

GRAZING GREEN MANURES

By Stuart McMillan

The importance of green manures for fertility improvement, weed control and soil building is well understood. However, many organic farmers, gardeners and ranchers still do not use green manures to their full potential.

One of the main barriers to using green manures is economic—taking cropland out of production means there is no income for that period. Depending on the type of green manure and how it is grown and incorporated, the grower can face significant costs.

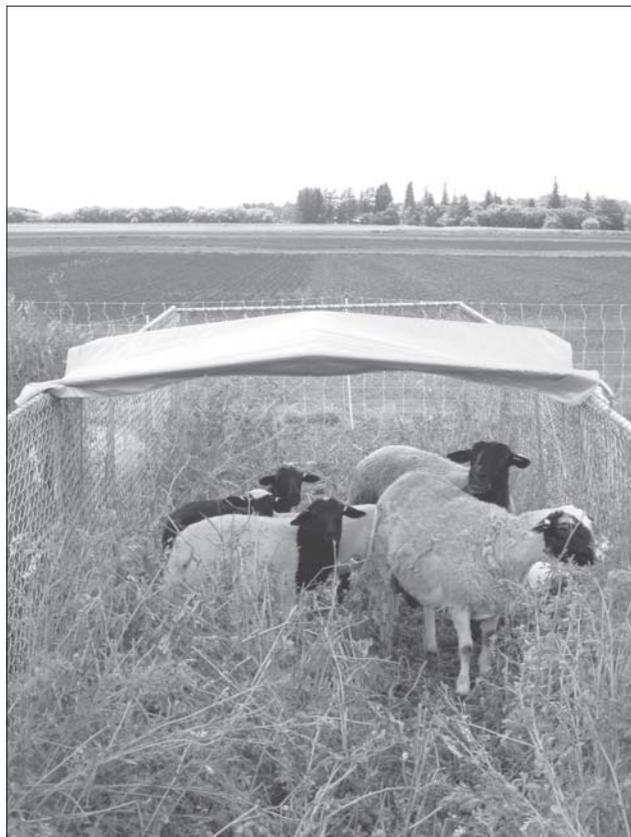
What if growers could get the benefits of a green manure and an economic benefit as well? One obvious fit is to mix green manures with livestock grazing. Many farmers have gazed at a lush field of legumes and grasses, and thought it would be a shame to till it into the ground rather than feed it to their livestock. Their consolation? At least they are feeding the soil and the animals within it.

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In Manitoba, researchers Harun Cicek and Joanne Thiessen Martens, under the guidance of Dr. Martin Entz, examined slightly different aspects of grazing green manures. They shared their results with farmers and scientists at the 2012 Canadian Organic Science Conference.^{1,2} Cicek compared seven green manure crops, while Thiessen Martens explored the grazing value of hairy vetch.

The researchers examined the potential for grazing green manures (by sheep), comparing the following:

- 1. Different types of green manures.** Green manures vary in their ability to regrow after grazing.
- 2. Timing of grazing.** The time in the growth cycle when the green manure is grazed affects how much material is available for grazing, its nutritional value, and whether it will regrow.



Sheep grazing green manures in Manitoba.

- 3. Grazing intensity.** The grazing intensity affects how much of the green manure is trampled, how much is eaten, and its ability to regrow.

For farmers, these three components need to be integrated depending on the end goal. Do they want the green manure to be killed in late summer and allow for early fall tillage? If so, they should choose a crop like peas/oats, and graze once at high intensity. The researchers found this strategy led to very little regrowth. Many plants were trampled, but that material was all incorporated into the soil in the end.



Dorper sheep grazing on oat heads.

If forage supplies are low and maximum weight gain is desired, a better choice may be multiple light grazings of a crop with good regrowth potential, such as hairy vetch.

Green manures vary in their nutritional values and suitability for forage. For example, sweet-clover contains coumarol; when the plant is spoiled or mouldy, this turns into the toxic dicoumarol. Similarly, hairy vetch has been reported to cause occasional problems in cattle and horses; this seems to be linked to consumption of ripe vetch with a lot of hard mature seed.

Additionally, different types of livestock vary in their sensitivity to plant compounds. Cicek did not see any negative effects in the Dorper sheep used for the experiment. However, caution should always be taken when introducing a new feed to animals.

Compared to incorporating a green manure, grazing increased the availability of nitrogen in the

upper and lower soil profile. This might reflect the fact that the availability of nitrogen in the urine and manure of animals is different than that of nitrogen in plant tissue.

The year after the green manures were grazed, cereal yields were generally higher compared to fields where the green manures were incorporated. Soil organic matter (SOM) levels were not found to vary between the systems, although the study may not have been long enough to allow detection of gradual changes to SOM.

Cutting the green manure as hay or silage was also investigated.

The downsides to this strategy are:

- nutrients are removed from the field,
- manure and urine are deposited off of the field, and
- extra machinery operations increase labour and other financial costs.

The findings suggest that this is not an ideal strategy, but it does provide some of the benefits of a

green manure crop and it is certainly better than black fallow.

A grazed green manure system needs to be adapted to the farm and region. There are a number of nuances. To start, the grazing habits of sheep, cattle and pigs are quite different. The placement of waterers and the length of time animals are in one place influence the nitrogen and phosphorus levels, and the location of nutrients within the field. For livestock farmers who have the machinery to plant green manures, or for grain farmers looking to add livestock, grazing green manures can improve yields, reduce feed costs, lower carbon emissions, and retain all of the traditional benefits of green manures in rotations.

Photo credits: Harun Cicek

References:

1. Cicek, H, MH Entz, JR Thiessen Martens & K Bamford. 2012. Investigating soil NO_3^- and plant N uptake when green manures are grazed. *Proceedings of 2012 Canadian Organic Science Conference.*
2. Thiessen Martens, JR & MH Entz. 2012. Exploring the unique role of hairy vetch in grazed green manure systems. *Proceedings of 2012 Canadian Organic Science Conference.*

Further reading:

Thiessen Martens, JR & MH Entz. 2011. Integrating green manure and grazing systems: A review. *Can J Plant Sci.* 91:811–824.

Grazed green manures. http://umanitoba.ca/outreach/naturalagriculture/articles/grazed_green_manures.html

Grazed green manures: phase 2 – the next crop. http://umanitoba.ca/outreach/naturalagriculture/articles/grazed_green_manures2.html