THE EFFECT OF DIFFERENT TYPES OF LITTER MATERIAL ON BROILERS PERFORMANCE

ABSTRACT:
The objective of the present study was to determine the effect of wood shavings, wheat straw, and their mixture as litter material on growth performance in broilers from 1 d to 42 d of age. A total of one hundred and fifty one-day-old Hubbard® chicks were used in our experiment, weighed and assigned at random into 6 pens of 25 birds each. There were two replicates of each of the following three treatments: 1) wood shavings, 2) wheat straw, and 3) a mix of 50% wood shavings and 50% wheat straw. The pens were littered at a depth of 75 mm. The results indicated no significant influence of used litter materials on feed consumption (FC), body weight gain (BWG) and feed conversion ratios (FCR). Mortality of birds reared on wheat straw tended to be numerically higher than that of other two treatments. Significant differences were observed for percentage litter moisture among treatments, while no consistent differences in litter pH were noted. The type of litter used in the rearing pens had significant effect on some indices of leg weakness. Walking ability scores (gait scores, GS) and foot pad burn scores were lowest in pens littered with wood shavings and highest in those littered with wheat straw, with birds reared on a mix being intermediate. It was concluded that wood shavings alone and when mixed with wheat straw are potential litter materials for broiler production.

INTRODUCTION:
Although the choice of a particular litter material depends mostly on its availability and price regardless of the comfort or its effect on birds' production, the importance of having good quality litter for rearing broilers should be recognized. Oliveira et al. (1974) observed that types of litter had no significant effect on growth rate, feed conversion, mortality, and performance index. Other studies with both broilers and layers (Sharma, 1987; Kassid and Coleman, 1989; Ranade and Rajmane, 1990) confirmed that performance was unlikely to be affected by the nature of the litter. Moreover, Anonymous (1992) has reported that neither types of litter nor their depths significantly affected birds' performance. Husbandry manipulations that lasted throughout the life of the birds were found to be more effective at reducing leg weakness than manipulations applied for a short time early in life (SØrensen et al., 2000; Dawkins et al., 2004). It was suggested that a litter substrate that remain dry throughout production and thus is favorable for activity of chickens, would promote better leg health (Su et al., 2000). A clear relationship was reported between walking ability and foot burn (SØrensen et al., 1999; Su et al., 1999). Birds that had worse foot burn also had worse walking ability. Several studies have identified a correlation between damp and or crusty litter and foot bad lesions (Harms and Simpson, 1977; Martland, 1984; Wang et al., 1998). In laying hens, moisture was a main contributing factor to bumble foot (Tauson and Abrahamsson, 1996). The present study was designed to evaluate the effect of wood shavings and wheat straw when used alone or mixed as litter materials on broiler performance, mortality and some indices of leg weakness.

MATERIALS AND METHODS:
One hundred and fifty 1-d-old Hubbard® chicks were used in our experiment. The chicks were weighed and assigned at random in each of 6 electrically heated pens measuring (2.33 x 3.17 m, height 3.0 m) at a density of 3.4 birds per square meter. All pens were clean, had been disinfected before the start of...
the walking ability of the birds while they were by the same assessor, who assessed damage to 3 = extended burn and inflammation assigned from 0 to 3, where 0 = no sign of foot pads were evaluated as the carcass bird to 5 = a bird that could not walk at all. The a 6-point scale, where 0 = a perfectly normal environment. Birds were assigned a score from moving spontaneously in the rearing atmosphere.

Gait score (GS) was assessed at 40 d of age. Foot pad burn was also scored at slaughter on day 42. Birds were scored individually for gait according to the methods of Kestin et al. (1992) by the same assessor, who assessed the walking ability of the birds while they were moving spontaneously in the rearing environment. Birds were assigned a score from a 6-point scale, where 0 = a perfectly normal bird to 5 = a bird that could not walk at all. The foot pads were evaluated as the carcass passed on evisceration line, and scores were assigned from 0 to 3, where 0 = no sign of damage to 3 = extended burn and inflammation (SØrensen et al., 2000). Litter moisture samples were collected at 7, 14, 21, 28, 35 and 42 d of birds’ age by combining litter samples from 3 different locations in each pen (near the feeders, and at the center and corners of the pen), mixing and obtaining a 100 g sub-sample. Samples were dried for 48 h at 60°C, cooled in a desiccator and weighed. Litter pH was noted between any of the differences were noted between wood shavings alone and when mixed with wheat straw at 14 and 21 days of age while litter moisture differed significantly at 28, 35 and 42 days.

The data obtained in the study were subjected to one-way ANOVA with litter substrate as a main factor using the General Linear Models (GLM) procedure of SAS® software (SAS Institute, 1992). Comparisons of means when the factor had a significant effect were obtained using Tukey HSD test. A probability of P < 0.05 was required for statements of significance.

RESULTS:

In our study, there were no significant influence of litter materials on performance parameters; feed consumption, body weight gain, and feed conversion ratio (Table 1). Mortality rates were numerically higher in birds reared on wheat straw (10%) than their counterparts reared on the other two types of litter (6% each, table 1). The moisture contents of different litter materials differed significantly (Table 2). At 7 days of age, no significant differences were found for percentages litter moisture among treatments.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wood shavings</td>
</tr>
<tr>
<td>FC (g)</td>
<td>3902.3 ± 50.6</td>
</tr>
<tr>
<td>BWG (g)</td>
<td>2072.6 ± 7.5</td>
</tr>
<tr>
<td>FCR (g feed/g gain)</td>
<td>1.88</td>
</tr>
<tr>
<td>Mortality</td>
<td>No</td>
</tr>
</tbody>
</table>

Lowest moisture contents were then observed in pens littered with wheat straw compared to other litter treatments throughout the experimental period. Non significant differences were noted between wood shavings alone and when mixed with wheat straw at 14 and 21 days of age while litter moisture differed significantly at 28, 35 and 42 days.

Table 2: Effect of litter materials on litter moisture percentages during the experimental period

<table>
<thead>
<tr>
<th>Bird’s age (day)</th>
<th>Wood shavings</th>
<th>Wheat straw</th>
<th>Mixed litter</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>10.80 ± 0.10*</td>
<td>8.99 ± 0.78*</td>
<td>10.17 ± 0.15*</td>
</tr>
<tr>
<td>14</td>
<td>13.00 ± 0.10*</td>
<td>9.81 ± 0.26*</td>
<td>12.00 ± 0.11*</td>
</tr>
<tr>
<td>21</td>
<td>19.96 ± 0.26*</td>
<td>13.11 ± 0.13*</td>
<td>18.99 ± 0.12*</td>
</tr>
<tr>
<td>28</td>
<td>23.85 ± 0.13*</td>
<td>25.25 ± 0.08*</td>
<td>22.46 ± 0.33*</td>
</tr>
<tr>
<td>35</td>
<td>35.30 ± 0.54*</td>
<td>29.75 ± 0.41*</td>
<td>32.20 ± 0.04*</td>
</tr>
<tr>
<td>42</td>
<td>33.05 ± 0.10*</td>
<td>29.97 ± 0.69*</td>
<td>30.59 ± 0.40*</td>
</tr>
</tbody>
</table>

- Values in the same row bearing different superscripts are significantly different (P<0.05), according to ANOVA.
- Values are means ± SEM of 2 replicates per treatment.

No consistent effect of litter material on litter pH was noted between any of the treatments during different sampling time.

Litter substrate significantly affected indices of leg weakness assessed in our experiment (Table 3).

Table 3: Effect of litter materials on some indices of leg weakness of broiler chickens

<table>
<thead>
<tr>
<th>Patterns</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wood shavings</td>
</tr>
<tr>
<td>Gait scores (GS)</td>
<td>0.85 ± 0.05*</td>
</tr>
<tr>
<td>Foot pad burn score</td>
<td>0.05 ± 0.05*</td>
</tr>
</tbody>
</table>

* Values in the same row bearing different superscripts are significantly different (P<0.05), according to ANOVA.
* Values are means ± SEM of 2 replicates per treatment (10 broiler chickens per pen).

Birds reared on wood shavings had lower gait scores and foot pad burn scores than birds reared on wheat straw, while birds reared on mixed litter were intermediate between them.
DISCUSSION:
Litter treatments used in our study had no significant effect on FC, BWG and FCR of broiler chickens. These results are in accordance with those reported by others (Ranade and Rajmane, 1990; Anonymous, 1992; Lien et al., 1992; Burke et al., 1993; Willis et al., 1997) who confirmed that performance parameters were unlikely to be affected by the type of litter substrate. Conversely, wood shavings in coarse structure as litter substrate were found to be better than wheat straw with regard to growth and feed efficiency (Su et al., 2000). Moreover, Sarica and Selcuk (1993) have reported higher live weights for broiler chickens grown on wood shavings than for other litter materials. Although Huff et al. (1984) reported that litter type had an influence on live weight but not on other production criteria, Malone et al. (1983) noted a significant effect of litter material on feed efficiency.

Although mortality rate to 42 days of age was higher for birds reared on wheat straw than birds reared on other types of litter, the differences were not significant. In agreement with our results, Huff et al. (1984) and Willis et al. (1997) showed no significant effect of litter type on mortality rates. Although the cause of mortality was not identified, the differences in mortalities recorded in different treatments may be not attributed to treatment effects (litter types).

Litter moisture contents increased significantly during the experimental period. This might be expected as a result of increased waste deposition and increased respiration of growing broilers. Both wood shavings and mixture of wood shavings and wheat straw substrates were good adsorbents compared to wheat straw alone. The ability to release moisture was greatest in wood shavings, the mixed litter and wheat straw, respectively. Observations indicated that caking of the litter was highest in wheat straw. These results are in agreement with previous study for Sarica and Cam (2000).

Leg disorders have several consequences for the welfare of the birds (Bizeray et al., 2002). First, walking may cause pain, as indicated for example, by the strutting walk of many lame birds (SØrensen, 1989), and in severe cases it may be difficult for the birds to get to food and water (Wong-Valle et al., 1993). Secondly, birds may be inhibited from performing essential behaviour patterns (Blokhuis and van der Haar, 1990; Bessei, 1992). Such inhibitions have been investigated in a behavioural study (El-Lethey, 2006). The leg problems can be diagnosed by observing abnormal or poor walking ability, ‘poor gait’ (Kestin et al., 1992), and by clinical diagnosis (Riddell, 1992). Excessive contact with wet litter is generally considered to be a primary cause of foot burn (Tucker and Walker, 1992). Our results revealed a significant effect of litter treatments on indices of leg weakness of birds. Gait scores and foot pad burn scores were lowest in pens littered with wood shavings and highest in those littered with wheat straw. These data were similar to results of previous study (Su et al., 2000).

Based on the results of our study, wood shavings alone and when mixed with wheat straw can serve as a potential alternative litter material for broiler production.

REFERENCES:
تأتي بعض أنواع الفرشة المختلفة على الكياسات الإنباتية وgetAttribute(106) إصابات الأرجل في بداري

المكون:

أ. تميز مجموعة كامل كلية الطب البيطري، القاهرة
ب. مدخ جزء


