

**Effect of Application of Feather Meal Treated with Bacterial Keratinase on Broiler Birds  
Weight**

**Olamide Adenike JOSEPH  
LCU/PG/001236**

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Natural and Applied Sciences, Lead City University, Ibadan, Oyo State, Nigeria**

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Microbiology**

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### **Certification**

This is to certify that Olamide Adenike Joseph with matriculation number LCU/PG/0001236 carried out this research work titled Effect of Application of Feather Meal Treated with Bacterial Keratinase on Broiler Birds Weight in the Department of Biological Sciences, Faculty of Natural and Applied Sciences, Lead City University. Ibadan, Oyo State for the award of Master Degree (M.Sc.) in Food Microbiology and that this has not been previously submitted.

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**Dr F.C. Adesina**  
**(Supervisor)**

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**Date**

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**Dr F. C. Adesina**  
**(Head of Department)**

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**Date**

## **Dedication**

This work is dedicated to my creator, God Almighty, my Husband, Mr. Ohisamaye and our children.

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## **Acknowledgment**

My utmost appreciation goes to God Almighty who gave me life and wisdom throughout this work.

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## Abstract

Feathers have been found to contain high protein content that is not easily digestible by poultry birds. Biologically processed feather meal has an advantage over mechanical and chemical methods because it preserves amino acids. This research was carried out to determine the potentials of a feather meal hydrolyzed by microorganisms as protein source in broiler feeds. To achieve this, selected thermophilic keratinolytic bacteria (*Bacillus subtilis*) isolated from feather dumpsites was used to produce keratinase enzyme and optimum conditions for highest keratinase activity was observed at temperature of 45°C, pH 7, 72-hour duration with casein (86.33 µl/L) and starch (581.33 µl/L) being the best nitrogen and carbon sources respectively, and this microorganism (*Bacillus subtilis*) was applied to feathers for hydrolysis for nine days. The hydrolyzed feather meal was incorporated into broiler ration at graded levels in comparison with fish meal as source of protein. Eighteen broilers were used to investigate the effects of the biodegraded feather meal on growth performance for 21 days and the design of feeding was; 1(100% hydrolyzed feather meal), 2(75% feather meal+ 25% fish meal) 3 (25% fish meal+ 75%feather meal) 4 (50%feather meal +50% fish meal) 5 (100% fish meal) 6 (100% non-hydrolyzed feather meal). Birds fed with hydrolyzed feather meal performed better than those fed with non-hydrolyzed feather meal and also, birds fed with higher concentration of fish meal diet performed better those fed with higher concentration of feather meal. Results showed that *Bacillus subtilis* was able to hydrolyze feather successfully and can therefore be used for commercial production of feather meal. Digestibility of the hydrolyzed feather meal by the broilers may be low and this may have affected the broilers weight, therefore there is need to carry out further studies on the duration of hydrolysis that will enhance feather meal digestibility by poultry birds.

**Keywords:** Keratinolytic, Thermophilic, Hydrolysis, Biodegraded.

**Word Count:** 300

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### List of Acronyms

#### Abbreviation

#### Meaning

BFW	Broiler Feather Waste
BSE	Bovine Spongiform Encephalopathy
$\text{CuSO}_4 \cdot 5(\text{H}_2\text{O})$	Copper Sulphate Pentahydrate
DNA	Deoxyribonucleic Acid
$\text{H}_2\text{O}_2$	Hydrogen Peroxide
HCl	Hydrochloric Acid
$\text{K}_2\text{HPO}_4$	Dipotassium Hydrogen Phosphate
$\text{KH}_2\text{PO}_4$	Potassium Dihydrogen Phosphate ion(Buffer)
$\text{MgCl}_2$	Magnesium Chloride
$\text{MgSO}_4$	Magnesium Sulphate
$\text{Na}_2\text{Tartrate} \cdot 2(\text{H}_2\text{O})$	Sodium tartrate Dihydrate

NaCl	Sodium Chloride
NaOH	Sodium Hydroxide
NH <sub>4</sub> Cl	Ammonium Chloride
NH <sub>4</sub> H <sub>2</sub> PO <sub>4</sub>	Ammonium Dihydrogen phosphate
PCR	Polymerase Chain Reaction
pH	Measure of concentration of Hydrogen ions
RNA	Ribonucleic Acid
Rpm	Revolution per minutes
TCA	Tricarboxylic Acid

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