

SOME WATER POLLUTANTS AND THEIR EFFECTS ON IMMUNE RESPONSE TO VACCINES IN POULTRY

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Dedication

To My Late Father &

To My Family

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LIST OF ABBREVIATIONS

mg/l	milligram per liter
PPM	part per million
Km	kilometer
µg	microgram
Hg	mercury
Pb	lead
Cu	copper
Cd	cadmium
LL	low level
HL	high level
Kg	kilogram
AST	aspartate aminotransferase
ALT	alanine aminotransferase
GGT	gamma glutamyl transferase
LDH	lactose dehydrogenase
SDH	sorbitol dehydrogenase
SGOT	serum glutamic oxaloacetic Transaminase
EAC	erythrocyte antibody compliment
PHA	phytohemagglutinin
PWM	pokeweed mitogen
Con-A	concanavalin-A
SRBCs	sheep red blood cells
IgM	immunoglobulin-M
IgG	immunoglobulin-G
LPS	lipopolysaccharides
MM	millimole
IL	interleukin
CD4 ⁺	T helper cells
CD8 ⁺	T cytotoxic cells
TH1	T helper cell type 1
TH2	T helper cell type 2
FCS	fetal calf serum
MEM	minimal essential medium
µl	microliter
TCID	tissue infective dose
CPM	count per minute

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INTRODUCTION

Introduction

Environmental pollution is a major problem confronting human and animal health. Civilization of the human being leads to impact of pollution in the environment. Water pollution nowadays represents a hazard for all living organisms. It gets polluted through two main sources, non-point sources and point sources. The most important point sources are the industrial and agricultural pollution. Industrial pollution is mainly a result of discharging plant effluent within or near water source, agricultural pollution is mainly a result of drains of agricultural lands within water sources.

Trace elements are considered to be the most important water pollutants. Some of them are important for normal physiological functions in trace amounts, but when exceed certain levels, they have adverse effects. Others have no physiological functions and are considered to be harmful even in traces. Copper is important for certain physiological functions, but it is harmful in high levels. Cadmium, lead and mercury are highly harmful elements. Water may contain one or more of these pollutants and if present collectively they may have either synergistic action leading to increased harmful effects or antagonistic action for each other.

In chicken, water makes up to 85 percent of the body of baby chicks, 55 percent of the body of an adult bird, and 66 percent of egg weight. Birds can lose 98 percent of the body fat or 50 percent of body protein and still survive. However, a 10 percent loss in body water causes serious physiological disorders and 20 percent loss in body water leads to death. Water has many

important functions in the body such as regulating body temperature a feed nutrient in the diet, aiding efficient digestion, metabolism and elimination of body wastes.

While water is the most important nutrient for poultry, it is the one most ignored. Poultry producers pay particular attention to feed consumption, temperature, and egg production, ventilation, and light intensity, but pay little attention to water quality and water consumption by birds. In many instances when flocks perform poorly, the reason may be consumption of water contaminated with high concentration of bacteria, organic and or inorganic toxic elements.

Heavy metals induce pathological effects, not only by direct interactions with a target organ but also by modulating components of the immune system and or self antigens that culminate in pathological changes. Immunotoxicity induced by heavy metals may take two routes, the more obvious route being toxic effects on a component (s) of the immune system. The etiologic agent could suppress the immune system so that normal homeostasis is disrupted and pathogens may invade and cause tissue damage. Alternatively, modulation of the immune system or the antigenicity of self could result in inflammatory and autoimmune disorders (Lawerence, 1985). The effect of heavy metal pollutants on the immune system of growing chicks has not been thoroughly investigated.

Heavy metal pollutants in the circulation may directly affect the functions of immune cells. Alternatively, heavy metal accumulating in thymus and bursa of fabricius may affect the maturation of T and B lymphocyte,