

EVALUATING FABA BEAN IN CANINE DIETS

A new 26-week study in adult dogs explores safety, cardiac health, and nutritional outcomes of faba bean ingredients.

At a Glance:

- **Faba bean flour, starch and protein concentrate can replace traditional diet ingredients**
- **No adverse clinical or cardiac outcomes were noted**
- **Body weight and composition were maintained**
- **Demonstrates safe inclusion of faba bean ingredients**

This study was conducted by researchers at the University of Guelph, with funding provided by Protein Industries Canada and Pulse Canada.



Evaluating the biochemical parameters, body composition and cardiac function of healthy dogs fed faba bean protein concentrate, starch, and flour

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Faba bean (*Vicia faba* L.) is a sustainable, high-protein pulse crop; however, its use in canine diets, including grain-free formulations, has been limited due to lack of regulatory or consensus approval as a pet food ingredient, the presence of anti-nutritional factors (vicine and covicine), and relatively low concentrations of the sulfur-containing amino acids methionine and cysteine. This study is the first to incorporate flour, starch, and protein concentrate derived from Fabelle, a low vicine and covicine faba bean cultivar, into adult dog diets. The primary objective of this study was to evaluate the long-term safety and nutritional adequacy of dehulled low vicine/covicine faba bean derived ingredients in adult dogs fed at maintenance.

Thirty-six healthy privately-owned adult Siberian Huskies (1-14 yrs) were randomly assigned to one of three dietary treatments (n=12 per group): a corn-based diet (CTL; crude protein (CP): 37.5%, metabolizable energy (ME): 3934 Kcal/kg), replacement of corn with dehulled faba bean flour (FABA1; 41.5% inclusion; CP: 36.03% , ME: 3968 Kcal/kg), or replacement of corn with dehulled faba bean starch and protein concentrate (FABA2; 36% and 8% inclusion, respectively; CP: 40.0%, ME: 3971 Kcal/kg). Following a 4-week wash-in period (week -4 to -1) on the CTL diet, dogs were randomized to treatment groups balanced for age, sex, body weight (BW) and ejection fraction measured by transthoracic echocardiograms (ECHO). Dogs were then fed the experimental diets for 26 weeks. Overall health and safety was assessed through measurements of BW, feed intake (FI), body composition by dual-energy X-ray absorptiometry (DEXA), and standard clinical health parameters, including serum biochemistry. Circulating sulfur amino acids (SAA) including cysteine, homocysteine and Cardiac health was assessed by measurement of high-sensitivity cardiac troponin I (hs-cTnI) serum concentrations and ECHO were conducted to assess cardiac structure and function. BW was evaluated weekly, with FI adjusted for week 0 BW maintenance. DEXA scans and ECHO were performed at weeks -2 and 24. Fasted blood samples were collected at baseline (week -1) and at weeks 1, 3, 7, 15, and 25 for assessment of routine clinical chemistry and hs-cTnI. PROC GLIMMIX procedure in SAS was used for data analysis. All outcomes, except ECHO and DEXA, were analyzed as repeated measures with baseline values included as covariates and the effect of dietary treatment, week and their interaction were included as fixed effects. Individual dog was included as a random effect. For ECHO and DEXA, only diet was included as a fixed effect, with baseline (week -2) included as a covariate.

Overall, inclusion of faba bean derived ingredients resulted in no adverse clinical, cardiac, or body composition outcomes. Both BW and FI increased over week (P < 0.01), with the highest values demonstrated at weeks 19 and 16, respectively which differed from several mid- to early- study weeks (P < 0.05). There were no changes in any ECHO or DEXA measurements among diets at week 24 (P > 0.098). Several changes in serum biochemistry were observed, but values remained within healthy reference ranges. One difference reported was cholesterol, which showed a week x diet interaction (P = 0.031). At week 15, cholesterol concentrations were higher in dogs fed FABA1 (4.61 ± 0.22 mmol/L) than CTL (3.48 ± 0.22 mmol/L) (P = 0.029). Cholesterol levels in the FABA2 group (4.10 ± 0.23 mmol/L) did not differ from either diet. Similarly at week 25, cholesterol concentrations were higher in FABA1 (4.48 ± 0.22 mmol/L) compared with CTL (3.55 ± 0.22 mmol/L; P = 0.005). In addition, hs-cTnI concentrations also varied by week (P = 0.004), with higher hs-cTnI concentrations at weeks 15 (14.33 ng/L) and 25 (14.76 ng/L) compared to week 3 (9.68 ng/L) across all dietary treatments. However, dogs remained below the <20-49.9 ng/L reference range, indicating no myocardial injury and signifying lack of biological pertinence.

Collectively, these results show that faba bean ingredients are well tolerated and supports the safe use and commercialization of Fabelle faba bean derived ingredients in adult dog diets, as the 26-week feeding period satisfies Association of American Feed Control Officials (AAFCO) criteria for adult maintenance claims.