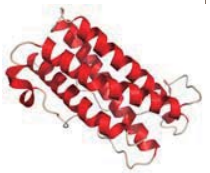
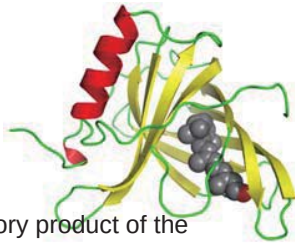
Genetic polymorphism of Retinol Binding Protein 4 (RBP4) and Leukemia Inhibitory Factor (LIF) gene for litter size in various breeds of swine in the Philippines

Trinidad C. Fernando
Molecular Genetics Laboratory
Genetic Improvement Unit
Philippine Carabao Center National Gene Pool and Headquarters, Science City of Munoz,
Nueva Ecija 3120, Philippines



Introduction: RBP4



- Retinol-binding protein is a major secretory product of the liver as well as of the uterine endometrium and periimplantation conceptuses of pigs
- RBP4 gene has a significant effect on litter weight on day 21 of age and litter weight at weaning
- The distribution of RBP and abundance of RBP mRNA in pig maternal and conceptus tissues throughout pregnancy was examined:

  an integrated system of RBP gene expression and protein secretion allows transport of retinol from the uterine endometrium to the periimplantation conceptus during early pregnancy and to the fetal-placental unit throughout pregnancy in pigs

Introduction: LIF

Leukemia inhibitory factor (LIF) is involved in the regulation of fertility functions, particularly in fetal development and implantation in pigs.

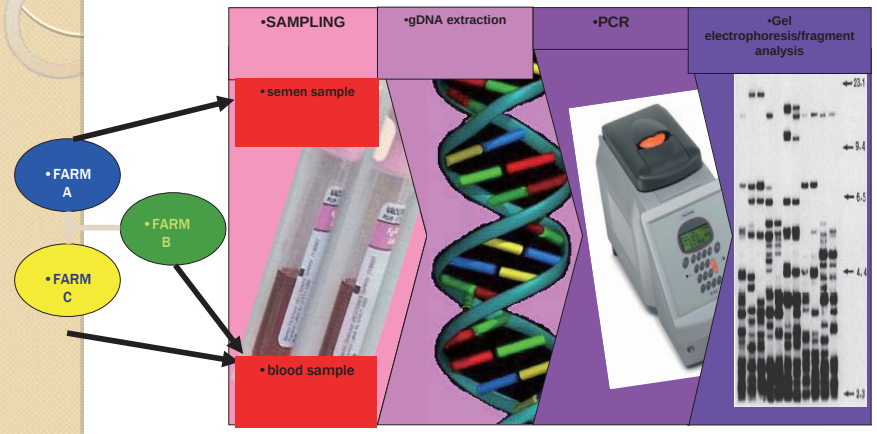
The C/T transition polymorphism (Allele A) found located at 6988 position, 24 bp downstream of the stop codon in exon 3 of the gene in swine has been reported.

This A allele was found to be positively associated with litter size in pigs.

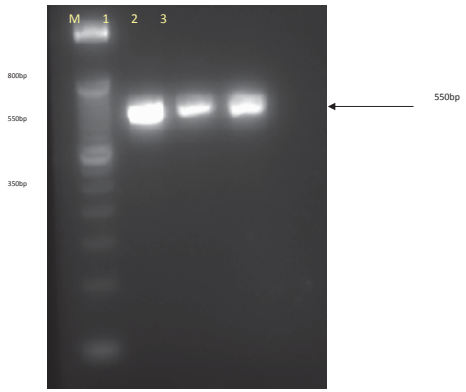
Objective

- Develop genetic evaluation protocols for the identification of individual breeder pigs that are carriers of high litter size gene

Methodology



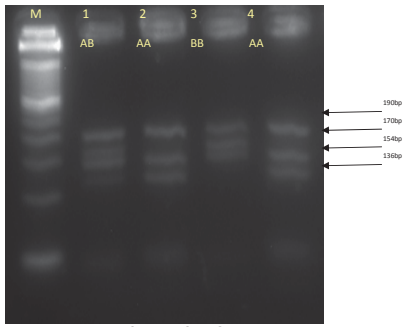
Results in RBP4



PCR product using RBP4 gene marker with product size of 550bp. M – marker, Lane 1-3– Sample

Results in RBP4

Results showed the allele frequency of A was 0.65 and B was 0.35. Genotypic frequencies showed that AA, AB and BB were 0.37, 0.55 and 0.08, respectively.



Agarose gel result after *MspI* digestion

Results in RBP4

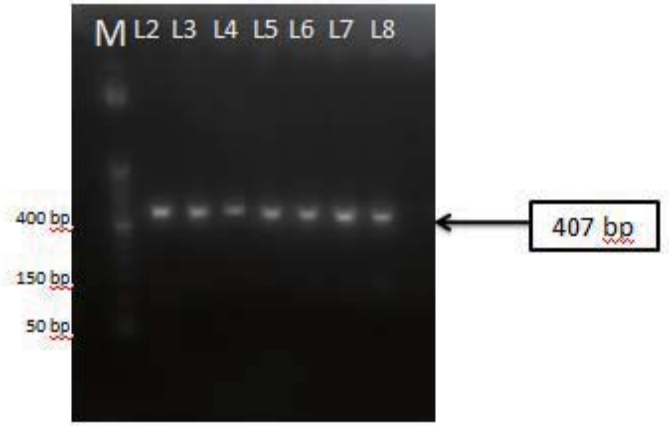
GENOTYPE	Number of samples
AA	78
AB	112
BB	16
TOTAL	206

Results in RBP4

• Result of DNA sequencing showed that there was 86-95% for AA to 79-90% for AB similarity to *Sus scropa* retinol-binding protein gene, partial coding region (cds).

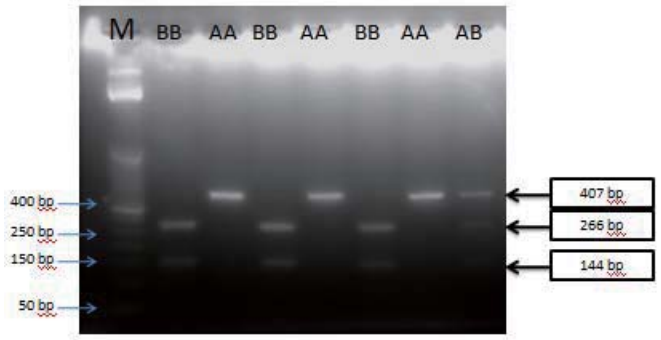
• The presence of allele B results to higher litter size.

Results in Leucocyte Inhibitory Fator (LIF) Gene



Gel Result of PCR products using LIF gene primers with amplified 407 bp band size. M-Ladder Marker, L2-L8- Samples 1 and 7

Results in Leucocyte Inhibitory Fator (LIF) Gene



Results in Leucocyte Inhibitory Fator (LIF)

GENOTYPE	Number of samples
AA	63
AB	101
BB	70
TOTAL	234

Results in Leucocyte Inhibitory Fator (LIF) Gene

The genotypic frequencies were 0.26, 0.30 and 0.44 for AA, BB and AB alleles respectively

Allele frequencies on the other hand were 0.48 and 0.52 for A and B allele, respectively

Animals carrying allele A showed increased number of piglets born alive across all parities. This A allele is a C/T transition polymorphism found located at 6988 position, 24 bp downstream of the stop codon in exon 3 of the gene in swine.

FUTURE PLANS

Genes	Function
***PRLR** (prolactin receptor)	For litter size
IGF2 (Insulin like Growth Factor 2)	For lean yield
CCKAR (Cholecystokinin type A receptor)	For feed intake and growth traits

*- PCR using PRLR is already done in all samples but RFLP using *Alu 1* restriction enzyme is still for optimization

REFERENCES

- **Harney, J.P. Smith, L.C. Simmen, R.C.M. Fliss, A.E. Bazer, F.W. 1994.** Retinol-Binding Protein: Immunolocalization of Protein and Abundance of Messenger Ribonucleic Acid in Conceptus and Maternal Tissues during Pregnancy in Pigs. Animal Science Department, University of Florida, Gainesville, Florida 32611-0691. http://www.ncbi.nlm.nih.gov/pubmed/8025169
- **Korwin-Kossakowska, A. Kapelański, W. Bocian, M. Kamyczek Grażyna, M. 2005.** Preliminary study of the RBP4, EGF and PTGS2 genes polymorphism in pigs and its association with reproduction traits of sows. Polish Academy of Sciences Institute of Genetics and Animal Breeding, Jastrzębiec, 05-552 Wólka Kosowska, Poland. National Research Institute of Animal Production, Pig Hybridization Centre, Pawłowice, 64-122 Pawłowice, Poland. Department of Pig Breeding, University of Technology and Agriculture, Mazowiecka 28, 85-084 Bydgoszcz, Poland. http://www.ighz.edu.pl/files/objects/2104/66/strona95-106.pdf

Thank you!
Salamat po!