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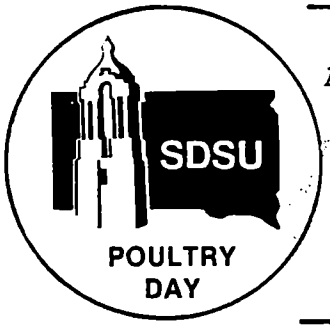
Emmett R. Easton
South Dakota State University



APPLYING THE PRINCIPLES OF INTEGRATED PEST MANAGEMENT TO POULTRY PRODUCTION IN SOUTH DAKOTA

Emmett R. Easton[1]

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The $7 billion gross income for poultry, with the exception of the broiler chicken industry, is shared by nearly every state in the Union. Total farm income for 1977 (broilers, eggs, turkeys) showed an increase to $7.2 billion, but a regional breakdown was not available (USDA Agr. Sta., 1977). Even though many of the components for integrated pest management in poultry production are known, more specific knowledge of how best to utilize these components is needed. In particular, the optional use of parasites for fly control is yet to be established. Methods of achieving optimal manure drying are only crudely established. A wide variety of housing designs creates ever changing problems with fly and mite populations. Changing production practices, especially bird densities, create new situations. Thus, the fly and mite problems and their control are dynamic and tied to evolving industry practices. Consequently, an integrated pest management approach is especially appropriate for handling these problems in poultry production. The major categories of insect pests affecting poultry are ectoparasites and filth flies. The ectoparasites include the northern fowl mite, red mite, lice, turkey chiggers and blackflies (vectors of Leucocytozoan parasites). The filth flies include the housefly (Musca domestica), Fannia spp, and several kinds of blowflies. Although not the subject of this report, rats, mice and wild birds are important pests in poultry production. In South Dakota, the primary pests in the poultry industry include the northern fowl mite (Ornithonyssus sylvarium) and the housefly (Musca domestica). The prospects are excellent for developing, within a few years, practical integrated pest management programs for these serious pests in poultry production.

From publications on losses, it is estimated that fowl mites, especially the northern fowl mite, cause a 4% reduction in weight gain and a 9% reduction in egg production for the one-third of the year when mites are active, and fowl lice may cause a 7% reduction in weight gain and a 10% reduction in egg production. Losses in weight gain are determined for poultry other than broilers, as broilers grow so rapidly that ectoparasite populations do not build up to loss levels. Losses, summarized in Table 1, do not include losses due to the minor pests, for these values have not been determined. The northern fowl mite can easily be seen on birds by parting the feathers around the tail, on the legs, under the wings and on the necks. All stages of the life cycle of the mite can be seen on the soiled feathers in those areas. Positive identification of the northern fowl mite, often confused with the red mite, Dermanyssus gallinae, is made under high power microscopic examination. Poultrymen, however, commonly recognize this parasite by finding these mites on eggs, while gathering down a cage row or see them on the hands of a bird examiner whenever poultry are handled for inspection.

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[1] Livestock Entomologist, Plant Science Department.

Table 1. Estimated Losses in Poultry Production Due to Arthropod Pests

Arthropod	Annual losses ($ million)
Mites	116.3
Lice	378.7
Others (ticks, chiggers)	4.0

The mite has been reported to occur on many species of birds and less frequently, if not uncommon, on rats and man; the latter are considered a means of transport and are spread by egg crates and carts, manure, feathers and miscellaneous equipment in common use between layer houses.

Control Concerns

(1) Chemicals. Northern fowl mite control has resolved itself into insecticide applications (either sprays or dusts) to the ground and/or to birds in cages. In either case, thoroughness of application is of prime importance. In practical application, each situation presents problems. In breeding houses, the males do not dust themselves and must be treated separately. With caged layers where several hens are confined in each cage, the hens stack up on each other and some are invariably missed when spray application is made from beneath the cages. While excessive mite populations can be knocked down, repeated applications are almost invariably necessary once an infestation gains a foothold. The current registered chemicals in common use for northern fowl mite control are carbaryl (Sevin), caumaphos (Co-Ral), dichlorvos (Vapona), malathion, stirofos (Rabon) and Rabon and Vapona poultry spray and larvacide. The synthetic pyrethroid insecticides are becoming very popular and Permethrin under 24C registration is currently being used in several states.

(2) Nonchemical. Management practices which may aid in mite control consist of screening poultry houses to prevent entrance of wild birds that carry northern fowl mites. Reuse of fiber egg flats is a major means of spreading mites between poultry houses and from farm to farm. Where plastic flats are used, these may be run through hot water washers to reduce the spread of mites. The housefly life cycle is basically typical for all of the filth flies. Eggs are laid on the moist manure. The eggs hatch, undergo three larval stages of development and transform into the pupal stage which is found in drier areas of the manure. The adult fly emerges in 4 to 5 days in the summer and the entire life cycle (egg to adult) typically requires 10 to 14 days (depending on temperatures). The adult housefly visits the manure often to feed and oviposit and rests on surfaces of the structure a great deal of time (especially at night), resulting in spotting and staining of the surfaces from defecation and regurgitation. Dense housefly populations occur during warm months of the year.

Current Control Methods

(1) Chemicals. Control of flies in poultry houses presently is attempted primarily by the use of chemicals such as larvacides and adulticides. The currently registered chemicals that are commonly used for fly control in poultry houses are dichloros (Vapona), dimethoate (Cygon), naled (Dibrom), pyrethrins and stirofos (Rabon). These chemicals may all be used within the house with the birds present except dimethoate. In many parts of the United States, the housefly is resistant to one or more of these chemicals (Georghiou, 1967). Adulticiding is done by residual surface applications, space sprays and baits, whereas larvaciding involves direct application to the manure. Newer classes of chemicals such as the insect growth regulator Larvadex are currently being used in over 18 states through the Section 18 Federal requirements. Efforts are under way to approve the use of Larvadex as well as permethrin for use on poultry here in South Dakota. Hopefully, the use of these products will result in better control than is currently the case with the use of malathion or Ravap that has shown evidence of resistance.

(2) Nonchemical. The prerequisite for any fly control program is manure management, i.e., the maintenance of manure in the driest condition possible, but this is difficult to accomplish. This applies to open type housing where manure accumulates at ground level and to the type of housing where poultry droppings accumulate at ground level inside a two-story poultry house. An alternate procedure is poultry house design which allows for daily removal of manure by scraping or flushing. Storage and disposal of this manure is then often a serious problem. Proper disposal of dead birds, soft-shell eggs and broken eggs is required to further reduce fly breeding.