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Toxicological Influence of Crude Oil Contaminated Water on Some Reproductive Hormones of Adult Rabbits Does In Niger Delta, Nigeria

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Abstract: *The study examined toxicological influence of crude oil contaminated water on some reproductive hormones of adult rabbits does. Forty (40) adult fertile (does) were randomly assigned to four treatment groups of ten does, designated A, B, C and D respectively in a complete randomized experimental design (CRD). The treatment groups were allocated to four graded levels of crude oil contaminated water as follows: Treatment A (control)- 0.00mls crude oil contaminated water, B - O.O1% crude oil contaminated water, C-O.02% crude oil contaminated water, D-O.03% crude oil contaminated water. From the result, Luteinizing Hormone was significantly affected by the crude oil contaminated water. Treatment A, (0.7) was significantly ($P < 0.05$) more than treatments B (0.5), C (0.45) and D (0.45) respectively. The crude oil contaminated water in groups (B, C and D) were insignificantly affected ($P > 0.05$) by the treatments amongst the groups. Follicle Stimulating Hormones was negatively affected by the treatment groups ($P < 0.05$) more than the control. Progesterone: was not significantly ($P > 0.05$) affected by the crude oil contaminated water between the treatment groups. But there was slight progressive numerical increase from Treatment groups A (0.65) to C (1.65). The least and the highest values are in treatments groups A (0.65) and C (1.65) respectively. The effect on estrogen, progressively decreased ($P < 0.05$) as the treatment increased amongst the groups. It was therefore concluded that crude oil contaminated water impair reproductive hormonal function of rabbits.*

Keywords; *Toxicological, Crude Oil, Contaminated Water, Reproductive Hormones, Rabbits Does, Niger Delta,*

I. Introduction

The toxicology of crude oil which is an area that studies or examines the effects of dosages of given compounds (material or chemical) on the lives of animals or plants exposed to it, has continued to receive wide attention. Toxicity of any compound is measured by means lethal dose (LD50), which is the dose that will kill 50% of the total animals exposed to the given compound. Crude oil has been noted to contain several poisonous compounds, which accumulate in the body and induce toxic symptoms that sometimes result in death. (Heintz et al, 1999)

Crude oil contains most poisonous compounds especially the hydrocarbons that are toxic and dangerous to lives of both plants and animals in the event of spillage within an environment. For instance, it has been noted that severe toxic effects are associated with low boiling compounds and aromatics like the alkanes (olefins) cycloalkanes (naphthenes), and alkanes (olefins)-aromatics (Houghton et al., 1991), Crafts and Reiber, (1948). Effects of poison brought about by the components of crude oil on life of animals cannot be accurately evaluated. This is because of the complicated nature of crude oil pollution since toxic chemicals seldom occur singly (Gibson, 1991). Several of these chemicals or components of the oil act together to produce an effect on the subject (animal or plant) giving a synergistic effect. Sometimes this effect results in weakening of the immune system so that the animal may fall victim much more easily to various parasitic and other disease organisms (Yahaya, 2001).

In the findings of Olawale et al.(2007), they observed that crude oil contaminated diet could pose serious effect on the hormonal system, which may consequently affect the reproduction process in organisms found in a crude oil polluted environment, and change in the endocrine system which may cause changes in reproductive development, growth or behaviour that can affect the animals or human or their offspring (Naz, et al., 1999). According to Monosson et al. (1999), anti-androgens in adult animals increase the serum levels of androgens, luteinizing hormone and estrogen. This may imply that the crude oil is acting as anti-androgenic compounds, and thereby inducing spontaneous abortions, still birth and reproductive malfunction (Alvarez et al., 2000). Cytotoxic and biochemical derangement are associated with ingestion of marine animals in polluted area (Eyong, 2000;

Nwaokwoala, 2000). Brain damage such as cerebral cortex malfunctions were also been observed in fetuses of pregnant rats exposed to bonny light crude oil, (Fischer et al., 2005)

II. Materials And Methods

Location of the study and duration

The study was carried out at the rabbittry section of Rivers State University of Science and Technology Teaching and Research Farm, Nkpolu-Oroworukwo, Port Harcourt, and ran for twelve weeks (12)

Animals and housing

Forty (40) post pubertal adult (7-8 months) fertile New Zealand breed of rabbits comprising four (bucks) and (40) does were used for this study. They were housed in conventional standard single tie hutches of two compartments. The does and bucks were housed in separate hutches. All the rabbits were sheltered in the same stable under the same environmental condition.

Experimental Design

Forty (40) adult fertile (does) were randomly assigned into four treatment groups of ten does and designated A, B, C and D respectively. In a complete randomized experimental design (CRD), each treatment group was further sub-divided into five replicates of two (2) does per replicate. The treatment groups were allocated to four graded levels of crude oil contaminated water as follows: Treatment A (control) 0.00mls crude oil contaminated water

- B O.O1% crude oil contaminated water
- C. O.02% crude oil contaminated water
- D. O.03% crude oil contaminated water3.6

Sample collection

Blood samples were collected via the ear vein with syringes and hypodermic were used to collect blood samples from the animal and stored in an ice pack which was immediately taken to the laboratory for analysis of the following hormones- Follicle stimulating hormones (FSH), Oestrogen, Luteinizing hormone (LH) and Progesterone.

Experimental Technique

The crude oil petroleum used in this study was Bonny light grade and was obtained from Nigeria Agip oil Company (NAOC) at Obirikom flow station in Ogba-Egbema Ndoni Local Government Area of Rivers State. They were exposed for 24 hours in a sheltered pan to allow evaporation of light fraction in order to ensure a stable product (White 1975).

This is in simulation of natural occurring condition following oil spillages in the oil-bearing communities. On arrival, the animals were pre-conditioned for two weeks to get them acclimatized to the new environment, during which feeds (growers mash and forage) and clean water were given adlibitum.

After the pre-conditioning period, the rabbits weighed and its weight recorded, then, the experimental animals (Rabbits) exposed to treatment water containing graded levels of crude oil contaminated water as thus, Treatment (A) (control) 0.0% crude oil, (B) = 0.01% crude oil, (C) (0.02%) crude oil and (D) O. 03% crude oil respectively. They were also exposed to Vitamin E administered in feed at the rate of 1 capsule per 10 rabbits after 3 months of administration of crude oil contaminated water.

Other management practices were strictly observed, for instance regular washing and disinfections of the feeders and drinkers, regular deworming with ivomec and or other dewormer, and intermittent administration of antibiotics, prophylactic administration of coccidiostart etc3.10

Data Analysis

Data obtained were subjected to the Analysis of variance (ANOVA)accoding to Steel and Torrie,(1980) and significant means separated using Duncan's Multiple Range Test (Duncan, 1955). The following analytical models were used:

$Yi = u + Ti + Ei$

where

Yi = Random sampling variable

U = Time means (content)

Ti = Fixed effect of the its treatment

Ei = Random experimental error

III. Results

Table 1. Influence of Graded levels of Crude oil contaminated water on Hormonal assay

S/ No	Performance parameter	Treatment Effect			
		A	B	C	D
1.	Luteinizing Hormone	0.7^{a}	0.5^{b}	0.45^{b}	0.45^{b}
2.	Follicle Stimulating Hormone	0.75^{a}	0.5^{b}	0.45^{b}	0.45^{b}
3.	Progesterone	0.45	0.65	1.65	1.0
4.	Estrogen	907.5^{a}	635.5^{b}	605^{c}	900^{a}

Mean in the same horizontal axis differs significantly ($P < 0.050$)

LH: From the result, LH was significantly affected by the crude oil contaminated water. Treatment A, (0.7) was uses significantly ($P < 0.05$) more than treatments B (0.5), C (0.45) and D (0.45) respectively. The crude oil contaminated water in groups (B, C and D) were insignificantly affected ($P > 0.05$) by the treatments amongst the groups.

FSH: was significantly affected by the treatment groups ($P < 0.05$). The highest increase or impact was observed in treatments A – 0.75a compared to treatments groups B (0.5), C (0.45) and D (0.45) respectively. Treatment B, C and D were not significantly affected ($P > 0.05$) in the treatment groups. But group B showed a slight numerical increase (0.5) than C and D respectively.

Progesterone: Progesterone was not significantly ($P > 0.05$) affected by the crude oil contaminated water between the treatment groups. But there was slight progressive numerical increase from Treatment groups A (0.65) to C (1.65). The least and the highest values are in treatments groups A (0.65) and C (1.65) respectively.

Estrogen: The effect on the estrogen hormones was progressively and significantly decreased ($P < 0.05$) as the treatment increases between the treatment groups. Treatments A (control received the highest impact (905.5) more than treatment groups B (635.5), C (605.5) and went up in treatments D (900).

IV. Discussion

Accumulated scientific data have shown that many man-made and naturally occurring compound released frequently into the environment have adverse effects on the endocrine system of humans and animals (Cooper et al., 1997). Some of the reported adverse effects on both farm animals and human on the endocrine systems and general physiology have resulted in reproductive malfunction and developmental disorder (Indarto and Izawa, 2001).

The observed significant impact the test chemical (crude oil) had on some of the reproductive hormones assayed in this study, suggest that crude oil intoxication through the water, pose significant deleterious effect on the hormonal system, (reproductive hormones of rabbits tested, which may consequently affects the reproductive process. And this collaborates with Otitoju and Onwurah (2007), who reported that crude oil contamination, poses serious effect on the hormonal system influences the reproductive process in organisms found in crude oil polluted environment including humans. They projected that the bioaccumulation of crude oil residues in the ecosystem over a long period of time, may lead to a lot of health problems if adequate care is not taking

The reproduction endocrine system controls many functions of the reproductive changes, development, growth or behaviour that can obviously affect their offspring (Naz, 1999).

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