Beef Session IV

Feedlot

Jay Brown, *Presiding*

Epidemiology—Its Use in Cattle Feeding

Dee Griffin, *D.V.M., MS.*
6204 Lakeview Dr.
Guymon, OK 73942

Cattle feeding is an industry of numbers. Small differences in the numbers that reflect performance, spell differences that may be of major concern. The interpretation is the key. In our industry, inappropriate reaction, either over or under responding, is a major error. The science of statistics offers one tuning mechanism to help us appropriately focus our response to the numbers we evaluate.

Of the several statistical methods useful in commercial feeding operations, regression analysis will be our focus. It offers three important evaluations: 1. The intercept gives us a starting point—"What's the best we have." 2. The slope gives us the ability to predict the future. 3. The R value helps us know how reliable the prediction was—an R value of 0 is not reliable while an R value of 1 is a perfect predictor.

There are a couple of pitfalls. The biggest problem is comparing unlike populations (all 5 oz. green apples to all 5 oz. green oranges). The next biggest problem is comparing unlike situations (the 5 oz. green apples you keep in the icebox with the 5 oz. green apples I keep in the trunk of my car). Let me illustrate: Each feedyard I work with codes incoming cattle as to order buyer, cattle types (English vs. Zebu), geographic origin, shipping origin (salebarn, or preconditioning), and flesh condition. I found as much difference in various feedyards coding as I did in the cattle. One feedyard coded 87% of all incoming cattle as medium fleshed while the second feedyard only coded 55% of all incoming cattle as medium fleshed. The second feedyard has a better record of performance for medium and thin-fleshed cattle than does the first feedyard when performance of medium and thin-fleshed cattle are examined individually. However, when both flesh types are combined before comparing there is no difference between feedyards. This illustrates one of the problems of subjective measurements. I have calculated regressions for morbidity, mortality, average daily gain, and feed efficiency compared to shrink in numerous sets of cattle at several feedyards. When I compared performance vs. shrink of medium and thin-fleshed, 500 to 600 lb. salebarn steers, from Tennessee, I was comparing objective items; each well defined and measurable. My base shrink (b) was 5.2% of body weight. The slope (m) showed a 21% increase in morbidity, a 1.8% increase in death loss, a 0.22 lb. decrease in average daily gain (ADG), and a 0.56 lb. decrease in feed efficiency (FE) for each 1% increase in body weight shrink. The reliability (R) for each value was 0.56 for morbidity, 0.40 for death loss, 0.67 for ADG, and 0.55 for FE. (Table 1)

TABLE 1.

Shrink(s) Effect on Tennessee Cattle (R)

	Least observed Base Shrink(s)	Morbidity slope per 1% S	Mortality slope per 1% S	ADG slope per 1% S	FE slope per 1% S
All Cattle	4.2%	21% (.56)	1.8% (.49)	.22lb(.67)	.56lb(.55)
A	4.0%	25% (.48)	2.4% (.42)	.28lb(.51)	.67lb(.36)
C	4.5%	20% (.52)	1.8% (.47)	.20lb(.52)	.55lb(.40)

If you ask the same questions dividing the population by order buyers A and C you find the base shrink (b) for order buyer A equal to 4.0% and 4.5% for order buyer C. It would appear that order buyer A has less shrink on all his cattle than order buyer C, and if less shrink is better A would therefore be better than C. However, if you do a regression of the cattle purchased by both order buyers, the slope (m) of order buyer A for morbidity equals a 25% increase, mortality equals a 2.4% increase, ADG equals a 0.28 lb. decrease and FE equals a 0.67 lb. decrease for each 1% increase in shrink. The reliability R equals 0.48, 0.42, 0.51, and 0.36 respectively. For order buyer C the slope (m) for morbidity equals a 20% increase, mortality equals a 1.8% increase, ADG decreased by 0.20 lbs. and FE decreased by 0.55 lbs. The reliability (R) equals 0.52, 0.47, 0.52, and 0.40 respectively. (Table 1) Evaluation of the regression data may suggest order buyer C was better than order buyer A (which was not our first impression).

Comparative data from an epidemiological standpoint must be evaluated during a simlar time span. Analysis done

quarterly is certainly better than yearly, (time heals all wounds) but is not as valuable as monthly. To illustrate a third quarter evaluation of choice 650 lb. country steers from Missouri and Arizona was made. No difference was found. (Table 2) However, when the quarter was broken down by month (July, August and September) and evaluated in relationship to the cattle turnover or percent of cattle in the feedyard less than days, the difference in morbidity and mortality is reflected in relationship to the seasonal change in feedyard activity. As feedyard activity increased, the country cattle from the west had more problems than the country cattle from the east. (Morbidity regression of Arizona cattle; m = 11.5%/100 head, R = 0.42 and a mortality regression; m = 1.0, R = 0.51. Missouri cattle morbidity regression; m = 6.8%/100 head, R = 0.47 and a mortality regression; m = 0.4, R = 0.56). (Table 2)

TABLE 2.

Missouri vs Arizona Cattle

	Least observed Base Shrink(s) M — A	Morbidity slope per Base S M — A	Mortality slope per Base S M — A
3rd Quarter	4.2—4.6	10.2— 8.8	.9 —1.1
August	4.4—4.8	6.8—11.5	.4 —1.0
Modified	4.4—4.6	6.2— 8.0	.56— .6

There is a certain amount of common sense in this, country cattle in late summer from Missouri are frequently groups of co-mingling spring cattle grazed all summer. The problems of co-mingling have already occurred, leaving only heat stress following fescue to fight. On the other hand Western cattle usually are virgin in their exposure to pathogens outside their herd. Because they do not typically have problems the first few weeks, observations wane and outbreaks between three and five weeks following cross-fence exposure tend to get out of control.

I looked at the same situation following modification of the receiving program on virgin country cattle from the west. The modification included addition of several vaccines and boostering the appropriate vaccines 10-21 days later. The virgin western cattle had a morbidity m = 8.0%, R = 0.56 and a mortality m = 0.6%, R = 0.56. At the same time the cattle from Missouri without the modification had a morbidity m = 6.2%, R = 0.55 and a mortality m = 0.56, R = 0.42. (Table 2)

I have found other examples similar to this, but it points out the importance of knowing the cattle you are dealing with. It is equally important to know the feedyard personality. I made the same modification at another feedyard and found no difference. At the second feedyard there was much resistance and considerable confusion. The important part of management is to make the most of the people you have. If their resistance to adapt is high, then feed the cattle that do not give them trouble. This is especially true if change comes at a time when people are very busy.

Regressions of morbidity and mortality for the last five years compared to number of new cattle received (in thousands) demonstrates the effect of outpacing employees' ability to take care of cattle. Morbidity base (b) is lowest at 5.2% with 600 head of new cattle per month per penrider. The morbidity slope (m) increases at the rate of 0.4% per 100 head, (R = 0.61). The mortality base (b) is lowest at 0.38% with 600 head of new cattle per month per penrider. The mortality slope (m) increases at the rate of 0.07% per 100 head, (R = 0.52). (Table 3)

TABLE 3.

Effect of New Cattle Received

	Least observed 600 hd/rider	slope / 100 head
Morbidity	5.2 %	0.4 % (.61)
Mortality	0.38%	0.07% (.52)

The bottom line is that as you get busier the death rate increases faster than the morbidity rate. While the same relationship exists, the numerical value of the relationship changes between feedyards. Some feedyards adjust better than others.

To go a step further in evaluating the value of certain sets of cattle between feedyards: identically backgrounded animals, split between three feedyards, were compared using pooled means. The comparison involved morbidity, mortality, ADG, and FE. At the 10% level there was a significantly lower death loss at one of the yards, while at that yard there was a significant difference in ADG and FE as compared to the third yard. (Table 4) The relationship to health and nutrition may well have been involved.

TABLE 4.

	Morbidity	Mortality	ADG	FE
Feedyard 1	8.4%	.38*	3.12*	6.4*
Feedyard 2	7.6%	.78	2.99*	6.8*
Feedyard 3	7.8%	1.01	2.71	7.4

Another situation in which health, nutrition and performance became intertwined involves parasites. Three years ago a set of backgrounded cattle came to one of the yards, with a 25% incidence of resistant ostertagia. The loss of FE was impossible to calculate. The ADG of all affected cattle was 0.78 lbs. less than non-affected cattle and the severely affected cattle had a 1.80 lb. decrease in average daily gain through the first 112 days on feed. Using these gains, an estimated FE should be between 10 and 12 pounds per pound of grain. A 10 lb. FE at todays deflated corn price would have a cost of gain of 75¢ instead of the customary 45¢ cost of gain.

TABLE 5.

	Effect of Parasites		
	Non Affected	Moderately Affected	Severely Affected
ADG	2.92	2.14	1.12 lb.

Liver flukes present another costly problem. In one coding system there are two areas which consistently have ADG and FE 10 to 15% below similar sets of cattle. Packing house inspections consistently reveal one-fourth of the cattle affected with liver flukes. However, the morbidity and mortality index of these cattle is about normal.

I have looked extensively at treatment programs and their effect on production costs. The yards I work feed yearlings 650 to 700 lbs. The yearly morbidity rate will be 10 to 15% depending on cattle type, season of the year, etc. Using the 15% rate, the difference between $10 and $20, a sick animal increases the cost of gain 0.4% per lb. of gain. While substantial, not many people go broke losing $1.50 per head. Overall, using first rate drugs is not that expensive. Expensive treatment programs do not do much good behind poor receiving programs. The first 96 hours of a calf's stay in the feedyard may prove to be the most expensive. Processing costs are standard ($5 to $8), however, small adjustments such as using the best quality products, maintaining equipment, and hiring plenty of quality help can cut one-third of your sickness rate and death loss and will cost you about $2 per head. These adjustments will level the extremes which cost your clients and customers. Sick animals mean loss of pounds of gain that you cannot regain with treatment.

Dr. Dave Hutcheson has shown the gain loss for 28 days following illness on feedlot steers. Dr. Bob Hillier has pointed out that all cattle have value and that money can be made from them all if their actual value is paid. My analysis has shown the value to be different under different situations. The less control one is able to exert on a given situation the less value animals have to you at that time.

I have seen the cost of gain increase a penny per pound of gain for 1% increases in death loss. The cost magnifies however, as the death loss continues to climb. The second 1% may cost 1.6¢ per pound of gain. If management cannot control the second increment of death loss, the cattle must be bought cheaper or a better quality of cattle purchased. I work with one feedyard whose cost per increment of death loss is only 0.8¢ per 1% death loss and increases to only 1.2¢ for the second 1% increment. The highest I have worked with was 1.4¢ for the first 1% death loss and was 2.6¢ for the second. All of these values have been for six weight cattle. The cost increment typically gets cheaper for lighter cattle, however, they typically have a higher death loss and thus more cost increments added. (Table 6)

TABLE 6

	Deathloss on Cost of Gain		
	Poor	Ave.	Good
First 1%	1.4¢	1 ¢	.8¢
Second 1%	2.6¢	1.6¢	1.2¢

As we have seen, the numbers change, it should be obvious that decisions made based on the observations I made during the last few years will not transpose to other feedyards. You've got to know your own game—someone else's does not count. We tend to do best what we do routinely, change our routine and we stumble. Each feedyard has its own personality, with strengths and weaknesses. My observations demonstrate the largest influence on appropriate decisions comes from expertise, experience and familiarity with the situation. Consultants frequently lack the day to day familiarity with a given feedyard. Upper level management often suffers the same problem plus overestimating their expertise, the largest single error made by lower level management. Concentration, cooperation, and communication become key to making the most of cattle feeding. Find them and you'll find your pot of gold at the end of the rainbow.

Questions & Answers:

Question: Do you have to make your own calculations?

Answer: No, the computer automatically does that. All you have to do is just ask for whatever month, two months, since it's done in sequential events . . . in fact, if you put it in sequentially, which is what you do if that's the way it occurs, you ask it to pull up snow storm number one versus snow storm number two and do that for a ten or fifteen day period. Personal computers have become cheap. They are very frustrating to work with, and I would not suggest that there are any good programs that you can work on. But you get a simple program like a 1, 2, 3 and start with your own stuff. They are not very big and you run out of space real fast.

Question: Is there a difference in morbidity related to daily weight gain?

Answer: No, I don't have a way to move my treated, versus non-treated in. The closest that we ever got to doing that was, in fact, what I mentioned awhile ago, the difference in mobidity. If you look at the cost and gain differences between pens of cattle that had nothing get sick versus pens of cattle that had a lot get sick, you more or less approximate that. With the average daily gain and cost of gain for anything past 28 days we've not done. I do know that in 28-day weighings, which is easy because they're kind of floating around next to a scale somewhere, that if the calf gets sick he does not gain for the next 28 days. It may be 30, but we weigh at 28 days. We did that on a lot of calves. And they just didn't gain. Somebody asked me the other day, what do you get out of your chronics and I said a pain! That's true.

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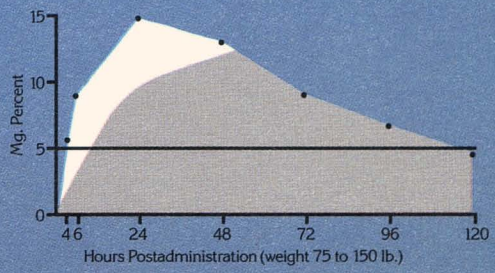

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For bacteria you get nothing but corynebacterium. If you compare within yards it will work. It all has to be done within each feeding organization what his treatment response is. But you're talking about sort of after they get to the barn and before they really leave. It's inadvertent, but I have an order buyer that loves to play that game, because that's called weigh ups. We figured out what weigh up was worth one time, or he did. They got their calves, and inadvertently it cost us money! That is why I went to some extreme to try and find out the data. This was just one set of animals. They got the cattle up, three different areas, and the cattle were all brought up that morning. About 9:00 o'clock they start dickering on the cattle. And the dicker went real good on the first load. And they moved them out and they hit the co-op scales out of town because that's how the deal was going to run, and we weighed at our ranch. At one o'clock in the afternoon he swung deal number two. And then at four o'clock in the afternoon we went deal number three. The difference was near two percent a clip on that one set, just one set. These were scant five cattle, English bred, but it was a two percent clip. We paid on shrink at the co-op. So we were paying a four percent shrink. If we had the cattle in at two we would have made two percent and had healthy cattle had he swung the cattle all morning right there on the farm and made the deal.