



### Carnegie-Mellon Study Claims Meatless Mondays Considerably Reduce Carbon Footprint



*"Shifting less than one day per week's worth of calories from red meat and dairy products to chicken, fish, eggs, or a vegetable-based diet achieves more GHG reduction than buying all locally sourced food."*

Source: Weber and Matthews (2008). Food-miles and the relative climate impacts of food choices in the United States. *Env. Sci. Tech*

### Meatless Mondays have Negligible Environmental Impact... and Lead to Further Questions

Dairy/Red Meat = 3.05% carbon emissions  
Meatless Monday = 0.44% reduction in carbon emissions

What happens to consumer choice?

What replaces animal by-products?

What replaces meat/dairy?

Source: US EPA (2010) Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2009; Washington, DC

### Essential to Assess Environmental Impact per Unit of Output

Vehicle 1    Vehicle 2

### Essential to Assess Environmental Impact per Unit of Output

Vehicle 1

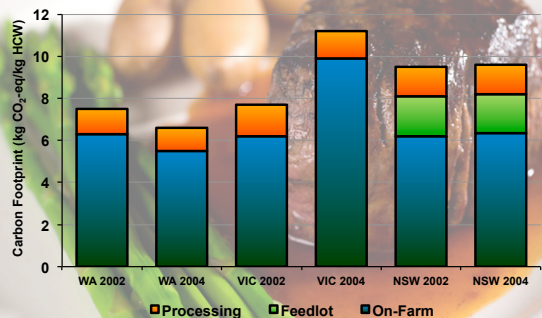
**250 People MPG**

Vehicle 2

**140 People MPG**

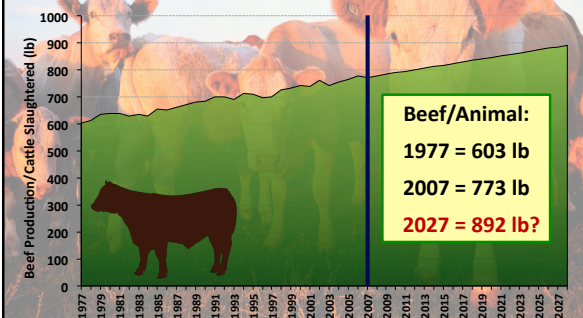
Sources: Created by Dr. Judith L. Capper, Washington State University, 2010

### The Majority of Beef Production's Environmental Impact Occurs On-Farm



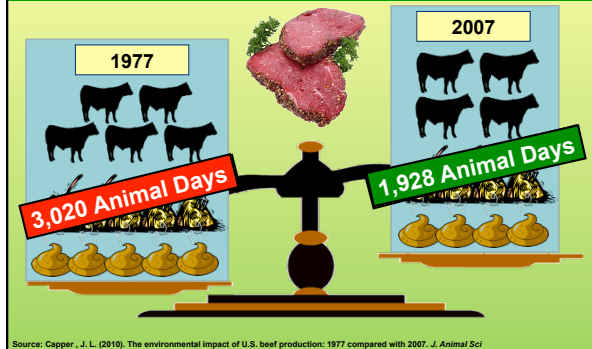
Source: Peters et al. (2009) "Red Meat Production in Australia: Life Cycle Assessment and Comparison with Overseas Studies" *Env. Sci. Tech*

### Opportunities to Further Improve Beef Yield per Animal may be Limited

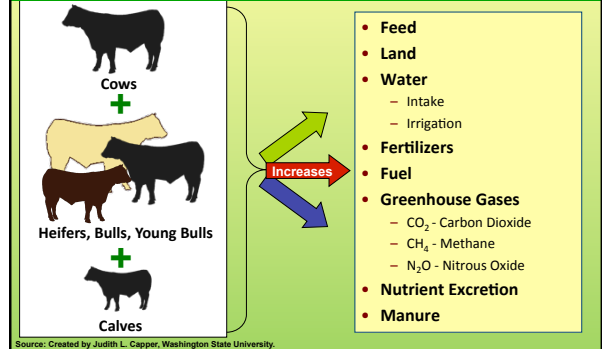


Source: USDA-NASS (2009) <http://www.nass.usda.gov/economics/pubs/2009/20090101.pdf>. Last accessed, 9/15/09

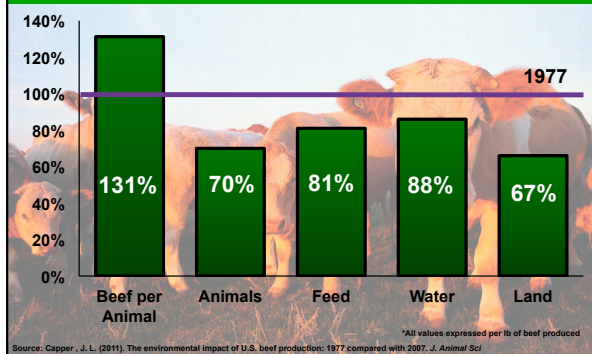
In 1977, it Took Five Animals to Produce the Same Amount of Beef as Four Animals in 2007



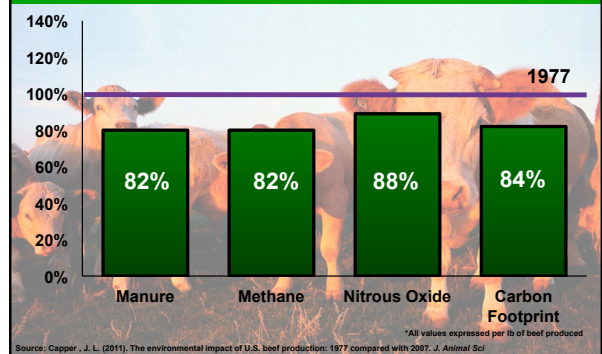
Supporting Population Must be Included - Beef Doesn't Just Appear in the Feedlot!



Environmental Impact of U.S. Beef Production has been Reduced by Improved Productivity



Environmental Impact of U.S. Beef Production has been Reduced by Improved Productivity



The Herbivore's Dilemma: Is Grass-Fed Beef Better for the Planet?

**So Grass-Fed A Caveman Would Eat It.**

**100% NATURAL GRASS FED GOURMET BEEF.**

We're shattering the myth about red meat.

No hormones, no steroids, antibiotics or chemicals.

Our exclusive Piedmontese bred beef are hand-raised with grass feed to ensure a natural healthy meat, free of chemicals, growth hormones and GMO products.

"We have succeeded in industrializing the beef calf, transforming what was once a solar-powered ruminant into the very last thing we need: another fossil-fuel machine." Michael Pollan, NY Times

Source: <http://ohnewestworldnews.com/> <http://www.1ackrellfarms.com/templates/uedmoo/home/images/explanation2.jpg>; and Pollan, M. (2002) "Power Steer" NY Times Magazine, March 31, 2002

Hormones are Portrayed as a Human Health Threat

**RECOMBINANT BOVINE GROWTH HORMONE INJECTED COWS ARE THE MOTHER OF ALL MILKSHAKES!**

**UDDERLY UNIQUE**

Source: [http://www.adriants.com/images/bovine\\_udder.jpg](http://www.adriants.com/images/bovine_udder.jpg)

## Consumers Have Three Production System Choices When Buying Beef

### Conventional:

- ✓ Extensive pasture-based system until weaning (7 mo)
- ✓ Animals enter feedlot either at weaning (calf-fed) or 12 mo of age (yearling-fed)
- ✓ Production-enhancing technology\* used in each sector

### Natural:

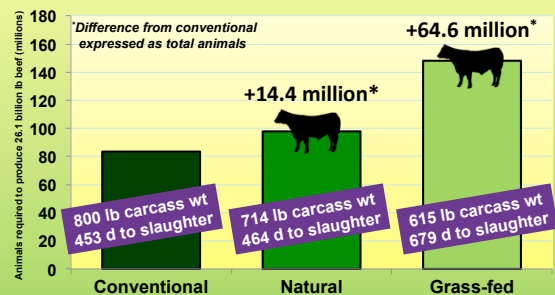
- ✓ Identical to 'conventional' system but production-enhancing technologies are not used

### Grass-fed:

- ✓ Extensive pasture-based system from birth to slaughter
- ✓ Production-enhancing technologies are not used

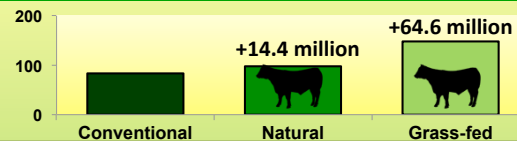
\*Technologies included in model: ionophores, implants, MGA,  $\beta$ -agonists

## Removing Technology from Beef Production Considerably Increases Animal Numbers



\*Animal refers to cows, calves, heifers, bulls, stockers and finishing animals  
Source: Adapted from Capper, J. L. (2010). The Environmental Impact of Conventional, Natural and Grass-fed Beef Production Systems. Greenhouse Gases and Animal Agriculture Conference, Banff, Canada.

## Removing Technology from Beef Production Increases Resource Use and GHG Emissions

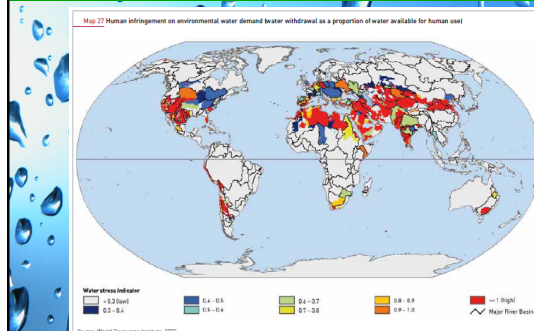


If all U.S. beef was grass-fed, it would increase:

- Land use by 131 million acres = 75% land area of Texas
- GHG emissions by 134.5 million t CO<sub>2</sub>-eq
  - Equal to annual emissions from 26.6 million U.S. cars
- Water use by 468 billion gallons
  - Equal to annual usage by 53.1 million U.S. households

Source: Adapted from Capper, J. L. (2010). The Environmental Impact of Conventional, Natural and Grass-fed Beef Production Systems. Greenhouse Gases and Animal Agriculture Conference, Banff, Canada.

## Water Scarcity is an Increasingly Important Issue

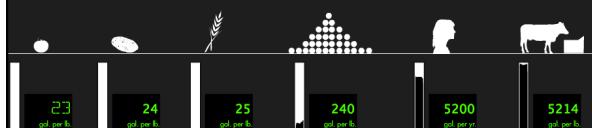


## Water Use is Employed as a Rationale for Vegetarianism and Veganism

LOOKING TO GO GREEN? Consider this...

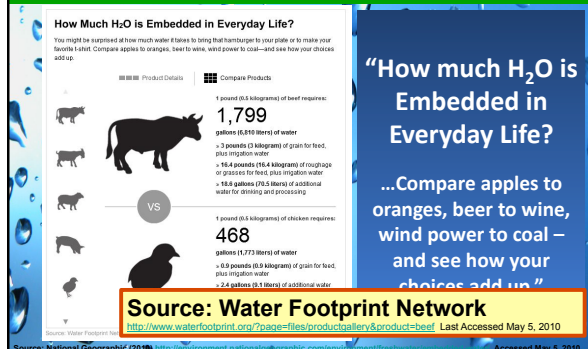
If you gave up beef, you'd save over 300,000 gallons a year.

A whole lot more than you could save by never showering.



Source: <http://www.veganresource.com/vegan/3Reasons.php> Accessed 7/10/2011

## 'Water Footprint' Data was Recently Highlighted in National Geographic Magazine



## Incorrect Data Misleads the Consumer and May Bias Food Choices

**Water Footprint**

Product Gallery

Product Water Footprints  
Your Water Footprint  
National Water Footprints  
Corporate Water Footprints  
Global Water Footprints  
Training Materials  
Publications  
Glossary  
FAQ  
Links  
Contact

**Product Gallery**  
Beef

Water footprint: 15500 litres of water per kg of beef.

In an industrial beef production system, it takes an average three years before the animal is slaughtered to produce about 200 kg of boneless beef.

Source: Water Footprint Network (2010) <http://www.waterfootprint.org/Tools/Products/Beef/BeefGallery.aspx>. Last Accessed May 5, 2010

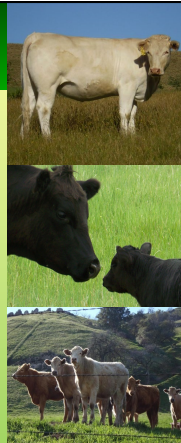
## Incorrect Data Misleads the Consumer and May Bias Food Choices

	Water Footprint Network	US Average
Boneless beef yield (lb)	441	605
Dressed carcass weight (lb)		
Slaughter weight (lb)		
Days to slaughter		
Overall growth rate (lb/d)		
Water (gal) per lb boneless beef		

Source: Created by Jade Cooper, Washington State University. Weight and growth rate data for US average based on LMU's ration formulation for Angus x Hereford beef-c steer grown from 75 lb to 1,800 lb. (Speckert & Olson (1984))

## Further Opportunities to Reduce Environmental Impact

- ✓ Reduce time to reach target weights
  - ✓ Increase growth rate and feed efficiency
  - ✓ Use beef performance technologies
  - ✓ Optimize diet formulation
- ✓ Minimize losses within the system
  - ✓ Reduce morbidity and mortality
  - ✓ Reduce parasite infection
- ✓ Improve reproductive efficiency
  - ✓ Aim for one calf per cow per year
- ✓ Increase land carrying capacity
  - ✓ Improved pastures
  - ✓ Better forage varieties
- ✓ Reduce post-harvest resource use and emissions
  - ✓ Water, paper, plastics, styrofoam



## Social Sustainability Remains a Huge Challenge



## The Beef Industry Needs Positive Publicity

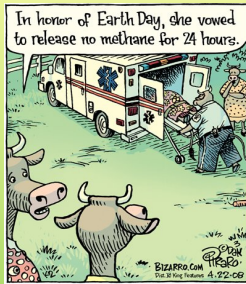
FOR THE THINGS WE ALL CARE ABOUT

Source: Merck Animal Health (2011) "Meeting Today's Beef Demands" <http://www.youtube.com/watch?v=hZBWBs29QkI>

## Conclusions

- ✓ Every production system has its niche
- ✓ The livestock industry must demonstrate dedication to reducing its carbon footprint in order to maintain social license to operate and remain viable
- ✓ Productivity is a key factor in reducing the carbon footprint of livestock production
- ✓ Environmental impact must be assessed using sound science rather than ideological principles and "touchy-feely" thought processes

Thank you!



[capper@wsu.edu](mailto:capper@wsu.edu)



[@bovidiva](https://twitter.com/bovidiva)



[www.bovidiva.com](http://www.bovidiva.com)



[www.wsu.academia.edu/JudeCapper/talks](http://www.wsu.academia.edu/JudeCapper/talks)

Source: 2008 <http://cartoonists.com/members/capper/>, Last accessed May 7, 2010; [www.bovidiva.com](http://www.bovidiva.com) is not affiliated with Washington State University