**BEDDING ALTERNATIVES AND WINDROWING PROGRAMS**

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**Introduction**

Reports of bedding shortages in the poultry industry and escalating costs can be traced back more than 60 years. This situation has often occurred in the more concentrated broiler producing areas such as the Delmarva Peninsula and the Shenandoah Valley. With rising production capacity over the years the demand for bedding by poultry industry increased. At the same time there have been other competing uses for conventional bedding materials (e.g. pine shavings and sawdust) and decreased supplies of these materials. The bedding situation has become critical in some regions of the USA. Part of this issue relates to higher seasonal demand by the poultry industry during peak cleanout periods. Temporary disruption of supplies due to weather or sawmill equipment breakdown during peak demand periods exacerbates the problem. The recent downturn in the construction industry with reductions in the output of shavings and sawdust from sawmills has caused a nationwide shortage for agricultural usage. Additionally, newer milling technologies has reduced the output of bedding materials and those sawmills that have not adopted more efficient milling methods face economic pressures and many have closed. The long term implications of urban sprawl and competing uses (e.g. energy, horse bedding, etc.) for these materials is a major concern for the poultry industry. A recent informal survey by the National Chicken Council found many production managers throughout the east coast and south expressed concerns with bedding supplies, costs and quality. They also felt the situation would only worsen over time.

**Bedding Alternatives and Options**

In order to compete for premium pine sawdust and shavings, one option for the poultry industry is to continue to pay higher cost if they wish to retain their bedding supplies. This may require long-term contracts to lock-in supplies and to transport these materials into the production area from greater distances. Select hardwood sawdust products (i.e., drier materials and from poplar trees) are also being used to offset the deficit. To avoid potential mold-related health issues, effective treatment and management strategies are required when using sawdust or shavings from oak species.

In areas deficit of conventional bedding materials the poultry industry may want to consider working with forest-related vendors to reprocess wood products into shavings.
or sawdust-like materials. Some bedding suppliers are supplementing inventories using grinders and shaving mills to process pine trees and chips into a sawdust-like and shavings products. The particle size, moisture content and microbial population can have a significant impact of the quality of these materials. In an effort to use less bedding depth following total cleanout while maintaining quality litter, some prefer to start with the driest material available and implement management strategies to minimize litter moisture and cake removal.

Another option is to supplement supplies with alternative bedding materials. Research on alternative bedding materials has been extensive over the years! Malone (1992) and Grimes et al. (2002) are among many that have reviewed the literature on alternative bedding materials. These alternative materials can be grouped into four general categories; wood, plant, earth and recycled waste products. The following is just a partial listing of these materials. The wood products include; soft- and hardwood shavings, sawdust, chips, bark, straw/leaves; reprocessed shredded pallets, wood fiber pellets and paper mill residues. Plant-based residues that have been used or evaluated include; hulls (rice, peanut, cottonseed/cotton boll, cocoa bean, coffee bean, sunflower, soybean, oat, wheat/wheat bran), and straw/stalks (wheat, barley, rye, oat, flax, soybean, corn/corn cobs, kenaf core, sage, switch grass, Bermuda grass, citrus pulp, sugar cane bagasse). Earth type products include such materials as sand, clay and peat moss. An extensive list of recycled products has been evaluated over the years, examples include; shredded, processed and pelletized paper; recycled sheetrock, plastics, foam products (e.g. polystyrene, urethane) shredded tires and composted municipal garbage. Due to physical, chemical, and biological properties; cost, availability, compatibility with handling/production practices, and logistical issues, only a limited number of these products have been successful substitutes for good quality pine shavings and sawdust! Among the sawdust and shavings alternatives that are currently being used or tested in the region include; peanut hulls, cocoa bean hulls, shredded cardboard and compost.

**In-House Composting to Recycle Litter**

With adoption of improved housing, drinker and ventilation systems; better health programs and increased use of litter amendments for ammonia control, the poultry industry has been able to extend the interval between total cleanouts. Although this has eased some of the pressure on our bedding supplies, we face continuing challenges with diseases and stressors such as ammonia with built-up litter. Furthermore, the region is under consistent, if not increasing environmental scrutiny as it relates to removal, outside stockpiling and land application of litter. In-house composting or windrowing of litter between flocks is a technology that may aid in addressing some current and emerging industry concerns. This is not a new technique! Following a 1987 report by a turkey operation that was composting litter between flocks to reduce pathogens and recycle litter, the author conducted a follow up study with broilers. Even though broilers reared on the composted litter were heavier compared to those grown on fresh pine sawdust and untreated used litter, the issues and timing in the 1980’s was not right for industry to consider this practice.
Over the past 20 years there has been growing interest but somewhat limited adoption of the in-house composting procedure. However, during the past few years many production areas are starting to adopt this practice for the following reasons; extend litter life, reduce pathogen challenge and the use of anti-microbial chemicals, and sequence partial cleanouts to better match nutrient management plans and waste storage requirements. During this short-term composting cycle many litter pathogens are reduced or eliminated due to the elevated temperatures, the high ammonia levels and the heat-tolerance microbes in these windrows. In fact, research conducted by at least four different universities suggest this process generally eliminates Coliforms and Salmonella. It reduces Clostridium Perfringens, total aerobic bacteria and total anaerobic bacteria by ~50%, 10-30%, and 60-80%, respectively. Field reports from various regions of the USA suggest this procedure breaks the cycle of dermatitis, necrotic enteritis and runting-stunting syndrome on problem farms. In some cases it requires implementing the procedure for two consecutive flocks and its effectiveness may dissipate within ~two flocks. The procedure is also used to inactivate many types of respiratory-related viruses in litter such as Laryngotracheitis, while immune-suppressive viruses tend to be more resistant to this biological heat process. Another reported benefit is a significant reduction in the darkling beetle populations. Depending on the method of composting, it may reduce or eliminate the need to crust-out houses.

Windrow composting of litter between flocks has been done with grader blades on tractors, skid-steer loaders and specially-designed aeration equipment such as the Brown Bear unit. Some areas of the south have used a grader blade to form several windrows per house. Forming a single windrow down the center of the house using a skid-steer loader is another option. With this method the cake is often included in the mix for its added moisture. Although it will require crusting the house when the piles are re-spread, the volume of cake removed is greatly reduced. Piles formed by this method tend to be larger and slower to heat compared to the aeration equipment. Windrow formed with the aeration equipment pulverizes litter and cake and eliminates or greatly reduces the need to crust-out houses. Depending on house width and litter depth, two or three windrows are formed immediately following bird movement. With this method the goal is to achieve 130 F or greater within the first two days and to maintain these temperatures for a minimum of 3-5 days. The optimum litter moisture is ~35% but adequate temperatures are achieved with lower litter moistures. To aid in moisture and ammonia release and to recondition the litter, turning windrows several times is recommended. Afterwards, the piles are spread out and the litter leveled with a skid-steer loader and/or box blade.

The in-house composting procedure may not be needed, an option or a desire for some growers and companies to implement. For those who opt to implement the practice, there are challenges the poultry industry in each region of the US will need to resolve. There must be adequate time (>10 days) between flocks to execute this procedure. Compared to just crusting out houses, it requires added cost in terms of equipment, labor or contractual services. These added costs may be offset by reduced bedding replacement, improved bird health and performance, and decreased environmental concerns. There is uncertainty how often, how long and under what circumstances the in-house composting would be most feasible and beneficial.
built-up litter during cold weather and housing like that in the Mid-Atlantic area, controlling ammonia in the subsequent flock is an issue that must be resolved. Currently, it is being partially addressed using higher rates of litter amendments. Controlling ammonia can be managed better in warm weather when the ventilation rates can be increased.

References
