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Alternative litter materials for poultry

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Broiler chickens in New South Wales are usually grown under intensive conditions in houses that have a semi-controlled environment, with optimum temperature and adequate ventilation. Food and water are provided and there is a floor covering of an appropriate litter material.

In round figures, the broiler industry in New South Wales produces 160 million chickens a year in 1200 poultry houses, each house having a total floor area of around 1500 m². The industry uses about 300 000

m³ of litter annually in the production of fertile eggs and meat chickens. The cost of litter, \$14.00 to \$18.00 per cubic metre delivered into a shed, represents a considerable component of the on-farm cost of broiler production.

The broiler chicken industry has been expanding at a rate of 4 per cent a year, placing an ever-increasing strain on the supply of litter materials. As a result, materials once in abundant supply are becoming scarce or unobtainable.

Broiler chickens on a litter of softwood shavings. Timber by-products are acceptable if free of contaminants and properly managed.



DESIRABLE CHARACTERISTICS

Good litter should act like blotting paper, soaking up moisture from body wastes while providing a dry, comfortable medium for birds to dust themselves in and rest upon. It should therefore be capable of drying quickly and be soft and compressible, absorbent and buoyant.

As birds will eat some litter, the base material must be free of any contaminants that could be absorbed into the edible tissues of the chicken. For the same reason, litter materials should also be free of other substances-including chemicals, disease organisms and moulds-that may damage the birds' health.

Litter material should be dust free, with no more than 15 per cent of it consisting of particles smaller than 2 mm. Avoid materials such as bark that break up into fine particles, thereby increasing the dust content.

A good litter should not 'cake' or compact into layers: some materials, such as oversized paper strips, tend to do this in the first two weeks of use. Litter material should also have low thermal conductivity, to retain warmth and act as insulation.

MATERIALS USED OVERSEAS

During the last 15 years, some countries-including France, Ireland, England, Denmark, Canada and the United States-have adopted the policy of using materials only from sources that can guarantee freedom of their product from harmful chemicals. Materials used in broiler sheds in such countries include:

- timber shavings, sawdust and wood chips produced specifically for this purpose;
- chopped straw;
- shredded paper;
- rice hulls;
- composted litter;
- pine bark;
- corn cobs;
- peanut hulls.

Numerous tests on the physical properties of these materials have been carried out to determine the best material in each country.

In March 1970, the University of Georgia published the results of a survey on the physical properties of litter materials available at that time. The survey ranked the materials in the following order of suitability for chicken litter:

1. pine shavings
2. rice hulls
3. pine sawdust
4. peanut hulls
5. chopped pine straw
6. clay (**not** recommended).

CHOICE OF MATERIALS IN NSW

For the past 35 years, the New South Wales poultry industry has used by-products from other industries as litter materials, including timber shavings and sawdust, rice hulls, shredded paper, composted litter, sunflower husks, wood chips and chopped straw.

All of these materials are available to broiler growers in varying quantities during the year, but timber by-products, rice hulls and shredded paper are probably the most accessible. To help growers choose the most suitable litter material, the characteristics of each are summarised below.

Timber shavings and sawdust

Coarse-cut sawdust or shavings provide ideal litter material for chickens if free of contaminants and properly managed. Both shavings and sawdust are available all year, usually as by-products of furniture factories, sawmilling for the building industry, and surface peelings from wood turning.

Timber used in machining these products is from several species of tree, is both local and imported in origin, and may be either softwood or hardwood. It may also have been treated with preservatives to protect the wood from such biological hazards as fungi, lyctid borers and termites. Chemicals used include borax (sodium borate, a salt of boron) and C.C.A. (copper chrome arsenate), which are used in both softwoods and hardwoods; and persistent organochlorine insecticides. All are harmful and may be retained in the edible tissues.

Timber by-products are acceptable for use as poultry litter only if they have come from untreated timbers. Broiler producers should purchase litter material from timber mills only when the millers are willing and able to guarantee that the by-products they supply are free from chemical contamination.

To avoid the risk of using contaminated by-products, some countries (including France, Ireland, England and Denmark) now produce a softwood shaving specifically for the intensive livestock industry. This may well be one of the options for the New South Wales poultry industry in future.

Rice hulls

Rice hulls are rapidly gaining a major share of the chicken litter market. Their size, freedom from dust, density, thermal conductivity, drying rate and compressibility make them an ideal litter base. Performance trials conducted in 1970 by the University of Georgia showed rice hulls to be the best litter for growing broilers.

In the past, rice hulls were considered unacceptable in New South Wales because they often contained weed seeds which germinated in market gardens where the used litter was spread. This objection has now been overcome with the development in the Murrumbidgee Irrigation Areas of a new sterilisation process for rice hulls. Material so treated is free of substances which may cause a problem.

Broiler litter based on rice hulls is now widely sought by market gardeners and mushroom growers for use as a manure, because its organic base is ideally suited to these producers. Another advantage of rice hulls is that they are packaged in weather proof plastic-wrapped bales which weigh about 35 kg and which can be stacked at the farm.

Shredded paper

Now that several companies have developed products suitable for the poultry industry, shredded paper has increased in popularity as a litter material. Particle size

Shredded paper baled and wrapped in plastic is easy to stack and to keep dry.



Composted broiler litter is soft, compressible and of even texture. Costs are low if producers can prepare the litter themselves.

should vary between 2 cm and 1 cm in diameter and be produced by cutting rather than tearing or hammering out. If incorrectly prepared, shredded paper tends to compact and 'cake' during the first two weeks of use.

The tendency of shredded paper to compaction can be further reduced if producers turn the litter in the first few weeks of use to aerate it and break up the layers as they form.

It is important to ensure that only old newsprint is used. Some printing inks are toxic until thoroughly dried, and glossy paper will not absorb moisture.

Like rice hulls, shredded paper has the further advantage of being available in weatherproof plastic-wrapped bales.

Composted litter

Composted litter, which may be produced by composting old broiler litter, is a very good litter material in all areas of the broiler shed except those used for brooding baby chicks, where complete freedom from ammonia is required. Where producers are able to spare the time to prepare composted litter themselves, the lower cost of the end product makes it a very attractive proposition because:

- there is no need to purchase new litter;
- dust levels are reduced;
- disease organisms and parasites are reduced by the high temperatures that develop during composting;
- the litter has an added resale value as an organic fertiliser because it contains a higher proportion of manure and thus more plant nutrients;

- once composting has been completed, odours are significantly reduced.

Organic market gardeners who use composted broiler litter prefer a material based on sawdust, as it breaks down faster during decomposition. It is claimed that hardwood sawdust breaks down more quickly than that from conifers.

As an organic fertiliser, composted broiler litter has few peers-being weed free, easily incorporated into the soil, and having a pH of 5.5 to 6.5. It is an ideal fertiliser for strawberries, brussels sprouts, broccoli, all seedlings, shrubs, roses and fruit trees.

Composting technique. The procedure for composting is as follows:

- Remove any caked litter and foreign matter.
- Retain sufficient litter to provide a spread depth of 10 cm over two thirds of the shed. Remove and dispose of the surplus litter.
- The litter retained inside the shed should then be moistened and heaped for two days.
- Check the heap to ensure that it reaches a temperature of more than 55°C.
- After five days stir, turn or spread the heap to aerate and mix the various layers. Moisten the material again, if necessary, before reheaping.
- After a further two to five days, spread the composted litter over the area of the shed that will not be used for brooding baby chicks.
- Use fresh new shavings or other material in the brooding area.

Chopped straw

Chopped straw is widely used internationally as a litter base, especially in cereal-producing countries such as England, France, the USA, Canada and Ireland.

In Australia wheaten straw is the most popular. It chops cleanly and is particularly suitable as a litter with its thick straw and ability to dry out quickly after cutting. This comparative dryness discourages the growth of fungi and reduces the likelihood of birds contracting aspergillosis. The straw should be chopped into 37 mm pieces.

As the straw tends to 'ball' rather than flatten out when spread, it is best to use a side-delivery hay rake or pitchfork it by hand to achieve an even litter of the recommended 50 to 75 mm depth. At this depth a standard broiler shed of 1500 m² would need about 100 m³ of chopped straw.

With wheat remaining one of Australia's main cereal crops, chopped wheaten straw will have a significant

role to play in providing litter material for the poultry industry. This role will be increased once a constant source of supply can be developed which can guarantee that the straw is free from weed seeds and, more importantly, from harmful pesticides and chemicals.

Sunflower husks

Sunflower husks, which are a by-product of the oilseed industry, make an excellent litter material provided they can be kept dry. If they are allowed to become wet, fungi will develop that could be harmful to chickens. The husks make excellent litter because of their large particle size and lack of dust. They do, however, tend to 'cake' and need constant working to maintain a friable condition. Another problem with sunflower husks is that they may not be available throughout the year.

Wood chips

In Australia, chips are produced by shredding eucalypts, wattles and other species of trees and shrubs, so the material tends to vary in chip size and quality. Further, if oleanders or mulberries have been shredded, the resulting material is very likely to be toxic to chickens.

Wood chips from camphor laurel trees are said to be effective in getting rid of spiders, so they may have a similar effect on the black litter beetle. But the disadvantages of this material are that it is usually available in only small quantities and it normally costs more than either rice hulls or sawmill wastes.

In Northern Ireland, problems of variable quantity and availability have been overcome by growing poplar saplings for twelve months, then harvesting and shredding them with a machine similar to a sugarcane harvester. This produces an excellent litter material when properly dried.

CONCLUSIONS

Provided litter materials are free from fungi and dust, are not derived from toxic species of plant, and have not been treated with the salts of boron or C.C.A. or with persistent insecticides, they should not be harmful to poultry. Avoid litter materials known to have any of these contaminants, and reject mill wastes (wood shavings or sawdust) if the miller cannot guarantee their freedom from wood preservatives and insecticides. It is also advisable to avoid materials contaminated with weed seeds.

Aside from these considerations, the choice of uncontaminated litter materials will depend on individual circumstances and on the availability and cost of materials, which varies in different localities.

REFERENCE

Full details of the University of Georgia survey and performance trials mentioned above are available in the following publication, obtainable through libraries:

REED, M. J. & McCARTNEY, M. G. (1970). *Physical properties of selected litter materials and performance of broiler chickens*. University of Georgia, U.S.A.

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