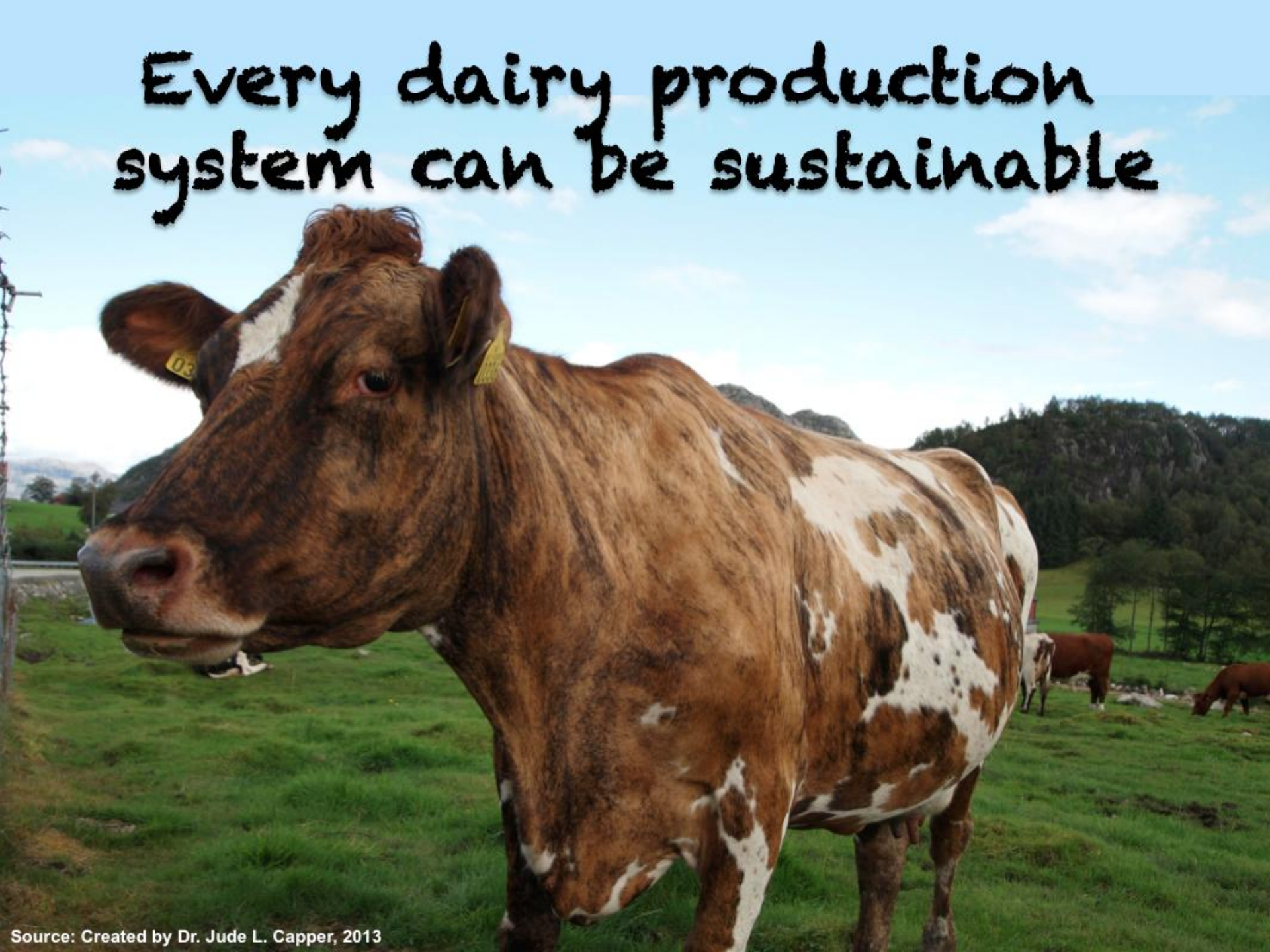
Source: Created by Dr. Jude L. Capper, 2012

Environmental Impact of Animal Agriculture

Jude L. Capper, PhD

NRC Considerations for the Future of Animal Science Research Second Committee Meeting, Washington, DC May 13th 2014

Every dairy production system can be sustainable



Source: Created by Dr. Jude L. Capper, 2013

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Every beef production system
can be sustainable
Source: Created by Dr. Jude L. Capper, 2012


Every beef production system can be sustainable
Source: Created by Dr. Jude L. Capper, 2012
Jude Capper, 2012

Source: Created by Dr. Jude L. Capper, 2013

Source: Created by Dr. Jude L. Capper, 2013. Photo from: http://pork.ucdavis.edu/ImageGallery/External/USPCEGeneral/piglets%20eating.JPG

Activist Groups are Using Consumer-Friendly Metrics to Push Agendas

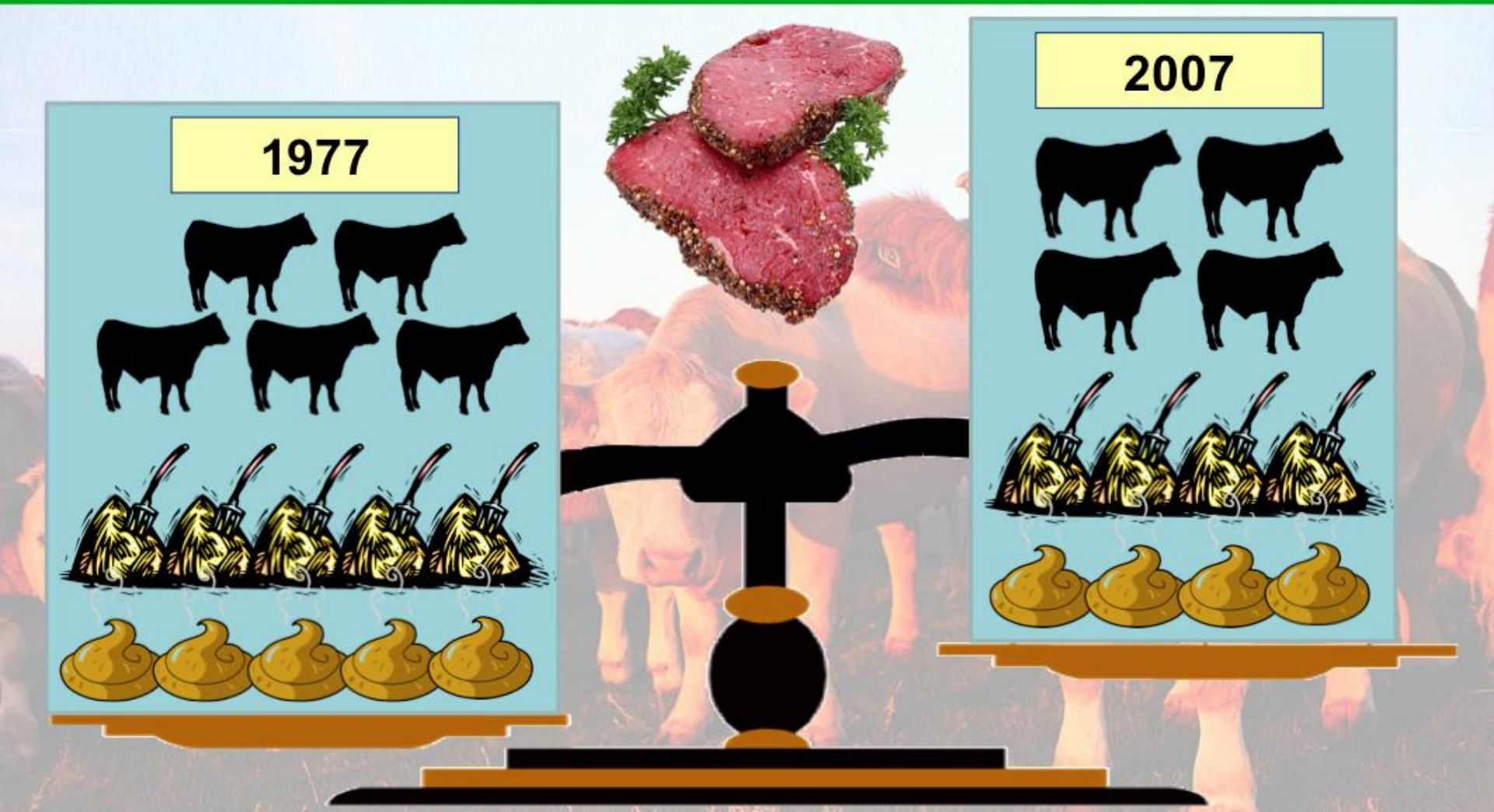
Source: Created by Dr. Jude L. Capper, 2012; Photo from: http://www.peta.org/b/thepetafiles/archive/2011/03/22/splish-splash-peta-s-takin-a-bath.aspx

Animal Agriculture Contributes a Small Proportion of the US Carbon Footprint

According to the US EPA (2012), meat production accounts for 2.1% of total greenhouse gas emissions.

Source: Created by Dr. Jude L. Capper, 2012; information from US EPA (2012) "Inventory of US Greenhouse Gas and Sinks 1990-2010."

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



Source: Created by Dr. Jude L. Capper, 2012; Data from: Capper, J. L. (2011). The environmental impact of U.S. beef production: 1977 compared with 2007. *J. Anim. Sci.*

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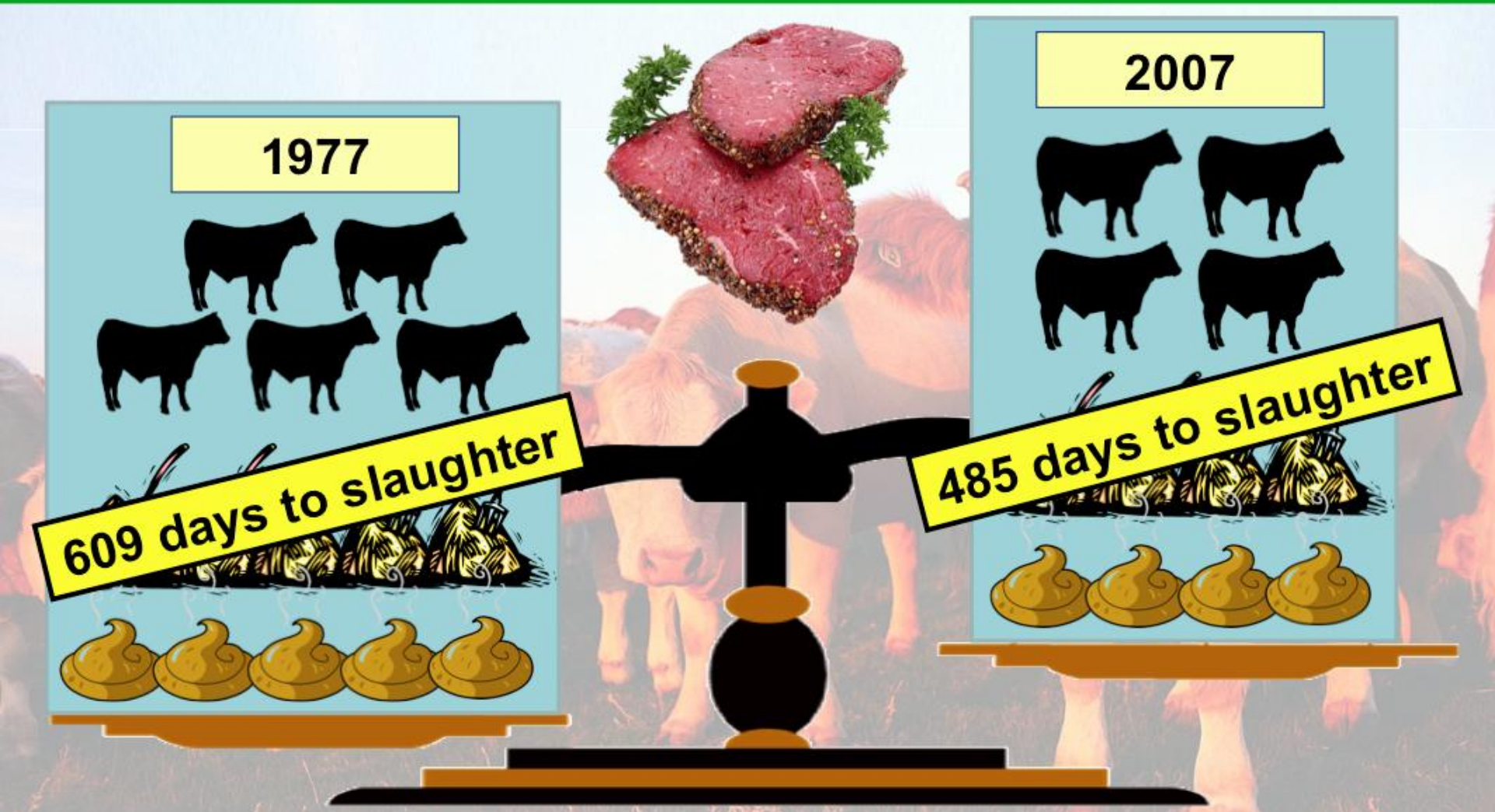

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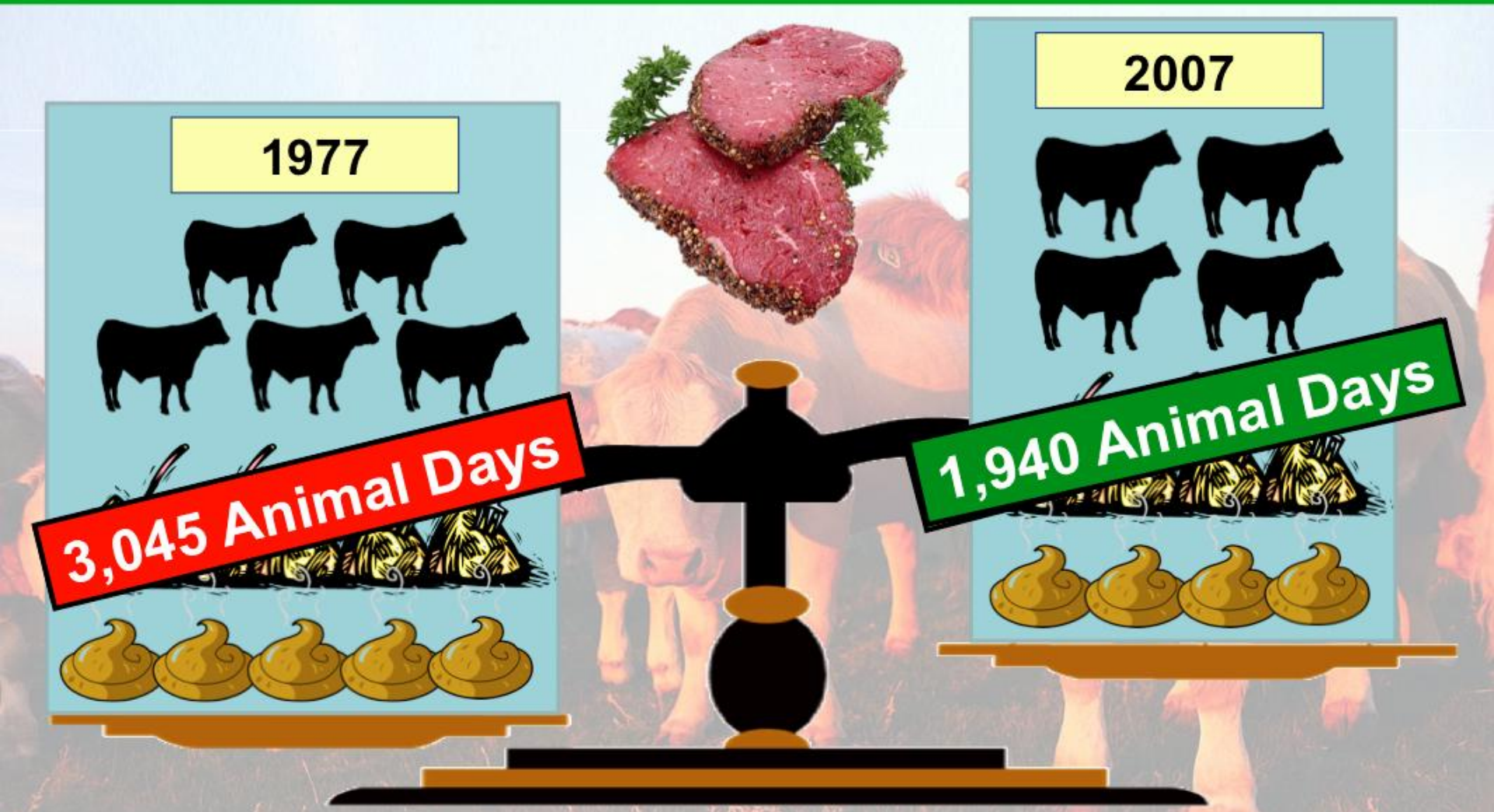
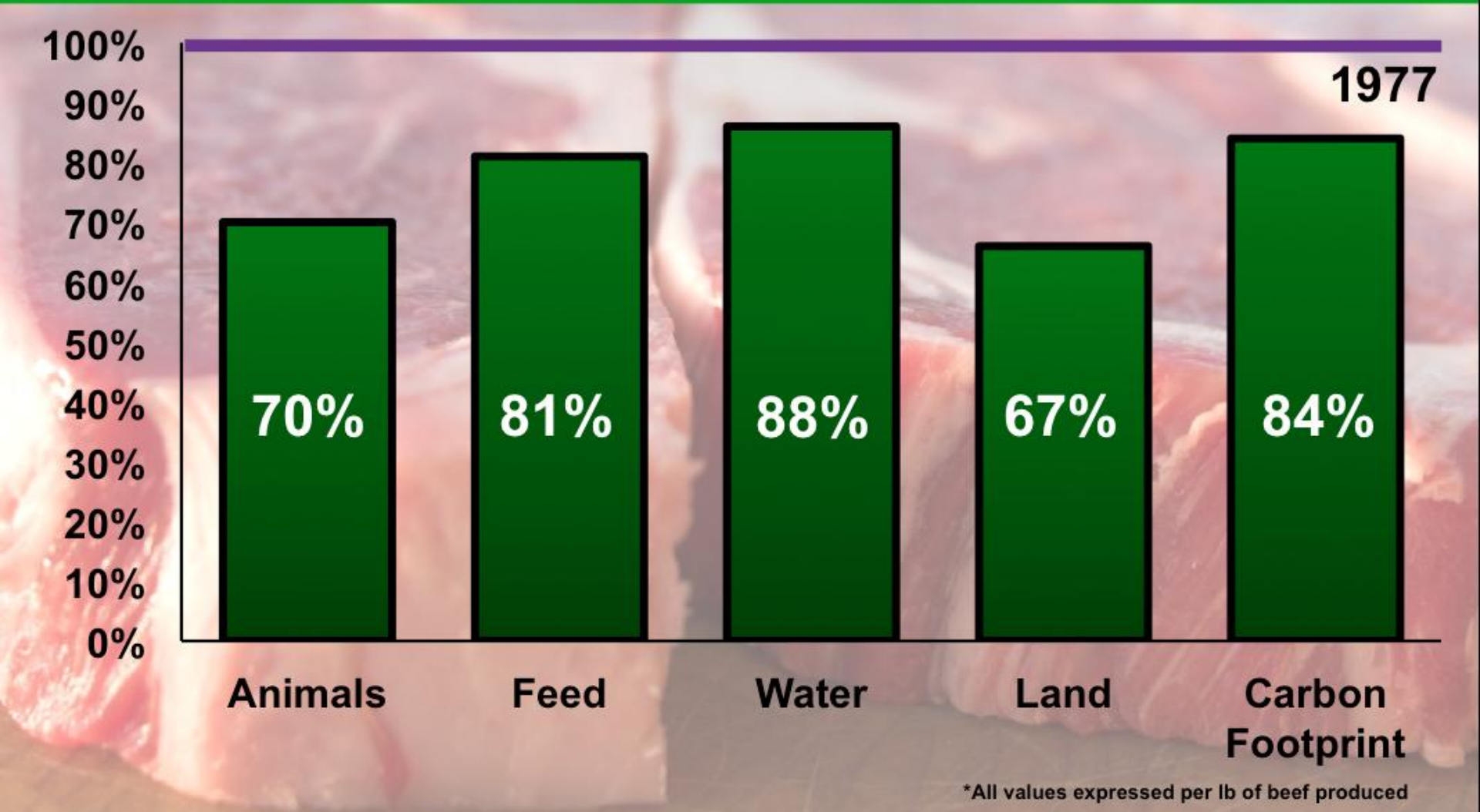


Source: Created by Dr. Jude L. Capper, 2012; Data from: Capper, J. L. (2011). The environmental impact of U.S. beef production: 1977 compared with 2007. *J. Anim. Sci.*

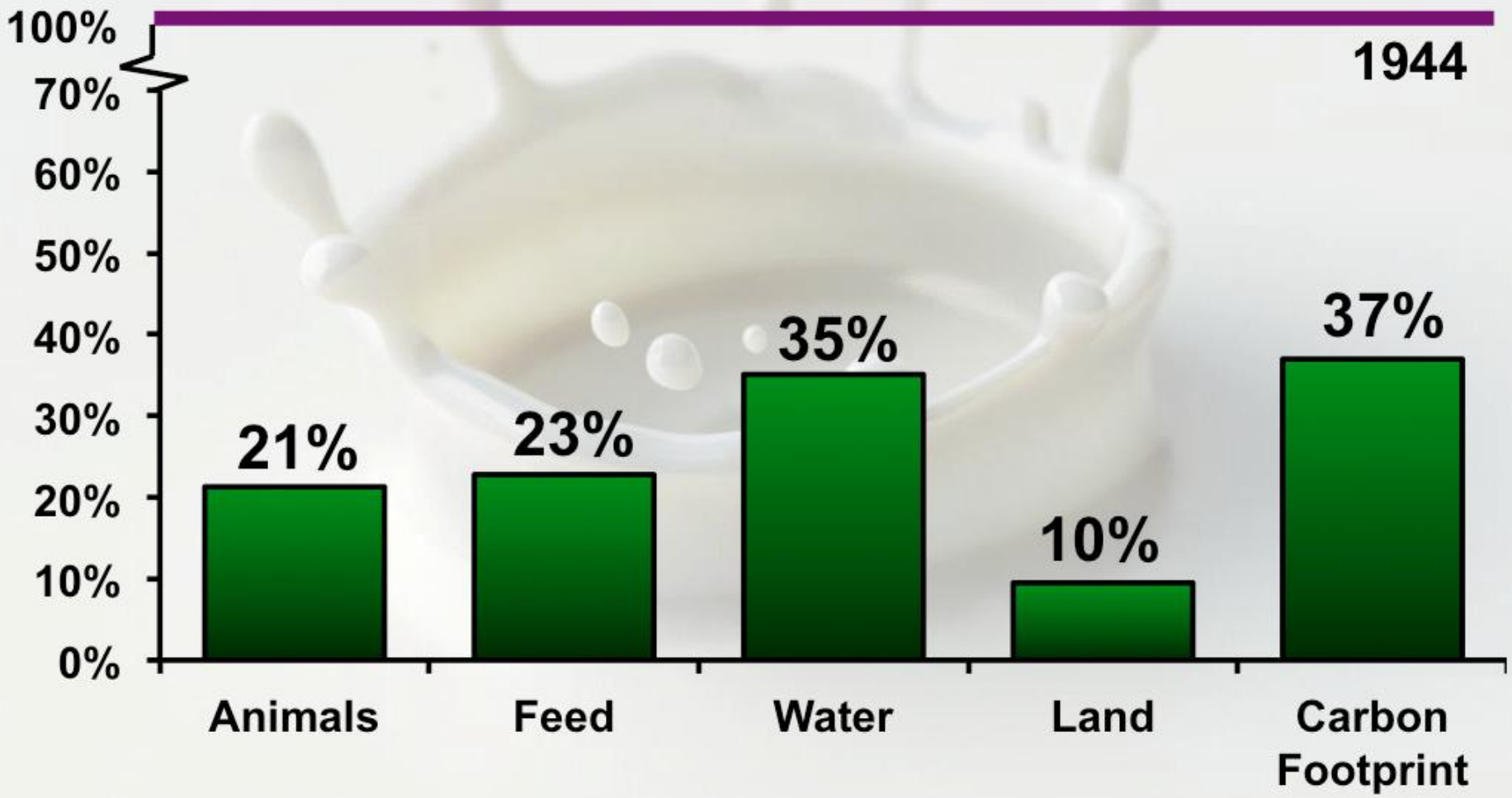
Environmental Impact of U.S. Beef Production has been Reduced by Improved Productivity



*All values expressed per lb of beef produced

Source: Created by Dr. Jude L. Capper, 2012; Data from: Capper, J. L. (2011). The environmental impact of U.S. beef production: 1977 compared with 2007. *J. Anim Sci*

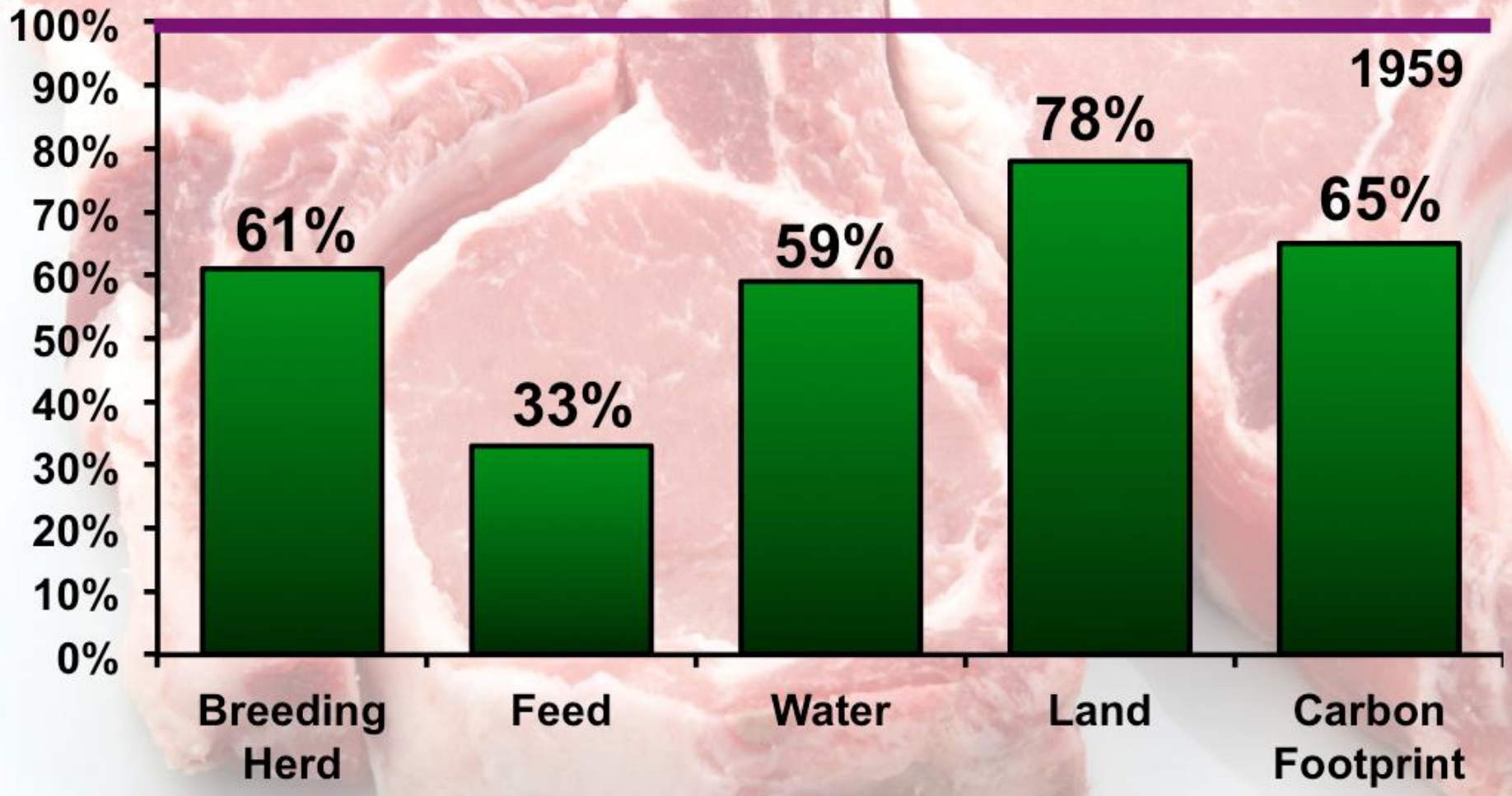
Modern US Milk Production Has Considerably Lower Resource Use and Carbon Emissions



*All values expressed per gal of milk produced at the farm gate

Source: Created by Jude L. Capper, 2012; Data from Capper et al. (2009) The environmental impact of dairy production: 1944 compared with 2007. *J. Anim. Sci.*

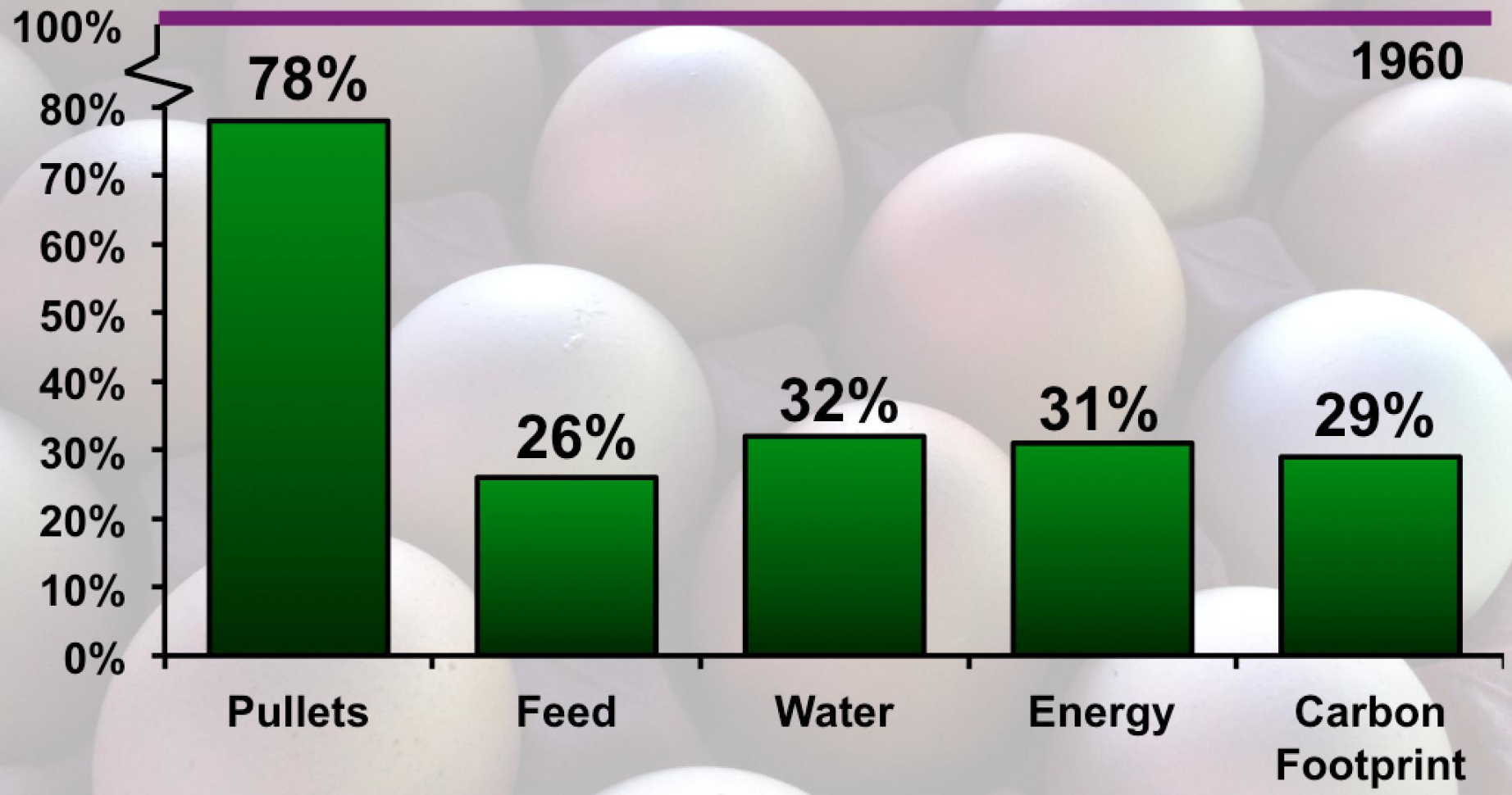
The U.S. Swine Industry Has Reduced its Environmental Impact Since 1959



*All values expressed per gal of hot dressed carcass weight poultry produced

Source: Created by Jude L. Capper, 2012; Data from Cady et al. (2013) A 50-year comparison of the environmental impact and resource use of the US swine herd: 1959 vs. 2009. ADSA-ASAS Annual Meeting, 2013, Indianapolis, IN

U.S. Egg Industry Uses Fewer Resources and Emits Less GHG than in 1960



*All values expressed per kg of eggs produced

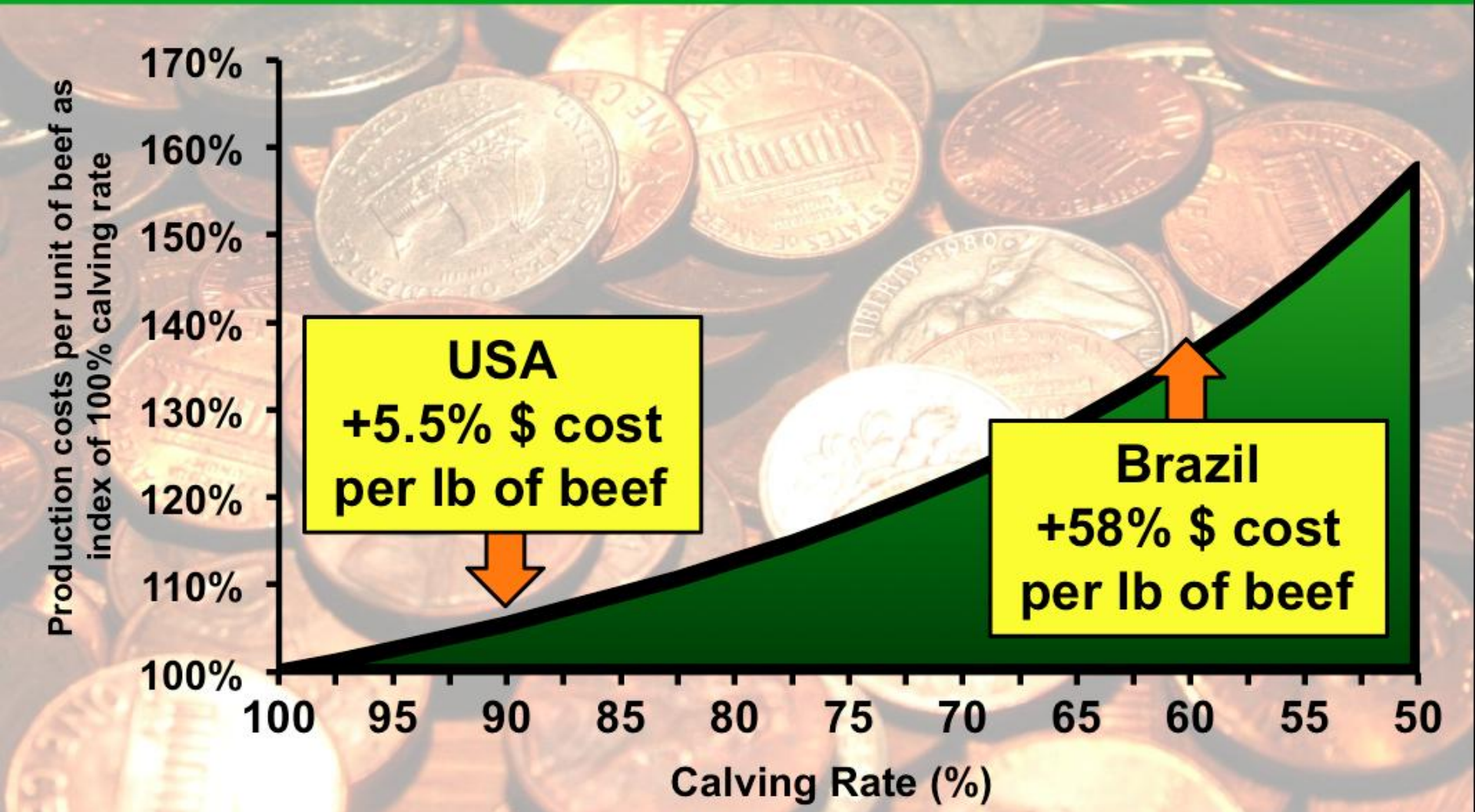
Source: Created by Dr. Jude L. Capper, 2014; Data from Xin, H. et al. (2013) A Comparative Assessment of the Environmental Footprint of the U.S. Egg Industry in 1960 and 2010. Egg Industry Center, Iowa State University, Ames, IA.

Output per Unit Bodyweight May Be the Most Important Efficiency Metric

Herd bodyweight dictates resource use: improving output per unit bodyweight improves economics…and environmental impact

Source: Created by Dr. Jude L. Capper, 2013.

Ranchers' Biggest Influence on Economic Sustainability May Be Through Calving Rate



Source: Created by Dr. Jude L. Capper, 2013. Data from Capper, J. L. 2013. The environmental and economic impact of calving rate within U.S. beef production. ADSA-ASAS Annual Meeting, 2013, Indianapolis, IN

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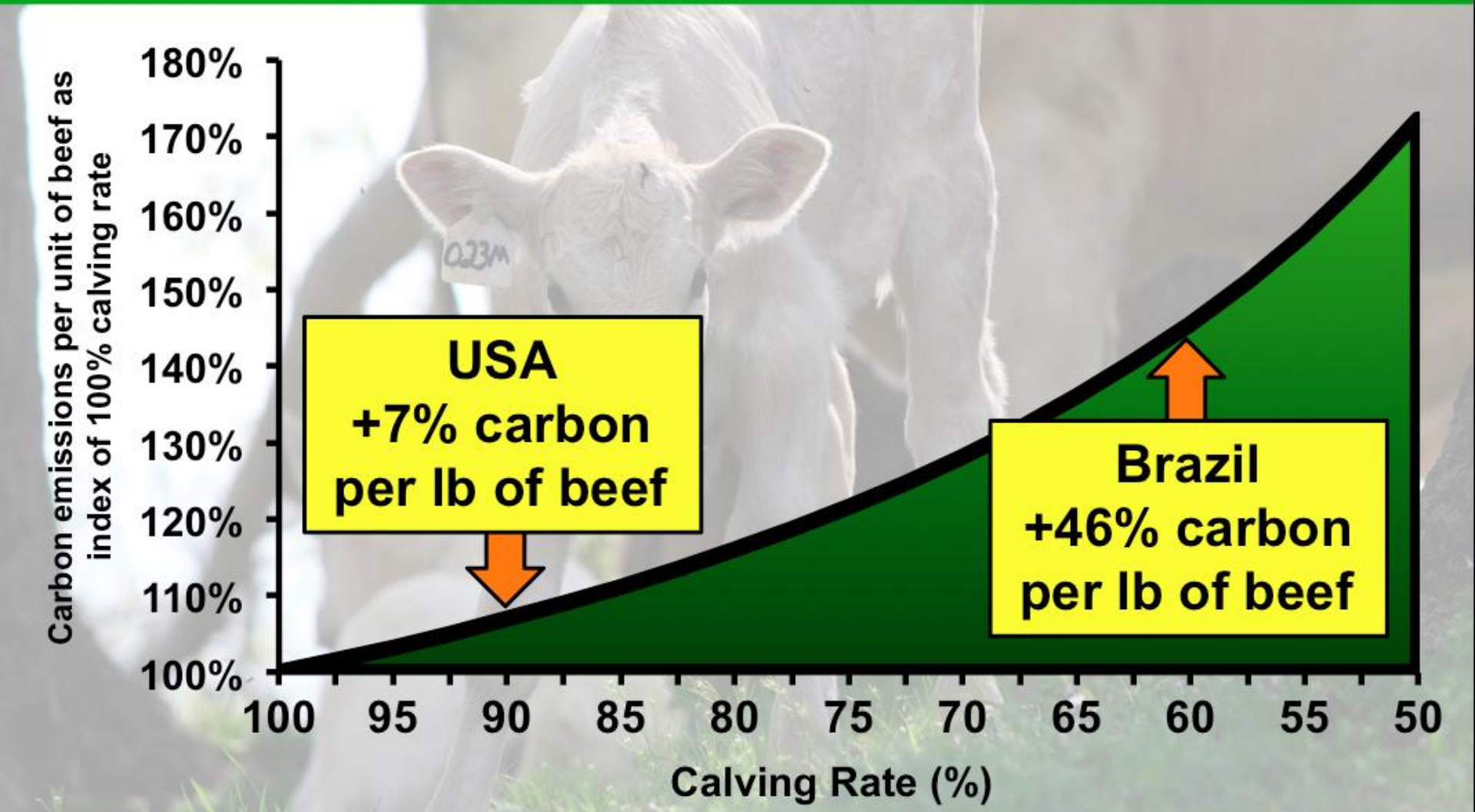


Source: Created by Dr. Jude L. Capper, 2013. Data from Capper, J. L. 2013. The environmental and economic impact of calving rate within U.S. beef production. ADSA-ASAS Annual Meeting, 2013, Indianapolis, IN

Ranchers' Biggest Influence on Environmental Sustainability May Be Through Calving Rate

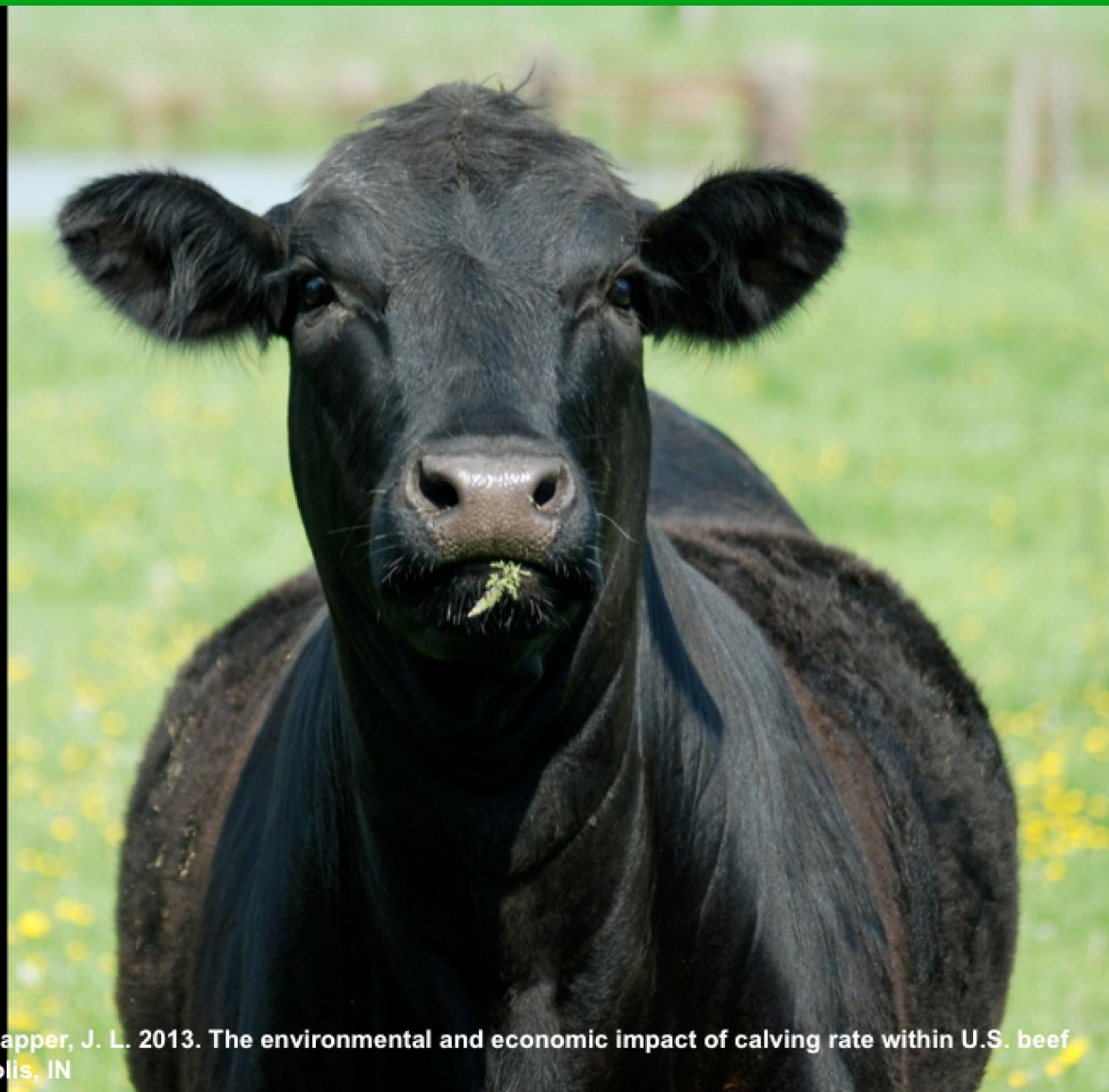
US calving rate of 90%

=

6.7% more cattle

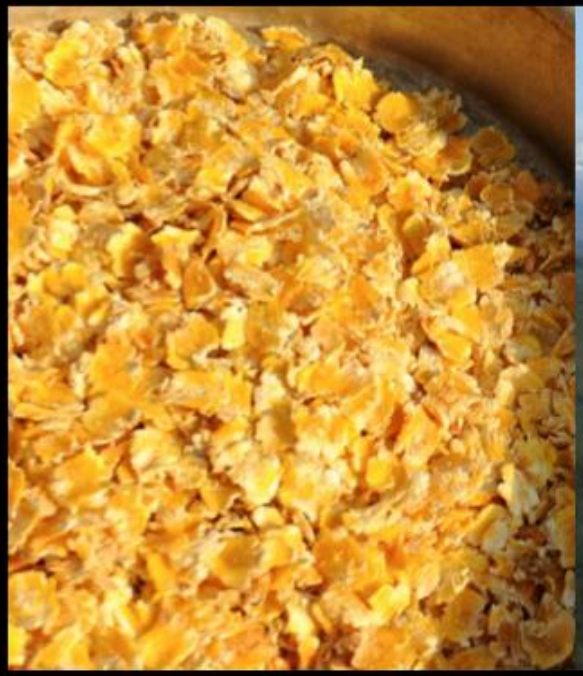
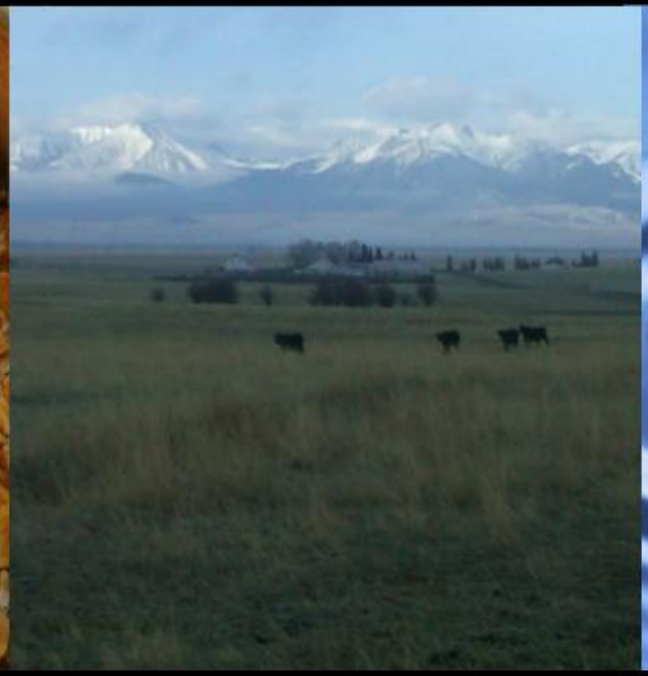
8.1% more land

5.2% more water per lb of beef



Source: Created by Dr. Jude L. Capper, 2013. Data from Capper, J. L. 2013. The environmental and economic impact of calving rate within U.S. beef production. ADSA-ASAS Annual Meeting, 2013, Indianapolis, IN

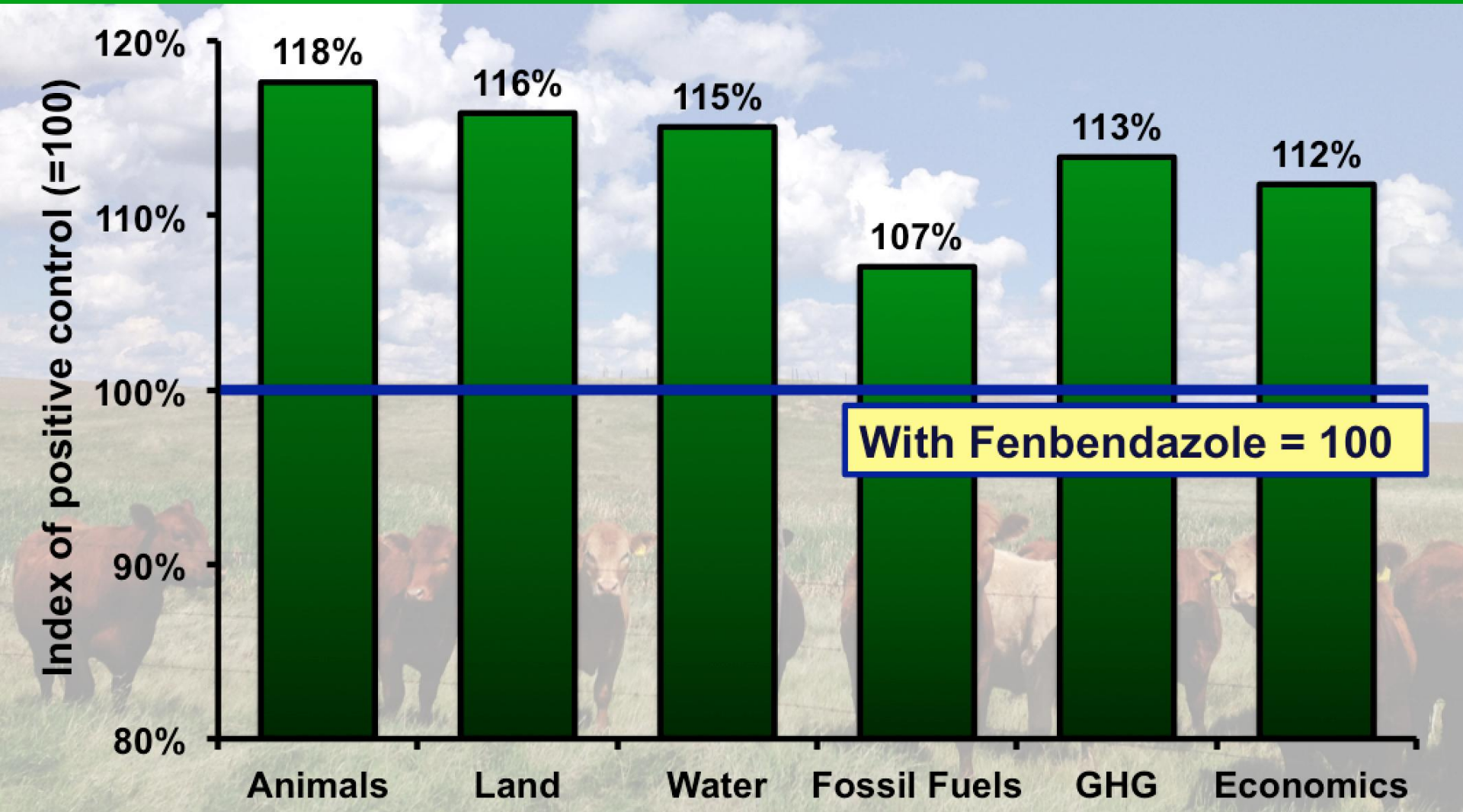
Growth-Enhancing Technologies Reduce Beef's Environmental Impact by 10.7%

Feed	Land	Water
		
4.2 Tons	**1.0 Acres**	**22,722 Gal.**

Resources Saved per 800 lb Carcass

Created by Dr. Jude L. Capper, 2012. Based on whole-system analysis of effects of technology use on resource use and carbon emissions in four beef production systems; with technology adoption at 100% wherever used savings compared to a system without implants or beta-agonist use

Withdrawing Effective Parasite Control Increases Economic and Environmental Impact



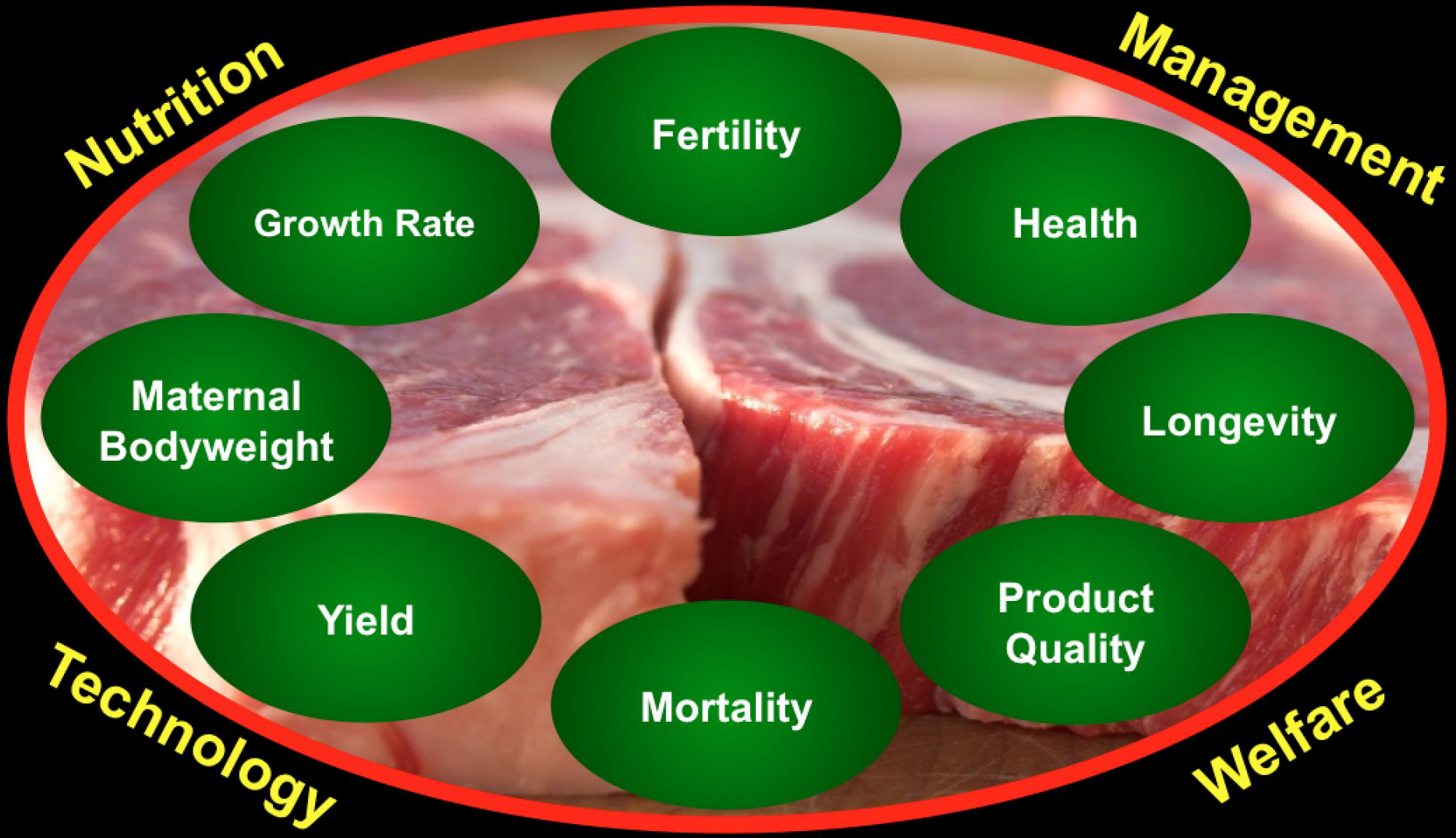
Source: Created by Dr. Jude L. Capper, 2013. Data from Capper, J. L. 2013. The environmental and economic sustainability impact of withdrawing parasite control (Fenbendazole) from traditional U.S. beef production systems. ADSA/ASAS Annual Meeting, 2013, Indianapolis, IN.

Effective Parasite Control Has a Positive Impact on Social Sustainability

Extra Beef Produced Via Effective Parasite Control in a 35-Cow Herd Supplies 19 Families With Their Annual Beef Demand

Source: Created by Dr. Jude L. Capper, 2013

Animal Characteristics to Maintain and Improve System Sustainability



Source: Created by Dr. Jude L. Capper, 2014

Where are the Linkages and Trade-Offs With Consumer Demands?


Biodiverse


Welfare-Friendly


Non-Competitive

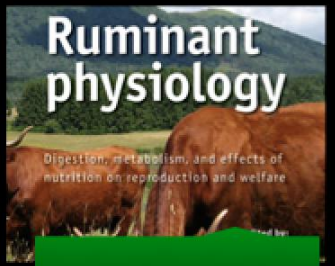
Local


Seasonal


Nutritious


Traditional


Affordable



Knowledgeable


Ethical


Safe

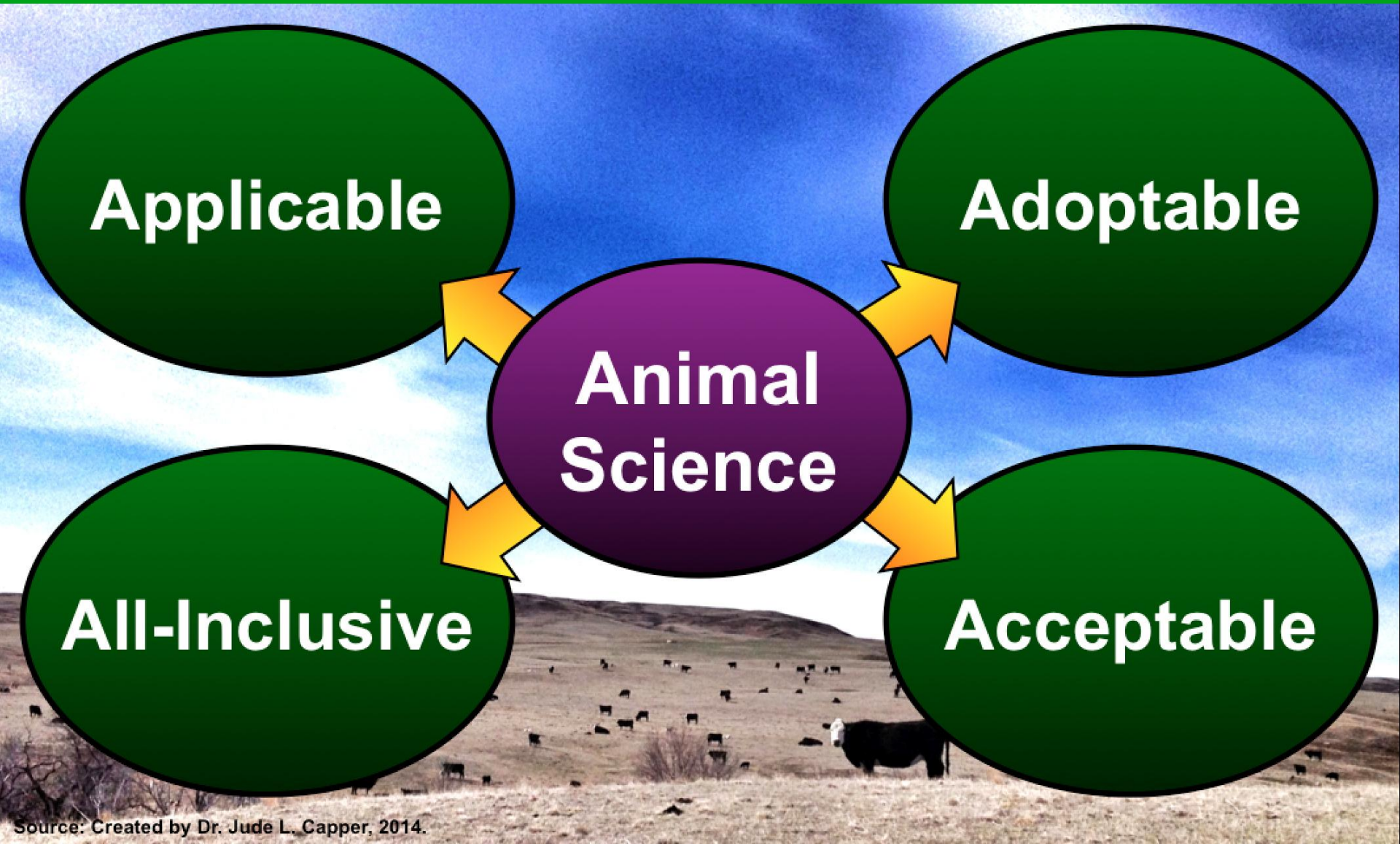

Transparent


Communicative


Regulated

Source: Created by Dr. Jude L. Capper, 2012; Adapted from Kloppenburg et al. (2000) "Tasting food, tasting sustainability: Defining the attributes of an alternative food system with competent, ordinary people" *Hum. Organ.*

Future Research Priorities Should Ensure Systems and Management Practices Are…



Source: Created by Dr. Jude L. Capper, 2014.

Thank you!

jude.capper@montana.edu

@bovidiva

www.bovidiva.com

http://wsu.academia.edu/JudeCapper/talks

Source: Created by Dr. Jude L. Capper, 2012; Carton from: http://snipurl.com/methanecartoon