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Florida Crop/Pest Management Profile: Poultry[1]

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Production Facts*

- In 1999, Florida ranked 11th nationally in egg production and 16th in broiler production. Florida does not have a commercial turkey industry.
- In 1999, chickens and eggs represented 25.8% of Florida's total livestock marketing receipts.
- Florida's chicken and egg receipts in 1999 were $354 million. Egg production was valued at $108 million. The value of broilers produced in Florida during 1999 totaled $246 million. The value of sales from 'Other Chickens' was $464,000. This includes sales of spent hens and roosters.
- As of December 1, 1999 there were 10.7 million hens and pullets of laying age on farms. There were also 2.1 million pullets not yet of laying age.
- A total of 122 million broilers were raised in Florida during 1999, equivalent to 647.7 million pounds. Despite this relatively large volume of broiler production, Florida produces only about a half of the state's consumption. The rest is supplied by states such as Alabama, Georgia, and the Carolinas.

* Source: 1999 Livestock, Dairy and Poultry Summary, Florida Agricultural Statistics Service http://www.nass.usda.gov/fl/lvstk/ldpsum99/ldps99p.pdf

Production Regions

In Florida three major broiler companies produce and market approximately 140 million birds per year. They are located in the northern counties (see Figure 1). They are: Tyson Foods, Jacksonville; Perdue Farms, DeFuniak Springs; and Gold Kist Poultry, Live Oak.

The bulk of the egg production units are in Central Florida (see Figure 2). In 1999, five companies owned the majority of egg production stock, averaging 1 million plus hens per company. The companies were Hillandale Farms, Tampa Farm Service, Cypress Foods, Zephyr eggs and Cypress Foods Management Group. The majority of hens are on company-owned farms. The exception is Cypress Foods Management Group, which produces all of its

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eggs on contract farms. Hillandale Farms and Cypress Foods have farms in other states (Georgia and/or Alabama).

For many years, eggs were marketed primarily as shell eggs, but in recent years consumption of egg products has increased. The term egg products refers to processed and convenience forms of eggs for commercial, foodservice, and home use. These products can be classified as refrigerated liquid, frozen, dried, and specialty products. Three companies are involved in production of egg products: Sunny Morning Foods in Fort Lauderdale, Happy Egg Dealers in Tampa, and Dixie Egg Company in Jacksonville.

Production Practices

Chicken meat production (Broiler industry)

Broilers (also called fryers or frying chickens) are meat-type chickens usually marketed at 4-10 weeks of age, depending on the body weight desired. Broilers are used for products such as Cornish hens (about 4 wk of age and 2.85 lb), chicken for fast food restaurants (about 6 wk of age and 4.1 lb), chicken for grocery stores (about 7.5 wk of age and 6.0 lb), and deboned chicken for sandwiches, nuggets, etc. (about 8.5 wk of age and 6.5 lb). Increasingly, further-processed products like microwave oven-ready or marinated items are being developed and marketed.

The broiler industry in Florida, as with the rest of the U.S., is vertically integrated. That is, the broilers are produced and marketed by companies that own or control breeder flocks, hatcheries, broiler flocks, feed mills, processing plants, and market arrangements. While there are some company-owned farms, typically, birds (both broiler and breeder flocks) are managed by farmers under contract and under supervision of the company. The farmer provides land, labor, houses, litter, equipment, taxes, utilities, and insurance. Contracts provide a base amount and reward efficiency and quality of product with bonuses. The company furnishes birds, feed, vaccines, drugs, and supervision.

Broiler chicks are derived from genetically selected male and female lines. The male and female lines are crossed to produce a hybrid offspring referred to as a broiler. The parent stock are referred to as broiler breeders. Integrated broiler companies typically have three types of contract farms – those that raise broiler breeder replacement stock, those keeping the broiler breeder stock for production of fertile eggs, and those growing out the broiler chicks.

Farm size. The size of contract farms varies considerably, even for the same type of farm, but the majority are small family farm operations.

- Only two broiler breeder replacement farms responded to the recent survey. In the preceding 12-month period one of farms placed 7,000 broiler breeder chicks and the other placed 64,000.

- Eighteen broiler breeder farms responded to the survey. In the preceding 12-month period, half of these farms had, on average, 50,000 or less broiler breeders (see Table 1). The number of breeder houses per farm varied from 1 to 6, with most having only two houses (Table 2).

- Of the 58 grow-out farms surveyed, more than half (58.6%) of the farms placed 300,000 broiler chicks or less in a 12-month period (see Table 3). The majority of the farms (74.1%) had 2-4 houses (see Table 4).

Rate of production

Hatching eggs. Broiler breeder productivity varied considerably among the farms surveyed. Reported hatching eggs per hen varied from 123 to 230, and averaged 163.8.

Broilers. In recent years Florida broiler companies have been shifting towards growing a larger bird to meet the demand for further-processed products. However, they still grow broilers for the fast-food and cut-up markets. As a result, there is considerable variation in the size of broilers grown. Meat yield per broiler on the farms surveyed varied from 4.5 to 7.0 lbs/broiler (see Table 5). The average reported yield was 5.6 lb/broiler.

Table egg production (Egg industry)

Laying hen stock is also derived from genetically selected male and female lines. Table egg breeders produce hatching eggs from which laying stock are produced. There are three types of farms involved in the table egg industry. Breeder farms have parent stock which produce the hatching eggs for production of laying hens. The pullets are typically raised on separate farms till just prior to lay, at which time they are transferred to laying farms. Layer farms keep hens from point of lay until they go out of production.

Farm size

Breeder farms. Four table egg breeder farms responded to the survey. The average number of breeders on the farm in the preceding 12-month period varied from 12,000 to 24,000, with an average of 17,100 hens.

Pullet farms. Five pullet farms responded to the survey. The number of chicks placed in the preceding 12-month period ranged from 40,000 to 3,000,000, indicating the wide variability in farm size. The number of pullet houses per farm varied from 1 to 19 (Table 6).

Layer farms. As previously stated, most table eggs are produced on large company owned farms. There still are, however, some smaller contract farms. Seven layer farms responded to the survey. The average number of hens on the farm in the preceding 12-month period ranged from 20,100 to 4,100,000, demonstrating the wide variability in farm size (Table 7). The number of houses per farm varied from 1 to 25 (see Table 8). Most laying hens are kept in cages. Two farms, however, reported having hens in cage-free housing. One farm had 2 such houses, and the other 3. Productivity also varied considerably. The number of eggs per hen varied from 151 to 257, with an average of 230.

Common Poultry Pests

Poultry producers have a variety of pest problems including external parasites that can infest the birds, and insects which breed in the manure and can harbor disease organisms and/or cause damage to poultry houses. Modern poultry production systems are typically large operations with high densities of birds. In such operations, even small losses due to pest and disease problems can have a large economic impact. Although the full extent of the impact is not know, it is estimated that parasites, insects and rodent problems cost the poultry industry millions of dollars each year (Kuney 2001). Poultry pests have the potential for causing and transmitting diseases to poultry. Some can also present a threat to public health. Control of these pests, therefore, is important from both poultry industry and public health standpoints.

External parasites

There are several types of insects that are classified as potential external parasites of poultry. The type of parasites found, as well as the extent of the infestation, is greatly influenced by the production system used. Confinement rearing tends to favor those parasites with short life cycles and direct transmission while cage-free or free-range systems provide an opportunity for parasites that require an intermediate host (Ruff 1999). The high-density systems of the American poultry industry have favored the northern fowl mite in layer and breeder houses, but have lessened the frequency of lice and chicken mite problems. Conversely, in countries using less intense production systems (e.g., Denmark), these systems have favored chicken mite infestation (Ruff 1999).

Bed Bugs (*Cimex lectularius*). Bed bugs are flat, wingless, bloodsucking insects about 1/5 inch long when fully grown. They have a very distinctive pungent odor when crushed. Bed bugs are classified as intermittent external parasites since they do not spend their entire life cycle on the host. Adults can completely engorge on hosts in 5 to 10 minutes (Hogsette & Jacobs 1998). Bed bugs feed at night, hiding and laying eggs behind insulation, in wall cracks, loose boards, nests and other dark areas during the day (Kuney 2001). Females lay eggs in batches of 15 to 60 in the cracks and crevices they occupy and can lay between 150 and 600 eggs in their lifetime. The time from egg to adult is 1 to 4 months. In bed bug infestations small, dark fecal dots around cracks, roosts, and on eggs can usually be seen. Bed bugs are typically brought into poultry houses by other birds. Bed bugs are not species specific and can be carried

from poultry flocks into human dwellings (Campbell 1996).

Chicken Mites (*Dermanyssus gallinae*). Chicken mites are another intermittent parasite of poultry. They are also called red mites or roost mites. They are commonly confused with the northern fowl mite (*Ornithonyssus sylviarum*) which spends its entire life on the host. Chicken mites are quite small, but they can be seen with the naked eye. Eggs hatch in about 3 days, and the life cycle can be completed in 7 to 10 days under favorable conditions (Hogsette & Jacobs 1998). Adult chicken mites can live off the host for more than a month. When infestations are heavy chicken mites often leave the bird and attack poultry workers or infest nearby dwellings (Ruff 1999). Changes in housing have all but eliminated the chicken mites in American caged-layer poultry flocks, but they do occasionally occur. They can also occur in breeder farms. Chicken mites can be transported from one flock to another on wild birds, rodents, and other animals and can be involved in the transmission of fowl cholera (Kuney 2001). Because these pests are rare, it can be difficult to find pesticides labeled specifically for their control (Hogsette & Jacobs 1998).

Fowl Ticks (*Argas persicus*). Fowl ticks, or blue bugs, are found in poultry operations worldwide. They are classified as soft ticks and are very different from the hard ticks we normally find on cats and dogs. Fowl ticks are light reddish brown to dark brown, and the skin is wrinkled. Adult size is 6 to 9 mm in length. Females lay eggs in the cracks and crevices they occupy, usually in batches of 30 to 100 or more, averaging 700 to 800 eggs during their lifetime. All stages of the fowl tick (adult, larvae and nymph) are blood-feeders. Adult females require a blood meal to produce each batch of eggs. Eggs hatch in 2 to 4 weeks and the newly hatched larvae are active day or night seeking a host. Larvae attach to the host and feed for 5-6 days. After this time, they drop from the host, and molt to the nymphal stage. Nymphs feed only at night and for short periods. Under favorable conditions, time from egg to adult is approximately 30 days. Adult ticks completely engorge on hosts in 30 to 45 minutes. Adults are extremely resistant to starvation, and can live more than a year without a blood meal (Hogsette & Jacobs 1998). Fowl ticks are the most important ticks in poultry although many species of hard ticks will feed intermittently on poultry. The fowl tick has been shown to transmit a number of spirochete, piroplasmosis, rickettsial, and bacterial diseases (Kuney 2001).

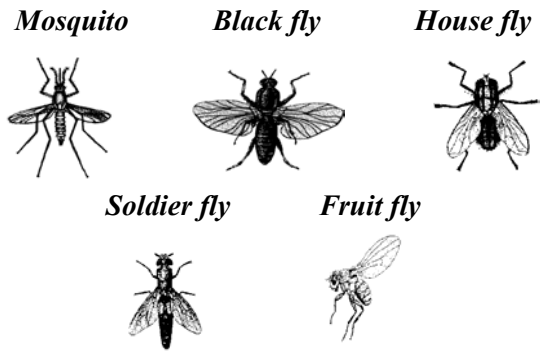
Poultry Lice. Poultry lice are small, wingless insects with chewing mouthparts. Up to 40 species of lice have been known to infest birds. The most common in Florida are chicken body lice (*Menacanthus stramineus*) and shaft lice (*Menopon gallinae*). Poultry lice do not suck blood. Instead they chew dry skin scales and feathers. Irritation causes birds to lose their appetite and makes them susceptible to disease. To detect lice, spread the feathers. Lice can be seen moving on the skin, especially around the vent, head and under wings (Campbell 1996). Lice are not species specific so will move to birds of a species different than their usual host if the opportunity arises (Schwartz 1994). There are several species of lice that have been reported on chickens and more than one species of lice may be found on the same chicken (Kuney 2001). Lice are generally most abundant during the summer, but may be active throughout the year (Schwartz 1994).

Northern fowl mite (*Ornithonyssus sylviarum*). The northern fowl mite is the most important and common mite in caged layers in the United States. The northern fowl mite is usually most active during the winter and spends its entire life on the chicken. Mites do move off the chicken occasionally and can spread to different locations within the chicken house (Kuney 2001). Wild birds are the main reservoir for northern fowl mites. Itching and irritation from mite feeding can cause anemia due to blood loss, and a reduction in egg production (Hogsette, Jacobs, and Jacob 1996). It is important to prevent a northern fowl mite infestation so periodic monitoring for fowl mites is recommended. Spot checking birds is done by examining the vent area (Kuney 2001). Mites appear as tiny, fast-moving white or dark specks in the feathers and on the skin around the vent area.

Sticktight Fleas (*Echidnophage gallinacea*). The sticktight flea is found on a wide variety of birds and mammals. This flea is unique among poultry fleas as the mouthparts are deeply embedded in the skin making the adult permanently fixed to its host. By comparison, other adult fleas of poultry are intermittent feeders on poultry (Ruff 1999). Sticktight flea larvae develop in the soil and around chicken

cages. Adult fleas emerge from pupae and are free-living until breeding occurs. Female fleas attach to skin around the face and wattles to lay their eggs. Chicken raised in wire cages 3 feet or more above the ground do not usually become infested with sticktight fleas (Hogsette *et al*. 1996).

Non-parasitic insects



Although a number of insects will feed on poultry (black flies, mosquitoes, midges, gnats, stable flies), only a few are generally of importance to bird health because they serve as intermediate hosts for other parasites. For example, black flies and midges are known to transmit leucocytozoonosis, which is a malaria-like disease of turkeys, geese, ducks and chickens caused by a protozoan parasite. Similarly, biting midges transmit haemoproteus, another malaria-like disease, to turkeys, pigeons and quail. Several genera of mosquitoes can transmit the protozoan agent causing plasmodium infections (Schwatz 1994).

Other insects, although they do not feed on poultry (flies and beetles), are also important poultry pests since they can be vectors in the spread of disease, can cause structural damage, and/or can pose a nuisance to neighboring communities.

Black flies. There are over 100 species of black flies. Adult female black flies feed on blood from humans as well as domestic and wild mammals and birds. In addition to the annoyance and discomfort, black flies transmit blood-borne parasites to turkeys, geese, and ducks.

Darkling beetles (*Alphitobius diaperinus*). Several beetles can be found in the litter and manure of poultry. Some are considered beneficial since they feed on fly eggs and larvae controlling fly numbers. Others are considered pests since they can cause substantial structural damage to wood structures and most insulation materials. Beetles may also play a role in disease transmission. When poultry have access to their litter, they will feed on the beetles they find. Beetles can transmit several tapeworms and a few bacterial (e.g., *Salmonella*) and viral (e.g., Marek's) diseases. The darkling beetle, or litter beetle, is recognized as a common nuisance pest in floor-raised poultry. The larvae are often referred to as mealworms. Adult darkling beetles are winged, shiny black or dark brown, and about 0.2 inches long. The female prefers to lay her eggs on rotting plant material such as litter and spilled feed. The larvae and pupal hide in the litter and can be hard to find. Darkling beetles may migrate into insulation material and totally destroy it. They can destroy polystyrene, polyurethane and even fiberglass insulation. Darkling beetles have been shown to carry a number of diseases, pathogens and poultry parasites (Jensen 2001).

Fire ants (*Solenopsis invicta*). Fire ants were accidentally introduced into the United States from South America around 1920. Fire ants are reddish brown and range in length form ⅛ to ¼ inch. They have an aggressive swarming behavior and a painful sting. Fire ants are attracted to electrical fields and they build up in high numbers in areas around contact points. They can cause short circuits or interfere with switching mechanisms. Fire ants can cause problems on poultry farms by attacking chickens and foraging on broken eggs. Fire ant stings can cause blemishes that adversely affect the quality of processed broilers (Drees & Vinson 1993).

Fruit flies. Fruit flies are common in areas where food has been allowed to rot and ferment. Adults are about ⅛ inch long and usually have red eyes. Fruit flies lay their eggs near the surface of moist, organic materials. Fruit flies are primarily nuisance pests but do have the potential to contaminate food with bacteria and other disease-producing organisms (Potter 1994).

House flies. House flies are the most persistent and common fly pest. They do not bite poultry but can spread poultry disease. Manure management is the most important method for controlling house flies.

The house fly is believed to have played a role spreading the virus responsible for the Newcastle disease outbreak of the 1970s (Kuney 2001). Today, concern about flies is mainly due to their nuisance characteristics. Even though small numbers of flies have been shown to be capable of movement up to several miles from their breeding site, most are found no more than a few hundred yards from their source (Kuney 2001). On the poultry farm, adult flies feed on a wide range of materials including manure, decaying organic material from animal and plant sources, broken eggs, and spilled feed.

Mosquitoes. Although mosquitoes are not considered a poultry parasite, they are important in the transmission of some disease, especially fowl pox. Mosquitoes lay their eggs in standing water where the larval and pupal stages develop in water. Adults emerge and mate before they seek a host for the first blood meal. Their life cycle is completed in from 7 to 14 days during warm weather (Kuney 2001).

Rodents. The Norway rat (*Rattus norvegicus*), roof rat (*Rattus ratus*) and the house mouse (*Mus musculus*) are the most common and most important rodent pests in poultry operations. The annual economic loss to the poultry industry because of rats and mice runs into the millions of dollars. A single rat can eat 25 pounds of grain in a year, and in the process contaminate 10 times that amount of poultry feed with feces and urine (Kuney 2001). Rats and mice can gnaw through most building material. They can also squeeze through openings the size of their skull, jump vertically up to three feet and climb up vertical surfaces (Kuney 2001).

Survey Results

The ecology of poultry pests is linked to the artificial environment in which they and the birds exist, and changes in the environment that impact pests can only be made if they are not detrimental to the birds. Because the environment of the various production systems differ, the complex of pests differs as well.

Most egg layers are kept in cages, although there are some producers with floor-reared birds. Broilers, broiler breeders, and replacement broiler breeders are raised on the floor. Most houses are not cemented but are covered in a layer of bedding. A variety of bedding materials can be used. The types of materials reported in the survey include peanut hulls, pine shavings and sawdust (see Table 9). Peanut hulls are more commonly used in the panhandle where the poultry farms are close to peanut fields. Although pine shavings are the material of choice, they are often expensive and hard to obtain. Sawdust is often used as a substitute.

The type of drinker used can influence the moisture level of the manure or litter. Most poultry producers are using nipple drinkers (see Table 10) which, when properly maintained, reduce water spillage. Some farms are in transition and have more than one drinker type.

Forced-air is the most effective ventilation system in the hot climate of Florida, but it is also the most expensive to install and operate. Fifty-four farms (60.5%) indicated that they used force-air ventilation in one or more poultry house. Forty-six farms indicated natural ventilation was used in one or more poultry house.

To help combat heat stress common during Florida's hot summers, producers can use cooling pads, foggers and roof sprinklers. All of these systems can be found throughout Florida. Nine farms (11.8%) indicated that they use roof sprinklers, 11 (14.5%) use low pressure foggers, 49 (64.5%) use high pressure foggers, and 25 (32.9%) using cooling pads. Again, some farms are in transition and have more than one cooling system on their farm. Five farms (6.6%) indicate they have no cooling systems installed.

Manure removal systems will vary depending on the type of housing. Twenty-five farms (32.9%) reported using scrapers. None said they used belts. Seventy (92.1%) used tractors to remove manure and 3 (3.9%) used high pressure flushing. Frequency of manure removal will also vary with the type of housing. Four farms (5.3%) remove manure daily, one weekly (1.3%), two monthly (2.6%), 11 annually (14.5%) and 15 semi-annually (19.7%). Forty-four farms (57.9%) indicated "other" as their frequency of manure removal.

With the exception of sticktight fleas, all the listed external parasites were reported to have been a problem by a least one of the surveyed farms (see

Figure 3). The percent of farms with problems, however, was low. The most common non-parasitic pests were darkling beetles, rodents, house flies and fire ants (see Figure 4). Darkling beetles were a problem in over 85% of the farms surveyed.

Of the 76 farms that responded to the survey, 66 (86.8%) had used pesticides in the previous 12 months to manage insects, mites, rodents, diseases or weeds. The most common pesticides used were Tempo® (cyfluthrin), Sevin® (carbaryl) and permethrin (see Figure 5). Of the 66 farms using pesticides, 52 (78.8%) used rodenticides. The most common rodenticides used were Ramik® (diphacinone) and Paraffin® (diphacinone) (see Figure 6). Forty of the 66 farms (60.6%) used herbicides to manage weeds around their poultry houses. The most commonly used herbicide was Roundup® (glyphosate) (see Figure 7).

Monitoring pest populations is an important management tool. It allows the poultry producer to gain control over an infestation before populations become extreme, reducing the use of chemicals and reducing costs. Of the farms responding to the survey, 19.7% monitor their chickens for external parasites and 57.9% monitor the premises for darkling beetles. There are several methods available for monitoring flies. Table 11 indicates the frequency with which these different methods are used. The most commonly used method to monitor adult fly populations with bait stations.

Keeping records of actions taken and the effectiveness of those actions helps producers identify which methods work efficiently and which do not. Records can also be used to alert the producer to impending problems such as the development of pesticide resistance or changes in pest behavior. Table 12 indicates the farms that keep records of pest management activities. Table 13 indicates the criteria used by producers to decide when to employ pest management practices (including pesticides).

Most pest control programs include the use of pesticides as well as a variety of cultural and biological control methods. Cultural control refers to management practices that reduce or alter pest populations. Table 14 lists some of the cultural practices used to manage insects and mites on the surveyed poultry farms. No farms reported using parasitic wasps for biological control of flies. Table 15 lists the cultural practices used for management of rodents while Table 16 lists the practices used for management of weeds. Most employ more than one method.

Of the 66 farms that indicated that they used pesticides in the previous 12 months, 45 (68.2%) had used disinfectants to manage disease. The most commonly used disinfectant was Clorox® (see Figure 8). When disinfectants are used, they are most often applied after each flock (see Table 17).

When pesticides are applied, it is important to calibrate the equipment to make sure that the correct amount is applied. Table 18 indicates the frequency with which pesticide applicators are calibrated on the farms surveyed.

There is a considerable amount of information available on methods for controlling pests. Table 19 indicates which are these sources are commonly used by poultry producers. The most well received source of information is the poultry company or integrator. Many also rely on their own experience.

Key Contacts

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Tables

Table 1. Average number of chickens on surveyed broiler breeder farms

Average number of broiler breeders in preceding 12-month period	*Number of farms*	*Percent of farms surveyed*
<50,000	9	50.0
50,001 – 200,000	5	27.8
200,001 – 400,000	1	5.6
400,001 – 600,000	2	11.2
600,001 – 800,000	1	5.6
TOTAL	**18**	

Table 2. Number of houses on surveyed broiler breeder farms

Number of houses	*Number of farms*	*Percent of farms surveyed*
1	1	11.1
2	5	55.6
3	0	
4	2	22.2
5	0	
6	1	11.1
TOTAL	**9**	

Table 3. Number of houses on surveyed broiler farms

Number of houses	*Number of farms*	*Percent of farms surveyed*
1	1	1.7
2	17	29.3
3	12	20.7
4	14	24.1
5	5	8.6
6	6	10.3
7	1	1.7
8	0	
9	2	3.4
TOTAL	**58**	

Table 4. Number of chicks placed surveyed broiler farms

Number of broiler chicks placed in preceding 12-month period	*Number of farms*	*Percent of farms surveyed*
<200,000	21	36.2
200,001 – 400,000	20	34.5
400,001 – 600,000	11	19.0
600,001 – 800,000	1	1.7
800,001 – 1,000,000	4	6.9
>1,000,000	1	1.7
TOTAL	**58**	

Table 5. Average meat yield from surveyed broiler farms

Average pounds of meat per broiler	*Number of farms*	*Percent of farms surveyed*
< 5	9	22.5
5.01 – 5.50	14	35.0
5.51 – 6.00	10	25.0
6.01 – 6.50	4	10.0
6.51 – 7.00	3	7.5
TOTAL	**40**	

Table 6. Number of houses on surveyed pullet farms

Number of pullet houses	*Number of farms*	*Percent of farms surveyed*
1	3	42.8
2	1	14.3
7	1	14.3
16	1	14.3
19	1	14.3
TOTAL	**7**	

Table 7. Number of layers placed on surveyed egg production farms

Number of hens on the farm in preceding 12-month period	*Number of farms*	*Percent of farms surveyed*
<50,000	2	28.6
50,001 – 500,000	2	28.6
500,001 – 1,000,000	0	
1,000,001 – 2,000,000	2	28.6
2,000,001 – 3,000,000	0	
3,000,001 – 4,000,000	0	
4,000,001 – 5,000,000	1	14.3
TOTAL	**7**	

Table 8. Number of houses per surveyed egg company

Number of pullet houses	*Number of farms*	*Percent of farms surveyed*
1	1	14.3
2	1	14.3
3	1	14.3
5	1	14.3
7	1	14.3
9	1	14.3
25	1	14.3
TOTAL	**7**	

Table 9. Types of bedding materials used

Bedding material	*Number of farms*
Peanut hulls	6
Pine shavings	5
Sawdust	48
Sawdust/Pine shavings	2

Table 10. Types of drinkers used

Type of drinker	*Number of farms*
Cup	10
Nipple	62
Trough	7
Bell-type	16
Other	1

Table 11. Methods used to monitor fly populations

Practice	Number of farms	Percent of surveyed farms (out of 76)
Use spot cards to monitor for adult flies	1	1.3
Use sticky ribbons to monitor for adult flies	4	5.3
Use bait stations to monitor for adult flies	5	6.6
Use traps (electrocution, attractant, etc.) to monitor for adult flies	2	2.6
Use resting counts to monitor for adult flies	2	2.6

Table 12. Pests for which records are kept of monitoring and control activities

Pest being control	Number of farms	Percent of surveyed farms (out of 75)
External parasites	0	
Darkling beetles	9	12.0
Flies	1	1.3
Rodents	9	12.0
Wild birds	0	

Table 13. Criteria used to decide when to employ pest management practices (including pesticides)

Criteria	Number of farms	Percent of surveyed farms (out of 75)
The presence of pests	59	78.7
Health department recommendations	2	2.7
Animal discomfort	11	14.7
Sampling thresholds for pests	3	4.0
Suggestion of extension agent/specialist	6	8.0
Recommendations of poultry company/ integrator	35	46.7
Suggestion of veterinarian or other professional	7	9.3
Reduced performance (egg production, growth, etc)	2	2.7
Treat on a routine basis	35	46.7
Advise of other producers	2	2.7
Personal discomfort	5	6.7
Suggestion of chemical salesman	2	2.7
Complaints/ Concerns of neighbors	1	1.3

Table 14. Practices used to manage insects and mites

Practice	Number of farms	Percent of surveyed farms (out of 76)
Released parasitic wasps for biological control of flies		
Reduced moisture content of manure and litter to control flies	33	43.4
Frequently removed manure to control flies	32	42.1
Managed manure to encourage populations of beneficial insects and mites	9	11.8
Routinely removed dead birds for fly control	55	72.4
Controlled vegetation around houses for fly management	43	56.6
Other	1	1.3

Table 15. Practices used to manage rodents

Practice	Number of farms	Percent of surveyed farms (out of 76)
Monitored rodents on a schedule	27	35.5
Used traps (snap, live, glue boards) to control rodents	9	11.8
Used cats to control rodents	24	31.6
Used physical barriers to exclude rodents	12	15.8
Controlled vegetation around houses to manage rodents	49	64.5
Used baits in poultry houses to control rodents	47	61.8
Used perimeter baits outside poultry houses	32	42.1
Used tracking powder to control rodents	1	1.3
Eliminated potential nesting materials and areas	35	46.1
Cleaned up feed spills to control rodents	48	63.2

Table 16. Practices used to manage weeds

Practice	Number of farms	Percent of surveyed farms (out of 76)
Mowed and trimmed	74	97.4
Grazed	64	84.2
Other	2	2.6

Table 17. Frequency with which disinfectants are used

Frequency	Number of farms	Percent of surveyed farms (out of 45)
After each flock	28	62.2
Once a year	4	8.9
Twice a year	5	11.1
Other	8	17.8

Table 18. Frequency with which pesticide application equipment is calibrated

Frequency	Number of farms	Percent of surveyed farms (out of 71)
At time of purchase	1	1.4
Once a season	6	8.5
Every two or three years	0	
Before each application	38	53.5
Two or three times a season	1	1.4
Other	2	2.8
Never calibrate equipment	8	11.3

Table 19. Sources used for obtaining information on managing poultry pests

Source of information	Number of farms	Percent of surveyed farms (out of 75)
Own experience	55	73.3
Cooperative extension service	7	9.3
Veterinarian	6	8.0
Magazine or newsletter	12	16.0
Radio or television	0	
Poultry company/integrator	57	76.0
Other poultry producers	22	29.3
Pesticide dealer or salesperson	12	16.0
Special publication	8	10.7
Other	2	2.7

Figures

Figure 1. Areas of broiler production in Florida

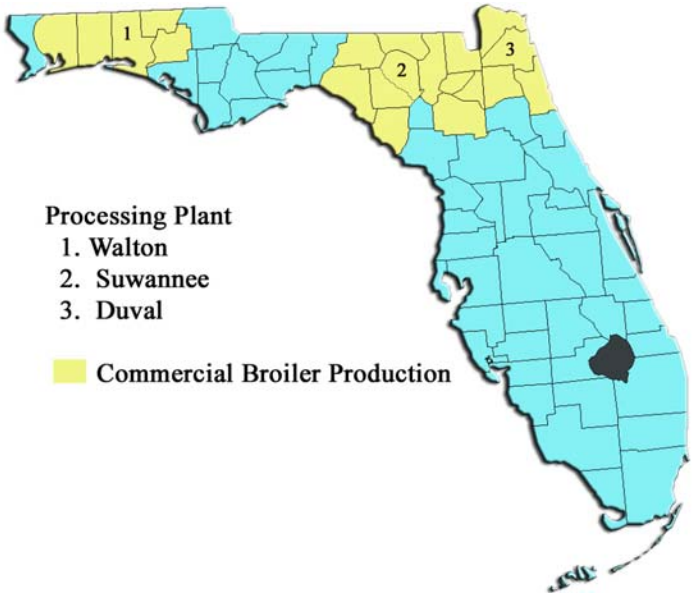

Figure 2. Areas of table egg production in Florida

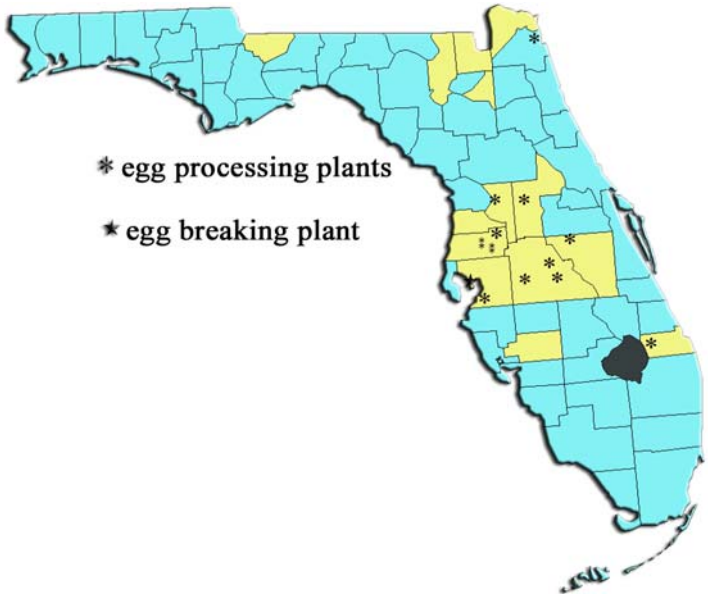

Figure 3. Incidence of external parasite problems

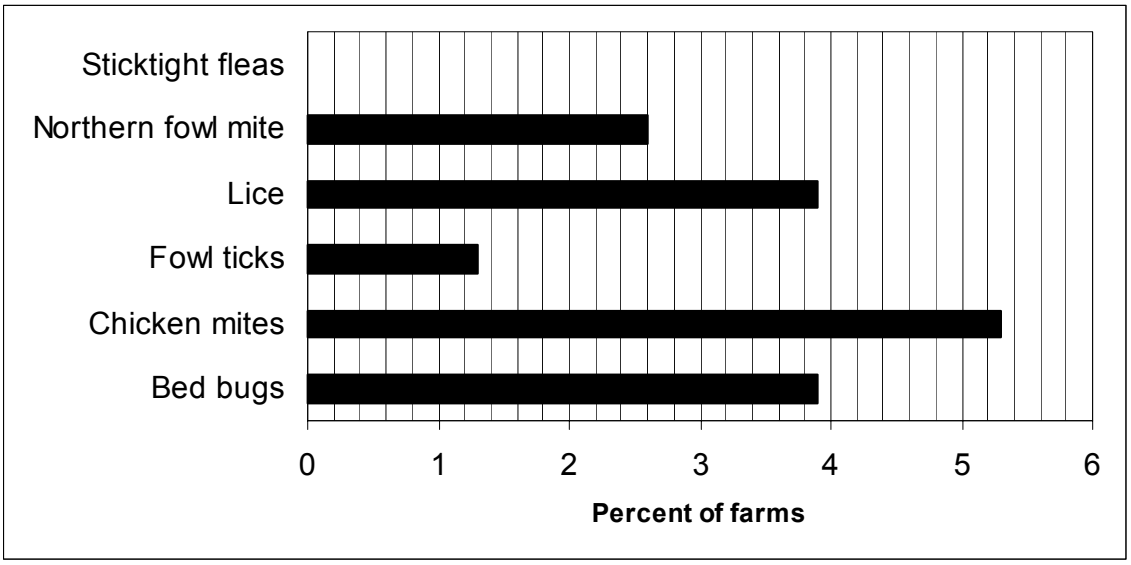

Figure 4 . Incidence of non-parasitic pest problems

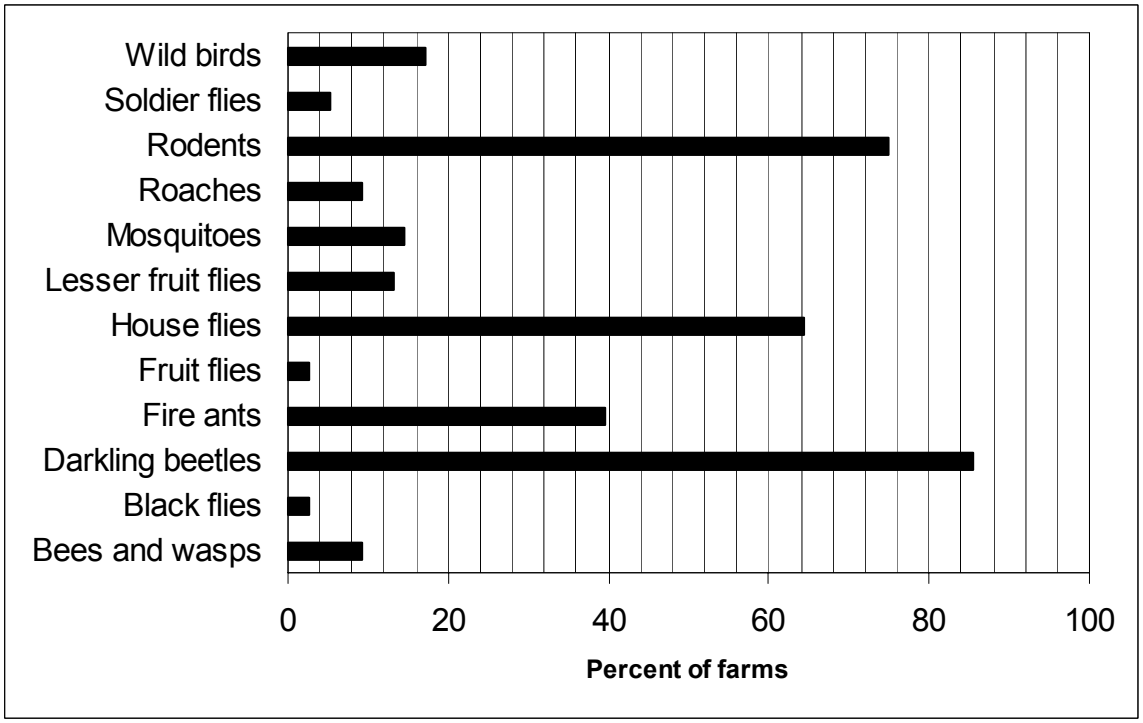

Figure 5. Types of pesticides used

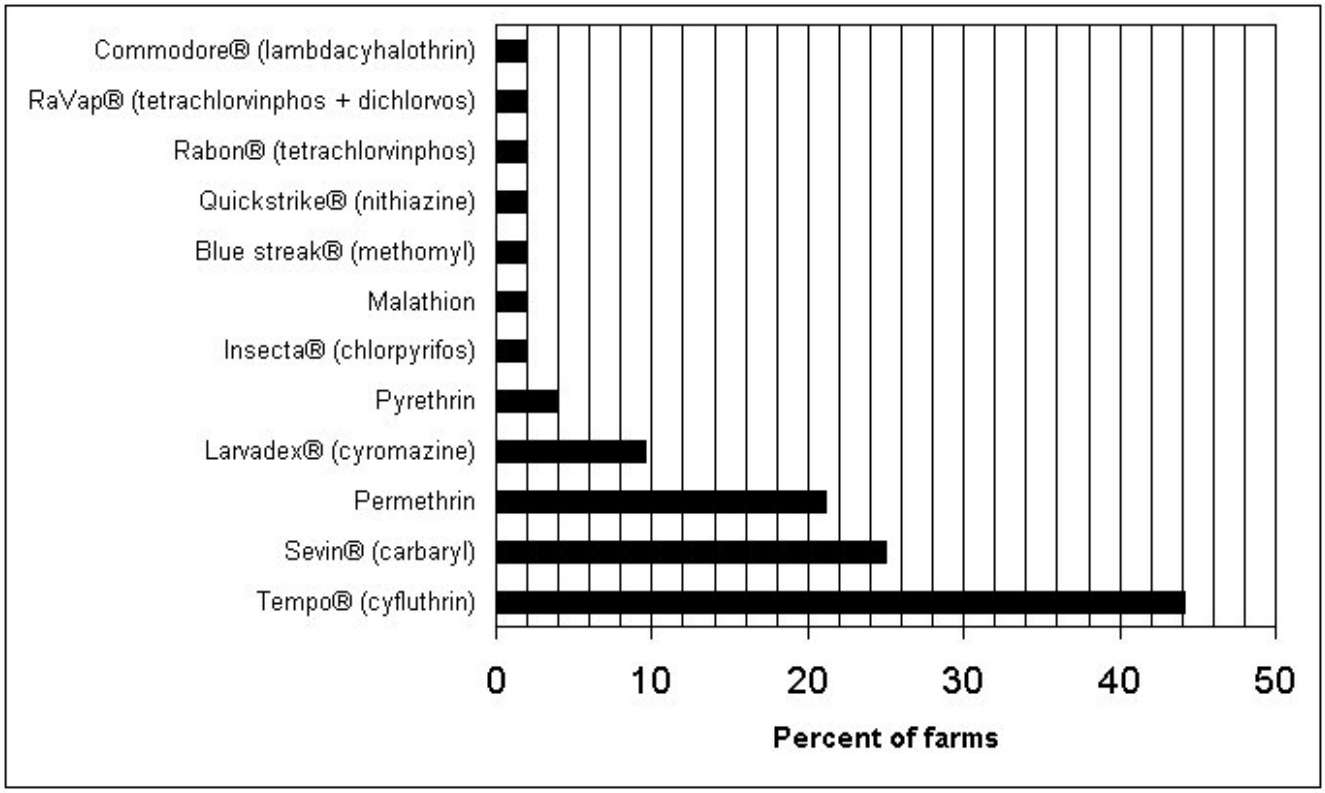

Figure 6. Type of rodenticides used

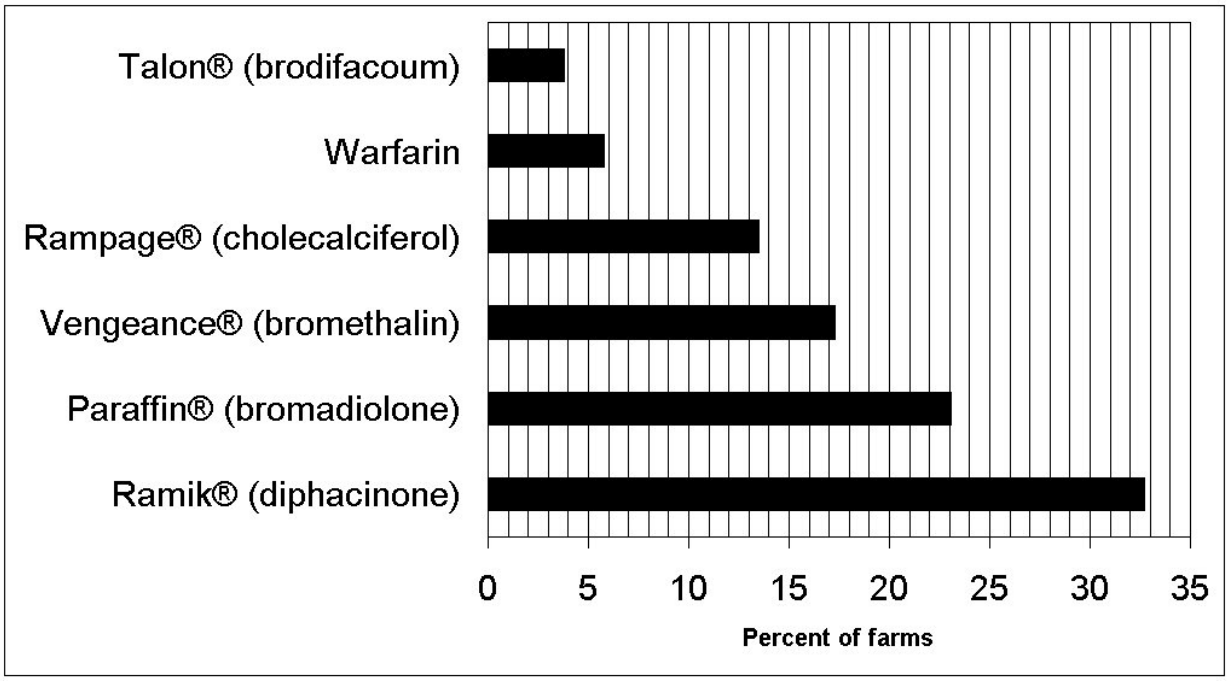

Figure 7. Types of herbicides used

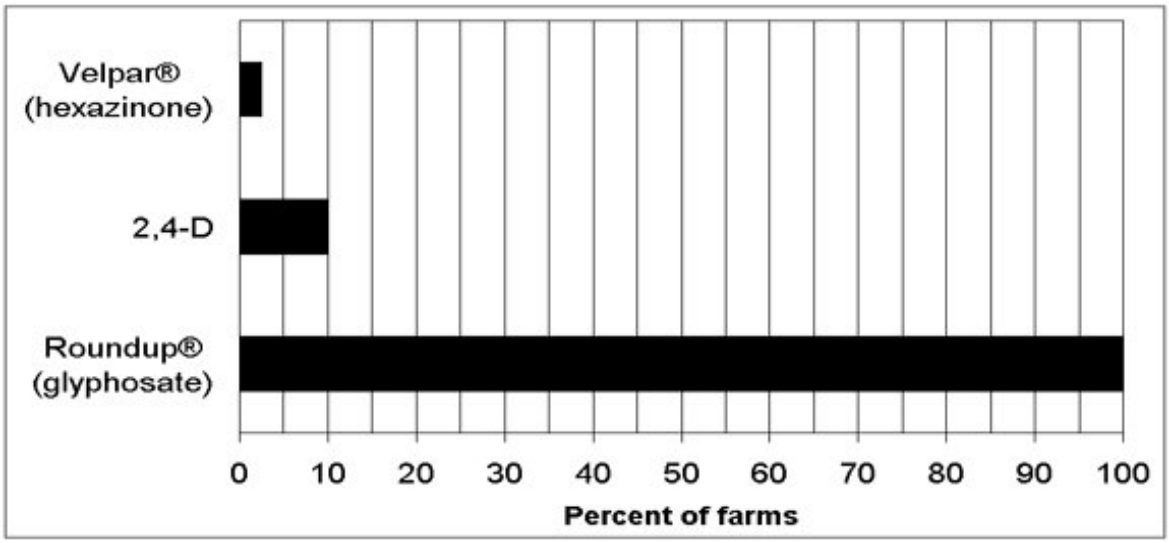

Figure 8. Types of disinfectants used