

Preliminary Study of the Influence of 2,4-D on the Digestibility of Ensiled Lawn Clippings and the Level of Acceptance by Lambs

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Introduction

In the United States land in agriculture production has decreased by 295,420.52 km² from 1990 to 2012(1). The estimated per capita poultry and red meat consumption within the United States as of 2015 is 94.57 kg (2), up from 90.27 kg in 1990(3). With the increase in population from 1990 to 2013 of 66.3-million, this is an increase of 1,820,280,242 kg of total meat consumed since 1990(3). Producers are faced with the challenge of feeding more animals with less land to produce the animals or feed for those animals. Lawns are a relatively large sector of grass production in this country, accounting for 163,801 km² of land(4). This is compared with the estimated 225,409.9 km² in hay production(1), and 323,748.51 km² in corn production(5). Additionally, lawn clippings make up 20% of material sent into landfills each year within the United States(6). The number of landfills in the United States have been decreasing, with 7,683 landfills in 1986(7) and only 1,908 landfills in 2009(8). If lawn clippings could be used as a livestock feed, this would redirect a waste large waste stream and provide feed for the production of additional animal products.

The objectives of the study were: 1) determine if lawn clippings could be successfully ensiled, 2) evaluate if ensiled lawn clippings were acceptable to livestock as a feed source, 3) determine if the herbicide 2,4- Dichlorophenoxyacetic acid (2,4-D) had an effect on the digestibility of the silage, and 4) discover how much herbicide residue remains in the fecal matter of the lambs.

Materials and Methods

- Eight Rambouillet lambs (wethers; 7-mo-old; BW = 36.7 kg ± 2.8) were fed a silage-only diet for nine days.
- Data was collected from six days of the feeding period.
- Silage was made from grass clippings from the Black Bull Golf Course in Bozeman, Montana.
 - There was a control (C) and a treatment (T) pile of clippings.
 - Both piles were treated with three gallons of water and one liter of 99-percent acetic acid
 - The treatment pile was sprayed with 4 oz. of an herbicide containing 2,4-D as the main ingredient.
 - The clippings were ensiled for five weeks.
 - Kentucky Bluegrass (*Poa pratensis*) was the predominant grass specie in the clippings.
- The lambs were fed 2% (DM) of their body weight per day (9).
- Samples were collected from the pre-processed clippings, post-processed clippings, silage, and fecal matter.

Results and Discussion

- The final pH (4.6 ± 0.17) and moisture content (60%) of the grass clippings were within the parameters for grass silage (10).
- NDF levels were not within the target range (42-48%), with (C) NDF of 60.4% and (T) NDF of 61.9%.
- The CP was comparable to dairy quality alfalfa hay (11).
- The overall digestibility of the silage was low.
 - Digestible NDF (dNDF) of C was 30.5% (±4.9) and T was 27.6% (±4.9).
 - Digestible ADF (dADF) of C was 16.5% (± 4.2) and T was 13.7% (± 3.4).
 - DM digestibility (DMD) of C was 41.6% (± 3.7) and T was 40.3% (± 3.7).
- Only 1 lamb refused to eat the silage for the first 24 hours. No refusal was collected after day 1.
- No significant statistical difference was observed in the dADF ($P=0.6609$), dNDF ($P=0.6968$), dCP ($P=0.2282$), and DMD ($P=0.8095$) between the control and treated silage.
- Numerical data showed some 2,4-D passage into the fecal matter. With 82mg/kg of 2,4-D in the treated grass clippings before ensiling, 110mg/kg in the treated silage, and 6.8 mg/kg in the combined fecal matter from the lambs in the treated group.
- Further studies will be needed to fully examine the potential of using lawn clippings as livestock feed.

Conclusion

- The study showed the lawn clippings could be successfully ensiled.
- Lambs readily accepted the lawn clipping silage as a feed.
- 2,4-D did not have a significant effect on silage digestibility.
- Some 2,4-D passed through the digestive tract of the lambs and ended up in the fecal matter.
- Lawn clipping silage is a promising feed prospect for the livestock industry.



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Table 1. Nutrient content of the ensiled grass clippings.¹

Silage	Nutrient				
	DM (%)	CP (%)	NDF (%)	ADF (%)	TDN (%)
Control silage	33.64	18.7	60.4	40.9	55.9
Treated silage	31.28	18.3	61.9	40.6	56.2
Silage	NEI (Mcal/lbs)	NEM (Mcal/lbs)	NEG (Mcal/lbs)	RFV (%)	
Control silage	0.57	0.54	0.31	88	
Treated silage	0.57	0.55	0.32	86	

¹Nutrition results from MidWest Laboratories (Omaha, NE).
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