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The Horse Slaughter Conundrum

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The debate over whether or not to slaughter horses for human consumption has become a controversial issue in agriculture in the past decade. Horses were slaughtered in the United States until a 2007 appropriations bill—the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act of 2006—withheld the federal funding necessary to inspect horsemeat, creating a de facto U.S. ban on the industry (U.S. Congress, 2006.) In 2011, the withholding was left out of the appropriation, causing potential industry entrants to mobilize and seek federal inspection, effectively rekindling debate around the issue. Although funding has been left out of the fiscal year (FY) 2014 bill (Horse Channel, 2014), the industry is continuing to seek its reestablishment while lawsuits from animal welfare activists attempt to hinder their attempts (Geyer and Lawler, 2013). The market for American slaughter horses shifted after the 2007 cessation of domestic slaughter, leaving Mexico and Canada as the only buyers and the United States as just a supplier (Table 1).

Table 1. Total U.S. sold horses killed for human consumption

	USA	Mexico	Canada
1994-2000	598,722	0	0
2001-2007	416,471	70,461	166,353
2009-2014	0	390,730	306,071

Source: USDA, National Agricultural Statistics Service

This led to the current system where American horses are exported across borders to be processed and then the end product—horsemeat—is sold on the international market to consumers with relatively stable and consistent demand. Although a handful of U.S. zoos purchase horsemeat for their animals (Luby, 2014), the vast majority of the meat is sent overseas.

The European Union (EU) is the largest regional importer of equidae meats, with France and Italy accounting for two thirds of all intra-EU horsemeat imports and nations such as Belgium, the Netherlands, Bulgaria, Finland, and Hungary also importing significant amounts of horsemeat (Chalabi, 2013). In total, the EU imported 54,853,400 kg (54,853.4 metric tons) of horsemeat in 2012 (Chalabi, 2013). Russia, however, leads all nations in horsemeat imports, having brought 28,574 metric tons into the country in 2012 (Australian Institute of Food Safety, 2013). Other countries where horsemeat is consumed include: China, Indonesia, Japan, Kazakhstan, and Scotland (Huffington Post, 2013).

Market prices for chilled, fresh horsemeat in Belgium, France, and the Netherlands ranged from $10.81 to $40.02 per kilogram, with an average of $23.22 per kilogram, while the price of individual packages of processed horsemeat products ranged from $1.87 to $3.92 (Geyer and Lawler, 2013). "In comparison, the price of a fresh cut of beef in the Netherlands in 2012 was €28 ($37.17) per kilogram, while a 500g package of processed, minced beef cost €3 ($3.98)" (Geyer and Lawler p. 251, 2013). In order to answer questions concerning the ethical treatment of animals, economic efficiency, and the differing roles of horses,

the U.S. public and their policymakers must make a choice—to slaughter or not to slaughter—that will have economic and welfare ramifications.

The Impacts of Horses as Food

One impact of renewing domestic horse slaughter is that the revenue and economic benefits from an American input product (horses) would be retained by the U.S. economy rather than going to Mexican and Canadian horse slaughter facilities. Benefits of domestic slaughter would be greater if, in addition to domestic labor, the companies were American owned. American companies such as Rains Natural Meats are working with the U.S. Department of Agriculture (USDA) to open, but the three slaughter facilities operating in the United States until 2007 were all foreign owned (Geyer and Lawler, 2013). The U.S. Government Accountability Office (GAO) reported the value of horsemeat exported by American equine slaughter facilities in 2006—the last full year of horse slaughter in the United States—to be about $65 million (GAO, 2011). Therefore, renewal of domestic horse slaughter would bring a similar—if not larger—amount of revenue to American businesses in the industry, in addition to state and federal tax revenue generated from the facilities' operations.

Domestic reestablishment of the horse slaughter industry would also bring jobs—albeit very limited in numbers—back to the United States. Until domestic horse slaughter ended in 2007, the three slaughter facilities operating in the United States employed a total of 170 low wage workers (O'Dowd and McNichols, 2013). Now these jobs are located in Mexico and Canada. One hundred and seventy employment opportunities can be crucial to the wellbeing of small, rural communities. With facilities that have sought USDA inspection in Iowa, Missouri, New Mexico, Oklahoma, and Oregon, there is a realistic possibility of bringing hundreds of jobs to the United States with the renewal of domestic equine slaughter (Geyer and Lawler, 2013).

Another impact of potentially lifting the ban on domestic horse slaughter concerns equine welfare and the amount of suffering endured by horses throughout the slaughter process. According to Table 1, about 44% of American slaughter horses are sent to Canadian facilities for humane, regulated slaughter, while the other 56% are shipped to Mexico for processing. Although there are two EU-regulated slaughter facilities in Mexico (International Fund for Horses, 2014), many horses are sent to local Mexican butchers that are known to use less humane methods of slaughter. The most brutal and publicized technique, puntilla knife, includes a repeated stabbing of the animal's neck until the spinal cord is severed—a process that often leaves the animal conscious and in unnecessary pain and suffering during the slaughter procedure (Geyer and Lawler, 2013). Horse slaughter in the United States, however, was regulated under the Code of Federal Regulations 9 C.F.R. § 313.15 requiring horses to "be stunned in a manner that they will be rendered unconscious with a minimum of excitement and discomfort." All three horse slaughter facilities formerly in the United States were designed to achieve this standard through the captive bolt gun, a device which drives an attached rod through the animal's skull and into the brain, delivering a lethal blow (Wright, Rietveld, and Kennedy, 2005). When performed correctly, this procedure is considered humane, although some veterinarians argue that actual conditions in the slaughterhouse make it difficult to execute without causing unnecessary pain, suffering, or excitement to the horse (Dodman, 2008). Video clips from the Veterinarians for Equine Welfare (2014) purport to show multiple instances where the captive bolt technique required multiple shots or caused unnecessary excitement to the animal. According to livestock slaughter expert Dr. Temple Grandin (2012), however, "the worst outcome from an animal welfare perspective is a horse going to a local Mexican abattoir." Grandin goes on to say that "horses going to totally unregulated slaughter facilities in Mexico is much worse than even a poorly run U.S. plant." The following excerpt written by Grandin (Grandin p. 224, 2010) effectively summarizes this aspect of horse slaughter:

"When the Humane Society of the USA lobbied the government to pass this law, nobody thought about worse fates that some unwanted horses could suffer. The fates that are worse than slaughter in Texas and Illinois are: (i) longer transport times; (ii) transport under substandard conditions in Mexico; (iii) being neglected and left to starve in the desert (high hay and grain prices have made this problem worse); and (iv) being ridden and worked in Mexico until they become totally debilitated. The author has seen these worse fates and they are awful. Horse slaughter became such an emotional issue that animal advocates chose to ignore the observations of people in the field that indicated that there are worse fates than slaughter in a U.S. plant."

Therefore, renewing horse slaughter in the United States would significantly decrease the number of horses sent to Mexican facilities, giving more horses a better chance at being slaughtered humanely and lowering the overall suffering endured by American slaughter horses.

Transportation costs and distances are other important factors used by domestic slaughter advocates to argue for the industry's renewal. According to the GAO (2011), before domestic

slaughter ceased, horses traveled an average of 550 miles after being designated for slaughter while, after domestic slaughter ceased, its analysis showed horses intended for slaughter traveled an average of 753 miles—an increase of about 203 miles. As well as making it more difficult for domestic agencies to enforce transport regulations that protect animal welfare, the increased travel distance exposes American slaughter horses to less stringent—and, in some cases, a total lack of—transport regulations in Canada and Mexico (Geyer and Lawler, 2013). This often leads to horses being transported without food, water, or rest for extended periods—according to Humane Society International (2013), up to 36 hours in Canada—and allows them to be hauled in dangerous, double-deck trailers, which pose a serious risk for animal safety and are banned in the United States (Canadian Horse Defence Coalition, 2010). Therefore, reestablishing horse slaughter in the United States would better protect American slaughter horses under domestic transportation regulations that lower overall suffering endured by the animals.

Comparing transportation costs between domestic horse slaughter and the current model of North American horse slaughter shows another beneficial impact of a potential renewal of equine slaughter in the United States. Depending on proximity location of prior slaughter facilities and current ones in Canada and Mexico, buyers of U.S. horses now incur higher costs for trucking, fuel, and feed. Canadian transport regulations allow dangerous double decker trailers and allow transport for up to 36 hours, while the United States has banned these trailers and has a 24-hour transport limit. A basic transportation model would indicate that the price paid by the horse buyer would be diminished based on the additional cost of transportation. GAO (2011) data substantiates this claim, as its horse welfare analysis revealed that "the cessation of domestic horse slaughter led to an 8% to 21% decline—depending on sale price—in the per head price of horses sold at those auctions." This could be a clear indication that American slaughter horse sellers are harmed by locating slaughter facilities across borders. Logic indicates that renewing domestic horse slaughter would reduce transportation costs, thereby increasing slaughter horse prices and the revenue generated by U.S. horse sellers, which promotes the welfare of individuals and communities that host horse auctions.

A final argument offered by those in support of reviving domestic horse slaughter regards the possibility of capitalizing on a good (horsemeat) with significant international demand and a surplus of input resources (horses). According to the Unwanted Horse Coalition (UHC, 2014), thousands of horses are abandoned, abused, and neglected because their owners could not or did not wish to properly care for them. Although the lack of credible and comprehensive data makes it difficult to determine the exact number of horses abandoned per year (UHC, 2014), it is thought that thousands of them contribute to burdensome feral horse populations. The Bureau of Land Management (BLM, 2014) has estimated that there are at least 49,209 wild horses and burros on the range in 10 western states, while the maximum appropriate management level has been set at 26,684 animals. This is problematic in that herd sizes grow quite rapidly, while BLM holding facilities are almost at capacity. According to agency webpages, BLM has 48,447 animals in short-term corrals and long-term pastures (with a maximum capacity of 50,153) that require care and, subsequently, tax payer money. Both range-managed and holding facility animals impose significant damage and care costs on the unfortunate owners of the lands that they invade, as BLM reports it spent $44.435 million on gather, removal, and holding in FY 2014. Abandoning horses also increases the amount of suffering that they endure because they no longer have the food, water, and care that have been provided to them throughout their lives, usually leading to malnourishment or death. Slaughter supporters contend that domestic horse slaughter would provide a profitable outlet for government agencies or private individuals who gather feral horses while also supplying an international demand, although it is currently against BLM (2014) policy to sell or send gathered horses to slaughter facilities.

In effect, proponents argue, the international market for horsemeat allocates a calorie rich good to eager and willing consumers. Therefore, resuming the domestic horse slaughter industry could provide a more accessible and cost effective outlet for a widely available input resource seen as a nuisance if BLM policy allowed sales to slaughter facilities.

The Impacts of the Anti-Slaughter Choice

The second course of action available to the United States is to continue the ban on horse slaughter within the country. A key argument presented by anti-horse-slaughter advocates concerns the ethical and just allocation of American tax dollars. Polls have shown that 80% of Americans are opposed to horse slaughter. This reflects Americans' views of horses as companion animals, the cowboy riding off into the sunset, and horses as pets, contrary to the more detached, utilitarian way that Americans view more traditional livestock such as cattle or pigs (Geyer and Lawler, 2013). Funds that paid for federal horsemeat inspections before the industry's domestic cessation were allocated by Congress and collected through taxation. Virginia Congressman Jim Moran (2013) asserted that if horse slaughter were allowed in 2014, each

facility opened would have cost taxpayers over $400,000. In effect, taxpayers were funding the operation of an industry that they did not approve of before Congress took away funding and created the de facto ban that exists today. With budget cuts constantly an issue in modern politics, continuing the de facto ban on horse slaughter saves a large chunk of tax money for programs more likely to be wanted or needed by the public. Congress could assess a user fee on animal slaughter to pay for the required meat inspectors, however. A similar pay-for-inspection program was utilized by horse slaughter firms until it was declared unlawful by the U.S. District Court in 2007 (U.S. District Court, 2007).

Another argument against the domestic slaughter of horses regards horsemeat contamination from drugs and medications administered to horses. According to *Food and Chemical Toxicology*, the presence of phenylbutazone—a commonly used anti-inflammatory drug known also as 'bute' or 'PBZ'—is "highly likely" to be in some American thoroughbred race horses, which often head to slaughter after their careers end (Dodman, Blondeau, and Marini, 2010). Although the U.S. Food and Drug Administration bans the administration of PBZ to horses intended for human consumption (U.S. Food and Drug Administration, 2014) because it can cause bone marrow toxicity in humans, the authors assert that there appears to be inadequate testing to ensure that horses given banned substances such as PBZ do not enter the slaughter pipeline (Dodman, Blondeau, and Marini, 2010). This led to their conclusion that consuming American horsemeat poses a serious public health risk (Dodman, Blondeau, and Marini, 2010). In addition to potential bute contamination, slaughter opponents argue that horse owners "almost universally give their horses medications, antibiotics, ointments, wormers, and other substances labeled 'not for animals intended for human consumption'" (Animal Welfare Institute, 2014). With no effective way of tracking the drug and medication histories of all horses, the Animal Welfare Institute (2014) asserts that consumers of horsemeat are exposed to serious health risks despite regulatory prohibitions from the EU and other countries that attempt to prevent contaminated meat from entering the food supply. Therefore, opponents of horse slaughter argue that potential meat contamination causes slaughter to be dangerous and ill-suited for mitigating the unwanted horse issue, as the lack of horse drug histories and effective regulations present health risks to consumers.

The negative externalities historically associated with horse slaughter facilities are also an important component of the argument to continue the domestic ban on the industry. Because horses have almost twice as much blood per pound of bodyweight than cows, equine slaughter facilities often experience issues with wastewater treatment and effluent discharge (Allen, 2012). The Dallas Crown horse slaughter facility that operated in Kaufman, Texas, would have cost the city $6 million for a new wastewater treatment plant; within weeks of the facility's closing in 2007, treatment capacity of the plant increased dramatically (Forbes, 2005), City officials alleged that legal costs from dealing with Dallas Crown's wastewater violations amounted to $70,000 in one year alone, placing great strain on town fiscal resources and consuming large amounts of taxpayer money (Allen, 2013). Other negative impacts from the facility included unpleasant odors, noisiness, and organic waste in the community (Geyer and Lawler, 2013). Finally, the Kaufman community saw a significant rise in real estate prices and property values, attracted more businesses that were previously deterred, and experienced significant (40-60%) drops in the rates of serious crimes after the facility's departure (Eckhoff, 2013). This not only promoted a safer and more prosperous community, but also decreased administrative and punitive costs of the local government. Therefore, maintaining the ban on domestic horse slaughter may be beneficial to potential host communities of the industry, shielding them from the detrimental externalities that have been experienced in former slaughter towns such as Kaufman.

Another justification used by anti-slaughter advocates to support the ban on horse slaughter concerns the relationship dynamic between Americans and their horses, as well as the horse's historical role in American society. Many Americans are against the consumption of horsemeat due to the horse's role in settling the American West, its value as a work and transportation animal, and importance as a show, racing, and recreation animal (GAO, 2011). In addition, many believe that the horse is now a companion animal, much like dogs, cats, or other domestic pets (GAO, 2011). For these reasons and others, horsemeat is no longer consumed in the United States, as tastes and preferences have shifted to accommodate new standards and values in society (Morris, 2013) that emphasize ethical treatment of a companion animal over the overall utility of the animal. Thus, a staple of the American diet has been removed from the Harvard Club dining room since 1985 (Geyer and Lawler, 2013).

Finally, the proliferation of horse rescue ranches supports the anti-slaughter viewpoint. From an animal welfare perspective, the best possible outcome for an unwanted horse is residency in a rescue ranch or sanctuary. These facilities provide care, nourishment, retraining, and adoption events for their horses, affording them a relaxed and humane approach

to death, as well as presenting a viable alternative to slaughter (Geyer and Lawler, 2013). Olexa, Cossey, and Smallwood (2011) assert that rescue ranches can "strengthen the equestrian community, create an additional revenue base for municipalities, provide an agricultural benefit to the public, and, perhaps most importantly, foster a humane alternative for all of the potentially useful, yet abused, abandoned, and aging livestock. In addition, rescue ranches can benefit local economies through linkages regarding purchases of feed, clothing, fencing, boarding supplies, and transportation services. Despite the many benefits provided by horse rescue ranches, their viability as a mechanism for unwanted horse disposal is limited by cost and capacity. Although comprehensive data in this area is limited, estimates from 2009 indicated that 39% of rescue and retirement facilities were at full capacity, while another 30% were near capacity (Osborne, 2009). This issue is exacerbated by the fact that some facilities recover as many as 23 new horses per month (Olexa, Cossey, and Smallwood, 2011), imposing costs estimated at up to $2,340 per horse per year (American Quarter Horse Association, 2007). Coupled with the relative longevity of horses (25-30 years), this can often force these facilities to stop taking new animals in order to promote the welfare of their current boarders. In addition, a potential ban on sending American horses across borders for slaughter would further strain the financial and physical resources of rescue ranches, as many more animals would need care. Therefore, rescue ranches provide a humane and economically beneficial outlet for unwanted horses, but lack the resources and capacity to completely replace North American horse slaughter or to significantly mitigate the unwanted horse issue.

In Search of a Compromise

The issue of horse slaughter in the United States has a diverse stakeholder group, causing ranchers, the meat industry, animal welfare groups, economists, taxpayers, and many more to stir debate on its utility, ethicality, and practicality. It seems as though no solution can maximize horse welfare and economic wellbeing, while also minimizing human health risks and accurately reflecting the values of the American population. This leaves us with a choice that will unavoidably cause some parties to lose. Though both options—renewing slaughter and continuing the ban—have significant benefits and drawbacks, the United States' final decision on horse slaughter must reflect current demographics, tastes, and preferences of the American people, as well as the practicality and economics of the horse as a global commodity.

For More Information

Allen, L. 2012. "Horse Slaughter a Fraud on the Public." Animal Law Coalition March 23. Available online: http://animal lawcoalition.com/horse-slaughter-a-fraud-on-the-public/

Animal Welfare Institute. 2014. "Horsemeat Poses Serious Risks to Human Health." Available online: https://awionline.org/content/safeguard-american-food-exports-safe-act

Australian Institute of Food Safety. 2013. "The Great Horsemeat Scandal". Available online http://www.foodsafety.com.au/2013/02/the-great-horsemeat-scandal-explained/.

American Quarter Horse Association as Amici Curiae Supporting Petitioners, Cavel International, Inc., v. Lisa Madigan. 2007. 500 F.3d 551. (No. 07-962) 2008 WL 1803448

Canadian Horse Defence Coalition. 2012. "Horses and Double Decker Trailers." Available online: http://defendhorsescanada.org/doubledeckerdoc.pdf

Chalabi, M. 2013. "Horsemeat: EU imports and exports data," *The Guardian*,.February 13. Available online: http://www.guardian.co.uk/news/datablog/2013/feb/13/horsemeat-uk-eu-imports-exports#table.

Dodman, N., N. Blondeau, and A.M. Marini, 2010. "Association of Phenylbutazone Usage with Horses Bought for Slaughter: A Public Health Risk." *Food and Chemical Toxicology* 48 1270-1274. Available online: http://equinewelfarealliance.org/uploads/Food_and_Chemical_Toxicology_FINAL.pdf

Eckhoff, Vikery. 2012. "Texas Mayor Paula Bacon Kicks Some Horse Slaughter Tail" and accompanying photo essay, "Life in a Slaughter Town: Kaufman, Texas." *Forbes*. January 10. Available online: http://www.forbes.com/sites/vickeryeckhoff/2012/01/10/texas-mayor-paula-bacon-kicks-some-tail/5/

Geyer, L. and D. Lawler. 2013. "Yea or Neigh? The Economic, Ethics, and Utility of the Horsemeat Filet." *Food Law and Policy* 247-274.

Gorey, T. 2014a. U.S. Department of the Interior, Bureau of Land Management, "Myths and Facts" August 15. Available online: http://www.blm.gov/wo/st/en/prog/whbprogram/history_and_facts/myths_and_facts.html

Gorey, T. 2014b. U.S. Department of the Interior, Bureau of Land Management. *"Wild Horse and Burro Quick Facts."* October 28. Available online: http://www.blm.gov/wo/st/en/prog/whbprogram/history_and_facts/quick_facts.html.

Grandin, T. 2012. "Answering Questions About Animal Welfare During Horse Slaughter." Available online: http://www.grandin.com/humane/questions.answers.horse.slaughter.html.

Grandin, T. 2010. *Improving Animal Welfare: A Practical Approach*. Wallingford, Oxfordshire, UK: CAB International. 224.

Horse Channel. 2014. Horse Slaughter Ban. Aired January 18. Available online: http://www.horsechannel.com/horse-news/2014/01/18-horse-slaughter-ban.aspx

The Huffington Post. 2013, February 17 "9 Countries that Actually Love Eating Horsemeat."

Available online: http://www.huffingtonpost.com/2013/02/17/countries-that-eat-horsemeat_n_2697565.html

Humane Society International/Canada. 2013. "HSI/Canada Calls for a Prohibition on Horse Slaughter after Cruelty in Canadian Facilities Exposed." Available online: http://www.hsi.org/world/canada/news/releases/2013/02/canada_horse_slaughter_cruelty_022813.html.

International Fund for Horses. 2014. Horse Slaughter: Images and Description, Available online: http://www.horsefund.org/horse-slaughter-images.php.

Luby, R. 2014. "ABQ BioPark to Buy 35,000 Pounds of Horse Meat to Feed Animals." KOB Eyewitness News 4, September 2. Available online: http://www.kob.com/article/stories/s3549540.shtml.

Moran, Jim. 2013. "USA Decision Allowing Re-opening of U.S. Horse Slaughter Facility." Media Release. (July 2.) Available at: http://moran.house.gov/press-release/moran-statement-usda-decision-allowing-re-opening-us-horse-slaughter-facility.

Morris, F. 2013. "Pets or Livestock? A Moral Divide Over Horse Slaughter," National Public Radio: The Salt. September 11. Available online: http://www.npr.org/blogs/thesalt/2013/09/11/221371617/pets-or-livestock-a-moral-divide-over-horse-slaughter

O'Dowd, P. and McNichols, M. 2013. "*Equine Slaughterhouse Feasibility: Unintended Consequences for US* 34," Wild Horse Observer Association. Available online: at http://whoanm.org/wordpress/wp-content /uploads/2013/02/UNITED-STATES-equine-slaughter-feasibility.pdf

Olexa, M.T., J.A. Cossey, and K. Smallwood, 2011. "Protecting Equine Rescue From Being Put Out to Pasture: Whether Ranches Dedicated to Abused, Abandoned, and Aging Horses May Qualify for "Agricultural" Classifications under Florida's Greenbelt Law," 16 *Drake Journal of Agricultural Law* 70, 88.

Osborne, M. 2009. "Unwanted Horse Survey Sheds Light on Issue's Causes, Extent," *Journal of the American Veterinary Association News*, August 15.

U.S. Congress. 2005. Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2006, Pub. L. 109-07, 119 Stat. 2120.

U.S. Department of Agriculture, National Agricultural Statistics Service. 2014. Available online: https://awionline.org/content/horse-slaughter-statistics.

U.S. Government Accountability Office. 2011. "Horse Welfare: Action Needed to Address Unintended Consequences from Cessation of Domestic Slaughter." 8 GAO-11-228. .

U.S. Government Printing Office. 2008. *Prevention of Equine Cruelty Act Hearing Before the Subcommittee On Crime, Terrorism, and Homeland Security,* statement by witness Nicholas H. Dodman. Available online: http://www.gpo.gov/fdsys/pkg/CHRG-110hhrg43830/html/CHRG-110hhrg43830.htm

U.S. National Archives and Records Administration. 2011. *Code of federal regulations.* Title 9 Part 313. Humane Slaughter of Livestock.

U.S. National Archives and Records Administration. 2014. *Code of federal regulations.* Title 21 Part 520

Veterinarians for Equine Welfare, *Horse Slaughter vs. Humane Euthanasia.* Available online: http://www.vetsforequinewelfare.org/video.php.

Wright, B., G. Rietveld, and D. Kennedy. 2005. *Euthanasia of Horses*, Ontario Ministry of Agriculture and Food. June 1. Available online: http://www.omafra.gov.on.ca/english/livestock/horses/facts/info_euthanasia.htm.

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