Study on Adulteration of Protein Rich Poultry Feed Ingredients in Chattogram Region

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Table of Contents

Content **Page**

Statement of Author

I, Salma Akter Papiya, certify unequivocally that I have performed all the tasks detailed in this report. The data was gathered from books, national and international periodicals, and other sources. All citations have been properly acknowledged. Consequently, I am solely responsible for collecting, manipulating, preserving, and publishing all data compiled in this report.

The Author

List of Acronyms Symbols Used

Abbreviation	Elaboration
%	Percentage
CVASU	Chattogram Veterinary and Animal Sciences University

List of Tables

List of Figures

Abstract

Poultry farming is a vital aspect of agricultural industry, contributing significantly to the protein supply for human consumption. The quality of poultry feed is paramount to the health and productivity of poultry. It's common to adulterate feed with inferior feed ingredient in poultry industry. Miller and manufacturers without access to feed laboratories frequently use feed ingredients that have been rejected for quality control reasons. This report presents the outcomes of an investigation into the adulteration of poultry feed within Chattogram Division. The study encompasses a comparative analysis between locally produced and imported poultry feed, with a specific focus on quantifying crude protein percentage. The initial results revealed varying level of crude protein in local feed samples (A=63.35%, B=82.78%, C=60.38%) prior to washing. Post washing, these levels saw a significant reduction (A=9.45%, B=35.18%, C=9.45%). Conversely, imported poultry feed samples exhibited higher crude protein percentage both prewashing (D=69.56%, E=70.00%, F=80.85%, and G=69.30%) and post washing (D=70.35%, E=78.40%, F=98.18%, and G=82.25%). The findings underscore potential concerns regarding local feed adulteration (by urea) while highlighting the comparative advantage of imported poultry feed in maintaining elevated protein content. Further investigation with large feed samples is warranted.

Keywords: Adulteration, Crude protein, Poultry feed, Urea.

Chapter 1: Introduction

Feed ingredients are naturally occurring substances which contain nutrients (carbohydrate, protein, fat, vitamin, minerals, and water) to nourish animal body in terms of maintenance, growth, production, and reproduction of animal for sustaining normal health. In case of Poultry, feed sector is integral to the food chain and intimately linked to basic agricultural production. Between 65% to 75% of expense of producing poultry goes toward feed. Therefore, any enhancement in broiler and layer performance brought about by their diet can unavoidably have a significant impact on profitability. A variety of feed ingredients including cereal grains, soyabean meal, animal by-product meals, lipids, and vitamin and mineral premixes, make up most of the ingredients in poultry feed. A balanced diet entails the blending of diverse food to create a diet that contains every vital nutrient necessary for the regular operation of a given animal or group of animals (Anjum et al., 2014). Among these feed nutrients protein is an essential component for growth, development, and overall health of poultry. Adequate protein-rich feed plays a crucial role in maximizing poultry yield, enhancing meat quality, and meeting the rising demands of the poultry industry.

However, the adulteration of protein-rich poultry feed has emerged as a significant concern. Adulteration of protein-rich poultry feed is described as the intentional, unlawful, and willful addition of any other ingredient to a pure raw material before it is sold under the description of a pure feed product (Qudoos et al., 2019). There is a constant search for a cheap protein source that can replace the more expensive dietary protein in the typical poultry diets to significantly reduce expenses in poultry sector. In this regard, several producers of poultry feed employ various components to tamper with the feed, which is frequently used in poultry ration. By adding a cheap supply of non-protein nitrogen to poultry feeds, adulteration attempts to lower the manufacturing costs by raising the protein concentration (Zharani et al., 2023).

Since there hasn't been much research done on adulteration of poultry feed up to the point, and the publication's appropriateness is likewise quite low. So, by evaluating the crude protein percentage, the current investigation was conducted to clarify the presence of adulterating agents or substances in poultry feed. This study also compared the quality of local and imported poultry feed by evaluating the crude protein content.

Chapter 2: Materials and Methods

2.1 Study Area

The goal of this investigation was to verify the existence of adulterating material in poultry feed samples which taken from the Poultry Research and Training Center (PRTC), Khulshi, Chattogram and from local market at GEC, Chattogram.

2.2 Sample Collection

Samples of 7 various types of poultry feed (3 local and 4 imported) were obtained from the research region, and the presence of adulterating substances was detected by estimating the crude protein percentage by Kjeldahl method at the Department of Animal Science and Nutrition (Laboratory). Samples were collected and stored at room temperature until processing.

2.3 Sample Preparation for Crude protein Detection

The study of estimating crude protein in poultry feed was conducted under two conditions: with and without washing (fresh condition) of feed samples.

Kjeldahl method consists of three steps: Digestion, Distillation, and Titration

a) In fresh condition (samples)

i) Digestion:

1gm of sample was weight and taken into a nitrogen free paper. It was folded and placed into a Kjeldahl flask. About 2gm of Catalyzed mixture (1 part by the weight of K_2SO_4, 3 parts by the weight of $CuSO_4$, and a few amounts of Selenium) was added and 20ml of concentrate commercial H_2SO_4 was added by running along by the side of the flask. The flask was placed on the heater of the digestion camber at a U inclined position and heated it gently by rising the temperature gradually and was heated until a clear colorless fume and green solution is obtained. During the digestion period the flask was turned occasionally. After complete digestion the flask was removed and cooled it and 100ml of distilled water was added before digestion get solidified.

ii) Distillation:

20ml of 2% Boric acid was taken into a conical flask and 2-3 drops of Mixed indicator (0.625gm Methyl Red, 0.48gm Methyl Blue, and 500ml 95% Ethyl Alcohol) was added and placed the conical flask under the tip of the collection arm of the distillation set. 90ml of NaOH (usually 4 times more than the volume of H_2SO_4 solution taken) solution was taken into the content of Kjeldahl flask by along with the side of the flask. A little amount of Zn and glass piece was added quickly and was quickly attached with cork of distilled set. The heater was turned it on for heating the contents of Kjeldahl flask. About 150ml of distilled was distilled into the conical flask content's Boric acid solution. The end point of distillation was indicated by the bumping of the mass of Kjeldahl flask.

iii) Titration:

The conical flask containing distillate was removed and was titrated against standard 0.1N HCl solution. For blank correlation a standard sized of blank N_2 free paper was taken, which was used in the experiment of another Kjeldahl flask and was go on with entire procedure.

b) After washing

Washing was completed by using distilled water. Feed ingredients were filtered using filter paper after being washed three times with 200ml of distilled water each time. Following washing, feed samples were dried overnight at 600^{o}C temperature in a Muffle Furnace. Then the next procedure was as like as fresh samples.

Chapter 3: Results

Determination of crude protein involved the determination of the nitrogen content of the sample which is the then multiplied by the factor 6.5 by considering two assumptions:

1. All nitrogen present in the sample is protein.
2. All feed protein contains 16% nitrogen, Therefore, %CP = $\%N_2$*6.25

Table 1. Crude protein percentage in local poultry feed samples (before and after washing).

	Serial No	**Name of Samples**	**Crude protein % (Before washing)**	**Crude protein % (After washing)**
Locally available poultry feed	1.	Sample (A)	63.35	9.45
	2.	Sample (B)	82.78	35.18
	3.	Sample (C)	60.38	9.45
Imported poultry feed	4.	Sample (D)	69.56	70.35
	5.	Sample (E)	70.00	78.40
	6.	Sample (F)	80.85	98.18
	7.	Sample (G)	69.30	82.25

Here, Sample (A) and (C) = CGM (poultry feed)

Sample (B), (D), (E), (F), and (G) = Poultry Meal (of different types)

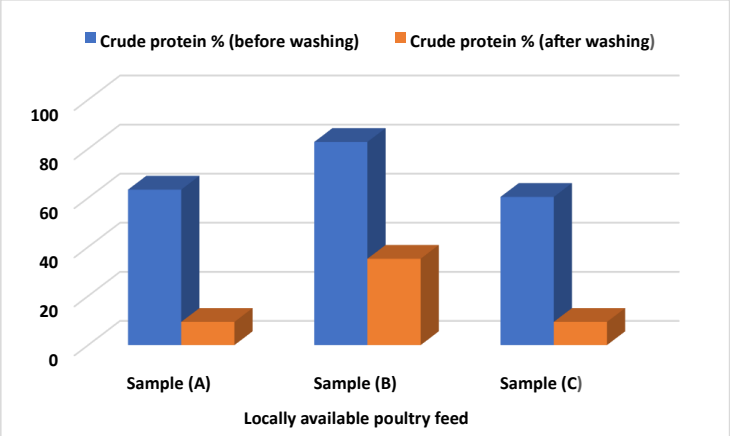

Figure 1. Crude protein % of locally available feed ingredients before and after washing with water.

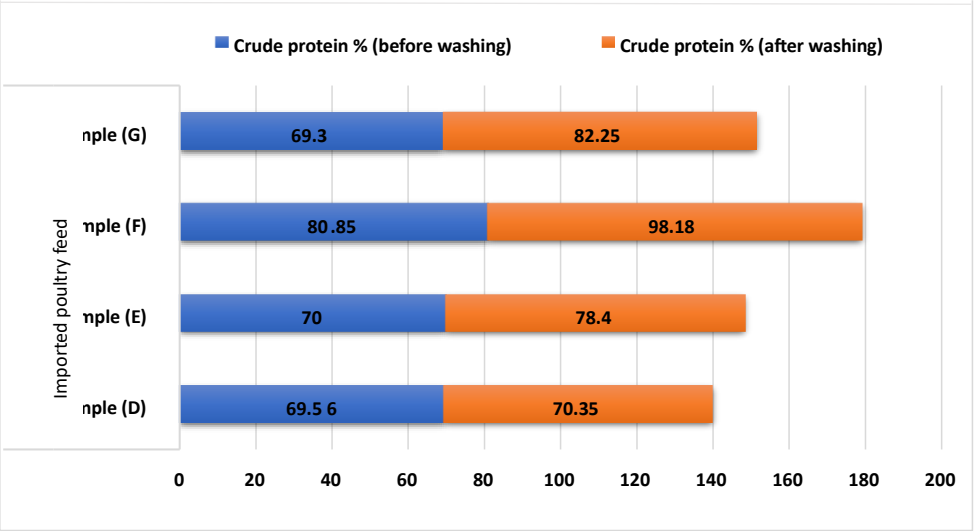

Figure 2. Crude protein % of imported feed ingredients before and after washing with water.

Chapter 4: Discussion

The current research's focus was to compare the protein percentage of local poultry feed and imported poultry feed to establish whether poultry feed was tainted by doing so. The finding indicates that the quantity of crude protein in fresh condition (in case of sample A 63.35%; sample B 82.78%; sample C 60.38%) are clearly more than the quantity of crude protein found after washing of feed samples (which are sample A 9.45%; sample B 35.18%; sample C 9.45%). Additionally, it is obvious from the physical examination (color, smell, texture) of fresh samples that the protein quality was significantly increased by the addition of urea (Okumura et al., 1976).

On the other hand, the percentage of crude protein in imported poultry feed after washing (sample D 70.35%; sample E 78.00%; sample F 98.18%; sample G 82.25%) has increased to before washing (sample D 69.56%; sample E 70.00%; sample F 80.85%; sample G 82.25%). That clearly indicated the higher quality of imported poultry feed than local one.

Due to its non-explosive nature and relative safety in handling, urea has largely supplanted other significant nitrogen fertilizers in regular use. As a non-protein nitrogenous (NPN) material to help ruminant animals meet some of their growing related protein needs, urea is being explored for use in animal feed (Maynard et al., 1985). However, little is known about urea's effects on various species of poultry, particularly in terms of use it may affect production traits.

However, due to adulteration in the formulation of poultry feed, urea can occasionally be present at higher levels in the feed for poultry (Pervaz et al., 1993), urea has been utilized to replace expensive proteins. When chicks are fed a urea treated diet, though, poisoning can happen (Jabbar, 1994; Pervaz, 1994; Abdou et al., 2006). Landers et al. (2012) and Brand et al. (2012) discovered that urea mixed diets had lower feed intake and body weight gain, which had a negative impact on conversion rate. Without a doubt, urea generated massive nitrogen overload with detrimental consequence for poultry, since they were unable to withstand it. The final, plainly inferior weight gain and the noticeably changed hematological and biochemical profiles of the intoxicated birds served as proof of these consequences (Zharani et al., 2023).

Strength and Limitation

This study makes it simple to assess the crude protein content (%) by Kjeldahl method to check poultry feed for adulteration.

There were some limitations in this study. We were able to confirm adulteration, however we were unable to identify the contaminated material. Again, initially, it was assumed that urea was responsible for adulteration, but no test could be performed to verify this. Due to intern level, increase number of feed samples are restricted to analysis.

Chapter 5: Conclusions

The investigation into the adulteration of poultry feed in Chattogram highlights the urgency in addressing this issue. By employing a rigorous approach and engaging with relevant stakeholders, the poultry industry can safeguard itself against unethical practices and ensure the provision of nutritious feed for the birds. Continuous monitoring, regulatory measures, and awareness campaigns are essential in maintaining the integrity of poultry feed, the overall quality of poultry farming, and public health.

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Competing interests

As the study was conducted by the author himself, so there is no competing interest.

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Biography of Author

This is Salma Akter Papiya, the daughter of Md Abdur Rahman and Shahnaz Parvin, doing her graduation on Doctor of Veterinary Medicine (DVM) at Chattogram Veterinary and Animal Sciences University under Faculty of Veterinary Medicine. She passed the Secondary School Certificate Examination (SSC)in 2014 from B N School and College, Chattogram and got GPA 5.00 and then Higher Secondary Certificate Examination (HSC) in 2016 from B N School and College, Chattogram and got GPA 4.75 out of 5.00. Currently she is doing her yearlong internship. She has a great enthusiasm in her study area to develop day one skills and gain more practical knowledge to be prepared for the modern era of science.