Litter Management

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Materials - Characteristics and types

**CHARACTERISTICS**

- Good hygroscopic capacity
- Rich in Carbon
- Medium-sized particles
- Low thermal conductivity
- Ability to be treated by physical method (Heat)
- Can be used as fertilizer

**Function**

1. Promote comfort for birds
2. Assist in the absorption of feces, urine, water and feathers.
3. Reduce the thermal oscillation in the shed.
4. Prevent insect proliferation
5. Minimize production of ammonia
6. Reduce exposure of animals to disease-promoting agents
Materials (Characteristics and types)

Litter composed by sawdust.

Poultry litter composed by new rice hulls, used in regions where the rice is the main culture.

Industrial process of production and baling of wood shavings.

Poultry house set up with a new wood shavings’ litter.
Materials (Characteristics and types)

1 – Sugarcane Residue; 2 – capim napier; 3 – Wood Shaves; 4 – mixture of wood shaves and sugarcane residue; 5 – mixture of rice hulls and sugar cane residue; 6 – Rice hulls.

Source: Garcia, R & Paz, I
<table>
<thead>
<tr>
<th>Period</th>
<th>Litter type</th>
<th>% moisture at 38 days of age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wood shavings</td>
<td>27.0</td>
</tr>
<tr>
<td>Rainy</td>
<td>Coffee hulls</td>
<td>25.2</td>
</tr>
<tr>
<td></td>
<td>Rice straw</td>
<td>27.2</td>
</tr>
<tr>
<td></td>
<td>Beans straw</td>
<td>30.6</td>
</tr>
<tr>
<td></td>
<td>Sugarcane residue</td>
<td>34.3</td>
</tr>
<tr>
<td></td>
<td>Wood shavings</td>
<td>29.4</td>
</tr>
<tr>
<td></td>
<td>Coffee Hulls</td>
<td>23.2</td>
</tr>
<tr>
<td>Dry</td>
<td>Rice Straw</td>
<td>31.3</td>
</tr>
<tr>
<td></td>
<td>Beans Straw</td>
<td>31.2</td>
</tr>
<tr>
<td></td>
<td>Sugarcane residue</td>
<td>31.0</td>
</tr>
</tbody>
</table>
Properly Heat of the Chicken Litter
Avoiding Eating The Litter
Kraft Paper Roll
Litter Quality (Moisture)

Moisture

- Litter’s moisture level must be kept between 20 and 30%.
- Lower than 20%, the dust concentration inside the house is increased, affecting negatively the respiratory system of the birds, predisposing them to infections.
- Higher than 30%, it can cause problems to the health and welfare of the birds, increasing the chest lesions, skin burns, foot pad dermatitis, condemnation and loss in carcass quality.

Methodology to estimate litter’s moisture.

The particles must attach to each other slightly in the hand and spread out when thrown on the ground. When there is an excess in moisture, litter gets compact even after being thrown on the ground. In case of being too dry, it will not attach to each other when tightened in the hand.
Litter Quality (Temperature)

- Next to the temperature of the aviary.
- In flocks under 20 days of age - Litter temperature less than ambient temperature.
- In flocks above 20 days of age - Concern must be aimed to litter’s temperature above environment temperature.

<table>
<thead>
<tr>
<th>Normal temperature in both ages</th>
<th>Normal temperatures in one of the ages</th>
<th>Abnormal temperatures on both ages</th>
</tr>
</thead>
<tbody>
<tr>
<td>DW G</td>
<td>2% higher than the breed standard</td>
<td>1% lower than the breed standard</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3% lower than the breed standard</td>
</tr>
</tbody>
</table>

Source: Dai Prá 2010 (unpublished data).
Litter Quality (Litter pH and Litter thickness)

**pH**

- pH slightly acidic when bed is new.
- After first batch pH stabilizes between 8 and 9.
- Ammonia release is lower at pH below 7
- Maintaining acidity is beneficial to birds (difficult due to constant input of urates from the excreta)

**Litter Thickness**

- Thickness used 10 cm to 12 cm. (for new litter)
- For reuse keep at 20 cm

<table>
<thead>
<tr>
<th>Litter thickness</th>
<th>Number of houses evaluated</th>
<th>Clostridiosis cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 5 cm</td>
<td>43</td>
<td>02</td>
<td>4.6</td>
</tr>
<tr>
<td>6 - 10 cm</td>
<td>65</td>
<td>06</td>
<td>9.2</td>
</tr>
<tr>
<td>Above 11 cm</td>
<td>114</td>
<td>36</td>
<td>31.6</td>
</tr>
</tbody>
</table>

Reused poultry litter with 13 cm of thickness
Litter = 0.5 kg per chicken

Open House 120m x 14m = 1,680 m² → 12 chicken per m² = 20,160 chicken

Total of material = 10 ton.

(Sugar cane residue) = USD 63 per ton. X 10 ton -> Total cost = USD 630 -> USD 0.031 per chicken

(Rice Straw) = USD 171 per ton. X 10 ton -> Total cost = USD 1,710 -> USD 0.084 per chicken

Selling price for fertilizer = USD 62.5 per ton.
Estimate final weight after cycle (42 days) = 34 ton -> 34 ton x USD 62.5 = USD 2,125

COST Sugar cane – USD 630 (low availability - power generation in sugar cane plants)
COST Rice Straw – USD 1,710
SALE PRICE = USD 2,125

Other costs -> Packaging and Labor

Deptº Técnico
Aspects related to the reuse of litter

- Fecal material supply
- + gases
- + Pathogenic microorganisms
- Fungi and bacteria of the environment

Change Litter

- Cost
- Environmental liability
  a) Surface water
  b) Water table
  c) Wood use

Effective decontamination methods

Metabolic Product - minimize negative effects and maximize positive effects.
Litter Management

Reuse Litter - Process

- Physical Process
  - Feather burning
  - Plate Breaking

- Biological Process
  - Fermentation
- Chemical Process
  - Acidification
  - Alkalination

During the cycle

- Revolve the Litter
- Remove the wetted plates

CARICOM
- Open House and negative pressure
- Litter material is sugar cane bagasse where that is available. Otherwise, the farms use wood shavings and rice straw.
- Normal cyclical use of the litter varies from one cycle to five (One year)
- Sold to farmers as fertilizer
Litter Management – Physical Process + Insecticide

Flock harvesting and equipment withdrawal

Cakes removal.

Burning the feathers using a flame thrower.

Last process is use insecticide (Piretroide)

Dept° Técnico
a) After harvesting the flock, a sanitary break of at least 18 days must be scheduled, which is the appropriate time to perform all the steps without compromising the method.
b) The feathers must be burnt using a flame thrower.
c) Removal of all cakes, which must be windrowed and covered in the field as much distant as possible from the poultry house.
d) Windrow the litter in the center of the poultry house. To have an adequate fermentation process, the windrow must have at least 1,20 meters in height.
e) Cover the windrow with plastic in its whole extension, fixing the edges.
f) Litter must stay covered for at least 12 days to allow a good fermentation process, reaching temperatures above 60° C.
g) After this time, the plastic cover must be removed, cleaned, disinfected and kept in an adequate place to be used in the next flock. A rodent control must be done to avoid any damage to the cover.
h) Spread out again the litter over the facility’s ground, paying attention on litter inverting and venting the house to remove the moisture excess. This process must be undertaken for at least three days.
i) A new layer of substrate (for example wood shavings) of 2 cm of thickness must be spread out over the reused litter in the brooding area, which accomplish about 25-30% of the total area.
j) Equipment set up for the next flock housing.
Litter Management - Windrowed litter plastic covering

Litter windrowed in the center of the house.

Windrow covered with plastic.

Spreading the litter out after removal of the plastic cover.

At least 12 days >60°C
Litter Management – Fermentation

Litter plastic covering in the whole extension of the poultry house

a) Like the previous methodology, a sanitary break of at least 18 days must be scheduled.
b) Raise or remove the equipment from the facility.
c) Burn the feathers using a flame thrower.
d) Removal of all the cakes from the litter, windrowing and covering it in the field as far as possible from the facility.
e) Removal of the litter close to the side walls and central posts to help in the plastic cover fixation.
f) Covering the litter in the whole extension of the house, fixing the edges.
g) Litter must stay covered for at least 12 days.
h) After this time, the plastic cover must be removed, cleaned, disinfected and kept in an adequate place to be used in the next flock. A rodent control must be done to avoid any damage in the cover.
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Litter Management – Fermentation

Litter plastic covering in the whole extension of the poultry house

Litter plastic covering in the whole extension of the poultry house.

Litter preparation for plastic covering.

Cover removal after 12 days.

Inverting the litter to allow the excess of moisture to evaporate.
Types of Management - Acidification

a) A sanitary break of at least 15 days must be scheduled.
b) Raise or remove the equipment from the facility.
c) Burn the feathers using a flame thrower.
d) Removal of all the cakes from the litter, windrowing and covering it in the field as far as possible from the facility.
e) Application of the acidifier product in the whole extension of the poultry house, at least 10 days prior to the housing of a new flock.
f) A new layer of substrate (for example wood shavings) of 2 cm of thickness must be spread out over the reused litter in the brooding area, which accomplish about 25-30% of the total area.
g) Equipment set up for the next flock housing.
Litter acidification with a pH reaching values below 4 leads to a reduction in the concentration of viable bacteria in it and improve the environment condition in the poultry house (Ivanov, 2001).
Types of Management - Alkalination

a) A sanitary break of at least 15 days must be scheduled.
b) Raise or remove the equipment from the facility.
c) Burn the feathers using a flame thrower.
d) Removal of all the cakes from the litter, windrowing and covering it in the field as far as possible from the facility.
e) Alkaline product application (quicklime CaO or hydrated lime CaOH) in the whole extension of the poultry house at no more than 3 days after the slaughter of the previous flock.
f) Incorporation of the quicklime in litter until it gets a homogenous mixture.
g) Fully close the house (doors, internal and external curtains and lining).
h) Three days before a new flock arrives a new layer of substrate (for example wood shavings) of 2 cm of thickness must be spread out over the re-used litter in the brooding area, which accomplish about 25-30% of the total area.
i) Equipment set up for the next flock housing.
Types of Management - Alkalination

Quicklime application using a tractor.

Quicklime application with hand-pulled equipment.

Poultry house after quicklime usage in all the litter.

Quicklime incorporation using a tractor.
Types of Management - Alkalination

Quicklime incorporation in litter through motorized equipment driven by the farmer.

Not removing the cakes turns difficult the quicklime effect.

Litter’s pH measurement after quicklime usage.

New substrate over the reused litter in the brooding area.
1 - The choice of material depends on the availability, not being preponderant the type of shed

2 - Main purpose: the control of pathogenic bacteria. - CaO

3 - Know if the poultry farmer is able to carry out the proposed methodology.

4 - Be accepted by certification authorities (supervision)

5 - Help control the presence of insects on the premises

6 - Reduction of environmental impact
https://www.youtube.com/watch?v=4PCtj0FwVxQ

https://www.youtube.com/watch?v=XvSaTWeC-kA
On the left an example of an appropriate handling of the litter with a frequent revolving process and on the right a bad handled litter showing cakes (litter compaction by moisture excess).

Foot pad and chest dermatitis
Availability is the determining factor for choosing Bed.
Litter Management

THANK YOU