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شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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Impact of Dietary Zinc Oxide Nanoparticles on Productive and Reproductive Performance of New Zealand White Rabbits

Thesis
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(B.V.Sc., Cairo University, 2014)

For
M.V.SC. degree
(Nutrition and Clinical Nutrition)

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Abstract

A 135 days comparison study was carried out from winter 15th December extended to 15th April to investigate the impact of Zinc Oxide Nano-Particles (the average particle size was about (d nm 70.6 nm), that was physically prepared and characterized in the lab, to compare different commercial Zinc sources (inorganic Zinc oxide) on the productive performance of New Zealand white breed (oryctolagus Cuniculus), growth status, male fertility ,semen character(semen volume, sperm concentration, dead and live %, abnormalities % and pH) , female fertility (Dam conception rate, number of live birth , birth weight, weaning weight, FCR and sealing weight), serum lipid profile , kidney function ,liver function, antioxidant biomarker and (Zn) concentration in serum and Muscle tissues and liver of adult and young Rabbits. Thirty-six adult primaries Doe and twelve adult Buck both at puberty age, individually weighted and was randomly assigned into four equal groups each with 3 replicates raised on individual cage. The experimental groups were as the following: Group 1(**G_1;** *n=9Doe +3 Bucks)* received basal diet supplemented with convention in-organic ZnO 50 ppm in premix, group 2 (**G_2** =9Doe +3 Bucks) received basal diet supplemented with Free zinc premix)., group 3 (**G_3;** *n=9Doe +3 Bucks*) received basal diet supplemented with ZnO-NPs 25 ppm in premix,, group 4 (**G_4;** *n=9Doe +3 Bucks*) received basal diet supplemented with 50 ppm ZnO-NPs in premix.The result revealed that G_2 was suffering from reducing productive and reproductive performance. The best growth performance and reproductive indices (The highest conception rate (%), Kindling (%), total litter size,

viability rate (%), average birth weight (g) and average weaning weight (g) also lowest pre weaning mortality (%)) was observed for the rabbits fed on diet supplemented with 50 ppm ZnO-NPs /kg of diet. Moreover, bucks fed on 50 ppm ZnO-NPs (G_4) surpassing all groups and achieved the best final reproductive performance(ejaculate volume (mL), spermatozoa concentration($\times 10^6$/mL) , motility %, live/dead %, abnormalities % and total sperm number/ ejaculate). The results revealed that G_4 supplemented with 50mg\kg ZnO-NPs achieved high significant increase in total protein and globulin but within the normal values while it showed decrease in albumin and A\G Ratio. Regarding the impact of ZnO-NPs on Liver and kidney enzymes; result showed no significant difference between group treated with ZnO-NPs and the one fed on conventional Zinc oxide, while Alkaline-phosphatase, urea and creatinine in bucks showed significant decrease than G_1. Also, G_2 showed significant increase in liver and kidney enzymes than other groups. Does and bucks in G_4 showed the highest significant decrease in cholesterol, Triglyceride, LDL, VLDL, risk factor, while there is no significance between G_1 and G_3. Also there was only numerical increase in HDL in G_4 and G_3 than G_1 but in bucks G_2 showed significant decrease in HDL. In addition, groups supplemented with 50 mg ZnO-NPs in the premix result in a positive impact on antioxidant biomarker as indicated by highest significant increase in SOD, GSH, and Catalase activity while there was no significance difference between G_1 and G_3 in catalase activity. Moreover, G_4 showed significance decrease in MDA and NO level in G_4 compared to other groups. Furthermore, does in G_4 showed highest significant increase in SOD and Catalase activity while there was no significance difference between G_1, G_3, and G_4 in GSH activity. Moreover, G_4 showed significance decrease in MDA and NO level in G_4 compared to other groups. Also Rabbits fed on diet supplemented with Zinc free premix exhibited lower levels of GSH, SOD, and catalase activity, while showed significant decrease in MDA and NO level. In growing rabbits, the results showed that the growing rabbits (G_4) supplemented with 50 mg ZnO-NPs/kg diet surpassing significance ($P \leq 0.05$) in all groups and achieved the best result regarding (birth weight(g), weaning weight(g), sealing weight(g) moreover lower Pre-weaning mortality %, and Post-weaning mortality%). Also G_4 showed significant improvement in FCR in comparison with other groups. Moreover, it showed highest significant increase in total protein and globulin, HDL, SOD, GSH, Catalase activity, and zinc concentration in serum, liver, and thigh tissue. As compared to other groups, G4 showed the greatest significant decrease in A\G ratio, creatinine, urea, uric acid, cholesterol, Triglyceride, LDL, VLDL, risk factor, MDA, and NO level at 62 days old, whereas albumin level showed no significant difference between all experimental groups.

It can be concluded that, rabbits fed on diet supplemented with 50 ppm ZnO-NPs /kg of diet can replace ZnO in rabbit nutrition with positive effects on adult rabbit productive ,reproductive performance, moreover, produce zinc enriched rabbit meat and maximize the productive performance and improve FCR without any adverse effect.

Key words: ZnO-NPs, inorganic ZnO, White New Zealand Rabbit, Productive performance, Bucks semen analysis, Does fertility index, Feed Conversation Ratio, Serum analysis, Biochemical-indices, lipid profile; Antioxidant bio-marker.

بسم الله الرحمن الرحيم

﴿ إِنَّ الَّذِينَ آمَنُوا وَعَمِلُوا الصَّالِحَاتِ إِنَّا لَا نُضِيعُ أَجْرَ مَنْ أَحْسَنَ عَمَلًا ﴾

صدق الله العظيم

(الكهف ٣٠)

Dedication

To my family, I am extremely grateful for my parents' love, prayers, support, and sacrifices in educating and preparing me for the future. I also want to thank my sister and brother for their unwavering support and prayers.

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First and foremost, praise and gratitude to our merciful GOD for His blessings during my research work, which helped me to successfully complete the research.

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