December 2007

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Proceedings, The Range Beef Cow Symposium XX
December 11, 12 and 13, 2007 Fort Collins, Colorado

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INTRODUCTION

Evidence based medicine is a balancing act between data and experience (Apley and Thomson, 2003). Decision making with just experience and no data has been termed "wizardry." This would be similar as to saying we used drug A last year and they all died. This year we used drug B and they all lived. Great! Scientists and statisticians need not apply to work in this environment. The friendly drug representative that sells drug B is the expert. Paralyzed indecision is using only data with no experience to make decisions. This is the art of trying to fix problems from a computer print out or database without knowing the directions on how to get to the production unit. This article will use some data integrated with practice experience as tools to explain why our mortality rates in feedyards has increased over the last few years.

DEATH LOSS TRENDS

Loneragan (2004) did a great job of looking at death loss over the last 5 years. Loneragan was able to show how death loss has increased using two databases: 1) USDA NAHMS Sentinel program and 2) Benchmark Performance program (Vetlife). The USDA Sentinel program has shown that from 1994 to 2003 there has been an average increase in overall death loss by 69% (6% per year) and increase in death due to respiratory disease by 119% (9% per year) in all cattle on feed.

The more variables that are accounted for, the less the increase in death loss occurs. The average arrival weight for a pen a cattle is a strong predictor of mortality. Lighter cattle generally have the higher the death loss then the same source of cattle at heavier arrival weights. The Benchmark data showed that cattle that had an arrival weight between 700 and 899 pound have not increased much in death loss from 1998 to 2003. However, the increase in death loss in lighter weight groups (400 to 599 pound) has significantly gone up over the 5 year period. The lighter the weight group the bigger the increase in death loss but not as big as the increase in overall death. This indicates that more light weight cattle are being placed.

Usually, the lighter the cattle, the more days we have to feed them until slaughter. We can feed twice as many 150 day cattle than we can 300 day cattle. This is compounded by the fact that we would expect less than half the death loss in the heavier cattle than the lighter, longer day cattle. So, twice the number with half or quarter the death loss makes more sense why death loss is going up. Loneragan's data sets did not look at geographical region where the calves originated or where the cattle were fed, both which could have changed from year to year.

Another confounder in these types of data bases is the cattle type. A 400 pound calf can come from different geographical regions and have a different physiological status. Northern calves (sale barn or ranch fresh), Southeastern sale barn cattle, Oklahoma/Texas sale barn cattle, Mexican cattle and cattle of dairy origin will all have different expectations at different times of the year at a similar weight regardless of sex.

Record keeping and databases today in the feedyard industry are basically used to make sure you aren't worse than the neighbors. Very rarely, do people use the data correctly to improve their operations. We just want everyone to understand that we are not as bad as the closeouts look because 2.8 million cattle in a database were similar. Who is submitting the data? Who is mining the data? These are two very important questions. It seems that there are feeding corporations and larger facilities that share their data to baseline against the rest of the industry. Therefore, their operations are the baseline and if their buying habits change, it looks like the whole industry is getting worse. This can be seen with Loneragan's data (2003). The overall death loss difference between USDA and Benchmark are as follows: 1998, 1.25 vs. 1.19; 1999, 1.41 vs. 1.35; 2000, 1.60 vs. 1.48; 2001, 1.78 vs. 1.50; 2002, 1.65 vs. 1.38; 2003, 1.75 vs. 1.46; USDA vs. Benchmark, respectively. Granted, these numbers are calculated somewhat differently. However, different yards are probably contributing to different databases.

Another problem with death loss data is that we have yet to define what is normal. Anderson (2003) reported that from 53,101 steers, 46,757 heifers and 8,801 head of mixed cattle the closed out death loss from Jan. 1, 1999 to June 30, 2002 was 1.23, 1.40 and 2.16%, respectively. He also stated that 35.4% of the pens had 0 %, 18.8% had 2 % or greater, 3.8 % had 5% or greater and .6% of the pens had 10% or greater death loss. Ninety percent of my problems in practice came from 10% of the cattle.

Another breach in database information is gonadal status of the animal. Male calves entering the feedyard may be classified steers. This is more common in lighter weight cattle that heavier weight cattle on arrival. Bull calves that are castrated after they arrive experience 140% more respiratory morbidity than their pen mates that were steers that were castrated before arrival (Renfro et al., 2004). Mortality and realizer rates were also significantly higher in bulls relative to steers (140% and 163%; mortality and realizers, respectively). Should bulls be classified differently in our databases?

It is not uncommon to have 20% of the heifers on arrival pregnant. Some of the higher risk cattle will have even higher pregnancy rates. My experience is that 10% of the bred cattle will be further than 120 days gestation. Needless to say, pregnancy in the feedyard is not good for the performance or health of the heifer. Heifer mortality rates have gone up do to the fact that cow slaughter facilities and emergency kill facilities will not take down animals anymore. Therefore fewer animals are railed and more are euthanized. This is probably best for our industry and the cows.

The databases we use today are good for historical data. However, we need to change the way we interpret the data to make decisions. Wheeler describes managing a business by looking at monthly or quarterly reports is like trying to drive a car by looking out the

rearview mirror. Statistical process control and understanding the variation around a mean is very important in understanding what is normal. At Cactus Feeders, we looked a death loss in closed out lots of heifers with an arrival weight between 400 and 499 pounds from one order buying station in the Southeast. We found that the average death loss is around 4 percent. This has not changed from 1999 to 2004. The upper critical control limit around this mean is 10 percent death loss. What this means is that until this type of animal has a death loss above 10 percent, it is not considered an abnormal event. If it is above 10% death loss, then we need to investigate why?

We all remember outliers (3 standard deviations from the mean) in graduate school. When you look at the statistical process control, all we are doing is diagnosing outliers. This could be applied across all types of production parameters for the feedyard. Wheeler states that to change the outcome we must: 1) change the process; 2) distort the process or 3) distort the data.

Death loss data can be confounded with realizer rates. Basically, there are three types of cattle that are railed out of the feedyards: 1) non-performing, clinically normal cattle that are not cleared of antibiotics, 2) non-performing, clinically normal cattle that are cleared of antibiotics and 3) moribund cattle that are railed to decrease the death loss number in the feedyard. In my experience as a practitioner, cattle that treated three times for respiratory disease generally have the following outcomes: 1) 40% finish normally with the pen, 2) 30% are realized and 3) 30% die. The industry needs to start counting realizers and dead cattle in the same category as animals lost out of the production cycle.

CATTLE FLOW

Cattle types and cattle feeder business structure impacts what type of cattle are brought to the feedyard. Smaller Midwest feedyards are trying to hit niche markets. The natural beef feedyards are seeing an increase in death loss because they don't want to but the antibiotics into the animals until it is too late. There will be new preventative medicine strategies as we move to more customized product for tomorrow's consumer.

Custom cattle feeding is a prominent supply of fed cattle. Many custom cattle feeders are very good about preparing their animals or procuring animals that are ready for the finishing phase. The retained ownership type of custom cattle feeder probably has the lowest death loss of all the cattle in the feedyards today. However, there are some custom cattle feeders that are still in the business because they are artists at buying the lowest priced animals, getting them financed above what they paid for them and then blaming the feedyard personnel for letting them die and get a feed credit. However, the feedyard keeps full and the only people that suffer are the ones that have to tend to the cattle everyday. Ironically, they are the ones that get fired and cursed. I sure wish cattle could talk.

Lastly, large feeding companies have been increasing the number of high risk, auction market cattle that they have been feeding. They have to keep head counts up. The

margins on feeding cattle continue to shrink along with the number of cattle that are available to buy. Basically, the market drives the buy. If the feeder calf market drops, the greed meter runs in the red line and we flood the yards with calves. The more high risk cattle we have in the feedyard, the higher risk your low risk cattle become. Therefore, all classes of cattle increase in death loss.

What is the first question that should be asked in the face of a BRD outbreak? We ask, "Is it a morbidity problem or a case fatality rate problem?" A producer had a 1% death last year and this year he is in the middle of a 5% death loss wreck. He wants to change drugs, veterinarians or both. Last year we pulled 10% and this year we pulled 50% of the cattle. Our case fatality rate is 10% for both years. Therefore we can educate the producer that the death loss is increased due to morbidity instead of using the wrong drugs. The drugs worked the same this year as they did last year. Why the increased morbidity? We then need to evaluate source of cattle, viral antigens, weather, people, prior nutrition, transportation, evenness of the cattle, etc. The bottom line is that if we are going to properly analyze death loss, the least we could do is capture the morbidity data.

Cattle don't die directly after treatment for BRD. We would like to think that the cattle dying in the hospitals were treated the last few days. However, Fulton (2003) reported that cattle the average time interval in days between day of first treatment and death (TDI) for all cases was 30 days (Range = 0 to 161 days). The average number of days on feed at time of death (DOD) for all BRD cases was 60 days (Range = 2 -199 days).

These data lead us to a point about why feedyards get in over their head with high risk cattle. We start out each fall with the misconception that we will make management and drug changes that will dramatically decrease death loss in the high risk calves. The first thirty days on feed we are treating the sick cattle. Remember the cattle don't die until 60 days on feed. Until then, we feel as though we have figured out how to stomp out disease and pestilence. The manager then decides that we need to procure more of these cattle until the death loss starts coming. At sixty days on feed the first group of calves is starting to accumulate death loss. By this time the feedyard is saturated with high risk cattle and they are going to die a high rate for 60 to 90 more days. The manager shuts off the buy and everything gets better by about Christmas. In the mean time, we changed drugs about thirty to sixty days into the wreck and the "new" veterinarian rode the epidemiological curve to glory.

DIAGNOSTICS

My father was a bovine practitioner. He said, "It's easier to sell a vaccine for a few thousand dollars, than a diagnosis for a few dollars." How true it is. We do a very poor job of diagnosing death loss in feedyards. Yes, most feedyards necropsy their dead cattle. However, do we really understand the etiology of the respiratory disease by gross pathology alone?

Transitional diseases are diseases that occur or start in one production unit and travel with the calf to the next production unit. Transitional diseases may cause different clinical

symptoms in different physiological status animals. Bovine Viral Diarrhea is one transitional disease that causes abortions at the cow/calf level and can be crippling to the immune status of the feedyard steer.

Bovine viral diarrhea virus (BVD) is an enveloped, single stranded RNA pestivirus. BVD is closely related to Hog cholera in swine and Border disease in sheep. There are two genotypes (Type I and II) and two biotypes (cytopathic and noncytopathic). BVD infections cause abortions in beef cattle during the first four months of gestation. Calves can be born normally but be persistently infected with BVD if they are exposed in utero before the immune system is established in the fetus. If BVD is in the fetus before the immune system is started, the calf simply recognizes BVD virus as self. These calves then shed BVD out of all secretions in their body and have BVD virus in all cells. BVD can also cause congenital defects and has been associated with weak calf syndrome.

Calves persistently infected (PI) with BVD have been shown to increase morbidity in feeder cattle. Grooms et al. (2002) showed that cattle exposed to PI calves while being shipped from Alabama to Michigan had nearly double the pull rates relative to cattle not exposed to PI calves during the long haul. Loneragan et al. (2005) showed that the prevalence of PI cattle at time of arrival in a commercial feedyard is .30%. They found that the prevalence of PI cattle is 2.6 and 2.5% in chronically ill and dead feedyard cattle. The presence of one PI calf in a pen of cattle increased the morbidity due to respiratory disease by 43%. This increase in pull rates was seen in the pen that housed the PI calf, but also in the pens adjacent to the PI calf's pen. BVD virus is only one example of a disease that goes undetected in feedyard mortalities and morbidities. We are conducting studies today to examine the effects of Corona virus, Leptospirosis, Anaplasmosis, Johne's and numerous other subclinical, yet immunosuppressive diseases.

Iatrogenic diseases are diseases that are manmade. Maybe the diseases or clinical syndromes aren't manmade, but the environment in which we put the animals in creates a problem. Salmonella is a disease that comes to mind. Hancock et al (REF) found that numerous cattle in an 18,000 head feeding facility were being diagnosed with Salmonella species. Firstly, the only cattle on the feedyard being diagnosed with Salmonella had spent time in the hospital. Secondly, there was a strong correlation with the prevalence of Salmonella isolation and duration spent in the hospital. They found that removing cattle promptly after they were recovered and proper sanitation decreased the prevalence of Salmonella in this feedyard to nearly zero. Again, when we overwhelm the system, hospital crews wind up processing sick cattle instead of getting proper a diagnosis and administering the proper treatments.

FEEDYARD STAFFING

Today it is becoming harder and harder to find people who are not only willing but also able to work with cattle. Agriculture in general, which includes the feedyard industry, is losing people to higher or similar paying jobs with better hours and working conditions. Less and less young people are working with animals as they grow up. Therefore, we find it harder to hire quality labor to ride pens, doctor cattle and process cattle.

Brink and Thoren (2001) conducted a study to determine if feedyard staffing had an impact on death loss in 700 to 800 pound steers. Their results were staggering. They found that 81% of the variation in death loss across all firms was explained by the number of pen riders, processors and doctors per 10,000 head. The high death loss/low employee firms had roughly half as many pen riders, processors and doctors per 10,000 head as did the low death loss/high employee firms (2.0 to 2.4 vs. 4.0 to 4.5, respectively). The death loss for the difference between these yards was double (1.0 % vs. .50%; high death loss/low employee firms vs. low death loss/high employee firms, respectively).

How should pen riding be evaluated? In the past we had numerous people that could ride pens and understand morbidity in feedyard cattle. Today it is difficult to hire and retain the services of quality cattle people. So, do we evaluate them on death loss, pen death loss, case fatality rates of pulls, time of day that they are getting done, number of cattle ridden, risk status of population that they are riding? Sometimes it is all of the above.

Swingle and Thomson (2003) graded lung scores at slaughter of 1690 head of South Dakota origin calves. We scored lungs by the following criteria:

None – no visible lesions
Moderate – scars, fibrin tags, consolidation, etc.
Severe – part of lung missing due to severe adhesions

Twenty six percent of the cattle on the trial were pulled for treatment of respiratory disease. Of these cattle pulled for respiratory disease, 62% of the cattle had lung lesions. A little under half (57%) of the cattle with lung lesions had severe lung lesions. Remember 74% of the cattle in the study were never pulled for respiratory disease. Of these, 43% of the cattle had lung lesions and a third of these cattle had severe lung lesions. Eighty seven head of cattle that never had lung lesions were treated. Today, it is easy to spend as much as $16 treating a 600 lb. calf for respiratory disease. Basically, $1,400 was spent on antimicrobials in cattle that never had respiratory disease. Conversely, 527 head of cattle that had lung lesions were never treated. Of those, 172 head of cattle had severe lung lesions. What else do lung lesions cost the cattle feeder? Cattle with severe lung lesions were 53 lb. lighter than cattle with no lung lesions at the time of slaughter. Their carcasses were 34 lb. lighter relative to cattle with no lung lesions. How much money would be left on the table today?

ANIMAL WELFARE

The beef industry has done a great job of addressing animal welfare. The beef industry wants to identify things that are cheap and easy to fix. The industry has decided that we are animal welfare experts if we don't use electric prods. Phillips (1988) shares the definition of animal welfare as it pertains to animals. He describes welfare as the ability of the animal to cope with its external and internal environment. As we pass from good to bad welfare for cattle, we go from equilibrium to physiological imbalance to injury and

disease to death. Death is the biggest breach in animal welfare. This makes way too much sense. We may have 10% death loss but we don't use hot shots.

Therefore, the industry should be starting with what reduces death loss. The big ticket items should be addressed first. Cattle need to be properly prepared for transition through the marketing channels. We need to adjust the marketing channels to decrease the amount of abuse and death loss in cattle. Preventative medicine and preconditioning are animal welfare. Transitional diseases must be eradicated out of the cow herds.

Animal welfare and auditing programs will occur in the swine and poultry industries because they are used to corporate documentation and they are vertically integrated. Feedyards will undergo auditing because you can hit 50,000 head of cattle in a 2 hour audit. Try figuring out how we will audit the cow/calf operations that all the feedyard cattle came from. If it isn't easy to audit, it won't get audited. Sale barns, order buyer stations and trucking lines should all be audited down the road. The problem won't be the audits, the problem will be enforcement.

SUMMARY

The cattle feeding industry is at a crossroads. Feeding high risk cattle is exactly opposite of the efficiencies we have improved upon in the feedyard. The decrease in a quality labor force flies in the face of having sick, high risk cattle in our facilities. It is now that we have to change the way we buy and sell cattle to match the efficiencies and deficiencies we have created at the yard level. We can't have our cake and eat it too.

Our databases are incomplete. We have placed almost every production parameter we can think of on a yard sheet. The animal health section of a yard sheet usually has: head in hospital, percent dead, percent realized and medicine costs. We need to track morbidity and the timing of the events. Individual animal identification will be the start of disease eradication at the cow herd level. It will also bring important changes to the way we buy and sell cattle. As far as death loss goes, there are many animal health products on the market. But, I don't know one of them that has a mortality claim. How could they? What we do everyday impacts the health of the cattle in the feedyard. Good animal husbandry doesn't come in a bottle. Our consumers of beef are depending on us to bring them a quality product.

LITERATURE CITED

Anderson, P. 2002. Death loss in feedlot cattle: What is normal? Vetlife, Tech Talks. URL:http://www.vetlife.com/support/techtalks/web/index.html

Apley, M. and J.U. Thomson. 2003. Evidence based medicine. Proceedings of the Academy of Veterinary Consultants. Vol. XXXI. No. 1

Brink, T. and M. Thoren. 2001. Unpublished data.

Grooms, D. 2002.

Fulton, R. 2003. Respiratory disease in cattle: Isolation of infectious agents and lesions in fatal feedlot cases. Proceedings of the Academy of Veterinary Consultants. Vol. XXXI. No. 3. p. 57.

Hancock, D.D. 1999. Case Study: Salmonella outbreak in the feedyard. Summer

Phillips, Clive. 2002.Cattle Behaviour & Welfare. 2nd Ed. Blackwell Science Ltd. Oxford, UK.

Loneragan, G.H. 2004. Feedlot mortalities: Epidemiology, Trends, Classification. Proceedings Academy of Veterinary Consultants. Vol. XXXII. No. 2. p. 34.

Loneragan, G.H., D.U. Thomson, D.L. Montgomery, G.L. Mason and R.L. Larson. 2005. Prevalance, outcome, and health consequences associated with persistent infection with bovine viral diarrhea virus in feedlot cattle. JAVMA. Vol. 226, No. 4. p. 595.

Renfro, D.C., R.S. Swingle, D.U. Thomson and M. Branine. 2004. Effects of castration On arrival on male bovine health and performance in the commercial feedyard. Plains Nutrition Council. San Antonio, TX. April 16, 2004.

Swingle, R.S. and D.U. Thomson, 2003. Unpublished data.

Wheeler, D. J. 1999. Understanding Variation: The Key to Managing Chaos (2nd Edition). Chicago – SPC press.