

How to Complete Grazing Group Manure Calculator

Purpose:

This procedure describes how to complete the optional Grazing Group Manure Calculator in the Nutrient Management Plan (NMP) spreadsheet. This worksheet will calculate the amount of uncollected manure generated and the weighted average of the manure nutrients deposited on a pasture by grazing animals. The calculations are based on the animal types using the pasture, the number of days, and the hours per day the animals are on the pasture.

It would be useful for a rotational grazing operation where a herd of cattle with cows, calves, a bull, and finishing cattle rotate through a series of pastures during the year.

Another useful example would be for multiple species using the same pasture. It could be the family farm with a few horses, a cow, some sheep, a few goats, a steer, and a flock of chickens all using the same pasture.

Finally it would be helpful for horse operations with various animal sizes and turnout time on pasture. A horse operation where the animals range from mini's to draft horses and all have different amounts of turnout time on a pasture.

After all the required information is entered, the calculator determines the amount of uncollected manure and manure nutrients deposited on a pasture based book values taken from the Penn State Agronomy Guide and/or Midwest Plan Services. A grazing note is also automatically generated that lists the stocking rate and time on pasture needed to generate the amount of manure determined by the calculator.

Each completed field / grazing group becomes a manure group in Appendix 3.

The Grazing Calculator is meant to replace repetitive multiple manure applications of uncollected manure. It is not intended to be used for multiple manure applications of collected manure.

This particular worksheet is an optional worksheet so it has a green colored sheet tab in the NMP workbook. The tab in the NMP Spreadsheet that looks like this:



Or you can find it using the hyperlink in the NMP spreadsheet Index:

	A	B	C	D	E	F	G
1	NMP Spreadsheet Index						
2	NMP Version 6.2 2018-06(2007-2016 Excel)						
19	Rainfall Worksheet						
20	Animal Types & Manure Production Values						
21	Growing Animal Weight Calculator						
22	Crop List Options						
23	Residual N Calculator						
24	Grazing Group Manure Calculator						
25	Print NMP Report						

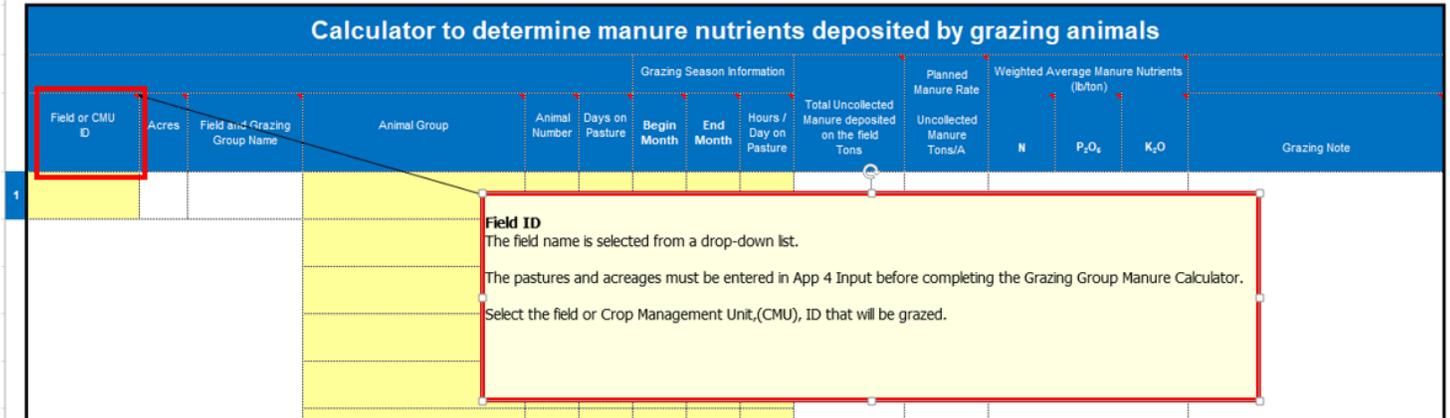
Layout of the Calculator to determine manure nutrients deposited by grazing animals

How to Complete Grazing Group Manure Calculator

Helpful notes added in Column Headers

The blue column headers cells with red triangles have helpful notes included to help you understand what needs to be entered or what the cell data is used for. Where you see a red triangle in the cell, there is a note to help explain what should be entered in that column.

For example when you click in the blue column header “Field or CMU ID”, the following pop-up box will appear:



1. Procedure

1.1. Enter the Field Id

Select the field Id from the dropdown list. If there are no fields available then complete the Field Information in App 4 Input up to and including selecting the Field Residual and Carryover Nitrogen for each Pasture before completing the Grazing Manure Calculator.

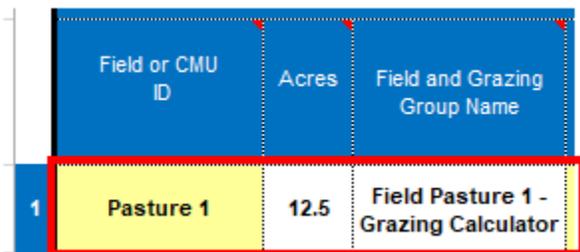
1.2. Field or CMU Id Acres

The field acres will be automatically transferred from Appendix 4 Input.

1.3. Field and Grazing Group Name

The field and grazing group is populated automatically. It will state:

Field “Field Id selected from the drop-down list” Grazing Calculator. In the example below it is Field “Pasture 1” Grazing Calculator. The name needs to be unique because you are creating a manure group. A total of ten fields can be completed in the grazing calculator. The field and grazing group name will eventually be transferred to as a manure group to Appendix 3 Input.



How to Complete Grazing Group Manure Calculator

1.4. Complete the animal group information for the first animal type added to the group.

To add the first animal type, select the Animal Group, Animal Weight, days on pasture for a season that corresponds to your manure group season, and hours per day on pasture.

1.4.1. Select the Animal Group from the dropdown list

Select the animal group name from the drop down list. The list only includes Animal Groups with uncollected manure listed in Appendix 3 Input. The animal type weight are automatically transferred from App 3 Input. The Animal Group Name cell will turn red if there is more manure allocated than generated in Appendix 3 Input.

Field or CMU ID	Acres	Field and Grazing Group Name	Animal Group	Animal Number
1	Pasture 1	12.5	Field Pasture 1 - Grazing Calculator	Beef Cows - Uncollected

Beef Cows - Uncollected
Beef Calves - Uncollected
Beef Bull - Uncollected
Beef Finishers - Uncollected

1.4.2. Complete the number of animals for the animal group and the grazing season information

Complete the Days on Pasture, the Beginning and Ending Months, and the Hours per Day the animals will be on that pasture

Field or CMU ID	Acres	Field and Grazing Group Name	Animal Group	Animal Number	Days on Pasture	Grazing Season Information			
						Begin Month	End Month	Hours / Day on Pasture	
1	Pasture 1	12.5	Field Pasture 1 - Grazing Calculator	Beef Cows - Uncollected	10	210	Apr.	Oct.	24

1.4.3. The manure production amounts and nutrient value are automatically generated the information for each animal group is completed. A grazing note is also automatically generated after you enter each animal group.

Calculator to determine manure nutrients deposited by grazing animals															
Field or CMU ID	Acres	Field and Grazing Group Name	Animal Group	Animal Number	Days on Pasture	Grazing Season Information			Total Uncollected Manure deposited on the field Tons	Planned Manure Rate Uncollected Manure Tons/A	Weighted Average Manure Nutrients (lb/ton)			Grazing Note	
						Begin Month	End Month	Hours / Day on Pasture			N	P ₂ O ₅	K ₂ O		
1	Pasture 1	12.5	Field Pasture 1 - Grazing Calculator	Beef Cows - Uncollected	10	210	Apr.	Oct.	24	132.30	10.58	11	7	10	The grazing group includes the following animals on pasture: 10 beef cows from the Beef Cows animal group, 24 hours per day for 210 days from Apr. to Oct.

1.5. Complete the remaining animal groups using the pasture during the specified time frame

How to Complete Grazing Group Manure Calculator

Since the Calves, Bull, and Finisher cattle use the field, those animal groups can be added as well. All of the animal groups using the pasture are listed. In the screenshot below, the 4 multiple manure applications, from the Cows, Calves, Bull, and Finisher Animal Groups have been combined to generate one set of production values for the group.

The total amount of manure generated by the grazing group, and the uncollected manure tons/A is automatically populated. The grazing note lists all the animal groups, hours /day, number of days on this pasture, and the grazing season.

Calculator to determine manure nutrients deposited by grazing animals															
Field or CMU ID	Acres	Field and Grazing Group Name	Animal Group	Animal Number	Days on Pasture	Grazing Season Information			Total Uncollected Manure deposited on the field Tons	Planned Manure Rate Uncollected Manure Tons/A	Weighted Average Manure Nutrients (lb/ton)			Grazing Note	
						Begin Month	End Month	Hours / Day on Pasture			N	P ₂ O ₅	K ₂ O		
1	Pasture 1	12.5	Field Pasture 1 - Grazing Calculator	Beef Cows - Uncollected	10	210	Apr.	Oct.	24	222.29	17.78	12	6	9	The grazing group includes the following animals on pasture: 10 beef cows from the Beef Cows animal group, 24 hours per day for 210 days, from Apr. to Oct. 10 beef calves from the Beef Calves animal group, 24 hours per day for 210 days, from Apr. to Oct. 1 beef bull from the Beef Bull animal group, 24 hours per day for 210 days, from Apr. to Oct. 10 beef finishers from the Beef Finishers animal group, 24 hours per day for 210 days, from Apr. to Oct.
			Beef Calves - Uncollected	10	210	Apr.	Oct.	24							
			Beef Bull - Uncollected	1	210	Apr.	Oct.	24							
			Beef Finishers - Uncollected	10	210	Apr.	Oct.	24							

1.6. Complete the grazing information for additional pastures

Up to ten pastures can be completed in the grazing calculator. There is a blue number next to each pasture that can be completed.

2. Summary of Total Uncollected Manure.

2.1. A Summary of the Animal Group days on pasture, tons of manure allocated and generated is automatically populated. The Generated values are taken from Appendix 3 Animal Group Uncollected manure amounts.

Animal Groups	Total sum of days on pasture	Total Tons Uncollected manure allocated per animal group in the Grazing Group Manure Calculator	Total Tons Uncollected manure generated per animal group
Beef Cows - Uncollected	210.0	132.30	132.30
Beef Calves - Uncollected	210.0	33.39	33.39
Beef Bull - Uncollected	210.0	7.72	7.72
Beef Finishers - Uncollected	210.0	48.88	48.88

How to Complete Grazing Group Manure Calculator

3. Transfer the completed information into Appendix 3 Input Worksheet

3.1. After the Grazing Group information is completed then click on the green arrow to transfer the information to Appendix 3 Input and Manure Average Input Worksheets. This will create a grazing manure group with the amount of manure generated listed as records and the Nutrients based on PSU Agronomy Guide values.

BH	BI	BJ	BK	BL
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After entering or updating Grazing Groups, click here to copy Grazing Group Information to App 3 Input and Manure Average Input

Summary of Total Uncollected Manure Deposited by Animal Groups

Animal Groups	Total sum of days on pasture	Total Tons Uncollected manure allocated per animal group in the Grazing Group Manure Calculator	Total Tons Uncollected manure generated per animal group
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After allocating the grazing groups, click here to copy grazing

Manure Group Identification	Manure Report Date (most recent)	Laboratory Name	Manure Type	Manure Unit (lbs/ton or lbs/1000 gal)	Total Nitrogen (N) lbs / ton or lbs / 1000 gal	Ammonium N (NH4-N) lbs / ton or lbs / 1000 gal	Total Phosphate (P2O5) lbs/ton or lbs/1000 gal	Total Potash (K2O) lbs / ton or lbs / 1000 gal	Percent Solids	PSC Value (Enter analytical or book value)	Manure Group Site Description	Manure Group Season Applied	Inventory Method	RECORDS: Total Manure Collected Per Manure Group	Total Manure Collected Units
Grazing Beef Herd	Book Values	PSU Agronomy Guide	Other	lb/ton	11.00	0.00	7.00	10.00	12.00	0.80	Records	Grazing	Calculated		tons
Field Pasture 1 - Grazing Calculator	Uncollected Book	PSU Agronomy Guide	Other	lb/ton	11.76	0.00	6.49	9.49	0.00	0.80	Records	Grazing	Records	222	tons

Appendix 3 Input

Manure Group Identification	Year	Manure Analysis Report Date (Most recent in bold)	Laboratory Name (Most recent in bold)	Manure Type	Manure Unit (lbs/ton or 1000 gal)	Total Nitrogen (N) (lbs/ton or 1000 gal)	Ammonium N (NH4-N) (lbs/ton or 1000 gal)	Total Phosphate (P2O5) (lbs/ton or 1000 gal)	Total Potash (K2O) (lbs/ton or 1000 gal)	Percent Solids	PSC Value (Enter analytical or book value)
Grazing Beef Herd	Average	Book Values	PSU Agronomy Guide	Other	lb/ton	11.00	0.00	7.00	10.00	12.00	0.80
<input type="button" value="Add 1 year"/> <input type="button" value="Clear all years"/>	1 year ago	Book Values	PSU Agronomy Guide	Other	lb/ton	11.00	0.00	7.00	10.00	12.00	0.80
	2 years ago										
	3 years ago										
	4 years ago										
	5 years ago										
Field Pasture 1 - Grazing Calculator	Average	Uncollected Book	PSU Agronomy Guide	Other	lb/ton	11.76	0.00	6.49	9.49	0.00	0.80
<input type="button" value="Add 1 year"/>	1 year ago	Uncollected Book	PSU Agronomy Guide	Other	lb/ton	11.76	0.00	6.49	9.49	0.00	0.80

Manure Average Input

How to Complete Grazing Group Manure Calculator

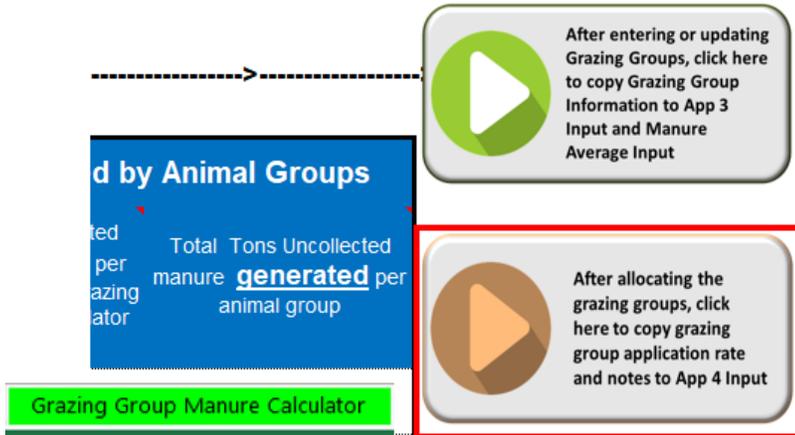
4. Complete the Manure and Application Section in App 4 Input

4.1. Enter the Grazing Manure Group, Planned Application Season and Application Management for each pasture entered in the Grazing Calculator.

NMP Index	Field Residual and Carryover Nitrogen History	Manure and Application				
Field or CMU ID	Carryover Legume N	Manure Group	Planned Application Season	Planned Application Management	P Index Application Method	Multiple Application
Pasture 1	No Previous Year Legume	Field Pasture 1 - Grazing Calculator	Grazing	Grazing anytime with nutrient uptake during growing season		
App 4 Input		Grazing Beef Herd Beef Cows - Uncollected Beef Calves - Uncollected Beef Bull - Uncollected Beef Finishers - Uncollected Field Pasture 1 - Grazing Calculator				

5. Transfer the completed information into Appendix 4 Input Worksheet

5.1. Click on the orange button in the Grazing Calculator to transfer the calculated manure application rates and grazing notes into App 4 Input.



The planned manure rate and grazing note will be transferred to App 4 Input

NMP Index	Field Information	Manure and Application			Manure Rate			Balance after Manure			Field Notes
		Field or CMU ID	Acres	Manure Group	Planned Application Season	Planned Application Management	Nitrogen Balanced Manure Rate	Crop Phosphorous Removal Manure Rate	Planned Manure Rate	N Balance	
Pasture 1	12.5	Field Pasture 1 - Grazing Calculator	Grazing	Grazing anytime with nutrient uptake during growing season	27.7	4.6	17.78	23	-115	-79	The grazing group includes the following animals on pasture: 10 beef cows from the Beef Cows animal group, 24 hours per day for 210 days, from Apr. to Oct. 10 beef calves from the Beef Calves animal group, 24 hours per day for 210 days, from Apr. to Oct. 1 beef bull from the Beef Bull animal group, 24 hours per day for 210 days, from Apr. to Oct. 10 beef finishers from the Beef Finishers animal group, 24 hours per day for 210 days, from Apr. to Oct.

6. Complete any additional information in App 4 Input

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6.1. Complete the any needed information such as Supplemental Fertilizer, P Index information or adding additional field notes.

7. Examples of how the Information created in the Grazing Calculator appear in the Printed Sections of a NMP

7.1. Appendix 3 Manure Group Information Printout

Appendix 3 Manure Group Information Crop Yrs. 2019	Grazing Beef Herd		Field Pasture 1 - Grazing Calculator	
Manure Report Date (note if averaging several reports)	Book Values		Uncollected Book	
Laboratory Name	PSU Agronomy Guide		PSU Agronomy Guide	
Manure Type	Other		Other	
Manure Unit (lbs/ton or 1000 gal)	lb/ton		lb/ton	
Total Nitrogen (N) (lbs/ton or 1000 gal)	11.00		11.76	
Ammonium N (NH ₄ -N) (lbs/ton or 1000 gal)	0.00		0.00	
Total Organic N (lbs/ton or 1000 gal)	11.00	Grazing NMP Index	11.76	
Total Phosphate (P ₂ O ₅) (lbs/ton or 1000 gal)	7.00	Grazing Appendix 3 Input	6.49	
Total Potash (K ₂ O) (lbs/ton or 1000 gal)	10.00	Grazing Manure Availability	9.49	
Percent Solids	12.00	Grazing Calculator	0.00	
PSC Value (analytical or book value)	0.80		0.80	
Percent Moisture	88.00		100.00	
Manure Group AEU's	26.97		0.00	
Description: Site & Season Applied	Records	Grazing	Records	Grazing
Inventory Method	Calculated		Records	
	Collected Calc.	Uncollected Calc.	Collected Calc.	Uncollected Calc.
Manure Group Identification	Grazing Beef Herd	Grazing Beef Herd - uncollected	Field Pasture 1 - Grazing Calculator	
CALCULATED: Total Manure Collected Per Manure Group	149.2	222.3		
Units	Tons	Tons		
RECORDS: Total Manure Collected Per Manure Group			222.3	
Unit			tons	
Manure Used On-Farm	Collected 0.0	Uncollected 222.3	Collected 222.3	Uncollected 0.0
Units	Tons	Tons	Tons	

Appendix 3 Manure Group Info.

How to Complete Grazing Group Manure Calculator

7.2. Manure Average Printout

Manure Analysis 5 Year Running Average						
Manure Average for Crop Years. 2019	Field Pasture 1 - Grazing Calculator					
	Average	1 year ago	2 years ago	3 years ago	4 years ago	5 years ago
Manure Report Date	Uncollected Book	Uncollected Book				
Laboratory Name	PSU Agronomy Guide	PSU Agronomy Guide				
Manure Type	Other	Other				
Manure Unit (lbs/ton or 1000 gal)	lb/ton	lb/ton				
Total Nitrogen (N) (lbs/ton or 1000 gal)	11.76	11.76				
Ammonium N (NH ₄ -N) (lbs/ton or 1000 gal)						
Total Organic N (lbs/ton or 1000 gal)	11.76	11.76				
Total Phosphate (P ₂ O ₅) (lbs/ton or 1000 gal)	6.49	6.49				
Total Potash (K ₂ O) (lbs/ton or 1000 gal)	9.49	9.49				
Percent Solids						
PSC Value (Enter analytical or book value)	0.80	0.80				
Manure Avg Printed						

How to Complete Grazing Group Manure Calculator

7.3. Appendix 4 Crop & Manure Management Printout

1		App. 4: Crop Yrs. 2019			Pasture 1		
2	CMUField ID						
3	Acres	12.5					
4	Soil Test Report Date	October 15, 2016					
5	Laboratory Name	AASL					
6	Soil Test Levels (Mehlich-3 P & K)	ppm P	ppm K	pH			
7	(Show conversions to ppm in Appendix 10)	56	75	6.2			
8	P Index Part A Evaluation	No to All Part A					
9	Part A Result	NBased					
10	Crop	Established Pasture (without legume)					
11	Planned Yield	2 ton/A					
12	PSU Soil Test Recommendation (lb/A)	N	P205	K20			
13		100	0	90			
14	User Soil Test Recommendation (lb/A)						
15	Other Nutrients Applied (lb/A) (Nutrients applied regardless of manure)	0	0	0			
16	P Index Application Method						
17	Double Crop CarryOver N (lb/A)	0					
18	Manure History Description Residual Manure N (lb/A)	35	Continuously - Summer Crop				
20	Legume History Description Residual Legume N (lb/A)	0	No Previous Year Legume				
21	Net Nutrients Required (lb/A)	65	0	90			
22	Manure Group	Field Pasture 1 - Grazing Calculator					
23	Application Season: Management (Incorporation, cover crops, etc.)	Grazing anytime with nutrient uptake during growing season					
24	Availability Factors (Total N or NH4-N & Organic N)	Total N	NH4-N	Org. N			
25		0.20					
26	P Index Application Method						
27	N Balanced Manure Rate (ton, gal/A)	28 tons/A					
28	P Removal Balance Manure Rate (ton or gal/A; if required by P Index)	5 tons/A					
29		Crop P Removal (lb/A) 30.0					
30	P Index Value						
31	Planned Manure Rate (ton or gal/A)	17.78 tons/A					
32	Nutrients Applied at Planned Manure Rate (lb/A)	42	115	169			
33	Nutrient Balance after Manure	23	-115	-79			
34	Supplemental Fertilizer (lb/A)	23	0	0			
35	P Index Application Method						
36	Final Nutrient Balance (lb/A)	0	-115	-79			
37	Multiple Application						
38	Manure Utilized on CMU	222 tons					

Appendix 4 Crop & Manure Mgmt.

How to Complete Grazing Group Manure Calculator

7.4.NMP Summary Printout

Nutrient Management Plan Summary

Total acres reported in NMP Summary: Crop Year(s)

Whole Farm Note:

Operation Acres:
 Total Acres: Total Acres Available For Nutrient Application Under Operator's Control: Owned: Rented:

Animal Equivalent Units: Animal Equivalent Units Per Acre:

CMU/Field ID	Acres	Crop	Manure Group	Application Season	Application Management	Planned Manure Rate	Starter/Other Fertilizer (lb/A)			Supplemental Fertilizer (lb/A)			Nutrient Balance (lb/A) ²			
							N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Pasture 1	12.5	Established Pasture (without legume)	Field Pasture 1 - Grazing Calculator	Grazing	Grazing anytime with nutrient uptake during growing season	Grazing	See Notes	0	0	0	23	0	0	0	-115	-79

7.5.NMP Summary Notes Printout

NMP Summary Notes

Crop Years 2019

CMU/Field ID	Notes
Pasture 1	The grazing group includes the following animals on pasture: 10 beef cows from the Beef Cows animal group, 24 hours per day for 210 days, from Apr. to Oct. 10 beef calves from the Beef Calves animal group, 24 hours per day for 210 days, from Apr. to Oct. 1 beef bull from the Beef Bull animal group, 24 hours per day for 210 days, from Apr. to Oct. 10 beef finishers from the Beef Finishers animal group, 24 hours per day for 210 days, from Apr. to Oct.

How to Complete Grazing Group Manure Calculator

7.7. Summary of grazing days and Uncollected Manure in the Grazing Calculator

Animal Groups	Total sum of days on pasture	Total Tons Uncollected manure allocated per animal group in the Grazing Group Manure Calculator	Total Tons Uncollected manure generated per animal group
Beef Cows - Uncollected	210.0	132.30	132.30
Beef Calves - Uncollected	210.0	33.39	33.39
Beef Bull - Uncollected	210.0	7.72	7.72
Beef Finishers - Uncollected	210.0	48.88	48.88

8. Revision History

Date	Description of Significant Changes
October 17, 2017	First issue of the document.
June 2018	The screenshots were updated to account for updates in NMP Version 6.2. Section 1.3 - The field and grazing group name is now populated automatically.