Using experimental and observational data to design, implement, execute, and maintain a herd health program for feedlots

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Abstract

Everyone in the beef cattle industry has access to the same antimicrobials and vaccines. Unfortunately, not all in the industry have access to the same data on products and vaccines available for use, making it difficult to make objective decisions.

Key words: feedlot, feedyard, herd health, BRD

Résumé

Au sein de l'industrie du bœuf de boucherie, tous ont accès aux mêmes antibiotiques et aux mêmes vaccins. Hélas, tous n'ont pas accès aux mêmes données concernant les produits et les vaccins qui sont disponibles, ce qui rend la prise de décision objective difficile.

Background Discussion

The major difference between an average and excellent beef cattle operation is the management team and personnel that execute the designed health program. Essentially, there are no secrets in the beef cattle business as it relates to herd health programs.

Morbidity drives mortality. If we treat 100 animals and get an acceptable response, we can expect 5 to 10% to die. In pivotal studies, the pure case fatality rate is normally 3 to 5% when studying bovine respiratory disease (BRD). It is a rare drug that will move the numbers more than 1 percentage point. It is critical to use management instead of medicine to reduce morbidity and mortality. If you could keep a mammal alive with antimicrobials, people would not die of AIDS. Therefore, we must do everything possible to enhance the immune system of each individual animal.

Antimicrobial resistance to BRD pathogens is increasing. The idea that we can select an antimicrobial that will solve our BRD problems is prehistoric thinking. Lubbers et al[3] demonstrated the increased resistance of *Mannheimia haemolytica* to various antimicrobial as depicted in Figures 1 and 2.

Our practice conducted a study with Dr. Brian Lubbers, which is reported in Figure 2. This study was conducted using southeastern cattle, and it demonstrated panresistance to multiple antimicrobials.

We must develop management practices that reduce stress in order to reduce morbidity and mortality. Classic work conducted by Griebel et al documents the importance of stress in the disease process. As indicated in Figures 3, 4, and 5, mortality was 2X to 5X higher when the only variable was increased stress.

There are indications diets high in starch create acidosis, resulting in suppression of the immune system. Donovan et al demonstrated diets that induce acidosis decrease blood pH, which had an effect on memory of T cells.[1]

High levels of protein in the diet may increase morbidity. A literature review by Galyean et al showed that protein levels of 12%, 14%, 16%, and 18% increase morbidity to 38%, 50%, 45%, and 68%, respectively.[2]

Some vaccines may increase morbidity and/or mortality. A study we conducted in lightweight Holsteins using 2 different brands of *Mannheimia haemolytica-Pasteurella multocida* bacterin-toxoid increased mortality 2 to 3X compared to the negative controls, as shown in Table 1.

The increased use of so-called autogenous vaccines in the feedlot industry is very puzzling. The definition of an autogenous vaccine is "A vaccine prepared from cultures obtained from a specific lesion of the patient and used to immunize him against further spread and progress of the same organism". With this definition of an autogenous vaccine, how can we justify autogenous bacterial vaccines in a feedlot setting? Is it logical to culture 1 lung isolate from a calf from Alabama, prepare a vaccine and inject it into a group of calves that arrive from Texas several weeks later? I have not seen the results of any controlled studies to support or refute the use of autogenous vaccines. It appears there are 2 EBM's; supposedly EBM stands for Evidenced Based Medicine. Is it possible EBM stands for Economic Based Medicine as it relates to autogenous vaccines?

Endotoxin levels vary between *Mannheimia haemolytica* vaccines. Using Associates of Cape Cod as a laboratory, we have demonstrated endotoxin levels from 20,000 EU/ml to 40,000 EU/ml in commercially available *Mannheimia haemolytica* vaccines. These vaccines are

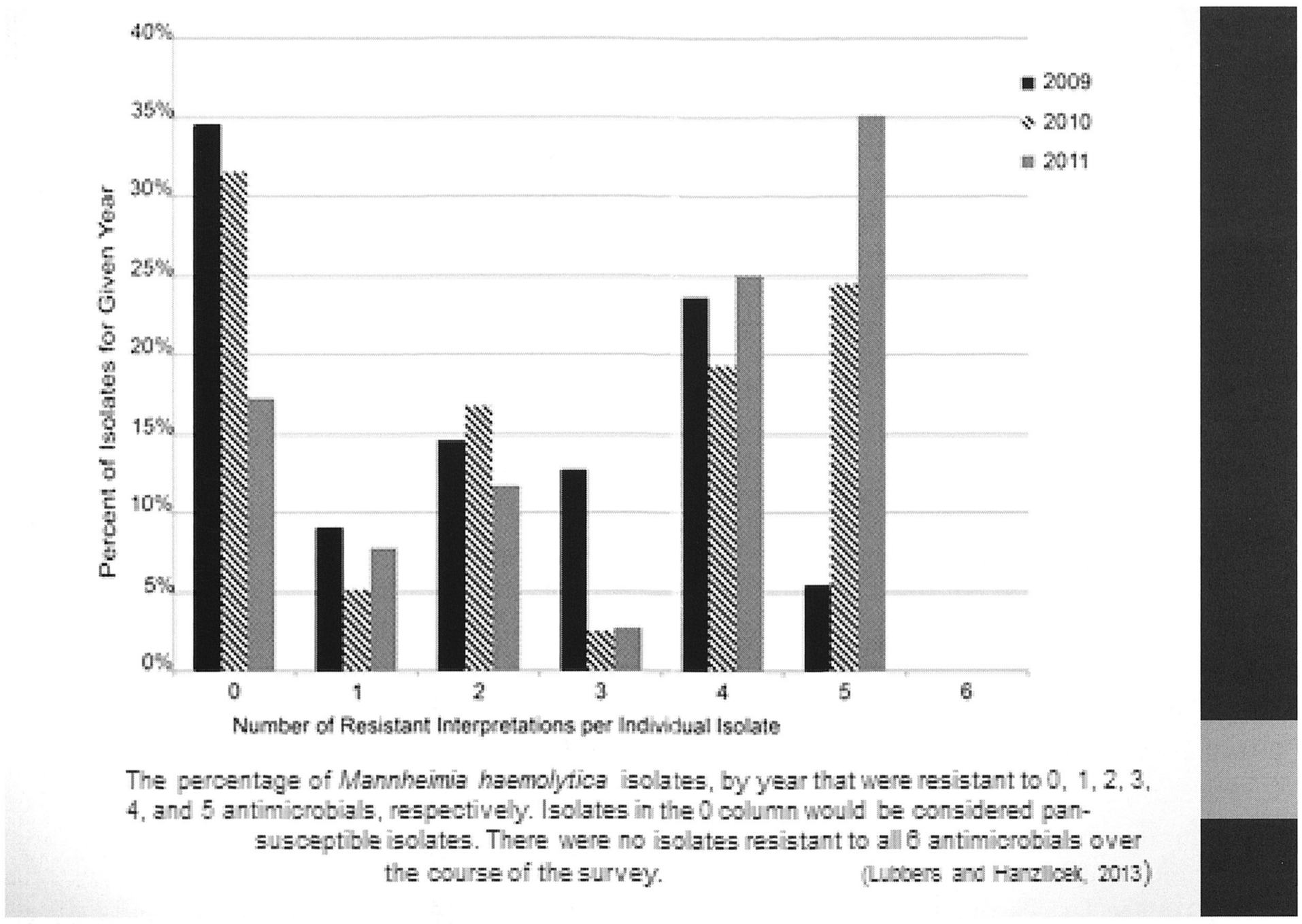

Figure 1. Antibiotic resistance

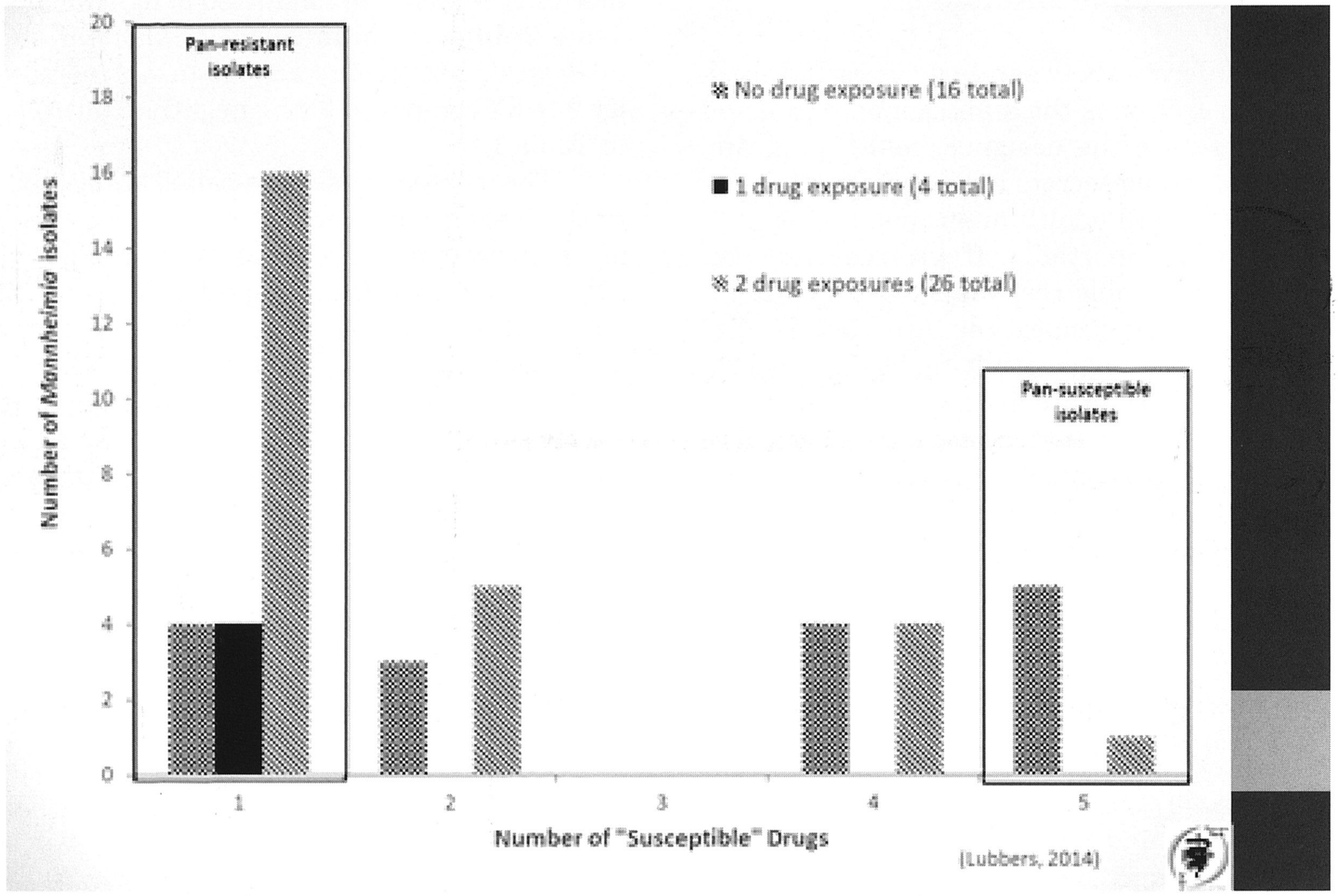

Figure 2. *Mannheimia haemolytica* antimicrobial susceptibility by treatment classification.

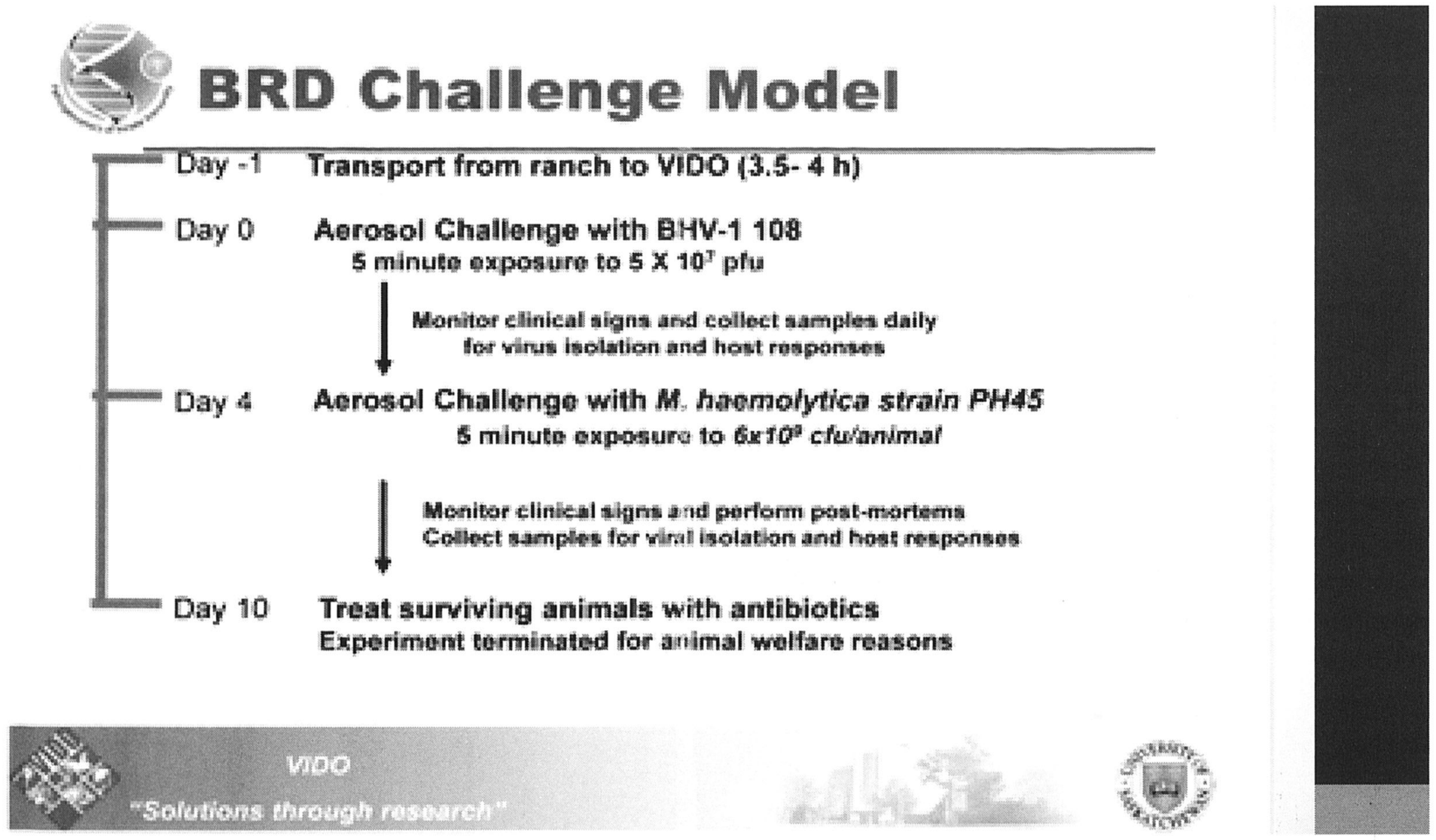

Figure 3.

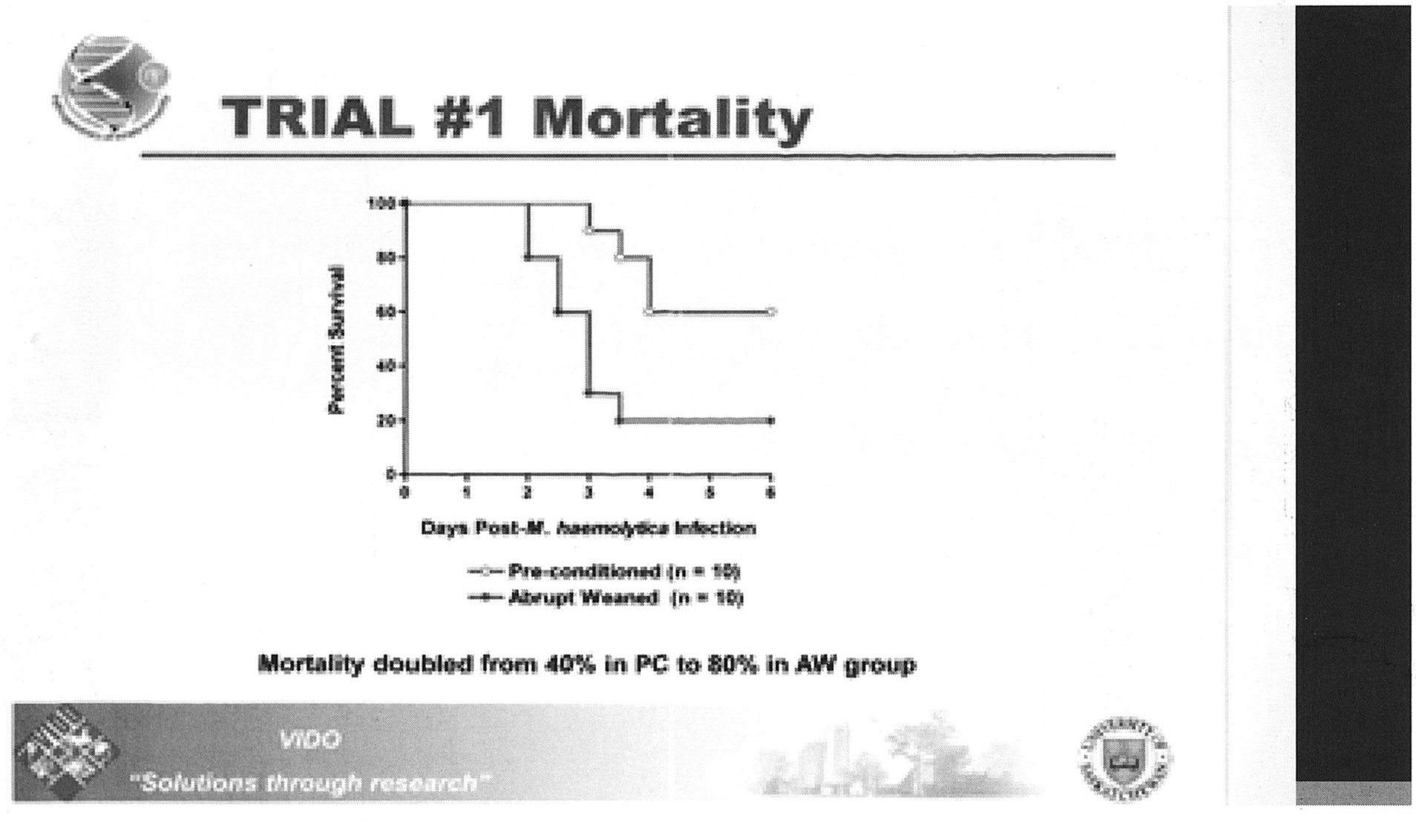

Figure 4.

supposedly somewhat purified. One would wonder what the level of endotoxins would be in autogenous vaccines.

Designing and Executing the Program

Management practices we encourage our clients to use in order to reduce stress are:

1. Feed a low starch or no starch starter ration for the first 25 to 30 days-on-feed to high-risk cattle. Distillers grain (wet and dry) meet this criteria.
2. Pen high-risk cattle so that each individual can access the bunk at the same time for the first 25 to 30 days-on-feed. This requires approximately 18" (46 cm) of bunk space per head. Combining

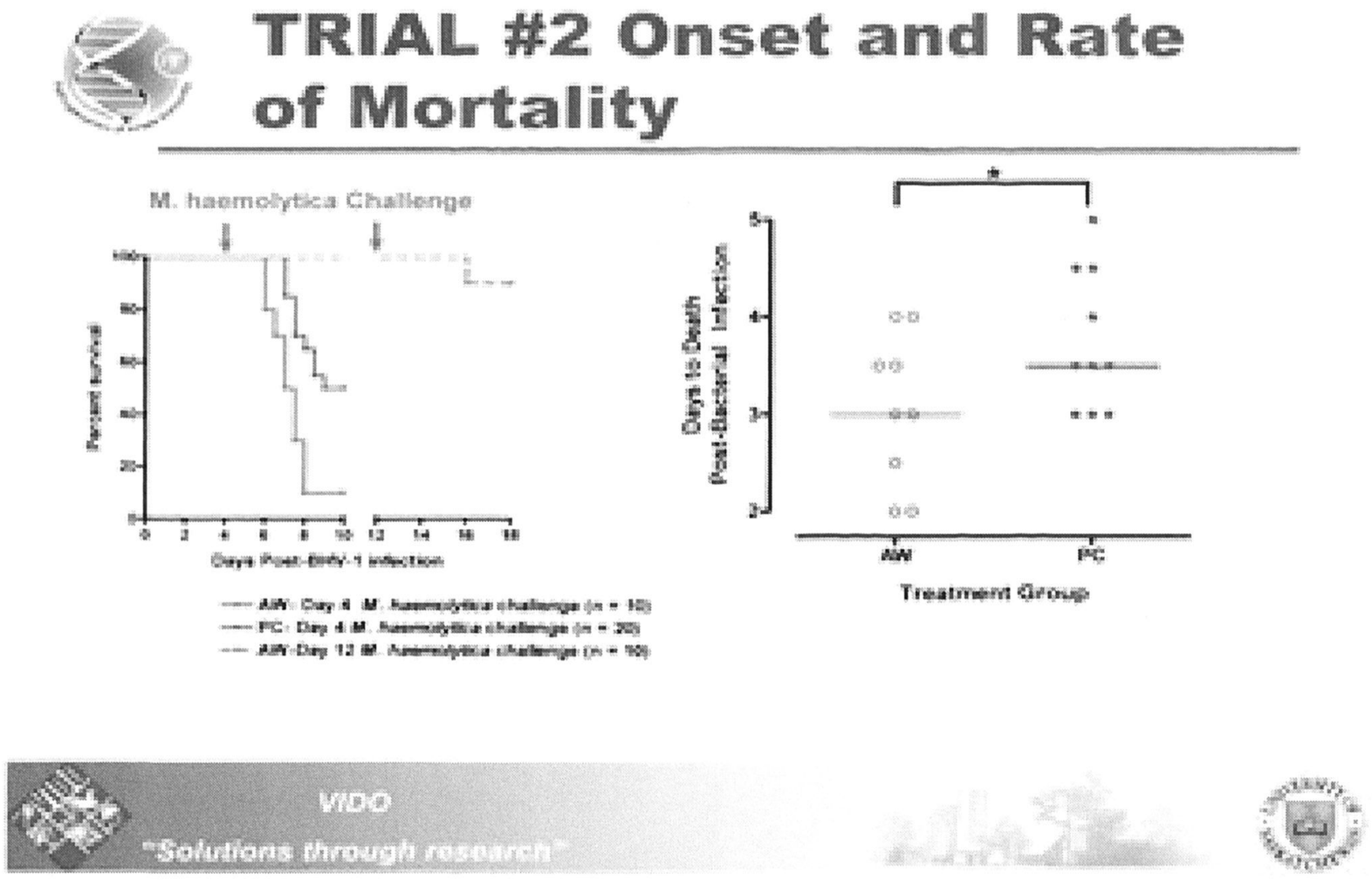

Figure 5.

Table 1. Comparison of negative control vs *M. haemolytica/P. multocida* commercial brands

Rep	Negative Control			Brand A			Brand B		
	# Head	% Pulls	% Dead	# Head	% Pulls	% Dead	# Head	% Pulls	% Dead
1	196	53	1.5	197	50	4.1	197	60	6.1
2	222	36	1.8	223	31	2.7	223	43	5.4
3	206	54	1.5	204	50	3.4	204	55	3.9

adequate bunk space with restricted intake for the first 25 to 30 days prevents aggressive calves from overeating and provides timid calves access to the bunk.

3. Provide excessive bedding ground for high-risk cattle for the first 25 to 30 days on feed. Bedding cattle so they have 300 to 400 square feet (27.9 to 37.2 sq meters) per head appears to be beneficial. Normally, if we allow for adequate bunk space we will have adequate bedding ground.
4. Bedding pens of high-risk cattle with material such as straw or cornstalks reduces stress. If you will study cattle habits, newly received cattle will practically lay on top of each other around a hay rack or bale of hay in the pen. Cattle arriving at the feedlot are not accustomed to lying on bare ground, be it wet or dry. Prior to arrival they would lay on some type of vegetation. We have found bedding cattle also reduces walking and bawling.

Conclusions

Programs that emphasize management over medicine will be the ones that stand the test of time. We will not win the battle by attempting to select another antimicrobial. As an industry, we will be forced by consumers and legislation to use fewer and fewer antimicrobials in the production of wholesome beef. We need to skate to where the puck is going to be.

References

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