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## Residues of Melamine Persist in Meat of Broiler Chickens Fed In-Feed Larvacide after Mandatory Withdrawal Period

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### Abstract

Larvacides are commonly used in poultry feed to alter the moulting stage of houseflies (*Musca domestica*) which hatch on droppings, hence reducing the population of flies and smell nuisance in poultry houses. Cyromazine, an active ingredient in larvacides, has melamine as a metabolite which became a public health concern after the death of 9 infants and hospitalisation of 294,000 others after taking melamine tainted infant formula. However, cyromazine is widely used to reduce smell from poultry litter and to increase nitrogen content which usually translates to higher weight gains in broilers without the knowledge of its residual effect on tissues of animals. In this study, residues of in-feed larvacide in broiler tissues was investigated. All protocols used in this study were approved by the Animal Care and Use Review Committee guidelines of Centre of Excellence in Agricultural Development and Sustainable Environment, Federal University of Agriculture, Abeokuta, Nigeria. One-hundred and sixty day old Arbor Acre broilers of approximately 40 g body weight were used in the study. Four diets were formulated to contain cyromazine at 0, 0.25, 0.50 and 0.75 g kg<sup>-1</sup> and they were assigned to 4 dietary groups consisting of 4 replicates per treatment of 10 birds each in a completely randomised design for 42-days feeding trial. A bird per replicate (4 birds treatment<sup>-1</sup>) was sacrificed to harvest tissue for residue determination at week 7, 8, 9 and 10 to establish 7, 14, 21 and 28 days withdrawal periods. Results indicated that melamine residue in meat (drumstick and thigh) were higher in the treated groups than the control group. Traces of melamine was found in the control group which might be from the raw ingredients used for compounding feed and probably from the environment. In conclusion, residues of melamine was left in the tissues of broiler chickens even up to 28 days withdrawal period, which is higher than maximum allowable limit by WHO.

**Keywords:** Cyromazine, Larvacide, Melamine, Residue, Chicken meat

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## **Introduction**

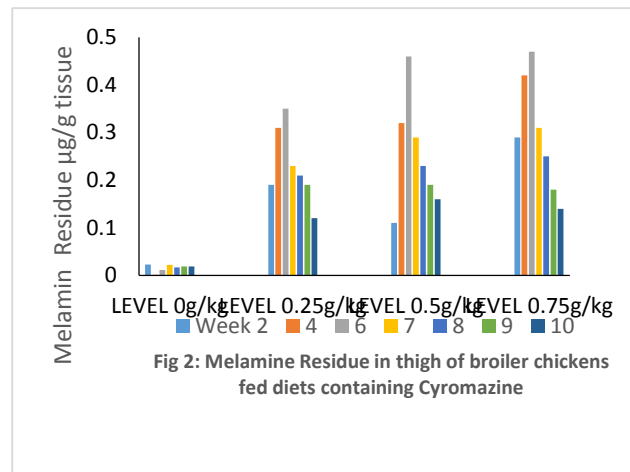
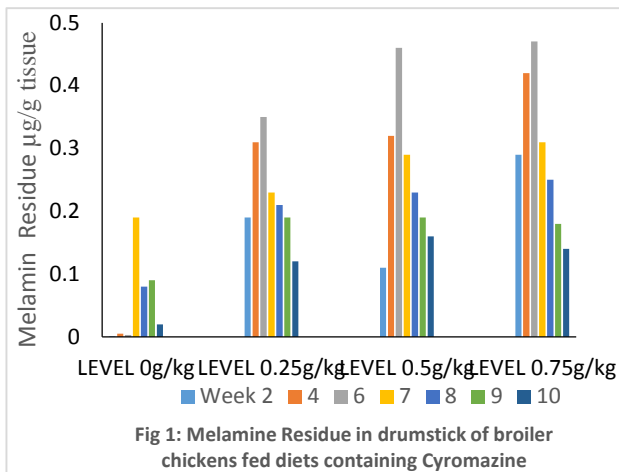
Increase in the number of poultry production enterprises and urban encroachment have resulted in increasing complaints on obnoxious odour pollution from local residents (Power *et al.*, 2005). This made many farmers embrace the use of Cyromazine as feed additive to curb the menace of obnoxious smell arising from poultry litter which is a subject of research. Cyromazine has been reported to prevent the degradation of poultry litter to avoid air pollution (WHO, 2008). Cyromazine is formulated as a pre-mix (1%), which is added to poultry feed; it is also formulated as a water soluble granule and a soluble powder (50%) for topical application to manure containing fly larvae (Royal Society of chemistry 1993). When housefly larvae are exposed to cyromazine, deformations may be observed in the pupal stage, which result from interference with chitin digestion and synthesis. It has been reported that the end product of cyromazine metabolism (melamine) resulted in infant mortality in China after six babies died and 294,000 were hospitalized after drinking melamine tainted infant formula (WHO, 2008). More than 1000 dogs and cats have died in various countries due to renal failure caused by accumulated kidney stones as a result of melamine in pet food (WHO 2008). In a bid to reduce the odour of poultry litter, the health of the consumers and exposure of the neighbours to environmental hazards should be of great concern. In view of this, Lee *et al.* (2011) suggested that environmentalists, resource managers, regulatory bodies use toxicity data in the formulation of various standards designed to protect the environment and make it sustainable. According to this author, pollution control should be practised for the well – being of humans and not the protection of an ecosystem. The study reveals the inclusion of cyromazine to feed and its residue on broiler chicken.

## **Methodology**

All protocols used in this study were approved by the Animal Care and Use Review Committee guidelines of Centre of Excellence in Agricultural Development and Sustainable Environment, Federal University of Agriculture, Abeokuta, Nigeria. One-hundred and sixty day old Arbor Acre broilers of approximately 40 g body weight were used in the study. Four diets were formulated to contain cyromazine at 0, 0.25, 0.50 and 0.75 g kg<sup>-1</sup> and they were assigned to 4 dietary groups consisting of 4 replicates per treatment of 10 birds each in a completely randomised design for 42-days feeding trial. A bird per replicate (4 birds treatment<sup>-1</sup>) was sacrificed to harvest tissue for residue determination at week 7, 8, 9 and 10 to establish 7, 14, 21 and 28 days' withdrawal period. Residue was determined with the use of HPLC.

## **Results and Discussions**

Results indicated that cyromazine residue in meat (thigh and drumstick) were higher ( $P < 0.05$ ) in the treated groups than the control group, which also contained residues of melamine.



Melamine residue in drumstick and thigh found in this study is above 2.5mg/kg of the maximum allowable concentration of human food (WHO 2008; Setiogi, 2008). It is below the legal limit of melamine that led to the death of six infants and over 50000 that were being hospitalised as a result of scandal in infant milk ( McDonald 2002, Macartney 2008, WHO 2010). This indicates that the chicken raised with this inclusion level will not pass the test for melamine by BBC News (2008). The melamine residues in all the treatments in this study is above the 0.0007mg/kg found in breast muscle as reported by Caldas (2007) who stated that 7% of cyromazine supposed to be metabolised to melamine. At 28 days withdrawal (10 weeks), the residue level in 0.25g/kg 0.50g/kg and 0.75g/kg for Drumstick is higher than the 0.2mg per kg body mass of the tolerable daily intake (TDI) which the World Health Organizations food safety estimated as the amount a person could stand per day without incurring a bigger health risk (Endrezl 2008). However, the melamine residue for thigh is lower than that of drumstick but is still above 0.2mg/kg which the European Union set as standard for acceptable human consumption as reported by Harrington (2010). It is also higher than the 0.35mg by the Canadian Authority.

## Conclusion and Outlook

In conclusion, residues of melamine was left in thigh and drumstick of broiler chickens even up to 28 days withdrawal period, which is higher than maximum allowable limit (2.5mg/kg) by WHO. However, Urgent and appropriate public health actions need to be initiated and educated on inclusion of larvacide on feed. More accurate withdrawal time should also be estimated in order to guide the industry on cyromazine safety levels

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