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EVALUATION OF THE MICROBIAL AND CHEMICAL QUALITY OF FEED AVAILABLE IN LOCAL MARKETS IN BAGHDAD CITY

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Abstract

Feed ingredient of both plant and animal origin are often contaminated with microorganism mostly bacteria and fungi depending on the composition of the feedstuff materials. This study evaluated the microbiology and chemistry qualities of feed available in local markets in Baghdad City. A total of (8) feed samples were collected from different places in Baghdad City. All samples were analyzed before their expired date. The samples were collected in sterile specimen bottle and taken to the laboratory, properly ground to fine particles (1mm partial size) using mill attachment of a moulinex blender before analysis.Total viable counts of the bacterial isolates using Nutrient agar was Determinated using serial dilution and standard plate count method determination of the mineral element was also carried out using Atomic emission spectrometer. The isolated bacteria were tentatively identified coliform and *Salmonella* spp. The highest total bacterial count were recorded a among sheep and goat feed (11×10^5) Cfu/g, followed by Buffalo feed (4×10^4) Cfu/g and feed center (26×10^4) Cfu/g. *Salmonella* spp. were recorded positive in two samples namely Buffalo feed and local feed. Magnesium was recorded high in all samples under study. It was observed that most of the micro-organism isolated from the feed samples used in this study were bacteria especially *Salmonella* spp.

Key words : Microbiological and Chemical Evaluation, Local Feeds, Baghdad City.

Introduction

Feed is derived from grains such as maize, barley, wheed, soybean, peanuts, bone meal and offal (Davies and Wales, 2010). Feed ingredients of both plant and animal origin are often contaminated with microorganisms. Most bacteria and various types depending on the composition of feedstuff materials, its origin, climatic conditions encountered during harvesting, processing, storage, transport technologies employed and packaging material (Dhama *et al.,* 2014). The use of poor quality ingredients has led to the production of poor quality feeds. The goal of the feed manufacturer is to supply the animals with feeds whose nutrients in a suitable form to its cells, organs and tissues (Atteh, 2015).

Feed may be contaminated by pathogens at any point in the production, storage, preparation processes. Pathogens like *Staphylococcus aureus* and *Escherichia coli* have been reported to be transmitted by the feed to susceptible consumers, where they grow and case disease or a food borne infection (Anon, 2008). *Salmonella* spp. is the major hazard for microbial contamination of animal feed, *Escherichia coli* and *Clostridium* spp. are other hazard of less importance (Arotupin, 2007). This study evaluated the microbiological and chemical quality of feed located in different places in Baghdad City.

Materials and Methods

A total number of 8 feeding samples were collected from Baghdad City. All samples were analyzed before their expiry date.

All samples were immediately transferred to the microbiology laboratory at Market Research and Consumer Protection Center, Baghdad University, and stored at -18C° in the deep freezer until use (Table1).

The media used were in a dehydrated form and prepared according to the manufacturer's instructions. One grams of feeding were added to 99ml of sterile distilled peptone water in a flask and shaken well to make 10^{-1} dilution. Further dilutions were prepared in sterile distilled peptone water. Prepared samples were serially diluted (10^{-6}) in sterile water and used to enumerate bacteria in specific culture medium.

This was carried out according to the methods described by (Honghtby *et al.,* 2002; APHA, 2000), which include the following methods:

First-Total plate count were enumerated by pour plate method using standard plate count. Diluted samples were cultured on plate count Agar by using one ml of each dilution (10^{-6}), which added to petri-dish and incubated at 37C° for 24 hours, colonies were counted.

Total coliform Bacteria: Diluted samples were plated onto Violet Red Bile agar by using one ml of (10^{-6}) dilution which added to agar then another layer of medium was added to make anaerobic atmosphere. Plates were incubated at 37C° for 24 hours, developed colonies were counted.

For Isolation and Identification of *Salmonella:* Prepared samples with (10^{-6}) dilution, (0.1ml) mixture was used to inoculate culture media, *Salmonella Shigella* agar (SSA) and Deoxycholate citrate agar (DCA) and incubated at 42C° overnight. All suspected colonies were submitted to the standard biochemical reactions as Triple sugar iron (TSI). agar, Lysine decarboxylase (LIA), Urease, Indole, methyl red, simmon citrate utilization to confirm whether they belong to *Salmonella* spp. ISO (2002). Many cultures of *Salmoella* may produce colonies with large, glassy block centers or many appear as almost completely block colonies.

Second: Determination of the mineral elements: Take 0.5 g of each brand and digest by using 10 ml of HNO_3 + HCL mixture. Preheat the mixture carefully until the solution is clear and then remove the digested material and dilute to ml. 100) by using distilled water. The iron, cadmium, copper and zinc elements were then measured using Atomic Absorption. The atomic emission spectrometer examines the wavelengths of the photons Emitted from atoms as they move from the excited state to the stable or energy state At least, it is known that each element sends a distinct set of separate wavelengths according to the electronic structure. In studying these wavelengths, the components of the sample can be identified.

Standard solutions for each metal element have been prepared under standard conditions (Lasheen *et al.,* 2008).

Statistical Analysis

Statistical significance was assessed by using least significant differences – LSD (T-test) P – value 0.05 was considered significance.

Results

The isolated bacteria were identified as Coliform and *Salmonella* spp. These organisms were distributed throughout the feed samples (table 2). For microbial study this mean result showed that highest bacterial count were recovered in sheep and goat feed (11×10^5) Cfu/g, followed by Buffalo feed (4×10^4) Cfu/g and feed center (26×10^4) Cfu/g respectively. *Salmonella* spp. were recorded positive in two samples namely Buffalo feed and local feed. Also coliform were recorded highest in sheep and goat feed (7×10^4) Cfu/g followed by feed center (8×10^4) Cfu/g. For chemical evaluation Mg were recorded highest in all samples. Pb in were recorded highest in Chicken Feed / Meat (1.1333µg/g) followed by Local feed (0.9636 µg/g) followed by Feed (Meat / Paddy) (0.9212 µg/g).

Cu were recorded highest in Fennel feed (0.8003 µg/g) followed by Local feed (0.4614µg/g). Cd were recorded highest in Local feed (0.5659µg/g) followed by Fennel feed (0.4818µg/g) (table 3).

Table 1: Collected feed samples from Baghdad city.

Volume /gram	Date of expiry	Date of production	origin	Samples Name	No.
250	2019/2/12	2018/02/13	Iraq	sheep and goats feed	1
250	2019/2/26	2018/1/27	Iraq	Buffalo feed	2
250	2019/3/29	2018/4/2	Iraq	Chicken Feed/ white	3
250	2019/11/28	2018/11/29	Iraq	Chicken Feed / Meat	4
250	2019/2/19	2018/2/20	Iraq	Fennel feed	5
250	2019/3/14	2018/3/15	Iraq	Local feed	6
250	2019/6/9	2018/6/10	Iraq	Feed (Meat / Paddy)	7
250	2019/2/14	2018/2/15	Iraq	Feed Center	8

Table 2: Isolation of microbial species identified in the feed samples.

Salmonella CFu/g	Coliform CFu/g	Total Count BacteriaCFu/g	Samples	No.
Nil	7×10^4	11×10^5	Sheep and goats feed	1
Positive	14×10^3	4×10^4	Buffalo feed	2
Ni	5×10^3	9×10^3	Chicken Feed/ white	3
Nil	3×10^2	2×10^3	Chicken Feed / Meat	4
Nil	5×10^3	21×10^3	Fennel feed	5
Positive	14×10^2	7×10^2	Local feed	6
Nil	22×10^3	19×10^2	Feed (Meat / Paddy)	7
Nil	8×10^4	26×10^4	Feed Center	8

Discussion

Many of these organism reported in this study common environmental

Table 3: Concentration of Elements in feed samples.

No.	Samples	Concentration of Elements µg/g			
		Cu	Pb	Cd	Mg
1	Sheep and goats feed	0.0571	0.6879	0.2053	26.5991
2	Buffalo feed	0.0558	0.8364	0.1177	26.7298
3	Chicken Feed/ white	0.3960	0.6030	0.3080	26.6335
4	Chicken Feed / Meat	0.2771	1.1333	0.3411	25.9138
5	Fennel feed	0.8003	0.6242	0.4818	26.4945
6	Local feed	0.4614	0.9636	0.5659	26.2702
7	Feed (Meat / Paddy)	0.3128	0.9212	0.0101	25.8986
8	Feed Center	0.2104	0.8788	0.1425	23.0692

contamination and these presence may indicate contamination from the environmental and raw materials during processing (Rosa *et al.,* 2005). Therefore it was observed that all the feeds examined for this study were of poor microbiological quality and failed to meet international microbiological standards. This result was in agreement with the finding of Lateef and Gneguim-Kana (2014). These feed samples used in this study contain sufficient nutrients to support the growth of bacteria like crude protein and PH (Folakemi and Monday, 2015).

The content of some chemical elements (cadmium, lead, copper, magnesium) in the animal feed (feed concentrate) from Local Markets in Baghdad City was determined. According to the obtained results it can be concluded that the all samples analyzed were increase in limit for content of heavy metals by Determination of Some Chemical Elements in Animal Feed and presence of health risks associated with the consumption of milk and dairy products, as well as of meat and meat products (Balabanova *et al.,* 2010; Ali *et al.,* 2013).

Conclusion

In conclusion, it was observed that while most of the microorganism isolated from the feed samples used in this study were common environmental contamination, the overall microbial quality of the feeds fell below international microbiological standard. It is important to minimize contamination of feeds through hygienic production and appropriate storage condition.

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