

## Animals and Severe Winter Weather

Several interlinked disaster conditions arise in the winter months: cold ambient temperatures, wind, snow, and ice. This chapter addresses these and the medical conditions that result from them because only a limited amount of literature deals with them

		TEMPERATURE °F												
		45	40	35	30	25	20	15	10	5	0	-5	-10	-15
WIND SPEED (MPH)	5	43	37	32	27	22	16	11	6	0	-5	-10	-15	-21
	10	34	28	22	16	10	3	-3	-9	-15	-22	-27	-34	-40
	15	29	23	16	9	2	-5	-11	-18	-25	-31	-38	-45	-51
	20	26	19	12	4	-3	-10	-17	-24	-31	-39	-46	-53	-60
	25	23	16	8	1	-7	-15	-22	-29	-36	-44	-51	-59	-66
	30	21	13	6	-2	-10	-18	-25	-33	-41	-49	-56	-64	-71
	35	20	12	4	-4	-12	-20	-27	-35	-43	-52	-58	-67	-75
	40	19	11	3	-5	-13	-21	-29	-37	-45	-53	-60	-69	-76
	45	18	10	2	-6	-14	-22	-30	-38	-46	-54	-62	-70	-78
			<b>A</b>						<b>B</b>					

WIND CHILL TEMPERATURE °F	DANGER
<b>A</b> ABOVE -25° F	LITTLE DANGER FOR PROPERLY CLOTHED PERSON
<b>B</b> -25° F/-75° F	INCREASING DANGER, FLESH MAY FREEZE
<b>C</b> BELOW -75° F	GREAT DANGER, FLESH MAY FREEZE IN 30 SECONDS

Wind chill index chart.

## General Problems

Two major environmental factors contribute to morbidity from cold, the air temperature and wind speed. One of the most important factors in exposure to cold is the amount of wind that is blowing. The faster the wind blows, the lower the relative temperature is. For every 20 mph of wind the relative drop in temperature is 31° F (17° C). Without wind even in very low temperatures, animals and humans can be relatively comfortable. However, when the wind blows, problems can develop rapidly. In animals there is a third factor that may make them susceptible to cold—the length and condition of their fur. Long fur or hair, which most animals grow naturally when exposed to gradually decreasing temperatures through the fall, is protective against the cold. However, if an animal's coat becomes wet or coated with mud, it is no longer effective as insulation. Cold weather is often associated with decreased humidity in the air. This combination of factors allows viruses to survive longer in the environment and may be part of the reason that respiratory diseases are more often diagnosed in the winter. Another factor that contributes to the increased rate of transmissible respiratory disease is the common practice of housing animals closer together to conserve heating costs.

## Human Conditions Related to Cold

Approximately 770 human deaths can be attributed to cold weather each year. This compares with an average of 270 persons dying each year from excessive heat. Half of the human deaths related to cold occur in persons older than 60 years of age, and 70% of these fatalities result from automobile accidents. The second most common (20%) cause of death is exertion. This occurs

most commonly in people engaging in unaccustomed exercise (shoveling snow) in cold air, which can affect myocardial contractility. The remaining deaths result from such conditions as hypothermia, carbon monoxide poisoning (indoor fires, waiting in stranded vehicles with the engine running and inadequate ventilation), and delayed response time of emergency services (ambulances) because of treacherous driving conditions. Cold “snaps” are not usually associated with increased mortality in humans; rather deaths are spread out over the entire cold season. More than 50% of severe cases of frostbite in humans are associated with drinking alcoholic beverages before or while being exposed to the cold.

### **Animal-Related Problems Caused by Severe Winter Weather and Cold**

Issues that arise from winter weather are probably underreported. The simple explanation for this is that many of the places affected are inaccessible, and trying to get to them is dangerous. Also problems related to cold temperatures and snow may be spread out over a large area. An example of how underreported winter-related problems are is the winter of 1993. At the same time that the media focused on the damages from the Northridge, California, earthquake, more building collapses and human deaths occurred in Pennsylvania because of snowfall than in California because of the earthquake. However, virtually no national reports were made on the Pennsylvania disaster.

### **Winter of 1996-1997**

Most recently the United States has suffered considerable loss of animal life because of severe weather. In the winter of 1996-1997 the Dakotas and upper Midwest were first covered by heavy snow and had prolonged periods of extreme cold. These were followed by extreme flooding in the spring. In January 1997, 500,000 lb of milk had to be discarded. The milk could not be collected because of snow-blocked roads. Similar losses occurred in New England in 1998.

Many grazing livestock were also stranded, and farmers were unable to reach them with feed and water. This led to poor body conditions in many animals, which predisposed them later to hypothermia resulting from floods. Eventually over 90,000 cattle died. More than 1000 carcasses were pulled from water in which they had drowned. Approximately 15,000 had to be buried where they were found.

Some employees of animal shelters and veterinary practices could not get to work, causing concern about the care of animals being boarded and those requiring medical attention. However, the public's preponderant concern became evident as phone calls started pouring in reporting pets that had been found unattended. Examples were stray animals that were found and dogs that were stranded in doghouses. Associated with these phone calls, humane officers had to investigate an increased number of animal neglect cases. It would appear that stray and abandoned pets may also be a great concern in blizzards.

### **Hypothermia**

Clinical problems that are associated with extreme cold are hypothermia and frozen extremities. Hypothermia is characterized by a body temperature below 95° F (35° C). Hypothermia can be primary, caused primarily by low ambient temperature, or secondary to other conditions such as infections, diarrhea, dehydration, or use of drugs (usually tranquilizers). Primary hypothermia carries a much better prognosis than secondary hypothermia. Hypothermic animals that show any sign of life should be reheated, even in the absence of a perceptible heartbeat, because they occasionally survive. If hypothermia is secondary to a disease process, the prognosis is usually worse than for primary hypothermia.

Animals that have become hypothermic should be reheated without delay. The two approaches to reheating hypothermic patients are fast and slow. The optimal method for each patient should be made on a case by case basis. Slow reheating is the more common and usually preferred method. In its basic form, slow reheating consists of placing the animal in a warm environment, covering its extremities with warm blankets or straw, providing a source of heat (e.g., heat lamp), and protecting it from the elements.

The most efficient way to reheat an animal is to use a heat box. This is highly effective because it supplies heat to the largest surface area of the body (the lungs) and therefore heats the animal via the core circulation. A heat box is simply a wooden box that is large enough for an animal (usually a lamb or calf) to stand up and move around in. The box has a double floor. The lower floor is for excrement collection; the upper is where the animal rests and should be made of coated perforated iron. Between the two floors an electric fan heater blows hot air into the box, which percolates up through the box. This allows the hypothermic patient to breathe hot air and effectively heats the animal from inside out, drying its coat and heating its extremities.

Heat boxes are highly effective, but animals should not be left unsupervised in them. A healthy lamb with primary hypothermia may reheat from a body temperature of less than 95° F (35° C) to normal body temperature in less than an hour, at which time it becomes susceptible to heat exposure. Care also must be taken with all hypothermic animals to ensure that they can maintain normal body temperature before they are returned to the environment in which they first became exposed. If an animal is sick and as a result becomes hypothermic, the primary disease must be treated before the animal can be returned safely to the field. One common underlying condition of neonates is starvation resulting from the mother's failure to produce enough milk for her offspring.

Other reheating techniques are usually performed in hospital situations because for these it is recommended that the techniques be accompanied by simultaneous intravenous therapy with warmed balanced electrolyte solutions containing bicarbonate and glucose. Yet other reheating protocols use warm (not hot) oral or rectal (enema) fluids to provide a source of core heat and nutrition.

### **Frostbite**

Frostbite results in physical damage to tissues, and frostbite injuries often take a long time to heal. Frostbite occurs relatively commonly in severe cold environments when sick animals are exposed to the cold. Calves are more likely to survive than many other neonates (e.g., foals, puppies, and kittens) because they are more resistant to cold. Evidences of previous frostbite are missing ear tips in calves and missing tails in adult cattle.

### **Miscellaneous conditions**

Other problems that arise in cold weather are hypocalcemia and hypomagnesemia in herbivores (cattle, sheep, and horses). These conditions usually occur when there is a sudden drop in temperature and in animals on diets that provide inadequate nutrition to withstand the cold.

All antifreeze is toxic to animals, but the degree of toxicity varies. Ethylene glycol is more toxic than propylene glycol. Monogastric animals (all species except ruminants, such as cattle, sheep, and deer) are most susceptible to antifreeze toxicity. If pets ingest even small amounts of antifreeze, their condition should be considered critical and they should be taken immediately to a veterinarian for examination. Horses, elephants, and hippopotami are monogastric animals and therefore also highly susceptible to antifreeze poisoning.

After pets have been out in the snow, accumulated snow and ice should be removed from between their paws and their coats should be dried. Special care should be taken to ensure that snow and ice do not accumulate between the toes, under the ears, and around the tail.

Cats commonly seek warm spots under car hoods in the winter, so it is important to knock on the car before starting it each time to ensure that any cats taking refuge there move.

Frozen water troughs and snow covering feed bunkers and pasture predispose animals to malnutrition and dehydration.

### **Business-Related Problems**

Ice storms can break power lines, causing widespread blackouts. This can be a serious problem for dairy farmers, making it difficult for them to milk their cows. Intensive farm industries, such as swine and poultry farms, may suffer during these storms if their heating systems fail or if fuel cannot be delivered for power generators. Power failure can result from system overloads, fire, or power lines that have been knocked down because of ice, wind, or snow.

Water supply can be compromised because of frozen pipes and pipes that burst as they thaw. This problem can be localized to one building or to one area of a town. Water and feed supply and the transportation of milk, animals, feed, and supplies can be interrupted because of generalized power failure. Access can be compromised because of snow, ice, poor visibility, flooding, frozen waterways, and unsafe passages over bridges. Buildings can be damaged from the weight of snow or from trees that fall on them. The general economy is often affected because of disruption of the supply network and isolation of suppliers and customers. Snow removal adds an additional expense both in cash and in time.

Animals that are expected to survive cold climates must be cold adapted. In most cases this occurs throughout the fall as the nighttime temperatures gradually fall and daylight hours decrease, making animals grow a thick protective coat. Animals also undergo metabolic adaptations that allow them to mobilize fat stores more quickly in the cold. These adaptations are important for pregnant animals because from birth the young have adaptive metabolisms similar to those of their dams that allow them to survive the cold. Animals that are not adapted to the cold should be protected.

The animals at greatest risk of exposure to cold are those that have not been adapted. Animals can inadvertently be exposed to unaccustomed cold temperatures when, for example, they are moved from the southern United States to the North in the fall, winter, or spring or when they have not been allowed to adapt to the cold because, for example, they have been kept indoors, have been excessively blanketed, or have been hospitalized.

Animals and humans that are adapted to living in the cold can survive extreme conditions. Similar to wildlife, livestock and horses that are adapted to cold can survive extreme conditions if they are protected from wind, are given sufficient feed, and have coats that are not muddy or wet. For example, cattle can survive temperatures of 30° F ( 34° C) if they are accustomed to cold weather and kept on full (ad lib) feed. (Note that cattle must also be adapted to eating ad lib feed; they cannot just be given free access.) If the diet is restricted, they should not be exposed to temperatures below 5° F ( 20° C). Cattle on restricted feed that are exposed to extremely low ambient temperatures for prolonged periods lose weight and are at risk of primary hypothermia.

### **Other Reports**

During severe winter weather in Europe in 1996 the Zurich zoo reported the death of a hippopotamus from incurable pneumonia. Presumably, the cold and other environmental factors pre-disposed this subtropical animal to respiratory disease from which it could not recover.

Every winter several deaths and near deaths of people who attempt to rescue their dogs or other animals are reported. The typical situation is that the rescuer spontaneously decides to go on a rescue mission but is improperly dressed or gets lost in severe weather. Another relatively common situation is for people to attempt to rescue an animal that is out on ice and then fall through the ice themselves.

Fire during winter storms presents a great danger because water supplies may freeze and firefighters and equipment may not be able to get to the fire.

A relatively common problem that arises in winter is the need to accommodate stranded travelers and their pets. Although most find places to stay such as hotels and motels, some contact emergency shelters. Shelters do not usually turn away people or their pets because this could be considered dangerous or even negligent.

If ice or snow brings down power lines, electrocution of animals can be a problem. Livestock may be most likely to be exposed to this risk.