

# Trends in Parasitology



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## Q2 Letter

### Illegal and Legal Wildlife Trade Spreads Zoonotic Diseases

Q4 Q3 Vincent Nijman<sup>1,\*</sup>

Parasites do not read legal documents. They cannot distinguish between animals or animal products that are traded with or without permits. Bezerra-Santos *et al.* [1] discussed the potential risks that the illegal wildlife trade has on the spreading and emergence of zoonotic pathogens. They highlight open wildlife ('wet') markets, the illegal transport of wildlife or their derivatives, as well as the illegal importation of exotic pets and the risk of zoonotic pathogens in the spread and introduction of diseases. While they do note that the concerns related to the transmission of zoonotic pathogens and the introduction of exotic infectious agents into a new region may also be applied to the legal wildlife trade, I argue here that the majority of their concerns are applicable to both legal and illegal wildlife trade. Given that, in many instances, the legal wildlife trade is several orders of magnitude larger than the illegal trade (Box 1) it is ineffective and possibly dangerous to focus on the illegal wildlife trade only.

In presenting their arguments, Bezerra-Santos *et al.* [1] relied on data collected and interpreted by others. I will use four of these same studies [2–5] to illustrate the point that, in fact, the legal trade poses a larger risk than the illegal wildlife trade.

The introduction of exotic ectoparasites through the illicit wildlife trade may result in serious consequences for public health [1]. *Rickettsia* and *Ehrlichia* spp. were detected in ticks on exotic reptiles and amphibians imported into Japan [2]. The

legal import of these animals amounts to 500 000 a year, with 100–200 reptiles and amphibians seized each year [6]. While illegally imported reptiles and amphibians are not subject to any quarantine regulations neither are legally imported ones [2]. Hence the risk of introduction of zoonotic viruses, bacteria, helminths, and protozoa carried by individual animals is equal for legal and illegal imports, but in this case the legal trade is at least three orders of magnitude larger than the illegal trade.

Since the spread of covid-19, wildlife markets are seen as synonymous with the illegal wildlife trade, but it is important to stress that, even in the wet market of Wuhan, the vast majority of nondomesticated animals (crocodiles, bats, civets, bamboo rats) were legally offered for sale. The lack of appropriate hygiene conditions (handwashing, sanitation, separation of wildlife and their parts) makes wildlife markets important drivers for the transmission of infections caused by wildlife-associated pathogens [1,3]. In Laos 33 752 animals were recorded in wildlife markets, of which 6452 animals belonged to species that were protected under Lao law [3]. There was no indication that protected species were handled differently to nonprotected species with regard to prevention of the spread of diseases. Given that the legal trade in these markets is four times larger than the illegal trade,

ceteris paribus, the threat of the legal trade is four times larger.

The importation of wild meat or animals intended for slaughter is another route for the spread of zoonotic agents. Animals or meat which were legally or illegally imported into European countries resulted in 3443 *Trichinella* infections in humans; however, only 1% of these cases could be linked to illegally imported meat [4]. The importation of exotic pets may pose public health risks for the transmission of zoonotic pathogens. Based on imports into The Netherlands the five pathogens with the highest perceived risks were *Salmonella* spp., Crimean-Congo haemorrhagic fever virus, West Nile virus, *Yersinia pestis*, and arenaviruses, transmitted by birds, mammals, reptiles, and amphibians [5]. This was the case for legal and illegal imports, but the legal imports far exceeded the illegal ones (490 750 vs 514 animals) [5].

Bezerra-Santos *et al.* [1] state that the monetary value of the illegal wildlife trade could be worth up to US\$23 billion annually; this is an upper estimate and includes illegal trade in timber, charcoal, and fisheries [7]. While this is an impressive amount it is dwarfed by the monetary value of the legal wildlife trade, with estimates of both legal fisheries and legal timber exports alone approaching US\$400 billion [5].

#### Box 1. Live Wildlife Imported into the USA

The USA is one of the three largest importers of wildlife, alongside the EU and China. Despite this, with few exceptions, it has no laws specifically requiring disease surveillance for imported wildlife. Taxa that are tested – as they could present a significant public health concern – include certain salamanders and rodents, primates, and bats. So the vast majority of nondomesticated animals entering the country are not tested. In recent years the US Fish and Wildlife Services inspected over 150 000 shipments of wildlife a year (live, dead, and derivatives), resulting in ~10 000 investigative cases being opened (~85% because of suspected violation of the Endangered Species Act and the Lacy Act)<sup>10</sup>. While this is an impressive number, the legal import of live animals into the USA, primarily from Asia, numbers in the tens of millions annually [8], including:

Molluscs: 1.75 million	b0.2
Fish: 40.43 million	b1.3
Amphibians: 1.02 million	Q1
Reptiles: 0.27 million	b1.5
Mammals: 0.96 million	b1.6
Birds: 0.63 million	b1.7
Miscellaneous (mixed species): 0.60 million	b1.8
	b1.9
	b1.10
	b1.11
	b1.12
	b1.13
	b1.14
	b1.15
	b1.16
	b1.17

79 (US\$151 and US\$244 billion<sup>i,ii</sup>). With  
80 95–99% of the (value of) wildlife trade  
81 being legal, it is imprudent to focus on  
82 the illegal part of it alone when trying to  
83 lessen the risk of the introduction of  
84 zoonotic pathogens. This is true even  
85 when taking into account that only a  
86 proportion of the illegal trade will be  
87 intercepted and acknowledging that, in  
88 some cases, the (unknown) health status  
89 of illegally imported animals may pose a  
90 higher risk for public health than legally  
91 imported animals. By emphasising the  
92 illegal wildlife trade as a gateway to zoonotic  
93 infectious diseases one runs the  
94 risk of creating a misplaced feeling of  
95 safety when considering the legal trade,  
96 and this may lead to lapses in surveillance  
97 and attention.

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### Declaration of Interests

There are no interests to declare.

### Resources

- <sup>i</sup> [www.fao.org/documents/card/en/c/ca9229en](http://www.fao.org/documents/card/en/c/ca9229en)
- <sup>ii</sup> [www.fao.org/forestry/statistics/80938/en/](http://www.fao.org/forestry/statistics/80938/en/)
- <sup>iii</sup> [www.fws.gov/le/pdf/LE-at-a-Glance.pdf](http://www.fws.gov/le/pdf/LE-at-a-Glance.pdf)

<sup>1</sup>Oxford Wildlife Trade Research Group, Oxford Brookes University, Oxford, UK

\*Correspondence:  
[vnijman@brookes.ac.uk](mailto:vnijman@brookes.ac.uk) (V. Nijman).  
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