

# Feeding faba bean to egg layers on egg production, egg quality, and carbon footprint

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The growing of crops as feedstuffs is a major contributor (~65%) to the carbon footprint of table egg production. Sourcing locally-grown feed commodities likely contributes less carbon by reducing freight compared with trucking feedstuffs produced far away. Faba bean is a pulse crop increasingly grown in Western Canada that has not been tested as feed for egg layers against imported soybean meal, the worldwide most common supplemental protein source in poultry diets. In a 16-week experiment, 128 LSL-Lite Lohmann layers (43 weeks of age) housed 4 per cage were fed increasing dietary inclusions of low-tannin, Snowbird faba bean (0, 8, 16, 24%) replacing both canola and soybean meal to measure effects on egg production, egg quality and carbon footprint. Feeding faba bean did not affect daily feed intake or hen body weight (Table 1), but linearly reduced overall lay percentage by 0.7 and egg mass by 1.45 g/hen-day for each 8% inclusion. Feeding faba bean reduced feed-attributable carbon intensity by 0.54 kg CO<sub>2</sub> equivalent/30 doz case of large eggs (Table 2). Gross income after subtracting feed cost (profit) was linearly reduced by 1.3 ¢/hen-day for each 8% faba bean inclusion. Feeding faba bean linearly reduced egg weight by 1.2 g by reducing albumen as percentage of egg weight by 0.3% for each 8% inclusion, but did not affect yolk or shell weight or shell thickness (Table 3). These results confirmed a reduction in the carbon footprint of table egg production by feeding locally-grown faba bean as a source of starch and protein. The minor reduction in lay production, egg mass and egg weight observed in this experiment could be related to numeric trends in reduced feed intake and efficiency (egg:feed) that progressively decreased energy and amino acid intake of layers over the 16-week trial.

Table 1. Effects of increasing faba bean feed inclusion on hen production (40 – 56 wks)<sup>1</sup>

	Faba bean inclusion, %				SEM	P value	
	0	8	16	20		Level	Linear
Feed intake, g/hen/d	114.3	115.1	113.3	112.3	1.3	0.297	0.920
Wk56 body weight, g	1946	1884	1939	1890	31	0.355	0.568
Eggs/100 hens/d	95.20 <sup>ab</sup>	96.29 <sup>a</sup>	94.26 <sup>bc</sup>	93.37 <sup>c</sup>	0.69	0.001	0.001
Egg mass, g/hen/d	58.90 <sup>a</sup>	59.27 <sup>a</sup>	56.99 <sup>b</sup>	56.68 <sup>c</sup>	0.66	0.001	0.920
Egg/feed, g/g	0.510 <sup>a</sup>	0.512 <sup>a</sup>	0.505 <sup>ab</sup>	0.492 <sup>b</sup>	0.009	0.054	0.016

Table 2. Effects of increasing faba bean feed inclusion on income minus feed cost, carbon footprint (40 – 56 wks)<sup>1</sup>

	Faba bean inclusion, %				SEM	P value	
	0	8	16	20		Level	Linear
Feed-attributable carbon intensity, kg CO <sub>2</sub> eq/30 doz eggs	24.99 <sup>a</sup>	24.02 <sup>b</sup>	23.67 <sup>b</sup>	23.45 <sup>b</sup>	0.41	0.001	0.001
Income-feed cost, \$/hen/d	0.132 <sup>b</sup>	0.135 <sup>a</sup>	0.131 <sup>b</sup>	0.128 <sup>c</sup>	0.001	0.001	0.003

Table 3. Effects of increasing faba bean feed inclusion on egg quality (40 - 56 wks)<sup>1</sup>

	Faba bean inclusion, %				SEM	P value	
	0	8	16	20		Level	Linear
Egg weight, g	62.10 <sup>a</sup>	61.54 <sup>b</sup>	60.43 <sup>c</sup>	58.56 <sup>d</sup>	0.23	0.001	0.001
Albumen, % of egg	55.54 <sup>a</sup>	55.56 <sup>a</sup>	54.93 <sup>ab</sup>	54.70 <sup>b</sup>	0.29	0.030	0.004
Yolk, % of egg	30.29	29.97	30.43	30.65	0.26	0.181	0.093
Haugh units, HU	85.3 <sup>b</sup>	88.1 <sup>a</sup>	88.1 <sup>a</sup>	89.0 <sup>a</sup>	0.6	0.001	0.001

<sup>1</sup>8 replicate cages of 4 layers each per dietary inclusion level of Snowbird faba bean