# Out-wintering beef cows

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The last month had been unseasonably cold and snowy. During these harsh conditions, questions are raised about whether beef cattle should be housed in a barn. This is a logical question given that the predominant form of animal agriculture in our area is dairy and most dairy cows are housed in doors. However the beef cow is endowed with unique characteristics that allow her to deal with and adapt to challenging weather conditions. Beef cows are housed outdoors because it is healthier and reduces the cost of labor and bedding.

First, a little review of Biology 101 of the bovine. All mammals maintain a constant body temperature; a condition known as thermoneutrality. Thermoneutrality is achieved through the production and release of heat. The production of heat is a function of tissue metabolism but, more importantly in cattle it is a function of the fermentation of forage in the rumen. In fact the production of heat is determined primarily by feed intake, i.e., the more she eats the more heat she produces.

Energy is required for maintenance of bodily functions such as achieving thermoneutrality. There are several factors that affect the maintenance requirement in cattle. Most germane to this discussion is that dairy cattle require 20% more energy to maintain thermoneutrality and other tissue functions than beef breeds. Dairy cows require more energy to stay warm because they have less insulation, thinner hide and less hair, along with the energy cost associated with producing large volumes of milk.

A final concept to understand is the upper and lower critical temperature. This is the temperature at which the maintenance requirement changes due to environmental conditions. The beef cow is most comfortable when the air temperature is between 30° F and 80° F and is considered the lower and upper critical temperature. However certain environmental conditions can alter these values.

Wind speed. Depending on the velocity, the maintenance requirement of cows with no wind protection increases 15%-30%.

Coat condition. Hair is the primary external source of insulation. If the hair coat is wet or matted, its ability to insulate is greatly reduced, which increases the lower critical temperature. For example a dry heavy winter coat provides adequate insulation down to 18° F, but if the hair coat is wet and matted, at 59°F cattle need additional energy to meet maintenance requirements. As a general rule the energy requirement of wet cattle increases 2% for every degree under 59° F.

Therefore cold stress could be defined as the point where temperature, wind speed and coat condition causes the cow to drop below her lower critical temperature.

Fortunately the combination of cattle biology and behavior along with management intervention can minimize the impact of cold stress.

Cattle acclimatization. This is the adaptive changes in response to changes in the climatic conditions and includes behavioral as well as physiological changes. Behavioral changes in response to cold stress include finding natural or man-made windbreaks, huddling in groups, or changing posture to minimize heat loss. Physiological adaptations include changes in metabolism, respiration rate, distribution of blood flow, feed and water consumption, rate of passage of feed through the digestive tract, hair coat, and body composition. As stated previously there is also a genetic component to combatting cold stress. Dairy cattle suffer more than beef. Hereford cattle are more cold tolerant than many other beef breeds.

Nutrition. As a general rule, for every degree that the effective temperature is below the lower critical temperature, the cow's energy needs increase by 1 percent. For example, a 1400 lb. dry cow in good condition with a dry hair coat will consume about 35 lb. of dry hay per day. Table 1 below shows the increased hay required if this cow is to maintain her body condition under different temperatures and wind speed. With no wind, when the temperature drops from 30° F to 0° F, she will need to eat 46 lbs. of dry hay to maintain her weight. In response to cold, changes in behavior and physiology will cause her appetite to increase and therefore eat more feed; perhaps up to as much as 30% more. For cows with 24 hour access to good quality hay, they will adjust their intakes to reflect climatic conditions. For those on a restricted intake and/or poor quality hay, adjustments in quantity and quality will need to be made to accommodate the lower critical temperature.

Table 1. Hay intake[1] as affected by temperature and wind speed

| | Temperature, °F | | |
|---|---|---|---|
| Wind speed, mph | 0 | 15 | 30 |
| | Dry hay[2,3], lbs./hd./d | | |
| 0 | 46 | 40 | 35 |
| 5 | 47 | 42 | 37 |
| 10 | 48 | 44 | 41 |
| 20 | 53 | 47 | 43 |
| 30 | 58 | 53 | 48 |

[1]1400 lb. dry cow, good body condition, consuming 2.5% body weight in dry hay.
[2]89% DM, 52% TDN.
[3]Values in red indicate that higher energy feeds will need to be fed.

Reality is though that a cow can only increase her intake by no more than 30%, therefore higher quality hay or energy supplements such as corn silage, corn grain or distiller's grain will need to be provided to meet nutrient requirements. In Table 1, these values are

shown in red. Recall that if she has a wet matted hair coat, her energy requirement increases by as much as 40%.

Protein. Protein requirements will not increase due to cold stress. However, by feeding additional hay to meet energy requirements, protein intake will naturally increase.

Water. Water consumption decreases during cold weather. Limiting water intake due to frozen waterers, creeks or ponds will decrease feed intake. Also following a cold stress event, water intake may increase 50% - 100%.

Summary.

- Beef cattle are able to withstand cold stress because:
  - Rumen fermentation of forage produces body heat
  - There is increased insulation provided by body fat, thick skin and heavy hair coat – think about the snow that accumulates on her back
  - Large body size to hold heat
  - Cattle naturally seek natural windbreaks and shelter
  - Cattle will stand and huddle which conserves heat

It is essential though that a good manager implements practices that augment a beef cow's ability to withstand cold weather:

- Monitor the weather. Cows can withstand one or two days below the lower critical temperature, but for longer periods, changes in nutrition and management need to be implemented.
- Protect animals from the wind. Wind breaks can be natural or man-made.
- Bed cows well. Place old hay bales, corn stalks and other sources of bedding in natural wind break areas.
- Provide additional feed, which may include grain. If wet feeds are fed, make sure they are not frozen.
- Provide ample fresh clean water.

So, do beef cows need to be housed in a barn? When properly managed and fed, beef cows do not need a barn to combat the effects of exceptionally cold winters.