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W. Christopher Scruton

Stephen Claas

Layout

David Brown

Logo Design

Ruth Cronje, and Jan Swanson;

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RELATIONSHIP BETWEEN IMMUNE CELLS AND PIG GROWTH ON A COMMERCIAL FARM

Lucina Galina-Pantoja^a, Gloria Solano-Aguilar^b, Martha A. Mellencamp^a, John Bastiaansen^a, Rafael Cabrera^{a@}, and Joan K. Lunney^b.

^a Sygen International/PIC, 3033 Nashville Road, Franklin, KY, 42135, USA.

^bIDRL, ANRI, ARS, USDA, Building 1040, Room 107, Beltsville, MD 20705 USA.

[@] Currently at Ralco-Mix Products, Inc, 1504 Aquarius Way, Bowling Green KY, 42104. USA.

Introduction

Genes, gene products, and cell types from the immune system that are involved in defense against environmental challenges are potential reagents to select robust pigs. The overall objective of this study was to understand how immune system activation influences pig production parameters. We evaluated the relationship between the level and function of circulating immune cells with average daily gain at different production stages including lifetime daily gain (LDG).

Material and Methods

Production performance of 199 pigs from 3 commercial genotypes was monitored throughout the lifetime of the pigs. Pigs were moved in weekly batches through the nursery, and growing-finishing rooms at specific target weights. Animals were individually weighed at birth and at weaning, and then every 2 weeks while they were “on test” and until they were “off test” and sent to the slaughterhouse. At 6-7 weeks of age the pigs were bled in the nursery. Blood samples were sent for laboratory processing and the percentage of immune cell subtypes (phenotype) and lymphocyte proliferation (function) was estimated using swine monoclonal antibodies (CD4, CD8, SWC3, SLADQ, CD2, CD16, CD21) and flow cytometric analysis (1). The predictive effect of the immune cell subtype markers and proliferative responses on lifetime daily gain was statistically analyzed using Mixed Model procedures (SAS Mixed). The model for gain traits included: sire (commercial line)+nursery room+sex+parity.

Results

Several cell subtypes including CD16+($p<0.05$), CD2+/CD16+($p<0.01$), and CD8+ ($p<0.05$) lymphocytes appeared to predict performance during the entire

productive life of the pig. Larger relative percentages of lymphocyte expressing CD16+, CD2+CD16+, and CD8+ receptors in blood reflected a detrimental reduction in LDG. The impact in days to market pigs expressing the highest (top 30 pigs) and lowest (bottom 30) percentages of CD2+CD16+ cells (NK lymphocytes) is shown in Fig I. These observations support previous reports that NK and CD8+ lymphocytes are associated with production parameters in swine (2) and expand the findings to commercial environments and LDG.

Conclusions

The CD16+, CD2+/CD16+, and CD8+, cell subtypes appear to be important biomarkers involved with the inherent ability of the pig to efficiently grow and produce better carcass weigh in commercial environments. Selection of pigs using these markers may allow more efficient production and practical use in the swine industry.

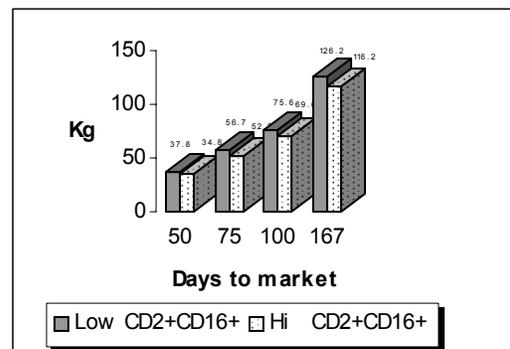


Figure I. Difference in days to market between pigs expressing low (avg of 5.4%) and high percentages (ave of 33.1%) of CD2+CD16+.

References

1. Solano-Aguilar, 2000. J Immunol Methods. 241.
2. Clapperton, 2001. Proc IVVS, Sweden.