

# PoultryPractices

Oklahoma Cooperative Extension Service

A newsletter for poultry producers and poultry litter applicators...



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## Avian Influenza Update

Barry Whitworth, DVM

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Avian influenza (AI) is a viral disease that primarily causes problems in domestic poultry. It is extremely rare that humans ever get AI. The disease originally known as "the fowl plague" was first seen in Italy around 1878. The United States (US) outbreak that began in the winter of 2014 and ended in the summer 2015 resulted in 50 million birds destroyed. This outbreak was estimated to cost \$1.6 billion in direct losses of turkeys and egg laying hens. However, when accounting for all factors associated with the poultry industry, the estimated impact on the US economy was \$3.3 billion. This was the most costly animal disease outbreak in the history of the US. One major lesson learned was biosecurity must be improved.

Since the 2014-2015 AI outbreak, the US has dealt with a few smaller outbreaks of AI. In January 2016, one case of highly pathogenic avian influenza (HPAI) and 9 cases of low pathogenic avian influenza (LPAI) were found in Indiana. In March 2017 two cases of HPAI were found in Tennessee. This was followed by a handful of states having a few cases of LPAI. All of these flocks were depopulated.

When HPAI is detected in a flock, the US is required to notify the World Organization for Animal Health (OIE) and other trading partners. This initially impacts trade between the US and other countries.

Avian influenza resides in migratory waterfowl. Ducks, geese, and other wild birds harbor the virus in the intestinal tract without having any clinical signs of the disease. If the virus is introduced into domestic poultry such as what happened in the US, large numbers of birds may become ill or die. Clinical signs of the disease vary depending on the severity of the virus and the organ system affected. The virus is classified as either LPAI or HPAI. LPAI usually results in no clinical signs or only mild problems. HPAI has many different clinical signs. Death with no symptoms is a common finding. Respiratory problems such as coughing, sneezing, watery eyes, and nasal discharges may be seen. Depression resulting in loss of appetite and decrease consumption of water may occur. Egg production may be impacted with a decrease in production and/or softshell or misshapen eggs. A bird's comb, wattle, head, eyelids, and hocks may swell. Combs and wattles may turn purple. Nervous system disorders include tremors, incoordination, and unusual positions of the head. Diarrhea has been reported on occasions.

For commercial poultry operators, practicing biosecurity is the best way to prevent the introduction of avian influenza virus and any other poultry disease into the flock. Producers should have a biosecurity plan in place. Basic biosecurity involves good sanitation, personal hygiene, and visitor restrictions as well as a restriction on sharing equipment.

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Sanitation involves keeping houses, feeders, and waters clean. Any feed spills should be cleaned up immediately to avoid attracting rodents and wild birds since they can spread diseases. Grass should be mowed short around poultry houses and debris should not be allowed to accumulate around houses. Dead birds should be promptly picked up and disposed of properly by rendering, burying, burning, or composting.



Visitors should be kept to a minimum. A person should never enter an area where poultry are housed unless they are wearing clean clothes and shoes. Producers may want to provide disposable coveralls for visitors. Visitors should wash their hands before entering the house and when leaving. Disposable shoe covers should be provided. A place to disinfect their shoes should be available in front of the entry to the house. Producers should be sure to keep the footbath free of debris and recharge the footbath frequently.

Avoid borrowing or loaning tools and equipment with other poultry producers. If this cannot be avoided, any vehicles, equipment, or machinery should be washed and disinfected before entering the operation.

Lastly, producers should avoid any contact with other poultry producers unless absolutely necessary and biosecurity precautions have been taken. Producers should avoid visiting fairs, shows, or auctions where poultry are present. If a producer does have contact with poultry outside his/her farm, they should wash and disinfect their vehicle and shower and change clothes before having contact with their own birds.

If a producer would like more information about basic biosecurity, please go to the USDA-APHIS *Defend the Flock* website.

## References

Final Report for the 2014-2015 Outbreak of Highly Pathogenic Avian Influenza (HPAI) in the United States, Revised August 11, 2016, USDA Animal Plant Health Inspection Service, Veterinary Service, National Preparedness and Incident Coordination

Swayne, D.E. and Halvorson, D.A. 2003 Influenza. In Y. M. Saif (ed.). *Diseases of Poultry*, 11<sup>th</sup> ed. Iowa State Press: Ames, Iowa, 135-160.

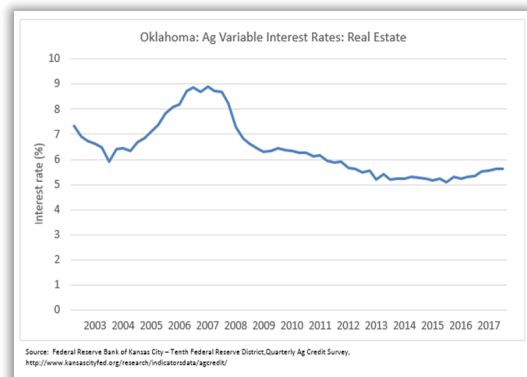
# Interest Rate Outlook: 2018

Scott Clawson

NE Area Ag Economics Specialist, Oklahoma State University

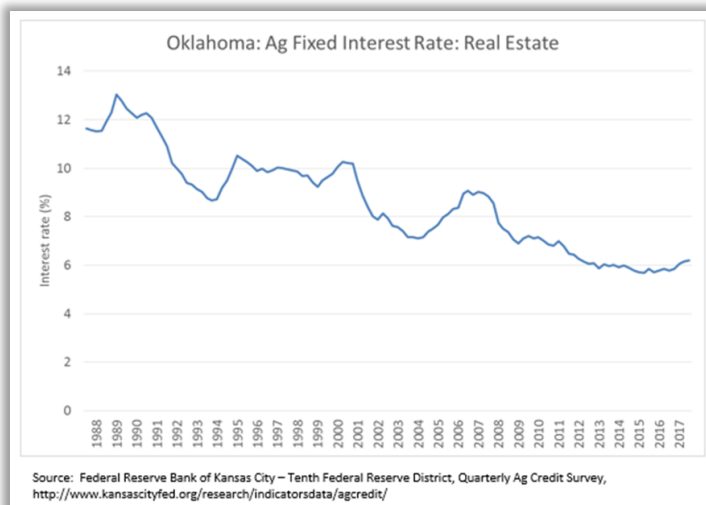
Poultry farm owners have been living the good life when it comes to interest rates. Since the financial crisis came to fruition in late 2008, interest rates have fallen to historically low levels. While we tend to focus on placement density, out times and other factors when we think of profits, there is an interest rate issue that may be lurking in the shadows.

When we think of interest rates in the light of modern poultry production, we are really focused on the farm mortgage itself. When the farm was purchased or constructed it was financed under either a fixed rate loan or an adjustable rate mortgage (ARM). At that time, the fixed rate option was most likely a higher rate than the ARM. The ARM option was most likely a cheaper rate at the time of origination but as the name implies the rate would adjust as the interest rate market changes. A popular ag version is the 3/1 ARM. The 3 referring to the initial 3 year period when the rate is fixed. The 1 referring to the rate adjusting every year afterwards for the remaining term of the loan. The reason this has importance is that many loans that were originated since 2008 may have sat relatively idle in regards to interest rates. This due to the continued favorable rate environment. Unfortunately, this looks to be changing.



Who and what is the Federal Open Market Committee? This is the group that sets monetary policy, including interest rates. The Federal Funds Rate has increased .75% over that past year. Why does this matter for farm owners? The answer is that this causes the Wall Street Journal Prime Rate to increase as well. So, why does the Wall Street Journal Prime Rate matter to farm owners? The answer is that these

ARM loans are typically tied to an index to determine how much the rate will move. Somewhere in the stack of documents that we signed at loan closing there will be something that looks like "WSJP+2.0%". This would mean that at the adjustment date, the new loan rate would be Wall Street Journal Prime + 2.0%. Today, that would make the interest rate 6.50% as WSJP is now at 4.5%. This is not the only index that rates can be tied to but this seems to be the most common.



As the rest of 2018 plays out, the rate change notifications that are sent by your bank may contain some unfortunate information this time around. Prepare and be ready for rates that are turning from the historical lows to a more modest level.

## Upcoming Applicator Field Days

More information can also be found at [poultrywaste.okstate.edu/pwme-classes](http://poultrywaste.okstate.edu/pwme-classes)

### DELAWARE COUNTY

**Date:** April 11, 2018  
**Time:** 12:00 PM - 4:00 PM  
 Lunch provided with RSVP by April 3rd  
**Place:** OSU Extension Office, Jay, OK

*For more information or to RSVP for lunch please contact the Delaware County Extension Office at (918) 253-4332.*

### MCCURTAIN COUNTY

**Date:** April 20, 2018  
**Time:** 9:30 AM - 2:00 PM  
 Lunch provided with RSVP by April 13th  
**Place:** Mac Lindley Research and Demo Farm  
 Valliant, OK

*For more information or to RSVP for lunch please contact the McCurtain County Extension Office at (580) 286-7558.*

### LeFLORE COUNTY

**Date:** April 24, 2018  
**Time:** 9:00 AM - 1:30 AM  
 Lunch is provided but no RSVP necessary  
**Place:** LeFlore Co, Fairgrounds, Poteau, OK

*For more information please contact the LeFlore County Extension Office at (918) 647-8231.*

### PAYNE COUNTY

**Date:** May 4, 2018  
**Time:** 10:00 AM - 2:30 PM  
 Lunch provided with RSVP by April 27th  
**Place:** Cimarron Valley Research Station  
 Perkins, OK

*For more information or to RSVP for lunch please contact the Payne County Extension Office at (405) 747-8320.*

# Tunnel Ventilation Fans: What You Need to Know

Brian Freking

*SE Area Livestock Specialist , Oklahoma State University*

Fan selection can become a very complex issue and a lot has been written by experts on this topic. However, the most important factors are fairly easy to understand and if you do your homework on these points that matter the most, you should be able to make buying decisions with confidence. The overall most important point to keep in mind is that while we must be looking at the initial costs and performance specifications for individual fans, it is how the total house fan package performs, including lifespan operating costs that must make up the final criteria.

**Fan CFM and other basics:** Most fans installed in modern broiler houses have galvanized steel cones. Fiberglass is great but to keep costs down most growers go with steel housings. The type of shutter must also be decided. Plastic, aluminum or the newer butterfly type shutters are all available. A newsletter could be written just on the different types of shutters.

The most basic requirement is airflow, the **cfm** rating. Fans must be able to deliver the air exchange rate and the tunnel air velocity needed. Note that fan cfm ratings depend on the static pressure (SP). Most manufacturers will rate fans at 0.05 inches SP; however, the more realistic working pressure to assume in a modern tunnel house is 0.10 inches. So all fan comparisons should be based on their cfm's at 0.10 SP.

Years ago 48-inch fans were the choice hands down. Today with larger houses and increasing airflow needs, larger diameter fans are being installed and there are more choices to make among fans of different diameters and horsepower ratings. This means if it is a retrofit job we also need to look at how well fans will fit into our existing structure. The grower must realize also that it may be a mistake to jump on a fan just because it's big and will mean fewer fans to buy, install and maintain. That is certainly a benefit of having the larger fan choices, but it should be balanced against the possible advantage of getting lower lifespan operating and total costs with, say a package of ten smaller but more efficient fans rather than eight or nine of the larger fans. This can easily happen because long-term operating costs of tunnel fans can be three to four times their initial purchase price. Installing fewer, larger diameter and/or higher horsepower fans might turn out to be the right thing to do, but the point is you need to be aware of total long-term costs for the entire building package, not just initial cost and convenience.

**CFM/Watt:** This is the energy efficiency ratio of the fan. The higher the cfm per watt number the less electricity it takes to move the air. A fan with a 20 cfm per watt rating will cost 20% less to operate than a fan with a 16 cfm per watt rating. Many ten year-old fans have very low cfm per watt numbers. Some are less than 16. Some of these old fans are also direct drive. A tremendous energy savings could be made by replacing these fans with higher efficiency models. On the average a good rule of thumb is that your tunnel fans in the broiler belt will run about 3000 operating hours per year. So if we had ten fans that moved 22,000 cfm at 16 cfm per watt the total yearly power bill would be \$4125 based on electricity at \$0.10/kwh.

The formula for determining the cost to run a fan for 3000 hours at \$.10 /Kwhr at 0.10 static pressure using the Bess Laboratory data ([bess.illinois.edu](http://bess.illinois.edu)) is:

$$\text{Operating Cost} = (\text{cfm at 0.10SP}/\text{cfm/watt})/1000 \times 3000 \text{ hrs} \times \$ .10 /\text{Kwhr}$$

If new fans were chosen that delivered 20 cfm per watt the yearly power bill would be \$3300. This is a 20% reduction in the power bill. Fans can be bought with energy efficiency ratios in the mid to high 20's. But the extremely high energy efficiency ratios are often much more expensive. The point is each time you improve cfm/ watt by 1, the operating cost of the fan goes down by about 5%. The above example is an over simplification but it does illustrate the need to evaluate cfm/watt for tunnel ventilation fans.

**Airflow Ratio:** As static pressure increases in a broiler house, the fans must work harder to draw the air into the house and the amount of air they are able to draw into the house decreases. So wind speed, wind chill and bird cooling decrease as the fans have to operate under higher static pressures. In essence the airflow ratio is a number that describes how well the fan keeps pumping air as the amount of restriction increases. It is a ratio of the air moved at a 0.20 pressure divided by the air moved at a 0.05 pressure. In



general fans with higher airflow ratios cost more than fans with low airflow ratios. Buying fans with higher airflow ratios, say 0.75 or higher, is basically buying insurance that the ventilation system will maintain needed airflow under conditions of heavier than normal load, such as when shutters and evaporative cooling pads are allowed to get dirty. Fans with airflow ratios below 0.70 won't perform very well when shutters and pads are dirty and we are operating at pressures above 0.10 inches in a modern broiler house. Fans running in pullet houses or where the inlets are restricted by light traps should be chosen with higher airflow ratios. Fans with constant exposure to windy conditions also need a higher airflow ratio. Windy conditions are not as prevalent in the broiler belt during hot weather as they are in other parts of the country.

When making the decision in choosing tunnel fans, the basic task is to determine the fan package that will produce the needed airflow under the conditions of operation for your house, and do the job needed at the lowest cost. Initial purchase price is important, but higher-priced fans with better energy efficiency may yield lower total long-term costs. This can happen even when more fans are required to meet the airflow needs, because tunnel fans typically cost up 3 to 4 times the initial purchase cost in electricity over their useful life.

Key points to keep in mind in buying tunnel fans:

- ✓ For broiler houses, evaluate fans based on airflow produced at 0.10 inches house static pressure.
- ✓ Look at airflow ratio - fans with airflow ratio below 0.70 won't perform well under full tunnel load or with dirty pads and shutters.
- ✓ In evaluating fan cost/performance specifications, judge on the basis of the fan package required to meet house airflow needs, not just on individual fan specs.
- ✓ Balance likely higher initial costs for high-efficiency fan packages with lower long-term total costs.
- ✓ Buy from a dealer you trust who will provide good service over the life of the equipment. Buy fans equipped as tested by BESS Labs.

As an aid to growers, specialists from Auburn University have developed an Excel spreadsheet that is available on the [www.poultryhouse.com](http://www.poultryhouse.com) website.

Table 1. List top performing tunnel fans (48" to 62", 230V/single phase, 60 hz) based on published test results produced by BESS Laboratory through December of 2017. The fans have an energy efficiency rating of at least 20.8 cfm/watt @ 0.10" static pressure and have an air flow ratio of at least 0.76, thus representing approximately the top 10% of all tunnel fans tested by BESS Laboratory.

BESS Laboratory ([bess.illinois.edu](http://bess.illinois.edu))

Shutter (A=Aluminum, B=Butterfly, D=Door, G=Galvanized, P=Plastic, R=Roll Seal).

Active	Manufacturer	Model	Power	Size	Cone	Shutter	cfm (0.05")	cfm/W (0.05)	cfm(0.10")	cfm/W (0.10)	AFR
Yes	Acme	DDPS48J-C	1 phase 230V, 60Hz	48"	Y	A	21400	23.2	20300	20.9	0.83
Yes	Hired Hand	6603-7132	1 phase 230V, 60Hz	54"	Y	B	26700	24.3	25200	21.8	0.8
Yes	American Coolair	MNBRDD52L	1 phase 230V, 60Hz	53"	Y	B	25100	24.2	23500	21.4	0.78
Yes	Chore-Time	46868-4822	1 phase 230V, 60Hz	48"	Y	P	20400	24.1	19000	21.5	0.78
Yes	American Coolair	MNBRC52L	1 phase 230V, 60Hz	53"	Y	A	25900	24.6	24300	21.7	0.77
Yes	American Coolair	MNBRDD52L	1 phase 230V, 60Hz	53"	Y	B	24900	23.8	23100	20.9	0.77
Yes	Chore-Time	46868-4842	1 phase 230V, 60Hz	48"	Y	P	20000	23.7	18700	21	0.77
Yes	Chore-Time	46992-4822	1 phase 230V, 60Hz	48"	Y	P	19300	25.3	18100	22.4	0.77
Yes	Chore-Time	48483-22	1 phase 230V, 60Hz	52"	Y	B	26200	24	24400	21	0.77
Yes	American Coolair	MNBRDD52LE	1 phase 230V, 60Hz	53"	Y	B	24100	26.1	22200	22.8	0.76
Yes	American Coolair	MNBRDD52LE	1 phase 230V, 60Hz	53"	Y	B	23900	25.4	22100	22.3	0.76
Yes	American Coolair	NBRID52L-SQ	1 phase 230V, 60Hz	53"	Y	D	24600	24.3	23000	21.3	0.76

Trade and brand names are used only for information. The Cooperative Extension Service and Oklahoma State University does not guarantee nor warrant the standard of any product mentioned; neither does it imply approval of any products to the exclusion of others that may be also suitable.

# The Basics of Poultry Nutrition

Earl H. Ward

*NE Area Livestock Specialist, Oklahoma State University*

A balanced nutritious diet is essential to all living things. Just like many animals, the nutrient requirements of poultry vary drastically depending on genetics, environmental conditions, growth, productivity, prevention of deficiency symptoms, and feed efficiency. Poultry require a balanced diet that consists of at least 38 different dietary nutrients.

The first nutrient that must always be addressed is water. Just like any animal, a bird's water requirement changes depending on many conditions and circumstances. Depriving a bird for 12 hours or more of water has had adverse effects on growing or egg producing birds. Depriving birds of water for 36 hours or more will result in an increase in mortality. Therefore, it is recommended to provide this wet nutrient cool, clean, and available at all times.

Birds are different than any of our other farm animals in the fact that they will adjust their feed intake depending on the energy density of the ration. Therefore they will eat until they satisfy their energy requirement. This means that the remaining nutrients must be adjusted accordingly based off of the available dietary energy (metabolizable energy).

For birds in an uncontrolled environment, there is a seasonal effect on the animal's energy uptake, which also effects the animal's feed intake. During winter conditions, a hen may consume up to 340 kilocalories of metabolizable energy per day to keep warm, but during warmer conditions may only consume up to 260 kilocalories a day. This means that during the warmer weather, or any other time that the energy intake is influenced the other nutrients in the diet must be adjusted according to avoid any deficiency or toxicity. As the feed intake decreases, the percentage of crude protein must increase to supply the required amount of protein to keep the animal in a productive stage. Growing birds will require a higher protein diet than mature birds will due to the lower amount of feed consumed, but also because they are trying to add protein to their skeleton. The animal's genetics will also influence the protein level in the ration. Birds that are bigger meat-type birds will require more protein than lighter egg-producing birds.



Photo courtesy of Oklahoma State University

Minerals always play an important role in a balanced diet. The two largest macro-minerals we need to consider are phosphorus and calcium. A lot of the phosphorus that is contained in feed ingredients is bound with phytate, which makes the phosphorus unavailable to poultry. Therefore, it is critical to formulate poultry rations based off of available phosphorus and not total phosphorus. The appropriate levels of calcium not only depends on the amount of calcium in the diet but also its ratio to the amount of available phosphorus. For growing birds the ratio should be right at 2:1 calcium to phosphorus. The calcium requirement is much higher for laying hens and older or more productive hens require a higher level of calcium.

Balancing rations has its complexity for every animal and the understanding of a healthy poultry diet is too complex to be able to cover in this article. Luckily, for the largest majority of poultry producers, there are commercial complete feeds that are already formulated and balanced for each stage of production for the bird. This balanced diet will ensure that your birds are happy, healthy, and productive.

## Resources:

Nutrition for Backyard Chicken Flocks. Alabama Cooperative Extension Factsheet ANR - 1317. <http://www.aces.edu/pubs/docs/A/ANR-1317/ANR-1317.pdf>. Accessed 1/30/2018.

Nutrient Requirements of Poultry. Klasing, Kirk C. <https://www.merckvetmanual.com/poultry/nutrition-and-management-poultry/nutritional-requirements-of-poultry>. Accessed 1/30/2018.

# Are There Weed Seeds in Broiler Litter?

**Brian C. Pugh**

*Area Agronomy Specialist Oklahoma State University*

Oklahoma forage or crop producers who have considered using broiler litter as a soil amendment are often concerned that they may be introducing weed seeds into their cropland or pastures. Due to rapid weed growth following a litter application, many often assume that the weeds must be coming from the litter. So, are they?

It's long been accepted that weed seeds present in raw feed grain are not likely to survive the grinding and subsequent high temperature pelleting process during poultry feed production. In addition, poultry scientists will tout the fact that seeds consumed by poultry, in comparison to other animals, are not likely to survive digestion. The difference is that birds possess a muscular organ used for crushing and grinding their feed, known as a gizzard. In fact, a 1934 study by Harmon & Keim demonstrated the power of the gizzard for destroying seeds. They fed 1,000 seeds each of Velvetweed, Field bindweed, White clover, Smooth dock, Annual smartweed, Wild rose and Peppergrass to different animals and then studied germination of seeds that passed through the digestive tracts (see chart).

	% Undamaged Seeds	% Viable Seeds
Cattle	24	10
Pig	23	9
Horse	13	9
Sheep	11	6
Chicken	0.3	0.2

Their study, and others since, proved that very few seeds make it past the hungry chicken. If we assume that the pelleting of feed kills all but 2% of weed seeds and a chickens' digestive system picks up 99.8% of those survivors, then we have eliminated 99.996% of original seeds. That is much more comforting.

Until the surge of commercial poultry production and the millions of tons of resulting litter that required land application, few replicated germination studies had actually focused on weed transport via litter. Let's look at a few of the most telling.

Zublena et. al (1995) conducted a study at NC State comparing poultry litter to a commercial N source. They used "clean" soil which had been sterilized of existing weeds compared to normal field soil. Their findings were that neither litter or commercial N exhibited any weed growth when the soil was weed free to start with. However, they also found that weeds flourished equally under either litter or commercial fertilizer treatment if the soil had pre-existing weed seeds.

Virginia Tech tested nine different broiler and turkey litters mixed with weed-free potting soil and then maintained them under good soil moisture. They found not one weed germinated.

In perhaps, the most in-depth and often cited study from Auburn, researchers conducted a greenhouse study to determine if broiler litter contains weed seeds, if the source of litter affects the presence of weeds, and how litter and plant nutrients affect germination and growth of weeds commonly found in the soil.

Samples of fresh litter were collected from 18 broiler houses throughout Alabama. Each sample was analyzed to determine nutrient content. Samples were mixed with a sterile potting medium to approximate application rates of 16 and 32 tons of litter per acre. Additional treatments included a control and multiple commercial fertilizer rates. The treated medium was placed in trays, half of which were planted with seeds of spiny pigweed, pitted morningglory, sicklepod, and large crabgrass. All treatments were kept moist for

*Continued on page 8*



six weeks. After a six-week incubation period, weeds were found only in trays where seeds had been planted (figures 1 and 2). Litter source and rate had varying effects on weed germination and performance. The large-seeded weeds, morningglory and sicklepod, appeared to be more tolerant to high rates of broiler litter. Crabgrass and spiny pigweed germination and growth were inhibited by some litter treatments, probably due to high ammonia levels in the sterile soil medium.

Based on these trials it becomes clear that litter is not the source of invading weeds in our pastures and cropland. So where do they come from? Weed infestations are likely to occur because of seeds already present in the soil. The high level of fertility, particularly ammonium concentrations, may induce germination of some species, but could inhibit germination and growth of others. Additionally, some research shows the increased organic acids present in decaying litter can promote certain weeds to germinate, but only if those seeds are already present in the soil.

Hopefully this data illustrates that the reason we see more weeds following litter application is the same reason we see more after applying commercial sources of fertilizer...the essential fertilizer nutrients that promote all plants to grow.



Figure 1. Unseeded pots amended with poultry litter and commercial fertilizer after 6 weeks.



Figure 2. Pots seeded with weed seeds and amended with poultry litter and commercial fertilizer.