goGraze: an innovative web and mobile based tool for grazing planning and recordkeeping

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Introduction

Thank you for taking the time at this conference to learn about an online tool that can help you create a grazing plan, keep records, and monitor the performance of your farm. goCrop™ is a nutrient management planning web application; goGraze is a module that may be used with or without the nutrient management capabilities of goCrop™. The origins of goCrop™ stemmed from an increased focus on nutrient management education and development when legislation required Vermont's medium and large farms to have nutrient management plans (NMPs). In 2006, Dr. Heather Darby, University of Vermont Extension Agronomic and Soils Specialist, created a training course in collaboration with staff from the USDA Natural Resource Conservation Service (NRCS) and the Vermont Association of Conservation Districts (VACD). The course helped farmers create their own NMPs and provided education on managing fertility for high crops yields while protecting the surrounding environment. The first NMPs were completed with pen, paper, and calculators, and later moved to excel spreadsheets. As technology advanced, it became clear that the next step was to offer an NMP tool online.

In 2011, the goCrop™ web application was released to help farmers more efficiently create NMPs and allow for easier recordkeeping. In 2012, a mobile version of goCrop™ was developed that allows farmers to enter records on their iOS devices. The ability to enter data in real time in the field again improved the efficiency and accuracy of recordkeeping. goCrop™ receives routine updates, adapting to changing reporting requirements and user demands. Due to a 2015 water quality bill the majority of Vermont farmers are now required to create NMPs that meet state and federal standards, including the NRCS 590 nutrient management standard. Plans require basic farm information and general management practices, field information (soil type, soil analysis results, crop rotations, etc.), crop information and fertility recommendations, manure analysis results, manure applications records and plans, the nutrient balance for each field, and multiple environmental indices (P-Index, Nitrogen Leaching Index, RUSLE2, etc.).

Since many current users of goCrop™ are grass-based dairy farms, there was a need to integrate more specific grazing planning and recordkeeping features into goCrop™. Darby and her staff have worked with farmers and agricultural service providers to develop goGraze as a grazing module to goCrop™ to meet these needs.

About goGraze

goGraze was designed as a module within goCrop™ to help farmers build a grazing plan and keep records that may be used to help meet USDA National Organic Program (NOP) and NRCS reporting requirements for their grazing incentive programs. Most importantly, it provides the farm with a valuable data management program to allow for planning and monitoring of grazing systems. When goCrop™ and goGraze are used together, they allow for whole farm cropping system management.

The following screen shots are provided to illustrate goGraze and the step-by-step process of creating a grazing plan and entering records.

The first step is to provide some key pieces of information, entered under the fields tab. Here, you will select all farm fields that are included in the grazing operation. For example, the farm will likely have multiple perennial forage fields with pasture, hay, and a combination of both. For each particular field, the farmer or a planner must choose the purpose of the crop, such as for harvest, grazing, and/or as a cover crop (Figure 1). In the nearby screen shot, an annual crop of forage oats and peas used for harvest and grazing was selected.
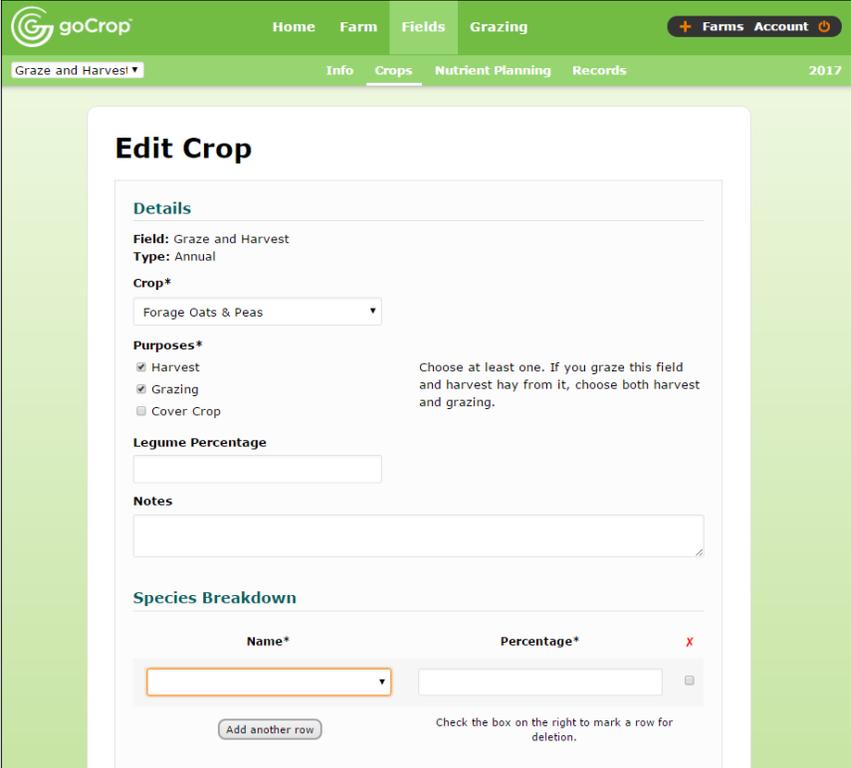

Figure 1. Screenshot of the Crops Details From with goGraze module addition, Species Breakdown and Species Breakdown Percentage.

To the right is an example of the harvest and grazing details needed to complete crop information to be used to help calculate potential yield of each field (Figure 2).

Figure 2.
Screenshot of the Crops Details From continued, showing Harvest Details and Grazing Details.

Harvest Details

More than one harvest?

○ Yes

◉ No

Total Anticipated Yield*

2000.0

Yield Unit*

lbs/acre ▼

Grazing Details

Grazing more than once?

◉ Yes

○ No

Anticipated Yield (per Graze)*

900.0

Yield Unit*

lbs/acre ▼

Approx. Number of Grazes

2.0

With the grazing feature, additional screens appear where the farmer can determine the regrowth rates for the pasture crop in that field (Figure 3). These regrowth rates or rest periods begin with defaulted book values typical for the seasonal growth rate for the type of pasture forages present in that field. The user can override these if they have their own farm data/information.

Pasture Regeneration Rates/Rest Periods

Ask yourself "If I graze a part of this field in [month], how long would I wait before grazing it again?".
Fill out an average for each month you might be grazing in.

Month		Avg Paddock Rest Period (days)
Jan	☐ Grazing?	
Feb	☐ Grazing?	
Mar	☐ Grazing?	
Apr	☑ Grazing?	14.0
May	☑ Grazing?	18.0
Jun	☐ Grazing?	
Jul	☐ Grazing?	
Aug	☑ Grazing?	36.0
Sept	☑ Grazing?	42.0
Oct	☐ Grazing?	
Nov	☐ Grazing?	
Dec	☐ Grazing?	
(Add another row)		Check the box on the right to mark a row for deletion.

Figure 3. Screenshot of the Crops Details From with goGraze module addition, Pasture Regeneration Rates/Rest Periods.

Once information for all fields to be included in the grazing plan is completed, the next step is creating the grazing plan in goGraze.

goGraze Grazing Planning

The grazing plan starts with creating animal groups that will be grazing on the farm. Options for animal groups appear in a drop-down menu. Default values for animal weight and daily dry matter intake (DMI) may be overridden with farm-specific information (Figure 4).

New Animal Group

Name*

Formed*

Notes

Group Composition

Species*

Purpose*

Sex*

Stage*

Dominant Breed*

Starting Information

Based on your choices above, goCrop will automatically fill in suggested values below. You can use these suggestions or input your own values.

Starting Number*

Starting Weight (lbs)*

Starting Daily DMI (% bodyweight)*

Cancel   Add Animal Group

Figure 4. Screenshot of the New Animal Group Form.

Once all animal groups have been created, the grazing plan may be created from scratch or based on a previous plan. Each plan receives a unique name (Figure 5). goGraze stores multiple plans for one year so you can compare plans and choose the one that is best for you or update your plan as conditions change throughout the grazing season (Figure 6).

New Grazing Plan

Name*

Crop Year*

2016

Based On

n/a - start from scratch

Notes

Cancel   Add Grazing Plan

Figure 5. Screenshot of creating a New Grazing Plan Group Form.
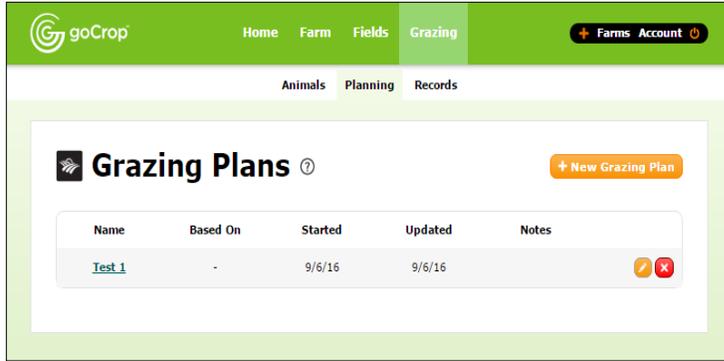
Figure 6. Screenshot of Grazing Plans page, showing one plan created.

When the grazing plan is opened, it will default to the Grazing Plan Summary page to view summary details of the plan and summary land needs for the group.

goGraze can account for a variety of variables for each grazing group. For example, users can identify animal groups that graze together (Figure 7). goGraze also accounts for the specifics of each grazing group such as the grazing season, fields that animal group will have access to (Figure 8), and the starting and ending heights of forage (Figure 9).

Figure 7. Screenshot of New Group Grazing Plan form.

Figure 8. Screenshot of Available Pasture list for each grazing group.

Figure 9. Screenshot of Available Pasture growing details.

To plan the grazing group's diet, goGraze allows the flexibility to plan for a specific dry matter intake (DMI) and modify the percent DMI expected from pasture as well as percent DMI from rations. The size of the grazing group, animal weight, and percent daily DMI in relation to animal weight may also be modified (Figure 10).

Figure 10. Screenshot of Planned Diet for specified grazing group.

goGraze can account for changes in diet for higher percentage of DMI from new pasture availability or differences in pasture productivity experienced throughout the year. Additions or losses of animals in the herd may also be modified and provides for quick DMI adjustments. Diets can be developed based on pounds of feed required per animal or for the group as a whole.

The final step in creating a grazing plan for a particular animal group is defining land base required to meet the pasture-based portion of the diet (Figure 11). In this section, grazing periods within the grazing season are defined and the DMI from pasture is based on input that was already recorded in the planned diet needs section. The total number of acres needed is determined by the productivity of fields and DMI required for the animal group. The user sets the occupation period (how often this animal group will be moved) and go-Graze calculates the number of paddocks needed and the size of each paddock.

Figure 11. Screen shot of Planned Land Needs for specified grazing group.

Figure 12. Screenshot of Grazing Details page showing Available Pastures and pasture details.

goGraze then summarizes the information for each grazing group, including length of the grazing season, number of days for minimum rest period, available pasture, and yield anticipated for each grazing event (Figure 12). The Planned Diet page includes total DMI from pasture for each recorded change in diet (Figure 13). This page also displays any changes in herd size, average weight, daily DMI, percent DMI from pasture and ration needed to meet feed demands.
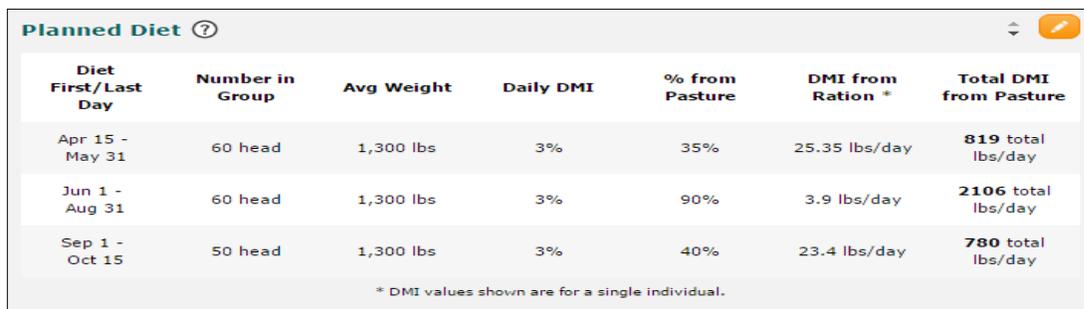
Figure 13. Screenshot of Grazing Details page continued showing Planned Diet details.

The Planned Land Needs page shows, by each animal group, each grazing period and the DMI required for perennial forage pasture (P) and/or annual forage (A) pasture (Figure 14). goGraze calculates number of acres needed for each forage type based on pounds of DMI required by the grazing group. Based on the estimated pasture yield, estimated paddock rest period, and the user defined occupation period, goGraze calculates the number and size of paddocks.

Planned Land Needs ⊘   ⌄ ✎

Grazing Period		DMI Needed from pasture*	Est. Pasture Yield	Est. Paddock Rest Period	Occupation Period	Paddocks	Acres Needed
May 1 - May 31	P:	779 lbs/day	503.6 lbs/ac	20 days	20 days	1.55 @ 30.94 acres ea.	47.95 acres
	A:	40 lbs/day	540 lbs/ac	20 days	11 days	2.82 @ 0.81 acres ea.	2.3 acres
Jun 1 - Jun 30	P:	2066 lbs/day	503.6 lbs/ac	24 days	20 days	1.5 @ 82.05 acres ea.	123.07 acres
	A:	40 lbs/day	540 lbs/ac	20 days	10 days	3 @ 0.74 acres ea.	2.22 acres
Jul 1 - Jul 31	P:	2066 lbs/day	503.6 lbs/ac	30 days	25 days	1.24 @ 102.56 acres ea.	127.18 acres
	A:	40 lbs/day	540 lbs/ac	24 days	6 days	5 @ 0.44 acres ea.	2.22 acres
Aug 1 - Aug 31	P:	2076 lbs/day	503.6 lbs/ac	36 days	20 days	1.55 @ 82.45 acres ea.	127.79 acres
	A:	30 lbs/day	540 lbs/ac	36 days	11 days	2.82 @ 0.61 acres ea.	1.72 acres
Sep 1 - Sep 30	P:	760 lbs/day	503.6 lbs/ac	42 days	25 days	1.2 @ 37.73 acres ea.	45.27 acres
	A:	20 lbs/day	540 lbs/ac	42 days	5 days	6 @ 0.19 acres ea.	1.11 acres

* DMI values shown are totals for the whole group.

Total required perennial pasture: 61.87 - 230.85 acres   **Total required annual pasture:** 1.74 - 2.61 acres

Figure 14. Screenshot of Grazing Details page continued showing Planned Land Needs details.

The information entered for each grazing group is summarized in the Grazing Plan Summary page (Figure 15). Here, an overview is given of the length of the grazing season, range of herd size, range of supplemental feed needed, and percent DMI from pasture for the grazing season for each animal group. Other grazing information includes the range of the period of occupation, paddock sizes, number of paddocks, and acres needed for each animal group throughout the season.
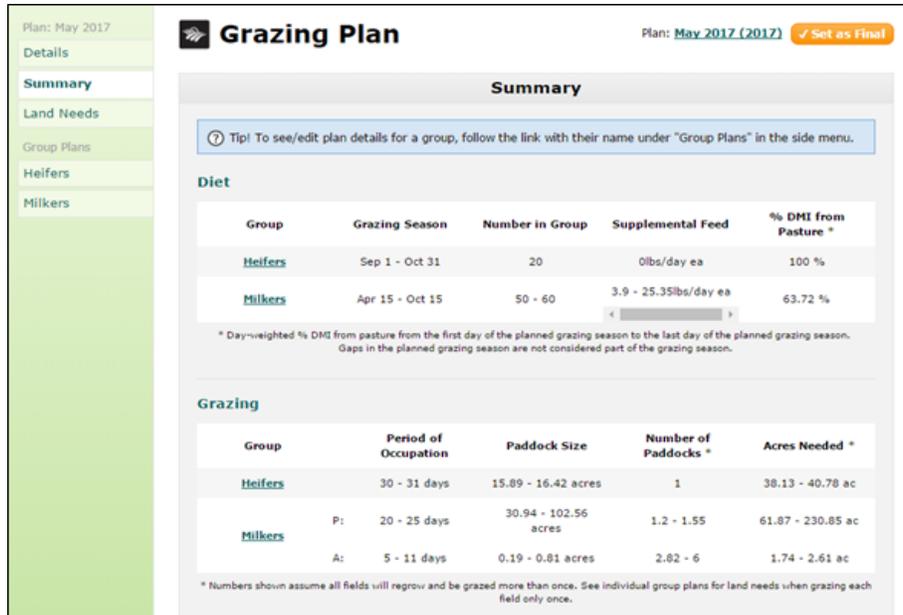
Figure 15. Screenshot of Grazing Plan Summary details.

Additional summary information is displayed in the Land Needs section. Here goGraze alerts the user if the plan falls short in number of acres needed and identifies which months may not have enough land for the planned grazing. Total land needs are summarized to show maximum number available for perennial and annual pasture and maximum number required of each.
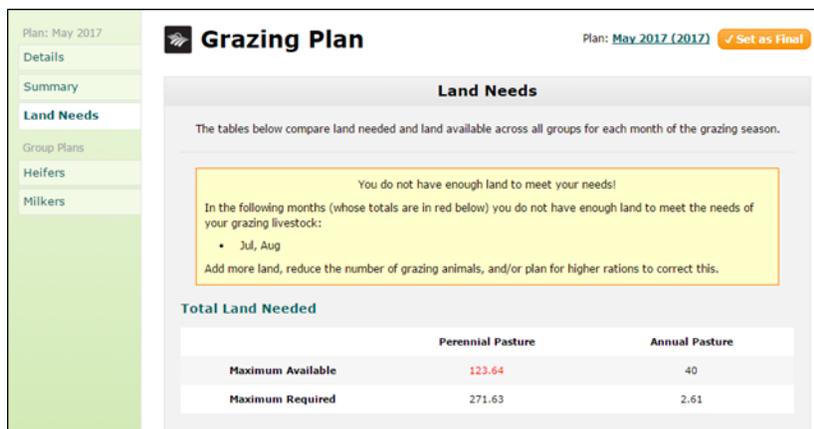

Figure 16. Screenshot of Grazing Plan Land Needs summary.

Land needs are also divided into perennial and annual pasture summaries to show how much land each group needs and how many acres are available from which fields each month (Figure 17).

Perennial Pasture
Acres Needed By Month

Group	May	Jun	Jul	Aug	Sep	Oct
Heifers	-	-	-	-	15.89	16.42
Milkers	47.95	123.07	127.18	127.79	45.27	-
Total Needed	47.95	123.07	127.18	127.79	61.16	16.42

Available Land By Month

Group	May	Jun	Jul	Aug	Sep	Oct
Native Pasture - Pasture	50	50	50	50	50	50
Pasture Out Back - Pasture	43.64	43.64	43.64	43.64	43.64	43.64
Small Pasture - Pasture	30	30	30	30	30	30
Total Available	123.64	123.64	123.64	123.64	123.64	123.64

Annual Pasture
Acres Needed By Month

Group	May	Jun	Jul	Aug	Sep
Milkers	2.3	2.22	2.22	1.72	1.11
Total Needed	2.3	2.22	2.22	1.72	1.11

Available Land By Month

Group	May	Jun	Jul	Aug	Sep
Graze and Harvest - Forage Oats & Peas	40	40	40	40	40
Total Available	40	40	40	40	40

Figure 17. Screenshot of Grazing Plan Land Needs summary details for perennial and annual pasture.

Recordkeeping with goGraze

The Grazing Records page displays the current pasture location for each animal group, pounds of DMI the animals will receive from this pasture, the percent DMI from pasture the cows are receiving up to this date in the grazing season, and percent DMI from pasture for the entire year. goGraze manages a number of different records: grazing, ration change, event, forage test, forage observation, and a detailed weather record. These records are displayed in a chart format, listed in chronological order.

goCrop — Home Farm Fields **Grazing** — + Farms Account
Animals Plans Records — 2017

Grazing Records

Add a Record...
Grazing Ration Change Event Forage Test Forage Observation Weather

Today on Pasture

Group	Current Location	Current Ration	DMI from pasture	% from pasture (to date) season | year
Heifers	-	-	17.88 lbs/day each	-	-
Milkers	-	-	39 lbs/day each	-	-

Records

You have no grazing records!

Figure 18. Screenshot of available Grazing Records, grazing group summary statistics, and record activity log.

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The Grazing Record accounts for the date and time each animal group was grazing (Figure 19). It may be adjusted to account for grazing on full-time pasture, split a.m. pasture/p.m. pasture, or annual pasture. The starting forage height must be entered for the record to be saved; the ending forage height can be updated later.

Figure 19. Screenshot of New Grazing Record Form.

To record a ration change, the user chooses the animal group, start date, and recording the ration change as total DMI or As-Fed (Figure 20). If total DMI is chosen, the user enters the pounds fed on a per animal basis. If As-Fed is chosen, the user enters the feed type, percent dry matter, and pounds fed. goGraze calculates the pounds of dry matter each animal is fed based on information entered into the plan.

Figure 20. Screenshot of New Ration Change Record Form.

The Event Record is designed to record other items of importance not captured in the other record forms. For example, if a fence broke and the cows had access to a cool stream on a hot day, recording that event may help explain why that animal group had increased milk production.
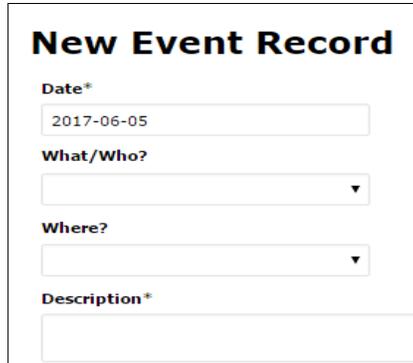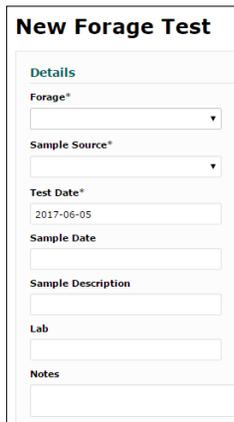
New Event Record

Date*
2017-06-05

What/Who?

Where?

Description*

The Forage Test page allows the user to record the nutrient content and test results of standing or harvested forage for a particular field in a As-Fed/Received or DM basis.

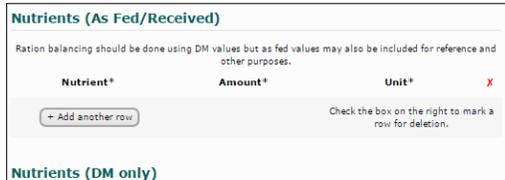**New Forage Test**

Details

Forage*

Sample Source*

Test Date*
2017-06-05

Sample Date

Sample Description

Lab

Notes

Nutrients (As Fed/Received)

Ration balancing should be done using DM values but as fed values may also be included for reference and other purposes.

Nutrient*	Amount*	Unit*	X
+ Add another row		Check the box on the right to mark a row for deletion.	

Nutrients (DM only)

The Weather Record page includes temperature, cloud cover, and precipitation. The record may be applied to multiple fields at one time.
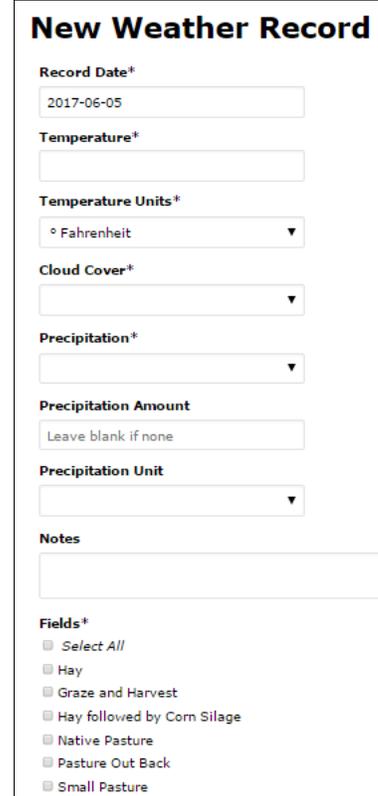
New Weather Record

Record Date*
2017-06-05

Temperature*

Temperature Units*
° Fahrenheit

Cloud Cover*

Precipitation*

Precipitation Amount
Leave blank if none

Precipitation Unit

Notes

Fields*
☐ Select All
☐ Hay
☐ Graze and Harvest
☐ Hay followed by Corn Silage
☐ Native Pasture
☐ Pasture Out Back
☐ Small Pasture

Figure 22. Screenshot of Weather

The Future of goGraze

Version 1.0 of goGraze offers a modern platform for planning and recordkeeping where users may create simple grazing plans and manage records on the web. As of July 2017, goGraze is in the beta stage; we have collected and are responding to farmer-tester feedback. Future developments of goGraze include a feature that allows the user to develop plans with an interactive grazing chart and offering the ability to enter grazing records on mobile devices.

goGraze is available for a free 30-day trial and may be added to a current goCrop™ account at no cost for a limited time. For more information, visit www.gocrop.com or contact cropsoilvt@gmail.com.