

Integrating a Traditional 4-H Youth Program with STEM Programming using Market Show Hog DNA to Evaluate Meat Quality

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PROJECT OVERVIEW

11 Utah Livestock Shows
1106 HOGS
 we randomly selected **150** and tested them for **PSS** & **RN**
 Porcine Stress Syndrome & Rendement Napole



Abstract

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 benefits and 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 is 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 presentation will review our 2016 findings from 150 sampled market hogs that were tested from eleven counties in the State. Through scheduled presentations, we will be 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.

BACKGROUND

Porcine Stress Syndrome (PSS)

- PSS is an inherited neuro muscular disorder in swine—linked to the Halothane (Hal) gene.
- PSS is triggered by stressful situations (E.g. fighting, transportation, showing, etc.).
- Symptoms of PSS include muscle/tail tremors, labored/irregular breathing, blanching/reddening of skin, high body temperatures, collapse, muscle rigidity, and eventual death (Stradler & Conaster).
- The HAL gene is not completely recessive meaning that heterozygous stress carrier pigs can also exhibit traits of PSS.
- Traits of swine with PSS include sudden death and pale soft exudative (PSE) meat.
- Research has found that stress carriers are much less likely to suffer sudden death, but are more likely to exhibit poor meat quality (Worwood).



Rendement Napole

- Found to lead to PSE meat in swine- poor pork quality caused by low pH and low water holding capacity in pork with the RN gene.
- Two alleles for the RN gene, RN- & rn+. The RN- gene is completely dominant meaning that just one copy of the RN- gene inherited from one parent can cause poor meat quality (Heaton, Howard, & Dallin, 2016).

A Bad Combination

- Some recessive genes can be additive, such is the case with PSS and RN.

- The detrimental effects of the HAL and RN gene on pork quality are amplified in pigs carrying both.

- 3.3% of hogs tested carried both the HAL and RN gene.



FINDINGS

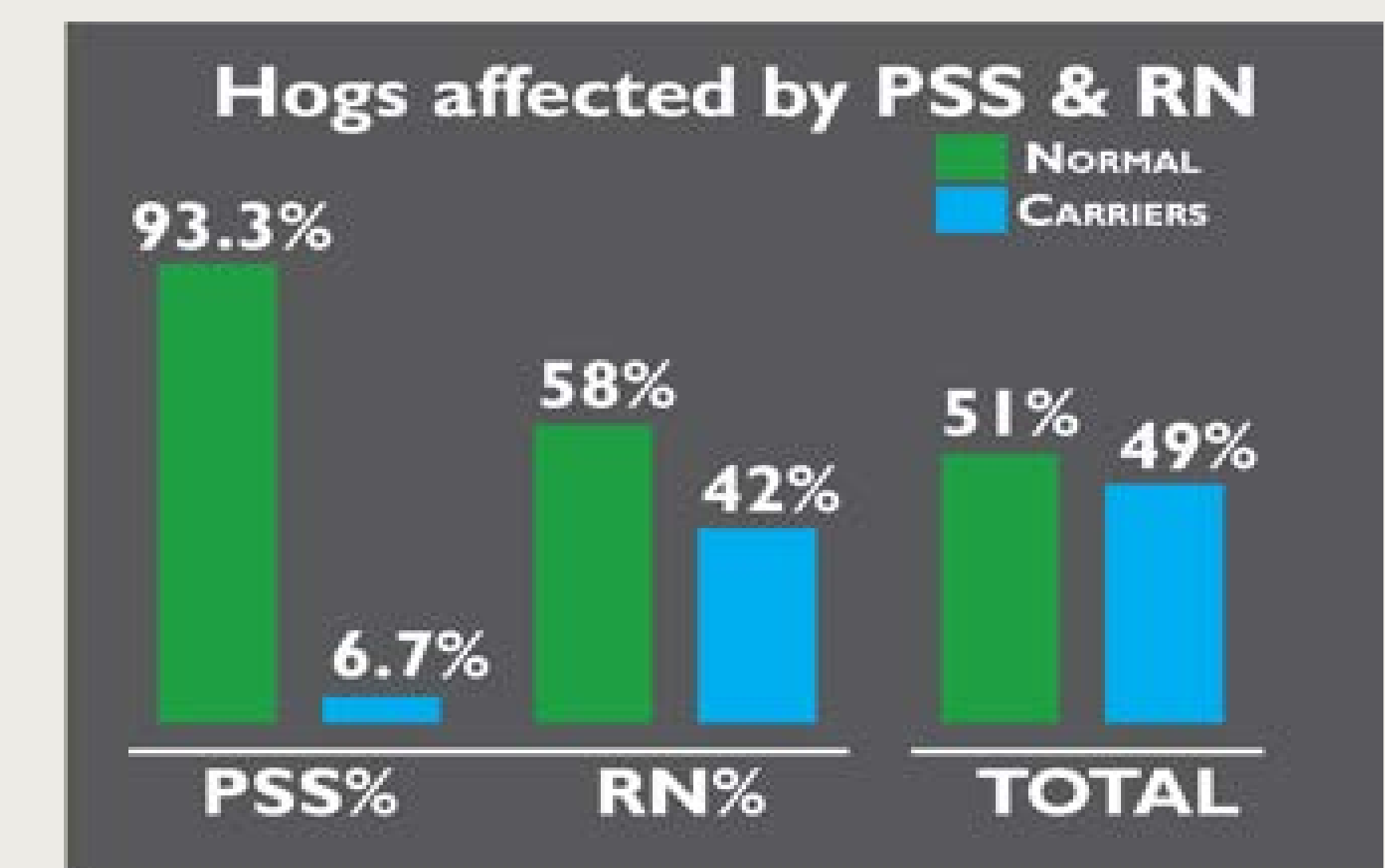


Table 1. The percentages of hogs affected by Porcine Stress Syndrome (PSS) and Rendement Napole (RN) in 11 Utah counties' junior livestock shows.

	PSS (%)	RN (%)	
Normal	93.3	rn+/rn+ Normal	58
Carriers	6.7	RN-/rn+ Heterozygous	36
		RN-/RN- Homozygous	6

- Approximately 49% of pigs tested had a genetic defect that could lead to poor meat quality (PSE meat) and/or other issues such as sudden death.
- The negative effects on meat quality caused by these genes causes economic losses in the pork industry and can have a negative impact on the public support of junior livestock shows (Du, 2004).

CONCLUSION

- These findings are alarming. The negative meat quality caused by the HAL and RN gene are completely avoidable through genetic education.
- It is not economically viable for producers to test all of their sows for the HAL and RN gene. By utilizing genetic testing that is performed on boars before artificially inseminating or breeding sows, producers can greatly reduce the threat of PSE meat or other issues.
- 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.

Works Cited

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