

Flies

Version 3.2

5 December 2010

Copyright© 1990 GrazingInfo Ltd

Introduction

Ordinary flies are annoying to animals and can worry them enough to decrease production, but biting and blood-sucking flies can be a more severe problem. Animals can suffer blood loss, allergic reactions and exhaustion, with stress that causes cattle to bunch together and mill around each other, becoming dirty, sweaty and smelly, which attracts more flies. There are many different flies in different countries. Find out about those that are problems in your area, and do the best you can to control them. Some are described below.

Flies can spread mastitis, salmonella, scours, pink eye, and infect humans. In some countries farmers gave up grazing pasture because of flies worrying their grazing animals. Some graze only at night.

Reasonable control of some is possible if everything is done by you and your neighbours.

Some farmers in some countries house and stall-feed their animals, solely because flies pester their grazing animals. I wonder if flies were as bad before man started farming domestic animals under confinement with compost and silage, providing facilities for flies to breed like flies! I don't recall a fly problem in the massive Kruger National Game Park in South Africa at visits in 1954, 1972 and 1992. It is not always the animals causing the increase, but how man handles animals and their effluent. Housing cattle with the resulting heaps of manure and moisture around and under concrete increases fly numbers.

I've never seen so many flies around dairies as in USA and Canada. In New Zealand there would not be 1% of the number they have. If we had that many, our dairy and health inspectors would close the farm dairy. Australia also has a lot. Although flies severely affecting animal production is not common in New Zealand, I have seen it occur, and have suffered it on our farm in 1956 - before silage stacks were covered with plastic film. Flies will breed in uncovered silage stacks and in the damp soil around covered ones.

South Africa and Australia have similar climates, but in South Africa farmers don't hang corks on their hats and don't salute all day, because they have a lot fewer flies, partly, I believe, because South Africa has millions of large white cattle egrets and small black tick birds that follow grazing animals all day, and eat insects as they are disturbed by the grazing animals. Also, some South Africans make an effort to control them with fly traps over their heaps of manure at barns. See below.

Reducing fly nuisances

In very hot areas allow the animals to move to areas where there is a breeze (if possible), such as under trees, to save them bunching up and soiling each other.

Back and body rubbers containing fly repellents (there are safe ones) or poisons set near water troughs can help. Change the poisons on a regular systematic basis worked out with your vet and neighbours, to avoid insect resistance.

Flies can occur for reasons beyond one's control, so use rubbing posts and milk-safe sprays that can be used on milking cows. Spray the under part of their bodies after the clusters are on, to stop it getting onto teats, and as they walk out spray the tops of their bodies. It is a pity that some people, who use insect repellents themselves, don't use them on their suffering animals. It should be remembered that it is unprofitable and cruel to expect animals to tolerate flies when they can be controlled. Also use all of the low cost management systems.

Many confinement farmers spray their buildings with pesticides, and, while there are ways of reducing flies without chemicals, when flies worry grazing animals and the suggestions below don't work, it is better to use a safe or mild chemical and have relaxed animals than not to spray and have stressed animals.

Life cycles can change from 30 days in cool weather to 9 days in hot weather, causing exponential increases, so be prepared for continuous control.

When necessary, treat animals for worms and other parasites.

Breeding areas

Many reported - after switching to controlled grazing fly numbers decreased and the dung beetles and other turd living critters consumed and dispersed it in the pastures. Bill Dunlap, Roseboro, NC, USA.

The first thing is to get rid of the fly breeding areas. Flies are attracted to acid, wet organic matter.

They need moisture for their eggs to hatch, so you should look for maggots in organic matter and in moist areas, and try to eliminate them. Breeding areas include heaps of manure, spilled feed, soil around concrete where water runoff keeps it wet, calf hutches, silage stacks and bunkers, and water tanks. Flies also breed at the base of long grass.

Flies breeding on neighbours' feed pads, silage stacks and properties is a difficult problem to fix.

Flies can breed in hay or silage that is fed out on pastures and not eaten, or left around feed racks where it becomes boggy and creates ideal breeding grounds.

Fly traps over manure

In confinement farming where manure from animals is produced in such large quantities that earthworms can't consume it all in time, it is composted or stored in heaps which should be covered completely with plastic or have fly traps over them. These can kill thousands of existing and newly hatched flies. Seepage should go into covered concrete pits and then be spread thinly on land, preferably before cropping.

Manure and silage seepage spread on pasture can burn it unless diluted. Animal manure from barns spread too thickly on to fields or pastures also creates breeding areas. A frame can be made of timber (lumber). Wrap black plastic around it to a metre above the concrete floor so flies can get to the manure to lay their eggs. Cover the top with clear plastic.

After laying eggs they fly up to the clear plastic top, dehydrate and die. The maggots help break down the dung, after which they pupate and hatch and are also trapped and die in the heat from the sun and drop onto the manure. The concrete base holding the manure must be smaller than the frame to prevent flies that hatch from the manure going sideways and up, and escaping. Wind barriers may be necessary to prevent flies from being blown out sideways. A U shaped wall can be built around it to keep the flies in and to protect the plastic from gales.

The trap should be light enough to be lifted off or tilted back for loading manure in and out. Chain filling from barns can be through a funnel at the top which is also a fly entrance.

Add agricultural lime to the bedding or sand in the barn, and under animals in the tie-up stalls, to the gutter and/or the heap in layers as the heap grows, to speed up decomposition and to encourage earthworms, which should be added to the manure to turn it into compost and to eat fly eggs. The lime also makes the manure sweet so it doesn't smell.

Make the height and depth to suit your handling equipment. Proportions in the drawing are approximate.

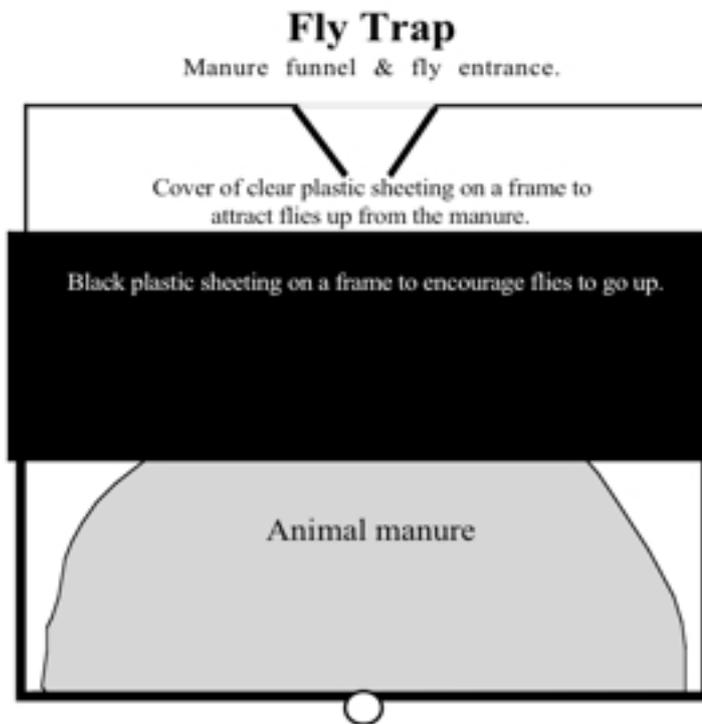
The pipe at the bottom should run to an effluent holding or spreading system. It is best if no liquid runs out.

In freezing conditions the manure heap should have the open side facing the sun. Correct composting generates warmth that will reduce freezing. It should not get hot or the earthworms will leave. Water can help control the temperature.

The only time a fly lands on our compost heap is when it is too dry, so gives off a mouldy smell, too wet, so causes a sour smell, and/or lacks lime.

Composting

Animal manure and vegetation can be reduced in volume by about 50% by using earthworms and by adding lime to it as the heap is made, so that earthworms consume the manure and turn it into compost or vermicast (compost and earthworm casts - excreta). If correctly made, both will have no smell, are easy to



handle and will be a fertile product which can be spread on pasture, or land to be cropped or sold. Spreading should be done just before rain or, in the case of land, just before chisel ploughing it in.

The lime also encourages soil bacteria to help decompose the manure.

If part of the compost goes mouldy it will smell, which will discourage earthworms and encourage flies, so apply water. If seepage occurs because of excessive rain it will smell bad, so cover it during the wet period. The effluent running out can cause pollution, so the manure should be in a concrete sump.

Birds will be attracted to the earthworms, so bird mesh may have to be put over it.

If pockets of the vegetation go green (like silage) and don't decompose, it is a sign of the organic matter being spread too thickly without enough lime. Lime raises the pH and starts decomposition. Earthworms finish it off. They will multiply and consume the material, mixing it and increasing its fertilising qualities. Earthworms won't thrive without lime and it must be really finely ground like powder or cement. Trial and error will show how much lime to use.

Earthworms will not stay in lawn clippings from lawns that have had too much artificial nitrogen applied, causing high nitrates. We suffered this once in our garden compost heap, which then got very hot and smelly and I couldn't believe that whereas earthworms had done a great job for years, they suddenly disappeared and the slimy smelling mess attracted flies. We buried it deeply and started again.

Effluent

Fresh effluent slurry (no older than a week) sprayed onto pastures increases earthworms and soil bacteria, whereas old effluent can become so concentrated and toxic that it has killed earthworms, unless spread very thinly in rain, or followed by rain.

Effluent oxidation ponds (lagoons) can also be pumped out to a travelling irrigator, using a pond pump float that floats on the pond. Good pumps pivot at the mounting to cover a wider area of the pond.

Spreading reactive phosphate and/or agricultural lime over dry manure as the heap builds up speeds decomposition and encourages earthworms, and can save having to turn it to make compost to get it to break down. If too dry, heaps of compost can become mouldy and get hot. This should not be allowed because earthworms will then move away or die, and compost microbes will not multiply. Adding layers of soil, and keeping it all damp without seepage, help keep it cool.

Composting with earthworms improves animal and poultry manure, but doesn't remove the excess minerals, it concentrates them. However, when in a dry form it doesn't wash into the soil and kill soil inhabitants, as can be done by old stored slurry.

It is essential to add agricultural lime to **stored slurry**, to reduce the smell and ammonia release which attracts flies. The lime can be spread under stalled cows and in gutters behind them. If you don't believe the benefits of adding it, do a trial of animal manure in bottles, one with lime mixed in and one without, with tight lids and smell them after a month, in a few months and a year. You'll then believe it. The one without lime will stink from the ammonia.

In freezing and dry conditions, earthworm activities stop.

Cluster flies *Diptera: Calliphoridae, Pollenia rudis*.

Cluster flies are large 'dopey' flies (10-15 mm), with a dark grey to black non-metallic abdomen. The larvae of the fly feeds on earthworms in grass pasture or lawn areas, then in late autumn and early winter the adult flies will move into homes and other buildings to hibernate over winter.

They are named cluster flies because of their habit of congregating in large groups or swarms in dark places such as attics, corners of dark rooms, 'nooks and crannies' and 'cracks and crevices'. Each fly releases a pheromone (smell) that attracts others. This pheromone will linger on even after all the flies have been destroyed and removed and thus will continue to attract cluster flies to that area so that the clusters keep recurring. It is therefore important that treatments are continued even when there are no flies present.

The flies congregate to survive through the winter and once warmer weather arrives in spring they emerge from their 'hibernation' to lay eggs on surrounding grassland, pasture and lawns. The larvae that hatch from the eggs bore into earthworms, where they feed as parasites, eventually killing the worms before pupating and emerging as adult flies. The flies go through as many as five life cycles through a summer before the last generation of the season looks for somewhere dark, warm and dry to hibernate.

How to get rid of Cluster Flies and keep them away



Kill the adults to prevent them laying eggs in surrounding grass. Kill the larvae in the grass to prevent the adults clustering in your buildings.

Organic farmers

These flies are shockers. I don't know what organic approved spray there is for them. Please let me know if you know of one.

Prevention

If possible it is best to prevent the problem of these flies moving into your home by treating the larvae in the soil before they become adult flies. Use [NO Insects Lawnguard Prills](#) which are a slow release insecticide for removing pest insects from the soil. This is an ideal product to protect you from Cluster flies. Sprinkle the prills on grassy areas within 10 to 20 cm of your home.

If you have the adult flies swarming and clustering in the house or other building you need to carry out a program of treatment.

Check around your house and buildings for clusters of flies in warm, dark, dry corners specially your roof void and eaves.

If these can be accessed, spray the clusters with [NO Bugs Super](#). If the clusters cannot be found or accessed use [NO Bugs Borafume Fumigators](#) or [NO Bugs Bug Bombs](#) in the voids.

Once the flies in the cluster are dead, clear away as many bodies as can be reached. If you use a vacuum cleaner ensure the bag is disposed of immediately. Spray the surfaces they were clustering on with more NO Bugs Super to prevent new clusters forming where the pheromone lingers.

Treat the surfaces around the home where flies have been seen and entry points to the roof void around the eaves, etc., with NO Bugs Super.

Treat again before the next season to prevent new clusters collecting. Given a chance they will use the same areas to form clusters.

Lawnguard prills

This product is specifically formulated for use on ground and soil dwelling insects such as; cluster fly larvae, ants, grass grubs, porina caterpillars, cluster flies, carrot rust fly, wire worms and slaters. Sprinkle granules over the problem areas, then water in very well. The insecticide is carried into the soil where the grubs are feeding, or by direct contact of the porina caterpillar in their tunnels.

Stable flies

These are about the size of a house fly, but it has stinging piercing mouth parts and is a blood feeder. It knows to attack the front legs of horses and cattle and the ears of dogs. It over-winters as slowly developing larvae in wet organic waste areas below the frost line. When temperatures warm the larva pupates, and the adults emerge. If there are flies on your animals irritating them, then you are losing money due to lost animal production. Where there are stable flies there are usually house flies, because they breed in similar situations. While house flies may not cost animal production, they can upset neighbours and your family.

Urban, city and rural dwellers should not dump grass clippings where they can become a stable fly breeding site. If clippings are used as mulch, spread it thinly.

Where big bales are unrolled, clean up and compost the uneaten hay, and that around racks and bedding from barns.

Repellents are effective in preventing the stable fly feeding on humans, and medicated salve on dogs' ears will help keep stable flies from feeding on them. Sprays are short-lived because stable flies feed on the front legs, and wet vegetation washes it off. Space sprays used for confined cattle at feedlots and dairies are not practical for range cattle. Ear tags and dust bags don't protect cattle from stable flies because they don't treat the front legs. Pastures don't provide stable fly breeding grounds.

Stable flies can be controlled with pour-ons, which can be used even on milking cows with no milk withholding period, and dog's ears, which they attack, can be protected with appropriate salves.

House flies

These are not blood feeders and don't bite. They are just a tickling infectious nuisance and live on almost anything moist.

Horn flies

These are smaller than house flies, breed in fresh manure and live on pasture, seldom in buildings. They are blood suckers feeding up to 20 times a day. The number that can cover an animal can suck out 200 grams of blood a day.

Face flies

These also spend their time outside except in winter, when they'll seek protection from cold. They breed in fresh manure and feed on liquid around eyes, mouths and open wounds. They are the main spreaders of pink eye.

If you are in a fly area, wear a white long sleeve shirt and a white hat. Flies will land on these more than on your face.

Spraying

Insecticides may have to be used when stable fly or other fly numbers force cattle to bunch in an attempt to protect themselves. As previously mentioned, sprays can be short-lived if animals are in long wet vegetation or in water, both of which wash off the insecticide, so avoid them.

Be aware of withholding periods for milking cows and beef slaughter, but there are milk-safe pesticides.

Use repellents and pesticides to supplement good management, not instead of it. Be aware that flies can become resistant to insecticides, so use them only as a last resort.

Sheep blowflies are a problem in New Zealand, so crutching and dipping or spraying are necessary.

I've seen cattle in some countries so covered with flies that one could hardly see the colour of the animal. Even parts of Canada with its cold winters has flies so thick that a car window open in farming areas for a minute can allow dozens of flies to enter.

A fine water spray over milking cows in the yard helps cool the cows, and discourages flies from worrying them while they are waiting. Well positioned, fine sprays can also reduce the number of flies coming in to the milking area. Sprinklers should be turned on to cool the concrete before going to fetch the cows. Once the cows learn the benefit of the sprinklers they will walk more quickly to get under them, whereas without sprays they dislike entering the hot concrete yard, so slow down just before the yard and have to be encouraged to enter. If they bunch up at the entrance they'll muck on each other, which will attract more flies.

When the summer heat reaches its peak, milk production drops, but it is not always just because of the heat. With heat come flies, and these can cause more frustration to cows and owners than the heat. Heat stress and flies cause cows to bunch together, which makes them dirtier still. The best way of reducing heat stress is by supplying balanced minerals, both in fertilisers, and by feeding soluble minerals that contain salt and the other minerals required by all grazing animals. Salt is the body's temperature controller, both hot and cold, so animals also need it in winter to reduce cold stress.

Prevention

There are treated ear tags, cattle rubbers and bags all used as self-treatment devices for flies such as horn flies and face flies, but don't protect cattle from stable flies on the front legs.

Fly traps for cattle

An Australian made, walk-through fly trap works on the principle of brushing 95% of flies off the animals as cattle walk through. Cattle can be taught to go through the trap on their way to milking, water or to fresh pasture. They also learn to walk through it for fly relief and for a nice scratch. The brushed off flies rise to the clear plastic dome which gets hot so they soon desiccate and die, drop to the ground and are then eaten by earthworms and/or ants. Having dairy cows walking through a trap before milking reduces the fly irritation during milking. If stable flies are a problem, make sure that there are brushes that cover the front legs as cattle walk through.

The invention was by the Queensland Government Department of Primary Industries in Australia that publishes plans.

Buffalo flies cause a chronic loss of production in beef herds in coastal and sub-coastal northern Australia. The majority of the production loss is due reduced grazing time because of fly worry. Buffalo

fly costs the Australian beef industry at least A\$20 million a year (up to A\$30 per head) in lost production and treatment costs.

There is increased marketing pressure to implement non-insecticidal management strategies for the range of parasites affecting beef cattle. A recent project jointly funded by DPI&F and MLA has demonstrated that fly populations could be reduced by 60% to 80% using a simple tunnel trapping system.

The trap is a short tunnel through which cattle have to pass regularly. This may be a watering point or feed station for beef cattle, or a lane or yards leading up to the milking shed for dairy cattle. Another one closer to the milking shed may be advantageous. The flies leave the cattle in response to the change in light intensity at the tunnel entrance, and are subsequently caught in cages attached to the sides of the tunnel trap that is simple to build, and, since there are no obstructions in the tunnel, training of cattle is relatively easy, sometimes by walking through ahead of them – if they are trained to follow.

The use of biocontrol agents such as parasitic wasps is increasing. They are small and don't harm people or animals, but they search out fly pupae because that's where they deposit their eggs. Eggs hatch, the flies are killed and new wasps emerge to kill more flies. Although they won't eliminate a fly problem, parasitic wasps will help to reduce fly populations. The wasps can be purchased from commercial suppliers.

In USA parasitic wasps for the control of flies are sold. Make sure you have some or watch for adverts for them. US sources of parasitic wasp against flies include -

Rutledge Enterprise, 4311 Aztec, Pasadena, TX 77504. Tel. (281) 487 0825.

Beneficial Insectary, 14751 Oak Run Road, Oak Run, CA 96069, Tel. (800) 477 3715.

If you use parasitic wasps, release them in the spring and at regular intervals through summer. By themselves, wasps are unlikely to control flies completely. Spraying flies can kill wasps. Use all systems and speak with your neighbours about controls. Flies can travel for kilometres.

Google for Flies+traps and you'll see plenty. One is at

<http://extension.missouri.edu/explore/agguides/agengin/g01195.htm>

Farm dairies

Many have proved that painting walls a light blue discourages flies. Don't make it too light because white attracts flies.

Baited fly catchers

Meat-baited bottles can catch thousands of flies. They need dark coloured lids with slots to allow flies to enter. Flies then try to get out through the light areas, not the dark lid. Heat generated in the bottle soon kills the flies. These traps can smell so place them where the smell won't cause a problem, but close to the source of flies, which could be a neighbour.

Spraying

Flies are developing resistance to some chemicals, and spraying repeatedly over several years will only add to the problem. Spray the sites where the adult flies congregate. Don't spray manure where earthworms breed, because the chemical will also kill them.

Flies & midges on humans

I've found that wearing white shirts attract flies and midges, which then seem to land on the shirt rather than on my face. As with animals, if you become stressed and frustrated, and start wiping them off or rubbing your face, you will spread their blood and fluids and yours, which will then encourage more insects to your skin. They are often seeking moisture. There are insect repellents (some useless and some good ones) that can be used.

Finally, mono animal-farming increases all parasite infestations, which could be a reason why game farms with everything from large animals to small birds don't have the problems. Free-range chickens spread animal manure and consume flies and their larvae. I'm sure that the world's most balanced farmer, Joel Salatin in Virginia, USA, has no fly problem. He grazes cattle, pigs, rabbits and poultry under natural conditions.

Balanced minerals

Des Holmes of Rukuhia, Waikato, in midsummer phoned and asked what he could do about his calves

on the clay soil bunching up tightly and milling round and being worried by flies. I suggested he put Feedtech in the water troughs. Three weeks later he phoned and said they had settled down and weren't now bunching.

Calves bunch up when flies worry them. Flies worry animals more when they lick each other a lot as flies seek moisture. Salt deficient cattle lick each other for salt from perspiration. Flies also worry animals more when they have dirty tails and dirty bodies from scouring, low selenium and from bunching up to avoid flies, so they muck on each other and attract more flies.

A farmer who had two farms a kilometre apart, one poor peat and one good mineral clay soil, gave his calves on the peat the best soluble mineral mix in the drinking water, but didn't think that the calves on the mineral soil needed it. He phoned me in summer because while his calves on the peat were not affected by flies, those on the mineral soil were, and were bunching up. I suggested he give them soluble mineral mix in their water and within two weeks they stopped bunching up, and the fly problem disappeared.

Heat stress and flies cause cattle to bunch together. This makes them dirtier which then attracts more flies. The best way of reducing heat stress is supplying balanced minerals, both in fertilisers and in soluble minerals which contain salt and magnesium that help animals control their body temperature.

When animals are stressed through having an unbalanced diet and/or insufficient quantity of palatable pasture, heat stress will affect them to a much greater degree than if getting an adequate balanced diet. The stressed animals are then molested by flies, which further adds to their heat stress.

Face flies are attracted to animals that are deficient in cobalt or zinc, because both these deficiencies cause excessive tears from eyes to run down their cheeks and leave a sticky mess to which flies are attracted. The runny eyes and flies can spread pink eye.

Flies will also attack sick animals, I presume because they hope the animal will die and feed their larva. Sick animals include not only mineral deficient ones, but also those with parasites, so feed a good soluble mineral mix such as DeLaval Feedtech, which has helped reduce internal parasite infestation. Also do faecal counts then drench as required.

Controlled grazing

The numbers of flies on well managed, controlled grazing farms are far less than on confinement farms with their heaps of dung. Herman Hempel of Eldridge, Missouri wrote in the Stockman GrassFarmer that, after changing from confinement to grazing, flies almost disappeared, and they had done nothing to control them.

In the Waikato, where there are no confinement cows or beef, and only a few pigs, I've noticed a lot more flies on livestock close to towns, and believe that most come from the urban heaps of lawn clippings and poorly made compost, and because there are fewer farm animals near cities for the larger number of flies. Also, those with animals on lifestyle blocks of a few acres graze them in very few paddocks, so there is no intensive grazing to trample manure, and animals congregate in paddock corners, around troughs and gateways, creating fly breeding areas. Earthworm numbers are lower because animal density is lower, and liming and fertilising are less.

Controlled grazing can help reduce field-bred flies in paddocks and in dung, by reducing long clumps of grass and by trampling dung. Rotational grazing moves the animals away from the flies attracted to their dung. In hot weather, moving them in the middle of the day leaves many flies behind on the dung pats, giving the cows a more peaceful time in a fresh paddock.

Move cows daily, so that they are not forced to lie in their own dung or made to graze areas where their own dung is breeding more flies. Dirty animals attract flies and parasites, and as they lick themselves they take in parasite eggs.

Try to plan the grazing rotation so as to move the animals into the prevailing wind, so that any flies that breed in the animal droppings are blown away from the animals, rather than towards them.

Earthworms & dung beetles

Earthworms and dung beetles play an important part in fly control, by *moving* animal manure into soils. Active ones of the right kind, in optimum soil and moisture conditions, take dung down so quickly that by the next grazing a few weeks later, it is all removed and animals eat across the dunged area.

The speed of breakdown of dung depends on its consistency (dry takes longer), whether trampled or not, rainfall, the number of the right earthworms and dung beetles and the number of other insects. Someone in USA counted over 400 different species of insects in decomposing dung.

Fertilising with lime, reactive phosphate and correct amounts of natural minerals, rather than superphosphate and other chemical fast release fertilisers, encourages healthy soils, earthworms, beetles and other soil life. Bird numbers increase when earthworm numbers are high. All reduce fly and parasite breeding in animal droppings.

There should be at least 20 (40 is better) earthworms per spade spit of 20 x 20 x 20 cm of soil. High earthworm populations eat the animal manure quickly before flies have time to breed in it and they keep dead vegetation on the soil surface to a minimum. Earthworm numbers increase rapidly after lime is applied to soils needing it.

Dung pats should have dozens of beetles - small varieties in wet and cold climates and large ones in hot dry climates.

Dead vegetation breeds flies and facial eczema spores, and causes several ill-health problems in animals. Toxins in mould on wet vegetation can cause severe problems in the rumen, and can increase somatic cell counts in milk. The fungal toxin called Fusarium lowers ewe conception rates. Cows may be also be affected, although cows are not as sensitive to the toxin as are ewes. The fungus grows on dead pasture at the base of a mouldy sward, especially in humid autumns. Some affect animal health and production, and can cause liver damage that can slow animal growth, decrease production and cause slips or abortions. All moulds and fungi affect animals adversely, so should be avoided, including old toppings (clippings) and mouldy hay or silage which, if fed in paddocks and not eaten, breed flies. Earthworms won't consume anything mouldy, so flies breed in it. Fusarium can produce Zearalenone on decaying grass which is a fungal toxin that is oestrogenic and causes a reduction in ovulation and fertilisation rates in ewes, resulting in fewer twins and more empties. It's a major problem for sheep farmers, as it reaches its peak when the rams go to the ewes in autumn. Topping or clipping increases dead vegetation.

One can smell mould by breaking long grass off at ground level and smelling the 7 cm yellow base of the plant. Cows normally don't graze this unless the 40% Grazing Rule is broken.

Where dung is thin, as with New Zealand animals grazing lush pasture, dung is consumed by earthworms and decomposed much faster than in dry countries where dung is thick and dry and sits on pastures for months, so is a possible reason for fewer flies in New Zealand. Dung beetles that are plentiful in game farms remove this dry dung fairly quickly. Are they fewer on ranches because of sprays?

Caliginosa earthworms are the best, because they are more active over a wider area, and move from dung pat to dung pat, and change the pat effects from a 30 cm circle to a 60 cm or larger one, creating lush pasture growth, instead of it sitting in one place and killing the pasture. Caliginosa earthworms may have to be bought and placed in pastures. Some earthworms are twice as active as others. I compared Motueka, South Island, earthworm breeder, John Stemmer's with our local ones in Hamilton, and his were twice as active. When spreading them on our farm and those of others, green areas developed where they were, and as they spread across the paddocks at about 20 metres a year. They also continued to work and multiply longer into the dry periods. It could pay you to research the commercial and active earthworms available in your area, and do some trials on your farm.

Because earthworms don't travel far, they can become inbred. Bringing in earthworms from other areas allows them to cross with yours and give hybrid vigour. Get some to multiply in boxes of a mixture of compost, soil and animal manure with agricultural lime, then spread them around the farm. See the Soils > Earthworms chapter.

Beetles may also need bringing in from farms that have them, but they won't thrive if the heaps of dung are spread mechanically - or soil fertility is low.

Harrowing

This is called dragging in some countries, and rightly so because it is a drag. Harrowing may be necessary where soils are dead (see Soils), pastures are root or sod bound with thatch (dead surface vegetation) and need ripping about to tear the mat open and spread dry animal manure, but harrowing is not good for established pastures containing earthworms and/or dung beetles. Tyres cut in half around the circle to give a half round and laid with the cut edge down, then tied or bolted together, cost less and spread the manure without damaging the pasture.

Rolling with a Cambridge V roller or tyres made into a roller can achieve the same.

If you don't have earthworms or dung beetles, harrowing may be justified to spread the pats, otherwise flies can breed in them. Remember, however, that spreading dung spreads internal parasite larvae over the whole pasture, which then makes it impossible to avoid when grazing, so animals then consume internal

parasite larvae and eat less pasture, then produce less meat or milk. If earthworm numbers are low, then prior to closing the paddock for harvesting for hay or silage, the dung pats should be spread, otherwise they can be picked up and mixed in the hay or silage which pollutes them and lowers their quality.

Driving around New Zealand 50 years ago one would see many harrowed paddocks. Today you can drive all day and not see one. Controlled grazing is much more intensive now, so hoof action does more good than decades ago. It tramples some of the fresh dung, which reduces fly breeding areas.

Breeding easy-care animals

New Zealand has always had a shortage of staff and lower prices for their farm products, so has been forced to develop animals that need little care, however this doesn't mean "no care".

This is done by not breeding from animals that need repeated dagging, drenching for worms, help at calving, etc. With flies, some animals are less affected by them, and within breeds some cope better than others. Herefords with white around the eyes attract more flies that can spread Pinkeye, so many farmers have bred out the white around their eyes.

Flies from pastures

This patchy newly sown pasture needs a mineral analysis to measure what is lacking.

Earthworms have spread the dung pats so instead of lying and killing the pasture and breeding flies and harbouring internal parasite larvae, the animal manure is in earthworm casts in the soil, growing more pasture.

From the animal manure it can be seen that compost,



animal or poultry manure or at least 100 kg/ha (90 lb/a) of Ammo N fertiliser a few times are necessary until the clovers are making enough N.

Animal manure is high in phosphorus, so the colossal amount of extra pasture growth from the dung compared with where there was none, indicates that phosphate is also lacking. This can be because insufficient agricultural lime has been applied to make the P available, and or the trace elements needed to make calcium work are deficient. See Elements > Calcium.

Note the lack of clovers in the background. In the foreground, the thriving clover in the urine patches indicates that the urine gave it potassium (K) and sulphur (S), so K should also be applied. Enough S will be provided by the Ammo. The small clover leaves indicate that lime is also needed. Very, very few farmers apply enough agricultural lime for optimum legume growth and animal health. Lime is the cheapest fertiliser and the first essential for soils needing it. Lime increases earthworm numbers, which decrease fly numbers because they move animal manure into the soil, and they eat fly eggs.

Farmers who increased lime applications, resulting in more earthworms, have noticed a decrease in fly populations in their buildings and homes, possibly caused by earthworms eating more animal manure faster leaving less for flies to breed in. Also, in our compost and earthworm breeding bins, earthworms eat the fly eggs so we never see any fly maggots in our compost, so I assume that earthworms also eat fly maggots in animal manure.