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What baseball can teach us about raising pigs

Hanson Lecture

Gordon D. Spronk, DVM

Baseball, for many, is almost purely a game of numbers.¹

The one constant through all the years has been baseball. America has rolled by like an army of steamrollers. It's been erased like a blackboard, rebuilt, and erased again. But baseball has marked the time. This field, this game, is a part of our past. It reminds us of all that once was good, and what could be again—James Earl Jones in <http://www.amazon.com/exec/obidos/asin/6301599977/baseballalmanac> (1989).²

Introduction

Admittedly, the topics of pigs and baseball rarely enter a conversation at the same time and may be dismissed by many as neither original nor very intellectual. This is not a scientific lecture; rather, it is an attempt to make an observation of our own situation and see if there are similarities to other areas of life and business that may help us all improve. In some respects, this is as odd as trying to make pigs fly, but that is not an original thought either. In its simplest form, it is an attempt to make us all think—baseball is simply the vehicle to stimulate the discussion. The game of baseball has been played for over 100 years and from the very beginning the numbers that the game generated—and the ability to make decisions based on those numbers—has created debate; for some all they care about is the numbers and the debate.

A number of disclosures are in order. First of all, this is a North American view, both of the pork industry and of baseball; although other North American sports have gained acceptance around the globe, baseball remains a game unique to this hemisphere (Japan may be an exception) as much as apple pie, baseball and Chevrolet . . . Secondly, it is a record of observations and opinions and I am grateful to those who have shared theirs with me. And lastly, although there may be no appearance of sci-

ence, there is more than meets the eye; from the veterinary point of view, I hope that you share in my enthusiasm to look beyond the ordinary in search of learning opportunities. Lastly, quoting that great baseball intellectual—Yogi Berra—“I never said most of the things I said.”¹

The holy war in baseball

The fight is about belief in different operating systems. On one side are the traditionalists, who cling to an old system that relies heavily on the opinions of “baseball men” . . . on the other side are the progeny of the information age, who view traditionalists as a flat earth society and believe in substituting data for subjectivity whenever possible.³

A baseball fan has the digestive apparatus of a billy goat. He can, and does, devour any set of statistics with insatiable appetite and then nuzzles hungrily for more—Sportswriter Arthur Daley²

In his well written and critically acclaimed book, *Moneyball* (Norton, 2003), Michael Lewis outlines the state of the game of baseball. Run for years by what he terms “club members,” the game is being challenged by a new generation of general managers that look beyond the usual “club” rules of how to run a team and are instead managing by the unique approach of analyzing the numbers in a new light. Billy Beane of the Oakland Athletics is the poster child of Lewis’ observations.

For Billy Beane, success in baseball is measured by two basic methods: wins and profits. The two do not necessarily have anything to do with each other. If money spent for players meant automatic success, then final standings of the Western Division of the American League at the end of the 2002 season made no sense (at the risk of pointing out the obvious, the wins and payroll ratios are inverse to each other; see Table 1).

Table 1: Win-loss record and total payroll of American League Western Division teams

	Wins	Losses	Games Behind	Payroll
Oakland	103	59	-	\$41,942,665
Anaheim	99	63	4	\$62,757,041
Seattle	93	69	10	\$86,084,710
Texas	72	90	31	\$106,915,180 ³

To some—but not all observers—Billy Beane as general manager of the Oakland Athletics is clearly in a league of his own. The fact that he was successful is not in dispute, how he did it is. Michael Lewis showed how a low payroll team with a knack and passion for numbers could compete against higher payroll teams that were run more with “old school tradition” than with modern computer algorithms.

Lewis makes the case that these traditions are being challenged by new schools of analysis and decision-making. The application of these principles is causing a ripple effect in the baseball world; the same may apply to pig production.

Summary

Lesson #1: The numbers need to be turned into knowledge

Baseball is ninety percent mental. The other half is physical—Yogi Berra²

Have we become so numbed by all the numbers that we are no longer capable of truly assimilating any knowledge which might result from them?—Bill James³

It is not unusual for the IT department—the number crunchers, the propeller heads—to be dismissed as weird or, at best, able to recite the numbers but fail to understand the real point. Understanding is the point. Ability to recite the numbers, but having no real knowledge of the game or the point of producing pigs, is lost on many people. Our (your) job may be to bring them back to the point: to determine the meaning behind the numbers, or to detect if there is an inefficiency caused by sloppy data. Or to say it another way—we should always be looking in places where the numbers do not tell the whole truth—or even lie about the situation.

Lesson #2: Be alert for forces outside of your circle of thought

Be alert for forces outside of your circle of thought challenging the way you do business and be wary of reactions within your circle of thought. Denial may not be the correct response.

You can observe a lot just by watching—Yogi Berra²

There are always challenges to any approach in business or swine production. Sometimes these changes to the status quo come from within the industry or business itself—e.g., “*profit centers are always moving*”—and sometimes they come from the outside. In baseball, the modern game is being challenged by approaches to the game coming from forces outside of the normal places that would normally be considered for sources of baseball knowledge.

That is the point of Lewis’ book. The same may be true with pig production. Forces outside of our normal circle of business may be challenging the way we operate.

When challenges to the ordinary way of doing things occur, there are typically two reactions: reject/deny the approach as ridiculous and dismiss it as careless thinking by fools, or embrace the new way of thinking and apply it to your own competitive advantage.

Lesson #3: “The crowd is not always right”

Capitalize on others’ irrational behavior, or “the crowd is not always right.”

For years, the financial markets have been used by a select few to capitalize on the irrational behavior of many. One such example is John Henry, owner of the Florida Marlins. He made his millions by using his instinctive feel for inefficiencies in human behavior. Those inefficiencies in the financial markets enabled Henry to buy a baseball team and use those same skills to observe the inefficiencies of the baseball world. The same may be true of pork production. Are there irrational behaviors that you have observed in your production circle? What about your own irrational behavior? How can we challenge ourselves to improve?

How do we turn numbers into knowledge?

“If you measure, measure well.”

“You may think that you are scientific when in fact you are nothing more than opinionated and arbitrary...”

“I don’t know whether you know it, but baseball’s appeal is decimal points. No other sport relies as totally on continuity, statistics, orderliness of these. Baseball fans pay more attention to numbers than CPAs”—Sportswriter Jim Murray²

Michael Lewis begins with the simple question: How did one of the poorest teams in baseball, The Oakland Athletics, win so many games?

With that question, Lewis takes us along for the ride on his quest for the Holy Grail: the secret of success in baseball. Lewis searches in all the logical places, in the dug-out, with the scouts, in the stands with the fans, to the front office, and with the players themselves. Along the way, he discovers that the numbers themselves—how they are recorded, measured, discussed, and analyzed—are the real stars.

And what he finds is that the numbers reveal that some of the fundamental measures of success or failure are poten-

tially flawed. In fact, most of the traditional measures may be measuring incorrectly.

Take the error, for example. Since the beginning of the game is was taken as a measure of what one person thought *should have occurred*, a record of opinions, not fact. Or take the hitting average. Although a simple metric, it may not tell the whole story of the ability of the hitter to get on base (on-base percentage) or how he was able to wear a pitcher down by taking additional pitches without striking out. Others are completely misapplied. The fielding statistic is a record of the ability of the player to field balls hit in his direction without error, but what if the manager put the fielder in the correct position in the first place? There is no record of that.

Pete Palmer, the sabermetrician and author of *The Hidden Game of Baseball* once calculated that the average difference in baseball due to skill is about one run per game, the average difference due to luck is about four runs per game. Over a long season the luck evens out, and the skill shines through . . .³

In pig production, we also produce volumes of numbers, different measures of actions on the farm and in the barn. We calculate ratios and compare rates over time. We then use these metrics to make decisions. But are we measuring correctly? Are we recording the correct numbers? Consider the following.

Grow-finish metrics

The wean-to-finish records that we maintain are clearly retrospective in nature. They tell us all the things that happened to a group of pigs while in the growing phase. They do not tell us anything to help change the pattern of growth while in the growing barns. The only real-time data that one could argue is valuable is the mortality rate, a record of the number of deaths over time. But this does not reveal the full picture. We are unable to determine until the group is closed out whether or not they gained well or were efficient or made a profit. In general, we may be measuring completely wrong. I personally get frustrated by the inability to have a solid impact when doing a barn walk-through. Clearly you can get a sense of the general care of the animals and the management of the barn, but my point is that the eye is incapable of determining the difference between a group that will perform at an expected rate and a group that is underperforming. Therefore my frustration with grow-finish metrics.

In the breeding barn

Could the same be true in the breeding barn? While we all know that pigs out the door pays the bills, the measure of success in the breeding barn is elusive. Common measures include total born/live born (TB/LB) and farrowing rate (FR) or pigs per sow per year—but, do they really measure what is happening in the breeding barn?

When investigating success in the breeding barn, we commonly run a set of reports that includes a mating/service report. It compares the impact of more matings (1 vs. 2 vs. 3 or more) on TB/LB and FR—this report can be run on any individual farm and parity and it will show almost universally that in order to increase farrow rate in younger parities, two matings is better than one and three or more is better than two. But is that really what the report is saying? Is it more a reflection of what happened as opposed to a real measure of actual events? In other words, it does not measure how many females were checked and not found in heat. It also cannot tell us how many animals were bred that were not in heat. It only tells us that of the animals that were mated (bred), mating more is better (in most cases).

All of this revolves around the ability of the breeding technician to determine if the female is “in heat”—and we all know what that definition is—so we will not waste time here debating that definition—or should we? Picture, if you will, the strike zone. It varies with the batters height (width is fixed by the plate). A batter has three strike opportunities to get on base (4 balls get him a free pass—but he still is on base). So we have that the strike zone is variable and that it is up to the batter to determine the “right pitch.”

The same is true of the breeding technician. Estrus length and “heat” vary with each individual female. Gilts typically have a shorter estrus duration and sows longer (standing heat at varying times within that estrus interval, with ovulation usually occurring at 80% of the entire period length). So how can farrowing rates or matings really measure the success of the breeding technician? They only measure the result of decisions made by the technician. Much like hitting percentage measures the result of decisions made by the batter. There are other measures that more accurately measure those decisions—i.e., on-base percentage, slugging percentage, RBIs, etc.; mating/service or MM% in the breeding barn are a couple of those other measures.

When analyzing multiple farm production, a common pattern that becomes apparent is that farms with high mating/service (1.9–2.4) have greater reproductive success. However, there are exceptions to the rule—there are a few farms with the mating/service ratio at 1.4 to 1.5 that are successful—but is that really a reflection of matings or a reflection of “at bat” decision making? In other words, did the technician do a better job determining when estrus started and then judged accurately when ovulation was going to occur and being very good at it? As a result, early matings were decreased and the most important number—the percentage of matings that occur within twelve hours prior to ovulation—went up. But we have no way to measure that decision! We only guess that as sows are in heat longer than four days and they ovulate

later (80% of four days is somewhere on day three) we better keep breeding them—three maybe four matings.

However, four matings is very inefficient when the financial officer tells us to quit wasting semen! Just like the coach telling you to lay off the first pitch. I'll leave you with this thought from *Moneyball*:

The manner in which baseball people evaluate a player's fielding performance—adding up their errors and applauding the guy with the fewest—is an outrage. “What is an error?” He (Bill James) asked. It is without exception the only major statistic in sports which is a record of which an observer thinks should have been accomplished. It's a moral judgment, really. In the peculiar, quasi-morality of the locker room . . . Basketball scores count mechanical errors, but there is a record of objective facts: Team A has the ball, and then Team B has the ball . . . But the fact of a baseball error is that no play has been made but the scorer thinks it should have. It is uniquely a record of opinions.³

How many records of opinions do you have in your breeding barn? Take the following situations where you are presented with numbers and need to turn them into knowledge.

Case #1

The farm that you have been called to is considering a switch in semen extenders. The choice is between extender A and extender B. The data reveals that A has a 2.4% higher FR and the same TB as B but costs \$0.20 per dose more. As manager, how do you make the decision on which extender to use?

Case #2

You are walking through a finishing site with over 5,000 pigs in inventory and the site manager is commenting that the ADG is too low. You are presented with data that confirms that ADG is low; the expected ADG in the nursery is 0.90–1.00, but the last closeout is 0.79–0.83 and the finisher ADG is 1.55–1.65. What do you do?

Case #3

The farms that you manage have an increased mortality rate in finishing pigs from 60–280 pounds. There are a variety of causes, but no general trend is established. There is no clear-cut established reason for the deaths, just a general pattern of twice-as-high-as-expected death loss. As a result, there is increasing pressure to change boar lines from boar line A to B. There is no side-by-side data available, only timeline data that suggests a before and after effect.

Case #4

You are in a presentation on a new product. The salesperson presents data that shows only before and after data. No side-by-side data or analysis of the statistical differ-

ence between the two products. They are passionate in their sales presentation that the new product has superior performance, but can provide no statistical proof. What do you do?

Case #5

You are in a presentation by a major pharmaceutical company. They are briefing you on the results of a recently completed trial. The trial was a simple two-by-two prospective study. The results, however, are being shown as a one-by-one trial. This is pointed out to the representative of the company. His response is that the data is too complex to report the other way. What do you do?

Case #6

You are reviewing your sow culling policy and are attempting to hit a target of 50% replacement rate. The herd has a history of over 60% replacement rate for over five years. In your control are the number of gilts that are entered into the herd, the number of times that the cull truck comes to the farm, and the size of the truck. You cannot control the market for the cull animals, the market for the value of the animals being entered, or the specific animals that will be culled each week. What do you do?

Who would think that an actual baseball team would read Bill James closely, understand everything that he said along with the spirit with which he said it, and had set out to find even more new baseball knowledge with which to clobber the nitwits who never grasped what James was all about . . .³

Change can come from the most unexpected places

Most baseball teams have traditionally been owned by owners who have made their mark in other business and then went on to own a team. When they attempted to apply the same common business principles to baseball, they have been less successful, depending how you measure success. In baseball it may be measured by:

- Profits
- Wins
- Attendance

When Billy Beane was hired to run the Oakland Athletics, he faced a problem as complex as a calculus quiz (or at least as complex as the extra credit question): How do you compete with a team (the New York Yankees) that has spent \$126 million on 25 players and you have only \$40 million to spend? How do you avoid humiliation, let alone defeat? Beane's answer—assemble a bunch of nobodies into an efficient machine capable of winning base-

ball games and watch them become stars by using information that others were ignoring.

How does that apply to swine production?

There are many outside forces that are putting pressure on the way we operate. For example:

Animal welfare

The manner in which we care for and house our animals has changed and will continue to change. The pressure to reassure the consumer regarding the animals that are in our care will continue to rise. This will change not only the way that we house our animals, but also the way we measure and document that care will continue to change. The public interest groups with an interest in the way we raise our animals will continue to shape how we do business.

Antibiotic usage

The manner in which we are able to use injectable, water-, and feed-grade antibiotics may be determined by outside forces. This will be done in the interest of the public health and not necessarily in the interest in the health of the animals that we care for or the food products that are produced from those animals.

External economic forces

The strength or weakness of the USD, interest rates, land prices, urban expansion, cost of feed grains, and cost of manure disposal are just a few of the external forces that are brought to bear every day as we operate our farms. These forces are unpredictable and are not easily managed.

Owners from untraditional sources

Traditional animal agriculture has been driven and owned by local, family-based businesses. That has changed. It is not unusual for large, well capitalized Wall Street firms to enter the business and operate in local areas. That influence has and will continue to shape the business of pork production.

GMOs

The influence of and the ability to genetically modify both the feed grains that we feed to our animals and to manipulate the animals themselves will have influence in the future.

The bottom line—be aware of forces outside of your normal circle of thought.

Thinking for yourself . . .

“Irrational behavior is explicable if not predictable...”

Michael Lewis points out that there are many examples of irrational behavior in the game of baseball; from the amount of money spent on low caliber players to judgments made as to when to keep the pitcher in the game and when he should be replaced. For example:

If gross miscalculation of a player’s value could occur on a baseball field, before a live audience of thirty thousand, and a television audience of millions more, what did that say about the measure of performance in other lines of work? If baseball players could be under-over-valued, who couldn’t?³

He printed out the 2002 offensive statistics for the Oakland As and the Minnesota Twins . . . The Twins batting average was 11 points higher than the As and their slugging percentage was five points higher. And yet they scored 32 fewer runs. Why? Their on base percentage was a shade lower, and they’d been caught stealing 62 times to Oakland’s 20 and had twice as many sacrifice bunts . . . **that is they squandered outs.** In Beane’s opinion, the math works, no matter how many times you prove it, you always have to prove it again . . . (As it turned out, the Twins won in five games).³

Some observations on possible irrational behavior in the pig business:

- The decision to hire someone with pig skills from a small farm and then immediately place him or her in a position over a team of people responsible for a multimillion dollar operation. The term “sink or swim” comes to mind and we are just now developing a superior system to attract, train, and develop managers for sow farms.
- The decision to depopulate a sow farm that is located in the middle of a pig dense area that is nearly all PRRSV-positive. While initially this may have been viewed as a positive step towards improved production, until we all understand more about how the virus is transmitted, this may be considered irrational.
- Building boar studs in the middle of a pig dense area—see above.
- Mixing pig sources into a new sow farm. While this is done in order to fill the farm as quickly as possible (in order to lower the start-up expenses), it may be a long term irrational behavior, I know since we have done this. It is the classic “*short term gain that turns into long term pain.*” While it may be successful in isolated cases, it is riddled with the risk of mixing multiple sources of gilts that have different levels of exposure to various pathogens and immune status. That risk may turn into a long-term problem of pathogen transfer to the newly born piglets.
- The persistent human behavior to do something, even if it is wrong. I can cite numerous examples, but will restrict myself to this one: your boar stud breaks with

PRRS and you switch semen sources to a new stud. You later find out that the new semen source does not even test for PRRS virus.

- An example of taking advantage of others' irrational behavior is the current trend of purchasers of sow farms at a discounted rate at the expense of others' behavior. This has and is happening as we speak. Sow farms were built with poor business plans or poor management and now are under financial stress (distress). The new buyers are able to capitalize on the situation by negotiating a steeply discounted price at the expense of the former owners.

There are others, but I think that you get the point. We should be aware of this basic human tendency and learn how to assist our clients in overcoming these behaviors for their own benefit. It is not—and will not—be easy.

Concluding remarks

The game isn't over until it's over—Yogi Berra²
These concluding remarks should be considered as simply my view as a single veterinarian, they should not be considered to be shared by my partners or others in the veterinary community.

- On the records themselves
 - I believe that we have old and outdated methods of collecting and recoding data. Although the PigCHAMP record-keeping system has been sufficient in the reproductive area for many years, there are cracks appearing even there. It never has been adequate in the area of grow-finish records. We are in desperate need of new, updated methods of recording data in the breeding barn and we are still searching for the answer of how to best record and analyze grow-finish data.
 - We are likewise unable to be proactive in our ability to influence growth performance. All the data is retrospective. We need to be able to determine, on a real-time basis, which barns need attention and then make real change in those barns to influence growth in a positive manner. There are promising possibilities on the horizon (ebarns, FAST barns) but it is early in the development and implementation phase.
 - Local vs. global decision-making—others have addressed this topic in previous meetings. We need better understating of the effect of a local decision and how it impacts the overall system of production. Early attempts with process control charts (SPC), constraint management, and other management methods have failed to yield the desired result. We are still searching for a better method.

- Our role as veterinarians: “Number one rule, attend to business”—<http://www.baseball-almanac.com/players/player.php?p=grovele01>²
- We may be wise to consider the following observations about human behavior in regards to psychology and economics from the book *Moneyball*:
 - There is a tendency to generalize wildly from our own experiences.
 - There is always a tendency to be overly influenced by your own most recent experience.
 - There is a bias towards what you have seen with your own eyes, or what you thought you had seen. The mind may play tricks on you when you only rely on what you see, and every trick is an opportunity for someone who can see through the illusion to reality. As there is a lot you do not see when you watch a baseball game, there is a lot you do not see when you walk through a barn.
- We continue to have a unique role in the business of pork production. While that role may be changing, we still remain a source of knowledge that can have the greatest impact on the success or failure of our clients' farms. While we as a profession have ventured into other fields—nutrition, management, records, etc.—our core strength is still health. The health of the herd is the foundation of success moving forward. I agree with others that have voiced concern about venturing too far out of the core knowledge of our training and expertise. There is much to be gained and offered by our profession by making our clients' herds healthy and maintaining that health.
- I believe that this is the future of our role in pig production: To better understand how pathogens move around and eliminate/control those routes of transmission. We can eliminate pathogens from farms with a fairly high rate of success; we cannot, however, maintain that elimination of pathogens over any long-term predictable period of time. That makes our role critical to the long-term success of our clients and our ability to fulfill that role may be our field of dreams and the home run of our profession.

One last parting thought on baseball and pigs. The point is not that baseball has anything to offer us in pig production, “the point is that someone in baseball has seized upon a system of thought to make what is an inherently uncertain judgment—the future value of a baseball player—a little less uncertain.”²⁴ And so it is the system of thought that I hope you have considered, and will continue to consider as you contemplate any application to your business and practice.

I had a friend was a big baseball player, back in high school. He could throw that speedball by you. Make you look like a fool boy—Glory Days by Bruce Springsteen (1984)²

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I have referenced and quoted *Moneyball* throughout the paper; for any omission or error in any direct quotes from the book, my apologies to the author.

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