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Descriptive Analysis Report of Wild Mammal Imports to the United States (2004–2009)



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Abstract: Regulatory authority over the importation of wild mammals is currently divided among several Federal agencies including the U.S. Department of Agriculture’s Animal and Plant Health Inspection Service Veterinary Services (USDA:APHIS:VS), the U.S. Fish and Wildlife Service (FWS), and the Centers for Disease Control and Prevention (CDC). In a 2010 report to the U.S. Senate Committee on Homeland Security and Governmental Affairs, the U.S. Governmental Accountability Office found that because each of the agencies is focused on different aspects of live animal imports, no single entity has comprehensive responsibility for the zoonotic and animal disease risks posed by live animal imports ([GAO 2010](#)).

This report presents a summary of wild mammal import data collected by the U.S. Fish and Wildlife Service from 2004 to 2009. Mammals were specifically chosen because of (1) the frequency and severity of zoonoses introduced by mammals and (2) the frequent interaction between wild mammals and humans (Pavlin 2009). Many emerging infectious diseases in humans are caused by zoonotic pathogens that originate in wildlife, for example the emergence of Nipah virus in Malaysia, SARS in China, and monkeypox in the United States (Jones 2008; Pavlin 2009). The wild mammal trade grew substantially during the six-year period from 2004 to 2009, with number of mammals and corresponding shipments doubling over that time period. From this summary, emerging trends by taxonomic classes, exporting country and port of entry have been identified. Areas of potential investigation for emerging infectious diseases, where more detailed analysis may be necessary, include parasites potentially carried by the animal, country of origin, regulatory safeguards, intended use of the animal after importation, and level of contact with other animals and people once released into the United States.

Keywords: Zoonotic, wild mammals, imports, infectious diseases, emerging trends

Questions or comments on data analysis, contact: Dr. Mary Ann Bjornsen (970) 494-7310:
E-mail: cahia@aphis.usda.gov

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Authors*

Mary Ann Bjornsen, Project Lead

Reginald Johnson, Risk Analyst

Carol LoSapio, Technical Writer/Editor

Joseph Mlakar, Operations Research Analyst

*USDA:APHIS:VS:Centers for Epidemiology and Animal Health
Center for Animal Health Information and Analysis
2150B Center Avenue, MS 2W4, Fort Collins, CO 80526

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DESCRIPTIVE ANALYSIS REPORT OF WILD MAMMAL IMPORTS TO THE UNITED STATES (2004–2009)

INTRODUCTION

In the past 70 years, zoonotic pathogens have caused the majority of emerging infectious diseases, and the majority of these zoonotic pathogens originated in wildlife. Examples include the emergence of Nipah virus in Malaysia, SARS in China, and monkeypox in the United States (Jones 2008; Pavlin 2009). The number of emerging infectious disease outbreaks caused by pathogens originating in wildlife has increased significantly during this same 70-year period (Jones 2008). These trends emphasize that a comprehensive plan to protect the United States from emerging diseases should include research into identifying the risks of wildlife-human interaction and targeting surveillance efforts on activities that result in wildlife-human contact.

The United States is among the world's largest wildlife importers (Defenders of Wildlife 2007). Multiple Federal agencies including the United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, U.S. Fish and Wildlife Service (FWS), and the Centers for Disease Control and Prevention currently have regulatory authority over wildlife imports to the United States ([CFR Title 50 Part 14](#)). The combined regulations of these agencies cannot address all potential animal and public health risks. This is due to gaps in regulations, differing program priorities, and roles and responsibilities of each agency. Gaps in wild animal import rules, especially those for exotic animals frequently imported for the pet business, can leave the United States vulnerable to disease incursions ([GAO 2010](#)).

This report presents a summary of wild mammal import data collected by the FWS from 2004 to 2009. Mammals were specifically chosen because of the frequent interaction between wild mammals and humans and the frequency and severity of zoonoses introduced by mammals (Pavlin 2009).

DATA

The data used for this analysis are declared wildlife imports to the United States from 2004 to 2009 as recorded in the Office of Law Enforcement (OLE) Law Enforcement Management Information System (LEMIS) database. LEMIS data originate from [USFWS Form 3-177](#), U.S. Fish and Wildlife Service Declaration for Importation or Exportation of Fish or Wildlife (FWS 2010). This form is used to declare all wildlife species entering the United States at ports of entry. Wildlife is broadly defined in this report as live animals that are either captured from the wild, raised or bred in captivity for legal export to the United States, and may include native, non-native (exotic) species, or laboratory animals. Although the LEMIS data do not routinely undergo rigorous validation by FWS, the Centers for Epidemiology and Animal Health (CEAH) has reviewed the data and worked with FWS to correct data entry error. Occasional changes in taxonomic classifications may also be a source of error in these data. Where such changes were identified, the data have been updated accordingly. Any minor inaccuracies that may remain do not significantly affect general trends, findings, and conclusions of this report.

RESULTS

Overall Wild Mammal Trends

From 2004 to 2009, approximately 1.1 million wild mammals from 227 genera (84 families) were imported to the United States. For each species imported, the scientific name is required according to taxonomic classification following the hierarchy of Order – Family – Genus – Species (Bucknell 2005). Ten of these genera (four families) were imported for the first time in 2009. The number of wild mammals imported in 2009 decreased by over 68,000 from 2008. However, for the recent three-year period (2007 – 2009), imports of approximately 760,000 of wild mammals were still more than double the number of imports in the previous three-year period (2004 – 2006), Figure 1¹. This increase was primarily due to a large increase in captive-bred dwarf hamsters imported from the Netherlands for the commercial pet trade. Similarly, the number of shipments of mammals entering the United States more than doubled from 2004 to 2009 (shipments may contain one or more genera of mammals in any quantity). The observed increase in shipments was caused primarily by an increase in the frequency of bison shipments from Canada.

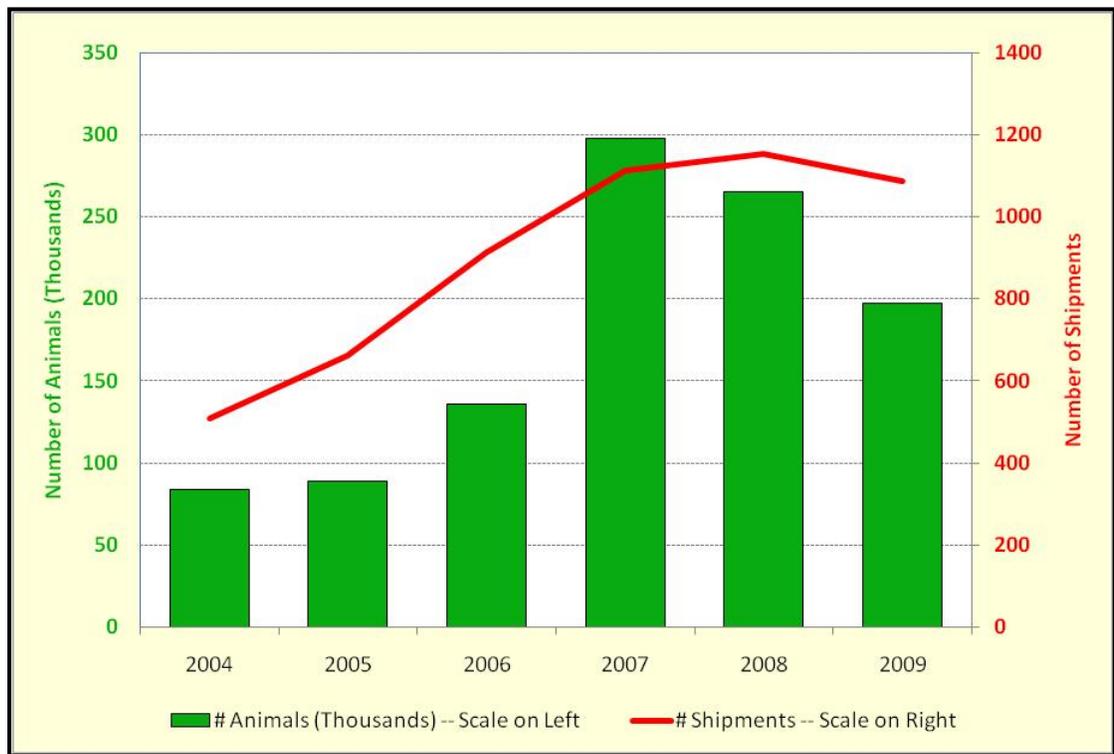


Figure 1. Wild mammal imports to the United States 2004–2009

¹ Shipments containing more than one animal order or genus were counted once per order or genus, consequently, the total number of shipments by order and genus appears greater than the actual number of individual shipments shown in Figure 1.

Trends by Order

The top three orders of mammals that entered the United States from 2004 to 2009 were rodents, non-human primates, and artiodactyls (even-toed ungulates such as bison) (Figure 2). These orders made up over 94 percent of total wild mammal imports during the six-year period. The annual share of rodents and artiodactyls imported increased overall in the last six years while the share of primates and lagomorphs decreased. The largest group of imported wild mammals was rodents; rodents accounted for 72.3 percent of wild mammal imports in 2009. Artiodactyls and non-human primates accounted for 14.4 percent and 11.3 percent, respectively, of wild mammal imports in 2009.

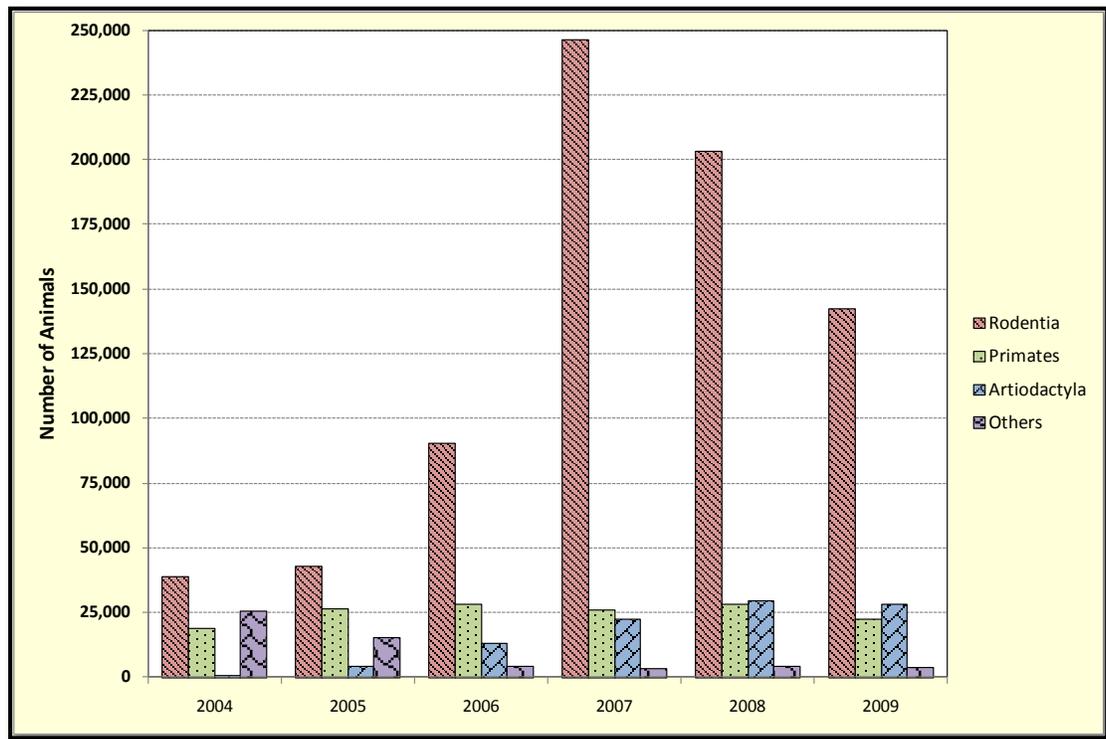


Figure 2. Top wild mammalian orders imported to the United States 2004–2009 (number of animals)

Shipments containing rodents, artiodactyls, non-human primates, and carnivores were imported most frequently during 2004 to 2009 (Figure 3). Over 87 percent of wild mammal shipments contained mammals from one of these four orders. The percentage of shipments containing artiodactyls increased from 1.0 percent of shipments in 2004 to 26.8 percent of shipments in 2009. The percentage of shipments in 2009 containing rodents, non-human primates, and carnivores was 22.3 percent, 16.1 percent, and 13.4 percent, respectively.

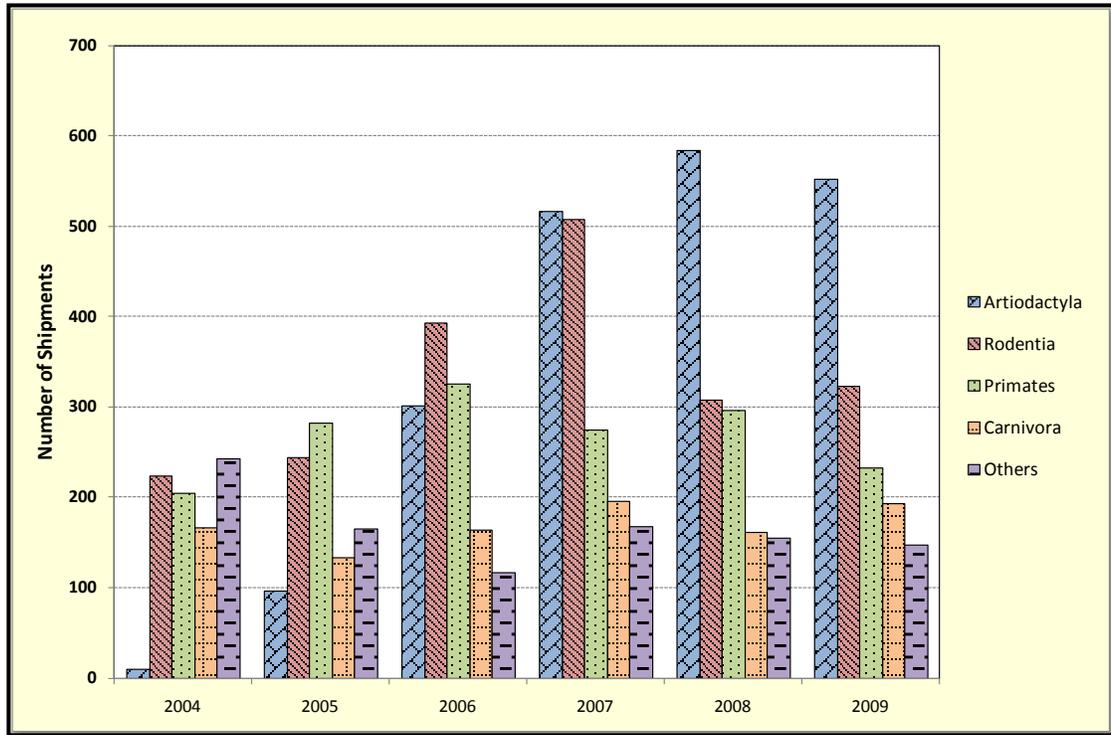


Figure 3. Top wild mammalian orders imported to the United States 2004–2009 (number of shipments)

Trends by Genus

Dwarf hamsters were the most numerous mammals imported comprising 58 percent of all wild mammal imports from 2004 to 2009 (Table 1). The number of dwarf hamsters imported to the United States has increased from approximately 120,000 in 2004–2006 to over 495,000 in 2007–2009. Dwarf hamsters entering the United States from the Netherlands accounted for 73.8 percent of the shipments and 15.1 percent entered from the Czech Republic. Dwarf hamsters were imported primarily for commercial purposes and were almost exclusively bred in captivity as determined from the purpose code entered in [USFWS Form 3-177](#).

The number of macaque imports remained consistent from 2004 to 2009 with crab-eating macaques being the most common species. Macaques were primarily imported for biomedical research and commercial purposes. The principal countries that supplied macaques to the United States were China, Vietnam, Mauritius, Philippines, and Indonesia. Of 1,423 shipments of macaques, 52.0 percent of shipments were exported from China, 17.2 percent from Vietnam, and 13.0 percent from Mauritius. Over the six-year period, several shipments of macaques from China and Mauritius contained animals that originated in the wild.

The number of American bison imported to the United States has increased steadily from 69 head in 2004 to 28,843 head in 2008 and 26,080 head in 2009. Imported bison originated primarily from Canada and were almost exclusively for finishing and processing.



Table 1. Top 15 wild mammal genera imported into the United States 2004–2009

Genus	2004		2005		2006		2007		2008		2009		Total	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Phodopus(Dwarf Hamster)	24,735	30	27,558	31	68,053	50	199,542	67	177,742	67	118,301	60	615,931	58
Macaca(Macaque)	18,216	22	26,050	29	27,406	20	25,304	9	27,350	10	21,701	11	146,027	14
Bison	69	0	2,821	3	11,510	8	20,457	7	28,843	11	26,080	13	89,780	8
Chinchilla	5,005	6	6,820	8	9,758	7	11,180	4	6,513	2	3,859	2	43,135	4
Mesocricetus(Golden Hamster)	4,198	5	1,241	1	7,179	5	13,744	5	3,200	1	6,426	3	35,988	3
Meriones(Jird)	741	1	330	0	429	0	12,893	4	10,431	4	5,158	3	29,982	3
Oryctolagus(Rabbit)	10,947	13	10,186	11	2,244	2	1,463	0	1,572	1	53	0	26,465	2
Cricetus(Hamster)	37	0	0	0	891	1	6,093	2	2,965	1	4,454	2	14,440	1
Procyon(Raccoon)	9,750	12	41	0	2	0	11	0	30	0	3	0	9,837	1
Mus(Mouse)	703	1	3,033	3	791	1	1	0	782	0	46	0	5,356	1
Cervus(Elk,Deer)	0	0	553	1	1,103	1	917	0	613	0	1,463	1	4,649	0
Petaurus(Glider)	480	1	200	0	220	0	423	0	1,324	0	1,634	1	4,281	0
Cavia(Cavi)	375	0	160	0	450	0	445	0	732	0	1,776	1	3,938	0
Grammomys(Rat)	1,000	1	2,000	2	0	0	0	0	0	0	0	0	3,000	0
Sylvilagus(Rabbit)	0	0	2,820	3	0	0	0	0	0	0	12	0	2,832	0
Other Genera Total	7,223	9	4,827	5	5,860	4	5,127	2	3,115	1	6,197	3	32,349	3
Total	83,479	100	88,640	100	135,896	100	297,600	100	265,212	100	197,163	100	1,067,990	100

Other wild mammals imported to the United States in smaller numbers are listed below. These mammals were primarily bred in captivity for commercial purposes.

- Chinchillas primarily from Canada, the Netherlands, and the Czech Republic
- Golden hamsters from the Netherlands and the Czech Republic
- Gliders primarily from Indonesia
- European rabbits from the Netherlands and Canada
- Jird from the Netherlands (jird are a genus of small rodents that includes gerbils; they are most commonly kept as pets)
- Red deer/elk from Canada and New Zealand
- Pygmy gerbils primarily from the Netherlands
- Kangaroos and wallabies primarily from New Zealand
- Several genera of rodents, including common hamster from the Netherlands, thicket rats from Chile, ground squirrels from Canada, and chipmunks from the Netherlands and China



Trends by Exporting Country

From 2004 to 2009, 89 countries exported wild mammals to the United States. Table 2 shows the top ten countries by number of animals and shipments; these countries supplied over 97 percent of U.S. imports of wild mammals during the same period. The principal imports from these countries were rodents from the Netherlands and Czech Republic; bison, rabbits, and chinchilla from Canada; and macaques from China, Mauritius, Vietnam, and Indonesia. Four countries accounted for over 90 percent of wild mammal imports during this period: Netherlands (57.9 percent), Canada (14.6 percent), the Czech Republic (9.7 percent), and China (7.8 percent). The greatest number of wild mammal shipments arrived from Canada. Of those shipments, 54.3 percent of those shipments were bison imported to the United States for finishing and processing.

Table 2. Top 10 countries exporting wild mammals to the United States 2004–2009

Country of Export	2004		2005		2006		2007		2008		2009		Total	
	Animals	Shipments	Animals	Shipments	Animals	Shipments	Animals	Shipments	Animals	Shipments	Animals	Shipments	Animals	Shipments
Netherlands	15,815	12	28,073	12	59,511	41	214,735	60	187,679	40	112,550	40	618,363	205
Canada	17,778	141	23,458	260	22,464	480	27,077	625	33,521	719	31,279	652	155,577	2,877
Czech Republic	14,462	16	2,441	8	23,016	13	27,012	28	12,893	14	23,852	16	103,676	95
China	10,356	70	13,060	97	13,354	104	15,189	114	18,071	133	13,158	106	83,188	624
Mauritius	4,695	22	4,606	13	4,377	14	3,888	36	4,486	41	3,179	32	25,231	158
Vietnam	2,360	24	4,480	48	4,916	35	3,600	30	1,800	14	3,238	27	20,394	178
Indonesia	1,804	19	3,205	25	1,630	17	1,557	18	2,172	16	2,124	14	12,492	109
Brazil	8,000	1	20	2	4	1	0	0	0	0	5	2	8,029	6
Kampuchea (Cambodia)	0	0	240	2	2,652	22	720	6	1,920	16	1,080	9	6,612	55
Guyana	1,032	56	517	43	693	54	636	66	489	59	2,039	71	5,406	349
Other Countries	7,177	148	8,540	151	3,279	132	3,186	131	2,181	101	4,659	119	29,022	782
Total	83,479	509	88,640	661	135,896	913	297,600	1,114	265,212	1,153	197,163	1,088	1,067,990	5,438

Trends by Port of Entry

Ten U.S. ports received over 95 percent of the total number of imported wild mammals and over 78 percent of wild mammal shipments from 2004 to 2009 (Table 3). Dallas/Fort Worth, TX received the greatest number of imported animals during this period, while Los Angeles, CA and Portal, ND received the greatest number of shipments. The number of animals arriving at Dallas/Fort Worth increased sharply in the six-year period from less than 23,000 in 2004 to more than 200,000 in 2008. This number declined to approximately 135,000 animals in 2009.



The increase in the number of rodents is primarily the result of the size of dwarf hamster shipments from the Netherlands. Animals per shipment increased from 25 animals in 2004 to 6,600 in 2009. Shipments entering through Los Angeles, CA were primarily macaques, rodents and gliders, and those entering through Portal, ND were almost exclusively bison and red deer/elk. In addition, a variety of large mammals including elephants, zebras, and large carnivores entered through the Canadian border ports of Blaine and Sumas (WA), Buffalo and Champlain (NY), Calais and Houlton (ME), Detroit and Port Huron (MI), Dunseith (ND), and Sweetgrass (MT).

Table 3. Top 10 ports of entry for wild mammals to the United States 2004–2009

Port	2004		2005		2006		2007		2008		2009		Total	
	Animals	Shipments	Animals	Shipments	Animals	Shipments	Animals	Shipments	Animals	Shipments	Animals	Shipments	Animals	Shipments
Dallas/Fort Worth, TX	22,878	39	29,966	61	69,281	86	226,674	89	200,329	75	134,920	76	684,048	426
Los Angeles, CA	10,417	113	15,029	145	19,083	180	17,668	152	19,230	162	18,293	132	99,720	884
Houston, TX	11,332	9	8,260	19	19,444	17	16,078	14	1,098	10	1,645	9	57,857	78
Portland, OR	3	1	2,247	44	8,739	169	13,820	273	14,230	261	13,395	255	52,434	1,003
Sweetgrass, MT	82	5	5,994	37	2,560	81	3,538	133	8,044	165	6,775	145	26,993	566
Chicago, IL	3,354	54	5,459	74	3,397	50	5,110	63	5,416	60	3,964	52	26,700	353
New York, NY	10,663	22	2,058	28	924	23	2,743	43	3,594	49	3,296	52	23,278	217
Sumas, WA	11,737	18	6,990	13	2,837	9	0	0	39	6	36	4	21,639	50
Miami, FL	4,378	95	3,421	61	1,494	87	1,345	98	1,581	93	2,718	96	14,937	530
San Francisco, CA	2,252	36	3,393	43	1,948	32	1,724	30	835	9	341	5	10,493	155
Other Ports	6,383	117	5,823	136	6,189	179	8,900	219	10,816	263	11,780	262	49,891	1,176
Total	83,479	509	88,640	661	135,896	913	297,600	1,114	265,212	1,153	197,163	1,088	1,067,990	5,438

DISCUSSION

The wild mammal trade grew substantially during the six-year period from 2004 to 2009, with 1.1 million wild mammals imported as part of 5,438 shipments. The 197,163 mammals and 1,088 shipments imported in 2009 represent twice as many of the imported mammals compared to 2004.

The continual increase in the number of imported mammals has raised concerns about the risk these imported animals present to both animal and human health in the United States and globally. According to a report released in November 2010 by the United States General Accountability Office (GAO) to the Committee on Homeland Security and Governmental Affairs on Live Animal Imports, the following animal families have been found to harbor zoonoses (GAO-11-9).

- Mice, rats, and gerbils have been found to harbor 21 zoonoses.
- Bovines have been found to harbor 15 zoonoses.
- Primates have been found to harbor 13 zoonoses.
- Chinchillas have been found to harbor 2 zoonoses.

The total number of mammals and mammal shipments increased through 2007; much of this increase was due to the demand for hamsters, specifically dwarf hamsters. Imports of dwarf hamsters increased nine-fold when the number in 2007 was compared to the number in 2004. The surge in popularity of dwarf hamsters in 2007 may be attributable to their small size, cosmetic appearance, longer lifespan, and affordability (Abrahamsen 2011).



The number of mammal imports decreased during 2008 and 2009 when compared to 2007. When this decrease was evaluated based on the taxonomical order, the order in which the greatest decrease took place was Rodentia. One explanation for the decrease in imports of rodents for the commercial pet trade may be the economic recession in the United States.

The primary purposes for which primates are imported are research and exhibition. Primate research activities and exhibitions, unlike the demand for pet rodents, may be less sensitive to changes in the strength of the economy, so the demand for primates would not be expected to decrease as sharply as the demand for pet rodents.

The number of mammals of the order Artiodactyla continually increased during 2004 to 2008. Many of these Artiodactyla are bison from Canada; while bison are susceptible to diseases that affect both animals and humans, they are slaughtered shortly after entry into the United States. Thus, the risk of disease transmission from bison may be mitigated due to the expected prompt slaughter (USDA : APHIS: VS 2010).



Rodents of unusual size.

CONCLUSION

This report provides a descriptive summary of live wild mammal imports to the United States from 2004 to 2009. Mammal imports are analyzed by taxonomic groups (order - genus - species), country of origin, and port of entry. This summary identifies emerging trends for the six-year period. Areas of potential investigation for emerging infectious diseases, where more detailed analysis may be necessary, should include:

- infectious diseases and parasites potentially carried by the animal,
- country of origin,
- regulatory safeguards,
- intended use of the animal after importation,
- taxonomic relationship, and
- level of contact with other animals and people.

As reported in a recent GAO report, current institutional controls and U.S. import regulations mitigate some of the risks of disease transmission from wildlife entering the United States (GAO 2010). However, these controls and regulations do not eliminate the risk of disease transmission from imported animals. The sheer size of the U.S. wildlife trade industry indicates the need for improved interagency collaboration and clear roles and responsibilities for involved agencies in order to mitigate potential risks to the United States from imported wildlife.

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USDA:APHIS:Veterinary Services
Centers for Epidemiology and Animal Health
Centers for Animal Health Information and Analysis
2150B Centre Avenue, Mail Stop 2W4
Fort Collins, CO 80526-8117
E-mail: CEAH@aphis.usda.gov
(Phone) 970-494-7000 (FAX) 970-494-7319

http://www.aphis.usda.gov/animal_health/emergingissues

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