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SOME MANAGEMENT TECHNIQUES FOR REFERDING OF ANIMAL AND POULTRY WASTE

(With Two Tables)

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إستخدام بعض الطرق لمعاملة روث الحيوانات وزرق الطيور قبل إضافتها إلى العلائق

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نظراً للنقص الشديد فى مواد العلف وخاصة البروتين فيها والتى تمثل أعلى مكونات العليقة سعرا إتجه فكر القائمين على تغذية الحيوان إلى إستخدام مواد غير تقليدية رخيصة الثمن فى محاولة لتقليل تكلفة إنتاج وحدة اللحم ويعتبر روث الحيوان وزرق الطيور من أكثر هذه المواد شيوعاً فى إستخدامها وذلك لتوافرها بكميات كبيرة من ناحية ومن ناحية أخرى هى صورة لمحاكاة الطبيعة حيث أن هناك بعض الحيوانات تتناول ماتخرجه مرة ثانية للإستفادة بأكبر قدر ممكن من مكوناتها الغنية بالبروتين والمعادن وبعض الفيتامينات كما يحدث فى الأرانب ولكن التوسع فى إعادة إستخدام روث الحيوان وزرق الطيور يلزم التأكد من خلوها من مسببات الأمراض حتى تؤدى الغرض من إضافتها لذلك إتجهت الأبحاث فى الآونة الأخيرة لمعاملة هذه المواد معاملات مختلفة لضمان سلامتها تماماً كمادة علف . وفى هذه التجربة تمت معاملة كل من روث الحيوان وزرق الطيور بالفورمالين وأيدوكسيد الصوديوم والجير المطفأ حديثاً إلى جانب محاولة الإستفادة من الجو الجاف والشمس الساطعة فى صعيد مصر لتجفيف هذه الفضلات ولقد أجريت التجربة كالآتى :- جمعت كمية عشوائية من روث الحيوانات وزرق الطيور كل على حدة ثم فحصت بكتريولوجياً لمعرفة العدد الكلى للبكتريا فى الجرام الواحد ولعزل بعض أنواع البكتريا التى إستخدمت كدليل على مدى فاعلية هذه المعاملات مثل باسيل القولون والإستربتوكوكس فيكالس . ثم قسمت كل كمية من هذه الفضلات إلى خمسة مجاميع .

١ - المجموعة الأولى تركت فى الجو بعيداً عن أشعة الشمس المباشرة فى التقليب من آن لآخر.

٢ - المجموعة الثانية عرضت لأشعة الشمس المباشرة مع التقليب من آن لآخر .

٣ - المجموعة الثالثة عوملت بالفورمالين ٣٪ ، ٤ - المجموعة الرابعة عوملت بأيدوكسيد الصوديوم٣٪

٥ - المجموعة الخامسة عوملت بالجير المطفأ حديثاً . وقد فحصت المجموعات الخمسة بكتريولوجيا مرة كل إسبوع ومن الفحص البكتريولوجى وجد أن جميع الطرق المستخدمة أحدثت نقص ملحوظ فى العدد الكلى للبكتريا وأنه لم يتم عزل باسيل القولون والاستربتوكوكس فيكالس فى نهاية الأسبوع الأول فى حالة المجموعات المعاملة بالفورمالين والمعرضة لأشعة الشمس المباشرة بينما تم عزلها فى الأسبوع الثانى فى كل من المعاملات بأيدوكسيد الصوديوم والجير المطفأ . وقد خلصت التجربة أن أيدوكسيد الصوديوم والجير المطفأ يمثلان أفضل الطرق المستخدمة فى معاملة هذه الفضلات ولاينصح بإستخدام الفورمالين لما يتركه من رائحة بهذه الفضلات مما يجعله غير مقبولا كمادة علف .

SUMMARY

Animal wastes represents a vast reservoir of cheap nutrients, particularly for ruminants. In most countries, waste, particularly from poultry, is easily collected, as it is and concentrated in small areas. Feed costs for dairy or beef cattle usually represent 50-80% of the total production costs this can be reduced to 20-40% by utilizing animal and poultry wastes as supply source of protein, minerals and other nutrients.

As the chemical composition and thus the nutritive value of wastes depend on many factors, of which waste management contributes major part, many different management techniques have been tried to ensure the safety of these wastes as feed.

The results achieved in this study indicate that all methods used for processing the animal and poultry wastes cause marked reduction of the total viable count. The indicator bacteria is completly inhibited at the end of the 1st week of exposure to formalin and sunlight, but they remain viable till the end of the 2nd week of exposure to sodium hydroxide and slaked lime.

INTRODUCTION

Animal waste management is rapidly becoming one of the major environmental concerns in the world. Because of the enormous amount of animal waste generated, many different management techniques have been tried, of which especially promising is the refeeding of animal wastes. The value of animal waste as feeds appear to be more superior to their other uses as it will result in reducing feed cost and a lower price of animal products, in addition, it contributes to self-sufficiency in protein, phosphorus and other expensive nutrients inruminant rations. The most valuable constituent of animal wastes is the nitrogenous fraction represented by protein and non protein nitrogen.

Poultry wastes are usually high in nitrogen content, avaraging 28% (EL-SOBBAN, et al. 1970; FONTENOT, et al. 1971). However uric acid, the main non protein nitrogenous compound in poultry wastes could be utilized efficiently by rumen microbes. Satisfactory performance was obtained when animal and poultry wastes are fed to farm animals and the taste of meat, milk and eggs has not been adversely affected (NOLAND, et al. 1955; EL-SOBBAN, et al. 1970; BULL and REID, 1971). ABD-ELLAH (1986) reported that additionof poultry waste to ruminant rations improve the digestibility of different nutrients while cattle waste shows no bad effects on ration digestibility and utilization, he also added that poultry wastes and cattle excreta could be used up to 27% and 14% respectively of the whole ration for sheep.

MANAGEMENT OF ANIMAL WASTES

Livestock wastes contain most of the same classes of chemical compounds found in feeds. Some form of treating the wastes for refeeding is desirable to make nutrients more available, to control adours, insects and to control disease problems. Also refeeding treated wastes offer the possibility of reducing the amount of new feed required.

Processing of animal wastes prior to refeeding is very important since harmful organisms may be destroyed with proper treatment (FONTENOT and WEBB, 1974; BHATTACHARYA and TAYLOR, 1975; FONTENOT and WEBB, 1975; McCASKEY and ANTHONY, 1979). All listed number of processing methods that have been used for eliminating pathogenic microorganisms including, heat, pelleting, chemical, fermentation and oxidation ditch aerobic liquid treatment.

There are many unanswered questions with regard to animal wastes as agent of disease transmission, and information on basic research is still lacking. Many pathogenic organisms are capable of causing disease in humans, livestock and poultry, have been isolated from animal wastes (U.S.D.A., 1957; SCHWABE, 1964). There are circumstances when animals are asymptomatic carrier for certain diseases which can infect and cause disease in other species (ADLER, et al. 1953). Microbial population in animal wastes is dependant upon many factors which may influence their multiplication. Several pathogenic organisms present in poultry excreta may affect other animals. Salmonella pullorum has been known to infect cattle, E. rhusiopathia produce infection in swine and birds; M. avium is capable of sensatizing cattle which react to mammalian tubercline (WILSON and MITES, 1964; DAVIS, et al. 1974). Several studies have been conducted for the isolation of pathogenic microflora in animal waste which may produce diseases in poultry as well as cattle, swine and sheep (NILO and AVERY, 1963; ALEXANDER, et al. 1968).

Many workers studied the effect of physical condition and storage of litter on bacterial population, they observed that moisture, PH, temperature of storage exerted little influence on microorganisms densities (SCHEFFERELER' 1965 a,b, 1966; LOVETT, et al. 1971). SMITH (1955) reported that salmonella galinarium may be detected after 6 to 59 days in poultry droppings allowed to air dry. On the other hand, STRAUCH and MUCLLER (1968) stated that salmonella species in the manure destroyed within a period of 6 days in summer and after 26 days in winter. Although a potential disease problem due to bacteria in animal waste does exist, chemical, or physical treatments of the wastes should destroy these potential pathogens.

In a trial to study the influence of various disinfectants as well as physical treatments on bacterial populations and some pathogens in animal and poultry wastes, this work was done to ensure its safety as animal feed.

MATERIAL and METHODS

Lots of fresh cattle and poultry wastes were collected for chemical and physical treatment. Each type of manure was divided into 5 parts, two of them were spreaded

in trays at about 10 cm. thickness on a concrete floor, left for 3 weeks. One of which was exposed to direct sunlight and the other was allowed to be air dried. The spreaded manure were turned several times to ensure good dryness.

The other three parts were treated chemically. One of them was treated with formalin 3% (30 ml for 1 kg of the waste). The 2nd part was mixed with Nacl 3% (30 ml for 1 kg of the waste), and the 3rd part was treated with freshly prepared slaked lime (30 gm/1 kg of the waste).

The survivability of the bacteria in fresh, spreaded and chemically treated manure were detected by bacteriological examination of all groups at one week interval, according to BAILY & SCOTT, 1978; CRUICKSHANK, et al. 1980 as follows:

1 - **Total colony count:**
One gram of each of the 5 groups was emulsified in 100 ml sterile saline solution. One ml was taken from the emulsion for total colony count.

2 - **Detection of indicator bacteria:**

2.1. Strept. Faecalis:
Strept., faecalis (S.F.) broth was inoculated by the faecal sample and incubated at 37°C for 18-24 hr Representative colonies were identified according to their culture characters and biochemical activities.

2.2. Escherichia coli:
Waste samples were inoculated onto MaCconkey broth. The inoculated tubes were incubated at 37°C for 24 hrs. A loopful from the enriched tubes was carried out on MaCconkey agar plate and incubated at 37°C for 24 hrs. Identification of pure culture was based on growth characteristics and biochemical reactions.

3 - **Estimation of moisture content:**
Moisture content of each of the experimental samples was estimated according to A.O.A.C. (1965).

RESULTS and DISCUSSION

Animal wastes to be fed should not contain pathogenic bacteria and toxogenic moulds, so treating animal waste before refeeding is very important to destroy harmful organisms.

Physical treatment especially solar drying is probably the oldest method of processing waste for refeeding, especially poultry excrement, as it has the lower moisture content than that of other livestock.

From table (1 & 2) it is shown that the exposure of cattle and poultry manure to air drying (indirect sunlight) cause reduction in total microbial count. The total viable count in poultry waste is reduced from 12.10^{16} in fresh waste to 239.10^{10}, 14.10^{7}, 38.10^{3} at the 1st, 2nd, 3rd week of exposure respectively while the total viable

count in cattle manure is reduced from 48.10^{14} to 0.10^{14}, 9.10^{3}, 41.10^{3} at the 1st, 2nd, 3rd week of exposure respectively. On the other hand exposure of cattle and poultry wastes to direct sunlight result in great decrease in bacterial population (32.10^{5}, 21.10^{5}, 246 in cattle manure and 2.10^{5}, 103.10^{3}, 125 in poultry manure at the 1st, 2nd, 3rd week of exposure respectively).

E.coli and streptoccus faecalis were not detected at the end of the second week of exposure to direct and indirect sunlight. At the 1st week of exposure to direct sunlight E.coli is completely inhibited. It is also evident from table 1, 2 that the moisture content of manure exposed to air drying was higher than that which exposed to direct sunlight.

Treatment of poultry waste and animal manure by chemicals is important for destroying pathogens and it may improve its quality as feeds. From table (1, 2), it is evident that treatment of animal and poultry waste by formalin 3%, Na OH 3% and freshly prepared staked lime greatly reduced the total viable count especially at the end of the 3rd week of treatment.

E.coli and strept. faecalis were not detected at the end of the 1st week from adding formalin to cattle and poultry waste, but both organisms were completely inhibited after a period of three weeks from adding Na OH 3% to both types of manure. Cattle and poultry waste treated by freshly prepared staked lime gives results not differ from those obtained by sodium hydroxide treatment.

From the results achieved, one can concluded that treatment of animal waste by sodium hydroxide and lime are more satisfactory methods as they improve the quality of waste as feeds (SMITH, et al. 1969) however, the treated manure with formalin will be rejected due to its unpleasent smell.

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Table (1)

Bacteriological examinatin of treated and untreated cattle manure

Groups of manure	Bact. exam. at 1st week			Bact. exam. at 2nd week			Bact. exam. at 3rd week			Moisture content		
	T.c.c/gm manure	E.coli	Strept. fae.	T.c.c.	E.coli	Strept. Paec.	T.c.c.	E.coli	Strept. fae.	1st week	2nd week	3rd week
Original bulk of manure	48.10^{18}	+ve	+ve	-	-	-	-	-	-	-	65%	-
Manure exposed to direct sunlight	32.10^{7}	-ve	+ve	21.10^{5}	-ve	-ve	246	-ve	-ve	17%	11%	5%
Manure exposed to air dry	8.10^{14}	+ve	+ve	9.10^{8}	-ve	-ve	41.10^{3}	-ve	-ve	18%	15%	9%
Manure treated with formaline (3%)	11.10^{5}	-ve	-ve	2.10^{2}	-ve	-ve	13	-ve	-ve			
Manure treated with, NaOH 3%	21.10^{14}	+ve	+ve	14.10^{8}	+ve	+ve	26.10^{3}	-ve	-ve			
Manure treated with slaked lime	42.10^{8}	+ve	+ve	10.10^{7}	+ve	+ve	567	-ve	-ve			

Table (2)

Bacteriological examination of treated and untreated poultry manure

Groups of manure	Bact. exam. at 1st week			Bact. exam. at 2nd week			Bact. exam. at 3rd week			Moisture content		
	T.c.c/gm manure	E.coli	Strept. fae.	T.c.c.	E.coli	Strept. Paec.	T.c.c.	E.coli	Strept. fae.	1st week	2nd week	3rd week
Original bulk of manure	12.10^{16}	+ve	+ve								50%	
Manure exposed to direct sunlight	2.10^{5}	-ve	+ve	103.10^{3}	-ve	-ve	125	-ve	-ve	10%	7%	3%
Manure exposed to air dry	239.10^{10}	+ve	+ve	14.10^{7}	-ve	-ve	38.10^{3}	-ve	-ve	13%	9%	5%
Manure treated with formaline (3%)	6.10^{5}	-ve	-ve	23.10^{2}	-ve	-ve	110	-ve	-ve			
Manure treated with NaOH 3%	42.10^{13}	+ve	+ve	39.10^{7}	+ve	+ve	4.10^{3}	-ve	-ve			
Manure treated with slaked lime	68.10^{13}	+ve	+ve	51.10^{9}	+ve	+ve	23.18^{3}	-ve	-ve			