AS1564

Winter Management of the Beef Cow Herd

Good winter management practices help cattle tolerate the wind and cold temperatures.
(photo by Erika Kenner, Leeds, N.D., 2005)

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May 2011

In the northern Great Plains, winter is a fact of life in which severe cold temperatures, frequent dangerous wind chills, and blowing and drifting snow are common occurrences.

Beef cattle increase body heat production as a response to severe cold exposure by increasing their metabolic rate (heart rate, respiration and blood flow). Animals eat more during cold weather to meet maintenance requirements.

Beef cattle adapt to colder temperatures during gradual changes in the season by growing longer hair, changing their metabolism and hormone secretion (NRC, 1981), and depositing insulating subcutaneous fat if the energy level in the diet allows. A clean, dry hair coat and protection from the wind are very important factors that help cattle tolerate cold temperatures.

After adaptation, mature beef cows in good condition during midgestation may adapt to a lower critical temperature (LCT) as low as minus 6 F (NRC, 1981) in dry, calm conditions (Figure 1). The LCT is the temperature at which maintenance requirements increase to the point where animal performance is affected negatively. Good winter management practices contribute to healthy and productive cattle, reasonable feed costs and humane care. This publication describes recommended management practices for beef cows during the winter.

Physical Environment

Northern Plains Conditions

Cattle producers can mitigate the winter conditions to some extent with proper planning, facility design and good management practices. Fall and spring in the northern Plains can be challenging seasons for weaning and calving. In the fall, wet, cold conditions negate the natural insulation value of the hair coat critical to already stressed calves. In the spring, wet and muddy condition can contaminate udders and lead to health challenges of newborn calves.

Permanent or portable constructed wind fences protect beef cows. (Carrington Research Extension Center)

Wind Protection

Beef cows need protection from the wind, especially during periods of bitterly cold temperatures and severe wind chill (Figure 2, Wind chill chart). Protection can be provided by constructing wind fences or planting shelterbelts. The combination of constructed wind fences and mature trees provides excellent protection (Anderson and Byrd, 2004). Multiple tree rows of varying height and maturity planted 50 to 100 feet upwind from the wintering pens will slow the wind and allow drifting snow to drop among the trees, thereby reducing the amount of snow deposited in the pens. Shelterbelts should not be grazed because the damage from grazing will shorten the life or possibly even kill the trees and significantly reduce the wind and snow protection afforded by the trees, and the underbrush and grasses between the tree rows. Tree species selection and planting information is available from local Extension or Natural Resource Conservation Service offices, which have programs to assist cattlemen in shelterbelt development.

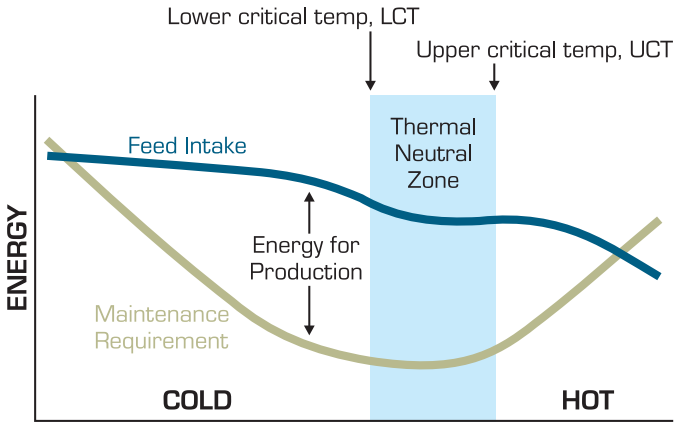

Figure 1. Relationship of feed intake and maintenance requirements to temperature. (Adapted from NRC 1981)

Figure 2. Wind chill danger zones for people and animals.

Estimated Wind Speed (MPH)	Actual Thermometer Reading (F)										
	50	40	30	20	10	0	-10	-20	-30	-40	-50
	Equivalent Temperature (F)										
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57
10	40	28	16	4	-9	-21	-33	-46	-48	-70	-83
15	36	22	9	-5	-18	-36	-45	-58	-72	-85	-99
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118
30	28	13	2	-18	-33	-48	-63	-79	-94	-109	-125
35	27	11	-4	-20	-35	-49	-67	-83	-98	-113	-129
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132
	Little Danger for Properly Clothed Person					Increasing Danger			Great Danger		

Wind speeds greater than 40 mph have little additional effect

Danger from freezing of exposed flesh

Constructed wind fences can be permanent or portable structures built in the fence line or placed inside the pens for all-around protection. Constructed wind fences that are 20 percent open and 80 percent solid allow some air to pass through and reduce downwind velocity a distance of 10 to 30 times the height of the wind fence. A 10-foot wind fence may reduce wind velocity effectively from 100 to 300 feet downwind, depending on wind speed and direction. Porous wind fences also will spread out snow accumulation. Solid fences will cause swirling and heavy snow accumulation immediately downwind and create smaller protected areas.

Wind-fence construction information and shelterbelt planning guidelines are available in the "Beef Housing and Equipment Handbook" (1987). Temporary wind fences can be made of bale piles (carryover hay or straw, or inedible biomass such as bull rushes or flax straw) stacked along the windward fence lines, snow piles pushed up by loaders, or other materials that will slow wind speed, such as large equipment tires.

Portable calf shelters should be utilized where cows and new calves do not have access to creep areas inside sheds or protected lots. Shelters should be moved periodically, and bedded and checked often.

Bedding is important for beef cows and newborn calves. (Carrington Research Extension Center)

Wintering Sites

Larger herds and environmental concerns have resulted in cowherds being wintered to a lesser extent in traditional drylot facilities and more on field feeding sites. Wintering on field feeding sites has some cost advantages because cows deposit manure on cropland or pasture, which saves mechanical lot cleaning, and it minimizes facility costs.

Several points should be considered when limiting the time cattle are confined to wintering lots and feeding is done in open fields. Protection from the wind remains critically important. Where natural shelter areas (trees, coulees, etc.) are not available, provide portable wind fences for protection. Minimize the impact to riparian areas by not feeding near water courses. Move the feeding site regularly to avoid concentrating manure and runoff concerns. On farmed fields, hay delivery with a bale processor minimizes residue for subsequent field operations.

One of the bigger challenges to "out wintering" is the development of an alternative winter watering site. Good field access for feed delivery and ability to bring cattle in to handling facilities for care are additional concerns. Snow depth can create problems in field feeding as well. Creating multiple windrows of snow with a loader can stop drifting snow and provide a clean feeding site.

Bedding

Bedding is important to help mitigate the cold by keeping cattle clean and providing insulation from snow or frozen ground. Replacement heifers fed primarily forage for modest gains may be more susceptible to the physical stress of severe wind chill and can become "cold soaked" or thoroughly chilled, which may reduce thriftiness and gain for several weeks and potentially lead to other health challenges.

Bedding is also important for beef cows, especially prior to calving in the winter. For mature cows in good condition and where clean snow is available, bedding may be needed only for calving. Bedding helps keep cows reasonably clean and protects the udder from frostbite and contamination. Bedded areas for newborn calves should be kept clean and new bedding added periodically.

Bulls definitely need bedding and wind protection, preferably sheds or more protective structures than simple wind fences, during the winter to reduce the possibility of frostbitten testicles, which can result in reduced fertility.

Pen Maintenance

Ice and snow buildup behind fence-line bunks and around water fountains may have to be removed occasionally during the winter. Removing ice and packed snow buildup will provide better footing for the cattle and avoid slips and falls that can lead to abortions or injury to bones and joints. A backhoe with a spike or a payloader works well for this. Water fountains or tanks should be checked every day during severe cold to ensure the waterer is operational.

Frozen manure lumps in high-traffic areas can increase stress on feet and legs. Scrape and pile frozen manure and snow in areas where runoff is contained. Scraping allows easier movement for cattle, machinery and people checking on cows. If snow removal from the pens is necessary, dump the snow in a site that drains into a containment structure. Runoff from clean snow should be directed away from containments.

Removing snow and ice buildup provides better footing for the cattle and easier access to feed in the bunk. (Carrington Research Extension Center)

Adequate nutrition helps maintain cow condition during winter.
(Lisa Pederson, Dickinson Research Extension Center)

Adaptation

Prepare cattle for the harsh extremes of winter through nutritional management in the fall. Make sure cows are receiving an adequate quantity and quality of feed to gain weight, put on some fat reserves and be in good body condition prior to the onset of bitter cold. Weaning calves reduces the cows' nutritional requirements and, given time, will allow cows to gain condition if fed appropriately.

Animals that have adapted to cold temperatures with adequate nutrition may have increased fat deposits that will act as insulation and energy reserves during severe winter cold. Do not allow cows to become too thin (condition score less than 4 on a 9-point scale) early in the winter because once severe weather starts, maintenance needs increase and significantly more energy density is required in the ration for cattle to gain weight. Most ration-balancing software programs will calculate maintenance needs based on weather conditions, but the condition of the cows is the ultimate test of the ration fed.

Feed Intake

Voluntary feed intake of beef cattle increases with decreasing temperatures. Table 1 describes the proportion of increase in intake for decreasing temperature ranges. Cattle consume 105 to 110 percent of predicted intake when temperatures drop below 22 F and up to 125 percent of predicted intake below 5 F (NRC, 1981). During severe cold (wind chills of minus 20 F or lower) intake actually may be reduced because cattle are reluctant to leave sheltered areas. Feeds with higher digestibility, that is, better-quality forage, should be fed during severe cold so cattle can compensate somewhat for increased energy needs.

A rule of thumb is to increase total digestible nutrients (TDN) 1 pound for every 5 degrees below zero F. Another version is to increase TDN 1 percent for every degree below the lower critical temperature, which in some cases with a dry winter coat may be as low as minus 6 F (NRC, 1981) for gestating beef cows adapted to winter conditions.

While many factors influence voluntary forage intake, for planning purpose, cows may consume as little as 2.5 percent of their body weight as hay under mild conditions but may need to be provided up to 3.5 percent during severe cold. Waste could increase the amount considerably.

Less than adequate feed intake and nutrient content of rations for pregnant beef cows could have short- and long-term consequences. Thin cows may be weak and have a difficult time calving, and they may not produce high-quality colostrum, affecting calf health. Calf vigor and rebreeding may be compromised as well. Fetal programming research suggests that cows fed less than adequate protein during gestation produce calves that may not be as healthy or productive throughout their lives.

Table 1. Voluntary feed intake of beef cattle in different thermal environments. (Adapted from NRC, 1981)

Temperature Range	Intake relative to published values (NRC, 1974)
78 to 60 F	Published values in Nutrient Requirements of Beef Cattle
60 to 40 F	Intake stimulated 2 to 5%
40 to 22 F	Intake stimulated 3 to 8%
22 to 5 F	Intake stimulated 5 to 10%
< 5 F	Intake stimulated 8 to 25% - intake during extreme cold or blizzards may vary greatly. Intake of high-roughage feeds may be limited by bulk.

Supplementation

Various forages are used as the primary feed source for wintering cows. Better-quality forage should be offered during the winter to keep cows in condition. Supplementation often is necessary to meet nutrient requirements of the animals when low-quality forage is fed. Extended periods of severe cold can reduce cow condition, especially if cows are in marginal condition and the ration is not formulated for the severe conditions. Cows can starve to death on a full stomach if forage quality is low and no supplements are offered. Impaction can occur, resulting in loss of rumen function and, potentially, death. If low-quality forage is the primary feed, supplemental protein and energy likely are needed.

Take samples of each forage (see "Sampling Feed for Analysis," NDSU Extension publication AS-1064, Schroeder and Sedivec, 2010) and send the samples to a reputable laboratory for analysis so you know what nutrients are in your feed and you can add specific ingredients to balance the ration. Assistance with ration formulation is available through your county Extension office or from feed companies.

Frozen feed requires significantly more energy to warm than wet feed, such as silage or distillers grain. Frozen feed must be thawed and warmed to body temperature. The effects of ingesting frozen (or cold wet) feed on rumen microbes and digestive function are not well defined.

Interval Feeding

Nutrient-dense feeds, such as silage, coproducts, grains and minerals, may be fed once every two days because preliminary research suggests cattle performance and rumen function are not affected negatively. Preliminary studies also suggest that lower-volume supplements (1 to 2 pounds per head per day) may be fed every third day without affecting rumen function. As an example, if cows are fed 2 pounds of a supplemental feed daily, feeding every third day means providing 6 pounds per head. More research is under way to evaluate interval feeding for gestating beef cows. Nutrient requirements in the third trimester of pregnancy increase, so intervals longer than two days may not be advisable without further research.

Another labor-saving technique is to pre-position forage in separate pens to reduce the frequency of starting tractors or loaders. Separate adjoining pens will be required for this practice. Feeding chores may be reduced to opening a gate every day or two. Pre-positioning bales once per week may be possible, depending on pen space, feeding arrangements and number of cows.

Grazing a multiday supply of bales in a field feeding setting (either set out periodically or allocated by temporary fencing) is gaining popularity to minimize feeding costs. To ensure the opportunity for cows to eat to their fill, meet nutritional requirements and control waste, a sufficient number of bales of known or estimated weight must be provided. Feeding waste can be controlled by the amount of feed provided and by using a mix of bales of higher- and lower-quality forage. Higher-value and higher-quality hay will be consumed with little waste, whereas some of the lower-quality forage of minimal value may be left as residue and used as bedding.

Sorting Cows

Cows should be sorted by nutrient requirements and fed according to need. This practice will optimize feed use and minimize overconditioned animals while permitting thin cows to recover without significant competition. Where limited lots or feeding areas will not accommodate grouping the herd by age and condition, at a minimum, a separate pen should be set aside for high-need animals lacking condition, thriftiness or soundness where competition is minimized and better feed can be provided. First-calf heifers and older, thin cows may be fed together with well-conditioned mature cows fed lower-energy diets appropriate to their production stage. Heifer calves kept for replacements will not compete well with mature cows and should be fed separately.

Time of Feeding

Feeding cows late in the day during severe cold will increase heat production during the night by the activity of eating and ruminating. Feeding cows at night also may alter the time cows calve, with as many as 85 percent of calves born between 6 a.m. and 6 p.m. when cows were fed between 5 and 10 p.m. (Anderson, 1982).

High-concentrate Diets for Emergencies

If the availability of forage is limited during severe storms, cows can be fed diets that are primarily grains or coproducts, but producers should manage carefully and understand the effects on the rumen. Feed must be distributed so all cows have equal access to avoid boss cows consuming more than their share and potentially experiencing acidosis. This practice runs some risk of nutritional problems.

Grains should be fed whole to reduce the rate of fermentation and acidosis potential. High-fiber feeds, such as wheat midds, soy hulls, barley malt or beet pulp, are preferred to grains due to low starch content and reduced acidosis potential. Distillers grain contains high levels of fat and sulfur and should not be fed as the sole feed ingredient. Careful planning and an extended adaptation period are recommended if high-concentrate diets are to be fed to beef cows in the winter.

Water

Cattle should have adequate amounts of clean, fresh water available at all times. Most automatic water fountains operating on a pressurized water system require energy to keep them from freezing. Energy-free fountains may be useful if more cows drink consistently and water from deeper wells enters the fountain at a higher temperature. Clean water fountain basins often and check water temperature to ensure thermostats are working and not drifting to higher temperatures.

To reduce the energy use of commercial water fountains, consider adding more insulation inside the housing, and cover the concrete slab inside the fountain as well. Rigid-board insulation cut to fit is recommended because it does not absorb water. The water line rising to the fountain from the buried lateral line should be centered inside a 10-inch or larger diameter insulated casing that extends 10 feet into the ground and acts as a heat well. Insulating the outside of the casing during construction where it passes through the concrete slab will reduce frost penetration. Steamfitters insulation may be useful for the riser pipe inside the casing, or a small light bulb may provide enough heat to keep pipes from freezing. Consider covering the exposed water surface with an insulated float, but secure it with a chain or cows may toss it out.

The "Beef Housing and Equipment Handbook" (1987) states that 16 head of cows can drink per foot of water fountain or tank perimeter when cows are in a pen and have continual access to water throughout the day. Practical experience suggests this is a conservative number if water flow is adequate.

Snow may be considered a water source in an emergency if it is soft and fluffy and not crusted or icy. However, some animals may not adapt to eating snow and suffer from dehydration. Also, thawing and heating melted snow to body temperature reduces cows' energy resources. Little research or information is available on snow as a water source.

Health Considerations

Extreme winter weather can result in hypothermia and ultimately cause death. Cattle that suffer hypothermia or frostbite are more prone to other disease conditions and certainly do not perform as well as cattle that are warm, dry and out of the wind.

Treating sick animals in the cold poses a challenge for personnel and products. When transporting or using any veterinary product, vaccines and medications should be kept in a "warm box" with a temperature from 35 to 45 F (2 to 7 C) when used. Frozen vaccines can become denatured, and frozen antibiotics can precipitate in the bottle. A portable heat source or more permanent chute-side heated and well-lit compartment on top of a work bench or cabinet works well to safely handle syringes and sharp objects such as needles, prepare correct dosages, and keep ear tags warm and pliable.

Calving

Sort cows close to calving into a more accessible facility for easier observation and addressing problems. A simple headgate-and-panels setup inside a lighted shed area is useful for solving dystocias. A calf warmer may be useful if cows are calved during severe weather (see photo). Small pens for short-term housing to ensure cows mother and calves nurse are very helpful in the shed with the headgate.

If possible, move cows that have calved to a new pen or yard to alleviate any issues with claiming newborn calves. This also will help maintain a healthy environment for newborn calves.

Crowding of baby calves in bedded shelters may increase the spread of scours or respiratory disease. Frequent checks, moving shelters and providing fresh bedding help reduce these challenges.

Calving cows in the winter may result in frozen ears or tails, which is more of a cosmetic issue that does not have an effect on performance. Frozen teats can be a challenge until calves are a few days old and capable of consuming more milk.

Winter calving is hard work for producers, family members and hired hands. Frequent checks of the close-up cows, especially during winter storms, as well as the care of newborns and the all too frequent problems require continual effort. Stress from little sleep, long days and frustrations of calving can be detrimental to personal health. Train all involved to recognize normal calving and when intervention is needed, as well as other calving management practices. Rotating night checks and chores helps all hands own the calving process and learn more about what needs to be done.

A calf warmer can be useful when cows are calved during severe weather.
(Carrington Research Extension Center)

Conclusions

Beef cows are capable of adapting to cold temperatures and maintaining condition if fed appropriately for the environmental conditions and provided protection. The challenge for cow/calf producers is to provide balanced rations with required nutrients for cattle to thrive regardless of the elements. Modifying the environment with wind protection and bedding are good husbandry practices that will reduce maintenance needs. Additional reading is recommended for more in-depth information on nutrient requirements and other topics. Consult your local Extension agent for references.

Cattle can thrive regardless of the elements when producers use good husbandry practices.
(photo by Todd Finke, Berthold, N.D., 2008)

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