World War I (1914−1918)

Triage in the trenches, for the love of animals

A tribute to veterinarians in the First World War

**Prologue**

Colonel Musgrave was drinking his coffee in the handsome salon of the merchant, Van Mopez; he opened a pink official telegram and read: --- Director of Commissariat to Colonel Musgrave --- Marseilles Indian Depot overcrowded meet special train 1000 goats with native goatherds find suitable quarters and organize temporary farm ---.

*‘Damn the goats!’* he said. His job being to feed Australians, he thought it hard that he had to bear in addition the consequences of the religious laws of the Hindoos (...)

[Arriving at the farm] the colonel went straight to the point: ‘*What's this damned letter that you sent me this morning? You received a thousand goats; you sent me four hundred of them. Show me the others*.’ The ground behind the farm sloped gently down to a wooded valley; it was planted with apple-trees (…) A horrible smell arose from the valley, and, coming nearer, the colonel saw about a hundred swollen and rotting carcases of goats scattered about the enclosure (...)

*‘Could not one,’* suggested Aurelle on the return journey, *‘ask the advice of a competent man? Perhaps goats cannot stand sleeping out of doors in this damp climate’* (...)

They had begun to build the huts described by the man from the South [South Africa], when the Indian Corps wrote to Colonel Musgrave that they had discovered a British expert whom they were sending him.

[Lieutenant Honeysuckle] was an artillery officer, but goats filled his life. Aurelle (…) found out that he regarded everything in nature from the point of view of a goat. A Gothic cathedral, according to him, was a poor shelter for goats; not enough air, but that could be remedied by breaking the windows.

His first advice was to mix molasses with the fodder which was given to the animals. It was supposed to fatten them and cure them of that distinguished melancholy (…). Large bowls of molasses were therefore distributed to the Hindoo shepherds. The goats remained thin and sad, but the shepherds grew fat. These results surprised the expert.

Then he was shown the plans of the huts. He was astounded. *‘If there is one thing in the world that goats cannot do without,’* he said, *‘it is air. They must have very lofty stables with large windows.’*

Colonel Musgrave asked him no more. He thanked him with extreme politeness, then sent for Aurelle. *‘Now listen to me,’* he said: *‘you know Lieutenant Honeysuckle, the goat expert? Well, I never wish to see him again. I order you to go and [look for] a new farm with him. I forbid you to find it. If you can manage to drown him, to run over him with my car, or to get him eaten by the goats, I will recommend you for the Military Cross. If he re-appears here before my huts are finished, I will have you shot. Be off!’*

A week later Lieutenant Honeysuckle broke his leg by falling off his horse in a farm-yard. (…) As for the goats, one fine day they stopped dying, and no one ever found out why.

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André Maurois, 1918 (translated from the French by Thurfrida Wake)

The above excerpts from André Maurois’ 1918 novel, *The Silence of Colonel Bramble* (24),illustrate the not-so-enviable reputation of the veterinary profession in the early years of the 20th century, initially focused almost entirely on horses. Glorified blacksmiths at best, immoral quacks at worst.

In much of Europe, blacksmiths were indeed most often entrusted with the care of army horses, the main supplier of ‘horse-power’ at the time. Only in 1908 did the Ministry of Finance of the Prussian Empire decide − in principle − to agree to the establishment of a Veterinary Corps, a measure that, due to the economic crisis at the time (which led to the First World War) [Box 1], was only implemented in February 1910. The initiative included the design of a veterinary military uniform, triggering a relentless wave of mockery by career officers and members of the military Medical Corps, who could not imagine such *‘butchers’* deserving their own Corps.

**BOX 3**

**Jewish veterinarians in both World Wars**

*On the German side, 42 Jewish veterinarians are documented as having actively participated in the First World War as military personnel, but this is no doubt an underestimation, based partly on those who were awarded the Iron Cross. By 1918, from a group of 91 Jewish veterinarians, born in or before 1900 in Germany, the percentage of casualties due to violence was high: 19% or 20%.*

*In the following years, this generation at first did not seem to see emerging Nazism as a threat and few paid attention to rising anti-Semitism. During the Second World War, from the 131 known Jewish veterinarians and veterinary students, 20 perished in the gas chambers, the fate of 37 is unknown, and for 62 individuals there are no records of the date or cause of their death.*

*Thankfully, 54 managed to escape Germany before the War started, many (20) to the future state of Israel, in the Palestinian Territories; several to Britain or the United States of America.(27)*

Despite the four years that separated the establishment of the new Veterinary Corps from the beginning of the First World War, the Corps was painfully unprepared for what was to come, perhaps because of the fact that it was not really taken seriously by the military hierarchy. But it is also true that, both in the *Allied* camp and in the *Central Powers’* camp, the War was not expected to last for more than a few months, enabling the steady supply of animals (and animal feed) from available stocks.

On the German side, three months into the mobilisation, stocks of oats had already run out. On the French side, an 1894 directive had established that the daily ration of a (military) horse should consist of 5.5 kg of oats, 3.5 kg of hay and 2 kg of straw; but also that: *‘in principle, the cavalry must almost exclusively rely on what the land has to offer, to be able to feed the horses on the spot’.* Fine, as long as the troops were on the move, but by November 1914 the Front Lines had been stabilised and ‘what the land has to offer’ was depleted within weeks. As a result, the daily hay ration was immediately reduced to 2.5 kg, then to 2 kg in August 1916 and to 1 kg in spring 1917. This also indirectly led to more cases of colic, adding insult to injury.(25)

Over all, the contribution of the Veterinary Corps to the mobilisation of the troops and its potential to assist in the rapid deployment of military personnel and supplies (including animals) had been grossly underestimated.(14, 31)

In Germany, early directives did not take into account the deployment of veterinarians according to their specialties (surgery, internal medicine, bacteriology). The medical equipment provided to the German Veterinary Corps was utterly inadequate and the concept of veterinary hospitals *(Pferdelazaretten),* despite experience acquired in other military campaigns earlier that century (against the French, the Chinese, and in South-West Africa, now Namibia), was overlooked. Germany entered the War with *no* army veterinary hospitals.(19) All this was only rectified in 1915, well into the second year of combat. By War’s end, the Germans could rely on 478 of such hospitals, capable of meeting around 20% of their needs.

The French, who were also anticipating a ‘short and sweet’ military counteroffensive, never considered the need to shelter their animals. With winter fast approaching, this was a dangerous omission to make. Following the British example, 4,000 mobile, removable stables were commissioned in 1917, but had only been partially deployed by the time the War ended, leaving the horses and their caretakers to fend for themselves most of the time, by any and all means available. Veterinary care camps *(dépôts de chevaux malades* orDCMs) were avoided at all costs as they were seen − rightfully so − as distribution centres for diseases and infestations such as mange.(25)

At the onset of the War, on 1 August 1914, the German Army Veterinary Corps employed 766 active veterinarians and 1,507 reservists. Over the four years of the War, 5,354 veterinarians (including those who were drafted) were to take part in military operations, representing some 75% of all veterinarians in Germany at the time [Box 2, 3]. Of these, 241 perished in the fighting.(14, 19)

**BOX 2**

***Friedrich Weber*** *(1892−1955) was a Bavarian veterinarian and politician who, following an uneventful conscription into the First Royal Bavarian Heavy Cavalry Regiment during the First World War, took part in the first (failed)* putsch *of Adolf Hitler in Munich, in 1923. He was convicted and jailed for five years, but released after two, thereafter building up a solid career as one of the key veterinary advisors to Hitler, eventually earning him the title of ‘*Reichsführer’ *of German veterinarians in 1933.*[34]

On the opposing side, on the Western Front in France, the French veterinary contingent consisted of 2,794 veterinarians (72% of all board-certified veterinarians at the time). Of these, between 522 and 546 active veterinary career officers were scattered across the various armies, not in a stand-alone, autonomous Veterinary Corps, but always under the authority of the Cavalry *(Direction de la Cavalerie).*(13, 20, 25, 26)In peace time, a Cavalry Regiment of between 800 and 1,200 horses would be entitled to a team of three Army veterinarians, the same number as an Artillery Regiment of between 1,100 and 1,500 horses. At the beginning of the War there were 91 Cavalry Regiments and 62 Artillery Regiments.(20)

Of all the veterinarians who joined Army ranks in 1914, only 1,500 actually took part in military operations; the remaining 620 occupied positions in back-up operations, such as warehouses and abattoirs; with 180 being assigned to overseas territories and colonies.(26) Whereas most veterinarians tending to the needs of cavalry horses were regarded as well trained and competent, their numbers were completely insufficient and in fact had been so even before the War. Furthermore, a 1911 *Instruction* (Directive) assumed that veterinarians in active combat would merely administer immediate care and that horses would then be evacuated to suitable facilities in the towns, or to veterinary care camps (DCMs) established by the Military Command, well behind Front Lines. None of this happened, or at least not immediately. As a result of this assumption, both the standard equipment and medicine cabinets of the typical veterinary support team were primarily geared towards dealing with minor injuries and superficial wounds, an utter mismatch with what veterinarians actually had to deal with.

**BOX 1**

**The First World War in a few facts and dates:** *Though directly triggered by the assassination of Archduke Franz Ferdinand of Austria, heir presumptive to the Austro-Hungarian throne, and his wife Sophie, Duchess of Hohenberg, on 28 June 1914 in Sarajevo, the capital of what is now Bosnia−Herzegovina, the First World War was above all the inevitable consequence of a prolonged and deepening economic crisis, linked to the crumbling influence of the traditional Empires, many of which were based on autocratic monarchies, and the rise of both extreme left (communism) and extreme right (national socialism, pan-Germanic) political movements in much of Europe, the Balkans and Russia.*[2, 5] *A month after the Sarajevo assassination, Austria−Hungary declared war on Serbia, the presumed instigator of the murder. In the following days, Germany declared war on Russia and, on 3 August 1914, on France. Following the invasion of Belgium and Luxembourg, Great Britain declared war on Germany on 4 August, leading to a cascade of Declarations of War, drawing in all the world's great economic powers assembled in two opposing alliances: the* Allies *(based on the* Triple Entente *of the Russian Empire, the Third French Republic, and the United Kingdom of Great Britain and Ireland) versus the* Central Powers *of Germany and Austria­−Hungary. Although Italy was a member of the* Triple Alliance *alongside Germany and Austria−Hungary, it did not join the* Central Powers*, as Austria−Hungary had taken the offensive against the terms of the* Alliance*.*

|  |  |
| --- | --- |
| *These alliances were reorganised and expanded as more nations entered the War: Italy, Japan and the United States joined the* Allies*, while the Ottoman Empire (most of which is now covered by Turkey) and Bulgaria joined the* Central Powers.  *The European War Theatre* Source*: Tes Teach (*[*www.tes.com/lessons*](https://www.tes.com/lessons)*)* |  |
|  |  |

*The First World War was not only fought in Europe and the Balkans, but also in overseas territories as far away as German New Guinea (most of which is now Papua New Guinea), parts of China, Guam, Siam (now Laos), Cameroon, South-West Africa (now Namibia), Togoland (now split between Ghana and Togo), Saudi Arabia, Egypt, Palestine and Persia (now Iran)*.[6]

Over the following months, however, largely thanks to the stabilisation of the Front Lines, things improved and measures were put in place to establish 36 DCMs, with appropriate veterinary professional and para-professional staffing, capable of caring for 25,000 animals. But the battles of the Somme and Verdun, in 1916, annihilated this achievement and soon the number of evacuated horses exceeded 40,000. This led in 1917 to a remarkable overhaul of the DCM system into genuine veterinary hospitals *(Hôpitaux vétérinaires aux Armées* or HVAs) and to better planning for the provision of substitute horses from behind Front Lines to support the efforts of the Cavalry at the Front. Moreover, extended authority and autonomy were given to the Army’s veterinary professionals, leading *−* ­by the time the War ended *−* to a fully fledged Military Veterinary Service.(13, 25, 26)

While detailed information on the status of the British veterinary contingent is hard to come by, a small group of British benefactors, calling themselves ‘Our Dumb Friends’ League’ (‘dumb’ in the sense of ‘mute’), which had previously been active in the care and protection of working horses in London and other major British cities, entered the scene, establishing ten horse hospitals (and later three dog hospitals) in France.

**BOX 4**

***Valère Janssens*** *(1893−1938), a student at the Veterinary School of Cureghem in Belgium by the time war broke out, was first assigned as an auxiliary to the Central Infirmary of the Belgian Army behind the Yser river (Non-Occupied Belgium). He requested a transfer to the Colonial Administration and served in the* Force Publique, *the colonial military police, in the Belgian Congo from 1915 to 1918, participating in military operations in Cameroon, eastern Africa and along the Congolese border. In April 1916, the* Force Publique *started an offensive against German East Africa, attacking from the West, whilst, simultaneously, the British Colonial Army attacked from the North. At the time, the* Force Publique *possessed hardly any motor vehicles. Military transport was mainly by mule. Valère Janssens was commissioned to bring mules to the eastern Congo border, all the way from the Zambi station in Bas-Congo (close to what is now Kinshasa), where the mules were produced on a stud farm. For the* Force Publique, *the military campaign ended on 19 September 1916, when it captured the main German town of Tabora (in what is now Tanzania), after ten days and nights of heavy fighting. The Belgian commander, General Charles Tombeur, later wrote:* ‘Valère Janssens was one of the first to enter Tabora, having led, despite almost insurmountable obstacles, a column of some 300 African muleteers and their mules across the west of Africa to the east’. *In 1919, upon his return to Belgium, Valère Janssens resumed and finished his veterinary studies (in 1920), but died on 7 November 1938, brutally killed by one of his own clients, driven mad by the loss of a horse that Valère had failed to cure*.[23]

At the height of the War, more than 80 volunteer veterinarians (and 150 assigned French soldiers) were working under the banner of (the Society of) the ‘Blue Cross’, a term first coined in the Balkan War of 1912 to distinguish its stocks and facilities from those of the Red Cross.

The Blue Cross worked as an ancillary workforce to the French Army, which accepted the League’s offer of support in 1914 with gratitude. Less so the British forces, which initially declined the League’s offer of help, having recently established a ‘proper’ Military Veterinary Corps. However, this was to change later on in the War.

Although the numerical contribution of the Blue Cross, in terms of hospitals, workforce and animals in its care, remained relatively modest (6,058 horses over the four years of the War), its most valued contribution lay in the fact that it established new, high standards of care, which were eventually adopted by the Military Veterinary Corps as a whole, and by the DCMs in France, mentioned above.

In 1915, the Blue Cross extended its offer to Italy. By the end of October 1915, six hospitals had been established and 1,872 horses taken into care.(32) A Military Veterinary Academy *(Scuola del Servizio Veterinario Militare)* had already been established in Italy in 1796, by Carlo Emanuele III di Savoia in Venaria Reale (today, a suburb of Turin). From 219 veterinary officers in 1915, numbers increased more than tenfold to 2,819 military veterinarians in 1918. Thirty-nine veterinarians never made it back home. Over the course of the War, 600,000 surgeries were conducted on four-footers (equids, large ruminants and dogs); 260,000 animals were treated in veterinary facilities and the total number of casualties was estimated at 76,000 or 21%, a relatively low mortality rate compared to the losses on the French and British side.(22, 30)

Belgium, which had adopted a neutral role in the emerging conflict, was nonetheless invaded by German troops one day after Germany declared war on France. At that time, Belgium had a Veterinary Corps consisting of a mere 48 career veterinary officers [Box 4]. Shortly afterwards, this grew to 160 ‘volunteers’ (8) in the little that was left of Unoccupied Belgium, a small enclave abutting France and surrounding the town of Ypres, a town which would, in later years, gain worldwide notoriety, like other hitherto unknown places, such as Verdun, Passchendaele or Gallipoli, during the same period, and for the same gruesome reasons...

The 1982 Michael Morpurgo novel for young adults, *War Horse*,(28) later turned into a compelling play using ground-breaking puppetry techniques (link to YouTube video: <https://www.youtube.com/watch?v=LCcFurXQ60M>), and an award-winning movie of the same name by Steven Spielberg in 2012 (link to YouTube video: <https://www.youtube.com/watch?v=AM9WMJlWuHg>), has made a global audience aware of the realities of being a war horse.

When it came to horses and mules, both sides of the conflict seem to have had to deal with the same scourges. Though reliable statistics are not available for the early years of the War, reporting systems were eventually put in place, allowing for a better understanding of what pathologies and metabolic disorders filled the army veterinarian’s working day.(19)

To fully appreciate this, a clear distinction must be made between mobilisation and military campaigns into enemy territory (marches) to establish a Front Line, and the protracted later stages of the War − at least in Europe − a War which was fought in the trenches and characterised by the immobility of the (Western) Front.

On the Eastern and Southern Fronts, both sides remained on the move for the greater part of the War.

When veterinarians are accompanying these campaigns, following a few kilometres behind the military columns, they have to deal with piercing wounds (from barbed wire, sabres, bayonets, bullets, shrapnel from exploded grenades or shells), lameness and pressure wounds from saddles and gear.(14, 19, 31) The latter, especially in summertime, are often further compounded by respiratory distress due to the inhalation of dust and gunpowder, while winter brings colds due to inadequate shelter against the rain and cold weather. Much lameness is due to penetrating nails, which have come off the wooden wheels of wagons, carts and gun carriages. In addition, chronic malnutrition, lack of quality roughage, lack of water and insufficient rest are widely held responsible for intestinal tract disorders, such as colic (Table I).(14, 19, 25)

*Table I: Internal causes of disease and death in French Army horses (estimates of morbidity, mortality and case fatality rates).* Source: *Milhaud (25)*

|  |  |  |  |
| --- | --- | --- | --- |
|  | Digestive tract disorders | Over-work (exhaustion) | Other |
| Morbidity | 642,000 | 476,000 | 423,000 |
| Mortality | 95,000 | 103,000 | 79,000 |
| Case fatality rate (%) | 14.7% | 21.6% | 19.0% |

Let it be clear that there were limits to the extent of veterinary care of horses. Many ended up being abandoned, left behind, or − if they were lucky − shot. One source (10) stated that the average shelf-life of a war horse was a mere five weeks.

As the War came to a stalemate in the trenches, the initial response of soldier and animal was relief: no more pulling heavy loads, shorter response times, faster supply of medicines, sufficient rest, and time for rehabilitation, better shelters...

While this was of course true, the mass concentration of animals in a small area, in unhygienic conditions, and the lack of proper food supplies from behind Front Lines also led to an increase in infectious diseases and infestations, many of which are rarely heard of today (Table II).

*Table II: Infectious diseases of horses, as reported by veterinary military authorities (and the Blue Cross) from the three warring countries (in France).(13, 14, 19, 25, 26, 31, 32) Data for Italy are based on vaccination/treatment statistics.(30)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| France | Germany | Italy | Great Britain | Pathogenic agent(s) |
| Gale | Räude | Rogna | Mange | *Sarcoptes, Psoroptes, Chorioptes* spp. |
|  | Brusseler Krankheit |  |  | Secondary infection by *Streptococcus* spp. following primary equine influenza infection. |
| Morve | Rotz | Morva | Glanders | *Burkholderia mallei* |
| Gourme | Druse |  | Strangles | *Streptococcus equi* |
|  | Rotlaufseuche |  |  | Equine influenza |
|  | Brustseuche |  |  | *Pleuro-pneumonia contagiosa equorum* |
| Lymphangite épizootique | Lymphangitis epizootica |  | Epizootic lymphangitis | *Histoplasma farciminosum* |
|  |  | Tetano |  | *Clostridium tetani* |
|  | Ansteckende Blutarmut |  | Equine infectious anaemia | Equine infectious anaemia |

*Table III: Infectious diseases of French Army horses (estimates of morbidity, mortality and case fatality rates).* Source: *Milhaud (25, 26)*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Mange | Strangles | Glanders | Epizootic lymphangitis | Other |
| Morbidity | 460,000 | 374,000 | 58,000 | 48,000 | 67,000 |
| Mortality | 50,000 | 28,000 | 21,000 | 18,000 | 27,000 |
| Case fatality rate (%) | 10.8% | 7.4% | 36.4% | 37.5% | 40.0% |

One of the diseases which flared up at march’s end, at least on the German side, was *Brustseuche* or *Pleuropneumonia contagiosa equorum*, a disease for which a successful arsenic-based treatment had been developed in 1911, Salvarsans® (Arsphenamine), but which had been overlooked in the arsenal of veterinary drugs. Only when Salvarsans® was widely applied, from 1916 onwards, did the disease come under control.(19)

Strangles, if antibiotics had been available at the time, would scarcely have rated a mention in the list. Unfortunately, penicillin was not discovered until 1928, leaving scores of horses to succumb to the upper respiratory tract infections of *Streptococcus equi* (or *Coryza contagiosa equorum).*(19)

Bousquet and Giard (13) report that, in the French camp in 1918, 155,000 horses were affected by mange, which seems to be in line with the statistic by Milhaud (25) over the four years of the conflict (Table III). As a preventative measure, the British Army resorted to shaving its horses, although this backfired at the onset of winter, when they frequently succumbed to hypothermia.(10) The Blue Cross reportedly cured 10,000 horses of mange, using sulphur baths.(32) The development of the sulphur dioxide gas treatment, which occurred almost simultaneously in France, England and Germany towards the end of the War, came too late to be of any use.(19)

While the *Institut Pasteur* finalised the development of a rudimentary vaccine against glanders (and melioidosis, the human variant, caused by *Burkholderia pseudomallei)*,based on killed *malleine*, there were still 32,000 animal cases reported in 1915 alone.(13) Some of these infections may have been intentional, as glanders is also regarded as one of the first biological weapons used in modern warfare, reportedly employed by the German troops to destabilise the Allied cavalry.(21)

Though precise figures are not available, it would appear that the German army, in addition to running its own stud and breeding farms, guaranteed a continuous supply of horses on the principle that all privately owned horses were regarded as ‘military reservists’, to be drafted as soon as required. To no avail, as the availability of horses and mules soon plummeted when the War lingered on for much longer than expected.(10) Nonetheless, towards the end of the War, by 1917, the German army still found itself with 1.2 million horses on hand.(14, 19)

In Belgium’s armed forces, behind the Yzer Front Line, numbers grew from 20,000 in 1914 to 36,000 towards the summer of 1918.(8) In Occupied Belgium, however, more than 110,000 horses were requisitioned by the Occupying Forces over the course of the War.

In 1914, in what was then Great Britain, the Royal Army had a mere 25,000 horses at its disposal , but − thanks to a well-prepared *Remount Service*, the body responsible for buying and training horses − was able to identify and purchase (with varying degrees of agreement on the part of the owners) between 140,000 and 165,000 horses and mules in a matter of days after the declaration of war on Germany.(10, 32) This enabled Britain to enter the War with the necessary numbers of cavalry and traction animals, but was soon insufficient to maintain the supply. Enter the United States and Canada, but also Argentina. Thanks to extensive breeding of − in particular − mules, in states such as Missouri, Britain was able to import, acclimatise and then transfer to the Front some 429,000 horses and 275,000 mules.(10, 33) The Blue Cross (32) estimates that, by 1917, there were 869,931 horses on active service.

**BOX 5**

***1909****: ‘…an officer of the mounted troops can conduct the classification, alone, with as much skill and ease as a veterinarian; the knowledge of a horseman and soldier, familiar with the needs of each weapon, supersedes that of the science of a technician’* (Report of the *Direction de la Cavalerie* to the Minister, 1 October 1909).

***1915****: ‘…in addition, it is essential that every commission has a veterinarian and the question may arise whether or not it would be appropriate to give him a decisive voice in the decision’* (Report of the *Direction de l’Arrière*, 2 August 1915).

***1919****: ‘…the special competences of veterinarians have been neglected’* (Report of the first Office of the Army High Command, *Etat Major de l’Armée,* Bureau n° 1 (B1), 24 April 1919).

[25]

In 1915, when Italy entered the War, the number of draught animals (which likely also included oxen) quickly rose from a mere 800 to 9,000 animals by 1916, to reach 18,000 by the end of the War.(4) In all, between 300,000 and 520,000 mules and 350,000 horses took part in the war effort.(33, 33)

In France, in the first weeks of mobilisation, the Army, which had a standing stock of 175,000 horses (20), requisitioned no fewer than 22,486 mules and 489,743 horses (up to 700,000 (33) horses between August to December 1914). These numbers were so high that there must have been some serious flaws in the selection process, especially since veterinarians were seldom involved in selection by the requisitioning committee *(commission de réquisition)*.(20, 25, 26) This reflected the subordinate status of veterinarians at the time, a status which improved during the War and was finally acknowledged after it ended [Box 5]. Moreover, the fact that young adult men and horses were pulled from farming communities that still relied heavily upon manual labour and animal traction to work their fields (33) must have had a severe impact on food production resulting in widespread malnutrition; consequences that should not be underestimated.

The available information varies but, over the course of the War, the French Army drafted anywhere between 1.88 million (25) and 2.75 million (20) horses and mules. Where authors seem to agree is that 1.14 million of them were killed while on service, a very high mortality rate, even in relation to 2.75 million equids (41%). Most of these animals, of course, were not proper cavalry horses, but draught horses, taken from farms and poorly adapted to the long marches that characterised the first phase of the War.(33)

Coincidentally, the mortality rate was the same for the 1,183,228 horses brought into the War by Great Britain, of which 484,000 were killed (41%).

Milhaud (25, 26) points to the extraordinary number of animals suffering and dying from what he refers to as ‘internal’ disorders (Table I), as opposed to ‘external’ disorders, such as ‘mud-related’ injuries but especially bullet wounds (Table IV). Remember, this was the first time that automatic machine guns had been used against the cavalry (22), both from land and air, using the first synchronised machine-gun/propeller *(Fokker Aeroplan)* warplanes.(31, 33) As early as autumn of 1915, the helplessness of animal against machine led to many of the cavalry regiments being disbanded and converted into infantry. Many of the ‘dismounted’ officers turned to the new Air Force to become pilots; that very Air Force which had signalled the end of their mounted career.(33)

***‘The First World War marked the beginning of the mechanisation of armies and the decline of the role of the horse in the armies’.*** E.Darré & E. Dumas (18)

*Table IV: External causes of disease and death in French Army horses (estimates of morbidity, mortality and case fatality rates).* Source: *Milhaud (25)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Injuries caused by projectiles | Saddle and gear injuries | Mud-based pathologies | Other |
| Morbidity | 270,000 | 455,000 | 376,000 | 2,820,000 |
| Mortality | 112,000 | 3,200 | 6,900 | 22,000 |
| Case fatality rate (%) | 41.0 | 0.7 | 1.8 | 6.4 |

***‘… the sophistication of weapons was the beginning of the end for the cavalry. During the 1914−1918 conflict, faced with barbed wire, machine guns spewing bullets at 500 strokes per minute and soldiers positioned in the trenches, horses exited the war theatre for good’*** (paraphrased from Italian). N. Rombola & A. Pugliese(22)

As a result of the same shortcomings in reporting and collecting data mentioned earlier, reliable numbers of animal casualties (whatever the causes) are hard to come by, and figures are usually rounded to millions for lack of more precise metrics. The most often quoted figure is between six and eight million horses. However roughly estimated (and sometimes considered controversial, because inflated), this is nonetheless a staggering number when compared to human military casualties: ten million, and the overall number of human casualties: 16−17 million.(6)  [Box 6]

***‘Between 10 and 16 million horses were used by all warring parties; the number of animals* [horses] *that died is usually estimated at 8 million. Exact numbers do not exist. Since one didn’t exactly put much effort in recording human casualties, a few hundred thousand horses less or more did not matter either…’*** S. von Schenck & R. Bei der Kellen (31)

Having neglected investment and maintenance of operational capacity after the (smaller) wars earlier that century, Germany was able to rely on a mere 6,000 dogs at the beginning of the War. By the time it ended, numbers had grown to 30,000.(14) In France, Thomas (33) claims that 12,000 dogs were *‘sous les armes’* (serving in the Army). Darré and Dumas (18) refer to 15,000 dogs, whereas the Blue Cross (32), which became involved in treating dogs from 1917, put the figure at 18,000 ‘war dogs’ in France. By the end of 1917, the Blue Cross had admitted 1,604 dogs into its veterinary hospitals, and sent back 1,088 cured dogs to active duty. One such patient was a German war dog which strayed into enemy lines, a ‘prisoner of war’ situation not anticipated by the Geneva Convention. By 1919, the Blue Cross reported having taken 10,169 dogs into care, of which 8,586 were returned to the Front, once treated.

It has not been possible to identify sources describing the nature of the injuries and/or pathologies/infectious conditions found in these dogs.

Dogs were used in rescue operations, especially in extreme mountainous environments such as the Alps (+3,000 m, up to −30°C) (3); as conveyors of military information; for pest control in the trenches (rats); as sentinels (or guard dogs); and as police dogs. Rescue dogs, it is believed, were trained to distinguish the wounded from their own camp or army, from those of the opposing camp, who were left to fend for themselves.(33)

Dogs were also used in many countries and armies for animal traction (except in Germany), to transport injured or dead soldiers, or to pull light artillery to the Front. The latter was not a great success and was soon abandoned (in Belgium), as the barking of the dogs turned them into target practice for the opposing artillery.(7, 33)

The French army used sleigh dogs more successfully. Some 436 were brought in from Alaska in 1915, during the heavy winters in the Vosges mountains, in the North-East of France.(33)

***‘In the trenches, [dogs] convey carts where it would be dangerous to use horses and men, and bring up food and first aid dressings to front trenches….’***.Sir Ernest Flower, Chairman, Blue Cross Fund (32)

While many dogs died during the War, they were also credited with saving thousands of lives, thanks to their ability to sniff out explosives, landmines and nerve gas attacks. From the spring of 1915, new military tactics were introduced, including the use of mustard gas, which had been strictly prohibited by the Convention of the Hague, signed in 1899.

Gas attacks left not only millions of soldiers and civilians dead or blind, but also an undefined number of animals. Horses and dogs could be equipped with gas masks, while pigeons were protected from gas attacks in special chambers, but many still died. Given the above, the First World War also saw intensified training of dogs to assist the blind.(32)

As was the case with horses and dogs, pigeons would never again be used to such an extent in any war, except maybe in Operation Columba (1941−1944), which involved more than 16,000 ‘Allied’ pigeons).(17) Given their extraordinary homing instinct, pigeons were of course used to relay information across terrestrial Front Lines, hence their ‘rank’ of *carrier* pigeons or *messenger* pigeons. But they also ended up serving on warships and even submarines, as back-up for other forms of communication, or being released from ships in case of shipwreck, as well as from aircraft (from which they could be launched in mid-air).(16) Collela (15) argues that pigeons could be ready for operation after only 20 to 25 days of training, using fixed pigeon lofts.

During the War in Italy, on the Tyrol Front, it was absolutely prohibited to shoot, wound or capture pigeons, whatever the animals’ ‘allegiance’. The Italians preferred not to intercept the enemy’s military communications, rather than risk exposing their own.(4)

Similarly, Germany outlawed the possession and use of pigeons by civilians at an early stage, with hefty fines, imprisonment and even the death penalty as deterrents.(33) At the beginning of the War, Germany had some 21,000 ‘military’ homing pigeons, lodged in 30 pigeon lofts along the borders, and at the Western and Eastern Fronts. By the end of the War, these numbers had risen to 120,000 animals and 500 lofts.(14, 19) But other sources claim that the Germans requisitioned up to a million birds from Occupied Belgium, where the sport of pigeon racing was already hugely popular before the War (and still is today). In France, their numbers quickly rose from 1,500 in 1915 to some 60,000 during the War, of which an estimated 20,000 were lost in combat.(33)

**BOX 6**

*It is the moaning of the world, it is the martyred creation,**wild with anguish, filled with terror, and groaning.**We are pale. Detering stands up.* ‘God! For God’s sake! Shoot them.’ *He is a farmer and very fond of horses. It gets under his skin. Then as if deliberately the fire dies down again. The screaming of the beasts becomes louder. One can no longer distinguish whence in this now quiet silvery landscape it comes; ghostly, invisible, it is everywhere, between heaven and earth it rolls on immeasurably. Detering raves and yells out:* ‘Shoot them! Shoot them, can’t you? Damn you again!’

‘They must look after the men first,’ *says Kat quietly (…) Then single shots crack out. The black heap convulses and then sinks down. At last! But still it is not the end. The men cannot overtake the wounded beasts which fly in their pain, their wide open mouths full of anguish. One of the**men goes down on one knee, a shot − one horse drops − another. The last one props itself on its forelegs and drags itself round in a circle like a merry-go-round; squatting, it drags round in circles on its stiffened forelegs, apparently its back is broken. The soldier runs up and shoots it. Slowly, humbly, it sinks to the ground. We take our hands from our ears. The cries are silenced. Only a long-drawn, dying sigh still hangs on the air…*

E.M. Remarque (1929), *Im Westen nichts Neues*   
(All Quiet on the Western Front)[29]

In Britain, the Royal Pigeon Racing Association estimated, based on more than 10,000 documents and photographs, that more than 100,000 pigeons served with British forces and that their success rate for getting messages through was approximately 95%, but only in daytime.(16) Unlike the British, the French and Belgians knew that pigeons could be trained to fly at night and their birds managed to pull off some remarkable military exploits.(33)

Further afield, the various military factions made use of many other animals, adapted to the environment in which the wars were fought. These included, in addition to mules and donkeys, camels, oxen, water buffalo and so forth.(19) Needless to say, many reports described how foot and mouth disease (FMD) outbreaks ran many an operation using ruminants into the ground.(14) Mules were particularly appreciated on the Southern European (Tyrol) Front, where the famous Alpine mountain infantry *(‘chasseurs alpins’* in French or *‘alpini’* in Italian) relied heavily on mules to manoeuvre men and artillery through the inaccessible and inhospitable terrain of the Alps, and especially the Dolomite mountain ranges where other animals − except for dogs − were largely useless.(3, 7, 12)

[Box 7]

A few articles mention the use of falcons (for the same purpose as pigeons) (3) and even bees (as early warning against gas attacks in the trenches of the Western Front).(7)

**BOX 7**

*On 25 April 1915* [Jack Simpson Kirkpatrick], *along with the rest of the Australian and New Zealand contingent landed at the wrong beach on a piece of wild, impossible and savage terrain now known as Anzac Cove.*

*Attack and counter attack began.*

*During the morning hours of 26 April 26, along with his fellows, Jack was carrying casualties back to the beach over his shoulder − it was then that he saw the donkey.*

*Jack knew what he had to do.*

*From then on he became a part of the scene at Gallipoli walking along next to his donkey, forever singing and whistling as he held on to his wounded passengers, seemingly completely fatalistic and scornful of the extreme danger. He led a charmed life from 25 April 1915 until he was hit by a machine gun bullet in his back on 19 May 1915.*

*In these amazing 24 days he was to rescue over 300 men down the notorious Monash Valley. His prodigious, heroic feat was accomplished under constant and ferocious attack from artillery, field guns and sniper fire.*

*Jack was recommended for the Victoria Cross, officially, through his unit, on 3 June 1915. Unfortunately, the senior medical officer at Anzac, Colonel Howse VC, had given faulty instructions to the junior officer preparing Simpson’s citation. He was recommended under the wrong category of heroism and consequently his VC request was denied.* [11]

To this date, and since 1967, Australians have been petitioning the British War Office to award him a posthumous Victoria Cross…

Finally, a few individual animal species made it to ‘mascot’ status, such as the kangaroo which accompanied the Ninth and Tenth Australian Infantry Battalions deep into Egypt, or ‘Buddha’ the monkey, mascot of one of the Belgian Lancers’ squadrons.

Many wild species, including birds and mammals such as foxes (manageable once tame), and rats (more problematic, due to their lice and fleas), adapted to human companionship and ended up living in the trenches, alongside soldiers, for the same reasons soldiers did: refuge.(33)

All species considered, the War effort mobilised some 14 million animals, 10 million of which were equids.(33) Most references to the role of veterinarians were made in respect to their role in treating these animals who had *(‘*who’ is used on purpose) fallen victim to enemy fire in the line of duty, whether this was to carry an officer, pull a cannon, rescue a wounded soldier or deliver a message.

***‘One of the hallmarks of World War I is that everything became “material”, you might have gone into the War with another idea, but by the time the onslaught of Verdun, on the Somme, was over, it was all about supplying as much fodder to the cannons as possible, whether they were humans or animals.’*** Gerhard Bauer, Dresden Military Historical Museum (31)

Much less is known about the role of veterinarians in the safety of food supplied to the troops. The quotes from *The Silence of Colonel Bramble*, with which this article started, point to the challenges in regard to food supply, both in terms of quantity and in terms of quality, safety and hygiene. The Belgian 1914−1918 Memorial Website ([www.be14-18.be/fr/defense/les-animaux-dans-le-conflit](http://www.be14-18.be/fr/defense/les-animaux-dans-le-conflit)) states that *‘veterinarians dedicated much of their work to preventative animal care. They advised the hierarchy on the purchase, lodging, feeding and use of animals. They were responsible for the staff training of the veterinary infirmaries and the farriers. They also carried out hygiene control work in bakeries and military slaughterhouses.’*(8) In France, Pasteur’s discoveries in the late 19th century had elucidated the role of micro-organisms in several diseases and the risks involved in the consumption of contaminated food. Whereas meat inspection in abattoirs was soon entrusted to city councils *(municipalités),* meat inspection for the troops was entrusted to Army veterinarians and soon extended to include all foodstuffs and all aspects of food hygiene in mass catering.(18) Milhaud (25) nonetheless found that only 10% of the estimated 1,500 ‘field’ veterinarians serving in the Army were actually entrusted with the food supply; that is, sanitary surveillance of livestock markets and feedlots, and meat inspection in the Army abattoirs. These veterinarians focused not only on ensuring the daily supply of 450 grams of meat per soldier, but also in dealing with outbreaks of FMD before slaughter and the destruction of tuberculosis-ridden carcasses post-slaughter.

From 1916 onwards, faced with challenges in the provision of meat (including frozen meat from colonies as far away as Madagascar), and increasing numbers of culled horses at the Front, part of the meat supply was sourced from these horses and initially supplied to the troops as ‘Arles’ or ‘Lyon’ (with pork) sausages but, later on in the War, as fresh meat.(26)  [Box 8]

**Epilogue**

**BOX 8**

**After the War:** *The horses that returned to Britain were first and foremost the privately owned horses of officers and the best and fittest horses, 25,000 of which were reintegrated into Army ranks. Some 60,000 more were brought back to Britain and sold to farmers. The vast majority of ‘English’ horses, though, were left behind on the continent.*[10]

*The British Army started selling many of its horses to French butchers.* ‘In England, that caused a major scandal: animal welfare groups intervened, and forced the British Army to return about 60,000 horses to England. Sanctuaries were created on the French side (…) but some of the horses still went to the slaughterhouse, not mankind’s most glorious moment…’ [Eric Baratay, University of Lyon, author of *Bêtes des tranchées. Des vécus oubliés*, (2013)(31)].

*Alerted by representatives [of the Blue Cross] in Belgium in the early 1930s, the League acted to save as many old war horses as possible. Mrs Dorothy Brooke, a member of the League’s Grand Council, and wife of General Geoffrey Brooke, launched a desperate appeal for funds to rescue them (…) Mrs Brooke, through the Brooke Hospital in Cairo, had already rescued 3,072 horses and mules in Egypt between 1932 and 1934 and added 4,000 more in Belgium through the League.* [9, 32]

*The* Brooke Hospital for Animals *is today one of the leading international animal welfare organisations and registered charity in England and Wales, employing over 400 animal welfare staff worldwide.*

On the occasion of the centenary of the First World War, remembered across the world from 2014 until the end of 2018, many aspects and experiences of this global conflict have been re-examined or brought to light for the first time, as we honour the memory of those estimated 16 million soldiers and civilians who perished in what was then known as the ‘Great War’, or the ‘War to End All Wars’. So many of these died on the infamous fields of Flanders, where Allied and Central Forces dug themselves into trenches for the better part of four years.

Over the past few years, new research has brought to light many insights into the plight of animals in this War, which − for the younger readers amongst you − was fought at the dawn of motorised warfare, using anything powered by two or four feet or paws, from the homing pigeons delivering secret messages across enemy lines, to the traction provided by oxen and mules to pull cannons and other heavy artillery, to the horses of the cavalry. Not least among these roles was the supply of animal protein to the troops, whether this came through the specific designation of animals for this purpose or as the result of a failed attempt at delivering any of the above services. Several leading publications today have documented the role (and suffering) of animals in *‘La Grande Guerre’.*

Less so the role of veterinarians in the ‘War to End All Wars’. Who were they? How many? How were they organised? What did they do, on either side of the enemy lines? The present article is a humble attempt to shed some light on these veterinary colleagues, based on available, mostly grey, literature. The authors make no claims to be comprehensive or scientifically robust. The War was a complex patchwork of combating armies and distrustful alliances, with infantry from as far afield as Senegal (the *Tirailleurs sénégalais),* India, Australia, New Zealand and Canada, and battles fought in all corners of the world, from the Pacific to South and South-West Africa. What is presented here is, therefore, at best anecdotal, prompted by little more than willingness to remember those colleagues who gave their best for whatever vision of the world they believed in, in the context of their era. Hence, this 11 November 2018, a century after the Armistice, spare a thought for these veterinary colleagues, and for the animals they cared for, because the latter, as so often repeated, ‘*had no choice*’*…* (10)

**References**

1. Anon. (1944).− *German−English Military Dictionary*. Technical Manual TM 30-506., US War Department. Available at: <http://www.allworldwars.com/German-English-Military-Dictionary.html> (accessed on 7 August 2018).
2. Anon. (2012).− *La fin d’un monde (1914−1918).* Bibliographie sélective. Bibliothèque municipale, Thionville, France, 20 pages.
3. Anon. (2014).− *Muli, cavalli, piccioni e cani: la strage silenziosa degli animali nella Grande Guerra*. Segreti di storia, 09-06-2014. Available at: <https://segretidellastoria.wordpress.com/2014/06/09/muli-cavalli-piccioni-e-cani-la-strage-silenziosa-degli-animali-nella-grande-guerra/> (accessed on 18 September 2018).
4. Anon. (2017).− Book review of Neri, M. & Tamburini, A. (2017) *La Grande Guerra degli animali.* Available at: <http://www.comune.arco.tn.it/Comune/Comunicazione/Notizie/La-Grande-Guerra-degli-animali> (accessed on 18 September 2018).
5. Anon. (2018a).− Assassination of Archduke Franz Ferdinand. Wikipedia. Available at: <https://en.wikipedia.org/wiki/Assassination_of_Archduke_Franz_Ferdinand> (accessed on 7 August 2018).
6. Anon. (2018b).− World War I. Wikipedia. Available at: <https://en.wikipedia.org/wiki/World_War_I> (accessed on 7 August 2018).
7. Anon. (2018c).− Book review of Simeoni, L. (2018) *Presenti! Muli e altri animali protagonisti della Grande Guerra.* Available at: <http://www.oggitreviso.it/libro-sui-muli-gli-animali-protagonisti-della-grande-guerra-188548> (accessed on 18 September 2018).
8. Anon. (undated/a).− *Les animaux dans le conflit*. Commémoration de la Première Guerre Mondiale en Belgique. Available at: <https://www.be14-18.be/fr/defense/les-animaux-dans-le-conflit> (accessed on 7 August 2018).
9. Anon. (undated/b).− *Paarden in de eerste wereldoorlog*. Forum Eerste Wereldoorlog (online discussion forum). Available at: <http://www.forumeerstewereldoorlog.nl/viewtopic.php?t=26797&highlight=dieren+++oorlog> (accessed on 7 August 2018).
10. Anon. (undated/c).− *Animals In War* Memorial. Londen, Verenigd Koninkrijk. Available at: <http://www.fotoshootwo100.com/article.php?id=404> (accessed on 7 August 2018).
11. Anon. (undated/d). − *Australia’s favourite hero.* ANZAC Memorial website. Available at: <https://www.anzacs.net/Simpson.htm> (accessed on 4 October 2018).
12. Balzarotti-Kämmlein R. (2015).− *I muli e la guerra,* lectures at Orzinuovi-Brescia, 29-08-2015 and elsewhere. Available at: <http://www.carrozzecavalli.net/2015/08/il-mulo-nella-grande-guerra-mostra-a-tema/> (accessed on 18 September 2018).
13. Bousquet P. & Giard M. (2018).− *Bêtes de guerre 1914−1918*. Editions De Borée, Clermond-Ferrand. 309 pages.
14. Buchner L. (2016).− *Veterinärdienst im Deutschen Heer während des Ersten Weltkrieges – Entstehung eines Veterinäroffizierkorps und erste Bewährungsprobe*. Wehrmedizinische Monatsschrift 2016/6. Available at: <https://wehrmed.de/article/2885-veterinaerdienst-im-deutschen-heer-waehrend-des-ersten-weltkrieges-entstehung-eines-veterinaeroffizierkorps-erste-bewaehrungsprobe.html> (accessed on 7 August 2018).
15. Colella R. (2015).− *La Grande Guerra e l’utilizzo degli animali*. Available at: <http://blog.quotidiano.net/colella/2015/06/15/la-grande-guerra-e-lutilizzo-degli-animali/> (accessed on 18 September 2018).
16. Copping J. (2014).− Honoured: the WW1 pigeons who earned their wings. Newspaper article *The Telegraph* 12 January 2014. Available at: <https://www.telegraph.co.uk/history/world-war-one/10566025/Honoured-the-WW1-pigeons-who-earned-their-wings.html> (accessed on 11 August 2018).
17. Corera G. (2018).− *Secret Pigeon Service: Operation Columba, Resistance and the Struggle to Liberate Europe*. William Collins (Harper-Collins), Glasgow.
18. Darré E. & Dumas E. (undated).− *Vétérinaires et droit international humanitaire : réflexions sur une controverse.* Lexique de droit international humanitaire. Available at: <https://lexdih.wordpress.com/divers/bibliographie/veterinaires-et-droits-international-humanitaire-reflexions-sur-une-controverse/> (accessed on 7 August 2018).
19. Driesch (von den) A. & Peters J. (2003).− *Geschichte der Tiermedizin : 5000 Jahre Tierheilkunde.* Schattauer Verlag, 278 pages.
20. Gaudot S. (2016).− *Histoire des vétérinaires ruraux aux XIXe et XXe siècles.* (DVM Thesis). Université Claude-Bernard − Lyon I. Lyon. 174 pages. Available at: <http://www2.vetagro-sup.fr/bib/fondoc/th_sout/dl.php?file=2016lyon112.pdf> (accessed on 7 August 2018).
21. Hautbergue G. (2012).− *Découverte du premier facteur létal de* Burkholderia pseudomallei*, BLF1. Une avancée majeure pour contrer la mélioïdose*. Medical Sciences (m/s) n° 3, vol. 28, mars 2012. 262−264. Available at: <http://ipubli-inserm.inist.fr/bitstream/handle/10608/7811/MS_2012_03_262.pdf?sequence=2&isAllowed=y> (accessed on 7 August 2018).
22. Lasagna E. (2017).− *Atti del VII Congresso Nazionale di storia della medicina veterinaria (2015).* Centro Italiano di storia sanitaria e ospitaliera (CISO), Sezione di storia della medicina veterinaria. Fondazione Iniziative zooprofilattiche e zootecniche, Brescia. 161 pages.
23. Mammerickx M. (undated).− *Étudiants vétérinaires mobilisés pendant la guerre*. Médecins de la Grande Guerre (Loodts P. & De Look F., editors). Available at: <http://www.1914-1918.be/etudiants_veterinaires.php> (accessed on 7 August 2018).
24. Maurois A. (1918).− *The silence of Colonel Bramble*. Translated from the French by Thurfrida Wake, New York: John Lane Company, 1920. Available at: <https://archive.org/details/silenceofcolonel00mauruoft> (accessed on 24 September 2018).
25. Milhaud C. (2014).− *1914−1918. Réflexions sur la perte de 1.140.000 équidés par les Armées Françaises.* Bull. Acad. Vét. France, **167** (3). DOI: <https://doi.org/10.4267/2042/54200>.
26. Milhaud C. (2015).− *Être vétérinaire sous l’uniforme*. Centenaire de la Guerre de 14−18. Médecine et armées. **44** (1), 86−92. Available at: <http://www.ecole-valdegrace.sante.defense.gouv.fr/content/download/6213/73342/file/14.%20Milhaud%20CL.%20%C3%8Atre%20v%C3%A9t%C3%A9rinaire%20sous%20l%E2%80%99uniforme.%20M%C3%A9decine%20et%20arm%C3%A9es%201-2016-%2086-92..pdf> (accessed on 7 August 2018).
27. Möllers G. (2002).− *Jüdische Tierärzte im Deutschen Reich in der Zeit von 1918 bis 1945* (DVM Thesis) Tierärtzliche Hochschule Hannover. Tenea Verlag für Medien, Berlin. 337 pages. Available at: <https://d-nb.info/968571565/34> (accessed on 7 August 2018).
28. Morpurgo M. (1982).− *War Horse* (novel). Kaye & Ward (Heinemann publishers), Portsmouth.
29. Remarque E.M. (1929).− *Im Westen nichts Neues,* Transl. (1958) *All Quiet on the Western Front*. Fawcett Crest, New York.
30. Sali G. (undated).− *Il contributo della veterinaria militare nella grande guerra del 1915-1918.* Centro Studi «Clinica veterinaria San Francesco», Rottofreno. Powerpoint presentation, available at: <http://profgiovannisali.it/powerpoint/grande%20guerra.pps> (accessed on 18 September 2018).
31. Schenck (von) S. & Bei der Kellen R. (2014).− *Pferde und Panzer − Der Erste Weltkrieg und die Zeitenwende in der Kriegsführung* (Podcast 2 July 2014). Deutschlandfunk Kultur. Available at: <https://www.deutschlandfunkkultur.de/erster-weltkrieg-pferde-und-panzer.976.de.html?dram:article_id=290738> (accessed on 7 August 2018).
32. Smith C. (1990).− *The Blue Cross at War: based on the annual reports of Our Dumb Friends' League.* The Blue Cross (incorporating Our Dumb Friends’ League). 72 pages. Available at: <https://www.bluecross.org.uk/sites/default/files/downloads/109890.pdf> (accessed on 7 August 2018).
33. Thomas C. (2018).− Les Animaux − Héros de la Grande Guerre (Collection 1914−1918), OREP Editions, Bayeux. 33 pages.
34. Vierhaus R. (2008).− *Weber, Friedrich (1892−1955).* Deutsche biographische enzyklopädie (DBE). Band 10, Thies − Zymalkowski. Munich, Germany: K.G. Saur. 436 pages.

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