

SHORT COMMUNICATION

Importation of dogs into the United States: risks from rabies and other zoonotic diseases

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Impacts

- Based on import trends suggesting that the annual number of unvaccinated puppies being imported into the United States increased substantially from 2001 to 2006, imported dogs pose a risk for introducing zoonotic pathogens such as rabies into the United States.
- Commercial resale or adoption of unvaccinated puppies originating from rabies-enzootic countries poses a risk for spread and transmission of foreign canine variants of rabies; since 2004, at least two cases of foreign variants of canine rabies virus have been documented in recently imported puppies.
- On July 31, 2007, CDC posted an Advance Notice of Proposed Rulemaking on the topic, and invited public comment on issues regarding possible requirements for a unique identification and health certificates, and setting a minimum age for importation that would require valid rabies vaccination prior to entry into the United States.

Keywords:

Zoonosis; rabies; importation; dog; cat; ferret

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Summary

The importation of dogs into the United States poses a risk for the introduction of rabies and other zoonotic diseases. Federal regulations (42 CFR 71.51) currently require proof of valid rabies vaccination for imported dogs, but allow the importation of some unvaccinated dogs, including dogs less than 3 months of age, provided certain requirements for confinement are met until the dog is vaccinated. Although there are no accurate surveillance data on the number of dogs imported each year, it is estimated based on extrapolated data that over 287 000 dogs were imported into the United States during 2006. Of these, approximately 25% were either too young to be vaccinated or lacked proof of valid rabies vaccination. Import trends suggest that an increasing number of unvaccinated puppies are being imported into the United States, many through commercial resale or rescue operations. Since 2004, foreign canine rabies virus variants have been documented in at least two imported puppies. Federal regulations are currently being reviewed by the Centers for Disease Control and Prevention to determine if they can be updated to address current import trends and disease risks, such as requiring a health screen and valid rabies vaccinations for all dogs prior to entry.

Introduction

In the current era of global travel and trade, the transport of companion animals across U.S. borders represents a

possible threat for the introduction of zoonotic pathogens into the United States. In many parts of the world, canine rabies virus variants are enzootic in dogs (*Canis lupus familiaris*), and bites from infected dogs cause over

50 000 human deaths each year (WHO Expert Consultations on Rabies, 2007). Although the United States has successfully eliminated canine rabies variants from domestic circulation, introduction of foreign canine rabies virus variants via imported dogs threatens this status. Rabies is of particular concern in imported dogs because of its long incubation period; on average, clinical disease develops 4–8 weeks after infection. Because of this, dogs may be admitted on the basis of apparent good health, but may be incubating the virus and could develop disease after entry. Other zoonotic pathogens (for example, leishmaniasis) may also be imported with dogs, and could potentially develop a sustained or enzootic presence in this country (Rosypal et al., 2003). Imported dogs may also harbor exotic or other ticks that could carry human or animal pathogens not currently present in the United States, or may physically introduce insects or pathogens of agricultural significance, such as screwworm larvae or tapeworms (Barre et al., 1987; Mannelli et al., 2003; Nyangiwe et al., 2006; U.S. Department of Agriculture Animal and Plant Health Inspection Service, 2007). Dogs may also serve as a source of human infection with intestinal parasites such as *Toxocara* and enteric pathogens such as *Salmonella* and *Campylobacter* (Enriquez et al., 2001; Robertson and Thompson, 2002).

No single U.S. agency has the sole authority to regulate the importation of dogs. The Animal and Plant Health Inspection Service (APHIS) within the U.S. Department of Agriculture (USDA) requires health certifications and inspections at the port of entry for some dogs imported from some countries on the basis that they may pose a

threat to U.S. agriculture through the introduction of screwworms or certain *Taenia* species of tapeworms which are not found in the United States (U.S. Department of Agriculture Animal and Plant Health Inspection Service, 2007). Under the Public Health Services Act, the Centers for Disease Control and Prevention (CDC) under the Department of Health and Human Services (HHS), has the authority to restrict the importation of dogs due to risks to human health. Under 42 CFR 71.51, CDC may require dogs that appear ill with a at the point of entry to the United States to be confined and referred to a veterinarian for examination (Fig. 1) (Title 42 Code of Federal Regulations, 2007).

42 CFR 71.51 requires a valid rabies vaccination for dogs 12 weeks of age and older imported to the United States from countries where canine rabies is present. However, this regulation has provisions that allow the entry of unvaccinated puppies and dogs if the owner agrees to confine the dog at a place of the owner's choosing until vaccinated, and then for 30 additional days (Title 42 Code of Federal Regulations, 2007). The regulation does not require a health screen for these dogs prior to arrival in the United States, nor does it require treatment for ticks or evaluation for specific zoonoses of concern. Under 42 CFR 71.51, importers are expected to appropriately confine and vaccinate imported dogs that lack valid rabies vaccination. Enforcement of this regulation is problematic because there is no federal requirement, mechanism, or capacity for documenting compliance. In addition, the current CDC regulations provide an exception to vaccination if the dog originates



Fig. 1. Imported puppies undergoing inspection at JFK International Airport, New York (note evidence of diarrhea on the animals and in the cage). Photo courtesy of Sheryl Shapiro, CDC New York Quarantine Station.

Table 1. Estimates of dogs imported into the United States during 2006

Port of entry	Type of surveillance system	Surveillance data	Extrapolations from surveillance data*
Airport	Dog importation data collected by CDC Quarantine Stations for Chicago O'Hare International Airport (ORD) and John F. Kennedy International Airport (JFK) (CDC, unpublished data).	10 125 dogs (5156 unvaccinated) were imported through ORD in 2006. An estimated 7350 dogs (1327 unvaccinated) were imported through JFK in 2006.	These airports account for 20% of international air passenger traffic entering the United States. [†] Therefore, estimated 87 375 dogs were imported through U.S. airports in 2006, of which 32 415 (37%) are estimated to have been unvaccinated.
Northern land border crossing	Confinement agreements issued for unvaccinated dogs at Canadian land border crossings within CDC's New York Quarantine Station's (at JFK airport) regional jurisdiction (CDC, unpublished data).	Reports were submitted for 73 unvaccinated dogs during 2006. Unvaccinated dogs were presumed to represent 18% of overall dog imports (the same as dogs entering through JFK airport). An estimated 404 dogs were therefore imported through these stations in 2006.	These land border crossings accommodate 47% of passenger vehicle crossings from Canada. [†] Therefore, an estimated 870 dogs entered from Canada in 2006, of which 157 (18%) are estimated to have been unvaccinated.
Southern land border crossing	A multi-agency 2-week border surveillance operation conducted November 27 through December 10, 2006, at San Ysidro and Otay Mesa border crossing stations. (Aaron Reyes, Southeast Area Animal Control Authority, personal communication 4/12/2007).	1991 dogs (381, or 19% unvaccinated) were imported during the operation. Presuming that this 2-week period was similar to other times of the year, an estimated 51 766 dogs (9906 unvaccinated) entered the U.S. through these ports during 2006.	These ports accommodate 26% of passenger vehicle crossings from Mexico. [†] Therefore, an estimated 199 100 dogs entered from Mexico in 2006, of which 38 100 are estimated to have been unvaccinated.
All United States	Combined extrapolations from airport, northern land border, and southern land border ports of entry		>287 000 dogs are estimated to have been imported into the United States during 2006, including an estimated 70 600 (25%) unvaccinated dogs.

*Extrapolations presume that the available surveillance data is representative of dog importations occurring at other similar ports of entry.

[†]Border crossing statistics available at Bureau of Transportation Statistics, <http://www.transtats.bts.gov>.

from a 'rabies-free' country. The presence of canine rabies is determined by CDC based on surveillance data reported to the World Health Organization by member countries, and determining an updated and accurate list of rabies-free countries is difficult because countries without robust surveillance systems may appear free of rabies.

While there are no official surveillance statistics on the numbers of dogs imported into the United States each year, it is estimated based on extrapolation of limited importation data that over 287 000 dogs were imported into the United States in 2006 (Table 1) (Bureau of Transportation Statistics, 2007). Of these, approximately 70% entered through land border crossings, while the remainder entered through airports. Because not all imported companion animals are inspected on entry, the true volume of imports is likely much larger than these estimates suggest. An estimated 25% of dogs imported into the United States during 2006 were either too young or otherwise not current for rabies vaccinations.

The importation of unvaccinated dogs into the United States appears to be increasing. The number of reports that CDC received for dogs entering John F. Kennedy International Airport doubled from 2003 to 2006 (CDC, unpublished data), and reports of unvaccinated dogs being imported into California increased by over 500% during the period 2001–2006 (Ben Sun, California Department of Public Health, personal communication 3/22/2007). Some of these increases may be explained by the apparent recent expansion in a high-volume international commercial puppy trade. Breeders overseas and across borders ship puppies to the United States for sale through commercial pet stores, flea markets, and internet trading sites. Consumer demand for puppies under 4 months of age results in some animals being sold before the end of the required vaccination confinement period (Fig. 2) (AP News Article, 2007; Discussion of the Pet Animal Welfare Statute (PAWS), 2005). The number of imported puppies sold commercially before the end of



Fig. 2. Puppies imported to the United States from Mexico via a land border crossing, 2006. Purebred puppies such as these are most commonly destined for quick commercial sale within the United States, many in violation of CDC confinement requirements. Photo courtesy of Gregory Elizondo, USDA-APHIS, Pharr, TX Port of Entry.

the required confinement period is unknown, but over 4000 confinement agreement violations are known to have occurred in 2006 (CDC, unpublished data). In addition to imports for commercial sale, several animal rescue operations import dogs from other countries for adoption in the United States. For example, in 2006, a humane rescue organization imported 295 dogs to the United States from the Middle East (Fig. 3) (Best Friends Middle East animal rescue operation, 2007). In addition to organized efforts, U.S. citizens may less formally acquire stray

animals during travel abroad and bring them back to the United States.

The importation of unvaccinated dogs from areas where canine rabies is enzootic poses a potential public health risk. Since 2004, CDC has received two reports in which young, unvaccinated puppies were imported from rabies-enzootic countries and developed rabies after arriving in the United States. In 2004, a puppy rescued as a stray in Thailand was diagnosed with a canine rabies virus variant the day after being imported to California. (Ben



Fig. 3. Humane rescue operation importing large numbers of dogs from the Middle East, 2006. Photo courtesy of Sheryl Shapiro, CDC New York Quarantine Station.

Sun, California Department of Public Health, personal communication 8/1/2007). In 2007, a puppy rescued as a stray in India was imported through Washington to Alaska, where it was diagnosed with a canine rabies virus variant commonly circulating in dogs in India. (Louisa Castrodale, Alaska Department of Health and Social Services, personal communication 8/1/2007). As these cases highlight, the importation of unvaccinated dogs poses not only a direct human health risk, but also a risk for translocation and establishment of canine variants of rabies virus not currently present within the United States. Although the documented risk appears small (less than 2 per million imported dogs), it is likely underestimated because imported puppies with rabies may die without being appropriately tested or diagnosed, particularly if they did not bite other animals or humans prior to death.

While rabies infection may not be highly prevalent in imported dogs, even the importation of one or two infected animals per year represents an unacceptable and preventable risk. While import restrictions may not be able to specifically address all possible zoonoses, a requirement for a health screening by a veterinarian in the country of origin prior to shipment could help reduce the likelihood of zoonotic disease transmission from imported dogs. More stringent requirements for animal identification, such as a tattoo or microchip, as well as treatment for ticks and other ecto- or endoparasites prior to import, are successfully employed in many other countries, including the United Kingdom and western European countries (Europa European Commission, Animal Health and Welfare, 2007). In addition to dogs, companion animals such as cats and ferrets are highly susceptible to rabies, and some other countries have importation restrictions for these animals, including requirements for rabies vaccinations (Europa European Commission, Animal Health and Welfare, 2007). The zoonotic diseases risks associated with these additional companion animal species should be carefully reviewed if changes to the current federal regulations are considered.

Discussion

CDC's regulations regarding the importation of dogs were promulgated in 1956 and updated in 1983 (Title 42 Code of Federal Regulations, 1956; Title 42 Code of Federal Regulations, 2007). During this time, international pet travel was not routine and typically involved the occasional family pet. In contrast, today's importation practices include highvolume importation of unvaccinated puppies for commercial resale and humane rescue. Federal regulations are currently being reviewed to determine if they should be strengthened to prevent the possible importation of foreign canine rabies virus variants.

On July 31, 2007, CDC posted an Advance Notice of Proposed Rulemaking (ANPRM) soliciting public opinion on possible changes to current federal regulations (Centers for Disease Control and Prevention, 2007). Questions posed for public comment included whether dogs should have a minimum age for importation, and whether a unique animal identifier and health certificate signed by a licensed veterinarian in the country of origin should be a requirement for importation. The ANPRM also asked whether cats and ferrets should be subjected to the same importation requirements as dogs. The public comment period for the ANPRM closed on December 1, 2007. Following review of all comments and consideration of specific disease risks, CDC will consider whether federal regulations regarding the importation of companion animals should be strengthened to prevent the importation of foreign canine rabies virus variants and other zoonoses.

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