Travel related diseases of dogs and cats

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The import of dogs and cats to Germany rises with increasing globalization and travel volume. Preferably stray dogs and stray cats from southern Europe are imported, but also from other parts of Europe and from all over the world.

Together with the animals diseases are imported, which did not exist in Germany before (for example *Borrelia miyamotoi*) [Schreiber et al., 2013] or which have been eradicated (Rabies) [Laboklin, 2014; WHO, 2014]. In general these diseases are called "travel related diseases". In the meantime some of the classical "travel related diseases" have already been established in Germany. They can even be found in domestic animals, who never left Germany (Babesiosis). In this connection it is important to distinguish between the infected vector, the infected animal and the outbreak of the disease in the animal. Often the pathogenic agent can be detected in Germany, but without any symptoms. (Table 1)

Many of these travel related diseases are transmitted by so called "vectors" to dogs and cats. Therefore they are also called "vector borne diseases" (VBD). Normally vectors are parasites, who belong to the strain of arthropods. Arthropods, which make up more than 80% of the approximately one million different animal species in the world, are the most species-rich phylum and play a big role as ectoparasites in humans and in animals [Eckert et al., 2005]. The carriers (vectors) of travel related diseases of dogs and cats are mainly different kinds of ticks, but also insects like fleas, lice and mosquitoes (table 1). In them the pathogenic agent multiplies and afterwards infects the final host via the blood. The import of animals from foreign countries therefore does not only permit the spreading of diseases into regions that originally were free from that pathogen, but also the import of the corresponding vectors. Many vectors (especially fleas) do not discriminate much between different hosts [Boch, 2008] and as the pathogen multiplies not only in the alternate host (vector) and in its proper host but in parts also transovarially, it can spread massively in a short time only [Randolph, 2004]. Not only endoparasites (protozoas, helminths) can be pathogenic agents but bacteria and viruses as well, however bacterial infections have the largest share [ESCCAP, 2011].

The demographic distribution of the agents depends directly on the vector. The influence of environmental factors can favour the distribution of certain diseases, either because the multiplication of the vector is favoured or the multiplication of the agent within the vector. The spread of ticks is considered to be influenced by climatic conditions. The strong increase of tick-borne diseases in recent decades suggests that global warming plays its part in this context. But this cannot be confirmed yet [Grey et al., 2009; Randolph, 2013].

In the following the vectors and their worldwide spread according to continents and countries are listed (table 2). This list is not complete and must be treated with caution. It is subject to constant change due to the complex epidemiology and the interaction between agents, vectors and hosts (dogs, cats, humans).

An example for this is the import of *Babesia canis canis* to Germany. About 30 years ago Babesiosis of the dog was counted among the travel related diseases. Its occurrence was limited to the European part of the Mediterranean and France [Pfister et al., 1993]. *Babesia canis canis* is transmitted by the tick "Dermacentor reticulatus", and the distribution area nowadays is the complete central-European territory, steadily extending to the north [Jensen & Nolte, 2005]. In dependence on the vector, the area of distribution of *Babesia canis canis* is continuously increasing [Barutzki et al., 2007; Naucke, 2008]. Only recently first evidence was provided from Lithuania

[Berzina et al., 2013]. In Germany Barbesiosis has become endemic [Naucke, 2008, Straumer, 2008; Public Health Department “Landesgesundheitsamt” of the German state ”Baden-Wuerttemberg“, 2010]. Several reforms of the agricultural structure are thought to have favoured that, because they added to the renaturation and reforestation of floodplain forests [Barutzki et al., 2007]. Since 2005/2006 cases have been reported from Berlin/Brandenburg [Heile, Heydorn & Schein, 2007] and Northern Germany [Jensen & Nolte, 2005].

Currently evidence of the heart worm *Dirofilaria immitis* in German mosquitoes bears explosiveness. *Dirofilaria immitis* was detected both in the German states Brandenburg and Baden-Wuerttemberg. The German Friedrich-Loeffler-Institut (Federal Research Institute for Animal Health) suspects a possible entry through imported domestic animals from the Mediterranean and by car traffic [FLI, 2013].

In all the world regulations exist to eliminate the massive danger caused by the transfer of foreign animals (within the European Union: Directive 998/2003, from December 2014: 576/2013; outside of the EU: provisions of the country of destination). From the countries of origin as entry permit a minimum standard of vaccinations is required. Furthermore sometimes a test of antibodies or the compliance with certain quarantine measures is requested (for example by Australia).

In the long term worldwide vaccinations can prevent the spreading of some diseases. Systematic vaccination campaigns made it possible, that Germany has been able to call itself a rabies-free country since 2008. Nonetheless there exists the permanent danger of re-introduction, because rabies is still present in other European countries (i.e. Estonia, Latvia, Lithuania, Bulgaria, Romania) [WHO, 2014].

Additionally, many diseases are not fully understood yet. Chains of infections and zoonotic significances are unclear, which can have fatal consequences in case of import.

Therefore, we believe that all options should be exhausted to create a humane situation that meets the requirements of animal welfare in the animals' home countries before considering the transfer of animals to another country. Should this not be possible in individual cases, then all measures must be taken to prevent the import of diseases caused by the international transport of animals. So big-hearted the desire to help may be the import still poses the risk to introduce a strange and dangerous disease to a new area. It is important to remember, that helping an individual animal may be at the expense of an entire population and of human health, too.

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