

Feedlot on Fields





BACKGROUND

Integrating crops and livestock as an alternative to a confinement feedlot operation.

Reduce environmental concerns associated with the excretion and concentration of manure at concentrated animal feeding operations.

Application of manure to soil potential benefits: improve fertility, structure, water holding capacity, increase soil organic matter, and reduce amount of synthetic fertilizer needed for crop production.



Lambs in confinement pens with GrowSafe feeders.

OBJECTIVES

Compare an integrated crop-livestock system, a tilled organic system, and a conventional minimum-till system.

Investigate the impact of "field" feedlot finishing of lambs fed either a high grain (barley) or high alfalfa diet and allowed to roam on winter wheat stubble.

Document the impacts of incorporating sheep into organic systems on soil health as indicated by soil microbial population function and diversity, soil compaction, and soil nutrient profiles, as well as subsequent crop yields.

Soil Penetration Resistance (kg/cm ²)					
	Treatment			Standard Error	
Item	CONV	TILL	GB	GA	16
SPR	6.51 ^{ab}	5.96ª	7.88 ^b	7.50 ^b	0.562

Rows without a common superscript differ (P< 0.05)

Year 2 Rib Eye Area (sq. in)					
	Treatmer	P-value			
Item	Confinement	Field			
REA	2.2	2.5	<.0001		



Lambs finished on wheat stubble fields.

SOIL RESULTS

No difference in soil penetration resistance (influences plant root growth, water movement) among treatments.

The unclassified *Bradyrhizobiaceae* and *Pseudomonas* species (part of rhizosphere) had a higher probability of being present in grazed and tilled plots vs. conventional fields.

Bradyrhizobiaceae functions: photosynthesis, nitrification, formation of plant root organs that perform nitrogen fixation.

Pseudomonas functions: growth-promoting rhizobacteria which can protect plants from pathogenic attacks by promoting plant defenses, or systemic resistance.



ANIMAL PERFORMANCE RESULTS

Year 1: DMIwas higher for ALF than BAR.

Carcasses from lambs that consumed the alfalfa-based diet were less tender than carcasses from lambs that consumed barley-based diet.

No difference in quality grade.

Year 2: ADG and ending BW were higher for lambs finished in fields compared to confinement-finished lambs.

Cost of gain was highest for alfalfa-fed lambs; however, these lambs applied approximately 60% more manure to each wheat stubble field than barley-fed lambs.



Soil Nutrient Table

Item	Conventional	Graze Alfalfa	Graze Barley	Till	<i>P</i> -value
Nitrogen (ppm)	2439	2644	2621	2707	0.17
Phosphorus (ppm)	49 _a	68 _b	53 _{ac}	57 _c	<.0001
Organic Matter (%)	4.5	4.7	4.4	4.7	0.09

²Rows without a common superscript differ (P < 0.05).

Manure Nutrients by Treatment

lbs of nutrient per ton

Item	Graze Alfalfa	Graze Barley
Nitrogen	12.57%	16.09%
Phosphorus	11.94%	14.29%

Estimated first year availability lbs per ton

Item	Graze Alfalfa	Graze Barley
Nitrogen (ppm)	4.43%	5.71%
Phosphorus (ppm)	8.42%	10.0%

% available

Item	Graze Alfalfa	Graze Barley
Nitrogen (ppm)	35%	36%
Phosphorus (ppm)	71%	70%

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