

Heat Stress In Feedlot Cattle: Producer Survey Results

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Summary

The weather on July 11 and 12, 1995 was a deadly combination of high temperature, high relative humidity, no cloud cover and no wind. The combination of heat and humidity has been matched only five times in Iowa's 101 years of weather records. Estimated cattle death loss in a 13-county area of West Central Iowa was 3,750 head or 2.32% of the cattle on feed. A survey of 36 beef producers with 9,830 head of cattle on feed in 81 lots was summarized. Thirty-five lots with shade (24 square feet per head) reported an average death loss of .2% as compared to 46 lots without shade with losses of 4.8%. Producers reported a disproportionately higher death loss in dark-hided cattle. Non-shaded lots facing south, southwest, or west had higher death loss than lots facing east or southeast. Heavier animals were more susceptible to heat stress. Lots containing heifers that were fed MGA had lower death loss (3.8% vs. 6.2%) as compared to lots with heifers but not receiving MGA.

Introduction

Thirteen west-central Iowa counties experienced high temperatures, high humidity, and no wind on July 11 and 12, 1995, resulting in an estimated loss of 3,750 head of cattle. The 13-county area marketed 323,300 head of grain-fed cattle in 1994. Veterinarians, renderers, producers, and extension staff estimated that 2.32% of cattle on feed died; direct losses were estimated at \$2.8 million and production losses at \$28 million. Weather conditions July 11, 1995 were high temperature of 104° F, 50% relative humidity, no cloud cover, and no wind from 3 p.m. until noon on July 12, 1995. Predicted weather conditions were highs in the low 90s and 10- to 15-mph winds. This combination of heat and humidity has been matched only five times in 101 years of Iowa weather history: in July 26 and 27, 1894, August, 17, 1913, August, 6, 1918, and August 3, 1930. Wind and cloud cover records were not available for those dates. Southern states with consistently higher summer temperatures also have reported incidents of high death loss. In 1983, Oklahoma State University conducted a heat-stress trial at Brookover Feedlot,

Garden City, Kansas. Weather conditions one afternoon were 98° F, 23% relative humidity, and 2 mph winds. The use of water sprinklers resulted in no death loss, but 10 out of 100 head of non-sprinkled cattle died. Sprinklers were placed in all pens. Results from their trial indicated no difference in performance due to animal density or coat color.

Materials and Methods

The survey was mailed by 9 of the 13 county extension offices to 321 beef producers. Thirty-six producers responded to the survey with data on 81 lots of cattle, 9,830 head on feed, including 7,445 steers and 2,385 heifers. Average death loss per lot was 2.82%, which was slightly above the 2.32% death loss estimated for the 13-county area. Survey data were sorted by responses to the survey and percent death loss within the lot.

Results and Discussion

Twenty-seven, or one-third, of the 81 lots had death loss of 2.5% or greater. Forty-one of the lots had no death loss (Table 1). Shade area for the high-death-loss one-third was .9 square feet per head as compared to the 19.4 square feet per head for the lots with no death loss. Midwest Plan Service recommendations for shade are 20 square feet per head.

Table 1. Heat stress survey results sorted based on % death loss by lot.

Item	2.5% death loss or greater	No death loss
No. of lots	27	41
No. of cattle	3,974	4,134
% of heifers	32%	16%
Lot area, sq ft/head	612	407
Shade area, sq ft/head	.9	19.4
% death loss	7.8%	0.0%

Table 2 shows a comparison of the 35 lots with shade and the 46 lots with no shade. In lots with shade, 24 square feet per head averaged .2% death loss as compared to 4.8% death loss for the cattle in lots with no shade. Eighty-six percent of the lots with shade reported no death loss, whereas only 19% of the non-

shaded lots had no death loss. Producers with the non-shaded lots reported highest death loss in dark-hided cattle. Thirty out of 36 producers indicated higher death loss in black cattle and the other six producers indicated higher death loss with red cattle and had no black cattle on feed. One producer indicated only 20% of the cattle in the pen were black, but 80% of the death loss was black cattle. No differences were reported between calves and yearlings.

Cattle fed in non-shaded lots sloping to the south or southwest/west had higher death loss (Table 3). All 11 south-facing lots lost cattle, and the lots had the highest percentage of heifers. The southwest- and west-facing lots had the highest average death loss of 6.8%, but 29% of the lots lost no cattle. The 21 east- and southeast-facing lots had the least death loss, 2.7%.

Heavier animals were more susceptible to heat stress, (Table 4). Non-shaded lots of cattle weighing from 1,075 to 1,180 pounds had a higher death loss (5.9% vs. 3.4%) than the lighter cattle weighing from 800 to 1,050 pounds. In the lighter-weight cattle, the death loss was 3.4%; only 25% of the lots had no death loss. Twenty of the 46 non-shaded lots had heifers (Table 5). Half of the lots were fed MGA. Animal weights and percent of heifers in the lot were similar. Death loss was lower in the lots receiving MGA--3.8% compared to 6.2%--and the percentage of lots reporting no death loss was four times greater for the MGA-fed lots.

Table 2. Comparison of lots of cattle with and without shade.

Item	Shade	No shade
No. of lots	35	46
No. of cattle	3,940	5,890
% of heifers	8%	35%
Lot area, sq ft/head	349	568
Shade area, sq ft/head	24.0	0.0
% death loss	.2%	4.8%
% of lots with no death loss	86%	19%

Table 3. Comparison of 46 non-shaded lots based on direction of slope.

Item	East/SE	South	SW/West
No. of lots	21	11	14
No. of cattle	2,822	1,261	1,807
% of heifers	24%	73%	26%
Est. live weight, lb	1,126	1,136	1,030
Lot area, sq ft/head	602	451	623
% Death loss	2.7%	6.3%	6.8%
% of lots with no death loss	29%	0%	29%

In response to the question "What emergency measures were effective?" 89% (25 out of 28) producers indicated spraying with water was the most effective treatment. Methods included fire trucks, water tanks with oscillating sprinklers attached, or running water on the ground for cattle to stand in. Cattle that were highly heat-stressed required water sprinkling later when temperatures were above 90° F. Most producers reported abnormal behavior of animals starting at noon on July 11. Feed intakes dropped according to the amount of heat stress the lot of cattle sustained; highly stressed cattle never resumed dry-matter intake prior to the hot weather.

Data indicate the following factors had no impact on death loss: implants, percent concentrate of the ration, percent crude protein of the ration, percent slope of the lot, number of head in the lot, or the percent of concrete in the lot.

Implications

How much can a feedlot operator spend to protect against a weather event that has occurred only six times in the last 101 years? Shade reduced death loss and improved feed intake and daily gain. Producers indicated spraying with water was the best emergency treatment. Darker-hided, heavier cattle should be finished in lots with shade or lots sloping to the east or southeast. Feeding MGA reduced death loss in lots containing heifers.

Table 4. Comparison of 46 non-shaded lots based on average weight of the cattle.

Item	800 to 1,050 lb	1,075 to 1,180 lb	1,200 to 1,250 lb
No. of lots	16	18	12
No. of cattle	1,626	2,851	1,413
Est. live weight, lb	983	1,121	1,222
% Death loss	3.4%	5.9%	5.0%
% of lots with no death loss	25%	22%	17%

Table 5. Comparison of heifer lots with and without MGA being fed.

Item	MGA	No MGA
No. of lots	10	10
No. of cattle	1,437	1,294
% of heifers	73%	76%
Est. live weight, lb	1,053	1,098
% Death loss	3.8%	6.2%
% of lots with no death loss	40%	10%