



## *Numbers Games*

Seventy percent of all essays on number crunching begin with Mark Twain's quote, "There are lies, damn lies, and statistics." Something like 80% of statistics are made up on the spot anyway.

Cuss them if you like, but you need to understand numbers and statistics, because they are essential to measuring and understanding cowherd profitability. Everybody knows what "average" is, but in the language of science it's called the "mean," often explained relative to the mode (most commonly occurring number) and median (middlemost number) in a range of numbers.

Just knowing a mean weaning weight and sale price of your calves isn't saying much these days, but it's a start. Though you can take action aimed at increasing those averages, progress will come at the individual level.

Averages are important benchmarks, made less important without the details behind them. Some architects of commercial beef genetics say you can build the ideal herd using what they call "breed complementarity." The idea is to get your maternal traits from a breed you think excels there, lean muscle from some Continental breed and marbling from an English breed, with heterosis to boot.

The trouble is, individual bulls do not transmit the breed average, and when you need more than one bull, their expected progeny differences (EPDs) will be different. Say

you buy five bulls with an average marbling EPD of +.01. Without knowing the breed average for marbling, we don't know if those five bulls—on average—will perform as intended. And what if they range from -.30 to +.30 marbling EPD? Depending on individual bull aggressiveness, a quarter of your calves may be out of extreme negative or positive outliers for marbling. Dig deeper than breed average, and bull-battery average.

Many producers find it useful to calculate “standard deviations” in addition to means for the economically important traits every year. That way, they can see how uniform their cattle are, statistically speaking.

Standard deviation (SD) is a measure of how individuals relate to the mean. The first SD always contains 68% of the population in question, 34% above and 34% below average. The second SD holds the next 28%, 14% above and below the first SD; and the third SD contains virtually all the rest, including the top 2% and bottom 2% in the population. These are the outliers.

A range of measurements such as marbling EPD or weaning weights can describe any group of cattle through the symmetry of normal distribution. Just like those statistics tests in college, you get a bell curve. There are broad and narrow curves, with the narrow representing greater uniformity.

You may have a mean weaning weight of 500 lb., but if you don't know your standard deviations, that mean doesn't mean much. It's one thing if 100 calves arrive at that average with weights from 450 to 550, and quite another if they weigh from 250 to 750 lb. The “outliers” in the first case are still an acceptable 100 lb. apart, but in the second case there's 500 lb. difference. Imagine how much money you would lose trying to sell that second group on a value based grid with discounts for outliers.

In any trait, you'll always have the extremes that are three standard deviations off your average, but that's no big deal if the total range is small. Progress toward uniformity and profit can be measured by charting ever-narrowing standard deviations.

You can use statistical analysis to guide culling decisions—consider the progress you can make by always selling cows that wean calves three standard deviations below average weight.

In your farm's production and financial records, you'll find many other benchmark averages. A standard deviation isn't always an appropriate tool, but in each case, the average cannot stand alone if you want to improve it. And when you see those statistics that report the average rancher is losing \$50/cow every year, you know you can't stand to be average.

Most people would say a 93% pregnancy rate is pretty good, but consider how much more that information is worth when you know the individuals. Your average cost of keeping a cow may beat the reported state average by \$10, but you'll get more satisfaction and profit by looking at the component costs to see if further progress is possible without sacrificing quality.

In the next edition of *Black Ink*, we'll look at on-farm research. Questions? Call toll-free at 877-241-0717.

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