National DHIA Annual Meeting CDCB Report

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March 5, 2019 – San Diego, CA
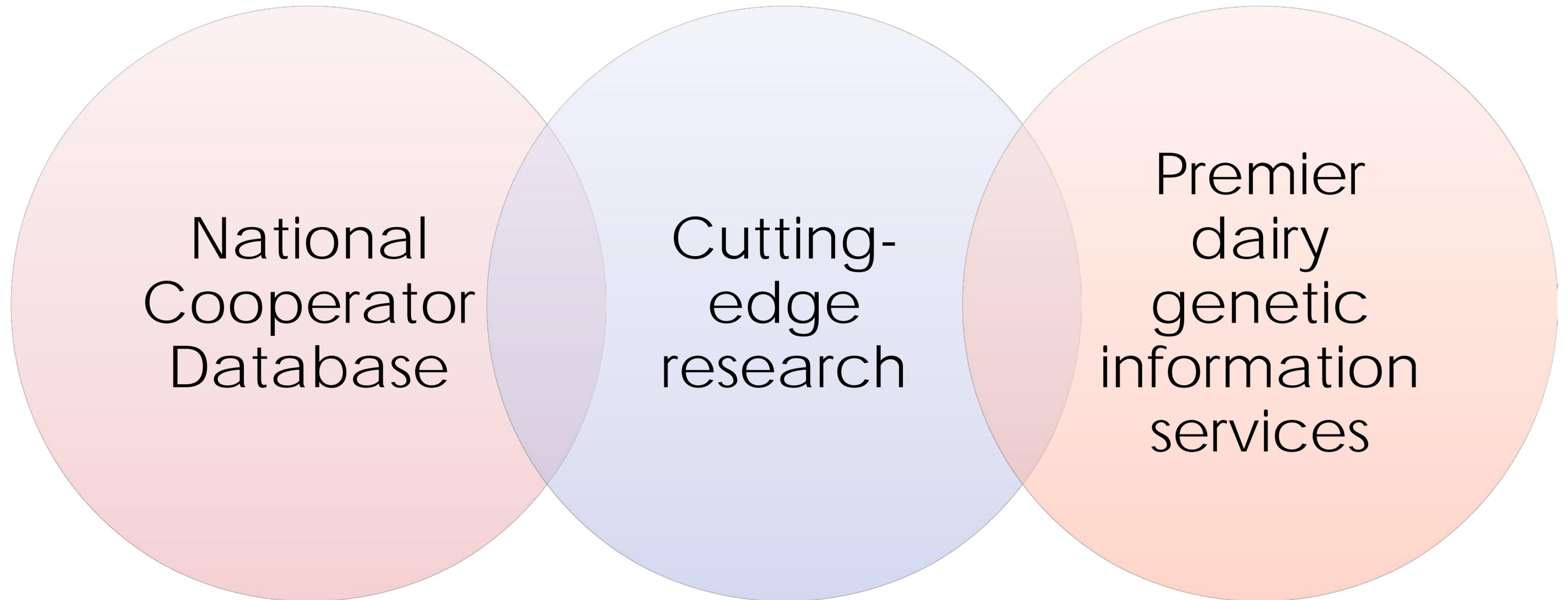
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COUNCIL ON DAIRY CATTLE BREEDING

Outline

- From genomics to big data

- Genomic evaluations including crossbred animals
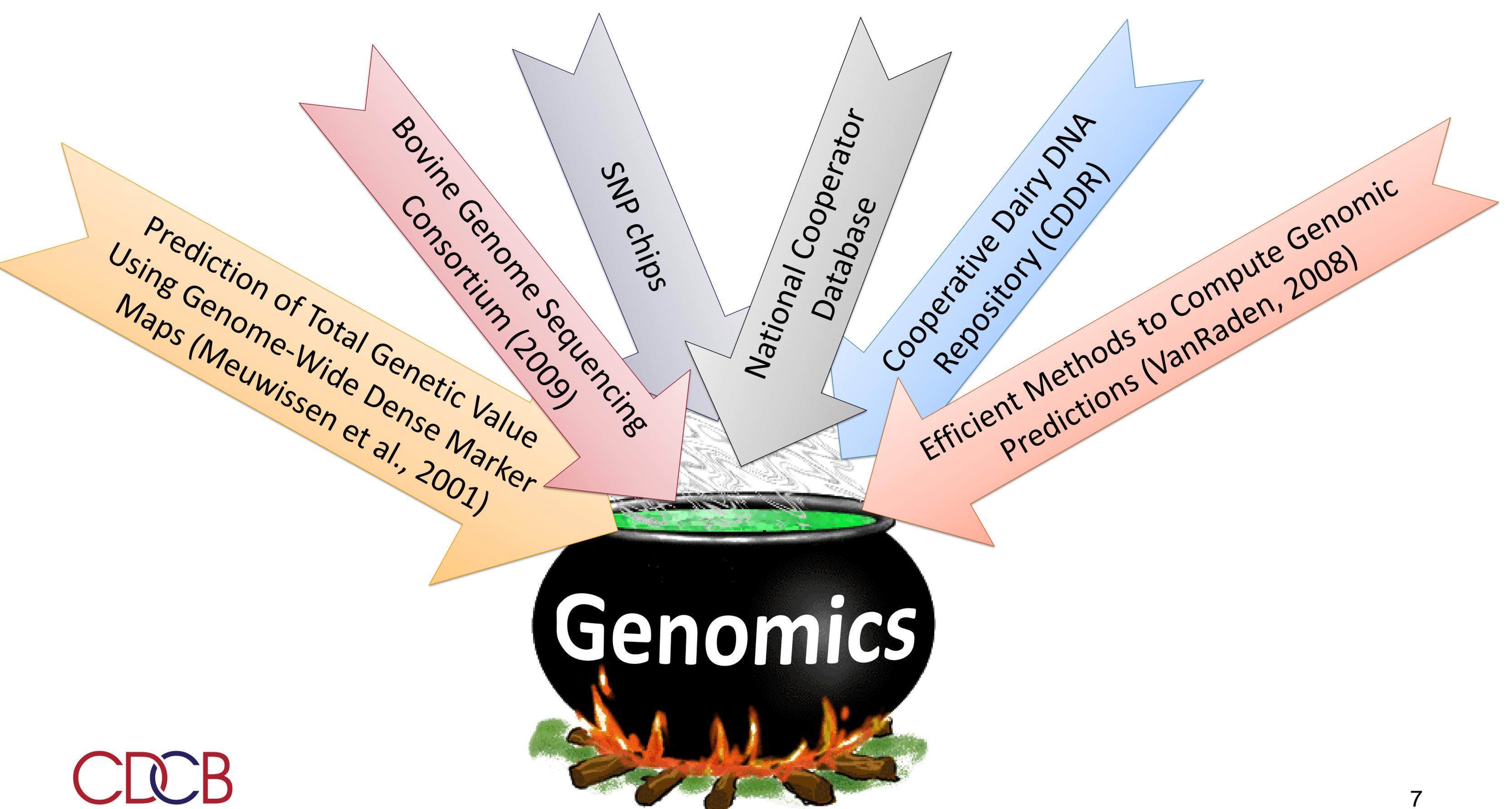
- Early first calving

- Updated service fees

CDCB is a non-profit dairy driven company that provides pre-competitive services and products in an independent and transparent framework to improve the genetics and management of dairy herds worldwide.

Value-added to dairy producers

National Cooperator Database

Cutting-edge research

Premier dairy genetic information services

FROM GENOMICS TO BIG DATA

Prediction of Total Genetic Value Using Genome-Wide Dense Marker Maps (Meuwissen et al., 2001)

Bovine Genome Sequencing Consortium (2009)

SNP chips

National Cooperator Database

Cooperative Dairy DNA Repository (CDDR)

Efficient Methods to Compute Genomic Predictions (VanRaden, 2008)
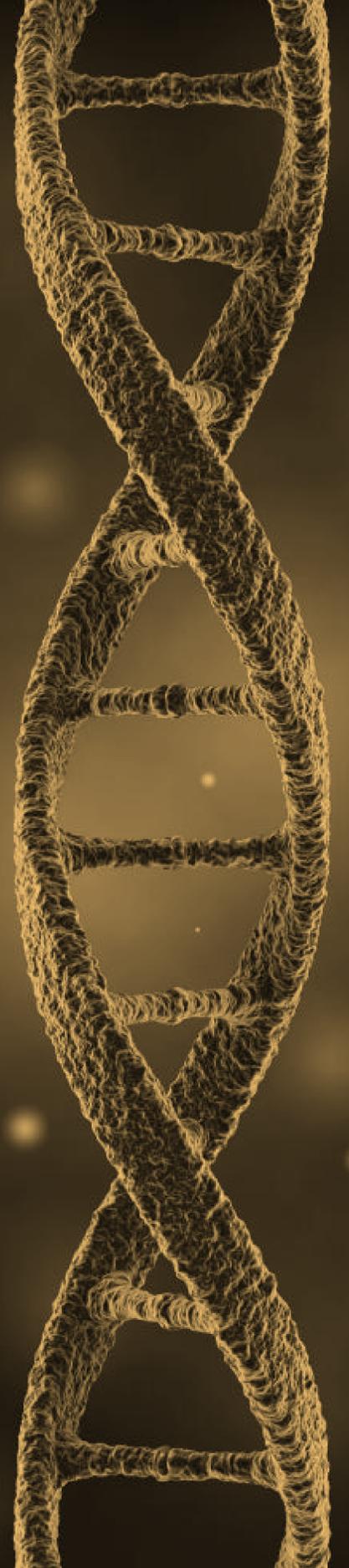
Genomics

Consequences of genomic selection

- Large reference populations closely connected to predicted individuals

- Drastic reduction in generation interval

- Early genotyping vs. progeny testing schemes

- Evaluation turnaround

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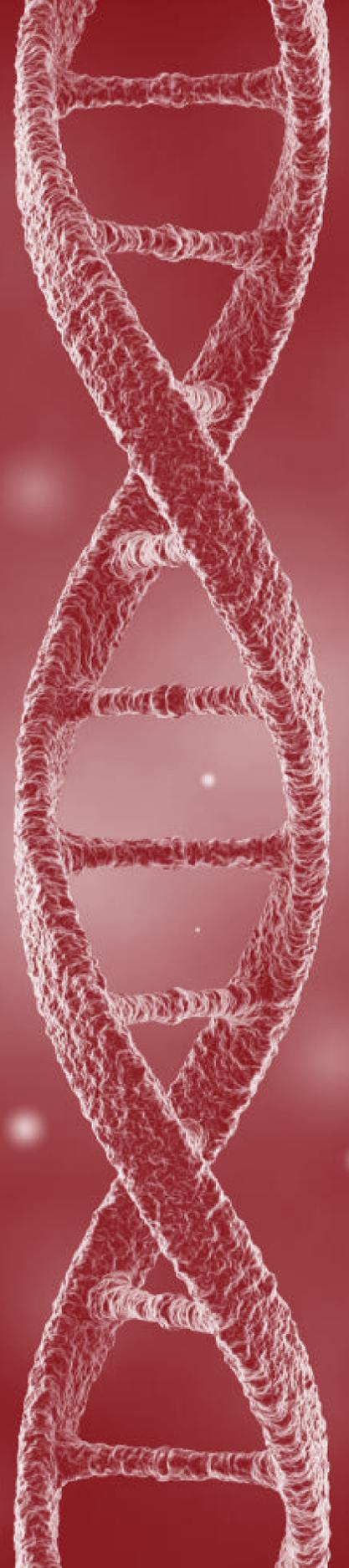
Consequences of genomic selection

- Parentage verification & discovery

- Haplotypes & recessive mutations

- Low heritable traits

- Traits difficult to measure

Consequences of genomic selection

- Consolidation and concentration

- Genotyping: new business

- Phenotypes more valuable than ever

- Nucleus herds concentrate bull dams

- Genomics as a management tool

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Year	Trait
1926	Milk & fat yields
1977	Protein yield (& solids-not-fat)
1978	Conformation (type)
1994	Productive life, somatic cell score (mastitis resistance)
2000	Calving ease (Iowa State University, 1978–99)
2003	Daughter pregnancy rate
2006	Stillbirth rate, bull conception rate (ERCR, DRMS, Raleigh, NC, 1986–2005), milking speed
2009	Cow and heifer conception rates, genomic evaluation
2012	Mobility, calving-to-insemination interval
2016	Gestation length
2017	Cow livability
2018	Health traits (milk fever, displaced abomasum, ketosis, mastitis, metritis, retained placenta)
2019	Early first calving, genomic evaluation for crossbreds, feed efficiency

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Ear Tag Technologies
Temperature
Activity

Milking System Collar
Daily activity, Behavior, Locomotion

Rumen bolus
Rumen temperature
Activity
Water Intake

Thermosensor
Vaginal temperature

Daily Feed intake
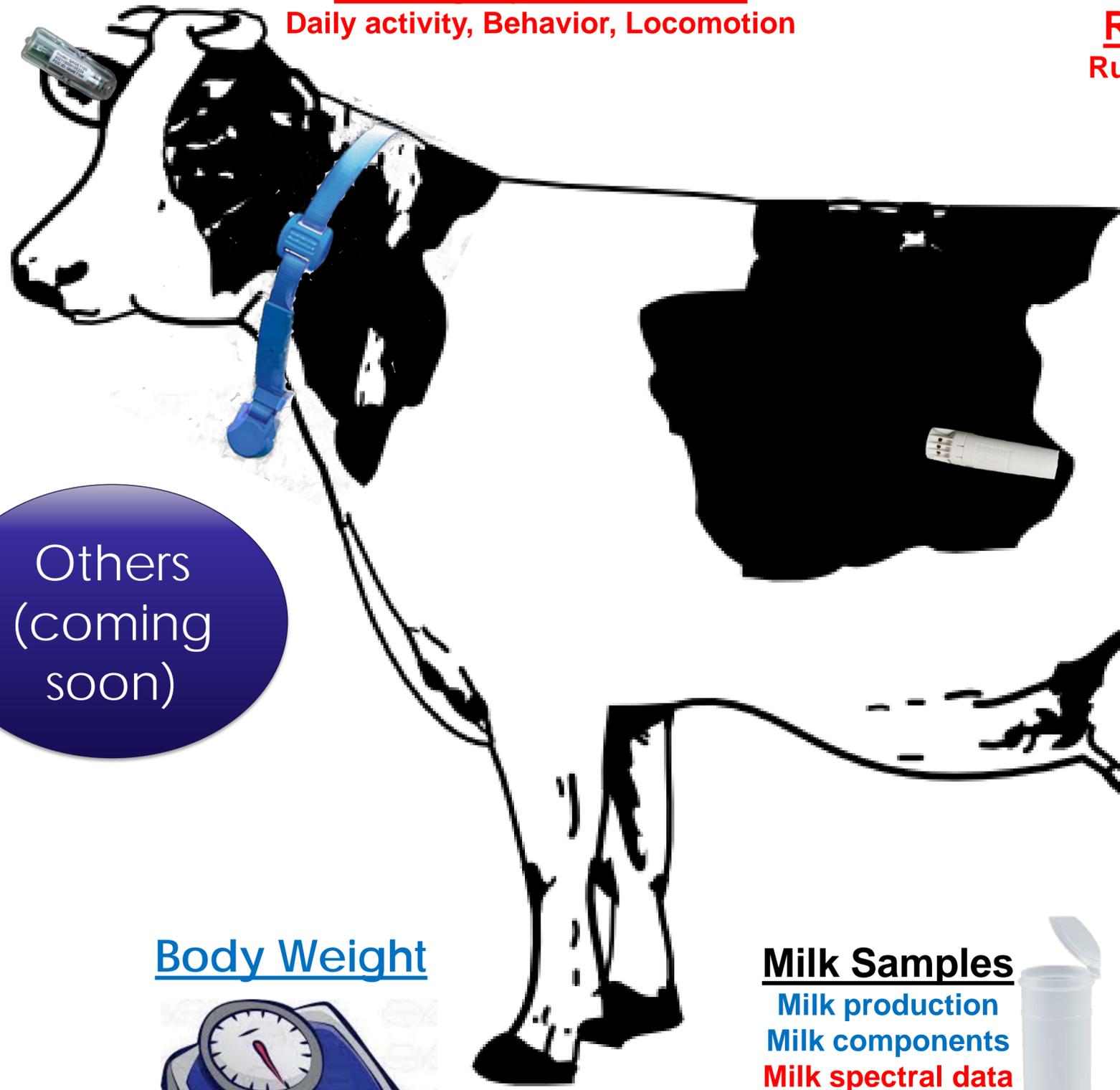
Others (coming soon)

Image data
Body weight estimates
Time at feeding bunk
Other activities

Body Weight

Milk Samples
Milk production
Milk components
Milk spectral data
(MIR and AfiMilk)

Pedometer
Locomotion/ activity

Author: Dr. James E Koltes. ASU

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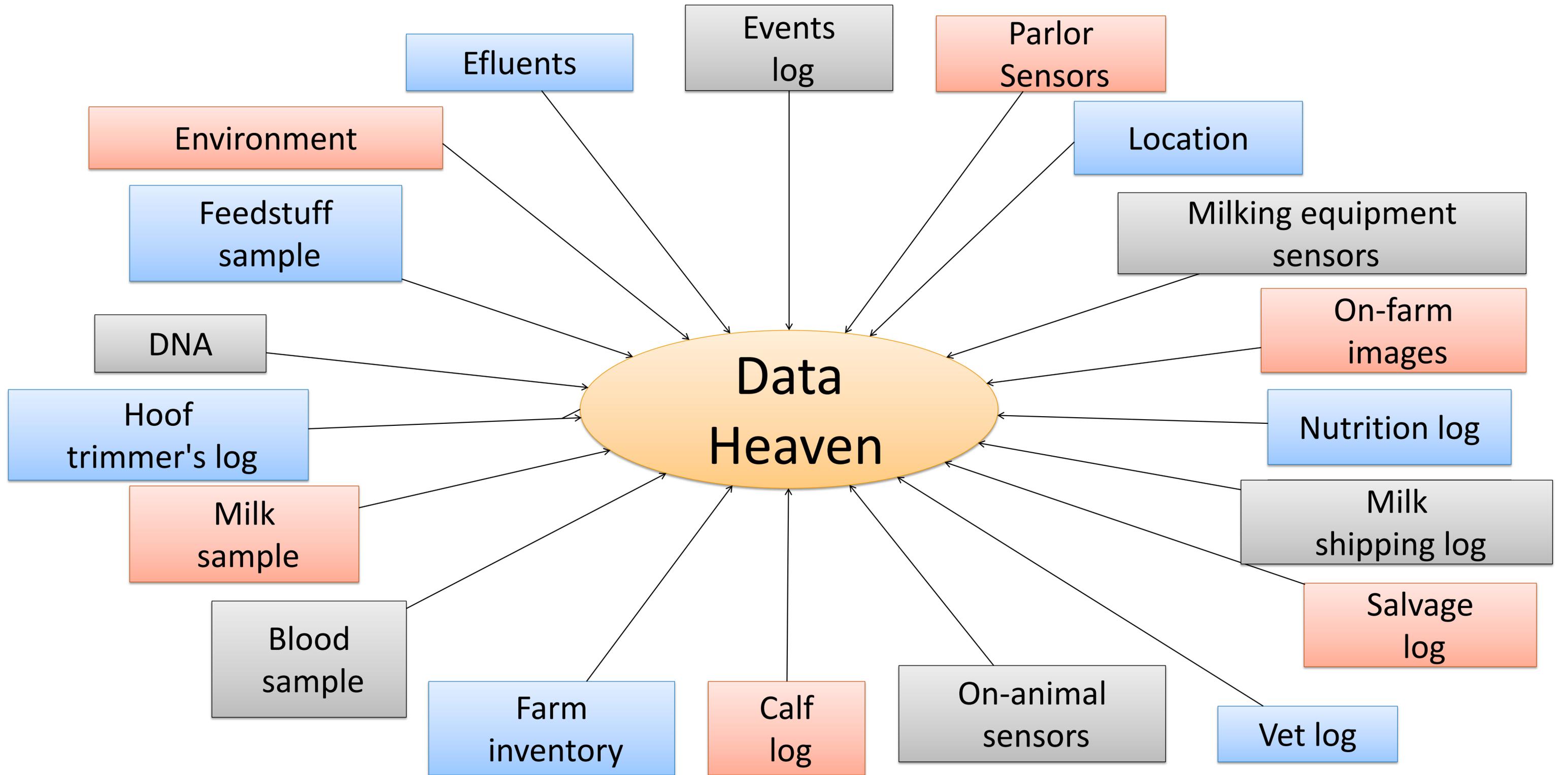
Dialog and Awareness (2019)

- **Series of activities to promote dialog and awareness :**

  - Meeting of the CDCB Board of Directors, Orlando, December 13-14, 2018.

  - NDHIA Annual Board Meeting, Orlando, January 28-30, 2019

  - CDCB Industry Meeting at the Western Dairy Management Conference Reno NV, February 25, 2019

  - National DHIA Annual Meeting, San Diego, March 5-7, 2019

  - **Visit organizations related to the dairy supply chain:**

    - DRPCs

      - Dairy Records Management Systems (DRMS) Raleigh, NC

      - AgSource Cooperative Services Verona, WI

      - AMELICOR Provo, UT

      - AgriTech Analytics Visalia, CA

Genomic Revolution: The Next 10 Years

CDCB Industry Meeting with Western Dairy Management Conference (Reno Feb, 25th, 2019)

- **Vision: How does dairy look in 2029?,** Jack Britt, PhD, Britt Consulting

- **Genomic Legacy: What have we achieved in the genomic revolution?** Paul VanRaden, PhD, USDA Animal Genomics and Improvement Laboratory

- **What has changed in the dairy business since 2009?,** Mark Stephenson, PhD, University of Wisconsin-Madison

- *Panel Discussion:* **What future advancements do we envision through genomics?**

  Jack Britt, Pat Maddox, (RuAnn Dairy, California), Denton Ross (Arizona Dairy Company, Arizona), Mark Stephenson, Paul VanRaden, USDA AGIL

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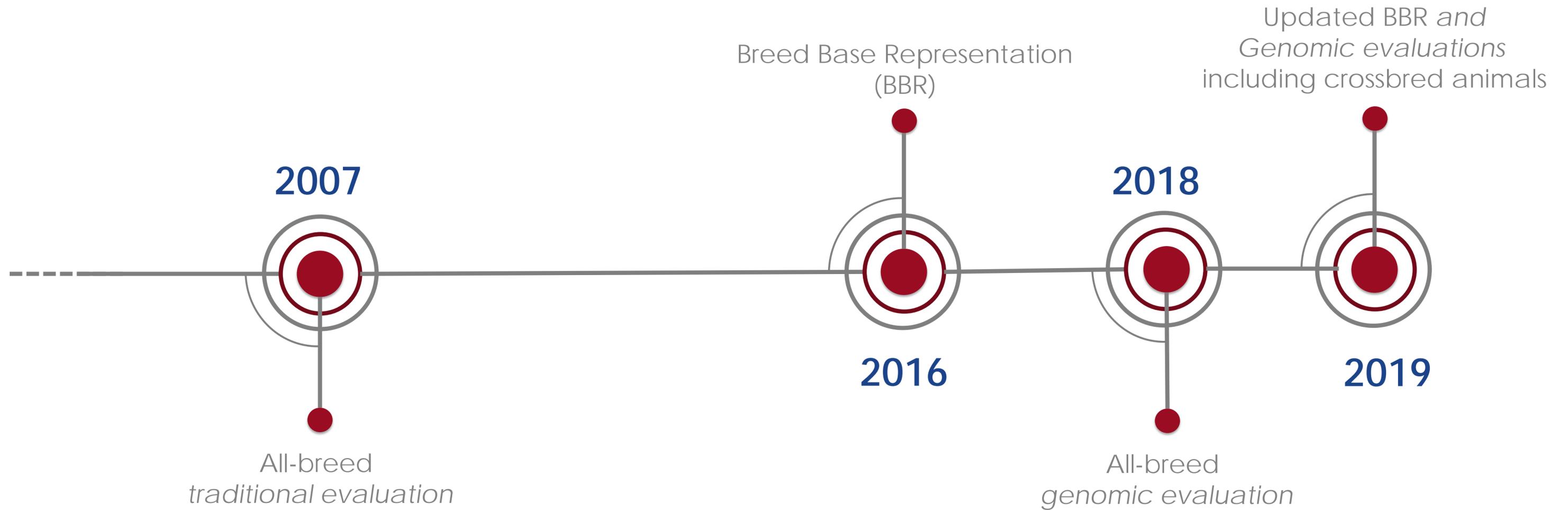
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- **Transforming Big Data into Value: Put Data to Work for Your Dairy**, Miel Hostens, DVM, Ghent University

- **Big Data for Innovative Solutions in Ag**, Cameron Holbrook, Amazon

- Panel Discussion: How can dairy leverage big data?

  - Cameron Holbrook, Miel Hostens, Austin Hyde, (Heglar Creek Dairy, Idaho), Mark Rodgers, (MKVT Polled Holsteins, Vermont), Renee Smith, (My Dairy Dashboard)

- Roundtable discussions: How do we leverage data and new technologies?

15 tables (7-9 people) with a facilitator)

GENOMIC EVALUATIONS INCLUDING CROSSBRED ANIMALS

Towards a genomic evaluation of crossbreds

Breed Base Representation (BBR)

Updated BBR *and Genomic evaluations* including crossbred animals

2007

2016

2018

2019

All-breed *traditional evaluation*

All-breed *genomic evaluation*

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Genomic predictions for crossbreds

- Genomic predictions computed within-breed since 2009

- More crossbreds will receive predictions in April 2019

  - Weighted combination of purebred predictions

  - Breed base representation (BBR): Genetic contribution of each breed

- Currently about 60,000 animals with >10% BBR from another breed

- About 17,000 animals with 6–10% BBR from another breed

  - Will no longer contribute to purebred reference

  - Will be predicted using only purebred data

EARLY FIRST CALVING

Early first calving (EFC)

- Heifers eat feed but produce no milk until calving

  - Earlier calving is worth $2.50 per day

  - Economic emphasis could be 3% of NM$

  - Removes some emphasis from heifer conception rate

- Large database (23 million records) available for EFC

  - Heritability of 2.7%

  - PTA standard deviation only about 3 days

  - Reliability of genomic predictions of 66% for Holsteins

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Starting April 3, 2019

CDCB FEE SCHEDULE UPDATE

Expansion of the CDCB services portfolio

- New traits:
  - Cow livability, gestation length
  - Resistance to mastitis, ketosis, displaced abomasum, metritis, hypocalcemia and retained placenta
  - Early first calving: April 2019
- Genomic predictions for crossbred animals: April 2019.
- Profitability indices: two updates on Net Merit, Fluid Merit, Cheese Merit and Grazing Merit
- New Haplotypes
- Accuracy: all-breed genomic predictions & 80K SNP list
- Genealogy: Breed Base Representation (BBR) & Parentage discovery

Expansion of the CDCB services portfolio

- Further expansion of the services
  - Access to new data streams
  - New tools and infrastructure – e.g. feed efficiency
- Simplification of the fee schedule
- CDCB service schedule update: April 3, 2019.
- Webinar: March 12, 2019, 1:00 pm EST

CDCB Fee Schedule Principles

- Data providers to the national cooperator database

- US herds and companies

- International genotype exchange partners

- Credits

Female nomination fees

Female Basic Nomination Fee	$	8
Cooperator Credits[a]:		
Female born in a US herd?	$	4
• Milk yield data provider?	$	2
• Conformation data provider?	$	1
• Health data provider?	$	1
Female born in a Canadian herd?	$	2

[a]*Final nomination fee = Basic nomination fee – Cooperator credits*

Male nomination fees

Male Basic Nomination Fee	**$**	**200**
Cooperator Credits[a]:		
Controller is a collaborator stud?	$	175
Foreign male submitted by an international genotype exchange partner?	$	200
US herd providing data?	$	100
• Milk yield data provider?	$	25
• Conformation data provider?	$	25
• Health data provider?	$	25

[a]*Final nomination fee = Basic nomination fee – Cooperator credits*

Artificial insemination service fees

Basic AI Service Fee	**$**	**1,600**
Cooperator Credits[a]:		
Controller is a collaborator stud?	$	800
Foreign male submitted by an international genotype exchange partner?	$	800

[a]Final AI service fee = Basic AI service fee – Cooperator credits

Take home

- National Cooperator Database rules!

- Big data is the next genomics

- Genomics for crossbreds are here!

- We can save money with early calvings!

- CDCB fees that we can understand!

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Thank you!

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