Saskatchewan Ministry of Agriculture

DEVELOPMENT

Bale Grazing and the Bale Grazing Calculator ©

Acknowledgements

The authors, Lorne Klein, PAg, and Travis Peardon, AAg, would like to thank the following individuals who assisted with the development of *Bale Grazing and the Bale Grazing Calculator©*:

- Dennis Haak, Prairie Farm Rehabilitation Administration (PFRA), Agriculture and Agri-Food Canada;
- Dr. Bart Lardner, PAg, Western Beef Development Centre, University of Saskatchewan;
- Dale Weisbrot, PAg, Livestock Development Branch, Saskatchewan Ministry of Agriculture;
- Mark Neuman, Livestock Producer, Group Plan Advisor with the Upper Souris Agri-Environmental Group Plan, Frobisher, Sask.;
- Jeremy Brown, PAg, Saskatchewan Watershed Authority; and
- Grant Lastiwka, PAg, Agricultural Research and Extension Council of Alberta.

The authors would like to thank Harvey Tedford, a Saskatchewan producer, for reviewing the book.

For more information

For more information about bale grazing, contact the authors through the Agriculture Knowledge Centre at 1-866-457-2377.

This document is also available on the Saskatchewan Agriculture website at www.agriculture.gov.sk.ca.

Cover: Examples of intensive bale grazing (top) and extensive bale grazing (bottom).
Photos: Saskatchewan Agriculture

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Introduction

Bale grazing on fields is a method of providing feed to beef cattle during the winter months. With this system, livestock are allowed access to bales previously placed on a field or wintering site. When properly managed, it does not compromise the health, comfort or performance of the livestock.

Bale grazing can offer both economic and environmental advantages compared to traditional intensive winter feeding. Economically, bale grazing can reduce the costs for labour, machinery and fossil fuels, both in the feeding of the bales and manure handling. Environmentally, research has shown increased nitrogen capture in the soil profile compared to intensive feeding in a corral followed by manure spreading with equipment. Proper site selection and bale density will ensure the nutrients from manure, urine and leftover material are uniformly deposited at acceptable rates to enhance forage growth and minimize environmental impacts on water quality.

This publication compiles the latest knowledge on bale grazing. The information is gathered from research trials and the experiences of producers.

Intensive and extensive bale grazing

Bale grazing on a field is a method of extensive winter feeding compared to intensive feeding on a confined area, which results in a manure pack. There are variations on how producers are setting up and managing extensive bale grazing systems.

On the intensive end of the spectrum, bales are transported to a site and placed relatively close together. A typical density is placing bales 40 feet apart on a grid, which equates to about 25 bales per acre. In this situation most producers are controlling the livestock with electric wire. Livestock are limited to a three- to four-day feed supply at a time, with or without bale feeders. This publication is written mainly with this method and intensity in mind.

On the extensive end of the spectrum, bales are grazed in the field and on the spot where they were ejected from the baler. A typical bale density would be two to four bales per acre. With this density, some producers are experimenting with leaving the twine or net wrap on the bales and allowing a three- to four-week allotment of bales at a time.

Above: **Intensive bale grazing on a selected site. Electric fencing controls livestock access to the bales.**

Below: **Extensive bale grazing on the hayfield where the bales where made and ejected from the baler.** ***Photos: Saskatchewan Agriculture***

Choosing a site

Land use

Producers can select bale grazing sites that are seeded perennial forage, annual cropland or native prairie. The preferred bale grazing site would be seeded perennial forage. Annual cropland is less suited for bale grazing. Native prairie sites are **not** recommended as bale grazing.

After bale grazing, even with good livestock management resulting in relatively high feed utilization, there will be a significant layer of organic material left behind. This consists of manure mixed with soiled and leftover feed. Depending on the amount of snow on the site, livestock traffic may create an ice pack underneath this layer. The organic layer is effective at insulating and slowing the warming of the soil in spring, artificially creating a longer winter season.

Seeded perennial forage

Seeded pastures and hay fields are the preferred land use for bale grazing sites.

Bale grazing straw on a bunchgrass pasture (Russian wild ryegrass). A 12-inch layer of straw was left behind after grazing. After four years, "dead spots" remain where straw bales were placed.

Bale grazing alfalfa/grass hay on a bunchgrass pasture (Russian wild ryegrass). A three-inch layer of material was left behind after grazing. After four years, the stand is slightly thinned where bales were placed. ***Photos: Saskatchewan Agriculture***

Bale grazing delivers a significant amount of nutrients to the site, especially on the points where the bales are placed. This nutrient supply is released over several years from the organic layer. Seeded perennial forage is generally the best suited vegetation for taking advantage of and utilizing this relatively high level of fertility.

Ideally, the stands should have at least one rhizomatous grass species (smooth bromegrass, quackgrass, Kentucky bluegrass). After grazing, if a relatively thick layer of residual material remains on the spots where bales were placed, these grasses have a greater chance of growing through the layer and filling in from new shoots produced by their rhizomes. On fields dominated with bunchgrass species (crested wheatgrass, meadow bromegrass, Russian wild ryegrass), there is greater potential for "dead spots" and weed growth on the spots where bales are placed.

The effect of bale grazing on legumes in a perennial stand is variable. When the residual layer after bale grazing is greater than four inches thick, alfalfa appears to be injured. When the residual layer is less than four inches, alfalfa can be enhanced. In some regions, alsike clover has been increasing on fields where bale grazing occurs. On perennial fields with a high percentage of legumes, producers are encouraged to experiment and proceed with caution.

Annual cropland

Annual cropland is somewhat less suited for bale grazing sites for several reasons. First, the layer of manure and leftover feed in the following spring may cause trash clearance problems with seeding equipment unless the residue is spread with heavy harrowing. Harrowing may or may not be effective, depending on the amount of material left over and the spacing of the bales. Second, an ice layer underneath the residue may keep soil temperatures cold beyond the date for optimum seeding. Third, if any plastic twine remains behind, it could cause problems with the seeding machinery. Fourth, the uneven distribution of nutrients after bale grazing would likely cause significant variation in following crops.

Native prairie

Bale grazing is not recommended on native prairie sites. The primary reason is bale grazing may increase the opportunity for invasive weeds and forage species, through seed introduction and increased soil fertility. Secondly, native plant species evolved and produce forage under relatively low fertility conditions. Native species will not respond to increased soil fertility similar to the level observed in seeded perennial forages.

Soil texture, nutrient leaching and water runoff considerations

Fields or bale graze sites with coarse-textured soils (sandy, gravelly) are not the preferred locations for bale grazing, due to the risk of nutrients leaching below the rooting zone and into the water table. If bale grazing is planned for these areas, consider using a lower bale density to reduce the risk of nutrient leaching. It is recommended producers avoid bale grazing on coarse textured soils above shallow aquifers.

Ideally, bale grazing should occur on a site where water runoff to surface water bodies is minimal or contained on the farm. Avoid bale grazing in riparian areas (wetlands), on steep slopes next to riparian areas, and on upland areas that drain directly into a water body used as a water source.

Soil fertility considerations for bale placement

Where there are variable soil conditions and/or rolling topography, producers may want to place bales on fields or target areas within a field where the nutrients, manure and residue from the bales will provide the greatest economic benefit. One example would be placing bales on hilltops where there is shallow topsoil and low fertility. Another example would be placing bales on fields with the lowest overall fertility. Avoid low lying areas and depressions with high natural fertility as excess nutrients and higher leaching rates will increase the potential for groundwater contamination.

Physical impacts on the bale graze site

The majority of bale grazing occurs during the fall on dry soils or during winter on frozen soils. In these cases, there are minimal physical impacts on the soil surface and on perennial plants. When bale grazing occurs during spring thaw, there is potential for hoof damage (pugging) to the soil surface. Producers should monitor this situation and have alternative plans until the soil surface is able to support livestock traffic. Options to minimize pugging during spring thaw are to bale graze on rhizomatous grass areas, higher elevations and south facing slopes.

Logistics of site selection

A main goal of bale grazing is to reduce winter feeding costs without compromising the health, comfort or performance of the livestock. When choosing a location, ideally the site should:

- be easy to monitor on a regular basis;
- be on or near the field(s) where the bales were made to reduce bale handling and transportation costs;
- be on land that is already perimeter fenced or can be fenced at low cost;
- be on seeded perennial forage in a nutrient deficient state, resulting in a large increase in forage productivity from added nutrients;
- have power available for electric fences to control livestock access to the bales (not needed if the fencing is solar powered);
- have a water source if adequate soft snow is not available;
- have wind protection for the livestock (protection can include natural bush,

The two photos above illustrate forage production two years after bale grazing took place on a low fertility, rhizomatous grass pasture (smooth bromegrass, Kentucky bluegrass). The lefthand photo shows an area *between* bales where low levels of nutrients were deposited by livestock. The righthand photo shows the area that was *underneath and adjacent to* a bale, where high levels of nutrients were deposited by livestock. This area is now dominated by smooth bromegrass.
Photos: Saskatchewan Agriculture

planted shelterbelts, or portable windbreaks); and
- have access to a handling facility if needed.

Wind protection and watering

Portable windbreaks should be used for wind protection if there is insufficient natural shelter. The windbreaks need to be moved on a regular basis to facilitate uniform distribution of livestock, and subsequently uniform distribution of nutrients from manure and urine.

When possible, avoid the natural shelter of riparian areas. If riparian and upland wooded areas must be used, you may need to limit or stop livestock access with fencing to allow for regeneration of trees and to avoid excess nutrient overloading.

When surface water bodies, such as dugouts and sloughs, are used as a water source, pumping to a winterized system is recommended. This will minimize the risk of cattle falling through the ice. These systems also reduce the potential for manure and nutrient contamination of the water source.

Permanent electric fence to protect the shelterbelt from livestock damage. ***Photo: PFRA***

To discourage lingering and the deposit of manure at the winter watering site, place portable windbreaks, feed, mineral feeders and oilers well away from the watering site. Note the high concentration of manure at this wintering site. ***Photo: PFRA***

Bale placement

Time of year and amount of feed placed

Bales can be placed during summer, fall or winter. There are several advantages to placing bales early in the season.

First, there are lower equipment costs if bales are grazed on the hayfield where they are made, or if they are taken directly from the hayfield to the wintering site.

Second, there is less wear on equipment and there are lower operating expenses during mild weather.

> . . . current research suggests a maximum bale density of 25 hay bales per acre.

Third, the producer has eliminated the cost of moving snow. Fourth, there are lowered costs of operating equipment in the snow. Fifth, the producer has the opportunity to remove plastic twine prior to freezing rain or wet snow.

Some producers have placed the entire winter supply of bales prior to winter. In some cases, this may be relatively high risk because of potential wildlife damage or livestock access problems due to snow drifting. If so, a portion of the bales can be placed in fall and the remainder can be placed during the winter on a weekly or monthly basis from the stack yard. In this situation, some of the cost advantage will be lost because bales are handled an extra time.

Bale setting and density

When electric wire is used to limit access, the bales are usually placed in rows on a grid system to simplify moving the electric wire.

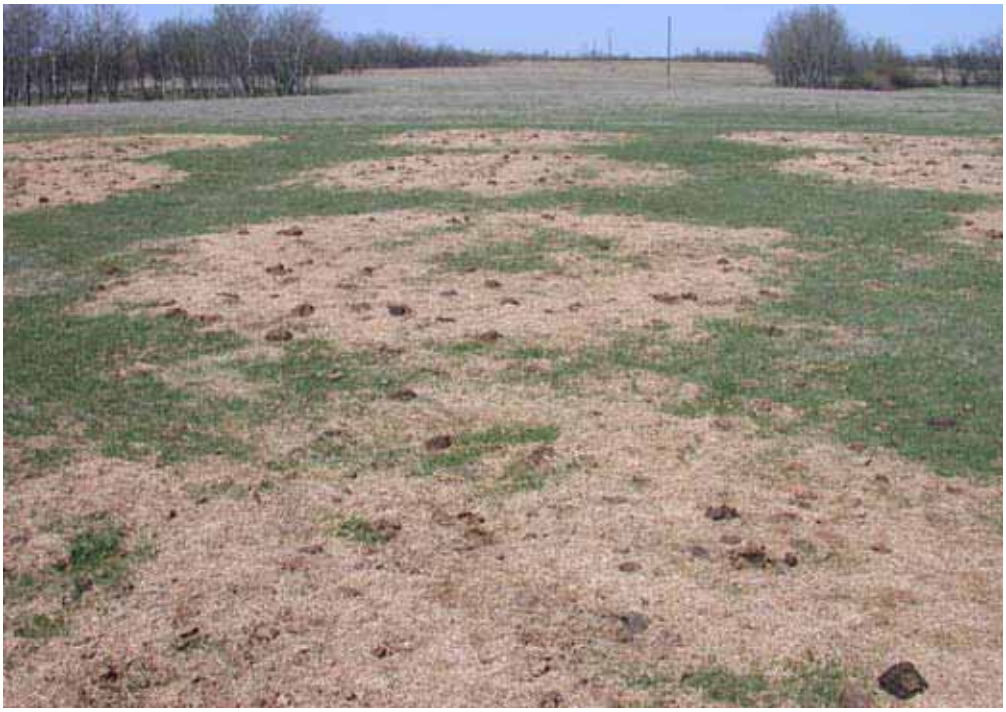
For example, if 10 bales are needed to feed a group of livestock for three days, then bales are set in rows of 10. Most often, bales are placed on their round side, just the same as when they are ejected from the baler. This way, the bales stay relatively intact after the twine is removed.

Using alfalfa/grass hay bales that average 1,300 pounds (lb.), current research is suggesting a maximum density of 25 bales per acre. To obtain this density, place bales in a grid on 40-foot centres.

Bales placed in fall, hauled directly from hayfield. Twine can be removed prior to freezing rain or wet snow. ***Photo: Saskatchewan Agriculture***

Photo above and photo at right: **These photos show the manure and leftover material following bale grazing at a density of 25 bales per acre (40-foot centres). At this rate, the overall average nutrient deposition from urine and manure is considered environmentally safe and economically optimal.**

Photos: Saskatchewan Agriculture



At this rate, an overall average rate of about 75 lb. per acre of plant-available nitrogen will accumulate in the soil profile the following spring. The nutrients will not be evenly distributed, but overall this is considered an environmentally safe and economically optimum rate for nitrogen application.

In a follow-up year, bales can be placed in the lower fertility areas of the grid.

When straw bales are included on the bale grazing site, overall bale density can be increased because straw results in a lower level of nutrients being excreted by the livestock. On a per-bale basis, assume that a straw bale contains about 25 per cent of the nutrients of an alfalfa/grass hay bale.

Feed rationing: quantity and quality

When planning for bale placement, assume cows will consume hay that has a 10 per cent moisture content at the rate of about 2.6 per cent of body weight per day.

Therefore, a herd of 100 cows with an average weight of 1,400 lb. would consume about 3,640 lb. of hay each day (100 x 1,400 x 0.026 = 3,640).

Allowing for 15 per cent feed waste, the herd of cows would need access to 4,186 lb. of hay for each day (3,640 x 1.15 = 4,186). If the electric wire fence is to be moved every three days, then the herd would need 12,558 lb. of hay for each move (4,186 x 3 = 12,558).

When all the bales being grazed are of similar feedstuff and forage quality, they are simply placed in rows and allocated to the livestock as needed. As with any winter feeding program, it is recommended to sample and feed test to determine if the feed provides adequate nutrition.

. . . bale grazing must be managed so that all animals get a relatively equal chance at better quality feed.

However, when bales are from different feedstuffs and of different forage quality, then some planning is needed. The planning involves the mix of different types of bales and the number of bales associated with each move of the electric wire. Different feedstuffs could include alfalfa, alfalfa-grass mix, grass, greenfeed or straw.

Bales of different feeds need to be weighed to determine their average weights. Each lot of bales needs to be sampled and analyzed to determine forage quality. The information can then be used to calculate the combination of bales required to balance the nutritional needs of the cows.

When bales of different feed quality are placed together and rationed to the livestock, the bale grazing must be managed so that all animals get a relatively equal chance at the better quality feed.

To ensure that all animals have relatively equal access to the better quality feed, allocate three straw bales and nine hay bales for a three-day period.

For example, suppose a combination of three hay bales and one straw bale will meet the daily intake and nutritional

needs of a herd. However, if three hay bales and one straw bale are allocated each day, the aggressive animals will get the majority of the better feed.

To ensure that all animals have relatively equal access to the better quality feed, allocate nine hay bales and three straw bales for a three-day period. On the first day, all animals will have the opportunity to fill up on the higher-quality hay. By the third day, all the animals will have to eat straw or a similar lower-quality ration.

Photo: Saskatchewan Agriculture

An alternate option is to place lower-quality bales by themselves in one location, and higher-quality bales by themselves in another location. At any point, the herd can be limited to low-quality feed for a period of time, or can be given free access to higher-quality feed.

This allows rations to be adjusted during the winter in response to the changing nutritional requirements of the cows. These requirements will change over winter in relation to air temperature, body condition score, and stage of pregnancy.

Livestock and electric fence management

Livestock access to the bales needs to be controlled. This minimizes fouling of feed and reduces the potential for partially grazed bales to be buried under drifting snow.

Livestock access is commonly controlled with an electric fence, but can also be accomplished with a series of small permanent paddocks. Livestock access to individual bales can be further controlled using bale feeders.

The optimum time period for each move of the electric fence appears to be three to four days. The electric fence does not necessarily have to be moved at specifically set intervals. With changes in temperature and livestock body condition score, the feed cleanup should be monitored and moving done accordingly.

Controlling livestock with electric fence is more difficult in winter than in summer. The insulating value of snow, heavier hair coats on the livestock, and relatively dry frozen soil are all factors that make it more difficult to deliver a shock to the animal. Monitor the voltage on a regular basis to

Controlling livestock with electric fence is more difficult in winter than in summer.

Electric wire fencing is held by rods using the bales as support.
Photo: Manitoba Agriculture, Food and Rural Initiatives

ensure it remains an effective barrier. If the voltage is low, check for a short. If there is no short, a more powerful energizer may be required. If the voltage is adequate and the animals are still challenging the fence, a better ground system with more ground rods may be needed.

An alternative for grounding is to use a second wire as a ground. Set the hot wire at a height

A producer controls access to bales with portable electric fence.
Photo: Saskatchewan Watershed Authority

Livestock trained to respect the electric fence in summer will be less likely to challenge the fence in winter.

about 40 inches, and the ground wire 12 to 16 inches below. Many producers prefer galvanized aircraft cable due to its flexibility and ease of handling.

Livestock trained to respect the electric fence in summer will be less likely to challenge the fence in winter. As a safety precaution, a second wire or set of wires should be placed one move ahead, just in case livestock cross the initial wire. Situations to monitor are frost weighing down the wire, winds blowing feed onto the wire, and wildlife interference. Posts can be placed in fall before the soil freezes.

Options for moving the wire during winter are:

- drilling holes with a cordless drill and masonry bit, and placing metal or fibreglass rods;
- opening holes manually with a pilot hole driver;
- pounding metal rods and removing with a pipe wrench;
- free standing posts with base;
- tumble wheels;
- sharpened rods inserted into bales; or
- posts supported by snow. Snow can be packed by snowmobile traffic the day before placing posts.

Site management after bale grazing

When bale grazing occurs on annual cropland, the site may need heavy harrowing in early spring to spread the residue before a seeding operation can take place.

When bale grazing occurs on perennial forage dominated by alfalfa and bunchgrasses, the site may benefit from harrowing to spread residue and lessen the occurrence of dead spots in the field. Alfalfa and bunchgrasses are susceptible to being killed if the residue layer is greater than four inches.

A disadvantage of harrowing is the economic cost. Harrowing may not be effective when there is high residue and the bales are placed close together. When bale grazing is located on perennial forage with rhizomatous grasses, the occurrence of dead spots is significantly lower and harrowing is likely unnecessary. During the spring following bale grazing, growth of the rhizomatous grasses beneath the bales will be delayed and may be somewhat less robust. However, later that year and following years, forage production is usually quite high.

Delayed warming of the soil in spring effectively creates a longer winter season and plants are less robust when they emerge.

Perennial forage stands will have delayed growth in the spring following bale grazing. Plant

growth is especially delayed on the spots where bales were placed and a thick insulating layer of residue remains along with the ice and frozen soil underneath the residue layer.

Delayed warming of the soil in spring effectively creates a longer winter season and plants are less robust when they emerge. Therefore, bale grazed pastures need sufficient time in spring for the plants to recover before regular grazing begins.

. . . bale-grazed pastures need sufficient time in spring for the plants to recover before regular grazing begins.

The suggested maximum rate for bale grazing alfalfa/grass hay on perennial forage is 25 bales per acre. From visual observations, this should be done only once in five years on a given site. It has been observed that bale grazing at this rate will enhance forage production for about five years. Returning to the same site more often will result in missed opportunities to improve other acres. It may also increase the environmental risk of nutrient overloading, resulting in nutrient losses in water runoff and leaching. On sites with greater water runoff and leaching potential, a time interval longer than five years will lessen the environmental risks.

Until more specific recommendations can be made, producers are encouraged to monitor the impact of bale grazing on plant growth, take soil samples to determine soil nutrient status, and manage accordingly.

Grass growth in spring is delayed underneath and immediately around the bales. Grazing needs to be delayed until plants have sufficiently recovered.
Photo: Saskatchewan Watershed Authority

Bale twine, net wrap, and bale feeder management

When bale grazing occurs on the same field where the bales are made, some producers have experimented with making bales without twine.

This may be an option as long as the bales remain intact and are able to shed water. However, experience suggests a minimum of twine is needed to hold the bales intact from the wind.

Bales made without twine wrapping. The wind has opened up the bales, thereby making the feed susceptible to weathering.
Photo: Saskatchewan Agriculture

Some producers are wrapping bales with sisal twine because it's biodegradable. It can be left on the bales to save the time and cost of twine removal. During grazing, the twine helps to hold the bale together, which reduces feed waste. It appears from observation that sisal twine is less likely to catch and pull out ear tags compared to plastic twine.

There are two disadvantages to sisal twine. First, bales made with sisal twine may need to be moved before the twine on the bottom of the bale decomposes. Second, the cost of sisal twine is currently about 50 to 75 cents higher per bale compared to plastic twine.

Most bales are wrapped with plastic twine. To minimize the time and effort of removing twine, it can be done prior to freezing rain and/or wet snow. An effective method of removing twine is to cut on one side of the bale, tie the loose ends in a knot, and throw the knot over the bale. The knots can be hooked to a quad or truck and the twines pulled as you drive along the bale rows. If bales are tipped on their sides, twine can be cut and removed by walking around the bale.

Potential disadvantages of early season twine removal are: wind will likely open the top layer of the bale; wildlife damage to the bales may be greater; and bales left over in spring cannot be kept as successfully until the following year because of the reduced ability to shed water.

Some producers are experimenting with leaving plastic twine and net wrap on the bales during grazing, and collecting it after grazing or the following spring.

Plastic net wrap holds the material together, reducing the opportunity for fouling.
Photo: Mark Neuman, Frobisher, Sask.

Livestock are shown "mob grazing" a bale that was wrapped with plastic net. Once the bale is opened up, livestock continue to graze before starting a new bale.
Photo: Mark Neuman, Frobisher, Sask.

It appears that livestock prefer to feed on net-wrapped bales that they have started to consume, and feed on them until done. This may allow producers to distribute three to four weeks of bales at a time, and could eliminate the time and expense of three- to four-day allotments with electric fence.

Leaving plastic twine and net wrap on the bales creates issues such as: potential ear tag losses, potential hazards to the livestock, and difficulty in gathering the twine from the field.

At this point, there is limited experience in gathering net wrap from the residual material following grazing. However, it appears gathering net wrap is relatively easy compared to gathering plastic twine.

Another option to limit feed waste is light-weight bale feeders made of one-inch square tubing. These can be tipped on end and rolled from one bale to another.

Bale feeders help reduce the fouling of feed because livestock cannot as easily pull the bale apart and get on top of the material. Bale feeders also reduce the opportunity for snow to drift over the feed that has been scattered from opened and partially grazed bales.

This photo shows that livestock have cleaned up the net-wrapped bale, that had been located on the right foreground, before starting to graze the net-wrapped bale on the left. The patch of residue on the right was the location of the net-wrapped bale.
Photo: Mark Neuman, Frobisher, Sask.

Wildlife considerations

In locations with high populations of big game, it may not be possible to leave bales unprotected in a field during winter due to consumption and fouling of feed by wildlife.

In these situations, one option may be to limit bale grazing to early winter months before game animals “bunch up.”

Leaving the twine on bales will help to reduce wildlife damage.

There may be extreme situations where bale grazing is not possible at any time due to wildlife damage.

Conclusion

When properly managed, bale grazing can offer both economic and environmental advantages compared to traditional intensive winter feeding.

Bale grazing can also be done without compromising the health, comfort or performance of the livestock.

Livestock managers will have a greater chance of success if they become familiar with the practice and issues of bale grazing before they start. Plan the bale grazing system. Monitor the feed, livestock and weather conditions during bale grazing. Make adjustments as needed.

New and innovative bale grazing methods are evolving as producers continue to experiment. Further research is being planned for bale grazing. This publication will be updated as new information becomes available.

Introduction to the Bale Grazing Calculator©

The Bale Grazing Calculator© is a tool to help producers estimate the cost of feeding livestock with bale grazing.

Two variables have a significant influence on the cost of bale grazing.

They are:
1) cost of the feed, and
2) number of times the feed is handled with machinery.

Depending on individual circumstances, infrastructure requirements that may or may not add to costs are perimeter fencing, electric cross fencing, water development, and portable wind shelters.

Example calculations are found on the following pages. In these examples, a feed utilization estimate of 40 lb. per cow per day is based on a 1,300 lb. cow consuming 2.6 per cent of body weight per day. (1,300 x 0.026 = 33.8 lb.)

An allowance of 18 per cent for feed waste equals a feed utilization estimate of 40 lb. per cow per day. (33.8 x 1.18 = 39.9 lb.)

Producers can adjust this estimate for their own situations.

See the next page for Options #1, #2 and #3.

Copyright notice: Bale Grazing Calculator©

When using this workbook and worksheets, producers should complete the worksheets using their actual or projected production figures. Values should be entered only into the white boxes, as all other values are calculated with fixed formulas.

Bale Grazing Calculator©: Home-grown and purchased hay

Option #1: Home grown hay

In this example, the hay is home grown by the producer and the bales are grazed on the field where they are made. The hay cost includes a comprehensive list of forage establishment and termination costs, as well as machinery, fence, land and labour costs.

A cost for bale moving can be assigned if the bales are moved after being made. The number of times bales are handled, and the distance they are moved can add significantly to bale grazing cost.

On the low-cost end of the spectrum, there is no moving cost if the bales are grazed on the spot where they are ejected from the baler.

On the high-cost end of the spectrum, bales would be hauled to a central location, stacked and hauled to a bale graze site periodically throughout the winter.

Suggested bale moving rates are listed in the table below.

Bale Moving	Bale Moving Cost ($/bale)
Graze where ejected from baler	0.00
Haul directly to site and place	3.00
Haul to hay yard, stack, haul to site during winter	15.00
Transport distance ($/bale/mile)	1.00

Option #2: Bales purchased and transported

In this example, hay bales are purchased and transported directly to an existing pasture.

This option could also be used when an operation is divided into separate land and livestock enterprises, and the hay is sold to the livestock enterprise at current market value.

The landed hay cost includes purchase price of the hay, transportation to the site, and arranging the bales on the bale graze site. A fertilizer value of $10 per ton (current best estimate) is subtracted from the Landed Hay Cost.

When hay is imported, nutrients from manure, urine, and leftover feed are deposited on the bale graze site. It is assumed the pasture is managed in order that the added nutrients will result in increased forage production.

Costs for perimeter fence, winter water-development and wind shelter can be assigned. However, in this example, no allowance is entered as this infrastructure could already be in place on, or near, the pasture.

A land cost is not assigned as bale grazing in winter is an added use for the pasture at virtually no cost.

Option #3: Additional costs for bale moving

This option is similar to Option #2, with an added cost for bale moving.

In this example, the purchased hay is unloaded and/or stacked on one location and then periodically throughout the winter hauled to the bale graze site.

A bale weight has to be entered as both bale weight and bale moving cost have an effect on cost per head per day.

The Bale Grazing Calculator©

To work with the interactive Bale Grazing Calculator©, go to the Saskatchewan Agriculture website at www.agriculture.gov.sk.ca. Click on Management, then click on Financial Planning.

There is no charge to use the calculator. If you need help with the calculator, please phone the Agriculture Knowledge Centre at 1-866-457-2377 between 8 a.m. and 5 p.m., Monday to Friday.

Bibliography

Jungnitsch, P., Lardner, H.A., Schoenau, J.J. and Highmoor, T. 2005. "Nutrient Management of Cow-Calf Winter Feeding Systems." *Proceedings of the Soils and Crops Workshop*. University of Saskatchewan. Saskatoon, Sask. Feb. 18, 2005. pp. 11-12.

Greenhouse Gas Mitigation Program for Canadian Agriculture. Winter feeding on smooth bromegrass pasture with bale grazing and bale unrolling, 2005-2007. Unpublished data collected by Lorne Klein, Saskatchewan Ministry of Agriculture.

Mulhern Davidson, Tara, and Gulka, Stacey. *Livestock Watering Systems in Saskatchewan: Producer Experiences*. Ducks Unlimited Canada and Saskatchewan Watershed Authority publication. 2007.

Articles published on the Saskatchewan Ministry of Agriculture website located at www.agriculture.gov.sk.ca. The articles are *Portable Windbreak Fences* and *Snow as a Water Source.*

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Ministry of
Agriculture

Bale Grazing and the Bale Grazing Calculator©
First printed June 2008
ISBN 978-1-926547-00-8 1K PDC CD 0213