Count Those Calories

Fine-tuning a winter feeding program.

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PHOTO BY CORINNE PATTERSON

Counting calories isn't just for dieters anymore. With hay production costs and corn prices rocketing upward, the difference between profit and loss for a cow-calf operator might hinge on one's ability to fine-tune the calorie intake of wintering mother cows.

Cow-calf operators who used to rely on discount hay and low-priced feedgrains to winter their cows through the lean months had better get used to this new reality.

"There is no cheap energy out there," says David Ames, Colorado State University Department of Animal Sciences. "Instead, beef producers have to learn how to fine-tune their feeding program."

Winter cow feeding has always had a significant effect on the profitability of a beef cow herd because of the scarcity of low-cost feed alternatives during that time of year, Ames says. The Integrated Resource Management (IRM) databank for Northern Plains beef cow herds estimates that winter feed costs are 31%-47% of the total cost of production.

Feeding & Feedstuffs

For most, fine-tuning a feeding program means tailoring their cattle diet specifically to the conditions at hand — in other words, more calculating the effects of weather on maintenance requirements, more calorie counting, more ration adjustments and less guessing.

"You want to keep the animal's body heat in a state of thermoneutral balance, where the cow is producing the same amount of heat that she is losing," Ames says, adding that a correctly calculated ration should help maintain that balance. Miscalculating on the high side will result in increased feed costs, while erring on the low side could have a negative effect on the welfare of a cow, her calf or future breeding prospects.

"If you get below the thermoneutral balance, then it will result in the need for increased heat and greater energy requirements," he says. "In a maintenance cow, that means you have to feed her more or she is not going to gain what she should during gestation."

No single answer

In looking at how specific weather conditions affect a cow's thermoneutral balance, recent research indicates that a cow's metabolic response is sometimes mitigated by how the animal reacts to those conditions.

For example, in eastern Montana, Montana State University (MSU) researchers found that two groups of cows that began the winter at roughly the same weight ended the season with variations greater than 100 pounds (lb.) in spite of the fact they received the same rations. The heavier animals had been placed on terrain that offered shelter from the wind, while the lighter ones were placed on ground that left them open and exposed to the full brunt of the elements.

A similar study in western Montana showed no significant difference between cows that had access to windbreaks and those that did not. Bret Olson, the MSU

►**Right:** Cows with BCS of 5 are more likely to breed back.

range scientist who conducted the western Montana studies, helps explain the difference in the results by noting that unlike eastern Montana, where the cattle were exposed to cold continental winds accompanied by overcast skies, the winds in his study area usually occurred on warmer days when the sun was out.

"The cows were minimizing heat loss by orienting themselves with the wind or maximizing heat gain by orienting themselves perpendicular to the sun," Olson says.

While researchers are now discovering that the effect of winter conditions does vary from location to location, some universal truths regarding the exposure of livestock to inclement winter weather still remain. Cold driving winds, poor coat condition and wet weather contribute significantly to reducing an animal's ability to withstand cold temperatures without drawing on its fat reserves to produce maintenance energy.

An ounce of prevention

For those who are serious about controlling winter feeding costs without risking cow performance, the time to implement a strategy is before winter, when lower-cost, quality grazing is still available to build up the body condition scores (BCS) of cows that will be calving in early spring and are moving into the coldest season. This can be accomplished by grazing stockpiled sites or accessing higher-quality, late-season regrowth. Specific attention should be paid to stocking rates.

In a comprehensive report titled *Feeding Beef Cows Based on Body Condition Scores,* Shane Gadberry, University of Arkansas Extension livestock specialist, notes that cows with a BCS of less than 5 at calving have considerably lower pregnancy rates

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Table 1: Lower critical temperatures for beef cattle, assuming no wind chill

Coat description	Thermoneutral temperature	
Summer coat or wet coat	59° F	15° C
Fall coat	45° F	7° C
Winter coat	32° F	0° C
Heavy winter coat	18° F	–8° C

Source: David Ames, Colorado State University.

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than those with 5 or higher. He adds that the acceptable BCS prior to calving is 5-7.

Because the cost of quality baled hay or feed grain is considerably higher than that of grazed forage, it makes economic sense to build up condition on mother cows by grazing in the late summer and fall, rather than playing catch-up with hay and grain in the winter. The report recommends periodic checks of BCS to make sure all mother cows in a herd are in peak reproductive condition.

Another report produced by Alberta Agriculture and Food titled *Condition Scoring and Feeding Strategies* explores in depth the advantages and limitations of cows accumulating body fat during periods of surplus or inexpensive energy intake to build up a reserve of energy that can be drawn upon in times when additional energy sources are required.

Table 2: Body condition score descriptions

BCS 4	**Slightly below optimal condition** • Foreribs are not noticeable. • 12th and 13th ribs can be distinguished. • Backbone can be identified, but feels rounded rather than sharp.
BCS 5	**Optimal body condition** • 12th and 13th ribs are not visible. • The backbone can be felt with only firm pressure, but it is not noticeable to the eye. • Areas on each side of the tailhead are filled, but they are not mounded.
BCS 6	**Slightly above optimal body condidition** • Ribs are fully covered and not noticeable to the eye. • Hindquarters are plump and full. • There is noticeable sponginess over the foreribs and on each side of the tailhead.

Source: Shane Gadberry, University of Arkansas Cooperative Extension Service.

► Grazing on quality late-season regrowth is an excellent way to add body condition for winter.

It is noted that while accumulating fat in beef cattle is not an efficient process — the conversion rate is between 40%-60% — the rise in the price of winter-fed energy should easily justify the extra effort associated with intensive grazing in the fall.

Canadian researchers concluded in studies conducted in 2000 that beef cows entering the winter with a BCS 6.0 have a significant winter-feeding advantage vs. cows scoring less than a BCS 4. For example, cows with a score of less than 4 at weaning time need to gain approximately 200 lb., or two units in condition, before calving in order to retain the ability to breed back. This means that a cow has to be fed about 7 lb. of barley or 11 lb. of hay per day above what she requires for maintenance. Based on 2000 grain and hay prices, this represents an increase of approximately 50% in the feed cost of wintering a cow.

Coat health critical

Because winter coat condition plays such an important role in maintaining the thermoneutral balance in cattle exposed to the cold (see Table 1, page 217), cows that will be exposed to winter conditions should receive a level of nutrition that will support the development of superior winter coats.

This also means making sure mother cows are not suffering from mineral deficiencies that could compromise hair health. In a 2001-2004 Tennessee forage mineral survey of beef pasture forage, it was determined that poor hair coat health in cattle could be traced directly back to low levels of available copper (Cu) in pasture grasses and resulting copper deficiencies in the animals themselves.

Magnitude of cold

One of the most important factors in determining the true effect of climate on wintering mother cows is wind chill, Ames says. The research he conducted in Kansas and Colorado shows that cold, driving winds can have a significant effect on a cow's thermoneutral balance and energy needs.

"What we have found is that the impact of wind chill on cattle is different from what it is on humans," he says. "With cattle, wind blows the hairs apart, exposing the cow's skin directly to the cold."

Ames recommends using a chart he and his fellow researchers developed (see Table 3) to determine the true effect of wind combined with low temperatures. For example, a 20° F temperature combined with a wind speed of 15 miles per hour (mph) would register 4° wind chill.

Table 3: Wind chill factors for cattle with dry winter coats

Wind speed, (mph)	Temperature (°F)												
	-10	**-5**	**0**	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**
Calm	-10	-5	0	5	10	15	20	25	30	35	40	45	50
5	-16	-11	-6	-1	3	8	13	18	23	28	33	38	43
10	-21	-16	-11	-6	-1	3	8	13	18	23	28	33	38
15	-25	-20	-15	-10	-5	0	4	9	14	19	24	29	34
20	-48	-25	-20	-15	-10	-5	0	4	9	14	19	24	29
25	-60	-32	-27	-22	-17	-12	-7	-2	2	7	12	17	22
30	-78	-73	-36	-31	-27	-21	-16	-11	-6	-1	3	8	13

Source: David Ames, Colorado State University.

Once the wind chill temperature is calculated, subtract it from the lower critical temperature (LCT) of the beef cow. For example, if the LCT of a cow with a dry winter coat is 32° (see Table 1, page 217), and the calculated wind chill is 4°, the magnitude of the cold is 28° (32 – 4).

It is important to remember that the insular quality of a cow's coat determines the LCT. While a cow with a dry heavy winter coat can tolerate temperatures down to 18° without requiring additional rations, that same cow with a wet coat would require additional rations at temperatures below 59° to maintain body condition.

Ration adjustment

Ames notes that once the magnitude of cold is confirmed, appropriate modifications to the diet can be made to compensate for a drop below the cow's LCT.

"In our research, when we adjusted the rations for extremely cold weather they would gain exactly as predicted," he says. "If you didn't adjust the ration, they would require more energy and they would gain less."

The accepted rule for adjusting rations is to assume that a cow's energy requirement increases 1% for each degree of the magnitude of cold. For example, the cow with a 32° LCT facing a wind chill of 4° has a magnitude of cold of 28 (32-4).

For that cow, the energy adjustment is 1% for each degree magnitude of cold, or 28% of the normal daily energy amount added to thermoneutral needs. This means that if she receives a ration of 16.5 lb. of good hay a day when in thermoneutral balance, she should receive the equivalent of 20.9 lb. of hay a day to compensate for the energy loss due to the magnitude of cold.

"It is very important to make the right adjustments to the feed levels before a cow starts falling behind," Ames says, adding that with today's hay and grain prices it could prove costly to have to gain the weight back.

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