

1. USU Extension Grant -- Final Report 2016-2017

2. Project Leader:

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3. Title:

Integrating a Traditional 4-H Youth Program with Science, Technology, Engineering and Mathematics (STEM) Programming (Follow Up Study)

4. Project Duration:

Project will begin June 1, 2016 and will finish by July 1, 2017

5. Amount Requested:

\$10,000.00

6. Project Summary:

The objectives of this project were to evaluate meat quality traits through genetic analysis on junior livestock market hog projects throughout the State of Utah, to develop life skills and knowledge in 4-H youth pertaining to genetic mutations, markers, and analysis in the porcine species, and to provide outreach via workshops, fact sheets, and presentations of the project results.

7. Project Results:

Junior livestock projects provide excellent opportunities for education and positive agricultural experiences for 4-H youth. As genetic testing advances become widely available to livestock producers, youth benefit by learning the positive applications of genetic testing. Porcine stress syndrome (PSS), which springs from the HAL gene, is an inherited neuromuscular disorder in pigs that is triggered by stressful situations, such as exercise, fighting, marketing, vaccination, castration, parturition, hot weather, etc. The symptoms exhibited by pigs experiencing PSS include muscle and tail tremors, labored and irregular breathing, blanching and reddening of the skin, rapid rise in body temperature, collapse, muscle rigidity and eventual death. (Stradler & Conaster, n.d.) In addition, Rendement Napole (RN) is a gene found to cause low ultimate pH and water holding capacity (WHC) in pork. Low water holding capacity results in poor quality meat, referred to as Pale Soft Exudative (PSE) grade meat, which causes dry meat with low palatability when cooked. Unlike the porcine stress syndrome (PSS), the RN- gene appears completely dominant. This dominance implies that a copy of the RN- gene inherited from even just one parent can cause poor meat quality. The negative effects of the RN gene on pork quality result in economic losses in the pork industry (Du, 2004). In 2016, over 1,000 4-H youth

participated in Market Hog projects throughout Utah (Dallin, 2017). This report will review our 2016-17 findings from 150 sampled market hogs that were tested from thirteen counties in the State. Through scheduled presentations, we were able to use our findings to educate 4-H youth, market hog producers, and USU Extension Faculty on the importance of selecting animals that do not have these genetic flaws and are therefore more likely to produce higher quality meat.

Project Results: A total of 13 counties are represented in this research with a total of 205 samples collected at random. Counties were mailed sample cards with instructions on how to collect hairs from the tails of swine to be tested and youth had the opportunity to help with sample collection in many of the counties. Extension staff in 11 off-campus counties collaborated with on-campus faculty to collect samples and data.

Of the 205 collected samples, 150 were randomly selected for testing. A total of \$9,000 dollars (\$60/hog) was spent on testing for Porcine Stress Syndrome (PSS) and Rendement Napole (RN). (Additional funding was obtained and utilized to help supplement the cost of testing and testing supplies) Genetic testing was performed by Geneseek, a Neogen Corporation. Of the 150 pigs that were tested, approximately 49% of the pigs had a genetic defect that could lead to poor meat quality, or other issues. Findings for the total sample are found in Table 1.

Table 1. The percentages of hogs affected by Porcine Stress Syndrome (PSS) and Rendement Napole (RN) in 11 Utah counties' junior livestock shows.			
PSS (%)		RN (%)	
Normal	93.3	rn+/rn+ Normal	58
Carriers	6.7	RN-/rn+ Heterozygous	36
		RN-/RN- Homozygous	6

These findings are alarming because the negative effects caused by the HAL and RN gene are completely avoidable. The results of this study also show the significant need for market hog genetic education. By utilizing boars that are found to be stress and RN free, producers can

greatly reduce the chance of their pigs having either the HAL gene or the RN gene. Eventually producers will virtually weed-out this gene from their herds.

Since the majority of swine are artificially inseminated and it is not economically viable for producers to test all of their sows for the RN and HAL gene, producers should utilize genetic testing performed on boars to reduce the chance of hogs carrying the HAL or RN gene. Boar stud services perform genetic testing on their sires before collecting and selling their semen. These results are available from the producer. Eighteen percent of sires on a boar stud website, selected at random, were found to have the HAL gene and be stress carriers (acutabovesires.com). By knowing and understanding indicators for animals that are carriers of PSS and RN-, producers are able to genetically select non-carriers for breeding stock. This helps to eliminate PSS and RN- altogether. As an end result, consumers who purchase 4-H market hog projects at a premium will receive a high quality product in return. Providing preventative genetic testing should correlate with a greater positive consumer response. 4-H junior livestock projects are a great vehicle for conducting educational workshops that will help cut back on the economic losses caused by the HAL and RN gene and that will help prepare 4-H youth to be better producers.

An extension factsheet is in the final stages of production, and an informational poster has been created to use for National Presentations and State/County livestock events to educate individuals on the effects of PSS and RN. The statistical significance of this study has raised interest to many in the market hog industry. It is hoped that additional studies can be performed with larger sample sizes throughout Utah and in different States to add statistical strength to the data set. We plan to seek funding from organizations such as USDA, UDAF, and the National Pork Producers in order to expand and build our test banks.

8. Dissemination of Information:

This information was presented as a peer reviewed presentation for the Northern Region Staff meeting. It has been accepted to be presented at the National Epsilon Sigma Phi conference in October 2017. In addition to these presentations, two statewide hog workshops were conducted in central locations in the state. Those invited were 4-H Youth, Volunteers, Producers, and Extension staff. The workshops focused on market hog DNA education and received excellent reviews from those in attendance. The results of this study have also been shared through pamphlets and posters at a variety of conferences and clinics throughout the state.