



Deep Litter in Chicken Houses

Introduction

by Robert Plamondon

Many poultry techniques that were once well-understood became shrouded in mystery after the poultry business shifted to factory farming. The old-time diversified farmers passed away, and there are one or two generations of industrialized farmers between us and them, breaking our cultural continuity. One of the lost ideas is the “deep litter” technique. People think they know what the deep-litter technique is, but they don't. The descriptions floating around these days are more folklore than fact. The article below is the real deal.

Deep litter is weird stuff. It's different from a big heap of shaving or a compost pile with chickens living on the top of it. It's worth looking at in some detail. Got your spading fork ready?

I've found some good material from the first people to research and promote deep litter, Kennard and Chamberlin at the Ohio Experiment Station. The following is an article of theirs from the Golden Age of deep litter, published in 1949.

For the impatient, here's a deep-litter quickstart:

- Deep litter is not about compost. It's about healthier chickens. Do your serious composting on a compost pile.
- More is better. It's not deep litter unless it's at least six inches deep.
- If the top of the litter gets caked over with manure, skim off the caked part and toss it into a corner. Within a few days, natural composting will cause it to turn back into litter again.
- Deep litter has anti-coccidiosis properties, but only after it's been around for a few months, so never remove it all. When you start bumping your head on the rafter, remove part of it.
- Stirring in hydrated lime at about ten pounds per hundred square feet will keep the litter more friable.
- If you can smell ammonia in the chicken house, you don't have enough ventilation. Open the windows, even if it's twenty below outside. Ammonia is a poison gas; cold weather is just a nuisance to grown chickens.
- If you're spending a significant amount of time messing with the litter, you're doing it wrong.

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Built-Up Floor Litter Sanitation and Nutrition

by Kennard and Chamberlin

Sanitation in brooder houses has been largely restricted to the everlasting use of the scoop shovel, fork, broom, and spray pump. What's new is the discovery of how to let nature's sanitary processes do a better job using built-up litter.

What happens to the compost heap is familiar to all. Regardless of how obnoxious its contents, nature's sanitary processes soon convert it into harmless residual material which is comparatively sanitary. Likewise, many of the same chemical and biological activities take place in built-up litter to make it more sanitary than fresh litter contaminated with fresh droppings.

When built-up litter is erroneously referred to as filthy or dirty material, it is because of either prejudice or lack of understanding. Because fresh litter smeared with unabsorbed fresh droppings is obnoxious, it is natural to think of it becoming more and more so the older it becomes. But old built-up litter is drier, more absorbent, and less obnoxious than fresh litter after a few days' use. Often overlooked is the fact the nature's chemical and biological processes have converted built-up litter into a more sanitary, less obnoxious, residual compost-like material which is preferable to fresh litter contaminated with a larger proportion of fresh droppings.

Call It "Built-Up Litter"

Built-up litter is sometimes called deep or dry litter. These terms are misleading. Deep or dry litter may be far different and without the beneficial properties of built-up litter.

Built-up litter is what the term implies. At the beginning fresh litter material is added from time to time as needed, but none is removed until it becomes 8 to 12 inches deep. Once the litter is built-up, after the first year some of the material will need to be removed occasionally to keep it within bounds.

Control of Coccidiosis

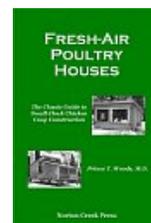
The prevention or control of coccidiosis by starting day-old chicks on old built-up litter could have been prophesied years ago. It has long been recognized that chicks exposed to small dosages of coccidia at an early age developed a resistance which gave protection against heavier dosages to which they are often exposed from 4 to 12 weeks of age. Built-up litter has thus proved the most practical and effective means by which this resistance can be established.

As second reason why built-up litter could have been expected to limit coccidiosis is the fact that nearly all, if not all, living organisms including bacteria, protozoa, etc., have their parasites. Old built-up litter would seem to offer a favorable medium and conditions for the functioning of the parasites and enemies of coccidia and perhaps other diseases, too.

The third reason is that a 10 percent solution of ammonia spray is considered effective for killing coccidia. Being unable to withstand such spray, they may likewise be unable to withstand the constant ammoniacal atmosphere in built-up litter.

Either of the probably reasons cited offer a plausible explanation for the surprising results secured during the past three years by the Ohio Station and similar unrecorded results experienced by poultrymen everywhere.

The first experimental evidence with reference to the user of built-up litter as a sanitary procedure was secured by the Ohio Station in 1946 when it was first used in the brooder house. During the three years previous when the floor litter was removed and renewed at frequent



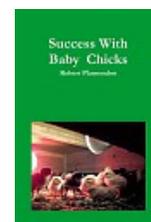
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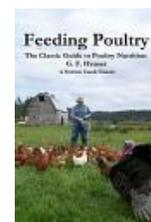
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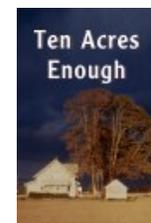
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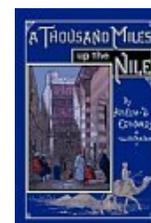
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intervals, the average mortality of 10 broods, or a total of 18,000 chicks, was 19 percent. During the succeeding three years with the use of built-up litter, the average mortality of 11 broods, or a total of 10,000 chicks, was 7 percent. Seldom did a brood escape an attack of coccidiosis *before* the use of built-up litter. *Afterward* there was no noticeable trouble from coccidiosis in 11 consecutive broods started and raised on the same old built-up floor litter. Old built-up litter is floor litter which has been used by two or more previous broods of chicks.

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Nutritional Benefit Of Built-Up Litter

As soon as the sanitary effects of old built-up litter became evident, two experiments were set up to explore the nutritional possibilities in the growth of chickens on old built-up litter. The basal all-plant diet used in the first two experiment was simple and extremely deficient for the growth of chickens.

Experiment 1 was started July 27, 1947, with the growth of Leghorn-R. I. Red cross-mated pullets after the first 10 weeks to the end of 25 weeks. pervious to the beginning of the experiment, pullets received a complete ration (which included 10 percent meat scrap and 5 percent dried whey) on the old built-up litter. The pullets were equally allotted on the basis of their weight into two groups each of 150 pullets at the beginning of the experiment. On group was changed to the incomplete ration, while the other group was continued on the complete ration. At the end of the experiment after 15 weeks the average weight of the birds was 3.97 vs. 3.95 pounds, respectively. Mortality was 8 vs. 9 percent, respectively. Despite the severity of the incomplete ration, that group of pullets did as well as those that received the complete ration. Obviously, the old built-up litter adequately supplemented the incomplete ration.

Experiment 2 was started August 12, 1947, with eight groups each of 200 Leghorn-R. I. Red cross-mated day-old chicks, At the end of 16 weeks the average weight of the chickens that received the incomplete ration was 3.42 pounds vs. 3.81 pounds of the chickens that received the complete ration. The percentage mortality was 6 and 5 percent, respectively. It was remarkable that the day-old chicks could live and grow as they did on the severely incomplete ration they received. As in the first experiment, it was the old built-up litter that made this possible.

Experiments 3, 4, and 5 were conducted on Leghorn-R. I. Red cross-mated, day-old chicks which received the complete and incomplete rations on old built-up litter, new built-up litter (started fresh with each brood), and fresh litter removed and renewed each 2 weeks. The incomplete ration was practically the same as used in the first two experiments except for the inclusion of 5 percent dehydrated alfalfa meal (17 percent protein) in these experiments. The averaged results at the end of 12 weeks of the experiments, which included about 3,000 chicks, follow:

Ration	Floor Litter	Weight Per Bird	Percent Mortality
Complete	Old built-up	2.45 lbs.	5
	Fresh	2.30 lbs.	7
Incomplete	Old built-up	2.34 lbs.	7
	New built-up	1.88 lbs.	18
	Fresh	1.64 lbs.	23

There was little difference in the rate of mortality of the chicks that received the complete ration regardless of the floor litter procedures used in the three experiments. There was, however, a better rate of growth of the chicks that received the complete ration on the old built-up litter.

It was the incomplete, all-plant diet where a critical dietary deficiency existed that the rule of old built-up litter for growth and livability was made unmistakable. The rate of growth and

mortality (largely due to coccidiosis) corresponded directly with the age of the floor litter.

Thus, the sanitary and nutritional phases of old built-up floor litter, where nature's chemical, biological, and sanitary processes can take place under favorable conditions, continue to yield surprising results as continued experimental evidence becomes available. Moreover, the practical results reported by poultry raisers from all parts of the country are in keeping with the experimental evidence.

How To Use Deep Litter

That's all very interesting, you say, but how does one go about using deep litter? The Kennard and Chamberlin published this advice in 1948:

Built-Up Floor Litter to Date

Until recently, the common practice was to remove and renew the floor litter in brooder and layer houses every week or two. Now, by means of built-up litter practices and the use of hydrated lime, the floor litter may be used in the brooder house for 8 to 16 weeks or longer without removal [*Note: later, the authors recommended never removing the old litter.*] In the laying house it need be removed only once a year, or it may be used for longer periods. The usual procedure for built-up floor litter is to start with about 4 inches of fine litter material with additions of 1 to 2 inches later as needed without removal of the old. A depth of 6 to 12 inches is maintained by partial removals from time to time.

Frequent removal and renewal of the floor litter from brooder houses was to avoid dampness and thus supposed to aid in the prevention of coccidiosis. The primary purpose for frequent removal and renewal of the floor litter from laying houses was also to prevent dampness. Later, this object was accomplished better by insulation of the houses and by means of built-up litter which protected the floor against the cold and the dampness that followed from condensation.

After built-up floor litter in laying houses became an accepted practice, came the use of hydrated lime with its additional advantages. Consequently, the use of built-up floor litter and its treatment with hydrated lime has now become the standard practice of many poultrymen throughout the country.

Advantages

First of all, there is the saving of labor and litter material and the better insulation of the floor during cold weather, which aids in keeping the litter drier and in better condition. The condition of the litter is further improved by the use of hydrated lime which makes the litter more friable, more absorbent, and less inclined to paste or cake over the surface.

Recently, it has been extensively observed by the Ohio Agricultural Experiment Station at Wooster that the use of built-up floor litter in brooder houses may serve as a means for the prevention or control of coccidiosis, when other conditions are favorable. Seven successive broods, each of around 2,000 chicks, have escaped noticeable trouble from coccidiosis as evidenced by the low rate of mortality (2.9 percent) after the first 4 weeks. Before the use of built-up litter, a majority of the broods failed to escape an attack. In some instances the same floor litter was used for six successive broods of chicks.

Chicks or layers on built-up floor litter were found to be less subject to cannibalism.

Latest of all has been the Station's discovery of the nutritional aspects of built-up floor litter by two experiments with the growth of chickens indoors and four experiments with the

production of eggs of good hatchability when the breeders were confined indoors. The rations in each instance were composed chiefly of plant feedstuffs without animal byproducts.

[Note: this article was written just before the discovery of vitamin B12, which is produced in deep litter through bacterial fermentation.]

Kinds of Lime to Use

With the rapidly increasing use of lime in connection with built-up floor litter in brooder and laying houses, many poultrymen face the question of which kind of lime to use.

Hydrated lime in 50-pound bags is mostly used and the different grades may be purchased from building supply or feed, seed, and fertilizer dealers under trade names such as Agricultural hydrated lime, Mason's hydrated lime, General Purpose hydrated lime, or Finishing hydrated lime. Any one of these products may be used, so the choice may be determined by the cost.

Judging Litter Condition

The condition of the floor is usually judged by its appearance. If it appears dry and in absorbent condition, not pasted or caked over the surface, it is considered in good condition. If the floor litter appears damp or wet and is pasted or caked over the surface, it is considered in poor or bad condition.

Floor litter treated with hydrated lime appears drier than floor litter under similar conditions without lime. Despite the appearance, however, there may be little difference in the actual moisture content. The principal effect of the use of lime was upon the physical condition of the litter. Lime makes the litter more friable and more absorbent. This gives it the appearance of being drier and in better condition.

Stir Lime Into Litter

It has been observed that hydrated lime may have a slight caustic effect upon the feet of chicks under certain conditions. Consequently, the hydrated lime needs to be carefully distributed over the floor litter and stirred well into the litter at once.

Hydrated lime can be used with any of the common litter materials such as chopped straw, ground corncobs, cut or shredded corn stover, wood shavings, peat moss, or cane litter. The principal requirement is that the litter be stirred at frequent intervals and additions of hydrated lime and fresh litter be made as indicated by the condition of the litter, all of which will depend on the age, number of the birds and weather conditions.

How to Use Lime

The procedure followed by the Ohio Station at Wooster was to scatter the hydrated lime over the floor at the rate of 10 to 15 pounds per 100 square feet of floor space. In the laying house, the amount may be at the rate of 1 pound per layer. This was done at intervals of 2 to 4 weeks or longer, depending on the compaction and surface condition of the litter. Sometimes a light covering of fresh litter was scattered over the lime and both were stirred into the old litter.

Care should be taken to thoroughly mix the fresh lime into the litter; otherwise, the unmixed lime on the surface of the litter may have a mild caustic effect on the chicks' feet. During the intervals between additions of lime and fresh litter, a redistribution of the floor litter to the other less used parts of the floor should be made when the litter becomes packed or caked on certain floor areas, principally around the watering and feeding equipment. Sometimes it is well to remove the litter which is in the worst condition.

Under certain conditions, it may be necessary to thoroughly stir and redistribute the litter over the brooder house floor every 2 or 3 days, depending on the number and size of the chickens and the weather conditions. After the first 8 weeks, daily stirring is often advisable when weather or other conditions are unfavorable. Lime is seldom used or needed until after the first 4 or 5 weeks.

Insulation of the laying house is also an important aid in the solution of the problem of dampness in the floor litter in addition to the use of built-up floor litter and its treatment with lime.

Long-Time Use

The same built-up floor litter has been successfully used in brooder houses at the Station's poultry plant for six succeeding broods of chicks. Likewise, most of the layers are on built-up floor litter that started nearly 3 years ago. Thus far, no disadvantages have been experienced from the long-time use of the litter, either in brooder or laying houses. The older built-up litter is, of course, more effective for the prevention or control of dampness because of its greater depth. It appears the only need for removal is to keep it within convenient bounds.

[End of Article by Kennard and Chamberlin.]

My Own Experiences

Well, all this stuff from the Forties is sort of interesting, but how does it work today? Pretty well.

Because we use free range in portable houses without litter, we use deep litter only in our brooder houses. We have three small brooder houses (too small, really), all of which have concrete floors. One brooder house is set up to accommodate 12 inches or so of litter; the others can't manage more than about 4 inches because deeper litter would rot out the walls.

The house with the deeper litter gives the least trouble, since it seems to be able to handle more moisture and absorb more manure. The other houses are less good.

We have used built-up litter for many years, and never remove all the litter. We rarely remove much litter at all. When a new batch of chicks is coming in, we'll remove the caked litter altogether, rather than throwing it into a corner, but that's about it. Then we put a thin layer of fresh litter on top of the old litter (thicker right under the brooder), and we're ready for a new batch of chicks.

If the surface of the litter cakes over (as it always does with broilers), we skim off the caked layer with a shovel or garden fork and toss it into a corner, creating an impromptu compost heap. In a few days, it will have composted to the point where it's much drier and less caked, and becomes just like all the other litter.

If the house floods, the litter doesn't seem to care. It will act the same as before once it dries out. Heaping it up in the middle of the house speeds this process up. I have had reasonably good results from just putting a thick layer of shavings on top of the horrible mess and finishing a brooding cycle that way, and stirring everything together later.

The lime trick also works very well. Wear a mask.

In our brooder houses, the deep litter isn't reliable as a preventative for coccidiosis. It probably helps a great deal, but our houses are small and they get very crowded if we don't move the broilers out promptly at 14 days. We have so little maneuvering room in the house that we can't do a good job of decaking the floor. If we did this every day, maybe we'd be coccidiosis-

proof. I don't know.

If you want to use this technique, arranging your brooder area to give you plenty of elbow room will help. It's important to decake the floor every day, which takes less than a minute if you're set up right. Ideally you'll use hanging feeders and waterers that can be raised out of the way, and being able to get the brooder out of the way easily is important, too. Decake and toss the caked litter into the corner, along with any wet litter, and level things out with dry litter from here and there, and you're done. If you're set up better than we are, it hardly takes any time at all.

As for the nutritional benefit, it's real but I wouldn't rely on it. Using balanced rations always costs less in the long run. Consider it to be a fringe benefit.

You Need a Well-Ventilated House

While coccidia don't like ammonia, neither do chickens. Your chicken house should allow quite a bit of airflow. **Deep litter must be combined with a fresh-air poultry house.** Closed housing will build up ammonia levels that are far too high. Even in the brooder house, ventilation is essential. Just keep the wind-chill factor down by limiting drafts at floor level, to prevent chilling the chicks.

See this chapter from [Fresh-Air Poultry Houses](#) for more information on the kind of open-front house that's suitable for use with deep litter.

Robert Plamondon has spent far too much time in the basement of Oregon State University's Valley Library, where he uncovers the Lost Secrets of the Poultry Masters. Robert keep several hundred free-range hens using a system based largely on Milo Hastings' The Dollar Hen (1909) and James Dryden's Poultry Breeding and Management (1916). Robert also runs Norton Creek Press, where he brings lost poultry lore to light. <http://www.plamondon.com>

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