Special Report

Lancaster Farming

POULTRY NOTES

FLIES — UNDERSTANDING THE PROBLEM — FINDING A SOLUTION

Charlie Pitts
Professor Of Entomology
Penn State

Agricultural production continues to change with the economics of size, demanding more animals and land in today's farming operations.

With the increases in animal numbers, situations have developed which can create conflicts between farmers and homeowners who live in agricultural production areas. Some of these conflicts include odors, use of pesticides, movement of trucks, and machinery on secondary roads, and flies.

Flies have taken advantage of ideal environments in and around animal facilities to breed and populate in large numbers. At times, the flies create nuisances to neighbors, especially when manure, laden with large quantities of pupae and larvae, is spread.

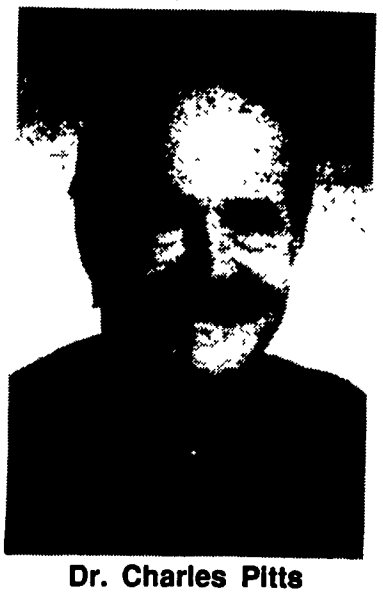
(With some fly populations resistance to today's insecticides, IPM — integrated pest management — activities must be developed and used to solve the problem.)

Flies need organic matter (manure, food wastes, poorly managed compost piles, etc.) that has 50-70 percent moisture to lay their eggs. These areas must be near a food source — with bedded animal packs, calf hutches and kennels, and poultry layer houses with in-house manure storage providing the best environments.

But even if fly numbers increase around farm facilities, neighbor complaints do not normally occur until manure is spread. When adult flies emerge, they head for the closest white and warm object, which is normally a neighbor's house.

A female fly is capable of producing up to six batches of 75 to 200 eggs at 3 to 4 day intervals. Larvae (maggots) hatch in 12 to 24 hours. In 4-7 days and three growth stages, larvae grow into pupa (dark reddish-brown cigar shaped case and about 1/8-inch long). Generations overlap, with all stages present at the same time. The entire cycle can be as short as ten days if temperatures are 85 degrees, and 45 days at 60 degrees F.

Solutions: With more large animal facilities, especially poultry layer operations, more flies are



Dr. Charles Pitts

present in our rural areas. With insecticide resistance, flies have become a problem.

Two areas are receiving major concentration: using IPM in the buildings to keep fly numbers at reasonable levels and properly handling manure once it leaves the facility. Two three-year grants from the Pa. Department of Agriculture, one to study manure treatment ($94,000), and the other to study in-house IPM activities ($113,000) have been received to address these problems.

In conjunction with the two grants, the following activities are under way: evaluation of tillage methods and their effects on keeping larvae and pupae from emerging. Early findings from this study showed plowdown to be somewhat effective. Moldboard plows were the most effective, chisel plows were next in effectiveness, and disking did not stop emergence of flies.

Covering manure with plastic is also showing some promise. To test this hypothesis, poultry manure was dumped in windrows, one dump truck wide, then black plastic was placed over the pile. A layer of soil was placed on the ends and edges of the plastic to seal the pile. In two field trials, the ends of the plastic were uncovered at 8 and 14 days, with no live larvae, pupae, or adult flies observed.

A consideration is to clean the house at 7 day intervals, then seal the manure under plastic. If covering and sealing the manure under plastic kills all development stages of flies, then manure can be spread at any time without fly problems. This would eliminate the cost of incorporating afterspraying, as well as other fly IPM activities in the house.

Baited fly barrels have shown success in capturing adult flies. These topless 55 gallon drums are fitted with a screen cone with a hole in the bottom. Cone sides are overlapped over the barrel edges and are tightly secured. Bait is placed in the barrel. When attracted to the bait, flies enter the trap through the hole. Once in the barrel, they cannot find their way back to the hole and thus out of the barrel. These traps have been placed around calf kennels and hutches, feed bins and exhaust fans of layer houses.

The ideal bait is still to be determined. Dead birds work well but create a pungent odor around the barrel. It also brings more than houseflies to the barrel. Unwanted milk, and a mixture of feed and water has also worked well. Adding water initially and on a regular basis to all (or additional milk in milk baited barrels) bait is essential. Two gallons of water or milk per week in the summer months is necessary. The number of barrels per facility and type and replacement of bait needs more on-farm investigation.

Parasitic wasps play an important role in poultry IPM programs and are helping reduce fly populations in high-rise poultry houses. The parasite is less than 1/16 inch long. The female wasp lays eggs in the pupal case and kills the developing fly. You must introduce a high number of wasps in the house to accomplish reduction.

Mulchers have been used to help lower number of pupae in concentrated areas such as in manure pits in high-rise layer houses. As larvae develop, they migrate to a dryer area to pupate. In cage layer/pullet houses, manure will form a cone-shaped pile with pupae maturing at the edges. A mulcher pushed down the rows will draw in pupae and kill them. This activity has helped especially after clean out and before natural enemies to flies have been reestablished.

Keeping manure dry is a key element. Leaks in waterers are the major source of wet manure (perfect place for flies to lay their eggs) and should be checked daily. Dry manure will cone and with proper ventilation proper drying will occur. This deters flies from breeding and promotes development of beneficial mites and beetles.

It is essential to monitor fly populations. Posting white 3 x 5 cards on a weekly basis at different areas will show fly level numbers. These cards can help determine what IPM activities are required.

The common housefly has found an ideal home in some of our farm facilities. Dealing with flies today takes more than an occasional spraying. Finding ways to lower fly numbers and stop neighbor conflicts is important to the agricultural industry in Pennsylvania.

Details of the above studies will be presented in later issues. If you need information, please call Charlie Pitts at Penn State, (814) 863-7789.

POULTRY MEAT TENDERNESS

(Continued from Page 6)

balance and of great economic importance to the meat bird industry.

Part of the phenomenon of shrinkage that occurs during the feed withdrawal period is a loss of moisture, which is associated primarily with muscle tissue in the body. As feed withdrawal time increases, expressible moisture in breast muscle decreases and tenderness declines. Prolonged feed withdrawal will also reduce muscle glycogen stores, which are necessary for proper development of many of the post-mortem changes that occur in meat that contribute to its tenderness and "juiciness."

Glycogen, a form of stored carbohydrate in animals that is similar to plant starch, provides a framework for holding water in skeletal muscle, and helps to retain moisture in the tissue. In addition, glycogen breakdown is integral to the process of *rigor mortis* and its *resolution* in post-mortem muscle tissue.

After the bird is slaughtered, readily available energy in the form of ATP and phosphorylcreatine in muscle is depleted and the muscle fibers develop a state of extreme rigidity called *rigor*. When this occurs after death, the condition is called *rigor mortis*. If the rate at which ATP depletion in muscle occurs is increased, cold shortening is prevented and tenderness increases. This can occur with electrical stimulation of deboned meat. Once ATP is depleted, glycogen begins to be metabolized under conditions that result in the production of a metabolic acid, lactic acid, that lowers the pH of the tissue. This process takes approximately four hours in broiler breast muscle (which is considerably faster than occurs in beef), and if the meat is deboned earlier than this, it is toughened.

During the second phase of rigor mortis (termed resolution), naturally occurring enzymes called proteases that break down protein structure degrade the muscle fiber or myofibrillar protein matrix, resulting in increased meat tenderness. Increased tenderness of deboned broiler breast meat occurs between 24 and 72 hours of refrigerated aging. One group of enzymes responsible for the structural breakdown of the muscle fiber protein, the cathepsins, are acid proteases, and their activity or effectiveness is enhanced at low pH (high acidity). The lactic acid produced by glycogen metabolism enhances the activity of cathepsins, and thereby promotes the resolution of rigor and increased tenderness.

In addition to the above pre- and post-slaughter events that can affect tenderness, the conditions under which the product is held for storage and transport can also affect quality. Freezing of muscle tissue and subsequent thawing results in the formation of ice crystals that rupture the muscle fiber membrane and cause seepage of fluid. Moisture retention and product "juiciness" and yield are therefore improved if the product is held at temperatures above freezing throughout the period from slaughter to sale.