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Lessons learned in the “real world”

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The definition of the “real world” is open to individual interpretation. For me, as a former academic, the “real world” refers to the business world, where your future is tied directly to the success of the business in which you are involved, where you put yourself and co-workers at risk by the decisions and actions you take, and where you are consumed by the challenges of growing your business and maintaining your competitiveness in an all too often cut-throat industry.

When I made the transition to the real world two or so years ago, I had no idea what I was getting in to. I had consulted for a decade and a half with some of the largest pig production companies in the world. I had been relatively successful training students for the real world and conducting practical research. I thought—before entering the real world—that I was a part of it, that I knew what was going on. But it was only after entering the business world that I realized how naive I had been and how much I had yet to learn about swine production and myself.

I believe that the following observations are true for the world in which I have lived these past two years. You may live in a different world, had different experiences, or have interpretations of the pig production business that are divergent from mine. I only hope that some of my experiences will provide some insight to each of you, especially to the younger generation of veterinarians. I do not pretend to suggest that my insights are correct, just that they are real to me. They come from a former academic veterinarian who has had the unique opportunity of overseeing production for two of the world’s largest pork production businesses. They also come from the perspective of a production-oriented veterinarian who hopes that he has helped open a door for opportunities for veterinarians in production and management.

Lessons learned on swine production

One of the things that veterinary education teaches you, perhaps better than anything else, is how to troubleshoot problems. As veterinarians, we are probably the best in the swine industry at identifying and fixing problems. It should not be surprising, then, that soon after joining the production companies for which I have worked, I saw a

plethora of problems. To differing degrees, in fact, I was brought in to fix things. What surprised me was how similar the production problems that I saw at both companies were to that which I had been seeing as a consultant over the years. In fact, there’s nothing startling about by observations; what makes them so intriguing to me is that the problems that I have encountered exist everywhere in the swine industry, have existed for as long as I have served the industry, and will likely continue to exist, unless we change our approach. Finding new ways to deal with these day-to-day issues has been my prime motivation.

Definition of production problems

Weaned pig output

Inconsistent weaned pig production volume is one of the most pressing problems of our industry. It is not uncommon in our industry to see as much as a 25% fluctuation from week to week in the number of pigs weaned from a farm. Similarly, it is common to see seasonal changes in productivity that vary by 15% or greater. In multi-farm systems where weaned pigs are commingled from multiple sources, it would be expected that variation would be less, since shortfalls in the production of one farm would be compensated by overproduction in another. However, this is often not the case. Week-to-week variation in weaned pig output from a multi-farm system is typically as great as that from a single farm. With variation in breeding herd output, it is very difficult—if not impossible—to optimize the throughput of a production system and to fully utilize the production facilities for all phases of production.

Driving forces for variation in production volume from the breeding herd include:

- insufficient control of gilt infusion rates, which is compounded when breeding female removal rates are elevated;
- breeding female inventories that often fluctuate cyclically throughout the year;
- facilities that are not designed to enable an expansion of inventory with changes in fertility, such as those changes that occur seasonally or after episodes of infectious reproductive failure;

- a lack of understanding at both the management and farm staff level of the factors that drive service targets (i.e., farrowing rate, born-alive litter size, preweaning mortality, and number of farrowing spaces to be filled).

We have known about these factors since confinement rearing of pigs began. However, throughout our industry we still grapple daily with the problem of achieving consistency in weaned pig output. As a result of these observations, one of the early lessons that I learned in the “real world” is that some production processes have to be controlled centrally—that is, they must be controlled in the production office not at the farm. Some of the factors influencing weaned pig output serve as useful examples of processes that I think ought to be controlled centrally:

- number of gilts placed into herds at each delivery;
- upper and lower limits of breeding female inventory (capacity utilization of facilities);
- upper and lower limits of number of females served into groups; and
- voluntary culling rates of breeding females.

There are other factors controlled centrally that relate to other performance measures, which I will discuss later.

Efficiency

Improvements in breeding herd efficiency are commonly sought since they reduce both variable and fixed costs while increasing volume produced. One of the most commonly used measures of breeding female inefficiency is the number of pigs weaned/inventoried female/year (PSY). All of us know the components of PSY that contribute the most to breeding female inefficiency:

- low pigs born alive (PBA),
- high preweaning mortality (PWM),
- high number of nonproductive day/breeding females/yr (NPD), and
- farrowing rate (FR), a component of NPD.

Years ago, Peter Davies, Dale Polson and I developed a method (standardized linear regression) for analyzing breeding herd productivity with an aim toward identifying the relative contributions of these individual efficiency measures to PSY. In the process, we learned that there is considerable variation from farm to farm in the relative importance of these variables. This observation has been repeatedly confirmed in my recent experiences.

One or more of these measures of sow breeding efficiency was a problem in the herds of both production systems I managed—either on a single farm or a system-wide basis. You would think that with the level of knowledge we have about the factors influencing endpoints of breeding

herd performance, we would be able to effectively address those risk factors that are present and, thereby, improve efficiency. Here is my simplistic interpretation of why I think that these problems don’t go away.

There’s an expression that we all have heard from time to time that goes something like this: “If you hear hoof beats coming up behind you, don’t look for zebras.” When someone says this, they are typically inferring that you should first look for the obvious, most logical cause for something happening, not something unexpected.

I have been reminded of this expression on numerous occasions during the past two years as I have sought to fix the production ills of my companies. We often mistakenly try to solve problems by addressing things that are not critically important. We chase a solution and sometimes even catch it, only to learn that the problem does not go away. For example, if a farm has a reproductive problem, I can be assured that the body condition of the gestating sows will be cited over and over again by production staff as they try to assign blame. Then, while we take the months that it takes to change the overall body condition of a farm’s sows, we find that born-alive litter size and farrowing rates did not improve. One thing I’m confident is that if there is a reproductive problem, sow body condition will have been considered before I arrive on the farm. I also can be confident that disease will be blamed as a primary etiology when the mortality rates of a nursery or finisher rise. Then, all too often, as we put in place aggressive medication programs, the problem fails to go away. People will cite the lack of availability of gilts for their not achieving weaned pig production targets while having replacement rates exceeding 60%. I can go on and on about how we fail to identify the true cause of a problem and then remain perplexed why the problems are not alleviated.

To address this ‘blind spot’ when I am trying to fix a problem, I think in a two-step fashion. First, I compile a comprehensive list of all the risk factors that may contribute to the problem. Second, I prioritize the problems into one of three categories:

- **Zebras**

Those factors that are very unlikely to be the cause of the problem.

- **Horses**

Those factors that *often* contribute *significantly* to a problem.

- **Ponies**

Those factors that only *occasionally* contribute to a problem, or only contribute *slightly*.

Third, I systematically analyze the “horses”—typically ignoring the “ponies” until I am frustrated in my analysis

Table 1. Relative importance of risk factor for key efficiency measures

| Risk factor | Pigs born alive/litter | Farrowing rate | Prewaning mortality |
|------------------------------------|---------------------------|-------------------|------------------------|
| Parity | Horse | Horse | Horse |
| Lactation length | Horse | Pony | Pony |
| Season | Pony | Horse | Pony |
| Age at first service | Horse | Horse | Zebra |
| Lactation feed intake | Horse | Pony | Zebra |
| Matings/service | Pony | Pony | Zebra |
| Breeding mgmt/ AI technique | Pony | Horse | Zebra |
| Semen | Pony | Horse | Zebra |
| Weaning-to-service interval | Pony | Pony | Zebra |
| Infectious reproductive disease | Horse | Horse | Horse |

of the horses. I ignore the “zebras.” The art of problem-solving is knowing the horses from the zebras, and knowing when to start looking at the ponies.

When you chase zebras, you not only waste time and frustrate yourself and others, but you lose the opportunity to make a profit for your client or your company. When you chase ponies, you rarely solve the problem completely or in a time-effective manner. The bottom line is that you should be effective first, then be efficient. Do the right job, then (and only then) do the job right. Since time is money, we must focus on the horses.

It’s been surprising to me over the years how often people go after zebras and ponies, when the horses are so obvious. One of my associates, Janelle Roker, pointed out the reason to me. Often the horses are under the control of management. To avoid assuming blame for something that is under their control, people look for things that they are not responsible for, which is often a pony or zebra.

Over the years, Yuzo Koketsu and I have published a series of papers on the relative importance of various risk factors on key indicators of sow breeding efficiency. Coupled with my empirical experience working with large production operations, here is my simplistic interpretation of the relative importance of risk factors on three measures of performance: PBA, FR, and PWM. I have left out NPD since each of its components (e.g., service-to-detected open, weaning-to-service days) must be considered separately.

There is a second mistake that novice production diagnosticians often make when troubleshooting reproductive problems. They often forget what Dale Polson and I described several years ago as the “counts vs interval” issue. “Counts” refers to the number of sows or gilts that have experienced a reproductive event. “Interval” refers to the performance of a group or subpopulation of females, usually measured in terms of days. Besides interval measures, the concept also applies to other efficiency mea-

asures such as pigs and pounds. The concept is best applied toward the components of NPD. For example, with entry-to-service NPD, the counts component is replacement rate (i.e., the number of gilts entering a herd during a defined time period), while the interval component is given in terms of an interval, that is the number of days from the time the average gilt enters a herd until she is served for the first time. Novices often think that poor efficiency—in this example, a prolonged interval from entry to service—is bad. However, it only becomes a major problem when the counts component becomes high. Another example is service-to-reservice NPD (SRS), which is comprised of service-to-detected-open (SDO) and detected-open-to-reservice (DORS) NPD. Farrowing rate is the counts component of SRS; the sum of SDO and DORS is the interval component. Farrowing rate becomes a critical contributor to NPD when it either becomes very low (high counts) or is associated with a delay in pregnancy detection (long intervals).

A third common mistake involving sow efficiency involves errors in the use or interpretation of records. It is not uncommon to see pages of incomplete data when error reports are generated for reports. One of the principle consequences of incomplete data is an artificially inflated NPD, which adversely affects PSY through its effects on litters/inventoried female/year (LSY). One of the quickest “fixes” for poor sow herd efficiency is often correcting the errors and missing data in the error file reports and action lists of the computerized records. I have seen PSY increase by 1.5 pigs or more when error corrections are made in a farm’s records.

Errors in interpretation also arise with measures that are susceptible to time bias. Measures such LSY tend to be inflated and NPD tend to be underestimated in reports covering the most recent six weeks or so. Thus, PSY tends to be inflated in weeks close to the current period. Time biases in records often lead to the feeling that things are getting better. We see that NPD appears to be going down,

Table 2. Influence of counts and intervals on nonproductive days

| NPD component | Counts | Intervals | Total NPD/ 100 females |
|------------------------------------|--------------------------------|--|---------------------------|
| <i>Entry-to-service</i> NPD | <i>Replacement</i> rate (%) | <i>Entry-to-service</i> interval (days) | |
| Case #1 | 70 | 20 | 1,400 |
| Case #2 | 45 | 30 | 1,350 |
| <i>Service-to-reservice</i> NPD | <i>Farrowing</i> rate (%) | <i>Service-to-reservice</i> interval (days) | |
| Case #1 | 85 | 40 | 3,400 |
| Case #2 | 75 | 28 | 2,100 |

and LSY and PSY are increasing. Week after week, it appears that things are improving, but as you look at data in the longer term, nothing is changing.

Quality

The breeding herd provides the raw material for subsequent growing phases of production. Thus, mortality rates, variation at market, and growth performance are often limited by the quality of pig produced by the breeding herd. Weaned pig quality is a consistent problem in the industry, especially on farms that are under-managed, in top performing farms who are pushing the limits on facility utilization, and in herds with unstable health statuses. Quality can be measured in terms of (1) weaning weight, expressed as either the average weight of the pigs in a lot or the variation in their weights, and (2) the health of the weaned pig.

The “horses” for weaning weight are: lactation length, feed intake of the sow during lactation, and genetics, as manifested in milk yield of the sows. The “ponies” are parity, season, and birth weight. Empirically, I’ve observed that some genetic lines have better appetites than others. However, while weaning weights are clearly related to genetic line, sows with better appetites do not always milk better. Both age and weight of the pig at weaning are related to post-weaning performance. In a large corporate swine business where on-farm management is hired and, thus, potentially more variable, pigs weaned at 16 days or fewer and pigs weaned at less than 9 lb often do not perform well in the nursery. One of the easiest fixes for light weaning weights is increasing lactation length. This is more difficult than what you would expect at first glance, since it requires that weaning ages be managed. Here’s how I’ve learned to do it:

1. Monitor weaning age centrally by viewing the distribution of each farm’s weaning age at least at monthly intervals.
2. Tattoo all pigs by farm and birth date (use three colors of tattoo ink and tattoo pigs born on different weeks with a different color).

3. “Flow” the sows being loaded into farrowing rooms every week according to their 112-day gestation dates.
4. Have the farm manager or farrowing department head be responsible each week for evaluating all sows and litters in a weaning group to determine if they should be weaned or allowed to nurse a few days longer.
5. Set a strictly enforced upper limit, as well as a lower limit, for the number of females that can be served each week.
6. Reduce the variation in number of sows served weekly and, thus, the number farrowed.

Mismatched flow across the phases of production

The widespread application of multi-site and all-in—all-out production systems has resulted in a need for the volume of pigs being produced in one phase to match the demand of a subsequent phase. Several things can cause a mismatching of production phases:

- Inconsistent sizes of groups of pigs “flowing” from one phase of production to another, such as that occurring when:
 - variable group sizes are weaned;
 - a subset of pigs is pulled forward early to fill a subsequent phase of production; and
 - there are high rates of removal of pigs from a group, as by mortality or by a subset of under-sized pigs being shunted off into parallel system.
- Variable growth rates of pigs, resulting in pig flow backing up in the system.
- Improperly sized facilities (i.e., the number of pig spaces does not match pig availability).
- Improper number of barns (i.e., duration of stay in facilities does not match availability of barns).

The consequences of mismatched flow are:

- Variable stocking densities, leading to variable growth performance and higher facility costs.

- Variable inventory duration, leading to pigs being moved at varying ages and weights.

Keys that I have found to be important considerations when designing flows of pigs through production systems include:

- Be realistic in estimates of weaned pig output. Look at records to determine what historical performance has been, not what you wish it to be.
- Consider variation in weaned pig output when matching building size to group size. There is a maximum stocking density above which you should not be comfortable, from both a pig welfare and growth performance standpoint. As you consider ebbs and flows in pig volume, design facilities size accommodate cyclical increases in volume.

Temporal variation in performance

Season affects both the reproductive performance of the breeding herd and the growth performance of the growing pig. Fewer sows are bred during the summer, resulting in fewer pigs being available for market approximately 45–47 weeks later. This drop in volume is compounded during the following summer by drops in feed consumption and, therefore, daily gains in groups closed out during the summer period. Consequently, either pig volume or average weights of pigs must fall if production schedules are to be maintained. Similarly, epizootics of reproductive disease can reduce the volume of pigs produced from a herd for weeks and, in some cases, months. These same diseases often result in high rates of mortality and reduced growth rates in subsequent growth phases, especially the nursery stage. Outbreaks of diseases, especially respiratory diseases, cause drops in volume, increased pig weight variation, and poorer growth performance.

Temporal variation in volume is the bane of the large swine producer. Besides being associated with variable performance, it leads to fluctuations in stocking density and space utilization, thereby causing throughput problems. Consequently, revenues suffer while costs rise. As vertical integration through processing increases in the swine industry, temporal variation also results in a mismatch between the demand from the processing plant and the volume produced by the swine enterprise. This mismatch leaves both the processor and the producer with the dilemma of either selling a variable number of pigs over time or selling pigs having a variable market weight.

Potential solutions to the volume variance problem include:

- Design facilities that allow breeding female inventory to vary with season such that service targets can be varied so as to maintain constancy in week-to-week weaned pig output.

- Build flexible off-site gilt housing (e.g., gilt development units and isolation/acclimation barns) that can be used to expand the available breeding female housing. At times when breeding female inventory needs to expand, gilts can be heat checked, bred, or even gestated for a while in the gilt housing.
- Set up contracts to purchase pigs to fill in the “holes” in your production.

Causes of production problems

People

Either directly or indirectly, production companies fail to achieve their objectives because of people. The main failing is the failure of farm staff to implement policies. One of my most difficult lessons over the last two years has been that strategies fail, not because the production limiting factor has not been properly identified or the approach for addressing it has not been sufficiently thought through, but that the strategy does not include sufficient detail for successful on-farm implementation. Even when implementation is not overlooked, it is all too often oversimplified. We assume that farm staff know how to do something or that they will figure out the details themselves. The real art of strategy formation in swine production is to design implementation steps that make it easy for farm staff to do what management asks them to do. The design should also include some form of monitoring, so that you can be assured that people are doing what you want them to do. If it cannot be measured, you have to ask yourself if your approach can be effectively implemented.

When you run a production company, there is never any question of who is accountable. If production does not meet budget or the owner’s expectations, you are history. One of the things that I learned several years ago from John Fetrow, former department chair at the University of Minnesota was that, in order to be successful, you need four things, known collectively as RARA:

Responsibility

Accountability

Resources

Authority

If any of the four are missing, you are likely to fail. If more than one is missing the chances of being successful in managing an opportunity or a problem is almost nonexistent. As is often the case with people who oversee production for large operations, responsibility and accountability are provided, but resources are still controlled by someone else. Authority often is only given, in part, in companies that have grown quickly and in which corporate leaders are used to hands-on management. Resources are the most difficult to get. My suggestion: do your home-

work, develop well thought-out production strategies, create pertinent cost estimates and budgets that include cost:benefit analyses, and then be proactive during the budgeting process to make sure that you get control of the budget. In the words of Barry Wiseman: "If you don't have control of the money, you don't have control of anything."

One of the keys to using RARA is to defray part of the accountability from a program that you oversee from yourself to subordinates. Ill-defined (vague) accountabilities allow people to escape culpability forcing you to accept the entire blame when things do not go as planned. Alternatively, if you—as the superior—do not get blamed, then the lack of accountability allows the blame to be placed on "uncontrollable" factors such as disease. Consequently, things fail to get better. People will nearly always feel empowered if they: (1) know that they will be held accountable; (2) have the other components of RARA, including resources; and (3) feel that they have a viable approach for dealing with the issue at hand. If you take away either 2 or 3, dedicated people will become anxious and/or frustrated, and fail to create the change that is needed.

People are often not successful because they do not know what to do. Not knowing what to do can breed a feeling of helplessness that, in turn, begets poor motivation and sloppy work habits. While it is easy to say that training is the answer, I can tell you that training farm and service staff is not easy. Having been in a previous life an educator, here are the lessons that I have learned about training production staff. Training needs to:

- be specifically targeted at the multiple levels of staff that work in production (e.g., technicians, department heads and farm managers, service staff, and staff officers);
- be a blend of on-farm and classroom, applied/practical and basic knowledge, technical, and managerial;
- allow day-to-day activities to be completed without causing undue hardship;
- be tied to performance merit review and career progression; and
- be clearly tied to the day-to-day activities of the student.

It goes without saying that inadequate staffing is the most important issue being faced by the modern U.S. swine industry. Both quality and quantity of farm workers are critical issues that are becoming increasingly important as competition in the labor pool rises. Consequently, all farms either have experienced or will experience periodic transient (best case) or chronic (common case) shortages in staffing. When farm manning is below budget, the shortage is obviously real; however, when farms are

fully manned but staff are not well selected, motivated, and trained, the shortage becomes functional.

There are no useable rules of thumb on how to staff farms successfully. Besides farm size, the manning of farms depends upon several things:

- the number of hours worked/week and the requirement for weekend duty;
- the degree of automation (e.g., feeding, waste management);
- the use of artificial versus natural matings;
- the availability of support staff from outside of the farm to do manure handling, feed manufacturing and delivery, live haul, power washing, etc.;
- the desired hours of farm coverage;
- the number of times post weaning that sows are moved
- weekly shipping schedules for animals;
- the quality of organization and task assignment of workers; and
- the education, motivation, and cultural background of workers.

In most traditional areas of pig production in the United States, wages and salaries for farm staff has trailed the rising competition for labor. Thus, all farms eventually have gone through or will experience periods of labor shortages. In the short term, it is imperative that staff be compensated for their additional effort. I like splitting the missing staff's wages (not benefits) across the remaining workers. That way, the work gets done, the additional effort of the staff gets rewarded, and the company saves on labor costs (since it is not paying the benefits on the nonfilled positions). Over the longer term, if farm manning has been done correctly in the first place, persistent staffing shortages will burn farm staff out. That makes personnel recruitment a vital activity for the production staff. It is not just the Human Resource Management department's obligation to recruit. When turnover is high, the production department must not only help ensure that qualified employees get hired but it must also look for ways of improving retention.

In some instances, staff can be stockpiled on other farms awaiting vacancies. Stockpiling is especially helpful with farm managers and department heads, who must often be recruited before current management staff is replaced. While overstaffing of the farms incurs added labor costs, staff are available as needed and there is little or no downtime getting new employees up to speed. A point to remember: just as gilts incur NPD from the time that they enter the herd until they are served, new staff, whether experienced or not, are less than fully productive for the

first few weeks. As mentioned earlier, high gilt replacement rates result in the “counts” component of NPD undermining breeding female efficiency. Similarly, high employee turnover exaggerates labor inefficiencies. It's hard to get top-notch production from a system with high employee turnover.

The manufacturing industry has long recognized the difference between labor rates and costs. Rates are what workers are paid in terms of dollars/hour or salary. Costs are what the labor rates translate to in terms of dollars per pig or pound sold. When farms are staffed at below budget for prolonged periods of time, total labor dollars may be below budget, but labor costs/pig rise as productivity suffers and volume decreases. Low labor rates (salaries or hourly wages) do not translate into lower costs if productivity suffers. Correspondingly, regionally competitive labor rates (i.e., those that consider what other industries inside and outside the swine industry pay) may result in competitive labor costs even though overall labor expenditure is high by traditional swine industry standards. Competitive wages are becoming a prelude to hiring top-quality workers. For all too long, the swine industry has ignored the difference between labor rates and costs.

When farms are broken (i.e., production is bad), farm staffing will need to be examined from top to bottom. At these times it is imperative to realize that farm managers are the key to a successful farm, more so than the staff that services the herd or the farm workers. Farm managers are on the front line and hold primary accountability for the performance of multi-million-dollar businesses. If they are not good, the farm does not perform well for long. In large organizations, the career path for management pulls farm managers out of the farm into service roles. Unless, there is a “farm team” that develops department heads into farm managers, promotion of farm managers off the farm will strip it of its leadership. Farms typically can do without their service manager and veterinarian; they rarely can perform well without a strong farm manager.

Corporate strategies and missions

In order for people to get where you want them to go, they have to know where to go. You must paint a clear corporate strategy for your staff and remind them over and over again what that vision is. Be crystal clear in your vision. Don't make your vision too complex, full of buzz words, or try to make it all things for all people. One of the companies for which I have worked was owned by a large pork processor who bought pigs from other large producers. We could have stated, as most other producers do, that we want to be “the low cost producer.” While cost management is critical to all producers, quality and wholesomeness, consistency of volume, and achieving desired market weights were critical issues to one of my companies. We wanted to be “the producer of choice” for

our owner and for our ultimate customers, so that we could realize the growth opportunities our relationship with our owner offered. Being the “lowest cost, highest profit, best quality producer that treats its employees well while being friendly to the environment” is something we all want our organizations to be. However, being all things to all people does not give your production staff a vision to buy into. Without a clear long-term vision, your staff will not be able to consistently make short-term decisions.

As I have been confronted with production problems, I have learned that there are four levels to strategy formation. There is the overall “corporate strategy,” which—in my experience—has only rarely been drafted; statements of corporate strategy are, however, critical, since they set the conceptual framework in which you must work. For example, the corporate strategy might be based upon your company being the industry standard in terms of production cost. There are the “operational strategies” that you design to solve specific production issues interfering with your pursuit of this corporate strategy. For example, achieving budgeted weaned pig output may be essential to your objective of achieving low cost production. Operational strategies are often called “initiatives.” Then, there are the standard operating procedures (SOPs), that you put in place to deal with key parts of your operational strategy. For example, you may have a “Replacement Gilt SOP” that deals with gilt infusions into herds and how gilts should be managed prior to and after delivery into the herd. Lastly, there is the “farm strategy” in which you customize the approaches used across your system to the individual farms in the system. While strategy-setting may be time-consuming initially, these strategies are often essential for objectives to be obtained with a minimum of false starts, which cause time and resource wastage and are often associated with lost opportunities.

Although failure to develop a strategy is fraught with problems, I have also found that the failure to react quickly to a problem—that is reaction time—is just as critical as the analysis of it. There is balance between the “ready, fire, aim” approach common to the entrepreneurs in the U.S. swine industry and the traditionalists in our industry who use a “ready, aim, aim, aim...” approach. Al Leman used to say: “We need to make mistakes quicker.” He was trying to tell us that in order to solve a problem, you have to do something. Quick reaction time is important when the cost of: (1) doing the wrong thing is low or (2) not intervening is high. Conversely, deliberation in actions is important when the cost of: (1) doing the wrong thing is high or (2) failing to intervene is low.

Corporate personality

Just like children do to their parents, employees follow and emulate their leaders. It has long been observed in the manufacturing industry that companies take on the personality of their leader. If the company president does

not care for, is aloof from, or distrusts their employees, the corporate culture is unlikely to be "people friendly." If the president is a spend-thrift, cost containment will dominate a profit consciousness. I have learned that you shouldn't try to work for someone that does not have the personal attributes that you value, and that you should not try to work in a culture that is not a good fit with your personal style or values. If you find yourself in either situation, you can either try to create a new culture, which is possible but difficult to accomplish, or you can change jobs. It is highly unlikely that you will change your boss. And, remember the old adage: "If you try to shoot your boss, you'd better kill him."

Production systems

In the early 1990s there was a lot of emotion about alternative production systems for the swine industry and, in my opinion, not much science. We went headlong into early weaning systems, the commingling of pigs from multiple source farms, and multi-site production. Despite the research that my group and others have done, the "real world" research laboratory taught me several things over the last couple years:

Early weaning

Early weaning, defined as weaning at 16 days or fewer, does not work in a large-scale production system, where: (1) labor is hired and, therefore, nursery management and sow lactation feeding are inconsistent across farms, (2) sow genotypes in use do not milk well enough to wean a heavy enough pig and/or are highly susceptible to the adverse effects of early weaning, and (3) where appetites of nursery pigs are poor, either due to genetic effects or health. In large operations, we can routinely get performance out of a pig that is 17 days of age or older and weighs at least 9 lb, but we struggle getting acceptable growth and survival rates with early-weaned pigs.

All-in—all-out

All-in—all-out works well with single-sourced pigs by site, barn, and room, in that order of effectiveness. Pigs reared in the "old-style" continuous flow, where pigs of multiple weekly age groups are reared in the same air space, perform well if they are placed healthy and stay healthy. Both epizootics of disease and chronic, nagging disease problems are common when conventional health pigs are reared "old-style" continuous flow. Pigs reared in the "new-style" continuous flow, where pigs from different sources of the same week age are reared in the same building but in different rooms by source (e.g., hotel nurseries), perform well as long as they remain healthy and the health status of source farms are near-identical and stable.

Commingled of pigs

Commingled of pigs of the same age but different source farms works well if source farms have a stable and similar health status. However, recurring health problems become common over time.

Straight-line distribution

Straight-line distribution applies to the flow of (1) replacement gilts from daughter nucleus and gilt mul-

tiplier farms to commercial farms and (2) market pigs from sow farms through nurseries and finishers. Maintaining the same and a single source of pigs for a facility reduces the occurrence of health problems, but this benefit often must compensate for the reduced facility utilization.

New production systems that are being tested in the research laboratory of the "real world":

Wean-to-finish

Wean-to-finish production systems are being increasingly used throughout the industry. With this technology, pigs are weaned into the barns in which they will be reared until market. Growth performance, survival rates, and labor and transport costs appear to more than compensate for the higher facility costs incurred with wean-to-finish production.

Same-group rearing

Same-group rearing refers to pigs being weaned into nursery groups that will remain intact as pigs are moved to finishing. In its extreme form, litter-mates will be reared through both nursery and finishing stages together. Preliminary results suggest highly competitive growth performance that seemingly compensates for the additional housing and transportation costs.

Big-pen

Big-pen production systems involve pigs being reared in groups of 100, 150, and 200 pigs/pen or more. Lower housing costs seem to be associated with reduced variation in pig growth performance and greater ease in managing pigs.

Zero-move

Zero-move sow housing involves sows being weaned into the stalls in which they will both be bred and housed for the duration of gestation. Considerably less labor is involved in managing gestation barns. There are some suggestions that farrowing rates are improved because of the reduced relocation stresses.

These technologies and others will continue to be evaluated in the future offering us lower costs, better performance, and/or enhanced ease of management. I predict that some will be successful and be broadly adopted by the industry; others will be discarded at an ever increasing rate over the next decade. As always, the advantage will go to early adopters. The "experimenters," who create and are the first to try the new technologies, will bear the "research costs." The technology "followers" will fail to capture the financial advantage of the new technology as the marketplace adjusts to its widespread adoption.

Health

I have spent a good part of my professional life as a veterinarian largely ignoring disease. There have always been plenty of other veterinarians around who have a better understanding of disease, which has allowed me to pursue my passion—production. Although not having a disease orientation, I consider disease to be another risk factor for performance, similar to nutrition, genetics, management, and environment. After a couple of years in the "real world," I now believe what my business partner, Brad Freking, said sometime profound during the last year:

“Disease is king.” I have learned that, although disease is one of several risk factors, it can be a “draft horse” in its effect on production. Here is what I have learned about disease. My takehomes will be obvious to most of you but, for me, they were critical to my learning to manage diseases in large production systems:

- A key to controlling diseases in growing pigs is to stabilize the health of the source sow farms.
- Pigs can be kept healthy after weaning, if production systems and pig flows are designed and implemented correctly.
- Biosecurity is critical to keeping breeding and growing pig herds healthy. Everything pales in comparison to pig-to-pig transmission and spread of diseases via live-haul.
- The best health program designs have no value unless they are carried out. If you have blind trust that your medication and vaccination programs will be carried out, you will be plagued by high mortality rates in nursery and, perhaps, finishing stages. Just as it is for other management practices, implementation is key. For health programs to be successful, you have to build in implementation steps that ensure that health products are administered and are administered correctly.

Production-support functions

The activities of other departments in your company can have performance-limiting effects on production:

- When development (procurement of new barns) lags behind, nursery and finishing barns do not get built. Consequently, pig flows are disrupted, and animals are over-stocked in facilities. The system breaks down and performance suffers.
- Poor feed manufacturing, obviously, results in reduced animal performance, whether you are talking about the lactating sow or the growing pig. Something as simple as getting the right diet delivered to the right bin at the right time can seem to be an almost insurmountable obstacle in a large organization. Feed delivery tracking and quality control programs are essential to get consistent performance.
- Everybody is becoming adept at capturing data, not only production but also financial information. Few people understand the importance of building a top-quality data base. Missing and erroneously entered data often leads to flawed decision-making. If you do not have confidence in your data, which most of us should not, it is difficult to make the day-to-day decisions necessary to lead a production organization. The production function of a company must take

ownership of the data; accounting departments rarely do.

- Although waste management activities do not directly affect production, they certainly distract you from carrying out production functions. Lagoon spills and land application accidents are—and will continue to be—the public relations nightmare of our industry. As an industry, we need to quit building them, now, or at least make them fool-proof.

Lessons learned about running a production business

Corporate philosophies

Simplistically, there are two general philosophies to which corporate producers adhere. With a low-cost orientation, the entire company is oriented toward cost management. When carried to the extreme, opportunities for enhanced revenue and added profits are lost. Often, as I have witnessed this production philosophy, I think of Ben Franklin’s saying: “Penny wise, pound foolish.” There can be little doubt that the survivors in this industry will be cost-competitive. I also believe that the long-term survivors will be those that know how to make a profit, not just control cost. The emerging frontier in swine business management is revenue enhancement.

Organizational structure

Besides differences in corporate philosophies, the “real world” university has taught me several business lessons on the organization and integration of the production department in a large corporation:

- Consulting with a bunch of single farms is very different than managing a multi-farm system. Knowing how to solve the problems and to maximize the performance of individual farms does not guarantee that you will be successful across a large system.
- The integration of all phases of production in multi-farm systems is a continual challenge. Few people voluntarily take ownership of pig quality. Often the “buck is passed” and poor quality pigs are passed on to the subsequent phases of production. Sow farm managers seldom worry about weaned pig quality, pig age and weight (absolute and variation), whether or not pigs get castrated or vaccinated, etc. Pig quality is further damaged as nursery barn managers fail to implement husbandry practices that encourage marginal quality pigs to eat and grow. Then, epizootics of PRRS, *S. suis*, *H. parasuis*, or TGE strike a group of pigs, exaggerating the pig-to-pig weight variation. When the feeder pigs arrive at the finishers, they are not sorted correctly or managed by size and health. Consequently, performance suffers and mar-

keting sort loss rises. Finish service and farm managers blame nursery staff; nursery staff blame finishing and sow herd staff. Establishing accountability for pig quality at all phases of production is critical. Getting people to communicate is a must.

- The breeding herd is the key to performance in subsequent phases. If performance is not satisfactory in finishing, get management practices and pig flows right in the nurseries and breeding herd. If mortality is high in the nurseries, make sure that the health status of the sow farm is stable and that weaned pig quality is sufficient. Always look upstream to solve a performance or mortality problem for a given phase of production.
- There are two main styles of management, both of which may work under different situations. As the term implies, the "top-down" approach involves upper management directing specific activities of subordinates. Decisions are taken above and carried out below. Getting buy-in is not an issue; obedience is critical. The top-down approach may work in some cultures and/or when the work force is uneducated. "Participatory management" style involves consensus building, wherein people at multiple levels develop policy and plan for its implementation. When done correctly, people at all levels are more likely to take ownership of the plan. With "participatory management," plans are more likely to get carried out; however, it takes more time. The top-down approach often results in "lone rangers" who act in isolation from others; they may be very powerful as individuals but they are very destructive to teamwork. "Participatory management" is dependent upon the creation of a functional team.
- When building a production team, look for these characteristics in team members: big picture people and implementers, leaders and managers, delegators and doers. It takes all kinds of people with diverse abilities to make a team. Do not succumb to the temptation that you need to like all team members equally or that they need to be like you. If you are not just a little uncomfortable with some of the members of the team, you probably have not challenged yourself enough.
- Organizational structure can be key to your success in running production. Most agricultural organizations retain a traditional organizational hierarchy of subordinates reporting to a single superior. To improve communication, flatten the organization. Evaluate each level to ensure that productivity benefits from having it. Service costs are often inflated, usually without improvements in performance, as we add on tiers of production service staff in attempts to address production problems. The replacement of "line officers" with "staff officers" can provide added focus of specialized staff to bear on production issues. If you choose to flatten your organization, beware of "span of control" problems. Most of us can only directly supervise 6–8 subordinates. Also, remember the lesson that has been learned over and over again in the manufacturing businesses: reorganization typically does not fix anything. It just distracts you from addressing the real problem at hand. Do not stir the pot by undergoing major reorganizations, if you can avoid it.
- People do not like change and usually resist it. Change is absolutely necessary in a dynamic organization, whether it is broken or working well. When immediate change becomes necessary in an organization because production is suboptimal, here is what I consider. Make sure that you define what is truly broken in the company and what is working well. Develop a new strategy or approach that includes methods to establish responsibility and accountability. Consider the strengths and weaknesses of each individual and how they should be involved in the change (if at all). Do not underestimate the importance of selling the need for change to the organization. Sell it up and down the line; sell it over and over again. Anticipate who will view the change as positive and who will view it as negative. Recruit a powerful ally to be cheerleader for the change. Clearly define specific objectives, steps, and probable outcomes so as to minimize unfulfilled expectations, which will undercut the change. Implement change throughout all levels of the organization. Declare a victory as the positive results of the change comes in.
- I have worked for two relatively new companies. When starting up a company, take the time and expense to build a strong foundation beneath the company. When companies grow fast, they often outgrow their management expertise. People get promoted before they are ready. Talented people get stretched thin and eventually burn out. All too often, start-up companies do not pause to consider whether they need to slow down their growth. Consequently, production efficiencies fall and support systems break down. The takehome: hire the management team before it is needed, not after the system has been built.
- There are other lessons to learn from startup companies. Establish information systems that allow production processes to be accurately and efficiently measured, and in a timely fashion. Create a production system, animal flow, and building design and stick with it. Adopt the best management practices that you know and be ruthless in your standardization of them across your farms. Establish your sys-

tem high health, so that you do not have to fight diseases on top of everything else that you are fighting.

Personnel management

Pig production is about people. Therefore, most important lessons are about personnel management. As a leader of an organization, the lives and well being of people are in your hands. You have to get good at leading and managing people quick. Here are some takehome lessons:

- Hire the right people. Not necessarily ones that fit your personality, but people with whom you can get along and who fit in your organization. If you make a mistake in hiring, do something about it early on. When you realize that you have to dismiss someone, take the hard decision early. Barry Wiseman once quoted Hank Harris (I have no idea whether or not the quote is accurate or whether Hank even made it, but I believe it nonetheless): “Sometimes the best thing you can do for someone is to fire them.”
- Recruitment is the key to getting top performance. If you do a good job recruiting, turnover rates will be lower and “nonproductive worker days” will be reduced. As mentioned earlier, the farm manager is your most important staff officer. Recruit top-notch farm managers and support them as they recruit their department heads and technicians. Create a “farm team” environment, where people know that they have a chance for career advancement. Recruit production management trainees as technicians and groom them to be department heads when they are moved up to replace farm managers who, in turn, are leaving to enter the service side of the business.
- High farm staff turnover rates are typically a consequence of hiring the wrong people and not taking care of them during their initial months of employment. Set reasonable expectations and make people feel that they are important to the organization’s success, if you want to improve employee retention.
- Give people the tools that they need to be successful. Training involves giving people a blend of technical knowledge with background information, which at least indirectly deals with production information. Be practical. Customize training to fit the student’s position in the organization.
- Incentives are expected and, therefore, are required. Incentives take several forms, not just monetary. People like to receive awards; they like to be acknowledged. They like to be given perks, such as the use of a vehicle, vacations, computers for use on their farms, comfortable work clothing, well equipped break rooms, etc. When financial incentives are used, they need to be based upon production endpoints that relate to the financial success of the company and upon

endpoints that directly relate to their job. Financial incentives need to have a short-term time horizon, so that farm staff are rewarded for their work soon after it is done. Incentives need to be dynamic, so that people are incentivized and do not expect to automatically receive the bonus.

- Pay scales need to be regionally competitive with other swine businesses as well as other agricultural and nonagricultural businesses in the area. Pay rates will need to be reviewed twice annually in regions where labor is short, and fair adjustments made when necessary. To prevent salary inflation and to be fair to all employees, I prefer to remunerate people in the following way:

$Salary = Base\ Pay + C.O.L.A. + Annual\ Bonus + Pay\ Augmentation + Merit\ Raise$

Base Pay varies with position and years of employment. Upon beginning a position, the starting base pay would be similar for employees having similar experience in swine production and/or similar education. Managers at the same level (i.e., two service managers) and managers at different levels (i.e., service manager vs. production manager) will be discriminated according to their base pay. The base pay of farm managers can be varied according to the type of farm that they serve (i.e., size of farm, production system of the farm, genetics vs commercial).

C.O.L.A. (Cost of Living Adjustment) is based upon the national monetary inflation rate.

Bonus. I prefer bonuses that are based upon a percentage of base pay, typically 10–30%. The award is composed of two things:

Performance-based bonus: based upon the achievement of performance levels above a threshold (e.g., 1 standard deviation unit above the average of the past two years of historical data).

Discretionary bonus: based upon subjective criteria, such as teamwork, extraordinary effort during the past year, special accomplishments not covered by the performance-based bonus.

Bonuses should be awarded once annually with one year’s bonus having no influence on subsequent awards.

Pay augmentation refers to additional salary received for performing a special service for the company beyond current job requirements. Added salary would only be for the duration of the assignment. For example:

- A supervisor moved into a farm manager position might be given a pay augmentation until s/he

proves themselves in that position

- A farm manager might be given augmented pay if s/he is transferred to another to fix it and, by doing so, would forsake any bonuses on his or her farm of origin.
- A supervisor or farm manager might be given pay augmentation for working on a teaching farm.

Merit raise would be a permanent award that is given to a person as long as s/he remains in her or his current position. It is comprised of two things:

- Sustained performance over a multi-year time horizon (e.g., above budget production for two years or longer).
- Educational achievements (e.g., obtaining a degree in a field having value to the company).

Finance

Many of the biggest lessons that I have learned over the past couple years have been in the area of financial management. Volume (pigs, pounds) is critical to cost control. Falls and fluctuations in volume result in increased costs through all phases of production. In swine production, many of the costs that are classically categorized in cost accounting textbooks as variable costs actually behave as fixed costs. For example, breeding stock feed costs are classified as variable costs but behave as fixed costs, since they are somewhat independent of sow productivity. As PSY increases, corresponding falls in weaned pig feed cost occur. The importance of volume lessens somewhat as you pass from the breeding herd, through the nursery stage, and on into the finishing phase.

Besides volume, there are several ways to cut costs. With the correct financial information system, cost containment can become part of the corporate culture. Areas with opportunity in most systems include:

- *Labor.* Make sure that farms are fully, but not over-staffed. Rates are typically less of a problem than number of workers. Set limits on the amount of overtime paid. Understand when and how vacation and leave pay hit the financial statement.
- *Breeding costs.* Poor efficiencies of genetic herds and high royalty payments commonly inflate genetic costs. Length of depreciation and salvage value used for boars and sows affect the breeding stock depreciation expense. Inefficiencies in the operation of boar studs and the on-farm use of delivered semen also increase costs.
- *Feed.* Not following feed budgets, delivering the wrong feed to the wrong bin, over-feeding sows during gestation are common occurrences in large swine operations. Deliveries at the end of a month, which

are not yet consumed, can bias that month's feed costs. Unanticipated increases in feed ingredient costs (especially grains and protein sources) will inflate feed costs. Poor production by the breeding herd will inflate the feed cost per weaned pig.

- *Health products.* Water medications of nursery and finishing pigs are typically overused and not monitored well for efficacy. Lots of pigs often have multiple 3- to 5-day treatments during their growth phase. "Big gun" drugs (which are typically expensive) and extra-label drugs are often used, when less expensive medicants will suffice. Vaccination programs are not instituted when they need to be, requiring the use of antibiotics. Vaccination programs are instituted, forgotten about, then never pulled out.
- *Repair and maintenance.* Preventative maintenance is not done, and farms are allowed to become run-down. Farm workers are not trained to do routine maintenance, such that outside contractors are required to be brought in. Initial construction is done shoddily or equipment is poorly manufactured, requiring augmented maintenance. Maintenance crews become bureaucratic and spend their time riding around in trucks rather than servicing herds.
- *Live haul.* Trucks not efficiently routed or filled to capacity. Trucks sit idle at wash bays waiting in line for their turn to be cleaned. An incorrect blend of contract and company hauling is used. Pig flow is not consistent. Weight of pigs shipped is under budget.
- *Supplies.* Farm inventories are not centrally tracked with upper and lower inventory limits being set. Deliveries to farms are not monitored. Controls on unit sales to farms are not set at the warehouse. Purchases are not competitively priced.

The key to management of these cost areas is budgeting. There are three essential steps to budgeting: (1) setting up an information system that allows you to track costs; (2) establishing a budget; and (3) using the budget as the "bible" for driving costs out of the system.

Setting up the information system:

- Establish procedures for capturing costs accurately and in a timely fashion with minimal angst by service and farm managers.
- Set up farrowing and nursery farms as cost centers with pigs being transferred at cost of production to the finishing phase, which becomes the profit center.
- Establish support departments for production as cost centers. While there are several departments in a company outside of the production function (e.g., human resources, development, feed milling, quality assurance, purchasing), several departments are directly

· tied to production and, thus, are often managed by production staff. For example:

- *Service Departments* for breeding herds (farrow-to-wean, farrow-to-feeder, and farrow-to-finish), nurseries, finishers, wean-to-finish, etc. These departments capture the salaries/wages, benefits, personnel expenses, supplies, vehicle expenses, G & A allocation, waste management, etc. of staff who service farms.
- *Veterinary Services Department* captures expenses of veterinary staff. Note: health products are charged directly to the farms.
- *Boar Stud Department* captures the expenses associated with boar stud operations, including processing and delivering semen. It may also capture royalty payments and depreciation costs for boars.
- *Catching and Hauling* captures expenses of personnel involved in live haul, scheduling, truck washes, and loading crew.
- *Production Information Department* captures expenses for production records, which often includes the forms used on farms.
- *Repair and Maintenance Department* captures expenses associated with personnel who maintain equipment and buildings.
- *Training Department* captures expenses associated with the education of farm, service, and support staff.
- *Breeding Stock Selection Department* captures expenses associated with personnel involved in the selection of breeding stock replacements bred by the enterprise or brought in from the outside and subsequently processed. Note: expenses associated with rearing seedstock are charged directly to the genetic farm.
- Allocate departmental costs to the individual farm income statement as well as the consolidated income statement. Typically, departmental costs will be allocated based upon the budgeted number of sows or budgeted capacity of nursery, finishing, and wean-to-finish farms.
- Express costs in terms used commonly by the swine industry: \$/pig for weaned pig, \$/head and \$/cwt for feeder pigs, \$/cwt for market pigs, and \$/gilt for breeding stock.

Establishing the budget:

- Base budgets on achievable levels of production, not on what you dream it will be or what is easily achiev-

able. Budgets should be a stretch for the farm, but be within reach.

- Predict as accurately as possible what monthly consumption of resources will be during the coming year for each type of farm in the system.
- Adjust monthly expenses to accommodate for seasonal variations in use (e.g., winter increases in propane consumption by nurseries).
- Express expenses in terms of appropriate cost drivers (e.g., pounds, pigs, sows, doses of semen, loads, trucks).
- Ensure that persons in direct control of costs are involved in developing and implementing budgets.
- Benchmark your budget with industry standards and with historical performance, but do not use other companies' numbers or historical performance to compose your budgets.
- Reset budgets annually considering improvements in performance and refinements in cost estimates. Budgets must be dynamic from year to year, changing as the company grows and gets older.

Using the budget to drive out costs:

- Make sure expense and revenue lines, and volumes reported on income statement are accurate before making any interpretations.
- Teach all service and farm managers how to interpret income statements, including:
 - budgets standards, including not only upper limits for costs but also the minimum expenditure to be expected,
 - what "variance" means, and
 - main factors that influence variance from budget for each cost item (i.e., cost risk factors).
- Teach people how to chase down expenditures when an expense account is above budget. For example, when breeding stock feed cost is too high, what is wrong? Are ingredient costs too high, weaned pig volumes too low, gestation feed consumption too high, or breeding animal inventory above budget?
- Identify who is responsible for controlling the cost risk factors associated with each overage and hold them accountable (e.g., if gestation feed consumption is too high, show farm manager how to control it).
- Make sure that service and farm managers focus on the most important cost components—not just the expense having the greatest dollar value, but the ex-

pense whose variance is the greatest percentage above budget.

- Understand opportunity costs associated with budget variances of efficiency measures that influence volume (i.e., the relative contribution of PWM, PBA, NPD, etc. to cost of production).
- Understand how volume affects line item expenses and how to differentiate the relative contributions of below-budget volume and poor cost management to individual line items and to overall cost of production.
- As budgets are used throughout the year, you will find some budget lines that will be either too high or too low. Sometimes you will find that you have made a mistake in preparing your budgets. Other times you will need to change a management program mid-year and incur additional expense. Consider the flaw in your budget as you interpret your income statements. Unless changes in your software are easy to make, do not modify your budget mid-year.
- Review budgets in a timely fashion. For example, close out monthly financials within two weeks after the end of the month. Within the following two weeks, review financials with the staff responsible for a de-

partment and with those responsible for individual line items on a farm's income statement.

- Develop well-defined strategies for addressing the cost line item that is causing a cost variance. Again, these strategies must include specific, actionable steps that can be carried out and monitored at the farm level.

Conclusions

There is no better way to learn production than to produce pigs yourself. You can read about it, research it, give seminars on it, and teach students about it. You can even consult with pork producers about it. But, unless you do it, you never realize what you do not know about swine production. I am only now beginning to understand how much I do not know about pigs. As veterinarians, I encourage more of you to go to the same school that I have attended these past two years. The tuition may be high, but the rewards are tremendous.

