PULSE CANADA

YELLOW PEAS IN LAYER HEN DIETS

A 12-week feeding trial evaluating the safety, performance, and quality impact of yellow pea inclusion at up to 24% in commercial layer hen diets.

STUDY AT A GLANCE

INSTITUTION
Kasetsart University
Bangkok, Thailand

SPECIES & BREED
Laying hens
(Hisex Brown)

DURATION & SCALE
12 weeks · 216 hens
4 Treatment Groups

INCLUSION LEVELS
0%, 8%, 16%, 24%
Yellow Peas

Demand for high-quality, cost-competitive feed ingredients is growing. Canadian yellow peas offer a combination of digestible protein, energy, and naturally low levels of antinutritional factors that make them well-suited for monogastric feed applications. This study provides the first systematic evaluation of yellow pea inclusion in commercial layer hen diets under tropical production conditions.

KEY FINDINGS

PRODUCTION PERFORMANCE

Yellow pea inclusion at up to 24% had no significant effect on body weight, egg production, feed intake, or feed conversion ratio across the full 12-week trial. Performance was statistically equivalent to the corn-soybean control at all inclusion levels.

24%
Maximum inclusion with no negative effect on production performance

EGG QUALITY

Hens fed 24% yellow peas produced significantly higher yolk weights. Shell quality and Haugh unit scores were unaffected at all inclusion levels. Yolk colour decreased at higher inclusion — a predictable change, correctable with pigment supplementation.

Improved yolk development
Yolk weight significantly higher at 24% inclusion

IMMUNE & BLOOD MARKERS

At 16–24% inclusion, yellow pea diets significantly reduced white blood cell and heterophil levels — markers associated with reduced inflammatory activity. The H:L ratio was unchanged, confirming no physiological stress or immune suppression.

Anti-inflammatory indicators observed
At 16–24% inclusion, without adverse health outcomes

WHY THIS MATTERS

These results demonstrate that Canadian yellow peas can replace up to 24% of conventional ingredients in commercial layer hen diets without compromising production performance.

The potential anti-inflammatory and egg quality benefits at higher inclusion levels represent added value beyond simple nutritional substitution.

YELLOW PEAS IN LAYER HEN DIETS

METHODS AND DIET FORMULATION

Kasetsart University, Bangkok, Thailand · 12-week trial · complete randomized design, 6 replicates per treatment

TRIAL DESIGN

ANIMALS

216 Hisex Brown laying hens, 49–61 weeks of age, allocated across 4 dietary treatments in a completely randomized design.

HOUSING

Battery cages (40 × 40 × 30 cm), 6 replicate cages per treatment, 9 hens per cage — 54 hens per treatment.

DURATION

12 weeks (84 days) of continuous feeding, with performance and egg quality recorded throughout.

EXPERIMENTAL DIETS — INGREDIENT COMPOSITION

Four isonitrogenous, isocaloric diets were formulated to hold protein (17.5% CP) and energy (2,750 kcal AMEn/kg) constant, differing only in yellow pea inclusion: 0%, 8%, 16%, or 24% by weight, replacing corn and soybean meal.

INGREDIENT (%)	CONTROL	8% YP	16% YP	24% YP
Yellow peas	0.00	8.00	16.00	24.00
Corn	54.74	49.17	43.58	38.00
Soybean meal (44%)	24.00	21.16	18.35	15.52
Calcium carbonate	10.13	10.13	10.13	10.13
Full-fat soybeans	4.18	4.18	4.18	4.18
Soybean oil	2.55	2.94	3.33	3.72
Mono-calcium phosphate (22%)	1.81	1.81	1.81	1.81
Soybean hulls	1.25	1.25	1.25	1.25
Sodium bicarbonate	0.56	0.56	0.56	0.56
Salt	0.31	0.31	0.31	0.31
Premix	0.25	0.25	0.25	0.25
DL-Methionine	0.22	0.23	0.25	0.26
L-Tryptophan	0.00	0.01	0.01	0.02
Total	**100.00**	**100.00**	**100.00**	**100.00**

NUTRIENT PROFILE

NUTRIENT	CONTROL	8% YP	16% YP	24% YP
AMEn (kcal/kg)	2,750	2,750	2,750	2,750
Gross energy (kcal/kg)	3,655	3,673	3,690	3,709
Crude protein (%)	17.50	17.50	17.50	17.50
Fat (%)	5.91	6.12	6.33	6.54
Fibre (%)	3.11	3.30	3.49	3.68
Ash (%)	2.50	2.44	2.38	2.32
Calcium (%)	4.20	4.20	4.20	4.20
Total phosphorus (%)	0.70	0.70	0.70	0.70
Available phosphorus (%)	0.43	0.44	0.44	0.45
Salt (%)	0.30	0.30	0.30	0.30

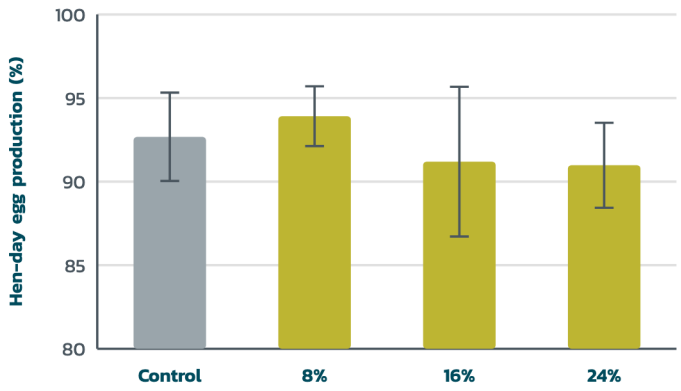
YELLOW PEAS IN LAYER HEN DIETS

PRODUCTION PERFORMANCE

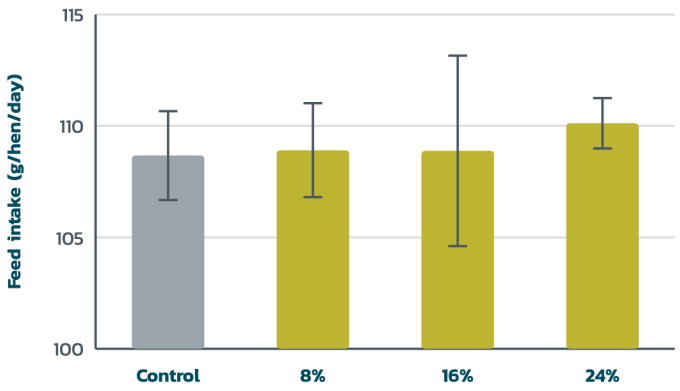
Values are mean ± SEM (n = 6 replicate cages). No significant differences were observed for any parameter (P > 0.05).

PRODUCTION PERFORMANCE

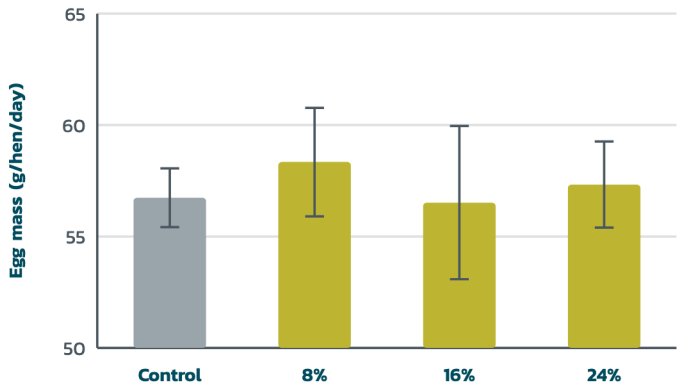
Body weight, hen-day egg production, feed intake, egg mass, and feed conversion ratio showed **no significant differences** between any treatment group and the control across the full 12-week trial. Yellow peas can be included at up to 24% without a production penalty.



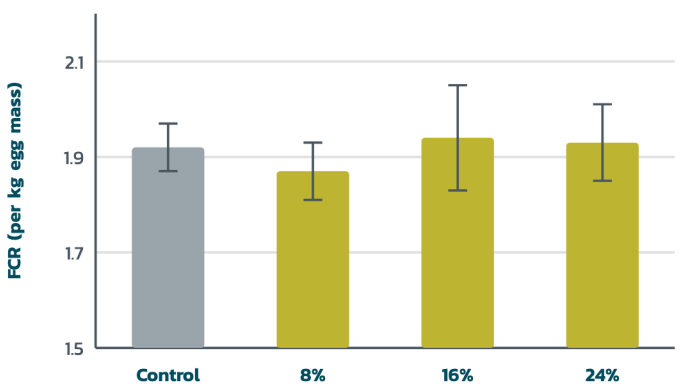
Hen-day egg production (P = 0.323)



Feed intake (P = 0.774)



Egg mass (P = 0.573)



Feed conversion ratio (P = 0.549)

PARAMETER	CONTROL	8% YELLOW PEAS	16% YELLOW PEAS	24% YELLOW PEAS	P-VALUE
Body weight (g)	1,861 ± 33	1,863 ± 15	1,877 ± 64	1,871 ± 31	0.892
Hen-day egg production (%)	92.68 ± 2.64	93.92 ± 1.79	91.20 ± 4.48	90.98 ± 2.54	0.323
Feed intake (g/d)	108.67 ± 1.99	108.91 ± 2.11	108.88 ± 4.27	110.12 ± 1.13	0.774
Egg mass (g/d)	56.74 ± 1.32	58.34 ± 2.43	56.52 ± 3.44	57.33 ± 1.93	0.573
FCR (per kg egg mass)	1.92 ± 0.05	1.87 ± 0.06	1.94 ± 0.11	1.93 ± 0.08	0.549
FCR (per dozen eggs)	1.41	1.40	1.44	1.46	0.220

YELLOW PEAS IN LAYER HEN DIETS

EGG QUALITY AND IMMUNE MARKERS

Values are mean ± SEM (n = 6 replicate cages). Superscripts [a,b] denote significant differences within a row (Tukey HSD, P < 0.05).

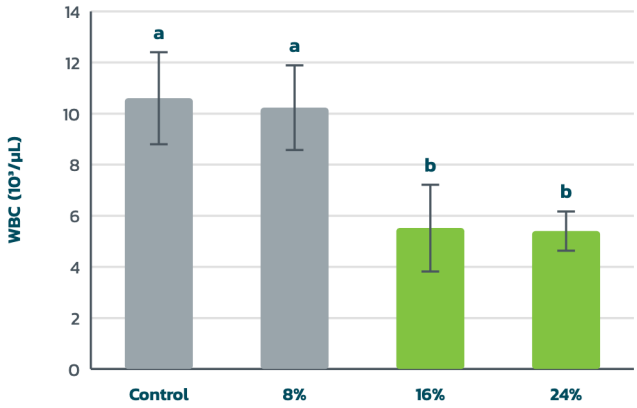
EGG QUALITY & BLOOD MARKERS

Yellow pea inclusion at 24% significantly increased yolk weight, demonstrating its ability to support egg component yield. Diets containing 16% and 24% yellow peas also resulted in **significantly lower white blood cell and heterophil counts**, indicating metabolic balance and enhanced systemic immune homeostasis. While the highest inclusion level affected yolk pigmentation, this expected response to corn replacement can be readily managed through targeted supplementation.

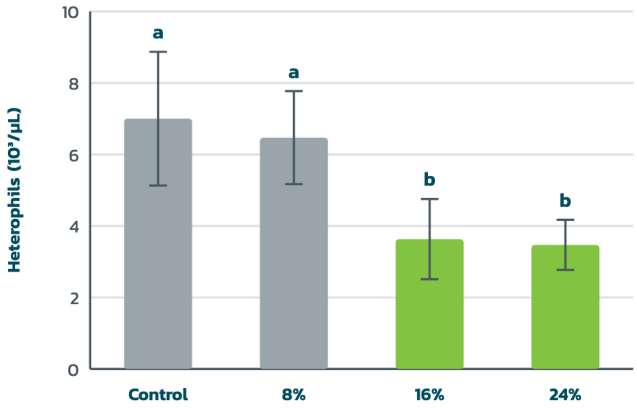
Interestingly, the beneficial effects of yellow pea inclusion were more evident during the later laying period, where a decline in nutrient utilization efficiency and egg quality is typically observed. This suggests that yellow peas may be particularly suitable for older hens, which require easily digestible and highly available nutrient sources.

PARAMETER	CONTROL	8% YP	16% YP	24% YP	P-VALUE
Egg weight (g)	61.27 ± 1.05	62.06 ± 1.78	61.92 ± 1.48	62.95 ± 0.55	0.200
Albumen weight (g)	40.50 ± 0.83	41.23 ± 1.22	40.94 ± 1.16	41.69 ± 0.37	0.211
Yolk weight (g)	14.59^{b} ± 0.32	14.57^{b} ± 0.38	14.80^{ab} ± 0.25	15.06^{a} ± 0.15	0.026*
Yolk colour (Roche scale)	7.44^{a} ± 0.07	7.43^{a} ± 0.14	7.41^{a} ± 0.16	7.19^{b} ± 0.08	0.005*
Haugh unit	90.94 ± 0.95	90.94 ± 1.41	91.54 ± 0.78	91.87 ± 0.93	0.345
Shell thickness (mm)	0.47 ± 0.01	0.47 ± 0.01	0.47 ± 0.01	0.46 ± 0.01	0.217
WBC (10^3/µL)	10.60^{a} ± 1.80	10.23^{a} ± 1.66	5.52^{b} ± 1.70	5.40^{b} ± 0.77	<0.001*
Heterophil (10^3/µL)	7.00^{a} ± 1.87	6.47^{a} ± 1.30	3.63^{b} ± 1.12	3.47^{b} ± 0.70	<0.001*
Heterophil:Lymphocyte ratio	2.32 ± 0.98	2.02 ± 0.65	2.30 ± 0.55	2.08 ± 0.62	0.849

IMMUNE MARKERS BY TREATMENT



White blood cell count. Significantly lower at 16% and 24% inclusion, bars sharing a letter are not significantly different.



Heterophil count. Significantly lower at 16% and 24% inclusion, with the H:L ratio unaffected. Bars sharing a letter are not significantly different.