

ELEVAGE SÉLECTIF DU CHIEN

FORMATION BIEN-ÊTRE ANIMAL

ETABLISSEMENTS AGRÉES

Notes de cours préparées par Johann DETILLEUX

26 SEPTEMBRE 2024 (4H30)





PROGRAMME 2024:

Jeudi 19/09/2024: Partie commune: Principes généraux (4h30)

Jeudi 26/09 : Elevage sélectif des chiens (9h-13h30)

Mercredi 23/10 : Elevage sélectif des chats (13h-17h30)

Jeudi 14/11 : La détention des reptiles (9h-13h30)



PLAN

Elevage sélectif

- Performances
- Standard de race
- Studbook

Sélection artificielle

- Réponse à la sélection
- Equation de l'éleveur
- Choix des reproducteurs

Consanguinité

- Coefficients
- Bénéfices
- Risques

Tares héréditaires

- Modes de transmission

Hypertypes

Discussion



L' **élevage sélectif** est une conduite de reproduction utilisée en élevage pour améliorer les performances des animaux

DÉFINITION

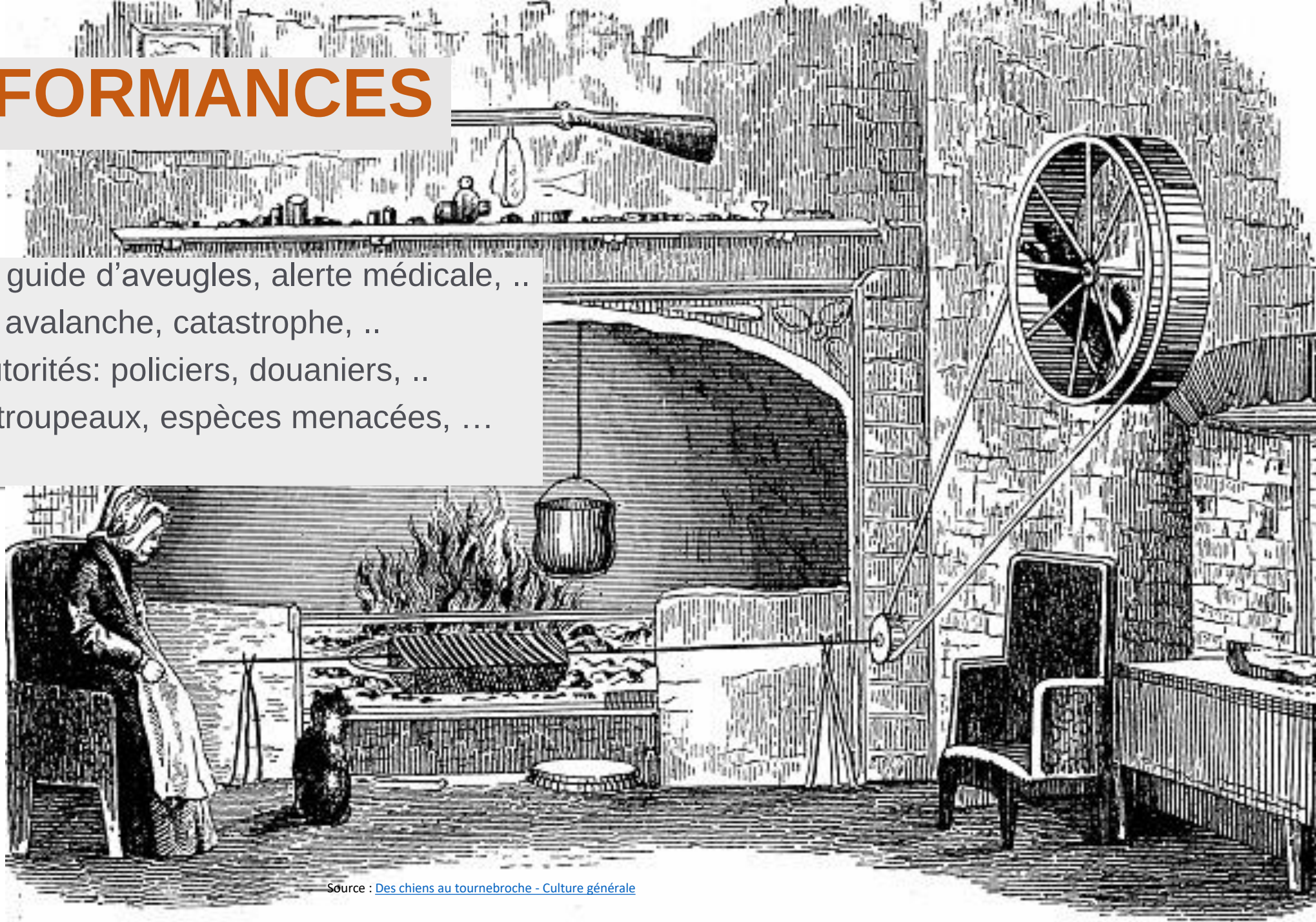


Source : [Top 6 des races de chiens les plus gentilles](#)



PERFORMANCES

Assistance: guide d'aveugles, alerte médicale, ..
Sauvetage: avalanche, catastrophe, ..
Aide aux autorités: policiers, douaniers, ..
Protection: troupeaux, espèces menacées, ...
...

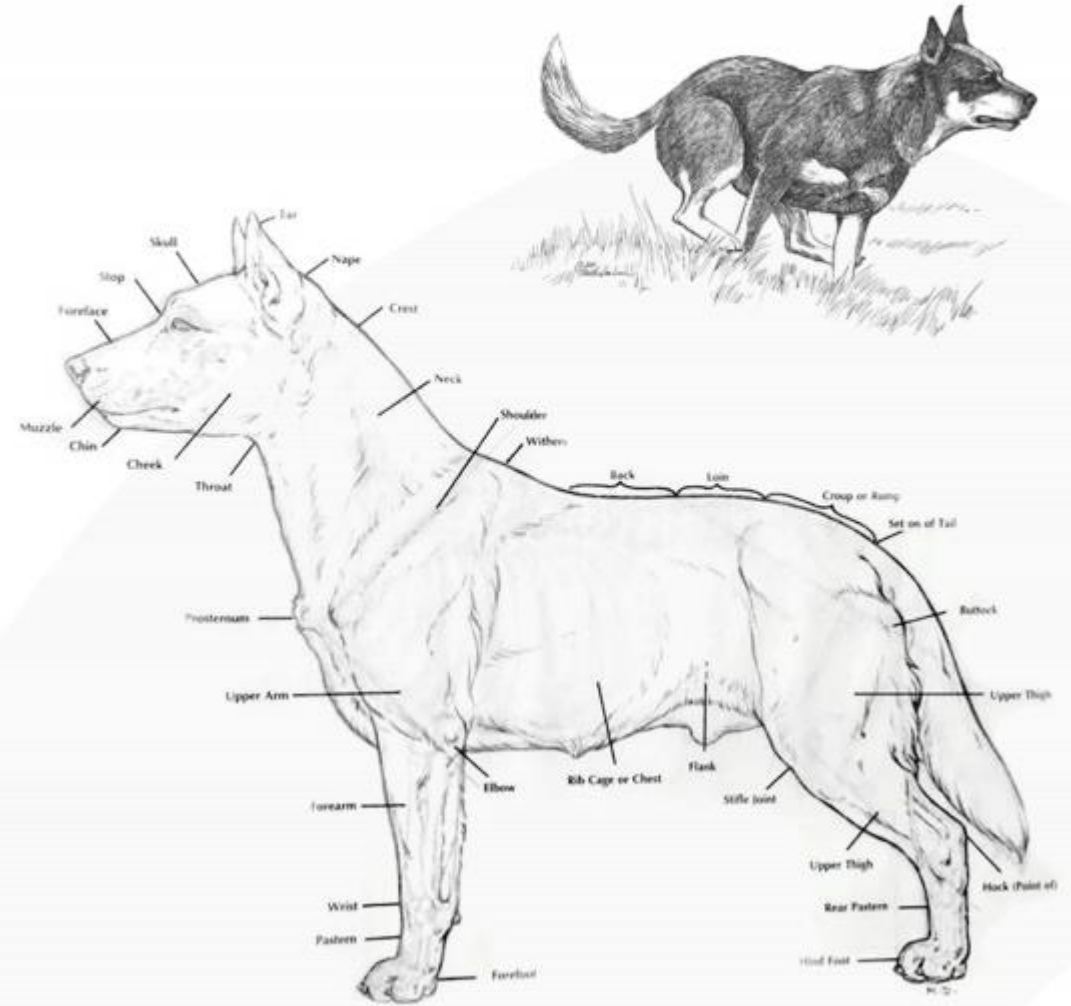




STANDARD DE RACE

BREEDING BUSINESS

THE AUSTRALIAN CATTLE DOG STANDARD



Source : [How To Breed Australian Cattle Dogs – Health, Origin & Breeding Practices](#)



STUD-BOOK PEDIGREE

AMERICAN KENNEL CLUB • FOUNDED 1884

Certified Pedigree

Sire BANCHEE'S RARE AIR
SN95081908 (02-08) BLK

Dam GUM COVE ALLIE GATOR
SR13933402 (02-08) BLK

BAILIWICKS JESSICA
SR46030502
LABRADOR RETRIEVER FEMALE BLK
Date Whelped: 06/10/2007
Breeder: FRANCIS ROBERTS/JASON GOODSON

FC AFC HAMMERIN' MAWK
SF160886 (09-91) OFA32E BLK AKC DNA
PV65376

PRISSY LISSIE
SM52420504 (04-96) OFA78G BLK

ATCHAFALAYA EXPRESS JET
SN53272106 (10-99) BLK AKC DNA
PV316142

ATCHAFALAYAEXPRESSEB'SANGEL
SN1081804 (11-01) YLW

AFC WESTWINDS PEDRO
SC895966 (02-82) OFA26 BLK

AFC ITCHIN' GRETCHIN
SD171196 (06-86) OFA24 BLK

AFC DOUBLE BARREL LEGAL TENDER
SF592307 (04-92) OFA27E BLK

DOUBLE BARREL CINCH
SM5158401 (04-92) BLK

AFC HAWKEYE'S B R BUDDY
SC257152 (10-82) OFA25G YLW AKC DNA
PV75276

CANDLEWOODS NOTA PENNY MORE
SF979955 (07-82) OFA25G BLK

DOGWOOD'S DOUNTOOTHERS MN
SN69251904 (07-95) OFA25E YLW AKC DNA
PV108168

DOGWOOD'S DO IT TO IT MN
SN23259705 (04-99) BLK

MFC AFC SAN JOAQUIN MONCHO
SD396505 (06-73) OFA23 BLK

BIG DADDY SUPER KATE
SD674703 (03-76) OFA32 BLK

FC AFC ITCHIN' TO GO
SD975946 (12-76) OFA34 BLK

CLIP A BOOP
SD690696 (06-76) OFA23 BLK

FC AFC THE MARATHON MAN
SD652880 (05-81) OFA23 YLW

TARNATION'S HAPPY GUSTO
SD776960 (06-87) OFA49 BLK

FC AFC HWOOD CLINCHER
SD596826 (06-88) BLK

BLU DEBBON OYSEY
SD161840 (02-87) OFA24 BLK

FC AFC CANDLEWOODS M D HOUSTON
SD430309 (06-85) OFA24G YLW

FC CANDLEWOOD WILDERNESS BROOKIE MN
SD673183 (05-89) OFA24G BLK

FC AFC TRUMANC'S ZIPARDO
SF434351 (08-89) OFA34G BLK

MFC FC AFC CANDLEWOODS TANKS A LOT
SF252290 (07-90) OFA27G BLK

FC AFC WILDERNESS HARLEY TO GO
SD696768 (09-94) OFA25G BLK

TROUBLESONE CASSIE SH
SM75751003 (10-83) OFA34G BLK

FC AFC RIPARIAN ROUGH RIDER
SF150065 (07-92) OFA38E YLW

FC AFC HILLOCK'S SPICE
SD179643 (09-92) OFA28E BLK

 **AMERICAN KENNEL CLUB®**

June L. Barclay
Executive Secretary

The Seal of The American Kennel Club affixed hereto certifies that this pedigree was compiled from official Stud Book records on January 7, 2011.

PARC DU CINQUANTENAIRE

SOCIÉTÉ ROYALE SAINT-HUBERT

NEUVIÈME EXPOSITION INTERNATIONALE

DE

CHIENS

ORGANISÉE
A BRUXELLES

Les samedi 16, dimanche 17, lundi 18
et mardi 19 mai 1891

CATALOGUE

Prix : 1 Franc



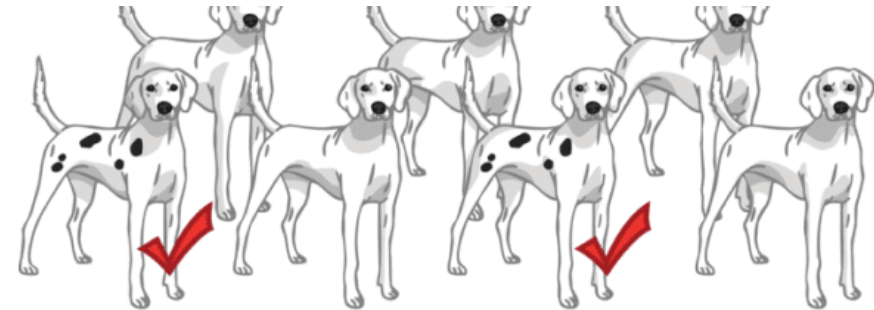
Prix : 1 Franc

BRUXELLES
IMPRIMERIE VANBUGGENHOUDT
42, rue d'Isabelle, 42

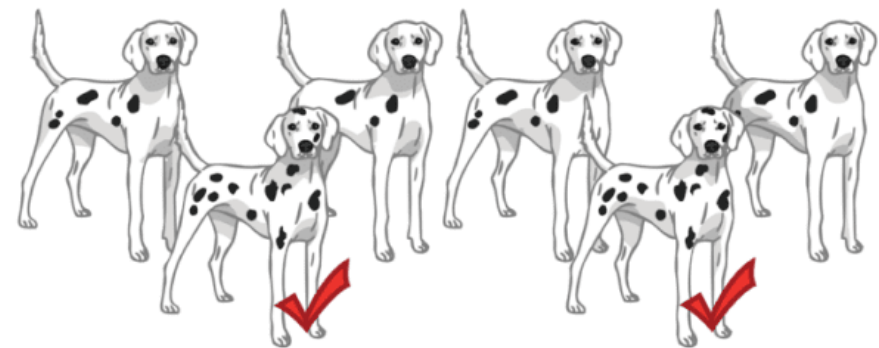




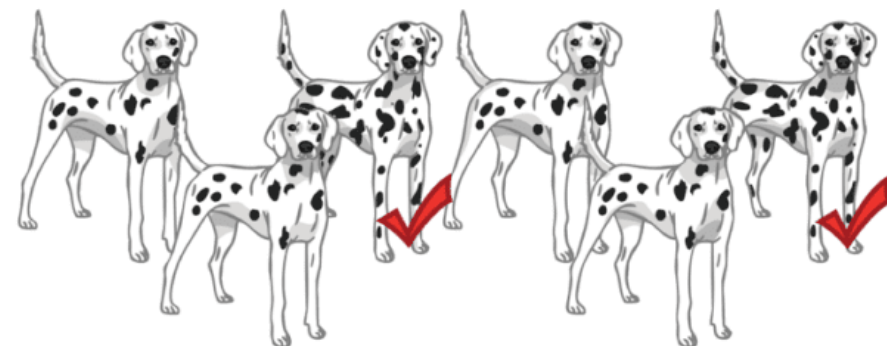
SÉLECTION ARTIFICIELLE



2nd Generation

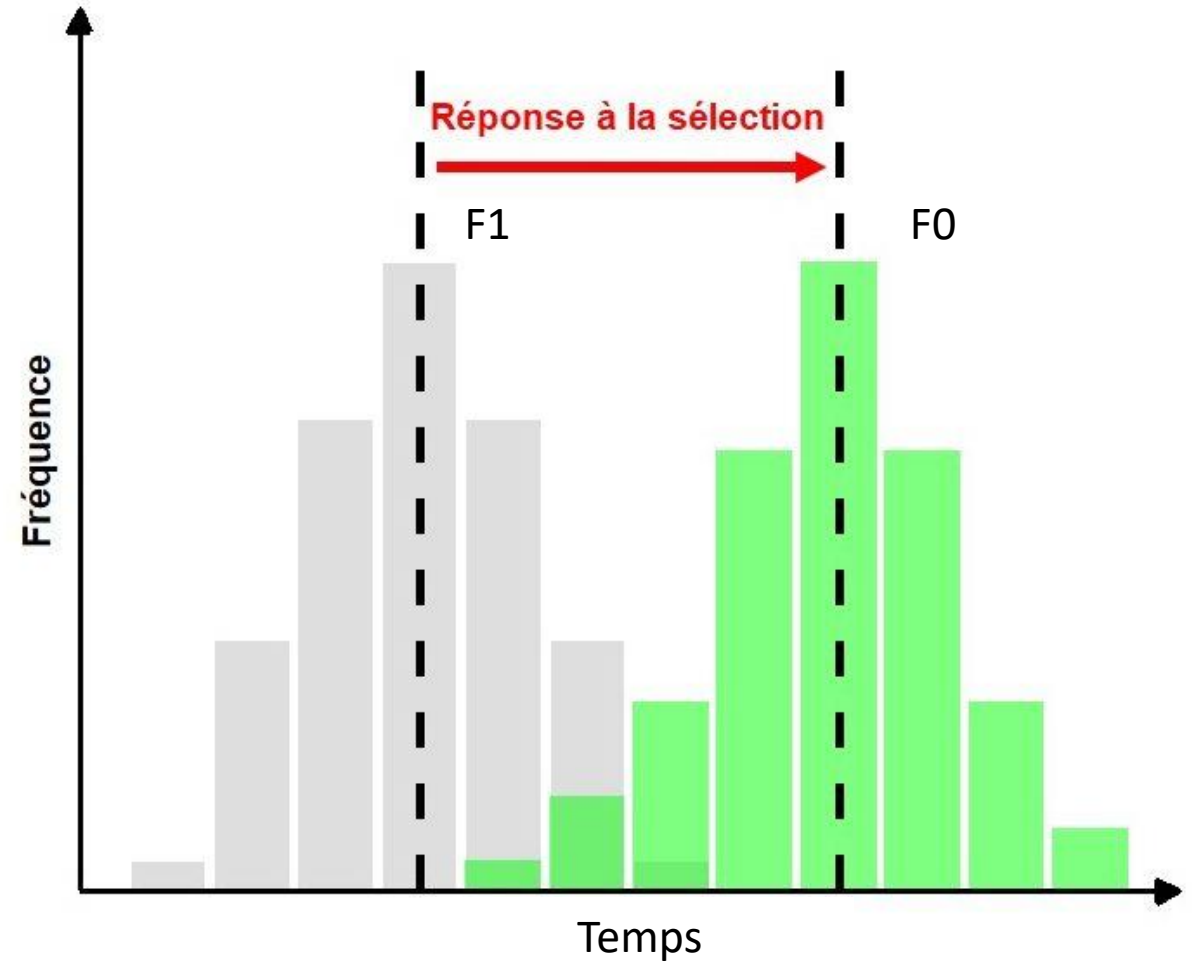


3rd Generation





RÉPONSE À LA SÉLECTION



Sources:

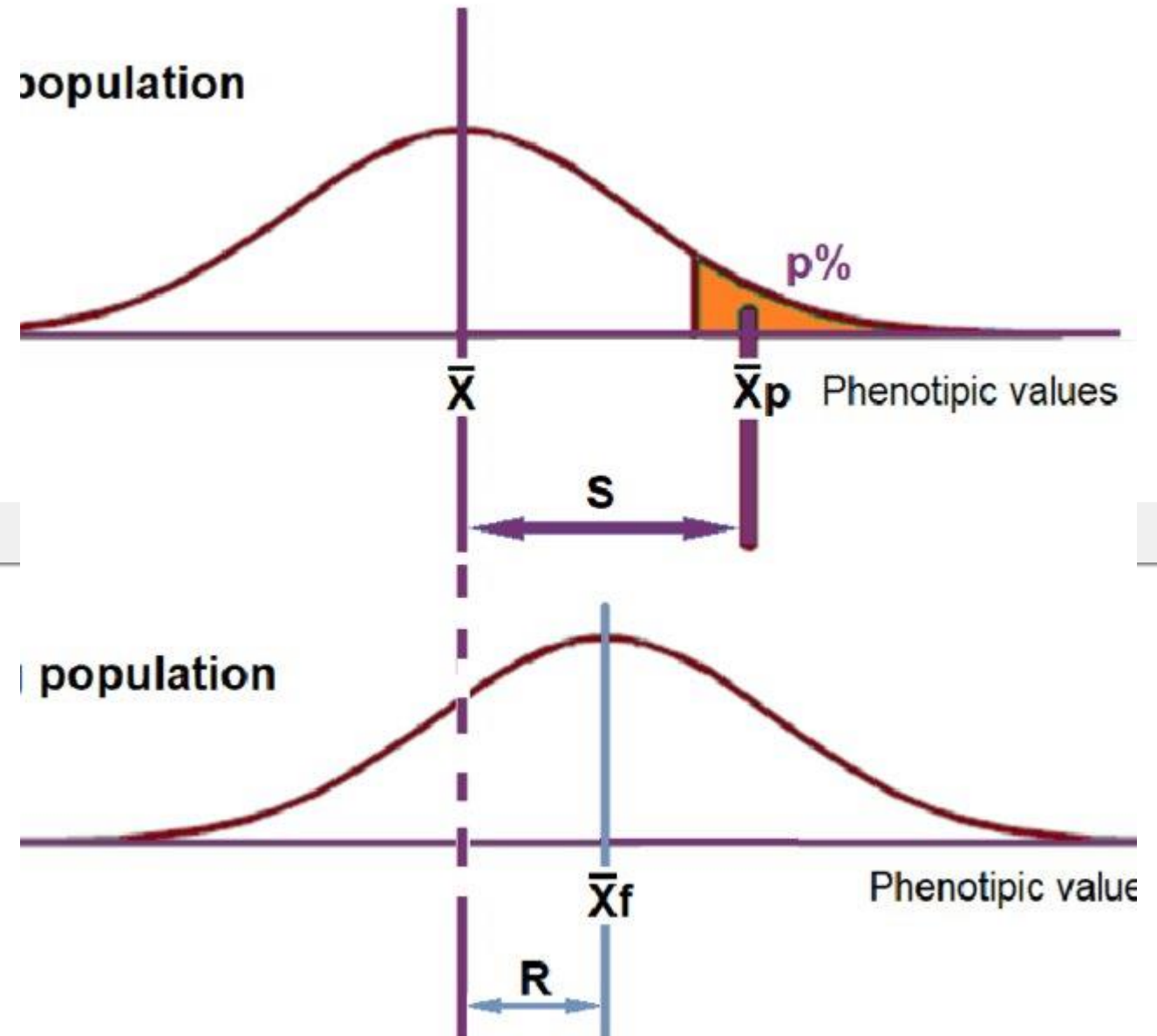
[Le site officiel de la Commission Cavage de la SCC \(lecavageenfrance.com\)](http://lecavageenfrance.com)

[4. La réponse à la sélection – Écophysiologie évolutive \(etsmtl.ca\)](http://etsmtl.ca)



$$R = h^2 S$$

EQUATION DE L'ÉLEVEUR





$$H^2 = \frac{V_G}{V_P} = \frac{V_G}{V_G + V_E}$$

$$P = G + E$$

$$V_P = V_G + V_E$$

phenotypic
variance

genetic
variance

environmental
variance



CHOIX DES REPRODUCTEURS

Phénotype

Généalogie

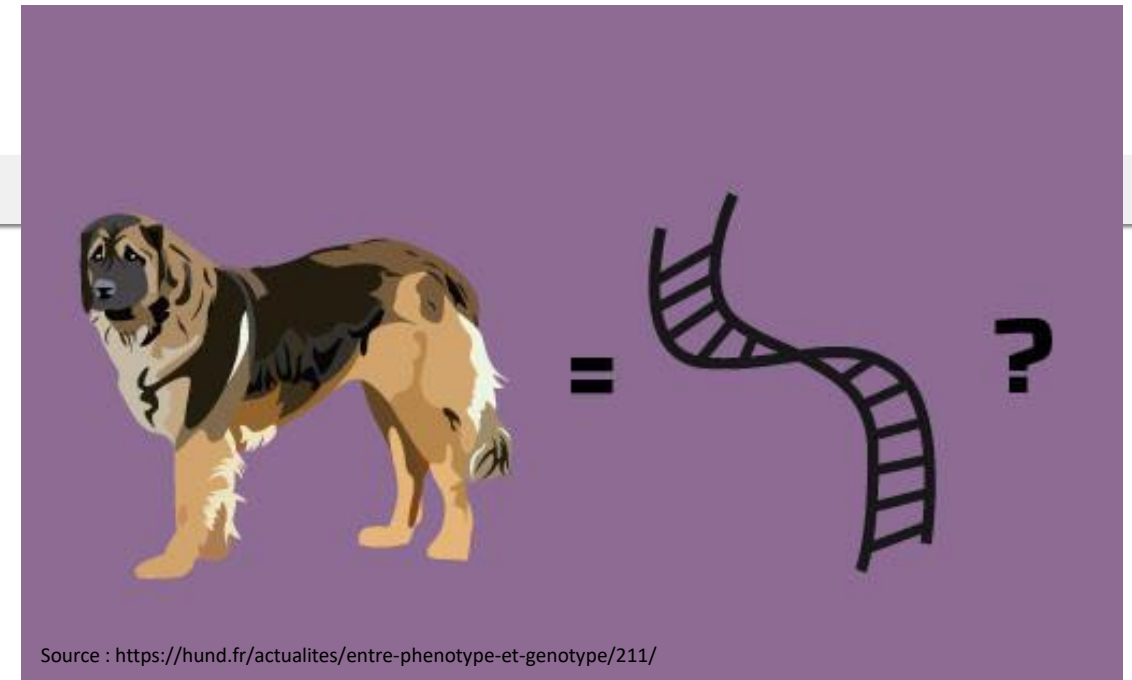
Sur gènes

Assistée par
marqueurs

Sur
indexation

Génomique

...





TRANSFORMATIONS

Source : [Incredible Then and Now Pictures That Show What Popular Dog Breeds Looked Like Before And After 100 Years of Breeding ~ Vintage Everyday](#)





QUESTIONS

Quand $h^2 = 0$?

Quand $h^2 = 1$?

Quand $S = 0$?

Quand $R = 0$?

Performance non-héritable non-héréditaire?

Performance héréditaire non-héritable?

Performance héritable non-héréditaire?

$$h^2 = 20\%$$

$$\bar{X} = 20 \text{ sec}$$

$$\bar{X}_p = 10 \text{ sec}$$

$$R = ??$$

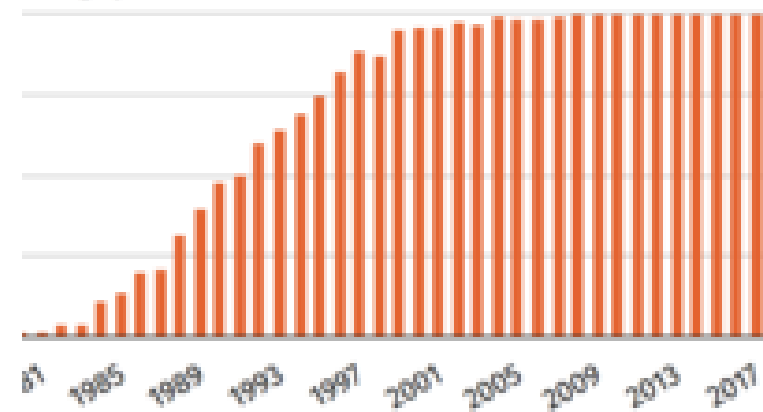
$$\bar{X}_f = ??$$



CONSANGUINITÉ

Source : [The popular sire syndrome - IWDB Infosite](#)

Number of dogs born every year related to scrag Lysander





COEFFICIENTS DE CONSANGUINITÉ

Sources :

<https://khalibisnya.com/la-consanguinite-du-chien-de-race/>

[How to calculate inbreeding from a pedigree chart](#)

[\[PDF\] Runs of homozygosity for autozygosity estimation and genomic analysis in production animals | Semantic Scholar](#)

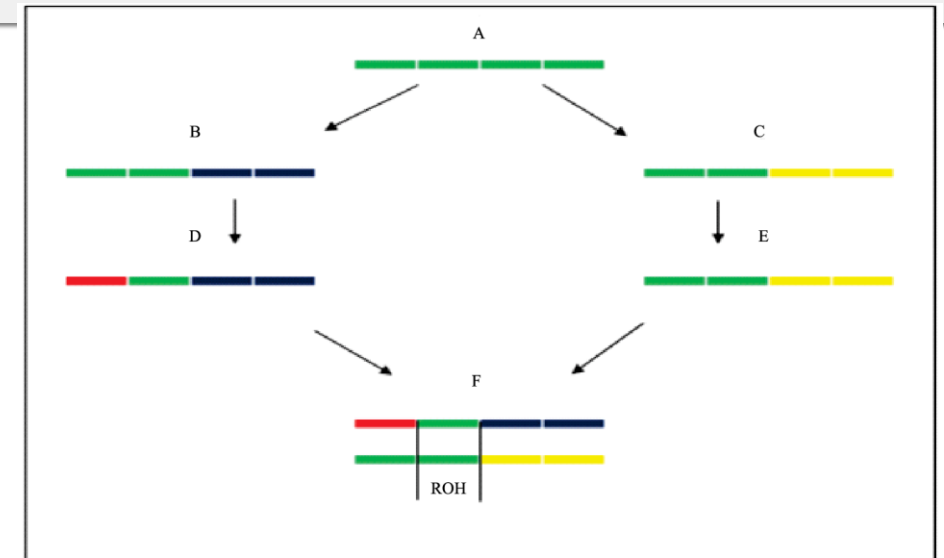
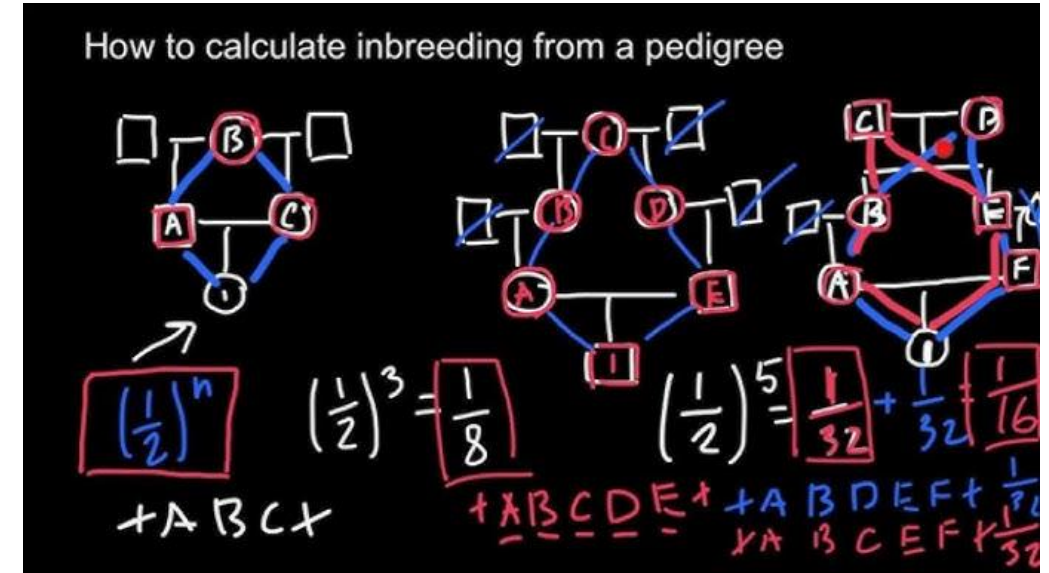
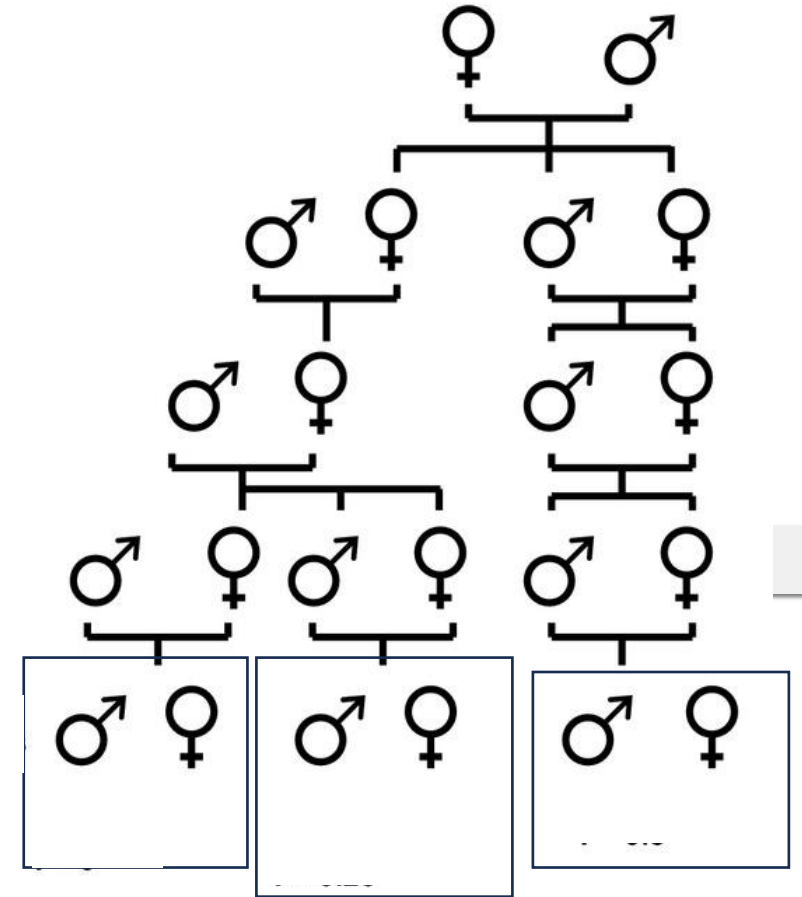


Figure 1 Representation of the formation of Runs of Homozygosity (ROH). Individual represents a ROH (green) formed



QUESTIONS

- Comment la consanguinité varie-t-elle au cours du temps?
- Le taux de consanguinité des chiens de race peut-il être nul?
- Combien de chiens trouve-t-on dans un pédigré de 5 générations?



Quels sont les individus les moins/plus consanguins?



- Uniformité
- Prépotence – ‘breed true’
- Fixation du phénotype désiré



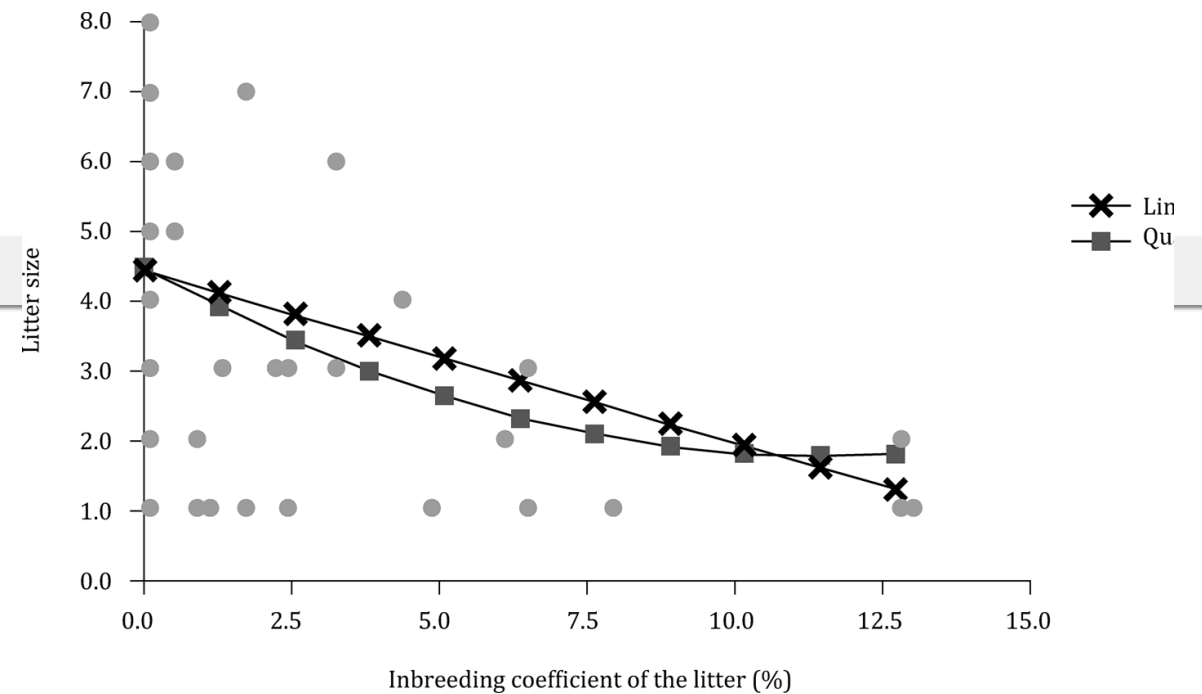
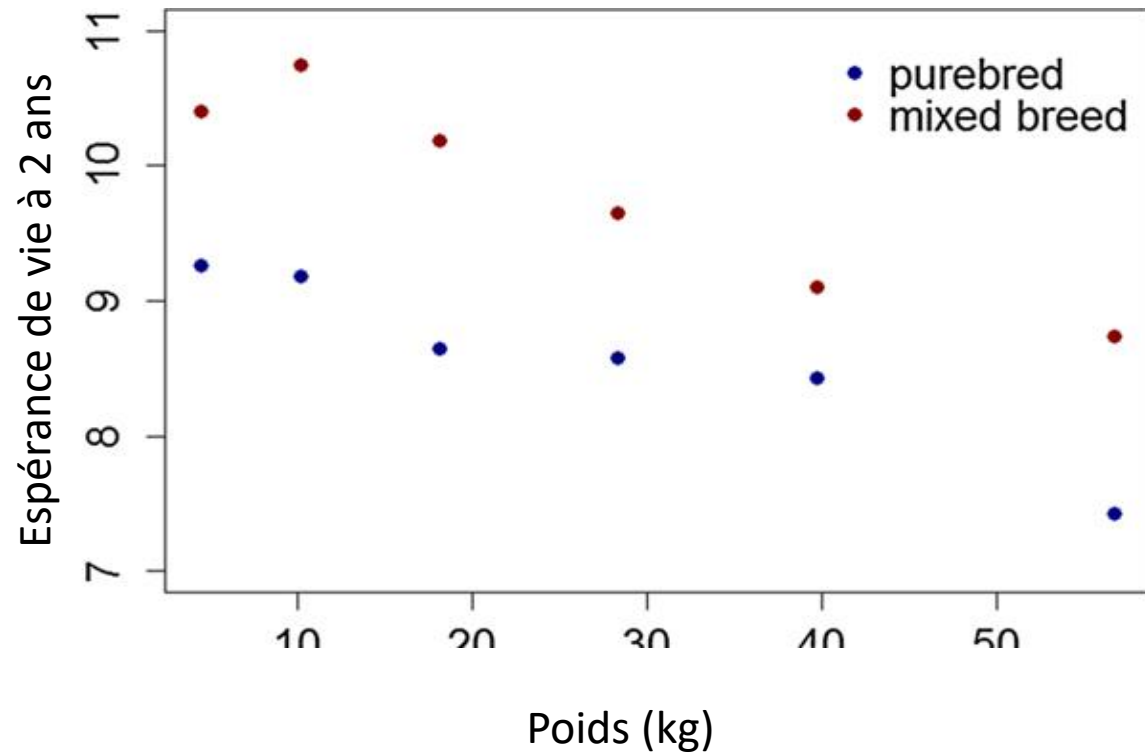
Source : [The 11 Best Dog Breeds of All Time \(businessinsider.com\)](https://www.businessinsider.com)



Source : [Comment choisir un chiot dans une portée ? \(ouest-france.fr\)](https://ouest-france.fr)



Dépression liée à la consanguinité



Sources :

[Body size, inbreeding, and lifespan in domestic dogs - PMC \(nih.gov\)](#)

[Inbreeding depression causes reduced fecundity in Golden Retrievers | Mammalian Genome \(springer.com\)](#)

[SciELO - Brazil - Inbreeding on litter size of German Spitz dogs](#)



Allèles délétères

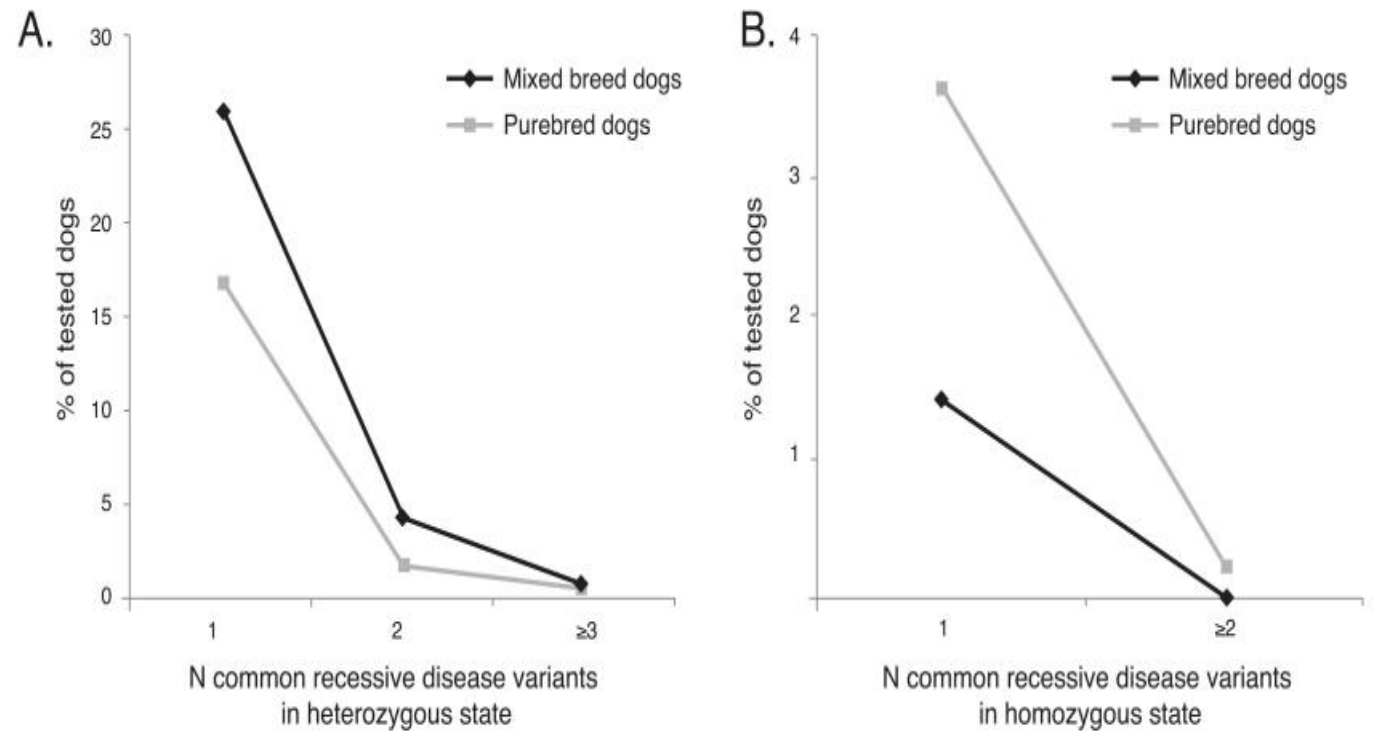
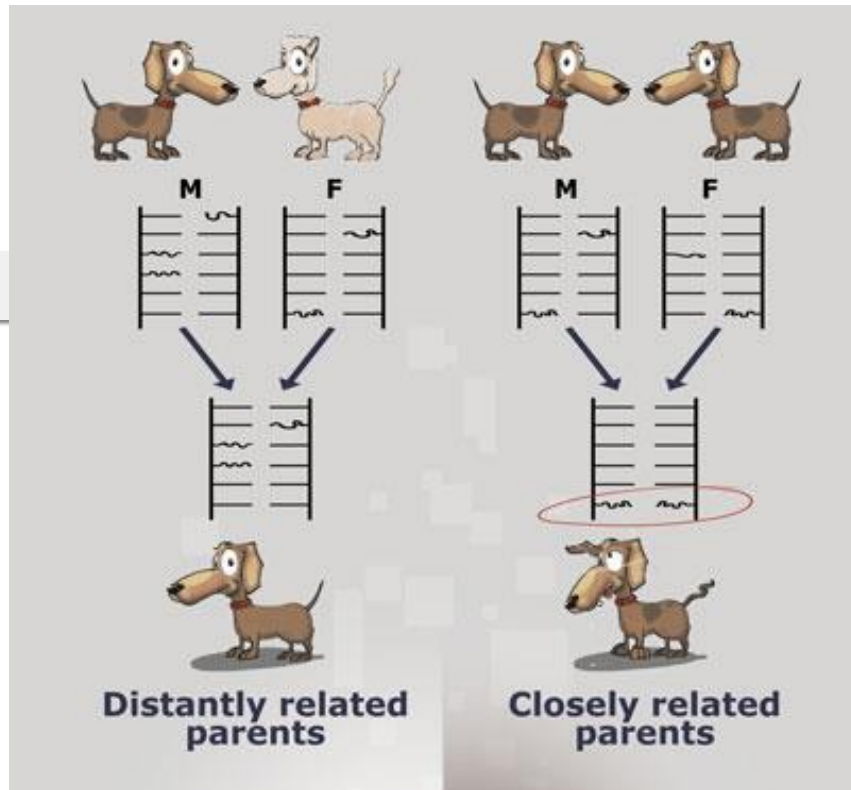


Fig 2. Patterns of common recessive disease variant presence in 96,673 dogs. (A) Comparison of 83,220 mixed breed dogs and 13,453 purebred dogs revealed that mixed breed dogs were significantly more likely to carry one or several of nine examined common largely recessive disease variants in the heterozygous state. (B) Conversely, dogs of the combined purebred sample were more likely to be genetically affected for one of the examined disorders, i.e. carry at least one recessive disease variant in the homozygous state.

Sources:

[Longevity of companion dog breeds: those at risk from early death | Scientific Reports \(nature.com\)](#)

[Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs | PLOS Genetics](#)

[Inbreeding, phenotypic traits, coat colours and prevalence of health problems in a population of English Cocker Spaniels: the first survey in Italy | SpringerLink](#)



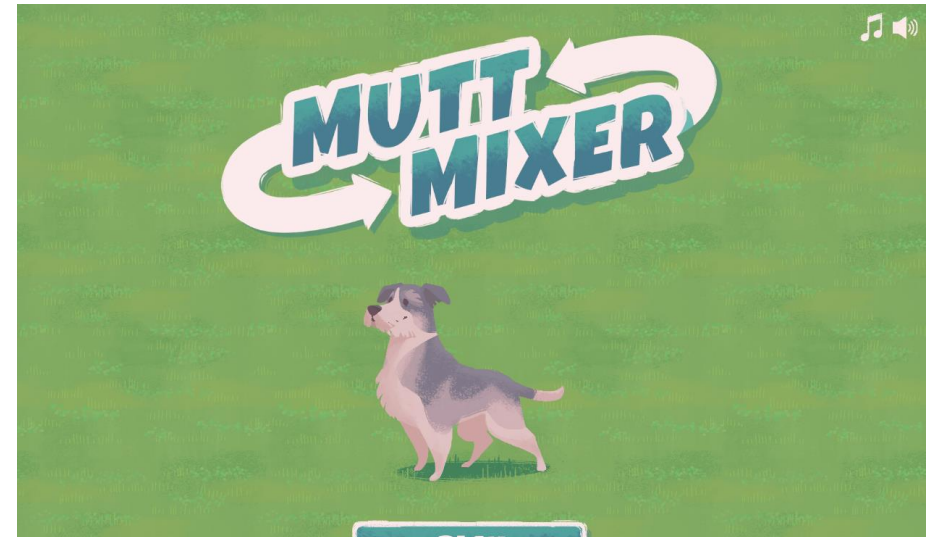
Jeu Mutt Mixer

Sources :

<https://learn.genetics.utah.edu/content/change/muttmixer/>

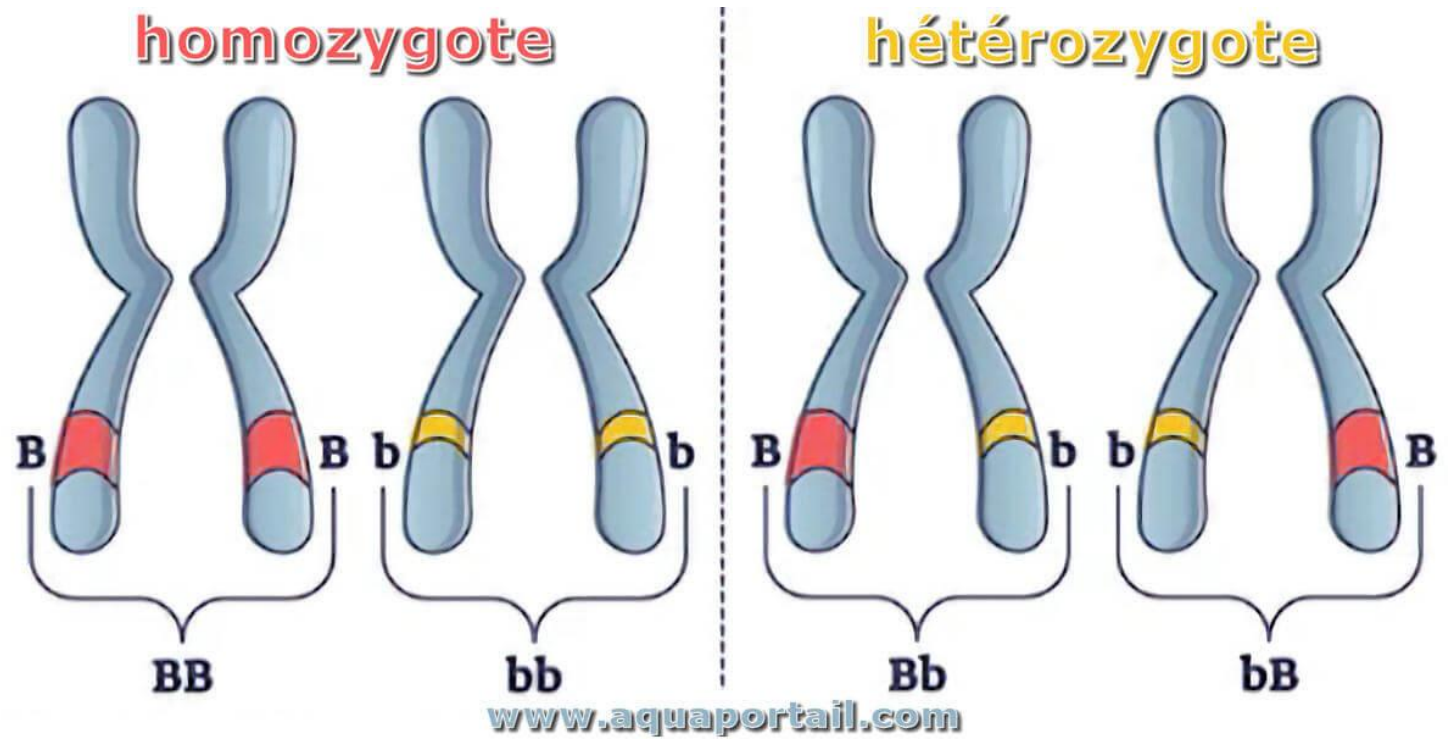
<https://learn.genetics.utah.edu/content/change/muttmixerexplained/>

HÉRÉDITÉ



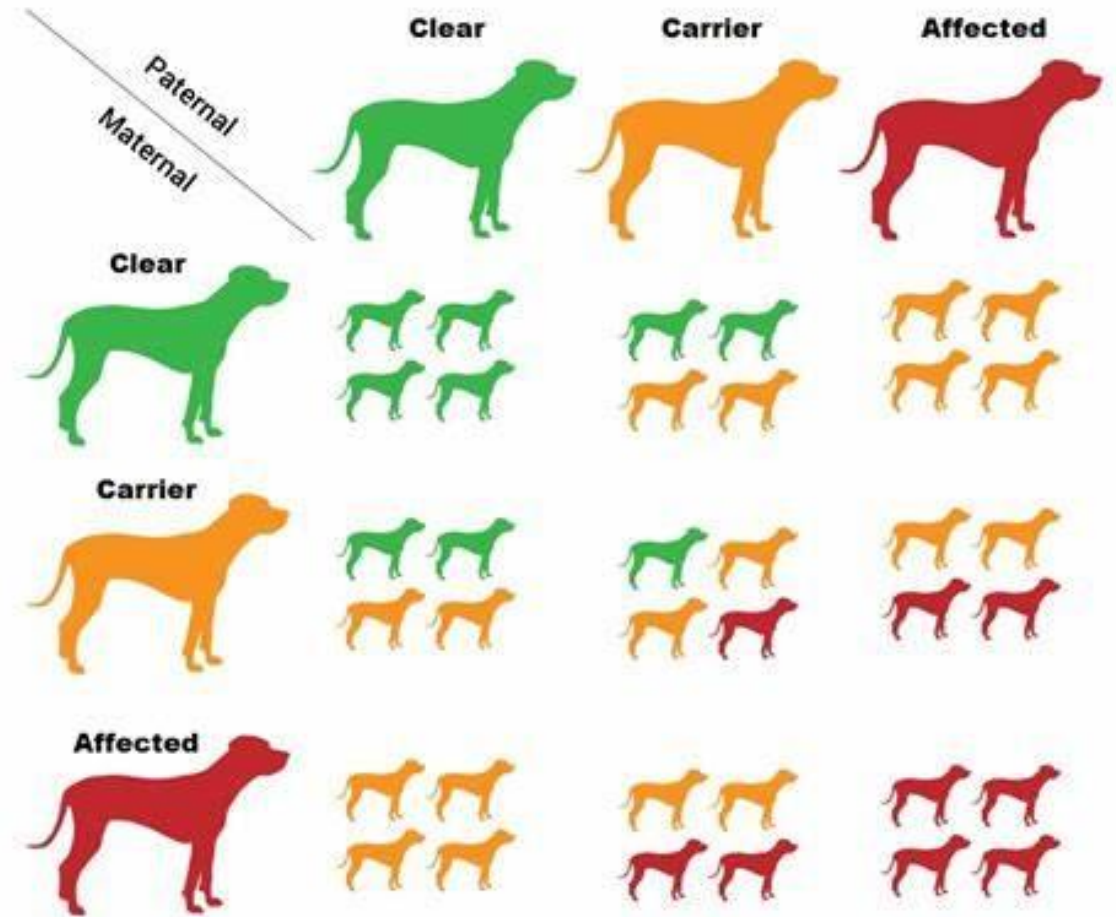


RAPPELS





AUTOSOMIQUE RÉCESSIF





EXEMPLE:



- Ataxie cérébelleuse héréditaire
- Test disponible (NCL-A)

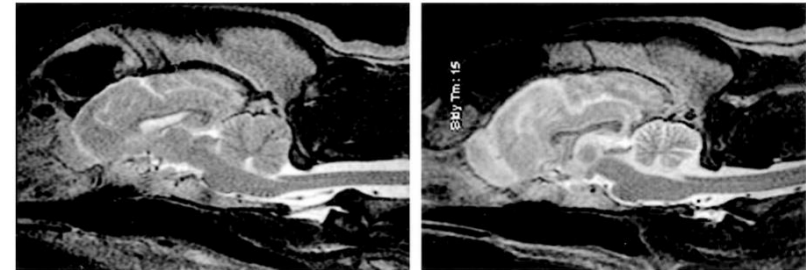


Fig 1. Sagittal T2-weighted magnetic resonance images of the brain of (left) a control dog and (right) an affected American Staffordshire Terrier. The marked increase in fluid between the folia of the cerebellum of the dog on the right indicates severe cerebellar atrophy or hypoplasia. The control dog was matched for age and weight with the affected dog.

Sources:

[Cerebellar cortical degeneration in adult American Staffordshire Terriers - PubMed \(nih.gov\)](#)

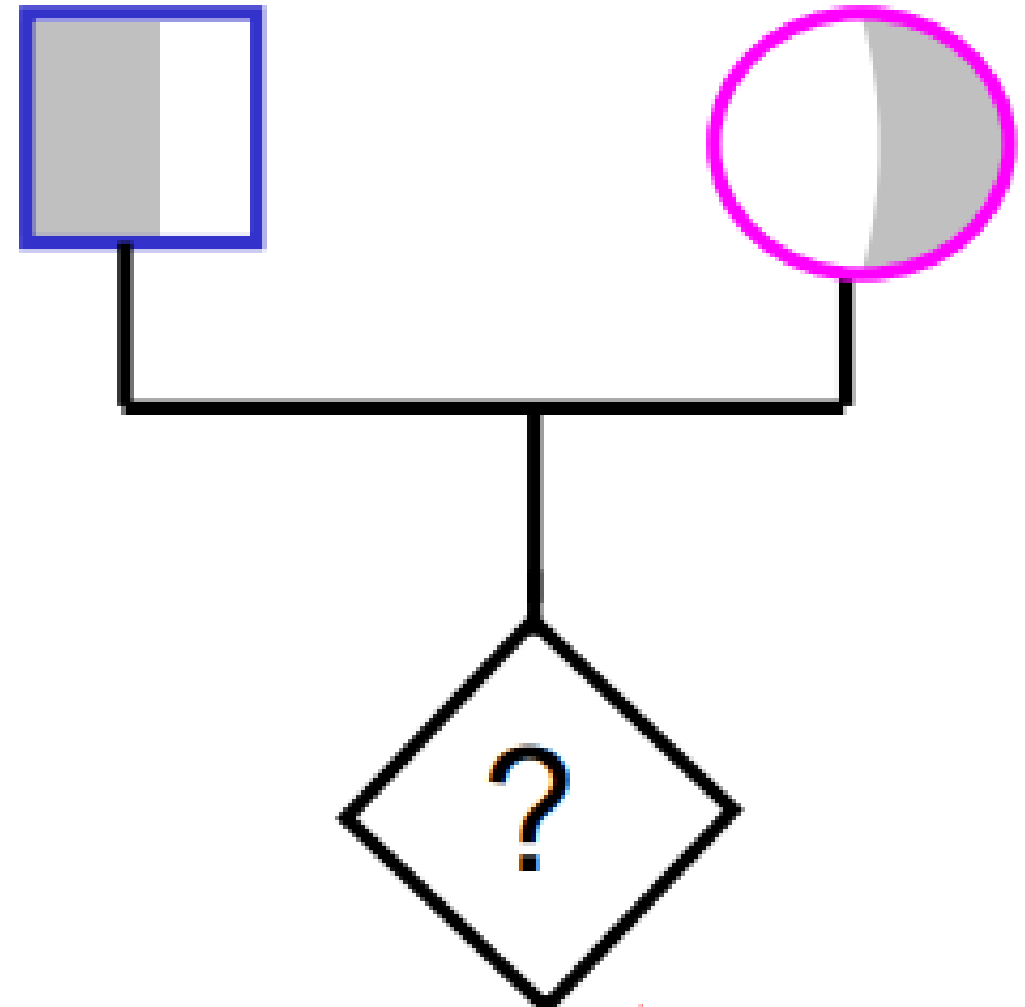
[La santé de l'American Staffordshire Terrier | Société Centrale Canine \(centrale-canine.fr\)](#)

[OMIA:000177-9615: Cerebellar cortical atrophy in Canis lupus familiaris - OMIA - Online Mendelian Inheritance in Animals](#)



RISQUE:

Sachant qu' un descendant de deux parents hétérozygotes est sain, quelle est la probabilité qu'il soit porteur (hétérozygote)?





CONSEIL GÉNÉTIQUE:

- Eliminer de la reproduction les homozygotes malades
- Selon le degré de consanguinité de la population, la sévérité de la tare et la valeur du chien, conserver ou éliminer les hétérozygotes
- Conserver pour la reproduction les homozygotes sains dominants

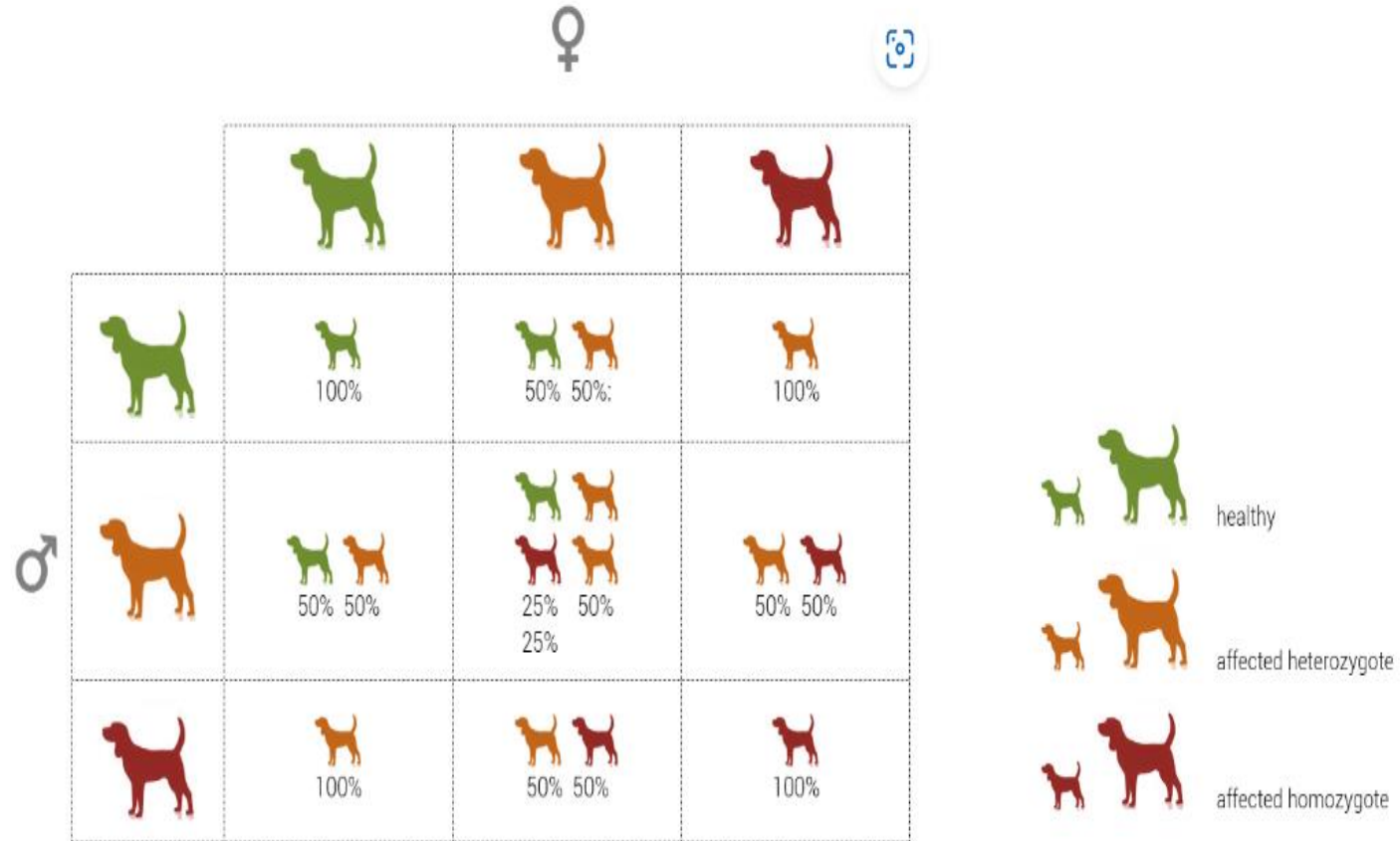


Sources :

[Conseil génétique selon le mode de transmission de la maladie](#) | [Société Centrale Canine \(centrale-canine.fr\)](#)
(3) Facebook



AUTOSOMIQUE DOMINANT



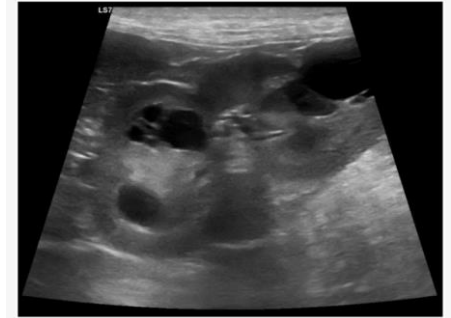
Source : Dog Genetics - Introduction to Modes of Inheritance - AnimaLabs©



EXEMPLE:



Figure 1. Ultrasound examination of the left kidney of the affected index female. Multiple cysts are visible.



- Polykystose rénale
- Test disponible (PKD1)

Sources:

[OMIA:000807-9615: Polycystic kidney disease in Canis lupus familiaris \(dog\) - OMIA - Online Mendelian Inheritance in Animals Genes | Free Full-Text | PKD1 Nonsense Variant in a Lagotto Romagnolo Family with Polycystic Kidney Disease \(mdpi.com\)](#)
[Polykystose rénale chez le chien - Société Centrale Canine \(genodog.fr\)](#)





RISQUE:

Soit un accouplement entre deux parents sains. Quelle est la probabilité qu'un descendant soit porteur ?



Source : [Chicago Dog Parks - Oak Park Apartments Near Chicago](#)



CONSEIL GÉNÉTIQUE:

- Eliminer de la reproduction les homozygotes malades et les hétérozygotes
- Conserver pour la reproduction les homozygotes sains récessifs



Sources :

[Conseil génétique selon le mode de transmission de la maladie](#) | [Société Centrale Canine \(centrale-canine.fr\)](#)
(3) [Facebook](#)



LIÉ AU CHROMOSOME X



Source : Dog Genetics - Introduction to Modes of Inheritance - AnimaLabs©



EXEMPLE:

- Myopathie myotubulaire liée à l'X
- Test disponible (MTM1)

Sources :

<https://omia.org/OMIA001508/9615/>

<https://vgl.ucdavis.edu/test/xlmtm-labrador>

<https://skeletalmusclejournal.biomedcentral.com/articles/10.1186/s13395-020-00239-0>



<https://onlinelibrary.wiley.com/doi/10.1111/jvim.12513>





RISQUE:

Soit un accouplement avec un mâle malade. Quelle est la probabilité qu'un chiot femelle soit porteuse ou malade?



Source : [How To Tell If Your Dog Is Sick](#)



CONSEIL GÉNÉTIQUE:

- Eliminer de la reproduction les mâles atteints
- Selon le degré de consanguinité de la population, la sévérité de la tare et la valeur du chien, éliminer les femelles porteuses

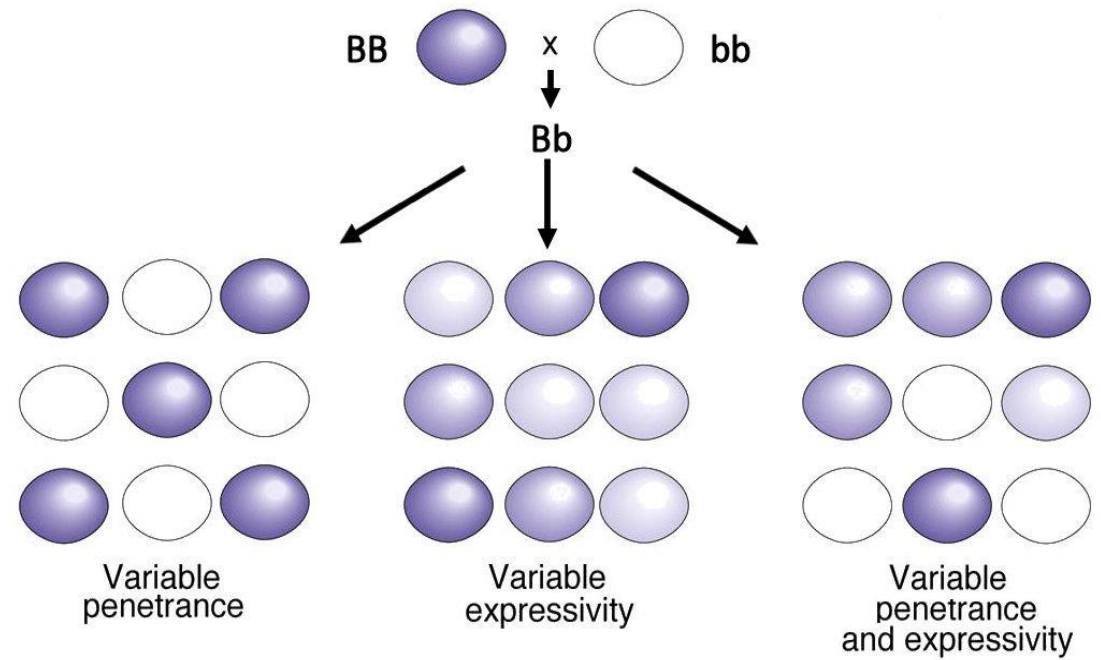


Sources :

[Conseil génétique selon le mode de transmission de la maladie](#) | [Société Centrale Canine \(centrale-canine.fr\)](#)
(3) [Facebook](#)



PÉNÉTRANCE ET EXPRESSIVITÉ



Source : https://www.mun.ca/biology/scarr/Penetrance_vs_Expressivity.html



EXEMPLE:

Pénétrance :

portion d'individus possédant un génotype donné qui exprime le phénotype correspondant

- Myopathie dégénérative
- Test disponible (SOD1)
- Pénétrance incomplète



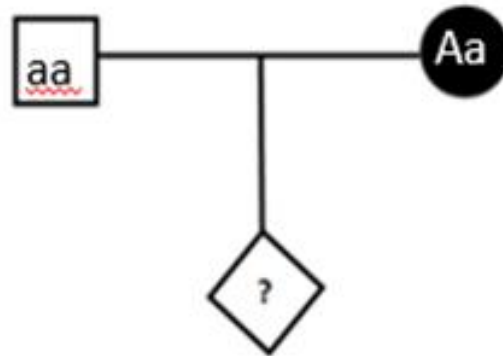
Sources :

[OMIA:000263-9615: Degenerative myelopathy in Canis lupus familiaris - OMIA - Online Mendelian Inheritance in Animals](#)
[Myélopathie dégénérative ascendante chez le chien - Société Centrale Canine \(genodog.fr\)](#)



RISQUE:

Dans le cas d'une maladie autosomique dominante, quel est le risque que le descendant soit malade si la pénétrance est de 80% et la mère hétérozygote?



Source: [Sick Dog - 5 Ways to Care for Your Sick Dog - Take good care of them.](#)

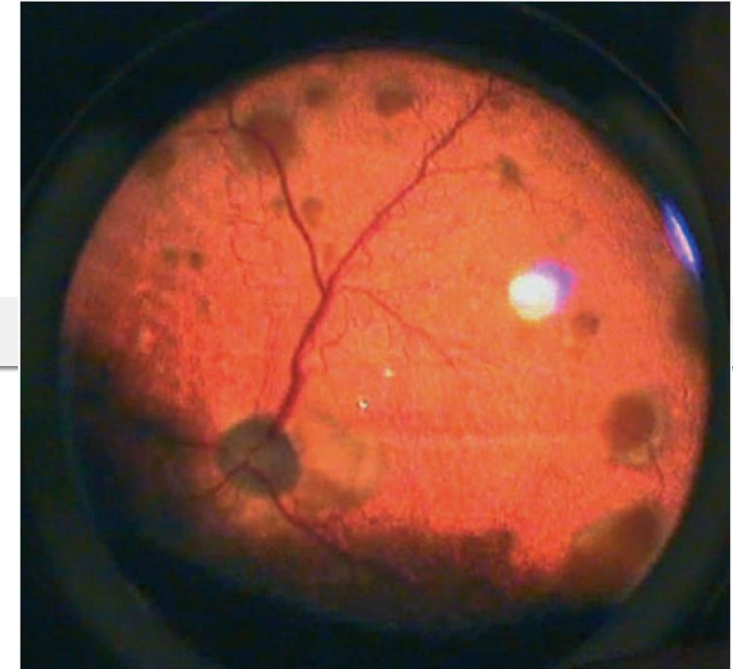


EXEMPLE:

Expressivité variable :

degré de l'expression d'un phénotype (son intensité)

- Rétinopathie multifocale 1
- Test disponible (BEST1)
- Expressivité variable



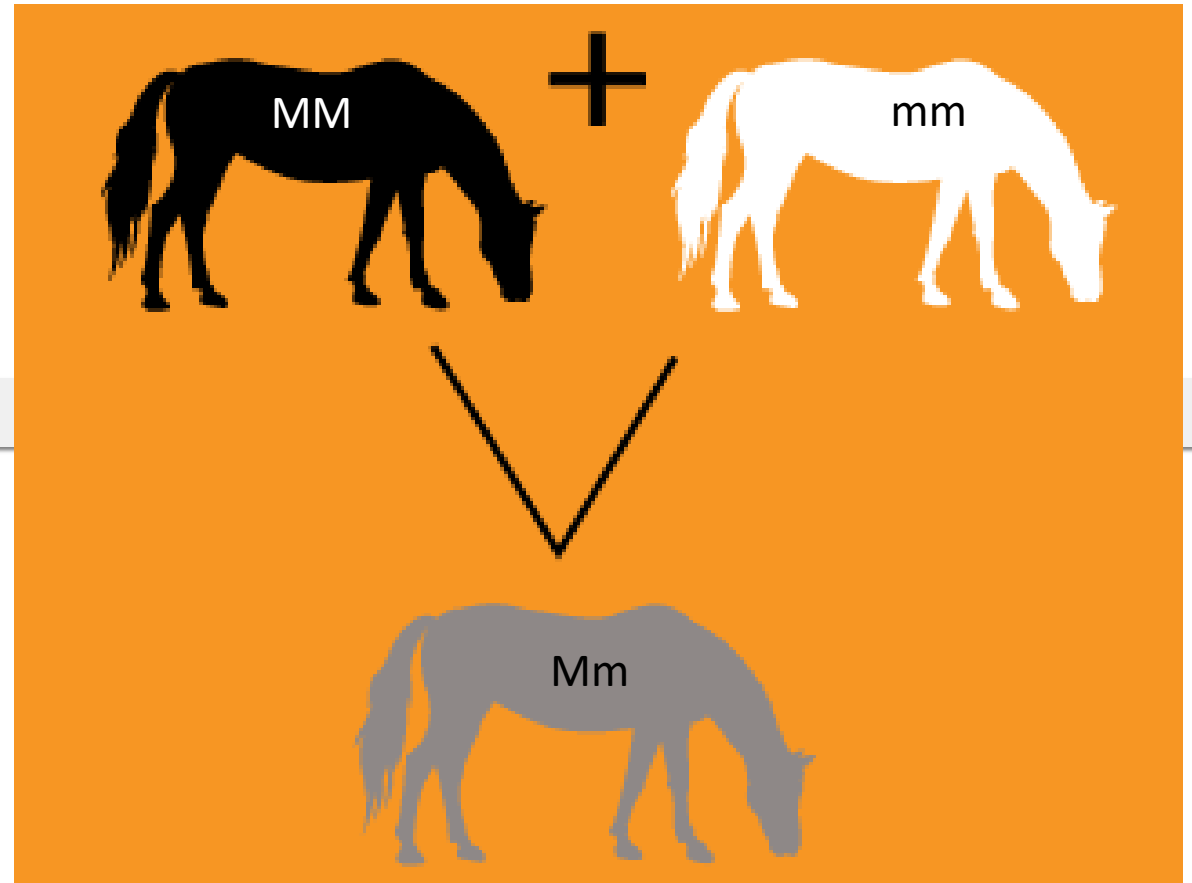
Sources:

<https://www.pawprintgenetics.com/blog/2014/04/07/variability-certain-canine-diseases/>

<https://omia.org/OMIA001444/9615/>



DOMINANCE INCOMPLÈTE



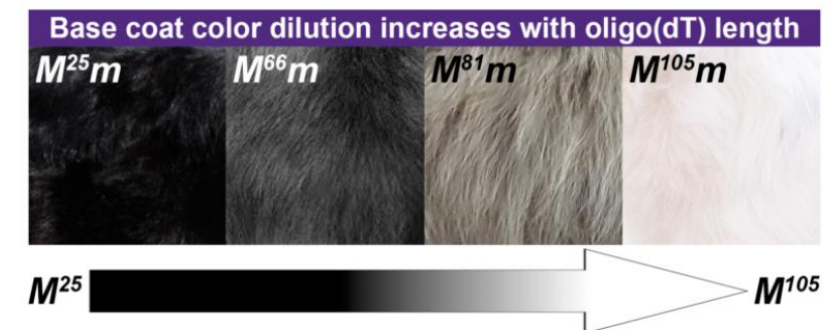


EXEMPLE:

- Dysgénésie oculaire liée au caractère merle
- Test disponible (PMEL)
- Autosomique dominant
« incomplet »



Source : [The Double Merle Dog and the Dangers of Merle-to-Merle Breeding - PetHelpful](#)



Dilution intensity likely correlates with the use of a cryptic splice acceptor site within the SINE that results in aberrant PMEL protein. Longer oligo(dT) lengths cause increased alternative splicing, more mutant PMEL, and less pigment.

Source : [On Biology: The genetics of merle coat patterns in dogs \(biomedcentral.com\)](#)

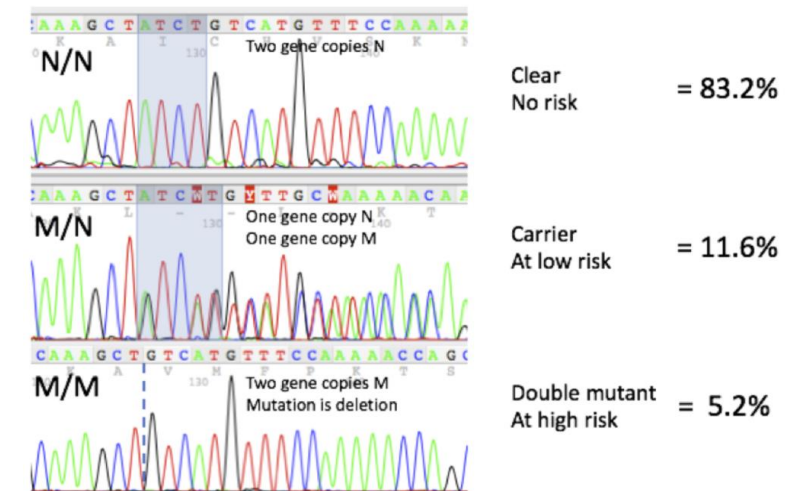


EXEMPLE:

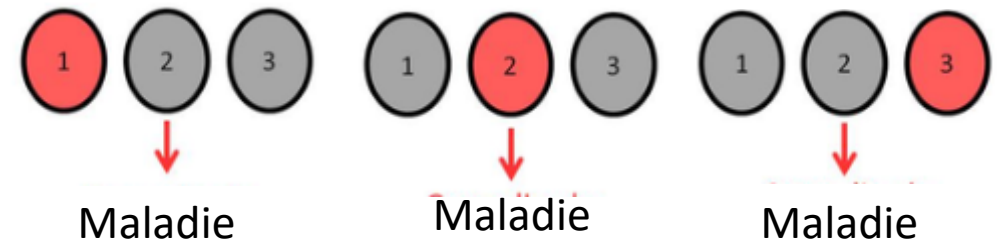
MDR1	Ivermectin-Präparate: Animec®, Chanectin®, Diapec®, Ecomectin®, Equimax®, Eraquell®, Furexel®, Hippomectin®, Ivomec®, Noromectin®, Paramectin®, Qualimec®, Vectin®, Virbamec® Doramectin-Präparat: Dectomax® Moxidectin-Präparate: Cydectin®, Equest® Loperamid-Präparat: Imodium®	• Nicht bei MDR1⁺ Hunden anwenden. • Es kann zu schweren Intoxikationen mit Todesfolge kommen.
MDR1	Zytostatika: Vincristin, Vinblastin, Paclitaxel, Doxorubicin, Mitoxantron, Dactinomycin, u. a. Immunsuppressiva: Cyclosporin A, Tacrolimus, u. a. Opiode: Morphin, Methadon, Fentanyl, Butorphanol Herz/Kreislaufmedikamente: Digoxin, Methylidigoxin, Verapamil, Diltiazem, Chinidin, Talinolol, Losartan, u. a. Antiemetika: Ondansetron, Domperidon Ulkustherapeutika: Cimetidin, Ranitidin Antimykotika: Itraconazol, Ketoconazol Antibiotika: Rifampicin, Erythromycin, Levofloxacin, u. a. Andere: Acepromazin, Fexofenadin, u. v. a.	• Unbewusstes Überdosieren • Zunahme neurotoxischer, hepatotoxischer oder nephrotoxischer Wirkungen möglich
MDR1	Advocate® (Wirkstoff Moxidectin), Milbemax® und Program Plus® (Wirkstoff Milbemycinoxim), Stronghold® (Wirkstoff Selamectin), Profender® (Wirkstoff Emodepsid)	• Sicher auch bei MDR1⁺ Hunden, wenn Herstellerangaben zu Dosierung und Applikation exakt befolgt werden.

Source : mutation du gène mdr1 - vétérinaire Carine Schalbar (nordveterinaire.lu)

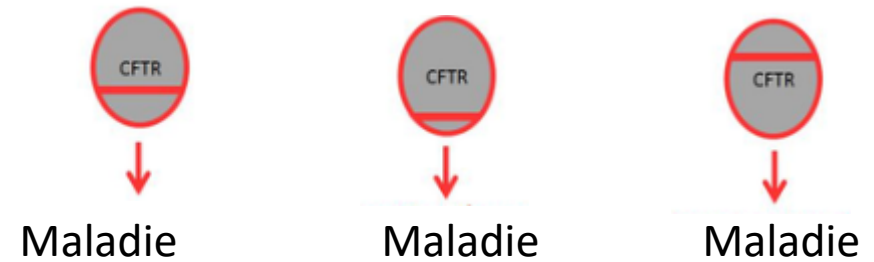
- Toxicité médicamenteuse (MDR)
- Test disponible (ABCB1)
- Autosomique dominant
« incomplet »



Source : Canine Disease Profile – Multi-Drug Resistance (MDR1) | Laboratoire de génétique vétérinaire (labgenvet.ca)



HÉTÉROGÉNÉITÉ





EXEMPLE:



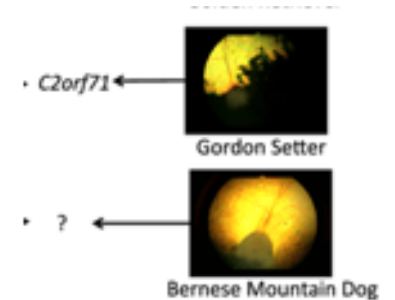
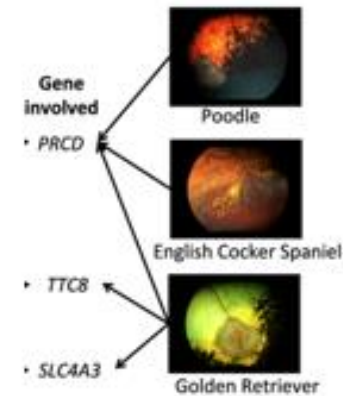
- Atrophie rétinienne progressive
- Tests disponibles
- Hétérogénéité génétique

Sources :

<https://omia.org/OMIA000830/9615/>

[https://www.fregis.com/fr-fr/chien/fiches-info-sante-des-chien/atrophie-retinienne-progressive-generalisee-\(arp\)](https://www.fregis.com/fr-fr/chien/fiches-info-sante-des-chien/atrophie-retinienne-progressive-generalisee-(arp))

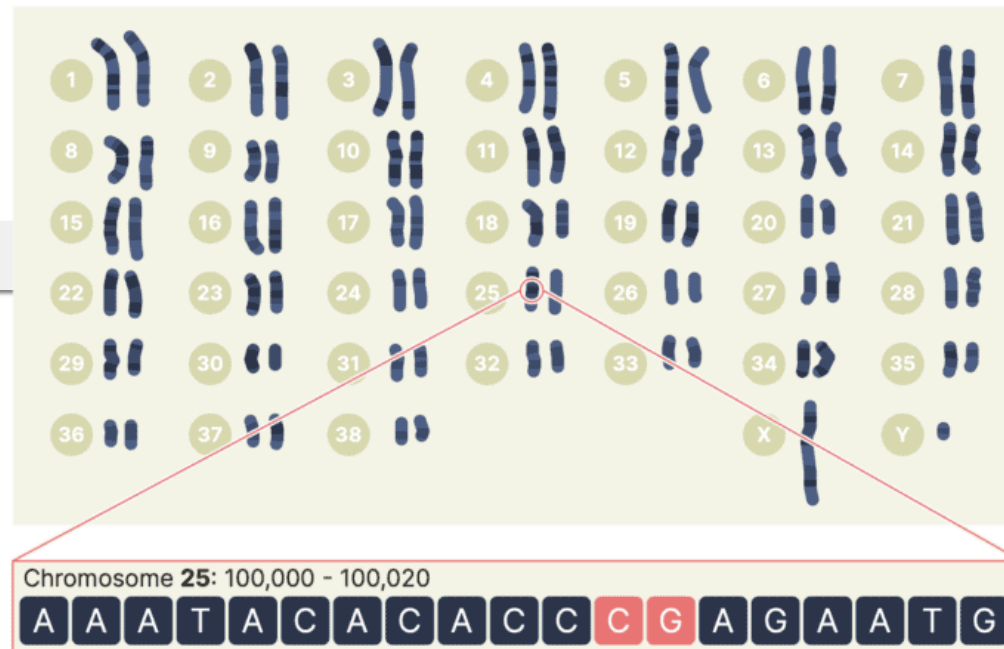
<https://www.dovepress.com/the-genetics-of-inherited-retinal-disorders-in-dogs-implications-for-d-peer-reviewed-fulltext-article-VMRR>



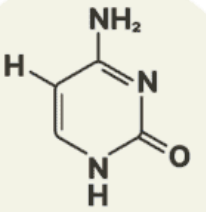


EPIGÉNÉTIQUE

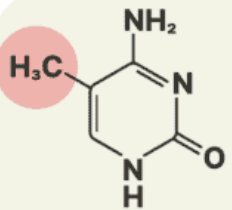
Dog genome



<https://loyalfordogs.com/posts/what-is-dna-methylation-and-how-does-it-help-us-understand-longevity>



C = Cytosine



Methylated cytosine



EXAMPLE:

Comportement

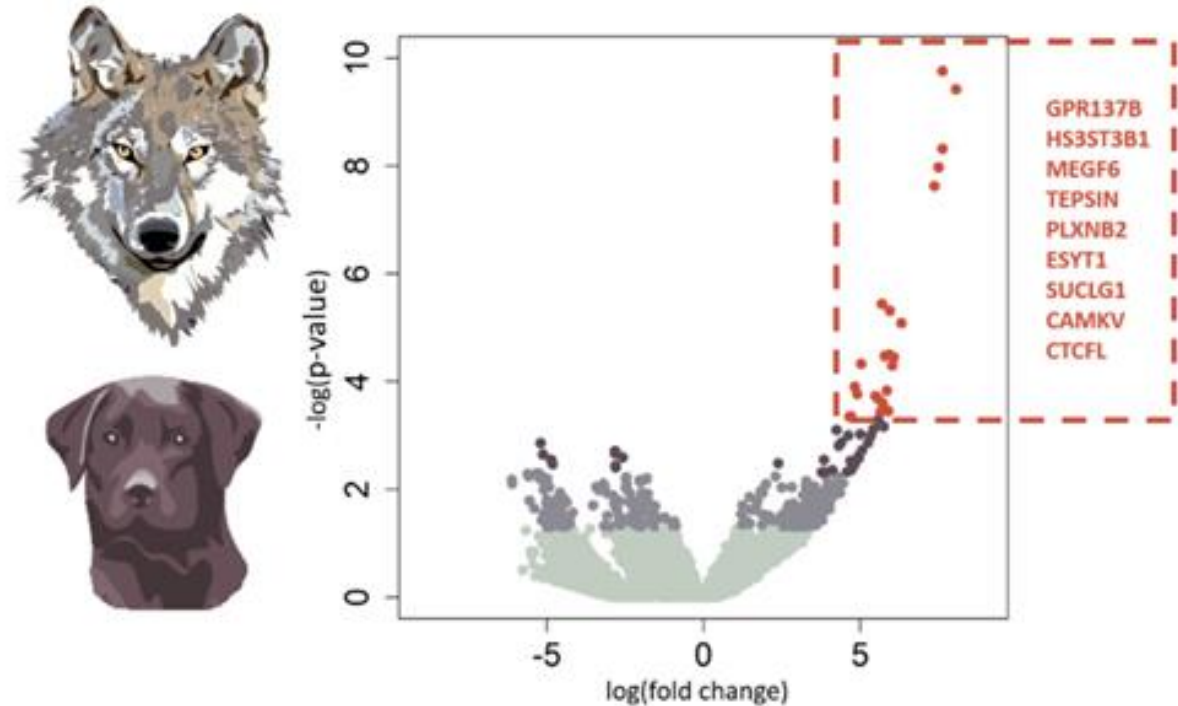


Figure 6. Volcano plot over the methylated regions that are different between wolf and dog. Colours represent significant levels (from bottom to top: $p > 0.05$, < 0.05 , < 0.005 , < 0.0005). Differentially methylated regions with a positive log fold change are more methylated in the wolf than the dog. The regions that reach the highest level of significance are listed to the right of the graph.

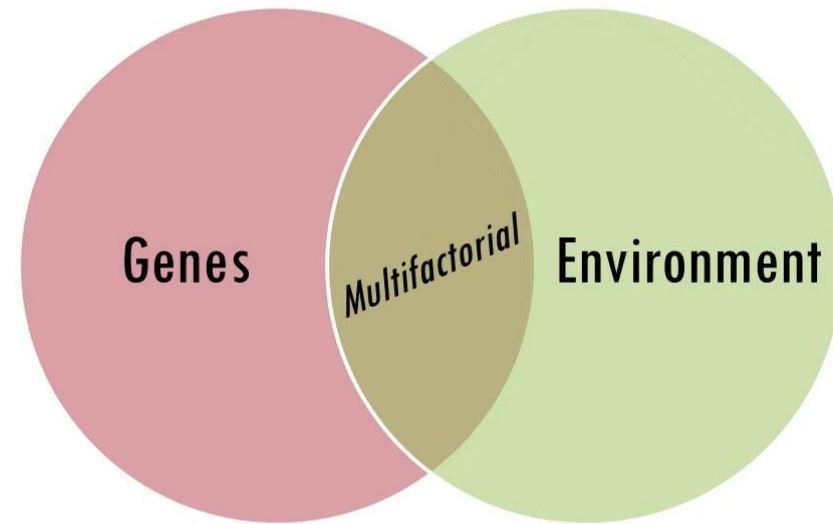
Sources :

(6) (PDF) Dog behaviour : Intricate picture of genetics, epigenetics, and human-dog relations ([researchgate.net](https://www.researchgate.net/publication/351111111_Dog_behaviour:_Intricate_picture_of_genetics_epigenetics_and_human-dog_relations))

DNA methylation in canine brains is related to domestication and dog-breed formation - PMC ([nih.gov](https://pubmed.ncbi.nlm.nih.gov/351111111/))



HÉRÉDITÉ MULTIFACTORIELLE



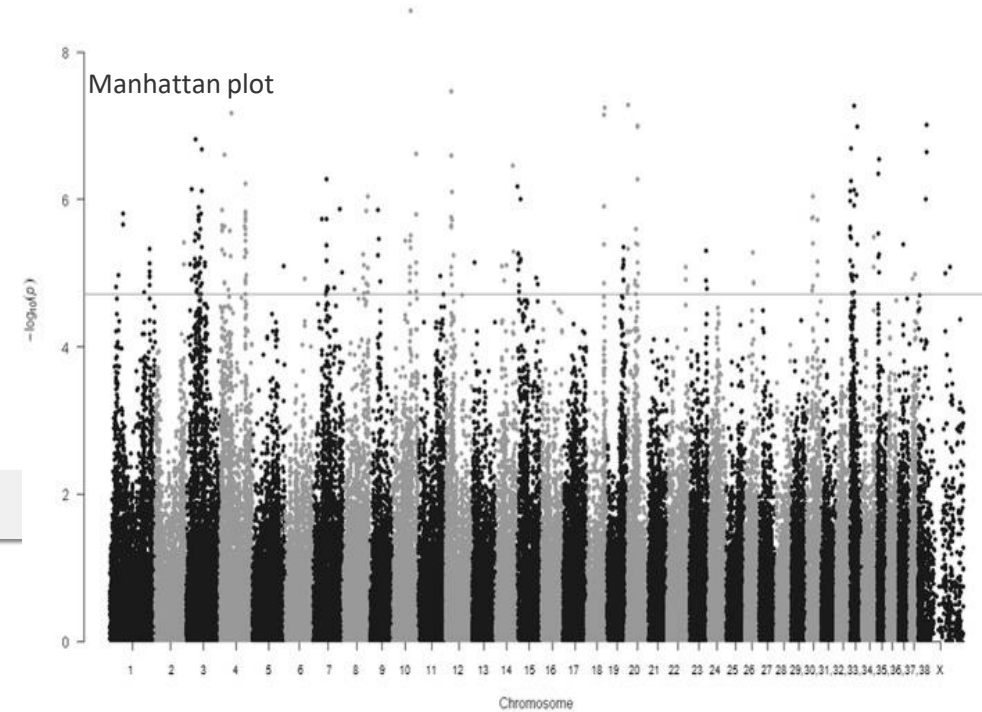
Source :
[Multifactorial inheritance \(futurelearn.com\)](https://futurelearn.com)



EXEMPLE:

Dysplasie de la hanche

$h^2 \sim 35\%$



A Genetic Predictive Model for Canine Hip Dysplasia: Integration of Genome Wide Association Study (GWAS) and Candidate Gene Approaches - PMC (nih.gov)

Sources:

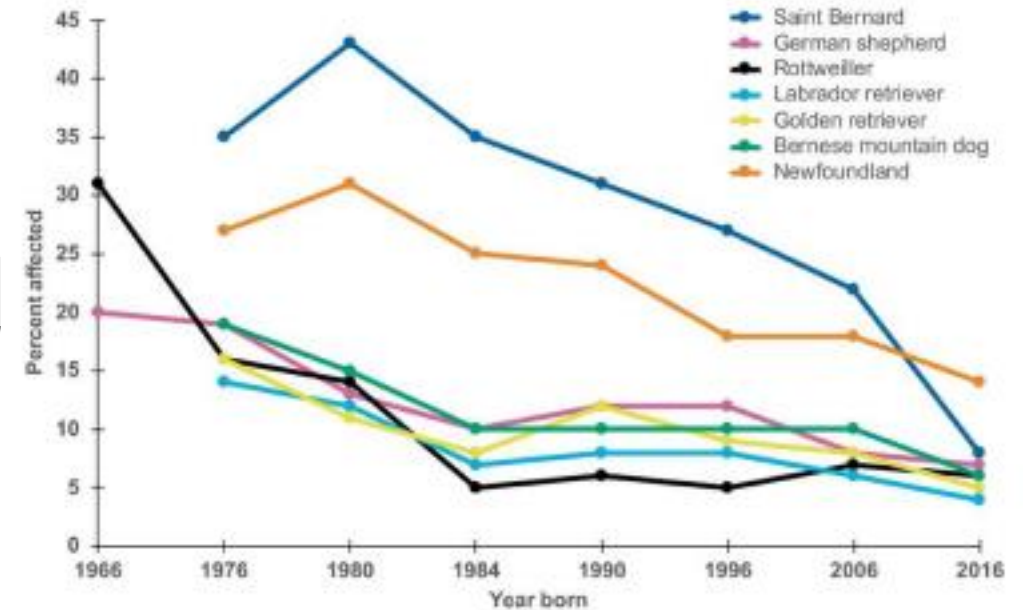
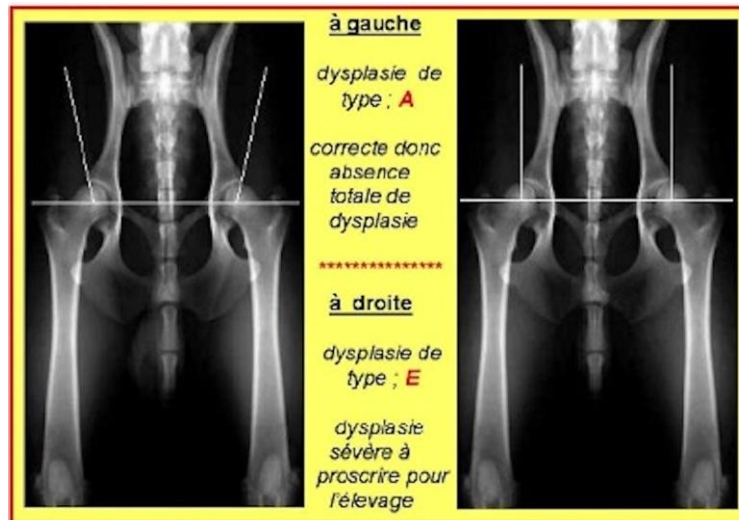
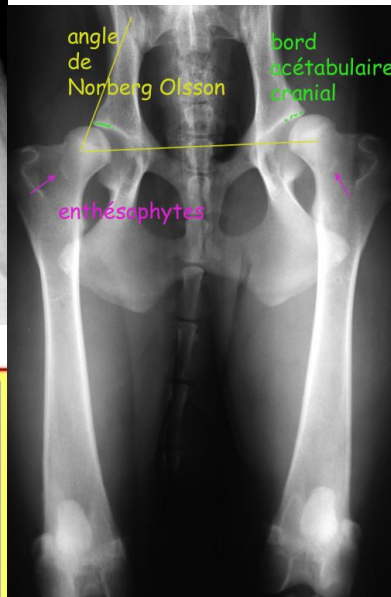
https://www.researchgate.net/publication/23556051_Prevalence_of_hip_dysplasia_elbow_dysplasia_and_humeral_head_osteocondrosis_in_dog_breeds_in_Belgium

[An across-breed validation study of 46 genetic markers in canine hip dysplasia | BMC Genomics | Full Text \(biomedcentral.com\)](#)

[OMIA:000473-9615: Hip dysplasia in Canis lupus familiaris \(dog\) - OMIA - Online Mendelian Inheritance in Animals](#)



Diverses mesures phénotypiques



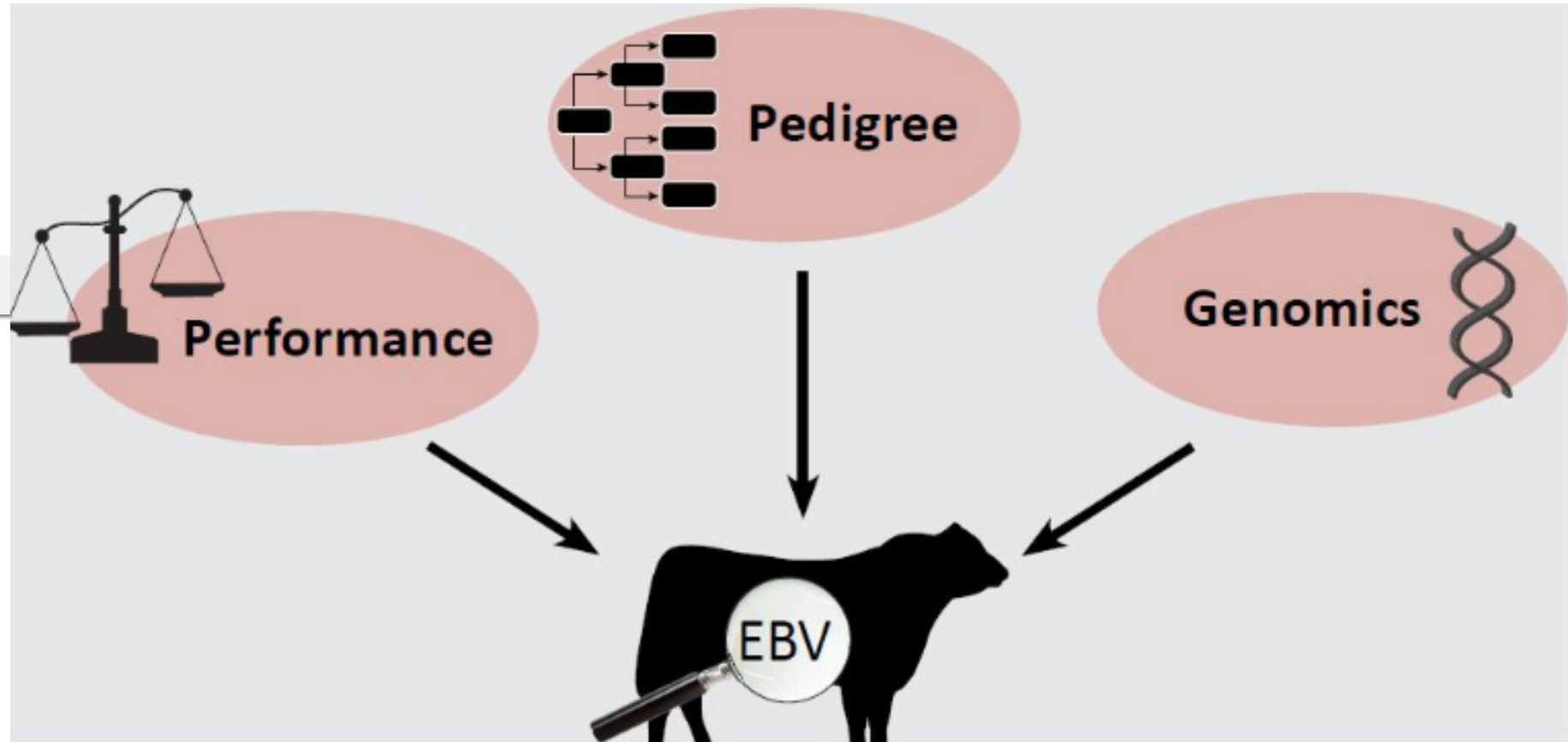
Diminution du pourcentage de chiens diagnostiqués avec les grades 2-4/D-E de la dysplasie de la hanche en Suède

Sources:

(8) (PDF) Swedish Experiences From 60 Years of Screening and Breeding Programs for Hip Dysplasia—Research, Success, and Challenges ([researchgate.net](https://www.researchgate.net/publication/331111111_Swedish_Experiences_From_60_Years_of_Screening_and_Breeding_Programs_for_Hip_Dysplasia))
[la dysplasie chez le chien | Société Centrale Canine \(centrale-canine.fr\)](https://www.centrале-canine.fr/)



Valeur d'élevage estimée – Zuchtwert



Sources:
[Prospective evaluation of a patented DNA test for canine hip dysplasia \(CHD\) | PLOS ONE](#)
[SV-Datenbank - HD breeding value \(sv-doxs.net\)](#)
[Monitoring Hip and Elbow Dysplasia Achieved Modest Genetic Improvement of 74 Dog Breeds over 40 Years in USA - PMC \(nih.gov\)](#)
[\(8\) \(PDF\) Comparative analyses of genetic trends and prospects for selection against hip and elbow dysplasia in 15 UK dog breeds \(researchgate.net\)](#)
[A Genetic Predictive Model for Canine Hip Dysplasia: Integration of Genome Wide Association Study \(GWAS\) and Candidate Gene Approaches - PMC \(nih.gov\)](#)



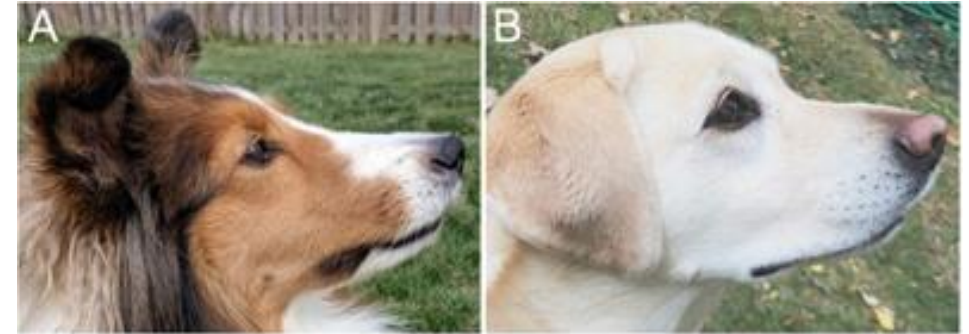
EXEMPLE:

Syndrome BAOS

Gènes (brachycéphalie)

FGF4, SMOC2, BMP3, DVL2,

Tissus mous, taille des narines,



Forme du crâne des chiens.

(A) Berger des Shetland (dolichocéphale) ;
(B) Labrador retriever (mésatiocéphale) ;
(C) bouledogue (brachycéphale) ;
(D) bouledogue français (brachycéphale).

Sources:

[What Practitioners Should Know About the Genetics of Brachycephaly - WSAVA 2018 Congress – VIN](#)

[Canine DVL2 variant contributes to brachycephalic phenotype and caudal vertebral anomalies - PubMed \(nih.gov\)](#)

[Canine Brachycephaly: Anatomy, Pathology, Genetics and Welfare - PMC \(nih.gov\)](#)

[Brachycephalics: 'Once a problem is seen it cannot be unseen' | Canine Medicine and Genetics | Full Text \(biomedcentral.com\)](#)

[Brachycephalic obstructive airway syndrome \(BOAS\) - in FOCUS \(rcvsknowledge.org\)](#)

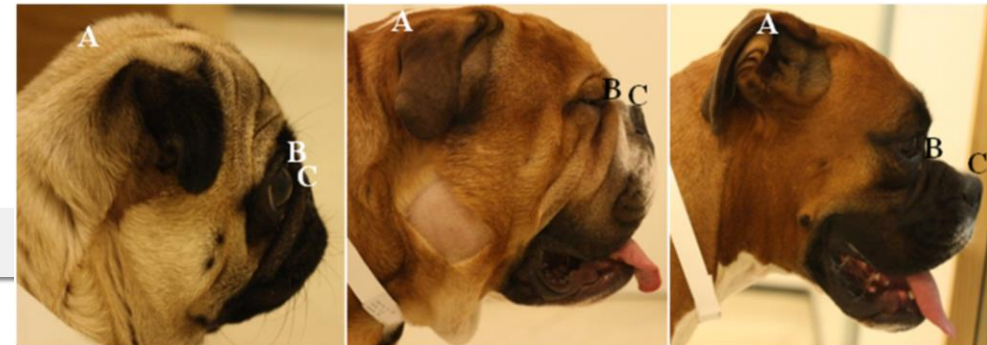


Diverses mesures phénotypiques

Indicateurs morphométriques

- Forme du crâne
- Sténose des narines
- Présence d'un pli

....



Tests fonctionnels

- Marche (6 minutes, 100 mètres)
- BREATH

...



Sources:

[Test BREATH pour les races brachycéphales | Société Centrale Canine \(centrale-canine.fr\)](https://centrale-canine.fr/)

[Impact of Facial Conformation on Canine Health: Brachycephalic Obstructive Airway Syndrome | PLOS ONE](https://doi.org/10.1371/journal.pone.0211111)

[breeding-short-muzzled-dogs-in-the-netherlands expertisecentre-genetics-of-companionanimals-2019-translation-from-dutch.pdf \(fecava.org\)](https://www.fecava.org/expertisecentre-genetics-of-companionanimals-2019-translation-from-dutch.pdf)



EXEMPLE:



Sarcome hystiocytaire du bouvier bernois

Pré-test basé sur 9 marqueurs

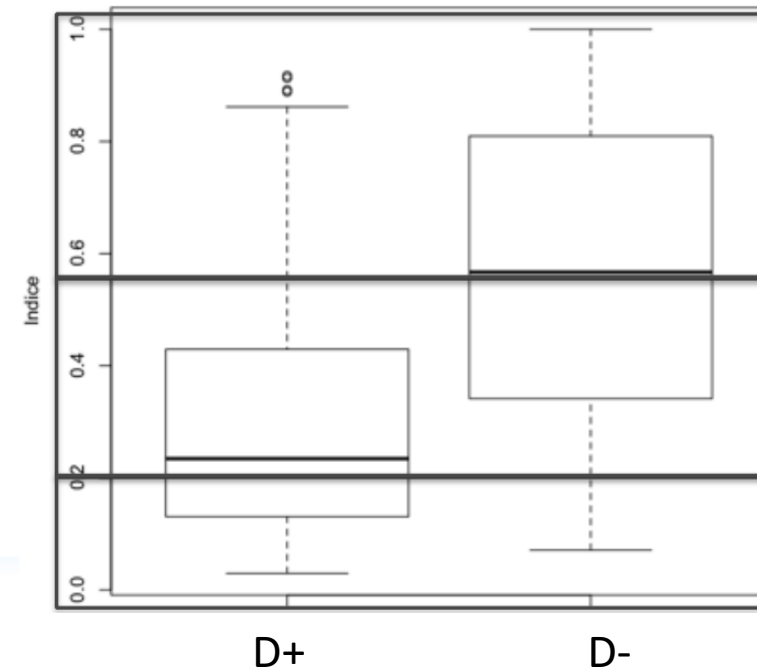
Sources:

[OMIA:000620-9615: Histiocytosis, malignant in Canis lupus familiaris \(dog\) - OMIA - Online Mendelian Inheritance in Animals](#)
[Epidemiology, Pathology, and Genetics of Histiocytic Sarcoma in the Bernese Mountain Dog Breed | Journal of Heredity | Oxford Academic \(oup.com\)](#)
[Le sarcome histiocytaire chez le Bouvier bernois : pathologie, diagnostic et risque génétique \(uliege.be\)](#)
[IWG 2017 B Hedan \(bernese.co.uk\)](#)
[Identification of common predisposing loci to hematopoietic cancers in four dog breeds | PLOS Genetics](#)

Category A

Category B

Category C



47 % of healthy
10% of affected

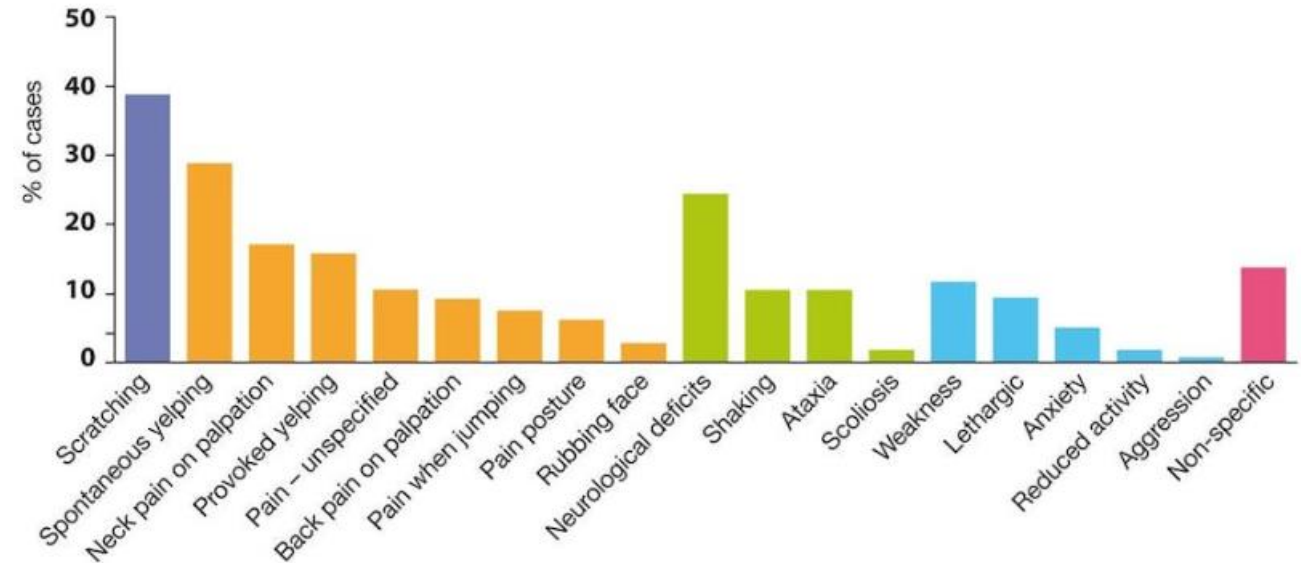
43 % of healthy
50% of affected

10 % of healthy
40% of affected



EXEMPLE:

Syringomyélie du CKC



[Chiari-like malformation and syringomyelia in dogs | Vet ... \(royalcanin.com\)](#)

Gènes: PCDH17, ZWINT,
PLXNA2, HHAT, MBOAT2, ITGAV, HPCAL1,...

$h^2 \sim 40\%$

Sources:

[A genome-wide association study identifies candidate loci associated to syringomyelia secondary to Chiari-like malformation in Cavalier King Charles Spaniels - PMC \(nih.gov\)](#)

[Syringohydromyelia in Dogs: The Genomic Component Underlying a Complex Neurological Disease - PMC \(nih.gov\)](#)

[Heritability of syringomyelia in Cavalier King Charles spaniels - PubMed \(nih.gov\)](#)

[Clinical Signs of Canine Chiari and Syringomyelia - from the expert \(youtube.com\)](#)

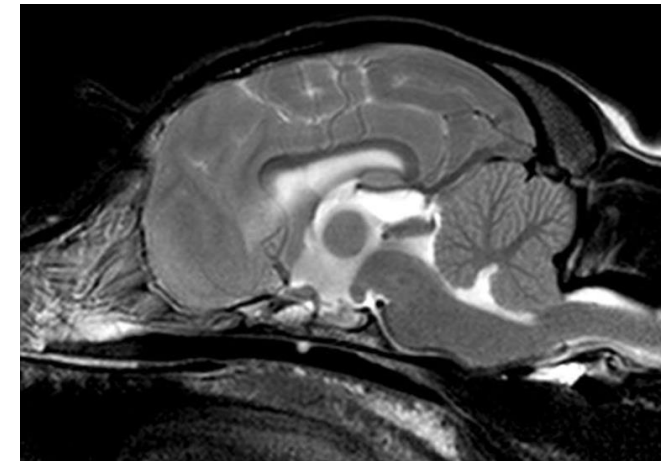
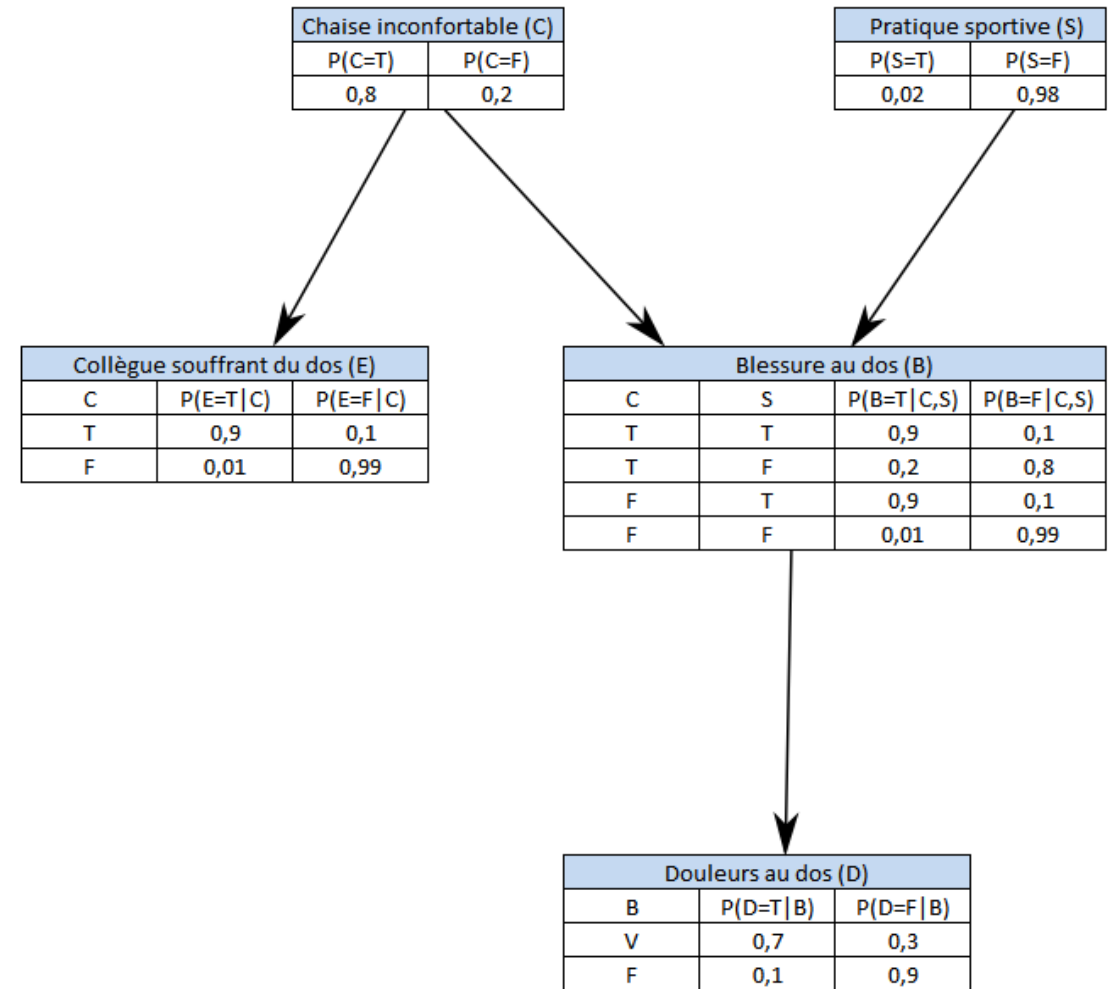


Figure 2. MRI scan of a canine patient with Chiari-like malformation showing herniation of the cerebellum through the foramen magnum. © Prof. Holger Volk



« INTELLIGENCE » ARTIFICIELLE

Source:
[Introduction to Bayesian Networks \(nbertagnolli.com\)](http://nbertagnolli.com)



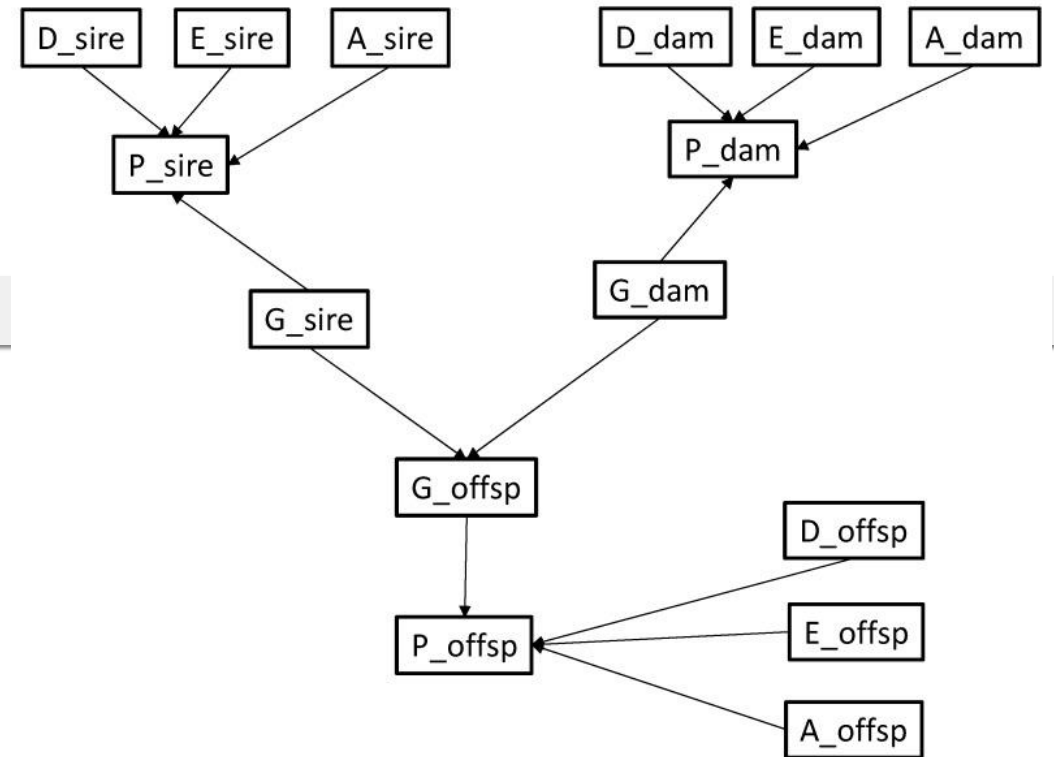


EXEMPLE:

Rupture du ligament croisé antérieur



<https://chien.ooreka.fr/astuce/voir/541313/rupture-des-ligaments-croises-chez-le-chien>



Sources:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7341277/>

<https://pubmed.ncbi.nlm.nih.gov/32499222/>

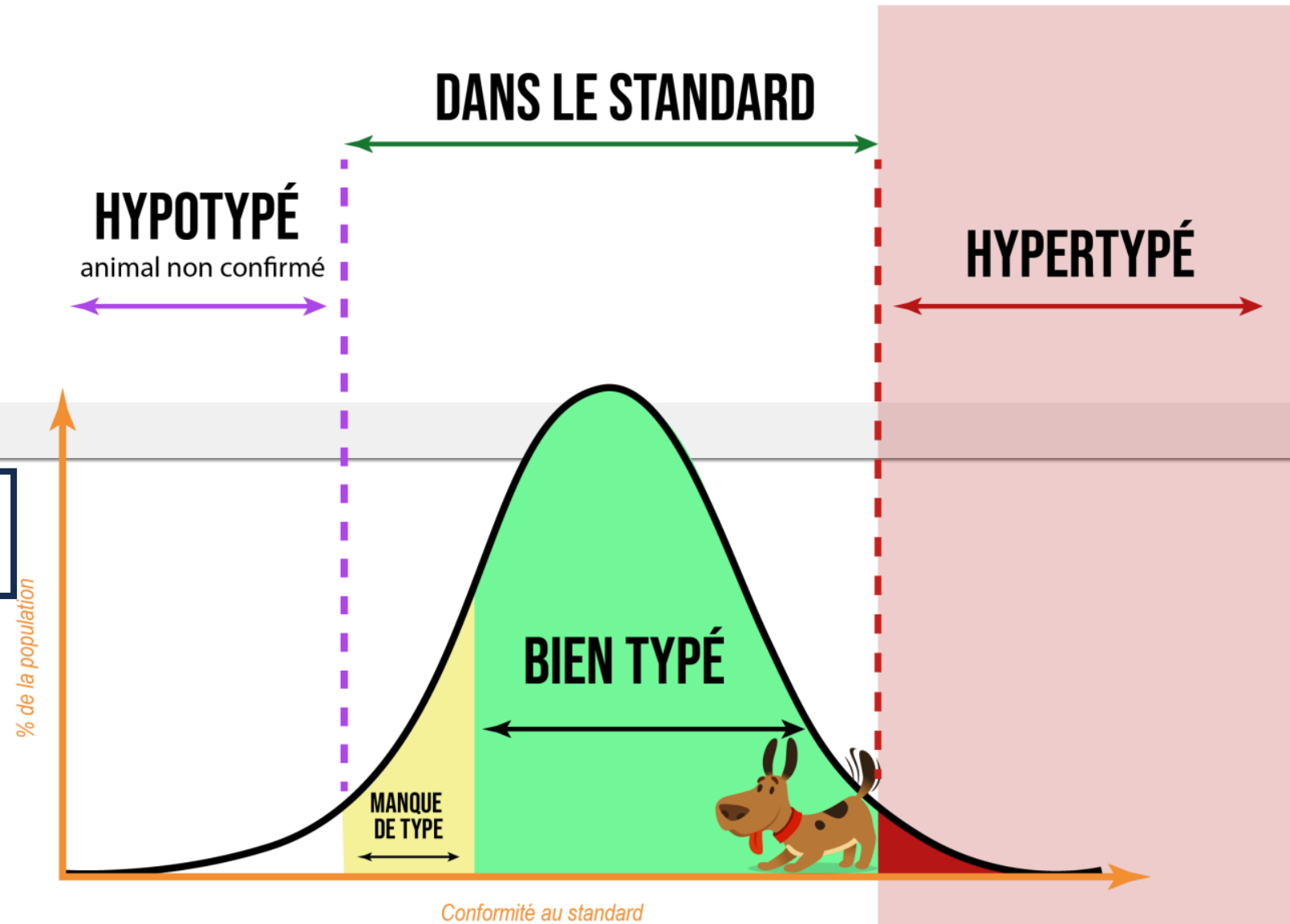
[ijatcse551022021.pdf \(warse.org\)](https://www.warse.org/ijatcse551022021.pdf)

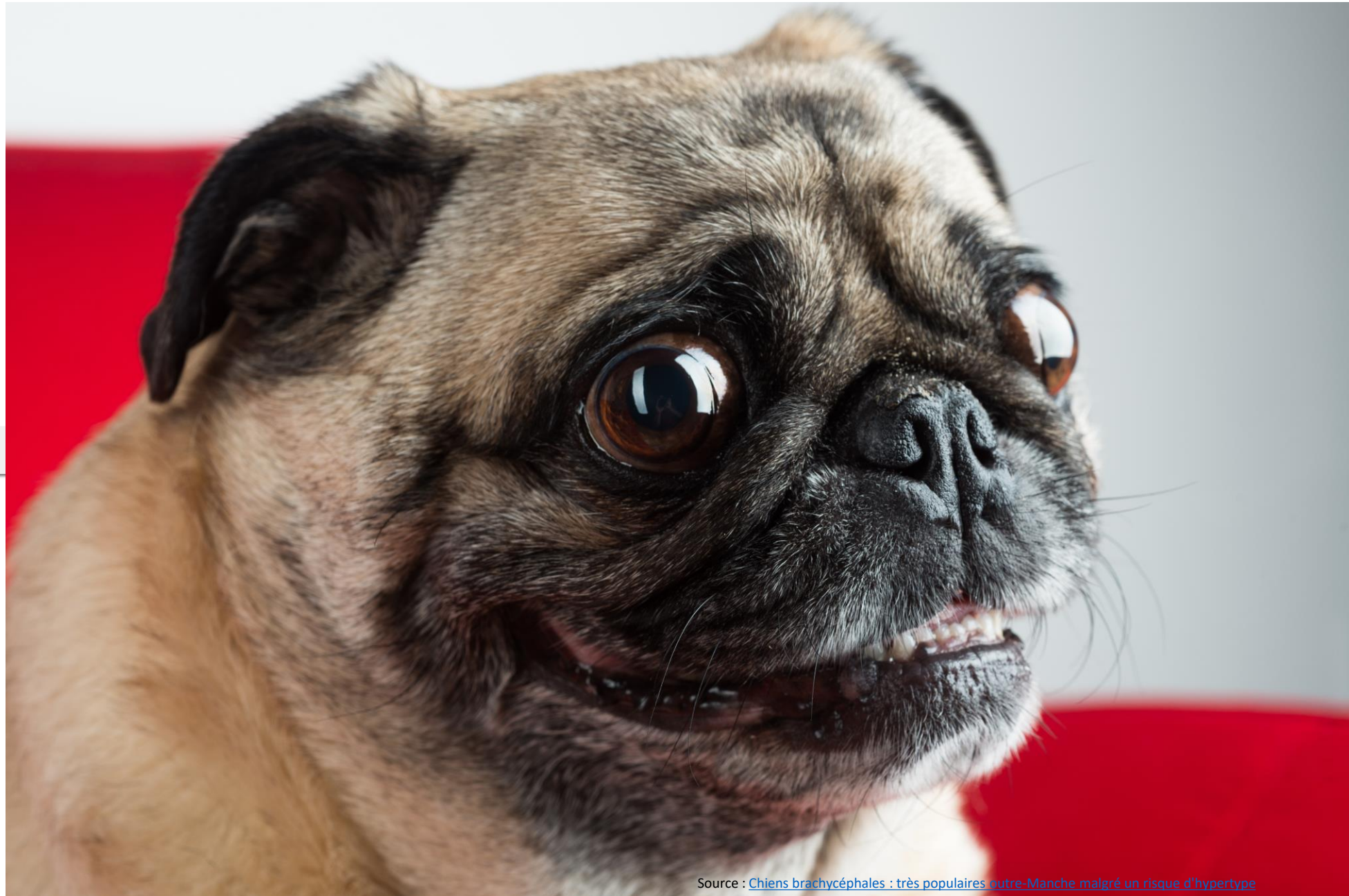


TOUT EST BIEN QUI FINIT BIEN?



HYPERTYPES





Source : [Chiens brachycéphales : très populaires outre-Manche malgré un risque d'hypertension](#)



HYPERTYPES

Source : <https://bienetreanimal.wallonie.be/hypertypes>





Discutons quelques cas concrets

- Vous faites des concours avec votre mâle Carlin. Pour atteindre le meilleur standard, vous désirez l'accoupler avec sa sœur brachycéphale. Quels sont les avantages et désavantages ?
- Vous êtes responsable d'un refuge dans lequel il y a un bouledogue. Quels conseils donnez-vous à l'adoptant?
- Vous élevez des Pembroke Welsh corgi. Vous êtes intéressée par un mâle provenant du Japon porteur de la mutation SOD1. Quelles précautions prenez-vous?
- On vous offre un chiot de race bouvier bernois. Que faire?
- Vos lévriers participent à des courses au cynodrome d'Awans. Comment améliorer les performances de leurs descendants ?
- Comment éviter de hauts taux de consanguinité dans votre élevage?
- Vous élevez des Beagle et votre mâle reproducteur a gagné de nombreux prix. Malheureusement, il voit de moins en moins bien et votre vétérinaire suspecte un glaucome. Que faites-vous?
- Vous élevez des Jack Russel et votre mâle reproducteur a gagné de nombreux prix. Malheureusement, il voit de moins en moins bien et votre vétérinaire suspecte un glaucome. Que faites-vous?

ET VOUS?