

2015 Sheep Production Report on Fodder Tree Diet

This research note is part of a series detailing results from different facets of the trial. For more information, see:

Fodder Trees: 2015 Yield and Nutrient Analysis

2015 Sheep Preferences of Fodder Trees

Economic Analysis and Practical Applications of Fodder Trees

RAIN has partnered with the Ontario Sheep Marketing Agency to investigate whether fast-growing, coppiced trees can be a nutritionally and economically viable fodder source for sheep. This project is taking place over the 2015 and 2016 growing seasons near Sault Ste Marie.

Thanks to our farmer co-operators for their assistance with this project.



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Method

In 2007, a short rotation woody coppice plantation was established by the Canadian Forest Service to assess the potential of fast growing willow and poplar for bioenergy. A section of this plantation was fenced off and split into four 0.75 acre paddocks. Trees were cut to 4" and allowed to regrow to heights of 12-24" before sixty mature, dry, Arcott Outaouais ewes rotationally grazed the new re-growth. Outside the grazed area, three species of native trees (Speckled Alder, Trembling Aspen, and White Birch) were also coppiced for comparison with the domestic varieties. Samples of the new growth were taken to determine dry matter yields and nutrient content of the tree re-growth.

Results

Sheep Weight and Body Condition Score:

Animal performance declined generally and could be attributed to numerous factors besides diet, such as stress due to change in environment (ewes were used to barn), absence of grain in their diet, and being older ewes. Sheep lost on average 3.9 lbs. over the four week period. Body condition scores were the same before and after grazing. This indicates that trees alone do not provide enough energy for ewes to maintain their weight, and a complimentary feed source would be required to meet sheep energy demands in a fodder tree system.



Figure 1. Arcott Outaouais ewes rotationally grazing coppiced trees

Nutritional Value of Trees:

Leaf samples were sent to A&L Laboratories Canada for macro- and micro-nutrient analysis. Nutrient levels were reported for nitrogen (N), sulphur (S), phosphorus (P), potassium (K), magnesium (Mg), calcium (Ca), sodium (Na), copper (Cu), boron (B), zinc (Zn), manganese (Mn), iron (Fe), aluminum (Al), and molybdenum (Mo).

The National Research Council (NRC) provides nutritional guidelines and recommendations for livestock. Based on the NRC guidelines for ewe maintenance requirements (ie: not growing, breeding, pregnant, or lactating), the trees in this study provided adequate levels of crude protein, calcium, magnesium, potassium, and sulphur. Some trees provided adequate phosphorus, but none of the trees contained enough sodium to meet ewe requirements.

For micronutrients (trace minerals), no tree exceeded the maximum tolerable level (MTL) for the sheep; iron, copper, manganese and zinc were all provided at adequate levels. Only molybdenum was deficient across all tree sources.

Table 1. Summary of NRC nutrient requirements for ewes (maintenance) and amounts of nutrient provided by different tree leaves

Ewe maintenance requirement in a diet that is 100% forages, based on DM content

		CP (%)	Ca (%)	P (%)	Na (%)	Mg (%)	K (%)	S (%)	Fe (ppm)	Cu (ppm)	Mo (ppm)	Mn (ppm)	Zn (ppm)
		9.4	0.2 - 0.82	0.16 - 0.38	0.09 - 0.18	0.12 - 0.18	0.5 - 0.8	0.14 - 0.26	30 - 50	7 - 11	0.5	20 - 40	20 - 33
		MTL:											
									500	25	10	1000	750
Species	Variety	CP (%)*	Ca (%)	P (%)	Na (%)	Mg (%)	K (%)	S (%)	Fe (ppm)	Cu (ppm)	Mo (ppm)	Mn (ppm)	Zn (ppm)
Poplar	2239-19	12.75	0.96	0.13	0.01	0.34	0.72	0.56	133	12	0.01	153	167
Poplar	DN	11.81	0.51	0.11	0.01	0.25	1.32	0.41	166	9	0.01	119	124
Poplar	NM-1	10.75	1.03	0.13	0.01	0.34	1.06	0.55	195	11	0.01	155	196
Poplar	NM-6	13.25	0.79	0.12	0.02	0.23	1.22	0.27	308	11	0.01	256	224
Willow	Charlie	10.50	1.97	0.17	0.01	0.69	0.7	0.75	170	6	0.01	189	100
Willow	Hotel	13.56	2.19	0.18	0.01	0.53	0.76	0.72	86	8	0.01	315	164
Willow	India	10.56	2.08	0.16	0.01	0.71	0.54	0.78	240	7	0.01	963	218
Willow	Pseudo	10.38	1.77	0.16	0.01	0.48	0.67	0.38	164	5	0.01	125	69
Willow	SV-1	13.75	2.18	0.33	0.01	0.44	0.6	0.71	207	7	0.116	480	196
Willow	SX-61	10.88	2.87	0.16	0.01	0.35	0.78	0.59	136	6	0.01	481	247
Willow	SX-64	10.56	2.21	0.16	0.01	0.31	0.99	0.58	238	7	0.348	527	233
Native Trees													
	Speckled Alder	13.88	0.56	0.12	0.02	0.24	0.45	0.15	145	8	0.01	206	37
	White Birch	12.69	0.98	0.48	0.01	0.18	0.99	0.12	212	5	0.01	113	194
	Trembling Aspen	17.13	1.94	0.22	0.02	0.23	0.93	0.25	130	12	0.01	295	325

*Crude protein content was calculated as 6.25 times the nitrogen content

MTL is maximum tolerable level

These results suggest that, while not a complete feed, the young regrowth of some coppiced trees can be a valuable source of nutrients for sheep. By working with a veterinarian and nutritionist, shepherds may be able to incorporate fodder trees into their management system to provide an alternative source of nutrition for their livestock during the growing season.

