

First results on genomic selection in French show-jumping horses

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▶ To cite this version:

Anne Ricard, Sophie Danvy, Andres Legarra. First results on genomic selection in French show-jumping horses. 63. Annual Meeting of the European Association of Animal Production (EAAP), Aug 2012, Bratislava, Slovakia. 476 p., 10.3920/978-90-8686-761-5. hal-02746523

HAL Id: hal-02746523 https://hal.inrae.fr/hal-02746523

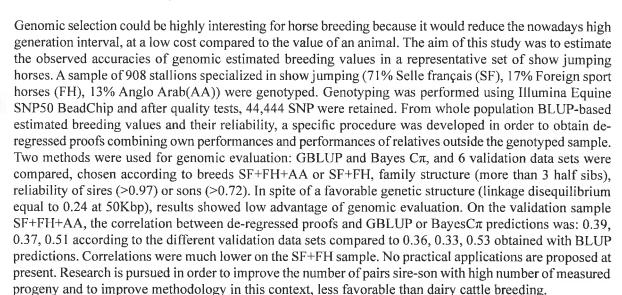
Submitted on 3 Jun 2020

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Session 45 Theatre 4

First results on genomic selection in French show-jumping horses

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Session 45 Theatre 5

The myostatin sequence variant g.66493737T>C detects evolution and domestication in horses

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Myostatin (MSTN) is a negative regulator of muscle growth. Particular or complete loss of function of MSTN leads to muscle hypertrophy. We determined the presence of the sequence variant g.66493737T>C polymorphism and the promoter insertion g.66495327-[Insertion227b]-66495326 of MSTN associated with sprinting ability in thoroughbreds, donkeys and 19 different horse populations. In addition, we analyzed the haplotypes surrounding these MSTN-polymorphisms using the genotyping data from the Illumina Equine 50K beadchip. The C-allele was found in all domestic horse breeds but not in Przewalski horses and donkeys genotyped here. The frequency of the promoter insertion was quite low (0.5%) and not in linkage disequilibrium with the g.66493737T>C polymorphism. AMOVA for donkeys and the 19 horse populations showed that 25% of the variance of the g.66493737T>C SNP is due to species and population differences and 75% of the variability can be attributed to differences within species and populations. Nei's standard genetic distances among donkeys and the 19 horse populations ranged from 0 to 0.29. Genetic distances were lowest among Przewalski and Arabian, Lewitzer, Lusitano, Hanoverian, Westphalian, Exmoor and Icelandic horses (0-0.01). Genetic distances were largest among Przewalski and Sorraia as well as Black Forest horses. Cluster analysis revealed five main clusters for the C-allele frequency. The analysis of the C/T-polymorphism of the MSTN gene highlights an east to west increase of the C-allele and indicates that this MSTN mutation arose in the West European E. ferus or during domestication in western European horses. In conclusion, the g.66493737T>C polymorphism seems to be a good indicator for differentiating domestic horses due to their western or eastern origin.

Book of Abstracts of the 63rd Annual Meeting of the European Federation of Animal Science



Book of abstracts No. 18 (2012) Bratislava, Slovakia 27 - 31 August 2012