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Abstract

This study had three primary objectives: 1) to determine if there is an annual and/or seasonal trend in percentage of death loss in Kansas feedlots; 2) to examine the difference in death loss between steers and heifers; and 3) to evaluate if "in" weight has had an effect on percentage of death loss in Kansas feedlots. The annual trend in death loss for both steers and heifers was found to be significant and positive, indicating that death loss has been increasing over the sample period. Seasonal increases in death loss were significant for early-spring closeouts for both steers and heifers. The annual trend in the difference between the death loss for steers and heifers, though not significant, was negative. There were, however, certain closeout months in which there were significant differences in the death loss of steers relative to heifers. Placement weight had a significant negative impact on death loss in heifer finishing, but no significant impact on steer finishing. Our regression analysis indicates that death loss has been increasing over the sample period, that certain closeout months tend to impact steer and heifer death loss differently, and that placement weight in heifers has had a significant impact on percentage of death loss in cattle.

Keywords

Cattlemen's Day, 2006; Kansas Agricultural Experiment Station contribution; no. 06-205-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 959; Beef; Death loss; Feedlots

EXAMINING DEATH LOSS IN KANSAS FEEDLOTS

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Summary

This study had three primary objectives: 1) to determine if there is an annual and/or seasonal trend in percentage of death loss in Kansas feedlots; 2) to examine the difference in death loss between steers and heifers; and 3) to evaluate if "in" weight has had an effect on percentage of death loss in Kansas feedlots. The annual trend in death loss for both steers and heifers was found to be significant and positive, indicating that death loss has been increasing over the sample period. Seasonal increases in death loss were significant for early-spring closeouts for both steers and heifers. The annual trend in the difference between the death loss for steers and heifers, though not significant, was negative. There were, however, certain closeout months in which there were significant differences in the death loss of steers relative to heifers. Placement weight had a significant negative impact on death loss in heifer finishing, but no significant impact on steer finishing. Our regression analysis indicates that death loss has been increasing over the sample period, that certain closeout months tend to impact steer and heifer death loss differently, and that placement weight in heifers has had a significant impact on percentage of death loss in cattle.

Introduction

Percentage of death loss has a direct impact on the pounds of saleable product, and therefore on feed conversions, average daily gains, and cost of gain when calculated on a weight-in to weight-out basis. Therefore, on the surface it would seem that there would be an incentive to minimize death loss, and that, with changing technology, we could observe a decrease in death loss over time. After all, animal health products have improved significantly, from preventive medicine to treatments, over the past 10 years. Other costs associated with mortality have increased over time as well, with more emphasis on handling of animals, and increased costs associated with dead animal removal from the facility. Improvements in other performance measures may more than offset the cost of increased death loss, however, when pushing feeding performance to the limit. In this study we examined death loss for a sample of feedlots in Kansas. We wanted to determine if death loss had been increasing or decreasing over the past decade, if there were seasonal trends in death loss, and if there were differences between steers and heifers.

Procedures

Data for this study were obtained from Kansas State University, Department of Animal Sciences, *Focus on Feedlot* report that is published monthly, dating back to the early 1980s. For the purpose of this study, the 1992 to 2004 time frame was used. 1992 is the first year that the report included percentage of death loss, which is crucial data for our study.

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Over the study time period, the survey was based on a consistent sample of approximately eight feedlots from the cattle feeding region of Kansas. All numbers are reported at closeout, and include number of cattle, final weight, average days on feed, average daily gain, dry matter feed conversion, percentage of death loss, average cost per cwt of gain, projected cost of gain for replacement cattle, corn price, and alfalfa price. The reported figures are the mean of individual feedlot monthly averages. Corn and hay prices are the current inventory prices. The actual survey is conducted with each individual feedlot over the telephone. It is important to note that cause of death is not reported in the survey. The purpose of this study is to simply examine aggregate patterns in death loss over time. Cause of death is obviously an important issue, and would be a natural extension of this study for future research.

The analysis for this study was performed by estimating two generalized least squares regressions. The first regression model simply specified the natural log of the reported percentage of death loss (LnDL) as a function of a series of seasonal and time-period dummy variables (February, March, etc.), a monthly time trend (Trend), and the weight of the cattle when entering the feedlot (Placement weight).

The first regression model was applied to the data sets for both steers and heifers. From this regression analysis, three questions can be investigated. First, is the annual trend in percentage of death loss increasing? Second, is there a seasonal trend in percentage of death loss? Third, does placement weight have a significant impact on death loss in Kansas feedlots? The base month for the monthly dummy variable was January, which cannot be included in the regressions for statistical reasons. The interpretation of the results is then relative to January closeouts. In addition, an extra time period (Nev) was included as a seasonal dummy variable. This dummy variable represented the time period of January 1993 to June 1993, when there were abnormal weather conditions and many of the performance variables were more than two standard deviations from the mean. Previous studies have "dummied out" this same time period when examining feedlot performance.

The second regression model was formulated by subtracting the heifer death loss data for each observation (month) from the steer death loss data (LnSDL – LnHDL), and regressing it against the trend variable (Trend), along with the seasonal and time-period performance dummy variables (February, March, etc.). This model allowed us to determine if there has been a significant difference in death loss over time between steers and heifers.

Both models were corrected for significant autocorrelation by using the Cochrane-Orcutt method, thus dictating the need for the generalized least squares estimation technique.

Results and Discussion

Table 1 summarizes the results for steers. The coefficient for the trend variable is positive and significant, which means that death loss has been increasing since the start of the sample period. Each additional year results in a 0.0467% increase in death loss on average, holding all else constant (calculated by multiplying the coefficient, 0.0036, by the mean of the death loss data, 1.08, then multiplying this number by 12 months). Because the model is in log-linear form, the coefficient must be multiplied by the mean to obtain an elasticity measure. The placement weight coefficient is negative, but not significant for steers. Thus, placement weight does not significantly affect percentage of death loss in the feedlots examined. When interpreted as an elasticity, a 1% increase in placement weight is expected to result in only a 0.0096% decrease in death loss, holding all else constant. Again, this result is not significant. The results of this model suggest that there is a seasonal component to death loss in steer finishing. In addition to the model results, this seasonality can easily be observed by examining Figure 1, which displays percentage of death loss on a monthly basis. Compared with the base month of January, there are months that are statistically different. Closeout months in early fall have a lower percentage of death loss than January, whereas closeout months in early spring such as April and May have a higher percentage of death loss.

Table 2 summarizes the results for percentage of death loss in heifers. The coefficient for the trend variable is positive and significant. As with the steers, this means that death loss has been on the rise since the beginning of the sample period. Each additional year results in a 0.0672% increase in death loss on average, holding all else constant. The placement weight results for heifers are a much different story than for steers. Here, placement weight is again negative, but in this case is highly significant. A 1% increase in placement weight is expected to result in a 0.050% decrease in death loss, holding all else constant. When feeding heifers, feedlots must be concerned with placement weight because it has a significant impact on how many of those heifers the feedlot is expected to lose. Heifers also demonstrate some seasonality in percentage of death loss. Although heifers do not exhibit the same seasonality in the early-fall closeout months, they do tend to have increased death loss in late-spring closeout months. Another interesting result is that the dummy variable Nev, which represents that unusual weather pattern in 1993, had a positive significant impact on death loss for heifer finishing, which means that death loss during this period was greater than the average January. This effect was not significant for steer finishing.

Table 3 summarizes the comparison of steers and heifers (the difference model) regarding death loss. The main variable of interest in this regression is the trend variable. Results indicate that there is not a significant trend over time in the difference between steer and heifer death loss. The coefficient is negative, so the difference in percentage of death loss has been shrinking over time, but not significantly. Monthly dummy variables were also included. All of the dummy variables are negative, indicating that the other months (and the early 1993 time period) have a smaller difference between steer and heifer death loss than the average January closeout period.

This study illustrates that there has been a significant increase in feedlot death loss since January 1992, which is counter to preconceived notions, given improved technologies in the cattle feeding industry. This is an important finding that warrants additional research, in that we did not attempt to identify any causes of the increase in death loss over time. Several possible explanations come to mind. Perhaps feedlot cattle are being "pushed" harder now than in previous years, resulting in increased death loss. Perhaps there has been some slippage in the ability to identify and manage sick cattle. Perhaps the industry as a whole is better at keeping cattle alive in the pre-feedlot phases, resulting in higher death loss in the feedlot. We defer to future research to explore potential causes of the apparent increase in feedlot death loss over time. In addition to the trend result, we find that placement weight has a significant impact on death loss when feeding heifers, indicating that feedlot operators may need to be more cognizant of placement weight when making heifer placement decisions. There were seasonal trends in both models. The steers and heifers both had a seasonal trend in death loss (an increase) that revealed itself in spring closeouts, and steers displayed a seasonal decrease in death loss in early-fall closeouts.

Table 1. Estimated log-linear results for percentage of death loss in steers

Independent Variable	Coefficient	Standard Error	P-statistic	Elasticity
Constant	5.6938	6.2279	0.36	
Time (Month)[1]	0.0036	0.0011	<0.01	0.0467
Placement weight, lb	-0.8924	0.9351	0.34	-0.0096
February[2]	-0.1119	0.0770	0.15	
March	0.1249	0.1001	0.21	
April	0.2982	0.1316	0.02	
May	0.2768	0.1383	0.05	
June	0.1420	0.1282	0.27	
July	-0.0635	0.1182	0.59	
August	-0.2203	0.1145	0.05	
September	-0.3502	0.1162	<0.01	
October	-0.3156	0.1084	<0.01	
November	-0.3338	0.0999	<0.01	
December	-0.1286	0.0812	0.11	
Nev	0.0731	0.1908	0.70	
RHO	0.6042	0.0640	<0.01	

[1]Time (month) = Monthly trend, with 1 representing the first month of the data sample. Placement weight = Placement weight of cattle when entering the feedlot (lb). February through December = monthly dummy variables. Nev = dummy variable for the time period January 1993 through June 1993. RHO = Coefficient that is used to correct for autocorrelation.
[2]The "January" dummy variable cannot be included directly in the model for statistical purposes (perfect multicollinearity). Therefore, all results are interpreted relative to the base seasonal period, January closeouts.

Table 2. Estimated log-linear results for percentage of death loss in heifers

Independent Variable	Coefficient	Standard Error	P-statistic	Elasticity
Constant	28.2681	4.7715	<0.01	
Time (month)[1]	0.0049	0.0005	<0.01	0.0672
Placement weight, lb	-4.3916	0.7271	<0.01	-0.0500
February[2]	0.1468	0.0844	0.08	
March	0.2140	0.0963	0.03	
April	0.1696	0.1148	0.14	
May	0.2721	0.1153	0.02	
June	0.2256	0.1099	0.04	
July	0.1307	0.1015	0.20	
August	0.1117	0.0950	0.24	
September	0.0127	0.0935	0.89	
October	-0.0583	0.0935	0.53	
November	-0.0102	0.0916	0.91	
December	-0.0538	0.0852	0.53	
Nev	0.5661	0.1357	<0.01	
RHO	0.2116	0.0785	0.01	

[1]Time (month) = Monthly trend, with 1 representing the first month of the data sample. Placement weight = Placement weight of cattle when entering the feedlot (lb). February through December = monthly dummy variables. Nev = dummy variable for the time period of January 1993 through June 1993. RHO = Coefficient that is used to correct for autocorrelation.
[2]The "January" dummy variable cannot be included directly in the model for statistical purposes (perfect multicollinearity). Therefore, all results are interpreted relative to the base seasonal period, January closeouts.

Table 3. Estimated log-linear results for percentage of death loss (data for steers minus heifers)

Independent Variable	Coefficient	Standard Error	P-statistic
Constant	0.2629	0.0986	0.01
Time (month)[1]	-0.0006	0.0006	0.37
February[2]	-0.2797	0.1013	0.01
March	-0.2163	0.1118	0.05
April	-0.1906	0.1139	0.09
May	-0.3164	0.1144	0.01
June	-0.3516	0.1143	<0.01
July	-0.3889	0.1123	<0.01
August	-0.4271	0.1123	<0.01
September	-0.3618	0.1122	<0.01
October	-0.3116	0.1119	0.01
November	-0.3371	0.1100	<0.01
December	-0.1956	0.1008	0.05
Nev	-0.4253	0.1601	0.01
RHO	0.2108	0.0785	0.01

[1]Time (month) = Monthly trend with 1 representing the first month of the data sample. February through December = monthly dummy variables. Nev = dummy variable for the time period of January 1993 through June 1993. RHO = Coefficient that is used to correct for autocorrelation.
[2]The "January" dummy variable cannot be included directly in the model for statistical purposes (perfect multicollinearity). Therefore, all results are interpreted relative to the base seasonal period, January closeouts.

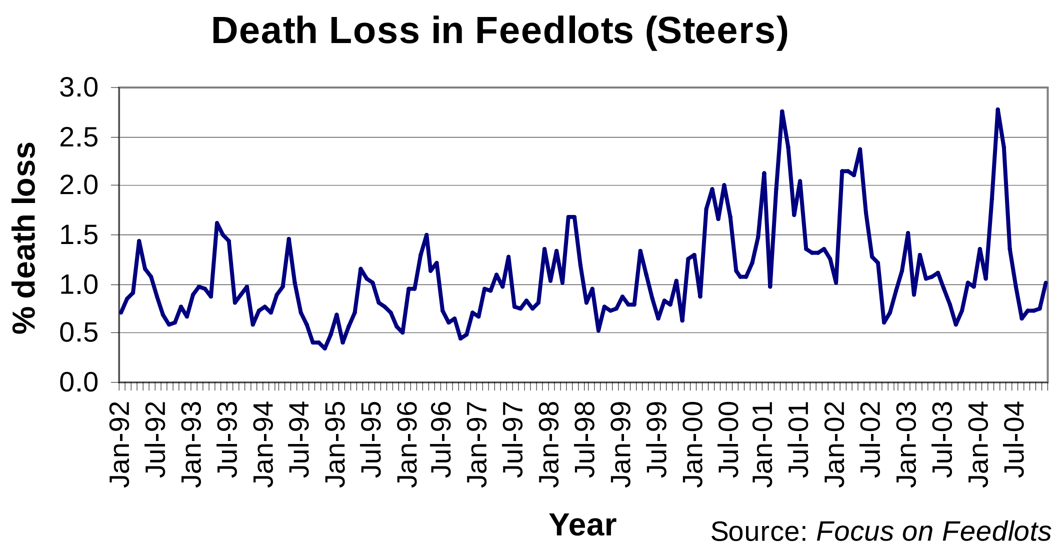

Table 1. Percentage of death loss in steers.

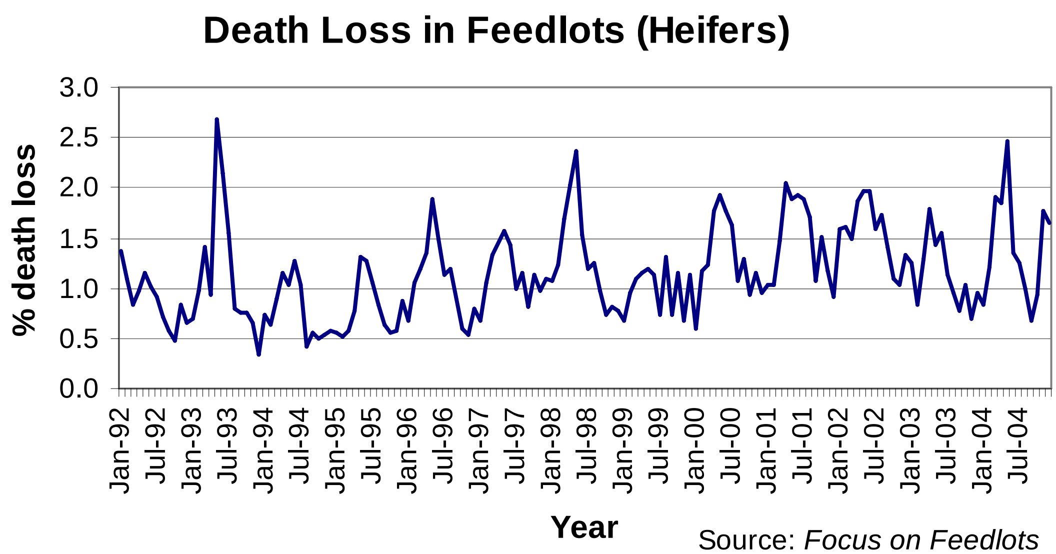

Table 2. Percentage of death loss in heifers.