

Effect of Animal Density, Coat Color And Heat Stress on Performance Of Feedlot Steers

S.C. Arp¹, F.N. Owens²,
S.L. Armbruster³ and Doug Schmidt⁴

Story in Brief

The influence of confinement density and coat color on performance were measured in cooperation with a feedlot at Garden City, Kansas using 978 steers. One group of 454 cattle averaging 777 lb were sorted by color (red or black) and randomly allocated to four drylot pens (> 70 ft²/animal) and four confinement pens (21 ft²/animal). A second group of 524 cattle of mixed color and breed (primarily English breeding) averaging 877 lb were randomly allotted to 6 pens, with a density of 21 ft²/animal in four pens and an animal density of 26 ft² in two pens. Initially, two of the four 21 square foot pens were to be sprinkled, but following four days after initiation of the trial, all groups of cattle in confinement were sprinkled to avoid further death losses. Animal density had no significant effect on daily gain, dressing percentage or the percentage of animals grading choice. But gain was 36 percent greater (P < .01) for cattle on drylot than in the confinement unit during the hottest months and 39 percent greater (P < .05) during the cooler weather. There was no significant effect of coat color on performance or dressing percentage.

Introduction

A recent innovation in cattle production has been the advent of confinement feeding of cattle. In this study, a noncovered "tear drop" floor system was studied. Tear drop shaped crevices between slats of the concrete floor are constantly or intermittently flushed with recycled water. Wintertime performance may favor cattle in the confinement facility. However, summertime gains of cattle in dense pens (< 21 ft²/animal) have been considerably less than cattle in neighboring dirt drylot pens. With the assumption that the differences may be due to greater heat stress of the cattle in confinement, we examined the problem from three angles. One approach was to test the effect of coat color on performance. Secondly we altered cattle density within confinement pens. The third comparison of interest was the effect of intermittent sprinkling on performance of steers in confinement pens. Air and black bulb temperature and relative humidity were monitored, and performance of groups divided by density and coat color were measured.

¹Graduate Assistant, Animal Science. ²Professor, Animal Science. ³Nutrition Consultant, Stillwater.
⁴Manager, Brookover Feedlot, Garden City, Kansas.

Materials and Methods

One group of 454 English bred steers averaging 777 lb were sorted by color (red or black) and randomly allocated to either drylot or confinement pens with duplicate pens of each color. Confinement pens had a density of 21 ft²/animal with 100 red steers/pen and 50 black steers/pen. The open lot pens had a density of greater than 70 ft²/animal with 40 red steers/pen and 37 black steers/pen. A second group of 524 steers of mixed color (red, black, and white) averaging 877 lb were randomly allotted to three replicated treatments. One group was intended to be nonsprinkled with a density of 26 ft²/animal. A second group was intended to be nonsprinkled with an animal density of 21 ft². The third group was sprinkled with an animal density of 21 ft². Four days after initiation of treatments, ten animals on the nonsprinkled treatment died from heat stress. Nine of these ten animals had black hair color. Subsequently, all cattle were sprinkled to avoid death loss. Sprinklers were thermostatically controlled and operated for five minutes every half hour when the ambient temperature was above 80°F. Average daily gain was monitored in two phases. The first phase was from the beginning of the trial, July 18, 1982, until September 10. This was the hottest part of the summer. The second phase lasted from September 10 until the end of the trial on October 21 to determine if the confined animals would make compensatory gains. Dressing percent and the percentage of animals grading choice were calculated from final full pen weights minus 5 percent and information supplied by the meat packing plant.

Table 1. Comparison of performance and slaughter data of confinement cattle.

Item	Treatment	
	21 ft ² /animal	26 ft ² /animal
Early daily gain, lb	2.73	2.54
Late daily gain, lb	1.22	1.32
Overall daily gain, lb	2.12	1.97
Dressing percent	64.7	64.3

Table 2. Performance and carcass measurements across floor type and coat color.

Item	Treatment			
	Drylot black	Confinement black	Drylot red	Confinement red
Steers	74	100	80	200
Pens	2	2	2	2
Daily gain (7/18-9/10)	4.16 ^a	3.13 ^b	4.15 ^a	2.99 ^b
Daily gain (9/10-10/21)	2.21 ^c	1.53 ^d	2.54 ^c	1.88 ^d
Overall daily gain (7/18-10/21)	3.24 ^a	2.35 ^b	3.39 ^a	2.45 ^b
Dressing percent	64.8	63.5	61.7	63.5

^{ab}Means in a row with different superscripts differ ($P < .01$).

^{cd}Means in a row with different superscripts differ ($P < .05$).

Results and Discussion

Four days after initiation of the trial, ten animals died on the nonsprinkled treatment. Other feed yards near Garden City also lost cattle that afternoon. The temperature on the fatal day was highest at 6 pm (98 F) with a relative humidity of 23 percent, not markedly different from earlier days. Wind speed measured at Garden City was very low, averaging 2 miles per hour on this day. Death losses in this study indicate that sprinkling reduces heat stress since no cattle on the sprinkled treatments were lost.

Within the confinement unit, animal density had no significant effect on daily gain or dressing percent. No foot and leg problems were noted in any pens, although ease of movement was reduced by concrete floors.

During the hottest part of the summer, gain was 36 percent greater ($P < .01$) for cattle on drylot than in confinement and during slightly cooler weather, gain favored cattle on the dirt feedlot pens by 39 percent ($P < .05$). No compensatory gain during cooler weather was apparent. Reduced feed intake is probably responsible for the lower performance of confined steers and is being analyzed presently. Coat color had no significant effect on performance or dressing percentage although possibly the performance of red colored cattle was depressed more by confinement than performance of black cattle.

Introduction

Death losses due to heat stress of feeder steers is a continuing problem in the Southern Great Plains. Heat stress is generally considered to be a problem of high temperature and humidity. Normal respiration rates for cattle are between 20 to 30 breaths per minute. Steers many of the cattle which succumb to heat stress in non-sprinkled, non-shaded feedlots are black in color. The purpose of this study was to evaluate relationships among coat color, body surface temperature and respiration rate.

Materials and Methods

Steers were allotted to treatments as described in "Effect of Density, Coat Color and Heat Stress on Performance of Feeder Steers," reported elsewhere in this publication. In addition, a group of Holstein steers in a confinement lot with no shade were used to evaluate the relationship of respiration rate and body surface temperature when a slight trend to assess the influence of breed type and treatment combination. Simultaneous measurements of respiration