



# dealing with shrink

*Minimizing shrink in calves help keep them healthy.*

by **Heather Smith Thomas**

Cattle have a large digestive tract, holding many gallons of feed and fluid. The body weight of any given individual may vary depending on whether the tract is full or relatively empty. This variation will depend on the time of day and how much the animal has eaten or exercised or how far it has been hauled.

Morning weights, when cattle are relatively empty because they've been resting during the night instead of eating, are generally less than midday or evening weights, when the gut is full, unless the cattle were held off feed before weighing. When an animal has a relatively empty gut and bladder, the difference between that body weight and "normal" body weight is called shrink.

## Types of shrink

South Dakota State University Beef Specialist Julie Walker says there are two kinds of shrink.

"Gut fill is one type," she explains. "For research purposes we often hold cattle off feed and water for 12 hours or overnight, to reduce the fill in the rumen. Whenever you start moving or handling cattle and they don't have access to feed or water, this type of shrink starts immediately," she says. When cattle

move around, especially if they are nervous or stressed, they urinate and defecate more.

"The other type of shrink is due to fluid loss within the body tissues (tissue shrink) and this basically starts at the same time but is more severe when cattle are off feed and water for a long time. This would be the case on a long transport or prolonged cattle working situation.

For instance, this would occur if the rancher gathers cattle today out of the pasture, works and sorts them, puts the calves on a truck and sends them to a sale barn — and they didn't have feed or water or they didn't like the feed or water.

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— *Julie Walker*

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They may not eat or drink for 24 hours or longer," Walker explains.

If the animals haven't had feed or water for an extended period with no way to replenish fluid loss, they become dehydrated with fluid loss from muscles and other body tissues.

"This type of shrink takes longer to resolve than fill shrink; the water in the tissues is harder to replace quickly," Walker says. "With fill shrink the animals can eat and drink and be right back to normal. Tissue shrink takes longer and how long depends on how much shrink has occurred and how long the animals were off feed and water," she says.

Mature cattle may carry nearly 30% of their weight in the gut and bladder and may lose a lot of weight quickly if held off feed and water for 24 hours or pass a lot of manure and urine in a short time, as when exercising or being excited, according to Walker.

Producers can figure a loss of 8 to 10 lb. per defecation or urination (a gallon of fluid weighs about 8 lb.). Shrink losses of up to 10% of body weight are not uncommon in cattle held off feed and water for 24 hours, and in some circumstances, shrinks of up to 18% can occur. Research has shown that about 60% of total excretory shrink loss during marketing procedures is

due to manure passage and about 40% is due to urine secretion.

Animals that don't eat or drink for up to 12 hours usually just have excretory shrink, Walker says. A short time on feed and water will refill the gut and bring the weight back to normal. Tissue shrink involves a decrease in actual carcass weight in the muscles, and it takes longer for the animal to recover from this type of weight loss.

Walker says many cattle buyers walk among a group of calves to evaluate and sort them, cutting back some, and this process stirs the cattle and moves them around. Thus they shrink more before being weighed. Some buyers insist that cattle be held in a corral overnight without feed before weighing or be gathered from pasture early in the morning before they have a chance to graze and drink.

If cattle are brought off pasture and weighed at the ranch or won't be hauled very far for weighing, the buyer may want a certain percent of the weight subtracted at weighing before the price per pound is calculated. This is called pencil shrink and is deducted from the actual weight. The idea is to base the per-pound price on a weight that would be more equivalent to "shrunk" weight.

Department of Large Animal Clinical Sciences at Western College of Veterinary Medicine at the University of Saskatchewan Veterinarian Colin Palmer says shrink is often misunderstood — especially the drawbacks to cattle health. Cattle always do better, stay healthier and bounce back more quickly after transport and sale, if they are not excessively shrunk during this stressful time.

"Auction markets tell me that many buyers don't want cattle unless they are shrunk," Palmer says. "If you offer them calves with no shrink taken off, they won't buy those. Some buyers will pay more money for shrunk calves off feed for at least 20 hours than they will in a pre-sort sale where there's not as much shrink," he says. Yet shrink and the

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stress involved, which hinders the immune system, is detrimental to the animals and may make them more vulnerable to disease. Cattle that don't experience as much stress and shrink during sorting and transport are more likely to stay healthy.

Calves sold directly off their mothers are best sold at home rather than after a truck haul to a sale because they won't eat much during the first 18 to 24 hours after weaning. The worst shrinks occur if the cattle are gathered and sorted off the cows and penned a day before being weighed and sold, according to Palmer. Even if those calves have feed and water in front of them, they will shrink as much as if they were being held off feed and water because they are too stressed to eat or drink very much.

Palmer says calves do better if weaned a few weeks ahead of selling, giving them time to adjust to weaning — especially if they are held long enough to start gaining weight again. Selling them only a week or two after weaning may result in a loss of actual body weight. But if they are sold after being fully weaned, they're not stressed and will shrink less if they have to be held in a corral very long or hauled before weighing.

"Calves that are weaned and shipped at the same time always shrink more than those already weaned and accustomed to eating hay," Palmer says.

Cull cows sold right after their calves are weaned may not eat much because they are stressed over losing their calves; the gut will be relatively empty when you weigh them.

"Weaned calves or yearling cattle generally don't shrink as much," he says. "Cull bulls sold and weighed directly off the ranch don't shrink as much as bulls hauled to sales."

When taken to new surroundings and held overnight, bulls are more concerned about the animals in the next pen —

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especially if they're near other bulls or penned with strange animals.

Walker says, "They may spend more time fighting or socializing or walking the fence than eating, and extra activity results in more shrink. Any emotionally upset animal will shrink. Other stresses that increase shrink include hot weather, stormy wet weather or high humidity, since cattle won't eat well during these times."

Cattle on lush green feed, silage or high protein alfalfa hay will shrink more than cattle on drier grass pasture, grass hay or other low moisture feeds.

"The lush, high moisture feed or high quality alfalfa goes through the tract faster and causes the feces to be more loose and runny," she says. One study showed that cattle from dry pasture had a 3.5% shrink after a two-hour haul compared to 5.3% shrink for cattle off lush green forage.

### Minimizing shrink

Several studies have looked at ways to help minimize shrink when producers are selling cattle, including various types of diets before transport. Palmer points out study results show that allowing calves to consume forage immediately before being sorted and shipped can reduce the amount of shrink by up to 2.9%. It helps if they are not "empty" before a long truck ride.

Palmer says another study showed that feeding ionophores, like Rumensin, reduces shrink by 0.2 to 1.5%. Electrolyte supplementation ahead of time can also help reduce the amount of shrink, but more research is needed to determine which electrolyte (or combination of electrolytes and at what levels) is most beneficial.

"In a study done at Kansas State University and University of Arkansas, Kenneth Coffey reported steers gathered at daybreak from pasture and placed in holding pens without feed or water shrank at the rate of 1.25% of body weight per hour during the first 2 to 2.5 hours, and 1.61% of body weight during the next 2.5 to 3 hours," Palmer says. Cattle tend to defecate and urinate more when they are nervous and empty out fairly quickly.

"A 30 minute roundup into the corral may result in 1% shrink," he says. "Loading, hauling (less than 100 miles), unloading and weighing will generally create an additional 2.5% shrink, sorting or waiting an extra hour before weighing will mean another 1%, 12 or more hours without feed or water before weighing will be an additional 2.5%, etc. Cattle that have been sold and held by an order buyer or for resale often recapture their shrink and weigh significantly more the second time even if it's just been a few days, due to the poor

handling that resulted in a large shrink prior to the first weighing."

There is often a great deal of money lost to the producer because of shrink during the original handling and hauling to market.

Cattlemen may not be able to do much about the price they get for cattle, but they can do things to minimize shrink. They can watch weather forecasts and try not to sell during bad weather and avoid rough handling, poor feed, dirty water in a corral where cattle are held before selling — since cattle may refuse to drink — delays in transport or weighing after cattle are gathered, and overloading or underloading trucks. Crowded cattle are more stressed and nervous and will urinate and defecate more.

"Under-loading can also increase shrink since it allows cattle to move around a lot during transport. Any time cattle are moving they tend to urinate and defecate more often," Walker says.

The biggest mistake people make is hurrying — not handling cattle quietly and slowly on sale day.

"Wild roundups, ramming and jamming cattle while sorting or loading can dramatically increase shrink. Thus it pays to have good facilities where cattle can be worked through and loaded very easily. Take whatever time is needed to do it slowly and gently. A gentle lead animal that will come readily into the corral, or a better loading facility can save time and problems. This will more than pay off in less shrink for the animals," she says. Gathering should be done calmly, such as luring the cattle into the corral with feed rather than chasing them in.

Cattle shrink every time they are moved. The more quickly and quietly they can be sorted, the less shrink, so it pays to plan ahead and sort ahead of sale day. If calves are already weaned and sorted (separating steers and heifers, sorting by size, etc.) or if cull cows are already in a separate pen or pasture from the rest of the herd, they will have regained their

temporary shrink from the sort and can be moved quietly onto the scales or the truck with a minimum of shrink.

Hauling time and conditions affect shrink. Usually the first few miles are the worst, but if the truck is properly loaded and conditions are ideal for hauling, the shrink rate per mile after that will be less, as the cattle adjust to the trip and settle down.

### Shrink and its effect on health

A.L. Schaefer, Agriculture and Agri-Food Canada, Lacombe Research Centre, Lacombe, Alberta, has worked on several studies addressing problems associated with shrink and the effect of transport.

“I was trained as a physiologist. Lacombe Research Centre has a program on meat science, and the meat scientists told me they were seeing muscle shrink and dark cutters, and wondering what was happening with these cattle. When you study the animals you realize that transport and handling creates such a novel environment for cattle that they are adversely affected by this stress. They’ve never had anything in their evolution and history to prepare them for this,” he says.

Cattle are prey animals; their main survival tactics are to fight or flee from predators (short-term stress events). They are not programmed to handle things like being gathered and sorted, weighed, held overnight in pens without feed, loaded or unloaded, or enduring long truck transport.

Schaefer says the “fear stress” in these novel situations can be just as detrimental as physical stress. Cattle sent to slaughter often experience several hours of transport, after which they are held in pens overnight prior to slaughter — and typically lose 6% or more of their live weight and carcass weight. They often display degradation in meat quality parameters such as pH, color and marbling score.

“So we started to measure some of the stressors. At that time, part of the attitude in the beef industry was that it was just gastrointestinal tract water being lost — that shrink is just loss of fluid from the gut. Many people actually thought that shrink is good, to get it out of there so the buyer doesn’t have to pay for useless water,” Schaefer says.

“This perception is far from the truth. Over the years we have done studies to look at the composition of fluid loss. We did total dissections of slaughtered animals, comparing the ones with greater shrink with those of lesser shrink, to see where this weight loss was coming from. What we learned was that about half of the weight loss was from the GI tract and about half was from muscle tissue. There can be real loss of muscle in finished animals, resulting in a reduction in carcass yield and quality.”

Schaefer says they then looked at the various kinds of physiological insults.

“Animals lose their muscle sugar and become hypoglycemic (low blood sugar and low muscle sugar),” he says. “They become dehydrated and lose interstitial water. The meat scientists found

that when animals lost this fluid from the tissues their meat became tougher. The shear forces and taste (as determined by a food-tasting panel) changed dramatically.”

Schaefer says it’s similar to grapes versus raisins “When grapes lose water they become raisins. The muscle tissue lost a lot of the positive ions, particularly sodium and potassium. These cattle break down muscle because they are trying to free up the carbon on the amino acids, so that the carbon can be used to make more glucose — to counteract the loss,” he says.

These are survival mechanisms the body has evolved to survive in times of stress and feed/water deprivation.

“There is a chronology and time frame to all of these changes, depending on how far the cattle are transported, etc.,” Schaefer says. “These are the kinds of insults we were seeing in cattle suffering from shrink, and this explained a lot about why there was a weight loss — and why that weight loss was so important. It was partly actual muscle tissue and not just urine and feces.”

Schaefer says some of the buyers were saying they wouldn’t buy

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### Effect of shrink to 600 lb. initial weight

This table shows that the difference between 3% and 12% shrink on a 600 lb. animal is 54 lb. At \$200 per cwt. and the weight of 582 lb., the calf nets back \$1,164.

The calf that weighs 528 lb. and is sold at \$200 per cwt. brings \$1,056 — a \$108 difference.

So the price required for the 528 lb. calf would need to be (\$1,164/528 lb. = \$220.45 per cwt.) to bring an equal value.

% Shrink	Shrunk weight, lb.
3%	582
6%	564
9%	546
12%	528
15%	510

Information supplied by Julie Walker, beef specialist, South Dakota State University.

“The industry needs to work together, to understand and address these challenges. We still have buyers who want raw, shrunk-out calves. They need to realize that this is not a healthy or beneficial situation for these animals, and that it would be helpful to pay the producers more for preconditioned cattle.”

— *A.L. Schaefer*

cattle unless the auction market would shrink them. Many buyers still prefer to buy “shrunk” cattle, not realizing how adversely this condition can affect their health, particularly for young cattle.

“The energy and water that’s been lost is very important. That fluid and material in the stomachs is what gives them energy to counteract the stress they are experiencing. It is important to keep them fed and watered. If pigs are fed a lot before transport they become motion sick, but cattle do better if they have some gut fill,” he says.

There are many factors involved in how much a certain animal will shrink, and one of the biggest factors is stress. The things that happen at sale time are novel for calves. “Their entire stress mechanism is triggered (the HPA system — hypothalamic pituitary adrenal response) in which cortisol is produced. This breaks down muscle and fat, for provision of glucose,” says Schaefer.

“If what they are experiencing in this stressful environment is not part of their history (if they are taken out of their familiar pen, social structure, etc. to be sorted and weighed), this triggers cortisol release. Transport triggers it again because they don’t know what to expect. During the ride there are strange noises and they are continually stressed, and their

bodies are in a protein-breakdown mode,” he says.

“It’s not surprising that some calves have eight to 10% shrink in these situations. With finished cattle, this is why feedlots try to have same-day slaughter, so they can stop this weight slide and loss as soon as possible. With young calves, when they are weaned and shipped and go into feedlots, the cortisol has had a damaging impact on their immune system, as well,” he says. This stress creates more risk for illness.

### **Preventing shrink**

Preconditioning calves before sale can be advantageous. They are usually handled a bit more and become accustomed to gentle handling and are not just fresh off the range.

“Any time you can acclimate calves to handling and a new environment, they will be more at ease and will shrink less at sale time,” he says. “Video sales have an advantage because there’s a little less transport and handling involved.”

Cattle are going directly from the farm/ranch to their destination rather than being trucked to a saleyard, waiting there for a day or so and trucked again to a feedlot.

“Solutions to these situations involve many factors. One approach here at Lacombe is to try to assist those calves — providing them with more energy before they are shipped, and making sure they have the necessary positive ions in their systems,” Schaefer says.

“We’ve found that some of the amino acids are very effective at reducing protein breakdown. One particular amino acid called tryptophan is used by the nervous system in cattle and helps calm them so they don’t perceive stressors quite as threatening as they might otherwise. We’ve found this amino acid to be helpful in reducing shrink. How we’d supply this depends on the calves — whether they are young calves or freshly weaned, or finished animals that are already used to being on feed. You

can provide a ‘cow Gatorade’ type product that contains some of these necessary nutrients.”

Schaefer did some work with several thousand animals that demonstrated better retention of weight. “These animals had a percent or two less weight loss than they would have otherwise,” he says.

“The cattle treated with nutritional therapy also showed a three- to four-fold reduction in the incidence of DFD (dark-firm-dry) meat. Using economic values for beef at the time of the study, the economic impact of using nutritional therapy for cattle held in pens before slaughter was about \$22 per head for 800-900 lb. carcasses.”

If a producer is preparing to send calves to market, there might be times that a nutritional therapy would also be beneficial.

“Sometimes when they are on pasture you can provide this product in a feed if the calves are used to eating a creep feed or mineral mix. We’ve also tried putting some of these things into the water for the calves when they arrive in the pens from a pasture. It all depends on what the cattle are used to. If a calf has never seen a waterer and has only drunk from a pond or stream, it may not work,” Schaefer says.

This is the advantage of preconditioning, so the calves can become accustomed to new ways to access feed and water. Then the calves are better able to tolerate the stresses they will encounter at sale time.

“The industry needs to work together to understand and address these challenges. We still have buyers who want raw, shrunk-out calves. They need to realize that this is not a healthy or beneficial situation for these animals, and that it would be helpful to pay the producers more for preconditioned cattle,” says Schaefer.

Then the person receiving the cattle will have less health problems or setbacks in their weight gain. **HW**