

This is independent practical information on sheep farming without commercial influences.

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New Zealand lambs, fed better in the 2011 season thanks to good pasture growth, finished two kg heavier, showing that like most NZ dairy farmers, too many animals are being carried on most farms in most years.

Before driving a car one has to study the road code and pass a test, but people are allowed to farm soils and animals without any knowledge. Don't try to do this with sheep, or even have some on a lifestyle property, without knowing what you are doing, because it can be costly and if done incorrectly, can be cruel, so illegal.

Those who know me might ask what I know about sheep. I studied sheep as part of a two year mixed agricultural course in South Africa in 1947/8. To pass I had to shear at least one sheep (a large merino nearly bigger than I was) and I worked on a 90 cow dairy and 500 sheep farm from the day after arriving in New Zealand in 1954. I have also consulted for sheep and beef farmers in NZ, USA, Switzerland and Slovenia, and still do. Some have benefited tremendously. I helped a very big sheep farm fix several severe problems.

Australia has the most sheep in the world, New Zealand second most and South Africa third, so, when farming, agricultural consulting or working in these three countries, one learns more about sheep than a farmer on one farm all day, every day.

The larger sheep farmers in New Zealand in the 1950s were "barons", with the most profitable ones doing very well just from wool. Now, however, wool is not enough, because of the poor marketing - have you seen any? The result is comparatively low wool returns, partly caused by good marketing of synthetics, and partly by high costs, including LimeMagPlus transported and spread, fertiliser and shearing costs, so some farmers have to shear their own, and have little money for fertiliser, and have not learned what LimeMagPlus is.

Except for Merinos and similar, breeding lambs became more profitable, partly because people are now more than ever seeking healthy foods, so the future for pasture fed lamb meat looks brighter, unless sold into China at half the price received in the UK! Now their biggest disaster is that the same amount of lamb that UK buys is being sold to China, but at half the price.

Wool can be partly replaced by synthetics, but meat can't be replaced. To promote and sell it see Omega-3 and Conjugated Linoleic Acid on page 2.

Hobby farmers and lifestylers

When owning a hectare or two of land around your home, the obvious thought is to use sheep to control the grass and supply meat. Controlling the sheep is the first problem. The second is protecting them from dogs and two legged thieves, which is even harder.

The boundary fence should be NZ high power sheep proof and preferably dog proof by having an offset high power electrified wire about 15 cm above the ground. Read the Fencing chapters.

From the Net -

1. My six sheep are driving me mad!! They have no respect for three wire 'low power' electric fence as they just use their fleece to insulate themselves and walk through or under it. The two calves have not done this once, bless them.
2. There are some sheep down the road that are kept behind the electrified plastic mesh that seems to do the trick. We didn't have success with tape electric fences controlling our sheep.
3. A roll of electrified netting with plasticised string and fine strands of metal wire woven in and plastic standards with spikes that you push into the ground works well. This is not permanent, but is easy to move and keep the sheep where we want them and out of the garden and away from orchard trees. Sheep can kill young trees. High power is still necessary. See the high power fencing adverts.

Tips

Use a high power fence unit and have a perfect earth system as described in Fencing. A shallow (less than two metres deep) and fewer than three galvanised 25 mm pipes, will not allow the required amount of current (shock) to flow back to the energiser (charger) and through wool.

Train sheep to high power fencing after shearing.

Sheep love pelleted concentrates which makes them easy to tame and move by having them in the same bucket or bag on your waist, to free your hands for moving the fence.

Training them in rain helps.

The shock must be so severe that they never forget it.

Never feed Palm Kernel Extract or meal (PKE) to sheep, because of its high copper content. It also has toxic levels of manganese. Too much PKE for too long has killed cattle in New Zealand and Australia.

Cooking lamb

A problem sheep farmers have in selling their meat to new markets is teaching people how to cook and eat it. Sheep meat has a distinctive odour and flavour, which those unfamiliar with it can reject - especially if boiled. Most tastes which people like are acquired ones, so nations brought up on lamb love it, while some others dislike it. Pasture reared lamb has an even stronger flavour, which, for those who like it, is one reason why they (for example the British) buy New Zealand lamb. Another reason is New Zealand's consistent excellent quality.

The smell from mutton boiled in a small kitchen can put people new to it off for life. Barbequed in the open, it can be the most delicious meat. We eat meat and fish regularly and our favourite by far is Lamb Racks (small chops from lambs, not older sheep) cooked in our oven with its expellair going. When hot, they are just the best, but they keep in the fridge and are enjoyable cold for a week - if kept in the fridge.



At a farmer field day that I ran in Japan, we barbequed New Zealand mutton (old ewe!) on sheets of steel over burning logs. 99% of the Japanese would never have tasted it before, so it wasn't a previously acquired taste, but they relished it and asked if it was a special delicacy in New Zealand. When I replied that it was a commonly eaten meat, they all said they were coming to New Zealand!

We don't know why, but chops are much easier to eat and chew if held by the bone 'handle' and bitten off in small pieces, rather than chewing pieces cut off with a knife.

These frozen lamb racks on the left have been here on the edge of the kitchen sink over night to thaw before cooking. They must be completely thawed. If cooked while still even a little frozen, they could end up tough to eat. Correctly done, the meat melts in your mouth.

Note the rich red colour from getting enough selenium and free range green pasture.

A simple way of cooking lamb racks is to make sure that any thick layer of fat on the back has been removed (as shown in the photo), by either the butcher or the cook, then sprinkle salt on the backs of the racks (the smooth side) and roast them on a rack in the oven, at a temperature of 180 C in a fan assisted oven, for 20 minutes, then turn them over and cook for another 20 minutes. This gives well-cooked meat. If you prefer it pinker (less well cooked), reduce the time, down to a minimum of 15 minutes each side for rare meat, but lamb is best well cooked and is tender, so there is no fear of becoming tough. With pasture-fed meat, it's important not to overcook it. To keep it moist and tender you might need a good meat thermometer. See <http://eatwild.com>

Herbs can be used to change the flavour, and the growing and grazing of these is being researched. Mint sauce over lamb makes it even more delicious to some people.

In New Zealand sheep farming profits are not what they used to be, so all efficiencies are essential. Wool has the problem that in New Zealand, even with extremely efficient shearers shearing sheep at up to one a minute, wool costs nearly as much to shear as it earns, and many sheep farmers earn nothing on their investment. Successful ones are shearing their own sheep, and aiming to profit from both wool and lambs. A client in 2010, who is still doing well farming sheep, shears all his 1,500 ewes himself,

analyses his pasture minerals, applies Lime+© and fertilisers correctly, has cross breeds, etc.

New Zealand lamb farmers now receive only about 25% of the retail price, while in the UK farmers get 48%.

Pasture-fed lamb (and beef) are naturally high in Omega-3 and Conjugated Linoleic Acid (CLA). The Meat Research Institute of New Zealand (MIRINZ) found that lamb had twenty times more Omega-3 than chicken breast, and that levels in lamb were as high as commonly eaten species of fish.

MIRINZ analyses showed that lean pasture-fed NZ lamb and beef are low in saturated fat and cholesterol, and contain significant quantities of other fatty acids that are now known to be beneficial in lowering the risk of heart disease.

This useful information has not been promoted in daily papers by the lamb industry, so people don't know about it. The cost of promotional advertising is high, relative to the return, so the only way it can be achieved is by sheep farmers writing letters to newspapers and magazines. Some do so to the farming papers, which is good, because few lamb breeders know this, but the masses have to be told.

80% of the meat we eat is lamb racks (chops). When clients are with us from many countries (in 2007 two from USA, one from Australia and 17 from Japan), they rave over them. Some question our eating the fat, until I explain that lamb fat has most of the conjugated linoleic acid, almost no cadmium nor other toxins that older fats have, and gives energy, and is nowhere near as fattening as wheat.

Solutions

In the 1980s I made the following suggestion to get our meat back on the top shelf and profits back for farmers. If anyone believes that these suggestions **can't** be implemented, I would like to know exactly why not.

1. I read in the Hawaiian Range Newsletter that New Zealand prime beef has nearly 50% less fat than top grade Australian grain-finished beef and 60% less fat than American choice (grain-fed) beef. The article said New Zealand's has a stronger and better flavour (a bit closer to game meat, for which purchasers pay higher prices), and has a lower sodium content, because our pastures are low in sodium, and we don't feed any grain-based concentrates. The research was conducted on different cuts from a variety of animals.
2. New Zealand's also has lower cholesterol, because it doesn't have as much fat through it (no marbling) as does feedlot finished beef, and New Zealand's has health giving CLA. So why can't we promote these benefits in New Zealand and to the wealthy overseas consumers who are wanting low fat, low salt foods? See <http://eatwild.com>
3. Our sheep and lambs should be bred a little bigger (as well as leaner), to reduce the cost per kg of slaughtering, and to leave more meat on chops after the fat has been trimmed off. The cholesterol and sodium figures should be monitored, compared with competitors' lamb, and promoted for their health benefits of having high CLA, being free-range, pasture fed, etc.
4. New Zealand sheep (and beef) farmers should combine, to get away from marketers competing with each other for sales, which benefits the buyers and bankrupts the farmers, whose average profits return little on their investments, while others in the marketing industries make profits.
5. Countries, and some areas of large countries, should be franchised to our meat co-operatives to promote their meat "New Zealand low cholesterol, low salt" meats in restaurants, at prices above current ones. The patrons to whom we should be aiming our marketing look for something new and different when reading restaurant menus, and would bypass "porterhouse" and "wiener schnitzel", etc., to buy "New Zealand" cuts.
6. The meat industry should develop the whole Pacific market, where competition is lower, and where, if we could sell to the wealthy, we would not be able to keep up with the demand, at prices above those being received at present.
7. In the 1980s I suggested that our farmers do everything they can to start producing and promoting organically produced meat. The Greenies and consumers demanding it are the ones who will achieve more than GATT, and faster. We should not just be ready for the market, we should be leading it, because we can promote free range pasture fed animals, and use the Greenies colour in our promotion of clean, naturally produced meat, using a minimum of fuel. I don't know the figures for northern hemisphere lamb, but for beef in USA the June 2004 National Geographic Magazine revealed that producing a pound of beef took $\frac{3}{4}$ of a gallon of oil, which they showed came to 283 US gallons (1,100 litres) to produce a 1,250 pound (568 kg) steer. These figures were for all fuel

used, from making fertiliser, farming, to freighting. In New Zealand it would not be 100 litres per fully grown animal. The same cost would apply to each dairy cow in each country. Our meat and dairy industries should promote our low fuel use, to flatten the “food miles” misinformed stirrers who are just trying to protect their own inefficient farmers.

Time is getting short for farmers, and for New Zealand as a whole, while the meat industry continues with its losers' excuses. In 2015 beef pieces increased.

Slaughtering

Some people like tough meat. I and most people hate it. Lamb, which is supposed to be tender, can very occasionally be tough - by my standards. However, whenever we get lamb from a farmer who has had it home killed, it is more tender and more tasty than that bought in a supermarket. The same applies to beef direct from farmers.

After my asking farmers and home slaughterers (people who go to farms in a hygienic truck and do the whole operation on the farm), and my visiting abattoirs, the reason seems to be that the animals slaughtered on their home farms, in yards they know, are more relaxed than those trucked (in NZ usually for the first time ever), yarded in strange and different smelling yards, mixed with other animals, driven to the crucial point where they can smell blood.

If farmers had to eat abattoir produced meat they might work to get the problem fixed by looking at feeding tranquillisers, having more, smaller, abattoirs to reduce travel time, paddocks at abattoirs to allow relaxing, the use of chlorine or similar to eliminate the smell of blood, etc. The result would be an increase in meat consumption. It is known that if someone gets a tough piece of meat they avoid that product and supplier for a while.

Sheep are strongly gregarious so, if slaughtering only one, have another with it while fasting it over night to prevent it becoming stressed, but don't let it see the slaughtering or smell the blood.

Use a fresh place each time so that they don't smell the previous blood.

Live-weight to slaughtered-weight ratio

In early spring pasture mass is important, but at weaning quality is more important. A higher percentage of clover in perennial ryegrass pastures increases the live-weight to slaughtered weight ratio of lambs from about 45% to 50%. The optimum level of cobalt in the pasture is essential for young animal growth. The optimum zinc level in pasture fed to fast growing thin animals, helps to produce meat rather than fat.

Profiting from sheep

To profit from race horses you need keep only a few, but to profit from sheep you need to farm thousands. This means being geared for mass production and easy-care.

Aim for the best easy-care sheep (mark, and don't keep replacements from, ones that you have to help lamb or that have other problems), get more land (buy or lease) to keep increasing sheep numbers, try to sell lambs and old ewes direct to consumers, have some cattle to deworm paddocks, vary the type of worm drench, measure pasture tissue element levels annually, and correct them with complete balanced LimeMagPlus and organic fertilisers, calculate your fertiliser applications based on land values and growth responses achieved, keep clovers in pasture, keep pasture short, green and growing for as long as possible.

If land is cheap, buy more rather than fertilise too much (except for essential elements); if land is dear, fertilise it more.

Aim for optimum animal health. See below.

Sheep don't drink much water and mineral licks are eaten by only a few, so with sheep it is even more important to get pasture mineral and trace elements correct. See Pastures, Elements and Fertilisers.

Henry Swayze, in Vermont, USA, found that his sheep kept in a barn limited him to 50 ewes that had more footrot, coccidiosis, pneumonia and dirty wool than after I had him change to having them on pasture all year, from 1981, which allowed him to farm 150 ewes. His controlled grazing, eating the weeds and returning the animal manure to pastures, produced clover-rich pastures.

FlockMaster

From the 1990s I wrote software in spreadsheet form, mostly to help dairy farmers be more efficient, so was asked to help Meat & Wool NZ develop FlockMaster, which is software to help sheep farmers identify areas for improvement. Sheep farmers enter their figures and the computer tells them what they could produce, so they have figures for which to aim. FlockMaster aims to help increase net profits by encouraging monitoring, diagnosing and doing. Experiences from successful sheep farmers are also included.

As I've written several times in articles and in GrazingInfo, farmers without figures, don't know where they are, or what to aim for.

A Meat & Wool New Zealand survey of 3,000 sheep farmers in 2004 revealed that 70% of NZ sheep farmers were unhappy with their 'productivity' (lambing percentage and wool yields). This is despite NZ sheep farmers having increased the lambing percentage and the lamb weights from 15 to 20 kg over recent decades. However, most of the increase would have come from about 20% of the farmers.

If you get FlockMaster, women and school children are often better at entering the farm information and keeping it up to date. When I suggested adding this suggestion to the FlockMaster they had found the same thing. A high percentage of readers and subscribers in GrazingInfo are women. Too many male farmers hope for a Silver Bullet, and even more believe crooked salesmen pushing low fertilising value, high cost products, for what they contain. Check the analyses in the Fertiliser Values spreadsheet and enter yours in it.

Breeding lamb and wool are now a little more profitable, partly because NZ lamb numbers have dropped substantially, and partly because people are seeking healthy foods more than ever, so the future of all meat looks brighter. It has meant that lime, trace elements and fertilisers can again be applied to improve productivity.

Health

Sheep are not as healthy and vigorous as cattle, so their health is early in this chapter. Good farmers will now exclaim that theirs are healthy, and there are many that are, but also many that are not.

Let's define health -

150% or better lambing rate. Some breeds can't do this, but correct crossing can help get there. The low wool price and high shearing costs mean that the income from lambs has become more important.

Fast growth for maximum size lambs at slaughter.

No Bearings (vaginal prolapse).

No hoof problems.

No facial eczema. Read how in Animal Health. Briefly, apply LimeMagPlus to increase earthworms, which then consume the sheep droppings (manure) to help stop the parasite cycle.

No parasite drenching. Read how in LimeMagPlus, Earthworms and other Fertilising.

No dags.

No other problems.

Most of the above are not strictly health or disease caused and can only be fixed with enough optimum pastures and correct mineral levels in pastures and in ewes.

As with all this GrazingInfo eBook, I welcome information to add to it, and corrections of typos and errors.

Autumn pasture is usually high in nitrates, because of the build up of N in the soil over the dry warm summer, then rain and the lack of sunshine in the shorter rainy autumn days. Farmers who fertilise with N in the autumn can have animal health disasters and scouring galore, and sometimes blame internal parasites. Scouring is from low selenium and or high manganese, as well as worms.

On dairy farms in the Waikato, when fall rain follows a long hot dry period and pasture shoots away, and is grazed while a few inches long, cows scour and get thin, and milk and milkfat percentage drop for about 10 days - despite getting more pasture.

The reason is the high moisture content, high nitrate and high potassium levels, and the sudden change of diet from dry summer feed to lush feed after rain. Scouring is because the rumen is unable to cope with it until it adapts (microflora changes). The same can happen in lush pastures in spring after snow thaws, accentuated by the change from hay and silage to lush pasture. Changing the diet gradually

is imperative.

Silage for sheep needs a low pH of about 4.0 to prevent health problems, such as mould and listeria. See below.

Toppings and dead grass at the base are a source of nutrients for fusarium and other fungi. Fusarium are free living and produce zearalenone which is a phyto-oestrogen ergovaline which adversely affects fertility. If deficient, adequate LimeMag and deficient trace elements applied six months before summer will reduce it.

Bearings (prolapsed vaginas)

The vagina, or, worse still, the uterus is pushed out. This is nasty to have to deal with, and it needs urgent veterinary attention, as the risks of infection are high. Causes are the pressure inside the ewe from large lambs (twins or more are worse), along with pressure from fat and a full rumen, especially if the ewe has fully fed on long (by sheep standards) lush green pasture or feed.

NZ King Country's John Fagan, a very successful sheep farmer and many times shearing champion, found that lambing earlier in late winter rather than spring, prevented ewes from getting too fat and having lambs too big to lamb easily, so causing bearing troubles. Be accurate with feed budgeting to avoid over-feeding.

Lambing earlier in winter in the NZ South Island to reduce bearings has to be balanced with the possibility of heavy snow and blizzards covering pasture too deeply to be able to eat and windchill killing lambs and even ewes. See Snow.

There is some evidence that bearing problems are partly stress related. Stress in various forms cause a lot more sicknesses than is often realised, especially when there is a health crash accentuated by a mineral imbalance. An example is human Swine Flu. Healthy people suffer only the typical flu symptoms and get better, while sick and very old people can die from it.

Salt reduces the incidence of bearings, especially when potassium is too high, which it often is in New Zealand, after using the typically wrong soil test figures, or some consultants and some fertiliser company recommendations, because they love selling potash at \$900 per 1,000 kg. Salt (sodium chloride) can replace some potassium chloride, and is only about \$220 per 1,000 kg.

Stress items affecting ewes, and possible solutions

1. Moving. Set stock them. No late drenching for anything stressful, no late scanning or other things requiring penning or moving. Sheep don't like being moved, so, if possible set stock them from a few weeks before lambing in paddocks with shelter, to reduce lamb deaths.
2. If it is possible that snow can occur that will cover pasture so deeply that sheep can't access it, have small bales of hay dotted around the paddocks where sheep are set-stocked. If it is not used it can be put back in barns. It then won't be as good, but better than hundreds of starving ewes and dead lambs. Yes, it is another cost in a declining profit industry, but cheaper than losing twice the value in deaths.
3. Hunger. Get feed allocation correct and consistent. Allocate more when cold and in wind chill.
4. Health problems. Health must be optimum in all ways - no parasites, excesses, deficiencies or stresses. Subclinical health effects must be avoided.
5. Mineral deficiencies or excesses. Correct mineral levels in pastures are essential. Avoid high potassium, manganese, phosphorus, copper, molybdenum, etc., and low magnesium, cobalt, selenium, sulphur, boron or iodine. See Feeding Minerals and the Beef chapter for animal health factors. See what correct mineral levels in pastures can do at the end of Beef, or the Poultry chapter.
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7. Ewes too fat. Lamb earlier (sooner) in late winter/early spring, but possible bad weather must be the main decider. Ewes scanned and carrying more than one lamb, then fed too much, are more susceptible. Both fatness and the twins can cause some stress and a health crash.

Consuming the correct amount of pasture dry matter is not the sole answer. It is also necessary that the correct amount of minerals are consumed, as, even if the optimum amount of dry matter is eaten, but

some elements are too low or too high, mineral ill effects can occur.

Sheep do very well on mixed correctly fertilised green pastures with ample clovers, kept fresh and free of dead litter, but, like horses, sheep should not be overfed, especially if potassium is too high, in which case applying about 40 kg per hectare of coarse agricultural salt can help. Some organic farmers feed seaweed or fish products, but salt is far better because it is cheaper per kg of minerals and has all the goodies of the sea, not just what the seaweed or fish absorbed.

The benefits of salt as a fertiliser

1. It suppresses the very bad effects of high potassium levels in pastures which is caused by old-fashioned consultants and greedy fertiliser companies using soil tests instead of pasture leaf analyses.
2. With lime, salt reduces leaching of water soluble minerals.
3. Salt makes grasses softer, so more palatable, so animals eat more and then produce more. Just 40 kg per hectare (less on the coast where sea spray supplies it) of agricultural lime makes it even softer.
4. The softer grass breaks off more easily by grazing cattle so doesn't pull, which is a major problem in parts of New Zealand.
5. It has been used to attract sheep to graze the backs of large paddocks.

Coarse agricultural salt has more minerals than fish and seaweed, because it has everything that is in the sea, not just what the fish and weeds get from it. See Salt.

Pastures should not be too short, because sheep then consume more parasites, listeria, soil bacteria, coccidiosis infections, facial eczema in summer when prevalent, and soil, which can adversely affect the gut, digestion and mineral balance.

Silage sometimes gets the blame for listeria, when it can be from feeding finely chopped silage (long chop is safer - see Silage) on polluted soils, or even grazing very short pasture. When feeding silage they are usually short of feed, so are stressed, which is usually a contributing factor of listeria toxicity. Also make the change to silage early (before pasture has finished), and gradually over ten days. This means feeding very little on the first day (10% of diet) and increasing by 10% per day for ten days. See Animal Health, Listeria. Feeding under fence lines is best, because the soil there is cleaner with no animal manure.

More than one of the following problems together can cause a health crash.

See the Spreadsheet called Interactions in Soils, Pastures & Blood.

Coccidiosis

This is easy to identify in cattle because the dung is almost black from blood, and is spread by the tail onto the body just below the pin bones. This is caused by anal soreness and itching, causing the tail to move excessively and spread the dung. If actual blood can be seen, the infection is serious. Symptoms can be confusing, accentuated by other parasites and other problems, so have your vet do a diagnosis. Some vets, however, have denied that the above coccidiosis symptoms (black dung on the body each side of tail) have been from coccidiosis, and some of their tests have been clear, but, after treatment, the scouring has stopped and the animal's health has improved. In sheep, dags are blacker than usual caused by the blood from Coccidiosis damage.

Clients often ask me why some animals of the same breed in the same herd are healthy, big and/or in good condition, while others are not. They don't look at their own family and human differences. The only way to avoid this is inbreeding, which then loses vigour.

Footrot

Click http://www.eurekalert.org/pub_releases/2008-10/bc-fcs101008.php

Identify and treat all cases immediately.

Footrot is one of the most common causes of lameness, and is infectious, caused by the bacterium *Dichelobacter nodosus*. Studies have shown that the rapid treatment of a sheep with footrot increases its rate of recovery, and decreases transmission of the infection to other sheep. However, is it possible to identify sheep in the early stages of the disease?

Walk sheep over a Hoofmat with copper sulphate to control hoof problems, and use zinc sulphate in Hoofmats to harden hooves.

There are vaccinations available for lambs, but be certain that you need them before buying them. A Meat New Zealand trial by Massey University in 2003, involving 8,000 lambs, showed that the benefits didn't return even the cost of the vaccine.

Check with advisers and neighbours rather than with those selling the products. What may be needed in one area may not be needed in your area, and improving management can sometimes be better than using a medicine.

Some farmers use a new needle for each injection, to reduce the number of abscesses. In USA Jeffers supply short thin needles in bulk.

Leptospirosis

Like cattle, dogs and rodents, sheep can carry leptospirosis, so be clean and careful, to avoid it affecting you, even when slaughtering, skinning, etc. See Animal Health > Diseases, and Human Health.

Orf

The name from [Old English](#) means "rough" and looks it when noses and mouths are scabby. It is caused by a [virus](#) occurring primarily in [sheep](#) and [goats](#) (click the underlined ones). It is also known as contagious pustular dermatitis, thistle disease, scabby mouth and others. The Orf virus can also infect humans, so wear gloves and protective gear.

It was recorded in the late 1800s and has occurred in most sheep and goat areas; however it has been eliminated in some.

If you suspect it, Google for Orf Disease, where you can see photos and full descriptions.

Metabolic problems

Sleepy sickness, grass staggers and milk fever in ewes are more likely if they are thin, short of feed, or stressed (transported and/or yarded), especially in cold wet weather and/or grazing wrongly fertilised pasture, which creates excessively fast growing, lush, high nitrate, low calcium and low magnesium pastures. Milk fever occurs more in older ewes between a month before lambing to a month after. Very fat ewes can be affected, as can thin ones with twins. See Animal health > Milk fever.

Too much over-lush pasture from artificial nitrogen, combined with a lack of sunshine, can bring on metabolic problems.

Adequate calcium and magnesium in pastures reduces the likelihood of the problems mentioned. A pasture analysis and/or a blood test can predict problems.

Other symptoms and causes

Ill thrift, not growing or putting on weight, anaemia, loss of breath through low red corpuscle numbers, dry coats, diarrhoea, pot bellies, swelling under the jaw at the back of the tongue, sunken and/or staring eyes, grinding teeth, many secondary problems, and even death. I've seen calves and deer die in one country before the farmer realised there was a problem.

Total Mixed Rations TMR

In the northern hemisphere many sheep are raised in barns for part of the year and fed on well formulated totally mixed ration (TMR or TMFeed in UK)), including minerals. Balanced in this case means formulated to a high degree of accuracy from decades of trials and adjustments. In the southern hemisphere, where there are about 120 million sheep in Australia, 50 m in NZ and 40 m in South Africa, almost all are grazed at a much lower cost and higher profit, but without much balance of minerals in the pastures, and without getting supplementary balanced minerals which is not possible when sheep are grazing pastures.

Grazing in the northern hemisphere is increasing, but their skill of formulating TMR rations has seldom been incorporated in pasture, by analysing it and applying balanced fertilisers with minerals.

Pastures should also be complete foods like TMR, which they can be close to, if fertilised correctly with minerals. With sheep it is even more important to get the pasture mineral levels right, because sheep drink very little water, which is used with cattle to feed deficient soluble minerals through a

dispenser. Fertilising correctly and mixed licks are the only way for sheep.

If you haven't made a complete change to pasture farming, so don't have good quality lush pasture and silage, or if you feed hay, and have to feed lambs grain, then they are likely to need moist feed or water, as will lactating ewes on dry feed and in hot climates. Minerals can then be added to the concentrates or water that they will drink. See Water.

Mineral deficiencies

A mineral deficiency occurred on a Waikato hill country sheep farm that could not finish (fatten to prime) lambs, so had to sell them by auction to farmers on the flats who could finish them. He thought that it was hills versus flats that made the difference. However, after pasture tissue testing for minerals (which all pasture farmers should do twice a year), he added 1 kg of cobalt sulphate per hectare to his fertiliser mix, and his lambs grew faster right to prime, making him a lot of money.

Cobalt is essential for ruminants to synthesise vitamin B12. If Co is very low, ruminants can get sick and die as happened decades ago pre Co use in the central North Island pumice soils. Recently six cows near Matamata in eastern Waikato died of low Co before the vet knew the cause. It was caused by excess prolonged urea use that reduced the organic matter which holds Co. See Elements > Cobalt. Deaths occurred on a larger scale in Japan and other countries.

An example of mineral deficiencies that can occur, caused by depletion, is where the growing and harvesting of sugar cane in Hawaii, for a hundred years or more, left the soils so minerally deficient (except for N, P and K) that cattle grazing pasture on the land did not grow, or put on weight or reproduce. Almost all New Zealand soils, but especially pumice, from eruptions between 100 and 600 AD, and peat, caused animal mineral deficiency problems before they were fertilised correctly. Now the best farmers on all soil types in NZ do pasture tissue tests annually, and fertilise accordingly. The good results achieved show that it is not an expense, but a profitable investment. NZ\$140 for a pasture tissue mineral analysis, to buy perhaps \$30,000 worth of then correct fertiliser, is an excellent investment, thanks to the healthier faster growing animals.

Most soil analyses recommend too much potassium, which causes many pasture and animal problems. (See Elements > Potassium.) So saving those more than pays for the pasture tissue mineral test, and gives healthier animals and more clovers. See Pastures > Analysing.

The problem of controlling internal parasites in sheep can be reduced if they are correctly fed on optimum pastures without mineral deficiencies. Low cobalt is the worst. Finishing lambs ready for slaughter is impossible when cobalt is low. Low Selenium is second worst element to be low. Fertilising pasture with 1 kg of Selcote Ultra per hectare per annum is the best way to get enough selenium for grazing animals.

Supplementing minerals

Sheep don't drink much water and none when dew or showers occur, so, as well as fertilising with all necessary minerals, dry licks are the only way to give them minerals. Read on for information on this.

The above examples show how pastures can achieve close to Total Mixed Rations (TMR) results just by balanced mineral fertilising.

Some sheep in New Zealand, and in Scotland I read in 2008, have suffered from internal parasites becoming resistant to drenches. See Drench-resistance below.

The top NZ **dairy** farmers who get their mineral balance and supplements right don't have worm problems - very little drenching is needed with calves, but lambs are harder to supplement and keep free of internal parasites, partly because they don't drink much water so can't be fed soluble mineral mixes in it, so can suffer deficiencies.

Pasture not correctly limed and fertilised including with trace elements, can't supply all the minerals required by all animals. You notice I say, "all" because a few animals on correctly fertilised soils thrive without any supplements and they are the ones from which to breed. Meanwhile one has to farm the majority, so all have to be cared for perfectly.

Some NZ organic farmers who can't use chemical parasite drenches have learned that getting the pasture mineral levels correct is essential.

The best 100%-grazing dairy farmers, even when heavily stocked with 2.5 cows and 0.25 calves and heifers per hectare never have to drench their calves for worms, and some only once after the lush

autumn rains when the calves are eight or nine months old.

Over-grazing without a controlled rotation can change it all, because grazing close to their manure increases parasite infestation, AND if any minerals are lacking, parasite infestation increases dramatically.

Minerals in bought or leased land

Farmers who buy or lease land with deficiencies such as below can go bankrupt, because the low income from slow growing animals doesn't earn enough money to correct the deficiencies. Before leasing or buying any land, get a pasture analysis of the 17 essential elements, and budget to apply LimeMagPlus or Phosphorus Nutrient Planner and correct all deficiencies before moving animals on.

Even lifestylers can buy problems if the land had been over fertilised with potash, molybdenum for pumpkins, too much selenium for horses, etc. A pasture analyses will reveal all. A soil analysis will not reveal much, and will be inaccurate.

The following grass only pasture mineral analysis figures on the right, from a client on Hawaii's Big Island, are the worst I've ever seen, but can occur to a lesser degree in any country where leaf tissue has not been analysed and not limed and fertilised to correct the levels. The optimums are based on pasture and animal health, profit and growth optimums, that are possible in pastures for grazing sheep.

	Optimums	Hawaii after sugarcane	
% Nitrogen N	4.0	1.50	*
% Crude Protein	25	9	
% Phosphorus P	0.4	0.14	**
% Potassium K	2.7	1.7	***
% Sulphur S	0.4	0.25	
% Calcium Ca	0.8	0.54	****
% Magnesium Mg	0.26	0.36	
% Sodium Na	0.2	0.1	
ppm Iron Fe	90	59	
ppm Manganese	50	134	*****
ppm Zinc Zn 50	29		
ppm Copper Cu	8	9	Most sheep breeds need only 8 ppm.
ppm Boron B22	5	*****	
ppm Molybdenum Mo	1.5	0.04	*****
ppm Cobalt Co	0.13	0.04	*****
ppm Selenium Se	0.3	0.12	*****

* Slow pasture growth from poor fertility after full harvesting sugar cane annually for a hundred years, and no legumes in the pasture because of low P, S, Ca, B, Mo, Co and Se. The result is low protein, so no animal growth.

** P is too low to grow pastures or animals. None had ever been applied.

*** K is adequate for animals that need only 1%, but is too low for legume growth.

**** Ca is to low for everything, so many aspects suffer.

***** Mn is toxic, causing stressed animals so stressed farmers. Applying agricultural lime reduces Mn. Poor drainage increases it.

***** B is critically low for legume growth and animal health.

***** Mo is always lower in dry soils. In wet conditions plants take up excessive amounts, especially if Cu is low.

***** Lambs can't be finished (fattened) on low Co pastures. Parasite infestation and their ill-effects will be high on the above pasture, irrespective of grazing management, because of deficiencies causing animal ill-health.

***** Low Se is the major cause of scours even with no internal parasites. High parasite infestation causes scours, in this case aggravated by low selenium. 0.3 is the minimum.

The above shows that if pasture tissue minerals are not measured, mineral levels will be unknown

so animal health and animal profit will suffer for a few years until Ca increases to hold organic matter to hold Co and Se to a lesser degree.

Low Mo levels can cause high Cu levels which can be toxic to some breeds of sheep.

There are legumes that'll grow in most areas, but the seed has to be inoculated, and pastures have to be limed and fertilised correctly, including with all deficient minerals and trace elements.

Legume examples are -

Hot areas - Subterranean clover, Arrowleaf and other Red clovers and grazing lucerne (alfalfa).

Temperate areas - White clover and/or Red clover.

Cold areas - Alsike clover.

Low Mo levels can result in high Cu levels which can be toxic to some breeds of sheep.

Some legumes won't survive repeated close grazing by sheep. See Pastures > Legumes for full details.

Salt

This has been mentioned a few times. It is an essential element, especially in cold and hot weather, and when potassium is too high. See Elements > Salt.

Sodium is the main content of saliva which is the first and most important digestive juice.

Research by Lincoln University students on Mt Grand Station, Hawea, found that sheep were strongly attracted to areas where salt had been spread.

Applying salt to areas at the back of large South Island high country paddocks that were under-grazed encouraged sheep to go and graze them. Lime has done the same. Animals eat less of sodium and calcium deficient pastures, so both can increase animal production.

Spreading salt on sodium-deficient South Island hill country pasture may be a way to help establish new pasture species (R J Aspinall et al. 2004) with trampling after oversowing.

The colossal ICI Fertiliser Company in the UK added salt to their nitrogen fertiliser after trials on mineral soils produced more pasture growth and 15% more milk [because animals consumed more and got essential minerals].

When first feeding salt to sheep that are deficient in Na, be careful that they don't rush the troughs so much that deaths occur from smothering (sheep piling on top each other) which has happened. Providing many feed sources reduces this possibility. If animals gorge on it when it is supplied, there is likely to be a benefit in providing it in lime and fertiliser and/or sprayed on pasture.

Spraying pasture with Solmin (Nine elements. See Minerals.), before grazing and not before rain, could give excellent results with sheep, especially lambs, because they drink almost no water in New Zealand temperate climate pastures.

NZ AgResearch trials on sheep grazing pumice soils which are very low in Na, achieved substantial benefits from applying salt. Three Marlborough, South Island farm trials with ewes gave increased milk production and body weight recovery after lambing, with up to 10% greater weights in Na supplied ewes. Most of the gain was between tailing and weaning. Their lambs were slightly heavier at weaning and suffered fewer deaths.

Obviously the above doesn't apply to large flocks. Fertilising applies to all.

It is better to feed a good loose mineral mix like Solmin in a dry trough rather than nothing. Start by feeding a small amount in dry troughs to avoid gorging. Sheep should have enough troughs to avoid crowding and smothering each other which salt deficient sheep have done even with only salt. These mixes should have enough salt to make them palatable, but not so much salt that animals don't consume enough.

Examples of these Jerseys suffering mineral deficiencies are used because deficiencies are not easily seen in sheep, so watch the cattle that should be grazed on the same farm as sheep, for signs of mineral deficiencies. The more cattle on the farm, the better the sheep will do.

These year-old calves near Te Puke, NZ, proved



the point. They had hardly grown for three months since being moved to this farm, which had not had lime applied because the pH was as recommended by the Department of Agriculture, but the calcium level in the pasture sample I took was extremely low. Phosphorus and Cobalt were also low. Ca makes fixed P available to plants and increases humus (See Elements > Calcium.).

The farmer offered to apply LimeMagPlus immediately, but I pointed out that it would take several months for the lime to give any results and the yearlings were due to be mated (bred) in three months' time. They were moved to better limed and fertilised pastures and started growing.

These nine month old heifers in 1982 were the worst out of 25 reared before applying fertilisers containing all deficient elements. They had been worm drenched repeatedly and rotated around 40 paddocks ahead of the cows. Note the clean tails indicating no worms and not selenium deficient.



This is the whole mob of 25 in March 1984 from the same herd on the same farm. Pastures had been fertilised with balanced fertilisers based on pasture analyses, and minerals supplied in the drinking water. There were no runts. These had never been drenched for worms. Both groups were reared on cows' milk and short luscious pasture and weaned at about seven weeks on to good pasture with no grain. After getting minerals they grew even better. Their hair shows they need salt.

Apologies for showing cattle examples under sheep, but the problems are easier to identify than in sheep, but if sheep droppings are in well formed marbles, they are unlikely to have internal parasites. However, loose droppings can be caused by low selenium levels and/or internal parasites.

The worst enemy of a sheep, is another sheep, so rotating cattle on the same farm improves the health and growth of sheep. Deficiency symptoms are much more easily seen in cattle, so they can act as indicators to help the health of sheep by showing deficiency symptoms.

General

Sheep are wonderful at improving pastures when rotated daily at 200 to 300 per hectare (80 to 120 per acre) for short periods. They like and eat most weeds, including toxic ones such as ragwort, without being poisoned, unless fed too much for too long, and do a good job of improving pastures. However, hard grazing by mature sheep for too long a period should be avoided, because of the parasite build up that can occur.

To succeed with sheep they must be understood. They are strongly gregarious, so much so that they will try to follow each other at a gate that is not even open, so pile up on top of each other and smother the bottom ones, hence the term 'smothers'. In Northern Italy in 1978, 200 sheep baffled their shepherds when they jumped into a river one after the other and drowned. The report in Curious Facts SBN 436 27439 6 stated that there was no explanation for this 'mass suicide'! The explanation is that sheep are strongly gregarious. I discovered how gregarious when my wife and I pulled the first of five sheep out of our neighbour's 2 m deep ditch. The first one out looked around and could see no sheep except those in the ditch and, although they were up to their necks in water, it must have felt that it would be safer with its mates, so jumped back in. We phoned the neighbour who brought his sheep dog which brought the rest of the sheep in the paddock up close - and some say that sheep can't think, others say they can, whatever way, they are not always right.

It is being so gregarious that makes them easy to shepherd by man or dog. In the days of predators they must have worked out that there is safety in numbers.

Safety

Everyone knows to be careful around bulls, well the same applies to rams - and some ewes. A butt by a sheep at full speed can be harmful.

Sheep are more difficult to fence, but, once trained to high-power electric fencing and moved regularly, they are little trouble. Some may persist at getting out. The best solution is to cull them. Dogs and people have to be fed, and ones always through the fence are usually in good condition!

Controlled grazing sheep for their meat is making more money than controlled grazing cattle in some parts of the US, where lambs can sell for over \$100 each.

Recommendations - standard NZ practices

- If sheep are mated in anything but good condition conception rates will be lower, so ensure that the ewes get into good condition when there is plenty of pasture in spring and early summer. Dry weather sometimes makes it impossible to put weight on them in late summer and early autumn.

- Dip or spray for lice and fly control at least two months (more for fine-wool sheep) before shearing. Spraying is more popular these days.

- Shear ewes a month before tupping (mating), but not too closely in areas where cold weather can occur at any time.

- If necessary, dip or spray again a few weeks after shearing, because it uses less dip when the wool is short.

- In late autumn flush them before mating to have them on a rising plain of nutrition. To do this effectively ewes should be given pasture which is 100% green growing leaf.

- Use a mating harness and marker on the rams. Change the colour every 14 to 16 days so that you can draft and manage the ewes according to time of lambing and feed available. Rams should have about 20 mm (0.75") of wool to prevent the harness irritating their skin. Check harnesses regularly to ensure they are comfortable and are marking the ewes.

- During the above times the ewes are rotated to suit the conditions.

- At least ten days before lambing, set stock ewes (leave in paddocks), so that ewes can find and settle to an area where they wish to lamb. This is done by spreading them over most of the farm, so that they are thin on the ground, to reduce mis-mothering. Allocate the appropriate number to each paddock and close the gates. Early to lamb ewes, thin ones, and those to twin, should be stocked at a lower rate per ha, on pasture with about 1,400 kg DM/ha, at about 8 per ha (3 per a), while the single lamb and good condition ones can be at a higher rate on pasture no lower than 1,200 kg per ha, at about 10 per ha (4 per a). These figures are for good NZ style perennial ryegrass or similar (good zero endophyte fescue, etc.) and clover pastures. Few sheep farmers have PastureGauges and measure pasture, so the following figures will give a rough guide for dense sheep pastures of perennial ryegrass and white clovers. The first inch is 800 kg DM per ha, from then on every inch is about 500, up to 2,500. This of course is a very bad measure of available energy, because the digestibility on high dry matter pastures can be so low. In fact 2,500 kg per ha in summer can be useless if it is too long, dry and unpalatable. When allocating pasture, farmers should also allow for the megajoules of metabolisable energy (ME).

- After lambing leave them set stocked for a while, depending on the feed in each paddock. Ones which are short of feed can be allowed to move in with ones which have plenty of pasture, by leaving the gate open - not by dogging them. This can be done until they are in bigger mobs and then rotationally grazed again.

- Monitor feed availability and consumption. A 20 to 25 kg (45 to 55 lb) lactating ewe needs 2.5 to 3 kg (6 to 8 lb) of pasture dry matter per day, so budget for this and ensure that they are getting it. The more you feed them during the spring flush the faster the lambs will grow, and the better condition the ewes will end up in prior to the summer feed shortage period. 70% of annual pasture growth can occur in spring and early summer, so animals must be fully fed then.

- High protein diets are essential for rapid growth and help reduce internal parasite effects. Well fed lambs can gain about 300 grams (11 oz) per day, but only if they are eating white clover (321 grams), lucerne (308) top quality perennial ryegrass and white clover pasture or Puna chicory (both 300 grams per day).

- Pastures have to be completely green, with no dead or brown material. 40% of other than green pasture will reduce the digestibility to 60%, which is not enough to grow lambs, and will only just allow cattle to grow. Lush green high protein pasture moves through the digestive tract more quickly, so the lambs (and other animals) eat more and do better. Some scouring can occur, but as long as parasites (worms and coccidiosis) are controlled, and copper, cobalt, selenium and other minerals are adequate, it should not be excessive.

- After weaning, use the ewes to clean up (graze hard) any paddocks which need it, but don't let them lose condition, by feeding them really well every now and then. Weigh them in mid-summer and feed as required to achieve the right weights before mating.

- Use facial eczema control methods - avoid dead pasture, graze short before the facial eczema period, apply lime, supply zinc.

- Draft lambs off for selling by dollar value, not by weight. In other words, calculate what they are worth every week, based on the price they are fetching, the cost of pasture and/or other feed they'll need to keep them, and/or to put more weight on, and the cost of drenching and shearing if kept too long.

- Patrol sheep regularly to check for growth, fly strike, general health and drench requirements, as well as taking faecal egg counts (FECs); however a low egg count doesn't always mean a low worm burden. Ask your vet re the egg laying habits of the worms you have.

- Do faecal egg counts regularly so you know when to drench for worms. Don't take an FEC within two months of drenching. FECs should be taken from healthy clean sheep producing marbles, not slush. Don't count on FECs as the only tool to see if they have worms. Most worm species are capable of killing the host before any great increase in egg counts can be seen.

- Buy rams from farms that have selected for no drench resistance, and have low FECs.

- Get liver tests of mineral levels from the first draft of lambs going to slaughter, to supplement the remaining ones when drenching, pasture spraying, licks (not very effective), or in drinking water if possible, and if hot when lambs are drinking. If cobalt and copper are both low, worm infestation and ill-effects will be worse, and lambs won't fatten.

- Dag (shear wool from around the tail) as and when required.

- Drench no more than necessary. The NZ average is about six times in the first year and once or twice in subsequent years. After deworming always move animals to a fresh paddock.

- If short of pasture, wean earlier, ration the ewes and feed the lambs more.

- Wean the lambs a day after putting them in a new paddock, and then put the lambs back in the same paddock for a few days, provided there is ample feed, and they don't chew it down to below 1,500 kg DM/ha. They will know the paddock, where the water is and won't try to get back to the paddock where they were last with their dams. Then, when ready to be moved (which should be within a few days of weaning) drench them and move them to a fresh "clean" paddock, which has preferably been grazed by cattle or harvested for silage, but not grazed by sheep for as long as possible.

- Breed for facial eczema resistance. The animal genetic resistance factor should be used by not breeding from affected animals. FE resistance is heritable. Buy rams from facial eczema resistant flocks. See Animal health > Facial eczema.

Breeding

Clients often ask me why some animals of the same breed in the same herd are healthy, big and/or in good condition, while others are not. They don't look at their own family and human differences. The only way to avoid this is inbreeding, which then loses vigour.

This international eBook is not the place to specify breeds of sheep because they vary so much between countries and Googling for 'sheep breeds' will find all that could be needed.

The principles are to be flexible and fast to change depending the market for lambs and wool, and the timing to fill market gaps.

In New Zealand from about the year 2000, when wool prices dropped and its harvesting costs increased, and lamb prices rose, ewe fertility was increased to breed more lambs per ewe. This increased lamb numbers and stocking rates. Ewes carrying multiple lambs needed more feed, so more spring pasture was needed. Nitrogen (N) has been used by some farmers to achieve earlier spring grass. If it saves under-feeding and lower weaning weights, then it is worthwhile, but only if adequate lime and other main elements had been applied. Lime and boron are SELDOM adequate.

Drench-resistance - reasons why drenching for parasites is sometimes done after pasture flushes

So called drench-resistance is worrying some sheep farmers.

Sheep don't thrive on over-lush pastures that occur after heavy autumn rains that follow long dry periods, which cause a buildup of nitrogen and other nutrients and lower levels of water soluble elements that leach, namely selenium, sodium, iodine. They then scour more, which can then be wrongly blamed on internal parasites, so the sheep are drenched, which helps develop drench resistance, and reduces earthworm numbers. It is known in Australia that dung beetles and earthworms can be adversely affected by even pourons.

The scouring from lush pasture makes sheep more prone to fly strike.

Earthworms are not active in the typical dry summers of Mediterranean type temperate winter rainfall climates, so animal manure sits in dry pats containing parasite eggs, that hatch and then spread after rain.

Grazing animals have usually been short of pasture, so have grazed close to the ground by the time autumn rains come, and then again after rain, increasing the intake of parasites.

During dry weather, when pasture is not growing much, soils build up N levels that become available after rain, and produce high nitrate pastures that cause most animals to scour, which is sometimes believed to be from worms, but is not.

The sudden change from dry to lush pasture is a change of diet that causes scouring until the rumen microflora adjust. After adjusting, the short lush pasture still goes through the digestive system faster, so causes loose dung.

After rain, internal parasites do better in animals on lush feed, so multiply faster.

Low selenium levels can increase scouring. Selenium can get low again in pastures six months after applying fast release organic selenium prills, especially if applied with a water soluble fertiliser such as Superphosphate with its excess sulphur, but Se lasts longer when the slow-release Selcote Ultra is applied. Zinc used in the control of facial eczema also lowers Se absorption, so animal levels can decrease and scouring increase.

Pasture pests required the growing of high endophyte ryegrasses that cause animal health problems, and decrease animal production, increasing dags and fly-strike. The dags caused farmers to drench their sheep against internal parasites more often, when worms were not the cause, increasing the problem of drench resistance.

The more drenching is done, the faster the parasites become resistant.

One or more of the above factors can result in animals being drenched for internal parasites when they are not necessarily a cause of the symptoms. This shows how important it is to be sure, and/or do egg counts before drenching.

See Symptoms and Causes in animals for full details

It is essential to identify the difference between parasite, illness and mineral deficiency causes. For as long as worm drenches have been available, they have been used every time a sheep scours, whereas there are other causes of scours. This practice has accentuated drench resistance by worms.

It is easier to identify deficiency and other symptoms in cattle than in sheep. An example is that sodium deficient cattle lick each other vigorously to try to get some salt.

The manure as it leaves the animal is a useful diagnostic tool, especially in cattle. Scours from other than worms can be from too much lush sappy pasture, sudden change of diet (even from dry summer pasture to lush autumn pasture after rains when pasture nitrates rise), a tail so heavy with dry manure that it can't be lifted sufficiently, so becomes soiled (aggravated by low zinc and/or low selenium causing weak tail muscles), coccidiosis (see below), high molybdenum and/or low copper, low selenium (in cattle it can be in a zigzag dung pattern on pastures), damaged intestines from a toxin, low zinc, coughing caused by low iodine (goitre lumps are usually firm) and/or dust, and, of course, worms obstructing the throat, which causes a soft swelling under the back of the jaw.

Sheep grazing pastures with a very low Mo content (less than 0.1 ppm) had Cu accumulate in their livers, which led to chronic Cu poisoning, and subsequent deaths. High Cu and S levels in pastures will reduce the amount of Mo retained by the animal.

Some animals always have dirty tails for no apparent reason. Their intestine villi (finger-like projections in intestines, to increase the nutrient absorption area) could have been permanently damaged when young by coccidiosis, or excess copper being fed or drenched at some stage.

Another problem with moving sheep into a new area is weeds - sheep are weed eaters and a sudden death can some times be found from the species within the paddock. Sheep eat closer to the ground so pick up problems that cattle don't. Healthy soils and pasture correctly fertilised give healthy sheep, so reduce problems. Soils can have clostridial bacteria which can kill sheep.

Sheep Deaths

There are 42 diseases that can cause deaths. Listeria infection is a possibility, but the signs for that in sheep are very distinctive, and most people would notice this before finding the beast dead. See Symptoms & Causes > Listeria and Animal Health > Diseases.

In 2015 fifty sheep died on pasture in the South Island of NZ. It could be they were given, or

accessed salt, and gorged on it, or any other toxin, like ash from coal fires, spread on lanes, gateways or around water troughs, which has been eaten and killed cows near Te Aroha. Or it could be that the pasture was a lot different from the usual, for example a sudden change to lucerne or high sugar ryegrass. Some are promoting 'high sugar' ryegrasses, but ryegrass is already a high sugar grass and a sudden change to too much can cause sheep to die from clostridial bacteria disease. This is in all soils and can be brought on by a sudden diet change and can cause pulpy kidney, tetanus, blackleg, or other diseases. If suspected, call your vet.

Sheep can't tolerate excess copper, especially the sheep from Scotland developed there on a lot of low copper seaweed. If any of you know the farmer, suggest that he measures the copper level in the main grass. In ryegrass it should be below 7 ppm for New Zealand breeds of sheep and even lower for Scottish ones. If it is not excess copper, analyse the main grass for all 17 elements. Low cobalt can be a cause. Get Hill Laboratories to do it. Some of the other labs are not as accurate. If still not solved, suggest he contacts me at vaughanjones1@xtra.co.nz

Questions I'll ask will be has he read GrazingInfo* Sheep 1 and 2, about the types of fertiliser used, LimeMagPlus applied, sprays applied, how short the pasture was, how long had they been in the paddock, were the dead the healthy ones or the thin ones, what weeds were in the pasture, were the dead sheep anaemic, what time of day did they die (nitrates are higher in the morning)?

* All owners of sheep from Life Stylers up, should read the Sheep chapters 1 and 2. The readers in this world usually thrive, while others can even die, or have animals die, from sheer ignorance. A New Zealand farmer in Australia had 120 cows die from eating Cape Weed in the pasture in the morning, when its nitrates are high. I spoke with him and he didn't know about Cape Weed or nitrates.

Selenium

Sheep and goats are even more susceptible to low Se and/or low vitamin E than cattle.

Sheep don't drink much water, so, where levels are low in feed and Se fertilising is not practised, 5 mg of Se drenched once a month to ewes before mating, and for a month before lambing are the NZ recommendations to prevent infertility and white muscle disease in lambs, followed by 5 mg doses once every three months for general health. Calves need twice this amount every three months. Slow release Se injections for sheep and cattle are available, however fertilising and/or oral supplementation in the drinking water for cattle are easy solutions, and by far the best. One sheep farmer told me that his sheep drank water with Solminix. Could sheep farmers please comment on this to me if they have notice their sheep drinking more water when with Solminix.

At Armadale, NSW, Australia, it was found that Se deficiency was associated with increased embryo mortality in sheep.

Halpin and others (Australia 1981) observed that the water-soluble sulphur in single superphosphate (0-9-0-11) depressed both pasture Se levels and the Se levels in sheep blood. This has also been found in New Zealand and USA pasture analysis that I've got done, possibly because repeated superphosphate leaches P and other elements and reduces organic matter in soils.

Sheep need to be exposed to the sun's ultra violet rays for body synthesis of vitamin D and the metabolism of calcium. In the winter, sheep of all ages, but especially hoggets grazing brassica crops, can suffer white muscle disease in spite of regular Se dosing. This might be from either the typical high sulphur in the crop or a low vitamin E level, or both. Grazing some green pasture, as well as the crop, supplies vitamin E.

White muscle disease is so-called because of calcium deposits that look white. Most sheep farmers are aware that a deficiency of Se in lambs causes white muscle disease, weak muscles shown by stiffness and paralysis of hind limbs, the death of newly born lambs from heart attack, etc.

Langlands and others in 1982 reported that Se blood levels in sheep were not lowered by high stocking rates where Se levels were adequate. However, heavy stocking in wet weather seals the soil surface so soil sulphur can't escape. High iron consumption from water, muddy or dusty pastures, and high molybdenum, lower Se absorption, which is also lowered when sporidesmin is present, and when feeding high rates of zinc for facial eczema control.

Very high Se can depress zinc absorption, while low zinc can decrease Se absorption, so ensure that pasture levels are correct.

Worm drench resistance in sheep is becoming a problem in New Zealand. I know that when calves and older animals get all the necessary minerals in pastures and drinking water, worm drenching

decreases to none, or to very little, compared with mineral deficient calves, so there is no reason why the same doesn't apply to sheep, but they drink little so pastures must be at optimum levels and in some cases licks may be needed. If sheep are low in minerals which are then supplied, the flock can clamber to get at licks and smother each other. Don't let minerals get low, and when first supplementing with them, have plenty of troughs and stand by with good dogs to move them if necessary.

Cobalt is also an important element. Lambs won't finish (fatten) on low Co pastures and internal parasites increase. See Cobalt.

Supplementation with Se, where needed, has increased ewe growth rates and wool yields by up to 12% and its fibre diameter.

Inherited goitre problems in sheep with Polled Dorset blood can occur. It may not be induced by a deficiency of iodine, or deficient feed. East Friesian milk sheep and South Australian Merinos have also suffered this. Congenital goitre was recorded in Tasmanian sheep In 1945 and many times since then. Those on sandy soils were worse affected. Sandy soils leach and don't hold organic matter, and organic matter holds minerals such as cobalt. Outbreaks of the disease can follow wet periods, which increase leaching and cause fast growing lush pasture, which is always lower in some minerals.

The first thing is to analyse the pasture leaves for the 17 known minerals (see Pasture Analysis) and any weeds that are being eaten, and see Symptoms and Causes in Animal Health.

Symptoms of low iodine include eye to thyroid gland swelling, poor cycling, goat kids born dead and calves lacking hair.

Some sheep breeds, particularly in Scotland and Norway, have eaten seaweed for thousands of years. It has many minerals, especially salt and iodine, so, when not getting seaweed, those sheep in particular can suffer. Fertilising with about 40 kg per hectare of coarse agricultural salt twice a year helps. Fertilising with iodine is costly (about NZ \$50,000 per 1,000 kg) and, being very water soluble, it leaches rapidly, so is uneconomic, and a waste. All sheep (and animals) need sodium. It reduces the incidence of bearings, especially when potassium is too high, which is mostly in New Zealand after using soil testing and fertiliser company fertiliser recommendations. They like selling potash at NZ \$1,000 per 1,000 kg. A pasture mineral analysis reveals the high K levels from using NZ soil test recommendation figures. See Elements > Potassium and Sodium. The latter cushions the effect of high K for soils, pastures and animals.

Many breeds of sheep can suffer from excess copper, which adversely affects the absorption of other elements, especially molybdenum.

Cold weather, lambing and other stress factors can bring on goitre deficiency symptoms, showing that a deficiency exists.

Preventing mineral deficiencies in cattle is easy by adding minerals to the water via dispensers (on line or Peta trough ones), but sheep drink very little, so other ways have to be used.

Sheep being fed brassicas are more likely to develop iodine deficiency symptoms.

Good rains usually result in prolific pasture growth. This tends to lead to the development of goitre by reducing the amount of surface soil eaten by grazing stock. Surface soil, when eaten, acts like a supplement, because it contains various minerals, including iodine. The amount of soil eaten is also influenced by stocking rates. Goitre is more likely to occur in flocks run at a low stocking rate than in flocks run at high stocking rates.

Scrapie

USA and some countries have Scrapie, a fatal, degenerative disease affecting the central nervous system of sheep and goats. There is no cure or treatment for Scrapie that I know of, and even scientists don't fully understand how it is transmitted. Sheep can harbour the disease for up to five years before they show signs, such as trembling, lack of co-ordination or scraping against objects. Under USDA regulations, producers with confirmed cases of Scrapie in their flock must often destroy animals to try to eliminate the disease.

Plants

Sheep or cattle fed on brassica fodder crops such as chou-moellier, rape, turnips and vegetable crop residues of cauliflower and broccoli are likely to produce goitre in their progeny if access to these crops is prolonged. This is because brassicas contain compounds called goitrogens which interfere with the availability of iodine.

Prevention

If practical, avoid grazing pregnant livestock over 'at risk areas' such as the sandier soil types, especially during the latter half of pregnancy.

When pasture is lush and plentiful after a good growing season, do not run pregnant stock on these pastures at low stocking rates. In good seasons iodine dosing is a wise precaution in known goitre areas.

Iodine dosing

Dosing ewes with iodine compounds in the fourth and fifth months of pregnancy prevents goitre in their lambs. The iodine compounds can be given directly or mixed with worm drenches. Recommendations on the dosage and the compatibility of iodine compounds with various drenches can be obtained from your local veterinarian.

For individual animals, such as goats, and for small numbers of ewes or sows, tincture of iodine will prevent goitre in the newborn. It should be painted weekly on the soft skin of the inner thigh during the final six weeks of pregnancy.

The recommendations for prevention can be adapted for treating goitre in newborn animals. A veterinarian can provide more specific advice if required.

Painting the teats of sows, ewes, goats and cows with tincture of iodine or an iodophor teat dip, once each day for a fortnight, will allow the suckling young to obtain enough iodine to limit development of most goitres.

A swollen thyroid gland causing a visible swelling (goitre), is the result of a lack of iodine in the dam's diet.

Remember that a deficiency of iodine, causing a lack of thyroid hormone, can contribute to deaths of newborn young, even though there is no visible swelling of the thyroid gland to suggest an iodine deficiency.

The most serious thyroid disorder of farm animals is congenital goitre (goitre that animals are born with) caused by iodine deficiency.

A goitre can be detected as a swelling in the neck by passing the thumb and finger down the windpipe starting just below the throat. In severe cases the enlargement can actually be seen as a swelling in the neck. However, goitre should not be confused with a swelling of the head in newborn animals that results from dystocia, a prolonged or difficult birth.

Congenital goitre occurs most commonly in lambs, less frequently in calves, and very occasionally in foals, fawns or piglets. Goat kids are particularly susceptible.

Lambs may be stillborn or weak at birth because of iodine deficiency yet show no visible enlargement of their thyroid gland. Newborn lambs with normal thyroid activity are better able to survive cold wet conditions. A mild deficiency of iodine, causing minimal outward signs of goitre, could be a major contributing cause of young lamb deaths.

Dead lambs should get a veterinary examination when lamb losses are high, even if bad weather could appear to be the cause.

Ill thrift and anorexia can occur, milk production decreases and mastitis and footrot increase.

Excessive salivation, hypothermia, coughing, nasal discharge (also caused by low selenium), runny eyes and pneumonia increase. There can be oedema in the head, neck and tongue of the lamb, and inability to suck, and/or thyroid glands can be enlarged to three times the normal.

Salt licks

Salt licks containing potassium iodide are likely to lose much of the iodine by evaporation and leaching. Sodium iodate is more stable in salt mixtures.

As with all licks, not all animals in a herd or flock will eat them. With cattle minerals are best fed through the drinking water, but sheep drink little so mineral feeding in the water is not satisfactory, and can be a problem when enough minerals are added for the flock size, but only half drink, so those get twice as much as they should.

Some mix Solmin with supplements fed, which makes sheep prefer them.

International Journalists Conference in USA 1993

One example of wrong information was a European's comment that New Zealand allows meat

growth hormones. I replied, “Not for meat exported to Europe, and that if not legal, it could be used underground, as is done in Europe, and then without the control of sales.”

New Zealand’s national flock has been called **easy care** for several decades, because it has been bred up by sensible selection, not by neglect, as insinuated by some.

It is not ‘No Care’ and I can assure readers that New Zealand farmers don’t go away during lambing. Many employ extra staff and some wives help by doing a lambing beat.

Easy care has been developed over a hundred years by marking the lambs which were born without help, and then breeding from the best of them.

It has resulted in a national flock that almost looks after itself, as do deer in the wild.

Overseas visitors ask us how one person can care properly for 1,000 or more ewes over the lambing time, and some farmers boast that they have bred such a good easy care flock that they can go on holiday during lambing, but they are boasting and certainly wouldn’t.

Our farmers still have to help some ewes, and still mark the best ones for further improvement, and they mother one of twins on to ewes with dead lambs, to get better lambs, but they mark test ones , and they mother one of twins on to ewes with dead lambs, to get better lambs, but they mark the lamb, and the ewe without her own lamb, to cull her.

Their wonderful strong-eyed sheep dogs help catch the sheep - without upsetting them.

Their wonderful strong eyed sheep dogs help catch the sheep - without upsetting them. An upset sheep can run away, so this is avoided.

Efficiencies

Overall, farming practices in New Zealand are highly efficient, both labour and animal husbandry wise. For example, most farmers set stock their ewes in sheltered paddocks (a hill facing the sun can be sheltered) prior to lambing. Ewes will choose an area several days prior to lambing and graze handy to it.

The cruel farmers are those in the northern hemisphere who have developed sheep and cattle that have to be helped with almost everything they do, to the extent that some cattle have to have caesarians.

Other Comments

With the current interest in animal welfare, correcting statements is important, as is getting correct information to journalists.

Now read Part 2.

Vaughan Jones

Agricultural consultant & journalist

GrazingInfo Ltd