Managing Soil Nutrients in Small Backgrounding Beef Feedlot Landscapes.

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INTRODUCTION

Beef cattle backgrounding that grow out weaned calves from cow-calf enterprises to weights and conditions ready for feedlot finishing (Bradford et al.,1978) is an integral part of the US beef industry.

Beef cattle backgrounding in feedlots adopt grain feeding and raise steers on smaller land areas under intensive management.

Of the nutrients fed to steers larger portion pass to the manure and soil (Sheppard et al., 2012). As a result, concentrated animal production sites can contain elevated soil nutrient levels (Jongbloed and Lenis, 1998).

Soil nutrients in backgrounding feedlots are concentrated in and around feeder area (Netthisinghe et al., 2013) where animals congregate mostly. Unless properly managed, soil nutrients in highly animal impacted areas can impact soil and water quality.

OBJECTIVE

To compare how

1.Continuous backgrounding for12 months (MI)

2.Manure harvesting in feeder area (MR)

3.Destocking the site for 12 months (MR-DS)

4. Hay harvesting for 12 months (MR-DS-H)

would influence soil test P, NH4-N, and Zn concentrations and their distribution across small backgrounding beef feedlot landscape from feeder (FD) to grazing area (GR) when sequentially imposed.

STUDY SITE

The study was conducted at the Western Kentucky University Agriculture Research and Education Complex, Bowling Green, KY. from 2009-2012. Backgrounding feedlot annually harbored six batches of steers with 120-130 heads in each when it was active.

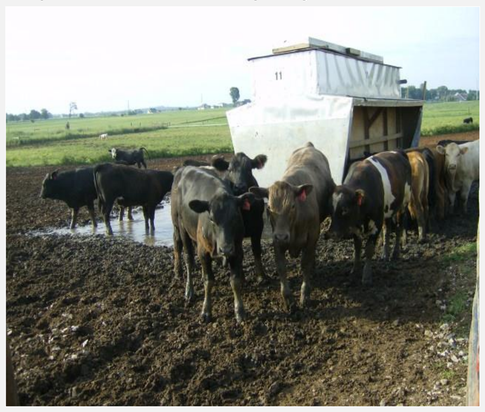
BACKGROUNDING FEEDLOT LANDSCAPE FROM FEEDER TO GRAZING AREA

MANAGEMENT PRACTICE IMPLEMENTATION AND SOIL SAMPLING

MI	MR	MR-DS	MR-DS-H
03/2009 to 03/2010	03/2010	03/2010 to 03/2011	03/2011 to 03/2012

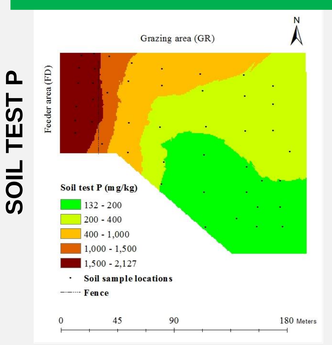
SOIL ANALYSIS

Soil samples were collected to 0-15 cm depth. Five samples collected within 1m radius were composited. Soil samples were then analyzed for STP and Zn by Mehlich- 3 extract ant (Mehlich, 1984) using ICP. Soil NH4-N content was determined by KCl extraction and flow-injection colorimetric analysis with cadmium reduction on a Lachet analyzer.

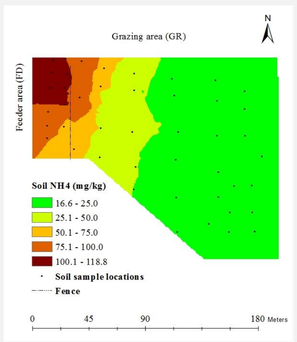


AFTER 12 months BACKGROUNDING- MI | **AFTER FD MANURE HARVEST- MR** | **AFTER DESTOCKING FOR 12 months – MR-DS** | **AFTER HAY HARVEST – MR-DS-H**

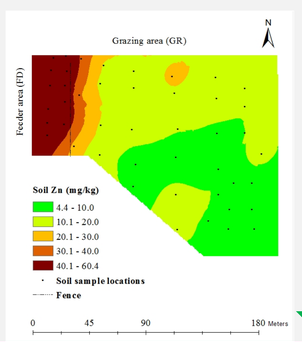
SOIL TEST P



SOIL NH4-N



SOIL Zn



Management Practice	Feeder Area	Grazing Area	Control Locations
n	20	30	22
	---------- mg kg-1 ----------		
Soil test P			
MI	3296.0[a] ± 1082.1	263.8[a] ± 142.6	99.6[a] ± 24.4
MR	1997.3[b] ± 602.1	-	-
MR-DS	1748.2[b] ± 1033.2	225.8[a] ± 104.6	97.1[a] ± 17.2
MR-DS-H	1637.9[b] ± 656.9	247.3[a] ± 114.2	106.1[a] ± 25.3
Soil NH4-N			
MI	91.7[a] ± 21.3	22.7[a] ± 14.6	13.3[ab] ± 9.5
MR	48.8[b] ± 15.1	-	-
MR-DS	20.3[bc] ± 12.2	11.9[b] ± 4.0	9.4[b] ± 2.5
MR-DS-H	12.1[c] ± 114.2	7.8[b] ± 1.8	13.4[ab] ± 7.5
Soil Zn			
MI	49.0[a] ± 14.4	12.0[a] ± 5.1	4.0[a] ± 1.1
MR	35.5[b] ± 8.2	-	-
MR-DS	38.5[b] ± 14.6	10.1[b] ± 4.7	3.3[a] ± 0.6
MR-DS-H	35.3[b] ± 9.7	10.4[b] ± 25.3	3.4[a] ± 1.2

Mean ± SD
Numbers with different super scripts across columns are significantly different $P \leq 0.05$.

RESULTS

- Manure harvesting drastically reduced STP, NH4-N, and Zn concentrations in the feeder area. The effects of destocking and hay harvesting on change in STP and Zn content in the feeder area was not significant.
- Hay harvesting reduced soil NH4-N levels in the feeder area as compared to the manure harvesting.
- The STP, NH4-N, and Zn levels in the grazing area were unaffected by the management practices.
- However, STP, NH4-N, and Zn concentrated area extents within feedlot was reduced by the management practices

CONCLUSION

Although, soil nutrient content change by the management practices is not substantial, management practices can reduce the extent of soil nutrient concentrated area within beef backgrounding feedlots. Applying management practices helps reducing requirement for further intensive soil nutrient management.

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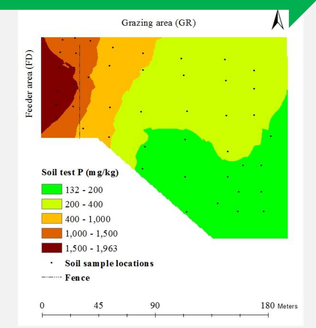
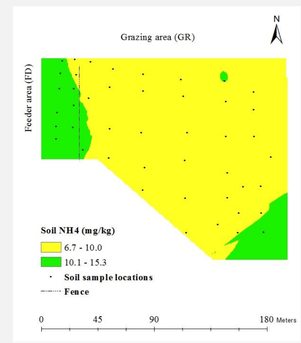
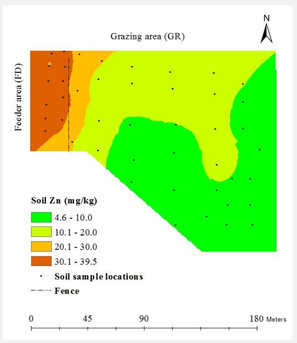
SOIL TEST P



SOIL NH4-N



SOIL Zn



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