

Off-Site Water – How does it influence cattle performance, pasture distribution, and water quality?

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Introduction

Water is the most important nutrient for livestock production but it is often neglected. I don't want to trivialize the need for the other five nutrients (carbohydrates, protein, fats, minerals, and vitamins); however, a deficiency of water will cause stress, sickness and death much faster than a deficiency of any other nutrient. This is because water is such a large component of the body. It makes up approximately 60 to 70% of the total weight of the animal. Table 1 provides a list of approximate water requirements for cattle, sheep, and horses. In this article I will discuss some issues relating to the interaction of water availability and cattle. Specifically, the issues that I will address are: 1) the influence of water quality on performance; 2) the influence of off-site water on grazing behavior and pasture distribution; 3) the ability of off-site water to improve water quality and decrease use of riparian areas; and 4) the economics of off-stream water developments.

Table 1. Approximate water requirements^a in gallons per day for different classes of livestock.

| Animal | Requirement | Range of Consumption |
|-----------------|-------------|----------------------|
| Dairy cow | 20 | 15-25 |
| Beef cow (pair) | 15 | 12-20 |
| Yearling cattle | 10 | 6-14 |
| Bull | 12 | 7-20 |
| Horse | 10 | 8-14 |
| Sheep | 2 | 2-3 |

^aThese values are meant as a guide only. Water intake and requirements are influenced by a number of variables including temperature, dry matter intake, stage and type of production, etc.

Cattle Performance

Water is an important nutrient for rangeland livestock production and is often provided directly from ponds or dugouts. This can result in poor water quality through fecal and urine contamination.

A series of studies by Agriculture and Agri-Food Canada evaluated three types of water sources for water quality and animal performance. The sources were direct access by cattle to pond water, access to pond water that was pumped to a trough with no direct access to the pond by cattle, and water pumped from a well, spring, or river to a trough.

Initial data reported in 1996 suggested that pumping water from a dugout to a trough increased performance of cows, calves, and steers (Figure 1). Briefly, pumping water from a dugout to a trough increased average daily gain by approximately 0.5 pounds. In a later study, cow performance was not affected by water source; however, weight gain of yearlings and calves was increased by approximately 20% with non-pond water. When comparing the clean and dirty pond water, there was about a 5% increase in yearling and calf weight gain with the clean water. The increased performance was attributed to greater water consumption and forage intake because cattle avoided water that was contaminated with as little as one-half of 1% fresh manure by weight. Also, cattle with access to fresh water spent more time grazing and less time resting than cows offered both types of pond water.

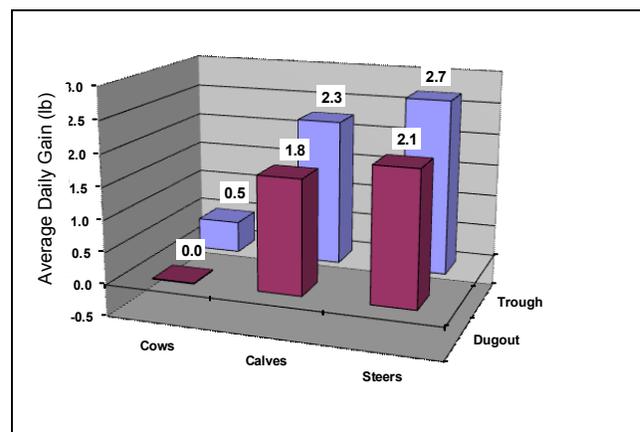


Figure 1. Average daily gain. Dugout versus trough water

Grazing Behavior and Pasture Utilization

Cattle are attracted to riparian areas and often use them at disproportionately higher rates than adjacent uplands. To address this issue, the Eastern Oregon Agricultural Research Center in Union conducted a study to determine if off-stream water, pumped from a stream to adjacent uplands, could alter cattle distribution, performance, and grazing behavior. Marni Porath, working with Tim DelCurto and Pat Momont, found that off-stream water resulted in increased weight gain by cows and calves compared to those with access to the stream only. In addition, cow/calf pairs with access to off-stream water troughs spent less time in riparian areas and grazed a greater distance from streams, especially during the heat of the day (Figure 2), compared with cattle without off-stream water. Similarly, in a case-study conducted on Sawtooth Creek in Harney County, Dave Chamberlain and Mark Doverspike compared a solar powered, off-stream watering system with watering directly from the creek. Having a source of clean water 50 to 100 feet from the stream diverted cow use from riparian areas to uplands as long as good forage was available on the uplands.

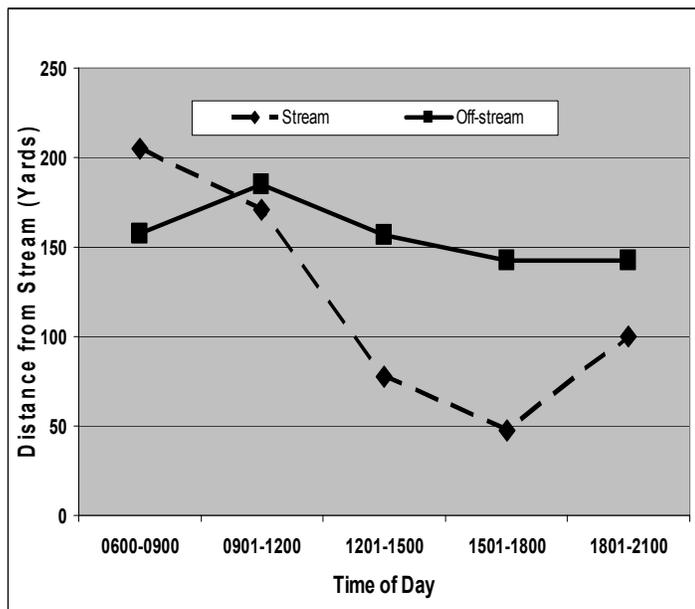


Figure 2. Average distance of cows from stream as influenced by time of day and stream or off-stream water – observed grazing period was middle to late July.

Water Quality and Riparian Ecosystems

Riparian zones account for only about 2% of the land in Eastern Oregon but they tend to receive a disproportionate amount of use by grazing livestock and wildlife. Consequently, recent concerns about water quality and wildlife and fisheries habitat have focused attention on livestock management practices in these areas. A few years ago a study was conducted on Bear Creek in Central Oregon during the winter feeding period. It compared off-stream watering in a trough with watering directly from the creek. Results showed that use of a trough, off-stream, was more than 99% effective in attracting cows away from the stream during periods of the day when thirst was the driving behavioral force. Also, the trough reduced the time cattle spent in the stream by 90% and, thereby, reduced fecal and urine pollution of the stream. In addition, a comprehensive study in Virginia looked at off-stream watering sources on stream bank stability and water quality. The researchers noted that, when given the choice, cattle preferred water from a trough 92% of time compared with the time spent drinking from a stream. More importantly, stream bank erosion was reduced by almost 80%, while fecal coliform and streptococci were reduced by 51 and 77%, respectively. Off-stream watering can be effective in improving water quality and maintaining a properly functioning riparian zone by reducing the time cattle spend in or near a stream.

Economics of Off-Stream Water

Off-stream water sources can improve cattle performance, grazing distribution and pasture utilization, water quality, and help maintain proper functioning riparian zones. The next logical question is - what is the economic return of providing off-stream water. Economists and animal scientists from Oregon State University and the University of Idaho used available data and plugged it into a bio-economic model based on an average 300 cow/calf operation that relies on both public and private lands. The result was an increase in annual net return ranging from \$4,500 to \$11,000, depending on the position in the cattle cycle and amount of annual precipitation. Therefore, regardless of crop year precipitation and market prices, use of off-stream water should yield a positive net return for ranches dealing with riparian grazing concerns. However, before deciding to implement an off-stream water program you need to ask yourself a few questions. These include: 1) what percent of the pasture is unused because of poor grazing distribution; 2) what is the value of the additional pasture that would become available to you (increased days grazing for your cow herd) if additional feed resources had to be purchased/leased; 3) is calf and/or cow performance suffering because of poor grazing distribution or water quality;

4) are your cattle spending a significant amount of time in riparian areas and degrading the site; and 5) could water developments, such as developing a spring or well, reduce the amount of time and money spent hauling water.

Summary

The implications of this work are that implementing off-stream water into a grazing plan can be effective in improving water quality and animal performance, altering distribution patterns of cattle, and reducing the potential impact of grazing on sensitive riparian areas. I hope I have provided you with some useful information on managing water resources. If you have any questions don't hesitate to contact me at the Eastern Oregon Agricultural Research Center in Burns (541-573-8910; dave.bohnert@oregonstate.edu).

References

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