

CDCB Collaborators Roles and Responsibilities - CDCB system and Toolbox

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New CDCB Genomic Nominators and Laboratories Workshop

May 27, 2021



Outline

- CDCB System and Collaborators
- CDCB Certification & QC Program
- CDCB in numbers
- Toolbox

CDCB SYSTEM AND COLLABORATORS

The Council on Dairy Cattle Breeding (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





Purebred Dairy
Cattle Association

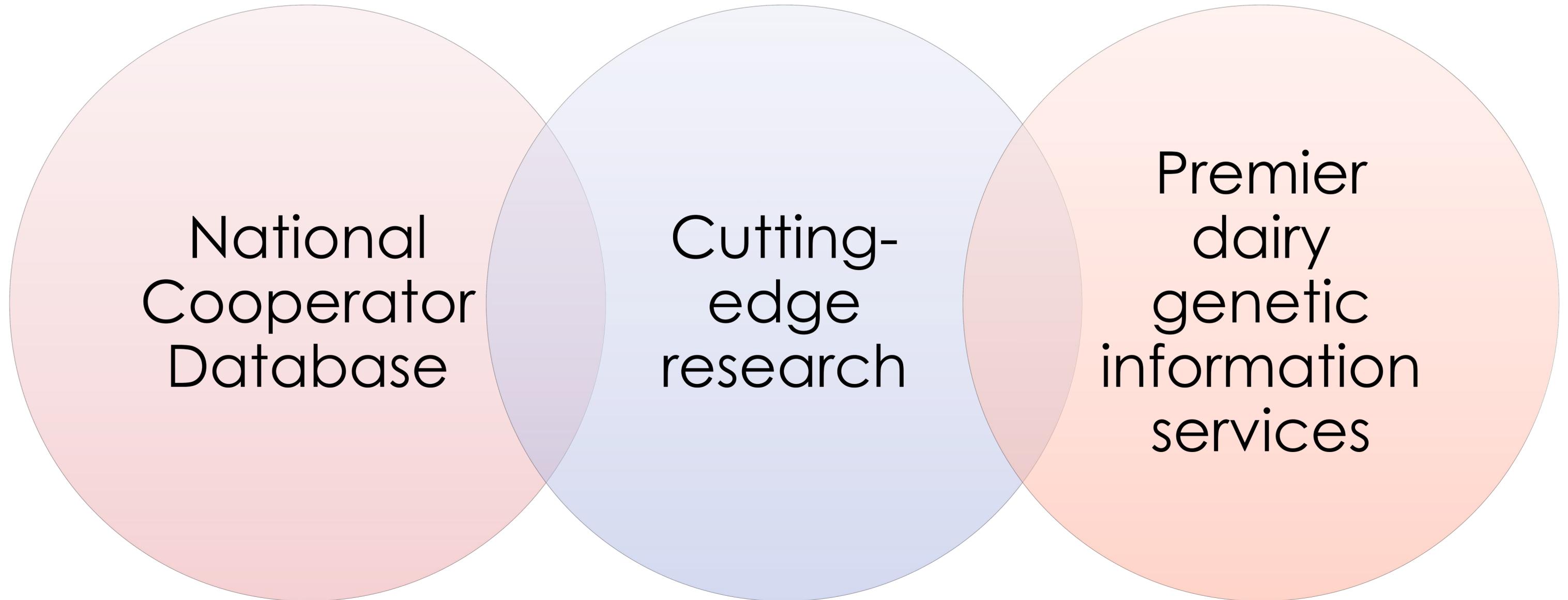
National Association of
Animal Breeders

Dairy Records
Processing Centers

Dairy Records Providers



Value-added to dairy producers



Dairy Herd Improvement Associations



Pedigree, performance and management records → CDCB

Pedigree and conformation records → CDCB



Dairy Records Processing Centers



Cows Leaving The Herd - Past 12 Months		Projected Herd Inventory - Next 6 Months	
Month	Reason	Month	Inventory
Jan	100	Jan	1000
Feb	100	Feb	1000
Mar	100	Mar	1000
Apr	100	Apr	1000
May	100	May	1000
Jun	100	Jun	1000
Jul	100	Jul	1000
Aug	100	Aug	1000
Sep	100	Sep	1000
Oct	100	Oct	1000
Nov	100	Nov	1000
Dec	100	Dec	1000

Breed Associations

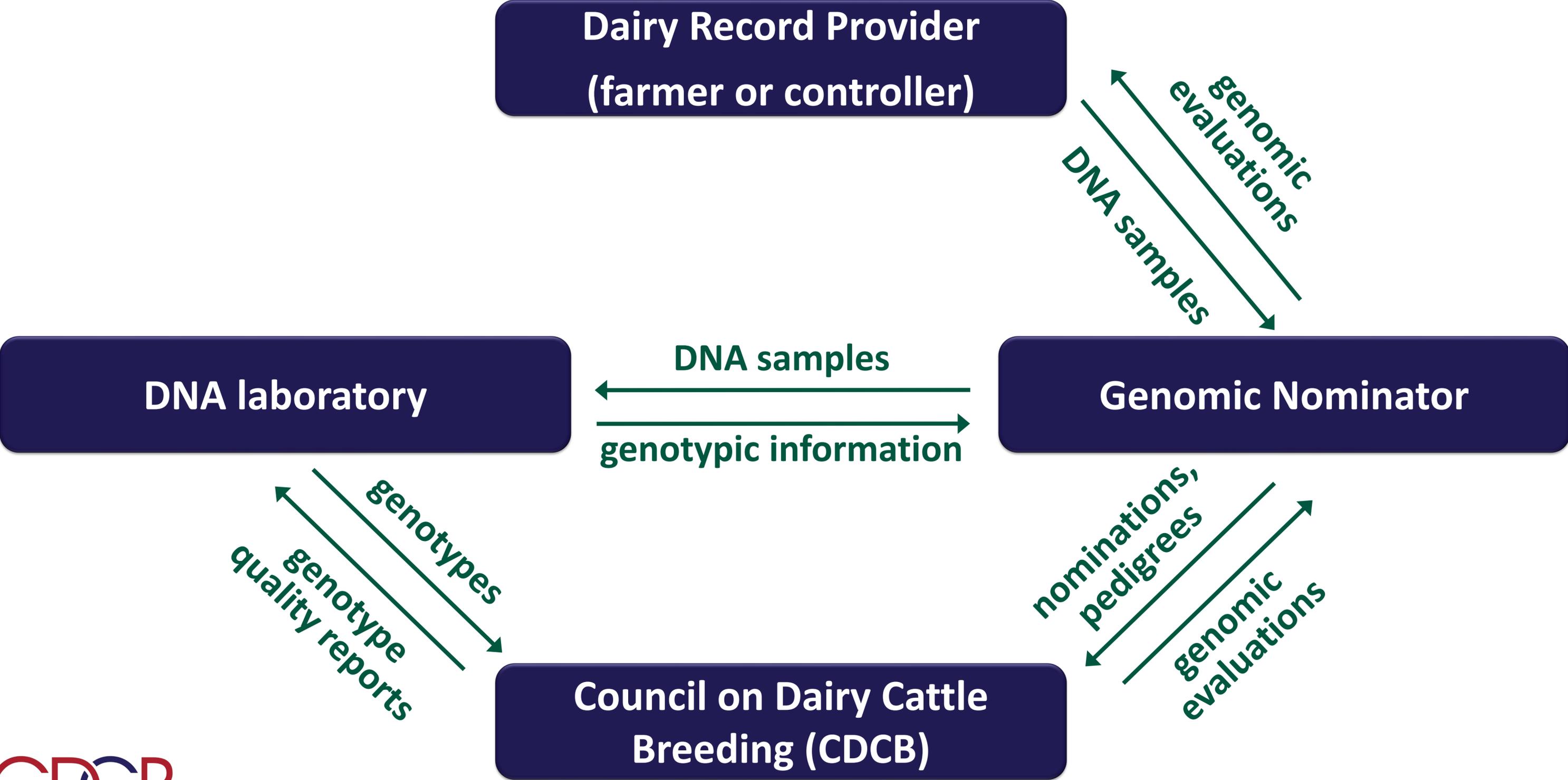
Genomic Nominators

Pedigree and genomic records → CDCB

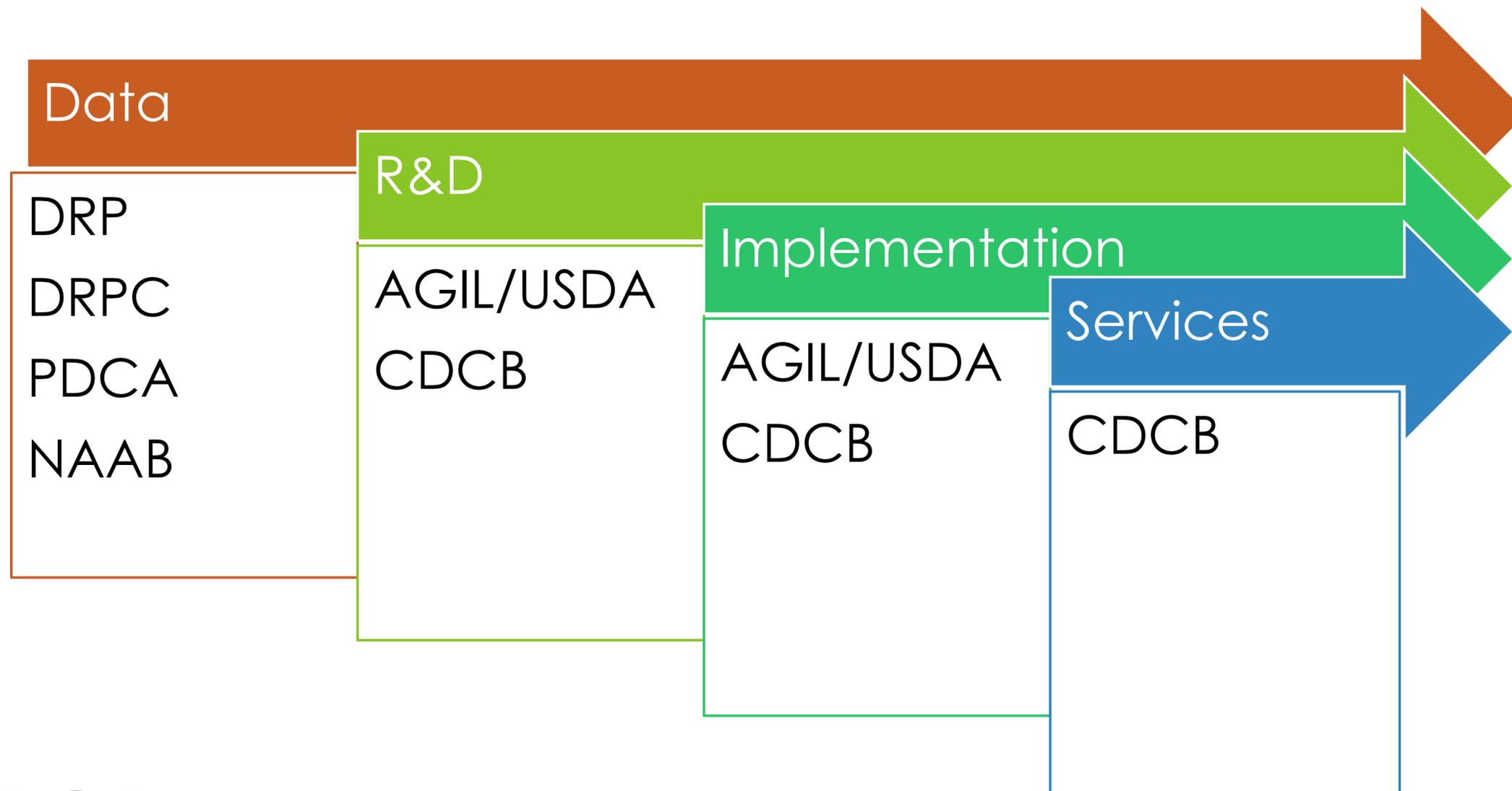
Genomic Laboratories



Genomic data flow



US Genetic Evaluation Process

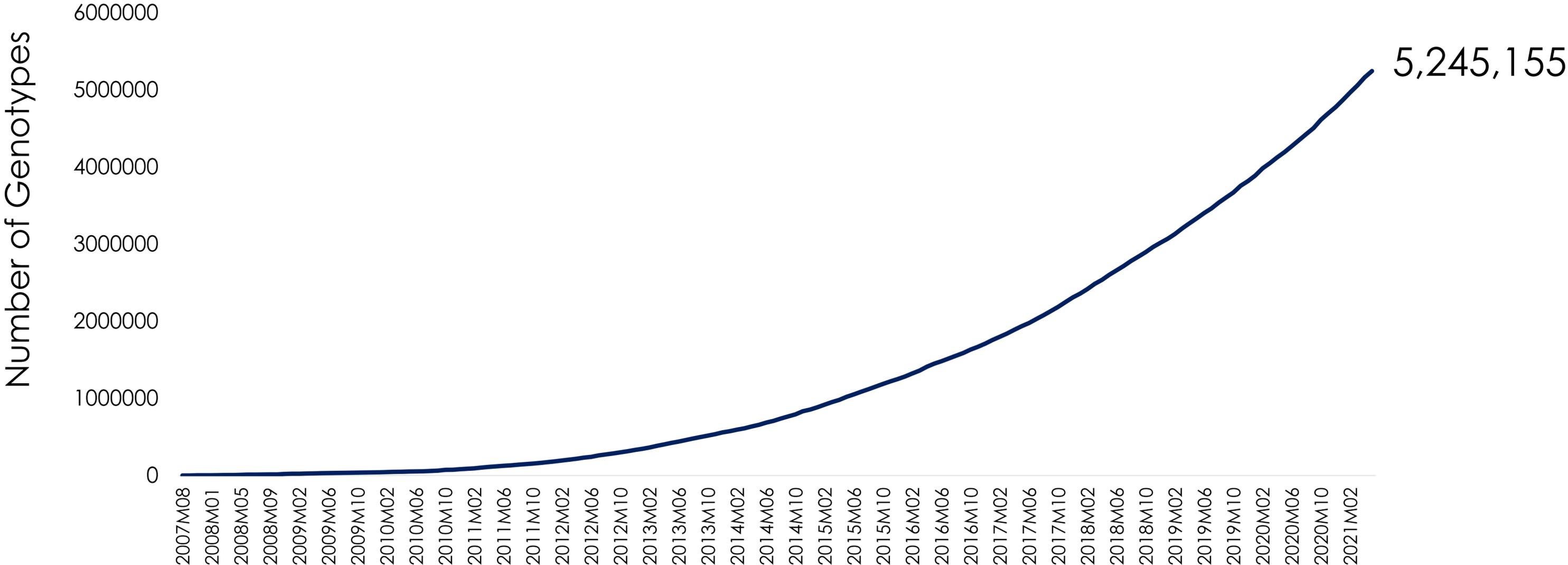


CDCB CERTIFICATION & QC PROGRAM

CDCB - Certification Process



Genotypes in CDCB Database

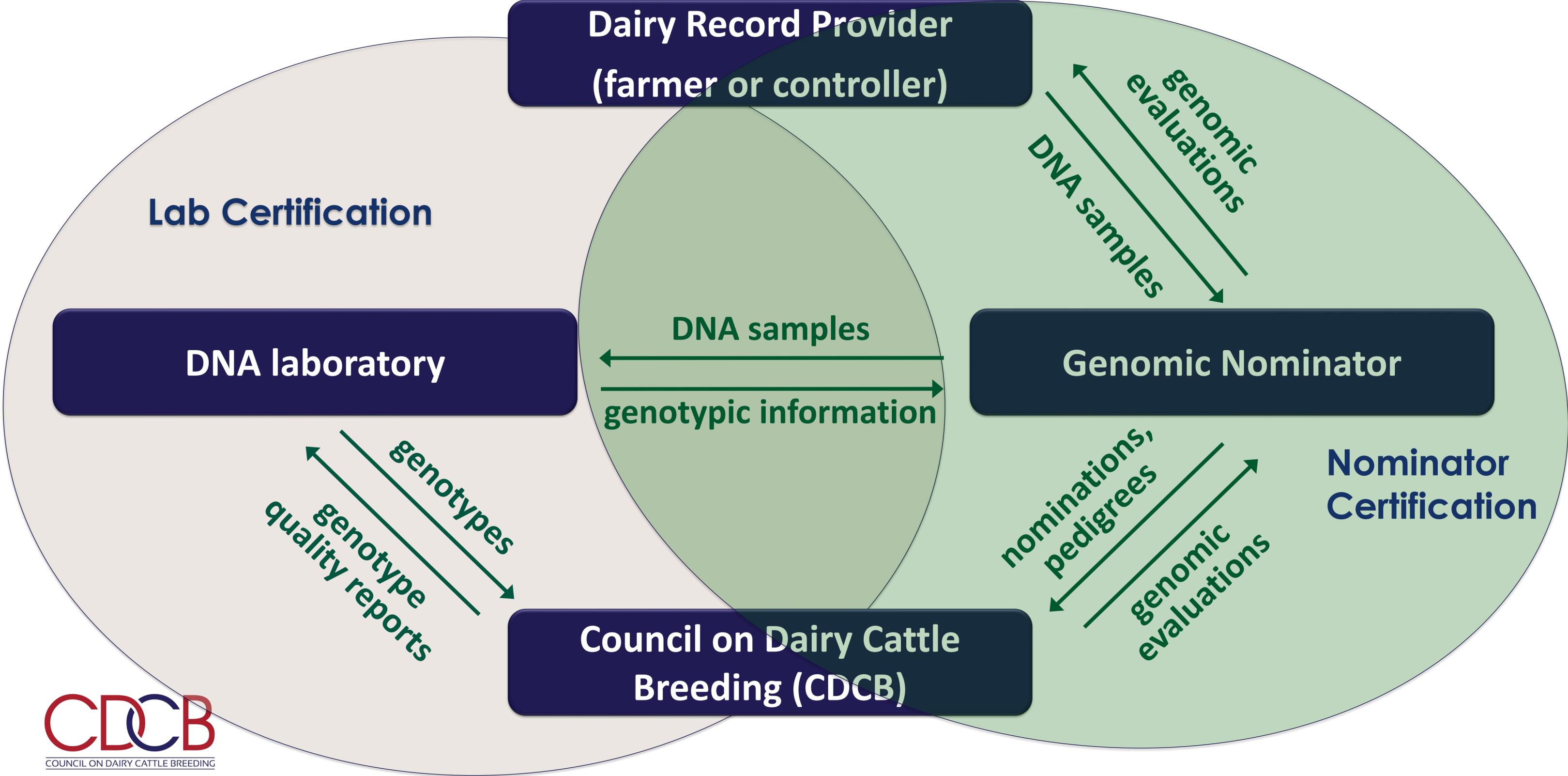


Purpose of the QC program

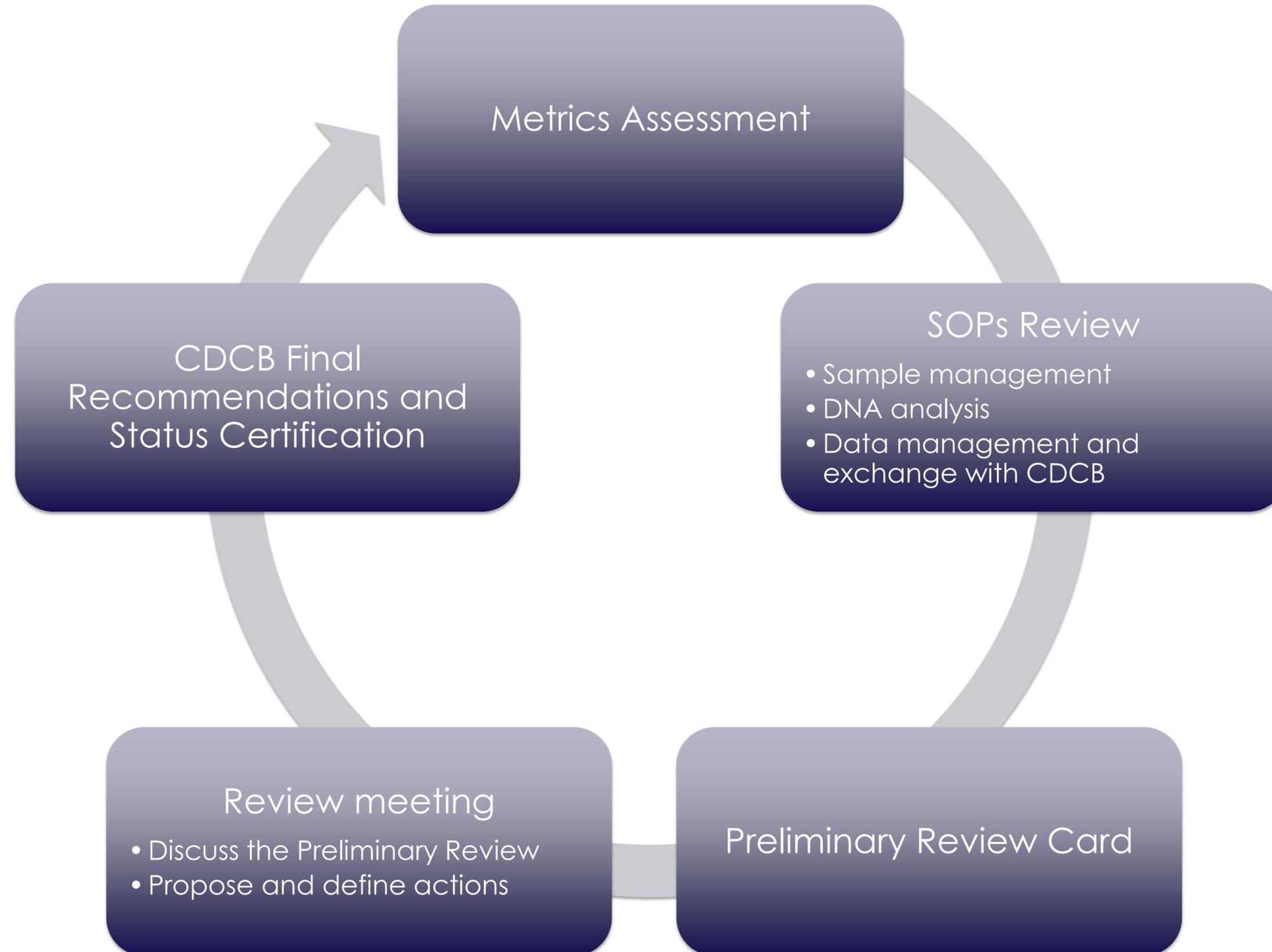
Ensure the accuracy and uniformity of all records included in the national genomic evaluation

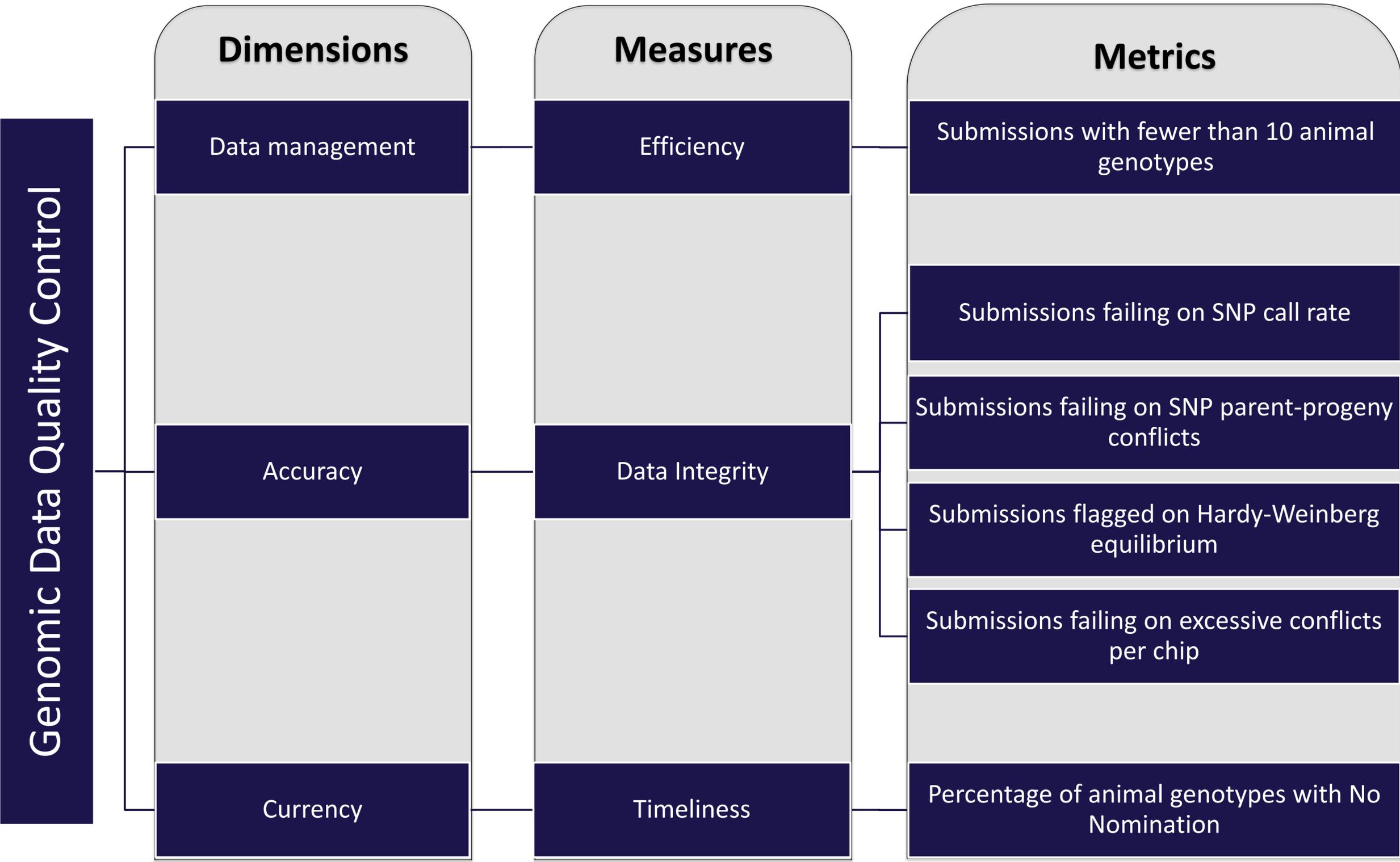
- Monitor certified nominators/laboratories performance regularly to ensure quality of data
- Detect the needs or issues experienced by CDCB collaborators
- Advise or find solutions for issues/concerns faced by collaborators
- Facilitate the exchange of data (in the most efficient way)
- Improve communication between collaborators and the CDCB

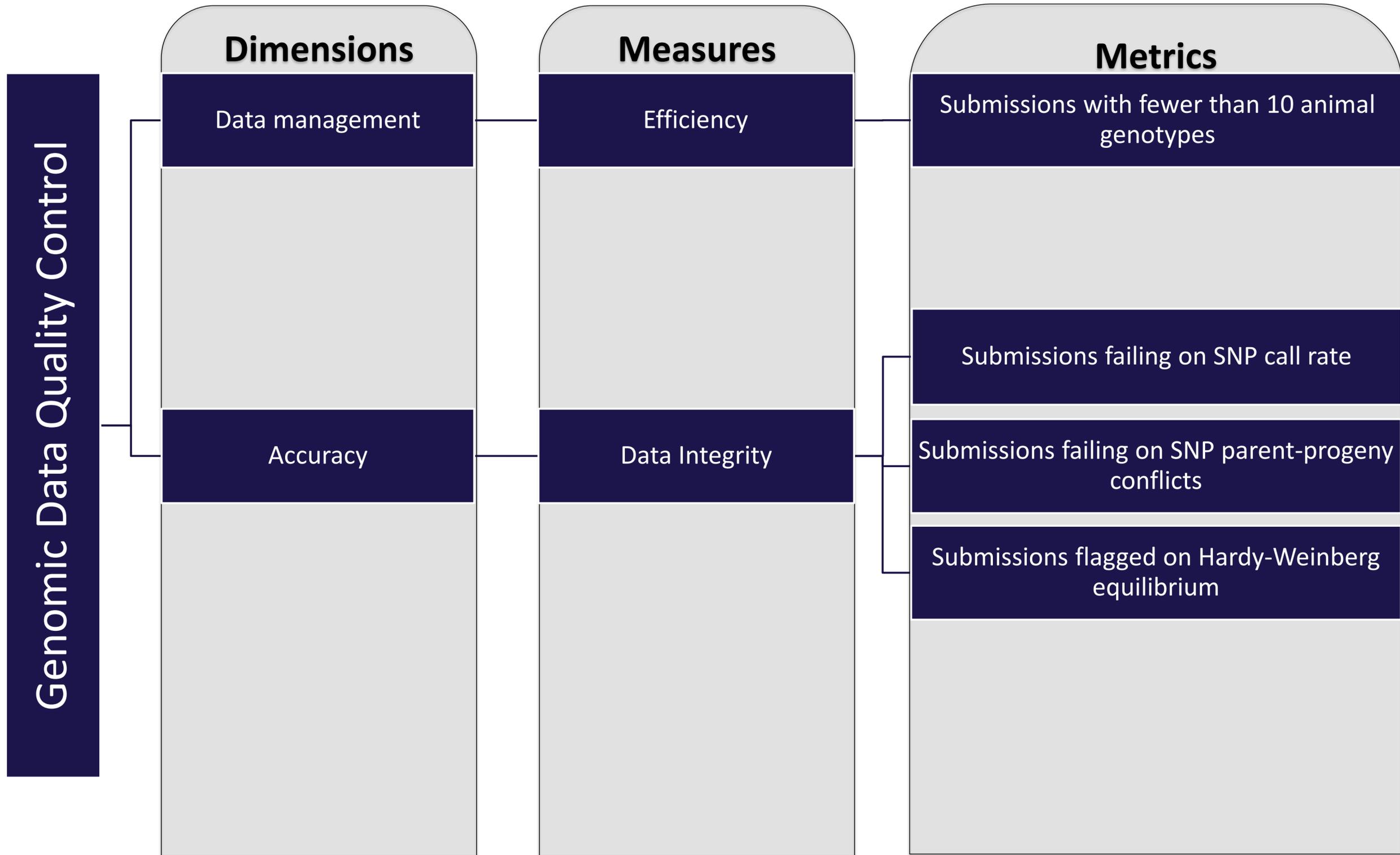
Certification



Annual Review Plan (Nominators & Labs)







Core Requirements for Genomic Nominators

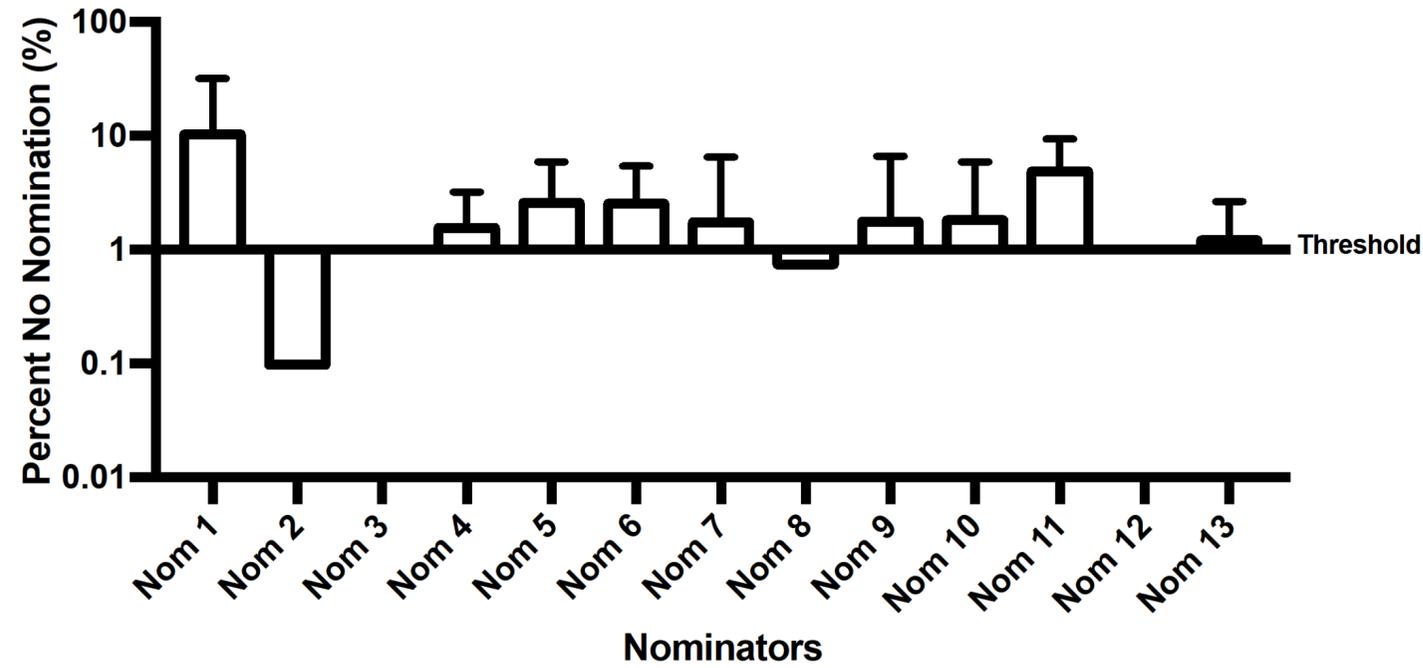
- Provide a unique animal identification (ID) for each nominated animal
- Have a unique animal ID associated with each tissue sample sent to the lab
- Report pedigree and genomic conflicts to customer/animal owner in a timely manner
- Provide the DNA laboratory with samples that are reliably identified
- Require DNA sample collectors to display the unique animal ID or be linked to a unique animal ID to allow validation of the animal being sampled at the time of sample collection
- Send (or direct customers to send) DNA samples to CDCB-certified laboratories
- Nominate animals before genotypes are received by CDCB
- Deliver genomic evaluations to customers
- Identify the appropriate fee class, collect fees on behalf of CDCB and remit fees to CDCB by the due date
- Notify CDCB staff of changes in ownership, location address, billing address, and any issue that could affect quality of service within 30 days of occurrence
- Comply with the Performance Metrics for Genomic Nominators defined in the [Quality Certification Guidelines](#). During monthly reviews of the Quality Metrics resolve any non-compliance identified by CDCB Staff
- Notify the CDCB 90 days in advance, if the Nominator decides to discontinue the service

Core Requirements for Genomic Laboratories

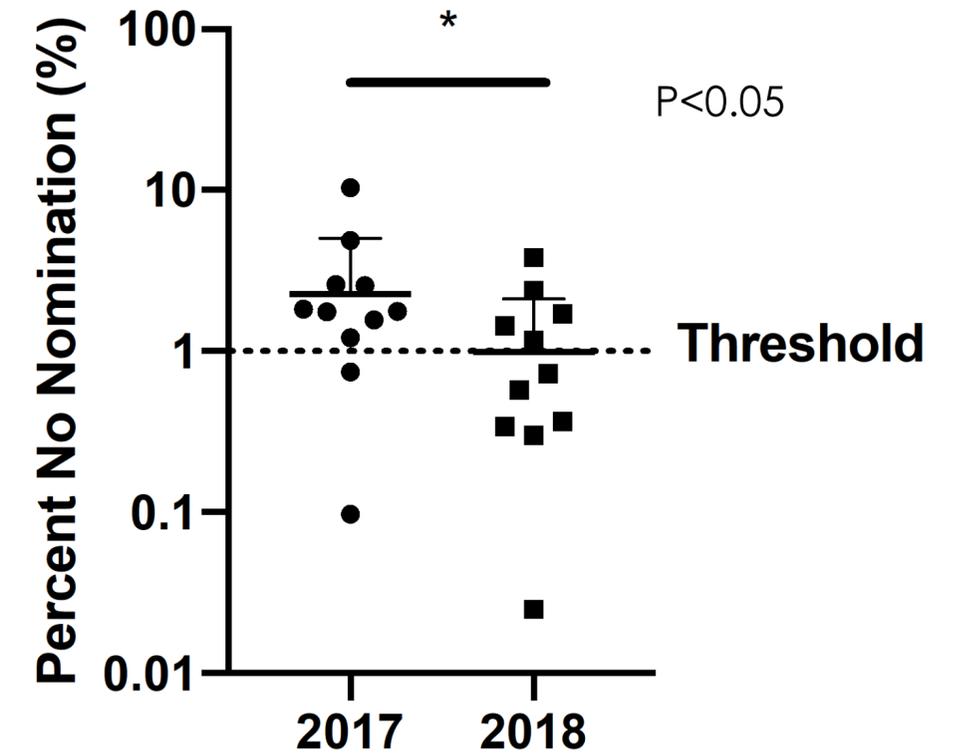
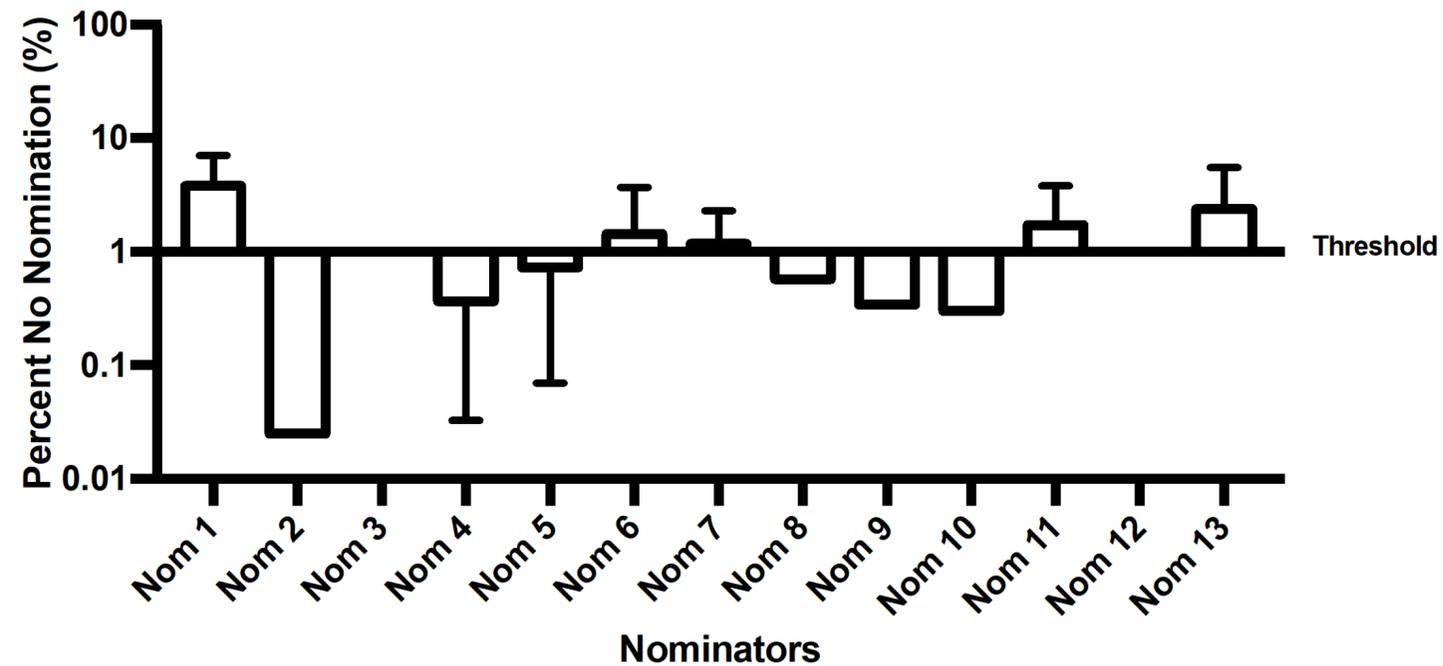
- Maintain a valid Quality Certification of standard laboratory processes
- Submit genotypes periodically to allow an assessment of the genotyping laboratory performance
- Verify the nomination of samples before submission to CDCB
- Be able to check submissions using the CDCB online system prior to submitting them for upload
- Be able to eliminate low-call-rate samples (<90%) prior to upload
- Be able to investigate and resolve issues involving SNP genotypes with low call rate, abnormal portion of heterozygous genotypes, or high number of parent- progeny
- Be able to coordinate with the genomic nominator(s) of the genotyped animals to ensure that submitted genotypes can be reliably associated with a valid animal identification, fee code and pedigree
- Comply with the Performance Metrics for Genotyping Laboratories defined in [Quality Certification Guidelines](#)

Impact of QC on Nominators' performance

2017



2018



QC PROGRAM SUMMARY

- The CDCB has developed a customized QC system for evaluating nominator/laboratory performance
- Previous experience with the nominators demonstrated the positive impact after implementing a similar approach
- The QC program assists nominators and laboratories in delivering high quality data and results, and to contribute to maintaining the integrity of the CDCB database

CDCB IN NUMBERS



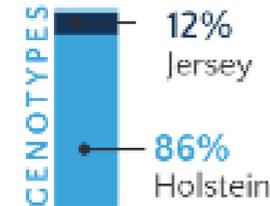
2009

Year genomic evaluations available in U.S.

Young genomic sires account for



>4½ million genotypes in world's largest animal database.



♂ **10%** of genotyped animals are male

♀ **90%** of genotyped animals are female

905,185 animals genotyped in the last 12 months (10.1.19 to 9.30.20)



50 traits calculated by CDCB

- 4 selection indexes
- 5 production traits
- 19 health, fertility & calving traits
- 22 conformation traits
- 23 official genetic conditions & haplotypes

Weekly genomic predictions for new genotyped animals

13M Lactation, Calving, Breeding and Health records added for each triannual evaluation

Monthly genomic evaluations

5.5M DHI records in CDCB health evaluations Holstein

Triannual evaluations conventional, genomic & Interbull (in APR, AUG & DEC)

690K DHI records records in CDCB health evaluations Jersey

Dairy Cows by Breed

AMONG 4.17M COWS WITH RECORDED BREED IN DHI HERDS (2019)

- 🐄 Ayrshire 2,112
- 🐄 Brown Swiss 9,416
- 🐄 Guernsey 3,219
- 🐄 Holstein 3,347,166
- 🐄 Jersey 326,791
- 🐄 Milking Shorthorn 842
- 🐄 Multi-Breeds 480,774

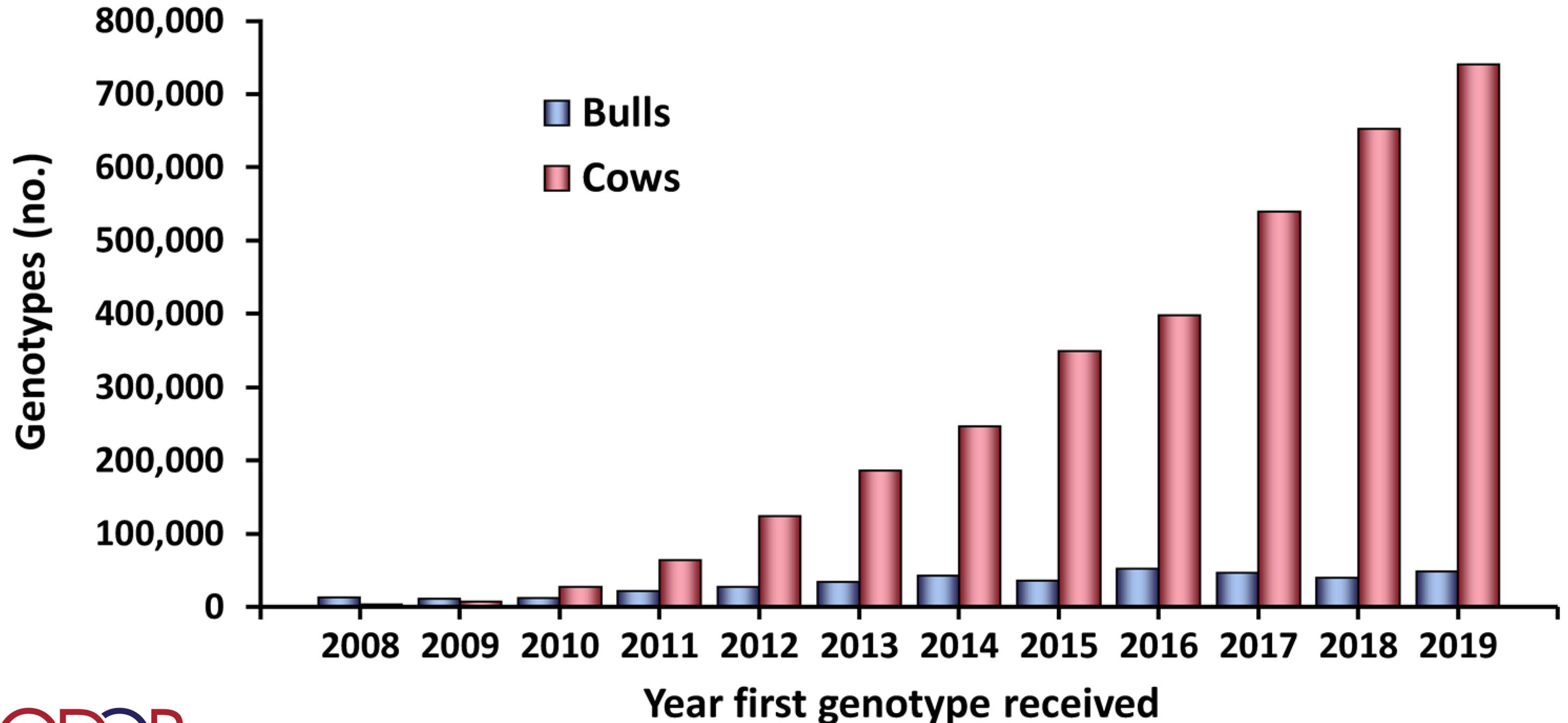
Dairy cow enrollment in DHI test (January 1, 2018)

Breed	Herds	Cows
Ayrshire	60	2,600
Brown Swiss	138	10,198
Guernsey	78	3,613
Holstein	12,616	3,545,514
Jersey	818	338,697
Milking Shorthorn	23	1,192
Multi-breed ¹	1,793	478,874

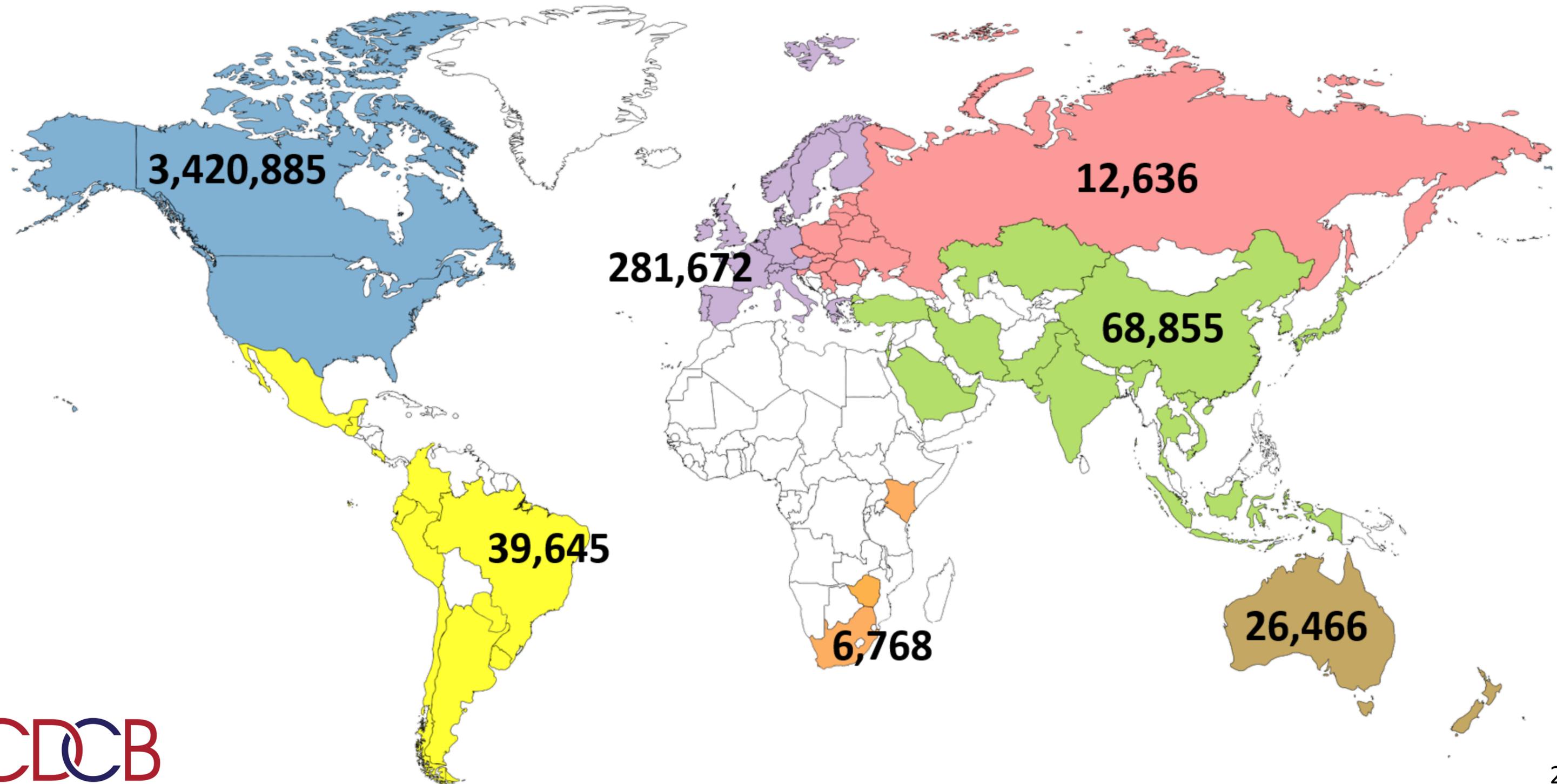
Worldwide livestock genotyping (January 2019)

Species	Countries/Companies	Animals
Dairy	United States and Canada	3,020,000
	Germany	785,000
	France	550,000
	Netherlands	465,000
	New Zealand	140,000
Beef (Angus)	United States	550,000
Beef and dairy	Ireland	1,500,000
Poultry	Aviagen	1,000,000/year

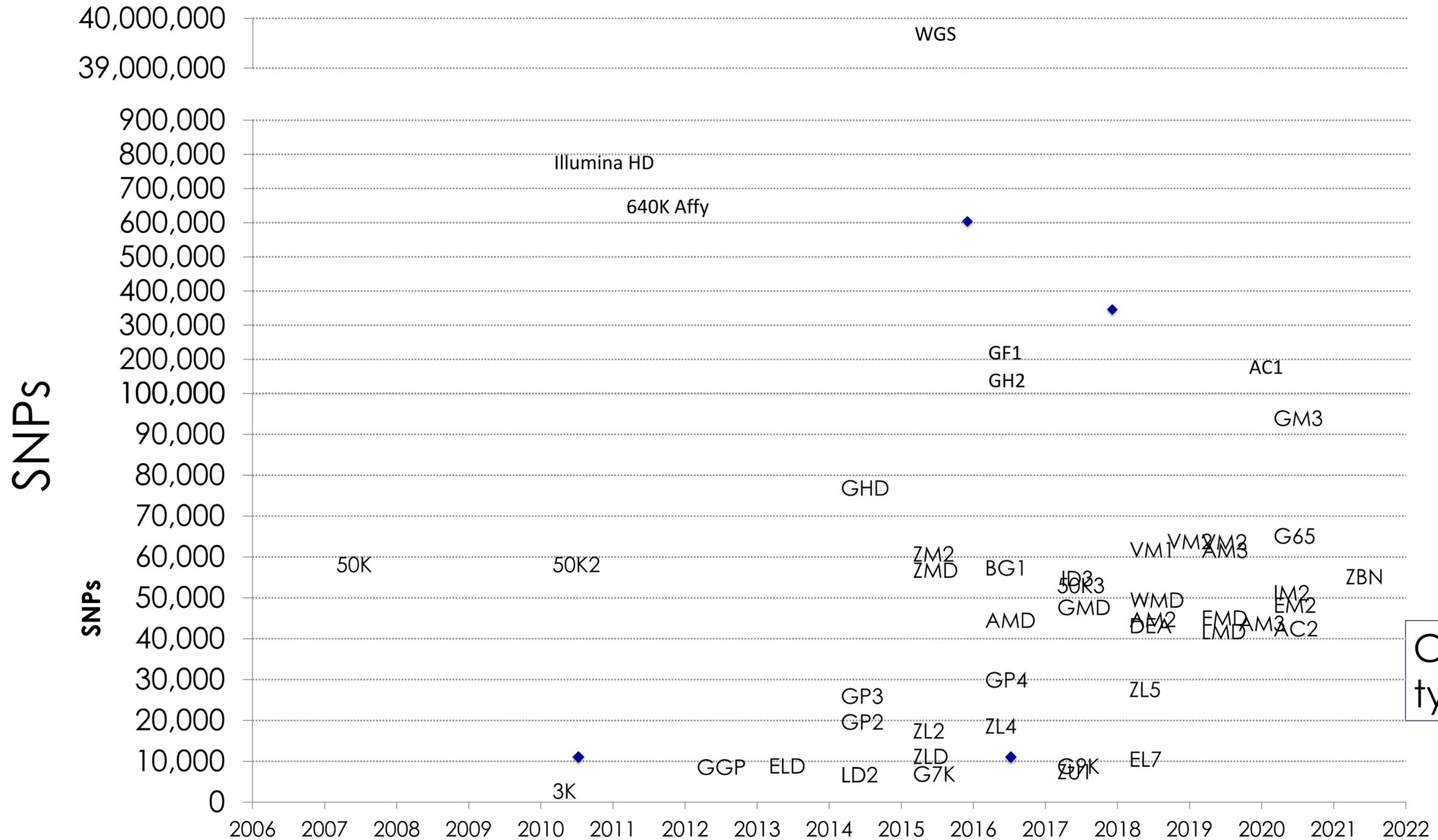
CDCB usable genotype counts by animal sex



Genotyped animals in CDCB database by region (March-2020)

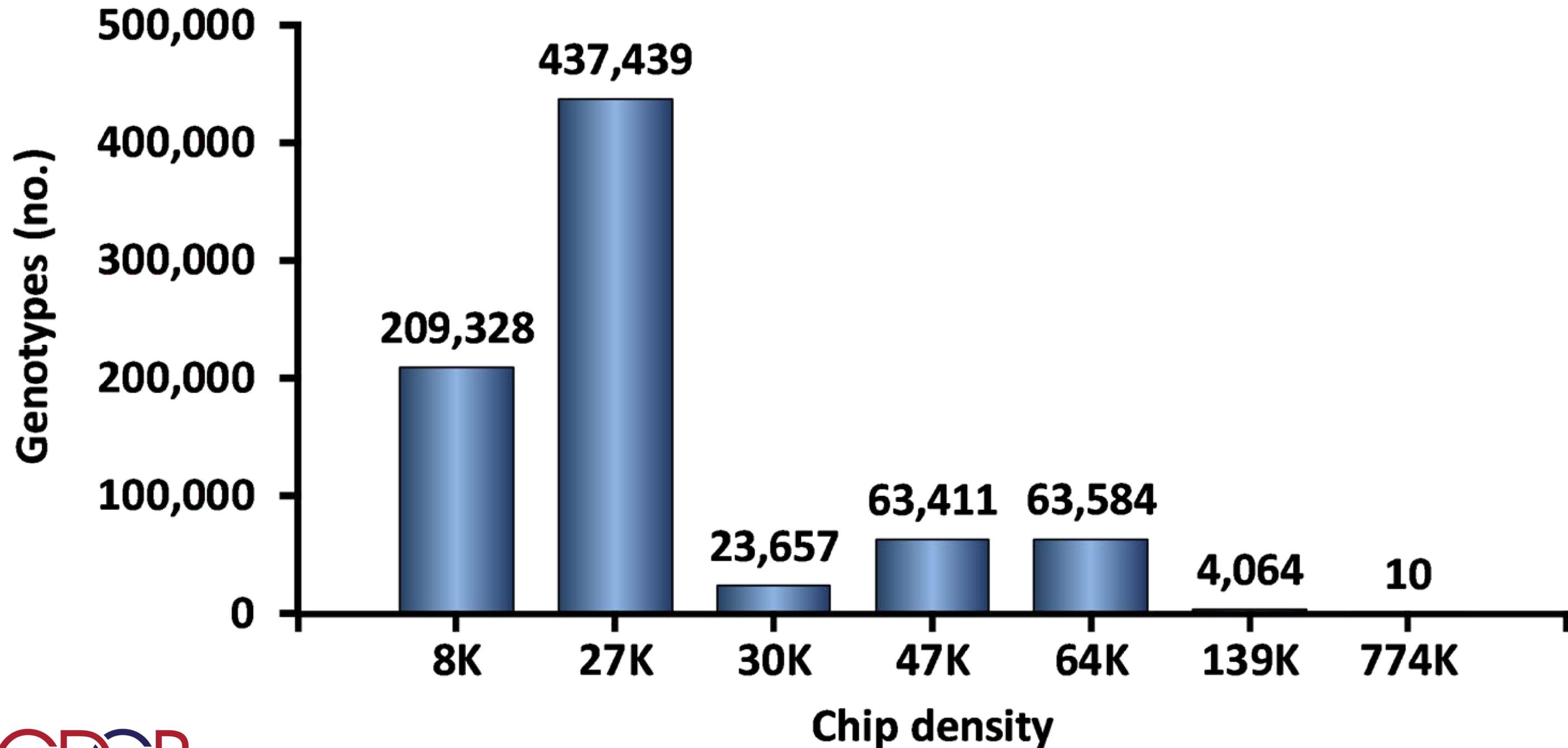


Many new chips have been added



CDCB accepts **47** types of SNP chips

Genotypes received in 2019 by chip density



TOOLBOX

Tools

- [CDCB Webpage](#)
- [CDCB Queries](#)
- [Redmine](#)
- Customer Service (Ticket system)

Thanks for your attention