Galloping in to the Future: Genetic Tips and Tools for the Horse Owner

The Horse Genome...

- 31 autosomes, 2 of each
- 2 sex chromosomes
- 2 copies in every cell
- Non-identical copies
- Copies can interact
  - Dominant
  - Recessive
  - Semi-Dominant
What should I (not) breed for?

Simple Genetic Disorders Solved…

- HYPERKALEMIC PERIODIC PARALYSIS, HYPP, 1992
- HYPEROXALICURIA, M. J. 1997
- EPILEPTIC SHIPTON WHITE, D. E. 1997
- EQUINE GASTRIC DUODENAL ULCE, EGD, 2001
- EQUINE EPILEPSY, E. T. 2000
- POLYCHROMATHEXIS UNIFORMIS, PU - JEB, 2003
- EQUINE LEUKODYSTrophy, EL, 2006
- EQUINE LEUKODYSTrophy, EL, 2007
- POLIOJOINT PHENOMENON, PJ, 2007
- TEL FONTANAL PENTADOXIC DEFICIENCY SYNDROME, 2011
- LOSS OF CANTER?, 2012
- NEW FOREST FOYI CONGENITAL MYOTONIA, 2012
- CONGENITAL STATIONARY NIGHT BLINDNESS, 2013
- INCONTINENIA PIGMENTI, 2013
- AND SEVERAL MORE!!!
Traits under positive selection...
- Chestnut, 1996
- Overo, 1998
- Black, 2001
- Cream, 2003
- Sabino I, 2005
- Liver, 2006
- Tobiano, 2007
- Tuffy, 2008
- Distance??? (MSTN), 2010
- Dominant White*, 2008
- Canter Quality?? (DMRT3), 2012

Hyperkalemic Periodic Paralysis
- Sodium channel SCN4A*
- Dominant
- Muscle fasciculation
- Paralysis/respiratory failure
- More severe in homozygotes
- Impressive
- At the age of 24 (1992) his progeny were estimated at 55,000 individuals

* Rudolph et al. 1992
... under negative selection?

Fossil horse genome, 700,000YA!

Where do I get my horse tested?
The system is new, and evolving...

Federal regulations for humans and animals differ...

Case 1 - Guilty until proven innocent
Case 2 - A Faux spot...

Where to find testing services?
- Ask your veterinarian?
- Universities and affiliates
- Accredited diagnostic labs
  (AAVLD)
- ISAG standardized parentage
  providers
- Licensed use of patented
tests
- Published techniques
- Good customer service
- Word of mouth?

Current and Future Applications?
- Test for Predisposition
- Gene Targeted Treatment
What if do I do I think I’m seeing something genetic?
- Carefully record the details.
- Save a sample!
- Consult with a geneticist?

WE NEED HORSES!!!

Questions? equinegenetics@ifas.ufl.edu