

THE 1990 ANTHRAX OUTBREAK: A HISTORICAL STUDY OF THE CAUSES OF THE OUTBREAK IN THE DAIRY PERUSAHAAN INTI RAKYAT (PIR) PROGRAM IN CENTRAL JAVA

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Abstract

The implementation of the Dairy PIR Program in Semarang and Boyolali Regencies, the exact cause of which remains uncertain. This study aims to investigate the causes of the outbreak using the historical method proposed by Kuntowijoyo, which consists of five stages: topic selection, heuristics, verification, interpretation, and historiography. The findings indicate that anthrax had existed in Boyolali Regency long before the implementation of the Dairy PIR Program, as documented in several colonial newspapers published in 1870, 1879, and 1934. These findings suggest that the source of anthrax infection had been present in the region long before the implementation of the program. Furthermore, the high mobility and density of livestock within the Dairy PIR Program, combined with an implementation that placed greater emphasis on increasing milk production than on strengthening animal health management, created condition conducive to the spread of the outbreak.

Keywords: Anthrax; Dairy PIR program; Boyolali and Semarang regency.

INTRODUCTION

The livestock sector, as a subsector of agriculture, plays a vital role in meeting the food and nutritional needs of the population (Nasution, 1983, p. 30). The demand for livestock-derived food products is expected to continue increasing in line with population growth, rising income levels, and greater public awareness of the importance of nutrition (Susila, 2003, p. 189-190). Nevertheless, the livestock sector in Indonesia has not yet operated optimally. This is reflected in the low level of animal protein consumption, which reached only 2.56 grams per capita per day in 1986, primarily due to the high cost of livestock-derived food products and the low of domestic milk production (Hardjosworo, 1987, p. viii).

According to statistical data, domestic fresh milk production reached 52.8 tons in 1977 and increased to 197.9 tons in 1986. During the same period, milk imports amounted to 365.2 tons in 1977 and further increased to 448.4 tons in 1986 (Hardjosworo, 1987, p. 10). These figures indicate that the volume of milk imports consistently exceeded domestic production. If this condition persists, it may weaken the position of small-scale local dairy farmers (Susila, 2003). Furthermore, Hartoko (2001, p. 75) argues that the higher the import content index, the greater the level of dependency, making the economy increasingly vulnerable to crises.

To transform the national dairy industry, a new development scheme for the dairy cattle sector was considered necessary (Abisono, 2002, p. 271). In 1985, the Dairy PIR Program was introduced as a new approach to dairy cattle development through Presidential Instruction (Inpres) No. 2 Tahun 1985 concerning the coordination of the development and promotion of the national dairy industry under the Perusahaan Inti Rakyat Persusuan. This new approach was expected to increase national milk production and improve farmers income; therefore, factors that could lead to economic losses needed to be minimized (Pemerintah Daerah Tingkat I Jawa Tengah, 1986). Animal health, as one of the key determinants of achieving maximum profitability in livestock

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farming, requires careful attention through the application of zootechnical knowledge as well as the prevention and control of animal diseases (Subronto, 2007, p. 7). In accordance with Government Regulation (PP) No. 16 of 1977, livestock enterprises are required to comply with all regulations concerning animal health, including measures for the exclusion, prevention, eradication, and treatment of animal diseases. In Central Java, this requirement was further reinforced through Central Java Provincial Regulation (Perda Dati I Jawa Tengah) No. 11 of 1986 concerning Livestock Business Licensing.

The Dairy PIR Program, which was implemented in parts of Semarang and Boyolali Regencies, was officially inaugurated and commenced operations on 13 February 1988 (Harian Neraca, 16 February 1988, p. 5). As a pilot project, it was initially expected to achieve considerable success. However, after two years of implementation, the project instead encountered significant setbacks. One of the principal causes of its failure was the outbreak of anthrax in 1990, which resulted in the death of approximately 1,406 cattle and the destruction of 341,623 liters of milk. At that time, an estimated 10,100 cattle were suspected of being infected with anthrax (Suara Merdeka, 11 July 1990, p. 8).

According to Abawi (2018), who examined the influence of physical environmental factors on anthrax outbreaks in Boyolali between 2008 and 2012 using an ecological study, the occurrence of anthrax in a particular area may be influenced by physical environmental factors such as rainfall, elevation, vegetation density, and livestock density. Similarly, Willa (2010), who investigated the relationship between community behavior, environmental factors and anthrax outbreaks in Southwest Sumba, argued that soils with high pH values and high organic matter content provide favorable conditions for the long-term survival of *Bacillus anthracis*, enabling the bacterium to persist for decades. Likewise, Martindah & Wahyuwardani (1998), who analyzed the temporal pattern of anthrax outbreaks in West Nusa Tenggara (NTB) from 1984 to 1994 using a time-series approach, found that the occurrence of anthrax in animals varied across both time and location. In line with these findings, Hardjoutomo & Poerwadikarta (2002) who investigated anthrax cases on an ostrich farm in Ciparung Village, Purwakarta Regency, West Java, reported that the area was one of Indonesia's recognized anthrax-endemic districts, where the previous recorded outbreak had occurred in 1985.

Although these studies successfully demonstrated the relationships between environmental factors, regional characteristics, and anthrax outbreaks, most of them employed epidemiological, veterinary, or ecological approaches. In contrast, the present study adopts a historical approach to investigate the causes of the anthrax outbreak that occurred within the Dairy PIR Program in Semarang and Boyolali Regencies in 1990. To date, the exact cause of the anthrax outbreak in the Dairy PIR Program project, one of the government's major livestock development initiatives, remains uncertain. Various parties, including the company itself, have argued that the outbreaks resulted from deficiencies in the project's management. Veterinarians, on the other hand, have suggested that the outbreak was caused by animal feed contaminated with *Bacillus anthracis*. These explanations are plausible, given that *B. Anthracis* can spread only through a suitable transmission medium. Nevertheless, it remains unclear how anthrax was introduced into the area and subsequently developed into a major outbreak in 1990. Therefore, a historical investigation of the region is necessary to better understand the origins and development of the outbreak.

Based on the background outlined above, this study aims to investigate the causes of the anthrax outbreak that occurred in the Perusahaan Inti Rakyat Persusuan project in Central Java in 1990, an event that illustrates the irony of a dairy cattle development program that instead triggered a major animal health crisis. To achieve this objective, the study employs a historical approach, examining the outbreak within its temporal and spatial context. The year 1990 was selected as the focus of the study because it marked the emergence of anthrax as an extraordinary outbreak within the project. In response to the crisis, the Director General of Livestock Services, the Directorate of Cooperatives Business Development (Bina Usaha Koperasi), and several members of Commission IV of the Indonesian House of Representatives (DPR RI) jointly recommended to the Minister of

Agriculture that the partnership be terminated, arguing that the Dairy PIR Program had completely failed to achieve its intended objectives (Media Indonesia, 28 January 1991, p. 3).

RESEARCH METHOD

In reconstructing historical events into a scholarly work, the narrative presented must be supported by reliable evidence to ensure the validity of the historical reconstruction (Purwanto, 2006, p. 10). Such evidence consists of primary information or historical data obtained from a variety of sources, including archival records, newspapers, books, report, and other documentary materials in textual, visual, or oral forms. These sources are subsequently evaluated to determine their relevance to the research topic, analyzed, and transformed into historical facts that serve as the basis for reconstructing past events (Kartodirjo, 1992, p. 16). According to Gilbert J. Garraghan, as cited by Wasino, the historical method comprises a set of principles and procedures designed to facilitate the systematic collection of historical sources, their critical evaluation, and the synthesis of the available evidence into a coherent written account (Wasino & Hartatik, 2018, p. 11).

Kuntowijoyo identifies approximately five stages in historical research that are commonly followed by academic historians: topic selection, source collection (heuristics), source criticism (verification), interpretation, and historiography. During the topic selection stage, the researcher first identified a historical theme by reviewing a range of historical literature, including journal articles, undergraduate theses, and newspaper reports. Through this process, the researcher encountered reports concerning the anthrax extraordinary outbreak that affected the Dairy PIR Program in Boyolali in 1990. This discovery attracted the researcher's interest and motivated further investigation into the event, while simultaneously marking the beginning of the heuristic stage of source collection.

The primary sources used in this study consist predominantly of newspaper publications, including Suara Merdeka, Media Indonesia, and Harian Neraca, which were obtained from the Suara Merdeka archive depot, the Central Java Provincial Archives Service, and the National Press Monument Collection. In addition, several colonial-era newspapers, such as Javasche Courant, De Locomotief, and Landbouw Courant, were accessed through Delpher, the Netherlands's digital historical archive.

After the required sources have been collected and classified, the next stage is source verification, which serves to assess the validity and reliability of the evidence. This process involves two forms of sources criticism: external criticism, which examines the authenticity of historical sources based on their physical characteristics, and internal criticism, which evaluates the credibility and trustworthiness of the information contained within the sources. This evaluation is carried out through the analysis and interpretation of historical facts, as a single fact may allow for multiple interpretations. Consequently, individual facts must be synthesized and compared with another one to produce a coherent and reliable historical explanation (Kuntowijoyo, 1995, p. 77). Following these stages of historical inquiry, the final steps is historiography, namely the presentation of the research findings in the form of a scholarly historical narrative based on the verified evidence.

RESULT AND DISCUSSION

Overview of the Dairy PIR Program

The Dairy PIR Program was a cooperative arrangement between a large-scale enterprise, acting as the nucleus, and smallholder dairy farmers who served as plasma partners. This partnership was established through a credit agreement between the nucleus and the plasma farmers, in which both parties were required to comply with the regulations arising from the cooperation in order to achieve mutual benefits. These regulations, which constituted the obligations of each party, had to be implemented to ensure the sustainability of the enterprise, including the distribution of credit, the responsibilities of farmers, and the provision of guarantees

against risks such as cattle mortality, infertility, and production standards that failed to meet the agreed requirements (Suara Merdeka, 15 February 1988, p. 2).

In this scheme, the nucleus company was PT Nandi Amerta Agung (PT NAA), a joint venture company consisting of PT Mantrust (55%), the Indonesian Dairy Cooperative Association (Gabungan Koperasi Susu Indonesia/GKSI) (20%), Land O' Lakes (21%) and Cooperative Business International (4%) (Harian Neraca, 16 February 1988, p. 5). The company was located on Jl. Raya Salatiga-Solo Km 7.5, Ds. Patemon dan Butuh, District Tengaran, Semarang Regency. Meanwhile, the plasma farmers were distributed across several villages: in Tengaran District, they were located in Patemon, Butuh and Karangduren Villages, while in Boyolali Regency, the plasma areas included Jeruk Villages in Selo District and Jlarem and Kembang Villages in Ampel District.

In this partnership scheme, the mechanism began with an agreement between the farmers as plasma partners and the nucleus company. Through this agreement, the company provided a credit package consisting of 3-6 dairy cows valued at IDR 2.5 million per cow, complete with forage and concentrate feed, as well as milking facilities such as milking machines and milk cooling tanks. In addition, the company provided guarantees in the form of debt cancellation in the event of cattle mortality and replacement of cows in cases of infertility or failure to achieve the production standard of 5.400 liters per lactation (Tempo, 2023, p. 23, 50). However, before the cows could be distributed to farmers, they were temporarily placed in a breeding farm until they became pregnant and were ready for milking. Only after the cows demonstrated satisfactory production performance could they be transferred to farmers, provided that the farmers had previously received technical guidance and training from the nucleus company (Tempo, 2023, p. 45).

Farmer development and supervision activities were carried out through designated development areas (satuan wilayah binaan), in which each unit consisted of approximately 90-100 farming households with a total ownership of around 600 dairy cattle. In determining these development units, several considerations were taken into account, including the proximity of farmers' locations, which were expected to be concentrated within a radius of approximately 2.5 km. Whenever possible, each unit was also expected not to extend beyond two administrative districts to facilitate guidance, supervision, and management activities. Within each development unit, there was a service unit that provided various forms of assistance, including animal health services such as infertility control, artificial insemination, and pregnancy examinations, as well as other services such as compensation for risks related to cattle mortality, infertility, or failure to achieve the expected product standards. The service unit also played an important role in marketing livestock products, including milk, male calves, and culled cows, while also assisting in monitoring the smooth delivery of milk supplies from dairy farmers (Suara Merdeka, 15 February 1988, p. 2). The Dairy PIR Program consisted of six service units (UP), with each unit supervising 10 barns containing 120 cattle per barn. These six service units were located in Semarang Regency (Karangduren, Patemon and Butuh Villages) and Boyolali Regency (Jlarem, Kembang and Jeruk Villages) (Suara Merdeka, 17 July 1990, p. 12).

With natural conditions that support the development of dairy cattle farming, areas such as Tengaran, Ampel, and Selo Districts, which are geographically located on the slopes of Mount Merbabu and Mount Merapi, lie at elevations ranging from 729 to 1,500 meters above sea level. This altitude creates relatively cool to cold climatic conditions, which are highly suitable for preventing heat stress in dairy cattle and thereby maintaining optimal milk productivity. Furthermore, as these areas are situated in mountainous regions, they are crossed by numerous rivers originating directly from the surrounding highlands, providing an adequate supply of clean water for livestock needs (Kantor Statistik Boyolali, 1983, p. 1-3) & (Kantor Statistik Semarang, 1986, p. 1-3).

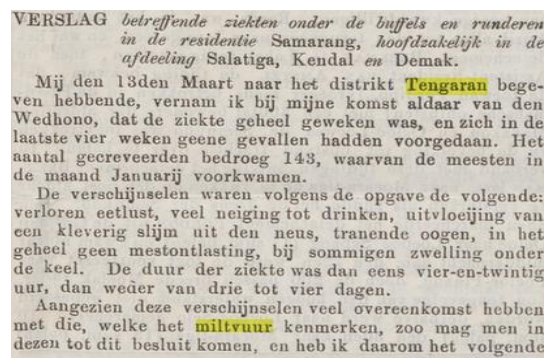
In this region, the most commonly found soil type is Andosol, which is formed from deposits of volcanic materials originating from the activities of Mount Merapi. The loose and lightweight texture of this soil, combined with its high organic matter content, makes it highly fertile and suitable for agricultural activities (Sukarman & Dariah, 2014, p. 35-44). In contrast to Andosol, Latosol soils, which are also present in this area, have relatively low fertility because they are formed

through the weathering of volcanic rocks and contain low levels of organic matter. These soils are generally found in areas with high rainfall and humid climates (Nurjaya et al., 2025, p. 119).

Soil is essentially an ecosystem that supports various living organisms, including bacteria, fungi, worms, and other organisms, which contribute to biological and ecological processes influenced by the complex composition of minerals and organic matter. This condition allows many soil organisms to participate, either directly or indirectly, in regulating pathogens that may have harmful impacts on humans (Putri et al., 2024, p. 41-48) & (Samaddar et al., 2021). Therefore, soil can serve as a reservoir for various pathogens, including bacteria, fungi, and viruses, which have the potential to cause diseases in humans, animals, and plants. Consequently, understanding the types of soil present in a particular region is essential, especially for livestock enterprise managers. They are not only required to understand the characteristics of livestock production systems in their area but also to identify the factors contributing to livestock production failures and recognize the advantages or limitations of the mineral composition of the soil on which their livestock enterprises are established (Subronto, 2007, p. 7).

Anthrax Outbreaks Prior to 1990

Following Indonesia's independence, no official data or reports regarding anthrax occurrences in either Semarang Regency or Boyolali Regency were found until the period preceding 1990. The absence of such reports may indicate that anthrax cases during this period were relatively rare, undetected, or inadequately documented within the animal health reporting system. The historical sources that have been successfully traced instead originate from the colonial period, during which the earliest records of anthrax occurrences in Semarang Regency, Boyolali Regency, or their surrounding areas can be traced back to 1867. At that time, the newspaper *De Locomotief* (17 June 1867, p. 1) reported the death of 147 livestock animals in the Tenganan District, which were suspected to have been caused by anthrax infection (see Picture 1). This indicates that livestock health problems associated with anthrax had already emerged at an early stage in an area that would later become one of the centers for dairy cattle development under the Dairy PIR Program.



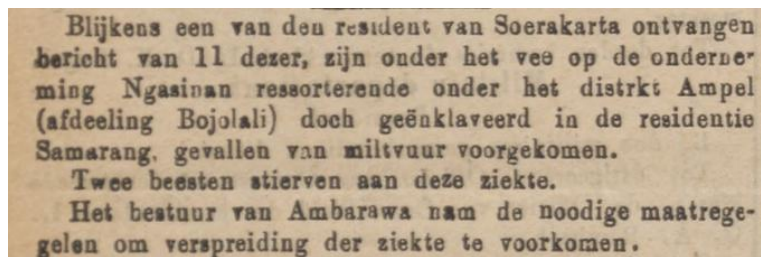
Picture 1. Report on Anthrax Cases in the Semarang, Kendal, Salatiga and Demak Areas

Source: <https://resolver.kb.nl/resolve?urn=ddd:010287165:mpeg21:p001>

Report of anthrax incidents in this region increased during the 1870s. *Javasche Courant* (10 June 1870, p. 2) reported an outbreak of anthrax in several areas of the Surakarta Residency, particularly in Sragen and Ampel. According to the report, the clinical signs were consistent with those of anthrax, and, more importantly, the disease affected large ruminants such as water buffaloes. The incident was also covered by *De Locomotief* (15 June 1870, p. 1) and *Java Bode* (18 June 1870, p. 2), which added that between March and April, 129 water buffaloes were infected, of which 50 died.

Over the following years, similar cases continued to recur at irregular intervals, often showing fluctuating patterns. In 1872, *Java Bode* (18 April 1872, p. 2) reported that 64 animals had died of anthrax in Surakarta, with the outbreak believed to have been caused by the poor quality of animal feed. In 1874, *De Locomotief* (30 May 1874, p. 3) reported that anthrax had caused substantial mortality among water buffaloes and cattle in Surakarta, prompting the Resident to urgently

summon a veterinarian to the region. In 1879, *De Locomotief* (28 January 1879, p. 2) reported an anthrax outbreak among livestock in Karanggede, Ampel District, Boyolali. Later that year, *Java Bode*, 29 November 1879, p. 3) also reported an anthrax outbreak in Klaten. Subsequently, *Landbouw Courant* (29 November 1879, p. 3) reported a similar outbreak in Ampel, Boyolali.



Picture 2. *Landbouw Courant* newspaper dated 29 November 1879

Source: <https://resolver.kb.nl/resolve?urn=MMUBWA01:000493054:mpeg21:p000003>

By the early twentieth century, reports of anthrax cases continued to emerge, although not on a large scale. *De Indische Courant* (11 March 1936, p. 6) reported that the Veterinary Service was concerned that the year might become “an anthrax year” – a phenomenon that occurred periodically, during which the disease manifested itself more severely due to soil conditions. Although the outbreak in Surakarta had been successfully brought under control, only the first two month of the year had elapsed (see Picture 3). The periodic recurrence of anthrax and its relatively widespread distribution indicate that animal health had long been a significant aspect of livestock production in the region, well before the modernization of the livestock sector was introduced.



Picture 3. Excerpt from *De Indische Courant*, 11 March 1936

Source: <https://resolver.kb.nl/resolve?urn=ddd:010285096:mpeg21:p0006>

Anthrax in the Dairy PIR Program

According to *Suara Merdeka* 11 July 1990, anthrax cases among dairy cattle under the Dairy PIR Program had begun as early as January of that year but only attracted widespread public attention in June. The disease was reported to have affected dairy cattle in three service units, resulting in the deaths of 195 animals between April and May. The outbreak was first identified in the Boyolali and Salatiga areas, where the affected livestock belonged to the Dairy PIR Program (*Suara Merdeka*, 12 July 1990, p. 12).

Laboratory examinations conducted at the Animal Disease Research Institute (Balai Penelitian Penyakit Hewan/BPPH) in Wates, Yogyakarta, indicated that the outbreak was consistent with anthrax infection. Initial examinations detected putrefactive bacteria, including *Clostridium septicum* and *Bacillus subtilis*. However, subsequent testing using laboratory animals successfully identified the bacterium responsible for anthrax. To confirm the diagnosis, additional confirmatory tests were performed at the Faculty of Veterinary Medicine, Universitas Gadjah Mada

and the Veterinary Research Institute in Bogor, both of which confirmed the presence of *Bacillus anthracis*, the causative agent of anthrax (Suara Merdeka, 12 July 1990, p. 7).

According to the report, at least 10,100 cattle were affected by the anthrax outbreak. Of these, 6,130 belonged to smallholder farmers participating in the plasma scheme, while the remaining 3,968 belonged to the nucleus company. The outbreak resulted in the deaths of approximately 1,406 cattle and the disposal of 341,623 liters of milk, causing substantial production losses. Of the discarded milk, 112,369 liters were produced by the nucleus enterprise, while 220,254 liters came from plasma farmers (Suara Merdeka, 11 July 1990, p. 8). These figures demonstrate that the outbreak had not only biological consequences but also significant economic impacts on the livestock sector.

The underlying causes of the anthrax outbreak within the Dairy PIR Program remained a matter of debate. Some government officials argued that management-related factors, including the provision and quality of animal feed as well as negligence in the management of the nucleus enterprise, were the primary causes. Representatives of the nucleus company acknowledged that the company had been overly accommodating toward plasma farmers and maintained that the principal problem lay in the management system applied to the plasma scheme, which required improvement, rather than in the quality of the feed alone (Media Indonesia, 30 July 1990, p. 9).

From a theoretical perspective, the occurrence of anthrax in this region can be explained by the biological characteristics of *Bacillus anthracis*, which is capable of forming highly resistant endospores that can persist in the soil for extended periods. Rahayu (2009) explains that the spores may survive for decades, even under extreme environmental conditions, making the disease difficult to eradicate. Consequently, areas that have experienced anthrax outbreaks in the past may continue to serve as sources of infection in the future. This interpretation is supported by evidence that Boyolali experienced an anthrax outbreak in 1934, as noted by Moeljono, a member of commission E of the Salatiga Regional House of Representatives (DPRD II Salatiga) (Suara Merdeka, 30 July 1990, p. 2). Accordingly, the anthrax outbreak within the Dairy PIR Program in Boyolali may be associated with the endemic nature of anthrax in the region.

These findings are consistent with the study by Martindah & Wahyuardani (1998), who analyzed anthrax outbreak patterns in West Nusa Tenggara between 1984 and 1994 using time series analysis. Their study found that the occurrence of anthrax in livestock varied across both time and location. Based on the monthly distribution of cases, anthrax incidence in NTB tended to increase during the rainy season, while the long-term trend showed a gradual decline in the frequency of outbreaks. Similarly, Hardjoutomo & Poerwadikarta (2002) demonstrated that anthrax can remain endemic in a region over long periods. In Purwakarta, for example, the last recorded case prior to the 1999 outbreak had occurred in 1985, indicating a disease-free interval of 14 years.

As part of the outbreak control measures, the local Livestock and Animal Health Service conducted a mass vaccination campaign between 6 and 28 June 1990, covering 21,204 animals, including dairy cattle, beef cattle, goats, and horses. Vaccination was carried out within a 5-kilometer radius of the Dairy PIR cattle facilities, encompassing 14 villages across two subdistricts. In Ampel Subdistrict, the campaign covered 11 villages: Gladakan, Seloto, Kaligentong, Candisari, Ngaglong, Kembang, Ngargoloko, Ngadirejo, Sampetan, Jlarem dan Urutsewu. In Selo Subdistrict, vaccination was conducted in three villages: Tarubatang, Jeruk and Sendang. A total of 131 vials of vaccine were supplied by the Central Java Livestock Service, with each vial containing 125 doses, and each animal receiving a single dose (Suara Merdeka, 11 July 1990, p. 8). In addition, to prevent the spread of anthrax to other areas, livestock movement into and out of the affected region was temporarily prohibited (Suara Merdeka, 12 July 1990, p. 7).

Animals that died from anthrax were required to be handled according to strict biosecurity procedures. Carcasses were not permitted to be opened for post-mortem examination; instead, they had to be burned, buried, and treated with disinfectants. Furthermore, burial sites were prohibited from being reused for livestock production or agricultural activities in order to prevent future environmental contamination and the re-emergence of the disease (Suara Merdeka, 12 July 1990, p.

7). Nevertheless, anthrax cases reappeared in Boyolali over the following years, further reinforcing the indication that the regions is an anthrax-endemic area (Table 1).

Table 1. Overview of Anthrax Cases in Boyolali Regency

Years	Cows	Goats
1991	1	-
1992	-	1
1993	-	1
2011	2	1
2012	1	1

Source: Personal Records of the Livestock and Animal Health of Central Java

The anthrax outbreak had its greatest impact on the nucleus company. The company's financial losses were estimated to have reached billions of rupiah, in addition to mounting demands from various stakeholders for compensation covering livestock maintenance costs, forage expenses, land rental fees, and the postponement of plans to import 8.000 dairy cattle (Bernas, 18 March 1992, p. 5). Considered a complete failure, the project -valued at approximately IDR 300 billion- was slated for termination because it had failed to achieve its intended objectives. Consequently, several members of Commission IV of the Indonesia House of Representative (DPR RI) agreed to recommend that the Minister of Agriculture terminate the partnerships, with all resulting liabilities to be borne by the nucleus company. Furthermore, the nucleus company was required to settle more than IDR 190 million in outstanding payments owed to plasma farmers (Media Indonesia, 28 Januari 1991, p. 3). According to Soewarno (58), a former employee of PT NAA, the cattle that survived the anthrax outbreak were subsequently distributed to plasma farmers, and the company ceased operations entirely in 1992 (Soewarno, personal communication, April 6, 2026).

CONCLUSION

Based on the findings and discussion presented above, it can be concluded that the source of anthrax in Boyolali had existed long before the implementation of the Perusahaan Inti Rakyat Persusuan. As documented in several colonial newspapers, including *Javasche Courant*, *De Locomotief*, and *Landbouw Courant*, anthrax cases were reported in the Ampel area as early as 1870 and 1879. This historical evidence is further supported by information provided by Moeljono, who noted that another anthrax outbreak occurred in 1934, reinforcing the long-standing presence of *Bacillus anthracis* in the region. The subsequent establishment of the Perusahaan Inti Rakyat Persusuan increase livestock mobility and animal density in Semarang an Boyolali Regencies, thereby heightening the susceptibility of livestock to infectious diseases. Moreover, the project placed greater emphasis on increasing milk production than on strengthening the animal health system, creating conditions that facilitated the transmission of anthrax and ultimately resulted in a major outbreak.

These findings suggest that local governments should exercise greater caution when issuing permits for livestock enterprises. As a policy recommendation, a comprehensive preliminary assessment should be undertaken before establishing livestock development projects. Such assessments should include the epidemiological history of the region, including previous anthrax outbreaks, as well as soil conditions, topography, and local environmental characteristics. These considerations are essential for the appropriate application of zootechnical practices and for improving the prevention and control of animal diseases.

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