Are Animals Occupational Hazards?

Working with animals requires attention to the unique hazards each one poses—otherwise, results can be deadly for workers. Using multi-year data, BLS' comprehensive overview of occupational hazards posed by animals may be the first to focus on so wide a variety of animals, from livestock to wild animals to pets to insects.

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While animals serve human needs, they can turn on humans with deadly consequences. From 1992-97, animals directly inflicted or contributed to 375 fatal occupational injuries—1 percent of all the fatal injuries reported to the Bureau of Labor Statistics (BLS). BLS also estimates that, during this timespan, there were 75,000 animal-related nonfatal cases in the private sector of the economy.[1] These 75,000 cases account for 0.6 percent of all nonfatal injuries and illnesses involving 1 or more days away from work to recuperate.[2] On average, there are 63 fatal injuries and 12,500 nonfatal injuries and illnesses involving animals each year.

Historically, research on occupational hazards associated with animals has tended to focus on one particular occupation, animal, or group of animals such as farm animals, often subsumed under more general research.[3] Data for 1992-97 from the BLS Census of Fatal Occupational Injuries (CFOI) and Survey of Occupational Injuries and Illnesses (SOII) enable BLS to undertake a pioneering, comprehensive overview of occupational hazards posed by a wide variety of animals. (See tables 1 and 2 for the kinds of animals involved in fatal work injuries and in nonfatal work injuries and illnesses, respectively.) This article presents some of the results of that research.

All live animals, as well as some dead animals, are included within the scope of this discussion. However, once animal carcasses go beyond the initial stages of veterinary autopsy or food processing, they lose their status as animals for BLS classification purposes, and are considered animal products, meat, or waste. At that point they are no longer within the scope of this article.[4] Allergic reactions to animal products, such as feathers or dander, also are not addressed here.

Separate sections devoted to fatal occupational injuries and nonfatal occupational injuries and illnesses specific to birds, fish, insects and arachnids, dogs and cats, and cattle and equine comprise the body of the article. The numbers of fatal and nonfatal cases reported for sheep, swine, rodents, and snakes and other reptiles are too small to support such a detailed analysis.[5] The major causes of animal-related work fatalities are analyzed. Comparisons among different animal categories are then explored, followed by a summary of major findings and a brief conclusion.

Birds

Between 1992-97, there were approxi-

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TABLE 1. **Animals involved in fatal occupational injuries, number and percent, 1992-97**

Animal	Fatal occupational injuries	
	Number	Percent
Total	375	100
Animals, unspecified	-	-
Birds	-	-
Chickens	-	-
Turkeys	-	-
Other birds	-	-
Fish (includes shellfish)	-	-
Insects, arachnids	42	11
Mammals (nonhuman)	303	81
Dogs	8	2
Cats	-	-
Cattle (bovine)	141	38
Equine	104	28
Sheep	-	-
Swine	-	-
Rats, rodents	-	-
Other mammals[1]	41	11
Reptiles, snakes	-	-
Other animals	-	-

[1] Deer account for more than half of these fatalities, followed by elephants, which account for one-eighth.

NOTE: Dash indicates fewer than five fatalities or data that do not meet publication criteria. Numbers may not add to totals due to rounding and the application of publication criteria.

mately 1,200 nonfatal occupational injuries and illnesses involving birds. Poultry (almost entirely chickens and turkeys, but also ducks and geese) account for nearly nine-tenths of these cases. Manufacturing, which often includes poultry slaughter and initial processing, accounts for two-fifths of the cases involving birds. Agriculture and retail trade also account for large numbers of cases. Workers in three occupations—farmworkers, nonconstruction laborers, and butchers and meat cutters—experienced nearly half the bird-related nonfatal cases.

Chickens and turkeys make up nearly the entire stock of farm poultry. During the 1992-97 period, the number of chickens averaged 388 million, and the number of turkeys averaged 293 million, per year.[6] Table 2 shows that, despite these large numbers, poultry accounts for a very small portion of nonfatal cases.

Although the data suggest that such incidents are rare, birds can pose a particular hazard for aviation, and have the potential for causing incidents involving multiple fatalities. Birds can be sucked into aircraft engines, causing the engines to fail in flight.

Fish (including shellfish)

Although there are virtually no fatalities associated with fish, they account for 2,500 nonfatal occupational injuries and illnesses over the 6-year study period. Manufacturing accounts for most of these cases; nonprecision machine operator, handler, and laborer occupations typically associated with manufacturing account for two-fifths of the fish-related nonfatal injuries and illnesses.[7]

About half of fish-related nonfatal cases result from contact with objects, such as being struck by a several-hundred pound fish being unloaded for processing. A fish this size need not even be alive to cause such an injury or illness—it need only slip off a conveyor belt and land on a worker's foot. Overexertion (as may occur in lifting or wielding a heavy fish to put it on a conveyor belt) and exposure to harmful substances (as when dermatitis results from handling fish) account for the vast majority of the remaining cases. Fish also inflict a wide variety of injuries and illnesses such as sprains, and punctures other than bites—some species' fins, for example, can be very sharp.

Insects and arachnids[8]

Insects caused 42 fatalities during 1992-97. Of these, 39 were the result of venomous bee, wasp, or hornet stings. Because many persons are allergic to bee, wasp, and hornet venom, they can quickly succumb to such conditions as anaphylactic shock, or even heart failure, unless promptly treated. Although arachnids did not account for any fatalities during this period, arachnids and insects inflicted 36,100 nonfatal occupational injuries and illnesses.[9] Venomous stings and bites were the most common.

Bees, wasps, and hornets are prevalent throughout the country, and pose a threat to workers, particularly when they are active during warmer times of the year. Unless stung dozens or even hundreds of times, nonallergic individuals tend to survive bee, wasp, and hornet stings. Although more rare, workers also encounter poisonous spiders whose venom is more dangerous—even to those workers who are not allergic. In the southwestern parts of the country, scorpions, whose sting is more venomous than most spider bites, can be a hazard, but workers are less likely to encounter these nocturnal arachnids. Fire ants, which are becoming increasingly common in the southeastern parts of the country, also can inflict serious injury.[10]

Another, less common hazard associated with insects and arachnids is the transmission of diseases to humans. Workers bitten by ticks, for example, can contract diseases such as Lyme Disease and Rocky Mountain Spotted Fever, which can cause long periods of disability unless the condition is promptly diagnosed and properly treated.[11] Insects and arachnids can also play a contributory role in se-

TABLE 2. **Animals involved in nonfatal occupational injuries and illnesses, number and percent, 1992-97**

Animal	Nonfatal occupational injuries and illnesses	
	Number (thousands)	Percent
Total	75.0	100
Animals, unspecified	1.0	1
Birds	1.2	2
Chickens	.5	1
Turkeys	.5	1
Other birds	-	-
Fish (includes shellfish)	2.5	3
Insects, arachnids	36.1	48
Mammals (nonhuman)	32.5	43
Dogs	13.8	18
Cats	4.6	6
Cattle (bovine)	5.3	7
Equine	5.1	7
Sheep	-	-
Swine	1.9	3
Rats, rodents	.2	0
Other mammals	.6	1
Reptiles, snakes	1.1	1
Other animals	.6	1

NOTE: Dash indicates data that do not meet publication criteria. Numbers may not add to totals due to rounding and the application of publication criteria.

vere injuries, such as a worker falling off a ladder because of a wasp attack.

Outdoor workers account for three-quarters of fatal insect injuries, with 27 reported in the agriculture and construction industries over the study period. Outdoor workers, such as construction and nonconstruction laborers, truck drivers, groundskeepers, and farm workers, also are among the workers most frequently victims of nonfatal insect and arachnid injuries and illnesses. But so are some indoor workers, including machine operators, janitors, nurses aides and orderlies, and even cashiers.

It is not surprising that stings and bites are most common on the upper extremities, as these are the most exposed body parts. Outdoor workers, and some indoor workers such as machine operators and janitors, often wear short sleeves or roll up their sleeves, and generally do not wear gloves during warmer weather when these insects are active. An insect or arachnid might, moreover, be able to sting or bite through many summer shirt or blouse fabrics.

The lower extremities are inherently more vulnerable to insect stings and bites than are the upper extremities because the surface area of the lower extremities is greater, and because parts of the lower extremities are more difficult to swat. Nevertheless, stings and bites are inflicted on the lower extremities barely half as often as on the upper extremities. One explanation might be that it is harder for these insects to sting or bite through such common work pant fabrics as denim. Moreover, although some workers wear shorts or skirts outdoors in warmer weather, when exposure to stings and bites is more likely, most do not; some employers even prohibit or discourage such attire.

Because the head is one of the most sensitive body parts, a worker stung or bitten on the head would be more aware of the injury and, consequently, be better able to take preventive measures such as swatting the attacking insect or arachnid. The head, one of the most exposed body parts, accounts for one-tenth of cases involving insects and arachnids.

Of greater potential concern, however, is that one-third of the cases involving the head are in the eye region, where swelling from even a mosquito bite might keep a worker away from the job by impairing vision until the swelling subsides. These 1,300 cases, however, tend to be minor, with a short recuperation time. One-fifth of them involve a foreign body—a small insect, such as a mosquito or gnat—getting caught in the eye without biting the worker.

Dogs and cats

Dogs. Dogs were involved in eight occupational fatalities—six of which resulted from highway and nonindustrial offroad vehicle crashes in which the vehicle went out of control after hitting, or swerving to avoid hitting, the dog.[12]

Dogs also were involved in 13,800 nonfatal occupational injuries and illnesses involving days away from work, three-quarters of which resulted from animal attacks. Overexertion, primarily overexertion in lifting, accounts for nearly all the remainder—hardly surprising because a number of dog breeds are quite heavy and unwieldy.[13]

Two-fifths of nonfatal cases associated with dogs involve the upper extremities, compared with just over one-fifth of injuries and illnesses overall. Almost all of these cases involve the hand (including the fingers), and generally result from dog bites. Bites comprise three-fifths of all dog-related nonfatal cases. In addition, there is a small number of more serious dog bites that transmit diseases. Sprains are the next most frequent type of case, accounting for one-fifth of the dog-related nonfatal cases.

Dog-related nonfatal injuries and illnesses affect a wide range of occupations, although nonfarm animal caretakers account for one-third of these cases, followed by truck drivers, who account for one-tenth, and veterinary technicians and meter readers, who each account for one-twentieth.[14]

Cats. During the 1992-97 period, there were no occupational fatalities associated with cats, although cats account for 4,600 nonfatal occupational injuries and illnesses involving days away from work.[15] Almost all injuries and illnesses inflicted by cats are animal attacks, such as cat bites or scratches. Bites alone account for more than two-thirds of all cat-related cases. In addition, there is a small number of more serious cat bites that transmit diseases. Because cats are uniquely equipped to scratch, they account for more abrasions severe enough to require days away from work for recuperation than any other mammal.

Four-fifths of injuries and illnesses associated with cats involve the upper extremities, compared with just over one-fifth of injuries and illnesses overall. The arms, wrists, and hands are often the easiest body part for a cat to bite or scratch. Animal-handling occupations—particularly nonfarm animal caretakers, veterinary technicians, and veterinarians—have the largest numbers of cat-related nonfatal occupational injuries and illnesses. The number of nonfatal cases involving veterinary technicians is about the same for cats as for dogs, but cats inflicted almost twice as many nonfatal injuries to veterinarians as did dogs during the 6-year study period.

Comparisons between dogs and cats. As we have seen, the number of occupational injuries and illnesses associated with dogs is several times that of cats. While there were no fatal work injuries involving cats during the 6-year period, dogs accounted for eight fatalities. There were 3 times as many nonfatal occupational injuries and illnesses for dogs as for cats. Divergent estimates of the numbers of dogs and cats in the United States confound quantification efforts, although the number of cats appears to at least equal the number of dogs.[16] Consequently, it appears safe to conclude that dogs pose a larger work hazard than cats.

As the following tabulation illustrates, the 1992-97 gender distribution of nonfatal injuries and illnesses involving these two common pets contrasts

with the gender distribution of nonfatal cases overall:

Animal	Nonfatal occupational injuries and illnesses			
	Number		Percent	
	Men	Women	Men	Women
Dogs	6,584	7,174	48	52
Cats	1,002	3,644	22	78

Although, overall, men sustain twice as many nonfatal occupational injuries and illnesses as women, despite being barely a majority of the workforce, women account for a majority of the cases for dogs and for cats. Their share of cases involving cats, four-fifths, is particularly large. Nonfarm animal caretakers, such as might work in a veterinarian's office, pet store, or kennel, account for the largest number of injuries and illnesses inflicted by dogs and cats alike. According to data from the Current Population Survey, women make up two-thirds of employment in this occupation.[17] While this might help explain why women predominate among dog- and cat-related nonfatal cases, it does not explain why women account for a greater share of cat-related cases than of dog-related cases. Even after adjusting for truck drivers and meter readers—male-dominated occupations that are among the most common for dog-related cases, but that are negligible for cat-related cases—women's share of dog-related cases remains much less than their share of cat-related cases.

Sprains and strains, which account for more than two-fifths of nonfatal injuries and illnesses overall,[18] are considerably less prevalent for cat-related cases than for dog-related cases, comprising one-fifth of cases for dogs and a negligible share for cats. Cats typically average 5 to 6 pounds,[19] while dogs usually weigh much more. While this might explain why sprains and strains are inflicted with greater frequency by dogs than by cats, and why women account for a greater share of nonfatal injuries and illnesses inflicted by dogs than of nonfatal injuries and illnesses overall, it cannot explain why women suffer disproportionately more cat-related cases.

Cattle (bovine) and equine

Cattle. Cattle include bovine in general, such as dairy and beef cows, calves, heifers, steers, and bulls; bison, which are being introduced as a commercial beef animal (more commonly referred to as "buffalo"); beefalo, a cow-bison hybrid; and exotic bovine such as water buffalo.

Cattle account for more fatal work injuries than any other animal. These 141 cases comprise two-fifths of the 375 worker fatalities associated with animals, and nearly half of the 303 fatalities associated with mammals, during the 1992-97 period. However, cattle account for only 7 percent of nonfatal injuries and illnesses associated with animals, 5,300 cases, during these 6 years.[20]

The fatality risk is disproportionately localized in a small segment of the cattle population. Bulls, which are only about 2 percent of the cattle population, account for about half the cattle-related fatalities, 68 of the 141. But, at calving time, cows, which are two-fifths of the cattle population,[21] pose another, albeit less prevalent, peril: workers experienced five fatalities related to birthing or maternal defensiveness, such as cows attacking farmers trying to midwife them.

Animal attacks account for four-fifths of the cattle-related job fatalities, 114 of the 141. The 14 vehicle crashes resulting from collisions with cattle account for about half the remaining cases, with most of the rest being struck-against incidents, such as 6 cases involving cattle knocking a gate or panel into the worker.

Agriculture accounts for three-quarters of the total cattle-related fatalities. It also accounts for most of the cattle-related nonfatal cases, followed by manufacturing (including meatpacking, which involves slaughtering live animals), transportation, and wholesale trade. Farm workers suffered nearly half the cattle-inflicted nonfatal cases. Truck drivers, butchers, and nonconstruction laborers account for most of the remaining cases.

More than nine-tenths of fatal injuries and nonfatal injuries and illnesses inflicted by cattle involve men. Nonhispanic whites comprise two-thirds of cattle-related nonfatal cases for which race and ethnic origin were reported, with Hispanics accounting for virtually all the remainder.

Bruises (either alone or in combination with other injuries and illnesses) comprise about a third of cattle-related nonfatal cases, compared with one-ninth of all nonfatal cases. Fractures (either alone or in combination with other injuries and illnesses) comprise about a sixth of cattle-related nonfatal cases, compared with under one-tenth of all nonfatal cases. However, sprains and strains (either alone or in combination with other injuries and illnesses) also comprise about a sixth of cattle-related nonfatal cases, compared with more than two-fifths of all nonfatal cases. While sprains and strains are much less prevalent among cattle-related cases than in nonfatal cases overall, fractures, bruises, and contusions are much more prevalent.

Equine. Equine, which include horses, ponies, mules, burros, and donkeys, account for more fatal work injuries than any animal other than cattle.[22] The 104 fatal work injuries associated with equine comprise more than one-quarter of the 375 animal fatalities, and one-third of the 303 fatalities associated with mammals, that occurred during the 1992-97 period. The 5,100 nonfatal equine cases, however, account for only 7 percent of nonfatal injuries and illnesses involving animals during these 6 years.[23]

There were 53 animal attacks accounting for half of the equine-related job fatalities. There also were 25 nonattack fatalities which resulted from the rider falling off the horse,[24] 16 fatal animal-drawn vehicle incidents (such as falling off a horse-drawn hay cart), and 9 vehicle crashes resulting from collisions with equine or swerving to

avoid colliding with them.

The 64 cases involving workers in farming occupations constitute the majority of equine-related job fatalities, followed by those involving jockeys, rodeo riders, and animal trainers, which together account for 20 cases during this 6-year period. Agriculture accounts for two-thirds of the equine-related fatalities, with amusement and recreation services, such as racetracks, accounting for another one-fifth. Two industry divisions, agriculture and services, account for almost all equine-related nonfatal cases. Farm workers account for one-third of the equine-inflicted injuries and illnesses; nonfarm animal caretakers account for one-quarter.

Bruises (either alone or in combination with other injuries and illnesses) comprise about three-tenths of equine-related nonfatal cases, compared with one-ninth of all nonfatal cases. Fractures (either alone or in combination with other injuries and illnesses) also account for about three-tenths of equine-related nonfatal cases, compared with under one-tenth of all nonfatal cases. However, sprains and strains (either alone or in combination with other injuries and illnesses) comprise less than one-fifth of equine-related nonfatal cases, compared with slightly more than two-fifths of all nonfatal cases. Whereas fractures account for only one-sixth of cases involving cattle, they are the leading injury involving equine, accounting for three-tenths of cases.

Comparisons between cattle and equine. A unique feature of both cattle- and equine-related cases is that an unusually high portion of trunk injuries involve locations other than the back or shoulder. For nonfatal cases overall, the back and shoulder account for four-fifths of trunk cases. In contrast, for cattle- and equine-related cases, the back and shoulder account for only half of the trunk cases.

Almost three-fifths of cattle-related nonfatal injuries involve the worker being attacked by cattle. Being struck by objects, as when a worker is hit by a gate nudged by a cow passing through it, accounts for an additional one-fifth of nonfatal cattle-related cases. Similarly, more than half of the equine-related cases also involve animal attacks. Being struck by objects accounts for three-tenths of nonfatal equine-related cases.

As the following tabulation shows,[25] for 1992-97, the peril cattle pose to workers is proportionate to their share of farm mammals overall:

Animal	Numbers of head (millions)	Fatalities
Total	174	249
Cattle	101	141
Swine	59	-
Sheep	9	-
Equine	5	104

NOTE: Dash indicates fewer than five cases or data that do not meet publication criteria.

Cattle account for three-fifths of the work fatalities involving farm mammals, and for three-fifths of farm mammals. However, the fatality hazard for equine is different: while equine comprise only 3 percent of all farm mammals, they account for two-fifths of the work fatalities involving farm mammals. Swine make up one-third of farm mammals, but account for few fatalities. Sheep, which are only about 5 percent of farm mammals, account for a negligible number of fatalities.[26] In addition to the differences in purpose of the various animals, this may reflect the relative physical size of sheep and swine, compared with horses and bulls.

Table 3 shows the percent distribution of fatal nonvehicle-related injuries inflicted by cattle and equine. Internal and intracranial injuries account for more than two-thirds of fatal cases for both cattle and equine. Injuries of this character and magnitude reflect these animals' sheer size and weight. Intracranial injuries play a larger role in fatal injuries for equine than for cattle, most likely because one of the most typical uses of horses is as riding animals. Riders falling off horses, horses falling while being ridden, and riders being bucked off horses are common causes of equine-related work fatalities.[27] On the other hand, internal injuries play a larger role in fatal injuries involving cattle than in those involving equine.

Major causes of fatal work-related fatalities

Three-fifths of the 375 work fatalities involving animals are the result of being attacked by an animal, or being stung or bitten by a venomous animal. These 227 incidents are divided into two main categories: Animal attacks, such as being gored by a bull or thrown from a horse carriage by a spooked horse, which account for 186 job fatalities; and venomous stings and bites, which account for 41 job fatalities.[28] Bee, wasp, and hornet stings account for nearly all the venomous stings and bites; cattle and equine account for the vast majority of animal attacks. Table 4 shows the kinds of animals most frequently involved in these incidents.

Fatal highway and nonindustrial, offroad vehicle crashes involving animals typically result from collision with an animal or swerving to avoid it; these 75 cases account for a fifth of animal-related fatalities. The following tabulation shows the number of cases attributable to the kinds of animals most frequently involved in fatal highway and nonindustrial, offroad vehicle incidents.

Animal	Number of cases
Total	75
Deer	24
Equine	20
Cattle	15
Dogs	6
Other	10

Cattle-related vehicle fatalities invariably involve collisions with cattle in the roadway: two-thirds of these cattle-related fatalities involve trucks, and half involve tractor-trailer trucks. Equine-related vehicle fatalities usually involve animal-drawn vehicles, such as horse carriages and hay wagons. In most vehicle crashes involving other animals, the crashes resulted because drivers attempted to swerve to avoid them. Trucks also were involved in half of these crashes, but tractor-trailer trucks were involved in only one-sixth.

TABLE 3. **Percent distribution of fatal nonvehicle-related injuries involving cattle and equine, 1992-97**

Injury	Cattle	Equine
Internal	39	26
Intracranial	25	41
Multiple, involving both internal and intracranial	5	7
Multiple, except those involving both internal and intracranial	16	6
Other	15	20

NOTE: Data exclude vehicular crashes.

TABLE 4. **Fatalities involving animal attacks or venomous stings and bites, 1992-97**

Type	Number
Total	227
Animal attacks	186
Cattle	114
Equine	53
Exotic mammals[1]	9
Other animals	10
Venomous stings and bites	41
Bees, wasps, hornets	39

[1] This category includes such mammals as elephants, tigers, and giraffes, which are not native to the United States and which are not included in the other specific categories. Elephants account for more than half of the fatalities inflicted by exotic mammals.

NOTE: Subcategories might not sum to totals due to subcategories not shown.

Combined, the 75 fatalities resulting from highway and nonindustrial, offroad vehicle crashes involving animals, and the 227 fatal animal attacks and venomous stings and bites, total 302 cases, four-fifths of the animal-related fatalities during the 1992-97 period.

Major findings

A number of key findings emerged from this analysis of the 1992-97 data:

- The risk that cattle pose to workers is proportional to their share of farm mammals overall. In contrast, equine comprise 3 percent of all farm mammals, but account for two-fifths of the work-related fatalities involving farm mammals. Swine and sheep pose a smaller risk than their share of farm mammals overall.

- Internal and intracranial injuries make up more than two-thirds of work-related fatalities involving cattle and equine. Intracranial injuries play a larger role in fatal injuries involving equine than in those involving cattle, while internal injuries play a larger role in fatal injuries involving cattle than in those involving equine.

- For both cattle and equine-related cases, a high proportion of trunk injuries involve locations other than the back or shoulder.

- The number of fatal and nonfatal cases associated with dogs is much greater than that for cats, demonstrating that dogs pose a larger work hazard than cats.

- Although men suffer a majority of nonfatal occupational injuries overall, women account for four-fifths of nonfatal occupational injuries and illnesses involving cats.

- Outdoor workers account for three-quarters of fatal insect injuries.

- Three-fifths of the animal-related work fatalities involved attacks by animals or stings or bites by venomous animals. Another fifth resulted from highway and nonindustrial, offroad vehicle crashes involving animals.

- Few, if any, work-related fatalities involved snakes or other reptiles, sheep, swine, or rodents.

Conclusion

Animals pose unique hazards to workers, such as being stung by bees or trampled by cattle. Although animals can pose hazards common to work-related injuries and illnesses overall, such as knocking a gate or panel into a worker in much the same way a gust of wind might do, these incidents are the exception. Animals also pose hazards that have both common and unique features. For example, deer darting into traffic to cross the road can cause crashes as vehicles swerve to avoid them, in much the same way that vehicles weaving in and out of traffic can cause crashes. However, unlike vehicles, deer often dart suddenly out of the roadside brush. Although some animals are large and heavy enough to be potent vehicle collision hazards in and of themselves, even collisions with smaller animals, such as dogs, can cause drivers to lose control of their vehicles.

Animals are among the few animate objects with which workers interact, and this places them in a special class of workplace hazards. To illustrate: the weight within a cabinet could shift were the shelves to fall out as furniture movers maneuver the piece up the stairs, straining a worker's back; but wielding a dog can cause a similar injury to a veterinary assistant were the dog to decide to shift its own weight. Similarly, inanimate objects do not attack a worker in the same way that a bull might gore a farmer or an elephant trample its trainer. Working with, or in the presence of, a particular animal requires special attention to the unique hazards it poses.

[1] Data on fatal work injuries are from the Bureau of Labor Statistics Census of Fatal Occupational Injuries (CFOI), 1992-97. This program, which has collected occupational fatality data nationwide since 1992, uses diverse data sources to identify, verify, and profile fatal work injuries. Information about each workplace fatality (occupation and other worker characteristics, equipment being used, and circumstances of the event) is obtained by cross-referencing source documents, such as death certificates, workers' compensation records, and reports to Federal and State agencies. This method ensures that counts are as complete and accurate as possible. CFOI data do not include fatal work illnesses.

Data on nonfatal work injuries are from the Survey of Occupational Injuries and Illnesses (SOII), 1992-97. This program collects information on nonfatal work-related injuries and illnesses from a random sample of about 250,000 establishments representing most of private sector wage and salary employment. The self-employed and farms with fewer than 11 employees are excluded. Worker characteristics are collected only for those workers sustaining injuries and illnesses that require days away from work to recuperate.

Because the scope and methodology of CFOI and SOII are different, comparison of the fatal and nonfatal data is problematic.

More information on CFOI and SOII is available at http://stats.bls.gov/oshhome.htm.

[2] A fatal injury was included in this study if an animal was the source or secondary source of the injury, or if the case's narrative description identified an animal as playing an active role in the fatal incident. Because secondary source was not published for the nonfatal SOII data, and narrative descriptions are not included in the SOII database, nonfatal occupational injuries or illnesses were included only if the animal was the source. The source identifies the object, substance, bodily motion, or exposure that directly produced or inflicted the injury or illness, whereas the secondary source identifies the object, substance, or person that generated the source of injury or illness or that contributed to the event or exposure. Each case must have a source, but many cases do not have a secondary source associated with them. Fatal injuries with source as an animal account for 0.6 percent of all injury fatalities, approximately the same percentage as for nonfatal occupational injuries and illnesses with source as an animal. When fatal injuries with a source other than an animal, but with a secondary source as an animal or with a narrative description identifying an animal as playing an active role in the fatal incident, are included, fatal injuries involving animals rise to 1 percent of fatal injuries.

[3] Examples of such occupation or animal-specific research include A. Steele-Bodger, "Hazards of Animal Handling," *Annals of Occupational Hygiene*, vol. 12, no. 2, 1969, pp. 79-85, which deals with farm animals; T.H. Cogbill and H.M. Busch, Jr., "The Spectrum of Agricultural Trauma," *Journal of Emergency Medicine*, vol. 3, no. 3, 1985, pp. 205-10; H.M. Busch, Jr., T.H. Cogbill, J. Landercasper, and B.O. Landercasper, "Blunt Bovine and Equine Trauma," *Journal of Trauma*, vol. 26, no. 6, 1986, pp. 559-60; J. Landercasper, T.H. Cogbill, P.J. Strutt, and B.O. Landercasper, "Trauma and the Veterinarian," *Journal of Trauma*, vol. 28, no. 8, 1988, pp. 1255-59; T.H. Cogbill, P.J. Strutt, J. Landercasper, and B.O. Landercasper, "Injuries from Horses and Cows," *Complications in Orthopedics*, vol. 4, no. 4, 1989, pp. 112-14, 120; and P. Freta, "Injuries from Farm Animals," *Principles of Health and Safety in Agriculture* (Boca Raton, FL, CRC Press, Inc., 1989), pp. 365-66.

[4] *Occupational Injury and Illness Classification Manual* (Washington, Bureau of Labor Statistics, December 1992) pp. DS55-DS56.

[5] *Encyclopedia Americana* reports, "Fatal snake bites are extremely rare in the United States…probably fewer than 10 such deaths annually...." Unlike Asia, where annual snake bite deaths are estimated at 30,000 to 40,000 because large populations live in close proximity to dangerously venomous snakes, the United States has only a few species of venomous snakes, and their habitats are usually isolated from population centers. Only 15 percent of snake species worldwide are venomous. Moreover, even when venomous snakes do bite, half the time they do not inject venom. (*Encyclopedia Americana*, vol. 25 (Danbury, CT, Grolier, Inc., 1999), p. 104.)

Attacks by other reptiles, such as gila monsters and alligators, also are rare, perhaps because these creatures are becoming less common as the consequence of property development, or because workers know how to avoid places that they frequent.

Bats are now the primary rabies vectors (organisms that transmit pathogens) to humans. Since 1980, 25 persons have caught rabies in the United States, all but three of them from bats. ("Bat Bites Cause Most U.S. Rabies Cases," *Washington Times,* Nov. 3, 1999, p. C5.)

[6] *Agricultural Statistics, 1999* (Washington, U.S. Department of Agriculture, National Agricultural Statistics Service, 1999), pp. VIII-30 and VIII-40-VIII-41.

[7] Due to vagaries of coverage requirements and reporting practices for some offshore operations, some nonfatal cases in the fishing industry may not be included.

[8] Insects are six-legged arthropods whose bodies consist of three segments—head, thorax, and abdomen—whereas arachnids are eight-legged arthropods whose bodies consist of only two segments—head and abdomen. Bees, hornets, and wasps are insects, whereas spiders, scorpions, and ticks are arachnids.

[9] Because small farms with fewer than 11 employees are excluded from SOII coverage, the actual number of nonfatal cases involving insects and arachnids is likely to be greater than the 36,100 reported to the SOII.

[10] For more information on venomous stings and bites, see Matthew Cahill, ed., *Diseases* (Springhouse, PA, Springhouse Corp., 1993), pp. 266-67.

[11] See Cahill, *Diseases*, pp. 135-37, 184-86, and 189-92. See also "Lyme Disease Facts," *Hazard Information Bulletin* (Washington, U.S. Department of Labor, Occupational Safety and Health Administration, Apr. 20, 2000).

[12] Dogs, in the BLS Occupational Injury and Illness Classification System, refer strictly to domestic dogs. Other members of the dog family, such as wolves, are subsumed under other mammals. SOII does not contain sufficient detail to ascertain the number of nonfatal cases attributable to other members of the dog family.

[13] A number of dog breeds are heavy and unwieldy. Saint Bernards, for example, can reach as much as 200 pounds. (See *Encyclopedia Americana,* vol. 9, p. 234.) BLS data are not sufficiently detailed to afford any breed-specific conclusions.

[14] Because the SOII does not include government employment, nonfatal animal-related injuries and illnesses to public sector employees, such as animal-control officers, police officers, and letter carriers, are not available from BLS. Data for some of these occupations might be available from other sources, such as the U.S. Department of Labor, Occupational Safety and Health Administration for Federal Government employees, and the U.S. Postal Service for postal workers. See also "Risks of the Route," *The Washington Post*, June 12, 2000, p. A19.

[15] Cats, in the BLS Occupational Injury and Illness Classification System, refer strictly to domestic cats. Other members of the cat family, such as tigers, which account for a small number of fatal occupational injuries, are subsumed under other mammals. SOII does not contain sufficient detail to ascertain the number of nonfatal cases attributable to other members of the cat family.

[16] There is no apparent consensus about the numbers of cats and dogs in the United States. *Colliers Encyclopedia* estimates that there are 50 million cats, 10 million of which are feral (*Colliers Encyclopedia*, vol. 5 (New York, P.F. Collier, 1994), p. 539), but only 25 million dogs (vol. 8, p. 292). *Encyclopedia Americana* reports that there are 25 million cats (vol. 5, p. 801), while elsewhere reports cats are believed to outnumber dogs, which it estimates at 29 to 35 million (vol. 9, p. 234). *World Book Encyclopedia* estimates 58 million cats (*World Book Encyclopedia*, vol. 3 (Chicago, World Book, 1989), p. 284) and 49 million dogs (vol. 5, p. 264). The American Veterinary Medicine Association estimates there were 53 million dogs and 59 million cats in the United States as of the end of 1996 (*US Pet Ownership and Demographics Sourcebook* (Schaumburg, IL, American Veterinary Medicine Association, 1997), p. 3; and "Cats, Dogs Live Longer with Up-to-Date Care," *Washington Times*, Nov. 15, 1999, p. A2). The Pet Food Institute estimates there were 56 million dogs and 68 million cats in the country in 1996 ("Pet Incidence Trend Report" (Washington, The Pet Institute, 1999), p. 6).

[17] See *Employment and Earnings*, January issues for 1993-98, which contain annual

average employment data for 1992-97.

[18] Timothy Webster, "Putting a Strain on Workers' Health," *Compensation and Working Conditions*, Spring 1999, p. 29.

[19] *Encyclopedia Americana*, vol. 5, p. 801.

[20] Because small farms with fewer than 11 employees are excluded from SOII coverage, the actual number of nonfatal cases involving cattle is likely to be greater than the 5,300 reported to the SOII. Other studies that include small farms find farm animals account for as much as one-third of traumatic nonfatal agricultural injuries. See Cogbill and Busch, "The Spectrum of Agricultural Trauma," pp. 205-10; T.L. Napier, W.R. Goe, and A.R. Pugh, "Incidence and Predictive Factors Associated with Farm Accidents in Ohio," Research Circular 287 (Wooster, OH, Ohio State University, 1985); and T.H. Cogbill, E.S. Steenlage, J. Landercasper, and P.J. Strutt, "Death and Disability from Agricultural Injuries in Wisconsin: A 12-year Experience with 739 Patients," *Journal of Trauma*, vol. 31, no. 12, 1991, pp. 1632-37.

[21] *Agricultural Statistics, 1999*, p. VII-1.

[22] "U.S. Equine Inventory Up 1.3 Percent," Agriculture Department Bulletin Eq 1 (Washington, U.S. Department of Agriculture, National Agricultural Statistics Service, Mar. 2, 1999).

[23] Because small farms with fewer than 11 employees are excluded from SOII coverage, the actual number of nonfatal cases involving equine is likely to be greater than the 5,100 reported to the SOII. See note 20 for further discussion of the role of farm animals in traumatic nonfatal agricultural injuries.

[24] Examples of animal attacks involving equine include a horse bucking its rider; a horse seeing a rattlesnake and rearing back in fright, causing the rider to fall off; a horse being broken in dragging its trainer; horses trampling a jockey who falls off his horse during a race; and a mule kicking a farm worker standing near it. Examples of falls from equine that are not animal attacks include a horse losing its footing and falling, even falling on top of the rider; a rider falling off, even if merely as a consequence of the horse galloping too fast; and a rider losing her balance for reasons unrelated to the motion or behavior of the horse.

[25] Cattle, swine, and sheep data are from *Agricultural Statistics, 1999*, pp. VII-1, VII-19, and VII-29. The Agriculture Department began releasing equine data in 1999; consequently, equine data are from "U.S. Equine Inventory Up 1.3 Percent." Because of a lack of data for earlier years, the equine estimate represents the number reported as of January 1, 1998.

[26] The nonfatal SOII data exclude farms with fewer than 11 workers, rendering comparison of the prevalence of nonfatal occupational injuries and illnesses for particular kinds of farm animals inappropriate. Totals for fatalities involving various kinds of farm animals include those from farms with fewer than 11 workers, while totals for nonfatal occupational injuries and illnesses do not.

[27] For discussion of a similar concept for farm youth, see D.B. Reed, S. Novak, and R.L. Heath, "Farm Youth and Horse-related Injuries: A Case for Safety Helmets," *Journal of Agromedicine*, vol. 5, no. 1, 1998, pp. 45-57.

[28] The following explanation might help clarify the distinction between venomous stings and bites versus other animal attacks: A snake bite, for example, would be classified as a venomous bite for a poisonous snake such as a copperhead (presuming venom is injected), whereas it would be an animal attack for a nonpoisonous snake such as a king snake.