



## Serpina3 and Vitronectin as Biomarkers for Feed Efficiency in Swine

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### Objectives

Feed represents over 60% of cost inputs in pork production in the United States. Residual feed intake (RFI) is a measure of feed efficiency representing the difference between observed and expected feed intake based on average daily gain and backfat. Two lines of pigs demonstrating differences in RFI have been generated by nine generations of selection. In previous two dimensional- difference in gel electrophoresis (2D-DIGE) experiments, vitronectin and the serine proteinase inhibitor A3 (serpinA3) were observed to be increased in the more efficient low RFI line, which suggests that they could serve as potential biomarkers for feed efficiency. SerpinA3 has many biological roles, including inflammation response, immune function, and tumor suppression. Roles of vitronectin include blood homeostasis, thrombosis, and fibrosis. Our objective was to determine the extent to which selection for RFI influences serum serpinA3 and vitronectin abundance for pigs fed traditional versus alternative low energy, high fiber diets.

### Materials and Methods

Pigs from the ninth generation of the Iowa State University RFI Project were used for this study. Serum samples were collected from pigs between 35 and 42 d of age and stored at  $-80^{\circ}\text{C}$ . During finishing, pigs from both lines were fed either a standard corn-soybean diet or a low energy, high fiber diet until slaughter. Individual feed intake data was collected to calculate RFI. Pigs from each line and diet ( $n = 7/\text{diet}/\text{line}$ , total  $n = 28$ ) were selected from a larger set of animals to represent the most extreme RFI values for each diet. One dimensional western blot analysis was performed on SDS-PAGE gels to determine the relative abun-

dance of serpinA3 and vitronectin in the individual samples. Samples were run in duplicate against a pooled reference of all samples. Data were analyzed using the mixed procedure of SAS version 9.3, with gel included as a random effect.

### Results

RFI line did not significantly affect SerpinA3 abundance in serum. For the high fiber diet, serpinA3 abundance was numerically increased in the low RFI line (high RFI = 0.84, low RFI = 0.98,  $\pm 0.09$ ,  $P = 0.11$ ).

When fed the alternate diet, vitronectin was more abundant in serum from pigs the low RFI line (high RFI = 0.95, low RFI = 1.28  $\pm 0.15$ ,  $P = 0.04$ ).

### Conclusion

SerpinA3 and vitronectin have shown potential as robust biomarkers in past 2D-DIGE experiments. However, based on this experiment serpinA3 and vitronectin do not appear to be consistently viable as biomarkers across different diet treatments when analyzed using one-dimensional western blot analysis. Though the proposed biomarkers show some promise in the high fiber diet, no noticeable difference was seen between the lines within the traditional diet treatment. This inconsistency may be caused by the inability of western blot techniques to show post-translational changes in protein that would be observed in 2D-DIGE. Based on their known biological roles, serpinA3 and vitronectin may play a part in protein turnover and ultimately postmortem proteolysis. Dietary factors may influence the viability of biomarkers for feed efficiency. This information could play a role in determining future biomarkers and methods of analysis that may be used in the pork industry. Supported by AFRI Grant 2011–68004–30336.