

Myiasis of New-Born Calves in Hawaii¹

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A peculiar type of myiasis occurs in Hawaii which apparently has not been reported outside the state. This involves the blow fly *Chrysomyia rufifacies* (Macquart), a species widespread over much of Asia and the Pacific.

This blow fly is usually closely associated with *C. megacephala* (Fabricius) and is well known in the literature as a predator upon the larvae of that species (Waterhouse, 1947; Moule, 1951, and Norris, 1959). It is normally considered a beneficial species contributing to reduction in population of *megacephala*. In at least some areas of Hawaii this species definitely behaves as a parasite and causes serious damage to new-born calves. The first record of this type of parasitism is by Holdaway in a report of the Hawaii Agricultural Experiment Station (Beaumont, 1943). He reported blow flies attacking young calves and mentioned the species *Chrysomyia megacephala*, *C. rufifacies*, and *Lucilia sericata* (Meigen). It is obvious that his report is the same as we are discussing here and the actual parasite should have been the "hairy" larvae of *C. rufifacies*. Holdaway recorded that there had been occasional losses of new-born calves for a number of years. He said "a survey of the ranches of kauai has shown that during 1940, strikes on young calves occurred in 16 ranches out of 29; 150 calves were struck, and 86, or 57 percent died. On the ranches on which strikes occurred, 15.6 percent of the calves born were struck and 9 percent died. Strikes did not occur in the hot, dry climatic zones, nor in the moderately warm, moist sections. They occurred predominantly in the moderately warm, and wet sections (climatic Zone D₁ of Ripperton and Hosaka). Maximum attack occurred in the wetter sections of the Lihue district and in the wetter sections of the Kapaa homestead area."

A review of the Hawaiian literature indicates that very few records have been made of this parasitism over the past 26 years and the problem has received no attention. Zimmerman (1944) recorded a case of bovine auricular myiasis involving blow flies parasitizing a cow's ears which had been intensely irritated by spinose ear tick, *Ornithodoros megnini* (Duges). He considered the primary invaders to be *C. megacephala* and reared 275 specimens of *megacephala* and 39 specimens of *rufifacies* from the ears, but if this was actually parasitism, it is the first record we have for Hawaii of the flies

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attacking older animals. Because of this report, Zumpt (1965) assumed that the Old World Screwworm fly (*C. bezziana* Villeneuve) was probably present in Hawaii. We have received many reports from ranchers concerning blow flies attacking young calves and have been conducting investigations on one of the ranches on the wet slope of Mount Haleakala, Maui. From the information we have to date, this is apparently a problem on ranches located in areas where the rainfall is 100 or more inches per year. There is indication that some ranches are losing as high as 10% of their new-born calves to this blow fly. From the observations we have made, the vulnerable period is the first seven days. The calves are usually "struck" shortly after birth, and unless the parasitism is detected and the calves promptly treated, the animal dies within approximately seven days after birth. The parasitism is peculiar in that the maggots attack only the dermis and the connective tissues; they literally eat the skin off large sections of the body and the calf dies of dehydration and possibly from the toxic effect of the maggots. Also, it is evident that after the calf has become heavily parasitized, the affected area of the skin becomes gangrenous and the smell of putrefaction causes the mother to abandon the calf so that starvation is also an important factor in weakening the animal. It seems apparent that the flies are attracted for oviposition to improperly-cleaned calves. One of the ranchers felt strongly that new mothers, inexperienced in cleaning their calves, were largely involved in these cases. In other cases, cows neglectful of cleaning their calves are involved. It is probable that flies are first attracted to bits of placenta, remnants of foetal membrane, and the fluid of the foetal sac not totally licked off the calf by its mother. From our observations, most of the initial "strikes" are on the back and sides of the animal. The first instar larvae feed as scavengers on tissue remaining from the mother's afterbirth; the second and third instar larvae bore directly into the skin. Once the calf has been attacked, large numbers of adult flies are attracted for oviposition. Initially, strikes involve oviposition by both *rufifacies* and *megacephala*; however, after 1-3 days of infestation, larvae of *C. rufifacies* predominate. Larvae of *megacephala* feed only as scavengers and literally disappear or are found only in those areas not occupied by *rufifacies*. Within a matter of a few days, the major surface of the back and sides of an infested calf may be involved and the animal becomes progressively weaker. The adults are usually not attracted for oviposition to the umbilical cord, or body openings until the calf is so weakened that it can no longer stand and is obviously dying. After about five days of parasitism, the adult flies do start ovipositing around the umbilical cord, around the eyes, nostrils, ears, and anus; the calf dies shortly after.

The nearest to this type of myiasis that we have found in the literature is "sheep strike" which has been commonly reported occurring in most sheep raising areas of the world. This parasitism, usually involving *Phaenicia*

cuprina (Wiedemann), *P. sericata* (Meigen) and possibly other blow flies, has been a serious problem for sheep raisers in Australia and New Zealand (Whitten, 1942; Moule, 1951; Norris, 1959). *C. rufifacies* is associated with sheep in Australia, but is purely secondary (James, 1947); the second and third instars are predators upon the primary parasites. Sheep strike was reported doing extensive damage in Hawaii (van Dine, 1908) when these animals were raised more abundantly here. In this type of myiasis, it has been assumed that the adult blow flies are attracted for oviposition to wool contaminated by feces and urine, and that the first instar larvae feed as scavengers and the second and third instars bore into the living tissue and feed as parasites. This type of parasitism has been intensively investigated in Australia and New Zealand, and it has been concluded that it results largely from the wool in one area being wet over a period of time causing skin irritation, serum exudation, and build up of bacteria severely damaging the skin and causing an odor which is attractive to parasitic blow flies.

Some ranches here in Hawaii exercise very effective control over their animals. The cowboys are out daily searching for newly-dropped calves and they are successful in saving a high percentage of the parasitized individuals. By detecting the infestation early, treatment of infected animals with an insecticide combined with a blow fly repellent kills the larvae in the skin and repels flies from laying further eggs in the wound.

It is suspected that the losses may be considerable on ranches where such careful control of the animals is not maintained, or on ranches where terrain or other factors, make it impossible to search out the newborn calves each day. It is also suspected that many of our ranchers probably do not realize that they even have a problem. We have received many reports indicating that the ranchers quite frequently run across dead calves in the field, but there can be no way of knowing what caused the deaths.

The concept of *C. rufifacies* was confused in much of the early literature, and its status was clarified by the excellent work of Holdaway (1933). The life history has been studied by Patton (1922, as *C. albiceps* (Wiedemann) and by Roy and Siddon (1939) in India, and by Mackerras (1933) and Norris (1959) in Australia. According to Zumpt (1965) the biology of *rufifacies* is similar, if not identical to that of *albiceps* (Africa, Madagascar, and Southern Europe) and in Australia *rufifacies* "plays a similar role as a secondary sheep myiasis fly to that of *C. albiceps* in Southern Africa, but strikes with any great frequency are only observed in the hot and dry parts of the country."

It appears that *C. rufifacies* behaves differently here in Hawaii, at least in some situations, than it does in other parts of the world where it acts as a predator and is therefore considered beneficial.

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