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Effect ofdifferent litters supplemented withchemicalsagents on broiler rectum

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Abstract

The objective of the study was to ascertain the effects of the litter type and its chemical supplementation on rectum characteristics in broilers. Experiment was conducted based on a 3×3 factorial arrangement with 3 litter treatments (sand, wood shaving, and paper) and 3 chemical reagent treatments (no reagent, lime, and bentonite). From obtained results, it is showed that litter type had not significant effect on rectum weight, relative weight of rectum, rectum length, rectum width, and rectum diameter (P>0.05), although sand litter had the highest rectum weight, relative weight of rectum, and rectum width numerically. Chemical regent type also had not significant on rectum weight, relative weight of rectum, rectum length, rectum width, and rectum diameter (P>0.05), however no reagent resulted to the highest rectum weight, relative weight of rectum, rectum length, and rectum diameter numerically. Meanwhile statistical differences between nine studied treatments for weight of rectum were significant (P≤0.05) and the highest level of rectum weight belonged to treatment 1 (sand as litter and no reagent), and treatment 3 (sand as litter and lime as reagent) remained at lower level than other treatments.

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Introduction

Broiler meat have important role in human nutrition. Broiler meat is a main source of protein supply at human societies.

Litter is a major factor in broiler productivity and there is some studies about litter effects on broiler performance (Malone *et al.*, 1983; Huff*et al.*, 1984). However there are little research about effect of litter and its process o broiler rectum, while rectum is a important organ and an index of chick health (Özkan*et al.*, 2003).

Chemical process of broiler litter can improve litter quality. It is expected chemical process of litter indirectly affect on broiler welfare and health. There are some reports about effects of chemical process of litter on broiler gastrointestinal characteristics.

Bird rectum have a role in nutrient digestion and absorption. Litter quality affect on internal organs such as rectum. rectum characteristics can be as an index for broiler health. There is not report about relationship of broiler litter quality with rectum characteristics, and so it must investigate based on scientific works.

In this study, the effects of 3 different litters (sand, wood shaving, and paper) supplemented with 3 chemical reagents (no reagent, bentonite, and lime), on broiler rectum was investigated. The objective of the study was to ascertain the effects of the litter and its chemical supplementation on rectum characteristics in broilers.

Materials and methods

Experiment

A total of 270 1-d old male Ross 308 broiler chicks were purchased from a local hatchery. The chicks were randomly allotted to 27 wire-floored land cages (100×150 cm) with 10 males per cage.

Treatments

Experiment was conducted based on a 3×3 factorial arrangement with 3 litter treatments (sand, wood shaving, and paper) and 3 chemical reagent treatments (no reagent, lime, and bentonite). There were 9 treatments with 3 replicates per treatment. Nine treatments included:

Treatment 1: litter (sand) supplemented (no reagent)
Treatment 2: litter (sand) supplemented (bentonite)
Treatment 3: litter (sand) supplemented (lime)
Treatment 4: litter (wood shaving) supplemented (no reagent)
Treatment 5: litter (wood shaving) supplemented (bentonite)
Treatment 6: litter (wood shaving) supplemented (lime)
Treatment 7: litter (paper) supplemented (no reagent)
Treatment 8: litter (paper) supplemented (bentonite)
Treatment 9: litter (paper) supplemented (lime)

Bentonite and lime were used as much as 3 and 1.5 kg/m3 litter for all related treatments respectively. The experimental period was 42 d and feeds were supplied to birds as *ad libitum* basis during the entire experiment. Water was available at all times. The light was provided for 23 h per 24 h day-night. At 42nd day of age, one bird per replicate was scarified and rectum removed and measured its characteristics.

Statistical analysis

Data were analyzed by analysis of variance using a 3×3 factorial arrangement with 3 litter treatments (sand, wood shaving, and paper) and 3 chemical reagent treatments (no reagent, lime, and bentonite), using a two-way ANOVA procedure. Data were analyzed by SPSS (1997) statistical software and GLM procedure was used. The data showed in Table 1 are the mean ± standard error values of the mean.An α-value of 0.05 was used to assess significance among means.

Results and discussion

Obtained results are summarized in Table 1. From obtained results, it is showed that litter type had not significant effect on weight of rectum ($P>0.05$), although sand litter had the highest rectum weight numerically (2.653 g). Chemical regent type also had not significant on rectum weight ($P>0.05$), however

no reagent resulted to the highest rectum weight numerically (2.496 g). Meanwhile statistical differences between nine studied treatments for weight of rectum were significant (P≤0.05). Amount of weight of rectum in nine studied treatments were between 1.613-3.330 g. Among studied treatments, the highest level of rectum weight belonged to treatment 1 (sand as litter and no reagent), and treatment 3 (sand as litter and lime as reagent) remained at lower level than other treatments. Other treatments were between these treatments.

Table 1. Mean (±SEM) of rectum characteristics at 42nd days of age in Ross 308 broilers affected by different litters and treated litters with different chemical reagents.

Trait / Treatment		Rectum weight (gr)	Relative weight of rectum (%)	Rectum length (mm)	Rectum width (mm)	Rectum diameter (mm)
Litter	Sand	2.653^{a}±0.280	0.109^{a}±0.012	35.778^{a}±2.169	11.770^{a}±0.674	0.780^{a}±0.071
	Wood shaving	2.036^{a}±0.280	0.079^{a}±0.012	38.111^{a}±2.169	10.751^{a}±0.674	0.936^{a}±0.071
	Paper roll	1.952^{a}±0.280	0.073^{a}±0.012	37.333^{a}±2.169	10.252^{a}±0.674	0.840^{a}±0.071
Chemical reagent	No reagent	2.496^{a}±0.280	0.093^{a}±0.012	38.889^{a}±2.169	11.018^{a}±0.674	0.897^{a}±0.071
	Bentonite	2.121^{a}±0.280	0.086^{a}±0.012	37.556^{a}±2.169	11.107^{a}±0.674	0.773^{a}±0.071
	Lime	2.024^{a}±0.280	0.082^{a}±0.012	34.778^{a}±2.169	10.649^{a}±0.674	0.886^{a}±0.071
Litter (Sand)- Reagent (No reagent)		3.330^{a}±0.484	0.132^{a}±0.021	37.000^{a}±3.756	10.643^{a}±1.168	0.737^{a}±0.123
Litter (Sand)- Reagent (Bentonite)		3.017^{ab}±0.484	0.125^{a}±0.021	39.000^{a}±3.756	13.027^{a}±1.168	0.817^{a}±0.123
Litter (Sand)- Reagent (Lime)		1.613^{b}±0.484	0.070^{a}±0.021	31.333^{a}±3.756	11.640^{a}±1.168	0.787^{a}±0.123
Litter (Shaving)- Reagent (No reagent)		2.257^{ab}±0.484	0.082^{a}±0.021	39.667^{a}±3.756	12.643^{a}±1.168	1.107^{a}±0.123
Litter (Shaving)- Reagent (Bentonite)		1.683^{b}±0.484	0.067^{a}±0.021	37.667^{a}±3.756	9.800^{a}±1.168	0.717^{a}±0.123
Litter (Shaving)- Reagent (Lime)		2.167^{ab}±0.484	0.087^{a}±0.021	37.000^{a}±3.756	9.810^{a}±1.168	0.983^{a}±0.123
Litter (Paper)- Reagent (No reagent)		1.900^{ab}±0.484	0.065^{a}±0.021	40.000^{a}±3.756	9.767^{a}±1.168	0.847^{a}±0.123
Litter (Paper)- Reagent (Bentonite)		1.663^{b}±0.484	0.064^{a}±0.021	36.000^{a}±3.756	10.493^{a}±1.168	0.787^{a}±0.123
Litter (Paper)- Reagent (Lime)		2.293^{ab}±0.484	0.088^{a}±0.021	36.000^{a}±3.756	10.497^{a}±1.168	0.887^{a}±0.123

* Means (± standard error) within each column of treatments with no common superscript differ significantly at p<0.05.

It is showed that litter type had not significant effect on relative weight of rectum (P>0.05), although sand litter had the highest relative weight of rectum numerically (0.109%). Chemical regent type also had not significant on relative weight of rectum (P>0.05), however no reagent resulted to the highest relative weight of rectum numerically (0.093%). Meanwhile statistical differences between nine studied treatments for relative weight of rectum were not significant (P>0.05). Amount of relative weight of rectum in nine studied treatments were between 0.064-0.132%. Among studied treatments, the highest level of relative weight of rectum belonged to treatment 1 (sand as litter and no reagent), and treatment 8 (paper as litter and bentonite as reagent) remained at lower level than other treatments. Other treatments were between these treatments.

Litter type had not significant effect on rectum length (P>0.05), although wood shaving as litter had the highest rectum length numerically (38.111 mm). Chemical regent type also had not significant on rectum length (P>0.05), however no reagent resulted to the highest rectum length numerically (38.889 mm). Meanwhile statistical differences between nine studied treatments for rectum length were not significant (P>0.05). Amount of rectum length in nine studied treatments were between 33.33-40.00 mm. Among studied treatments, the highest level of

rectum length belonged to treatment 7 (paper as litter and no reagent), and treatment 3 (sand as litter and lime as reagent) remained at lower level than other treatments. Other treatments were between these treatments.

It is showed that litter type had not significant effect on rectum width (P>0.05), although sand litter had the highest rectum width numerically (11.770 mm). Chemical regent type also had not significant on rectum width (P>0.05), however bentonite as reagent resulted to the highest rectum width numerically (11.107 mm). Meanwhile statistical differences between nine studied treatments for rectum width were not significant (P>0.05). Amount of rectum width in nine studied treatments were between 9.767-13.027 mm. Among studied treatments, the highest level of relative weight of rectum belonged to treatment 2 (sand as litter and bentonite as reagent), and treatment 7 (paper as litter and no reagent) remained at lower level than other treatments. Other treatments were between these treatments.

Litter type had not significant effect on rectum diameter (P>0.05), although wood shaving as litter had the highest rectum diameter numerically (0.936 mm). Chemical regent type also had not significant on rectum diameter (P>0.05), however no reagent resulted to the highest rectum diameter numerically (0.897 mm). Meanwhile statistical differences between nine studied treatments for rectum diameter were not significant (P>0.05). Amount of rectum diameter in nine studied treatments were between 0.717-1.107 mm. Among studied treatments, the highest level of relative weight of rectum belonged to treatment 4 (wood shaving litter and no reagent), and treatment 5 (wood shaving as litter and bentonite as reagent) remained at lower level than other treatments. Other treatments were between these treatments.

Rectum have important role in broiler nutrition and digestion. Therefore, any attempt for increasing of broiler productivity must consider rectum characteristics (Özkan*et al.*, 2003). Litter is high potential for broiler productivity improvement and many researchers studied its effect on broiler performance(Malone *et al.*, 1983; Huff*et al.*, 1984). Our findings showed different litters have different effect on rectum characteristics and also different reagent for litter process had the different effect on broiler rectum. Recently Muniz *et al* (2014) reported presence of Salmonella spp. in reused broiler litter. Walkden-Brown*et al* (2013) investigated effects of various additives to reused broiler litter on litter ammonia production, chicken welfare and performance. As conclusion based on our findings sand paper as litter without supplementation with reagent is the best litter for broilers.

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