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Alternative Timing of Applying Broiler Litter to Pastures

by Chuck West and Tommy Daniel, Department of Crop, Soil & Environmental Sciences

Broiler litter is normally applied to pastures in Arkansas to benefit from its fertilizer value. In an effort to slow down or cease the build-up of phosphorus on soils prone to runoff, reduction or termination of litter application is sometimes recommended. This often causes concern among cattle producers because broiler litter is a low-cost fertilizer that promotes grass growth and therefore maintains high pasture carrying capacity. Replacing litter with higher-cost, commercial nitrogen fertilizer is a financial burden on cattle producers.

We conducted a field study to determine whether producers could shift the timing of litter application from the more normal time of spring clean-out to later in the year when the risk of field losses of phosphorus are lower and still maintain high annual forage yields. Litter applied in March and April consistently promotes heavy growth of tall fescue in April through June because cool, moist growing conditions are favorable for tall fescue. Most pastures also contain bermudagrass, a summer-growing forage. This mix of perennial grasses can provide pasture production in northwest Arkansas for nine to ten months and even longer further south. We wanted to learn whether delaying litter application to July or September, when runoff risk is less, would reduce annual forage production or simply shift the bulk of production to a different season.

Broiler litter was applied at three different times, April 1, July 1, and September 1 in 2004,

Broiler Litter – cont'd on page 2

EDITOR'S COLUMN

Welcome to the final issue of *Avian Advice* for 2009. You may notice several changes, like the color and finish of paper, color pictures and changes in the mix of long vs. short articles. Hopefully, these changes will be welcomed as improvements. We are always seeking ways to improve the quality of *Avian Advice* while lowering costs and decreasing turn-around time. Please let us know how we are doing.

Dr. Susan Watkins and I are leading a new research effort geared toward improving lighting energy management. In cooperation with the Arkansas Energy Commission, we will begin a multi-flock assessment of LED lighting technology compared to traditional lighting on several farms across the state. This project stems from evaluation of on-going research at the Arkansas Broiler Research Farm and looks to be an exciting opportunity for energy management in the future. Expect research results and additional project details in coming issues of Avian Advice.

We wish you all a Merry Christmas and Happy New Year filled with peace and prosperity.

[signature]

INSIDE

2005, and 2006. Treatments consisted of 0, 1.5, or 3.0 ton/acre. Plots were harvested monthly from May to December, plus the following May to measure the carryover effect. The forage yields we present are averaged over the three years.

Results and Implications

Applying litter on April 1 produced the expected boost in grass growth during April through June. The July 1 application boosted forage growth during July and August, but only in 2004, which had adequate rainfall to support grass growth. The September application did not exhibit a significant increase in grass growth until the following spring. The April and July applications also showed a carryover stimulation of grass yield, but not as dramatic as the September application.

The overall result averaged over three years and including the carryover effect in the following spring showed that the April application yielded the most forage, 8550 lbs/acre. The July and September applications reduced forage yield to 7800 lbs/acre, which is an 8.8% decline in total forage yield (or 750 lbs/acre) when shifting the date of litter application from the spring period to the summer or fall period. Around 25-30 lbs/acre of nitrogen from urea fertilizer would be required to recoup the lost forage yield, at cost of $15/acre. This compares favorably with having to replace all the litter with commercial nitrogen, which would be approximately 100 lbs/acre, or $50/acre.

Applying no litter to the forage produced 6640 lbs/acre over 12 months. Adding 1.5 tons/acre of litter increased dry forage yield by 1400 lbs/acre to 8040 lbs/acre. Applying 3 tons/acre produced an additional 1000 lbs/acre over the 1.5 ton/acre rate, which showed diminished gain in forage production for the high litter application rate.

The alternative application dates would allow the use of litter as a fertilizer at times of the year when runoff losses from heavy rainfalls are less likely; however, with diminished efficiency. In general, spring application consistently results in large boosts in forage production in May and June because soil moisture is reliably available to support forage growth; however, summer growing conditions are erratic between years. Applying litter during the hot conditions of July can result in losses of nitrogen as some of the ammonia in the litter escapes to the atmosphere, thereby reducing the fertilizer value of the litter.

Litter applied in early September would be on a soil whose moisture is typically depleted from the hot, dry summer months. Warm, wet conditions with a delayed killing frost would be needed to favor grass growth response to the litter. Progressively shorter days and slow fall recovery of tall fescue when competing with bermudagrass would limit the growth response to September litter application, as it did in our study. Nevertheless, September application resulted in total forage growth that nearly equaled that of the April application. Arkansas pastures typically produce very large quantities of forage in the spring, sometimes exceeding the ability of the cattle to utilize it efficiently. Therefore, shifting litter application to summer or fall could reduce excess spring production while providing acres that can receive litter at time of low risk of phosphorus losses with storm events.

Summary

Delaying litter application to a more favorable period in terms of lower P-runoff risk, such as in July or September, shifts the yield boost later, with a modest (8-9%) loss of total annual yield. April application still gives the highest total increase in forage yield, but a viable option exists for late-season litter application without substantial loss in total forage yield because of carryover fertilizer response to the following spring.

Jerry Wooley - A Career of Extension Service

Jerry Wooley retired on June 30, 2009 after 32+ years of service with the Arkansas Cooperative Extension Service of the University of Arkansas Division of Agriculture. Jerry is a native Arkansan who grew up on a commercial egg and cattle farm near Vilonia, Arkansas. He is the oldest child of L.O. and Eva Wooley. Jerry and his wife Jo Ellen have two sons: Justin and Jacob. Jerry is a 1975 graduate (BS) of the University of Arkansas at Fayetteville, Arkansas. He later completed his MS degree (also from the University of Arkansas) while working for Extension. His first job was as a broiler service tech in Russellville, Arkansas with Val-Mac (now Tyson-Dardanelle Complex). Jerry started his extension career in 1977 in Conway County as a 4H agent. He worked in Conway County for 6 years then for 7 years in Crawford County. In 1990, he became the Extension Poultry Specialist with a major responsibility in youth poultry programs. Jerry credits Dr. Lionel Barton with encouraging him to apply for the poultry specialist position vacated by the retirement of Lowell Lankford. Jerry was headquartered in the Little Rock State extension office but traveled the state encouraging youth in poultry.

Dr. Lionel Barton says that "Jerry is one of the easiest people he ever worked with and no matter the problem Jerry

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Novel H1N1 Influenza - The Swine Flu

Swine Influenza as a disease of pigs is common worldwide throughout pig populations. The disease is caused by a Type A Influenza virus. Swine Influenza as a disease of pigs usually results in a mild disease where an infected pig has signs of coughing, sneezing, discharge from the nose, lack of an appetite, weight loss, an elevated temperature, and lethargy. In a few instances a pregnant sow may abort.

Influenza viruses belong to the family Orthomyxoviridae. There are three types of Influenza viruses designated Types A, B, and C. The type A Influenza has the greatest range of hosts and can cause disease in many animal species (including birds, people, horse, pigs, seals, dogs, etc.). Usually, Avian Influenza affects mainly birds, Equine Influenza affects mainly horses, Human Influenza affects people, etc. This is also true of Swine Influenzas; they mainly affect pigs.

However, people can become infected with Swine Influenza viruses (especially those in close contact with pigs such as hog farmers, veterinarians, etc.). Also the reverse can be true; pigs can become infected with Human Influenza viruses (although this is not common). The viruses are different but can bind to the cells of the pig respiratory tract. This can also happen with Avian Influenza viruses. They too can bind to the cells of the pig respiratory tract and thus a pig can become infected with Swine Influenza, Human Influenza and Avian Influenza. This allows a pig to act as a mixing vessel where a novel or new virus strain can be developed from say a Human and Avian strain infecting it simultaneously. When there is a different specie spread of the Influenza virus a new strain may develop that has characteristics usually seen in the Influenza viruses of another species.

This is the case with the current pandemic of H1N1 the so called "Swine Flu". The virus currently causing the problem is a new or novel type A Influenza virus. It is a subtype called H1N1. This designation is based upon two surface proteins on the virus called Hemagglutinin and Neuraminidase. These two proteins are formed by the HA and NA genes, respectively.

Novel H1N1 – cont'd on page 4

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found a way to solve it." Another friend and colleague, Gary Davis, said "Jerry is the consummate extension professional who had the ability to identify and monitor variables and issues important to poultry science youth education".

Jerry created partnerships and networks to encourage Arkansas youth to participate in 4H and FFA poultry programs and events. He coordinated poultry BBQ contests and helped youth overcome their fear of competitions and public speaking. Jerry worked with many individuals, poultry complexes, allied industry personnel, and the Poultry Federation to benefit the youth of Arkansas and the Arkansas poultry industry. He impacted countless youth across the state and continues to do so. In fact, even though he retired the end of June he judged several county fair poultry shows this Fall and was active at the Arkansas State Fair and Junior Livestock Premium Auction for the benefit of the youth of Arkansas.

Jerry's 32+ years of service in Arkansas Extension for the youth of Arkansas may have ended but he still is very active impacting youth. Jerry your years of service have impacted many. May your retirement be as meaningful.

ARS veterinary medical officers collect a nasal swab from a piglet to test for novel H1N1 influenza virus. Photo by James Fosse.

When several viruses are involved in an infected animal, the genes can be exchanged between the viruses resulting in a new virus. What has been determined for this H1N1 virus is that it contains within its eight genes some from both North American and European/Asian swine flu viruses, an avian flu virus and a human flu virus. The HA gene in this strain is from a Swine Influenza virus of North American origin. The NA gene of this novel virus is from European and Asia Swine Influenza. But it appears that the gene may have been acquired by the swine populations in Europe and Asia from an Avian Influenza. This virus also has 3 other genes which came from a Swine Influenza virus but these genes appear to have got into the pigs from Avian Influenza and a human Influenza. This virus has been referred to as a “triple reassortant” (mixed) virus. Therefore, the new virus is a mixture of 2 swine Influenza viruses (one from North America and one from Europe/Asia) but it also has genes from an avian and human virus strain. Thus we have a new virus strain to which most people have little, if any, immunity.

Since the pandemic began, there have been a few instances (in Canada, Argentina, etc.) that suggest the virus has been spread into pigs from sick people. However, these infections have been small in number. It has been speculated that as cases of H1N1 increase there could be increased frequency of spread from people to pigs. These infections in the pigs have been mild in severity. There has been no evidence to suggest that these instances have had any impact on the pandemic dynamics. In addition, there have been reports (in Chile and Canada) of the H1N1 virus being spread from affected people to turkeys. These too have been isolated events and have not changed the pandemic dynamics. Since the virus is killed by normal cooking temperatures there have been no human infections linked to the consumption of properly prepared products.

The Center for Disease Control and Prevention (CDC) in Atlanta, Georgia has a website with information about H1N1. That website details symptoms, preventative practices, etc. concerning the disease in people. The website is www.cdc.gov/H1N1FLU/. The United States government also has a website at www.flu.gov that has information about the virus, symptoms, vaccinations, etc. Information is also available at www.who.int/csr/disease/swineflu/en/ a website operated by the World Health Organization. There are numerous monitoring and surveillance efforts being conducted worldwide to track the pandemic and any changes in the virus.

A couple of suggestions posted in many public places are wash to your hands with soap and water and the use of alcohol based rubs on your hands. In addition, it is advisable to avoid touching your eyes, nose or mouth since viruses and bacteria can be spread this way. If you are sick it is best to get medical attention from your physician. There is currently a massive vaccination program that has been launched to protect people against this new virus and seasonal flu. The CDC is recommending all high-risk individuals get vaccinated. The CDC also recommends you stay home if you are sick unless you are going to receive medical attention.

If you have poultry or pigs use good Biosecurity practices and stay away from your animals if you are sick. Follow the Biosecurity practices and protocols that have been implemented by the integrator to protect your flock or herd from disease. These Biosecurity practices are not just for Influenza they apply to any disease threat.
Some of these practices are really quite simple and may include:

- Keep **“No Visitors”** and/or **“Restricted”** signs posted at the far road entrance.
- **Do not allow** visitors in the poultry or swine houses or on the farm.
- **All** farm personnel should wear **separate clothing** (including shoes, boots, hats, gloves, etc.) on the farm. Clothes used on the farm should **stay** on the farm.
- **Completely change all clothing** after caring for the flock or herd and wash hands and arms thoroughly before leaving the premises.
- **Do not visit** other poultry or swine farms.
- Keep all poultry and swine houses securely locked. Lock all houses from the inside during work.
- All equipment, crates, coops, etc., must be **thoroughly cleaned and disinfected** before and after use.
- **All essential visitors** (owners, feed delivery personnel, catchers and haulers, service men, etc.) are to wear protective outer clothing (coveralls), boots, and headgear prior to being allowed near the poultry flock or farm.
- **Monitor all vehicles** entering the premises (service, feed delivery, animal delivery or removal, etc.) to determine if they have been **properly cleaned and disinfected. This includes disinfection of the tires and vehicle undercarriage.**
- Sick and dying animals or birds should be submitted to a diagnostic laboratory for proper problem diagnosis. All commercial growers should contact their supervisor and follow their instructions.
- **Dead birds or swine** are to be **properly disposed** of by burial, incineration or other approved methods.
- Any person handling wild game (especially waterfowl) **must** completely change clothing and shower or bathe before entering the premises.
- **Do not** borrow equipment, vehicles, etc., from another farm.
- **Do not visit** areas where Influenza is a problem.

Dustan Clark, Cooperative Extension Service, Division of Agriculture, University of Arkansas

Changes Affect University of Arkansas Poultry Extension Group

On May 1, 2009 the Poultry Extension section of the Arkansas Cooperative Extension Service, University of Arkansas Division of Agriculture, Center of Excellence for Poultry Science started undergoing changes. The first change was the retirement of Dr. Frank T. Jones on April 30, 2009. Dr. Jones received his B.S. from the University of Florida in 1968 and earned his M.S. and Ph.D. degrees from the University of Kentucky in 1972 and 1977, respectively. After an illustrious career involving feed quality assurance at North Carolina State University, Dr. Jones joined the Center of Excellence for Poultry Science as extension section leader in July of 1997. He was promoted to associate center director for extension in July of 2005. Dr. Jones founded the departmental newsletter *Avian Advice* in 1999 and provided technical editing for the publication. Dr. Jones also established and coordinated the International Short Course on Modern Poultry Production which trained participants in the various areas of the poultry industry using a combination of classroom lectures, laboratories, and field trips. His duties as the leader of the poultry extension group consisted of various administrative duties, serving as primary contact for the group, and program coordination and guidance. His extension career in Arkansas also involved pre-harvest food safety and poultry feed production. Dr. Jones had a distinguished career winning such awards as Dr. Jones is still active assisting the poultry industry via private consulting. Dr. F. Dustan Clark, extension poultry health veterinarian, assumed leadership and administrative duties for the group and was appointed as interim associate center director for extension on May 1, 2009.

Another change came about on June 30, 2009 with the retirement of Mr. Jerry Wooley. Jerry was headquartered in the Little Rock State Office of the Arkansas Extension Service. He had worked with the Arkansas Extension Service for over 32 years serving as a county agent in Crawford and Conway counties and as the youth poultry program specialist. As the director of the youth poultry programs he worked with Arkansas youth involved in 4H and FFA. Jerry also worked with poultry industry leaders, county agents, allied industry personnel, agriculture teachers and many county fair boards working with the youth of Arkansas to develop their interest in poultry. Jerry judged numerous county poultry shows in his career. He also coordinated and worked tirelessly with the acquisition, banding and delivery of pullets to youth for the county and state fair pullet chains and broilers for the Arkansas state fair. Jerry also worked with 4H broiler BBQ contests and assisted numerous county agents and individuals with calls regarding small hobby poultry flocks.

On September 1, 2009 another change took place, Sharidi Barber was hired as the new youth poultry program associate. The youth poultry program associate is a newly created position in the Little Rock state extension office. Sharidi will be performing many of the duties previously performed by Jerry Wooley such as coordinating and conducting 4H youth broiler presentations and contests and broiler BBQ contests. She also works closely with county agents across the state and with agriculture teachers in conducting youth poultry workshops. Sharidi will also coordinate acquisition and distribution of birds for the Arkansas pullet chain and the State Fair broiler show and will be the first respondent to questions from small hobby flock owners.

The current areas of responsibility for the group are as follows:

- **Dr. Keith Bramwell** will continue to work in broiler breeder management and hatchery management. He will also participate in poultry extension short courses.
- **Dr. Dustan Clark** will continue to work with poultry health issues and Biosecurity. He will serve as the leader/administrator of the group.
- **Dr. H.L. Goodwin** will continue to work with economic and trade issues that affect the poultry industry; and grower and labor issues. He will serve as the editor of the quarterly newsletter, *Avian Advice*.
- **Dr. John Marcy** will continue working with poultry processing and food safety and will stay involved in HACCP training and culinary projects.
- **Dr. Susan Watkins** will continue working with production and management issues in broilers and turkeys. She will also continue her water quality program and participation in poultry short courses.
- **Sharidi Barber** will be responsible for poultry 4H and FFA youth programs. She will also coordinate the Arkansas Pullet chain and State fair broiler programs.

All of the extension poultry group will continue working with Arkansas youth interested in poultry and serve as information sources regarding poultry questions from industry, county agents, individuals, veterinarians, etc. These changes have resulted in some shuffling and/or expansion of duties for the group.

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Planting Vegetative Shelterbelts and Installing Windbreak Walls on a Poultry Farm

Introduction

Animal agriculture has faced increasing environmental challenges related to air and water quality. As the number-two broiler state and home to several poultry integrators, aerial emissions from poultry facilities could affect the economic viability of poultry industry in Arkansas. Ammonia, dust and odor emissions from poultry houses typically travel downwind in a concentrated plume. Dust particles are able to adsorb and transport substantial amounts of odorous compounds and ammonia (Donham et al., 1986; Hammond et al., 1981; Parbst, 1998). By planting trees and shrubs around poultry houses farmers can disrupt the plume and mix it with the prevailing winds to dilute odor.

Tunnel ventilation is a form of mechanical ventilation which moves air along the length of the building in order to maximize the air velocity throughout the building. This provides effective cooling in warm weather and is the primary reason tunnel ventilation has become popular for poultry housing in the southern U.S. Because the exhaust fans are located at one end of the building, emissions from the fans are locally concentrated, compared to fans or sidewall openings along the length of a naturally ventilated building. This concentration of fans in one area provides an opportunity to trap air pollutants by using shelterbelts or structural walls with a mechanism of both capture and dispersion. When budget is a constraint to establish full windbreaks around a poultry farm, a cost-effective way to adopt this technology is to strategically select locations where the most benefits can be realized.

A windbreak (also called shelterbelt, vegetative shelter, wind barrier, etc.) is defined as a fence, wall, line or growth of trees, etc., to prevent the wind coming through with its full force. As wind blows against a windbreak, air pressure builds up on the windward side (the side towards the wind) and large quantities of air move up and over the top or around the ends of the windbreak. A windbreak can be from one to several rows and comprise appropriate species of trees and shrubs, or built from artificial materials, i.e. cloth, open synthetic material (curtain), or wooden slats of various porosities. Vegetative buffers have the advantage of being natural to the environment compared to artificial materials. The choice of installing a structural windbreak wall instead of planting vegetative buffer is largely made when immediate results for odor/dust mitigation is needed and planting relatively large sizes or numbers of trees is not financially feasible.

Benefits of Vegetative Buffers

Vegetative buffers planted as windbreaks have long been used to reduce and redirect winds, to protect crops or orchards from wind damage (Dierickx, 2003), and to mitigate pesticide drift from agricultural and forest applications (Ucar and Hall, 2001). Additional benefits of vegetative buffers include: reducing energy use; serving as a screen of undesirable sight, sound, and smell (Tabler, 2005); improving landscape appearance and property value and blocking views of houses, waste facilities, and routine farm activities ("out-of sight out of mind"). In recent years, shelterbelts on confined livestock farms have been evaluated for trapping dust and ammonia (Adrizal et al. 2008; Malone, 2006) and altering odor dispersion plume (Lin et al., 2009). Well-designed and properly planted vegetative buffers have been recommended as best management practices (USDA NRCS, 2007; Scott, 2007) in eastern United States.

The main objective of this project was to evaluate and demonstrate the efficacy of using vegetative buffers and windbreak walls on the University of Arkansas Applies Broiler Research Farm in Fayetteville downwind of tunnel ventilation fans to mitigate ammonia, dust and odor emissions from poultry houses to the surrounding environment. Placement of the buffer and windbreak wall on the ABRF are shown in Figure1.

Vegetative and Structural Windbreak Wall Installation

Shelterbelts established in the vicinity of ventilation fans need to endure the adverse environment downwind of the discharge fans. Several factors need to be considered, including plant species, spacing, number of rows, distance from fans and management activities such as irrigation and pruning. The plants' characteristics desired for the vegetative shelterbelt species include: 10 – 15 ft mature height; plenty of limbs near ground level; moderate to fast growth rate; drought tolerant to survive droughty, rocky soils (as typically found in West Arkansas); tolerant of full sun; dust and ammonia tolerant; hardy growth throughout Arkansas; minimum bird attraction; non-invasive, and if possible native.

For this project, multiple rows of deciduous and evergreen trees and shrubs with minimal pruning requirement were planted. The deciduous trees/shrubs are situated as front rows from the discharge fans to allow foliage filtering dust-laden air during the period when the tunnel discharge fans are in operation (warmer season). Theoretically, leaf drop in fall and winter will "clean" the vegetation of dust in preparation for the next warm season ventilation. The deciduous rows are followed by fast growing evergreen trees further from the fans to provide year-round foliage for both dust control and a visual barrier. In the winter of 2007, a 100-ft wide, 4-row planting of trees were installed directly opposite of four 48" tunnel cone fans on the south side of House 1 at the Applied Broiler Research Farm near Savoy, AR (Fig. 1a). The distance between the first row of trees and fans was approximately 60 feet. The total depth of this planting was 30 feet. The crape myrtle (Lagerstroemia sp.), a very popular woody ornamental shrub/small tree throughout SE US landscapes, was selected as the deciduous species and planted into two staggered rows, comprised of 25 6.8-ft plants (7-gallon). One row of each evergreen, e.g. Green-giant Arborvitae and Cryptomeria (commonly called Japanese Cedar), were planted as third and fourth rows, each comprised of ten 4.5-ft plants (15-gallon). Each row measured 90-100 ft, centered by the discharge fans. Spacings within-rows were 8, 10, 10 ft for crape myrtle, Arborvitae and Japanese Cedar, respectively. Row spacing between the four rows are 8, 10 and 12 feet. The orientation of this shelterbelt could have an additional benefit of reducing Southern prevailing wind in warmer weather after establishment. Drip irrigation was installed after planting and used in summer 2008. Trees were mulched in April 2008 and March 2009 to prevent weed growth and preserve moisture in the root zone.

In the spring of 2009, an artificial windbreak wall consisted of metal posts and shade cloth fabrics were installed on the North side of the tunnel fans of House 4 (Fig. 1b). The design wind speed of the flat-panel windbreak wall was 60 mph. The frame of the windbreak wall was constructed from 14 ft high, 14 gauge 3.5" OD structural tube posts, and 14 gauge 1.66" and 1.90" horizontal bars. Heights of finished fence posts are 10 ft, allowing for 4 ft of posts to be in ground (Fig. 2). One ft diameter holes were dug to allow posts secured by pouring cement in ground. Black shade clothes (80% knitted mesh) were fastened to the post and bars with shade clips and cable ties. Shade clips are used approximately 2.5 ft from each other on the edge of each panel. The final wall has a dimension of 40 × 10 ft (length and height), and 20 ft away from the tunnel fans (Fig. 3). The distance of wall from fans were determined to not hinder air exhaust from fans but still allow windbreak to serve as a barrier to slow down wind generated by the powerful fans.

Figure 1. Aerial photos of the Applied Broiler Research Farm where this project is implemented. This photo shows the location of discharge fans, vegetative shelter belt installed and the structural windbreak wall installed.

Vegetative Buffer Evaluation

Forty-five trees were planted in December 2007; 44 survived, even with the winter storm that occurred in late January 2009. However, some dieback of new shoot growth was identified in March 2009 and later diagnosed as a fungal disease (tip blight) (Fig. 4). Fungicide sprays (Broad Spectrum Lawn and Garden Fungicide) were applied five times between late March and mid-April. The branches with obvious tip blight were pruned to prevent infection progressing into underlying shoots. This was done when a period of dry weather was experienced.

Vegetative Shelterbelts – cont'd on page 8

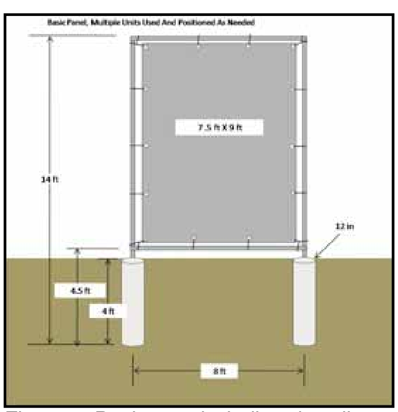

Figure 2. Basic panel windbreak wall above and below ground components


Figure 3. Structural windbreak wall installation on the broiler farm

Japanese beetle infestation on crape myrtles was observed for a short period (2 weeks) in the summer of 2008, but prevailed from late June to early August in 2009 (Fig. 5). In 2009, three insecticide treatments using Liquid Carbaryl Garden Spray were applied to protect the foliage.

After a certain period of tunnel fan use, trees were covered with dust blown from the fans (Fig. 6). Crape myrtles, planted as the two front rows, were heavily loaded with particulates. This demonstrates that vegetative buffers planted strategically on a poultry farm are effective in trapping and depositing particulates locally and as a result potentially reduce odor dispersion. Rain washed the dust off the leaves and branches.

Tree heights were measured in January 2009 to document their growth of previous year (summer 2008). Crape myrtle grew 11% (from 6.8 to 7.5 ft) in average, while Green Giant Arborvitae & Japanese Cedar grew 38 and 39% (from 4.5 ft to 6.2 or 6.3 ft), respectively.

Figure 4. Trees survived ice storm in winter 2009 but showed fungal disease symptom on Japanese Cedar in March 2009

Figure 5. Trees continue their growth in summer 2009

Figure 6. Leaves of crape myrtle planted at the first two rows are covered with dust blown from the tunnel fans out of the chicken houses

Figure 7. Windbreak walls are effective in trapping dust and feather blown by the tunnel fans out of the chicken house

Figure 8. Smoke test on wind pattern generated by the tunnel fans

Windbreak Wall Evaluation

Two summer flocks were raised after windbreak walls were installed. The panels were able to trap dust and feathers when tunnel fans were in operation (Fig. 7). A major rain event is required to wash off dust accumulated on the panel. Bottcher et al. (2000) reported that windbreaks placed near exhaust fans on tunnel-ventilated livestock buildings diverted air jets issuing from the fans upward, and promoted mixing of the odorous, dusty airflow with the wind passing over the building. As a result, the particulates and odors in the air-breathing space of downwind neighbors will be reduced by atmospheric mixing. Wind pattern were also tested by smoke bombs as shown in Fig. 8.

Summary

The adoption of sound, practical, efficient and cost-effective technologies to address air emission issues will be increasingly important in animal agriculture. Such technology includes strategically planting trees and shrubs as a vegetative shelter belt around poultry houses or installing a windbreak wall opposite to tunnel fans to mitigate dust and disperse gases. This technology can serve as a low cost program to partially address future air quality and emission challenges and improve neighbor relations by creating a visible image of positive environmental stewardship.

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