

Effect of chickling vetch (*Lathyrus sativus* L.) or alfalfa (*Medicago sativa*) hay in gestating ewe diets

C. Poland^{1*}, T. Faller² and L. Tisor¹

1. Dickinson Research Extension Center, North Dakota State University,
1089 State Avenue, Dickinson, ND 58601, USA

2. Hettinger Research Extension Center, North Dakota State University

*Email: wpoland@ndsuxt.nodak.edu

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Introduction

Lathyrus sativus (grasspea or chickling vetch, guaya in Ethiopia, khesari in India) ⁽⁵⁾ is a common food legume widely grown and eaten throughout many parts of the world ^(5,6,7). The nutritional composition of *L. sativus* and *L. cicera* (two closely related species) is similar to that of other feed grain legumes e.g. field pea (*Pisum sativum*), faba bean (*Vicia faba*), lupin (*Lupinus angustifolius*) ^(4,8). However, *Lathyrus* spp. can contain a large number of antinutritional substances that can reduce their potential as a raw, unprocessed feedstuffs ^(2,3). Most notable is a neurotoxin, 3-N-oxalyl-L-2,3-diaminopropionic acid (acronyms: -oxalyl-diamino-propionic acid or ODAP and -oxalyl-amino-alanine or BOAA), which can cause a paralysis of the lower limbs known as "lathyrism" ^(3,4).

In Canada, the annual creeping vine grass pea has been used primarily as a green manure alternative to summer fallow in small grain production systems to reduce wind and water erosion and increase soil nitrogen concentrations ⁽⁷⁾. AC-Greenfix is a variety of *L. sativus* developed at the Semiarid Prairie Agricultural Research Centre (SPARC) in Swift Current, Saskatchewan, Canada ⁽¹⁾. It is marketed in the US by Dakota Frontier Seeds.

The objective of this preliminary study was to test the forage quality and general safety of *L. sativus* hay compared to alfalfa (*Medicago sativa*) hay in gestating ewes.

Material and Methods

Twenty pregnant, whitefaced ewes (BW = 77.5 ± 6.1 kg; condition score = 3.0 ± 0.33) were randomly allotted into one of four groups (5 ewes/group). Groups were then assigned to one of two dietary

treatments. Treatments were ad libitum access to either alfalfa (ALFA) or chickling vetch (var. AC-Greenfix provided by Dakota Frontier Seeds, Flasher, ND; ACGF) hay. Standard supplementation (e.g. grain, minerals, vitamins) practices for gestating ewes at HREC were also provided uniformly to each group. Ewes were fed hays for 56 d prior to lambing. Ewes were weighed and condition scored (1 = very thin and 5 = obese) on days 0, 28 and 56. Ewes were shorn during the first 28 d on feed. Individual fleece weight averaged 5.5 kg. Liveweights during the study were not adjusted for fleece removal. Feed deliveries and refusals were recorded daily and weekly, respectively. Feed disappearance was the differences between hay delivery and refusal. Feed efficiency was calculated as liveweight gain divided by feed disappearance.

One ewe on the alfalfa treatment lambed on day 18 of the treatment phase. This ewe and lambs were maintained in their respective pen for the remainder of the phase to allow for calculation of feed disappearance. Gain data from this ewe was excluded from the data set and feed parameters adjusted to a per head basis for comparison purposes. Four ewes (two from each treatment) had not lambed by spring turnout. Calculations of lambs born and weaned reflect only those ewes that lambed after the treatment phase and before spring turnout to pasture. Data were analysed as a completely random design using pen as the experimental unit for feed and efficiency data and animal as the experimental unit for liveweight and condition score data.

Results and Discussion

Nutritional composition of alfalfa and chickling vetch hay are reported in Table 1. Dry matter and crude protein concentrations were similar between the two hay types. Chickling vetch tended to have more acid- and neutral-detergent fibre and lower calculated

energy concentrations compared to alfalfa. Despite these differences, both hays were nutrient dense forage of high quality. One visible difference was the presence of a small amount of corn stover in the chickling vetch hay. Stover contamination was the result of corn being grown on the same field in the preceding year.

Body weight or gain and condition score or change were not affected ($P > 0.1$) by dietary treatment (Table 2). Ewes lost an average of 6.3 kg in the first 28 d. A majority of this loss was fleece weight. Ewes gained approximately 11.5 kg over the last 28 d. Ewes gained approximately 5.2 kg and 0.5 condition score units over the 56 d feeding period. Lambs born and weaned were also not affected by dietary treatment (Table 2). Ewes produced 1.4 lambs/ewe prior to spring turnout and weaned 1.3 lambs/ewe.

Table 1. Nutrient composition of chickling vetch (var. AC-Greenfix; ACGF) and alfalfa (ALFA) hay fed to gestating ewes.

Item	ACGF	ALFA
Dry matter (DM)	87.4	88.6
Crude Protein (CP), %DM	18.2	18.1
Acid Detergent Fiber (ADF), %DM	36.3	35.0
Neutral Detergent Fiber (NDF), %DM	48.6	44.6
Energies:		
Total Digestible Nutrients (TDN), %DM	60.6	61.7
Net Energy for Maintenance (NE _m), MJ/kg DM	5.5	5.7
Net Energy for Gain (NE _g), MJ/kg DM	3.1	3.3

Table 2. Effect of hay source on body weight and condition when fed to gestating ewes.

Item ^b	Treatments ^a		SE ^c	P-value ^d
	ACGF	ALFA		
Initial				
Weight	78.5	76.2	2.0	0.43
Condition	2.9	3.1	0.10	0.17
Day 0 -28				
Weight	72.4	69.8	1.7	0.31
Gain	-6.17	-6.44	0.68	0.77
Daily gain	-0.22	-0.23	0.02	0.77
Day 28 - 56				
Weight	82.8	82.2	2.0	0.85
Gain	10.5	12.4	1.0	0.19
Daily gain	0.37	0.44	0.04	0.19
Day 0 - 56				
Gain	4.3	6.0	1.0	0.25
Daily gain	0.08	0.11	0.02	0.25
Condition	3.3	3.7	0.16	0.12
- change	0.40	0.56	0.16	0.52
Number of lambs per ewe^e				
Born	1.4	1.4	-	-
Weaned	1.4	1.2	-	-

a Treatments include ad libitum access to chickling vetch (var. AC-Greenfix; ACGF) and alfalfa (ALFA) hay for 56 d during gestation.

b Body weight and gain are expressed in kg and daily gain in kg/d. Body condition scored on a 5-point scale (1-very thin and 5-obese).

c Standard error.

d Probability of statistical significance.

e Two lambs in each treatment lambled after ewes and lambs went to pasture. Thus, lambs born and weaned for these ewes were unknown and recorded as 0. Also, one lamb in the alfalfa treatment lambled early during the gestation feeding period and lamb data from this ewe was removed from analysis.

Hay delivery ($P < 0.01$), refusal ($P < 0.01$) and disappearance ($P = 0.02$) in the first 28 d was affected by dietary treatment (Table 3). ACGF had greater hay deliveries (77 g/d) and refusals (150 g/d) and less disappearance (68 g/d) compared to ALFA. Feed efficiency ($P = 1.0$) during the first 28 d was not

affected by dietary treatment. During the second 28 d, feed delivery ($P = 0.08$) and refusals ($P < 0.01$) were increased 154 and 236 g/d, respectively, by ACGF. Hay disappearance ($P = 0.35$) and feed efficiency ($P = 0.70$) were not affected by dietary treatment in the second 28 d. Overall hay delivery ($P = 0.04$) and

refusal ($P < 0.01$) were increased 118 and 172 g/d, respectively, by ACGF. Overall feed disappearance ($P = 0.19$) and efficiency ($P = 0.54$) were not affected by dietary treatment.

Chickling vetch produces a hay that is comparable to alfalfa hay in nutrient composition. No adverse affects were observed in gestating ewes fed chickling vetch

hay compared to alfalfa hay. Observed increases in hay delivery and refusal of chickling vetch hay were probably related to the presence of corn stover in the hay bale that ewes tended to sort out and not consume. These preliminary data suggest no overt problems from feeding chickling vetch hay to sheep and that chickling vetch (var. AC-Greenfix) is comparable to alfalfa hay in gestating ewe diets.

Table 3. Effect of hay source on hay deliveries, refusal and disappearance and feed efficiency when fed to gestating ewes.

Item ^b	Treatments ^a		SE ^c	P-value ^d
	ACGF	ALFA		
Days 0 - 28				
Delivered	2.39	2.31	0.003	<.01
Refusal	-0.22	-0.07	0.007	<.01
Disappearance	2.17	2.24	0.007	.02
Efficiency	-10.1	-10.1	1.29	1.0
Days 28 - 56				
Delivered	2.60	2.45	0.034	.08
Refusal	-0.27	-0.03	0.015	<.01
Disappearance	2.33	2.41	0.046	.35
Efficiency	16.0	18.1	3.39	.70
Days 0 - 56				
Delivered	2.50	2.38	0.019	.04
Refusal	-0.25	-0.05	0.009	<.01
Disappearance	2.25	2.33	0.027	.19
Efficiency	3.41	4.47	1.03	.54

a Treatments include ad libitum access to chickling vetch (var. AC-Greenfix; ACGF) and alfalfa (ALFA) hay for 56 d during gestation.

b Hay delivery, refusal and disappearance are expressed as kg/d. Efficiency is body weight gain (Table 1) expressed as a percentage of hay disappearance.

c Standard error.

d Probability of statistical significance.

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