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Sheep Blowfly Research I.—A Survey of Maggot Collections from Live Sheep and a Note on the Trapping of Blowflies.*

By G. A. HEPBURN, Division of Entomology, Pretoria.

SMIT and du Plessis (1927) and Smit (1931) have discussed the subject of the distribution of blowflies in the Union of South Africa with special reference to those causing myiasis in sheep. Their results indicated that maggots of *Chrysomyia chloropyga* Wied., and *Lucilia sericata* Meig., were the ones most commonly found and that the two species were about equally abundant. The hairy maggots of *Chrysomyia albiceps* Wied., were much less common on the sheep.

In recent years similar surveys carried out in Australia have proved that *Lucilia cuprina* Wied., a primary blowfly, was responsible for the majority of maggot infestations on sheep. The two species of blowflies *L. sericata* and *L. cuprina* have been thus separated only during the last few years. From the evidence available it is safe to assume that in the literature dealing with the blowflies in South Africa statements on *Lucilia sericata* can be read to refer to the other species *L. cuprina*.

* Blowflies have been present in South Africa for many years and excellent pioneering work on this group of insects was carried out by Smit and others; but it is only in recent years that these destructive parasites increased to such an extent that they became a serious menace to the sheep and wool industry.

The urgency and seriousness of the problem demanded special measures, and a team of workers was brought together to study the various aspects of the subject. Mr. G. A. Hepburn, B.Sc., was seconded from the Division of Entomology and Mr. M. C. A. Nolte, M.Sc., from the Division of Chemical Services. Other members of the team were Mr. A. H. de Vries, B.Sc., of the Division of Animal and Crop Production and Mr. P. A. Cilliers, B.Sc., whose appointment was made possible by a grant from the Wool Council. The work was carried out under the immediate direction of Dr. H. O. Mönnig, Head of the Section of Parasitology at Onderstepoort. The series of articles here presented contain the first results of this joint undertaking.

Unfortunately the necessity of tackling other urgent problems rendered the continuation of this valuable collaboration impossible. Mr. Hepburn and Mr. Nolte have returned to their former spheres of work, but they have the satisfaction of knowing that they have rendered a lasting service to the sheep and wool industry.

The following articles will indicate the progress that has been made. The complicated interrelation between the different species of blowflies has been studied and deductions of great practical importance have been made. Valuable indications have been obtained regarding attractants and repellents for blowflies. And the success obtained with the remedies recommended for the treatment of myiasis has been most encouraging.

The work is being continued on a reduced scale and further articles in the series will be published.

P. J. DU TOIT, *Editor.*

In the light of Australian experience it was felt advisable to re-survey the position in order to obtain a clear idea of the relative importance and abundance of the species of maggots found attacking sheep. A survey of the main sheep farming areas of each province of the Union was carried out in the manner described by Smit and du Plessis (1927). In addition, two detailed surveys were made at Onderstepoort and the Experiment Station at Dohne, Cape Province.

Selected farmers in each of the provinces of the Union were supplied with labelled tins in which they sent specimens of maggots collected from live sheep. The maggots, together with a small amount of wool, were posted to Onderstepoort from time to time beginning in September, 1940 and continuing until April, 1942. On arrival at the laboratory the maggots were placed on meat kept in insect boxes and reared to flies which were then identified and recorded. In most instances the larvae arrived in a healthy vigorous condition, but there were occasions when they arrived dead, largely as a result of packing too many in a tin and with too much damp and decomposing wool.

At Onderstepoort and Dohne maggots from individual sheep were collected and reared so that the records of infestations at these two places are more detailed than those obtained from collections made by farmers. In the latter collections maggots from more than one infested animal were mixed together in samples sent here for identification. In the circumstances it was impossible to get collections from individual sheep sent separately.

The surveys at Onderstepoort and Dohne were made by Mr. P. A. Cilliers from August, 1939 to August, 1940, and September, 1940 to April, 1941 respectively. The results of these two surveys and that from collections made by farmers are shown in the accompanying Table 1.

A glance at this table shows that of 324 collections of maggots, 179 or 55 per cent. were composed solely of *Lucilia cuprina*. In combination with other species this fly is responsible for about 90 per cent. of the total strikes. *Chrysomyia chloropyga* comes next in importance, while *Lucilia sericata* plays a minor rôle.

Unfortunately the collections sent in by farmers in Natal and the Transvaal were insufficient to enable valid comparisons with those from the other two provinces to be made. From the few records available it is interesting to note that the majority of strikes were made by *Lucilia cuprina* and *Chrysomyia chloropyga* in combination. In general, the rainfall and humidity of the sheepfarming areas in the Eastern Transvaal and Natal is higher than that of the sheep areas in the Cape and Orange Free State. Whether this factor could be correlated with a higher incidence of *Ch. chloropyga* strike is one for investigation. A project designed to collect data on this aspect of the blowfly problem was drawn up at the commencement of the investigation, and a few preliminary experiments were run, but owing to an increase of work in other phases this had to be abandoned. Briefly, the scheme planned was to expose individual sheep in fly-proof cages in which separate species of blowflies were liberated. Data on temperature and humidity and the numbers of strikes were to be recorded; records of the microclimate of struck areas of the animals were also to be obtained. Chemical treatment of the sheep was also contemplated. In this way it was hoped to gather information which might lead to a better understanding of the behaviour of the species of sheep blowflies.

Table 1.

Flies reared from Larvae collected from Struck Sheep.

	Total No. of Collections.	No. of Collections Comprising :—									
		L. cuprina.	*L. sericata.*	*Ch. chloropyga.*	*Ch. albiceps.*	*L. cuprina* and *L. sericata.*	*L. cuprina* and *Ch. chloropyga.*	*L. sericata* and *Ch. chloropyga.*	*L. cuprina, L. sericata* and *Ch. chloropyga.*	*L. cuprina, Ch. chloropyga, L. sericata* and *Ch. albiceps.*	*L. cuprina, Ch. chloropyga,* and *Ch. albiceps.*
1. Collections by farmers—											
(*a*) Orange Free State	49	26	1	0	2	8	6	0	6	0	0
(*b*) Transvaal.....	12	2	0	3	0	0	7	0	0	0	0
(*c*) Natal.....	12	1	0	2	0	0	9	0	0	0	0
(*d*) Cape.....	79	39	1	2	0	8	16	1	10	1	1
Total.....	152	68	2	7	2	16	38	1	16	1	1
2. Collections at Onderstepoort....	116	57	1	14	0	11	24	2	7	0	0
3. Collections made at Dohne.....	56	54	0	0	0	0	2	0	0	0	0
Grand Total	324	179	3	21	2	27	64	3	23	1	1
Percentage of Total..	—	55	1	6	1	8	20	1	7	0·5	0·5

The Trapping of Blowflies.

Some remarks on this subject may not be out of place in this paper. In order to gain some idea of the prevalence of blowflies at Onderstepoort traps baited with meat were exposed almost continuously from May, 1940 to July, 1942. Fresh minced meat with water was put in a trap every week. At some times only one trap was run, but for the most part two traps were run concurrently, one containing fresh bait and the other bait which was seven days older. Catches were removed every three or four days and recorded. A graph (Graph I) was drawn to show the average mean daily catch per trap for each month and the average maximum and minimum temperatures were plotted. Rainfall figures were also indicated.

The catches of *Lucilia cuprina* began to increase steadily from July, 1940 to September, then dropped to twenty-three per trap per day in November, after that there was rapid rise reaching a peak (120) in December. From this time onwards a steady decline set in until March, when there was a minor peak (22), thereafter a rapid drop to one fly per day. Low catches continued throughout the winter of 1941, but an increase occurred in September and the highest peak was reached in February, 1942. This high point (34) was very much lower than that of the previous year. This may, perhaps be attributed to the summer being hotter and drier than the previous one.

The curves for *Chrysomyia chloropyga* indicate it to be most abundant in September and October of each year. Here again the catches for 1941 were lower than those for 1940.

Chrysomyia albiceps reaches its maximum peak in October to December with a minor one in May. *Chrysomyia marginalis*, from these trap records, appears to be most abundant from October to January or February. The maximum daily catch obtained with this species was five. In this connection it is interesting to note that there were occasions when fresh sheep carcasses attracted hundreds of these flies, while the bait traps about one hundred yards away were not catching any. Furthermore, attempts at rearing this species in cages proved very difficult as oviposition was most erratic. It would appear that stimuli required to induce oviposition by this species are not the same as those required by, say *Lucilia cuprina*. It is reasonable to argue that *Chrysomyia marginalis* may not be so readily attracted to the usual meat baits as *Lucilia cuprina*. It follows, therefore, that the fly catches in meat-bait traps may not give a true indication of the relative density of the population of the different species.

Lucilia cuprina is known to be attracted more readily to meat-bait in the early stages of decomposition than to baits in the more advanced stages of decomposition, whereas *Chrysomyia albiceps* is attracted more to the latter. For any given period of trapping, therefore, to obtain an idea of the density of population of the different species of flies, the baits most attractive to them should be exposed. The importance of *Ch. marginalis* will be discussed in paper No. V of this series. Inasmuch as it does not attack living sheep, but is a good scavenger, there is no object in trying to find a highly attractive bait for this species.

The correlation of strike incidence with fly catches in traps may perhaps be demonstrated sometimes. From records compiled by Mr. P. A. Cilliers at Dohne, for the period September, 1940 to April, 1941, fifty-six collections of maggots from individual sheep were made. Of these *Lucilia cuprina* was

responsible for fifty-four, while the two remaining ones comprised *L. cuprina* and *Chrysomyia chloropyga*. For the same period the numbers of flies taken in meat-bait traps were: *Lucilia cuprina* 4,420; *Lucilia sericata* 58; *Chrysomyia chloropyga* 4,265; *Chrysomyia albiceps* 1,570 and *Chrysomyia marginalis* 175.

Conclusions.

1. From collections of maggots from live sheep at Onderstepoort, Dohne, C.P. and the main sheep farming areas of the Union of South Africa, *Lucilia cuprina* alone was responsible for 55 per cent. of the total strikes, and in combination with other species the percentage was increased to 90.

2. *Chrysomyia chloropyga*, as a sheep myiasis producing fly, ranks next in importance to *Lucilia cuprina*.

3. From trapping records at Onderstepoort the seasonal abundance of blowflies are obtained. The necessity for using selective baits is stressed.

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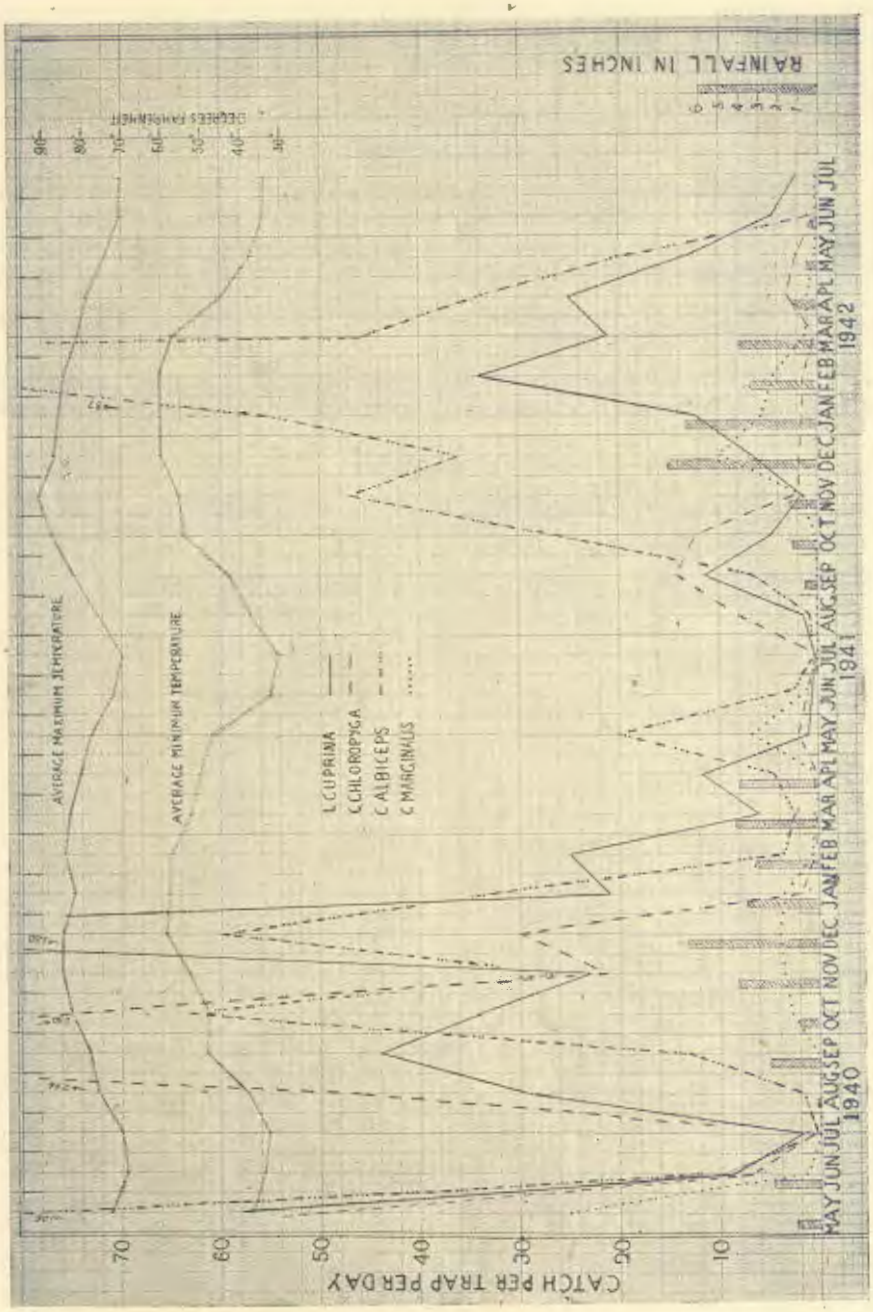
CATCH PER TRAP PER DAY
70
60
50
40
30
20
10
MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APL MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APL MAY JUN JUL
1940
1941
1942
L CUPRINA
C CHLOROPYGA
C ALBICEPS
C MARGINALIS
AVERAGE MAXIMUM TEMPERATURE
AVERAGE MINIMUM TEMPERATURE
DEGREES FAHRENHEIT
90°
80°
70°
60°
50°
40°
30°
RAINFALL IN INCHES
0
1
2
3
4

GRAPH 1.