

## **SUMMARY**

This study was carried out in two cattle farms in Beni-Suef locality during the period from April 2011 till October 2012 to address the occurrence, distribution and risk indicators of different flies' species of veterinary importance, in addition to assessing the role of house flies in transmission of *Salmonella* spp., followed by an experiment to evaluate the efficiency of three different methods for fly control under field condition.

### **Part (I):**

This part was conducted during the period from April 2011 till July 2012 in two cattle farms (farm I and II), that differ in their managerial practices and hygienic condition, including an observational study focusing on quantitative and qualitative estimation of different flies' species of veterinary importance and risk indicators of flies' dominance and infestation in selected farms.

### **The obtained results showed that:**

1- The daily average of flies' number in farm (I) throughout months in study showed a gradual increase from January till the end of March ( $257\pm 50$  and  $368\pm 76$  resp.), followed by a sudden increase in April ( $516\pm 68$ ) that reached ( $540\pm 86$ ) in May, then a gradual decrease from June till the end of July ( $340\pm 94$  and  $316\pm 81$  resp.) followed by a gradual increase from August ( $418\pm 80$ ) that reached the highest average in September ( $618\pm 90$ ), followed by a gradual decrease started from October ( $428\pm 76$ ) till the lowest average in December ( $264\pm 64$ ). Meanwhile, the highest daily average of flies' number in farm II occurred in September ( $862\pm 98$ ), followed by May, April and August ( $782\pm 78$ ,  $652\pm 78$  and

540±80 resp.), then June, November, and March (484±60, 480±84, and 386±82 resp.) while the lowest daily average was recorded in January and December (296±83 and 370 ±61 resp.).

2- House flies appeared to be the most common fly sp. occurred in both farms at a percentage of (60.8) followed by midges, mosquitoes, and stable flies (14.4, 11.1, and 8.4% resp.), while blow flies had the lowest percentage (5.3).

3- The highest averages of ambient temperature (°C) were during August (31.5 ± 8.5 °C) followed by July, June and September (29.3±7.6, 28.7±8.3 and 27.4±7.3 °C resp.,) whilst the lowest average values were during January, February and December (12.6±7.0, 14.2±7.5 and 14.5 ±5.5 °C resp.). Moreover, a significant variation in average values of relative humidity (%) was recorded during study with the highest values in January and December (71.6±8.6 and 70.5±8.3% resp.). With regard to air speed (knots/hr) prevailed in both farms, it was clear that April followed by March, February and January had the highest averages (5.4± 2.0, 4.8± 1.6, 4.6± 2.0 and 4.1± 1.6 knots/hr resp.). In contrast, the lowest air speed was observed in August, July and September (2.9± 1.6, 2.6± 1.3 and 2.3± 1.6 knots/hr resp. ). On the other hand, the maximum averages of light duration (hr) were recorded during June (14.0 ± 0.5 hr). Whereas the minimal averages were demonstrated in cold months: December, November and January (10.1±0.3, 10.8±0.3 and 11.0 ±0.3 hr resp.).

4- The highest percentages of flies in both farm I and II were reported diurnally (86.1 and 79.6 resp.,) compared to (13.9 and 20.0) nocturnally. Concerning the light period , it was obvious that in farm I the most active diurnal fly sp. was house fly, followed by blow flies , stable fly and midges (95.3, 88.9 , 86.2 and 83.8 % resp.), meanwhile mosquitoes followed by some species of midges were predominantly active at night (

92.3 and 16.3%). Similarly in farm (II) house fly, followed by blow flies, stable fly and midges were more active diurnally (95.2, 93.3, 84.8, and 77.6 % resp.) while mosquitoes were active mostly at night (93.2%).

5- The average values of moisture content was higher in farm II ( $60.1\pm 3.8\%$ ) compared to farm I ( $54.2\pm 3.0\%$ ). On the other hand, the highest average of soil pH was recorded in October in farm I ( $7.6\pm 0.4$ ) and in September in farm II ( $7.8\pm 0.6$ ).

6- In the surrounding environment of animals in farm I, drainage water followed by calving area and stall corners harbored the highest average of flies' number ( $830\pm 120$ ,  $640\pm 120$  and  $524\pm 90$  resp.) followed by animal stalls, water trough and gutters ( $389 \pm 60$ ,  $326\pm 80$  and  $160\pm 40$  resp.). Furthermore, manure heap followed by gutters and drainage water in farm II had the highest averages of flies' count ( $1420 \pm 118$ ,  $1020\pm 112$  and  $906\pm 98$  resp.).

7- By using visual observation and photography, it was remarked that the highest average of flies' attack was noticed in beef cattle in farm II ( $208.7\pm 44$ ) followed by cows and horses in farm I ( $181\pm 41.6$  and  $155.8\pm 39.3$  resp.) while buffaloes showed the lowest attack rate ( $150.8\pm 43.3$ ).

8- The frequent distribution of flies in relation to months of study indicated that the highest flies' attack occurred in September in both farms, where the highest flies' averages were recorded in dairy cows (farm I  $316\pm 76$ ) followed by horse and beef cattle ( $268\pm 56$  and  $260\pm 42$  resp.) then buffaloes ( $243\pm 62$ ), then in April beef cattle in farm II showed the highest daily average ( $310\pm 50$ ) followed by cows and horses ( $282\pm 48$  and  $253\pm 46$  resp.) and to a lesser extent buffaloes ( $214\pm 46$ ).

9- The frequent distribution of flies' species on different body parts of animals in both examined farms showed that the animal's muzzle (4) and around the eyes (4) were the most favorable sites attacked by house flies followed by shoulders and back (3), belly, ears and wounds (2 for each). Meanwhile, lower limb of animals represented the prediction sites of stable flies' attack (4) followed by the belly (3).

10- The percentages of house flies' samples reacted positively with *Salmonella* tests in farm II were higher than that of farm I (36.3 and 28.8 resp.). Regarding to the frequent distribution of positively reacted flies in relation to season of the year, it was clarified that the highest rate of positive samples to *Salmonella* were during summer months in farm I and II (52.5 and 67.5 % resp.). *S. Typhimurium* appeared to be the most common serotype isolated from flies collected in both farms (41.7%), followed by mixed serotype infection (17.9) and *S. Enteritidis* (7.9 %) ,while *S. Meleagridis* in farm I and *S. Dublin* in farm II showed the lowest percentages (3.6 and 2.5 resp.).

11- The highest percentage of *S. Typhimurium* isolated from flies in both farm I and II were during winter months (50.0 and 42.8 resp.).

**Results in part (I)** revealed that poor housing condition, accumulation of organic matter and feed storage inside the stable were the main causes which led to increasing the average numbers of flies and provided breeding sites for different species of flies in the examined farms

**Part (II):**

A three-month field study was carried out in farm (I) during the period from August 15 till the end of October 2012 to compare the efficacy of different treatments for flies' control in cattle farm. The farm

was selected due to the ability to adjust and maintain the required conditions throughout study period.

**Results showed that:**

1- The average values ( $\pm$ SE) of air temp ( $^{\circ}$ C), relative humidity (%), soil moisture content (%) and pH were similar in the four examined groups except that soil pH in TGIII was variable throughout study period. Furthermore , the average values of air temp ( $^{\circ}$ C), relative humidity (%), and soil moisture content (%) in four examined groups throughout the study period were (28.3  $^{\circ}$ C, 62.9 %,and 58.3 % resp.), whilst the average value of soil pH was lower in TGIII ( $6.3\pm 0.9$  ) compared to ( $7.4\pm 0.8$  ) in other three groups.

2- The average flies' number ( $\pm$ SE) in cows' environment before and after application of treatments at the end of study period (90 days) appeared to be high in all groups ( $548\pm 60$ ,  $436\pm 42$ ,  $239\pm 40$ , and  $194\pm 50$  resp. in control, TG1, TGII, and TGIII resp.), compared to average values before treatment ( $98\pm 26$ ,  $104\pm 32$ ,  $110\pm 30$  and  $103\pm 36$  resp.). Besides, the average flies' number showed a significant variation between control and treated groups as well as in between treated groups themselves.

3- In TGI, where Deltamethrin was applied, the average flies' number showed an increase from ( $156\pm 30$ ) to ( $342\pm 50$ ) at day 15<sup>th</sup> , then decreased to ( $214\pm 43$ ) after the second application of treatment at day 30<sup>th</sup> then increase steadily to reach ( $436\pm 42$ ) at the end of the study. While in TGII, where Deltamethrin and bait were used ,the average number of flies was increasing gradually from ( $167\pm 40$ ) at day one post Deltametherin application to reach peak average at day 45<sup>th</sup> ( $326\pm 60$ ) then decreased gradually to reach the lowest level at day 90<sup>th</sup> ( $239\pm 40$ ) . However in TGIII, where Deltametherin and superphosphate were used, it was clear that the average flies' number was increasing gradually from

(143±35) at day one post application of Deltamethrin to reach the maximum value (308±58) at day 45<sup>th</sup> in the study, then decreased gradually from (216±76) at 60<sup>th</sup> day to reach (194±50) at the end of the study.

4- The average flies' number on different body parts of cows in the examined groups at the end of study period revealed a significant reduction in flies' count in treated groups compared to control one and another significant variation in between treated groups themselves; as the average flies' number before treatment was (186 ± 40, 196± 35, 213± 44 and 224± 4), while at the end of study ( 90<sup>th</sup> day) it reached (314 ± 42, 306 ± 25, 213± 64 and 165± 56) in control, TG I, TGII and TGIII resp. TG III followed by TG II showed a significant reduction in flies' attack throughout weeks of study to reach their maximal efficiency at the end of study period ( day 90<sup>th</sup> ): 165± 56 and 213± 64 resp., followed by those monitored after the 75<sup>th</sup> day (188± 35 and 198± 48 resp.).

5- The highest efficacy of treatment regimes against house flies in the examined groups indicated that the average flies' number was reduced in TG II from 68.5 to 52.9% followed by TGIII from 66.1to 59.4 % and the lowest efficacy appeared in TG I and control group (60.2% and 62.1% resp.).

**In part (II) results revealed the** efficiency of a combination of Deltamethrin with superphosphate (TGIII) in reduction of flies' attack to animals which reflected the reduction of flies in cow's environment .Moreover, treatment regime using Deltamethrin and bait showed the second efficiency in reduction of flies attack on cows in TG II compared to Deltamethrin in TG I and control group.