

Feeding Kochia

August 2026

With kochia (*Kochia scoparia*) becoming more prominent in many areas of the province, more producers are incorporating it into their winter-feeding plans. If harvested and baled or ensiled before the plant is mature, the feed quality is excellent, rivalling many popular forages in energy and protein values. However, kochia also carries with it many risks, including high levels of sodium and sulfur, nitrates, oxalates and other potentially dangerous compounds. Each of these risks can be mitigated through feeding management but it is important to be aware of the potential situations that could arise from feeding kochia.

Feed Quality

Kochia can be a very nutritive feed, with Saskatchewan samples averaging approximately 14 per cent crude protein and 64 per cent Total Digestible Nutrients (TDN). Like with most feeds, the quality of kochia feed depends on harvest timing and quality of harvest methods. As kochia matures, protein and energy levels will decrease and fiber levels will increase; however even at full maturity crude protein can be as high as 14 per cent. Harvesting kochia at 50 per cent bloom is the ideal stage to optimize both yield and feed quality and will provide feed of similar quality to alfalfa harvested at 20 per cent bloom.

Table 1. Average maximum and minimum nutrient values of kochia samples from Saskatchewan.

	TDN	CP	NDF	ADF
Average	63.9	13.8	45.0	31.4
Max	67.1	17.2	50.4	37.7
Min	59.6	9.5	36.3	27.3

TDN = total digestible nutrients; CP = crude protein; NDF = neutral detergent fiber; ADF = acid detergent fiber

Mineral Levels

Ensuring that minerals are balanced in an animal's diet will go a long way to maintaining animal health and productivity. One of the risks associated with kochia is its mineral content. While kochia tends to have adequate levels of most minerals, it can accumulate high levels of sodium and sulfur that need to be managed.

Sodium

While sodium is a required mineral for animals, too much sodium can be dangerous. Excess sodium in a ruminant's diet can lead to reduced mineral intake, reduced feed intake, diarrhea, dehydration, tremors, ataxia and potentially death.

The risk of sodium toxicity is higher if livestock are on a poor-quality water source. The recommended maximum tolerable limit for sodium in beef cattle or bison diets is 1.8 per cent. The recommended maximum tolerable limit for sheep is 1.6 per cent.

Sulfur

Sulfur is another mineral that is required by livestock, but can be toxic in excess. This is especially a risk if your water source is high in sulphates. Signs of sulfur toxicity include reduced fertility, reduced feed and water intake, more illness in your herd and the development of polioencephalomalacia. Polioencephalomalacia is a neurological condition that may present as blindness, seizures, downer cows and potentially death. The recommended maximum tolerable limit for cattle and bison is 0.5 per cent if fed a high forage diet or 0.3 per cent if fed a high grain diet. The recommended limit for sheep is 0.4 per cent if fed a high forage diet and 0.3 per cent if fed a high concentrate diet.

Nitrates

Nitrates are naturally produced in plants as a form of nitrogen storage. While most ruminants can tolerate some level of nitrates in their feed, an excess amount can overload the nitrate conversion system in the rumen, resulting in nitrite entering the bloodstream and combining with red blood cells to form methemoglobin — reducing the oxygen carrying capacity of the blood. This can appear as watery eyes, reduced appetite and milk production, abortion, shortness of breath, weakness, staggering and eventually death. Once an animal has experienced nitrate poisoning there is no treatment, aside from removing the high nitrate feed.

There are several factors that impact the accumulation of nitrates in kochia, and other plants. Periods of stress, like frost, drought or hail, will increase the concentration of nitrate because the conversion of nitrate to other nitrogen containing compounds is slowed. Once good growing conditions return, it will take several days of favourable weather for the accumulated nitrates to be used by the plant.

Luckily, nitrate levels in a diet can be managed. Most feed testing labs offer nitrate testing, which can help you determine what the risk of nitrate toxicity is in a certain feed. For more information about nitrates, [see our website](#).

Oxalates

Another potentially toxic compound found in kochia is oxalate. However, the toxicity is complex and depends on the chemical form of oxalate in the plant, the age of the animals, availability and quality of water, the diet composition and the species of animal. Although oxalate concentrations can vary from seeds to forage or young to mature plants, it should be assumed that they are present in some form in kochia.





There are four potential ways oxalates can be broken down by the animal:

1. Oxalates enter the rumen and are broken down into carbon dioxide and formic acid — this is not toxic to the animal.
2. If the oxalates are present in the plant in an insoluble form, they will pass through the digestive tract without breaking down or binding to anything else — this is not toxic to the animal.
3. If the oxalates are present in the plant in a soluble form, and the animal is consuming a high calcium diet, the oxalate ions will bind to calcium in the rumen to form insoluble oxalate crystals. These crystals will pass through the remainder of the digestive tract — this is not toxic to the animal.
4. If the oxalates are present in the plant in a soluble form, and the animal is consuming a low calcium diet, there will not be enough calcium in the rumen for the oxalate ions to form crystals, so they will be absorbed into the bloodstream. Once in the bloodstream, they can bind with calcium in the blood to create a calcium deficiency and/or form oxalate crystals in the kidneys to block the renal system. This is when oxalate toxicity occurs.

Signs of oxalate toxicity include reduced milk production, laboured breathing, muscle tremors, weakness, collapse, downer cows and death. There have also been reports of waterbelly attributed to oxalate toxicity. In some cases of severe oxalate toxicity, animals have started convulsions within two to four hours of consuming the feed. The toxic level for the total diet is approximately two per cent, with sheep being more sensitive to oxalate levels than beef cattle.

Unfortunately, oxalate levels can be difficult to determine as there are no labs in Canada that test for oxalates.

Other Toxic Compounds

Sodium, sulfur, nitrates, and oxalates are not the only potentially toxic compounds in kochia — but the exact details of which compounds within kochia can cause problems have yet to be determined. Different alkaloids and saponins can be present in kochia, some of which seem to have some negative effects. Some trials have seen effects as mild as reduced performance when kochia was fed at high levels to market animals, where some have seen evidence

Limit kochia to 30 per cent of a livestock diet to reduce the risk of toxic effects.



of severe photosensitivity related to liver and kidney damage. Photosensitivity can lead to swollen eyelids and necrosis of extremities, including muzzles, teat ends, or ears. These animals are also often jaundiced and have fatty liver. Some studies have also found that kochia can impact hormone levels in the animal that effect milk production. Unfortunately, because the exact compounds that cause these issues are largely unknown, they cannot be tested for, and safe limits cannot be determined.

Propagation

Unrelated to livestock health is the risk of kochia spreading resulting from it being fed. It can either spread from seeds falling out of the feed or from seeds passing through manure. Although the rumen environment will kill a large portion of kochia seeds, research suggests that up to 15 per cent of kochia seeds can survive digestion. The seeds usually take at least three days to pass through the rumen, which means you could be spreading kochia after you have stopped feeding it.

Management

Despite the high potential for toxicity from kochia, it can be a great feed, and it can be fed safely. Follow these tips to use it safely in your rations:

- Feed test and water test. Test the kochia, and all the feed you plan on using to ensure you can keep mineral and nitrate levels of the entire diet at safe levels. This includes the water source the livestock will be drinking.
- Limit kochia to 25 to 30 per cent of the diet. Even if mineral and nitrate levels are acceptable, oxalate and other toxin levels could be high, so its inclusion should be limited.
- Cut the kochia early and high. Cutting it early before the plants get stressed and higher up will reduce the nitrate risk. Cutting before seed set will also reduce propagation risk. Cutting earlier will also improve the feed quality.
- Increase calcium and energy in the ration. Increased calcium will help to counteract potential calcium deficiencies caused by oxalates, and increased energy will help ruminants use nitrates more effectively.
- Give animals time to adapt to the kochia. Start with a lower percentage of kochia in the diet and gradually work the diet up to higher levels over a few weeks. This will give the rumen microbial community time to adapt to potential toxins. Try to avoid grazing areas that have a high concentration of kochia so that they can be adapted.
- Manage where you are feeding the kochia. Consider whether you can manage a new kochia stand where you are feeding and/or spreading the manure and plan accordingly.
- Don't feed kochia prior to moving livestock to a clean pasture. Wait at least three to five days to allow the kochia seeds to pass out of the rumen completely to avoid spreading it further.

Despite its risks, kochia can be very beneficial to include in winter rations for livestock. If managed properly, kochia can be a cost-effective source of energy and protein for many livestock producers. For more information about feeding kochia, contact the Agriculture Knowledge Centre at 1-866-457-2377.