

# A Point-in-Time Comparison of the Environmental Impact of Jersey vs. Holstein Milk Production

*Dr Jude Capper*



**HOOKED ON  
JERSEYS**  
WORLD JERSEY CATTLE BUREAU



# A Point-In-Time Comparison of the Environmental Impact of Jersey vs. Holstein Milk Production



**Dr. Judith L. Capper**  
**Dr. Roger A. Cady**

**World Jersey 19<sup>th</sup> International  
Conference**  
*Hamilton, New Zealand*  
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WASHINGTON STATE  
UNIVERSITY



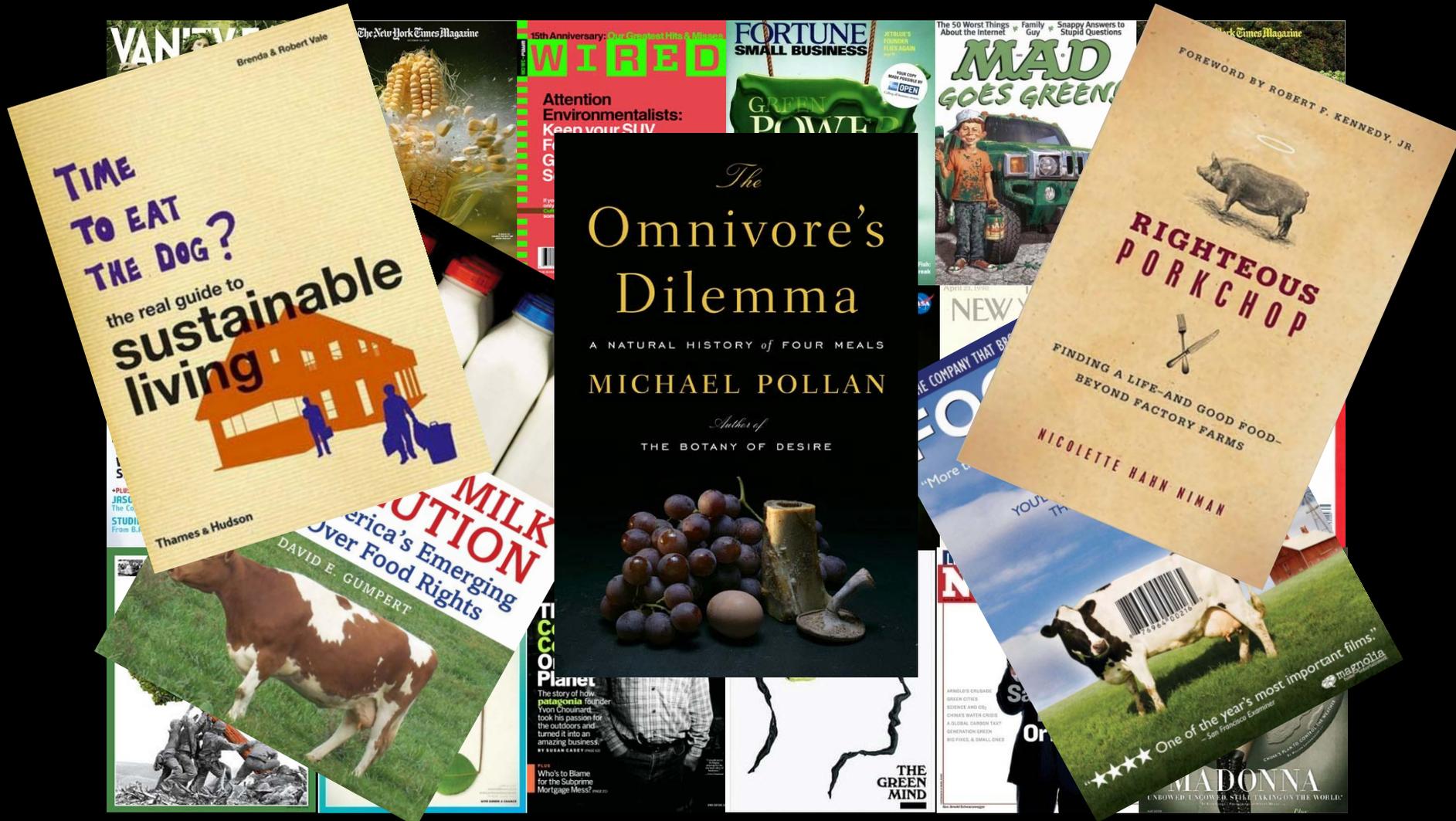
*World Class. Face to Face.*

**Elanco**

**NAJ**

Major Funding by  
National All-Jersey Inc.

# Sustainability Heads Every Agenda

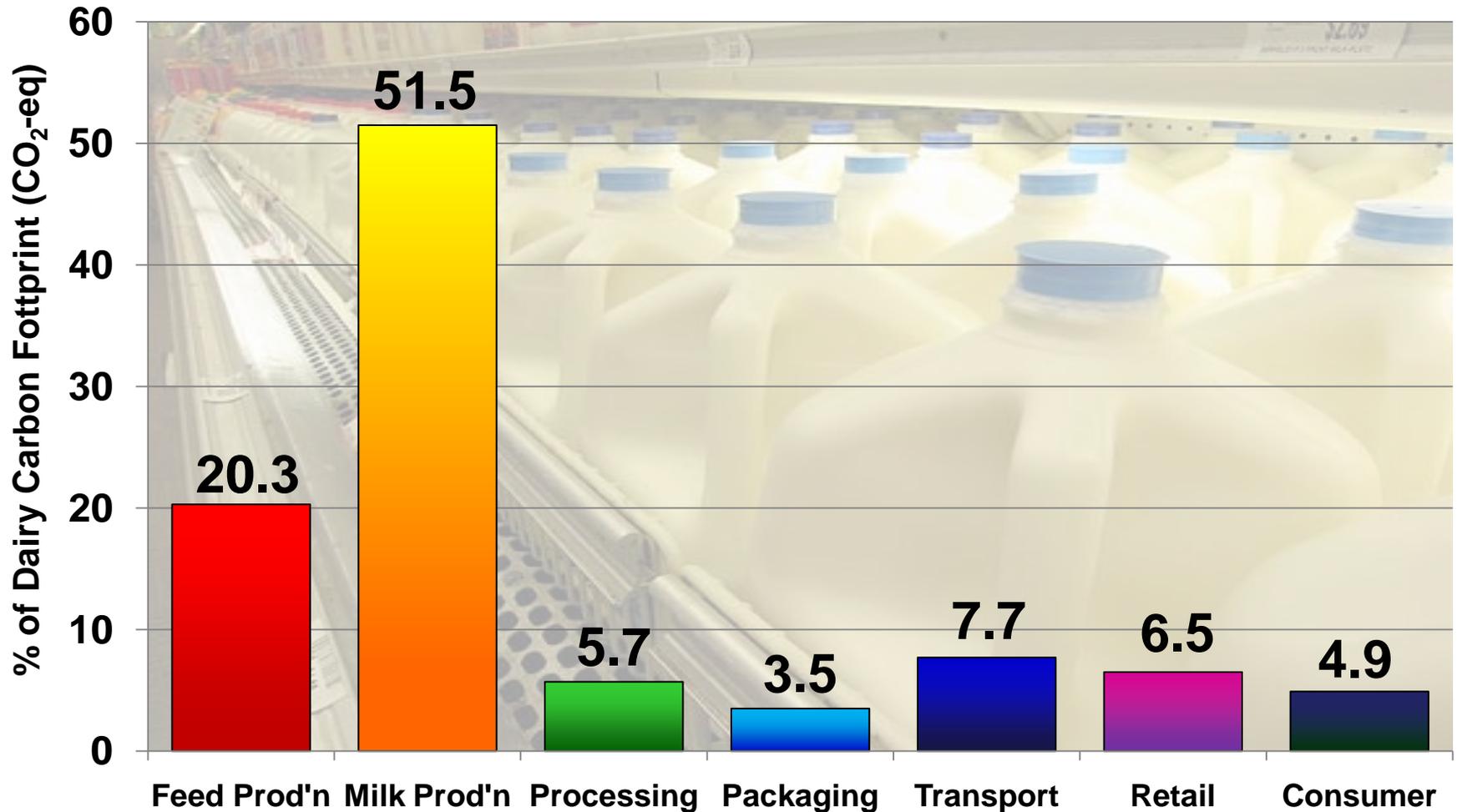


# The Global Livestock Industry is Under Threat



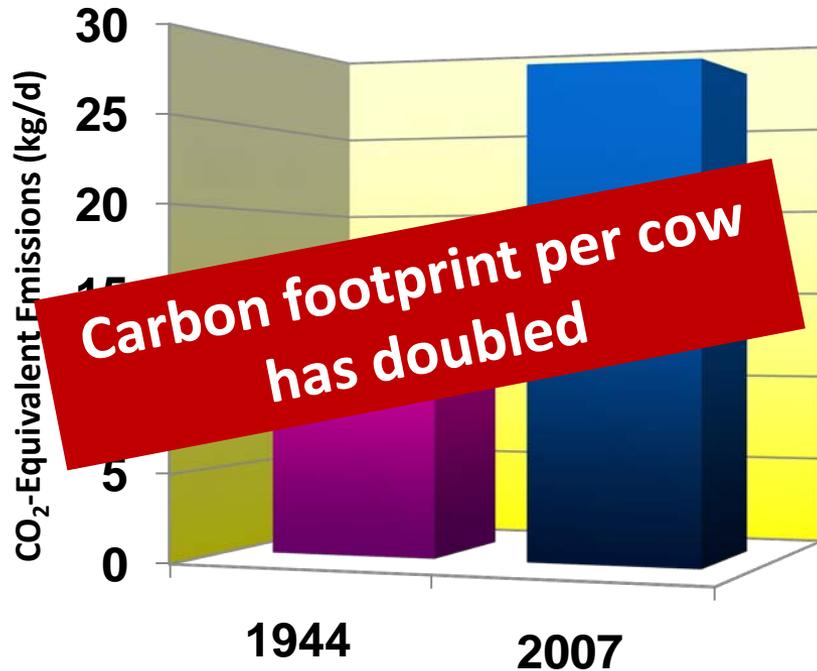
Sources: <http://culturemap.com/newsdetail/09-03-10-is-sex-in-the-shower-killing-our-water-supply-relax-beef-production-is-a-bigger-culprit/>;  
[http://animals.change.org/blog/view/save\\_the\\_animals\\_save\\_the\\_planet\\_blog\\_action\\_day\\_09\\_climate\\_change](http://animals.change.org/blog/view/save_the_animals_save_the_planet_blog_action_day_09_climate_change) PETA (2010)  
<http://www.peta.org/mc/ads/PAMpartsPETA300.jpg> and <http://www.goveg.com/environment-globalwarming.asp> All accessed Sept 10 2010

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

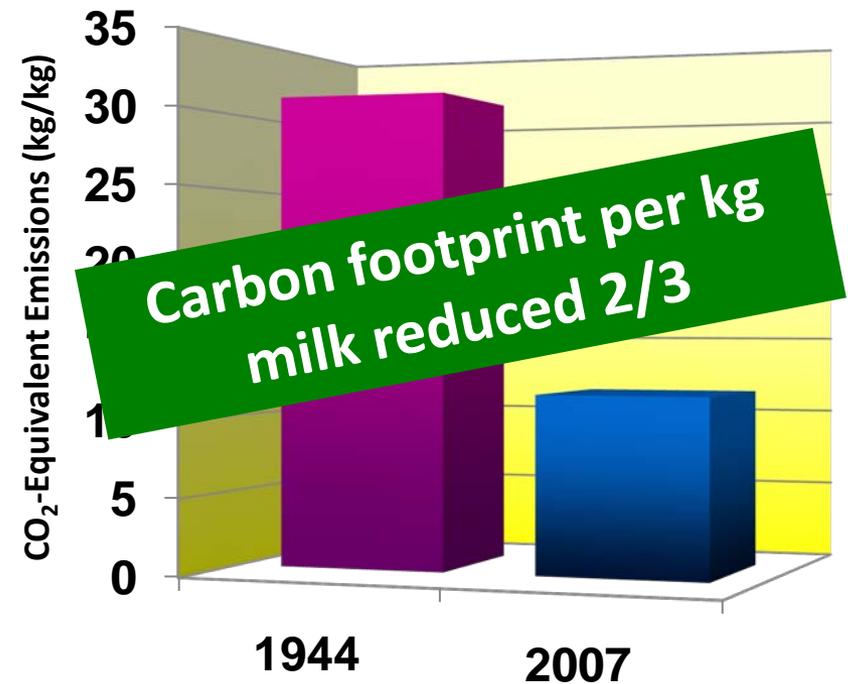
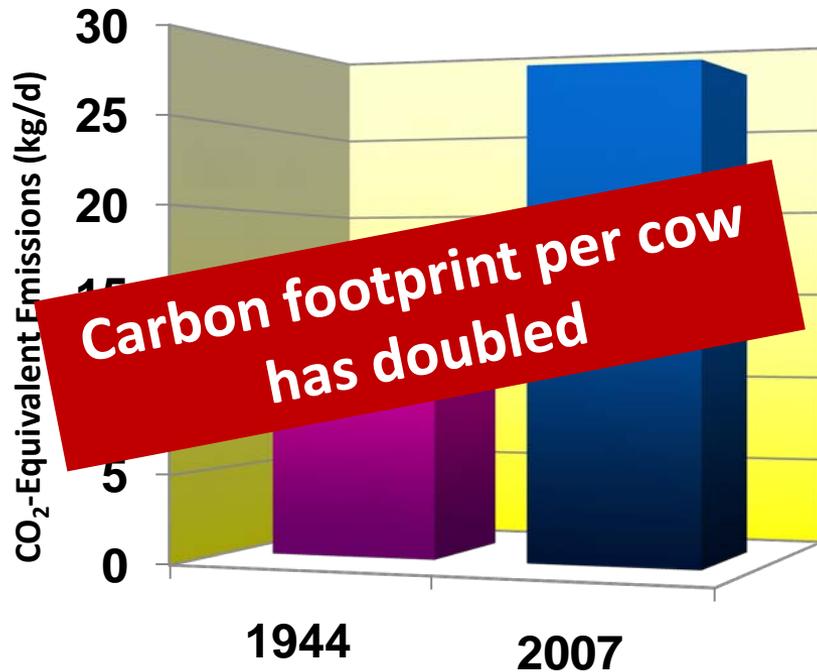


Source: Graph created by Dr. Judith L. Capper, Washington State University, 2010; Innovation Center for U.S. Dairy (2010) U.S. Dairy Sustainability Commitment Progress Report. Available at: [http://www.usdairy.com/Public%20Communication%20Tools/USDairy\\_Sustainability\\_Report\\_12-2010%20%284%29.pdf](http://www.usdairy.com/Public%20Communication%20Tools/USDairy_Sustainability_Report_12-2010%20%284%29.pdf)

# The Dairy Industry Must be Evaluated on the Basis of Production, Not per Cow

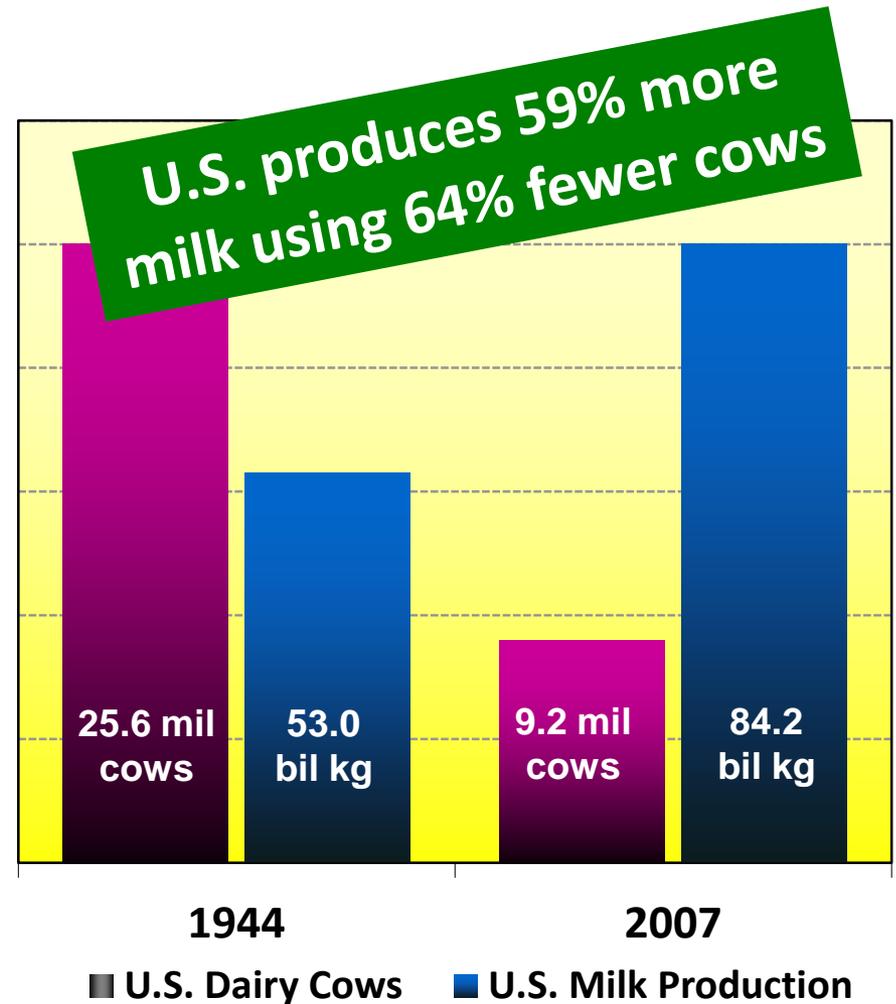
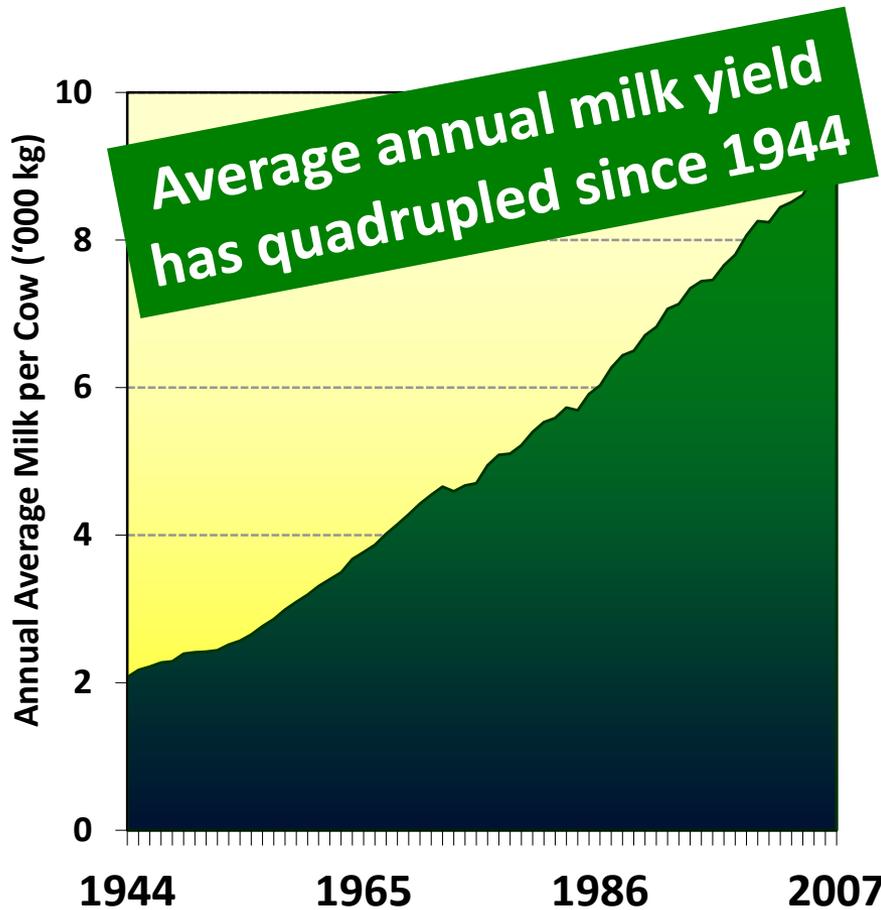


# The Dairy Industry Must be Evaluated on the Basis of Production, Not per Cow



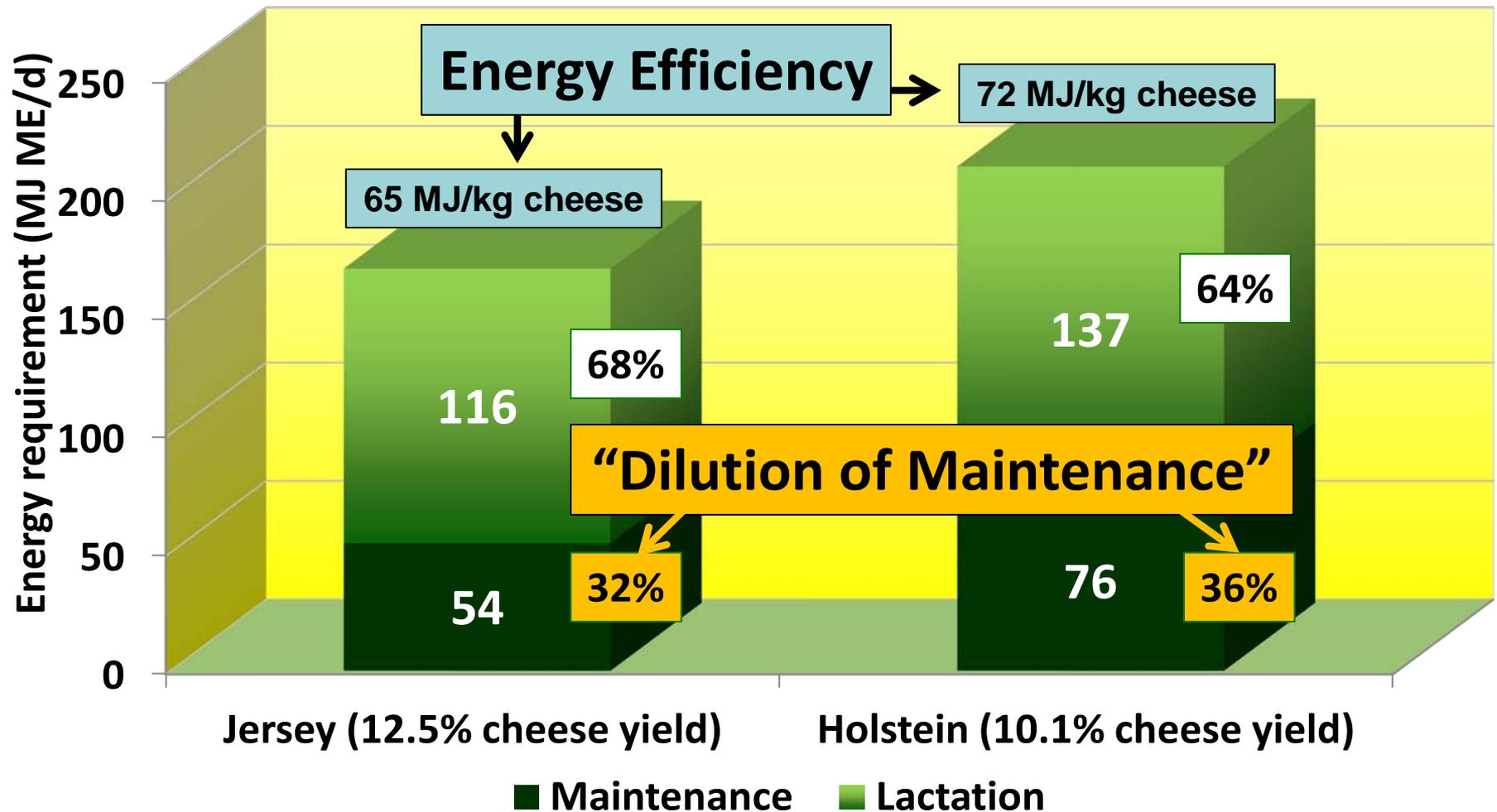
**U.S. Dairy Farms Have Reduced Total Carbon Footprint by 41% Since 1944**

# Environmental Impact Reduction due to Improved Productivity



# Reduction and Dilution of Maintenance

## Reduce Energy Use per Unit of Cheese



# Maximizing Productivity Reduces Total Maintenance Costs & Resource Use



- **Jersey cattle produce 12.5 kg cheese per 100 kg milk**
- **Reduced body mass compared to Holsteins**
- **Cheese yield and body mass interaction may reduce population maintenance**

**Source:** Created by Dr. Judith L. Capper; Capper, J. L. and R. A. Cady (2010). A Point-In-Time Comparison of the Environmental Impact of Jersey vs. Holstein Milk Production. Greenhouse Gases and Animal Agriculture Conference, Banff, Canada

# Objectives

**Quantify the environmental impact of producing cheese from Jersey or Holstein milk**



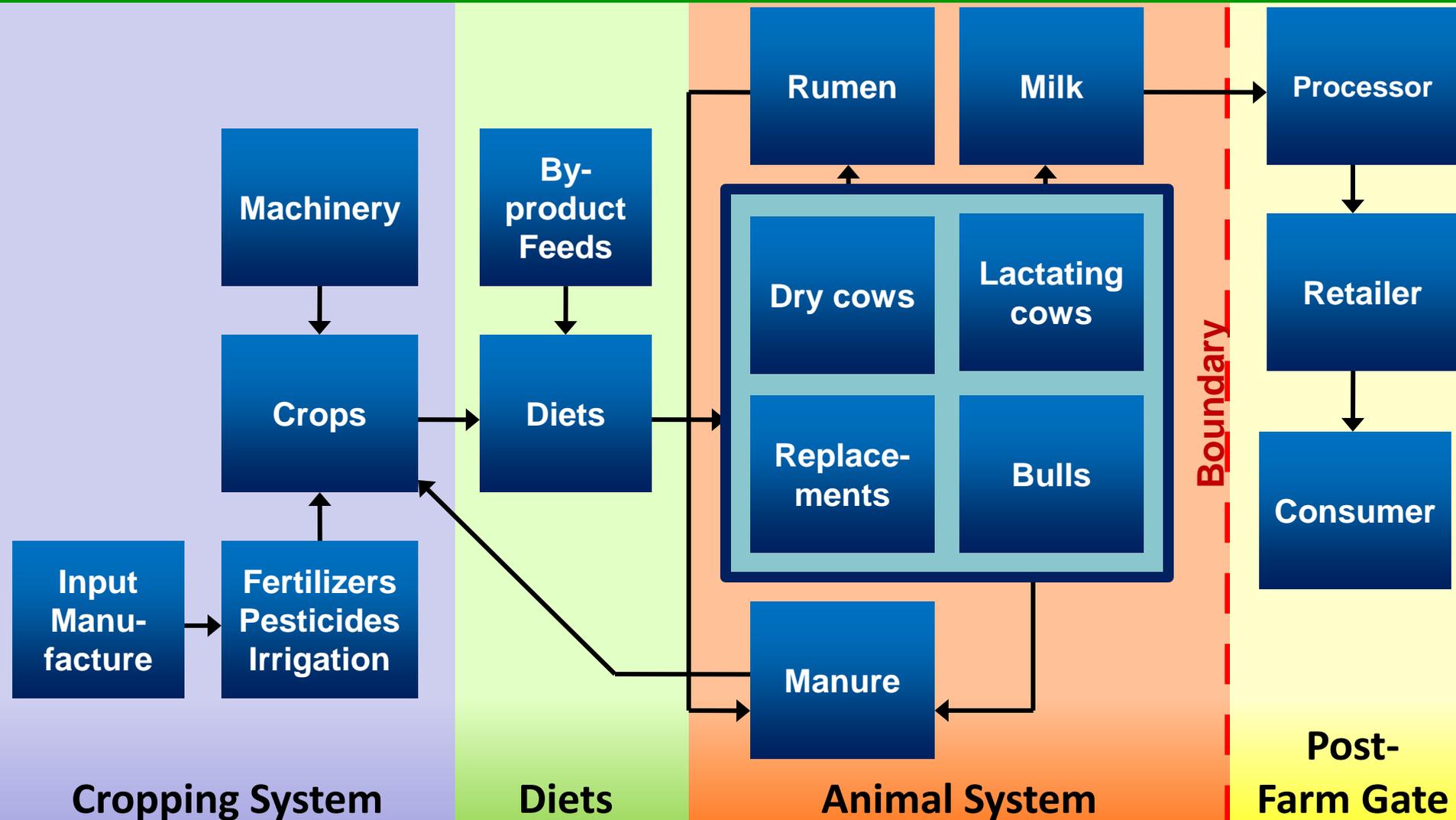
**Evaluate relative contributions of breed-specific performance characteristics to environmental impact**



# Methodology

- ✓ **Deterministic model based on animal nutrition and metabolism**
  - **Includes all animals within the dairy population**
  - **System boundaries extend from crops inputs to farm gate**
- ✓ **Life cycle assessment principles employed**
- ✓ **Functional unit: 500,000 MT cheddar cheese**
- ✓ **Commercial nutrition software (AMTS Dairy.Pro<sup>1</sup>) used to determine nutrient requirements and formulate diets**
- ✓ **Input data sourced from peer-reviewed scientific publications and government reports**
  - **DRMS DairyMetrics™ breed-specific data**
  - **USDA crop yields and production inputs**

# Summary of Model System

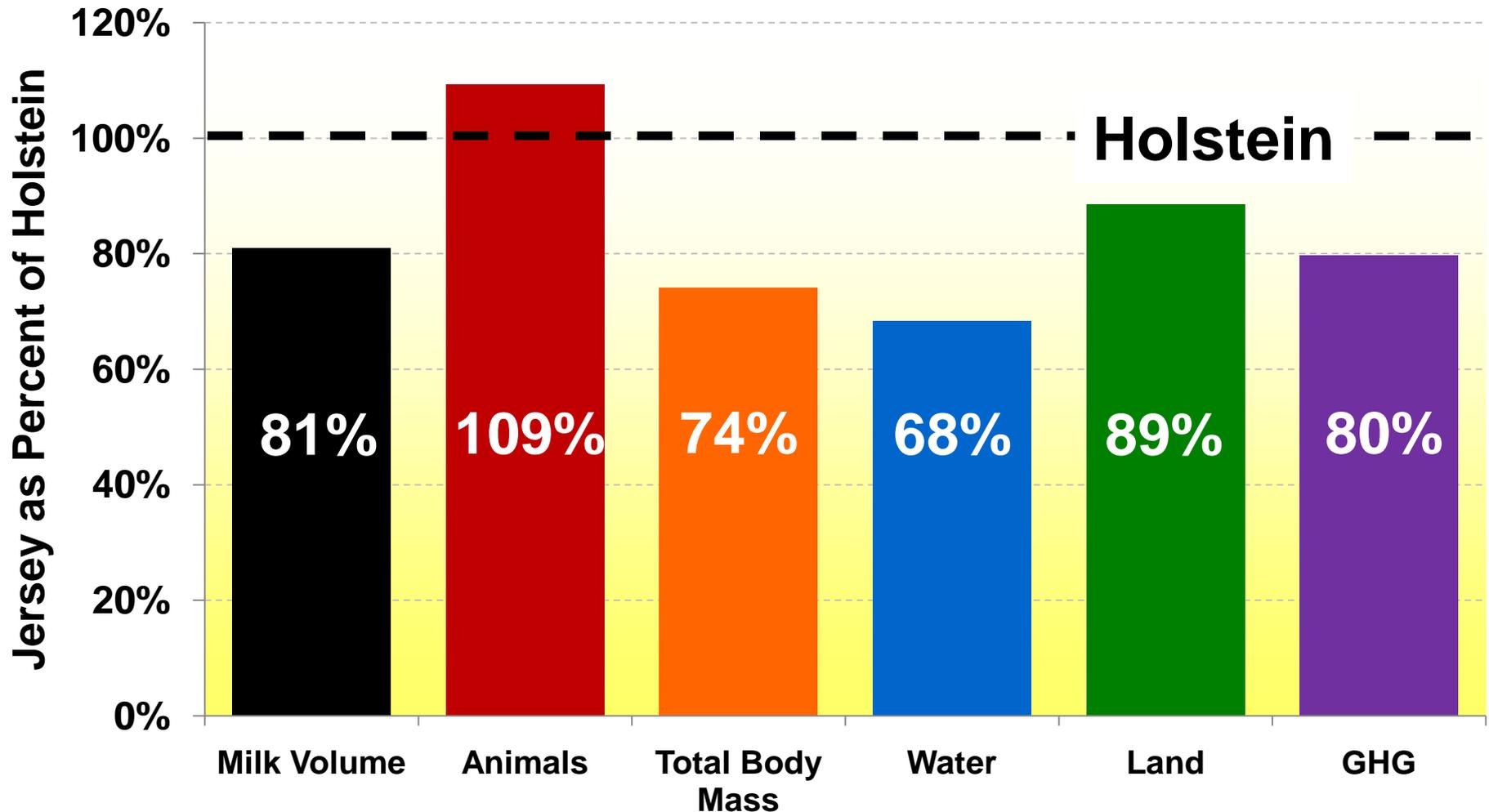


# Breed Characteristics Summary

	Holstein	Jersey
Daily Milk Yield (kg)	29.1	20.9
Fat %	3.8	4.8
Protein %	3.1	3.7
<i>Cheese Yield (kg/kg)*</i>	0.101	0.125
Calving Interval (mo)	14.1	13.7
Annual Turnover %	34.5	30.0
<i>Expected # Lactations*</i>	2.54	3.00
Age @ First Calving (mo)	26.1	25.3
<i>Heifer:Cow Ratio*</i>	0.86	0.83
Mature Cow Body Weight (kg)	680	454

\*Factors in blue are estimated as functions of data accessed  
 Source: DRMS, DairyMetrics™, [www.drms.org](http://www.drms.org), accessed Nov. 9, 2009

# Jersey vs. Holstein: Comparison of Resource Use and Environmental Impact



# Resource and GHG Savings per 500,000 MT Cheddar Cheese: Jersey Breed Advantage

✓ **974 km<sup>2</sup> Land**

- *10x bigger than Hamilton, New Zealand*

✓ **251,972 million liters of Water**

- *Supply 749,711 Hamilton households/yr*

✓ **546 million MJ of Energy**

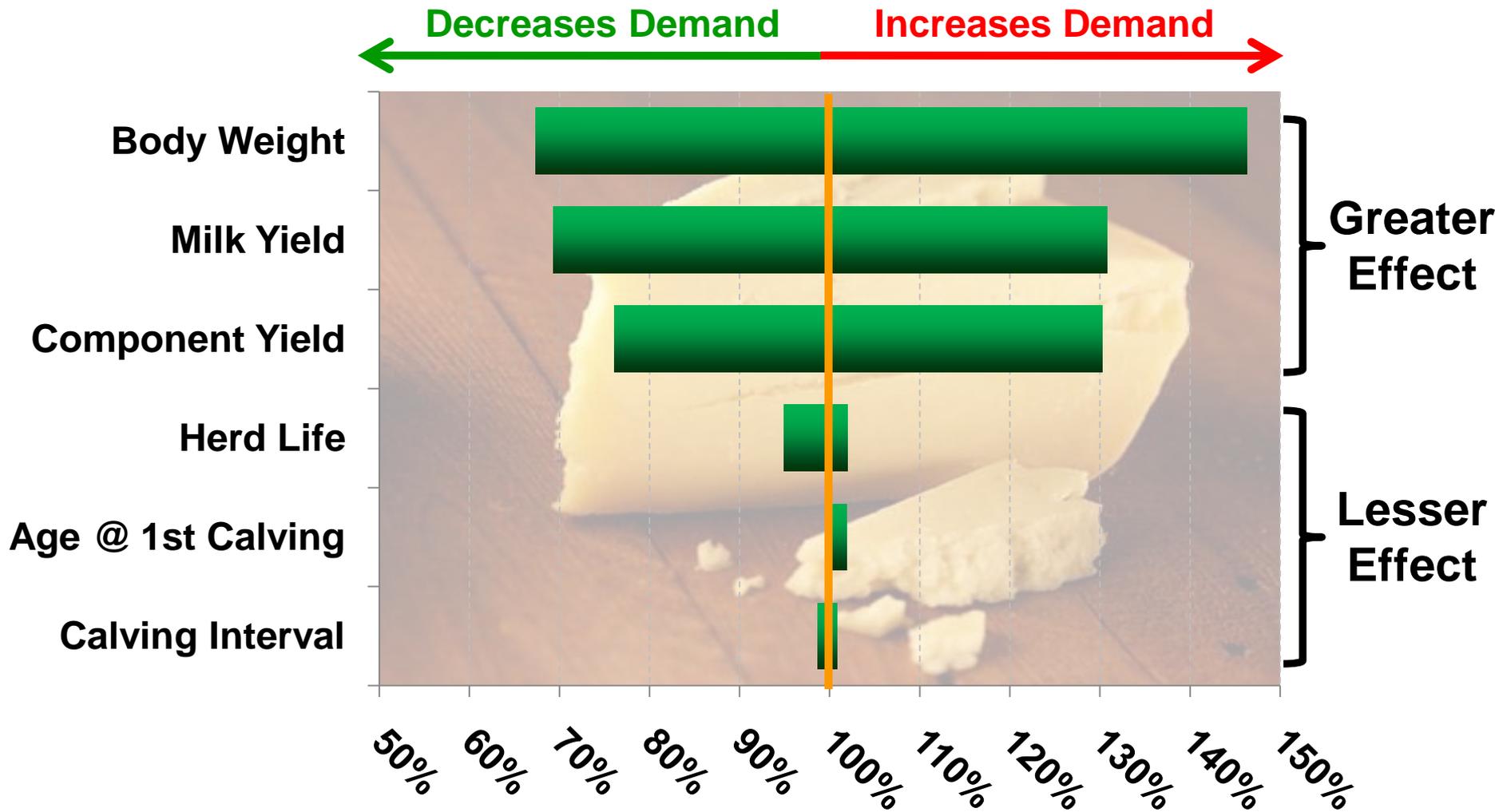
- *Power 14,109 Hamilton households/yr*

✓ **1.71 million MT of CO<sub>2</sub>**

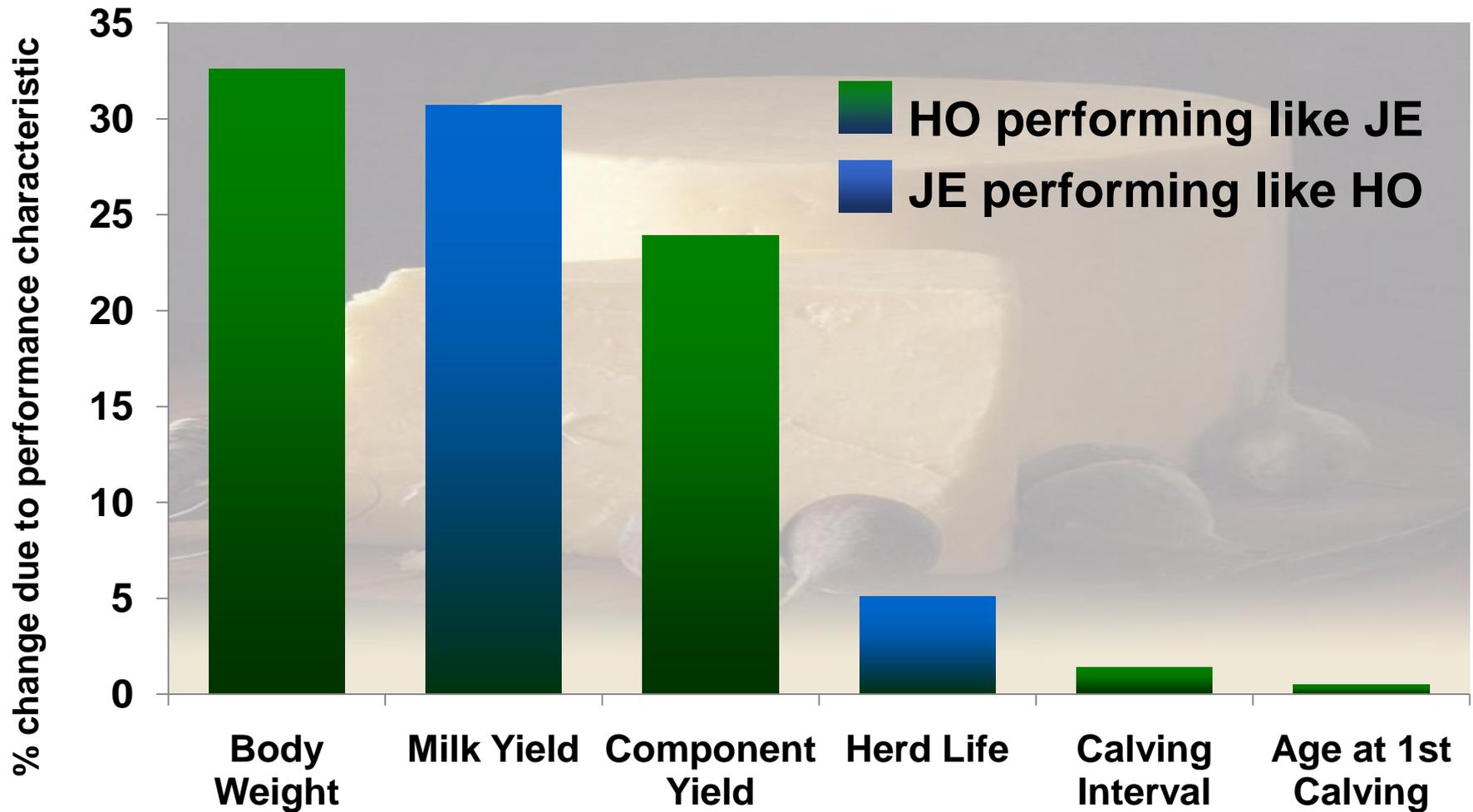
- *Equivalent to taking 336,888 cars off the road for a year*



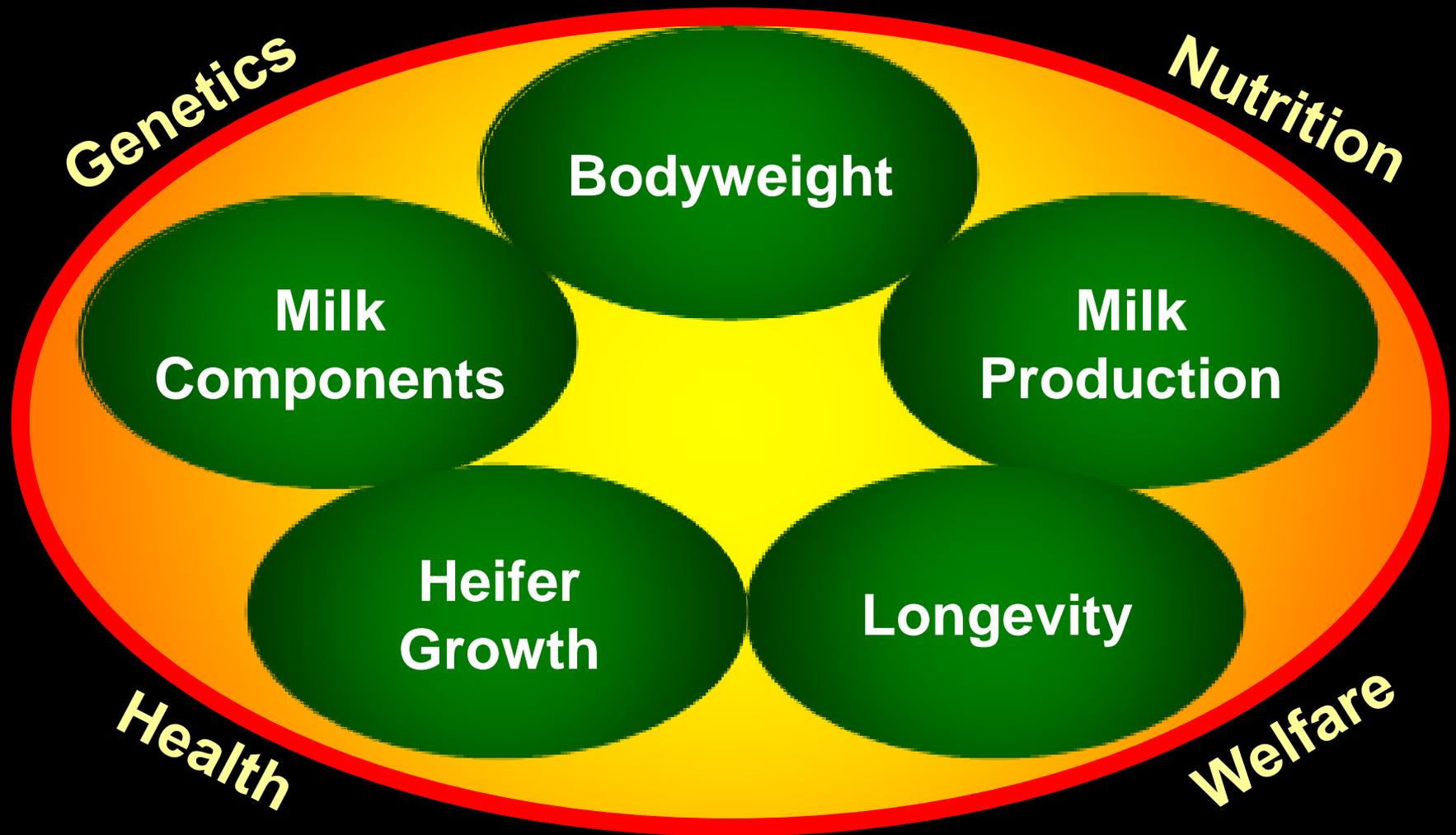
# Relative Impact of Performance Characteristics on Water Use for Cheddar Cheese Production



# Breed Effect of Performance Characteristics on Water Use for Cheddar Cheese Production

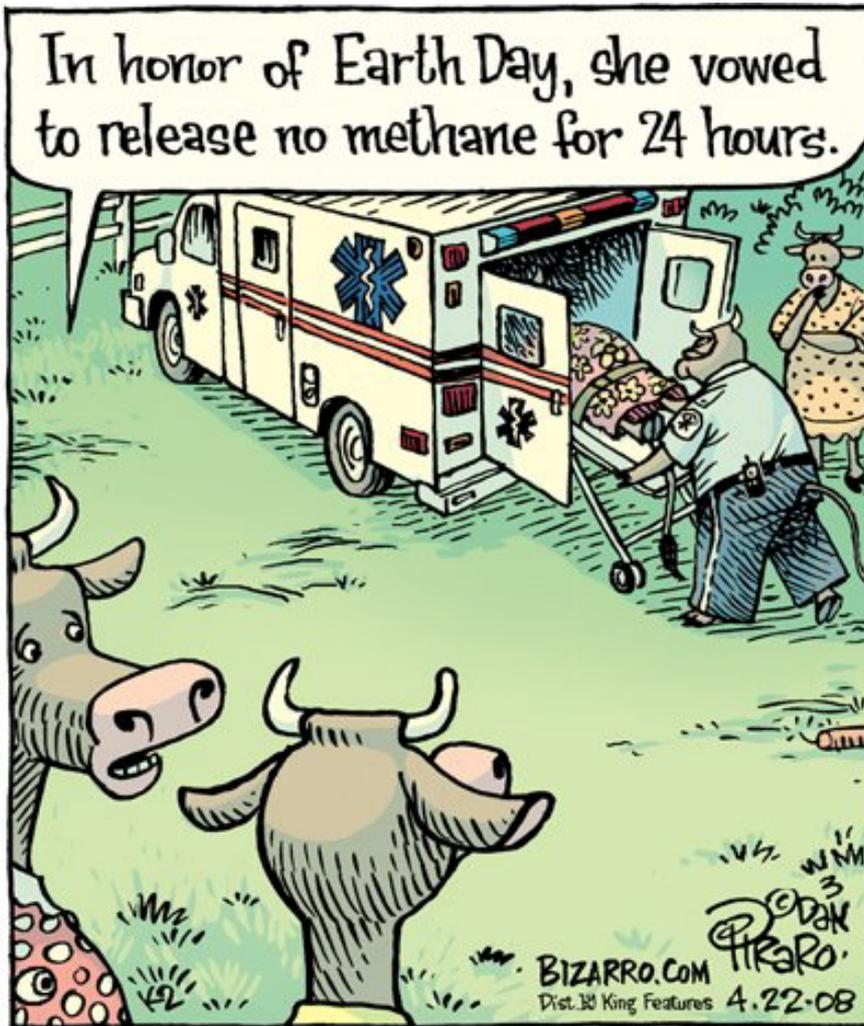


# Selection Characteristics to Maintain and Improve Sustainability



# Conclusions

- Using Jersey milk for cheese production saves resources and reduces the carbon footprint compared to Holstein milk
- *Improving productivity* dilutes population maintenance cost (resource use) over more units of production
- *Reducing body mass* reduces population maintenance
- *Increasing milk components* means more units of cheese are produced from a set amount of milk
- Future Jersey selection goals should focus on improving productivity while maintaining bodyweight and milk component advantages



**Thank  
you!**

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Source: 2008 <http://snipurl.com/methanecartoon>, Last accessed May 7, 2010

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Major Funding by  
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Source: Created by Dr. Judith L. Capper, Washington State University, 2011