

**EFFECT OF AFLATOXIN B, TREATMENT ON  
PREGNANCY, NEWBORN, AND QUALITY AND  
QUANTITY OF MILK PRODUCED FROM MAMMALS**

BY

**MOSAAD ATTIA ABDEL-WAHAB**

B. Sc. Animal production 1981,

M. Sc. Animal physiology 1989

A thesis submitted in partial fulfillment  
of  
the requirements for the degree of

**DOCTOR OF PHILOSOPHY**

in

Agricultural Science  
(Animal physiology)

Department of Animal Production  
Faculty of Agriculture  
Ain Shams University  
Cairo - Egypt

1996



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## APPROVAL SHEET

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By

Mosaad Attia Abdel-Wahhab

B.Sc. Animal production (1981)

M.Sc. Animal physiology (1989)

This thesis for Ph.D degree has been approved by:

Prof. Dr. E.A.Kotoby ( *E. A. Kotoby* )

Professor of Animal Physiology, Ain-Shams University

Prof. Dr. A.A. Mohamed ( *A. A. Mohamed* )

Professor of Animal Physiology, Al-Azhar University

Prof. Dr. S.O.Amin ( *S. O. Amin* )

Professor of Animal Physiology, Ain-Shams University

Date of examination 11 / 1 / 1996



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By

**Mosaad Attia Abdel-Wahhab**  
B. Sc. Animal production 1981  
M. Sc. Animal physiology 1989

Under the supervision of:

**Dr. S. O. Amin,**

Prof. of Animal Physiology, Ain Shams University, Cairo, Egypt.

**Dr. Khayria Naguib,**

Prof. of Mycotoxins, National Research Center, Cairo, Egypt.

**Dr. K. Mayura,**

Research Associate, Texas A&M University, College Station,

Texas, USA.





## ABSTRACT

**Mosaad Attia Abdel-Wahhab, Effect of Aflatoxin B<sub>1</sub> treatment on pregnancy, newborn, and quality and quantity of milk produced from mammals. Unpublished Ph.D of Science, University of Ain-Shams, Faculty of Agriculture, Department of Animal production, 1996.**

In the rabbit study, 15 pregnant animals were divided into three groups, group 1 dosed orally with 0.15 mg and group 2 dosed orally with 0.1 mg AFB<sub>1</sub>/kg body weight during 12-30 days of gestation while group 3 was used as control. Treatment with AFB<sub>1</sub> significantly decreased GPT and GOT contents in the serum of pregnant rabbits. Histological examination of the ovaries collected at the end of the treatment period showed coagulative necrosis in the growing and mature follicles and, decreased number of Graafian and growing follicles with increased number of atretic follicles.

The effects of sorbents (HSCAS 1, HSCAS 2, and clinoptilolite) on AFB<sub>1</sub>-induced developmental toxicity were studied in 84 female rats. The sorbents were added to the diet at a level of 0.5% (w/w). Test animals were dosed orally with AFB<sub>1</sub> at 2.0 mg/kg body weight during gestation (days 6-13), and dams and fetuses were evaluated for maternal, developmental, and histological parameters on day 20 of gestation. AFB<sub>1</sub> alone and clinoptilolite plus AFB<sub>1</sub> resulted in significant maternal and developmental toxicity. HSCAS 1 and HSCAS 2 markedly diminished the maternal (i.e., mortality, reduction in body weight, ascites, hepatotoxicity, and decreased feed intake), and developmental (i.e., embryo lethality and embryotoxicity) effects induced by AFB<sub>1</sub> when added to the diet at a concentration of only 0.5% w/w. Clinoptilolite was ineffective in preventing the maternal and developmental toxicity induced by AFB<sub>1</sub> in rats. Interestingly, clinoptilolite plus AFB<sub>1</sub> resulted in very severe maternal liver lesions (more than AFB<sub>1</sub> alone). None of the sorbents exhibited any toxicity either in maternal animals or developing embryos.

Thirty two adult male rats maintained on diets containing 0.5% (w/w) HSCAS 1, HSCAS 2 or clinoptilolite were dosed orally with 2.0 mg AFB<sub>1</sub>/kg body weight. HSCAS 1 and HSCAS 2 markedly reduced the excretion of AFM<sub>1</sub> (major urinary metabolite) in the urine of rats compared to the clinoptilolite. The findings from this study confirm that HSCAS tightly bind AFB<sub>1</sub> and, the AFB<sub>1</sub>-HSCAS complex is not significantly dissociated *in vivo*. HPLC, CSID-M<sub>1</sub>, and ELISA were compared for

detection of AFM<sub>1</sub> in three kinds of milk. CSID-M<sub>1</sub> and HPLC methods were accurate and detected AFM<sub>1</sub> at concentrations as low as 0.125 ppb in milk samples. ELISA detected AFM<sub>1</sub> at a concentration of  $\geq 0.25$  ppb. This study demonstrates that the CSID-M<sub>1</sub> minicolumn method is rapid, accurate, cost-effective, and user friendly. This method is particularly useful for the field screening of milk and to predict exposure to AFB<sub>1</sub>.

**Key Words:** Aflatoxin B<sub>1</sub>, Clay, rabbits, rats, pregnancy, newborn, milk aflatoxin M<sub>1</sub>.

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