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Correlated response of blood concentration of cytokines with selection for reduced MPS pulmonary lesions in landrace pigs

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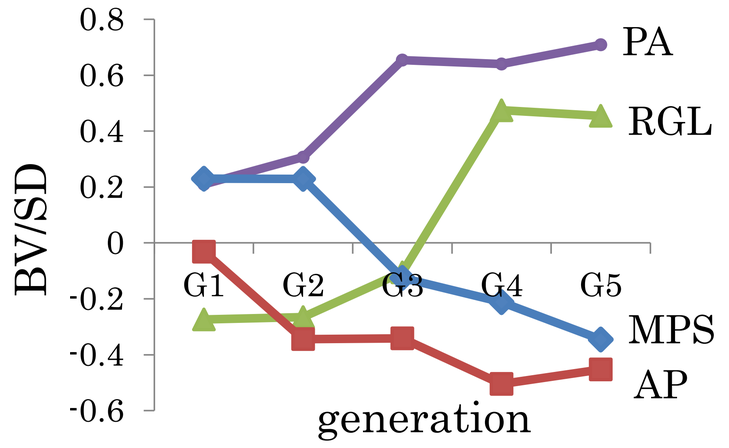
Introduction

Mycoplasma Pheumonia of swine (MPS) inflict great financial harm on the pig industry. At present, antibiotic feed additives and vaccines are used for this matter. However it is not effective means because of the matter of food safety and drug resistance bacteriums. So we made novel swine line selected for reduced MPS pulmonary lesions through five generations (H. Kadowaki et al., Livestock Science, 2012). Various of immune traits were already measured on this line. In this study, we measure blood concentration of cytokines (IL10/13/17, TNFα,IFNγ) newly and estimate these correlated response.



※PA, phagocytic activity; RGL, ratio of granular leucocyte to lymph cells; MPS, Mycoplasma Pheumonia of swine; AP, antibody production

Materials & Methods

●Animals

About 1,300 Landrace purebred pigs were used (five generations). Selected trait : MPS, daily gain (DG), backfat thickness (BF), plasma concentrations of cortisol (CORT).

●Measurement of Cytokines

Materials : Serums of sib-tested pigs A (clean environment) and B (not clean environment).
Method : Enzyme Linked Immunosorbent Assay (ELISA).
Cytokines : IL10, IL13, IL17, TNFα, IFNγ.

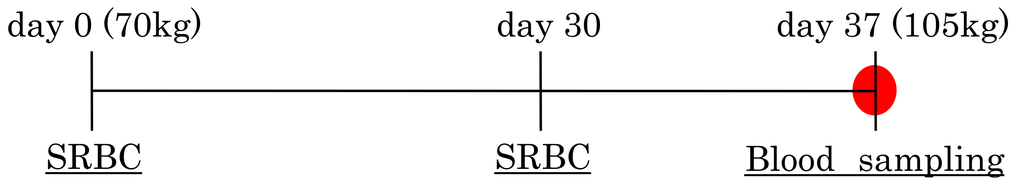
●Statistical Analysis

The genetic parameters were estimated by VCE6.0 program. The breeding values of all pigs(1396 pigs) were estimated by PEST program. Generation differences were compared by ANOVA using the SAS system. Fixed effects are generation, sex, and environment.

■Number of tested pig

	sib-tested pig		parents		
Generation	A	B	sires	dams	Total
Base	-	-	13	34	47
1	67	62	33	52	214
2	51	95	50	108	304
3	47	79	50	113	289
4	42	78	49	106	275
5	45	73	46	103	267
Total	252	387	241	516	1396

■Sampling program



Results

■Heritability and genetic correlations (Cytokine-Cytokine)

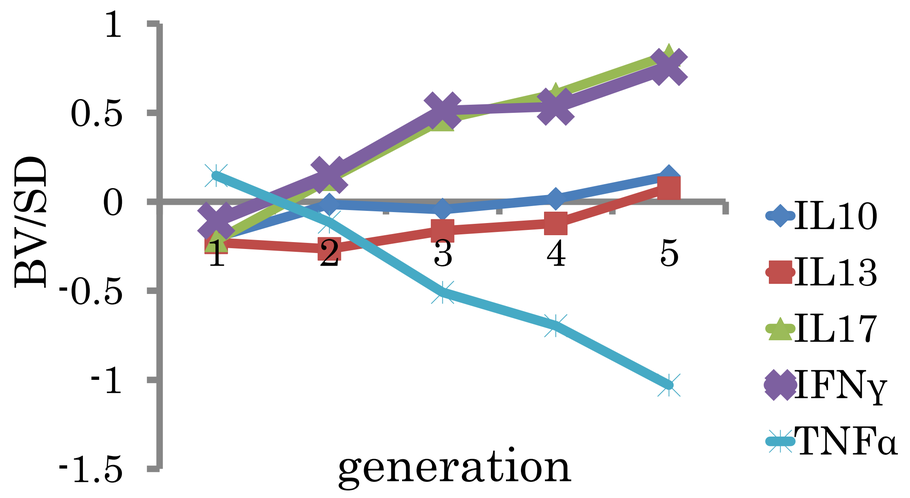
	IL10	IL13	IL17	TNFα	IFNγ
IL10	**0.20**	**0.86**	0.20	-0.18	0.47
IL13		**0.12**	0.50	0.09	**0.86**
IL17			**0.27**	-0.61	**0.54**
TNFα				**0.20**	**-0.72**
IFNγ					0.05

■Genetic correlations (Cytokine-Selected trait)

	h^2	IL10	IL13	IL17	TNFα	IFNγ
DG	0.60	**0.32**	0.10	0.20	-0.22	**0.66**
MPS	0.09	-0.02	-0.45	**-0.86**	**0.69**	-0.45
BF	0.66	**-0.28**	-0.03	-0.16	**0.32**	**0.46**
CORT	0.13	0.39	-0.16	-0.02	-0.01	0.21

※Underline show a significant difference

■Genetic trend of cytokines



	1−2	1−3	1−4	1−5	2−3	2−4	2−5	3−4	3−5	4−5
IL10	N.S.	N.S.	N.S.	***	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
IL13	N.S.	N.S.	N.S.	***	N.S.	N.S.	***	N.S.	**	N.S.
IL17	***	***	***	***	***	***	***	N.S.	***	N.S.
IFNγ	**	***	***	***	***	***	***	N.S.	**	N.S.
TNFα	**	***	***	***	***	***	***	N.S.	***	***

***: P<0.001, **: P<0.01, N.S.: Not Significant.

Conclusions

- IL17 is available for selective breeding related to MPS, because of reratively high heritability (0.27) and genetic correlation with MPS (-0.86).
- Changes of IL17 or TNFα associated with selection suggested that natural immunity is important for suppression of MPS.
- Cell immunity might also be important for that, but we think increase of IFNγ is largely a result of high genetic correlation with DG and BF.
- Through the selection, breeding values of IL10 and IL13 have hardly changed. This is why antibody response by humoral immunity is less important for MPS.

Natural Immunity is Important for MPS !!