Cutout switches

Use these for ease of maintenance and fault finding. Every time you wish to do something to the fence, you don't want to have to go back to the energiser to switch it off. Remote energiser on/off controllers are available. They turn the energiser off and on again through the live wire.

To trace a short in the fence, it is far easier to switch off sections at a time and test the voltage, thereby isolating the fault to a small section of fence, which can then be checked more easily, than looking for a short over the whole farm.

The latest cut-out switch is fully enclosed, has stainless steel contacts, nuts and bolts for a long life, and has been designed so that it can easily be switched on and off from a bike or a horse without getting a shock. Being sealed, spiders and bird droppings don't enter and cause leakage and corrosion. Some switches can be locked in on or off positions to prevent strangers from changing them, or the knobs of some can be removed, leaving the switch live to reduce the likelihood of tampering.

No Thin or Rusty Wires

These restrict power flow, so are not good conductors of the high power needed for animal control.

Top Quality Insulators

These prevent power loss and current flows that can give shocks across wet soils to water troughs. Quality also reduces repairs.

End or Strain Insulators

These used to be porcelain, but under today's costs plastic and fibreglass compounds are more popular and better and good ones don’t crack. When tying them, leave the knot loose enough to untwist under excessive strain if an animal bursts through, rather than have the wire break, and/or cut through the end insulator. It is easier to re-tie the wire back on to the insulator than to repair a broken wire. Also, a wire that has broken through stretching has lost its spring, so is damaged and will break again more easily and rust sooner because the galvanising fractures and lifts from the steel.

Line Insulators

Designs should allow attaching with two loose staples, have a smooth surface, a tracking distance of at least 25 mm (1”) and a straight distance of about 12 mm to any mounting or potential leakage point. A long tracking distance eliminates arcing problems from high-powered energisers.

At a glance, this insulator looks OK, but fails, and the staples have been driven in much too tightly. Tightly stapled insulators are more inclined to break or tear off under pressure - and to leak. Even in dry weather at 3 pm, all these

insulators, on two farms, were leaking so badly that loud cracks could be heard 10 metres from each.

Small insulators, which allow leakage through and around them, are expensive disasters and nullify the effect of high-power. Use top quality insulators of near-permanent materials from reputable companies. Some companies have made and sold garbage. Small ones held on with only one vertical staple are the worst at leaking, especially after bird droppings, spider webs or sea spray cover them. The saving in using them is only a fraction of a cent per metre of fence, while the loss of production and your time could add up to thousands of dollars. I've seen these replaced three times with similar new ones - the old three still hanging on the fence. How much does it take for some people to learn. I've seen 300 metres of new five-wire, all-live sheep fence running down to the sea, lower the voltage to a useless low level through salt leakage, even when a 12 joule energiser was used. After a shower of rain, the voltage was almost zero. Proper insulators (good black pinlocks) would have lost little power and cost little more.

Sea air and salt on a live/earth, high-power fence using fibreglass, lowered voltage excessively. Fibreglass is an excellent insulator, but when covered with salt and with live and earth wires about 150 mm (6 inches) apart, it still has difficulty. Good insulators with a 25 mm tracking distance would increase the total tracking distance to nearly 200 mm (30% more) and give a broken surface, which helps reduce tracking. Don't confuse a broken track with a corrugated one, as on some insulators. The corrugations can fill with dirt and then, when wet, short badly.

Dead wires can become live through induction from live wires on the same fence. All electric fence energiser earth wires have current flowing through them, so use double-insulated cable from the fence to the earth (ground) system. Grass and weeds touching live and dead wires simultaneously can make the dead wires live.

The safest insurance against troughs and gateways becoming live is to earth all except live wires on all fences. This can be done by tying the easier soft (not high tensile) wires around the dead wires at each end post and pushing the end into the ground. Clamps need not be used because it is usually only low power-induced current being earthed. Four mm (8 gauge) wire is the easiest to use for this, and will last longest in corrosive soils. To ensure that troughs don't become live, place a length of 4 mm wire into the bottom of the water, then over the edge and into the ground. Do this even to troughs away from fences, because leaked electricity from poor insulators and/or vegetation can flow across the surface of the ground, especially after rain falls on dry soils, then through an animal, into the water, through the pipe, and to the energiser.

Single-stapled, short-track insulators and tube insulators can leak to posts and dead wires, so should not be used. Spiders and moisture in tube insulators corrode wires and allow current to leak when wet. They wear through and shorts in them are hard to find.

Another fault of single staple insulators is that it takes only a knock for them to pop out, because both legs of the staple are vertical, so create a split in the post. The best insulators are 'pinlocks' held on by two horizontally driven staples, because most don't leak, and they allow the wire to be let down if necessary. They last longer and, if stapled correctly, don't come off posts. However, green ones do leak and can be heard clicking into CCA treated posts.

Pinlock insulators eliminate the arcing possibilities of high-powered energisers, and there is no possibility of metal-to-metal shorting, even after many years, or because of being

overstrained, or after wind chatter effects, which wear through tubes. Shocks in farm dairies can be caused by overloading the earth system from current flow caused by leakage from poor insulators and vegetation growing and touching the live wires.

Wire Offsets With Pinlock Insulators

Fit these to all conventional fences because they will make non-electrified fences last longer and be more stock proof, and give power to connect to when block grazing. Use ones which attach to the fence wires (NOT to posts) because wires are more flexible and offsets are less likely to be torn off by machinery and don't fall off the post after it dries and staples pop out. The wire can be disconnected and attached to a pinlock insulator under tension, without removing the bracket, and when in position, the wire can't come out. Being flexible, they don't injure animals that crash into them or rub on them if there is no power on the fence. Offsets stop animals "walking" the fence and making footpaths which grow weeds and erode. The most economical way of doing this is to take an existing wire off the fence and place it on offsets. Separate insulators on offsets can be easily replaced 20 years later if necessary. While a particular item may cost 10% less, the percentage saving on the whole job may be only 0.1%, but the inferior product could mean earlier and frequent maintenance, leading to frustration with the system.

Hot-Dipped Double-Galvanised Joint Clamps

These give good conductivity of the pulse, which is essential. A wire twisted around another is useless when it comes to conducting sufficient energy to control animals. Initially, the twisted join will be reasonable, but deterioration of the join occurs with sparking and the film which forms on the wire. The power loss in a loose connection is so great that, after only five unclamped joints, the shock is noticeably lower. Many farmers have increased their voltage at the end of their fence lines by 100% just by using a few dozen joint clamps. Clamp all joints firmly and tighten them every year in hot weather when they are expanded.

When erecting a power fence (PF), remember that you have become an electrician; you are not only erecting a fence, you are also erecting power lines. So, to transmit power without resistance, all joints must be well-tied figure of eight or reef knots, or be clamped firmly with strong, galvanised clamps. Use only hot-dipped galvanised ones, specifically designed to give good connections and to last in the field - not electroplated ones which rust within a few years. Some old style joint clamps have been difficult to use. Improved ones are available.

Connect Wires in Parallel

This helps conduct high-power, because, as with water, the more wires the power has to travel down, the less resistance. Connect wires in parallel at both ends of strains on main lines. This will ensure maximum power to the end of the fence. Cross fences should not be coupled in parallel at the far end, because doing so makes it hard to find faults on that fence, there is little benefit, and because the bottom one or multi-wires on sheep fences may have to be disconnected during fast growth of vegetation.

Underground and Leadout Cables

These should be double-insulated to increases their life and reduce plastic cracking and leaking, which occurs more with single-insulated cable. To allow power to continue down the

farm when a gate is open, undergate cable should be laid in 12 mm plastic water piping under the gateways, at the same time as burying the animal drinking water pipe. To pull it through the plastic piping, push high tensile wire (with the end folded back tightly) through first and then use it to pull the cable through. On large farms with multi-wire electrified fences, use double-insulated, 3.15 mm aluminium cable to conduct the same amount of power as the fence does.

Flexible Connectors

Bottom electrified wires which are low should use these for disconnecting them during floods and heavy pasture growth, to reduce the drain on the fence, and during calving, lambing, kidding and fawning. During these periods, stock pressure on the fence is not high and newly born animals should not be subjected to unnecessary shocks. With sheep, goats and pigs, the bottom wire should be no more than 150 mm (6”) from the ground, and it should follow the contour of the ground. In some cases, once stock are trained, the bottom wires of multi-wire fences can be left disconnected most of the time, but the option should be there, so they can be connected if necessary.

Once grass touches the bottom wires, it becomes electrified and stock won’t eat it, so it keeps growing and shorts the fence out. When closed for hay or silage, all wires which could have grass touching them should be disconnected. The leakage causes current flows in the area and back to the earth system, which loads it and increases the likelihood of current flowing through water troughs, dairies and other buildings. It also lowers the voltage, which then reduces the overall “browning-off” ability of the fence, which then results in more leakage. Browning-off is where the current flow from high-power energisers kills leaves and dries them out, making them less conductive.

Flexible spring connectors give a reasonably good contact, but are best not used on the main line, nor where voltage monitors and energiser controllers are used. For bottom wires on cross fences, which may need disconnecting once or twice a year, they are ideal and save a bit of money.

Pasture Under Fences

Bottom wires should always be able to be disconnected with insulated, flexible spring connectors or the more expensive switches, after the grass touches the bottom wire. Where there are predators, boundary fence bottom wires should not be disconnected, except in some cases during the day while being grazed.

Increase the stocking rate so that animals graze pastures closer to fences before any touches the fence, becomes live and won’t be grazed.

Sprays which kill everything should not be used, because of cracks which form in the bare soil in clays in dry weather (I've seen fences falling over because of these cracks), possible erosion on hills, and because weeds will grow there after a while which can be stemmy so even harder to control. If essential, use a desiccant such as Paraquat, which kills grasses and only knocks clover, which grow better after it because the competition from the grass is removed. Clovers are less likely to reach the fence.

On small farms a hand-held, motor-driven weed-eater can do a lot in a day.

Over time, pasture will grow less and less under live wires because the area doesn’t get animal manure, hoof action or compaction (some is good), so it ends up higher than adjacent ground and becomes drier. Animals soon learn to not lift their tails near electric fences (the wind can blow tails onto hot wires), so they keep further away from them.

Permanent Wire Strainers

Buy the best ones, not the first one you see or those you've used for years. There are new, improved, simple, low cost ones which allow the tensioning of existing wires, without having to cut them, joining broken wires by unwinding them and providing enough wire for the join before tightening the permanent wire strainer again, and to save time doing the above and re-tensioning fences after a decade or so. Don't wind them up too tight. Power fencing wires must be only tight enough to not sag too low in the heat.

When erecting an electric fence, you are putting up a flexible psychological barrier, not a physical barrier, therefore the tension need only be sufficient to look neat. In fact, stock have greater difficulty getting through a correctly tightened power fence because the wires move with the animal and give them the shock which occurs every second, whereas wires with over 90 kg (200 lb) tension may allow the animal to slip through before getting a shock.

Correctly tensioned wires will also last longer. Much of the rusting of non-electrified, galvanised wires is caused by over tensioning to achieve animal control, and by animal pressure stretching wires, causing the galvanising to lift from the steel core because their stretch rates are different. There is no need for this to happen with correctly tensioned PF. Tie the end insulators so that the knot unties, rather than break the wire or insulator if animals or machinery hits wires, or ice pushes the fence to the ground.

Permanent Tension Springs

These allow snow and freeze load to occur on wires, without over-stretching and damaging the wires or use let down fences, especially where snow drifts could occur. Also, use strong insulators, such as Pinlocks, that are strong with easy-to-release wires, prior to winter snow and at other times. Space supports closer than the maximum to reduce the load on insulators.

Prepare Fence Lines

Make the fence area smooth and clean to make fencing easier, with fewer dips and hollows, and longer lasting, without trees falling over them, rain washing them out, etc. Sow pasture seed over bare areas.

Clean up Afterwards to Avoid Shorts

Old, rusty wires shorting fences are hard to find in long grass. Remove all old fences and wires completely to avoid future short circuits to ground.

Visibility is Important

Animals soon learn that electric fences are things to be avoided - provided they can see them. To improve visibility and reduce break-throughs, use 2.5 mm galvanised wire for permanent fencing, and high-conductive (ample number of highly conductive metal wires), predominantly white polywire for temporary. Both give the most benefit at night when most break-throughs occur, many times just because some animals can't see the fence. Some use 1.6 mm (16 gauge) galvanised wire to save money. It is not as visible and only half as conductive as 2.5 mm, so is sometimes okay for cross fences, but not for lanes where the power is being conducted to the back of a big farm.

Before buying polywire, check its conductivity. The lower the Ohm figure, the better it is, but the conducting wires must also last - some don't. If unsure, ask users and ask SEVERAL

stores about which product sells the most (be careful if it is also the cheapest) and which one users like the best.

Rather than have an insulator at the end of the polywire, remove the stainless steel strands at the end of the polywire and make a loop to attach to the non-electrified fence. If power has to flow down the polywire from the far end, then, holding the insulated bared end, wrap the conductive part around the live wire twice for a good contact, and tie the end to a post or make a bow.

Try to avoid-

- Rolling in polywire with a large insulator on the end, because it snags in the grass, will stretch the polywire and shorten its life.
- Winding the wire in through pigtails or treadins, because doing so will cut through the insulation.
- Leaving polywire anywhere stock can chew it when not electrified, because they'll ruin it.
- Allowing polywire to short on to steel, because doing so melts the stainless steel strands. Even lying and shorting onto the ground can melt the stainless steel strands.
- Leaving polywire where the sun can shorten its life.

Have a Training Paddock

Train animals to power fencing. Placing electrified offsets on existing, electrified or ‘old fashioned’ fences around a paddock helps train animals to electric fences. Allow time and space to train any new animals. If necessary, disconnect the rest of the farm so that the shock in the training paddock is as higher. One severe shock is never forgotten, a light tingle is. If the soil is dry, use an earth return fence.

Animal’s bad habits don't have to be broken if they are not allowed to develop, so obey the electric fencing rules and your animals will too. High-power, good fence design and good products discourage bad habits forming.

Lightning

Lightning can be a main cause of energiser failure in some areas, caused by strikes on fences and on the power supply system. Before a storm hits, unplug and disconnect energisers (and computers, etc.). Don’t do this during a storm when you should keep away from them, telephones, fences and trees. Get off and away from tractors with steel in the ground. If hydraulic, lift the implement. Being in a large, safe building is best, unless it has a poor lightning arrestor with insufficient grounding, because it can attract lightning, but be unable to get it to ground quickly enough.

A lightning diverter, also called a lightning arrestor, should be installed. These allow the power surge to go to earth rather than through the energizer and its earth.

Lightning fuses should also be used by plugging them into the mains power point and plugging susceptible items into them.

Lightning flashes are initiated when the electric fields in clouds exceed the breakdown strength of the ambient air and a progressive spark breakdown commences. At this point, the discharge occurs and a return current is initiated from the ground upwards. Currents of a strike are between 1,000 and 200,000 amps. Light bulbs are usually between 50 and 150 amps.

The long distances of electric fencing now used increase the chance of a lightning strike,

so an effective protective system should be used. Also, lightning often hits the power supply line and goes through the energiser to its ground system, blowing its fuse or components. The mains power (utility) supply earth system should be good enough to attract the lightning rather than have it go through the energiser to its ground.

Many modern electric fence energisers include diodes in the output circuit, connected either in series or in parallel with the output transformer. Apparently these diodes (assuming their maximum voltage ratings are not exceeded) are more effective at blocking lightning by making the strike go across the energiser spark gaps, if the energiser is negatively pulsed. This creates a condition where spark gaps can operate and give greater protection of output diodes. If an energiser has no diodes in the output circuit, there will be little practical difference in lightning resistance between a positive and negative pulse energiser.

Energizer earth systems, because they are substantial, can attract lightning, so ensure that it is at least 10 metres from the mains power supply earth, because it, and your appliances, could be adversely affected by the lightning attracted to the Energizer earth system.

There have been cases where, after installing a lightning arrestor to a building, the building - never previously struck - got struck, but without damage because of the arrestor.

In lightning areas, install lightning diverters to the fence at damp points on the farm where a good earth can be obtained, and one at least 15 metres from the energiser earth system. In bad lightning areas, have the top wire of fences earthed to independent earth systems in damp areas along the fence lines, but don’t connect it to the energiser earth system.

Earth systems for lightning diverters, if built in a large six metre square with one in the centre, apparently conduct more current as a bolt, than when in a straight line. Bentonite earthing around each stake also helps, however, no earthing system guarantees complete protection. In bad lightning areas, earthing the top wire into a good earth every hundred or so metres helps.

Regular Maintenance Saves Work

Spend a little time regularly on maintenance, and remember that maintenance starts with the correct installation as described above. Remember that short cuts in fence design and construction can mean more work in the future - fault finding. PF saves and earns thousands of dollars, but don't skimp on it or it will end up being more expensive in time and maintenance.

Voltage monitors developed in 1980, enable farmers to see from their energiser the voltage they have at remote areas on their farm. This system gave electric fence owners a considerable advantage over those with non-electrified fences, in that warnings were given of slips, fallen trees and broken fences. New monitoring systems are superior to the earlier ones and can even telephone the farmer about fence problems and if the water level is low in a reservoir.

Check Mains Earth (ground) System

Check your mains power supply earth and ensure that its connections are tight and that it is not in a dry soil. Also check the complete energizer earth system every year for looseness and corrosion, and replace rusty wire, especially on the earth system, because rust is a poor conductor and the earth system has the biggest job to do.

Don’t switch off the energiser

Don’t switch off the energiser or any sections of the fence for long periods, or browning-off of the grass will cease, and because, if the animals get a shock every time they touch a wire, they learn to respect all fences, and control becomes easier.

Tumblewheels

These allow the mover to go to one end of a temporary fence and pull the fence across on an angle, without the stock having to be moved out, or getting over the fence. Developed by veteran inventor and Taranaki farmer, Sandy Chesswas, it incorporates a patented automatic disc switch in the centre of six aluminium legs. Automatically, the top four remain live, and the bottom two on which it rests are disconnected, as it is rolled across the paddock.

Deer

It is over capitalising that has removed profitability from many farms, so a wise move is to use PF wherever possible, to avoid this. The use of PF for deer has a bright future, because the material and erection savings in a fence up to two metres are substantial compared with netting fences, although the latter may be necessary on boundaries. They can be improved by adding an offset live wire.

It is important to not skimp on quality of PF materials or to avoid a complete system i.e., correct earthing, adequate numbers of cut-out switches, double galvanised joint clamps, etc. Deer, sheep and goats require a high-powered shock to control them. A shoddy fence will not give this.

Fence Design for Deer

Deer panic easily, move quickly and can jump high and far, but good PF design contains them. Adding offset brackets gives even better control, because it makes them stand back from the fence. Some bucks can jump over a normal height fence (1.3 m) from a standing start. The way to prevent this is to have an electrified wire on an offset bracket 300 mm out from the fence, so that the buck has to stand back from the fence. One on the other side too will keep the attractive doe or aggressive buck a little further away and so discourage contact, fighting and jumping.

Silver reflective (aluminium) strips or wide polytape help. Deer sniff or lick them and get a severe shock through the head (it won't kill them) and they then keep away.

Netting fences have entangled deer when they have tried to reach through to graze on the other side, especially when they have horns. Electrified offsets prevent them from doing this.

It is also advisable to increase the height of fences where bucks are to be kept away from hinds against their will. An insulated extension (Insultimber or fibreglass) nailed or tied to the top of a fence to support more wires is easy and effective in adding height to existing fences.

Remember that power fencing is a visual and fear barrier, not a physical one.

Training Deer

Deer must be trained so that they don't get out and damage fences, or worse still, damage themselves, as has happened - sometimes fatally. Being one of the smartest animals, they are easily trained to power fencing, but their intelligence must be remembered when designing and laying out the fences.

Training newly purchased deer to power fencing is crucial, so a handy paddock with two metre high conventional fencing and an electrified offset wire is essential. The cost is little for offset brackets set at about 15 metres apart and a single wire.

Use offsets with proper insulators, which can be changed if necessary. Tubing over wire offsets has been known to fail within seven months and the faults are hard to find inside tubing.

High-Power

Most failures in controlling animals, especially deer, occur when the shock is inadequate (below 3,000 volts). Large deer farms may require a high-powered energiser of 20 joules or more, and to build and maintain fences to allow this energy to be available on all fences. Poor connections or inadequate earthing (grounding) can be a cause of animals not respecting fences.

If your animals are getting out, check the earth first, followed by the joint clamps on the whole fence from the energiser to the back of the farm, and at the same time look for shorts.

Bare areas around gateways become dry and non-conductive, so deer don't get a shock. They also erode in wind and rain. Pasture damage around gateways and in corners is easily prevented by using a live predominantly white (ultra visible) polywire or tape strung around the area.

Fawning

During fawning, and for a month after, it is advisable to have the bottom wire of fawning paddock fences disconnected by using a flexible connector, so that fawns don't get a shock and run a long distance away - disastrous if it is half way through the fence when it gets the shock.

Keeping wild deer out

This can be difficult even with power fencing. The problems can be that they have not been trained to shocks and that they don't see the fence. These two factors then result in damaged fences. The information in this chapter on fencing, especially on offsets and angle fences, helps. Fences built on a slope from vertical help achieve this because the deer look at it and find it difficult to work out its height and width before jumping, so don't. Adding offset brackets to vertical fences helps achieve the same thing. An angle fence may seem difficult to build, but once mastered, is not all that hard.

Silver reflective (aluminium) strips every 10 metres which they sniff or lick and get a severe shock through the head (it won't kill them) help.

Wild deer can run through new fences and damage them. However, if they are of 2.5 mm (12.5 g) high tensile wire and not too tight, with posts well apart, and not too many wires, the fences are less likely to be damaged extensively and will be easier to repair. Deer are territorial so will continue trying to graze areas previously grazed and may take a while to finally keep out. Never erect fences or parts of them without electrifying them and having training strips.

To keep deer out one needs -

- High-power, low impedance energisers, maintaining at least 3,000 volts on the whole fence.
- At least five wires, about two metres high.
- A wide offset bracket with a wire to create a wide looking fence which is not as easy to jump as a narrow one.
- Something they like can be laid under the fence so when they eat it they get a shock.

- Silver reflective (aluminium) strips or wide polytape which they lick out of inquisitiveness and get a severe shock through the head (it won't kill them).
- Grassed, dampish areas where they stand to touch the fence, not dry non-conductive soil. Erect new fences in damp weather, not in dry weather.
- A clear area so they see the fence.

The area next to the fence should be clear of brush, scrub and tree growth so that they see the fence. Deer panic easily, so if they are forced into an electric fence by their not seeing it, or by others coming behind and pushing them into it, they can panic and damage the fence in seconds. The other wild deer in the group then all storm through. The first one may get a shock, while others are unlikely to get one, so the next day when they come back for more of your highly palatable ryegrass, the shocked one may hold back, but another will lead and go through with the same performance, wrecking your fence every day. Deer usually arrive at dusk, so being in the paddock may slow them down in time to get a shock.

Use an energiser which monitors the system and warns you of problems, so if the voltage drops you can get there quickly to fix it. You will save a lot of money using PF, don’t waste it all by allowing the system to fail.

Always have wire cutting pliers handy to cut animals free, and an energiser remote controller or cutout switches to switch the fence off from wherever you are.

Goats

The increase in the number of goats being farmed is attracting the attention of forestry conservators, because, in the past, goats climbed out over conventional fences and became wild in forests. They then multiplied and caused severe plant damage and soil erosion in camping areas and on footpaths.

Warnings are rightly being given about what goats can do regarding erosion and tree damage. In Taiwan, they were only allowed on flat land, until New Zealand power fencing enabled sufficient paddocks to be made to keep rotating them, and to prevent prolonged camping and the development of paths up and down hills, which heavy rain can turn into gullies.

Man is quick to blame the weather or animals for mistakes he makes. We have ownership and control over our land, so are responsible for what domestic animals do to it and for its conservation. If there was no high-power fencing, one could be sympathetic to people not being able control goats, but when modern electric fencing can be erected so easily, there is no excuse for land abuse through lack of animal control. Footpaths, followed by erosion, occur when paddocks are large and there are insufficient paddocks to keep the goats on a reasonably fast rotation.

Fences should not be constructed straight up and down hillsides, but on an angle to the slope, so that water runs through the fence, not down footpaths on the side of fences.

Tree protection is simple with four posts (two if it is next to a fence) and four off cuts of wire. Subdivision should be planned to go via tree areas so that they can be protected.

Eroding areas can be fenced to exclude animals and allow grasses to re-establish.

Goats are notoriously good fence negotiators and have a strong wander lust - partly because of their browsing nature, and partly because their early development was in arid areas where they had to roam for miles to get enough to sustain themselves. There is no reason why

goats should escape with today's high-power fencing.

Goats are possibly the first animals domesticated, being referred to since the earliest Egyptian, Greek and Roman times. This may account for their tameness and intelligence.

They are easy to herd and, even today, are still tended this way in many countries, including in their country of origin, Turkey.

In New Zealand where we have no surplus labour on farms to herd animals, and where there can be valuable crops on one side of the fence and goats on the other, fences have to give 100% control. Electrified offset wires have been a great benefit in making conventional fences goat proof, and in extending the fence's life.

Goats are naturally well insulated with their long, dry hair, dry skin and long bone hooves, so they need a more powerful energiser to give them a good shock, to maintain control. Dogs, on the other hand, are the opposite, in that many have short hair and soft flat feet, which give good contact with the soil. To keep control of hard-to-control animals like goats, all rules of power fencing must be carried out and at least 3,000 volts kept on all fences. The recommendation of keeping all fences electrified applies especially with goats, because they seem able to sense when the power is off.

We grazed mohair and milking goats on our second farm, and my clients have too. We trained them to high power in a small paddock with four wires with all other wires disconnected to ensure a powerful shock. One shock plus a reminder taught them. They were smart though, because if the fence was off, they seemed to be able to hear and would go through if they wanted to. Newly born kids had to be trained, so we kept them behind mesh until a few weeks old and then trained them.

We used high power from 1960 to 1987 and never hand any entangled, but low power users and leaking fences that lacked severe shocks did have this occur.

Unlike cows, goats notice if another gets a shock and they also notice if they don't, so if one goes through without a shock, others will follow, wires will be stretched (not to mention human tempers) and sag and control can be lost.

With goats, sheep and pigs, the bottom wire should be no more than 150 mm (6") from the ground, and it should follow the contour of the ground.

During kidding, stock pressure on the fence is usually not high, because ample feed should be available. Newly born kids should not be subjected to unnecessary shocks, so bottom wires should be disconnected with flexible connectors.

Netting fences have entangled goats when they have tried to reach through to graze on the other side of the fence, especially when goats have horns. Electrified offsets can prevent them from doing this.

Some bucks can jump over a normal height fence from a standing start. The way to prevent this is to have an electrified wire on an offset bracket 300 mm (1') out from the fence, so that the buck has to stand back from the fence. One on the other side too will keep the attractive doe or aggressive buck a little further away and so discourage contact, fighting and jumping.

It is also advisable to increase the height of fences where bucks are to be kept against their will. An insulated height extension, or fibreglass stapled or tied to the top of a fence to support more wires, is easy and effective.

Horses

See 'Horses', a chapter dedicated to horses.

Pigs

As is known, these animals are intelligent, so they plan their movements. Farmers have seen some stand and look at a fence erected to keep them out of a crop, start screaming, then charge the fence and get through - almost always underneath, However, this is usually with low power chargers and is seldom done by pigs trained to high-power low impedance energisers. Once trained to a good shock, they are easier to control, but if temptation in the form of attractive feed is just through the fence, they will be continually tempted to try and get through, especially if they have tasted the crop. This is again a case of avoiding having to break bad habits, which can be caused by pigs getting into the crop before the fence has been erected, the power being off, low power, bad fence design, crop growing through the fence, etc.

Sowing tempting crops a few metres back from the fence helps, and the bottom wire should be no more than 150 mm (6”) from the ground, and follow its contour exactly. If piglets are being controlled, the bottom wire may have to be lower.

When confined to small areas, pigs are inclined to kill the pasture. If the soil then becomes dry and/or is non-conductive, it can be so insulating that even 4,000 volts at the fence, when measured to a good earth, can be only about 1,000 to the dry soil, so pigs get through.

Solutions to the killing of pasture are: to use an offset wire to make the fence wider and prevent the pasture under the real fence from being killed; to keep the area moist; to have a movable temporary fence to allow resowing of pasture under the fence; and to rotate the pigs between paddocks so that they don’t kill the pasture.

Rabbits

Four electrified wires, spaced at 80, 90, 100 and 110 mm from the ground on vertical supports, achieves control. Angle fences were used in the beginning with the slope facing the infestation, but it has been found that a vertical fence does just as well and is easier to erect and maintain. As with other wild life, high-power and at least 4,000 volts are necessary.

Wild Dogs, Wolves, Dingoes & Coyotes

The recurring problems that these can cause can be reduced or even eliminated by erecting five-wire, high-power, electrified boundary fences. Where fences already exist, adding an offset bracket with a live wire 15 cm (6”) above the ground can do the trick.

A lifestyle block initially had dog problems every few months. After constructing a five-wire, electrified fence around the whole property, 99% dog control was achieved. The only dog to get through the fence must have received the 5,000 volt shock, because it went no further than into the first paddock and then (going by the tracks) spent the night walking the fence trying to get back out. It had to be called and let out through a gate.

Dogs with their four soft padded feet are excellent conductors so get a severe shock, so are easier to control than hooved animals.

In USA, a reason for the decline in sheep numbers from 30 million a few decades ago to 13 million, are fencing costs and coyotes. Lambs in the USA fetch US$100 each, net to the farmer, so high-power multi-wire fences are viable to reduce losses.

Floating Fences

When an electrified wire or wires need to be run across water, either as a lead-out or to

control animals, plastic drums can be used as floats. Stabilising weights may have to sit in the bottoms to stop them rotating. Wet concrete poured in and allowed to set should do this.

Not all plastic is insulating, so screw a good insulator to the top.

When the water level drops, the drums will go down and still give a lead-out or fence. If the fence needs to be higher, use an extension which can be fibreglass bolted to the drum. Seal the bolt holes to avoid water entering.

Allow enough slack for high and low water. A long spring may be necessary on one or both ends to keep tension on the wire or wires.

Temporary Fencing or Block Grazing

Block grazing is the term now used for what is really 'controlled grazing', to get away from the term 'strip' because the squarer the paddock area is, the better. It reduces animal walking, gives more even grazing, reduces pasture damage, keeps animals warmer in cold, windy weather and uses shorter lengths of temporary or portable fencing, with reduced likelihood of breakthroughs.

Why block graze cattle, sheep, goats, deer, pigs & horses?

No dairy farmer questions the necessity for block grazing his cows, because they see the increased milk production, while fewer cattle, sheep, horse and deer farmers use this management system, which is easily achieved by having sufficient paddocks or using temporary fencing.

Block Grazing increases profits and improves pastures and fertility by-

- Grazing pastures at the most nutritious stage for maximum animal production.
- Allocating the best feed to the highest producing animals, or those being finished for market.
- Reducing the cost of weed control or eliminating weeds altogether.
- Saving labour when checking animals which are grouped.
- Improving stock management because of earlier and easier observations of any health problems when animals are grouped.
- Returning the animal manure evenly over the whole grazing area, rather than in camping areas. More will still be dropped around water troughs and gateways.
- Helping maintain the optimum grass/clover balance by lengthening the rotation for more grass, or shortening it for more clover.
- Preventing the grazing out of clovers and the smothering of clovers by long grass.
- Identifying surpluses and conserving them for hay or silage so that the grazed pasture remains.
- Using short duration grazing to minimise pasture damage.
- Saving pasture for flushing ewes and increasing lambing percentages.
- Rotationally grazing lambs, which then yield more meat and less fat.
- Rationing pastures to build up reserves (stockpiling) for anticipated lean periods.
- Regularly moving animals to new pasture, which quietens them.
- Conserving animal energy by reducing their aimless walking.
- Preventing the formation of footpaths.
- Making mustering easier.
- Using animals' hoof action to improve sod-bound pastures.

- Reducing parasite infestation by providing fresh pasture and reducing infested camping areas. The increased carrying capacity can negate this.
- Confining pasture damage during wet periods to small areas or sacrifice paddocks, which can be regrassed if necessary.
- Protecting crops, trees, eroding areas etc., from damage.
- Reducing ear tag losses because animals don't put their heads through electric fencing.
- Eliminating back grazing with back fences.
- Thorough and fast grazing of each paddock, which gives more rapid regrowth, enabling more animals to be grazed on the same number of hectares.
- Shortening the grazing and lengthening the growing periods.
- Increasing plant tillering and pasture density.
- The bottom line is that users make more profit.

Temporary fencing is the only way to economically achieve the many benefits possible.

Before starting to temporary fence animals new to it, train them in an area where they can learn with ample time and space. When temporary fencing goats and deer, use a reasonably high-powered energiser of ten joules or more and maintain at least 3,000 volts on all fences. If you have mains power on all fences around the farm, it is ideal, provided you have good connections and adequate power, otherwise use a one joule or higher battery energiser. Goats especially, are naturally well insulated with their long dry hair, dry skin and long bone hooves, so need a powerful energiser to give them a sufficient shock for good control.

Fence Easily

There are right and wrong ways of erecting temporary fencing for block grazing. The correct way is to take the reel in one hand, and the treadins (stepins in USA) in a carry bag or under the other arm, and go to the appropriate fence and tie the bared polywire to the wire or post or use an insulated grip designed to not catch in the grass when being rolled in.

Then walk across the paddock, unwinding the reel to the opposite fence. As you go, position the treadins, preferably on high and low places, to stop stock crawling under high wires or jumping over low wires. Hang the reel on the fence close to a post and wind up to the correct tension, avoiding stretching the polywire. Electrify the reel with a power connector.

When rolling up the temporary fence, go to the reel end, disconnect the power, take the reel and walk as you wind in the polywire, placing the treadins under your arm as you go.

If you happen to go to the Insulgrip end first, disconnect it and drop it on the ground, but remember that the polywire will be live. Collect the treadins as you walk or ride your Japanese quarter horse (farm bike) towards the reel.

Winding in the polywire with an Insulgrip on the end is easier than if there is a large insulator and wire hook on the end. Also, the Insulgrip doesn’t catch on the grass and weeds, which stretches the polywire.

There are mechanised labour-savers which mount onto ATVs to hold treadins and reels and even wind in the polywire.

Permanent Fencing

The reasons for permanent fencing include keeping animals in and out, and getting the best

out of pastures and grazed crops. Stones, wooden rails and pickets driven into the ground were the first barriers used over the years. Barbed wire was patented in USA in 1874, but should not be used in electrified fencing because of the danger of becoming entangled in it.

Before deciding on any fence positions and designs, plan your complete and ultimate layout. This means how you'd like things (herd size, lanes, water reticulation, ditches, shelter belts, buildings and fences) to be in the long term.

Allow for a wintering pad if you think it could be necessary, and plan it large enough for future herd sizes and for animals to lie down in a sheltered environment. Five square metres per dairy cow has been quoted, but closer to double this is required. Check with you animal welfare and SPCA people, as well as environment and private consultants. See the Pad plan.

Fencing is a comparatively low cost capital item which gives one of the best returns, has a snowballing effect on income, and yet is low on the list of some farmers priorities when planning and budgeting. Fencing is a management tool which reduces the cost of production by saving fertiliser, reducing weeds, improving pastures and by reducing the uneven distribution of fertility.

Ask farmers which is their best growing paddock and most will answer, "my smallest one." Ask them why and they'll say, "Because it is the most thoroughly grazed, gets the most even spread of animal manure, and has the shortest grazing period and the longest growing period" (termed "rest period" by some, but good pasture seldom rests during the growing season).

On most farms, the back paddocks are often the worst, usually because they are the biggest. They suffer from having stock left in them for too long, and become uneven through fertility transfer caused by camping.

Improving Soil Fertility & Pastures

When animals are not controlled, they graze selectively, transfer fertility to camping areas, create foot paths, back-graze re-growth and allow pastures to deteriorate. When controlled, they improve pastures. The back-grazing of young, fresh re-growth is bad for the pasture because it depletes root reserves, and bad for animals because of scouring from the yellow immature feed. Intensive subdivision reduces back-grazing, without having the extra work of using temporary back fencing. If block grazing is necessary and all fences are PF, it is easy to hook onto them.

Animal Security

Unfortunately, the theft of animals is now also of concern in many countries, so a demand for security fencing has developed. High-power fencing can be an excellent security fence. Stock thieves have been unsuccessful in getting animals to go through cut, electrified fences because the animals knew where the fence was and the shock it could give. With an alarm system, power fencing becomes a good security system. Many power fencing systems, some very sophisticated, are available and can pay for themselves in reducing theft, escaped, and entangled animals.

Animal breakouts are fewer with high-power fencing because animals don't apply pressure to fences all the time like they do to conventional fencing, and even if power fencing is damaged in storms, trained animals usually stay in their paddocks.

Weed Control

When paddocks are so large that animals have to be left in them for a long time, the uneven

grazing that occurs in large paddocks causes pasture deterioration and weeds not to be eaten. The result is that they multiply and have to be sprayed, or sometimes the paddocks have to be re-grassed, as has happened with thousands of hectares of gorse infested pastures in New Zealand.

Energisers

These are now built for every purpose and include ones which can be operated from a wide variety of power sources, including solar and wind power. The energisers for solar and wind power systems have been developed with economy in mind, and yet they still have a power output greater than many mains energisers. Battery energisers have been developed to the stage where some have more power than some mains energisers. They were developed for the vast areas of Malaysia, Kenya, Argentina and Australia, where mains power was not available, and where large wild animals need a severe shock to control them. These high-powered battery energisers drain the batteries fairly rapidly, so are best used where lighting plants or other regular battery charging facilities are available. In the 1980s, 200 km of power fences were erected in Malaysia every year, to keep elephants out of rubber and palm oil plantations. Low-powered energisers, trenches and log barricades had all previously failed to keep the elephants out. If these cunning animals can be controlled, then most can.

Safety standards require that energisers are installed as follows -

- Under cover, away from driving rain and moisture.
- Away from combustible material.
- No more than one energiser may be connected to any one fence at a time.
- If an overhead leadout wire is used, it should be clearly marked and local aerial operators should be notified of it presence.
- Electrified wires should avoid contacting other fences and overhead transmission lines.
- Local body approval must be obtained before using their poles as supports and before constructing any electrified fences near or across any public areas or thoroughfares.

Other Accessories

There are a host of accessories made to go with the modern PF, which, these days are near permanent, so use those which are of a permanent nature.

Be a Tidy Fencer

Clean up fence lines to avoid shorts, because old rusty wires shorting fences are hard to find in long grass. Remove all old fences and wires completely to avoid future shorts to ground.

Look at all the power fence companies' manuals. Each has something unique, but avoid cheap, low quality items like the green insulators that short so badly that one can hear them clicking.

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Have you read Part 1?