

*Sudan University
of Science and Technology
College of Graduate Studies*

EFFECT OF PHYTASE ON PROTEINS AND ELECTROLYTE UTILIZATION FOR BROILER CHICKS

By

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

((وَإِنْ تَعُوا نِعْمَةَ اللَّهِ لَا تَحْصُوهَا

إِنَّ اللَّهَ لَغَفُورٌ رَحِيمٌ))

سورة النحل B

((And if you would count the favours of Allāh, never could you be able to number them. Truly! Allāh is Oft-Forgiving, Most Merciful.))

Sūrah The Bee, 18

DEDICATION

This work is dedicated to:

*The souls of my
Father
And
Mother*

My Brother Khalf Allah

My wife Malak

My beloved daughter Safa

DECLARATION

The work described in this Thesis has not been submitted for any other degree or diploma for this or any other examining body except where acknowledgement is made by reference. The research described herein was the unaided effort of the author.

Arabi. S.A

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FIGURES

Figure(1): Possible interactions with phytase molecule 22

Figure (2): Structure Formula of Myo-inositol-hexaphosphate (Phytic Acid)

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Abbreviations Key:

A.niger

| *Aspergillus- niger*

ADG

Average daily gain

AME

Apparent metabolically energy

ANF

Anti-nutritional factors

Ca

Calcium

CF

Crude Fiber

CP

Crude protein

EBPR	Enhanced Biological Phosphorous Removal
FCR	Feed conversion ratio
FI	Feed intake
FUT/kg	Phytase unit
G.F	Gain: feed conversion ratio
GI	Gastrointestinal tract
nP	Nonphytate phosphorous
NPP	Non phosphorous phytate
NSP	Nonstarch polysaccharides
P	Phosphorous
PT(FYT/kg) (%)	Phytase
RBV.	Relative biological value
SCFA	Short chain fatty acids
WG	Body weight gain
WSNSP	Water-soluble, nonstarch polysaccharides

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ABSTRACT

In the productive benefits of commercial microbial phytase (Ronozyme) were tested. Five experiments were run. In experiment one, four levels of phytase 0, 250, 500 and 750 FYT/U were used at 23%CP , 0.48%P and 3 Mcal/kg feed, using seventy two day-old unsexed Ross-308 broiler chicks, allotted randomly to four treatments× three replicates, each of six chicks, and experimentally fed for 42 days. Experiments 2-5 used high (0.45%) and low (0.30%) P with either high (23%) or low (19.5%) CP, all at 3 Mcal/kg feed. In

each experiment, thirty six unsexed Ross-308 broiler chicks were allotted randomly to two treatments× three replicates of six chicks each, and fed experimentally for 42 days.

Data collected in all experiments covered performance, serum metabolites, slaughter and carcass data, tibia bone physical and chemical measurements, Ca and P balances and economical evaluations.

The results indicated that diet supplementation with phytase, improved performance significantly, with the 250 FYT/U dose being higher than in the other treatment groups for body weight gain (1943.173 ± 33.18), mean hot (1943.17 ± 3.09) and cold (1924.89 ± 3.45) carcass weights and tibia length. Total phosphorous (82.39 ± 0.01) and total calcium (74.77 ± 0.47) retentions percent and total protein (7.90 ± 0.20) were highest in the 500 FYT/U doses. Cholesterol mean values were lower in the test groups compared to the control. Triglyceride value of the 500 FYT/U dose (124.40 ± 4.13) was lower than the control. Meat quality subjective scores did not differ significantly inbetween groups, and scores given for all attributes are above moderate acceptability. Profitability ratios of all test groups were higher than the control group, with the 250 FYT/U dose recording the highest value (1.054).

The performance values (WG, FI, FCR and energy intake) for the 750 FYT/U/kg diets were higher in test groups than the control. Test groups (the 750 FYT/U/kg diets) mean values for cholesterol and lipids were higher than the control except for serum proteins (7.34 ± 07) in the low nP low CP% plane. Slaughter and carcass values for the 750 FYT/U/kg diets revealed that all parameters in slaughter weight, hot and cold carcasses and dressing percentages based upon them and total edible parts% to be

higher than the control. All tibia bone measurements for the 750 FYT/U/kg diets were higher compared to the control.

Total P and Ca consumptions and total P and Ca retentions% for the 750 FYT/U/kg diets were higher compared to the control except for the high nP low CP% planes where P and Ca consumptions were lower (2960.16 ± 4.41 and 4905.60 ± 27.9).

Profitability ratios (1.065, 1.076, 1.048 and 1.012) of the test groups (750 FYT/U) were always higher than the control group.

The results withdrawn were amply discussed, their practical implications were overviewed and suggestions for future researches were put forward.

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

(يَا أَيُّهَا الَّذِينَ آمَنُوا خُذُوا مِنْ طَيِّبَاتِ مَا رَزَقْنَاكُمْ وَاصْبِرُوا الصَّوْبَ بِمَا أَنزَلَ اللَّهُ إِنَّكُمْ لَعَبِيدٌ)

صدق الله العظيم- سورة البقرة (172)

مخلص الأطوحة

أختبرت في هذه الدراسة الفوائد الإنتاجية لإنزيم الفايبيز التجاري (رونوزايم) . اشتملت الدراسة علي خمس تجارب . في التجربة الأولى استخدمت أربعة مستويات من الفايبيز 0، 250 ، 500 ، 750 وحدة أنزيم بمستوي بروتين خام 23.00% ، فوسفور 0.48% و مستوي طاقة 3 ميجاكالوري كجم/غذاء ، غذي بها 72 ككتوتا لاحما من سلالة روص-308 غير مجنسة عمر يوم واحد ، قسمت عشوائياً الي اربع

مجموعات تجربة x ثلاثة مكررات بكل واحد منها ستة كراكيت. كانت مدة الاعلاف التجريبي 42 يوما. التجارب 2 – 5 استخدم فيها الفوسفور العالي (0.45%) والمنخفض (0.30%) مع أي من البروتين الخام العالي (23%) أو المنخفض (19.5%)، وجميعها في مستوى طاقة 3 ميجاكالوري كجم/غذاء. في كل تجربة، تم استخدام 36 كتكوتا لاحما من سلالة روص-308 غير مجنسة عمر يوم واحد، قسمت عشوائياً الي مجموعتي تجربة x ثلاثة مكررات بكل واحد منها ستة كراكيت. كانت مدة الاعلاف التجريبي 42 يوما.

البيانات المتحصل عليها في كل التجارب غطت الأداء الإنتاجي، مستقبلات المصل، بيانات قياسات الذبيحة وجسد الذبيح، قياسات الخصائص الفيزيائية و الكيميائية لعظمة الساق، موازين الكالسيوم و الفوسفور و التقويم الاقتصادي.

تشير النتائج المتحصل عليها علي أن تزويد العلائق بإنزيم الفايبيز قد حسن الأداء الإنتاجي تحسينا ملحوظاً خاصة عند الجرعة 250 وحدة انزيم حيث سجلت أعلى نتيجة من كل المجموعات بالنسبة الي وزن الجسم (1943.173 ± 33.18)، متوسط الوزن الساخن (1943.173 ± 33.18) والوزن البارد (1924.89 ± 3.45) لجسد الذبيح و طول عظمة الساق. كانت نسبة الفوسفور الكلي (82.39 ± 0.01) والكالسيوم الكلي (74.77 ± 0.47) المستقيين % و البروتين الكلي (7.90 ± 0.20) أعلى عند الجرعة 500 وحدة انزيم. متوسط قيم الكولسترول كانت منخفضة في مجموعات الاختبار مقارنة بالمجموعة المرجعية. كانت قيم الجليسيريدات الثلاثية عند الجرعة 500 وحدة انزيم (124.40 ± 4.13) أدنى منها في المجموعة المرجعية. القيم الانطباعية للحم كانت متشابهة في المجموعات المختلفة، وسجلات مناحيها متوسطة القبول. نسب معدل الربحية كانت أعلى في مجموعات الاختبار عنها في المجموعة المرجعية، وسجلات جرعة 250 وحدة انزيم أعلى قيمة (1.054).

كانت قيم الأداء (كسب الوزن، المأكول الطوعي، معدل التحويل الغذائي ومأكول الطاقة) للجرعة الغذائية 750 وحدة انزيم/كجم أعلى في مجموعات الاختبار عنها في المجموعة المرجعية. متوسط قيم مجموعات الاختبار (أعلاف 750 وحدة انزيم/كجم) في الكولسترول والدهون كانت أعلى من المجموعة

المرجعية عدا البروتين المصلي الكلي (7.34 ± 07) في تجربة المستوى المتدني لاتاحة الفوسفور و البروتين الخام%. قيم الذبح وجسد الذبيح للاعلاف 750 وحدة انزيم/كجم، أظهرت كل القياسات في الوزن عند الذبح، وزن جسد الذبيح الساخن و البارد و نسبة التصافي فيها والأجزاء المأكولة الكلية% أعلى من المجموعة المرجعية. كل قياسات عظمة الساق للاعلاف 750 وحدة انزيم/كجم، كانت أعلى من المجموعة المرجعية. الكالسيوم والفوسفور الكليين المستهلكين و الكالسيوم والفوسفور الكليين المستقبين للاعلاف 750 وحدة انزيم/كجم، كانتا أعلى بالمقارنة للمجموعة المرجعية ماعدا التجربة التي بها فوسفور متاح عالي مع بروتين خام% منخفض حيث كان استهلاك كل من الفوسفور (4905.60 ± 27.9) و الكالسيوم (2960.16) ± 4.41 متدنيا.

نسب معدل الربحية (1.065, 1.076, 1.048 , 1.012) في مجموعات الاختبار (750 وحدة انزيم) كانت دائما أعلى من المجموعة المرجعية .
تم نقاش واف للنتائج المتحصل عليها، ونظر في تطبيقاتها العملية ووضعت كذلك مقترحات للدراسات المستقبلية.