Effect of XTract 6930 on the nutrients digestibility of laying hens

KEY FINDINGS

XTract 6930 exhibited:

- ***Optimal protein and energy metabolizability at 100ppm***
- ***Improved average villi height***

INTRODUCTION AND OBJECTIVE

To improve the health and well–being of animals, a common use of antibiotics was for prophylactic purpose, such as improvements in growth rate and feed conversion efficiency. But antibiotics as growth promoters have been criticized for the possible occurrence of resistance in microbes. However, in-feed inclusion of antibiotics as performance enhancer is very much prevalent. This situation encouraged researchers to find alternative growth promoting feed additives. Herbs and essential oils have been used since Ancient times and they are gaining interest as feed additive.

The objective of this trial was to test the efficiency of a combination of carvacrol, cinnamaldehyde and eugenol (XTract 6930) at different doses on nutrient digestibility in layers.

MATERIALS AND METHOD

The trial was conducted at the University of the Philippines Los Baoos.

Experimental design

A total of 22-weeks old pullets were used and housed in individual cages for a duration of 20 weeks. They were assigned to one of the 4 dietary treatments (25 replicates per treatment).

Treatments

- **Negative control**: basal diet
- **XT75:** basal diet + 75ppm XTract 6930
- **XT100**: basal diet + 100ppm XTract 6930
- **XT125**: basal diet + 125ppm XTract 6930

Experimental feed

The birds were fed with their respective treatments from 22 to 42 weeks of age (Table 1). Water was available at all times.

Measurements

5 layers were randomly selected for each treatment for crude protein and gross energy digestibility. Chromic oxide was mixed in the feet at 0.20%. Faecal samples from each replicate were collected 3 days after the birds were fed. The collected faecal samples from each replicate were dried and subjected to crude protein analysis, gross energy and chromic oxide determination. Apparent nutrient metabolizability (COM) of crude protein and gross energy were calculated using the equation:

$$COM(nutrient) = (1 - \frac{\%\ indicator\ _{in\ feces}}{\%\ indicator\ _{in\ feed}} \times \frac{\%\ nutrient\ _{in\ feces}}{\%\ nutrient\ _{in\ feed}}) \times 100$$

At week 42, three birds per treatment were sacrificed by cervical dislocation. Tissue samples were taken at the duodenum, jejunum, and ileum. Prepared histological sections of the tissue samples were stained following the Mayer's Hematoxin and Eosin (H and E) technique and average villous height was determined by measuring five adjacent villi from their top to the villous crypt junction.

Table 1: Composition of the diet

Ingredients	%
Yellow Corn	46.37
Soya	29.00
Rice Bran	9.50
Limestone	8.60
Coco oil	3.90
Monodical Phosphate	1.50
Iodized Salt	0.35
Mineral and vitamin Premix	0.78
Calculated analysis	
ME, kcal/kg	2750
Crude Protein, %	18.00
Crude fat, %	6.99
Crude fiber, %	3.09
Lysine, %	0.93
Methionine, %	0.39
Methionine+Cystine, %	0.70
Threonine, %	0.69
Calcium, %	3.50
Total Phosphorus, %	0.85
Available Phosphorus, %	0.45

Statistical analysis

The data were analyzed using Completely Randomized Design and 3-way Factorial Design for the villi measurement. Comparison of treatment means was done using Duncan's Multiple Range Test and Least Significant Difference of SAS 9.1.

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RESULTS AND CONCLUSION

Metabolizability of Nutrients

The COM for energy and protein are presented in Table 2. XTract supplementation showed significant effect on the metabolizability of the crude protein and gross energy. COM of crude protein was improved ($P < 0.05$) when the layer diet was supplemented with 100 to 125ppm of XT with 12.76% to 15.61% improvement with 100 and 125ppm of XTract, respectively. Gross energy, conversely, had a linear pattern of response. As the supplementation of XTract increased, the COM of gross energy significantly increased. A 13.40% improvement in energy utilization was observed when XT was added to layer diet at 125 ppm.

Table 2: Apparent metabolizability of nutrients of diets supplemented with different levels of plant extract

XT treatment	0ppm	75 ppm	100ppm	125 ppm	COV, %
Crude Protein*	63.56^{c}	64.38^{bc}	73.48^{a}	71.67^{ab}	6.63
Gross Energy**	75.09^{d}	78.36^{c}	81.33^{b}	85.15^{a}	2.09

*Means within row with different superscripts differ significantly (P<0.05)
**Means within row with different superscripts differ significantly (P<0.01)

Villi Height

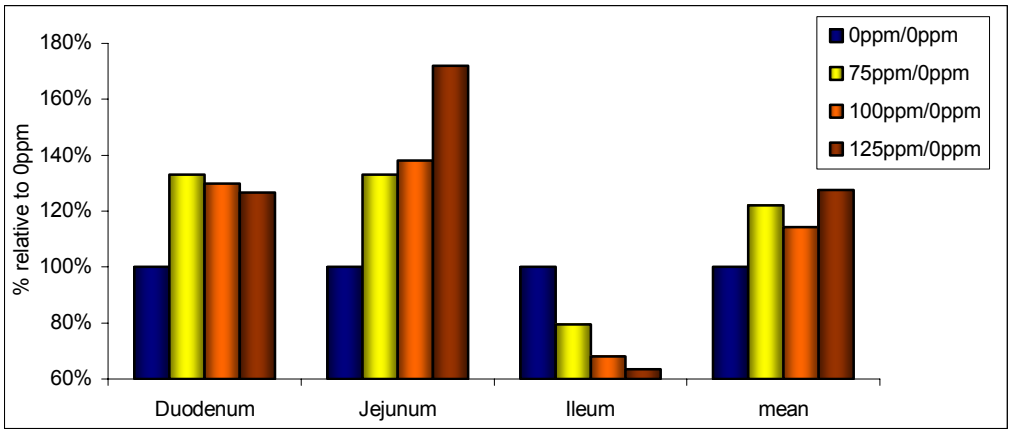
Statistical difference in the average villi heights were noted between the XTract treated diets and the control diets (table 3). This indicated that supplementation with XT XTract even at 75ppm affect positively the average villi height which may potentially result to better nutrient absorption (graph 1). Increasing XTract supplementation did not increase average villi height in duodenum and jejunum but not in ileum. The significantly higher villi height at duodenum may be due to the fact that it is main site of nutrient absorption.

Table 3: average villi height of layers fed diets supplemented with different doses of XTract at 42 weeks of age

	XT treatment			
	0 ppm	75 ppm	100 ppm	125 ppm
Duodenum	9.20	12.25	11.95	11.65
Jejunum	6.95	9.25	9.60	11.95
Ileum	9.05	7.20	6.15	5.75
Mean	8.63^{b}	10.53^{a}	9.87^{a}	11.00^{a}

Means within row with different superscripts differ significantly (P<0.001)

Graph 1: average villi height of layers fed diets supplemented with different doses of XTract relative to the control at 42 weeks of age



This experiment demonstrated that XTract 6930 supplementation improved the metabolizability of crude protein and energy. Highest apparent metabolizability of CP was measured with the basal diet supplemented with 100ppm. For energy, the metabolizability was linearly improved with XTract supplementation. Finally, addition of XTract improved the average villi height.