

Poa for the Planet and Ponies

John and Katrina Kelly “Two Gums” Lilydale.

July 2017

Executive Summary:

Laminitis is a significant issue for horses and particularly ponies. High sugar grasses can be one causal factor in the condition. Poa, with its low sugar status, is known to be a low founder risk feed for horses and ponies. Poa in a green state is readily eaten by horses and ponies but its palatability is low in a straw state. This project aimed to assess the feed suitability of chaffed Poa for horses and ponies. Results indicated there is potential. Poa Chaff protein levels were satisfactory across all sample periods whilst its simple sugars levels were low. It is hoped increased awareness about the feed attributes of Poa for horses and ponies will encourage landholders to maintain or enhance Poa stands. A feasibility study is warranted to assess the commercial potential of Poa Chaff. Project costs came in under budget.

Introduction:

This project was undertaken on a small farm just outside Lilydale, Northern Tasmania. The property owners, John and Katrina Kelly have a dream of establishing a mosaic of Poa (*Poa labillardierei*) and white gum dominated native bush on part of a 20 acre ex eucalyptus plantation area.



Figure 1. Poa labillardierei

They also own ponies.



Whilst ponies are a romantic image, like all romantic images they come with a few reality checks.

'Ponies' in the modern Australian vernacular typically means Shetlands or Welsh equine of less than 13 hands. These are highly subject to laminitis and eventually founder, conditions which cause extreme pain to the pony and may lead to them having to be put down.



Figure 2: A pony suffering from advanced founder or laminitis. Note the stance; leaning back in an attempt to get weight and pressure off front hooves.

The causes of such conditions are complex and discussed widely in the literature. Causal factors include poor (or no) feet trimming, lack of adequate exercise giving insufficient blood flow to the hoof, low body mass causing insufficient hoof wear and contraction to give adequate blood flow and finally high levels of specific plant sugars in the feed. Laminitis is sometimes compared to diabetes in humans.

Like the old Castrol oil advert says "Oils aint oils", well "Sugars ain't Sugars". There are multiple types and measures of sugars in horse feed. The sugars which most commonly lead to laminitis are Water Soluble Carbohydrates (WSC) and Ethanol Soluble Carbohydrates (ESC), collectively known as simple sugars. When digested in the horse small intestine these can have a significant impact on blood sugar levels (glycaemia response) and this is a causal factor in laminitis (the science behind it is even now not clearly understood).

Unfortunately Tasmanian improved pastures, especially during spring and autumn, are a high risk diet for founder prone horses and ponies.



Previous reports have suggested Poa may be an excellent pony feed.

<https://www.nativeseeds.com.au/shop/books-resources/native-grasses-prevention-equine-laminitis>).

The Kelly's infatuation with Poa started in 2007 when they planted 4000 Poa plants on their property prior to their garden wedding in 2008.

From personal observation of equines it has been noted:

- horses love to eat Poa when its green but not when its dry
- Poa produces large quantities of dry matter which is readily harvestable
- horses are happy to eat the dry matter when its chaffed but not as straw.

As far as the Kelly's are aware, no one has researched the feed potential of Poa chaff, specifically as a low laminitis risk feed for ponies. This project aimed to explore the suitability of Poa chaff as a pony feed, especially with relation to laminitis management.

In addition to offering a new low laminitis risk feed, it is also hoped commercial use of Poa may encourage landowners to value their existing Poa stands more highly and or establish new Poa areas on their properties.

With some blue sky dreaming one can imagine large areas of Poa in Tasmania harvested, chaffed, bagged and sold to keen horse owners all over Australia as a premium low risk pony feed.

Methods and timeline:

Three dry matter samples were collected from the property in three distinct periods:

- with seeds insitu (8.1.17),
- with seeds stripped (23.1.17)
- and then at the end of summer when most of the seeds had dropped (12.3.17).

Thus a total of 9 samples were collected for analysis, date tagged and air dried prior to postage to the USA in one batch on the 31st March 2017.

Results:

The analysis of the Poa samples is attached in Appendix 1 and summarised below in Table 2.

Statistical analysis of the results was beyond the scope of this project.

Discussion:

Analysis of Poa as a suitable feed for ponies:

Livestock feed values have been comprehensively analysed. A typical analysis of a range of livestock feeds is given below.

Feed	Approximate dry matter (DM)%	Metabolisable energy (ME) (MJ/Kg DM)	Crude protein % dry matter (ME/kg DM)
GREEN FORAGES			
Grasses			
<i>Cocksfoot</i> - young, immature mature	23 32	11 9	12 8
<i>Phalaris</i> - young, immature mature	20 35	10 7	17 7
<i>Ryegrass, Perennial</i> - young, immature mature	20 30	11 10	12 8
<i>Grass-dominant pasture</i> - immature mature	20 40	11 5	8 2
HAY			
Grasses			
<i>Ryegrass, perennial/clover</i> - cut at flowering cut two weeks after flowering	80 85	10 9	9 8
<i>Ryegrass, Wimmera/sub clover</i> - cut at flowering	80	10	9

cut two weeks after flowering	85	9	8
Legumes			
<i>Clover (sub dominant)*</i> - cut at flowering	80	9	13
<i>Lucerne*</i> - pre flowering	85	9	15
flowering	90	8	14
Cereals			
<i>Oaten</i> - cut at flowering	90	9	7
milk stage	85	8	5
ripe seed	87	8	3
<i>Wheaten</i> - cut at flowering	90	8	5
dough stage	85	8	4
ripe seed	87	7	3
SILAGES			
STRAWS			
Barley straw	90	7	1
Oaten straw	90	7	2
Wheaten straw	90	6	1

Table 1. Energy and protein compositions of common foodstuffs whole versus processed grain

(<http://agriculture.vic.gov.au/agriculture/livestock/beef/feeding-and-nutrition/feed-value-of-selected-foodstuffs>)

For the composition results of the Poa samples collected under this project see Appendix 1.

A summary of the results is shown in Table 2.

8.1.17	crude protein % DM	Digestible Energy Mcal/kg	WSC % DM	ESC % DM	Calcium % DM	Sodium % DM
1	11.7	2.06	3.7	3	0.79	0.05
2	6.6	1.92	2.8	2.8	0.14	0.035
3	7.9	1.84	3.2	2.6	0.11	0.031
average	8.73	1.92	3.23	2.80	0.35	0.04

23.1.17	crude protein % DM	Digestible Energy Mcal/kg	WSC % DM	ESC % DM	Calcium % DM	Sodium % DM
1	6	1.90	4.7	4.7	0.1	0.034
2	9.1	1.88	3.5	3.5	0.1	0.026
3	6.5	1.84	4.1	2.3	0.13	0.025
average	7.20	1.87	4.10	3.50	0.11	0.03

12.3.17	crude protein % DM	Digestible Energy Mcal/kg	WSC % DM	ESC % DM	Calcium % DM	Sodium % DM
1	6	2.00	5.7	3.3	0.13	0.023
2	5.3	1.62	3.2	-	0.12	0.064
3	4.3	1.76	2.8	2.5	0.12	0.03
average	5.20	1.79	3.90	2.90	0.12	0.04

Table 2: Average nutritional values across Poa samples as per the harvest regime..

A comparison of the results for Poa against other potential feeds reveals a number of important quality issues in relation to the suitability of Poa as a pony feed.

- **Poa crude protein** levels of 5-8% compare favourably with a range of other feeds, especially for a 'maintenance' feed of an adult pony under low work load. Poa crude protein levels were significantly higher than those reported for oaten chaff.
- **Poa energy** levels of about 1.8 Mcal/kg (7.5 MJ/kg) whilst low aren't right off the scale compared to other feeds. Again the intent of Poa use is for maintenance feed in 'ponies' which (as most parents will agree) are desirably 'low energy'. The Poa energy levels appear perfectly acceptable for this application.
- **WSC + ESC (simple sugars)** in Poa of 3-4% are well under the approx. 10% benchmark for low sugar hay. These are the sugars which cause all the grief in ponies. It is these which lead to laminitis and eventually

founder. This low 'nasty sugar' level may well make Poa very suitable for ponies at risk of 'metabolic' & laminitis problems.

- Poa appears to have amazingly high **Calcium**, about half that of average Lucerne hay (1.3%), which is the rolls royce of horse feed in terms of calcium levels.
- **Sodium** levels are very low, as a result ponies in work fed on Poa may need a salt supplement. However in practice 'ponies' are rarely in work demanding enough to justify such a supplement. For resting/maintenance these sodium levels should not be an issue, especially given the potassium levels are quite acceptable.
- Finally the one thing the tests can provide no guidance on is **palatability**. They do indicate that if palatability is acceptable, Poa may be a perfectly acceptable (and in terms of 'nasty sugars, quite desirable) pony feed. Poa palatability, in our experience is moderate. But ponies are often a little pampered, and palatability invariably improves with restriction of other feed sources. Chaffing also, in our experience, improves Poa palatability.

It should also be noted that, as would be expected, protein and energy levels were higher in the earlier harvested samples. Interestingly, whilst reported protein and energy levels varied widely across the samples, WSC and ESC levels appear very consistent. This may suggest Poa can be a highly reliable low laminitis risk pony feed. Although, as noted below, sample sizes in this trial are not sufficient to give statistical strength.

Qualifications:

Use of this data needs to be subject to the following qualifications:

- 1) It represents only data from one year. Nutritional value can vary dramatically across years depending on seasonal conditions.
- 2) Whilst the samples were collected at different stages of plant development, they were restricted in numbers. Nutritional quality varies with season and plant development, any attempt to quantify this variation within statistically acceptable limits would require sample sizes considerably larger than those funded under this project.
- 3) Typically genetic variance across wild plant and animal species is greater than domesticated species, therefore variance in Poa results collected in Queensland for example, may well be greater than variance across Tasmanian lucerne compared to Queensland lucerne. However in practice variance in feed quality as a result of seasonal conditions tends to far outweigh the limited within species variance seen in native Australian plants.

Recommendations:

This project looked at the feed potential of Poa chaff for ponies.

It appears Poa has potential as a low founder risk feed and warrants further investigation and funding of a feasibility study.

Particular consideration needs to be given to:

1. the practical elements and financial costs associated with harvest, chaffing and bagging Poa stands
2. the target market. This may be restricted to highly motivated, founder aware, owners of laminitis or potentially laminitis prone horses and ponies. The size of this target market and its potential spend are completely unknown to the authors.

Acknowledgements:

Funding for Poa for Ponies and the Planet was provided by the Tamar NRM Christopher Strong Natural Resource Fellowship.

Acknowledgement is also given to Habitat Plants at Liffey, Meghan Dykman and Greg Lundstrom for support and advice.


References:

www.naturalhorseworld.com

www.nativeseeds.com.au/shop/books-resources/native-grasses-prevention-equine-laminitis

(<http://agriculture.vic.gov.au/agriculture/livestock/beef/feeding-and-nutrition/feed-value-of-selected-foodstuffs>)

Appendix 1 Poa Composition Results

Analysis performed by:  Equi-Analytical Laboratories 730 Warren Road Ithaca, NY 14850 1-877-429-4110 www.equi-analytical.com		Lab Sample No: 23627250 Page 1 of 1
Analyzed for: KATRINA KELLY PO BOX 294 MOWBERRY TASMANIA, 7248 AUSTRALIA	Lab Desc: 102 Date Sampled: 04/06/2017 Date Received: 04/11/2017 Date Printed: 04/11/2017 Description 1: CHAFFING PRODUCT POA TUSsocks Description 2: Statement ID: S-1-17 #1	Visit our website www.equi-analytical.com for information on interpreting and using your results.

Results				
% Moisture	7.1			
% Dry Matter	92.9			
	As Sampled		Dry Matter	
Digestible Energy (DE), Mcal/kg		1.92		2.06
	%	g/kg	%	g/kg
Crude Protein	10.8	108.4	11.7	116.7
Estimated Lysine	.42	4.2	.45	4.5
Lignin	6.2	61.7	6.6	66.4
Acid Detergent Fiber (ADF)	38.3	382.9	41.2	412.2
Neutral Detergent Fiber (aNDF)	60.7	607.3	65.4	653.7
WSC (Water Sol. Carbs.)	3.4	34.2	3.7	36.9
ESC (Simple Sugars)	2.8	27.6	3.0	29.7
Starch	2.2	22.4	2.4	24.1
Non Fiber Carbo. (NFC)	14.4	144.3	15.5	155.3
Crude Fat	2.0	20.2	2.2	21.7
Ash	4.9	48.9	5.3	52.6
	%	g/kg	%	g/kg
Calcium	.73	7.31	.79	7.87
Phosphorus	.19	1.88	.20	2.03
Magnesium	.10	1.00	.11	1.08
Potassium	1.08	10.82	1.16	11.65
Sodium	.046	.463	.050	.498
Chloride	.57	5.70	.61	6.14
Sulfur	.16	1.62	.17	1.74
	ppm	mg/kg	ppm	mg/kg
Iron	130	130	140	140
Zinc	33	33	36	36
Copper	8	8	9	9
Manganese	83	83	89	89
Molybdenum	1.0	1.0	1.0	1.0
Cobalt	.51	.51	.55	.55
	As Fed		100% Dry	
RPV			81	

Analysis performed by:

Equi-Analytical
Laboratory
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Bucka, VIC 3080
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www.equi-analytical.com

Lab Sample No: 23527260
Page 1 of 1

Lab Desc: 102
Date Sampled: 04/06/2017
Date Received: 04/11/2017
Date Printed: 04/11/2017
Description 1: CHAFFING PRODUCT POA TUSsocks
Description 2:
Statement ID: 8-1-17 #2

Analyzed for:

KATRINA KELLY
PO BOX 294
MOWBERRY
TASMANIA, 7248
AUSTRALIA

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Results				
% Moisture	6.3			
% Dry Matter	93.7			
	As Sampled		Dry Matter	
Digestible Energy (DE), kcal/kg		1.80		1.92
	%	g/kg	%	g/kg
Crude Protein	6.2	61.8	6.6	65.9
Estimated Lysine	.24	2.4	.26	2.6
Lignin	5.6	55.6	5.9	59.3
Acid Detergent Fiber (ADF)	43.9	439.0	46.9	468.7
Neutral Detergent Fiber (aNDF)	70.0	700.4	74.8	747.8
WSC (Water Sol. Carbs.)	2.6	26.5	2.8	28.3
ESC (Simple Sugars)	2.6	26.4	2.8	28.2
Starch	.5	4.9	.5	5.2
Non Fiber Carbo. (NFC)	13.0	130.0	13.9	138.8
Crude Fat	1.4	13.7	1.5	14.7
Ash	3.1	30.7	3.3	32.8
	%	g/kg	%	g/kg
Calcium	.13	1.34	.14	1.43
Phosphorus	.10	1.03	.11	1.10
Magnesium	.06	.59	.06	.63
Potassium	1.15	11.51	1.23	12.28
Sodium	.032	.323	.035	.345
Chloride	.54	5.40	.58	5.77
Sulfur	.11	1.13	.12	1.20
	ppm	mg/kg	ppm	mg/kg
Iron	85	85	90	90
Zinc	22	22	23	23
Copper	6	6	6	6
Manganese	48	48	51	51
Molybdenum	.7	.7	.8	.8
Cobalt	.17	.17	.18	.18
	As Fed		100% Dry	
RFV			65	

Analysis performed by:

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Lab Sample No: 23527270
Page 1 of 1

Lab Desc: 102
Date Sampled: 04/06/2017
Date Received: 04/11/2017
Date Printed: 04/11/2017
Description 1: CHAFFING PRODUCT POA TUSsocks
Description 2:
Statement ID: 8-1-17 #3

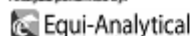
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Analyzed for:

KATRINA KELLY
PO BOX 294
MOWBERRY
TASMANIA, 7248
AUSTRALIA

Results					
% Moisture	6.9				
% Dry Matter	93.1				
	As Sampled		Dry Matter		
Digestible Energy (DE), Mcal/kg		1.72		1.84	
	%	g/kg.	%	g/kg.	
Crude Protein	7.4	73.7	7.9	79.2	
Estimated Lysine	.29	2.9	.31	3.1	
Lignin	6.3	62.7	6.7	67.4	
Acid Detergent Fiber (ADF)	44.7	447.1	48.0	480.3	
Neutral Detergent Fiber (aNDF)	71.8	717.7	77.1	771.0	
WSC (Water Sol. Carbs.)	3.0	30.2	3.2	32.5	
ESC (Simple Sugars)	2.4	23.8	2.6	25.6	
Starch	.3	3.1	.3	3.4	
Non Fiber Carbo. (NFC)	9.4	93.6	10.1	100.5	
Crude Fat	1.5	14.7	1.6	15.8	
Ash	3.1	31.1	3.3	33.4	
	%	g/kg.	%	g/kg.	
Calcium	.11	1.06	.11	1.13	
Phosphorus	.18	1.76	.19	1.89	
Magnesium	.10	.96	.10	1.04	
Potassium	1.13	11.30	1.21	12.14	
Sodium	.029	.292	.031	.314	
Chloride	.52	5.20	.56	5.59	
Sulfur	.13	1.28	.14	1.38	
	ppm	mg/kg.	ppm	mg/kg.	
Iron	81	81	87	87	
Zinc	23	23	25	25	
Copper	4	4	5	5	
Manganese	27	27	29	29	
Molybdenum	1.0	1.0	1.1	1.1	
Cobalt	.10	.10	.11	.11	
	As Fed		100% Dry		
RFV			62		

Analysis performed by:



230 Warner Road
Black, NY 14600
1-677-819-1110
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Lab Sample No: 23627280
Page 1 of 1

Analyzed for:

KATRINA KELLY
PO BOX 294
MOWBERRY
TASMANIA, 7248
AUSTRALIA

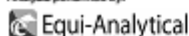
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Date Sampled:
Date Received: 04/06/2017
Date Printed: 04/11/2017
Description 1: CHAFFING PRODUCT POA TUSsocks
Description 2:
Statement ID: 23-1-17 #1

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Results

% Moisture	6.7				
% Dry Matter	93.3				
	As Sampled		Dry Matter		
Digestible Energy (DE), Mcal/kg		1.77			1.90
	%	g/kg	%		g/kg
Crude Protein	5.6	56.1	6.0		60.1
Estimated Lysine	.22	2.2	.23		2.3
Lignin	7.2	72.4	7.8		77.6
Acid Detergent Fiber (ADF)	45.2	452.4	48.5		484.8
Neutral Detergent Fiber (aNDF)	69.3	692.9	74.2		742.5
WSC (Water Sol. Carbs.)	4.4	43.9	4.7		47.1
ESC (Simple Sugars)	4.4	44.0	4.7		47.2
Starch	.4	3.7	.4		3.9
Non Fiber Carbo. (NFC)	13.9	138.7	14.9		148.6
Crude Fat	1.1	11.1	1.2		11.9
Ash	3.4	34.5	3.7		36.9
	%	g/kg	%		g/kg
Calcium	.09	.89	.10		.96
Phosphorus	.10	1.04	.11		1.11
Magnesium	.07	.68	.07		.72
Potassium	1.11	11.11	1.19		11.90
Sodium	.032	.321	.034		.344
Chloride	.53	5.30	.57		5.68
Sulfur	.11	1.13	.12		1.21
	ppm	mg/kg	ppm		mg/kg
Iron	65	65	70		70
Zinc	35	35	37		37
Copper	4	4	5		5
Manganese	14	14	15		15
Molybdenum	3.1	3.1	3.3		3.3
Cobalt	.09	.09	.09		.09
	As Fed		100% Dry		
RFV					64

Analysis performed by:



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Lab Sample No: 23627280
Page 1 of 1

Analyzed for:

KATRINA KELLY
PO BOX 294
MOWBERRY
TASMANIA, 7248
AUSTRALIA

Lab Desc: 102
Date Sampled:
Date Received: 04/06/2017
Date Printed: 04/11/2017
Description 1: CHAFFING PRODUCT POA TUSsocks
Description 2:
Statement ID: 23-1-17 #1

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Results

% Moisture	6.7				
% Dry Matter	93.3				
	As Sampled		Dry Matter		
Digestible Energy (DE), Mcal/kg		1.77			1.90
	%	g/kg	%		g/kg
Crude Protein	5.6	56.1	6.0		60.1
Estimated Lysine	.22	2.2	.23		2.3
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ESC (Simple Sugars)	4.4	44.0	4.7		47.2
Starch	.4	3.7	.4		3.9
Non Fiber Carbo. (NFC)	13.9	138.7	14.9		148.6
Crude Fat	1.1	11.1	1.2		11.9
Ash	3.4	34.5	3.7		36.9
	%	g/kg	%		g/kg
Calcium	.09	.89	.10		.96
Phosphorus	.10	1.04	.11		1.11
Magnesium	.07	.68	.07		.72
Potassium	1.11	11.11	1.19		11.90
Sodium	.032	.321	.034		.344
Chloride	.53	5.30	.57		5.68
Sulfur	.11	1.13	.12		1.21
	ppm	mg/kg	ppm		mg/kg
Iron	65	65	70		70
Zinc	35	35	37		37
Copper	4	4	5		5
Manganese	14	14	15		15
Molybdenum	3.1	3.1	3.3		3.3
Cobalt	.09	.09	.09		.09
	As Fed		100% Dry		
RFV					64

Analysis performed by:

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Lab Sample No: 23527290
Page 1 of 1

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KATRINA KELLY
PO BOX 294
MOWBERRY
TASMANIA, 7248
AUSTRALIA

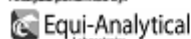
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Date Sampled:
Date Received: 04/06/2017
Date Printed: 04/13/2017
Description 1: CHAFFING PRODUCT POA TUSsockS
Description 2:
Statement ID: 23-1-17 #2

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Results

% Moisture	6.8			
% Dry Matter	93.2			
	As Sampled		Dry Matter	
Digestible Energy (DE), Mcal/kg	1.75		1.88	
	%	g/kg	%	g/kg
Crude Protein	8.5	84.8	9.1	91.0
Estimated Lysine	.33	3.3	.35	3.5
Lignin	4.1	40.7	4.4	43.7
Acid Detergent Fiber (ADF)	42.4	424.4	45.5	455.3
Neutral Detergent Fiber (aNDF)	67.5	675.3	72.5	724.6
WSC (Water Sol. Carbs.)	3.3	33.0	3.5	35.4
ESC (Simple Sugars)	3.3	32.9	3.5	35.3
Starch	.2	1.9	.2	2.0
Non Fiber Carbo. (NFC)	11.2	111.8	12.0	120.0
Crude Fat	1.4	13.8	1.5	14.8
Ash	4.6	46.3	5.0	49.7
	%	g/kg	%	g/kg
Calcium	.09	.95	.10	1.02
Phosphorus	.22	2.22	.24	2.38
Magnesium	.09	.94	.10	1.01
Potassium	1.56	15.55	1.67	16.69
Sodium	.024	.243	.026	.261
Chloride	.63	6.30	.66	6.76
Sulfur	.16	1.59	.17	1.71
	ppm	mg/kg	ppm	mg/kg
Iron	89	89	96	96
Zinc	32	32	35	35
Copper	7	7	8	8
Manganese	33	33	35	35
Molybdenum	.7	.7	.8	.8
Cobalt	.10	.10	.10	.10
	As Fed		100% Dry	
RFV			69	

Analysis performed by:



Equi-Analytical
Laboratory
730 Warren Road
Reno, NV 89502
1-877-419-4110
www.equi-analytical.com

Lab Sample No: 23627300
Page 1 of 1

Analyzed for:

KATRINA KELLY
PO BOX 294
MOWBERRY
TASMANIA, 7248
AUSTRALIA


Lab Desc: 102
Date Sampled:
Date Received: 04/06/2017
Date Printed: 04/11/2017
Description 1: CHAFFING PRODUCT POA TUSsocks
Description 2:
Statement ID: 23-1-17 #3

Visit our website www.equi-analytical.com for information on interpreting and using your results.

Results

% Moisture	6.5			
% Dry Matter	93.5			
	As Sampled		Dry Matter	
Digestible Energy (DE), Mcal/kg	1.72		1.84	
	%	g/kg	%	g/kg
Crude Protein	6.1	60.9	6.5	65.1
Estimated Lysine	.24	2.4	.25	2.5
Lignin	6.2	62.4	6.7	66.8
Acid Detergent Fiber (ADF)	44.6	446.3	47.7	477.4
Neutral Detergent Fiber (aNDF)	70.6	705.6	75.5	754.8
WSC (Water Sol. Carbs.)	3.9	38.5	4.1	41.2
ESC (Simple Sugars)	2.2	21.9	2.3	23.4
Starch	.4	4.1	.4	4.4
Non Fiber Carbo. (NFC)	11.5	115.0	12.3	123.1
Crude Fat	1.2	12.0	1.3	12.9
Ash	4.1	41.2	4.4	44.1
	%	g/kg	%	g/kg
Calcium	.12	1.21	.13	1.30
Phosphorus	.20	2.02	.22	2.16
Magnesium	.06	.64	.07	.68
Potassium	1.27	12.74	1.36	13.63
Sodium	.023	.229	.025	.245
Chloride	.53	5.30	.57	5.67
Sulfur	.13	1.26	.13	1.35
	ppm	mg/kg	ppm	mg/kg
Iron	54	54	57	57
Zinc	25	25	27	27
Copper	4	4	4	4
Manganese	33	33	36	36
Molybdenum	1.2	1.2	1.2	1.2
Cobalt	.05	.05	.05	.05
	As Fed		100% Dry	
RFV			64	

Analysis performed by:



Equi-Analytical
Laboratory

730 Warner Road
Riverside, NY 14660
1-877-810-4150
www.equi-analytical.com

Lab Sample No: 23627310

Page 1 of 1

Lab Desc: 102

Date Sampled: 04/06/2017

Date Received: 04/11/2017

Date Printed: 04/11/2017

Description 1: CHAFFING PRODUCT POA TUSsockS

Description 2:

Statement ID: 12-3-17 #1

Visit our website www.equi-analytical.com for information on interpreting and using your results.

Analyzed for:

KATRINA KELLY
PO BOX 294
MOWBERRY
TASMANIA, 7248
AUSTRALIA

Results

% Moisture	7.1				
% Dry Matter	93.0				
		As Sampled		Dry Matter	
Digestible Energy (DE), Mcal/kg		1.86		2.00	
	%	g/kg		%	g/kg
Crude Protein	5.5	55.4		6.0	59.6
Estimated Lysine	.22	2.2		.23	2.3
Lignin	6.3	62.6		6.7	67.4
Acid Detergent Fiber (ADF)	45.7	456.6		49.1	491.2
Neutral Detergent Fiber (aNDF)	67.8	677.8		72.9	729.2
WSC (Water Sol. Carbs.)	5.3	52.7		5.7	56.7
ESC (Simple Sugars)	3.1	30.8		3.3	33.1
Starch	.3	2.7		.3	2.9
Non Fiber Carbo. (NFC)	14.9	148.9		16.0	160.2
Crude Fat	2.1	20.9		2.3	22.5
Ash	2.6	26.5		2.9	28.5
	%	g/kg		%	g/kg
Calcium	.13	1.25		.13	1.34
Phosphorus	.08	.82		.09	.89
Magnesium	.05	.50		.05	.54
Potassium	.80	8.01		.86	8.62
Sodium	.021	.210		.023	.226
Chloride	.30	3.00		.32	3.23
Sulfur	.11	1.10		.12	1.19
	ppm	mg/kg		ppm	mg/kg
Iron	59	59		64	64
Zinc	17	17		18	18
Copper	3	3		3	3
Manganese	45	45		49	49
Molybdenum	.4	.4		.4	.4
Cobalt	.09	.09		.10	.10
		As Fed		100% Dry	
RFV				65	

Analysis performed by:

Equi-Analytical
Laboratory
730 Warren Road
Ithaca, NY 14850
1-877-819-4110
www.equi-analytical.com

Lab Sample No: 23827320
Page 1 of 1

Lab Desc: 102
Date Sampled: 04/06/2017
Date Received: 04/18/2017
Date Printed: 04/18/2017
Description 1: CHAFFING PRODUCT POA TUSsockS
Description 2:
Statement ID: 12-3-17 #2

Analyzed for:


KATRINA KELLY
PO BOX 294
MOWBERRY
TASMANIA, 7248
AUSTRALIA

Visit our website www.equi-analytical.com for information on interpreting and using your results.

Results

% Moisture	6.7				
% Dry Matter	93.3				
	As Sampled		Dry Matter		
Digestible Energy (DE), Mcal/kg		1.51		1.62	
	%	g/kg	%	g/kg	
Crude Protein	5.0	49.9	5.3	53.5	
Estimated Lysine	.19	1.9	.21	2.1	
Lignin	7.3	73.3	7.9	78.6	
Acid Detergent Fiber (ADF)	42.4	424.4	45.5	454.7	
Neutral Detergent Fiber (aNDF)	75.0	750.5	80.4	804.2	
WSC (Water Sol. Carbs.)	3.0	30.3	3.2	32.5	
Non Fiber Carbo. (NFC)	4.0	39.5	4.2	42.3	
	%	g/kg	%	g/kg	
Calcium	.11	1.15	.12	1.23	
Phosphorus	.06	.61	.07	.66	
Magnesium	.05	.48	.05	.51	
Potassium	.92	9.17	.98	9.82	
Sodium	.060	.595	.064	.638	
Chloride	.41	4.10	.44	4.39	
Sulfur	.09	.89	.09	.95	
	ppm	mg/kg	ppm	mg/kg	
Iron	72	72	78	78	
Zinc	17	17	18	18	
Copper	3	3	3	3	
Manganese	40	40	43	43	
Molybdenum	.2	.2	.2	.2	
Cobalt	.15	.15	.16	.16	
	As Fed		100% Dry		
RFV			62		

Analysis performed by:



Equi-Analytical
Laboratory

230 Warren Road
Stucco, NY 14880
1-877-819-4110
www.equi-analytical.com

Lab Sample No: 23827330
Page 1 of 1

Lab Desc: 103

Date Sampled: 04/06/2017
 Date Received: 04/13/2017
 Date Printed: 04/13/2017
 Description 1: CHAFFING PRODUCT POA TUSsockS
 Description 2:
 Statement ID: 12-3-17 #3

Visit our website www.equi-analytical.com for information on interpreting and using your results.

Analysed for:

KATRINA KELLY
PO BOX 294
MOWBERRY
TASMANIA, 7248
AUSTRALIA

Results				
% Moisture	6.2			
% Dry Matter	93.8			
Digestible Energy (DE), Mcal/kg	As Sampled		Dry Matter	
		1.85		1.76
	%	g/kg	%	g/kg
Crude Protein	4.0	40.1	4.3	42.7
Estimated Lysine	.14	1.4	.15	1.5
Lignin	3.2	31.7	3.4	33.8
Acid Detergent Fiber (ADF)	44.6	446.4	47.6	476.1
Neutral Detergent Fiber (aNDF)	77.6	775.8	82.7	827.5
WSC (Water Sol. Carbs.)	2.6	26.0	2.8	27.8
ESC (Simple Sugars)	2.4	23.9	2.5	25.5
Starch	.4	4.1	.4	4.3
Non Fiber Carbo. (NFC)	8.4	83.7	8.9	89.3
Crude Fat	1.2	12.0	1.3	12.8
Ash	2.6	26.0	2.8	27.7
	%	g/kg	%	g/kg
Calcium	.11	1.11	.12	1.18
Phosphorus	.06	.62	.07	.66
Magnesium	.05	.53	.06	.57
Potassium	.64	6.42	.66	6.65
Sodium	.028	.280	.030	.299
Chloride	.25	2.50	.27	2.67
Sulfur	.08	.80	.09	.85
	ppm	mg/kg	ppm	mg/kg
Iron	58	58	62	62
Zinc	20	20	22	22
Copper	3	3	3	3
Manganese	33	33	35	35
Molybdenum	.8	.8	.8	.8
Cobalt	.09	.09	.09	.09
	As Fed		100% Dry	
RFV				58

Appendix 2 Equi-Analytical Invoice



730 Warren Road
Ithaca, NY 14850
1-877-819-4110
www.equi-analytical.com

Invoice Number: 16556
Date: 06/29/17
Page 1 of 1
Reprint

INVOICE

KATRINA KELLY
PO BOX 294
MOWBERRY
TASMANIA, 7248
AUSTRALIA

Quantity	Description	Total
8	EQ CONSULTANT PROFILE - 23627250, 23627260, 23627270, 23627280, 23627290, 23627300, 23627310, 23627330	632.00
1	EQUI-ANALYTICAL CUSTOM BASE FEE - 23627320	7.00
1	Crude Protein - 23627320	6.00
1	Acid Detergent Fiber - 23627320	6.00
1	Neutral Detergent Fiber - 23627320	6.00
1	Lignin - 23627320	9.00
1	Sulfur - 23627320	5.00
1	Chloride - 23627320	8.00
1	Cobalt - 23627320	5.00
1	Sugar - 23627320	7.00
10	Minerals - 23627320	15.00
	Miscellaneous Charge	(30.00)

Payment Details

CC: 4xxxxxxxxxx2688 (Expires 06/17) \$676.00

Total	\$676.00
Paid	\$676.00
Balance Due	\$0.00

Office Use Only

PAID

TEST WITH THE BEST

48