

Snow as a Water Source for Wintering Beef Cattle

There are many reasons for beef producers to consider using snow as the sole water source for wintering cattle. The most common reason is to increase the length of the grazing season without the costs of water bowls, water lines and power for pumping and heating water. Relying on swath grazing and stockpiled forages for more days of the year also reduces manure hauling, tractor and feed hauling equipment costs.

Though it might seem simple, using snow as the sole water source requires paying close attention to make sure grazing cattle get enough water. Failing to closely monitor the cattle could result in sick animals and poor production. Failure to provide sufficient water is considered inhumane and animal welfare issues may arise.



Will Cows Perform Well with Snow as the Only Water Source?

Although no scientific studies have been conducted in Manitoba, The University of Alberta has conducted several studies and has found no reason to assume that energy diverted to thawing snow will cause herd performance to decline.

Studies in 1980 compared the performance of cows given:

1. continuous water – access to liquid water from a heated water bowl
2. restricted water – access to liquid water from a heated water bowl for a 15 minute period immediately following feeding
3. snow only – no access to liquid water

The trial ran from the first snowfall that remained on the ground in January 9, 1980 to March 19, 1980. All cows were fed a diet of half timothy hay and half barley grain. There were no differences in cow live weight or in fat depth changes among the three control groups. A similar study at the same time with a smaller number of cows showed no difference in urine chemistry, rectal temperature or total water turnover among the three groups. The two trials indicated:

- Cows consuming only snow as a water source showed no signs of major physical stress.
- Snow consumption caused no increase in energy required to maintain body weight.



A University of Alberta study published in 1990 evaluated longer-term effects of snow feeding on milk yield and calf growth. Four pregnant beef cows were provided only snow as a water source (snow cows) while four pregnant beef cows also had access to heated water (water cows). The trial ran from

December to March. The snow cows consumed between 14 and 20 kilograms of snow per day. The water cows drank seven to 11 kilograms of water per day, but also consumed approximately seven to 12 kilograms of snow per day. The following table shows the results:

| | Water Cows | Snow Cows |
|--|------------|-----------|
| Cow Body Mass, Kilograms | | |
| Beginning of trial | 471.5 | 479.0 |
| End of trial | 505.0 | 501.0 |
| Metabolic Heat Production, Kilojoules per kg ^{0.75} (average for December to March) | 465.45 | 463.7 |
| Rectal Temperature, Degrees Celsius (average for December to March) | 38.1 | 37.8 |
| Ave. Milk Yield, Kilograms per Day (2-16 weeks lactation) | 6.4 | 7.6 |
| Calf, Average Daily Gain (ADG), Kilograms per Day (birth to weaning) | 0.70 | 0.74 |

Source: Degen and Young, 1990. The Performance of Pregnant Beef Cows Relying on Snow as a Water Source. Can. J. Anim. Sci. 70: 507-515

There were no statistically significant differences in any of the cow or calf measurements. Researchers expected snow consumption would increase energy use and demand for metabolic heat production or result in decreased rectal temperatures. This was not the case. The authors concluded that cows were able to consume sufficient snow to meet their water needs and that no additional nutrition was required to melt the snow and bring the water to body temperature.

Another study at the University of Alberta evaluated snow feeding on the performance of nine to 10-month old calves. The study provided one group with water from a heated water bowl while another group relied on snow. Identical rations were fed to both groups with a predicted average daily gain (ADG) of 0.75 kilograms. The snow fed calves had a numerically lower ADG and a poorer feed to gain ratio, but the difference was not considered significant. Results of the feeding trial are shown here:

| | Snow Calves | Water Calves |
|------------------------|-------------|--------------|
| Days on Test | 98 | 98 |
| Live Weight, Kilograms | | |
| Initial | 206.4 | 200.9 |
| Final | 265.2 | 269.6 |
| ADG, Kilograms | 0.60 | 0.70 |
| Feed:gain | 10.2:1 | 8.8:1 |

Source: Young, Tennesen and Degen. 1980. Liveweight and behavioural responses in cattle ingesting snow as their water source. 59th Annual Feeders Day Report, University of Alberta.

In conclusion, research indicates there is no energy use increase or need for increased feeding when using snow as a water source. The heat provided through feed digestion appears to be sufficient to melt snow and warm the resulting water to body temperature.



Management of Snow Fed Cows

Careful management of snow fed cows is essential to prevent this potential labour and money saving management practice from becoming an animal welfare issue. Consider the following points:

- Snow as the only water source is not recommended for lactating cows, those in poor body condition (BCS<3), cows on less than optimum feeding programs or for those who are sick or unhealthy.
- An alternate water source must be in place and immediately available in case snow conditions change and cows cannot maintain sufficient snow intake.
- Snow must be clean and easily accessible. The University of Alberta study (1980) showed cattle preferred clean snow that they could easily pick up using a circular scooping motion of the tongue, a similar motion to that used when grazing.
- Ice-crusts, wind-blown or trampled snow sources are not considered adequate. It may be necessary to break through ice-covered snow with a tractor or some other means to allow cows access. Providing traction (straw, old hay, sand) on icy surfaces is recommended to prevent injuries.
- Carefully evaluate the snowfall in your area. It takes about 10 centimetres of snow to get one centimetre of water. Not all areas are well suited to this management practice. Consider the amount of snowfall and openness of fields – wide-open spaces with little or no wind protection will result in wind-blown snow which is not easily accessible to cows.
- Use feed intake to assess whether cattle are receiving enough water from snow. Feed intake for a mature cow should be between two and 2.5 per cent of body weight (BW) and should be consistent from day to day. A drop in feed consumption could indicate insufficient water intake.
- Cows in pens or confined to small fields may not have a sufficient supply of snow to act as a water source.
- Ensure cows receive a well-balanced ration that provides all the energy, protein, minerals and vitamins they require. Cows fed poorly digestible rations will be prone to rumen compaction, regardless of water source.
- Discuss the ins and outs with someone who has experience with snow feeding. Be well informed.

Behaviour Changes When Snow is the Sole Water Source

- Eating snow is a learned behaviour. It can take four to five days for all cows to become snow eaters. In the meantime, be prepared for restlessness and bellowing. Novice snow eaters will adapt faster if they are with animals who have become accustomed to snow.
- If bellowing and restlessness persist after four to five days, investigate. The cows are trying to tell you something is not right.
- Some changes in feeding and drinking patterns have been noted when cattle are not given access to water. The authors of the University of Alberta study outlined here observed that calves ate their daily feed at a slower rate than calves with access to water. They tended to eat more frequently throughout the day and alternated feeding and snow intake. Animals provided with water tended to drink only once or twice a day. Alternating feed and snow consumption may help minimize thermal stress.

Conclusions

- Research shows that snow can be the sole source of water for cattle without affecting performance negatively.
- Maintaining the health and welfare of snow fed cattle should be a top priority.
- It is essential that snow be available in sufficient quantity and in a form that is easily accessible by cattle.
- Management practices must be in place to ensure good nutrition at all times. A backup watering plan is also essential to deal with the scenario of snow becoming unavailable at any time throughout the winter.

Additional References

Canadian Council on Animal Care. 1993. Guide to the care and use of experimental animals. Vol. 1. CCAC, Ottawa, ON.

The Animal Care Act – <http://web2.gov.mb.ca/laws/statutes/1996/c06996e.php>

Sources

Brown, Lance. 2006. Winter outdoor livestock watering. British Columbia Ministry of Agriculture and Lands.

Degen, A.A. and B.A. Young. 1990. The performance of pregnant beef cows relying on snow as a water source. *Can. J. Anim. Sci.* 70: 507 - 515.

Degen, A.A. and B.A. Young. 1984. Effects of ingestion of warm, cold and frozen water on heat balance in cattle. *Can. J. Anim. Sci.* 64: 73-80.

Dickie, Doug. 1998. Power outage management infosheet: Q/A: Beef cattle consuming snow as a source of water. Ontario Ministry of Agriculture, Food and Rural Affairs.

Thomas, Heather Smith. 1999. Utilizing Snow as a water source. *Angus Journal*, November, pg 265.

Young, B.A, A.A. Degen and T. Tennessen. 1980. Liveweight of individually fed beef cows receiving snow or liquid water. 59th Annual Feeders Day Report, University of Alberta.

Young, B.A, T. Tennessen and A.A. Degen. 1980. Liveweight and behavioral responses in cattle ingesting snow as their water source. 59th Annual Feeders Day Report, University of Alberta.



For More Information

- Your local Manitoba Agriculture, Food and Rural Initiatives Growing Opportunities Centre.
- Manitoba Agriculture, Food and Rural Initiatives website: www.manitoba.ca/agriculture.
- Forage Beef website: www.foragebeef.ca
A forage and beef production website that contains information gathered from Manitoba, Alberta and Saskatchewan.
- Your local Agriculture and Agri-Food Canada (PFRA) office.
- Manitoba Forage Council website: www.mbforagecouncil.mb.ca.

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