USING BRASSICAS TO IMPROVE ORGANIC PASTURES

Fay Benson – New York Organic Dairy Initiative, Cornell Extension

Today's Topics

- WHY BRASSICAS
- FARMERS' EXPERIENCE
- HOW TO GROW
- NO-TILL INTO GRAZING SWARDS

Cornell University

WHY BRASSICAS – NUTRITION

- "Provide high quality feed in summer and autumn when pasture quality is often low*
- "High digestibility, energy (11-14 MJ ME/kg DM) and protein (15-25% in brassica leaves, 9-16% in turnips and swede bulbs) *
- Reported livestock weight gains while grazing brassicas:
  - ¾ to 1.2lbs/head/day for lambs *
  - 1.5 to 2.25lbs/d for growing cattle *

❖ (Ayres and Clements, 2002)

Cornell University

WHY BRASSICAS – Catch Crop

When Reseeding a Pasture

- Fast Growing in cool season
- Plant in early spring or late summer
- Have grazing forage in 2 months
- Graze through November
- Roots have beneficial effect on soil health
- Residue can be disked in spring for early planting of new grazing stand.

Cornell University

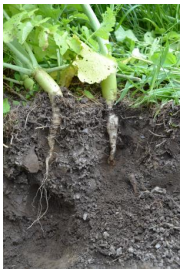
WHY BRASSICAS – Season Extension

- Prefers Temperatures Below 50 degrees
- Sugars Increase With Freezing
- Frozen Plants Retain Feed Value

Cornell University

WHY BRASSICAS – Soil Health

- Heavy Feeder, Good to take up Nutrients in Sacrifice Areas
- Non-Mycorrhizae, add Diversity to Soil
- Tubers and Root Hairs Loosen Soil and Feed Biology



Cornell University

Farmer's Experience - John Stoltzfus, Whitesville NY

- 2 Mixes:
  - Oats and Kale
  - Oats and Turnips
- Fertilized with Pig Manure
- Planted in August
- Spring Oats acted as forage oats late in fall
- Study Supported by Lakeview Organic Mill, Penn Yan, NY

Sample Description	Farm	Code	Sample
FR BRASSICA FORAGE		218	11560450

KEUKA OATS & PAJA TURNIP

Analysis Results

Components	As Fed	DM
% Moisture	89.5	
% Dry Matter	10.5	
% Crude Protein	3.2	30.5
% Adjusted Crude Protein	3.2	30.5
Soluble Protein % CP		44
% Acid Detergent Fiber	2.2	21.0
% Neutral Detergent Fiber	2.9	27.5
% TDN	7	67
NEL, Mcal/Lb	.08	.74
NEM, Mcal/Lb	.07	.71
NEG, Mcal/Lb	.05	.44
% Calcium	.12	1.11
% Phosphorus	.05	.45
% Magnesium	.03	.26
% Potassium	.30	2.87
% Sodium	.049	.468
PPM Iron	20	193
PPM Zinc	4	35

Not for Dry Cows

<u>Yield</u>
2.8 tons
Dry
Matter
/Ac

Alfalfa Haylage	Corn Silage
CP- 20	CP- 7.5
ADF- 32	ADF- 23
NDF- 40	NDF- 39
NEL – .6	NEL- .77
Calcim –1.37	Calcium – .2
Phos- 0.34	Phos- .25
Potass- 2.64	Potass.-1.03

Farmer's Experience – Eric Vanstrom – Nurse Crop

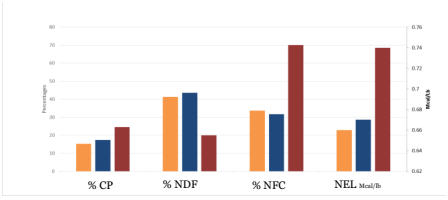
- Corn Silage Previous Year
- Left fallow till July
- Broadcast 300lbs 15x15x15/ac
- Disked after generous rainfall
- Broadcast:
  - 5lbs Kale
  - 32lbs Oats
  - 10lbs Clover
  - 3lbs Orchard Grass

Farmer's Experience – Eric Vanstrom

September Pasture Walk

# of Grazings Depends on Leaf to Stem Ratio

Vanstrom's Nutrition Analysis Comparison



Oats- Pasture- Kale-

Farmer's Experience - Tim Willsallen

- Australian
- Used Brassicas to increase farm's efficiency
- 1000 Sheep Year round
- 100 Bred Heifers for the Grazing Season

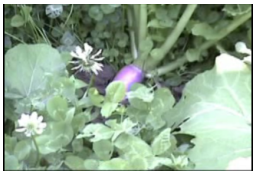
Daily Pasture Moves (with hot fence)
Changed Area with Season
Never Clipped

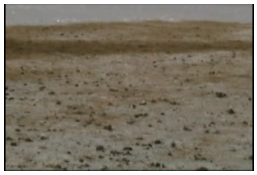
Winter Feed For Sheep:

170 ac System
40 acres turnips planted every fall
Paddocks on 4 year rotation

Three Day Residencies

First Day Tops, Second Day Tubers, Third Day Round bale





See Video of Willsalen's at: http://vimeo.com/25094661

Winter Dry Matter Intake

40ac X 5000lbs DM/ac = 200,000lbs DM

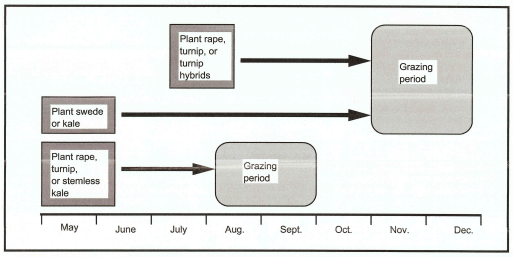
1000 ewes require 2.5lbs/day = 2500lbs/day

Or

250,000lbs for 100 days of winter feeding.

Turnips + 55 Bales = 255000lbs Dry Matter

When To Plant in the Northeast



Cornell Recommendations

N pounds/acre	P_2O_5 pounds/acre			K_2O pounds/acre			Comments
	Soil Phosphorus Level			Soil Potassium Level			
	low	med.	high	low	med.	high	
Application for direct seeding							
100-120	***120***	***80***	***40***	***160***	***120***	***60***	***Total recommended.***
40	80	40	0	120	80	20	Broadcast and disk-in.[1]
40	40	40	40	40	40	40	Band place with planter.
20-40	0	0	0	0	0	0	Sidedress four weeks after seeding.
Application for transplants							
100-120	***120***	***80***	***40***	***160***	***120***	***60***	***Total recommended.***
40	80	40	40	120	80	40	Broadcast and disk-in.[1]
40	40	40	0	40	40	20	Band place with planter or broadcast before planting.
20-40	0	0	0	0	0	0	Sidedress four weeks after planting.

1: Sidedressed nitrogen can be split into two applications four and eight weeks after seeding or transplanting. Growers with leachable soils may split the necessary nitrogen between planting and two sidedressings and eliminate broadcast applications.

2: If phosphorus level is high, starter solution may provide adequate phosphorus with no additional P_2O_5 needed

Feeding Concerns Can Be Controlled With Management:

Concern:

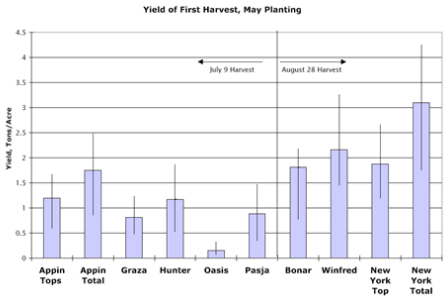
- Cool season growth along with N fertilization can lead to Nitrate Poisoning.
- High protein content can cause bloat.
- Hypothyroidism or Thyroid Condition can be alleviated with increased Iodine in feed
- Keep away from cows 4 hours before milking to avoid off flavors

Potassium level too high for dry cows

Management:

- Introduce grazing animals to brassica pastures slowly.
- Avoid abrupt changes from dry summer pastures to lush brassica pastures. Don't turn hungry animals that are not adapted to brassicas into a brassica pasture.
- Brassica crops should not constitute more than 75% of the animal's diet.
  - Supplement with dry hay if continually grazing brassicas or allow grazing animals access to grass pastures while grazing brassicas.
- Feed Kelp or other Iodine Source
- No-till establishment into existing sod will reduce the risk of these disorders because of grass in the brassica pasture.

Organic Yield for Conventional Tilled Brassicas



Economic Comparison to Organic Corn

Plow-Till Establishment Costs:

- $80-$105/Acre

FEEDVAL Organic Crop Value:

- Assume Corn @ $12.04/bu
- Assume SBM @ $1093/ton
- Assume 2 ton/A tops, 1 ton/A bulb

- $1735/Acre for New York Turnip
- Compare to $1800/A Corn Silage

So Why Aren't Brassicas Used More In Our Pastures?

PROS	CONS
RAPID GROWTH AFTER PLANTING	SHORT GROWING SEASON
MINERAL PROFILE GOOD FOR DAIRY	CAN HAVE HEALTH AND FLAVOR ISSUES
INEXPENSIVE SEED	DOES NOT PERSIST
GOOD AS NURSE OR CATCH CROP	DOES NOT TOLERATE DROUGHT
TILLAGE IS PREFERED METHOD OF ESTABLISHMENT	

No Till Would Solve Many of the Issues

- Reduce cost of establishment
- Pastures would already have grasses to balance diet
- Could lengthen the grazing season
- Add additional seed for future grazing

On Farm Trials Started 2007

- Kathie Arnold Truxton NY
- Atchison Drill
- August 10th
- 5 lbs Clover & 3 lbs Pasja Turnips

Results

- "Spotty"
- Grew well along cow paths
- Theorized lack of competition
- Wet August brought grasses back in 30 days

2009 Towards Sustainable Foundation Grant

- 3 Farms in different regions to test soil and weather variations
- Acetic Acid "burn back"
- Compare resulting sward to existing sward

Acetic Acid to suppress pasture sward

- Rates of 10% & 20% (vinegar – 5%)
- Developed Plot Sprayer

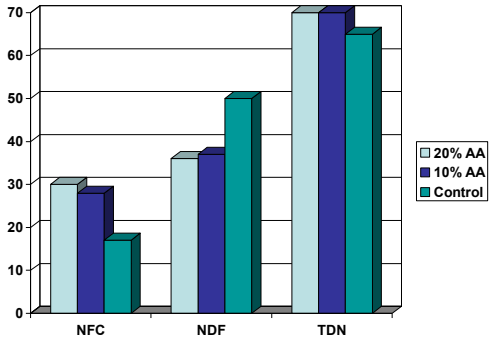
This is the Result We Sought

3 WEEKS LATER

Results Still Spotty

- Two of the sites had wet August
- Some clumps of Turnips, most went back to original sward
- Northern NY site had measurable difference

20 Samples From Tuttle Farm



Rule of Thumb:

- Cows can eat 1.3% of their body weight of NDF from forage on a DM basis.
- Changing NDF from 50 to 36 allows cows to eat 43lbs Pasture w/Turnip vs. 31lbs of Control Pasture (Dry Matter)

Ration Cost

- One 1,200Lb-Cow Giving 50lbs of Milk

Requires

- 23lbs Control Pasture + 8lbs Corn Meal

OR

- 43lbs Pasture w/Turnip

=

- Cost difference of $1.60/cow/day

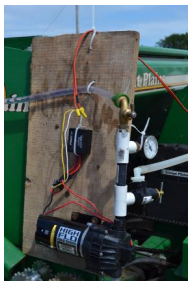
NESARE 2014

- Work with Daikon Radishes
- Address Soil Compaction in Pastures
- Fenceline Sward Differences

NESARE 2014

- 3-5 acre plots
- Pasture sward needed additional burn effect
- Fleshmans 10% Acetic Acid w/ salt
- 20 gallons/acre
- Organic and Conventional Treatments

NESARE 2014



Getting Complicated

Zufall Results:

30 Minutes after application

1 Week after planting

At 4 Weeks, Same Problem

- Grasses overtake turnips
- Turnips turn yellow
- After 2 months plots are the same as control

Roundup Plots Better But Struggle

Sent pictures to agronomist

Not a disease

Starvation

Clue: Grew Well With Biological Activity

Jerry Brunetti – "Biological Activity greatest at meetings of ecosystems"

Such as: Sea Shores, Hedgerows, and Dead Grass Piles

Soil Nutrients there but need to be released

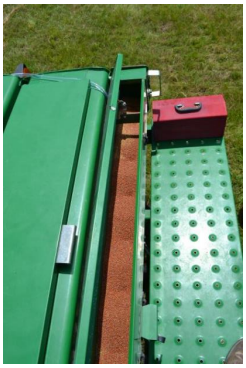
Explained Difference with Planters

Shoe Type Openers = More Disturbance = More Biological Activity

Disc Openers: Minimal Disturbance

Next Year: Add Chilean Nitrate to Seed Box

Not to feed plant but to feed biology



Cornell Soil Health Test

Pasture reseeded 3 times with poor results

Chemical Test Shows Good to Excellent Levels

Most Limiting Factors
- Biological Activity
- Mineralizable Nitrogen
- Surface Hardness

Crop: Grown: pasture — Date Sampled: 6/13/2011

	Indicators	Value	Rating	Constraint
PHYSICAL	Aggregate Stability (%)	36.4	53	
	Available Water Capacity (in/in)	0.11	38	
	Surface Hardness (psi)	225	27	rooting, water transmission
	Subsurface Hardness (psi)	350	36	
BIOLOGICAL	Organic Matter (%)	2.2	27	energy storage, C sequestration, water retention
	Active Carbon (ppm) [Permanganate Oxidizable]	259	10	Soil Biological Activity
	Potentially Mineralizable Nitrogen (µgN/ g dryso il/week)	7.7	27	N Supply Capacity
	Root Health Rating (1-9)	4.0	63	
CHEMICAL	pH (see Nutrient Analysis Report)	6.3	100	
	Extractable Phosphorus (see Nutrient Analysis Report)	3.3	44	
	Extractable Potassium (see Nutrient Analysis Report)	103.1	100	
	Minor Elements (see Nutrient Analysis Report)		100	
	OVERALL QUALITY SCORE (OUT OF 100):		51.7	Low

Soil Textural Class:==> loamy sand

SAND (%): 78.0 SILT (%): 19.6 CLAY (%): 2.4

Next Year - National Conservation Innovation Grant

NY Grazing Coalition Field Days

Equipment will be able to measure the three components of "Healthy Soil"

1. Chemical
2. Physical
3. Biological

For More Information

- NY Organic Dairy Initiative - http://www.cuaes.cornell.edu/cals/cuaes/organic/projects/dairy/dairy-initiative/
- University of Illinois http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs141p2_030013.pdf
- Penn State http://extension.psu.edu/agronomy-guide/cm/sec8/sec810d
- Tim Willsallen video, http://scnydfc.cce.cornell.edu/ Search "Grazing in the Grass"
- Vermont Forage Brassica Variety Trial Reports (2010-2013): http://www.uvm.edu/extension/cropsoil/forages

QUESTIONS?

Fay Benson
New York Organic Dairy Initiative

- Find all upcoming and archived webinars at http://www.extension.org/pages/25242
- Find the recording and slides from this webinar at http://www.extension.org/pages/71820
- Have an organic farming question? Use the eXtension Ask an Expert service at https://ask.extension.org/groups/1668/ask
- We need your feedback! Please respond to an email survey about this webinar.
- Thank you for coming!