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FIELD TRIALS TO REDUCE AMMONIA CONTENT OF AIR IN BRIOLER HOUSES

(With Two Tables)

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محاولة حقلية لتقليل النوشادر في هواء بيوت بـــداري التسـمين

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تعتبر زيادة نسبة النوشادر في هواء مساكن الدواجن وخصوصا بداري التسمين من المشاكل التي تقابل مربي الدواجن خصصا في فصل الشتاء حيث تقل التهوية وتغلق بغرض التدفئة مما يؤدى الى ارتفاع نسبة النوشادر والتي تعرض الدواجن لكثير من الأمراض حيث تحدث تهيجات والتهابات بقرنية العين والجهاز التنفسي وتقلل من سرعة تحويل هذه البداري للغذاء وتؤثر على سرعة نموها مما يقلل من حجم هذه البداري عند نهاية فترة التسمين هذا بالاضافة الى أن زيادة نسبة النوشادر تقلل من مقاومة الجسم مما يزيد من فرصة اصابة الطيور ببعض الأمراض وخاصة مرض الكوكسيديا والنيوكاسل والتهاب الجيوب الأنفية. لذلك فقد أجريت هذه الدراسة لتقدير مدى كفاءة بعض المواد الكيمائية في تقليل نسبة النوشادر في هواء بيوت بداري التسمين. ولقد استخدم محلول كبريتات النحاس ٤٪ بمعدل ١٧٠ سم/م٢ من مساحة أرضية العنبر وكذلك محلول حمض الخليك نسبة ٢٪ ، حمض البنزويك نسبة ٢٪ بمعدل ٢٣٠ سم/م٢ لكل منهما وأيضا الجير المطفأ بمعدل نصف كجم/م٢ من مساحة أرضية العنبر . وقد قدرت نسبة النوشادر في هواء هذه العنابر خلال فترة ٢١ يوم بعد خلط هذه المواد بالفرشة. وقد وضح من التجربة أن استخدام محلول كبريتات النحاس وكذلك الجير المطفأ يقلل من نسبة النوشادر لمدة ٢١ يوم بينما محلول حمض البنزويك والخليك يقلل من نسبة النوشادر لمدة خمسة عشر يوما وعشرة أيام على التوالي . ويمكن استخدام هذه المواد الكيمائيه لتقلل من نسبة النوشادر خصوصا في فصل الشتاء حيث تقل التهوية وعدم تجديد الفرشة المستخدمة في العنابر.

SUMMARY

Brioler litters were chemically treated with cupper sulphate 4%. Benzoic Acid 2%. Acetic Acid 2% and slaked lime 0.5 kg/m² floor area to determine the effectiveness of these agents in suppresion of ammonia release from the litter. Cupper sulphate 4% and slaked lime were found to be the most effective substances in controlling ammonia release for about 21 days. Benzoic Acid 2% and Acetic Acid 2% reduced the ammonia levels for 15 and 10 days respectively.

INTRODUCTION

Ammonia is still considered as one of the most common problems in air laying hen houses and in the grow-out phase of poultry production. The production of the unacceptable high level of ammonia in poultry houses was partly occur from the re-use of old litter to avoid the rising costs of materials in such farms (CAVENY, et al. 1981). The reduction of ventilation to avoid excessive heat loss during winter is another factor in increasing the high concentration of ammonia in poultry farms (ANDERSON, et al. 1964 b).

Ammonia is a product of bacterial breakdoun of uric acid in poultry manure. Moisture and temperature influence the rate of breakdown, and therefore affect the production of ammonia (ROBERT, 1987).

The harmful effects of ammonia in poultry houses, particularly in brioler and pullet rearing operations are well decumented in the literature. Symptoms of ammonia irritation in chickens including watery eyes closed eye lids, rubbing of eyes with wings, decreased growth rate, poor food conversion and unthriftness. It is also considered as the principal cause of kerato conjunctivities and trachitis in chickens and turkeys (LILLIE, 1970; CAVENY and QUARLES, 1978; QUARLES and FAGERBERG, 1979; REECE, et al. 1980 and DEATON, et al. 1984). In addition exposure to ammonia may also increase the susceptibility to many diseases as coccidiosis (QUARLES and CAVENY, 1979). Newcastle disease and air sacculitis (MOUM, et al. 1969).

Poultry may also develop a variety of disorders when exposed for long periods to level of 20 ppm ammonia or more (ANDERSON, et al. 1964 b). VALENTINE (1964) found that ammonia concentrations of 60-70 ppm predipsosed birds to respiratory disease and increased the risk of secondary infections. CHARLES and PAYNE (1966) noted that birds exposed to 102 ppm ammonia showed symptoms similar to that recovered in cases of calcium defficiency. While KLING and QUARLES (1974) observed a significant lowering of body weights among 8 weeks of age ammonia stressed birds. CAVENY, et al. (1981) showed a significant reduction in feed efficiency among birds exposed to 50 ppm ammonia from 1-19 days of age.

Several chemicals have been tested to determine their ability in controlling or reducing ammonia release from poultry litter and manure. PARKHURST, et al. (1974) was able to reduce the litter pH for 2 weeks at 1% and for 3 weeks at 3% level when he treated pine sawdust litter with 60% acetic and 40% propionic acids. DICHMANN (1987) showed that sorbic acid and Benzoic acid added to a commercial litter greatly reduced the ammonia contnet of the air in deep litter houses for several weeks. TAIROVA (1989) recommended the spraying of the floor of pig farms with 1-2% potassium permanganate or 2-4% cupper sulphate solution for overcoming bad smell.

The purpose of this study was to evaluate the effectiveness of some chemicals in reducing the ammonia release from the litter of brioler chickens.

MATERIAL and METHODS

Four compounds mainly cupper sulphate 4%, Benzoic Acid 2%, acetic Acid 2% and slaked lime (Freshly prepared) were selected for this study. They were selected on the basis of relatively low cost and potential for reduced ammonia release.

The test were conducted in brioler houses where briolers were reared on cutted wheat straw litter at 1000/chicken for 150 m^2 floor space. The chemicals used were broadcasted and thorough mixed with a garden rake over the litter at rates of 170 ml/m^2 for cupper sulphate, 330 cm/m^2 for each Benzoic and acetic acid solutins and 0.5 kg/m^2 for slaked lime.

Ammonia level was measured on the basis of 3, 7, 10, 15 and 21 days according to REECE, et al. (1979) and the method adopted by JACOBS (1944) using the liquid impinger containing known volume of standardized 0.01N sulphuric acid and methyl/red as indicator until the indicator changes to the neutral side.

The amount of the acid used in the test was governed by the concentration of ammonia expected and according to the following statement :

$$\frac{0.2445 \times \text{ml } 0.01N \text{ sulphuric acid} \times 1000}{\text{Rate of sampling} \times \text{minutes}}$$

one ml of 0.01N sumphuric acid is equivalent to 0.00017 mg or 0.2445 ml of ammonia gas at 25°C and 760 mmHg pressure. The rate of sampling was expressed in litter. 1000 is a factor converting the mililiters of ammonia per liter of air, that is parts per thousands to parts per million.

Samples ammounting to 50 grams were collected from each untreated and treated litters and placed in separate clean plastic bags, litter pH was determined by pHmeter.L and the moisture was determined by oven-drying of a representative sample of the litter.

RESULTS

Are tabulated in table (1 & 2).

DISCUSSION

Results are tabulated in table (1) showed that cupper sulphate 4% was one of the most effective agents in controlling ammonia during the 2_1 days, treatment inspite of the increased litter pH and moisture % (table 2). This findings may be attributed to the nuetralizing and dodorizing actions of cupper sulphate (TAIROVA, 1987).

Benzoic Acid was also found to be effective in reducing ammonia release by 15 days treatment (table 1), in spite of the increased litter pH and moisture % (table 2). This may be attributed to the fact that ammonia gas is readily absorbed by water and consequently reacts with many acids (RECCE, et al. 1979).

Acetic acid 2% was the least efficient chemicals in controlling ammonia in the brioler houses (Table 1). It reduced the ammonia content in such building for only 10 days after treatment. This may be due to rapid decomposition of this substance and the factore of its neutralizing ability.

Ammonia level was also significantly reduced in these trials when slaked lime was incorporated into the litter for 21 days. (table 1). The slaked time treatment was effective in reducing the moisture % of the litter than cupper sulphate, Benzonic acid and acetic acid treatment (table 2). Application of slaked lime at a rate of 0.5 kg/m² floor area kept ammonia release at low level because of the deodorize and obsorbant actions of this substance.

It is clearly evident from our results that there was a direct relationship between the litter pH and ammonia release (table 1 & 2). Ammonia release reached to its high levels when the pH was 8.0 or more.

From this results acheived, it can be conclude that addition of chemicals to litter is one of the effective methods in controlling ammonia in brioler houses. Cupper sulphate 4% and slaked lime are the most efective agents in reducing ammonia level for about 21 days. Benzoic acid 2%, acetic acid 2% are effective in controlling ammonia release for about 15 and 10 days respectively. However, such chemical control can only be regarded as a method of reducing ammonia when ventilation and litter management has been poor.

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Table (1): Effect of chemical treatments on ammonia release (ppm) from litter of brioler chickens.

Days	Without treatment	After treatment			
		Cupper sulph. 4 %	Benzoic A. 2 %	Acetic A. 2 %	Slaked lime 0.5 kg/m^2
3	60	49	33	46	37
7	74	32	26	42	14
10	75	34	37	50	22
15	80	48	40	80	48
21	186	53	65	140	56

Table (2): Effect of chemical treatments on litter pH and moisture % of brioler chickens.

Days	Without treatment		After treatment							
			Cupper sulph. 4 %		Benzoic A. 2 %		Acetic Acid 2%		Slaked lime 0.5 kg/m^2	
	pH	moist.	pH	Moist.	pH	moist.	pH	moist.	pH	Moist.
3	7.20	17	7.9	18	8.10	14	8.30	16	8.10	17
3	7.36	18	8.2	20	8.58	16	8.72	19	8.39	16
10	7.50	21	8.4	25	8.32	18	8.76	21	8.26	19
15	7.90	25	8.7	29	8.60	25	9.80	34	8.90	21
21	8.30	32	8.9	33	8.76	33	10.20	36	9.50	23