

Organophosphorus Induced Delayed Neuropathy Toxicity in Broilers

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Abstract

An experiment was conducted to ascertain the organophosphorus induced delayed neuropathy (OPIDN) toxicity in broilers. One hundred and eighty day old broiler chicks were weighed, wing banded and distributed randomly into 15 replicates of 12 chicks each and 3 replicates were assigned to each diet. Starter and finisher control diets using commonly available feed ingredients and mineral mixture were prepared. The feed ingredients were screened for methyl parathion (MPA) using thin layer Chromatography. Starter diet was fed from 0-21 and finisher diet from 22-44 d. The required amount of MPA was mixed to the starter and finisher control diets to get five dietary concentrations of 0 (D₁), 15 (D₂), 30 (D₃), 45 (D₄) and 60 (D₅) ppm. The OPIDN toxicity expressed during the course of experiment were studied from 0—44 d.

Key words : OPIDN, Methyl parathion, Broilers, Toxicity.

Methyl parathion an organophosphorus insecticide is widely used in agriculture and animal husbandry practices. Thus it becomes integral part of the livestock and poultry feed because of its residual effects. The adult hen is the recognized animal for Organophosphorus Induced Delayed Neuropathy (OPIDN) studies (1, 2). This is because clinical signs which occur after delay period are similar to that which occurs in humans and are easy observe as they progress. Birds play an important role as bio-indicators being conspicuous, relatively easy to observe and in the focus of public interest and care (3). Hence in this study an effort was made to ascertain OPIDN toxicity in broilers.

Methods

One hundred and eighty day old broiler chicks were weighed, wing banded and distributed randomly into 15 replicates of 12 chicks each and three replicates were assigned to each diet. Starter and finisher control diets using commonly available feed ingredients and mineral mixture were prepared (Table 1). The feed ingredients used for diet formulation were screened for the presence of methyl parathion (MPA) using thin layer Chromatography (4) with modifications. Feed found negative for the presence of MPA was used in diet formulation.

The required amount of methyl parathion (MPA) was mixed to the starter and finisher control diets to get the dietary concentration of 0 (D₁), 15 (D₂), 30 (D₃), 45 (D₄) and 60 (D₅) ppm. The OPIDN toxicity expressed during the course of experiment was studied from 0—44 d.

Table 1. Ingredient (%) and nutrient composition of starter and finisher control ration. * Trace mineral mixture added/ 100 kg diet : CuSO₄·5H₂O : 2 g; FeSO₄·7H₂O : 20 g; K₂O₃ : 0.2 g; MnSO₄·7H₂O : 12.3 g; ZnSO₄·7H₂O : 17.6 g. **Vitamin premix added/ 100 kg diet : Vit AB₂D₃K : 10g ; choline chloride ; 50 g; Vit. E4000 IU, Vit B₁ 200 mg B₁₂ 1 mg, Niacin 6000 mg, Pantothenic acid 1000 mg.

Ingredient	Starter part/ 100 parts	Finisher part/ 100 parts
Maize	47	56
Soyabean meal	36	31
Deoiled rice bran	14	10
Salt	0.3	0.3
Vitamin premix**	0.1	0.1
Methionine	0.1	0.1
Mineral Mixture		
Dicalcium phosphate	1.2	1.2
Limestone	1.2	1.2
Trace mineral*	0.1	0.1
Total	100	100

Table 1. Continued.

	Starter part/ 100 parts	Finisher part/ 100 parts
Nutrient Composition (Analyzed)		
Crude protein (%)	22.2	20.2
Calcium (%)	1.02	1.01
Total phosphorus (%)	0.79	0.77
Copper (ppm)	16	15
Manganese (ppm)	62	58
Selenium (ppm)	0.07	0.064
Zinc (ppm)	68	67
Nutrient Composition (Calculated)		
Metabolizable energy (Kcal/kg)	2831	2905
Lysine (%)	1.064	0.937
Methionine (%)	0.51	0.48

Results and Discussion

While spots appeared against the black background in the standard solution of MPA spotted on TLC plate, which was not the case in the feed sample.

Hence the feed sample tested negative for the presence of MPA. Appearance of white spot in the feed sample would have indicated the presence of MPA in feed.

In the hen a lag period of several days is needed before any clinical alteration appear. Early signs of OPIDN observed in this species were abnormal foot placement and leg weakness which affected balance. As OPIDN progressed, hens became reluctant to walk, showed in - coordination and their wings drooped and they used wings for balance. severe signs included loss of upright posture when walking, followed by loss of ability to walk. Eventually the wings also became involved. The OPIDN signs such as abnormal foot placement and leg weakness were observed in MPA diets D₄ and D₅ at about 5 weeks of age whose severity increased with increase in age. At younger age OPIDN signs were transient. At 6 weeks of age the broiler used wing for balance and the OPIDN sign period lasted longer. At 44 d age it could not balance with the help of wing, lost upright posture and ability to walk (Fig.1). OPIDN signs have been reported in chickens upon exposure to neuropathy inducing organophosphorus compounds. However, according to them OPIDN did not seem to appear in chicken under 55—60 days of age, whereas in our experiment it appeared at a younger age (5—7).

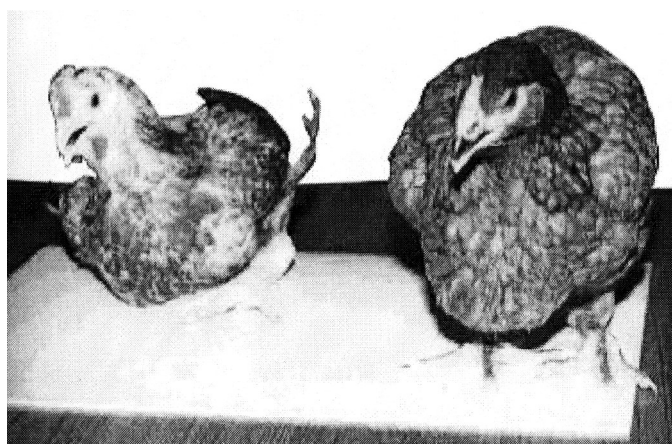


Figure 1. OPIDN toxicity in Broilers Left Abnormal. Right Normal.

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