The effects of varying amylose levels in different diets on digestibility and glycemic response in canines

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Introduction

- In canines, blood glucose response varies based on the type of carbohydrate and rate of digestion[1,2]
- Low glycemic diets promote weight loss or maintenance of weight through increased satiety[3]
- In human studies, amylose is a slowly digested starch that could decrease glycemic response and digestibility[4]

Study Objectives

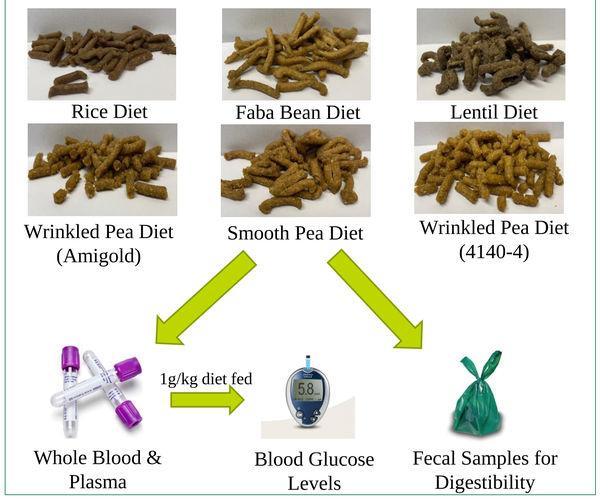
- In dogs, compare starch digestibility among diets based on their varying levels of amylose
- Assess the glycemic response of diets to determine which diet promotes a lower glycemic response in dogs

Hypothesis

Dog diets with higher levels of amylose will produce a low glycemic response due to decreased rates of digestion

Materials & Methods

6 Test Diets (fed for 7 days):

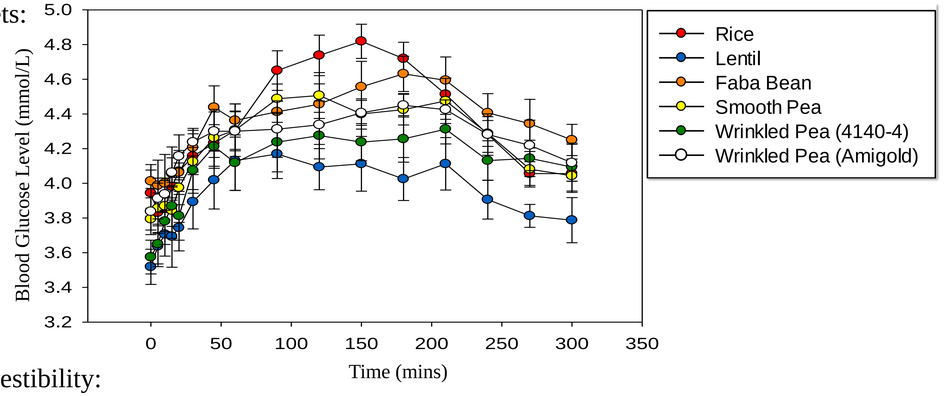


Results

Diet Formulations:

Ingredient Name	Rice Diet	Lentil Diet	Faba Bean Diet	Smooth Pea Diet	Wrinkled Pea Diet (4140-4)	Wrinkled Pea Diet (Amigold)
Flour (%)	23.12	42.19	46.4	41.67	58.65	58.14
Chicken Meal (By-Product, %)	37.83	21.494	17.533	24.26	8.85	9.034
SOLKA-FLOC (%)	15	13.812	13.563	11.57	10	10
Chicken Fat (%)	10	10	10	10	10	10
Fish Meal (%)	5	5	5	5	5	5
Canola Oil (%)	6.55	5	5	5	5	5
Celite (%)	1	1	1	1	1	1
Vitamin/Mineral Premix (%)	1	1	1	1	1	1
NaCl (%)	0.3	0.3	0.3	0.3	0.3	0.3
Choline Chloride (%)	0.1	0.1	0.1	0.1	0.1	0.1
Calcium Carbonate (%)	0.05	0.05	0.05	0.05	0.05	0.05
Dicalcium Phosphate (%)	0.05	0.05	0.05	0.05	0.05	0.376
Amylose Content (% in diet)	4.64	6.84	7.01	7.30	13.09	14.82

Glycemic Response of Diets:



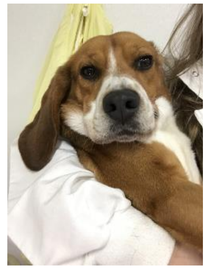
Glycemic Response & Digestibility:

	Glucose	Rice	Lentil	Faba Bean	Smooth Pea	Wrinkled Pea (4140-4)	Wrinkled Pea (Amigold)	P - Value
Fasted Blood Glucose (mmol/L)*	3.8 ± 0.2	3.9 ± 0.1^{a}	3.5 ± 0.1^{b}	4.0 ± 0.1^{a}	3.8 ± 0.06^{a}	3.6 ± 0.1^{b}	3.8 ± 0.1^{a}	< 0.001
Peak (mmol/L)*	6.3 ± 0.2	5.0 ± 0.09^{a}	4.4 ± 0.1^{b}	4.8 ± 0.1^{a,b}	4.7 ± 0.1^{a,b}	4.5 ± 0.1^{a,b}	4.7 ± 0.1^{a,b}	0.01
Time to Peak (mins)**	52.5 ± 5.5	135 ± 12.7	99.4 ± 18.6	132.5 ± 20.9	91.9 ± 9.2	111.6 ± 18.0	130 ± 22.8	0.2
AUC (mmol/L x mins)*	849.3 ± 19.6	810.9 ± 15.8^{a}	726.5 ± 21.7^{b}	792.6 ± 12.6^{a,b}	780.2 ± 14.0^{a,b}	749.4 ± 18.8^{a,b}	776 ± 14.1^{a,b}	0.02
Glycemic Index*		95.7 ± 2.2^{a}	85.8 ± 2.8^{b}	93.6 ± 2.2^{a}	92.2 ± 2.6^{a,b}	88.3 ± 1.5^{a,b}	91.5 ± 1.2^{a}	< 0.001
Digestibility (%) **		99.98 ± 0.004^{a,b}	99.98 ± 0.008^{a}	99.98 ± 0.002^{a,b}	99.98 ± 0.002^{a,b,c}	99.88 ± 0.02^{b,c}	99.88 ± 0.02^{c}	< 0.001

n = 8, 180 minutes of glycemic response, 1-Way Repeated Measures ANOVA* and Friedman's One-Way ANOVA on Ranked Data**; Different letters indicate significant differences using Tukey's post-hoc analysis (P < 0.05)

Conclusions

- In general, diets with higher amylose levels produced a lowered glycemic response
- However, extrusion resulted in kibbles of different densities with the most dense diet being the lentil diet which confounded the above effect
- Increased amylose content decreases diet digestibility
- Amylose could be utilized in dog diets to promote a low glycemic response and potentially prevent the development of obesity and diabetes, ultimately improving animal health



References

- 1. Thomas, D. E., Brotherhood, J. R., & Brand, J. C. (1991). Carbohydrate feeding before exercise: effect of glycemic index. *International journal of sports medicine*, *12*(02), 180-186.
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- 4. Anderson, G. H., & Woodend, D. (2003). Effect of glycemic carbohydrates on short-term satiety and food intake. *Nutrition reviews*, *61*(suppl_5), S17-S26.

Acknowledgements

Alberta Pulse Growers · Pulse Canada · Ontario Bean Growers · Manitoba Pulse & Soybean Growers · NSERC CRSNG · Saskatchewan Pulse Growers