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Effect of genetic pricing on herd management decisions

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Introduction

Implementation of swine genetics programs in most operations has been driven largely by costs as opposed to what is optimal from a herd management or profitability standpoint. Optimizing return on genetic investment must take into account genetic potential and rates of improvement, health risks of bringing in genetic resources for replacement and improvement, and pricing programs that enable producers to enhance cash flow. Short-term decisions regarding genetic introductions or program changes have significant long-term impact on business profitability. Producers may make genetic decisions in the short-term to help cash flow that result in a long-term financial impact from which they may not be able to recover.

Pricing practices for parent stock

Historically, up-front pricing or royalty-based pricing programs have required producers to pay for replacement parent animals upon delivery or entry into the breeding herd. This up-front investment was expected to generate a return with biological expectations that were unrealistic or overly optimistic. On the other hand, real costs of producing those animals within a genetic supplier system may have been realistic in many cases. Genetic costs along with meat value expense required producers stocking start-up systems to add a significant amount of working capital to their account to get the project off the ground. In starting up or restocking a 2,500 sow breed-to-wean system, the genetic premiums, based on $100 per parent gilt and $5,000 per terminal AI boar can add 10% to the total capital requirements of the project. If this capital requirement is financed and amortized across a two to three year time period, an additional $400,000 to $500,000 cash flow will be required to service that genetic premium debt during the start-up time period. Depending on the system and revenue opportunities, expected annual cash flow for a breed-to-wean system of that size would be about $1.5 million (2,500*20*$30). Thus, breeding animal debt service in the initial three years of production could represent 10–15% of annual sales or cash flow.

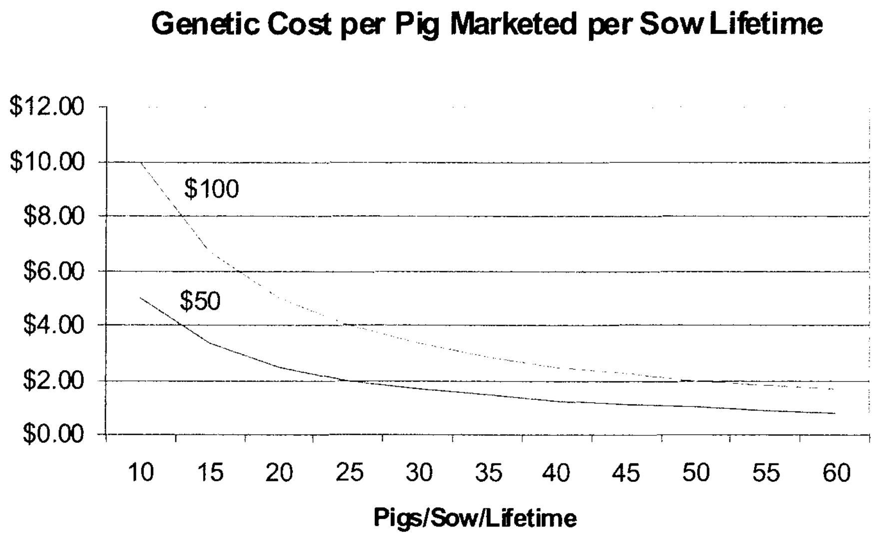
With an up-front genetic pricing system, producers usually attempt to equate genetic costs per pigs weaned or per pig marketed. In most of these calculations, meat value is assumed to be canceled-out by salvage value of the sow. However, this may not be accurate in cases where sow herd mortality rates are excessive. The productive life span and total weaned pig output of a sow in the breeding herd will have a major impact on up-front genetic premiums being spread over pigs produced while the sow is in the herd. Based on PigCHAMP(r) records for pigs weaned per sow per lifetime and using various levels of up-front genetic pricing, genetic cost per weaned pig sold or transferred can be calculated. Figure 1 illustrates the impact of sow productivity and longevity, in the form of lifetime output, on genetic cost per pig marketed. Average pigs per sow per lifetime can vary across farms based on differences in herd health, culling management, death rate and sow productivity rates. Reported PigCHAMP(r) 2001 averages for pigs per sow per lifetime are 29.3 and 43.0 for the average and top 10%, respectively, in herds reporting this trait. The reported values in the PigCHAMP 2000 report were 29.2 and 50 for average and top 10% producers respectively.

Grandparent production systems

The genetic cost of parent gilts can be established by up-front pricing methods such as premium over meat value plus calculated breeding inefficiencies. As reported in the recently published NPPC Maternal Line Evaluation, gilts that are purchased but never farrow can represent as much as 20% of the original population. Depending on the purchase contract, that breeding inefficiency can translate directly to increased genetic cost per animal produced. For producers that elect to produce their own replacement animals, establishing a grandparent (GP) herd is the logical progression in controlling animal supply, herd health, and genetic costs. In this scenario female genetic costs are established in one of three ways.

The first option, fixed pricing on the grandparent animal, allows producers to impact their genetic cost per parent gilt by implementing their own level of GP sow replacement rate and parent gilt selection rate. For example, a GP female might be valued at $750 with up-front pricing and be expected to produce 12 replacements in her lifetime. That would equate to $62.50 per selected parent gilt in GP genetic premium. The more gilts produced per GP sow, the lower the cost per parent gilt and the lower the

Figure 1. Effect of female up-front genetic costs and lifetime sow productivity on genetic cost per pig sold



parent gilt genetic cost per commercial pig marketed. On the opposite side of that argument, the possibility of these GP sows not being as productive or long lived as projected that could result in genetic cost per replacement gilt being higher than anticipated.

The second option places a fixed cost or royalty payment on each gilt selected for breeding. GP sows are placed at meat value plus some nominal fee and genetic premium is captured on replacement gilts as they are identified and transferred to the breeding herd. This takes some variability of genetic cost per parent gilt and, thus, per terminal animal out of the system, but it also does not allow for improved costs owing to improved efficiency of production at the GP sow level. This method also has some additional accounting required to track selected animals in the system.

The third option has several variations for GP sows or rotational systems that charge a fixed fee per sow used at the GP level or above per month or per year. Typically these programs offer replacement animals at meat value and producers attempt to maintain a constant herd size. Cost per parent gilt can vary based on selection rate and productivity rate. Variability in productivity rates can impact the cost of parent gilts flowing out of this system. Changes in source herd health status and animal availability can impact the consistency of the GP herd size within the customer farm and therefore impact replacement gilt availability.

Establishing a grandparent herd requires some additional skills within the operation to manage cost effective production of replacement females. When establishing GP production within a commercial farm, accurate matings and animal identification are required for successful implementation and optimum realization of genetic potential. Additionally, on-site or off-site rearing facilities for replacement females must be available for proper development and gilt pool management. In many cases, specialized GP farms are established within large systems to produce parent gilts with various methods devised for introducing those gilts into multiple commercial sow farms within the system. This animal movement offers opportunity for disease entry or control across the system. It also allows for efficient production of replacement females to be reared and delivered as needed throughout a production system. Considerations for bringing replacements into the GP farm must be taken into account from a system-wide bio-security and herd health perspective.

Internal genetic programs

In large systems the number of animals entering the system at the GP level can be significant. The risks inherent in animal introduction from sources outside that GP system can be viewed as unacceptable. Thus, some production systems have elected to control production higher up the genetic pyramid, described by a factor of 10. Figure 2 illustrates the various levels that may be required and implemented in a breeding program that utilizes a nucleus herd concept. Genetics can be introduced at each level of the genetic pyramid by various means, including animal introduction, artificial insemination, embryo transfer, or other developing technologies. The level of productivity and rates of genetic progress can vary greatly from herd to herd utilizing these methods of genetic introduction, improvement, and dissemination.

Costs of genetics from systems that utilize females at a position higher than grandparent in the genetic pyramid are variable and somewhat difficult to calculate, depending on assumptions, pricing clarity, and inclusion of all costs in pricing programs. The biggest assumptions built into most pricing programs that utilize up-front pricing are: lifetime output per sow and the internal selection rate of gilts produced at each level of the genetic pyramid. Additionally, fees for inventory maintenance, semen costs, royalties, and other costs incurred in producing genetics at various levels must be considered when calculating all genetic costs. The other side of that argument is that lower cost genetic programs may not go into a detailed consideration of implementation and testing; they also give up a significant amount of value in terms of heterosis, genetic improvement, and rates of genetic progress. These values can be significant over a relatively short time horizon.

The partnering of production and genetic companies to implement a planned breeding program that allows optimum genetic progress, product specifications, and production achievement—as well as profitability goals—is possible. Part of that partnering must be based on transparent and fair pricing of genetics at all levels of the genetic pyramid. One method that could help in this partnering process is collecting a genetic fee per weaned pig. Genetics are provided to producers to meet their production needs, with most genetic fees deferred until progeny are actually weaned. This program is risk-sharing for the genetics company and the production company, with both benefiting from improving levels of production.

Return on genetic investment

Considerations such as cash flow, debt service, and time cost of money are important factors in estimating and establishing desired returns on genetic investment. With lengthened acclimation periods, strategies for developing gilts on-site, and PRRS-elimination strategies that bring in large numbers of gilts once or twice per year, gilt development costs have probably increased over the last 10 years in most operations. Additionally, as the age of replacement gilts has decreased at entry into the farm, there may be a larger percentage of replacement animals that are not mated or do not farrow a litter. These added costs of gilt acclimation and breeding efficiency of replacement gilts could be added to the overall costs of replacement gilts. In totaling the up-front costs of replacement gilts it becomes apparent that a female must stay in the herd a significant number of parities to create a cash flow that permits break-even on that investment. The break-even point varies based on the model inputs of total up-front costs, breeding efficiency, and daily variable costs of keeping that female in the herd. The revenue side of the equation varies as well, based on lifetime output and value per pig sold or transferred. The graph in Figure 3 shows revenue for a sow exceeding the accumulated costs for that female at differing parities based on variance in up-front costs. This model assumes 20.2 pigs weaned per sow per year and $25 value per weaned pig for the revenue side of the equation. The two cost models assume $1.10 per sow per day in both gilt acclimation and breeding herd. The high group assumes a $100 up-front charge with a 90-day development period. The low group assumes a $50 up-front cost with a 60-day development period. The point of break-even on a cash flow basis with this model is one additional parity of production, on average, with the higher up-front pricing and longer acclimation periods.

Closed herd system

Managing and controlling health within large systems has been a primary focus over the last few years. Unacceptable levels of death loss in the breeding herd, as well as nursery and finishing segments of pork production systems, have been identified and targeted for improvement. However, the risk of disease entry into the system through animal- or semen-introduction has caused producers to re-think their genetic programs from the standpoint of genetic material-introduction.

From a theoretical standpoint, all genetic program activities can be accomplished at the producer level after es-

Figure 2. Approximate sizing of various levels within a genetic pyramid

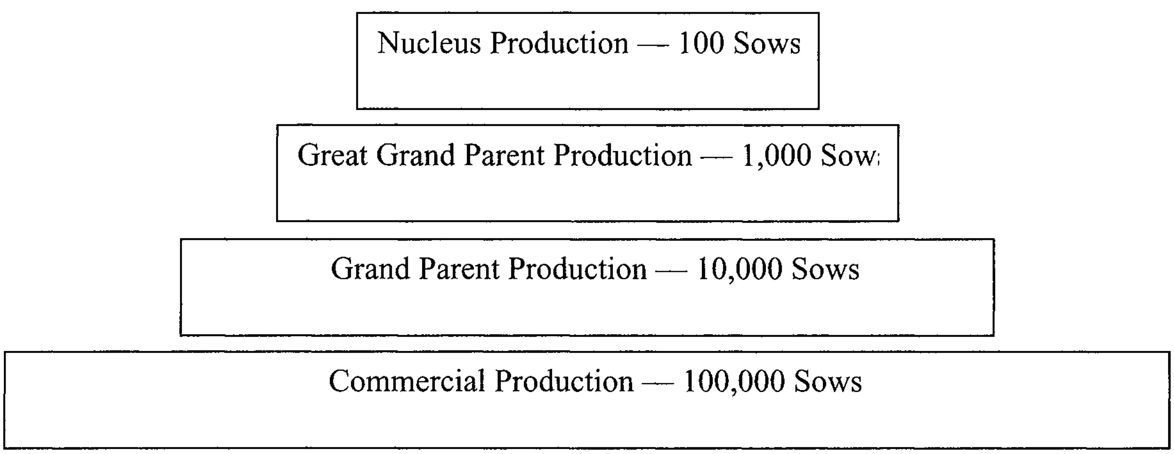
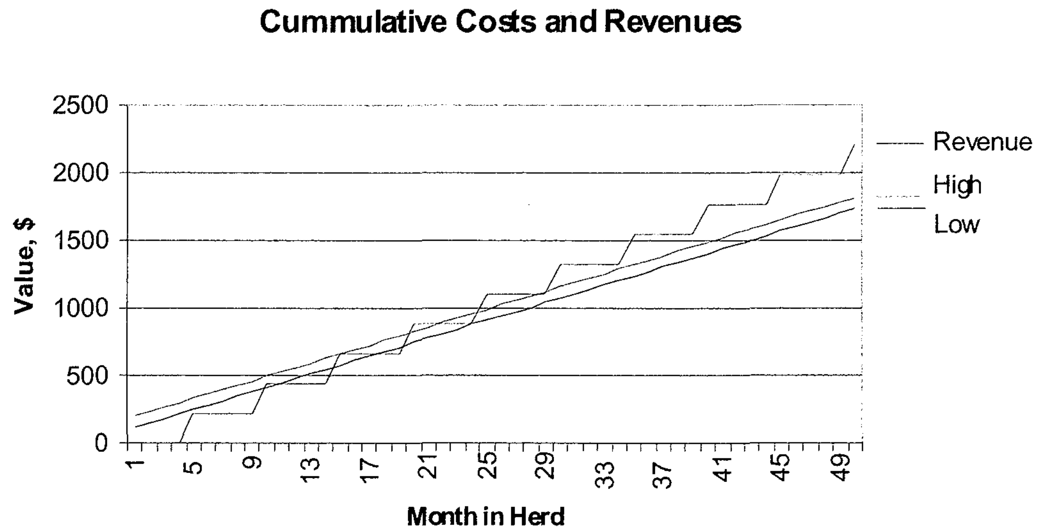


Figure 3. Break-even cash flow model for gilts entering the herd with differing up-front genetic costs



tablishing a herd with the proper genetic lines and breeding program. Closing the system to all live animal introductions can be accomplished by establishing planned matings for replacement animals at various levels of the genetic pyramid. To keep the breeding program progressing, using only semen to introduce the needed genetic material, producers can close individual farms or entire systems. Producers have worked to implement breeding programs that may incorporate rotational breeding schemes or classic breeding programs that take advantage of heterosis and on-farm testing to make continuous genetic improvement at the farm level.

From a practical standpoint, implementation of any breeding program beyond commercial production requires commitment from both farm staff and management to implement correctly and effectively. Predictably, breeding the wrong sow to the wrong boar in a planned breeding program can create loss of productivity, heterosis, and an increase in performance and product variability.

The number of lines used in the breeding scheme will determine the number of generations that are required to produce a parent gilt product. A three-line combination parent gilt will take three generations or about three years to move genes through the production pyramid and then a fourth generation or year to produce terminal progeny. Thus, genetic decisions taken today will impact production years down the line and a system cannot change rapidly owing to the limitations of biology. Even changing terminal boars requires a nearly one-year waiting period to review results of that decision. Thus, establishing and maintaining high health, high performance genetics is the most logical and effective way of optimizing return on genetic investment.

Genetic pricing effects on production decisions

Producers have evaluated various gilt-stocking and -introduction programs to enhance health and production within their systems. Stocking with high-health animals has been limited by availability from breeding companies. Production systems have evaluated options of controlling their own health destiny by closing herds and meeting their own replacement gilt needs at various genetic levels at an acceptable and known health status. Gilt pricing programs have often restricted serious consideration of depopulation and repopulation of farms based on up-front pricing, especially of parent stock females. Additionally, animal availability has been a limiting consideration, as have the costs of over-production at the internal gilt multiplication level. Most parent gilt pricing programs have placed an unacceptable cost component on production systems that use up-front pricing or certain royalty assessment programs to ensure enough gilts to seriously consider drastic changes in replacement gilt introduction or system-wide modification.

Financial considerations related to health effects on production, and ultimately profitability, are huge variables that can be estimated. Strategies to eliminate or stabilize various disease conditions in swine herds have been developed and implemented with varying degrees of success.

A strategy recently used in many operations to stabilize PRRS virus circulating in various breeding herds has been to bring in a large population of replacement animals at one time and then close the herd to all animal entry. This closure may be maintained for an extended time period during which costs of output variability and increased production costs for the elevated animal inventory are incurred. Additionally, most breeding herd facilities are not built to handle a large inventory of replacement females of either breeding or developing age. However, the detrimental costs of dealing with PRRS in the breeding herd have forced producers to take drastic measures to control disease and improve predictability of production.

Options for disease elimination that may not be considered owing to genetic pricing issues include depopulation and repopulation of commercial production farms. With high up-front genetic costs, as well as potential loss of cash flow and down-time, producers have been reluctant to utilize this option. However, if an option was available that reduced the up-front costs and allowed oversupply of internally available replacement females, this option might be more appealing. If replacement gilts could be produced at an internal cost that was slightly higher than commercial production, planned depop-repop options might become part of a broader health strategy.

Conclusions

Production companies expect an acceptable return on their genetic investment. Genetics companies expect an acceptable return on their investment in R&D and health maintenance or improvement. Partnering to provide the right genetics at the correct level in the genetic pyramid is critical to the long-term success of each link in the pork chain. Moving to a weaned pig pricing system that reduces up-front costs and allows serious consideration of various previously unutilized management techniques. These options can help producers optimize production output and, hopefully, profitability as well.