

Effects of Litter Load on Tame Pasture Health

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Key Points/Take Home Message

Litter (mulch) is any old plant residue.
Litter performs many beneficial functions to maintain pasture health.
Litter loads upwards of 8000 lbs/ac did not reduce forage production.
Study findings are still being analyzed – more to come!

Tame Pasture Litter Study

Introduction

Litter (also called mulch), is any old plant residue left over from a previous years' production in a native rangeland or tame pasture and can be standing, freshly fallen or slightly decomposed on the soil surface. Most of what we know about litter is from the study of native rangelands. For example, litter performs several important functions that are vital to the maintenance of resource values for livestock forage production, wildlife habitat and watershed protection and so is linked to rangeland health. Litters' light-gray-tan color will tend to reflect the sun's rays, cooling the soil surface thereby slowing the loss of scarce moisture. Litter also acts as a kind of latticework at the soil surface that promotes infiltration of water. Litter, along with other live plant material, slows runoff and creates a pathway for water to flow into the soil. By improving the retention and percolation of water into a range site, soil erosion by water is greatly reduced. Of course, litter will also reduce wind erosion the same way that a good stand of stubble will in a grain field by causing the wind to be deflected upwards and by capturing any airborne soil particles. The presence of a litter layer reduces soil exposure to weedy plant species and insects such as grasshoppers that might take advantage of such conditions to establish new plants or lay eggs. As soil micro-organisms break down the litter to humus, nutrients are recycled to support plant vigor and growth thereby reducing [tame pastures] or eliminating [native pastures] the need for costly applications of fertilizer.

Litter is also considered by many to be a kind of 'forage bank'. The carryover adds to total available forage in drought periods to supplement livestock forage needs. Producers can "stock pile" a forage supply by maintaining adequate litter levels at all times. This practice maintains range health and long term productivity of the pasture.

For the producer, having enough litter means more moisture available for plant growth especially during dry periods. A number of studies on native rangelands show just how important litter can be depending on the soil zone or natural region of the province. Studies in the past decade show that without litter, forage yields will be reduced by

about 50% in the brown and dark brown soil zones and by about 30 % during dry years on foothill ranges.

In native grass rangelands, the value of litter is well known however, little is known about the function of litter in tame pastures with cultivated plant species. A study was undertaken to learn more about the value of litter in a tame pasture situation. Common concerns about litter on tame pasture include minimum and maximum amounts to maintain health and productivity. Does the litter have any effect on soil microbial activity, temperature, moisture or soil stability? The results of the study will assist in the development of management practices for tame pastures that sustain production and maintain long term health and other resource values.

Methods

The study is located in east central Alberta, approximately 8 miles south of St. Paul in the St. Paul Provincial Grazing Reserve. The site is in the Dry Mixedwood natural subregion, on a loamy textured Orthic Grey Luvisol. The dominant forage species is smooth brome.

Two blocks with 36 plots each were established (one in each of 2004 and 2005) in an enclosure. Six different treatments of litter loads were applied including; no litter, 250, 500, 1000 and 3000 lbs/ac plus an in situ litter (control). The treatments were

A second control was established in a Buck for Wildlife (BFW) enclosure that is ungrazed since 1985. The BFW litter levels averaged 7342 lbs/ac from 2004 to 2007. The annual production of forage is clipped and weighed for each of the treatments over 3 years. Other site conditions such as soil temperature and moisture were also monitored to gauge impacts on forage production and pasture health.

Results and Discussion

Results

The results are still being analyzed. After three years of study, total forage production is not significantly affected by litter treatments. A response may yet appear in other factors such as soil microbial activity and pasture health. The 2007 forage production in all treatments was reduced from 2006 production levels. In 2007, the ungrazed BFW forage production continues to be significantly greater (t test; $P < 0.05$) from the grazed pasture area treatments (2613 versus 1608 lbs/ac respectively) despite a 4 year average litter load of 7342 lbs/ac.

Discussion

What we have learned so far is that there is no practical upper litter load that would cause a reduction in tame forage production. In contrast to native rangelands, low litter loads on tame pasture (i.e. cultivated plant species) do not appear to have a negative effect on forage production. For the study period of 2004 to 2007, precipitation was close to the long term normal. It is possible that a response to low litter loads would not be manifested until drought conditions occurred.

The impact of litter treatments on other factors related to pasture health and sustainability of forage production are still being investigated.

References

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