



# Effects of SMAD6 and SUGCT genes on Litter traits of pigs

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## Introduction

One of the main goals in swine industry is to find the significant SNPs associated with Litter traits. SNPs localized in SMAD6 (g.164674664G>A) and SUGCT (g.53672799A>G) genes are of interest in this aspect.

## Materials and methods

The purpose of this work is to optimize the process of SNPs genotyping for PCR real-time technology and to identify additive and dominant effects on Litter Traits in pigs. The study was conducted on Large White sows (n=400). The traits under study included the Total number born (TNB), Total number born alive (NBA), Litter weight, piglets born alive (BALWT). The associative analysis was performed using the Linear mixed model (LMM) procedure using the R Statistical Package (additive effect was encoded 0, 1, 2 and dominant effect 0, 1, 0).

## Components of developed test systems

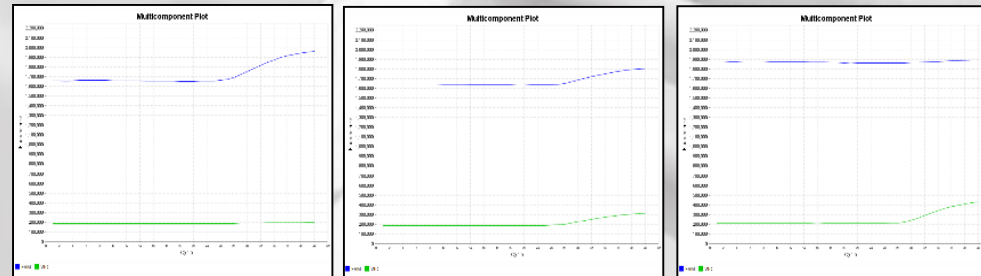
The primers for SNP\_g.164674664 G>A genotyping

g.164674664-G (R6G-TGGTCCCCGGGACAGGC-BHQ-1)  
 g.164674664-A (FAM-TGGTCCCCGGGACAGGC-BHQ-1)  
 g.164674664-F (CAAGGTCAGACAAAGGGACTGC)  
 g.164674664-R (ACTGTATGTAAAGCATGGTGAAGC)

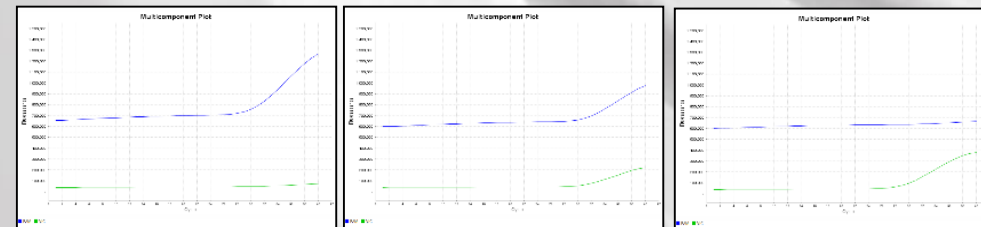
The primers for SNP\_g.53672799 A>G genotyping

g.53672799-A (R6G-CTTCAGCATCTGAACAGAACA-BHQ-1)  
 g.53672799-G (FAM-CTTCAGCGTCTGAACAGAACA-BHQ-1)  
 g.53672799 - F (GGAAGTCTGCTATCTGTTTCATTTCTT)  
 g.53672799 - R (GGAGCTCAAATCCCAGTATTGC)

## Examples of test systems operation g.164674664



## g.53672799



## Optimal conditions for PCR

Stage	Primary denaturation	Denaturation	Primer annealing	Elongation
Temperature, time.	95 °C, 8 min.	95 °C, 20 sec.	rs80891106 58 °C, 45 sec. rs81379421 63 °C, 45 sec. rs81421148 60 °C, 45 sec. rs81319839 62 °C, 45 sec. Photographing	72 °C, 5 sec.
Number of repetitions	1		40	

## Results

Table. Additive and dominant effects SNP\_g.164674664G>A and SNP\_g.164674664G>A on Litter Traits sows

Traits	Genotype			Effect	
	AA	AG	GG	a	d
SNP g.164674664G>A					
TNB	14,08±0,79	13,92±0,84	13,97±0,83	0,06	-0,06
NBA	12,39±0,75	12,84±0,80	12,95±0,79	-0,28	-0,04
BALWT	14,32±0,97	15,05±1,04	16,12±1,02	-0,90*	-0,89*
SNP g.53672799A>G					
TNB	14,12±0,44	13,68±0,42	14,28±0,53	-0,08	-0,66*
NBA	13,29±0,42	12,53±0,50	13,08±0,50	0,11	-0,61
BALWT	16,61±0,55	15,01±0,66	15,73±0,66	0,44	-0,97*

The additive and dominant effects of SNP\_g.164674664 G>A on Litter weight are determined. Litter weight were 1.8 (12.6%, p < 0.05) and 1.1 (7.7%, p < 0.05), higher in sows of SNP\_g.164674664\_AA and SNP\_g.164674664\_AG genotypes respectively. The negative dominant effect SNP\_g.53672799\_AG was found for TNB and BALWT (Table 4). Homozygous sows compared to heterozygous have higher TNB and BALWT by 0.7 (4.7%, p ≤ 0.05) and 1.0 (7.4%, p ≤ 0.05), respectively.

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