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MYXOMATOSIS IS LOSING ITS PUNCH

By A. R. TOMLINSON, Chief Vermin Control Officer

THE results of the testing of field strains of myxomatosis just released by the Australian National University are of vital importance to every farmer in Western Australia. They show clearly that the predicted decline in the effectiveness of myxomatosis has occurred. Worse still, they reveal that the decline has been more rapid in some areas than observers anticipated.

The figures show that only two out of eight samples of the virus taken early in 1956, from diseased rabbits were still Grade II, with a killing rate of 99 per cent. These samples were from Bridgetown and Albany, and were very little changed from the original virus which killed 99.5 per cent.

Samples taken from Tenterden and Pinjarra with another from Albany were Grade III, with a killing rate of 70 per cent. to 98 per cent. This grade of virus is still a good killer, but shows a definite reduction in usefulness from that produced in the laboratory.

Two samples from Dongara and one from Bruce Rock were most significant. They were graded as IV, with a killing rate of between 30 per cent. to 70 per cent., and will not control rabbits.

A very important point is that in Grade II, death occurs in 13 to 16 days; in Grade III, 17 to 28 days and in Grade IV, 20 to 50 days. This means that the rabbits with Grade IV will carry the virus and infect other rabbits for three or four times the period those with Grade II infections will be alive to spread the disease. As a result the Grade IV strain will spread almost four times as rapidly as Grade II, and there is little doubt that this relatively useless Grade IV type will replace the stronger strains.

Rabbits which have recovered from the effects of a weak strain are immune from the stronger strains. These results are what everyone knew could be expected, but it comes as rather a shock to find that myxomatosis is losing its effectiveness so rapidly.

I should imagine that there are few places in Western Australia where there are rabbits without myxomatosis among them. So our problem here is not to spread the disease but to try to stop the weak strains from spreading, so that the more potent types keep on killing.

Probably the only way to do this is to continue to inoculate rabbits with the laboratory strain of the virus. This still kills at 99.5 per cent. and is by far the best type for our purposes. The idea is to carry out the inoculations before the

strains which are already present in the field commence to spread. The weak field strains will immunise the rabbits against the stronger types. I feel that probably the most promising months would be January, February or March in the Northern areas and Lower South-West, and April to June in the Great Southern, Midlands and Eastern districts. This is a rather rough division, but about as close as can be determined.

Ampoules of the highly lethal laboratory virus are available from the Agriculture Protection Board. They are sold to farmers, but issued free to vermin boards. Protection Board officers inoculate rabbits for farmers if enough rabbits are available, while one officer is continually infecting and releasing rabbits.

The end of the very high controlling effectiveness of myxomatosis may be in sight, but there is no reason why we should not continue to get the most out of the disease, and continue to infect rabbits with fresh virus.

At the same time, it is no use blinding ourselves to the fact that the time is past when we could fold our arms and say that myxomatosis will control the rabbits for us. There has been a noticeable increase in rabbits even if they are still nowhere near the previous numbers. It has become very necessary to supplement the controlling effect of the virus where it has been so effective by other methods, particularly poisoning with "1080" and warren ripping. Remember—even two rabbits on a property are a menace.

THE IMPORTANCE OF GOOD SEED IN VEGETABLE PRODUCTION

By T. WACHTEL, Vegetable Adviser, Horticultural Division

THE seed is the foundation of the crop that eventually is to be harvested. As an American textbook on vegetable growing puts it: "Within the seed coat may be locked up the key to future success or failure." A vegetable crop can be much poorer than the seed, but it cannot be better.

The success of the crop is dependent largely upon the genetic characters possessed by the seed, and upon the environment in which the crop is grown. By environment we generally mean such factors as climate, soil, soil moisture, fertility level, etc. These environmental conditions can be controlled, to a large extent, by the grower, or altered sometimes to suit the particular crop. But what we cannot do once the seed is sown, is to alter the inherited properties, the genetic make-up of the seed. Once the seed is sown, we have no more control over one of the most important factors that will determine the future success of the crop. Differences in seeds with regard to inherited characters are enormous. These differences may affect the size and shape of the plant or of the produce, earliness, yield, disease resistance, and many other characters of great economic importance.

The important characteristics of good vegetable seed may be summarised as follows: It must be viable, free from seed-borne diseases and pests, free from weed seeds and foreign matter, and true to type.

Viability means that the seed is capable of germinating well, and strongly enough to produce a subsequent healthy growth. Viability of the seed is determined to some extent by the climatic conditions in which it is planted, its age and storage conditions. Germination tests can be carried out quite simply, by putting seeds between moist blotting paper. But very often seed which germinates well is not viable enough to push the small plant through to the soil surface. To test viability it is a better practice to plant some seeds in a small box of soil, imitating, as far as possible, natural conditions.

Diseases can be carried either on the surface of the seed or inside the seed coat. Some of these diseases can be entirely or partially controlled by seed treatments. Bacterial canker, blackleg and damping-off are only a few examples of the many diseases that can be carried on or in the seed.

Freedom from weed seeds, foreign matter and other vegetable varieties or strains is of obvious importance. Mixtures of different vegetable varieties are a detrimental factor in vegetable production.

As good seed is so important, it is also evident that seed producers must be encouraged to produce good seed, by ensuing that they get a sufficient return. In carrying out a breeding programme and proper seed selection, the costs are high. But here again it is true, that the cheapest article is not necessary the most economical in the long run. In many vegetable crops the cost of seed is only a small percentage of the total cost of growing a crop. It has been estimated that the cost of seed represents only about 1 to 2 per cent. of the total cost for most vegetables. We can readily appreciate that even a small increase in marketable yield would more than repay the extra price paid for reliable seed.

The next question that suggests itself is, whether it would not be a better practice for the grower to save his own seed. The answer is, that saving one's own seed undoubtedly has some advantages, but disadvantages are far more numerous. It has the advantage that it enables the grower to select the plants to suit his own particular growing conditions. It also helps avoid the uncertainties often associated with buying seed of incompletely known origin. But it must be realised that seed production is a highly specialised business, requiring great skill and long experience.

Trueness to type is commonly much more of a problem than purity or viability. To produce seed true to type, certain conditions have to be provided, and these are seldom possible under market gardening conditions, where different varieties and strains of the same vegetable crop are grown in close proximity. Many of the common vegetables are pollinated by insects or wind. Different varieties of the same crop grown for seed must be sufficiently isolated to prevent fertilisation by foreign pollen. Self-pollinated crops, like tomatoes, lettuce, peas and beans, are much easier to work with. For insect-pollinated crops, isolation of at least one quarter of a mile between varieties of the same crop, and closely related crops, like cabbage and cauliflower, is desirable. For wind-pollinated crops, like for instance beetroot, the distance must be even greater. Unless these conditions can be provided, the home production of seed is of questionable benefit.

WATER CONSERVATION ON THE FARM

By J. W. LEWIS, Irrigation Adviser, Bunbury

WATER conservation on the farm is becoming increasingly important in this State, and on most properties in the South-West water can be conserved easily and economically. Coupled with the use of modern spray irrigation systems, this trend may well revolutionise farming methods in years to come and lead the way to greater agricultural prosperity.

Much publicity has been given to "water harvesting" in the Eastern States, and the work of Geddes at Badgery's Creek is familiar to many. Special pumps have been developed, known as "water harvesters," to shift large quantities of water in a short time. This is necessary as the rainfall is unreliable, and creeks may only run for a few days after rain.

In the South-West of this State we have a different problem. Our climate is typically Mediterranean, with a long dry summer and a wet winter. Although the rainfall is very reliable, the ground can only hold a certain amount of water, and a large proportion of it is lost by run-off. The problem is to catch and store some of this run-off for use during the summer months.

There are several methods of conserving water on the farm. Every property has different conditions of topography, geology and soil, and these will determine the best type of structure to be used.

Firstly, the excavated tank. This is simply a hole excavated in the ground, and the ratio of water stored to excavated material is 1:1. Due to this relatively high cost of storing water, it is usually uneconomical to build a dam of this type sufficiently large to hold water for irrigation purposes.

The excavated tank is common in the drier agricultural areas, and is usually used for stock water. It is important that it is placed so that there is sufficient catchment area to fill it during the winter months.

Probably the cheapest method of conserving water is in a turkey's nest or ring dam. As its name implies, it is ring-shaped and situated on fairly flat ground. Due to the method of construction, in which a wall is pushed up in a ring shape leaving the centre untouched, much of the water is stored above ground and the storage ratio is high—usually 4:1 or greater.

The most common method of storing water in the hilly country of the South-West is by damming a gully. A clay-core wall is built across the gully at a suitable place so that a maximum amount of water is held back. It is important that this type of dam be provided with an adequate bypass to carry the normal flow of water once the dam has filled. The water storage ratio will depend on the gradient of the gully, but is usually in the vicinity of 3:1.

Evaporation is usually a problem during the summer months in all types of water storage works, unless there is some replenishment from a permanent running creek, and big water losses are due to this factor. This is especially so in a turkey's nest dam, where there is a large area of comparatively shallow water. The recent development of cetyl alcohol by the C.S.I.R.O. now offers a solution to this problem at a reasonable cost, and a thin film of this chemical maintained on the surface of the water reduces evaporation by as much as 33 per cent.

Although water can be conserved in some way on most farms, it is important to situate the dam or dams with due regard to water requirements and proximity of land suitable for irrigation. Also, water storage works are costly, and it is essential that they be located, designed and constructed in the correct way, so that they will be a lasting asset on the farm in the years to come.

ITCH MITE IN SHEEP

By C. R. TOOP, Chief Veterinary Surgeon

DURING the past 12 months there has been a sharp rise in the incidence of itch mite and many cases have been reported both from sheep markets and individual properties. The symptoms of itch mite infestation are very similar to those produced by lice but, unlike the sheep louse, the itch mite is invisible to the naked eye and the microscopic examination of scrapings taken from the skin after the wool has been closely clipped is necessary for its detection.

The mite inhabits the superficial layers of the skin and sets up an irritation with symptoms of biting and rubbing so that the fleece becomes torn and ragged and loose tassels of matted wool may be seen hanging from the sides and flanks. The affected wool becomes stringy and has a wispy spiral-pointed tip. It often contains particles of crumbling scurf and may show a slight yellowish discolouration. The staple is tender and may easily be broken anywhere along its length. In advanced cases the wool is badly cotted; shearing may be difficult and the value of the fleece is seriously depreciated.

The infection is spread from sheep to sheep by direct contact and it probably occurs soon after shearing when the wool is short and conditions are favourable to the migration of the parasites. The earliest symptom consists of a small whitish patch on the side or flank and from this point the infection gradually spreads over the back and hindquarters

to the thighs. The spread of itch mite through a flock is usually slow and insidious and a period of several years may elapse before a significant proportion of the sheep are observed to be affected.

Dipping with lime sulphur, according to present knowledge, provides the only means of eradication. It should be carried out two to three weeks after shearing and a wetting agent should be added to the dip to ensure thorough saturation.

The arsenical dipping fluids will not eradicate itch mite, but they do suppress the infestation and reduce the mite population to a level where it is unlikely to produce any ill effects. Symptoms are rarely reported in flocks which have been dipped with arsenic as an annual routine and certain dips which contain rotenone are reported to have the same effect.

The dieldrin and aldrin dips, on the other hand, have no effect upon the itch mite, and while these preparations are used, the infection will continue to spread. This is an unfortunate development because both dieldrin and aldrin are highly effective against lice and keds and, in addition, protect the sheep against blowfly attack for a period of about three months.

In approaching the problem we must consider not only those flocks showing signs of infestation but also the many other flocks which, although harbouring the mites, have not yet developed symptoms. A return to the arsenical dipping fluids and jetting against blowflies as a separate operation with dieldrin, aldrin or diazinon would provide a solution, but this might be regarded as a retrograde step. Alternatively the flock could be dipped on one occasion with lime sulphur, which would eradicate the mites, and dipping with dieldrin or aldrin could then continue, but it would be necessary to guard against the reintroduction of the infection with bought in sheep. The lime sulphur dips do not destroy lice or keds. They are very irritant and have to be used with care and are unlikely to appeal for general use—and the fact that they may be combined with dieldrin and aldrin does not seem to help very much.

An insecticide, which will destroy lice and keds as well as itch mite and, at the same time, afford a reasonable degree of protection against blowflies is obviously required and this must continue to be sought.

ORCHARD IRRIGATION

By J. CRIPPS, Horticultural Adviser

THERE are no fruits grown in Western Australia which do not give larger crops if irrigated, although the majority of fruit growers do not have irrigation installations.

Today I am not going to deal with dams and sprinklers but am assuming that the grower realises the advantages of irrigation in orchards, which are—

(1) Larger crops.
(2) Better quality fruit.
(3) Larger trees, due to greater growth.
(4) Assured return for expenditure.

This last is important for capital expenditure and expenditure to cover normal running expenses may be wasted to some extent if crops are reduced by lack of water.

Fruit growing should not be a risky enterprise. By disease control, correct cultural management and irrigation, most of the risk should be removed and a regular crop assured. This in turn enables the organisation and management of the orchard to be built round a certain production which is achieved regularly year after year, so that a known quantity of labour and materials are required at any one season, mistakes are minimised and smooth running assured.

Having mentioned the advantages of irrigation we will now assume that the orchardist has an efficient sprinkler irri-

gation system and the next question which arises is, "How much water to apply and when to apply it?"

A guide is necessary if water is to be applied when needed. Some orchardists tell me that their supply of water is limited and that they merely apply all they can, after which the trees have to survive as best they can. A method of calculating the available soil moisture would in this case ensure that none of the limited supply of irrigation water was wasted and would enable the orchardist to determine whether or not it would be profitable to acquire an additional supply. That is, whether the marginal cost of the work involved in the storing of more water or the sinking of an extra bore, would be less than the marginal revenue obtained from the increased crop resulting.

If sufficient water is available, its application may be governed by the appearance of the trees, but when fruit trees show signs of moisture stress, the desirable period for the application of water has passed and some damage has been done. Neither is the appearance of the surface soil a good guide. A soil auger may be used to gauge the available moisture present in the soil below the surface, but this work is time-consuming and requires considerable skill. What other methods are available?

Well, one can estimate soil moisture loss by calculating the difference between rainfall and evaporation, but this method is difficult and by no means foolproof. Is there then, a reasonably foolproof method of discerning when to irrigate and how much water to apply? I think that there is and this method involves the use of a simplified tensiometer for measuring soil moisture. Moisture in soil is held by tension and this tension increases as the quantity of moisture present decreases, until it is so great that the small quantity of moisture remaining cannot be taken up by plants. Not all moisture present in soils is available to trees and plants. The tensiometer measures soil moisture tension and therefore from its readings the amount of moisture actually available to crops can be estimated. A simplified version of the tensiometer is available and is known as the Irrometer. This irrometer has several important advantages. It can, and should, be inserted in the soil and left in position throughout the summer months. The soil moisture present is indicated by a dial divided into units one to a hundred so that reading is simple.

A reading of seventy indicates that virtually no moisture is available to the trees and one of nought, that the soil is saturated. In actual practice, irrigation should commence at a reading of between 50 and 60 and should cease at between 0 and 10.

Since the main root zone of a fruit tree normally lies at a depth of between four inches and three feet, it is suggested that the two irrometers be placed close together at depths of one foot and two feet three inches, to measure moisture conditions near the top and the bottom of the root zone. Two irrometers per acre is the recommended number, but a smaller number would give valuable information.

The cost of these irrometers will be approximately £32 per acre if the recommended number is employed, but they should last for at least five years with careful handling, so that the annual depreciation of an installation will be £6 8s. per acre. The annual cost of insertion and reading will be approximately £2 15s. making an annual total of £9 3s. per acre. It is suggested that this annual cost will be more than covered by savings in time, labour and fuel occasioned by a reduction in irrigation when not required and/or increases in crop value and quality occasioned by the provision of adequate moisture when it is required.

The use of two irrometers experimentally in one orchard in the hills area has shown that the greatest need for water is during the month before harvesting commences. Fruit trees, and in particular stone fruit, should however, be watered after the crop has been picked to ensure fruit bud development and a good crop during the following year.

Further information on the use of irrometers can be obtained from the Department of Agriculture.

POWDERY MILDEW DISEASES IN THE HOME GARDEN

By OLGA M. GOSS, B.Sc. Hons., Plant Pathologist

MOST of you will be only too familiar with the powdery mildew diseases which occur so frequently during the warmer months in your gardens. The most common plants badly affected by these diseases are grape vines, roses, hydrangeas, delphinium, lagerstroemia and melons of various types.

For those of you who perhaps, do not recognise the disease by name, a short description of its appearance will doubtless call it to mind.

Powdery mildew is easily recognised, for it forms a quite conspicuous, dirty-white, powdery growth on the surface of infected leaves, green stems and fruits, which is easily rubbed off with the fingers. Although the fungus is mainly on the surface, it sends out feeding structures which enter the leaf tissue and rob it of food and water so that it tends to shrivel and become distorted. Infected leaves gradually dry up and finally fall to the ground. The powdery surface of the mould really consists of myriads of tiny fungal seeds called spores which are capable of causing new infections when conditions are suitable—wind acting as the main agent of dissemination.

The disease spreads most rapidly when weather conditions are warm—i.e. 75°-90°F, but not too hot, and when light intensities are reduced by shading, etc. This means that the parts of the garden most conducive to the spread of the disease are those which are sheltered from the sun and wind and where plants are too crowded, or pruned to give very bushy growth. With some plants, e.g., roses and hydrangeas, humidity also seems to be important. In most home gardens the regular use of sprinklers induces ideal conditions for spread of mildew both by building up humidities and by lowering leaf temperatures. However, some control of this aspect can be obtained by regulating the watering, applying water at a time when the foliage will dry off fairly quickly and avoiding wetting the leaves as much as possible.

Mildew is a striking example of the old adage "Prevention is better than cure" for one established in the garden, it is very difficult to control. Efforts therefore should be directed to preventing its occurrence.

To do this, rake up and burn all prunings and fallen leaves from woody perennials, such as vines, roses, hydrangeas, etc. Then spray the pruned plant with a strong sulphur spray, e.g., lime sulphur, at the rate of 1 part lime sulphur to 10 parts of water for vines or roses—or 1 part to 20 parts for hydrangeas. This practice of strict garden hygiene and dormant spraying is of vital importance, for all spores in the immediate vicinity of the plant including those on fallen leaves and in bark crevices are destroyed, so reducing the chances of early infection of new growth to a minimum. However, some infection may still occur from dormant mycelium actually within the buds.

During the growth period, all plants liable to be attacked by mildew should be sprayed or dusted regularly—once a week to once a fortnight. For most plants the most suitable materials include lime sulphur, wettable sulphur, livers of sulphur or karathane if a spray is required; or flowers of sulphur if dusting is preferred. In the case of rockmelons and cucumbers however, sulphur cannot be used as it causes injury, but copper compounds or karathane give good control. Sulphur can be safely used on other melons such as pumpkins, etc. When using sulphur, do not spray or dust at a time when the plant is stressed for moisture as damage may result. In the case of roses, increased control of mildew has been obtained by using a combined copper-sulphur spray at

half rates, e.g., copper-oxychloride ½ oz., wettable sulphur ½ oz. in 2½ gallons of water.

To briefly summarise the control methods—

(1) Practice strict garden hygiene.

(2) Apply a dormant lime sulphur spray.

(3) Spray regularly during growth. Do not wait till you notice the disease—by then it is very difficult to cure.

(4) Control watering—if possible picking times when the foliage will dry off quickly, and avoid wetting the leaves as much as possible.

Further details on the identification and control of these diseases may be obtained from the Plant Pathology Branch of the Department of Agriculture.

"CAT FLU"—A MATTER OF SERIOUS CONCERN

By J. SHILKIN, B.V.Sc., Veterinary Surgeon

THE importance of cats in the community is not generally realised by the public, yet severe epidemics among the feline population should be a matter of considerable concern. The presence of a reasonably large cat population in our cities is most important in keeping rat and mice numbers down to a low level, and their importance on farming properties is too well known to need any comment. Rat-borne diseases do occur in man in Australia and rats are always a potential danger as carriers and spreaders of some extremely serious diseases of man.

Diseases which may affect the cat population of any country are therefore quite important and the most serious of these are the diseases which are loosely known as "cat flu."

The term "cat flu" seems to be firmly established among cat owners and the public generally, but the group of diseases which this term covers would more properly be described as the feline distemper group.

Contrary to general opinion "cat flu" is not one disease but at least three and possibly more separate diseases. Considerable research and discussion have gone on in the veterinary profession both in Australia and abroad in an endeavour to establish how many clearly defined diseases would come within the category of the term "cat flu." While complete clarification still does not exist, it would appear that we can somewhat arbitrarily divide the feline distemper group of diseases into three fairly well-defined and separate conditions—infectious feline enteritis, infectious feline catarrh and contagious ulcerative glossitis.

I would like to deal with these conditions separately and give you some idea of the causes, symptoms and treatment in each case.

Infectious Feline Enteritis—known also as Panleucopenia.

This is a highly contagious, usually fatal disease of young cats characterised by a sudden high temperature, dehydration, (a drying out of the tissues)—and marked destruction of the white corpuscles of the blood, which is responsible for the alternative name for the disease—panleucopenia. It is caused by a virus which may also affect a number of the wild and zoo animals.

Animals, affected are generally in the age group of about 5 to 12 months and it is possible that very young kittens possess an immunity which later wears off. Older animals may possibly have either recovered or have developed an immunity in early life.

The main features of the disease seen in this State are high fever, prostration and rapid loss of condition. Vomiting may occur and cats appear to resent handling, which at times gives the impression of causing acute pain. Affected cats will not eat or drink and usually lie prone on the abdomen with the head on the front paws. Death may occur within two or three days, sometimes more quickly.

With the advent of the newer antibiotic drugs, following upon the discovery of

penicillin, the chances of successfully treating affected cats have been greatly improved. In fact with early and correct treatment up to 80 per cent. of affected animals may be saved. As these drugs are not available to the layman, treatment should therefore be carried out by a veterinary surgeon if at all possible. However, where veterinary services are not readily available, particularly in country areas, owners must necessarily do what they can themselves.

In treating sick cats generally it is always a good plan to handle and restrain them as little as possible. With feline enteritis, however, a certain amount of fluid is desirable but this may be given quickly and with little handling. A weak solution of vegemite, say half a teaspoonful in a cup of water may be given in half teaspoonful doses every hour. This solution in small doses is usually retained by the animal. If the throat appears to be sore as is often the case, a little penicillin suspension which is the preparation used for mastitis in cows and which is frequently stocked, particularly on dairy farms, may be squeezed out of the tube onto the back of the tongue. Apart from these measures it is advisable to do little else.

Preventive treatment in the form of a vaccine is now available in Australia. This consists of two injections, the first of which is preferably given when the kitten is about six weeks old and the second 10 to 14 days later. Vaccination, of course, requires the services of a veterinary surgeon.

Infectious Feline Catarrh.

The next disease in the feline distemper group is infectious feline catarrh—also known as pneumonitis and influenza. This disease may be more properly labelled "flu" than either of the others as it more closely resembles influenza as we know it in man. It may occur in cats of all ages and usually the mortality is fairly low. However in young cats particularly those which have recently undergone surgery—usually castration or removal of the ovaries—a mortality may be fairly high.

Symptoms generally consist of sneezing and coughing with a discharge from the nose and eyes, while the appetite may or may not be affected depending on the severity of the condition. It is a highly contagious disease and in older cats may be chronic and of fairly long duration if not treated.

Here again veterinary treatment is desirable as penicillin and sulpha drugs are often helpful. However where home treatment must be carried out, aspirin, one tablet twice daily, may be useful. Careful nursing is important and this requires that the animal be kept warm and occasionally tempted with food. Water should of course, be readily available. If the appetite is lost, small quantities of vegemite in water as suggested previously may be of advantage.

In this condition, inhalations of friars balsam frequently relieve the nasal discharge and generally bring about improvement. Whilst this can be carried out in a box or covered cage every care must be exercised to see that the cat cannot upset the container of friars balsam. Here again, penicillin suspension may be used if the throat appears to be sore.

Contagious Ulcerative Glossitis, also called infectious stomatitis.

This disease occurs largely in mature cats and as the name implies the main symptom is an inflammation of the mouth. Drooling of saliva, a wet chin, loss of appetite and a foul breath are the first symptoms usually observed. Later, the tips and edges of the tongue may be seen to be inflamed, and later still, small ulcers appear on the upper surface of the tongue. Death seldom occurs but the cat has difficulty in eating and drinking and becomes somewhat emaciated.

Penicillin injections frequently have a good effect on this disease so that here again veterinary assistance should be sought wherever possible. Where this is not possible penicillin suspension, as previously mentioned, squeezed into the mouth several times a day should help to relieve the symptoms.

In all types of "cat flu" it appears to be an advantage to withhold milk until the animal is well on the way to recovery.

The essentials of treatment in all cases can be summed up as veterinary assistance wherever possible, as little handling as possible, and careful nursing.

EVEN GOOD FARMERS CAN CAUSE EROSION

By BRIAN MARSH, B.Sc. (Agric.), Soil Conservation Adviser

THE particular aspects of soil conservation I am to discuss has not been publicised before, and the suggestions contained in this talk may be of use to you during seeding operations this year. It is often asked, "Will the use of clover really prevent erosion."

If all farmers used a clover rotation now, and had been doing so for 40 or 50 years, there would still be a great number of erosion gullies formed and still forming.

Most gully erosion we see on our travels in the wheatbelt, is in the form of gulllies in the depressions and natural watercourses arising from catchments of from 50 to 500 acres. There is more of this type of erosion than of the rilling and gully networks we see extending up the hillsides.

Most watercourses were once smooth depressions capable of being crossed, unfortunately, by farm machinery. Now many of them are gullied and act as focal points for extension of erosion.

Many people say that the trees should never have been cleared from these depressions. That is true, and if that policy had been followed, much of the present erosion would not have taken place; however, these depressions are capable of supporting good pasture which is more profitable than trees and even better able to withstand erosion. The cause of the erosion has not been the clearing of the trees, it has been the subsequent cultivation.

How does this erosion take place? Firstly; water most easily moves loose or cultivated soil. Secondly; in depressions we often get flows of water capable of moving cultivated soil *whether it is clover country or not.* Thirdly; it is not yet an accepted farming practice to keep out of watercourses when cultivating.

Good farmers, not realising these points do cause crosion. By good farmers I mean those using pasture improvement practices, using sub-clover and eliminating fallow. These practices do tend to greatly reduce runoff in most rains, but heavy rains do occur quite often and these cause water to flow in the hollows. If the soil is loosened by cultivation it can be moved by flowing water. Most farmers cultivate depressions with no thought for the possible consequences. I must ask you to think of your own case—you have almost certainly cultivated around the head of a gully in a hollow; . . . . isn't the presence of that gully certain indication that erosive water has flowed and still can flow over your cultivation.

You have a choice. You can leave a permanent grassed waterway, or leave a brown erosion scar.

As something like 80 per cent. of the watercourses are already scoured like this, I'd better try to give you some idea about fixing the damage.

Here in Western Australia we have developed a method of safely treating such gullies. Isolated gullies without very large catchments, can be filled and grassed over without diverting the water elsewhere, but a gully can't be filled without protecting the loose fill from running water.

Short spreader banks are built over the filled gully. These banks are about two feet high and about one chain long and are arranged so that water flows on to grass on one side of the gully. This water then flows back towards the gully where it is picked up by another bank and so on. After treatment the gully filling is seeded to pasture and then left permanently out of cultivation as it should have been in the first instance.

This type of treatment and the use of contour banks on extensive gullying help to cure erosion. The use of long rotations using fertility building pastures helps to prevent erosion.

Their combined use will never do a complete job of soil conservation, until it is recognised generally that cultivation of natural waterways is a bad thing. I advise you, when seeding this year, "If in doubt, leave it out," and if you are still in doubt, seek the advice of the Soil Conservation Service.