

**INFLUENCE OF PHYTASE SUPPLEMENTATION
TO JAPANESE QUAIL DIET TO INCREASE THE
UTILIZATION FROM PLANT INGREDIENTS**

By
Eman Sayed Osman Hassan
B.Sc.Agric. (Agricultural Production),
Cairo University, 2000

**A Thesis Submitted in Partial Fulfillment
of
The Requirement for the Master Degree
in
Environmental Science**

**Department of Agricultural Science
Institute of Environmental Studies and Research
Ain Shams University**

2009

APPROVAL SHEET

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ABSTRACT

This study was performed to evaluate the impact of feeding low available phosphorus (Av.P) levels below the NRC recommended level and supplementing microbial phytase (M.Ph) on some of growth performance traits, tibia measurements and blood constituents of Japanese quail.

A total of 420 one- week old unsexed quail chicks were reared in brooder batteries up to three weeks of age, then transferred to grower batteries up to six weeks of age. Chicks were randomly distributed into five experimental groups with two replicates of 42 chicks each. The first group served as a control group and fed a regular basal diet contained 24% CP, 2900 kcal M.E/kg, 3.2% CF, 1% Ca and 0.45% Av.P (control diet). The second and third groups fed the control diet after reducing Ca and Av.P levels to be 0.66 and 0.30% without and with M.Ph-supplemented level (900 FTU), respectively. The fourth and fifth groups fed the control diet after reducing Ca and Av.P levels to become 0.33% and 0.15% without and with the same M.Ph- supplemented level, respectively. At three and six weeks of age, blood and tibia samples were obtained from 60 chicks of each age (6 males and 6 females/ treatment). Tibia ash, Ca and P were determined in 40 out of 60 tibia samples that were previously taken at six weeks of age. The main results can be summarized as follows:-

- 1- Live body weight (LBW) was significantly ($P \leq 0.01$) increased as a result of reducing Av.P- fed level at two, three and four weeks of age, while the addition of M.Ph did not significantly affect the LBW at all tested ages.

- 2- Body weight gain (BWG) of birds fed 0.15%- Av.P level was significantly ($P \leq 0.05$) higher than those fed 0.30% or 0.45%- Av.P level. A nonsignificant increase in BWG was also obtained by M.Ph addition at all studied ages.
- 3- Feed intake (FI) did not significantly affect due to the reduction of the dietary Av.P level at all tested ages. A significant ($P \leq 0.05$) increase in FI was obtained by M.Ph addition only at five weeks of age.
- 4- Feed conversion ratio (FCR) of birds fed 0.15% Av.P level was improved at two weeks of age and also at the entire studied period. There were no significant improvements in FCR were obtained by M.Ph addition at two, three and five weeks of age and the whole experimental period.
- 5- Calcium and phosphorus levels in Japanese quail droppings decreased as the dietary Av.P level decreased at six weeks of age. A significant ($P \leq 0.05$) decrease in the Ca and P levels of droppings was obtained due to the M.Ph addition.
- 6- Tibia weight (TW) and tibia relative weight (TRW) were significantly ($P \leq 0.003$) increased due to feeding 0.30%-Av.P diet while they were significantly ($P \leq 0.001$) decreased due to feeding 0.15%-Av.P diet. Supplementation of phytase did not significantly affect TW and TRW.
- 7- Tibia length (TL) was significantly ($P \leq 0.003$) increased by feeding 0.30%-Av.P diet while it was insignificantly affected by feeding 0.15%-Av.P level. Addition of M.Ph did not significantly affect TL.
- 8- Tibia breaking strength (TBS) was insignificantly and significantly ($P \leq 0.0001$) decreased by feeding 0.30- and 0.15%-Av.P levels,

respectively. A significant ($P \leq 0.0001$) increase in TBS was obtained by M.Ph supplementation.

- 9- Tibia ash (TA) did not significantly affect by reducing Av.P level and addition of M.Ph in both sexes.
- 10- Tibia calcium (TCa) did not significantly affect by reducing Av.P level in both sexes, while phytase addition resulted in a significant ($P \leq 0.01$) increase in TCa only for females.
- 11- Tibia phosphorus (TP) level did not significantly affect by reducing Av.P level and phytase addition in both sexes.
- 12- Plasma calcium (Pl.Ca) level was significantly ($P \leq 0.01$) decreased as the dietary Av.P level decreased. Although, birds fed 0.30%-Av.P level had a significant ($P \leq 0.001$) higher Pl.Ca level than those fed 0.15%-Av.P level. A significant ($P \leq 0.0001$) increase in Pl.Ca was obtained by M.Ph addition.
- 13- Plasma phosphorus (Pl.P) level was not significantly affected by feeding low Av.P levels while it was significantly increased by M.Ph supplementation.
- 14- Plasma total protein (T.Pr) concentration did not significantly influence by feeding low Av.P levels and M.Ph supplementation as compared with that of the control group, while birds fed 0.30%-Av.P level had higher T.Pr concentration than those fed 0.15%-Av.P level.
- 15- Alkaline phosphatase (Alk.P) concentration was significantly ($P \leq 0.004$) decreased as the dietary Av.P level decreased. No significant effect of M.Ph supplementation on Alk.P level was observed.

The previous results suggest that phytase supplementation increased the availability of Ca, P and some nutrients. Subsequently, it improved

performance and bone mineralization of Japanese quails. Furthermore, it minimized the use of inorganic phosphorus in the diet and excreted less P in the manure and consequently reduced environmental pollution.

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List of Abbreviations

Alk.P	Alkaline phosphatase
ALT	Alanine aminotransferase
AST	Aspartate aminotransferase
Av.P	Available phosphorus
BWG	Body weight gain
Ca	Calcium
DM	Dry matter
FCR	Feed conversion ratio
FI	Feed intake
GM	Genetically modified
LBW	Live body weight
LDH	Lactate dehydrogenase
M.Ph	Microbial phytase
Mg	Magnesium
Non-GM	Non- genetically modified
NPP	Non- phytate phosphorus
NRC	National Research Council
P	Phosphorus
Pl.Ca	Plasma calcium
Pl.P	Plasma phosphorus
T.Pr	Total protein
TA	Tibia ash
TBS	Tibia breaking strength
TCa	Tibia calcium
TL	Tibia length
TP	Tibia phosphorus
TRW	Tibia relative weight
TW	Tibia weight
Zn	Zinc

INTRODUCTION

