

Polymorphism of insulin-like growth factor (*IGF-1*) gene in Polish Lowland Sheep from Podlaskie Voivodeship

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Abstract: *Polymorphism of insulin-like growth factor (IGF-1) gene in Polish Lowland Sheep from Podlaskie Voivodeship.* Research was carried out on 432 Polish Lowland Sheep (405 ♀ and 27♂) of three varieties: Corriedale, Żelaźnieńska Sheep and Polish Lowland Sheep of Podlasie region. All animals were subjected to gene identification factor insulin – *IGF-1*, in the assessment of alleles C and T. In conclusion it should be noted that in the three examined varieties of Polish Lowland Sheep showed no polymorphism in exon 3 of the insulin-like growth factor (*IGF-1*) gene, limiting its scope to determine the allele C, respectively genotype CC. This result indicates the need for further research in this area in “culture” sheep imported and adapted to Polish conditions and the production environment.

Key words: Polish Lowland sheep, *IGF-1* gene, genetic polymorphism

INTRODUCTION

Protein *IGF-1* is one of the key components of the pathway of growth hormone (Franco et al. 2005). *IGF-1* is produced in the liver and is responsible for cell growth and body treatments.

It is believed that the effect of growth hormone occurs in the tissue in coopera-

tion with local somatomedin e.g. *IGF-1* and stimulates the secretion of hypothalamic somatostatin inhibits secretion of growth hormone (Krzyszowski – Ed. 1998). Insulin factor gene is exchanged among the conditions which were useful to the identification of races, as demonstrated in the Mediterranean countries (Pariset et al. 2006). Niżnikowski et al. (2013) presents a different view in relation to the research carried out on domestic sheep breeds compared to the ancestor of the sheep – European mouflon *Ovis aries musimon*. Taking into account the fact reported in the cited work conditions influence the incidence of insulin-like factor gene *IGF-1*, it was decided to examine its frequency of occurrence in three varieties of Polish Lowland Sheep: Żelaźnieńska, Corriedale and Polish Lowland Sheep of the Podlasie region (PZO 2013).

MATERIAL AND METHODS

The studies were conducted on Polish Lowland Sheep: Corriedale Sheep (2 herds), Żelaźnieńska Sheep (2 herds)

and Polish Lowland Sheep of Podlasie region (3 herds). Ewes and rams were aged 2 to 11 years (Table 1). Herds were randomly selected for sampling. For the isolation of genomic DNA blood samples were obtained of animals from *vein jugularis* into tubes containing anticoagulant EDTA. The study was carried out assessment of the polymorphic region (exon 3) in insulin-like growth factor (*IGF-1*) gene.

TABLE 1. Experimental material used in the study

Sheep Breeds	Number of ewes and rams		
	Total ♀	Total ♂	Herd sampling
Corriedale	108	6	Herd 1 – 98 ♀, 6 ♂ Herd 2 – 10 ♀
Polish Lowland Sheep of the Podlasie region	185	14	Herd 1 – 25 ♀, 4 ♂ Herd 2 – 57 ♀, 4 ♂ Herd 3 – 93 ♀, 6 ♂
Żelaznieńska	112	7	Herd 1 – 96 ♀, 6 ♂ Herd 2 – 16 ♀, 1 ♂
Total within gender	405	27	×
Total	432		

TABLE 2. The name of *locus* primer sequence and SNP of the polymorphic region in *IGF-1* gene

<i>Locus</i>	Name	Primers sequences 3'–5' (forward/reverse)	SNP	Localization
<i>IGF-1</i>	insuline-like factor	CACACACCTTGTTGCACTCC/ /GCTGAGTTGGTTGGATGCTCT	AY737509: 211 C > T ^a	Exon 3

^a Pariset et al. (2006).

DNA was isolated from blood leukocytes using the conserved EDTA. In order to receive high quality DNA suitable after freezing and thawing of a reusable, blood is pretreated with the resulting DNA

modification by removal of heme-compounds lysis of erythrocytes products.

DNA is isolated from leukocytes by chromatography on mini-columns of silicate A&A Biotechnology. The fraction thus obtained was used as template DNA for amplification of polymorphic gene allele fragment. Sample genotyping was performed with KASPar® system (www.kbioscience.co.uk), which use the single nucleotide polymorphism (SNP) based on primers listed in Table 2.

The genotyping of DNA samples within the ewes and rams shows distributions of alleles and genotypes frequency separately for each varieties of studied sheep. Allele and genotype frequencies were compared depending on the varieties of sheep using χ^2 test and SPSS v. 21 software, with was assessed range of alleles and genotypes frequency between varieties, sexes, and the differences between the sexes in terms of individual alleles and genotypes.

RESULTS AND DISCUSSION

Studies have shown that for factor *IGF-1* gene were found only the C allele. Analyses of 432 samples collected from the rated sheep did not show the presence of

the T allele in any case. In comparison with the results of Pariset et al. (2006), mainly describing sheep found in the region of the Mediterranean Sea, Black Sea and Germany, sheep tested in Poland showed no polymorphism here. That was confirmed by the results achieved by Niżnikowski et al. (2013) in studies conducted in sheep breeds in Poland. It is expected that the distribution of the conditions occurring in sheep breeds in Poland was typical for this region of the world and different from the observed trends in other European countries (Pariset et al. 2006). Perhaps it has to do with another course of life processes of growth and development, which wrote Krzymowski – Ed. (1998). In this situation, can be a useful series of studies on sheep imported into Polish, polymorphism alleles and genotypes of insulin-like factor gene subject to change due to processes of adaptation – which requires further work in this area.

Generally, it should be noted that the summing up of the three examined varieties of Polish Lowland Sheep showed no polymorphism alleles and genotypes of factor *IGF-1*, limiting its scope to determine is the C allele and genotype CC. This result indicates the need for further research in this area in “culture” sheep imported and adapted to Polish conditions and the production environment.

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- Streszczenie:** Polimorfizm genu czynnika insulinopodobnego *IGF-1* u polskich owiec nizinnych utrzymywanych w województwie podlaskim. Badania przeprowadzono na materiale 432 polskich owiec nizinnych (405 ♀ i 27 ♂) trzech odmian: corriedale, owcy żelaźnieńskiej i polskiej owcy nizinnej regionu podlaskiego. Wszystkie zwierzęta były poddane identyfikacji genu czynnika insulinopodobnego *IGF-1*, w zakresie oceny występowania alleli C i T. Podsumowując, należy stwierdzić, iż u badanych trzech odmian polskich owiec nizinnych nie wykazano polimorfizmu występowania alleli i genotypów genu czynnika insulinopodobnego *IGF-1*, ograniczając jego zakres do ustalenie jedynie do allelu C i genotypu CC. Wynik ten wskazuje na potrzeby przeprowadzenia dalszych badań z tego zakresu u owiec kulturowych pochodzących z importu i adaptowanych do polskich warunkach środowiska produkcyjnego.

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