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EVALUATION OF MINERALS AS MANURE VALUE OF FAECAL MATTER OF CHICKS FED WITH MOLLUSCAN SUPPLEMENTARY DIET

AKARTE* S.R. AND R.B. BAHADURE

Vidyabharati Mahavidyalaya Amravati, C.K.Naidu Road, Camp, Amravati – 444602

ABSTRACT

The mineral matters of body comprise a large number of elements present in varying amounts in different parts, according to the function they perform and some are passed out along with faecal matter which is having prime importance as animal manure–value for application in agricultural field. Poultry manure is an excellent source of nutrients and can be incorporated into most fertilizer programs. With the view point of this chicken faecal matter was assessed after providing them additional molluscan diet *i.e.* dried flesh of whole body mass and the grinded shell crush of bivalve, *Lamellidens marginallis*, as nonconventional food added in normal grains such as Wheat , maize , Jawar , Bajara and beans, searals etc. For comparative assessment of mineral contents in faecal matter of chicks, thirty days feeding to five different groups of chicks was performed with different diet contents such as conventional food-grains, poultry farm recommended commercial food, supplementary fish food and supplementary 10% and 20% molluscan diet. After 30 days feeding, faecal matter of these chicks was assessed for minerals in it. It was observed that phosphorus contained in faecal matter was higher only in grain- fed chicks, whereas sodium and potassium was lower in grain-fed and 10% molluscan diet fed chicks as compared to other groups. Calcium was higher in 10% and 20% molluscan diet fed chicks than other groups.

KEY WORDS: **molluscan diet, poultry feed, manures, minerals.**

*Corresponding author

AKARTE S.R.
Vidyabharati Mahavidyalaya Amravati, C.K.Naidu Road, Camp, Amravati – 444602

INTRODUCTION

Wide variety of feedstuffs can be, used in poultry rations are mainly classified as energy feedstuffs, protein supplement and mineral supplements. The nutritionists therefore, try to develop diets, which maximize chick growth while minimizing the cost. Research interest has therefore, been awakened in the area of alternative feed resources which have comparative nutritive value but are cheaper than the conventional protein sources. Some experimental outlines shows formulation of feed for poultry birds, the feed is important through practical point of view in order to provide a substitute for proteins of animal origin [1]. Considering this, the present study was undertaken to test addition of molluscan dried flesh and shell crush mixed with different components of grains which are easily available in the market. It was an attempt to test the formulation of feed for chicks with an addition of molluscan crush of whole animal flesh and shell in normal conventional grains, containing Bajara, *Cajanus-cajan*, wheat, rice bran, maize, pea beans, sorghum, etc. in respect to growth and weight gain, biochemical contents in respect to blood, minerals contents of bone, histochemical effect on gizzard, intestine, liver and kidney as functional organs and minerals in fecal matter of chicks which is focused as manure-value for use in agricultural crop field. Manure from different animals has different qualities and requires different application rates when used as fertilizer, e.g. horses, cattle, pigs, sheep, chickens, turkeys, rabbits, humans (sewage), and guano from seabirds and bats all have different properties. Poultry fecal matter as manure is an excellent source of nutrients for agricultural crops and can be incorporated into most fertilizer programs. The key to successful management is to match the nutritional requirements of the crop with nutrients available in the manure. So the study was undertaken to evaluate minerals from the faecal matter of chicks fed with molluscan diet as nonconventional food.

MATERIALS AND METHODS

The molluscan species *Lamellidens marginalis* were collected from local lakes and brought to the laboratory, kept in aquarium containing fresh water for one day in laboratory. Then animal was kept in deep freeze to kill without any loss of nutrient contents of it. Then the whole body was separated out from shell and kept in oven for complete drying. Before drying the water content was removed after blotting animal flesh on filter paper. The animal shell crush and dried flesh (Molluscan feed) was blended within grinder along with white dried grains such as Jowar, Wheat, Maize, Bajara, Pea bean, Soybean, Rice *etc*. The pellets were prepared from above mixture for feeding young chicks. The one day old poultry birds were collected from Poultry farm and were acclimatized for rearing in the laboratory conditions for 3 days. After 3 days of acclimatization chicks were divided into 5 different groups as Control group I- fed with only grain, Group II fed with only poultry farm recognized food, Group III fed with 10 % molluscan feed added to grains, Group IV fed with 20 % molluscan feed added to grains, Group V fed with - 10 % fish meal added to grains. Young chicks of three day old were fed for one month with the addition of nonconventional feed i.e. dried flesh of whole body mass and the grinded shell crush of bivalve mollusc, *Lamellidens marginallis*.

OBSERVATIONS AND DISCUSSION

Some investigators indicated that the quantity of manure varies with the breeds and the live weight of the bird, the time of collection, the composition of the diet, the plan of nutrition, the feed intake, the climate and other factors [2]. The mean mineral composition of broiler excreta (dry matter) from South African sources was determined as, calcium 25 ± 6.7 g/kg, phosphorus 15 ± 3.3 g/kg, magnesium 5.8 ± 1.1g/kg, potassium 13 ± 3.4g/kg, sodium 5.6 ± 1.6g/kg, copper 43.6 ± 17.7mg/kg, iron 1335 ± 1878mg/kg, manganese 317 ± 128mg/kg, zinc 254 ± 59mg/kg. The manure contained high concentrations of macro and micro minerals[3]. Poultry droppings are harmful to plants when fresh but, after a period of composting, are valuable fertilizers. The observed minerals in fecal droppings of experimental chicks are given in the following table.

Minerals in Faecal Matter of Chicks, (Mean and S.D.)

Estimated Elements	S-1 (Control)	S-2 (Poultry Farm Recognized food)	S-3 (Exp-I -10%)	S-4 (Exp-II -20%)	S-5 (Fish Meal)
Phosphorus(P) ***(mg/gm)***	0.096 ±0.0006	0.072* ± 0.0002	0.08* ± 0.0002	0.08* ± 0.0002	0.074* ± 0.0002
Sodium (Na) ***(mg/gm)***	0.039 ±0.0001	0.083* ± 0.001	0.044* ±0.0016	0.05* ± 0.0025	0.092* ± 0.006
Potassium (K) ***(mg/gm)***	0.16 ± 0.0019	0.18* ± 0.0027	0.15* ± 0.0016	0.55* ± 0.004	0.82* ± 0.002
Calcium (Ca) ***(mg/gm)***	0.016 ±0.0025	0.037* ± 0.003	0.875* ± 0.002	1.52* ± 0.016	0.015 NS ±0.0025

Above values were calculated on the standard method for estimation of Na, K, Ca by Digital Flame Photometer and determination of Phosphorus by UV-VIS Spectrophotometer method . Values are mean ± SD; n=5, * P<0.01 (Highly Significant), ** P<0.05 (Significant), NS- Not Significant (Compared with group I). According to Environmental Health News, the poultry industry produces up to 26 million tons of chicken manure each year in the United States alone. Much of that manure is used as fertilizer, and there are no requirements for the manure to be examined or treated before it's used on farm fields[4]. Animal manure is an excellent fertilizer for crops and forages. Manure contains nitrogen, phosphate, potash, and micronutrients that are essential for plant growth. Also, applying manure to land can improve soil tilt, increase water-holding capacity, reduce water and wind erosion, improve aeration, and promote beneficial organisms[5]. Chicken manure is known as the manure with the most fertilizing power, and that is largely due to the very high grain content that the chickens are fed, as well as the insects that the chickens eat whenever available. However, chicken manure is also usually a good source of Calcium, Boron, Copper, and Zinc; not because the grains in the chicken feed are high in those elements but because the chicken feed is fortified with those elements. Macro minerals (Ca, P, Na, Cl, K, Mg and S) and trace minerals (As, Co, Cr, Cu, Fe, I, Mn, Mo, Se, Zn and others) are mostly assessed from such manures. Poultry Farm Excreta contains all the nutrients required for plant growth. Field experiment was carried out at Banha (Qalubia Governorate) to investigate the effect of the chicken manure and mineral fertilizer on distribution of heavy metals in the different organs of two varieties of Tomato (GS 12 and Alisa), and their fruit yields. Treatments were 100% mineral fertilizers, 75% mineral fertilizers plus 25% chicken manure, 50% mineral fertilizers plus 50% chicken manure, 25% mineral fertilizers plus 75% chicken manure and 100% chicken manure. Before cultivation, soil samples of all the field treatments (0-60 cm) were collected and analyzed for available and total Pb and Zn. The available Zn was decreasing in soil with cultivation, while the available Pb was increasing with cultivation except by using 25% chicken manure plus 75% mineral fertilizer. The high total yield was recorded with GS 12 variety in all treatment, but the best treatments were 25% chicken manure plus 75% mineral fertilizer then 75% chicken manure plus 25% mineral fertilizer[6]. Poultry litter is an effective N fertilizer for cotton. Litter contains substantial amounts of Potassium (K) and Magnesium (Mg) also, but whether the K and Mg needs of cotton can be met by the commonly recommended litter rate was not documented. The results showed cotton received sufficient K from 4.5 Mg ha-1 litter, a rate previously found to be insufficient in meeting the N requirement of cotton[7]. The value of layer chicken litter and yellow maize meal was compared as a source of P in cattle and to find a cheap supplement that can be used by communal farmers to improve the mineral status of their cattle as poultry litter is useful supplement feed to improve the mineral status of their cattle or to supply their phosphorus (P) needs. According to the results obtained animals (Friesian calves) receiving the layer chicken litter had significantly more faecal P than the animals receiving yellow maize[8]. The calcium content in fecal matter of our experimental chicks was, 0.016 ± 0.0025 (mg/gm) in group-1, 0.037 ± 0.003 mg/gm in group-2, 0.87 ± 0.002 mg/gm

in group-3, 1.52 ± 0.016 mg/gm in group-4, and 0.015 ± 0.002 mg/gm in group-5. It was observed that the calcium content in chicks fed with 20% of molluscan food was highest and nearly half of that in fecal matter of chicks fed with 10% molluscan food. It was significantly higher in fecal matter of chicks fed with grains, commercial food and fish meal addition. The content of calcium increase could be attributed to the successive increase in the addition of shell grit in the feed in addition to the grains. It was observed that the higher content of calcium in shell crush of molluscs is reflected as unabsorbed calcium in digestive system and excess of calcium is excreted, but no adverse effect was observed in respect to digestibility of phosphorus or excretion of fecal matter during the experimental period.The sodium content in faecal matter of chicks was 0.039 ± 0.001 mg/gm in group-1, 0.083 ± 0.001 mg/gm in group-2, 0.044 ± 0.0016 mg/gm in group-3, 0.05 ± 0.0025 mg/gm in group-4, and 0.092 ± 0.006 mg/gm in group-5 . It was found that the sodium content in fecal matter of chicks fed with fish meal was highest and it was slightly lower that in chicks fed with commercial food, but it was observed significantly low in all the groups of chicks fed with conventional grains, 10% and 20% supplementation molluscan diet. The potassium in faecal matter of experimental chicks was 0.16 ± 0.0019 mg/gm in gourp-1, 0.18 ± 0.0027 mg/gm in group-2, 0.15 ± 0.0016 mg/gm in group-3, 0.55 ± 0.004 mg/gm in group-4, and 0.82 ± 0.002 mg/gm in group-5 . It was found that the potassium content was highest in the chicks fed with grains and commercial food. It was comparatively lower in fecal matter of chicks fed with 10% and 20% molluscan diet. In our experiment from analysis of sodium and potassium excretion in the fecal matter which was less in chicks fed with molluscan diet than that in chicks fed with fed with grains, commercial diet and fish meal as additive. It was stated that the dehydration is accompanied by increased excretion of nitrogen and electrolytes such as sodium (Na+) and potassium (K+) and increase in urea, total protein, and chloride in the serum and decline in the red blood count due to severity of water restriction in animals was reported[9]. It was observed form physical appearance of the fecal matter of chicks of all experimental groups that there was no dehydration found to happen in these entire groups, but tendency for water absorption was more in the chicks fed with molluscan diet. Phosphorus (P) is one of the major environmental pollutants excreted by poultry and swine, and excess environmental P is directly related to eutrophication and loss of biodiversity in water systems. High levels of excreted P from animal production systems are related to the low digestibility of P from plant sources, since it is bound in the phytate molecule which vertebrates cannot break down. While plant-based ingredients that are fed to commercial poultry and swine actually contain adequate levels of P to meet the animals' nutrient requirements, this P is not available to the animal. As a result, inorganic P is supplemented in poultry and swine diets, resulting in P excretion from unabsorbed inorganic sources as well as undigested phytate-bound P. To minimize high P excretion levels, exogenous phytase enzyme is often added to diets. Phytase is a microbial-derived enzyme that breaks down the phytate molecule, liberating phytate-bound P and rendering it digestible. Phosphorus content in faecal matter of our experimental chicks in various groups was found as 0.096 ± 0.0006 mg/gm group-1, 0.072 ± 0.0002 mg/gm in group-2, in 0.08 ± 0.0002 mg/gm in group-3, 0.08 ± 0.0002 mg/gm in group-4, and 0.074 ± 0.0002 mg/gm in group-5. It was observed in our assessment that phosphorus content in chicks fed with grains was at higher level, whereas in chicks fed with 10% and 20% of molluscan food it was more than that of commercial and fish meal food provided chicks but lower than only grain fed chicks indicating the benefit addition of molluscan diet for digestion of available phosphorus in grains and less excretion of phosphorus in faecal matter of chicks as compared to chicks fed with only grains. It also indicated that the phytate present in grains might have digested in the gut by addition of molluscan feed and resulted in low excretion of phosphorus in fecal matter. So the need for additional phosphorus content in cereal based diet can be reduced. The decreased excretion of phosphate which is also observed in fish meal

addition to suggest the favor of addition molluscan diet as compared to only grain feed for chicks. This effort was to improve and exploit economic potential of chicken as the need for the scientific development of poultry utility in respect to nutrients and mineral concentrations in manure, when used as fertilizer, can lead to soil concentrations that exceed crop requirements.

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