

August, 2015

Cropping System, Grazing and Soil Health

Rob Dunn, P.Ag., Cropping System Specialist, FarmWise Inc.

Soil health can be improved through cropping systems that increase biomass production, maintain good soil cover, minimize soil disturbance and include crop types with an appropriate water use intensity for the particular soil type. Where the option exists to integrate perennial forage either for hay or grazing, soil health may be further improved – as evidenced by several Western Canadian studies^{1 2}.

In those studies, including perennial hay in rotation increased soil organic carbon (SOC) and improved other soil quality indicators like aggregate stability compared to annual cropping alone. Grazing should have an additive effect since more biomass and nutrients are retained. Farmer experience, along with research in the Northern Great Plains region has demonstrated additional soil benefits from well managed perennial grazed systems.³

Low soil disturbance cropping systems like no-till with good rotations that maintain soil cover will help build soil health. Two important aspects related to rotation are crop diversity and crop water use intensity. Crop diversity is addressed further in several other articles in this series but suffice it to say that rotational diversity supports soil biological diversity since each crop type promotes a different spectrum of species within the soil biota. Rotations that include high and low carbon crops along with contrasting rooting patterns will also help build soil structure, like fibrous cereal roots and canola or pea tap roots.

Crop rotations should have a water use intensity that matches the soil type and weather patterns to avoid water logging, runoff or an aggravation of existing salinity issues – along with the many other resulting soil quality issues. Conserved soil moisture should always be used for productive crop growth which may require adjustments during wetter cycles.

Research and farmer experience with cover crops has shown that maintaining a living mulch can improve soil quality but this can be challenging because of limited growing season and rainfall compared to other regions. Studies have shown that either companion or intercrops have promise and should be considered for Alberta.⁴

¹ Potential of Forages to Diversify Cropping Systems in the Northern Great Plains. Martin Entz et al. 2001. *Agronomy Journal* 94:2 pages 240 – 250.

² Lessons from long-term dryland rotation study at Bow Island. *Ag Annex*. February, 2012. <http://www.agannex.com/canada/lessons-from-long-term-dryland-crop-rotation-study-at-bow-island>

³ Soil Quality: A Review of the Science and Experiences in the USA. B.J. Wienhold et al., June, 2014 [Environmental Geochemistry and Health](#), Volume 26, [Issue 2](#), pp 89-95.

⁴ Cover crops with winter wheat: Under-seeding winter wheat with alfalfa can provide some advantages. June, 2014. *AgAnex*. <http://www.agannex.com/field-crops/cover-crops-with-winter-wheat>



ARECA Soil Health Initiative

This article is part of a series to promote better understanding of our agricultural soil resources along with practices that can influence soil health.

There has been limited Alberta farmer experience with annual cover crops for soil improvement or grazing although interest is growing. This includes short term cover crops following forage or annual crop harvest⁵ and use of Brassica species (mainly radish) for soil improvement and/or grazing. Gabe Brown from Bismarck, North Dakota has successfully integrated full season cover crops with grazing into his farming operation and has made presentations about his experience at several Alberta workshops.⁶

In summary, cropping systems with good annual crop rotation that minimize soil disturbance will help improve soil health. Additional incremental benefits are possible through the inclusion of perennial forages and the practice of grazing rather than forage removal. Interest is growing in the use of companion or cover cropping for either soil improvement or grazing with considerable benefits possible.

⁵ Annual cool season crops for grazing by beef cattle. A Canadian Review. D. McCartney et al. 2008. *Canadian Journal of Animal Science*, 88(4): 517-533.

⁶ Cover crops and soil health guru winning converts in Alberta.

<http://www.albertafarmexpress.ca/2014/10/24/cover-crops-and-soil-health-guru-winning-converts-in-alberta/>