



https://en.wikipedia.org/wiki/Pastured_poultry



<http://onpasture.com/2016/04/11>



www.newenglandgrassfed.com



<http://www.bestforage.com>



<https://stevenormanton.files.wordpress.com>


Livestock, Pasture, Soil, & WATER: Some Issues to Consider, and Possible Opportunities for New England NGOs

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- Erosion and sedimentation
- Manure runoff and nutrient

- Manure management
- Land Use Change



Current Water Quality Issues in New England

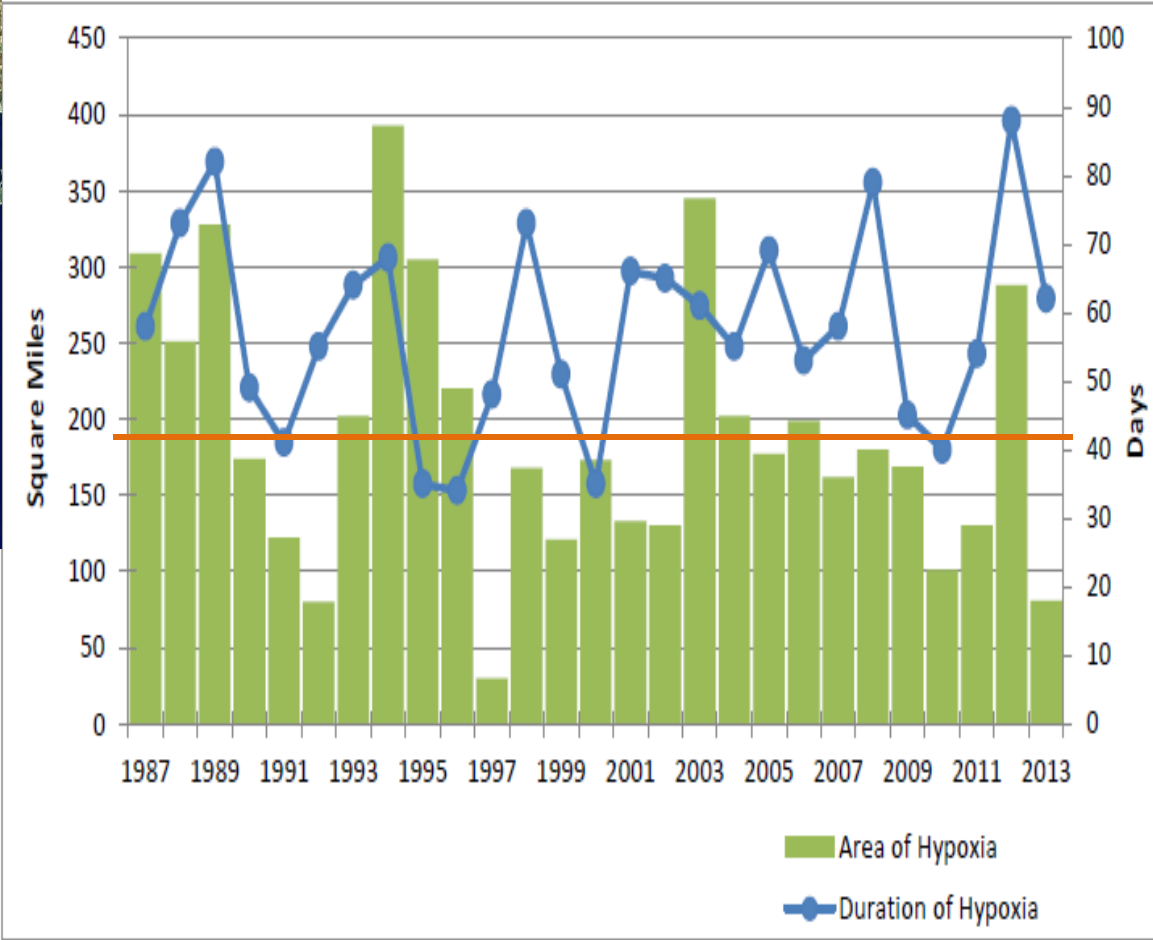
1. Coastal Water Quality – Nitrogen
 - Salt marsh decline
 - Coastal eutrophication and hypoxia
2. Groundwater Quality – Nitrogen
 - Drinking water contamination
 - Surface waters – inland & coastal eutrophication
3. Inland Water Quality – Phosphorus
 - Groundwater discharges and surface runoff
 - Lake, pond, and river eutrophication and hypoxia
 - Water supply reservoir eutrophication and filtration/water treatment requirements

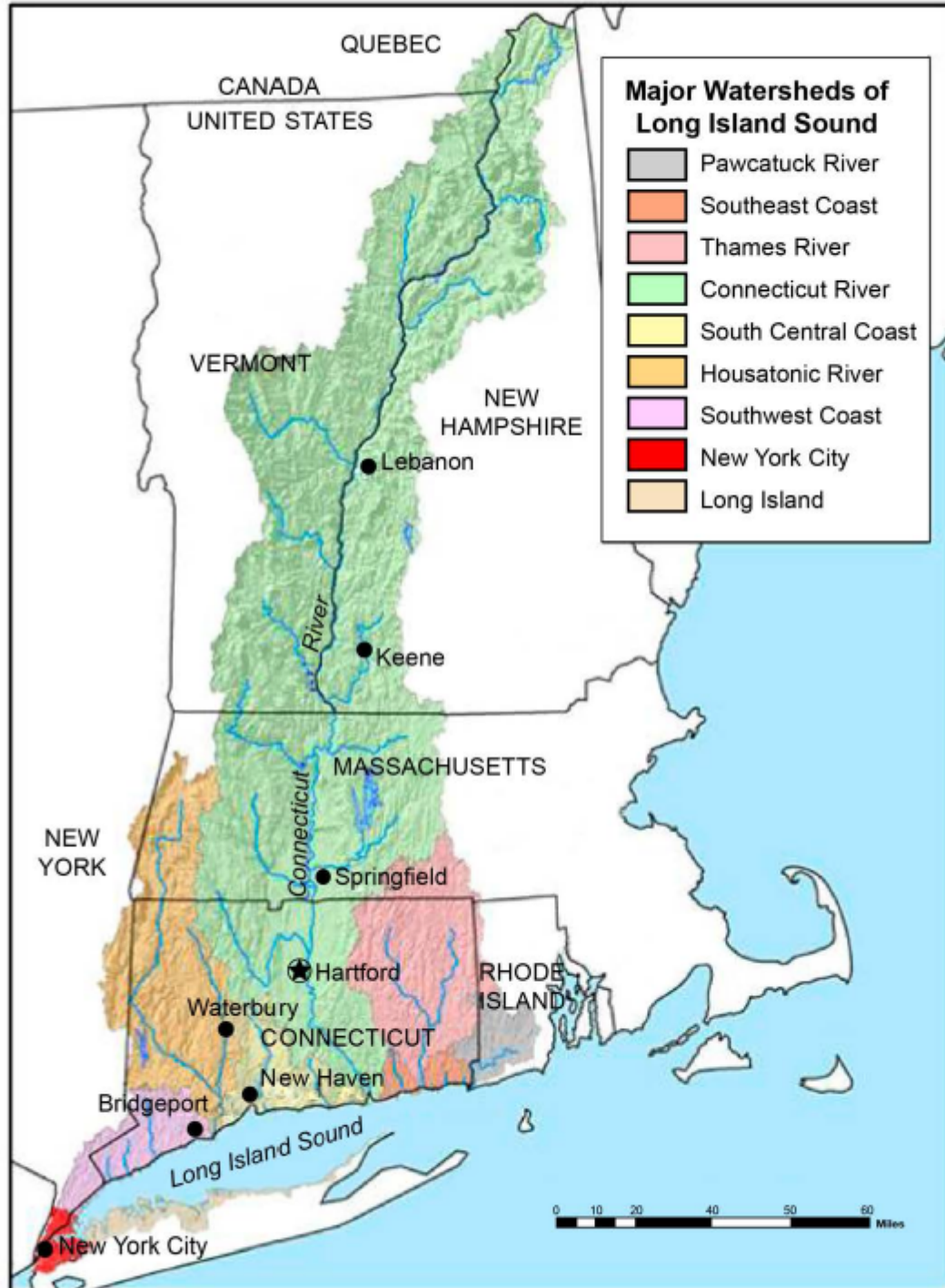


New England
Agriculture is a
Contributor to
These Problems

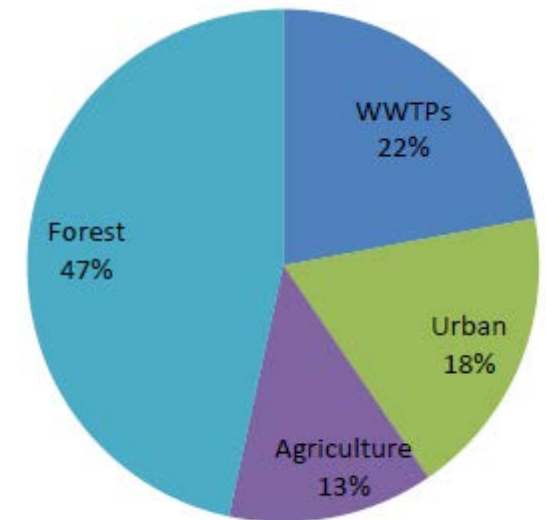


Figure 1: Maximum area and duration of hypoxia (DO < 3.0 mg/L) in LIS, 1987-2013 (Welsh, 1990 and CTDEEP, 2013)



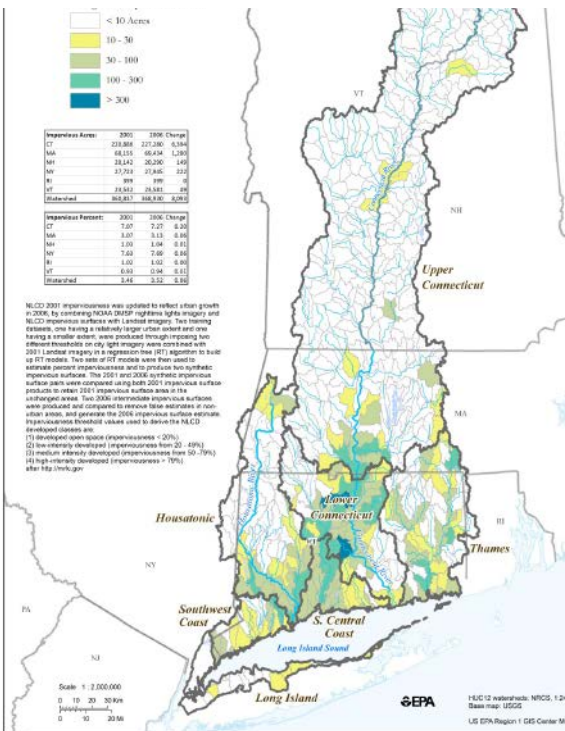


c. 47% of N inputs are from MA, NH, VT sources. Non-forest inputs are largely through urban and agricultural runoff and wastewater treatment plant discharges

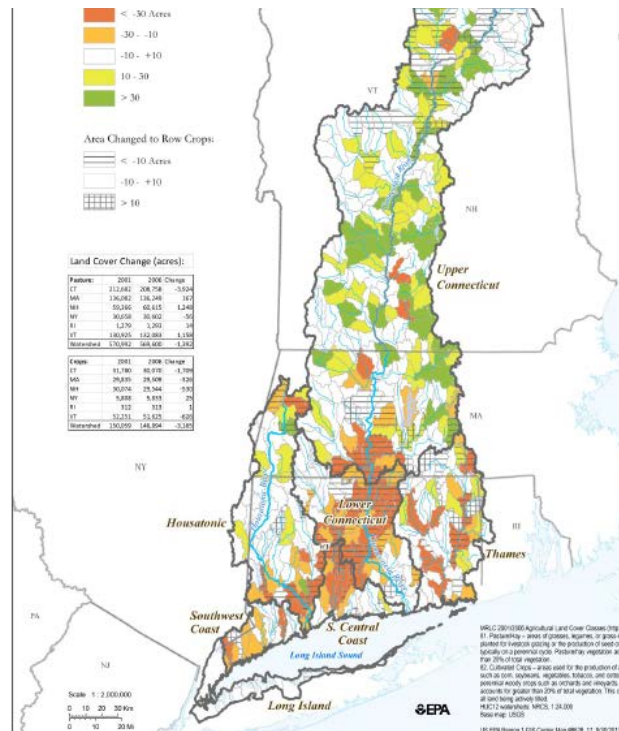


Land Cover Change in Long Island Sound Watershed 2001-2006 (National Land Cover Database)

Impervious



Agriculture



Forest

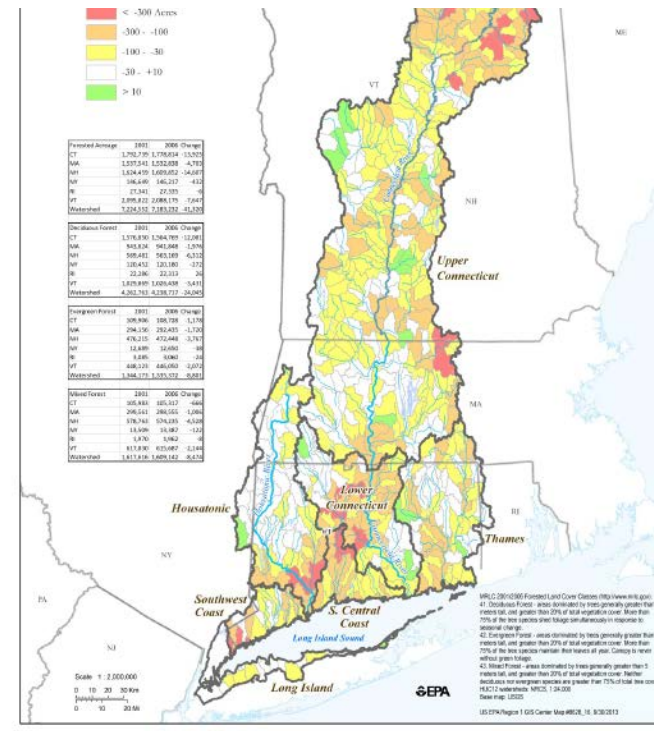


Table 2: Summary of agricultural land cover and land use indicator data provided in the state sections

Indicators	CT	MA	NH	NY	VT
Data Source, Timeframe (unless otherwise noted)	USDA Census of Agriculture, 1987-2007	MA GIS Interpretation, 1985-2005 ⁴	USDA Census of Agriculture, 1992-2007	CLEAR LISS Land Cover Data, 1985-2010	USDA Census of Agriculture, 1987-2007
Commercial Fertilizer Spread	-38%	Not Provided	-25%	Not Provided	-32%
Manure Spread	Not Provided	Not Provided	-25% (2002-2007)	Not Provided	-10% (2002-2007)
Number of Farms	+37%	Not Provided	+68%	Not Provided	Not Provided
Farm Acres	+2%	-29%	+28%	Not Provided	-8%
Agricultural Field (CLEAR, 1985-2010)	-1.3% (-0.8% riparian)	Not Provided	Not Provided	0%	Not Provided
Cropland	Not Provided	Not Provided	-7%	Not Provided	-25%
Other Agricultural Uses	Not Provided	Not Provided	-14%	Not Provided	Not Provided
Pasture	Not Provided	Not Provided	+259%	Not Provided	Not Provided
Woodland	Not Provided	Not Provided	+47%	Not Provided	Not Provided
Total Farm Animals (all listed below)	Not Provided	Not Provided	-17%	Not Provided	Not Provided



Watershed Synthesis Section

A Preliminary and Qualitative Evaluation of the Adequacy of Current Stormwater and Nonpoint Source Nitrogen Control Efforts in Achieving the 2000 Long Island Sound Total Maximum Daily Load for Dissolved Oxygen

Watershed Synthesis Section completed by NEIWPCC on behalf of the Five State/EPA/NEIWPCC Long Island Sound TMDL Workgroup. The work was performed under the Enhanced Implementation Plan for the Long Island Sound Total Maximum Daily Load, an agreement signed by the five Long Island Sound watershed states and U.S. EPA Regions 1 and 2.

Finalized August 2014

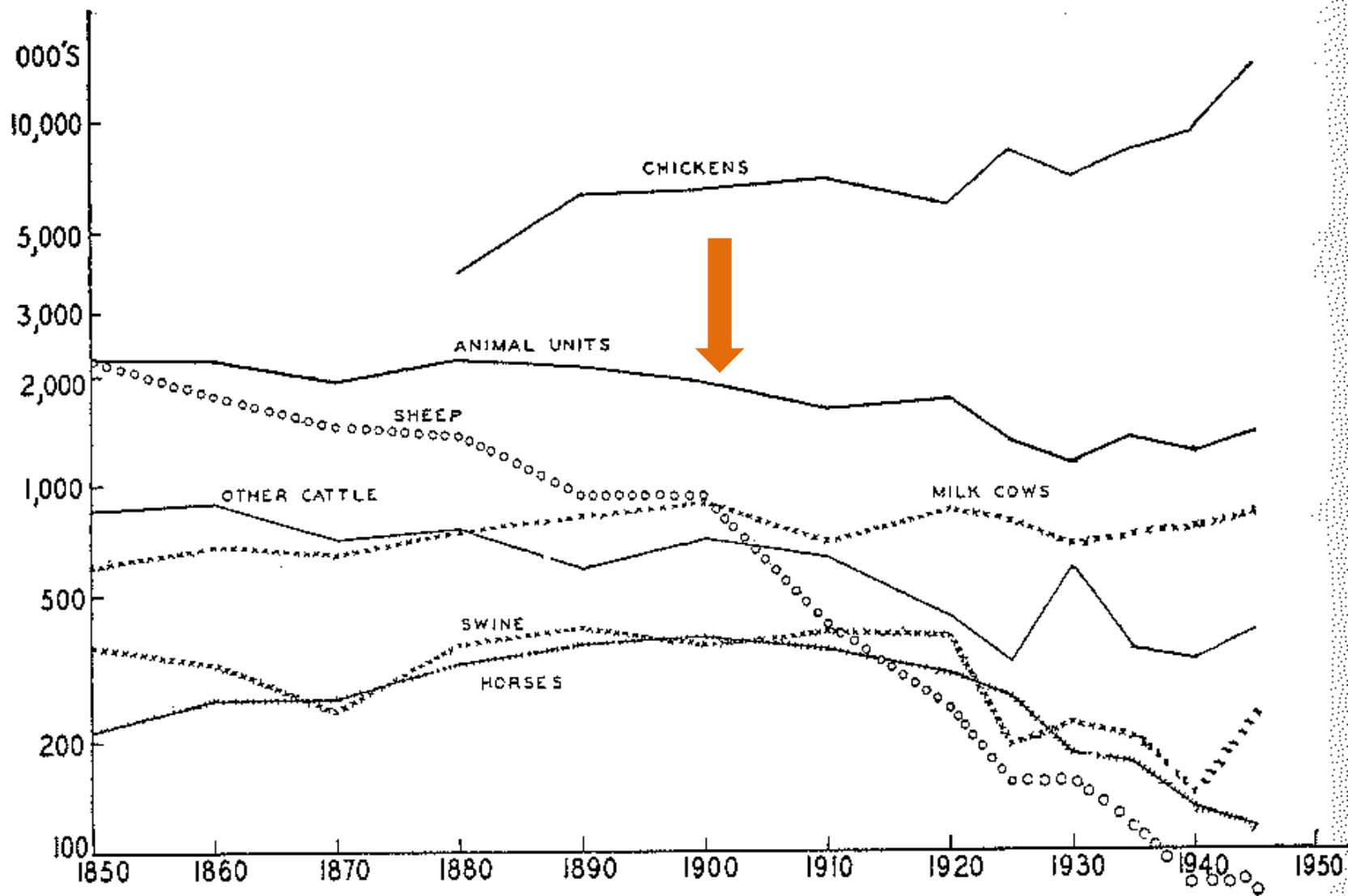
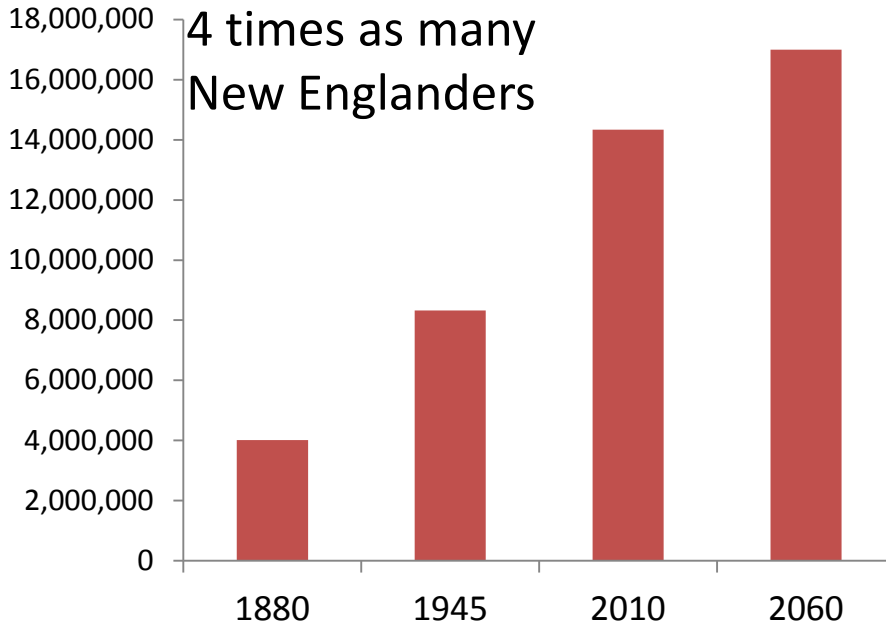


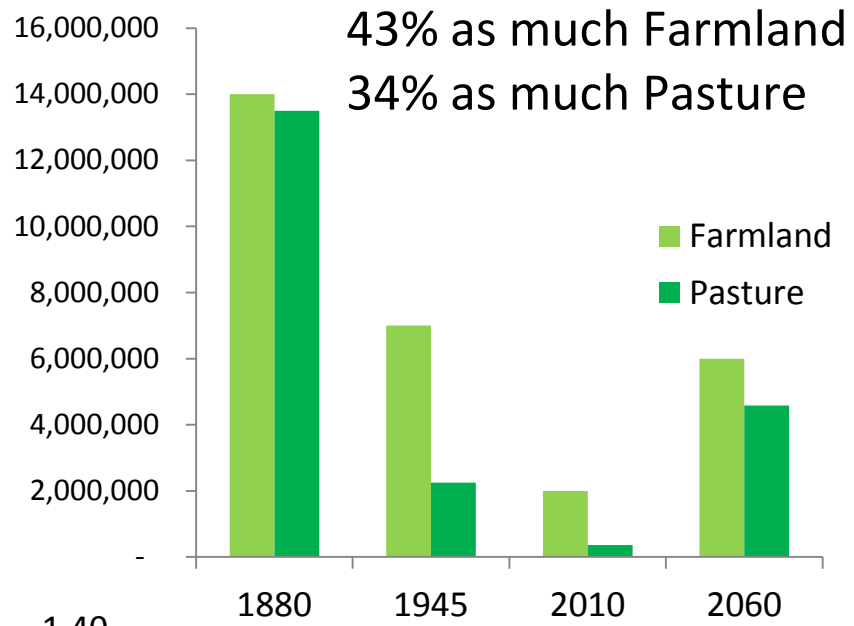
Chart 59. *Changes in Relative Numbers of Livestock, 1850–1945. Census Data (Logarithmic)* (Animal units used as a measure of total livestock numbers)

ANEFV 2060 Projections Compared with 1880

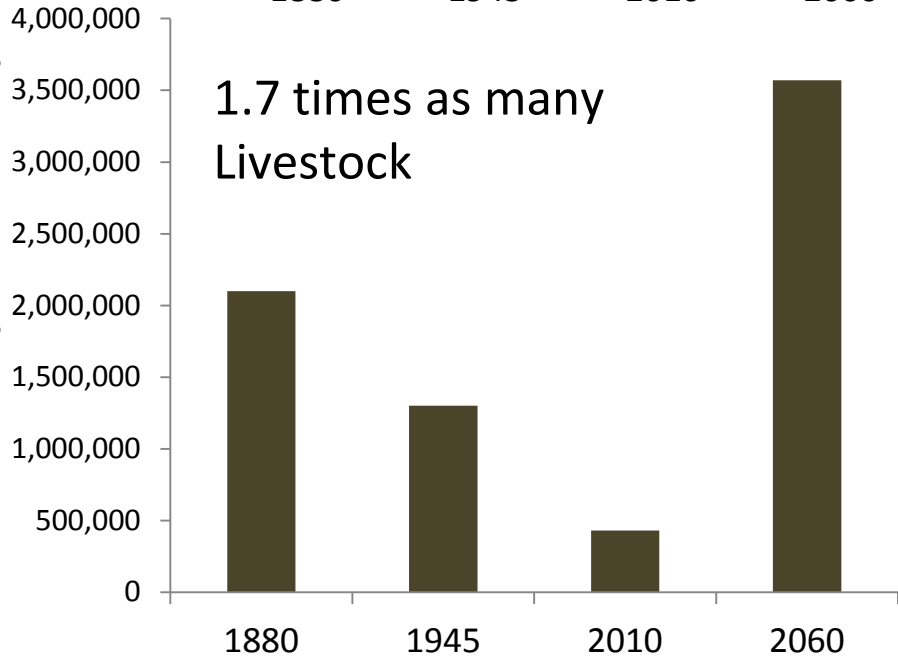
Human Population



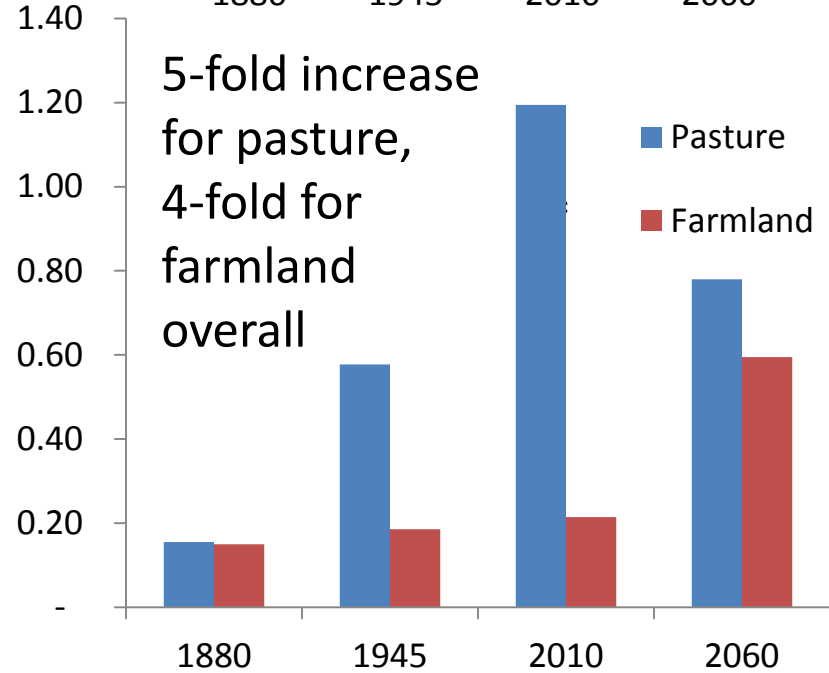
Agricultural Acreage



Livestock (Animal Units)



Animal Units Per Acre





High N loadings: 500-1000 kg N per km²
of watershed area

4.5 lb N per acre

N production in
manure per year per
animal (lbs)

Pig	12
Cattle	90-370
Layers	0.7
Turkeys	3

**MANUAL OF BEST MANAGEMENT
PRACTICES (BMPs) FOR
AGRICULTURE
IN NEW HAMPSHIRE**

*Best Management Practices for the Handling of Agricultural
Compost, Fertilizer, and Manure*



Department of Agriculture, Markets, and Food
Capitol Street, PO Box 2042
Concord, NH 03302-2042
(603) 271-3551

**Raising Poultry
on Pasture**
Ten Years of Success



The American Pastured Poultry
Producers Association Compilation

Edited by Jody Padgugan

www.apppa.org

Control livestock access to water bodies
(Appendix with Fencing information)

Control runoff from barnyards and feedlots

Divert roof runoff away from barnyards
and feedlots

Manage pastures to reduce manure
concentration

- Placement of watering facilities
- Herd management area placement
- Paddock layout

When possible, compost manure

Manure storage and application guidelines



CHALLENGES AND OPPORTUNITIES

1. Siting of New Pastured Livestock Operations
2. Best Management Practices for Runoff from Pastures
3. Best Management Practices for Livestock in Pasture
4. BMPs for Manure



OPPORTUNITIES FOR NGOS AND ACADEMIA

Model operations on NGO or academic land

Watershed and site assessment methods and decision trees

Conservation restrictions and easements

Education and outreach

Model bylaws and regulations

Public policy

How to link new operations to BMP implementation



CHALLENGES AND OPPORTUNITIES

1. Siting of New Pastured Livestock Operations

- Farm-specific conditions (streams, wetlands, soils)
- Watershed conditions
- Water quality status and issues
- Effect of inputs
- Forest-clearing implications?
- Permitting Criteria?

Opportunities

Model operations on NGO or academic land

Research

Watershed and site assessment methods and decision trees

Conservation restrictions and easements

Education and outreach

Model bylaws and regulations

Public policy



CHALLENGES AND OPPORTUNITIES

2. Best Management Practices for Runoff from Pastures
 - What Practices, Where?
 - Should they be Optional?
 - Financing – initiation and ongoing implementation
 - Monitoring for effectiveness
 - Adaptive change as needed

OPPORTUNITIES

Demonstration projects

Research

Education and outreach

Public Policy and Regulations



CHALLENGES AND OPPORTUNITIES

3. Best Management Practices for Livestock in Pastures

- Stocking density
- Rotation intervals
- Stock condition
- Forage condition and monitoring
- Soil assessment
- Access
- Watering
- Resting areas
- Winter grazing/feeding

OPPORTUNITIES

Demonstration projects

Research

Education and outreach

Public Policy and Regulations



CHALLENGES AND OPPORTUNITIES

4. BMPs for Manure

- Spreading
- Winter management of livestock
- Stockpiling and Composting
- Lagoons

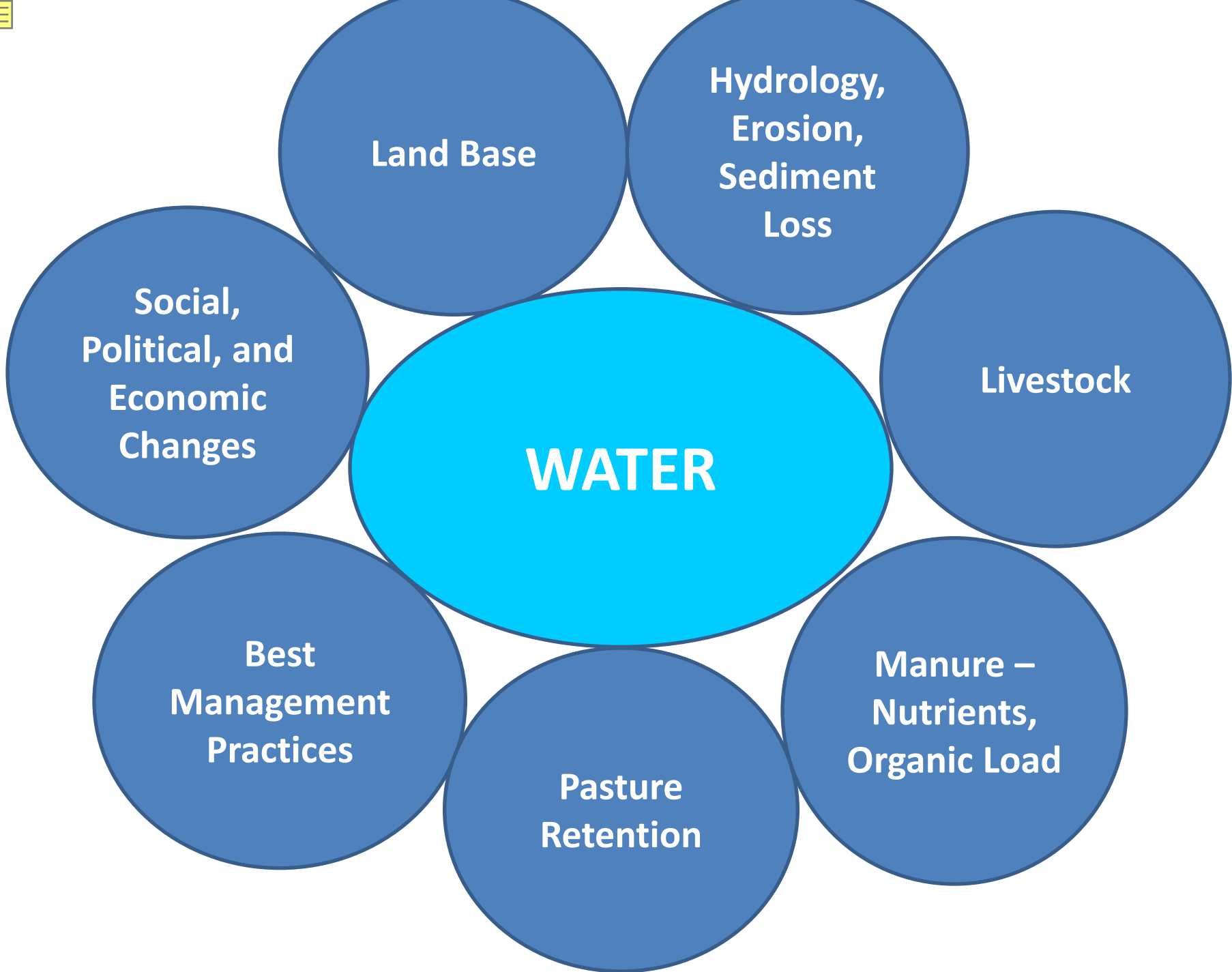
Opportunities

Research

Demonstration projects

Education and outreach

Policy and regulations



Land Base

**Hydrology,
Erosion,
Sediment
Loss**

Livestock

**Social,
Political, and
Economic
Changes**

WATER

**Manure –
Nutrients,
Organic Load**

**Pasture
Retention**

**Best
Management
Practices**



Grazing Livestock and Water Quality

Forages, such as hay and pasture, are indigestible to humans. For generations, grazing animals have benefited mankind by their ability to convert forages into meat, milk, leather, and wool. However, poor grazing management can reduce animal production and degrade grasslands, riparian areas, and water resources.

How can livestock grazing affect soil and water quality?

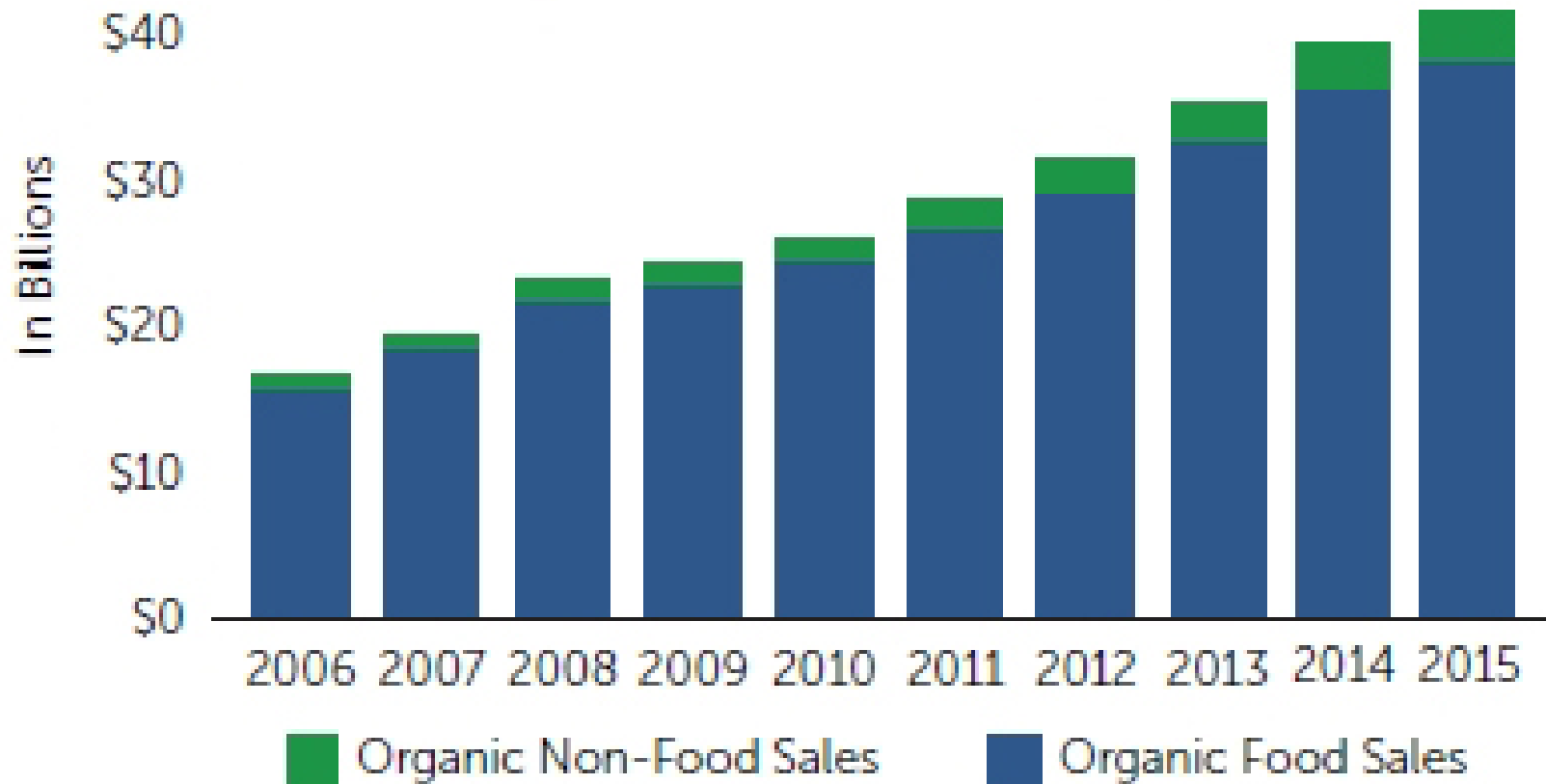
Poor grazing management can result in contamination of surface and subsurface waters through bacterial contamination, nutrient over-enrichment, and soil erosion from pastures. Recent research on the effects of fertilizer, manure, and urine on nitrogen cycling provides some interesting information. In pastures receiving 180 to 223 pounds of nitrogen fertilizer per acre, the nitrogen that was returned to the soil surface as urine or manure ranged from 138 pounds per acre for beef steers to 268 pounds per acre for dairy cows. In grass-clover pastures receiving no nitrogen fertilizer, the value was slightly less at 118 pounds per acre. Considering that a manure pile covers less than 1 square foot and a urine spot covers 4 to 7 square feet, it is interesting to note that the soil under *each* dairy cow manure pile or urine spot receives the equivalent of 500 to 1,000 pounds of nitrogen per acre.

The nitrogen in urine is immediately available to the plants, and most plants are overwhelmed with the high concentration of this nutrient around a urine spot. Some of this nitrogen may be lost to the atmosphere. In contrast, the nitrogen in manure is released more slowly than the nitrogen in urine. The ability of plants to take up this much nitrogen is limited—they simply cannot use such heavy rates of nitrogen efficiently.

Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914. Employment and program opportunities are offered to all people regardless of race, color, national origin, sex, age, or disability. North Carolina A&T State University, U.S. Department of Agriculture, and local governments cooperating.



Total U.S. Organic Sales and Growth, 2006–2015





Livestock --100% to be produced in New England, primarily on pasture and hay, with grain ration imported

	2010	2060
<u>Dairy</u>		
Consumption	1.5 cups/day	1.5 cups/day
Production (number of animals)		
Dairy herd	225,000	1,860,000 (700,000 cows)
Production (acres)		
Pasture	na	1,800,000 ac
Hay	na	900,000 ac
(Grain -- Imported)	na	(174,000) ac



2010

2060

Meat and eggs

Consumption

Red meat (beef & lamb)

1.72 oz/day

0.6 oz/day

Pork

1.2 oz/day

0.6 oz/day

Poultry

1.9 oz/day

1.9 oz/day

Eggs

0.5 oz/day

0.5 oz/day



2010

2060

Meat and Eggs

Production (number of animals)

Beef cows & cattle	100,100	412,000
Sheep	51,500	2,240,000
Pigs – sows	?	160,000
– pigs	52,800	2,600,000
Poultry – layers	1,200,000	18,000,000
– broilers	55,000,000	335,000,000
– turkeys	145,000	17,200,000

Production (acres)

Pasture – New England	na	1,200,000 ac
Hay – New England	na	1,580,000 ac
(Grain – Imported)	na	(2,368,000) ac



2010

2060

Meat and Eggs

Production (number of animals)

Dairy herd	225,000	1,860,000
Beef cows & cattle	100,100	412,000
Sheep	51,500	2,240,000
Pigs – sows	?	160,000
– pigs	52,800	2,600,000
Poultry – layers	1,200,000	18,000,000
– broilers	55,000,000	335,000,000
– turkeys	145,000	17,200,000

Production (acres)

Pasture -- New England	na	3,000,000 ac
Hay -- New England	na	1,580,000 ac
(Grain -- Imported)	na	(2,368,000) ac

Year	Number of Farms	Farmland Acres (to nearest 1 million acres)	Pastureland acres (to nearest 10,000 acres)	Animal Units	A. U. per Farmland Acre	A.U. per pasture acre	Manure (tons)	N in Manure	P in Manure	Organic C in Manure	
1880	205,000	14,000,000	13,500,000	2,100,000	0.15	0.16					
1945		7,000,000	2,250,000	1,300,000	0.19	0.58					
2010		2,000,000	360,000	430,000	0.22	1.19					
2060		6,000,000	4,580,000	3,570,000	0.60	0.78					
			1945 and 2010 pasture data from NEFV spreadsheets								

## animals		Dairy cows	sheep	Beef cows	Sows	pigs	layers	broilers	turkeys	Poultry total ##
	2010	225,000	51,500	100,100	3,300	52,800	1,200,000	55,000,000	145,000	56,345,000
	2060	1,860,000	2,240,000	412,000	52,800	2,600,000	18,000,000	335,000,000	17,200,000	370,200,000
animal units		Dairy cows	sheep	Beef cows	Sows	pigs	layers	broilers	turkeys	TOTAL A.U.
	2010	225,000	3,605	75,075	1,452	8,976	20,400	93,500	725	430,743
	2060	1,860,000	156,800	309,000	23,232	442,000	306,000	569,500	86,000	3,754,592