



Genetics: Welfare

Croney Research Group

Can a Dog's Genetics Impact Their Welfare?

Yes!

Genetic diseases impact welfare and we should do our best to not produce affected puppies

How Can a Dog's Genetics Impact Their Welfare?

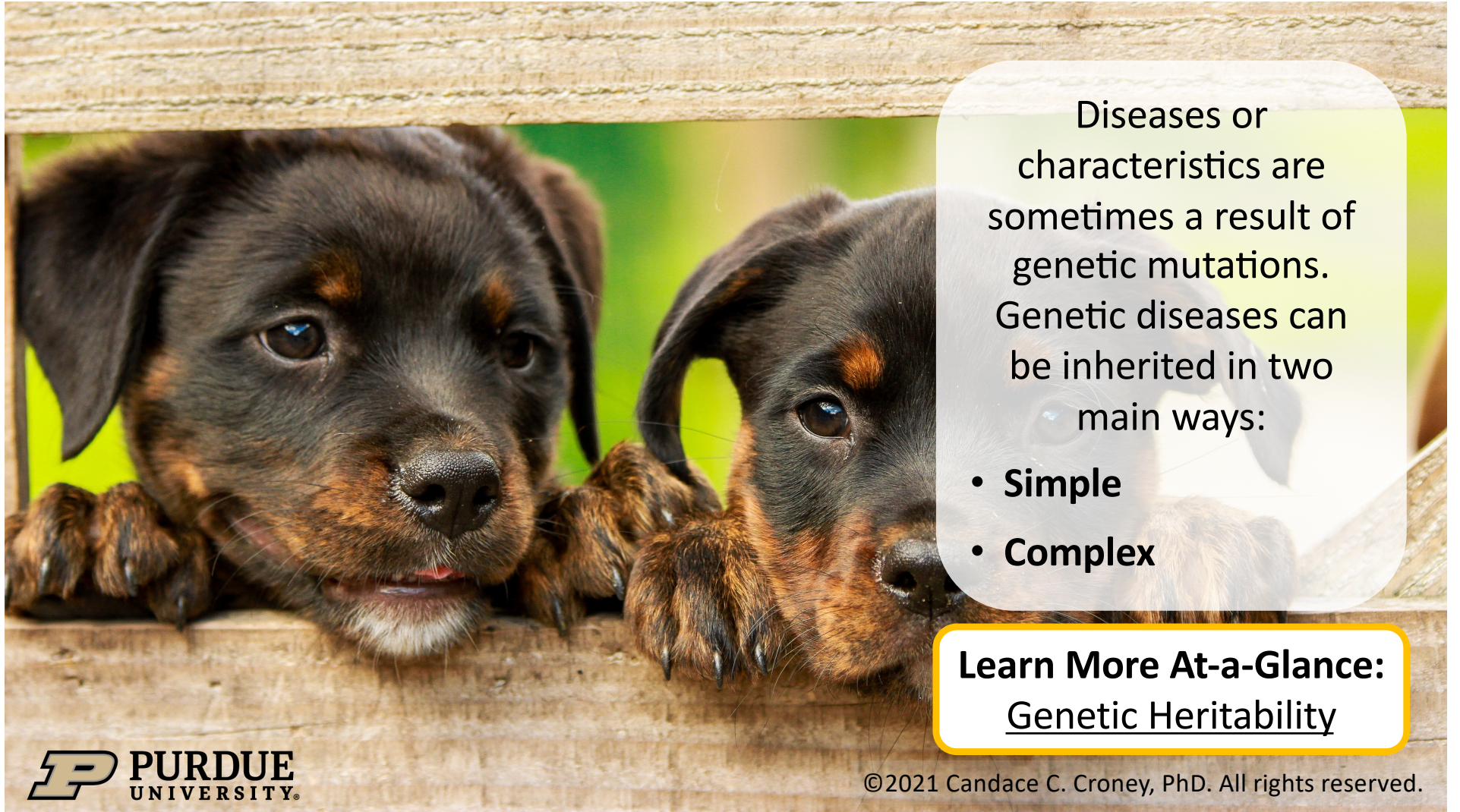


Some genetically-produced physical traits can harm a dog's welfare, such as "extreme" body shapes (e.g., extremely flat faces can impair a dog's ability to breathe)

Learn More At-a-Glance:
[Genetics Application](#)

How Can a Dog's Genetics Impact Their Welfare?

Behavior is impacted by genetic makeup (behavioral euthanasia is the leading cause of death for dogs in the United States)



Diseases or characteristics are sometimes a result of genetic mutations. Genetic diseases can be inherited in two main ways:

- **Simple**
- **Complex**

Learn More At-a-Glance:
[Genetic Heritability](#)

Simple Inheritance

Traits controlled by a
single gene with two
alleles (versions)

Single-Gene Mutation Disease Examples

- Most forms of Progressive Retinal Atrophy (PRA) – an eye disease
- Hyperuricosuria (HUU) – a disease that predisposes dogs to bladder or kidney stones
- Exercise Induced Collapse (EIC) – a neurologic disease that makes some dogs collapse
- Sensitivity to certain drugs (such as Ivermectin sensitivity due to a Multidrug Resistance 1 mutation – *MDR1*)


Complex Inheritance

- Involves multiple genes, multiple alleles, gene interactions, incomplete dominance, and/or codominance
- Each of these can contribute a small amount to the overall disease risk

Multiple-Gene Mutation Disease Examples

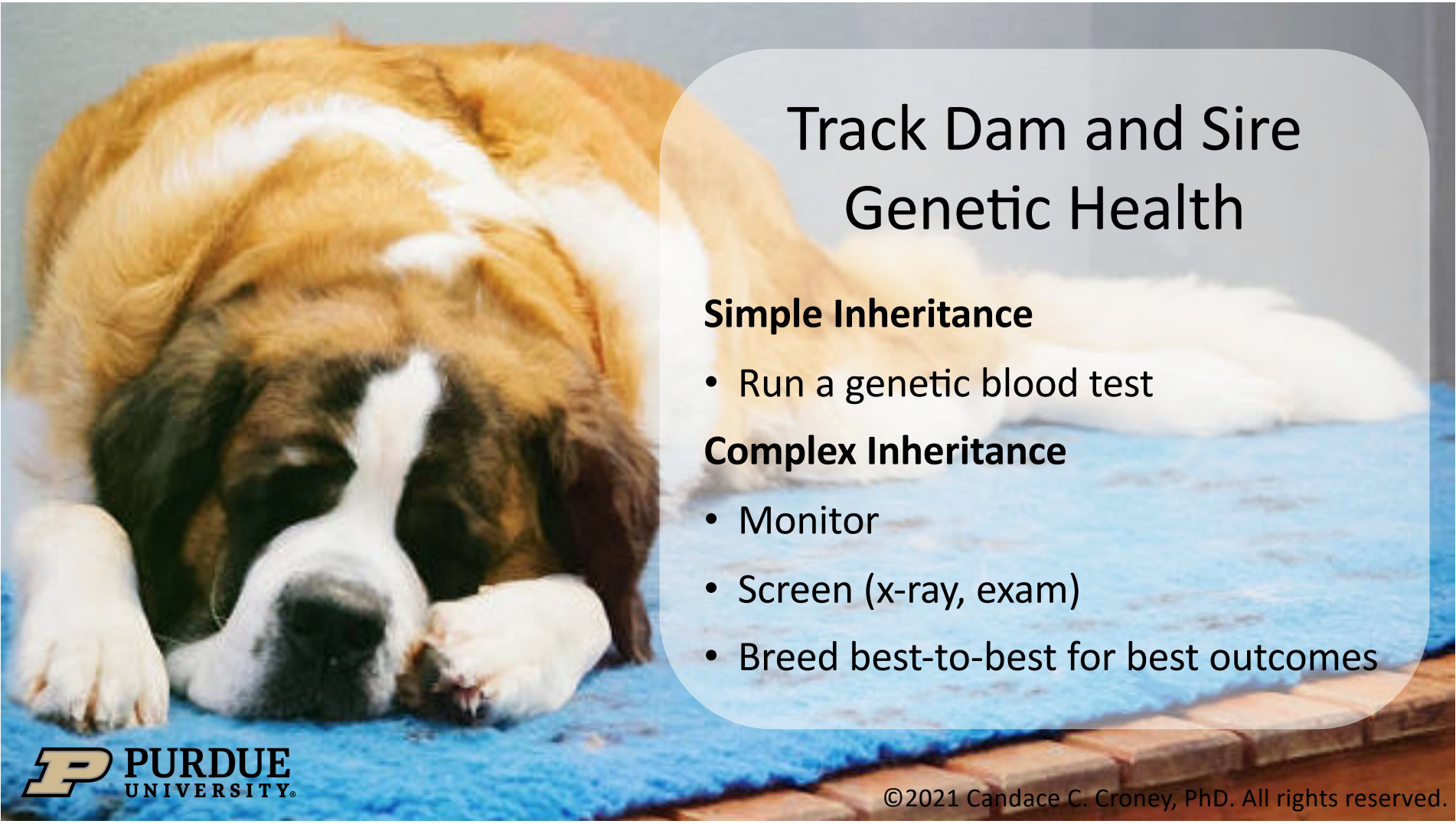
- Hip dysplasia
- Epilepsy
- Elbow dysplasia
- Behavioral traits

Minimizing Genetic Diseases



Careful pairings of dam and sire informed by their genetic health reduces the occurrence of genetic diseases in their litters

Learn More At-a-Glance:
[Genetic Counseling](#)

A Saint Bernard dog with brown and white fur is lying down on a blue mat. The dog's head is resting on the mat, and its front paws are visible. The background is a plain, light-colored wall.

Track Dam and Sire Genetic Health

Simple Inheritance

- Run a genetic blood test

Complex Inheritance

- Monitor
- Screen (x-ray, exam)
- Breed best-to-best for best outcomes



Selective Breeding

Pairings can pass along both the desired and undesired genetic traits of the dam and sire, potentially increasing offspring susceptibility to disease or behavior problems

Selective Breeding: Potential Health Concerns

- Behavioral disorders
- Blood disorders
- Cancer
- Cardiovascular disease
- Dermatological diseases
- Immune diseases

Selective Breeding: Potential Health Concerns

- Neurological abnormalities
- Orthopedic disease and skeletal abnormalities
- Respiratory diseases
- Sensory concerns
(including hearing and vision impairment)
- Urogenital diseases (e.g., kidney stones)

Selective Breeding for Physical Appearance: Brachycephaly

- **Brachycephaly:** the flat-faced characteristic seen in several dog breeds
- There are multiple genes that are mutated in most dogs with brachycephaly
- The mutations result in changes (shortening) of the snout/muzzle

Common Concerns in Brachycephalic Dogs Impacted by Genetics:

- **Dental** - crowding of teeth in the nonexistent muzzle
- **Dermatological** - infection of skin folds on the face
- **Gastrointestinal** - gastric reflux due to changes in internal pressures, related to increased breathing effort
- **Ophthalmological** - shallow eye sockets and eye lids that often cannot close all the way



Common Concerns in Brachycephalic Dogs Impacted by Genetics:

- **Reproduction** – trouble fitting big-headed puppies through the birth canal
- **Respiration** - increased respiratory effort, BOAS (Brachycephalic Obstructive Airway Syndrome)
- **Thermoregulation** – unable to cool off adequately due to changes in respiration



Owners of brachycephalic breeds
report concerns regarding:

- Health
- Expense
- Ethical and welfare issues
- Negative impacts on owner lifestyle
- Behavior

Selective Breeding for Physical Appearance: Coat Pigmentation

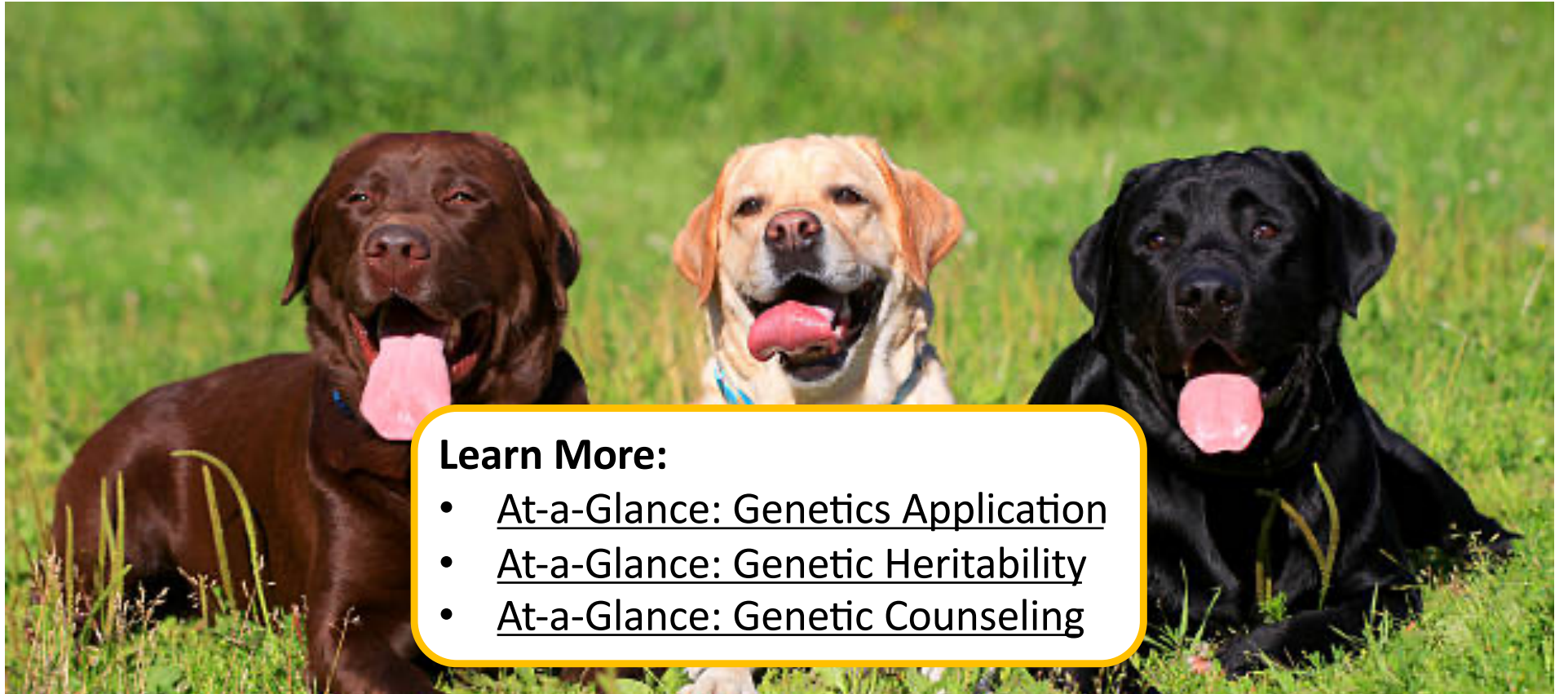
Merle coloration has been linked genetically to a variety of concerns related to:

- Hearing
- Vision

Selective Breeding for Physical Appearance: Coat Pigmentation



- The genetics of merle are now well-understood, including “cryptic” merles
- Genetic tests can assist breeders in making breeding choices in order to retain the desired merle coat color pattern while avoiding negative impacts to vision and hearing



Learn More:

- [At-a-Glance: Genetics Application](#)
- [At-a-Glance: Genetic Heritability](#)
- [At-a-Glance: Genetic Counseling](#)



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