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Care And Management of Livestock in Winters

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Abstract

Cold stress during winter poses significant challenges to livestock health, productivity, and welfare, particularly in young, aged, or stressed animals. This article reviews strategies to mitigate the effects of low temperatures, including proper shelter design, provision of clean and dry bedding, and access to sunlight to reduce heat loss. Nutritional management, with an emphasis on high-quality roughage and balanced supplements, supports increased energy demands and maintains body condition. Adequate water supply at appropriate temperatures is critical for digestion and thermoregulation, while parasite control further reduces physiological stress. Physiological adaptations, such as acclimation, fat reserves, and elevated metabolic rates, enhance the ability of animals to withstand cold. By integrating these management practices, livestock producers can minimize the negative impacts of cold stress, ensuring improved survival, productivity, and welfare during harsh winter conditions.

Keywords: Cold stress, livestock, winter management, shelter, feed, water, acclimation, metabolic adaptation.

Introduction:

Cold weather during winter, particularly when combined with high moisture levels, places considerable physiological pressure on livestock. While many farm animals possess natural mechanisms to tolerate low temperatures, animals that are very young, aged, unhealthy, or already under stress exhibit reduced resilience. Cold stress is widely recognized as a major cause of impaired growth rates and elevated death losses, resulting in notable economic damage to the global livestock sector, especially in regions with prolonged and harsh winters in the Northern Hemisphere. Depending on exposure duration and severity, cold stress may be classified as either short-term (acute) or long-term (chronic). Evidence suggests

that sustained exposure to moderately cold environments can trigger adaptive responses in animals, such as increased feed consumption, enhanced heat production, elevated basal metabolism, and modifications in digestive efficiency. As livestock production systems shift toward greater intensification, achieving fully enclosed housing for cattle remains impractical due to their inherent need for physical movement. Consequently, winter-related low ambient temperatures continue to pose challenges for cattle producers. Moreover, environmental factors such as strong winds and snowfall accelerate body heat loss, further intensifying cold stress. Observational studies indicate that dairy cattle raised in northern China may experience milk yield reductions of up to 40% during winter months, while calves aged 0–28 days show more than double the risk of mortality in winter compared with summer.

Shelter:

Most livestock can tolerate wind chill temperatures above 20°F without experiencing significant physiological stress; however, protection from adverse weather conditions remains essential for maintaining health and productivity. Animals must have access to a dry shelter to avoid exposure to cold rain, wet snow, and strong winds, all of which accelerate heat loss. While natural barriers such as trees may offer some protection, properly designed three-sided sheds oriented away from prevailing winds provide more effective shelter. The use of curtains or windbreaks can further reduce the impact of cold air currents. Adequate exposure to sunlight is equally important, as it supplies natural warmth and helps reduce microbial load within animal housing. Allowing animals to move outdoors during daytime hours enables direct sun exposure, which aids in maintaining body temperature. Sufficient space should be provided to allow animals to lie down comfortably without the risk of trampling or suffocation. In addition, clean and dry bedding is essential, as it serves as insulation against the cold ground and prevents excessive loss of body heat.

Feed:

It is a common misconception that livestock require additional grain during cold weather to maintain body warmth. In reality, heat production in animals primarily results from the fermentation of dietary fiber in the rumen, which releases energy and generates internal heat. Therefore, feeding good-quality roughage such as grass hay or alfalfa is both effective and economical for maintaining body temperature during winter. Monthly feed requirements should be adjusted according to standard forage guidelines, with animals generally receiving 2–3% of their body weight per day on a dry matter basis. Since hay typically contains about 10% moisture, 100 kg of dry matter corresponds to approximately 110 kg of hay. When lower-quality fodder is used, larger quantities are required to meet nutritional needs. Additionally,

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feed allowances should include at least 10% extra to compensate for wastage. During extremely cold conditions, livestock should be provided with a well-balanced and energy-rich ration, including supplements such as groundnut cake, mustard cake, cottonseed cake, and soybean flakes, to support maintenance requirements and prevent cold-related stress. Animal forage (dry matter in lb/month): 1Cow- 800, 1Horse- 1000, Sheep and Goat- 200.

Hay:

When purchasing hay, careful evaluation using sight, smell, and touch is essential to ensure good quality feed for livestock. High-quality grass or alfalfa hay is typically bright green, indicating adequate vitamin A content and good protein quality, whereas brown or bleached hay often contains degraded nutrients. Fresh hay should have a clean, grassy odour and should not smell mouldy, damp, musty, or dusty. The texture should be soft and leafy with fine stems, as coarse, thick stems indicate lower nutritional value. Ideally, hay should contain a high proportion of leaves with minimal stems, weeds, manure, or foreign material. Harvest maturity is also important, with grass hay best cut before full seed head development and alfalfa harvested at approximately 10–13% bloom, as excessive flowering reduces feed quality. All purchased feed should be tested for nutrient composition to ensure proper ration formulation and cost-effectiveness. When feeding fescue hay or grass seed straw, it is critical to ensure they are free from endophytes, which are toxic fungi that can severely affect animal health, particularly in horses where even small amounts may cause reproductive failure or death. Finally, hay should always be sourced from reliable suppliers, as contaminated hay may contain seeds of toxic or invasive weeds that can spread rapidly and pose long-term risks to livestock and pasture health.

Water:

Adequate water supply is one of the most important aspects of winter livestock management because water plays a vital role in digestion and heat production during fiber fermentation. Animals should never be expected to meet their water needs by consuming snow, as this requires excessive effort, reduces feed intake, and lowers body temperature. To encourage proper hydration, drinking water should ideally be maintained above 40°F, as cold water significantly reduces voluntary intake. Automatic waterers are preferable, but when unavailable, water must be provided several times daily and ice removed regularly during freezing conditions. Sufficient water intake is essential for animal welfare and varies according to body size, feed consumption, milk production, and environmental temperature. In horses, maintaining hydration during winter is especially critical, as they prefer water temperatures between 45 and 65°F and typically consume 5–15 gallons per day depending on

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activity and climate. Reduced water intake increases the risk of impaction colic, a condition caused by the accumulation of dry feed material in the digestive tract. Maintaining proper water temperature and increasing forage intake before cold weather can help prevent this condition. Estimated gallons of water needed: Horse- 8-12, Cows- 7-12, Sheep and Goats- 1-4.

In addition to hydration management, effective control of internal parasites before winter is necessary to reduce physiological stress and maintain body condition, as parasites such as *Ostertagia ostertagi*, *Dictyocaulus viviparus*, *Fasciola hepatica*, and *Calicophoron daubneyi* can negatively affect animal health and productivity.

Factors affecting an animal's ability to withstand the cold

- **Acclimation:** Cattle adapt to cold environments through acclimation, primarily by developing a longer and denser hair coat that help reduce heat loss. For this natural insulation to be effective, the coat must remain clean and dry, as the presence of dirt or moisture greatly reduces its insulating capacity and increases susceptibility to cold stress.
- **Fat layer:** Cattle with poor body condition are less capable of tolerating cold weather compared to animals with adequate fat reserves. A well-developed fat layer acts as an insulating barrier between the body core and the external environment, helping to retain heat and protect the animal from the effects of low temperatures.
- **Metabolic rate:** Cows elevate their metabolic rate to increase heat production, which helps in maintaining their body temperature. This demands an elevated diet, and hence the rise in their appetite.

Conclusion:

Cold stress significantly affects livestock health, productivity, and welfare during winter months. Effective management through proper shelter, adequate nutrition, clean and warm water supply, and good-quality feed is essential to minimize heat loss and maintain animal performance. Ensuring clean bedding, appropriate body condition, parasite control, and access to high-quality roughage help animals cope with low temperatures. Attention to acclimation, metabolic demands, and overall husbandry practices can greatly reduce the negative impacts of cold stress and improve livestock survivability and productivity during winter.

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