



# Genomics Update & Discussion

Neogen Canada  
2023 CBA Convention  
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# About NEOGEN

## NEOGEN

Founded in 1982 in Lansing, Michigan, NEOGEN's solutions can be found at every step of the food system, around the world.

NEOGEN provides the most comprehensive range of solutions for the food processing, animal protein and agriculture industries, not only protecting the world's food supply, but also allowing our customers to produce more efficiently and effectively than they could before.

# From Farm to Fork

How it all ties together



## Food Safety

NEOGEN reaches all segments of the food, beverage and feed industries with solutions that include: rapid diagnostics for the detection of unintended substances, sanitation verification tools, innovative pathogen tests, next generation genome sequencing and more.

### Corporate and Food Safety Headquarters:

Lansing, Michigan



## Animal Safety

NEOGEN develops solutions for the animal protein market, as well as the performance and companion animal segments. We offer veterinary instruments and supplies, cleaners and disinfectants for farm and veterinary settings, insecticides and rodenticides to limit the spread of disease and more.

### Headquarters:

Lexington, Kentucky



## Genomics

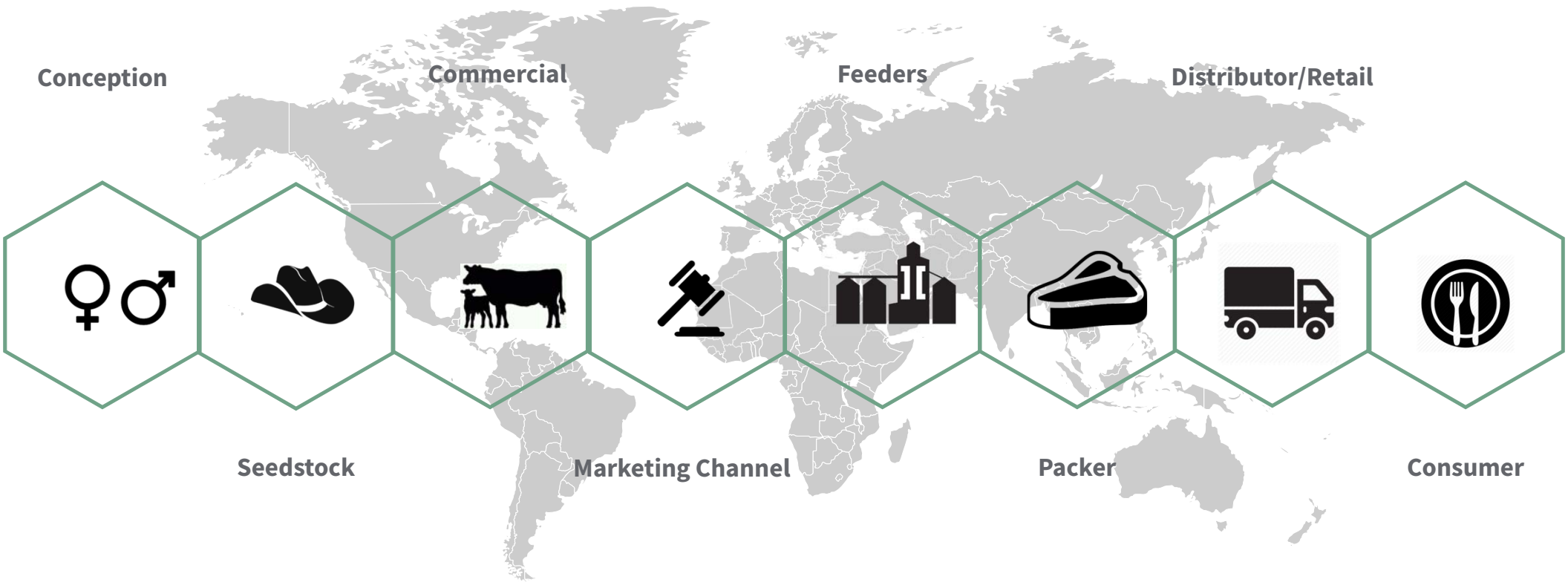
NEOGEN offers genomics solutions that allow animal protein producers to make educated breeding decisions that improve the efficiencies of their herds, breed associations to verify parentage, and for food safety professionals to identify bacterial strains associated with particular disease outbreaks.

### Headquarters:

Lincoln, Nebraska

# Neogen Services the World

Genomics – Animal Health – Food Safety



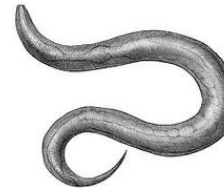
# Global Presence

Neogen's DNA Testing Laboratories



# Neogen Genomics: The World's Largest Commercial Genomics Laboratory

The Global Leader in Genomics

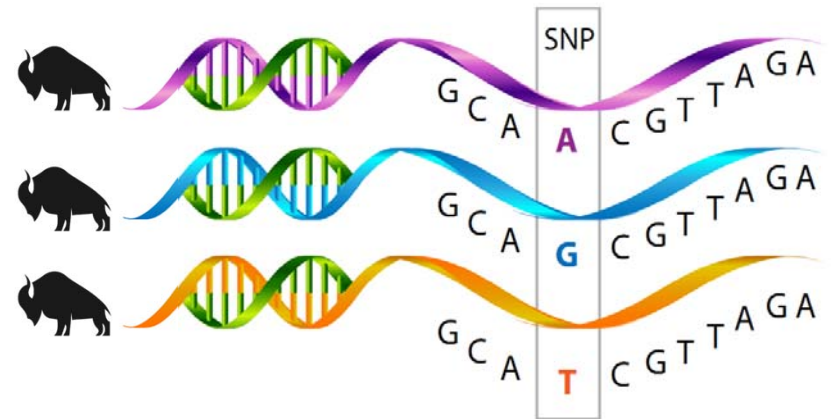


# Neogen & CBA: Our History

From the Genomics Research Program

## Genomics Research Program (2017-2020)

- Three objectives: create testing for parentage, subspecies composition, and cattle introgression
- Found ~54 million SNPs in the bison sequenced vs cattle, where we see 30-35 million SNPs
- Tested 83,000 SNPs on 480 animals to validate that these markers are linked to the objective of interest – narrowed this down to 15,000 SNPs



# Neogen & CBA: Where We Are Now

Commercialization of Genomic Tools

## GGP-Bison 15K SNP Chip

- Use approximately 15,000 SNPs to test for
  - Parentage
  - Subspecies Composition
  - Cattle Introgression

## Affymetrix 83K Bison Array

- A research tool that delivers 83,000 SNPs as raw data
- Also includes the markers that indicate parentage, subspecies composition, and cattle introgression



# How to Test Your Animals

Testing Available through the CBA Website

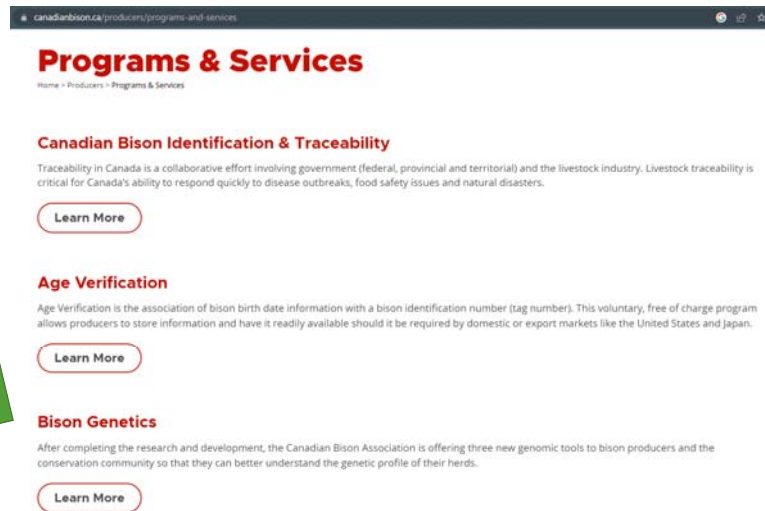
1. Order sampling equipment (Allflex TSUs, Hair Cards, Blood Cards)  
<https://www.neogen.com/solutions/sampling-equipment/>
2. Decide which animals to test and collect samples from them



# How to Test Your Animals

Testing Available through the CBA Website

1. Order sampling equipment (TSUs, Hair Cards, Blood Cards)  
<https://www.neogen.com/solutions/sampling-equipment/>
2. Decide which animals to test and collect samples from them
3. Download order form from CBA website and fill in the information



The screenshot shows the 'Programs & Services' page of the Canadian Bison Association website. The page is titled 'Programs & Services' and lists three main sections: 'Canadian Bison Identification & Traceability', 'Age Verification', and 'Bison Genetics'. Each section has a 'Learn More' button. A large green arrow points from the left towards the 'Bison Genetics' section.

**Programs & Services**  
Home > Producers > Programs & Services

**Canadian Bison Identification & Traceability**  
Traceability in Canada is a collaborative effort involving government (federal, provincial and territorial) and the livestock industry. Livestock traceability is critical for Canada's ability to respond quickly to disease outbreaks, food safety issues and natural disasters.  
[Learn More](#)

**Age Verification**  
Age Verification is the association of bison birth date information with a bison identification number (tag number). This voluntary, free of charge program allows producers to store information and have it readily available should it be required by domestic or export markets like the United States and Japan.  
[Learn More](#)

**Bison Genetics**  
After completing the research and development, the Canadian Bison Association is offering three new genomic tools to bison producers and the conservation community so that they can better understand the genetic profile of their herds.  
[Learn More](#)



# How to Test Your Animals

Testing Available through the CBA Website

1. Order sampling equipment (TSUs, Hair Cards, Blood Cards)  
<https://www.neogen.com/solutions/sampling-equipment/>
2. Decide which animals to test and collect samples from them
3. Download the order form from the CBA Website and fill in the information
4. Mail samples and order confirmation to Neogen Canada in Edmonton



# Understanding your Results: Parentage Testing

Evaluating Bull Performance

Parentage results include the qualified sire and/or dam, and if the trio qualifies (where both parents are tested)

If testing a potential parent, the results certificate will confirm that the animal was tested and is now on file for use

What to do with this information:

- Determine how many calves each bull sired/dam mothered
  - Are they earning their keep?
- Determine which bulls sired the best (or worst) calves
- Avoid (or enable) line breeding with replacements

Who's the father?



# Understanding Your Results: Subspecies Composition

Each animal is assigned a results category based on its Plains vs Wood score

Subspecies composition results differentiate plains/woods bison and the composition of crosses as a percent.

What to do with this information:

- Phenotypic assessment
- Manage hybrid vigor
- Increase genetic diversity



# Understanding Your Results: Cattle Introgression

Results are displayed as a cattle score, which is the percentage of cattle DNA identified by the test

Cattle introgression results identify those bison that test positive for cattle introgression expressed as a percent.



What to do with this information:

- Pure breeding stock
- Conservation in developing pure herds





# Certificate of DNA Identification

Customer Sample ID: 0 Pink

Animal ID: 300005213	CCIA Number: A000001
Barcode: TSU Number	Birthdate: 5/1/2022
Sample ID: 000001	Order ID(s): 800001, 800002
Sex: F	Date of Report: 9/28/2023

*A unique DNA profile has been created for the individual listed above by genotyping single nucleotide polymorphism (SNP) markers. These genotype results uniquely identify the individual's genetic identity and are stored at Neogen for future parentage comparison.*

*SNP DNA profiles can be compared between parents and offspring to verify parentage relationships. These markers do not provide information relevant to health, performance, or behavior.*

Sire Result			Dam Result		Trio Result
Sire ID	Sire Result		Dam ID	Dam Result	Sire/Dam Result
300011	00White	Qualified	300012	00Yellow	Qualified

Cattle Introgression Result
Cattle Score
0.96 %

Subspecies Result		
Plains Score	Wood Score	Result Category
99.62 %	0.38 %	Plains



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CANADIAN BISON ASSOCIATION

CONSUMERS ▶

PRODUCERS ▶



Items in Cart (0)

# Bison Genetics

Home > Producers > Programs & Services > Bison Genetics

## Bison Genomics Testing

After completing the research and development, the Canadian Bison Association is offering three new genomic tools to bison producers and the conservation community so that they can better understand the genetic profile of their herds. The three tests include:

- A parentage test based on the newest technology available.
- A test to determine the Plains/Wood composition of a bison using genetics.
- A test to measure cattle introgression in bison.

### An Important Note

The Canadian Bison Association will maintain a confidential file of the test results for analytical purposes. The analysis will not reveal any individual results. The test results belong to the producer that purchases the test.

At this time the Testing program is ONLY available to Canadian Producers. The process for US Producers will be outlined as soon as it is finalized.

## Producers

- Home
- The CBA
- About Bison
- Regional Associations
- Programs & Services**
  - Canadian Bison Identification & Traceability
  - Age Verification
  - Bison Genetics**
  - Bison Registry
  - Carcass Grading
  - Marketing
  - Production & Financial Performance
  - Bison Producer Training Materials



# Thank You For Listening

**Get In Touch**

[www.NEOGEN.com](http://www.NEOGEN.com)

