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Fact Sheet-00-22

Can Shade Structures Reduce the Amount of time Cattle Spend in Riparian Areas?

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Introduction

In the spring of 1996 a project was initiated to determine if shade structures could reduce the amount of time cattle spent in riparian areas. Research by McIlvain & Shoop (1970) indicated that providing shade during the summer could change cattle use areas. This is important as the amount of time cattle spend in a riparian area is an important factor in determining riparian health (Marlow ET.AL 1991) and Meyers 1989). In fact, a recent evaluation of effective cattle management techniques in riparian zones concluded the following: "What operators do to encourage livestock not to loiter in the riparian zone while they are in a pasture is more important than either season of use or length of time in the pasture per se." (Montana BLM 1997).

The most common way to accomplish this is to provide off stream water. However in much of Nevada that is difficult due to lack of available water, land ownership patterns, and excessive costs of providing the water.

The purpose of this study was to determine if providing off stream shade could reduce the time cattle spent in the riparian areas.

The project was located on Antelope Creek, approximately 40 miles north and east of Battle Mountain Nevada. Antelope Creek is located in the foothills of the Santa Renia mountains and flows through rolling hills covered by big sagebrush and various bunchgrasses. No trees grow nearby with the

exception of willow clumps, which occur sporadically next to the creek. No other shade is available in the area.

The summertime climate of the area can be characterized as hot and dry. Daytime highs routinely reach 100 degrees F. and precipitation is rare. However, during 1997 and 1998 the temperatures were cooler than normal and precipitation levels were higher.

Methods

Eight shade structures were constructed of 16, 6"x 6" x 16' pressure treated posts buried 4 feet deep. The posts were planted parallel on 10' centers 16.5' apart. A horticultural grade, black shade cloth providing 95% shade was suspended between the posts using 1/4" wire cables. The resulting shade structure was 50' long by 16.5 feet wide. The shade cloth was suspended 12' above the ground.

The structures were spread over 4 miles of Antelope creek and located on both sides of the waterway. They were constructed above the creek bed at locations near trails cattle used to access the creek. They were placed on level ground, which was cleared of all sagebrush during construction.

Cattle use of each structure was determined by monthly counts of cattle within the project area during the afternoon and classifying their locations.

The locations were classified as; 1) under or immediately adjacent to the shade structures, 2) in the riparian zone or 3) in the uplands surrounding the creek. Total sightings were tallied after the cattle left the allotment each year and the location of the sightings expressed as a percentage of the total cattle count.

Information was collected on utilization levels of grass and willows at the end of the grazing season. This information was collected at locations adjacent to the shade structures and in areas away from any shade. Photographs and stubble heights of the grasses were also collected at the same time.

Several physical characteristics of the creek were measured over the course of the project. These characteristics included; 1) riparian vegetation, 2) stream morphology, and 3) water quality and temperature. These data were collected at 3 permanent sampling locations within the project area. The sampling locations included an enclosure, which prevented all cattle grazing during the course of the study.

In addition, the Nevada Department of Wildlife (NDOW), resurveyed portions of Antelope creek using a General Aquatic Wildlife System (GAWS) Level III survey during the last year of the study. The first survey of Antelope creek was completed in 1990.

RESULTS

The 1996 grazing season began in late September when the cattle entered the Antelope creek area. They remained in the area until November. The 1996 season was moderately dry and Antelope creek began to dry up in midsummer. Creek flow became intermittent at that time and water was unavailable near some shade structures.

The monthly counts of cattle and determination of their locations indicated that the cattle spent the most time in the riparian areas. During the 1996-grazing season 70% of the cattle were located in the riparian areas when sighted. A little less than a third of the cattle (27%) were sighted in or under the shade structures and only 3% were located in the uplands during 1996.

The 1997 season was different in that it was cooler with more rainfall during the spring and early summer. Rain showers were frequent during the season. Water was available near the shade structures all year. The cattle entered the area in mid-May and remained until November.

Due to the wet conditions few cattle used the riparian areas or shade structures until mid-summer. During 1997 50% of the cattle sightings were in the riparian areas. Upland use by cattle increased to 32% of the sightings recorded, while shade structure use fell to 18% of sightings.

The 1998 season was again cooler and more wet than normal for the study area. Water was available at all locations throughout the year. The cattle entered the area during late June and remained until November. Cattle use did not shift from the uplands to the riparian areas until mid-July. The riparian areas remained the preferred location until the weather began to cool in the fall.

During 1998 cattle use of the riparian areas increased to 61% of total sightings. Use of the loafing areas was 21% of the sightings, and the upland sightings were 18% of the cattle.

The three-year average cattle counts were approximately 60% riparian area, 22% shade structure counts and 18% upland use. Uplands were used primarily during the cooler months of spring and fall.

High temperatures were common during the summer months along Antelope Creek. Temperatures in the shade were recorded as high as 105 degrees F. during the 1997 and 1998 seasons. Cattle were often observed lying in direct sunlight immediately adjacent to an unoccupied shade structure during the hottest part of the day. The color of the cattle had no apparent effect on use of the shade structures. Animal age was also not a factor. Use of the shade structures appeared to be random in nature.

Utilization levels varied slightly during the 3 years that data was collected. The variations appeared to be related to climatic conditions, the date cattle entered the area, and the accessibility of the riparian area next to the shade structures. Normal livestock distribution also played a role.

The data showed no measurable differences in utilization levels or stubble height due to the presence of the shade structures. In fact, utilization levels of willows appeared to have been slightly higher near shade structures.

Antelope Creek changed dramatically in some locations over the course of the study. The wet years of 1997 and 1998 resulted in active stream bank cutting and downstream deposits along the study area.

This resulted in Antelope Creek moving and changing width in several locations. The creek became narrower at 1 monitoring location and slightly wider at the other 2 locations.

The amount of riparian vegetation also changed during the study. The riparian vegetation communities generally increased in width along both sides of Antelope creek regardless of changes that occurred in the stream bank. It increased in width at 10 monitoring transects, decreased at 4 and remained the same at 1 transect. In almost all instances the changes affected the adjacent upland vegetation types more than the semi-wet communities.

Willow populations decreased in 2 monitoring locations and increased in 1. The changes were due to willow clumps being lost when the stream bank undercut where they were growing.

The changes that occurred did not appear to be related to the presence or absence of the shade structures. The stream is very active at all locations and the riparian vegetation is increasing as well.

The information on water quality collected indicates little to no change occurred during the study. Total phosphorous concentrations were high, while total nitrogen levels were low.

Other chemical constituents measured were generally within accepted standards.

The GAWS survey completed by NDOW indicated generally improved conditions due to better livestock management and increased precipitation since the last survey. No benefit could be attributed to the shade structures.

Conclusions

Existing literature indicates that cattle will use shade structures enough to change pasture utilization levels. The current study did not support that finding. Although cattle did use the structures, the use was apparently not high enough to reduce riparian vegetation utilization levels. Likewise, no positive benefits to the physical or chemical components of Antelope Creek were recorded due to the use of the shade structures.

The authors assume that the Antelope Creek area does not get hot enough for a long enough time period to force cattle into using the shades for long periods. The majority of cattle used the shades during the

hottest portion of the afternoon that lasted only 2-3 hours. They were also observed lying in the direct sunlight adjacent to the shade structures, while the structures sat empty.

Considering the cost of construction (\$1158.27/structure), the maintenance required, and the lack of direct benefit they cannot be recommended at this time for the cooler portions of the state. Further studies may be useful in the southern portion of Nevada to determine their effectiveness in warmer climates.

The entire final report of the project and the NDOW report are available in the Churchill County Extension office. It can also be obtained from other Extension offices in the state. It discusses the study in further detail including tables and charts, which represent the actual, measured data obtained during the study.

Further References

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