

**AGRICULTURAL RESEARCH FOUNDATION
FINAL REPORT
FUNDING CYCLE 2016 – 2018**

TITLE: “Effect of Clipping Heights on Yield and Quality of Simulated Management Intensive Grazing of Irrigated Pasture”

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EXECUTIVE SUMMARY

The three county area of Central Oregon has a network of canals delivering irrigation water to farms in Deschutes, Crook, & Jefferson counties. Farms in Central Oregon grow a variety of crops including pasture for livestock grazing and hay production. The total number of irrigated acres dedicated to pasture in a given year is approximately 46,600 acres.

Unfortunately, a majority of livestock owners over graze their pastures resulting in less forage per acre, reduced profits, increased weed pressure and increased water use. Results from this trial should help OSU Extension educate Central Oregon landowners about forage production and how over grazing harms the plant and reduces yield. Furthermore, it is our hope the results from this research will potentially reach Eastern Oregon producers who farm on approximately 267,000 acres.

Proper grazing height (or clipping height on hay fields) of pastures will increase longevity and dry matter (DM) production of pastures, especially grazing sensitive grasses like orchardgrass. It is hypothesized that leaving taller grazing residual will increase DM production and thus increase the pounds of livestock weight produced. An indirect benefit could be less ingestion of parasites by livestock by keeping grazing heights taller. Taller grazing heights should allow less weeds to take hold and soil temperatures should be cooler, reducing water and heat stress to the plant, and stand life should increase.

Numbers whether positive or negative correlated to the hypothesis will allow the livestock industry to have documented scientific information in order to make informed decisions on grazing height and pasture management.

OBJECTIVES

The objective of this research is to determine the optimal grazing height of orchardgrass that will maximize forage production while retaining the complex carbohydrates and energy reserves the plant requires for regrowth that are stored in the crown of the plant.

PROCEDURES

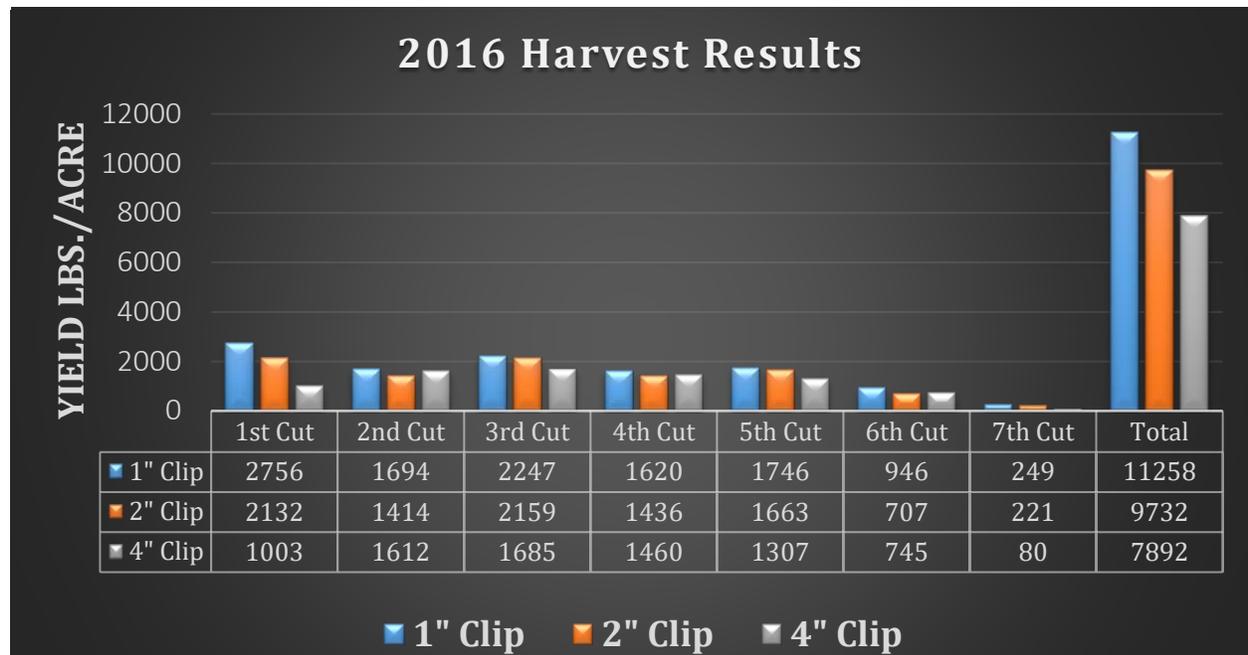
1. Secured research site at COARC and staked out twelve, 6'x25' plots with clipping plot treatments of 1", 2", and 4".
2. The experimental design was a randomized block design with four replications.
3. Soil test samples taken from the twelve research plots and sent to a lab to determine soil fertility.
4. COARC farm manager Hoyt Downing and assistant Mitchel Alley irrigate research trial plots with sprinkler irrigation on an as needed basis.
5. The date and average height of orchardgrass in plots prior to clipping is recorded with a forage grazing stick.
6. Pictures of the research area taken and recorded prior to and after clipping.
7. Harvest dates in 2016 occurred on April 20th, May 18th, June 23rd, July 20th, August 24th, September 27th and November 4, 2016.
8. Harvest dates in 2017 were May 3rd, May 26th, June 20th, July 19th, August 25th, September 26th, and November 2, 2017.
9. A forage plot harvester and Jari mower was utilized to clip grass plots at heights of 1", 2" & 4".
10. In 2017, a John Deere riding mower was used to clip plots as greater accuracy was attained with this machine.
11. Clipped orchardgrass from plots was raked on to canvas tarps, weighed and measured in order to determine total yield for each 1", 2" and 4" cutting height treatment plot.
12. Samples were collected and will be sent to Klamath Basin Research & Extension Center (KBREC) lab. Grass will be tested for quality and amount of carbohydrates in forage with Near-Infrared Spectroscopy (NIRS).
13. Plots fertilized after each harvest with organic chicken feather meal for a year-end total of 187.5 pounds per acre. This delivered 22 pounds per acre of nitrogen applied after each harvest with the exception of the last harvest.
14. We are utilizing forage lab tests to calculate yield response, quality of forage and stand persistence. Moisture and quality samples are weighed in the field. Yield samples are dried in an oven to determine dry matter basis calculations



SIGNIFICANT ACCOMPLISHMENTS

Last year, Mylen and I documented our trial results and our expectations that clipping orchardgrass down to a 1” and 2” height seven times during the grazing season would result in diminishing yields. By cutting the orchardgrass down to 1” and 2”, we are removing a majority of the plant’s crown, which eliminates a large portion of the plant’s carbohydrate storage area. The carbohydrates stored in the crown are essential for plant regrowth.

We compared this 1” cut height treatment to plots that were harvested at a 2” clip height and a 4” clip height. Since the plots with a 4” cutting height retained ample plant tillers for storing carbohydrates for plant regrowth, we felt the 4” plots would yield more forage by the end of the year than the 1” and 2” cutting height plots. Our research in 2016 proved our hypothesis incorrect as the 1” and 2” cutting height plots outperformed the 4” cutting height plots the entire year with no significant slowdown of the 1” and 2” cut height plots by years end. After much discussion, we theorized that when the 2017 trial results were completed, the 4” cutting height plots would yield the greatest amount of forage. It was just taking more time for the reduced energy storage 1” and 2” cutting height plants to lag behind the 4” cutting height plants. The table below shows our harvest results for 2016.



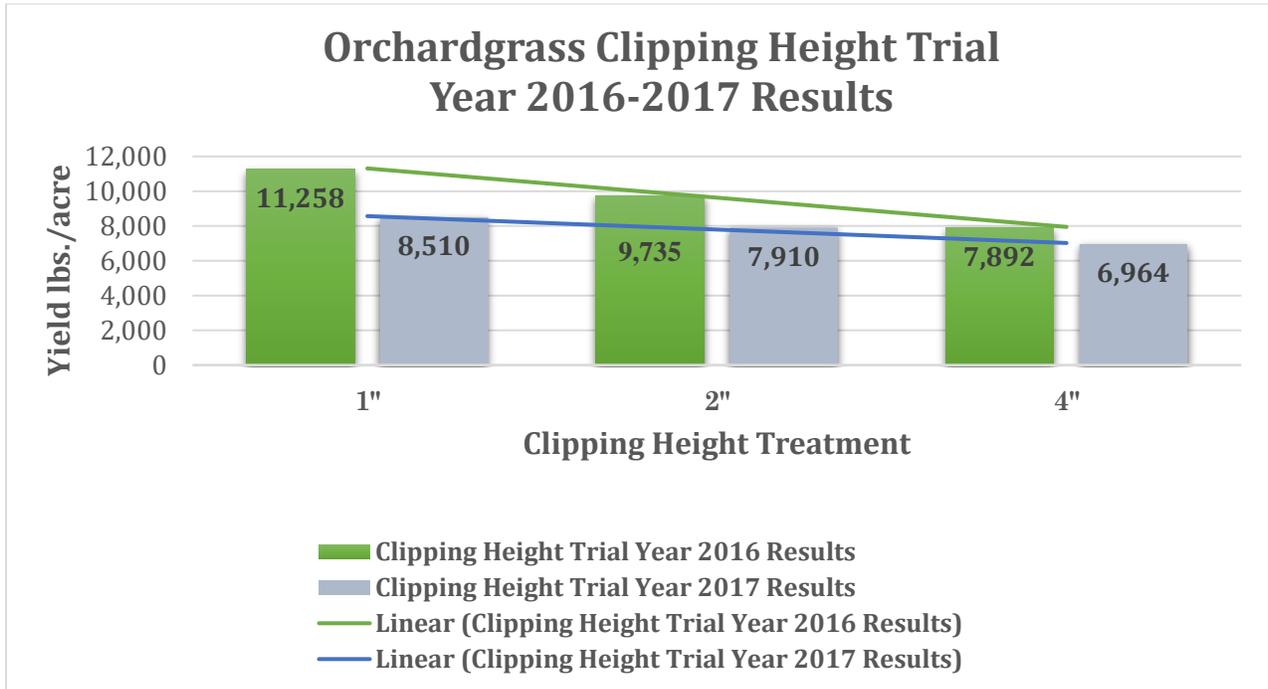
2017 Harvest Results



In 2017, we harvested the twelve different plots seven times and recorded the results. To our astonishment, the 1" and 2" cutting height plots still yielded more forage than the 4" cutting height plots. However, we documented a decrease in plant growth of the 1" and 2" plots versus the 4" plots. The results show 2,748 pounds less forage harvested from the 1" cutting height plots from 2016 to 2017. This is a 32.3% drop in yield from last year to this year. The 2" plots also decreased their yield by 1,825 pounds or 23%. In contrast, the 4" cutting height plots had the smallest decrease in yield at 928 pounds or a 13.3% reduction in yield. This would indicate that the plots with the 4" cutting height that retain the crown and tillers, and thus carbohydrate storage for plant regrowth, are catching up. Once again, it appears the orchardgrass is more resilient to over grazing than expected. We expect that it will take one more year before the 4" cutting height plants document higher yields than the 1" and 2" cutting height plots.

Another hypothesis has arisen from analyzing the data. Typically, when livestock over graze orchardgrass, they are free to continuously graze the fields on a daily basis. Our plot treatments utilize a 1" and 2" clip height to mimic overgrazing, but instead of continuously clipping the plots on a daily basis, we are resting the plots approximately 30 days between clippings. We believe this is giving the orchardgrass extra time to recover and regenerate lost energy stores. That is why it is taking longer to see the detrimental effects of grazing or clipping orchardgrass down to a 1" and 2" cutting height. A third year of data collection will allow us to finalize our conclusions, publish our results and continue to disseminate the information gathered from this research trial.

Below is a table that compares the total yields of the plots from 2016 to 2017.



BENEFITS & IMPACT

Mylen and I did six pasture walks/classes in 2016 and three pasture management classes in 2017. We will be doing at least three classes in 2018. The goals for the classes include educating farmers on Management-intensive Grazing (MiG) and improving pasture forage production in Central Oregon. These walks enabled us to teach and drive home the “sins” of overgrazing to our clients. Thanks to the orchardgrass clipping height research trial, we now have data specific to Central Oregon to present to farmers and ranchers.



The Central Oregon Hay Growers' Association and Central Oregon Extension hosted the Central Oregon Forage Field day at COARC in 2016, 2017 and will host it again in May of 2018. Local farmers and ranchers attended the events and in 2016, approximately 30 students from Evergreen College attended. Information on MiG, forage plant identification and plant growth rates were taught. The orchardgrass research trial is a major point of discussion during these field days and it provides a visual teaching tool on the damage over grazing does to orchardgrass and other forage plants. The reasons for conducting the trial, methods utilized in conducting the trial and how the trial data can be applied to real world situations are discussed. In addition, this information will be written up and published for dissemination to farmers and ranchers in Central Oregon and throughout the state. Extension channels will be utilized to bring this research to the public through face to face classes, field days, newsletters and publications.

ADDITIONAL FUNDING RECEIVED DURING PROJECT TERM: COARC did not charge us the typical production costs of \$2,000 for the 2016 year in order to help us out in our first year of research. However, COARC will charge us for production costs in 2017 and 2018. Thanks to COARC, we will have enough funding to get a third year of data results in 2018.

FUTURE FUNDING POSSIBILITIES: Perhaps a seed company might become a part of future research.

