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Understanding the Genetic and Environmental Interactions

Dr. Jodi Sterle
Assistant Professor and State Extension Swine Specialist
Texas A&M University

A major goal of raising show pigs is achieving maximum lean growth with minimal fat deposition. These two traits (as well as any trait) are determined by two factors; genetics and environment, and the interactions between them. The genetic potential of your animal has been determined prior to birth, but that does not mean that you can ignore it. Certain genetics "dive or thrive" under certain conditions, or environments. For example, feeding a pig with ultra high lean growth potential inadequate nutrients will leave that pig looking average at best, and his genetic *potential* (how he could have performed under the very best conditions) is never reached. Another good example of choosing the right genetics for the environment is the use of Brahman influence in beef cattle raised in the southern United States. Their ability to tolerate heat, humidity and insects allows them to flourish in regions where other breeds may become heat stressed or even die. Correspondingly, in the upper Midwest, little Brahman influence is seen because of the harsher winters and milder summers, making the heat tolerance attributes of the breed less necessary.

We often think of the environment as the immediate area surrounding the pig, including temperature, floor space, etc. In this case, however, we consider environment to also include the health of the pig, the nutrition program and feeding regimen, or anything else that is not controlled by the genes that the animal has inherited from his parents. A pig that is sick and off-feed will not express his genetics to their fullest potential because of the environment that it is in at the present time. Additionally, a pig that is severely feed restricted will not grow like its genes would allow it to if it were allowed to be on full-feed. Considering all of these things and how they interact will allow you to best match the genetic potential of the animal with its environment and allow it to perform to its maximum ability. However, this is not an easy task. In fact, researchers have been studying these interactions for years and have made substantial progress. But, as the genetics and environments (including technology) change, so do the interactions, keeping this goal a challenge to achieve.

The first thing you need to do in order to understand these interactions is to find out everything you can about the genetics of your pig. Much of this information is taken from relatives, such as animals from a previous mating of the parents (siblings), the parents themselves, or even others with similar genetics. How fast do they usually grow? When do they start "peaking out" in muscling and begin to deposit fat? Do they require a higher level of protein (or more specifically lysine) than average? What is the average frame size likely to be? What about muscle expression? These are great questions for you to ask the breeder about the pig you are about to purchase. It is similar to buying a used car. You wouldn't even think about buying one without looking at the odometer to see how many miles it had or taking it out for a test drive, would you? The same idea applies here. Most swine producers that I know love talking about their pigs and how they perform, it is just up to you to ask them. The more you know about the background (and more specifically, the genetic potential) of the animal, the more prepared you will be to provide the best environment for him to flourish in. If the parents of your pig have genetic data available on them, such as EPDs from a sire summary, make sure that you read it and understand it (for more information on understanding sire summaries, refer to a previous *Showbox* article on the subject). Just remember that the genetics only tell you part of the story. Sire summary information tends to be gathered under the most optimal conditions, and does not mean that you will get the exact same results from a different mating and under different conditions. Another important thing to remember is that the majority of genetic information is based on statistics, or more specifically averages. Therefore, there will always be animals that perform better and worse than the value presented to you. Keeping all of these things in mind will help you pinpoint possible causes of performance differences.

Gaining a better understanding of the interactions between the genetic potential of the animal and its environment can help you gain the competitive edge that we are all looking for. It is no longer adequate to go out and buy a pig and some feed and show up at the county fair or stock show and expect to win, without doing all of your homework. As competition has increased, so has the knowledge required to be competitive. More and more science is being infused into agriculture in general, from cash crops to vegetables to large-scale pork production. While these changes make raising a project to completion more technical and somewhat tougher, they also make it much more exciting!