"Feeding 9 billion people by 2050"

55% increase in global demand for meat

"Environmentally sound, socially responsible & economically viable"

Role of Sustainable Beef

John A. Basarab, P.Ag., Ph.D.

Global Challenge

23-24 January, Calgary, Alberta, Canada

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

Global Roundtable on Sustainable Beef Production

"Environmentally sound, socially responsible & economically viable"

People

Food

Animal

Progress

In 2016, McDonald's started to source "sustainable beef"

http://crsb.ca/

~56 member companies and organizations:

A&W, Costco, Loblaw, Tim Hortons, Walmart Sobeys, Metro

World Wildlife Foundation, Ducks Unlimited, World Animal Protection

Significance of the Greenhouse Effect

Without the "Greenhouse Effect" the average temperature at the earth's surface would be 33 ^{0}C colder.

However, the effects of man-made emissions largely from the burning of fossil fuels has increased the potential to warm above and beyond natural processes.

Bloomberg (Apr 9, 2014): Cars Become Biggest Driver of GHG Increases
United Nations say 71 percent increase since 2010 levels

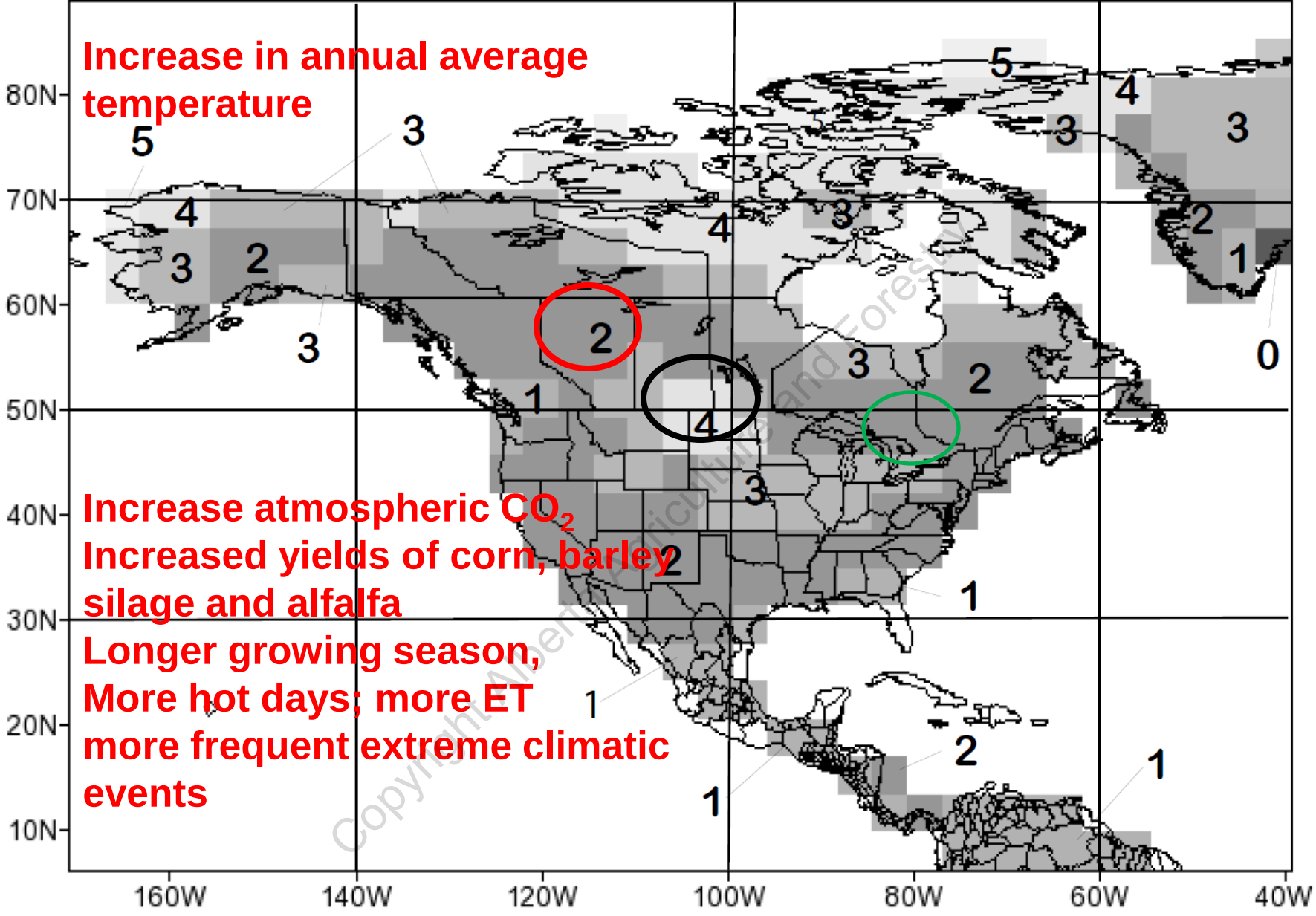


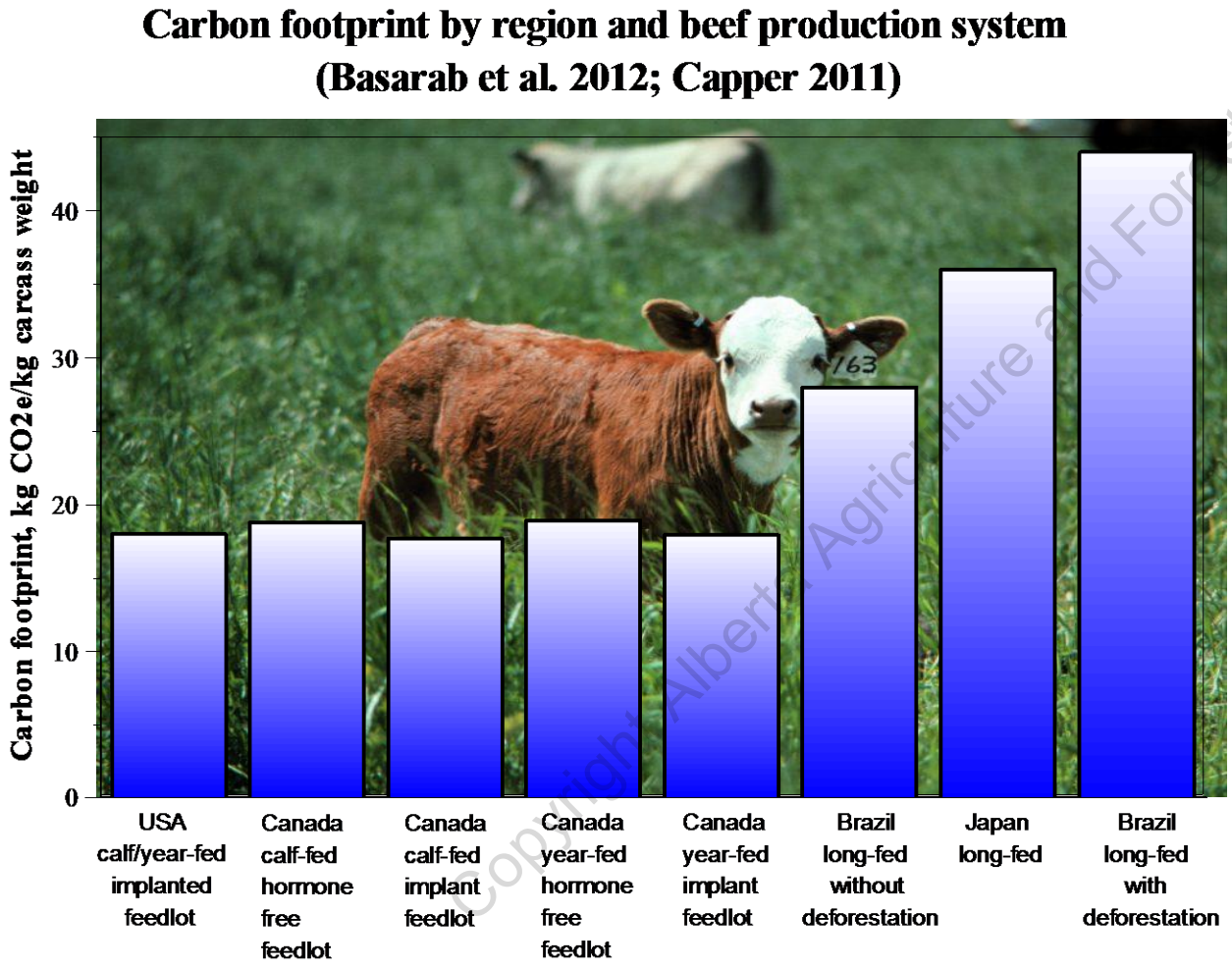
Figure 6.12 Average annual temperature change due to the greenhouse effect as determined by Canadian Climate Impact Senerios considering a high greenhouse gas emission rate. Numbers indicate average annual differences in temperature (°C) between 2000 and 2050.
http://www.cics.uvic.ca/scenarios/index.cgi

Livestock are a producer of man-made Greenhouse Gases (GHG) through the belching of methane from cattle, sheep and goats. Methane is 25 times more powerful as a GHG than CO_2.

Environmental Sustainability

- **Global livestock production is 14.5% of global man-made GHG**
- **Global beef production is 5.95% of global man-made GHG**
- **Canada's beef production is 0.072% of global man-made GHG,**
- **Canada's beef production is 3.6% of Canada's man-made GHG and while lands that grow grasses and legumes for cattle sequester carbon**
- **2-3 billion t of carbon in grasslands in weatern Canada; wetland even more**
- **Carbon stored under 1 ha = removing 150 cars from the earth**

Production Efficiency 1977-2007



Same amount of beef now required:

70% of the animals,

81% of the feed,

88% of the water,

67% of the land,

resulting in a 16% Decrease in the carbon footprint of beef

(Capper 2011, Animal Frontiers).

Disruptive Technologies – transform life, business and the global economy

(McKinsey Global Institute May 2013)

Mobile internet
Automation of knowledge work
Internet of things
Cloud technology
Advanced robotics
Autonomous vehicles
Next-generation genomics
Energy storage
3D printing
Advanced materials
Advanced oil and gas exploration
Renewable energy

$2.7B, 13 years

Cost and duration of Human Genome project, completed 2003.

$15M, 3 years

Cost and duration of Bovine Genome project, completed in 2009.

$10,000, months

Cost and duration of CCGP, completed in 2014 .

$1000, days

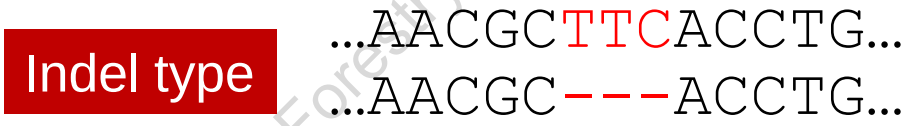
Cost and duration of sequencing, 2016.

Whole Genome Sequencing

- **320 most influential bulls**

Breeds	#SNPs	#Indels
Simmental	12,672,406	1,059,886
Limousin	13,296,742	1,198,388
Hereford	13,015,145	1,444,096
Angus	12,763,641	1,435,562
Charolais	16,447,566	1,571,901
Gelbvieh	14,864,027	1,620,727
Beef Booster	16,202,960	1,688,228
Alberta composite	16,406,640	1,704,254
Guelph composite	15,309,424	1,545,929

Indel type



35 million variants identified

80% previously unknown.

1000 Bull Genomes Project

4800 HD and 5600 50K genotypes

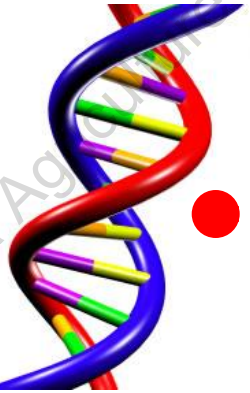
Sequencing lead: Paul Stothard

CANADIAN CATTLE GENOME PROJECT

Uses and potential value of genomic information in cattle production

"who's your grand daddy"
Breed composition
Mate matching

"who's your daddy"
Parentage assignment



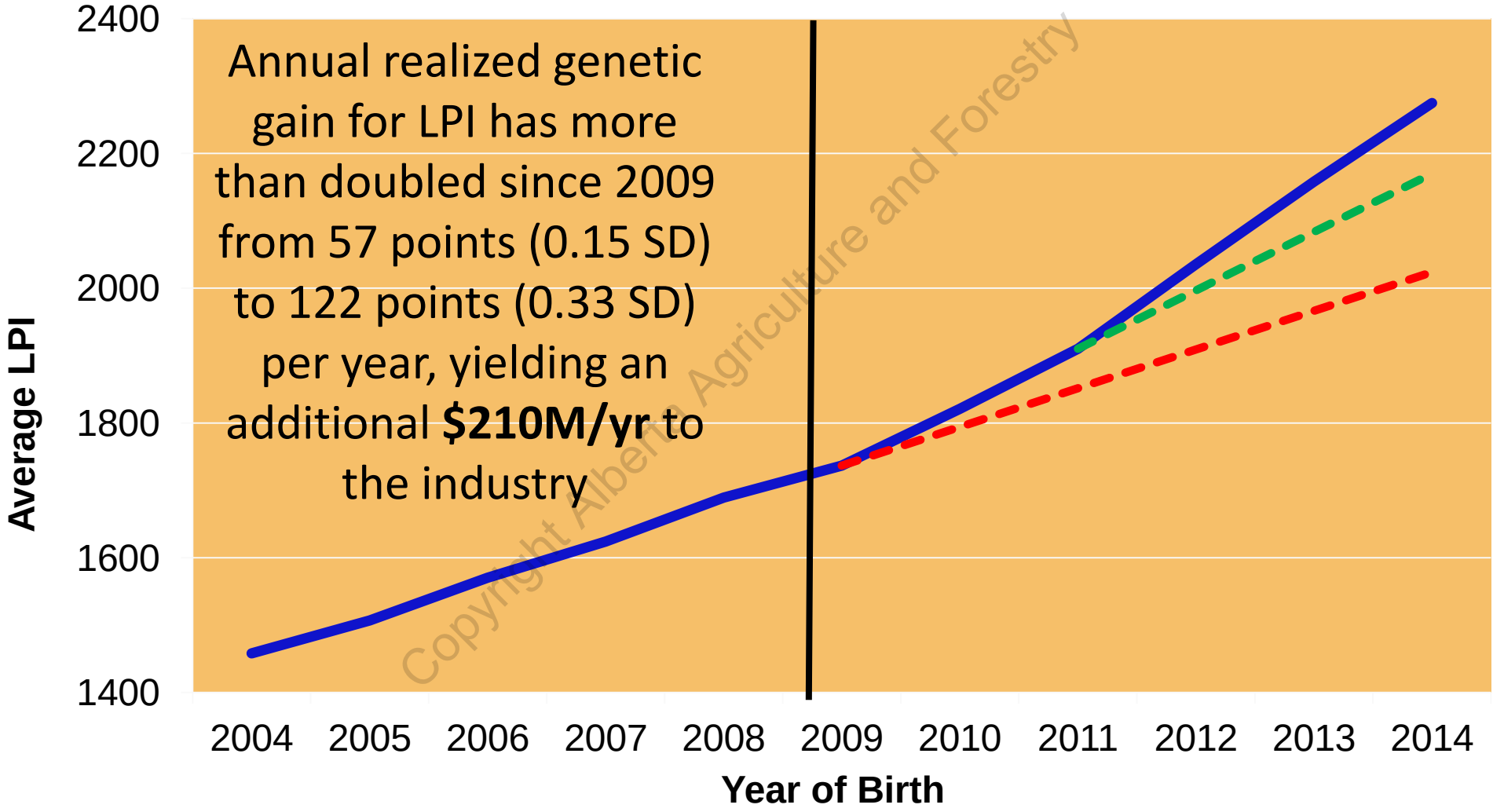
Monitoring major & lethal genes

"Ancestry.com"
Retained heterozygosity
Vigor Score

Traceability

Increase accuracy of genetic evaluations

Impact of Genomics
Lifetime Profit Index (LPI)



Miglior et al. 2014. Advancing Dairy Cattle Genetics. Feb 17-19, Phoenix, AZ

Economic and Environmental Benefits

Selection for feed efficiency (annual rate of genetic progress=0.8%)

2.9 million feeders – 92,800 tons/yr

4.7 million cows – 296,000 bales/yr


Questions?
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GrowSafe
SYSTEMS
www.growsafe.com

Adapting to Climate Change in Western Canada

In broad terms the climate is expected to be warmer, have more frequent extreme climatic events and enhanced atmospheric CO_2.

Positive effects:

Increased productivity-warmer temperature & increased CO_2
Potential to grow new crops
Accelerated maturation rates
Longer growing season
Decreased moisture stress in some areas

Negative effects:

Decreased herbicide and pesticide efficacy
Increase moisture stress in some areas
Increased insect infestation
Crop damage from extreme heat
Less reliable forecasts
Increased weed growth and disease
Increased soil erosion