

‘Spanish’ flu and army horses: what historians and biologists can learn from a history of animals with flu during the 1918–1919 influenza pandemic

FLOOR HAALBOOM*

ABSTRACT

At the time of the 1918–1919 ‘Spanish’ influenza pandemic, influenza researchers did not just relate this disease to the human population, despite the focus of historians of medicine on its human aspects and meanings. In line with the use of historical reports of animals with influenza in present-day microbiological studies on influenza among different animal species, this article investigates understandings of animal influenza in the Netherlands during the 1918–1919 pandemic. The article adds microbiological uses of the historical record by putting observations of animals with influenza in historical contexts, in particular the context of military dealings with influenza at the end of the First World War, and the social position of veterinary medicine. The case of the Dutch military horse veterinarian Emile Bemelmans, who argued that human and horse influenza were identical, illustrates that knowledge of these contexts is important to critically use historical sources reporting animals with influenza in present-day biological influenza research.

Keywords: influenza; veterinary medicine; military medicine

* Descartes Centre for the History and Philosophy of the Sciences and the Humanities, Utrecht University & Julius Centre for Health Sciences and Primary Care, University Medical Centre Utrecht. E-mail: a.f.haalboom@umcutrecht.nl. This study is part of a PhD project on the historical dealings with infectious diseases shared by humans and animals (zoonoses) in the Netherlands (1890–2010), funded by the medical faculty and veterinary faculty of Utrecht University, the Dutch Ministry of Health, Welfare and Sport, and the Dutch Ministry of Economic Affairs. I am grateful for the support of the teachers of the Utrecht University course ‘Science and the Dilemma’s of Modernity’ (2011) in preparing this article: Ruud Abma, Timo Bolt, Friso Hoeneveld and Ingrid Kloosterman. In addition, I thank Timo Bolt, Frank Huisman, Fred Vogelzang and two anonymous referees for their valuable comments on earlier drafts.

'Spanish' flu and army horses

In August 1918, physician P.H. Kramer, officer of health of the Dutch Militair Geneeskundige Dienst (Military Health Service, hereafter MGD), discussed an exceptional event in war-stricken Europe:

a disease of an exceptional epidemic character, which has not honoured the neutral borders of our fatherland, and which has become known to us closely under the name of 'Spanish flu' or 'Spanish illness'.¹

Whether this flu was really of Spanish origin remains to be seen, as the reports on the epidemic were unreliable due to the circumstances of war. Kramer was writing during the start of what would become known as the 1918–1919 'Spanish' influenza pandemic, which eventually killed tens of millions of people worldwide, a higher number than First World War related deaths.² In the Netherlands, more than 16,000 people died during the height of the pandemic, in the autumn of 1918. The summer of 1918 and the spring of 1919 saw milder outbreaks, which still added several thousands of victims to the influenza death toll.³ Kramer, however, was still unaware of these figures, and wrote about an epidemic which travelled quickly, but remained relatively mild. Rather, Kramer expressed an interest in the dynamic properties of influenza epidemics in his overview: the symptoms appeared suddenly and were never exactly alike. Moreover, he discussed historical reports of 'simultaneous outbreaks of infectious diseases among horses, dogs, cats or chickens, which one related to the raging disease among the people'.⁴

Such historical accounts of the (apparent) link between diseases in animals and influenza pandemics among the human population have recently attracted the attention of microbiologists studying influenza.⁵ Their interest is driven by questions on the biological cause of the 1918–1919 pandemic, the influenza virus, and its evolution as it multiplies in different animal host species. Microbiologists want to understand the origin of novel influenza pandemics, and what role different animal species play in this. Historical sources promise to offer them an insight into influenza's evolutionary ecology. As such, they look for observations of animals suffering from influenza in these sources. Some microbiologists give the First World War a special place in this story. They argue that the Great War offered special ecological circumstances for the influenza virus to thrive in, including plenty of opportunities of contact between large

1 P.H. Kramer, 'De "Spaansche griep"', *Nieuwe Rotterdamse Courant* (August 14, 1918) 2. Dutch quote: 'een ziekte van een buitengewoon epidemisch karakter, welke ook de neutrale grenzen van ons vaderland niet heeft geëerbiedigd en die ons thans onder den naam van 'Spaansche griep' of 'Spaansche ziekte' van nabij bekend is geworden'.

2 H. Philips & D. Killingray, 'Introduction', in: H. Philips and D. Killingray ed., *The Spanish Influenza Pandemic of 1918–1919. New Perspectives* (London/New York 2003) 3–4.

3 A.A.J. Quanjer, *De griep in Nederland in 1918 tot 1920* (n.pl. [s Gravenhage] 1921) 19.

4 Kramer, 'De Spaansche griep' (n. 1) 2. Dutch quote: 'bij weer andere epidemieën traden tegelijkertijd onder de paarden, de honden, de katten of de kippen infectueuze ziekten op, die men met de heerschende ziekte onder de bevolking in verband bracht'.

5 See for instance: D.M. Morens & J.K. Taubenberger, 'Historical thoughts on influenza viral ecosystems, or behold a pale horse, dead dogs, failing fowl, and sick swine', *Influenza and Other Respiratory Viruses* 4 (2010) 327–337; D.M. Morens & J.K. Taubenberger, 'An avian outbreak associated with panzootic equine influenza in 1872: an early example of highly pathogenic avian influenza?', *Influenza and Other Respiratory Viruses* 4 (2010) 373–377.

numbers of soldiers and animals. These circumstances might have resulted in a new influenza virus of exceptional virulence, which eventually caused the 1918–1919 pandemic.⁶

Another body of literature on the history of the 1918–1919 influenza pandemic is written by historians, especially historians of medicine. They ask questions about the reception and perception of the influenza pandemic at the time. In these stories, the First World War is an important context to understand why, despite its high death toll, the 1918–1919 influenza pandemic was ‘forgotten’ – shortly after its disappearance and in historiography at large.⁷ More recently, historians have argued that the war had a decisive role in constructing dealings with the pandemic.⁸ Michael Bresalier shows that influenza research in Britain was shaped by its military context, while Mark Honigsbaum argues that the British emotional response to the 1918–1919 pandemic was strongly influenced by wartime propaganda.⁹

Thus, biologists and historians ask very different questions about the 1918–1919 influenza pandemic. Both sets of questions are useful to better understand the nature and impact of the pandemic, in both biological and sociocultural senses. Both perspectives, however, also have limitations. Microbiologists tend to overlook the specific contexts in which the historical documents they consult were made. Their search for present-day understandings of influenza viruses in the past is problematic, as the meaning of the concept ‘influenza’ has changed over time.¹⁰ Understanding specific historical contexts is the core business of historians, but they tend to focus on the human aspects of the pandemic. As a result, they tend to overlook understandings of influenza as a disease shared by humans and animals.¹¹

This article addresses the question whether Dutch physicians and/or veterinarians related influenza in animals to human influenza at the time of the 1918–1919 pandemic, and if so, what role their specific sociocultural contexts played in this. The first part presents a comment on the anthropocentric perspective of historians on the 1918–1919 influenza pandemic. Historians Anne Hardy and Warwick Anderson do point at influenza’s central role in scientific understandings of the interrelatedness of human and animal diseases, focusing on mid-twentieth century disease ecology.¹² However, they do not yet explore older understandings of influenza among different animal species. The second part, on the historical context in which animals were linked to the 1918–1919 pandemic among humans, is a

6 J.S. Oxford a.o., ‘World War I may have allowed the emergence of “Spanish” influenza’, *The Lancet Infectious Diseases* 2 (2002) 111–114; E.D. Kilbourne, ‘A virologist’s perspective on the 1918–1919 pandemic’, in: Philips and Killingley, *The Spanish influenza pandemic* (n. 2) 29–38.

7 Philips and Killingley, ‘Introduction’ (n. 2) 13; M. Honigsbaum, *Living with Enza. The forgotten story of Britain and the Great Flu pandemic of 1918* (London 2009); A.W. Crosby, *America’s forgotten pandemic. The influenza of 1918* (Cambridge/New York 1989).

8 M. Bresalier, ‘Fighting flu: military pathology, vaccines, and the conflicted identity of the 1918–1919 Pandemic in Britain’, *Journal of the history of medicine and allied sciences*, 68 (2013), 87–128, there: 91–92.

9 *Ibidem*; M. Honigsbaum, ‘Regulating the 1918–1919 pandemic: flu, stoicism and the Northcliffe Press’, *Medical History* 57 (2013) 165–185.

10 Bresalier, ‘Fighting flu’ (n. 8) 90–91.

11 For a programmatic critique of the human primacy in medical history, see: R. Kirk, and M. Worboys, ‘Medicine and species: one medicine, one history’, in: M. Jackson ed., *The Oxford handbook of the history of medicine* (Oxford 2011) 561–577.

12 W. Anderson, ‘Natural histories of infectious disease: ecological vision in twentieth-century biomedical science’, *Osiris* 19 (2004) 39–61; A. Hardy, ‘Animals, disease and man: making connections’, *Perspectives in Biology and Medicine* XLVI (2003) 200–215, there: 207–209.

comment on the a-historical perspective of microbiologists interested in historical sources reporting animals with influenza. As we will see, the military setting was an important context for shaping ideas on influenza shared by humans and animals. Another important context was the social position of veterinary medicine in relation to medicine.

Influenza in humans and animals

At the time of the 1918–1919 pandemic, influenza was not understood well, and difficult to identify with certainty. People relied on clinical diagnosis of the disease in human beings, while heated debate took place on its cause, mostly from a bacteriological perspective: was it a bacterium, with the influenza bacterium – isolated by the German bacteriologist Richard Pfeiffer in 1892 – as most discussed candidate? Was it really influenza, and if so, how could a usually mild disease become suddenly so virulent? Were the war circumstances involved? A 'filterable virus'? Toxins? Historian Ton van Helvoort even characterises the debate on the cause of influenza at the time of the 1918–1919 pandemic as a situation of 'total confusion'.¹³ Diagnosis of influenza was very difficult, because the disease had so many manifestations. Influenza historian Bresalier cites one British influenza researcher saying that influenza was 'of protean diseases the most protean'.¹⁴ A Dutch physician referred similarly to influenza as a 'chameleon-like' illness.¹⁵ The Dutch Minister of Health was involved in reassuring people that the 'Spanish' influenza was a disease different from plague of the lungs, as the symptoms were confusingly similar even to physicians.¹⁶ In short, what exactly caused this disease was unclear, and (therefore) it was difficult to distinguish it from other diseases in human beings, let alone in animal species. The feeling of helplessness among the medical profession was profound, especially because the pandemic struck during a period in which physicians became more and more successful in controlling infectious diseases with the methods of bacteriology.¹⁷

Animals had an important role as laboratory models in the study of human influenza. During this period standardisation of laboratory animals was developing, but did not yet entirely replace older nineteenth century approaches of examining differences and similarities between diseases in a wide range of animal species, including humans.¹⁸ Among physicians, attempts to study influenza in different animals mainly served to better understand the human influenza problem. Animals were also reported to 'spontaneously' suffer from influenza, i.e. without human beings intentionally infecting them. Historical reports of horses, dogs, cats and chickens suffering from influenza were known, as Kramer's comment in the introduction of this article shows.

13 T. van Helvoort, *Research styles in virus studies in the twentieth century. Controversies and the formation of consensus* (Enschede 1993) 62.

14 M. Bresalier, "'A most protean disease": aligning medical knowledge of modern influenza, 1890–1914', *Medical History* 56 (2012) 481–510, there: 510.

15 J.H.F.E. van Hunsel, 'Eenige opmerkingen betreffende de periodiciteit bij enkele infectieziekten', *Nederlandsch Tijdschrift voor Geneeskunde* (hereafter *NTvG*) 63 (1919) 913–922, there: 914.

16 H. Aldershoff and C.W. Broers, 'Vlektyphus-epidemie op Urk', *NTvG* 63 (1919) 323; B. Premsele, 'Neosalvarsaan en griep' *NTvG* 63 (1919) 1522; 'Wetten, besluiten, Officieele Verslagen, enz. – 'De Spaanse griep', *NTvG* 62 (1918) 1703–1704; 'Longgriep of longpest', *Vox Medicorum* 18 (1918) 187–188.

17 Bresalier, 'Fighting flu' (n. 8) 88–90; Bresalier, 'A most protean disease' (n. 14); R. Vugs, *In veel huizen wordt gerouwd. De Spaanse griep in Nederland* (Soesterberg 2002) 42–45.

18 M. Bresalier, A. Cassidy, and A. Woods, 'One health in history', in: J. Zinsstag a.o. (eds.), *"One health". The theory and practice of integrated health approaches* (forthcoming in 2014).

Using animals as models for the study of human influenza sometimes proved to be difficult. One physician argued that the bacterium he thought responsible for human influenza could not be experimented with, as it was *not* able to infect laboratory animals, and obviously experiments with human beings could not be done.¹⁹ In later years, the lack of a suitable laboratory animal susceptible to influenza was articulated as the major problem in influenza research.²⁰ During the 1918–1919 pandemic, not every researcher encountered this difficulty, however. Ophthalmologist and bacteriologist L.K. Wolff, a major participant in the Dutch medical debate on influenza, subscribed to the theory that a ‘filterable virus’ was involved in influenza based on his work with laboratory animals: ‘both human beings and higher apes can be infected with this virus, while other animals: rabbit, guinea pig, and mouse probably show defects as well’.²¹ Nevertheless, Wolff was cautious about his conclusions, as his findings had not been proven in the ultimate experimental population of human beings.

Animals spontaneously infected with influenza were also used as comparisons to better understand human influenza. The medical journal *Vox Medicorum*, for instance, referred to the German veterinarian Smitt, who noticed ‘the large influenza outbreak’ in dogs as well as in human beings during the 1918–1919 pandemic.²² The editors of the journal added that such occurrence of influenza in both animals and humans was an exceptional event. Their primary interest was not in animals with influenza, but in what Smitt’s findings in dogs taught them about the human pandemic. *Vox Medicorum* argued against the idea held by the Dutch government that the cause of influenza’s high mortality was malnutrition:²³ Smitt’s paper showed that a lot of dogs died of influenza, just as people did, but ‘among the dogs a lot of luxury specimens were infected, which without doubt got their food and drink’.²⁴ Ergo: malnutrition was no sufficient explanation for influenza’s high mortality, neither in dogs nor in people.

In July 1918, physician G.A. Prins cautiously related influenza’s variable nature to the influence of influenza-infected animals. Contemplating reasons why influenza had in some cases changed from a mild into a severe illness, Prins considered ‘repeated animal passage’ of the influenza germ, in his opinion a filterable virus.²⁵ The previously mentioned physician and bacteriologist Wolff noted similarities between human influenza and diseases of cows and horses. He argued that cow pneumonia and ‘horse influenza, of which the filterable virus was discovered by our fellow countryman Poels’ should be compared with human influenza.²⁶ Wolff referred here to the work of veterinarian Jan Poels, director of the Rijks-seruminrichting (State Serum Institute) in Rotterdam.

19 C.J.C. van Hoogenhuyze, ‘De bacteriologie van de griep’, *NTvG* 63 (1919) 1697–1698.

20 M. Bresalier, ‘Neutralizing flu: “Immunological Devices” and the Making of a Virus Disease’, in: K. Kroker a.o. ed., *Crafting immunity. Working histories of clinical immunology* (Aldershot/Burlington 2008) 107–144.

21 L.K. Wolff, ‘Over het virus, dat de veroorzaker is der influenza’, *NTvG* 63 (1919) 492–500, there: 499. Dutch quote: ‘dat met dit virus zoowel menschen als hoogere apen zijn te besmetten, terwijl andere dieren: konijn, Guineesch biggetje en muis vermoedelijk ook afwijkingen vertoonen’.

22 Anonymous, ‘Griep bij honden’, *Vox Medicorum* 19 (April 2, 1919) 54.

23 E. Mecking, *Het drama van 1918. Over de Spaanse griep en de zoektocht naar virus en vaccin* (Amsterdam 2006) 112–113.

24 Anonymous, ‘Griep bij honden’ (n. 22) 54. Dutch quote: ‘bij de honden [werden] veel luxe-exemplaren aangestast, die ongetwijfeld hun natje en hun droogje wel kregen’.

25 G.A. Prins, ‘Spaansche griep’, *NTvG* 62 (1918) 339. Dutch quote: ‘herhaalde dierpassage’.

26 Wolff, ‘Over het virus’ (n. 21) 495.

These examples show that animals were part of the wide variety of medical explanations for influenza: as models for human influenza (either intentional models in laboratories or the spontaneous models of domesticated animals), in ideas on the variability of the disease, and as probable creatures who shared influenza with human beings. Historians of medicine who have until now focussed on human influenza can use such ideas to gain better insight in what people understood influenza to be.

On the other hand, in Dutch veterinary literature of the time references to the 1918–1919 influenza pandemic among the human population are almost non-existent.²⁷ In popular media, a cow with influenza did turn up in a serial story in a local newspaper several years after the 1918–1919 pandemic: a young veterinarian setting up his veterinary practice in a small southern town, with 'a couple of headstrong farmers' as clients, diagnoses 'a cow with spanish flu'.²⁸ But in reality, the Dutch veterinary community largely ignored 'Spanish' flu. Even the elite of Dutch veterinarians, keen on raising the status of their profession by associating it with human medicine, did not take part in the debate on the 1918–1919 influenza pandemic.²⁹ The same Poels to whom Wolff referred as having done work on horse influenza, was the second veterinarian who became a *medical* professor, in applied bacteriology in Leiden. But although Wolff related Poels's findings on horse influenza to the pandemic, Poels himself did not. His colleague, Dirk Aart de Jong, who was the first veterinarian to obtain a Dutch medical chair in Leiden in 1908, showed no interest in the observations of influenza in man and animals either, although he was the main advocate of 'comparative medicine' of different animal species including humans in the Netherlands in this period. Only one veterinarian developed an extensive theory on the relation between human and animal influenza: the military horse veterinarian Emile (E.C.H.A.M.) Bemelmans (1878–1935). In 1919, he argued that 'the human 'flu' and the so-called 'infectious disease of the breast' of horses are exactly *identical* in *aetiological*, *bacteriological* and *epidemiological* senses'.³⁰ It is no coincidence that Bemelmans developed his theory within the army, while De Jong and Poels showed little interest in the link between human and horse influenza in their civilian research institutes. Horse influenza was a major military problem on its own.

Army horses and influenza

Although the Netherlands remained neutral during the First World War, its army was mobilised, including its animals. This mobilisation included dogs, pigeons, and, most importantly, many horses. Military veterinarians were responsible for these animals, as part of

27 An exception from the Dutch Indies was J. Merkens, 'Een ziekte onder de melkkoeien', *Nederlandsch-Indische Bladen voor Diergeneeskunde* 31 (1919) 48–50. In this article, governmental veterinarian in Bandoeng Jan Merkens speculated that a mysterious disease he came across in cows might be 'the mysterious Spanish influenza', and that a pig breeder near Bandoeng had observed a similar disease among his pigs. The editor of the journal rejected Merkens' hypothesis, and the issue was not further discussed.

28 Passe Partout, 'De zesdaagsche langs 'n omweg', *Tilburgse Courant* (January 19, 1926).

29 J. Poels, *Verslag van de werkzaamheden der Rijksseruminrichting 1918–1921* (Rotterdam 1923); D.A. de Jong ed., *Tijdschrift voor Vergelijkende Geneeskunde, Gezondheidsleer, en Parasitaire en Infectieziekten* 3–4 (1918–1919); D.A. de Jong, 'Dierziekten bij den mensch', *NTvG* 65 (1921) 351–352; C. Offringa, *Van Gildestein naar Uithof. 150 jaar diergeneeskundig onderwijs in Utrecht. Deel 1 's Rijksveeartsenijschool (1821–1918), Veeartsenijkundige Hoogeschool (1918–1925)* (Utrecht 1971) 236–238; Dalila Wallé, *Leiden medical professors 1575–1940* (Leiden 2007) 249–255.

30 E. Bemelmans, 'De "griep" en hare bestrijding', *NTvG* 63 (1919) 184. Dutch quote: 'dat de 'griep' van den mensch en de z.g. 'besmettelijke borstziekte' van het paard, zoowel *aetiologisch*, *bacteriologisch* en *epidemiologisch*, volmaakt *identiek* zijn'.

the MGD. During the mobilisation, around hundred veterinarians were enlisted as military veterinarians. Moreover, 23 military horse veterinarians who held various military ranks were permanently enlisted.³¹ One of these was Bemelmans. Horse veterinarians had been of good standing in the veterinary profession from the early nineteenth century onwards, when King Louis Napoleon appointed the first equine veterinary officer. During the following century, veterinary officers in the army were higher educated than their civilian colleagues, and formed the elite of veterinary medicine. At the time of the influenza pandemic, Bemelmans was a military horse veterinarian with the rank of captain, a position only six veterinarians had in the Netherlands. In 1924, Bemelmans became director of the military veterinary hospital in The Hague, in which position he became the directing horse veterinarian of the Netherlands.³²

Bemelmans's 1919 theory about horses and human beings suffering from an identical disease did not come from thin air. Influenza was a common diagnosis in equine veterinary medicine. The German professor in veterinary medicine Wilhelm Dieckerhoff (1835–1903) distinguished two kinds of horse influenza: influenza catarrhalis (*Pferdestaupe*) and influenza pectoralis (*Brustseuche* or infectious breast disease). As a military veterinarian, Bemelmans had been involved in extensive research on horses with infectious breast disease years before the 1918–1919 influenza pandemic. The publications resulting from this research were very extensive and filled with references to international scientific literature. Bemelmans noted he was working in a tradition of many scientists who had been looking for the cause of horse influenza, but had not succeeded yet.³³ One of those scientists was Robert Koch, who was ordered by the German Emperor Wilhelm to investigate the horse disease, because, according to Bemelmans, 'the breast disease greatly endangers the readiness for battle of the army especially.'³⁴ Bemelmans himself received a similar order from the Dutch government in 1908, presented to him by the Inspector of the Medical Service of the Army.³⁵ He was seconded to Poels's Rijksseruminrichting from 1909 to 1910 to investigate infectious horse diseases, and continued this research at the military depot for army horses (Remontedepot) in Milligen in later years.³⁶ Thus, Bemelmans was involved in the work on the filterability of the causing factor of horse influenza conducted at the Rijksseruminrichting, to which physician Wolff referred during the 1918–1919 influenza pandemic.³⁷

Based on this research, Bemelmans became convinced that Dieckerhoff had incorrectly given the name of influenza to both *Pferdestaupe* and infectious breast disease. On clinical grounds, Bemelmans thought *Pferdestaupe* could not be considered a respiratory disease, and was caused by a filterable virus rather than the bacterial toxins he thought responsible for infectious breast disease. Because of its connotations with Dieckerhoff's wrong

31 Offringa, *Van Gildestein* (n. 29) 213–214; J.B.A. Loomans a.o., 'The emancipation of the equine veterinary practitioner in the Netherlands', *Pferdeheilkunde* 25 (2009) 28–37, there: 29–30.

32 Offringa, *Van Gildestein* (n. 29) 213–214; Loomans a.o., 'The emancipation' (n. 31) 29; A. Rijnberk, 'Honden in Nederlandse krijgsmacht I. Mitrailleurtractie', *Argos* 47 (2012) 224–241, there: 232.

33 E.C.H.A.M. Bemelmans, *De "influenza" ziekten van het paard* (Tilburg 1914).

34 *Ibidem* 58. Dutch quote: 'Daar de borstziekte in het bijzonder voor de slagvaardigheid van het leger steeds een groot gevaar oplevert.'

35 *Ibidem* 62.

36 E. Bemelmans, 'De beteekenis en de bestrijding der streptococci en hun stofwisselingsproducten bij verschillende besmettelijke ziekten van mensch en dier', *NTvG* 58 (1914) 9–10.

37 Bemelmans, *De influenza ziekten* (n. 33) 10–22; Wolff, 'Over het virus' (n. 21) 495.



Fig. 1: Arrival of ill and wounded army horses. Examination for infectious diseases (in this case glanders). Glass negative by the photographer Herman de Ruiter made for: J. Kooiman, *De Nederlandsche Strijdmacht en hare Mobilisatie in het jaar 1914* (Purmerend 1915). Collection Nationaal Militair Museum, Soesterberg, nr. 108924.

classification, Bemelmans proposed to drop the general term influenza entirely. He preferred the name 'griep' ('flu') for infectious breast disease.³⁸ During the 1918–1919 influenza pandemic, he related horse flu (and not *Pferdestaupe*) to human influenza.

In this context of years of research of equine influenza as a major problem for the army, an important part of Bemelmans's theory was the promise of a therapeutic drug: neosalvarsan. Bemelmans experimented with the newly developed drug salvarsan on army horses with flu, and concluded it was a useful drug for their treatment.³⁹ Salvarsan (and somewhat later the less toxic neosalvarsan) was an arsenical compound introduced in 1909 as a treatment for syphilis, but it was commonly tried for other diseases as well.⁴⁰ Bemelmans's findings and similar studies conducted by his colleagues were important to the army, because they promised to prevent army horses from dropping out. Bemelmans's fellow captain horse veterinarian F. Laméris noted in 1917 on the damage of influenza among army horses: 'often one feels helpless in the face of it, and sees the most beautiful

38 Bemelmans, *De influenza ziekten* (n. 33) 161.

39 E. Bemelmans, 'Salvarsan-inspuitingen bij remontepaarden gedurende de borstziekte-enzootie 1911/1912 in het Remontedépot te Milligen', *Tijdschrift voor Veeartsenijkunde* 39 (1912) 629–639.

40 S.D. Jones, *Death in a small package. A short history of anthrax* (Baltimore 2010) 119.

horses dying or becoming almost useless'.⁴¹ Neosalvarsan provided long hoped-for therapy, despite its toxic drawbacks.

Although influenza was a disease frequently diagnosed in horses in the veterinary community, veterinarians did not generally relate the disease to influenza among humans, not even during the 1918–1919 influenza pandemic.⁴² Bemelmans's publications on horse 'flu' in the *Tijdschrift voor Diergeneeskunde* (Dutch veterinary journal) – rather than his papers for the medical community – were no exception.⁴³ Apparently, he thought his ideas about a link between human and horse influenza were irrelevant for veterinarians. In 1919, Bemelmans's argument on the identical nature of human and horse influenza in the *Nederlandsch Tijdschrift voor Geneeskunde* (the Dutch medical journal) was reviewed in the veterinary journal, and the reviewer did express polite interest in Bemelmans's further work on the topic.⁴⁴ However, no further references to Bemelmans's theory were made in the veterinary journal, and no other publications about animals with influenza appeared during the 1918–1919 influenza pandemic.⁴⁵

In medical circles, however, Bemelmans became a persistent voice in the debate on the cause and nature of influenza, claiming a role for veterinary medicine, equine medicine in particular, in understanding and possibly controlling the human disease. Already in 1914 he extended his theory on horse flu to several human and animal infectious diseases in an article in the Dutch medical journal.⁴⁶ Bemelmans listed human influenza as an example among many other animal and human diseases which he thought were accompanied by (deadly) infections of streptococci. Although he did not yet argue that human and horse flu were exactly equal, he did explicitly note their similarities: 'Also between the human influenza and the so-called breast disease in horses peculiar similarities exist'.⁴⁷ The 1918–1919 influenza pandemic was an excellent opportunity for Bemelmans to claim knowledge many physicians did not have, based on years of work on army horses who, he was convinced, shared this disease with humans. After the most severe wave of the pandemic during the autumn of 1918, his papers on influenza were published in the *Nederlandsch Tijdschrift voor Geneeskunde*. In the same period, Bemelmans presented his theory at a meeting of the Amsterdamse Genootschap voor de bevordering van Natuur-, Genees- en Heelkunde (Society for the promotion of Physics, Medicine and Surgery).⁴⁸

41 F. Laméris, 'Neosalvarsantherapie bij Pleuropneumonia contagiosa equorum (Influenza pectoralis)', *Tijdschrift voor Diergeneeskunde* (hereafter *TvD*) 44 (1917) 125–135, there: 125. Dutch quote: 'men staat er dikwijls hulpeloos bij en ziet de mooiste paarden sterven of bijna waardeloos worden'.

42 J.A. Beijers, 'Infectieuze bronchopneumonie', *TvD* 45 (1918) 36–40; J.A. Beijers, 'Complicaties van influenza', *TvD* 45 (1918) 136; reports of the Dutch Veterinary Service over 1926–1939 (1928–1940).

43 E. Bemelmans, 'Het wezen, de besmettelijkheid en de maatregelen ter bestrijding van de 'griep' (oneigenlijk: besmettelijke borstziekte) van het paard', *TvD* 43 (1916) 6–19.

44 Vrijburg, 'Referaten', *TvD* 46 (1919) 151.

45 *TvD* 45–47 (1918–1920).

46 Bemelmans, 'De beteekenis' (n. 36) 4–24.

47 *Ibidem* 14. Dutch quote: 'Ook bij de influenza van den mensch bestaat er een merkwaardige overeenkomst met de z.g. borstziekte der paarden'.

48 Bemelmans, 'De griep' (n. 30) 184; E. Bemelmans, 'Neosalvarsan en griep', *NTvG* 63 (1919) 1709–1710; E. Bemelmans, 'De "besmettelijkheid" van de influenza', *NTvG* 63 (1919) 850–851; E. Bemelmans, 'De besmettelijkheid van influenza', *NTvG* 63 (1919) 1106–1107; E. Verschaffelt, 'Dr. med. vet. E. Bemelmans, "De aetiologie van de griep"', in: 'Genootschap ter bevordering van Natuur-, Genees- en Heelkunde te Amsterdam, Gecombineerde vergadering der Secties voor Geneeskunde en voor Biologie van 12 Maart 1919', *NTvG* 63 (1919) 1133–1137.

In these papers, Bemelmans addressed the nature of influenza (although he still preferred the name 'flu') of both humans and horses. He opposed the ideas that Pfeiffer's bacterium or a filterable virus caused the disease, but thought toxins made by the *bacteria streptococci* were responsible for its deadly secondary complications. He was less clear about the exact causes of the disease itself, because he encountered a well-known problem within influenza research: he did not succeed in artificially infecting horses with human influenza, or horses mutually with influenza. This was a violation of one of Koch's postulates to establish the causative agent of a certain disease. Bemelmans speculated that his horse flu and human *endemic* (mild) influenza were exactly equal, but he was uncertain about the relation between endemic and pandemic influenza, again like many influenza researchers.

Among physicians, Bemelmans's ideas on the similarities between human and horse flu did not remain unnoticed. Significantly, the official report on the 'Spanish' influenza published by the Gezondheidsraad (Health Council) on request of the Minister of Labour referred to Bemelmans's theory, in an aetiology-section called 'Human and animal influenza'.⁴⁹ The author of this report again illustrates how influenza research was linked to the army, even in the neutral Netherlands: it was written by the distinguished military physician and inspector of the MGD, major general A.A.J. Quanjer (1852–1927).⁵⁰ Quanjer devoted quite some attention to the influenza outbreak among Dutch soldiers: both because medical army statistics provided good evidence for the spread and incidence of the disease, and because the mobilised army units had a significant role in its spread.⁵¹

Quanjer cited Bemelmans's thesis that human influenza and equine infectious breast disease were 'completely identical', referring to his medical publications, and put it in the context of earlier observations of similarities between human and animal influenza in the medical handbook of the Berlin medical professor August Hirsch (1817–1894).⁵² Hirsch had noted simultaneous outbreaks of influenza among people, horses, dogs, cats and other animals in history, and argued on the relation between human influenza epidemics and influenza epizootics among animals, as repeated by Quanjer: 'The number of those observations is so impressive, that one cannot easily reject the idea of an aetiological, maybe also pathological relation between those epidemics and epizootics'.⁵³

Quanjer tried to relate these theories to physicians' reports of the 1918–1919 influenza pandemic. He had received a letter from an army physician, who noted that all influenza-infected soldiers at his base in Ede stayed in a hayloft above a stable with army horses. Significantly, as Quanjer quoted this letter: 'The horses from this battery are suffering from an influenza-epidemic as well'.⁵⁴ The letter contained much more details on the course

49 Quanjer, *De griep* (n. 3) 47–48.

50 *Ibidem*. As influenza continued to infect some people in 1920, Quanjer referred to the '1918–1920' influenza epidemic.

51 *Ibidem* 10–11, 15.

52 See: August Hirsch, *Handbuch der historisch-geographischen Pathologie* (Stuttgart 1881); Hans H. Lauer, 'Hirsch, August', *Neue Deutsche Biographie*, Band 9 (Berlin 1972) S. 212 f.

53 Quanjer, *De griep* (n. 3) 47–48. Dutch quote: 'Het aantal dezer waarnemingen is zoo imponeerend groot, dat men het vermoeden van een aetiologisch, misschien ook pathologisch verband tusschen deze epidemieën en epizootieën wel niet zonder meer van de hand kan wijzen'. The original quote can be found in: Hirsch, *Handbuch* (n. 52) 28–29.

54 Quanjer, *De griep* (n. 3) 48.

of the influenza epidemic among the soldiers, but Quanjer selected the part on horses to include in his report.⁵⁵

Similar observations of a relation between human and horse influenza from countries involved in the war were linked to Bemelmans's theory. For instance, a major newspaper related Bemelmans's conclusion that both horses and human beings got influenza to findings of the two French physicians Orticoni and Barbié, who cooperated with the French veterinarian Augé.⁵⁶ Several months after the publication of Bemelmans's theory, the *Nederlandsch Tijdschrift voor Geneeskunde* reviewed a study by the US military physician George A. Soper, who also argued that influenza should be considered an important disease in horses, with severe economic consequences during the First World War.⁵⁷

Quanjer mentioned Bemelmans a second time in the therapy-section of his official report.⁵⁸ Indeed, Bemelmans's argument that neosalvarsan could be used as a therapeutic drug against influenza was what triggered a reaction from physicians, who tested Bemelmans's recommendation, reporting varying results.⁵⁹ Especially the Amsterdam physician B. Premsele (a general practitioner, sexologist, and member of the editorial board of the Dutch medical journal), was interested in Bemelmans's theory because of neosalvarsan's therapeutic promise.⁶⁰

The case of the horse veterinarian Bemelmans illustrates that the military context was not just important for human influenza research, but also facilitated the development of ideas on an aetiological relation between human and horse influenza. Horse influenza was an important military problem in itself, and the body of knowledge developed on this disease was easily linked to human influenza. This context is important for interpreting critically the large number of historical reports on horses with influenza that microbiologists have linked to the ecology and evolution of influenza over time.⁶¹ Based on these reports, biologists for instance speculate that horses 'played a role in influenza virus maintenance and evolution analogous to that of pigs in the modern era.'⁶² Although these authors do question whether influenza as recorded in historical documents was the same as present-day influenza, they take the presence and absence of different animal species in historical documents at face value. Bemelmans's case illustrates that it was his position and experience as a military horse veterinarian which inspired his linking of equine and human influenza. Only careful conclusions on the ecological reality of influenza among different animal species can be drawn from cases like this one.

A horse veterinarian in medical debate

Another context is important for Bemelmans's case: the sociocultural position of veterinary medicine in the Netherlands at the time. Although Bemelmans's theory was included in the

55 Quanjer marked the part on horses in this letter: Letter A.J.[?] van Wieringen to the Central Health Council (14 July 1918), 2.15.06 Centrale Gezondheidsraad te Utrecht 1895–1920, inv. nr. 108 Stukken betreffende het adviseren aan de minister inzake de bestrijding van Spaanse griep, Nationaal Archief (The Hague).

56 'De verwekker van de griep', *Nieuw Rotterdamsche Courant*, (May 31, 1919) 1–2. See: A. Orticoni, L. Barbié, and Augé, *Pr. Méd.* 27 (1919) 247.

57 'Influenza in horses and in man', *NTvG* 63 (1919) 1963.

58 Quanjer, *De griep* (n. 3) 48 and 65.

59 J.J. Bloemen, 'Neosalvarsaan en griep', *NTvG* 63 (1919) 1442; Premsele, 'Neosalvarsaan' (n. 16) 1522; O.H. Eischveld Bosch, 'Neosalvarsaan en griep', *NTvG* 63 (1919) 1522–1523.

60 B. Premsele, 'Behandeling der longverwickelingen bij griep met neo-salvarsaan en kalk', *NTvG* 63 (1919) 1098.

61 See for instance: Morens and Taubenberger, 'Historical thoughts' (n. 5) 330–332.

62 *Ibidem* 332.

medical debate on what exactly caused the influenza pandemic and how physicians should deal with it, Bemelmans was not an obvious authority within this debate. For instance, at first there was no response at all to his article in the Dutch medical journal of January 1919. Editor Premsele remarked in April that he was surprised Bemelmans's theory did not inspire any reaction, as it was worthwhile because of his thoughts on the relation between human and horse influenza, and the use of neosalvarsan.⁶³ Only after these remarks did some reports on the effectiveness of Bemelmans's proposed use of neosalvarsan appear.

The slow reaction to Bemelmans's ideas had everything to do with his social position as a veterinarian. Officially, the Militair Diergeneeskundige Dienst (Military Veterinary Service) was subordinate to the Militair Geneeskundige Dienst, and only received temporary independence when the army was mobilised. The rank of the directing horse veterinarian was major, a relatively low military rank, while the rank of the Inspector General of the MGD was higher. Bemelmans's chief and author of the influenza report Quanjier, for instance, had the rank of major general. Military veterinarians were very aware of these differences. They were lobbying to make the Militair Diergeneeskundige Dienst permanently independent. 'The horse veterinarian highest and oldest in rank sees himself in subordinate position under the mentioned inspector [of the MGD], with little or no independence and responsibility', wrote Bemelmans indignantly in 1918.⁶⁴ As the Militair Diergeneeskundige Dienst was seen 'as an inferior appendix of the Militair Geneeskundige Dienst', its development was slowed down, especially because military physicians were ignorant of the science of military veterinary medicine.⁶⁵ When Bemelmans became the highest ranking horse veterinarian in the Netherlands in 1924, he became head of the Militair Diergeneeskundige Dienst at the same time, as it was made independent in 1919.⁶⁶

Thus, although Bemelmans was an important man within veterinary medicine itself, his status was less self-evident in relation to human medicine.⁶⁷ At the time of the 1918–1919 influenza pandemic, Dutch veterinarians in general were still in the midst of attempts at social elevation of their profession and recognition of their field as a true science. For instance, the sole Dutch veterinary school only obtained the status of higher education in 1918, and academic status in 1925 (and that primarily to make cutbacks). Veterinary professors had been struggling for social acceptance of veterinary medicine on equal footing with human medicine since the beginning of the twentieth century. An important means to

63 Premsele, 'Behandeling' (n. 60) 1098.

64 E. Bemelmans, 'De verhouding van den Militairen Veterinairdienst (M.V.D.) tot den Militairen Geneeskundigen Dienst (M.G.D.) der landmacht', *Militaire Spectator* 87 (1918) 139–144, esp. 139. Dutch quote: 'De hoogste en oudste in rang zijnde paardenarts, ziet zich in ondergeschikte betrekking toegevoegd aan genoemden inspecteur [van de Militair Geneeskundige Dienst], met weinig of geen zelfstandigheid en verantwoording'. I thank Friso Hoeneveld for drawing my attention to this article.

65 *Ibidem* 141 (quote), 143.

66 H.H. Jongbloed, H.E.M. Mettes, 'Inventaris van het archief van de Inspecteur(-Generaal) van de Geneeskundige Dienst der Land- en Zeemacht en daarbij gedeponeerde archieven, 1814–1940 (1950)' (Nationaal Archief, The Hague 1993) 24.

67 Loomans a.o., 'The emancipation' (n. 31) 29.

achieve this was modern bacteriology, but developing a strong veterinary field in bacteriology proved to be quite complicated.⁶⁸

A public dispute between Wolff and Bemelmans on the latter's pronounced idea that human and horse flu were not caused by a bacterium or 'filterable virus' did not at all concern the relation between human and animal influenza, but rather good bacteriology and respectable science. Wolff at first ignored Bemelmans, although he probably knew him at least from the beginning of 1919, when Bemelmans attended a meeting of the medical section of the *Genootschap ter bevordering van Natuur-, Genees- en Heelkunde* (Society for the promotion of Physics, Medicine and Surgery). Illustrating the urgency and helplessness the medical community felt in the face of the mysterious influenza pandemic, this meeting was devoted entirely to the question of influenza. Wolff himself argued that a filterable virus was responsible, another physician considered influenza bacteria, possibly Pfeiffer's, as the most likely cause. Bemelmans was clearly not thought of significant in the *Genootschap* at this time, and his article on influenza in the Dutch medical journal a few weeks earlier did not make an impression: his question on the difference between endemic and pandemic influenza – a very central question for his theory⁶⁹ – was not considered to be relevant by the chairman, and his name was misspelled ('Mister Bemelmann').⁷⁰ In March 1919, Wolff did definitely learn about Bemelmans's ideas, when the latter presented them at a meeting of the Society as a guest speaker.⁷¹

But Wolff – as an official member of the elite learned *Genootschap* rather than just a guest – thought Bemelmans' theory to be entire nonsense.⁷² When he finally paid attention to it in the medical journal in August 1919, he accused him of denying the contagiousness of influenza by using some strong rhetoric:

I do not believe, that a critical and sensible observer can maintain this opinion; moreover, the statements of Bemelmans are pre-eminently confused and inaccurate; to prove the relationship between influenza and breast disease of the horse, Bemelmans uses the argument, that human influenza is not contagious (sic!) and he tries to make a reasonable case for this by some physicians' sayings from 1889–1890.⁷³

68 P. Koolmees, *Tussen mens, dier en samenleving. Korte geschiedenis van de Koninklijke Nederlandse Maatschappij voor Diergeneeskunde (1862–2012)* (Utrecht 2012) 60–61; C. Offringa, 'Ars Veterinaria: ambacht, professie, beroep. Sociologische theorie en historische praktijk', *Tijdschrift voor Geschiedenis* 96 (1983) 407–432, there: 430; J.M. Gutiérrez García, 'Laboratory medicine and the identity change of veterinary medicine in Spain at the turn of the twentieth century', *Dynamis. Acta Hispanica ad Medicinae Scientiarumque Historiam Illustrandam* 30 (2010) 239–260; A. Hardy, 'Professional advantage and public health. British veterinarians and state veterinary services, 1865–1939', *Twentieth Century British History* 14 (2003) 1–23, there: 9; Offringa, *Van Gildestein* (n. 29) 215–344, especially 215–219, 234–241, 312.

69 Bemelmans refers to this question later on in: Bemelmans, 'De besmettelijkheid' (n. 48).

70 M.E. Heynsius van den Berg, 'Genootschap ter bevordering van Natuur-, Genees- en Heelkunde te Amsterdam – Sectie voor Geneeskunde 22 Januari 1919', *NTvG* 63 (1919) 552.

71 Verschaffelt, 'Dr. med. vet. E. Bemelmans' (n. 48).

72 K. van Berkel, 'Het Genootschap als spiegel van twee eeuwen wetenschapsgeschiedenis in Nederland', in K. van Berkel a.o. ed., *Spiegelbeeld der wetenschap. Het Genootschap ter bevordering van Natuur-, Genees- en Heelkunde 1790–1990* (Rotterdam 1991) 11–58.

73 Wolff, 'Over het virus' (n. 21) 495. Dutch quote: 'Ik geloof ook niet, dat een kritisch en nuchter beschouwer deze meening kan volhouden; de mededeelingen van Bemelmans zijn bovendien bij uitstek verward en onnauwkeurig; om de verwantschap van influenza en borstziekte van het paard aan te toonen, gebruikt Bemelmans als argument, dat de menscheninfluenza niet besmettelijk is (sic!) en tracht dit aannemelijk te maken door eenige uitspraken van artsen uit 1889–1890.'

Denying contagiousness was a serious accusation in the field of bacteriology indeed. Bemelmans's ideas did not deserve attention, simply because he was not a good scientist.

Bemelmans consequently defended the quality of his bacteriological research in an open letter. He argued that he did think human influenza to be contagious, but thought this contagiousness to be a complicated one.⁷⁴ Also, emphasising the veterinary expertise his opponent did not have, he opposed Wolff's suggestion that influenza should be compared to infectious lung diseases of cows and *Pferdestaupe*, which Wolff wrongly called horse influenza. In a published reaction, Wolff repeated his accusation that Bemelmans's theory implied that human influenza was not contagious. Bemelmans would even have told him so before his paper at the meeting of the Genootschap voor de bevordering van Natuur-, Genees- en Heelkunde. Referring to the device *Pour discuter il faut être d'accord*, Wolff maintained: 'I, nor other people, have reacted to this entirely deviant opinion in the discussion after the lecture'.⁷⁵

Again, Bemelmans reacted with an open letter. He insisted that he thought the disease shared by humans and horses to be contagious, although he had not succeeded in transmitting it artificially. That was what he had told Wolff. The circumstances in which the infection was spread through a stable were very complicated. Bemelmans stressed that eminent bacteriologists had the same problem: 'just like prof. Robert Koch, Gäffky a.o'.⁷⁶ The editorial board added to this letter that the discussion on the topic was closed. Bemelmans would never publish in the medical journal again. Very different was the position of veterinarian Jan Poels among medically trained hygienists and bacteriologists like Wolff: he was a well-known and respected figure in these circles, and Wolff liked his idea that horse influenza was caused by a filterable virus.⁷⁷ Despite Wolff's strong rejection of his ideas, Bemelmans continued his research of influenza among army horses, and during the 1930s also among army dogs, until his death.⁷⁸ In popular media, his theory also continued to attract some attention.⁷⁹

In hindsight, it seems logical that Wolff paid little attention to Bemelmans's theory, as Bemelmans rejected an influenza 'filterable virus' which Wolff did believe in. However, what I want to show with their dispute is not who was right or wrong, but how their disciplinary backgrounds and social positions influenced their argument and the extent to which their

74 Bemelmans, 'De besmettelijkheid' (n. 48).

75 L.K. Wolff, 'De besmettelijkheid van de influenza', *NTvG* 63 (1919) 1022. Dutch quote: 'Pour discuter il faut être d'accord', en dus heb ik, en ook anderen, niet op deze geheel afwijkende meening gereageerd in de discussie na de voordracht'.

76 Bemelmans, 'De besmettelijkheid' (n. 48) 1107. Dutch quote: 'ook niet aan prof. Robert Koch, Gäffky, e.a.'

77 See for Poels' position among physicians: P. Verhoef (ed.), *'Strenge wetenschappelijkheid en praktische zin'. Een eeuw Nederlands Centraal Veterinair Instituut 1904–2004* (Rotterdam 2005) 31–33.

78 E. Bemelmans, 'De "verwekker" van de influenza (griep) bij den mensch en van de eigenlijke influenza (de zoogenaamde borstziekte) van het paard', *Geneeskundige Gids* 5 (1927) 149–158, continued 173–183 (in this article, Bemelmans referred to five articles he published in the French journal for comparative medicine *Revue de Pathologie Comparée et d'Hygiène Générale* in 1926); E. Bemelmans, 'Vergleichende Untersuchungen über das Wesen der Grippe des Menschen, der sog. Brustseuche (Grippe) des Pferdes und der Staupe (Grippe) des Hundes', *Ergebnisse der Allgemeinen Pathologie und Pathologischen Anatomie des Menschen und der Tiere* 26 (1932); E. Bemelmans, 'Experiments proposed to solve definitely the influenza-problem', *Antonie van Leeuwenhoek. Nederlandsch Tijdschrift voor Hygiëne, Microbiologie en Serologie* 2 (1935) 85–105.

79 'De verwekker van griep bij mensch en dier', *Nieuw Rotterdamse Courant* (March 14, 1927) 1; 'De verwekker van de influenza', *Het Vaderland* (February 10, 1930) 3.



Fig. 2: Staff of the 3rd division. Emile Bemelmans is on horseback on the left. The other men are, from left to right: Luber, G. Huys, N.E. baron Bentinck, D. Romeijn, army chaplain Jansen, unknown, army chaplain Van der Ven. Glass negative by the photographer Herman de Ruiter made for: J. Kooiman, *De Nederlandsche Strijdmacht en hare Mobilisatie in het jaar 1914* (Purmerend 1915). Collection Nationaal Militair Museum, Soesterberg, nr. 10856.

ideas were taken serious. For historians, this shows that the debate on influenza was not just a *medical* debate. For microbiologists, awareness of the specific contexts in which historical documents on influenza were produced helps to use those documents more critically.

Conclusion

In this article I have investigated whether animals with influenza were included in the debate on the cause and nature of the 1918–1919 influenza pandemic, and in what specific contexts this took place. Although reports of animals infected with influenza are marginal in the entire debate on the pandemic, they cannot be considered entirely insignificant. Especially in medical circles ideas on the close relationship between influenza among humans and animals were present. Such ideas served as illustration of the curious properties of influenza outbreaks, in particular influenza's variability, and as comparative arguments to better understand and deal with human influenza. In some cases, the relation was suspected to be aetiological: humans and animals could share infections. That historians of influenza have restricted themselves to human influenza is not a historically necessary bias, but reveals a strong tendency to restrict their outlook to *human* medicine, health and disease.

It was the military horse veterinarian Emile Bemelmans who developed the most extensive theory on a relation between influenza of humans and horses in the Netherlands. As

other scholars have argued, war and the military formed an important context for the influenza debate in countries participating in the First World War.⁸⁰ This was also the case for the neutral Netherlands, as the official 1918–1919 influenza report, written by the head of the Militair Geneeskundige Dienst attests. The army is also important for understanding the circumstances in which Bemelmans developed his theory on human and equine influenza. Bemelmans's years of experience in studying horse influenza on government order, including the therapeutic use of the arsenic compound neosalvarsan, formed the basis for linking horse flu to the 1918–1919 influenza pandemic among human beings. Within the army, horses with influenza did not receive attention because of a medical problem among the human population, but because horses themselves were valuable.

The importance of Bemelmans's military position for the development of his ideas on the close relation between equine and human influenza, is further illustrated by the fact that outside the army, veterinarians were not interested in the 1918–1919 pandemic. Not even those veterinarians who were specialised in the parallels between veterinary medicine and human medicine, like Jan Poels and Dirk Aart de Jong. This veterinary lack of interest in influenza would change profoundly during the 1930s, when several veterinarians got positions as bacteriologists at the medical Instituut voor Praeventieve Geneeskunde (Institute for Preventive Medicine), which became the Dutch centre for influenza research. This was a very different research context than the army, and consequently these veterinarians did not look at army horses with influenza, but at 'civilian' animals, mainly pigs and dogs.⁸¹ Only in 1958 did Dutch influenza researchers again become interested in horses with influenza in relation to a new 'Asian' influenza pandemic, and in Bemelmans's theory.⁸²

Another important context for Bemelmans's case is the social position of veterinary medicine at the time of the pandemic. In this period, veterinarians were in the midst of attempts to elevate their discipline to a higher social position, preferably equal to human medicine, and mainly through the science of bacteriology. Bemelmans was a strong voice in criticising the subordinate position of the Militaire Diergeneeskundige Dienst to the Militair Geneeskundige Dienst. The dispute between medically trained bacteriologist L.K. Wolff and Bemelmans on influenza illustrates how the lower social position of veterinary medicine in relation to human medicine could affect the reception of veterinary research negatively.

Thus, the specific historical contexts of observations of animals with influenza help to illuminate how a particular social environment shaped understandings of animal and human diseases. In different contexts, such understandings were different as well. This insight has important implications for the use of historical evidence in microbiological studies of microbes' past travels through different animal species. Such evidence has been produced in very specific historical contexts, and cannot be used at face value without knowledge of these contexts. This is an excellent opportunity for microbiologists and historians of science and medicine to cooperate more.

80 Bresalier, 'Fighting flu' (n. 8) 90–91.

81 See for instance: A.T. van der Schaaf, 'Over verwantschap van het griep-virus en het virus van Carré (honden-ziektevirus)', *TvD* 62 (1935) 635–637; L. de Bleeck, 'Influenza van biggen', *TvD* 66 (1939) 940–944.

82 J. Versteeg, R.P. Mouton, and J.D. Verlinde, 'Aziatische influenza bij paarden?', *TvD* 83 (1958) 608–613.