

STRESS GENE PREVALANCE IN BOARS OF DIFFERENT ARTIFICIAL INSEMINATION STATIONS

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Summary. Porcine Stress Syndrome (PSS) is autosomal recessive disorder in pigs caused by mutation in HAL gene. PSS makes worth production, reproduction and health traits as well as influences meat quality. The condition is called PSS because the affected pigs are susceptible to death from environmental stresses such as transportation or the events preceding slaughter. The meat of stress susceptible animals is pale, soft and exudative (so called PSE meat). There are big losses while boiling such meat and it is not good for processing. The PSE meat correlates with lower pH and higher drip loss in HAL homozygous pigs. The genetical background of the PSS is mutation in the Ryanodine receptor Gene (RyR) in position 1843 where nucleotide C is changed into T. This gene have been located to porcine chromosome 6p12-q22 by fluorescent in situ hybridization (FISH) method. The mutation leads to changed membrane characteristics in skeletal muscle fibres, especially to an increased release of calcium ions from sarcoplasmic reticulum as a response to different stress factors. So the gene is sometimes called calcium release channel gene (CRC). This induces hyperactivity of the metabolic processes in the fibres and gives bad meat quality after slaughtering and death of animals because of a heat shock - malignant hyperthermia susceptibility in pigs so the gene is sometimes called (MHS) gene. The gene is also called HAL gene as the mutation can be detected by pigs susceptibility to inhalational anaesthetics such as halothane. After identifying the gene causing the mutation in 1992 year the PCR- RFLP method was developed for distinguishing between stress susceptible (PP), gene carriers (NP) and unsusceptible (NN) animals. The DNA tests is performed once in animal life and not dependent on an age. It is possible to do the test on new born piglet so the selection can be done very efficiently. The DNA can be extracted from any tissue - blood , semen, ear tissue, hair roots. The cheapest and the most comfortable way of taking sample is hair roots as it can be done without the veterinarian and there is no neediness for any special practice. The objective of the study was the implementation of the PCR-RFLP test for HAL (CRC; MHS; RYR) genotyping and detection of the frequency of mutation in sows and boars populations of different breeds in Lithuania. Testing for mutation was performed by PCR-RFLP method with genomic DNA isolated from ear tissue and hair roots. When extracting DNA form ear tissue a small part of it was incubating with lysis buffer with enzyme Proteinase-K, SDS and DTT. When extracting DNA from hair roots they have been incubated with enzyme Proteinase K, KCl and Tween. PCR with specific primers for HAL gene was carried out amplify the specific fragment. An aliquot of the PCR product was subjected to restriction endonuclease Alw 1 and Hin digestion .The products of restriction enzyme digestion were separated on the high resolution agarose gel and stained with ethidium bromide. Gels were analyzed and stored at data by computerized UV video documentation system. In this work PCR-RFLP analysis was performed on the Hal gene of 125 boars of different breeds in the artificial insemination stations. 84 % of Pietrain breed boars is stress susceptible (PP), 11 % mutant gene carriers (NP) and 5 % is stress negative (NP). The other breed stress susceptible is German Landrase in which according to our results 40 % are stress positive (PP), 20 % heterozygous of hal gene (NP) and 40 % are negative(NN). All Large White boars was stress negative (NN) and between Swedish Yorkshire breed boars there 85 % stress negative (NN) and 15 % mutant gene carriers. Pigs from different breeds are very different in susceptibility to different stresses. More stress susceptible are animals with high productivity as they have been selected for lean meat. The assumption can be made that the gene for lean meat is closely linked to HAL gene. An example is Pietrain breed which gives lean meat but the pigs of this breed are the most susceptible to stress in comparison with other breeds. Over the past few years the world's pig breeders have been trying to eliminate this mutation from the breeding population but have found that the region of DNA containing the mutation also plays a significant role in the reduction of body-fat. As the consumers of pork are continually looking for leaner meat the breeders have had to retain the mutation in the population in order to keep this meat quality. So it is very important to know genotype of sows and boars in order to make correct breeding schemes and not to allow the HAL gene to become into homozygote condition.

Keywords: Hal gene, malignant hyperthermia susceptibility, PCR-RFLP, porcine stress syndrome, PSE, ryanodine receptor.