Reducing Energy Costs of Farm-Related Transportation

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Opportunities off the farm

- Pick-up truck efficiency
- Heavy-duty truck efficiency
- Expanded alternative modes
- Structure of distribution system

Pickup truck efficiency

- In debates over fuel economy in Washington, much attention to need to preserve pickup functionality and keep purchase price down for farmers; less has been said about the need to reduce fuel expenditures.
- Raising the fuel economy of a pickup driven 15,000 per year on $2.50 per gallon fuel from 12 MPG to 16 MPG saves $625 annually.

Pickup efficiency (cont.)

- A 2001 ACEEE analysis concluded that fuel economy of a typical full size pickup (16.7 MPG in 2005) could be increased by 61% for $2,300 with no change in size or performance.
- At $2.50 per gallon, payback is 3 - 4 years.

Federal policies to increase fuel economy?

- USDOT has proposed raising standards for light trucks from 22.2 MPG to about 24 MPG in 2008-2011.
- Also moving to a size-based system, in which full-size pickups will be held to lower standards.
- Tax credits (Energy Policy Act of 2005): Hybrid and “lean-burn” vehicles get credits based on fuel economy and lifetime fuel savings.

ACEEE Estimates of Light-Duty Vehicle Tax Credits

Current Models

Make	Model	Hybrid/ Diesel	Vehicle Class	Adjusted City MPG	Fuel Saved (gal)	Emissions Pass/Fail	Total Credit
Chevrolet/GMC	Silverado/Sierra (2wd) [a]	Hybrid	Pickup	18	1,393	Pass	$ 250
Chevrolet/GMC	Silverado/Sierra (4wd) [a]	Hybrid	Pickup	17	1,759	Pass	$ 650
Ford	Escape Hybrid (2wd) [a]	Hybrid	SUV	36	3,155	Pass	$2,600
Ford	Escape Hybrid (4wd) [a]	Hybrid	SUV	33	2,907	Pass	$1,950
Honda	Accord Hybrid [a]	Hybrid	Car	29	1,583	Pass	$ 650
Honda	Civic GX [a, c]	CNG	Car	30	N/A	Pass	$3,600
Honda	Civic Hybrid (auto) [b]	Hybrid	Car	50	2,373	Pass	$2,100
Honda	Civic Hybrid (man) [b]	Hybrid	Car	47	2,260	Pass	$1,700
Honda	Insight (auto) [a]	Hybrid	Car	57	1,498	Pass	$1,450
Honda	Insight (man) [a]	Hybrid	Car	61	1,258	Fail	$ -
Jeep	Liberty [a]	Diesel	SUV	21	1,083	Fail	$ -
Lexus	RX 400h	Hybrid	SUV	31	3,334	Pass	$2,200
Mercedes-Benz	E320 CDI [a]	Diesel	Car	27	1,524	Fail	$ -
Toyota	Highlander Hybrid (2wd)	Hybrid	SUV	33	3,545	Pass	$2,600
Toyota	Highlander Hybrid (4wd)	Hybrid	SUV	31	3,334	Pass	$2,200
Toyota	Prius [a]	Hybrid	Car	60	2,744	Pass	$3,150
VW	Golf (auto) [b]	Diesel	Car	33	1,627	Fail	$ -

Upcoming Models [b]

Make	Model	Hybrid/ Diesel	Vehicle Class	Adjusted City MPG	Fuel Saved (gal)	Emissions Pass/Fail	Total Credit
Chevrolet	Malibu	Hybrid	Car	28	1,464	Fail	$ -
Chevrolet/GMC	Silverado/Sierra '08	Hybrid	Pickup	20	2,053	Pass	$ 900
Chevrolet/GMC	Tahoe/Yukon	Hybrid	SUV	20	3,221	Pass	$1,800
Lexus	GS 450h	Hybrid	Car	28	2,190	Pass	$1,300
Mercury	Mariner Hybrid	Hybrid	SUV	33	2,913	Pass	$1,950
Nissan	Altima	Hybrid	Car	32	1,956	Pass	$1,300
Saturn	VUE	Hybrid	SUV	25	1,236	Fail	$ -
Toyota	Camry	Hybrid	Car	32	1,956	Pass	$1,300

Tax Credits for Heavy-Duty Hybrids

Improvement in city fuel economy	30-40%	40-50%	>50%
% incremental cost covered by tax credit	30%	40%	50%

Vehicle weight	**Maximum incremental cost**
<14,000 lbs.	$7,500
14,000-26,000 lbs.	$15,000
>26,000 lbs.	$30,000

Heavy-duty truck fuel economy

- Potential to improve fuel economy of heavy-duty trucks with “conventional” technologies is large
- Common wisdom: truck users are very concerned about fuel economy, so all cost-effective technologies are adopted
- But:
  - No standardized way of testing the fuel economy of a vehicle or an individual technology
  - Resale often occurs within a few years

Heavy-duty truck fuel economy (cont.)

- In fact many efficiency technologies are underutilized.
- DOE's 21st Century Truck program foresees potential to double tractor-trailer fuel economy.
- Tractor-trailers are responsible for 69% of energy use by heavy-duty trucks.

Heavy-duty fuel economy (cont.)

- Wal-Mart recently announced its intention to raise fuel economy of its trucks by 25% in 3 years and to double in 10 years
- ACEEE findings: Existing, cost-effective technologies could increase the fuel economy of tractor-trailers by almost 60% over the next decade

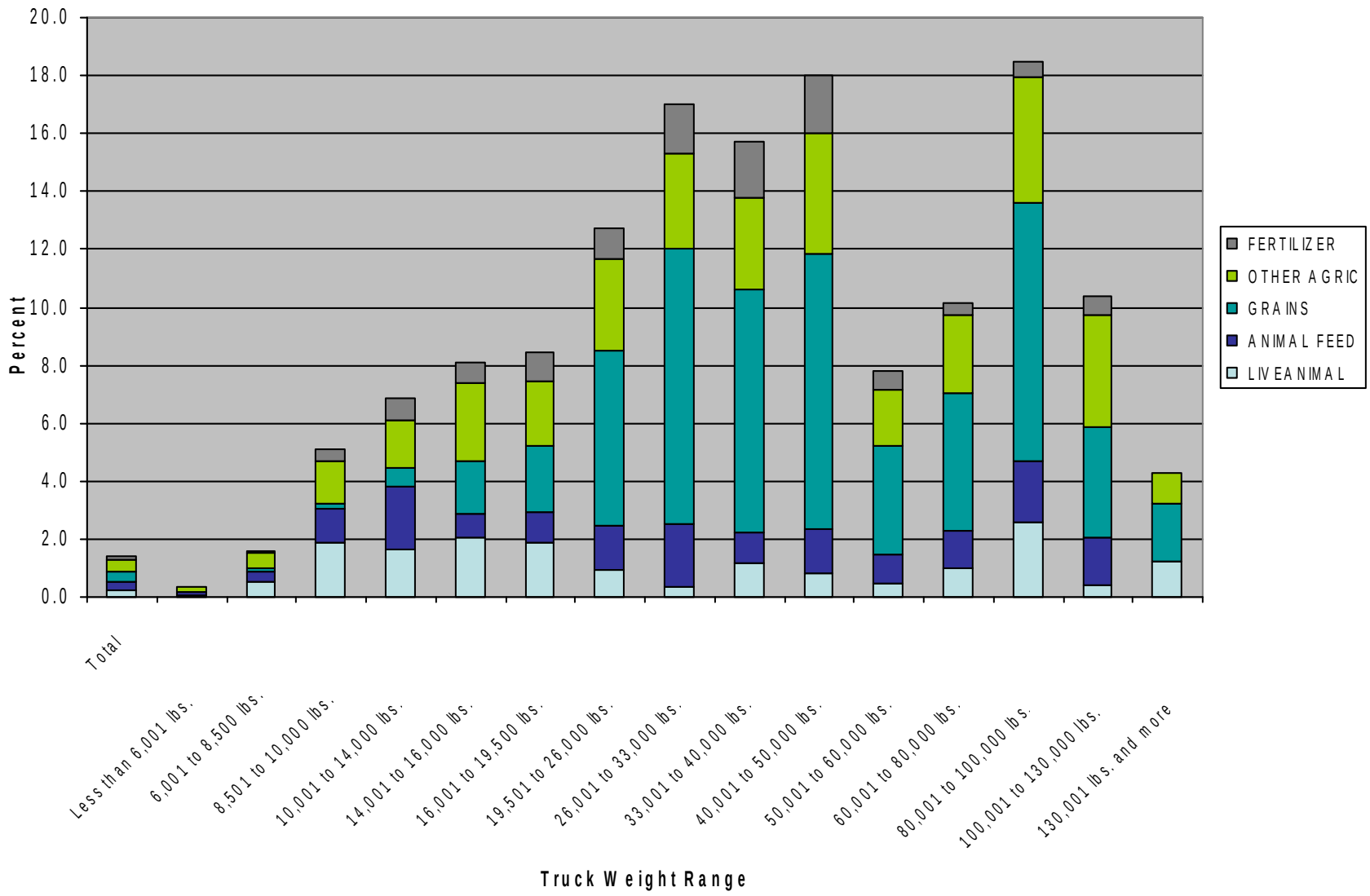
Tractor-trailer efficiency technologies available by 2008

	% mpg gain
Aerodynamics	
cab top deflector	1.5%
gap closing	2.5%
trailer edge curvature	1.3%
Electrical auxiliaries	1.5%
Engine	
friction reduction	2.0%
increased peak cylinder pressure	4.0%
improved injectors	6.0%
thermal management	5.0%

Source: Vyas et al., 2002, Argonne National Lab

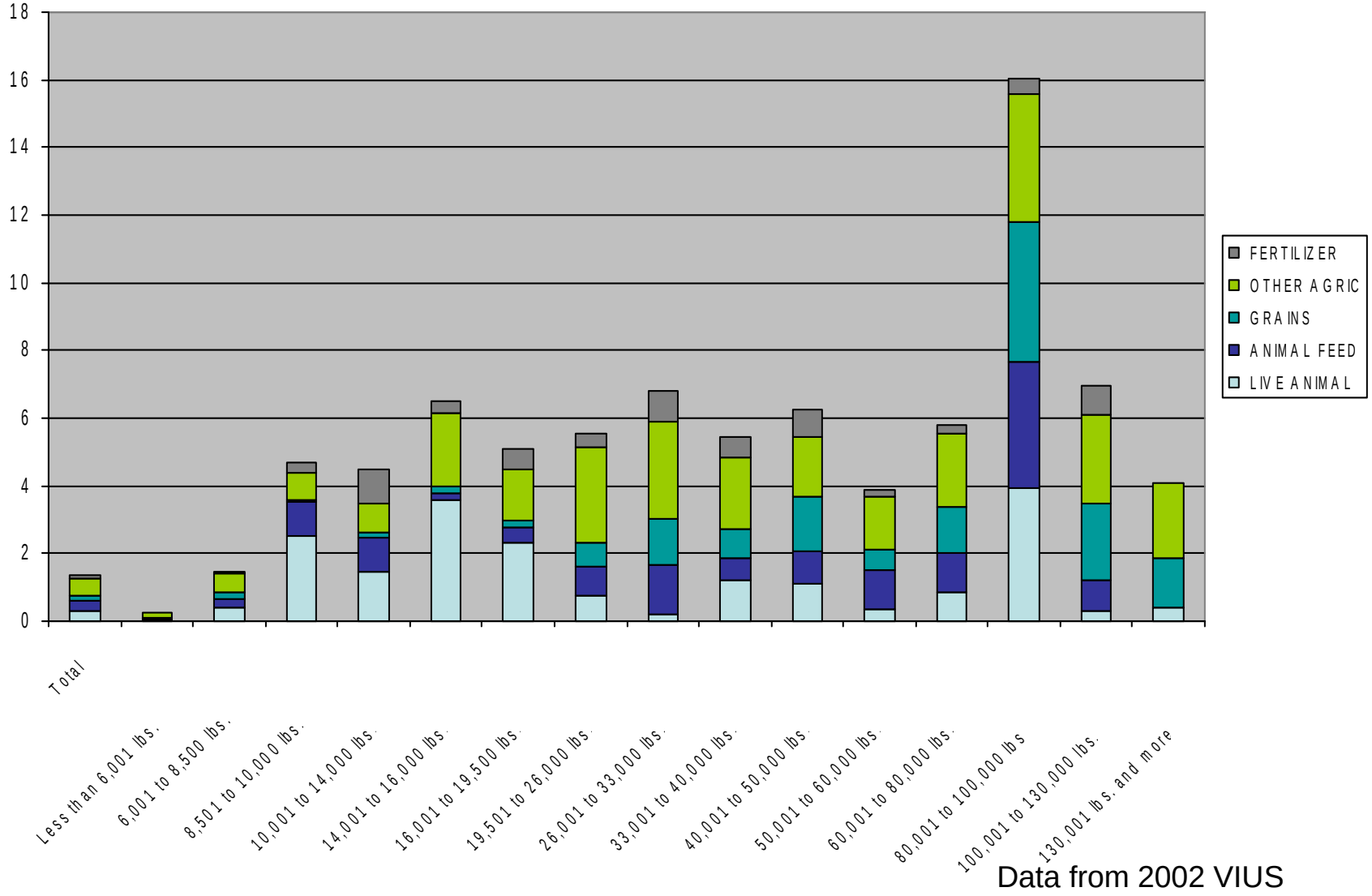
Truck demographics

- How big is the farm-related portion of the total truck population?
- Which truck classes are dominant in the ag community?
- Which classes are most important from an energy perspective?



Data from 2002 VIUS

Farm-Related Truck Miles as Percent of All Truck Miles



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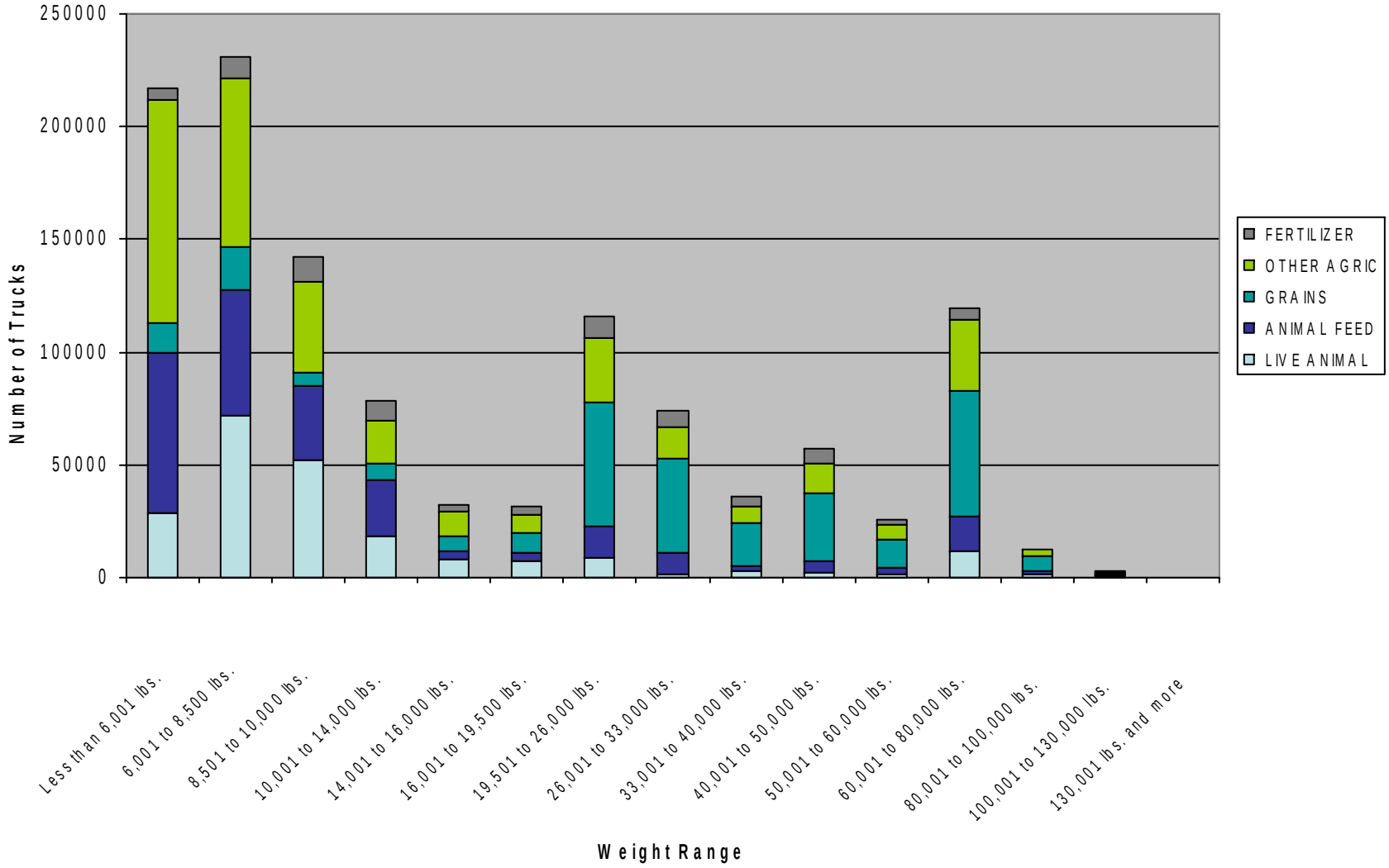
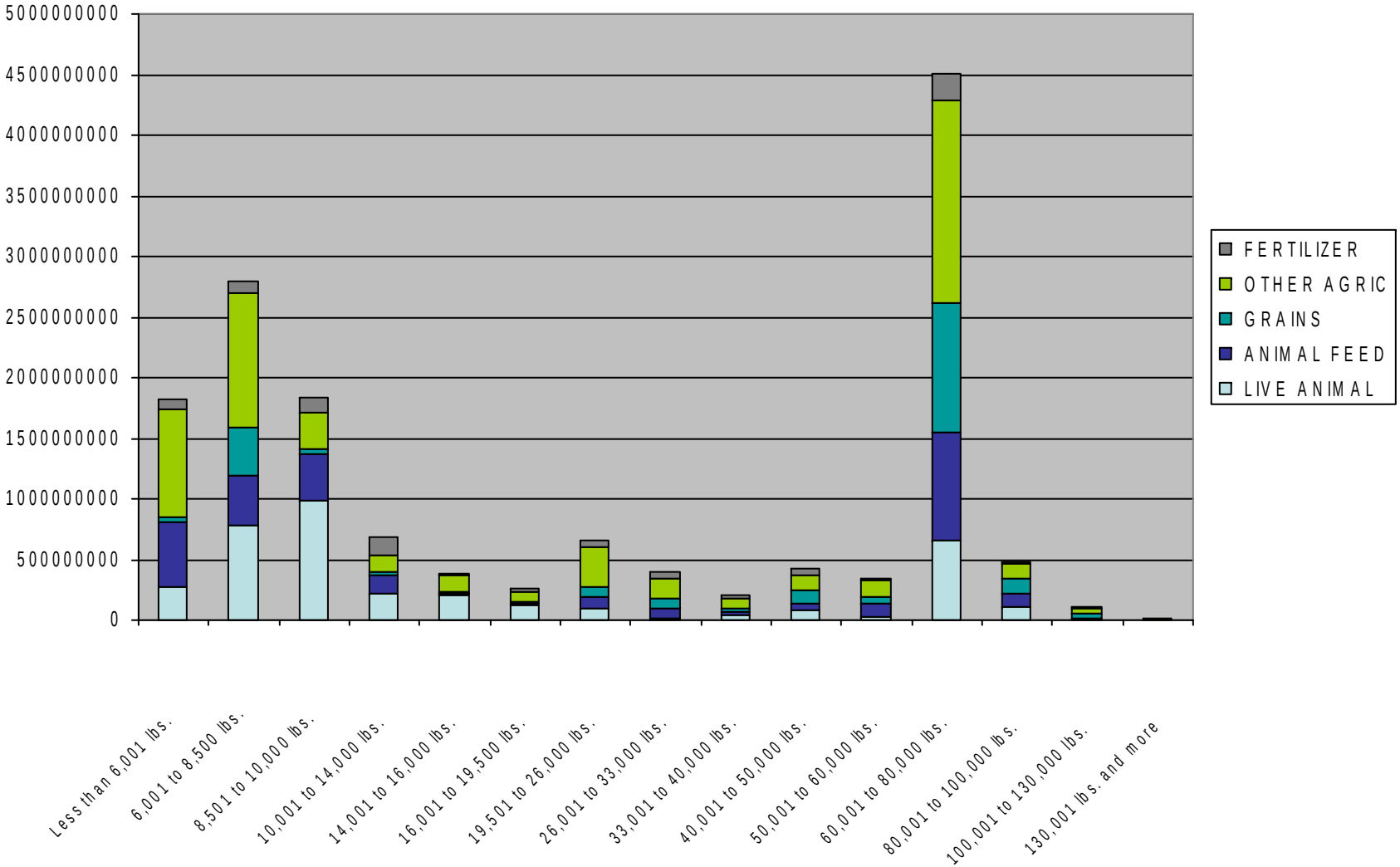


Data from 2002 VIUS

Farm-related truck miles by weight class



Data source 2002 VIUS

Steps to raise heavy-duty fuel economy

- Get fuel economy test procedure in place for heavy-duty vehicle
- Consider standards for heavy-duty trucks (Japan has just adopted standards)
- Having fuel economy measurement protocols allows:
  - Implementation of heavy-duty hybrid tax credits
  - Voluntary truck greening programs

EPA's SmartWay Transport program

- A voluntary partnership to help shippers and carriers identify and adopt technologies and practices that reduce the environmental impact of freight transportation.
- Current emphasis is on:
  - Idling reduction
  - Tires (wide-based)
  - Trailer aerodynamic upgrades
  - Oxidation catalysts

Energy efficiency of the freight network

- Making truck more efficient is only part of the story: congestion on the roads, difficulties in the trucking industry, high fuel costs underscore the problems associated with over-dependence on trucking.
- Rail and water substantially less energy-intensive
- But truck share continues to increase dramatically.

Produce arriving by truck at Chicago terminal market:

Year	1981	1998
Arrivals by truck % of total	49.6%	86.9%
Arrivals by rail % of total	50.4%	13.1%

Pirog, Leopold Center, 2001

- There are major limitations to mode-shifting for agricultural products, but
- Much more attention and resources for non-highway modes are warranted.

Table 1. Rail's Leading Commodities by Revenue

Example of Four Class I Railroads' Annual Reports

Norfolk Southern (2000)	CSX (2001)	Union Pacific (2001)	BNSF (2001)
23% Coal, Coke, and Iron	24% Coal, Coke, and Iron Ore	23% Energy	37% Consumer Products
18% Intermodal	16% Intermodal	19% Industrial Products	23% Coal
15% Automotive	13% Chemicals	18% Intermodal	23% Industrial Products
13% Chemicals	11% Automotive	15% Chemicals	17% Agricultural Products
11% Metals and Construction	9% Forest Products	14% Agricultural Products	
10% Paper, Clay, and Forest Products	7% Agricultural Products	11% Automotive	
10% Agriculture	6% Metals		
	5% Minerals		
	6% Other		

AASHTO's Freight-Rail Bottom Line Report

Food miles

- High energy prices also call for another look at the cost of supplying national and international vs. local food markets
- Pirog et al.: “Conventional” food distribution system supplying Iowa with produce from national sources uses 4 to 17 times more fuel than an Iowa-based regional system would use.