reporting, isolation and slaughter:

- on the first cases being reported, in addition to the encouragement of spontaneous reporting and the reporting and tagging of infected localities in January 1771, farms in the vicinity of sources are subject to inspections by experts in December 1774. From January 1775, any suspicious area is subject to progressive searches by the army ;
- the capture and marking of affected herds, effective from January 1771, are applied to all herds in infected areas in January 1775 ;
- slaughter is limited to the first ten sick animals from any one locality in December 1774, is then applied to all affected animals as of January 1775 and extended in January and February 1776, to all contaminated animals. Later on, slaughter is restricted again to sick animals.

In February 1776, with disinfection added to these measures, at the least the washing of the premises, as well as the burial of corpses and manure, state veterinary medicine applied perfect theoretical conditions when it came to rinderpest.

However, contemporaries did not realize that the Consolidation Act on epizootic diseases (*Decision of the Council of 16 July 1784*), while a real draw back, is an eloquent testimony. Worse, during the episode that

marked the end of the Revolution, veterinarians who at this time were asked to advise followed the medical profession's prejudices and denied contagion (*Judgement of 27 Messidor V–July 15, 1795*).

The achievements of 1776 were only understood under the Second Empire. Well before the recognition of Louis Pasteur's ideas, veterinarians adopted the principles of animal health whose benefits persist today. Rinderpest, now a disease of the past, was more than a valuable lesson. It gave birth, with equine glanders, to the regulations on infectious diseases applied to our animals.

Disclosure of interest

The author declares that he has no conflicts of interest concerning this article.

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