

Table 4. Average initial body weight (BW), BW gain and final BW of broilers fed diets with Bt corn hybrids, their near isohybrids, and commercial reference hybrid¹

Treatments	Initial BW gm 8 days	BW gain, kg 8-28 days	Total BW gain, kg 29-42 days	Final BW, kg 8-42 days
DK818-NIT	103.75	0.80	0.96	1.76
DK818-NIT	101.25	0.79	1.00	1.79
DK818-IT	107.50	0.81	0.97	1.78
DK838-NIT	102.50	0.76	1.00	1.76
DK838-NIT	106.25	0.81	0.95	1.76
DK838-IT	102.50	0.77	0.99	1.76
Reference hybrid -IT	103.75	0.79	1.01	1.80

No significant differences among treatments ($P>0.05$)

Table 5. Average cumulative feed efficiency of broilers fed diets with Bt corn varieties, their near isohybrids, and commercial reference hybrid¹

Treatments	Feed conversion efficiency, kg 8-28 days	29-42 days	8-42 days
DK818YG-NIT	1.71	2.17	1.96
DK818-NIT	1.72	2.11	1.94
DK818-IT	1.73	2.25	2.01
DK838-NIT	1.76	2.06	1.93
DK838-NIT	1.68	2.22	2.03
DK838-IT	1.74	2.14	1.94
Reference hybrid -IT	1.73	2.17	1.98

¹No significant difference among treatments ($P>0.05$)

Dressing Percentage

The amount of broiler meat available after removing the feathers is important for this is what is eventually traded in the meat market. The dressing percentage of broilers is comparable when fed Bt corn or non-Bt corn diets. With giblets, the dressing percentage ranged from 70.64-73.35. Without giblets, the dressing percentage ranged from 66.20-68.76.

Meat quality

The broiler's meat was evaluated in terms of color, off-flavor, juiciness and tenderness. Regardless of the diets given, the meat of the broilers was comparable in color, off-flavor, juiciness and tenderness.

Conclusion

Broilers fed diets containing Bt corn or non-Bt corn showed comparable performance in terms of feed consumption, body weight gain and feed efficiency. This indicates that the Bt corn Yieldgard varieties and the non-Bt corn varieties are nutritionally equivalent. Likewise, the dressing percentage (with and without giblets) and sensory parameters were not significantly different denoting that the different corn varieties used have similar effects on the meat quality of broilers.

Under the conditions of this study, Bt corn varieties are as safe and nutritious as their near isohybrids and commercial reference hybrid for feed when fed to broilers.

Reference

Querubin, Lydia J., Celina Donna Q. Bantoc, Josephine R. Centeno, Donabel R. Dahilig and Nelia F. Carandang. 2003. *Feeding value for broilers of two Yieldgard (YG) corn hybrids versus their isogenic counterparts, treated with and without insecticides. Philippine Journal of Veterinary and Animal Science, 29(2): 84-96.*

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Philippines Bt corn and feed safety



Growth performance and meat quality of broilers fed with Bt corn and non-Bt corn diets are comparable suggesting the safety of Bt corn as feeds

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Background



Rapid population growth means more mouths to feed and more foods to produce. For the animal industry, this means more livestock and poultry products. Consequently, more feeds is required to meet the nutritional needs of these animals. Corn is a major ingredient in feed formulations. In the Philippines, the local production of corn is not enough to supply the growing demand of the animal industry.

One of the limiting factors in corn production is the damage caused by the Asiatic corn borer (ACB) *Ostrinia furnacalis* (Guenee) which causes as much as 30-50% yield reduction. The injuries caused by corn borers become entry points for fungal pathogens or molds that produce harmful substances called mycotoxins. When the infected parts of corn plants containing mycotoxins are eaten by animals, reduced performance, sickness and death may occur. Scientists have developed Bt corn that will enable the corn plant to protect itself from ACB attack by producing its own insecticidal protein. Bt corn's name is derived from the gene inserted in the genetic make-up of the corn plant which came from a common soil bacterium, *Bacillus thuringiensis*.

The Philippines Department of Agriculture issued permit for the commercial propagation of Bt corn MON810 on December 2002.

Presented here are results of a local study that investigated the feed safety and feeding value of Bt corn to broilers and its effects on meat quality.

Commercial broiler chicks were fed from 8 to 42 days of age with seven different diets of two

Bt corn varieties (DK818YG and DK838YG), their near isohybrids-(the same hybrids but non-Bt, DK818 and DK838) with and without insecticidal treatment and a commercial reference hybrid with insecticidal treatment during the corn growing period. The birds were fed with starter diet from 8 to 28 days of age and finisher diet from 29 to 42 days of age.

The corn grains used in the feeding studies were harvested from farmers' fields in Isabela where the different corn varieties were grown.

Protein content

Crude protein content of the different corn varieties was similar. It ranged from 7.42-7.91%. For the broiler diets, the crude protein ranged from 21.06-21.88% for starter and 19.31-20.25% for finisher diet (Table 1).

Table 1. Crude protein content of the Bt corn hybrids, their near isohybrids with (IT) and without (NIT) insecticide treatment, and commercial reference hybrid¹

Varieties	CP	CP (%)	
		starter diet	finisher diet
DK818YG-NIT	7.49	21.09	20.25
DK818-NIT	7.46	21.09	20.20
DK818-IT	7.51	21.06	20.25
DK838YG-NIT	7.91	21.88	19.50
DK838-NIT	7.70	21.05	19.55
DK838-IT	7.42	21.81	19.31
Reference hybrid- IT	7.58	21.09	19.37

¹ Extracted from proximate composition analysis in Tables 1, 4 and 5 from Querubin, L.J. et al, 2003; no significant difference among treatments (P>0.05) Legend: CP=crude protein

Feed energy and digestibility

The study also demonstrated that Bt corn varieties were as digestible and provided similar energy levels as the non-Bt corn varieties. Digestibility of the different corn varieties ranged from 88-91% while the gross energy ranged from 3852-3980 kcal/kg corn and the metabolizable energy ranged from 3421-3621 kcal/kg corn (Table 2).

Table 2. Coefficient of apparent digestibility (COD) of gross energy and gross and metabolizable energy of Bt corn hybrids, their near isohybrids, and commercial reference hybrid¹

Varieties	COD _{GE} %	GE ²	ME ³
DK818YG-NIT	88.02	3887	3421
DK818-NIT	90.75	3952	3586
DK818-IT	91.83	3939	3621
DK838YG-NIT	85.70	3897	3340
DK838-NIT	90.55	3852	3488
DK838-IT	89.48	3947	3532
Reference hybrid- IT	89.92	3980	3579

¹No significant difference among treatments (P>0.05)

² Gross energy (kcal/kg corn, as fed) means total available energy in feeds (raw material)

³ Metabolizable energy (kcal/kg corn, as fed) which was obtained following the Sibbald method, means the energy used by animal after feed consumption/digestion

Broiler performance

Results of the feeding trial showed that feed consumption (Table 3), body weight gain of broilers (Table 4) and feed conversion efficiency (Table 5) are comparable between Bt corn and non-Bt corn varieties. Likewise, the dressing percentage with and without giblets of broilers was not significantly different.

Broilers fed diets with Bt corn varieties or their near isohybrids consumed about the same amount of feed as those fed with the commercial reference hybrid corn. This means that Bt corn varieties did not affect the feed consumption of the birds.

Moreover, broilers fed with Bt corn varieties gained as much weight as those fed with the near isohybrids and commercial reference hybrid. This indicates that Bt corn diets are nutritionally equivalent to support normal growth of the birds.

Feed efficiency included how much of the feed was converted into a unit weight of the animal. All corn varieties used in the feeding trial of broilers showed very good feed conversion efficiency, ranging from 1.68-1.76 from 8 to 28 days of age and 2.06-2.25 from 29 to 42 days of age.

Table 3. Average cumulative feed consumption and total feed consumption of broilers fed diets with Bt corn varieties, their near isohybrids, and commercial reference hybrid¹

Varieties	Feed Consumption (kg)		Total Feed Consumption (kg)
	8-28days	29-42days	
DK818YG-NIT	1.37	2.08	3.45
DK818-NIT	1.36	2.11	3.47
DK818-IT	1.40	2.18	3.58
DK838YG-NIT	1.34	2.06	3.40
DK838-NIT	1.36	2.21	3.57
DK838-IT	1.34	2.12	3.46
Reference hybrid- IT	1.37	2.19	3.56

¹No significant differences among treatments (P>0.05)