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Short communication

Detection of *Brachyspina* carriers within Polish Holstein-Friesian bulls

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Abstract

The aim of this paper was to verify the hypothesis whether carriers of genetic defect Brachyspina occur in the Polish Holstein-Friesian Cattle. PCR method was used to screen 78 Polish Holstein-Friesian bulls. Eight bulls were identified as heterozygotes for 3,3 kb deletion in the FANCI gene – the mutation causing Brachyspina defect. All carriers were sons of 3 sires: Cleitus Jabot, Sandy-Valley Bolton ET and Coyne-Farms Dorcy ET which were descendants of the US sire Sweet Haven Tradition (HOUSAM 1682485). Systematic screening of young bulls having in the pedigree Barchyspina carrier is necessary to prevent spreading of the recessive mutation in the dairy cattle population in Poland.

Key words: Brachyspina, carrier, Holstein-Friesian cattle, lethal defect

Introduction

In current livestock breeding practices, especially of dairy cattle, the exchange of genetic material proceeds very rapidly by means of artificial insemination (AI), import of semen and transfer of embryos. The intensity and universality of these practices require the constant monitoring of the active population (especially of AI bulls) to detect potential defects and genetic diseases as well as pathways of their spreading since the use of a small number of bulls in breeding programs results in an increased number of related animals in the entire population of cattle. Brachyspina syndrome (OMIA 000151-9913) is the newest genetic defect in Holstein cattle caused by 3,3 kb deletion in the bovine fanconi anemia complementation group 1 (FANCI) gene (Charlier et al. 2012). Recessive homozygotes undergo early-term abortion or are stillborn (Agerholm et al. 2006, 2007). All so far identified carriers were traced back to a common ancestor, the US Holstein sire Sweet Haven Tradition. The acronym of the disease – BY, is currently used in pedigree files in the most advanced dairy cattle breeding programs (www.holsteinusa.com).

The aim of this paper was to verify the hypothesis whether Brachyspina carriers occur also in the Polish Holstein-Friesian Cattle.

Materials and Methods

The present study includes 78 Polish Holstein-Friesian Black-and-White bulls born between 2005 and 2014 which were the property of domestic insemination companies or individual breeders providing young bulls to these companies. Genomic

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DNA was isolated from ear tissue samples using the NucleoSpin Tissue kit according to the manufacturer's instructions (Macherey-Nagel GmbH & Co. KG, Dueren, Germany). BY carriers were identified by two separate PCR amplification as described earlier (Charlier et al. 2012).

Results and Discussion

Among 78 bulls investigated, 8 were identified as heterozygotes for 3,3 Kb deletion of FANCI gene. All carriers were sons of 3 sires: Cleitus Jabot, Sandy-Valley Bolton ET and Coyne-Farms Dorcy ET which were descendants of US sire Sweet Haven Tradition (HOUSAM 1682485).

Our preliminary results clearly show that the BY carriers are present in Polish Holstein-Friesian cattle population and should be included in regular screening of AI dairy bulls. It should prevent spreading of the BY recessive mutation within cow population and steadily eliminate the number of new carriers as it was achieved for other genetic defects (BLAD, CVM) screened by our group (Czarnik et al. 2007, Ruść et al. 2013). The high incidence of BY carriers (ca. 10%) reported in this paper does not reflect the actual average frequency of BY in the whole population since animals included in the analysis were chosen by breeders as having in the pedigree data BY-positive ancestor.

Based on the analysis of pedigree of BY carriers which semen was imported to Poland in the last decade, we assume that the number of BY carriers is lower than BLAD and CVM carriers at initial stage of screening program (unpublished data). Data obtained in other countries however, show that the number of BY-positive bulls is still relatively high and can spread rapidly when ignored. For example, Charlier et al. (2012) reported 7,4% BY carriers and VanRaden et al. (2011) – 6%, both for Holstein breed. In the Chinese Holstein, Fang et al. (2013) found 13 carriers within 342 animals (206 bulls and 136 cows).

Since Holstein-Friesian cattle is one of the most inbred dairy cattle breed, closer international integration of national associations of Holstein cattle breeders and coordination of genetic defects discovery programs is necessary to decrease the risk of new recessive disorders and reduce their prevalence.

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