

A glass of milk with a splash of milk being poured into it. The background is a light blue gradient with small white dots.

The Impact of Genetics on the Environment

Steve Winnington

Area Director of Marketing – World Wide Sires

A Little Background.

- Born on a UK Dairy Farm
- National Diploma in Farm Business Management- Broomfield UK
- Worked in Dairying in UK, New Zealand and Denmark
- 30 Years in the AI Industry
- 2 Years living in India, establishing the first international AI station.
- Joined WWS as Area Director of Marketing in 2013
- Current Markets: UK, Ireland, **Czech**, Hungary, **Poland**, Romania, Ukraine, Greece, Saudi Arabia, Iran, Jordan, Qatar, UAE, Oman and Yemen

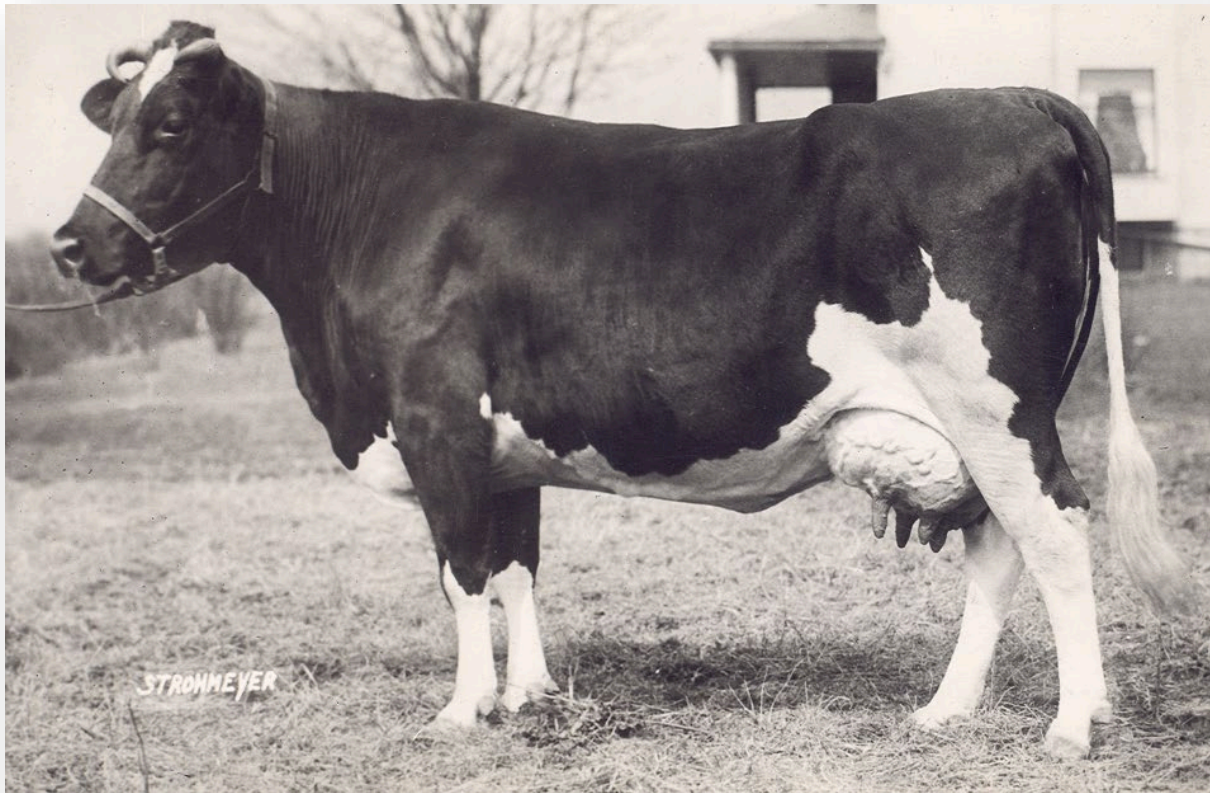


Herd SUCCESS (1980)



125 Kgs/Cow/Year for 80 Years – Global needs 50/yr. by 2050

1930's – 1,500 Kgs/cow/year



21st Century – 11,606 Kgs/cow/year
> 10,000 Kgs/year



After 80 Years US Profitability
Progress

Today, producing a gallon of milk uses 90% less land & 65% less water, with a 63% smaller carbon footprint than in 1944.

Source: The Dairy Alliance

Helping the world feed the world.



Accelerated Genetics

Global Population

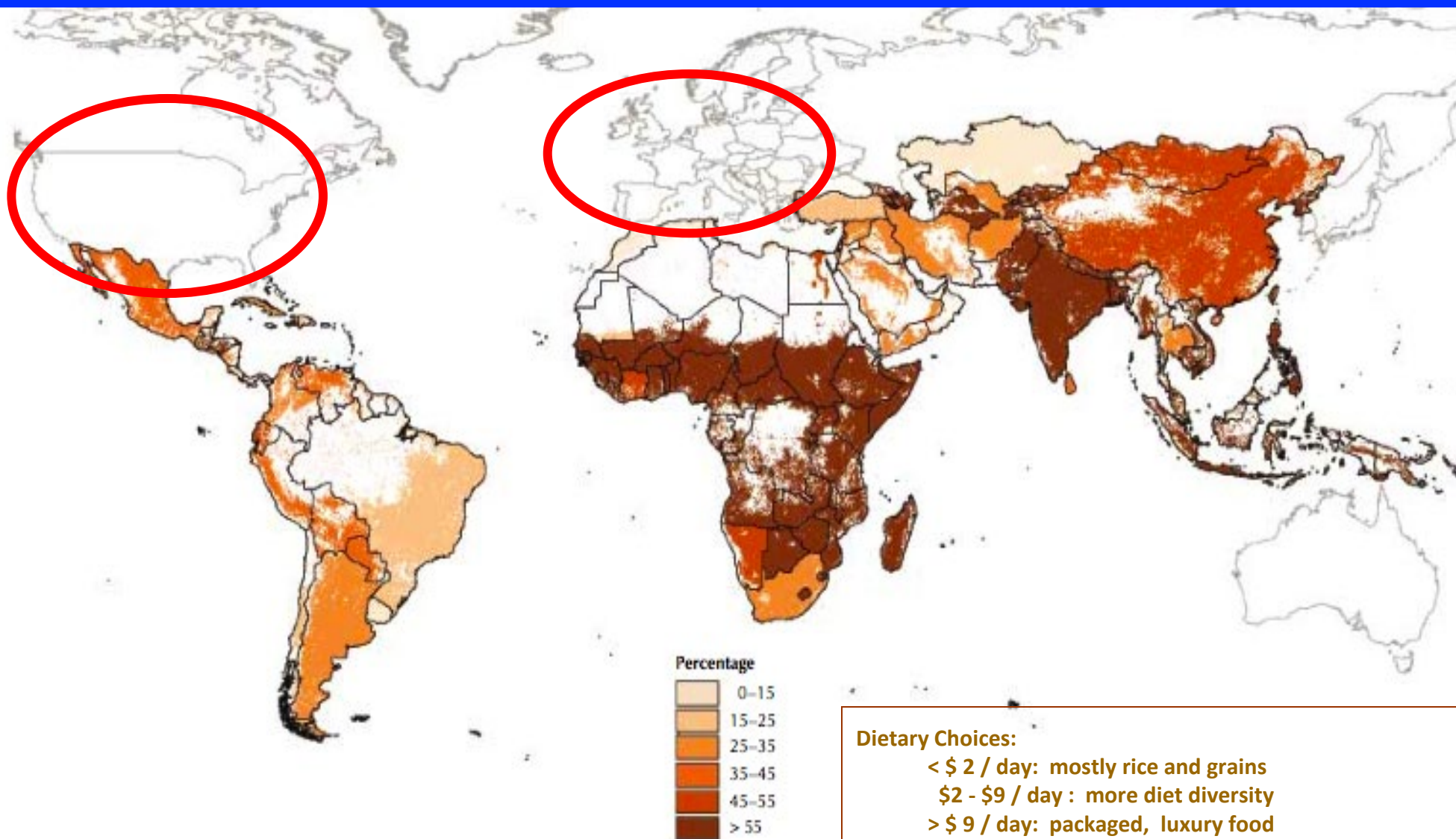
- 1966: 3,406,417,036
- 2019: 7,764,951,032
- February 2024: **8,092,754,214**

- **Czech Population: 10.5 Million**

2024 Global Population Growth: 10.5 Million



More than 55% of the population below poverty line

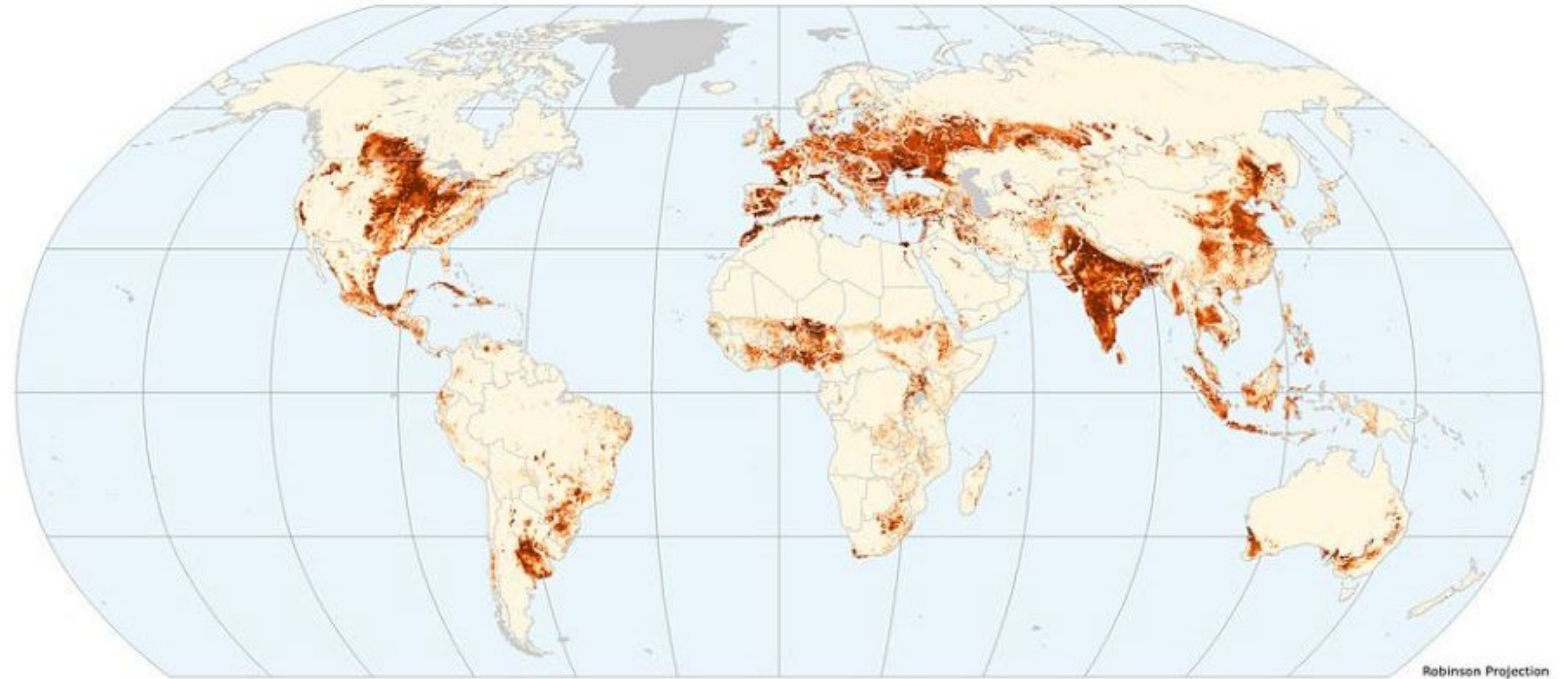




70% Water
9% Desert
6% Rainforest
10% Tundra
8% Mountains
3% Urbanization

4% Cultivation,
7% Pasture Marginal land

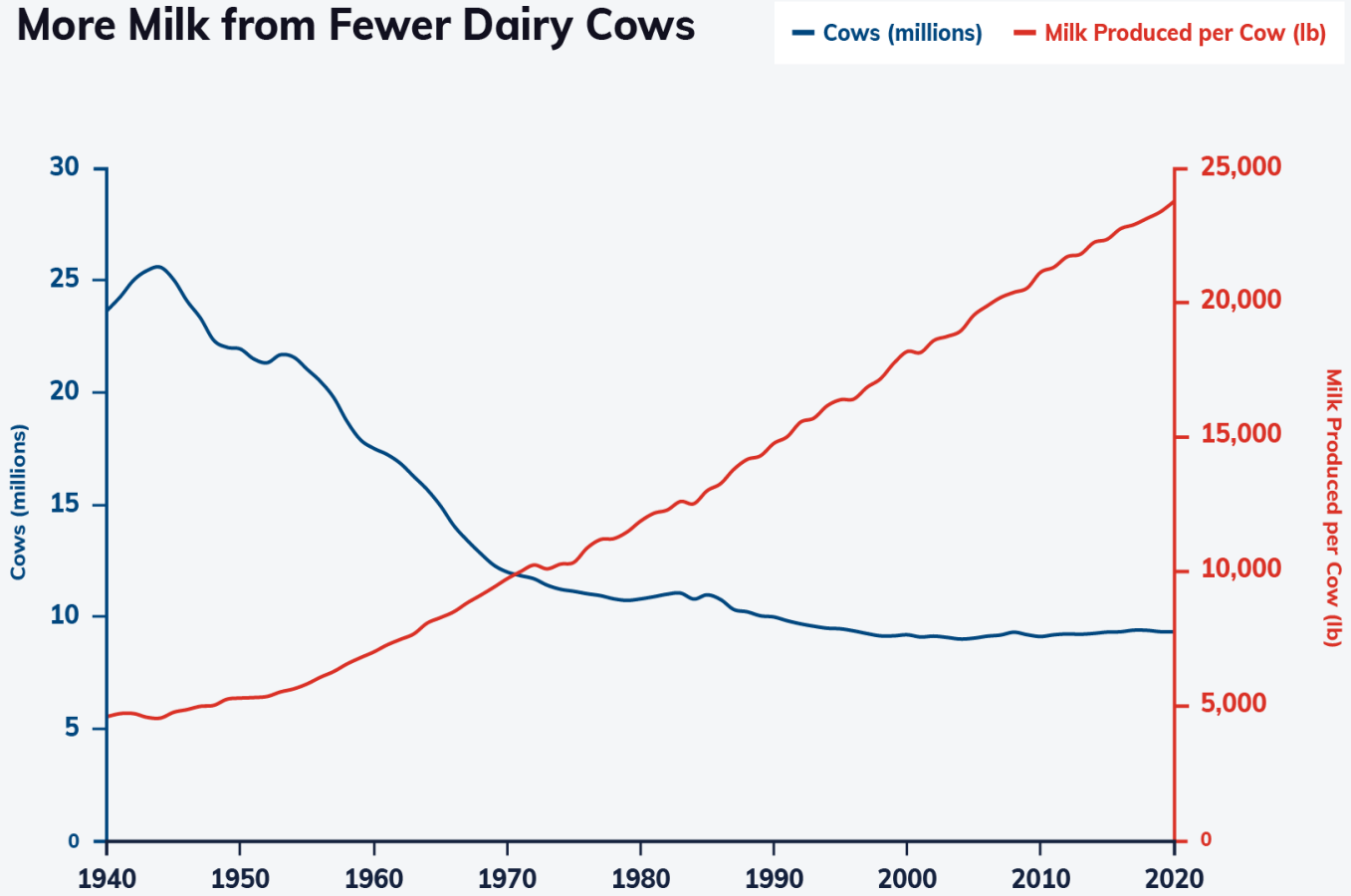
Global Cropland



In the next 30 years we need to produce more food than has been produced in the last 3000 years!

Trends in Production Efficiency Over Time Are Promising

More Milk from Fewer Dairy Cows

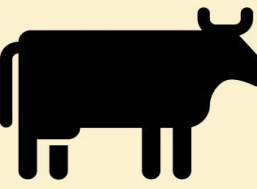


Source: USDA National Agricultural Statistics Service

205 Kgs/Cow/Year for 10 years





Did you know?


Between **2007** and **2017**



U.S. milk yields increased by 4,508 lb per cow¹

That means that every gallon of milk produced in 2017 used:

-  **17.3% less feed**
-  **20.8% less land**
-  **30.5% less water**
-  **20.2% less fuel**



The carbon footprint of a gallon of U.S. milk produced in 2017 was **19.2% lower than in 2007**

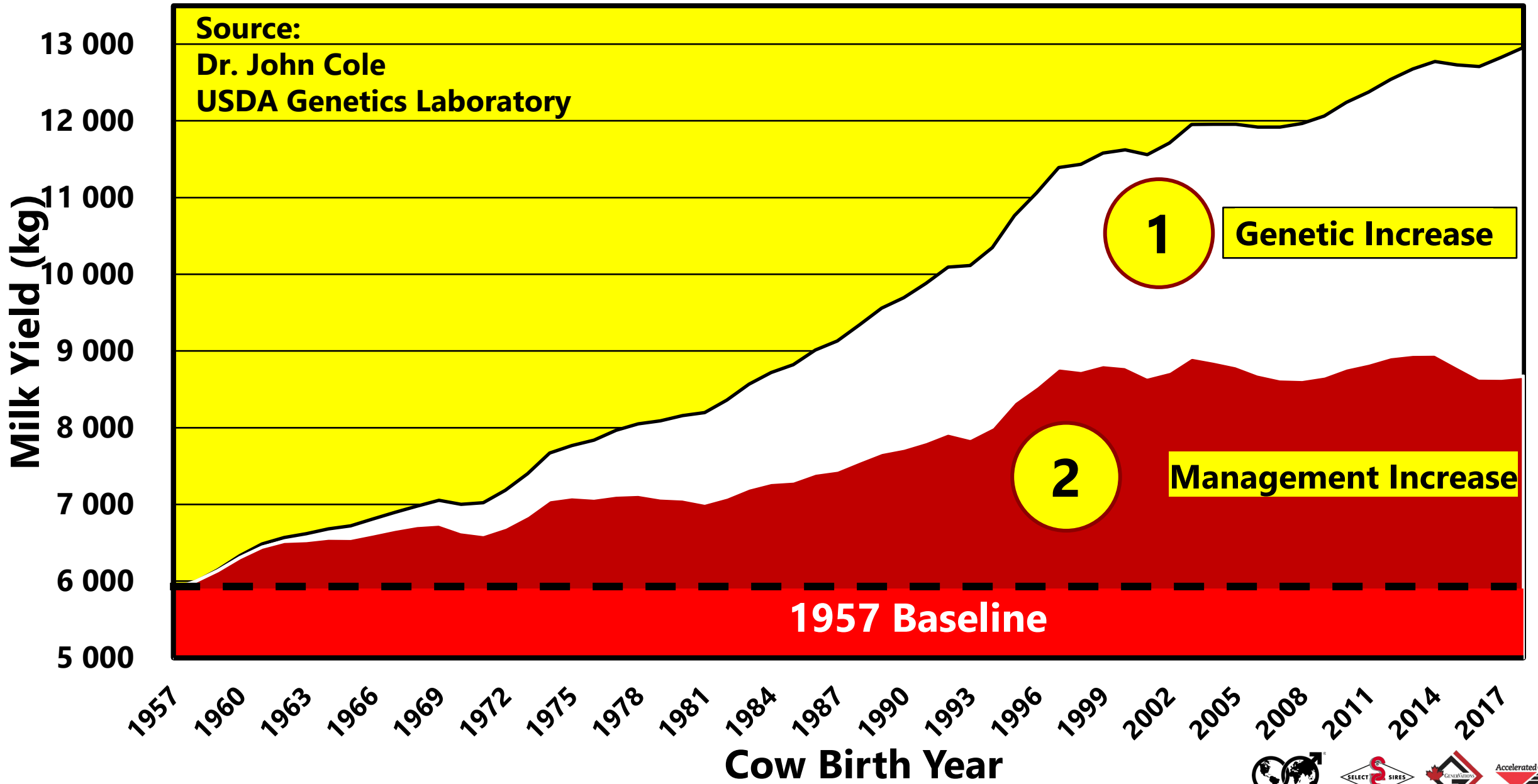
¹Change in energy-corrected annual milk yield per cow. Created by Dr. Jude L. Capper. Data from Capper, JL and Cady, RA. (in press) The effects of improved performance in the U.S. dairy cattle industry on environmental impacts between 2007 and 2017. Journal of Animal Science. <https://academic.oup.com/jas/advance-article/doi/10.1093/jas/skz291/5581976>

Cows

are part of the solution



Increased milk production in USA Holsteins from 1957 to 2018 was driven by genetics.

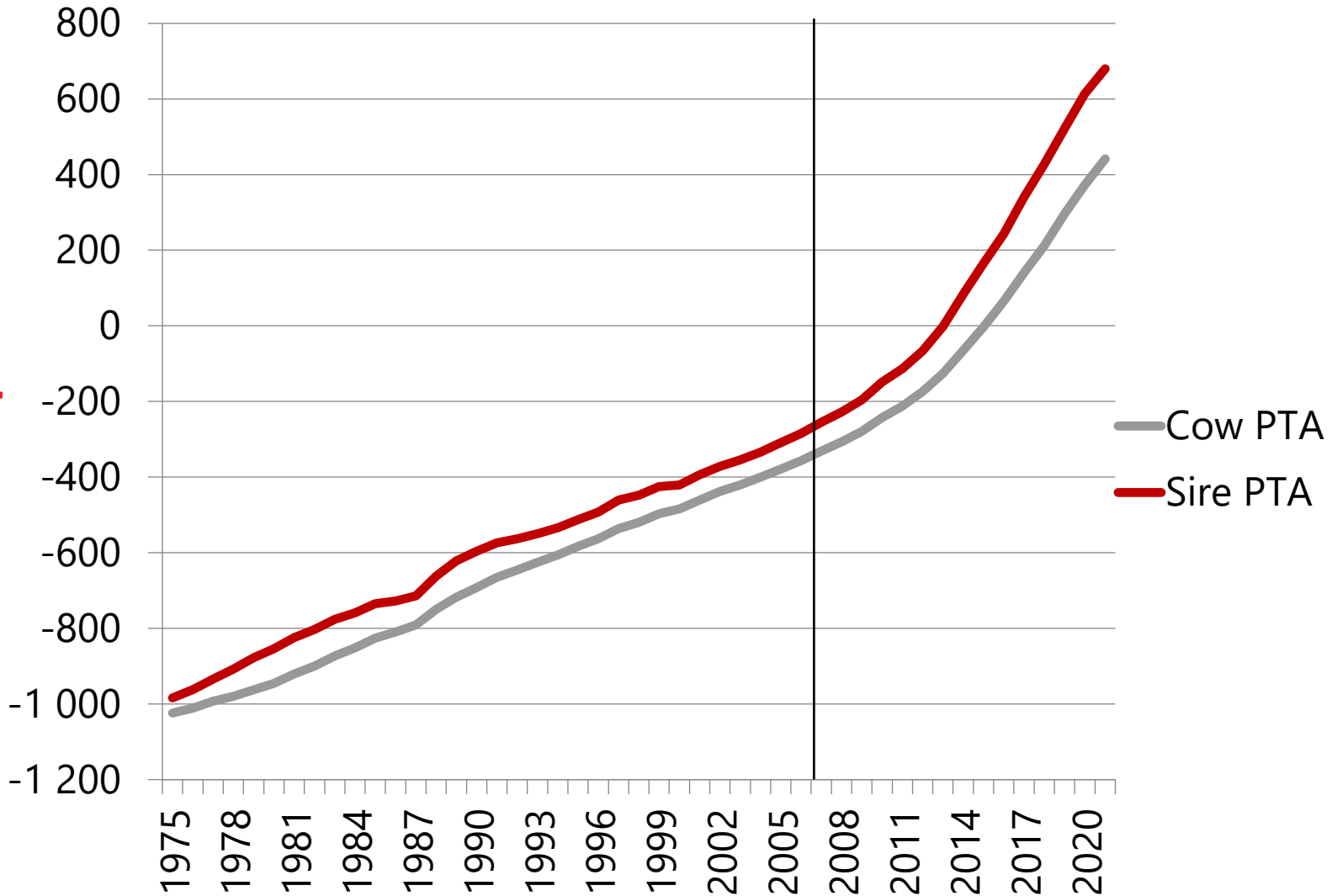


U.S. Holstein Genetic Trend for NM\$

Track record for improved sustainability is strong

Genetic improvement is a key contributing factor

The pace of genetic improvement continues to accelerate!



CDCB, Dec. 2023



Generation Interval

- The age of the parents when their resulting offspring are born.
- If Dam is 2 years + 2 months old when calf is born – GI is 2 years + 2 months
- Sexed Semen on heifers – most female calves from young heifers – decreases Generation Interval
- Genomic Testing Bulls - 5 years old down to 2 years (reliability tradeoff)



Priorities for Herd Genetic Improvement

- Solid reproductive management
- AI Sire selection
- Genomic testing for improved female selection
- Sexed semen usage
- IVF and embryo transfer

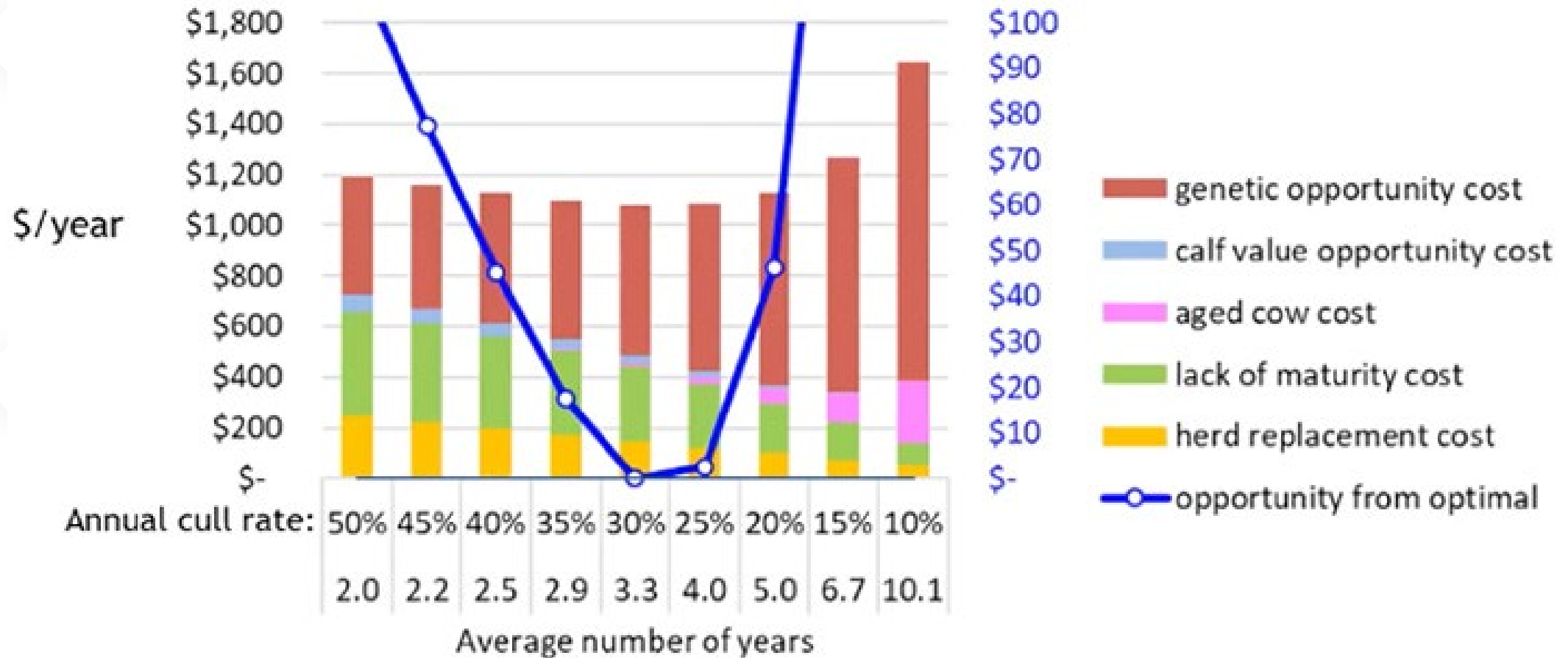


Priorities for Herd Sustainability Improvement

- Develop and work with high-performance cattle
- **Minimize the number of unproductive animals**
- Add sustainability traits to your selection index:
 - Residual Feed Intake (RFI)
 - Feed Saved
 - Methane efficiency

“The most inefficient animals on a dairy are those in the sick pen!”

Optimal Culling Rate



DeVries, University of Florida

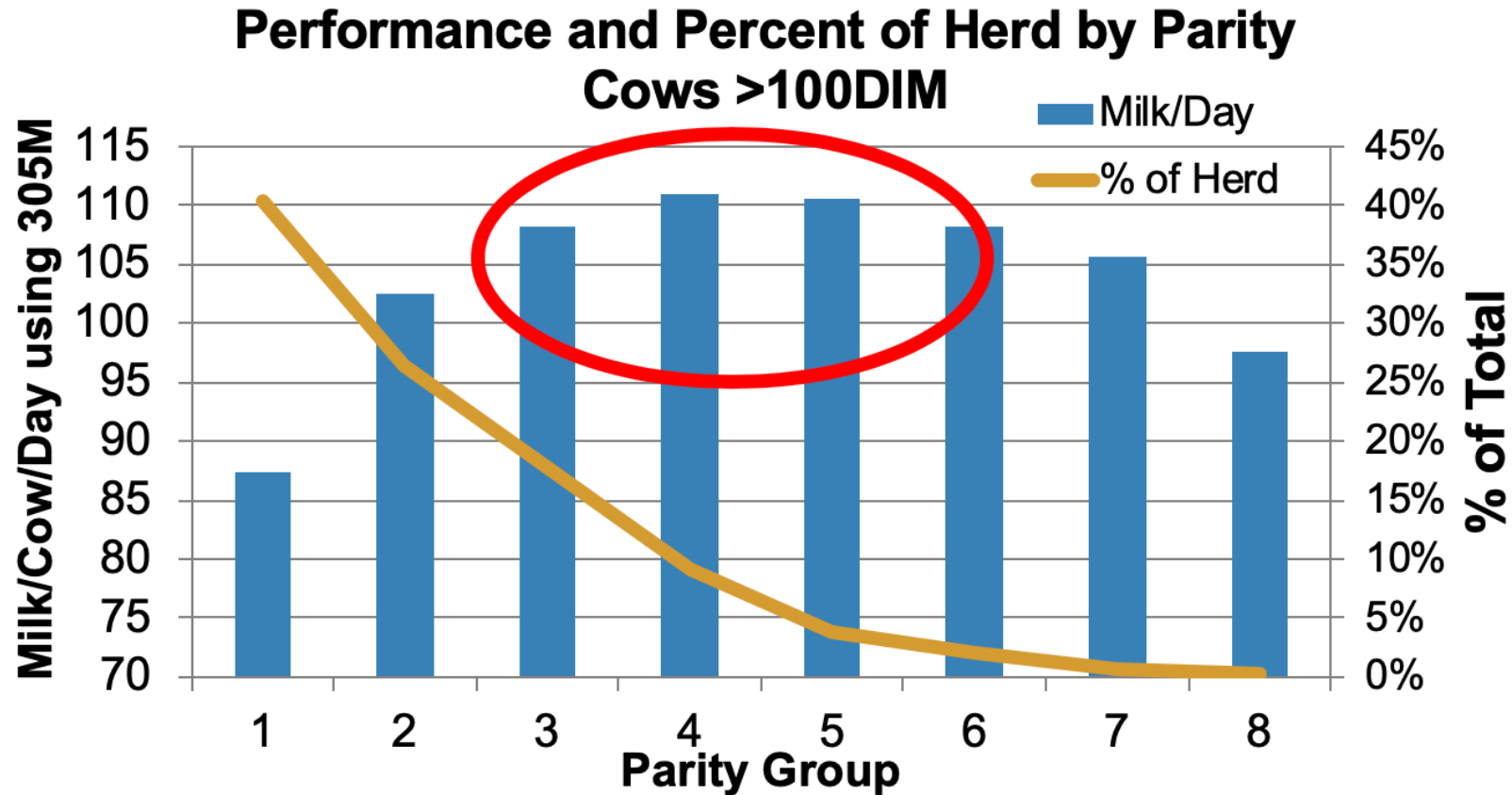


Culling Rate Take-Home Points

- Reduced culling rate reduces the number of unproductive animals on your dairy
- Determining an optimal culling rate is complicated
- Regardless of culling rate, there is consensus that we want cows that are healthy and fertile regardless of their age



Longevity – Driving Profit



MAIN CHALLENGES

FERTILITY, MASTITIS, LAMENESS, COW COMFORT



Impact of Culling Rate on GHG Emissions

Performed a life-cycle assessment on two example 2,000-cow Holstein herds

	Dry Matter Intake (lbs/cow/day)	ECM (lbs/cow/yr)	Herd 1	Herd 2
Herd Size			2,000 cows	2,000 cows
Cull Rate			37%	30%
Heifers, <12 months	10.0	0	840	700
Heifers, 12-24 months	20.1	0	767	622
1 st lactation cows	50.7	25,303	740	600
2 nd lactation cows	55.1	28,280	520	520
3+ lactation cows	59.5	29,678	740	880
Total Cows and Heifers			3,607	3,322

Comparison of Methane and GHG Emissions

Herd 1 (37% cull rate) and Herd 2 (30% cull rate)

	ECM (lbs/day)	Enteric Methane Emissions (tons CO _{2e} /yr)	Total GHG Emissions (tons CO _{2e} /yr)	Enteric Methane Intensity (lbs CO _{2e} /lb ECM)	Total GHG Intensity (lbs CO _{2e} /lb ECM)
Herd 1	151,939	11,680	22,303	0.421	0.804
Herd 2	153,652	11,442	21,982	0.408	0.770
Difference	+1,713	-238	-704	-3.1%	-4.2%



We Have a
Winning
Message



We need
to focus
on the
needs of
the end
user, The
Customer!

LIVESTOCK TURN FOOD WE CAN'T EAT INTO PROTEIN



Global livestock feed intake. Share of main feed types consumed by livestock supply chains (both ruminants and monogastric species) in 2010.¹

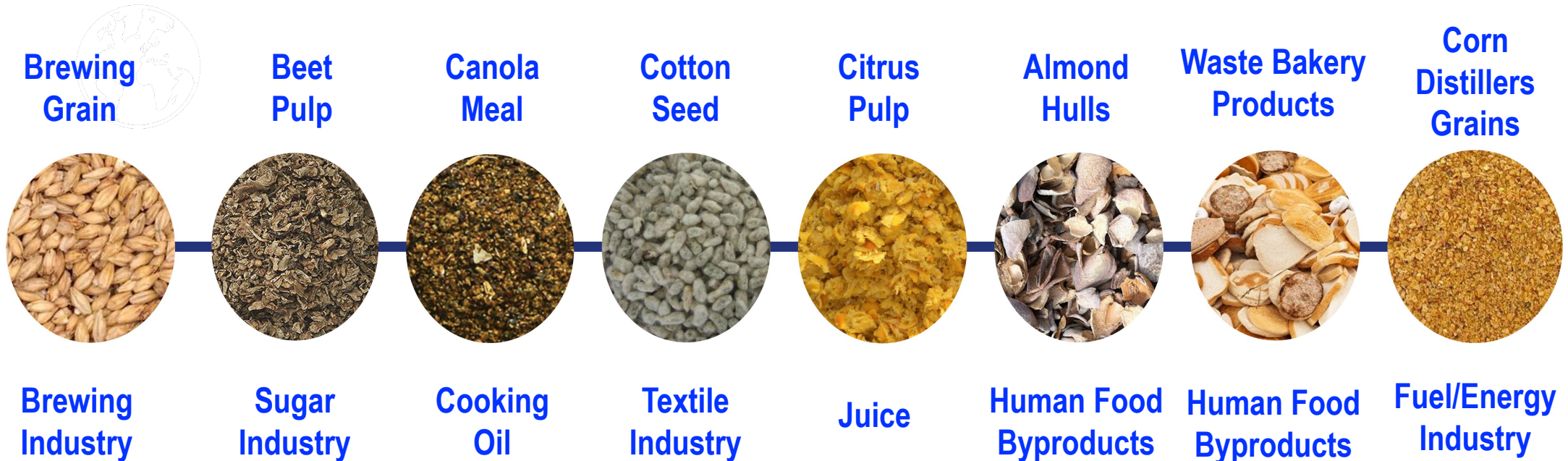
1. Mottet, Anne. "Livestock: On Our Plates or Eating at Our Table? A New Analysis of the Feed/Food Debate." *Global Food Security*, Elsevier, 10 Jan. 2017. www.sciencedirect.com/science/article/abs/pii/S2211912416300013?via%3Dihub.

Sustainability

Were else in
our world can
we take
Natural
Resources
that are 86%
'Un-useable'
and Utilize
100% of that
Resource?

The Dairy Cow: **The solution NOT the problem!**

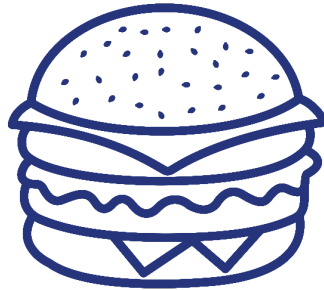
Dairy Cow **Super Powers**: The dairy cow can use an unbelievable amount of by-products!



+ Many, Many More...

The Dairy Cow: The solution NOT the problem!

By-products of
the dairy cow



We all love a good
burger



Leather for shoes etc.



Poo! The manure
produced by the cow
means less Chemical
Fertilizer needs to be
produced



To Wrap up!

- The global population continues to grow and needs to be fed with healthy, nutritious food.
- Genetics have driven efficiency over the last 60+ Years
- Genomics have accelerated the genetic gain since 2009
- Huge genetic opportunities in cow Health
- The most **inefficient** cows on a dairy are those in the sick pen
- **The Cow is part of the Solution, NOT the Problem!**

A row of black and white cows is shown in a barn, eating hay from a trough. The cows are lined up, and the hay is piled up in front of them. The background is slightly blurred, showing more cows and the structure of the barn.

Thank You!