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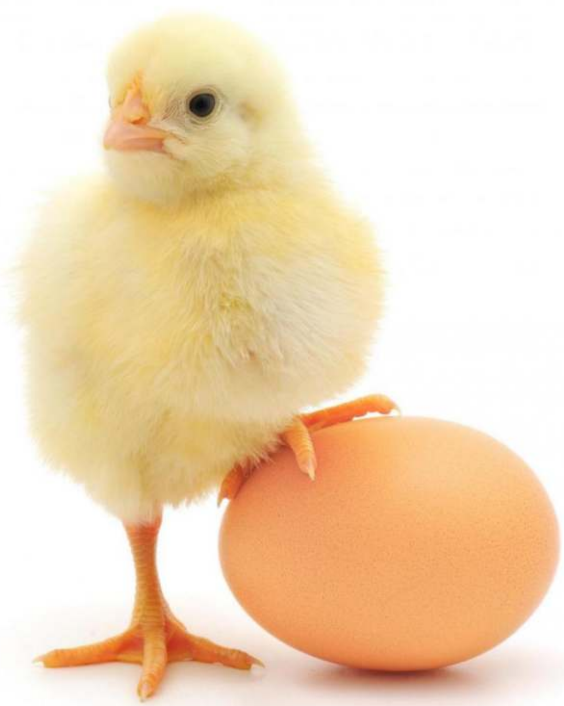

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Effect of Refined Petroleum Product (Kerosene) Flame and Fumes on Serum Enzyme Characteristics of Broiler Chickens

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Abstract: Enzyme serology of broiler chickens exposed to refined petroleum product (kerosene) flame and fumes at varying distances over a period of 16 hrs daily for 56 days in a poultry house was evaluated. The burning of kerosene was simulated in a designed burner. The measured distances were 4m, 8m and 12m from the flame point. The control birds were located in a separate poultry building without the flame treatment. Proprietary broiler starter and finisher diets were fed *ad libitum*. Blood samples were taken at the 4th and 8th weeks for enzymological assay from each treatment. The enzymes assayed were Serum Glutamic Oxaloacetic Transaminase (SGOT), Serum Glutamic Pyruvic Transaminase (SGPT) and Alkaline Phosphatase (ALP). No significant ($P > 0.05$) differences were observed in Serum Glutamic Pyruvic Transaminase (SGPT) and Alkaline Phosphatase (ALP). Results also showed that there were significant differences ($P < 0.05$) in Serum Glutamic Oxaloacetic Transaminase (SGOT).

Key words: Broiler chickens, flame and fumes, kerosene, serum enzyme

INTRODUCTION

Petroleum (crude oil) is a remarkably varied substance both in its use and composition. It is often dark, straw coloured, tar black or sometimes green in outlook.

Crude oil is the chief source of hydrocarbons and when fractionally distilled, the various components are often collected over a range of boiling points (Ababio, 1993). The main fractional distillates of petroleum include natural gas, light petroleum (petroleum ether), ligroin (light naphtha), petrol (gasoline), paraffin (kerosene), gas oil, lubricating oil and asphalt (bitumen). Refined petroleum product (kerosene) is a mixture of hydrocarbons that contains 12-18 carbon atoms per molecule and it boils between 170-250^{o}C. It is a fairly volatile liquid which is used as a fuel for lighting lamps (illumination), heating or cooking, fuel for automobiles driving, modern jets and aeroplanes, burning bush, grasses and wood (incineration) (Murray, 1972; Jumoke, 1999). Kerosene is also a good solvent for grease and paints. It is also used as an insect repellant because of its odour. Developing countries with epileptic electricity supply use kerosene in lanterns and stoves for heating and brooding chicks and other livestock. When kerosene burns, it produces a flame which could be blue, luminous flame or yellow sooty flame, depending on the type of burner used. Fumes from sooty kerosene flame are laden with volatile organic carbon (VOC) and suspended particulate matter (SPM), which irritate the respiratory tract when inhaled either by man or livestock. Enzymes are specific biologically synthesized proteins that catalyze biochemical reactions without undergoing changes in composition. These catalyzed reactions are frequently specific and essential to physiologic functions. Serum Glutamic Oxaloacetic Transaminase (SGOT), Serum Glutamic Pyruvic Transaminase (SGPT) and Alkaline Phosphatase (ALP) are among several other enzymes used in diagnostic enzymology (Ganong, 1971). A low or high range of SGOT, SGPT or ALP is abnormal and is an indicator that the animal may have suffered heart or mild liver damage.

The objective of this study is to determine the effect of burning refined petroleum product (kerosene) on the enzyme serology of broiler chickens.

MATERIALS AND METHODS

120 day old broiler chicks of Aboika breed were divided into 4 groups of 30 birds each, replicated thrice with 10 birds per replicate in a completely randomized design trial. The distances from the flame point were 4m, 8m, 12m and a control, representing the treatments as I, II, III and IV, respectively (Fig. 1). Treatment IV (control) was located in a separate building without flame. The birds were distributed randomly into 12 pens and brooded in an open sided brooding pen on deep litter. Brooding temperatures ranged from 33-35^{o}C. The crude oil was ignited in a designed metal burner, 22.86cm high, I7.80cm diameter and a thickness of 1.27cm (Fig. 2). This study was done at the Teaching and Research Farm of the Rivers State University of Science and Technology in Port Harcourt, Nigeria.

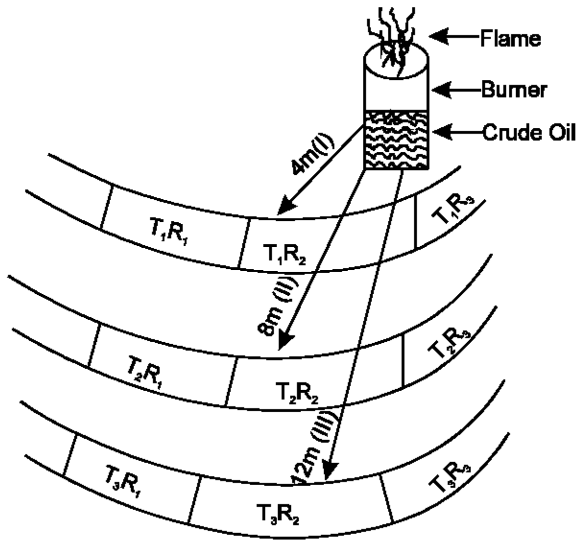

Fig. 1: Poultry pen experimental design, showing the distances from the flame point.

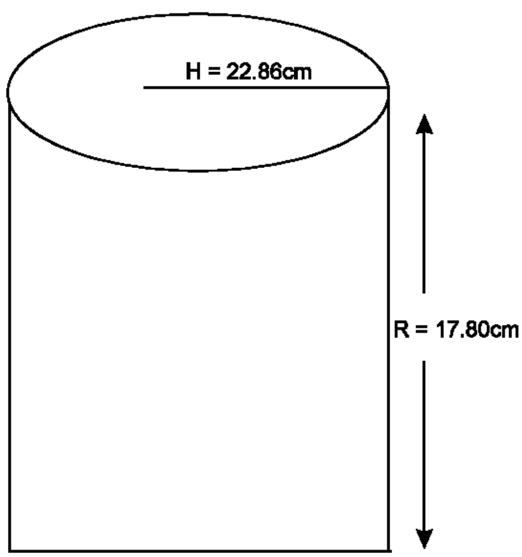

Fig. 2: Design metal burner that was used to burn the kerosene to produce the flame. Diameter = 17.80cm, Height = 22.86cm, Thickness = 1.27cm

The birds were fed *ad-libitum on* a proprietory broiler starter mash containing (2285.6kcalME/kg and 24.91% crude protein) for 5 weeks and a broiler finisher mash (2304.9kcalME/kg and 20.05% crude protein) for 3 weeks. Water was provided *ad-libitum*. Feed intake and mortality values were recorded daily.

At the 4^{th} and 8^{th} weeks, blood samples were collected into well-labeled tubes for serum separation. The samples were analyzed at the Chemical Pathology Department of the University of Port Harcourt Teaching Hospital (UPTH). Data obtained were subjected to analysis of variance (Steel and Torrie, 1980) and treatment means were separated using Duncan's Multiple Range Test (DMRT) as modified by Gomez and Gomez (1984).

Table 1: Overall effect of kerosene flame and fumes on broiler chicken serum enzyme

Week	Distance (m)	SGOT	SGPT	ALP
	4	104.66^a	49.33	150.66
4	8	121.66^b	39.00	144.00
	12	89.00^c	32.00	151.66
	Control	32.00^d	22.00	114.33
Standard Error (SE)		±12.90	±10.02	±14.33
	4	21.00^a	5.00	118.66
8	8	32.00^b	7.66	97.66
	12	28.33^c	9.00	81.00
	Control	17.33^d	6.33	133.33
Standard Error (SE)		±2.74	±0.94	±24.42

^{a,b,c,d}Means within each column that bear different superscripts differ significantly.

RESULTS AND DISCUSSION

Results (Table 1) showed no significant difference among various treatment groups in respect of SGPT and alkaline phosphatase in both the brooding (0-5 weeks) and finishing phases (5-8 weeks). Significant ($P < 0.05$) differences existed in the means of serum glutamic oxaloacetic transaminase (SGOT) in the brooding and finishing phases. This may be due to tissue destruction in that glutamic oxaloacetic transaminase is liberated into serum. However, there were differences in the means of SGOT in the brooding phase, indicating decreased SGOT into the blood to maintain homeostasis for defense mechanism. The significant differences among treatments in respect of serum glutamic oxaloacetic transaminase (SGOT) in both brooding and finishing phases, indicates liver necrosis, followed by increased levels of the enzyme in the serum of the treated groups.

Enzymes are specific biologically synthesized proteins that catalyze biochemical reactions without undergoing changes in composition. These catalyzed reactions are frequently specific and essential to physiologic functions. They are found in all body tissues and frequently appear in the plasma following cellular injury or from degraded cells or storage areas. Tissue damage or necrosis resulting from injury or disease is generally accompanied by increases in the levels of several non-functional plasma enzymes. Serum glutamic oxaloacetic transaminase (SGOT), serum glutamic pyruvic transaminase (SGPT) and alkaline phosphatase (ALP) are among several other enzymes used in diagnostic enzymology (Ganong, 1971). Liver, heart, kidney and blood are the indicator tissues to measure exposure to crude oil pollutants because they produce the enzymes SGOT, SGPT and ALP. These enzymes were reported to increase with increasing crude oil concentrations in diet and have been related to the extent of hepatic, cardiac and kidney damage in treated subjects, (Chambers *et al*., 1978; Zimmerman, 1978). In the present study, levels of these enzymes in the treated groups tended to be higher than the controls

Conclusion: The experiment focused on the effect of refined petroleum product (kerosene) flame and fumes on broiler chicken serum enzymes. The burning of kerosene in both the brooding and finishing phases of broiler chicks resulted in negative responses in the parameters measured. However, kerosene which is used globally for lighting in lamps (illuminant), burning bush, grasses, papers, brooding of day old chicks in stoves, aviation fuel, also has its associated problems of respiratory diseases upon inhalation. The heat (thermal) radiation and continuous light intensity from the burning of kerosene, also added to the stress of the birds, in addition to inhaled fumes. The use of kerosene therefore is not recommended in poultry production especially the brooding phase, in which noxious gases are emitted, VOC and SPM produced by the kerosene flame (as fumes) tended to affect their respiratory systems, liver and heart. Where feasible, electricity as an option should be advocated. But where kerosene has to be used for instance in villages, there should be adequate ventilation to disperse the fumes and heat to reduce the stress level on the chicks.

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REFERENCES
Ababio, O.Y., 1993. New School Chemistry for Senior Secondary School. 3rd Ed. African Feb-Publishers Limited (AEP), Onitsha, Nigeria, pp: 112-120.

Chambers, J.E., J.R. Heintz, F.M. McCorkle and J.D. Yarbrough, 1978. The effects of crude oil on enzymes in the brown shrimps (Penaeus spp). Comp. Biochem Physiol, 61C: 29-32.

Ganong, F.G., 1971. Review of Medical Physiology, 5th Ed., Lange Medical Publications, California, USA, pp: 321-345.

Gomez, K.A. and A.A. Gomez ,1984. Statistical Procedure for Agricultural Research. 2nd ed. John Wiley and Sons Inc., pp: 85-87.

Jumoke, E., 1999. Comprehensive Chemistry for Senior Secondary Schools. Sure Bet for WASSCE. Glance Series. A. Johnson Publ. Ltd. Ikate, Surulere, Lagos, pp: 95-96.

Murray, P.R.S., 1972. Principle of Organic Chemistry. A Modern and Comprehensive Text for Schools and Colleges. South East Asian reprint. H.E.B. Hong Kong, Singapore, Kuala Lumpur, London, pp: 92-96.

Steel, R.G.D. and J.H. Torrie, 1980. Principles and Procedures of Statistics. McGraw-Hill book Co. Inc., New-York, pp: 113-114.

Zimmerman, H.J., 1978. Hepatotoxicity. New York, Appleton-Century-Crofts. New York, pp: 300-320.