

## Diseases of Sheep

### Key to differential diagnosis of sheep Diseases

#### If there are DEATHS SUDDENLY OCCURRING with few or no premonitory symptoms:

The disease may be (in which case look for the following key features):

**(1) Anthrax** Animals usually found dead – carcase distended with gas – bloody discharge from nose, mouth and anus. Carcase must not be opened but if post – mortem examination made in error, spleen will be swollen and soft – numerous hemorrhages will be present in various parts of the body – stomach and bowels intensely inflamed – blood tarry, no clotting – anthrax occurs mostly in well – recognized areas and mostly in summer.

**(2) Enterotoxaemia** Affects prime lambs, weaners – food rich and succulent – many sheep affected – occasionally affects adults – may die in convulsion (mainly lambs) – or in coma (mainly adults) – kidneys pulpy and swollen, small intestine almost empty, mayonnaise – like contents – bowel fragile – pericardial jelly like chicken fat – no temperature rise – depraved appetite – some scour – sometimes bloat – small hemorrhages in heart – sometimes darkening of skin – bowel toxins on filtration *Clostridium Perfringens D* in smears, glucose positive urine.

**(3) Black Disease** Occurs in well – conditioned sheep two to four years old – in fluke country – March to June – odd cases to August – painless, sudden death – dead tissue (grey) in liver 13-50 mm [0.5-2 in] in diameter on the diaphragmatic surface, circular, well – defined, surrounded by reddening – fluke damage in liver – clear fluid in pericardium – fluid in abdomen and lung – skin, after removal, red or black from engorged blood – laboratory recovery of organisms from liver lesion.

**(4) Swelled Head in Rams** High temperature – doughy swelling under eyelids, lower parts of head and neck – profound depression – death in 48 hours – clear, yellowish exudates in swollen area – lymph nodes of throat and head swollen and red – *Clostridium novyi* on culture.

**(5) Acute Liver Fluke Disease** Sheep found dead or standing on their own – very ill – do not want to move – skin pale – tense swollen

abdomen – slight jaundice – hemorrhagic reacks in liver made by tiny burrowing flukes – much bloodstained fluid in abdominal cavity – liver enlarged and dark – anemia (pallor mucous membrane) – history of fluke and fluk snail on property.

**(6) Very Heavy Worm Infestation** Profound anemia – massive infestation with *Haemonchus* in the fourth stomach (the sheep bleeds to death even when in fat condition) – usually in lambs or young sheep – if on very heavily infested paddocks in muggy warm weather, sudden worm burdens may ‘bleed the sheep to death’

**(7) Hypocalcaemia** Gait stilted, proppy – tremor in muscles – totore, goes down – pupil dilated – corneal reflex absent – sheep lies out on sternum, head out, chin on ground, hind legs straddled out behind – no cudding, no rumen movements – discharge from nostrils – death from a few hours to three days – temperature depressed – blood samples show low calcium – respond to calcium injections – history of being precipitated by change in nutritional management – ingestion of oxalate – containing plants – lush feed – oat crops.

**(8) Grass tetany (Hypomagnesaemia)** Muscular tremors – staggering – convulsions – excitability – frothing at mouth – rapid death – excitement precipitates nervous response – symptoms merge with hypocalcaemia in some cases – blood samples show depressed magnesium sulphate plus calcium injections combined – sudden deaths in most acute cases – lush feed, oat crops.

**(9) Salmonellas** Scouring – temperature – depression – lie about – when forced to stand, tremble lie in water – death rapid within a few hours, up to two days' lingering in some cases – padding feet or struggling prior to death – sift proppy gait, arching of back – scour from bloodstained to dark greenish. Mucus – containing to normal – sometimes an evil smell – lingering cases that persist may show symptoms for there weeks and may show break or tender fleece – fourth stomach ,small intestine, mesenteric lymph nodes, liver, all congested – excess pericardial fluid – erosions in mucous membrane or small or large intestines – congestion of lungs – hemorrhages in kidney – history of holding on contaminated water for some days as in abattoir yards.

**(10) Plant Poisoning** Gastroenteritis caused by irritant poisons or plants – staggering, convulsions, madness and coma by various weeds – acute cases just found dead – typical

illness – see text on ‘plant poisoning’- annual rye grass, grass toxicity (the nematode *Aquinas agrostis* and *Corynebacterium rathayi*) produce corynetoxin staggers, paralysis, death – many other mycotoxins can also produce death, either delayed or sudden – see separate accounts under Mycotoxicosis.

**(11) Phalaris Staggers** The acute *Phalaris* poisoning may produce death within four hours of going on to the pasture – history of Phalaris grazing – collapse, gasping for breath, irregular heart beat – darkening of the mucous membranes of the mouth, eyes, vulva – going bluish – if recover, may have further attack – fright may precipitate death – incidence of convulsive spasms of limbs, extension of the head – stiffening of legs – throwing head back – pupils enlarged – chewing movements of jaws – salivation occurring in flock.

**(12) Algae Poisoning** History of presence of algae in water – deaths 12-24 hours or later – chronic cases days later – acute cases, straw – colored fluid in pericardium, peritoneum – congestion in lungs, liver, mesentery, spleen – hemorrhages – soft kidneys – congested bowels – toxin tests positive – chronic cases, yellow fat, shrunken liver – nervous symptoms – blindness.

**(13) Blackleg** May die suddenly or after lingering for some days – affected areas dark in colour, bruise – like – if from wound, dark purplish bloody exudates from swollen area – may be bubbles in exudates – if vaginal infection, a dark discharge from vulva – skin pits – usual course 12-18 hours – acute lameness if in leg – straddling gait if genital tract – high temperature – hemorrhages in heart – *Clostridium chauvoei* on culture – sometimes bloody froth from nostrils of car case.

**(14) Malignant Oedema and Septicaemia** Symptoms and lesions similar to blackleg in sheep – *CL. septicum* and occasionally *CL. Novyi* and *CL. Perfringens* recovered on culture – history for activation of spores by bruising or nutritional factors – skin wounds – dry red black discoloration.

**(15) Poisons–Arsenic** Arsenical poison common – gastroenteritis – scouring – evidence of arsenic, e.g. old foot rot bath, sprays, etc. – car case well preserved.

**(16) Poisons – phosphorus** Congested gastrointestinal tract – fuming ruminal contents with smell of phosphorus – pale, friable liver – probable history of vermin extermination.

**(17) Poisons – prussic Acid (HCN)** History of HCN – containing plants – smell of HCN – positive test HCN – sudden deaths – traveling stock particularly – smell of almonds in breath – mucous membranes become blue

**(18) Poisons – Nitrate / Nitrite** Two types: (a) Brownish – colored blood (methaemoglobin) – history of consuming plants with high nitrate content – mucous membranes become blue; (b) gastroenteritis followed by reduction and methaemoglobin effect – distinct brown coloration of eyes, mouth and vulva – distressed breathing – trembling, staggers – slobbering sometimes – diarrhea – chocolate – colored blood.

**(19) Poisons – General** Wide range of toxic materials on sheep stations – wide range of symptoms depending on chemical nature – gastroenteritis in the case of irritants – convulsions with strychnine, copper, nicotine, carbon tetrachloride week killers, rodent killers, phosphorus, and so on – large doses give sudden deaths before symptoms produced.

**(20) Tetanus** In lambs marked with rubber rings, occurs typically three weeks after – stiff in walking – show spasms if startled – go down on side with legs stiffened out – muscles stiff and board – like – unable to suckle – grinning facial expression – head held high, legs wide apart – sometimes death rapid with few symptoms – sometimes bloating – usually history of e.g., shearing, mulesing, lamb marking.

**(21) Toxemic Jaundice (Chronic Copper Poisoning, Heliotrope Poisoning and Associated Diseases)** Affects British breeds and crosses, only rarely Merinos – yellow coloring of skin and internal organs – staggering – rapid wasting – brown or red urine – car case yellow – liver orange – kidneys blue – black (gunmetal) – suggestive feeding history (heliotrope, Paterson’curse, ragwort etc.) – first cases die rapidly, later cases linger three to five days – surviving cases fail to thrive – liver copper values above 1000 ppm.

**(22) Braxy** Occurs in Tasmania – affects weaners, hogget's, lambs – sudden onset, rapid death – acute inflammation or gangrene of the fourth stomach, sometimes third stomach, second stomach and duodenum – peritoneal exudates - hemorrhages in heart and kidneys which may be soft and pulpy – excess pericardial fluid – main lesion in fourth stomach, oedema, thickening or necrosis of its folds – high temperature.

**(23) Pneumonia (Acute)** Thirty – one types of pneumonia mentioned in text – coughing – temperature – depression – off feed – flock history – presence of parasites in lung – presence of consolidation and inflammatory exudates in lung – recovery of causal organisms by bacterial culture – acute cases may be found dead without prior symptoms being noted.

**(24) Pasteurellosis Pneumonia** – temperature raised – sheep depressed – cough – nasal discharge – death may be sudden or delayed some days – septic pneumonia and pleurisy on post – mortem – purulent foci in lungs – red hepatisation and serofibrinous pleurisy – recovery of *Pasteurella hemolytic* or *pasteurella* spp. on culture.

**(25) Bloat** Distension of abdomen, particularly the left side of the body – on lush feed or secondary to tetanus.

**(26) Trucking Losses** Fat sheep when trucked may start to die on unloading – paralysis, may straddle feed out behind and lie on breast bone – in this case is due to hypocalcaemia.

**(27) Snake Bite** Odd animals only – coma – death rare in sheep – paralysis of throat – cannot swallow – dribbles saliva – flaccid protruding tongue – may lie paralysed and motionless for hours before dying quietly from respiratory failure.

**(28) Calculi** In wethers mainly – sometimes rams – depression and death – calculi seen on post – mortem.

**(29) Rumenitis** Occurrence of myopic infection in rumen followed by clostridia infection – acute septicemia – acute inflammation and necrosis of rumen – severe inflammation of underlying sub mucosa – inflammatory oedema and haemorrhage – history of feeding on irrigated pastures or on concentrate nuts – acute cases die suddenly.

**(30) Mastitis Per acute** Violent inflammatory reaction – necrosis of udder ('blue bag') – prostration – rapid death – recovery of *staphylococcus aureus*.

**(31) Lamb Dysentery** Rare disease in Australia – lambs 1 to 14 days affected – sudden death – stop suckling, listless – bloody diarrhea – inflammation and ulceration of intestine, both small and large – liver enlarged and friable – diagnosis only by laboratory work – recovery *CL. porringers* type B.

**(32) Crow pick (Special Type Blood Poisoning)** Localized malignant oedema – deep, lacerated wound – usually in eye – eye torn out – area swollen, dark – bloody dark discharge – prostration – death – history of crow attack – death sudden in some cases.

**(33) Exposure After Shearing** Newly shorn sheep or newly born lambs – death in bleak weather.

**(34) Heat – stroke** Animals forced to stay in sunlight or in heat waves if in full wool.

**(35) Intussusceptions** Acute abdominal pain – sudden death – on post – mortem portion of bowel telescoped inside adjoining portion – necrosis and sloughing – sometimes nodule worm infestation.

**(36) Nutritional Haemoglobinuria** Common New Zealand – history of grazing on brassicas, occasionally grass and green feed crops – anemia+ – jaundice – haemoglobinuria – dark kidneys – recumbency – in appetite.

**(37) Leptospirosis** Generally none in sheep, occasionally (particularly in NZ) a transient jaundice, red urine and rare death.

**(38) Bacillary Haemoglobinuria** Sudden death suggestive of black disease – recovery of *Clostridium hemolytic* from affected liver – occurrence in irrigation areas – presence of condition in cattle on same property.

**(39) Pyaemic Hepatitis** Sudden death within 24 hours – tremors – seouring – thickening and hemorrhaging of the small intestine – exudates of enteritis – recovery of *Yesinia* ( previously *Pasteurella*) – some outbreaks have small abscesses in liver – stomach and intestines inflamed – may be triggered by sudden stress, e.g. yarding for shearing.

**(40) Urea Poisoning** Hyperesthesia – walk with proppy gait – dullness – depression – muscle tremors about head and then generalized – intermittent tonic convulsions – slowing of papillary reflex – go down and then roll on side – legs extended in tetanic spasm – froth at mouth – mucous membrane cyanotic – paralysis and death.

**(41) Clostridia Myocarditis** Infects lambs up to 12 months of age – myocardial necrosis – hemorrhagic pericardial fluid – sudden death – some outbreaks, history of lamb marking or tail docking or shearing or mulesing; other

outbreaks, no such history – recovery of *Clostridium chauvoei* from heart.

**(42) Rift Valley Fever** Not in Australia – causes abortion – sudden death in young animals – fever – weakness – mucopurulent nasal discharge – sometimes vomiting and colic – hemorrhagic diarrhea – petechial hemorrhages visible on mucous membranes and internal organs – jaundice – swollen liver, greyish – brown to yellow – brown colour – greyish – white foci 1-10 mm [ $<0.5$  in] in diameter throughout parenchyma – hemorrhagic or necrotic in Flomaton gastrointestinal tract – ascites, hydro pericardium, hydrothorax, pulmonary oedema – bloody peritoneal fluid – jaundiced car case.

**(43) Meliodosis** Rare disease – coughing and respiratory distress on exertion – sheep stagger – become recumbent – eye and nasal discharges which may be thick and yellow – sometimes swelling of joints – loss of condition – course, one week to several months – abscesses in lungs, spleen and liver, which are encapsulated in a fibrous wall and contain thick dry pus of greenish or greenish – yellow colour and may be surrounded by zone of pneumonia in lung – suppurative joint lesions occur – abscesses on nasal mucous membrane with brown centre and ragged depressed ulcers – nasal mucosa red and swollen, sometimes inflammation of meninges of brain and of the brain itself – recovery of *pseudomonas pseudomallei*.

**(44) Red Gut** Sudden deaths – bloating of the intestines (but not of the rumen)- hemorrhagic enteritis – bloodstained fluid in the abdominal cavity – history of feeding on lush green pasture with little hard in it.

### **If there are DEATHS after lingering for some days:**

**The disease may be** (in which case look for following key features):

**(1) Malignant Oedema** Some cases linger – symptoms and lesions same as blackleg in sheep, but *Clostridium septicum* and occasionally *CL. novyi* and *CL. porringers* recovered on culture.

**(2) Blackleg** May die suddenly or after lingering for some days – affected areas dark in colour, bruise – like (does not crackle like cattle lesion) – if from wound, dark purplish bloody exudates from the swollen area – may be bubbles in exudates – if vaginal infection, a dark

discharge from vulva – skin pits – usual course 12 to 18 hours – acute lameness if in leg – straddling gait if genital tract – high temperature – hemorrhages in heart – *Clostridium chauvoei* on culture – sometimes bloody froth from nostrils of car case.

**(3) Toxemia of Pregnancy** Slow onset – stupidity – history of pregnancy and decreasing plane of nutrition – blindness – pushing – loss of blink reflex – walk in circles aimlessly – plasticity in limbs – abnormal posture – go down – paralysis – death two to six days – twin lambs – yellow liver with peculiar fatty mottling – fat necrosis in abdomen – kidneys have pale cortex – adrenal glands have red cortex and pale medulla (reverse in normal).

**(4) Salmonellosis** Scouring – temperature – depression – lie about – when forced to stand, tremble – some cases lie in water – death rapid within a few hours, up to two day's lingering in some cases – paddling feet or struggling prior to death – stiff, proppy gait – arching of back – scour from blood – stained to dark greenish mucus – containing to normal – sometimes an evil smell – lingering cases that persist may show symptoms for three weeks and may show break or tender fleece – fourth stomach, small intestine mesenteric lymph node, liver, all congested – excess pericardial fluid – erosions in mucous membrane or small or large intestine – congestion of lungs – hemorrhages in kidneys – history of holding on contaminated water for some days as in abattoir yards.

**(5) Worm Infestation and Fluke Infestation** Mostly the animals do not die, but those which do usually linger for some time – worms will be found on post – mortem – either anemia or scouring will be present.

**(6) Blowfly Strike** Struck sheep isolates itself – wool of area dark in colour and wet – stamps feet – bites at struck area – sick, depressed, ceases eating, cudding – maggots in struck area – death if unrelieved, or shedding fleece if recovers.

**(7) Toxemic Jaundice** Affects British breeds and crosses, only rarely Merinos – yellow coloring of skin and internal organs – staggering – rapid wasting – brown or red urine – car case yellow – liver orange – kidneys blue – black (gunmetal) – suggestive feeding history (heliotrope, Paterson's curse etc.) – first cases die rapidly, later cases linger three to five days – surviving cases fail to thrive – liver copper values above 1000 ppm.

**(8) Carbon Tetrachloride Poisoning** Depression, coma and death – history of drenching with carbon tetrachloride.

**(9) Tetanus** In lambs marked with rubber rings occurs typically three weeks after – stiff in walking show spasms if startled – go down on side with legs stiffened out – muscles stiff and board – like – unable to suckle – grinning facial expression – head held high, legs wide apart – sometimes death rapid with few symptoms – sometimes bloating – usually history of, e.g., shearing, mulesing, lamb marking.

**(10) Enterotoxaemia** Affects prime lambs, weaners – food rich and succulent – many sheep affected – occasionally affects adults – may die in convulsion (mainly lambs) – or in coma (mainly adults) – kidneys pulpy and swollen – small intestine almost empty, mayonnaise – like contents – bowel fragile – pericardial jelly like chicken – no temperature rise – depraved appetite – some scour – sometimes bloat – small hemorrhages in heart – sometimes darkening of skin – bowel toxins on filtration *CL. Perringers* D in smears, glucose positive urine.

**(11) Hypocalcaemia** Gait stilted, preppy – tremor in muscles – totters, goes down – pupil dilated – corneal reflex absent – sheep lies out on sternum, head out, chin on ground – hind legs straddled out behind – no rumen movements – discharge from nostrils – death from a few hours to three days – temperature depressed blood samples show low calcium – respond to calcium injections.

**(12) Pneumonia** Thirty – one types of pneumonia as mentioned in text – coughing – temperature – depression – off feed – flock history – presence of parasites in lung – presence of abscesses in lung – presence of consolidation and inflammatory exudates in lung – recovery of causal organism by bacterial culture.

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area – lymph nodes of throat and head swollen and red – *Clostridium novyi* on culture.

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**(16) Plant Poisoning** In many cases animal linger and show the characteristic symptoms – see text – scouring – malaise – depression – gastroenteritis or other specific symptoms and lesions depending on plant involved.

**(17) Photosensitization** Restlessness – shaking head – swelling of face, lips, ears, eyelids, between the jaws – yellow fluid collection in subcutaneous tissues – acute irritation, rubbing eyes, ears, face against trees – exudates from scabby crusts, skin becomes hard, board – like and necrotic in bad cases – newly shorn sheep affected along back – jaundice – necrotic shriveled distorted ears – history of eating sensitizing plants or materials.

**(18) Facial Eczema** Really acute photosensitization – watering from eyes – opalescence of cornea – reddening of conjunctiva – droop ears, head and face swells – restlessness, seeks shade, stamping of legs – leather – like skin which shrivels and peels – liver swollen, thickening of bile ducts – distortion of liver – discoloration sometimes gunmetal blue – regeneration of liver tissue may produce bulbous protrusions – history of eating *Swordsman fungus* with food.

**(19) Scabby Mouth** Yellowish brown scabs later become black on muzzle, face, legs; rarely anus, vulva and ears – secondary infections may produce suppuration and necrosis – runs course in three weeks – reddish spongy areas in mouth, on gums, dental pad and palate sometimes – difficulty for lamb in sucking.

**(20) Posthitis** In withers – depression – uneasiness – coma – death – local symptoms around sheath.

**(21) Urinary Calculi (Bladder Stones)** Pain, restlessness or walking with a straddling gait – occurrence in withers or rams – straining, prostration, deaths from uremia – may be palpable per rectum.

**(22) Botulism** Depression – increased pulse rate – wobbly gait – back arched – drool saliva from mouth – protrude tongue – unable to swallow – cuddling ceases – usually constipated – paralysis – coma and death in from 12 hours to three days – occasionally blindness – recovery may take two weeks or longer.

**(23) Listeriosis and Circling Disease** Circling – birth of dead or dying lambs – abortions – progressive paralysis – salivation – encephalitis – tendency to separate from mob and walk in a circle about 15 metres [50 ft] in diameter – star gazing – paralysis about mouth – panting – sometimes eye discharge – listlessness – staggering – tail twitching – drooping ears.

**Note:** Abortion and nervous symptoms do not appear together in the same animal (reason unknown.).

**(24) Crow Pick** Localized malignant oedema – deep lacerated wound – usually in eye – eye torn out – area swollen, dark – bloody dark discharge – prostration – death – history of crow attack.

**(25) Mastitis (Acute)** Recovery of *Pasteurella hemolytica*, *Discophiles avis*, *Antinomies (Corynebacterium) progenies*, *Corynebacterium pseudo tuberculosis*, hemolytic streptococci, anaerobic cocci, *Pasteurella* spp. (*multisided* and *mastiditis*) – straddling of the hind legs in walking – swelling of the belly – swelling inflammation, sometimes sloughing of the udder – death in one to three days in worst cases – recoveries variable.

**(26) Pasteurella Mastitis** Swelling of udder – fever – trembling – stiffness – gangrene – swollen lymph nodes and death – history of bruising by big strong lamb – recovery of *Pasteurella* spp. On culture.

**(27) Impaction** Animal sluggish – distension of rumen with hard, fibrous material – history of unsuitable feeding – depression, somnolence and death if unrelieved.

**(28) Cancers or Neoplasms** Depending on nature and site, swelling, lumps, tumors – wasting illness – scouring or a wide range of symptoms depending upon organs involved.

**(29) Adenocarcinoma** Rare condition – sheep ill, weak, breathless, distended abdomen, death three to six weeks – small intestine a cancerous mass about 3-3.5 meters [10-12 ft] down from fourth stomach – white thickened fibrotic material surrounding bowel – fleshy nodule on peritoneal surface of reticulum diaphragm and liver.

**(30) Melioidosis** very rare condition – coughing – respiratory distress on exertion – sheep stagger – become recumbent and die – eye and nasal discharges which may be thick and yellow – sometimes encephalitis – blindness – mild convulsions or walking in circles – head pushing – back arched – swelling of joints – loss of condition – course one week to several months – abscesses in lungs, spleen, liver, which are encapsulated in a fibrous wall and contain thick dry pus of greenish or greenish – yellow colour and may be surrounded by zone of pneumonia in lung – supportive joint lesions occur – abscesses on nasal mucous membrane with brown centre and ragged, depressed ulcers – nasal mucosa red, swollen – sometimes inflammation of meninges of brain and of the brain itself – recovery of *pseudomonas pseudomallei*.

**(31) White Liver Disease** Lingering or sudden deaths in lambs 6 weeks to some months of age – ill thrift – pale or white livers, response to vitamin B12 injection.

**(32) White Muscle Disease** Stillborn lambs or deaths soon after birth – tongue lesions – inability to suck – older lambs, hogget's with stiff stilted gait – lameness – arched back – prostration – symptoms precipitated by driving – occurrence in hogget's 10-15 months old after feeding on turnips – younger lambs on clovers – collapse on driving – take three or four days to die – excess fluid in abdominal and pleural cavities – fibrin present – liver may be swollen – white patches in skeletal muscles – grey – white patches under lining membrane of heart – some muscles swollen, friable, white chalky or yellow grey and striated – urine reddish brown.

**(33) Weaner Colitis** Occurs in young sheep – mucoid scouring – high morbidity – low mortality – recovery of *Campylobacter (Vibrato)*.

**(34) III Thrift and Selenium – Responsive Unthriftiness** Similar to white muscle disease but characteristic lesions absent – nothing specific on post – mortem – osteoporosis – occurrence often in improved clover pastures after heavy fertilizer application – particularly NZ.

**(35) Grass Seed Infestation** Massive infestation of grass seen in skin – local cellulites – septicemia – abscesses – multiple painful areas all over the body – stiff gait – lameness – eye damage – occasionally pleurisy and pneumonia – blowfly strike.

**(36) Coccidiosis** Scouring – often clears up in four or five days – deaths may occur at four or five days – bloodstained dropping or black – anemia – recovered lambs gaunt and develop into culls – inflammation small intestine last 6 metres [20 ft] – sometimes large intestine (caecum and colon) – yellow pinhead nodules, sometimes even soft wart – like growths in intestinal wall – intestine thickened, sometimes rigid – may be whitish nodules raised above the surface of mucous membrane – intestinal content slimy, semi – fluid and yellow or brown – *Coccidia* in scraping when examined under microscope – mainly young sheep four weeks to six months – sometimes history drought feeding or concentration on small area – favored by overstocking and continued use of same feed area.

**(37) Hogget III Thrift and III Thrift in Lambs** progressive emaciation – diarrhea – thirst – emaciation of feeding on immature pasture – sometimes selenium deficiency (usually not). See text for collection of approx. 20 diseases.

**(38) Prolapsed or Everson of the Uterus** History of feeding on clover – on good feed, sloping country – old fat ewes on third lambing or older – ewes carrying twin lambs.

**(39) Copper Deficiency** Chronic diarrhea – occurrence after sheep on area for at least a year – anemia – unthriftiness – emaciation – pine away and die – steely wool – loss of color in black wool sheep – severe emaciation and scoring in pregnant and lactation ewes – lameness – spontaneous – fractures – paralysis in lambs when born or within a few days of birth – dead lambs – lesions of brain and spinal cord – blindness – staggering, dog – sitting in lambs.

**(40) Cobalt Deficiency (Coast Disease)** Occurrence South Australia, Tasmania – anemia – particularly lambs and wieners – unthriftiness – discharge from easily – death in three or four weeks – fatigue easily – affected ewes produce sickly lambs or dead lambs – confined to certain soil types – pumice, some granite, sand – aggravated by pasture improvement – osteoporosis.

**(41) Combined Cobalt and Copper Deficiency** Occurrence South Australia, Tasmania, Western Australia – anemia – weight loss – lethargy – weakness – emaciation – inappetence – depression of wool growth – steely wool – paralysis in lambs – death –

hemosiderosis of liver and pancreas – fragility of bones.

**(42) Vitamin A Deficiency** Drought conditions – night blindness – weak or dead lambs – occurrence six months or more after last green feed – weakness – unthriftiness – calculi – sterile rams – response to vitamin A supplements by drenching, feed or injection.

**(43) Rickets** Occurrence in NZ or southern States of Australia – deficiency of sunlight or rachitogenic pastures – widened epiphysis cartilages – occurrence eight to twelve months – lameness – ill thrift and even death.

**(44) Johne's Disease** Occurrence in certain areas around Canterbury, NZ- adult sheep only – thickened lymphatic in gut wall – probably not in Australia in sheep (1987) – loss of condition – emaciation – usually no diarrhea – gradual onset and progression.

**(45) Periodontal Disease** Loosening of teeth – inflammation of the gums around the teeth – resumption of alveolar bone and fibrous replacement – inflammation and abnormal growth of gums – occurrence particularly in NZ on selenium – deficient country – adults only.

**(46) Chronic Floresis** Adults only – mottled brittle teeth – bones chalky white and brittle – exospores may be present.

**(47) Cryptococcus** Very rare condition – cough – symptoms like pneumonia – discharge from nose – swellings of affected lymph nodes – involvement of brain – recovery of *Cryptococcus* on microscopic examination – may be swellings of maxillary sinuses.

**(48) Congenital Progressive Muscular Dystrophy** White muscle, lameness hindquarters worse than forequarters – slow development first seen at a few weeks of age and developed largely by one to two years – not responsive to selenium – transmitted hereditarily – Merinos only – sometimes bloating – ill thrift responds to hand feeding but slow progression and regression.

**(49) Bluetongue** Not in Australia but non – pathogenic virus present in 1977 . Edematous swelling lips together with hyperemia or mucosa of mouth, edema of larynx, tongue movements, salivation nasal discharge, edema of lips and tongue (blue tongue) – edema face and lower surface of the neck – wastage of muscles – loss of condition – tort Collis –

lameness, reddening of coronary bands in late stage.

**(50) Nephritis and Nephritis** Young sheep following have drenching for scouring – swollen kidneys – cortex tan in colour – medulla watery and translucent – ureic conditions throughout car case – multiple deaths – hepatocellular necrosis – may be cyanosis and skin darkening.

See also conditions listed under 'III Thrift', as all of these may cause lingering deaths.

### **If there are DEATHS IN YOUNG LAMBS:**

**The disease may be** (in which case look for the following key features).

**(1) Vibriosis** Occasional deaths in young lambs soon after birth – abortions last month of pregnancy, sometimes early and continues – fetus with dropsical subcutaneous tissue – enlarged pale liver with necrotic areas – no necrosis in fetal membranes – brown vaginal discharge in ewes for several days after aborting.

**(2) Listeriosis and circling Disease** Circling – birth of dead or dying lambs – abortions – progressive paralysis – salivation – encephalitis – tendency to separate from the mob and walk in a circle about 15 metres [50 ft] in diameter – start gazing – paralysis about 12 hours after onset of symptoms – blindness – frothing at the mouth – panting – sometimes eye discharge – listlessness – staggering – tail twitching – drooping ears.

**Note:** Abortion and nervous symptoms do not appear together in the same animal (reason unknown).

**(3) Brucellosis (Ovine Abortion)** Abortion of lambs – 60 per cent of lambs till alive at beginning of lambing – such lambs show chalk – like deposit (calcified plaques) on walls of hooves and accessory digits – ewes, after mating with infected rams, show hyperemia, mucopurulent exudates on vaginal and cervical mucosa for a few days – at lambing, placenta is gelatinous, edematous and thickened – cotyledons pale, being pale red or yellowish – white instead of normal red – may be flattened and partly disintegrated – membranes between cotyledons look like chamois leather, being yellowish – white, firm and thickened – ewe's

uterus may be thick due to gelatinous edema – sometimes embryos mummified with subcutaneous edema – recovery of affected ewes – many lambs born dead, some die early from exposure, weakness, poor viability.

**(4) Toxoplasmosis** Abortions, two to six weeks before lambing – prenatal lambs deaths – stillborn lambs – placentitis – sometimes young lambs may die – recovery of causal organism by bacterial culture – white flecks or foci in fetal cotyledons – leucoencephalomalacia (softening of the white matter of the brain).

**(5) Salmonella Abortion** Death of lambs subsequent to salmonellas in ewes – weak lambs – stillborn lambs – macerated fetuses – history of salmonellosis – see 'Salmonellosis under 'Sudden Deaths'.

**(6) Desertion by Ewe** Lost lambs bleating, emaciated, distressed, death from starvation and exposure – history of maiden ewes – ewes fly struck – ewes in poor condition – lambs with entropion – ewes harassed by dingoes, foxes, eagles, crows.

**(7) Septicemia (Blood Poisoning) and Malignant Edema** Occurs mainly after marking – high temperatures in the sick lamb – hemorrhages in the heart wall, kidney and other organs – often a septic wound (e.g. after lamb marking) or navel – the skin around the crutch and inside the thighs is blackened and the tissues swollen with bloodstained serum and gas.

**(8) Arthritis, Non – Supportive** sudden onset – involves large number of lambs – no obvious changes in most joints, some only swollen – occurs 10 – 14 days after marking – acute lameness, tenderness – raised temperature – involves hock, corpus, elbow, stifle – emaciation – some die – chronic cases may walk on knees – posterior paralysis if intervertebral joint involved.

**(9) Arthritis, Supportive** Acute lameness, tenderness – swelling of affected joints – abscesses may burst through skin like boils – distortion of joint – permanent lameness – recovery unusual – sometimes abscesses in lung and elsewhere – pus, yellowish to greenish – recovery *Antinomies* (C.) *progenies*, *Staphylococci* or *Streptococci* on culture; or *History ovis* / *Homophiles sinus*, *Mycoplasma*, *Chlamydia*, *Erysipelothrix*, *E. coli*, *Salmonella* all may cause supportive polyarthritis.



**(10) Histophilus Ovis infection** Causes epididymitis – gangrenous mastitis – abortion – septicemia – polyarthritis – abscesses in young lambs – death in young lambs – embolic pneumonia – nephritis – enlarged joints – excess fibrino – purulent exudates – synovial membrane changes.

**(11) Enterotoxaemia** Two to 16 weeks lambs. Affects prime lambs, weaners- food rich and succulent – may sheep affected – occasionally affects adults – may die in convulsion (mainly lambs)- or in coma (mainly adults) – kidneys pulpy and swollen – small intestine almost empty, mayonnaise – like contents – bowel fragile – pericardial jelly like chicken fat – no temperature rise – depraved appetite – some scour – sometimes bloat – small hemorrhages in heart – sometimes darkening of skin – bowel toxins on filtration – *C. porringers* D in smears, glucose positive urine – congested edematous lungs.

**(12) Blowfly Strike** Occurs after lamb marking or after injury by dogs, foxes or crows – wet areas.

**(13) Paralysis** May occur a week or two after lamb marking due to the development of an abscess in the spinal column, the result of infection of the tail or scrotal wound.

**(14) Blackleg** Occurrence in young lambs occasionally, e.g. following marking – purplish bloody exudates – swollen area – prostration – death – *Clostridium chauvinist* on culture.

**(15) Phenothiazine Poisoning** If ewes dosed in last fortnight of pregnancy, dead lambs (premature or full term) may result – or weak lamb dies early.

**(16) Colibacillosis in Lambs** Occurrence at two to nine weeks of age (maternal immunity may protect for first few weeks if ewe has contacted disease) – transitory scouring, sickness and recovery in mild outbreaks, per acute toxemia and septicemia, lameness, central nervous symptoms – arched back, tails held horizontally – stiff movement of legs – diarrhea – lie on sides with heads thrown stiffly back – paddle legs – pain reaction on handling – pallor of liver and kidneys – congestion of meninges of brain – excess cerebrospinal fluid with cream fibrinous, flaky material – pleural and pericardial cavities may show excess clear straw – coloured fluid which clots on exposure – carpal, elbow or any joint of the body may be involved – recovery of *E. coli* on culture. (**Note:** May confuse with tetanus and with enterotoxaemia clinically.)

**(17) Tetanus** In lambs marked with tuber rings occurs typically three weeks after – stiff in walking – show spasms if startled – go down on side- with legs stiffened out – muscles stiff and board – like – unable to suckle – grinning facial expression – head held high, legs wide apart – sometimes death rapid with few symptoms – sometimes bloating – usually history of, e.g., shearing, mulesing, lamb marking.

**(18) Chlamydia spp.** Ewe abortion – polyarthritis in lambs – lung infection – conjunctivitis – recovery of *Chlamydia* spp. by special culture – perinatal lamb losses.

**(19) Erysipelas Septicemia** Recovery of *Erysipelothrix* from liver, kidney, mesenteric lymph nodes and joints – congestion synovial membranes – septicemia.

**(20) Goiter** Deaths in lambs – much enlarged thyroids – history of prenatal lamb mortalities and abortions – history of feeding on white clover pastures – increased susceptibility of Dorset horns, next crossbreds, least Merinos – response to potassium iodated – occurrence in certain susceptible areas, Australia and New Zealand. The lamb may be strong and healthy when dropped – few hours after goes into convulsions – coma – death.

**(21) Scabby Mouth** yellowish brown scabs later become black on muzzle, face, legs; raelly anus, vulva and ears – secondary infections may produce suppuration and necrosis – runs course in three weeks – reddish spongy areas in mouth, on gums, dental pad and palate sometimes – difficulty for lambs in suckling.

**(22) Navel ill** Occurrence in young animals – swelling, discoloration, varying with type of organism – secondary pneumonia and joint infections – recovery of causal organism by culture (*Pasteurella* spp., *Clostridia* spp., *Corynebacteria*, *Sphaerophorus necrophorus*).

**(23) Necrobacillosis** Another form of navel ill due to *sphaerophorus necrophorus* – navel infection from soil – necrotic lesions in liver – sometimes in lungs, bones and elsewhere – occurrence three to eight weeks.

**(24) Pneumonia** Thirty – one types of pneumonia as mentioned in text – coughing – temperature – depression – off feed – flock history – presence of parasites in lung – presence of abscesses in lung – presence of consolidation and inflammatory exudates in lung – recovery of causal organism by bacterial

culture. Friedlander's bacillus infection has killed suckling lambs with pneumonia.

**(25) Coccidiosis** Scouring – often clears up in four or five days – deaths may occur at four or five days – bloodstained droppings or black – anaemia – recovered lambs gaunt and develop into culls – inflammation small intestine last 6 metres [20 ft] – sometimes large intestine (caecum and colon) – yellow pinhead nodules, sometimes even soft wart – like growth in intestinal wall – intestine thickened, sometimes rigid – may be whitish nodules raised above the surface of mucous membrane – intestinal content slimy, semi – fluid and yellow or brown – *Coccidia* in scraping when examined under microscope – mainly young sheep four weeks to six months – sometimes history drought feeding or concentration on small area.

**(26) Yersinia Pseudotuberculosis** Causes placentitis – multiple focal abscesses in the liver, lungs and kidney of the unborn lamb – might be born dead or die soon after birth.

**(27) Lamb Dysentery** Not in Australia – lambs one to 14 days affected – sudden death – stop suckling, listless – bloody diarrhea – inflammation and ulceration of intestine, both small and large – liver enlarged and friable – diagnosis only by laboratory work.

**(28) Enzootic Ataxia** (One type copper deficiency.) Stillborn lambs – weak lambs that die soon after birth – unable to suckle – involvement of brain and spinal cord – erratic staggering movements – blindness – older lambs one to three months fail to thrive – weak – paralysed after driving a few yards – heart beat, respiration fast – some show only swaying rump from side to side and staggering – worsens on driving – dog sitting – death from starvation – anaemia in ewes – relived by copper supplements – steely wool – doggy wool in fleece of affected sheep.

**(29) Copper Deficiency** Chronic diarrhea – occurrence after sheep on area for at least a year – anaemia – unthriftiness – emaciation – pine away and die – steely wool – loss of colour in black wool sheep – severe emaciation and scouring in pregnant and lactating ewes – lameness – spontaneous fractures – paralysis in lambs when born or within a few days of birth – dead lambs – lesions of brain and spinal cord – blindness – staggering, dog – sitting in lambs.

**(30) Thiamine Deficiency** Death in lambs one to 10 weeks of age – agelactia in mothering ewes – evidence of polio – encephalomalacia in

flock – clinical pathology evidence of thiamine deficiency syndrome.

**(31) Bacterial Abscesses** Abscesses in liver in young lambs – *Actinomyces (Corynebacterium) pyogenes*, *C. pseudotuberculosis* may be recovered – sometimes *Streptococci* – abscesses in other positions such as joints – history of infection via umbilicus.

**(32) Feeding Troubles** Ewes with mastitis or other diseases so that the lamb is not suckling – will die unless poddied.

**(33) Leptospirosis** Dead lambs – or lambs affected one to six months – fever – anaemia – jaundice – dark kidneys – red water – abortion – *Leptospira* in urine – rare in Australia and uncommon in New Zealand – usually mild form – no symptoms.

**(34) Clostridial Navel Infection** (*Cl septicum*, *Cl fiseri*) – oedematous swelling ventral abdominal wall – severe serosanguinous fibrinous peritonitis – also other clostridial infection, e.g. lamb dysentery, blackleg, may affect young lambs.

**(35) Exposure, Bleak Weather** Deaths in lambs in cold weather – lack of protection – poor feed – poor milk supply – low bodyweight.

**(36) Injury at Birth** Large, healthy lambs may have ruptured liver, spleen, lung damage or suffocation due to birth injuries, brain haemorrhage.

**(37) Streptococcal Uterine Infections** Abortion of dead and dying lambs – temperature – discharges – occurs in New Zealand and Australia.

**(38) Attack by Predators** History of attack by dingoes, foxes, eagles, ravens, pigs, crows, etc. – traumatic damage to tongue, eyes, back – evidence of local gangrenous infection as for crow pick, blackleg, malignant oedema.

**(39) Lazy Lambers** History of ewes being on clover, particularly subterranean – ewes require assistance – many dead lambs if unassisted – history of siring by large Downs breed rams.

**(40) Genetic Lethal Factors** Deformities, abnormalities or deficiencies which suggest recessive lethal factors.

**(41) Dystocia or Lambing Troubles** Determine whether the lamb died before or after birth. If before, there is no clot in the umbilical vessels.

If after lambing, the umbilical vessels will have a blood clot. If before, assess how long before (liquefaction of kidneys, mummification, decomposition). If after, note whether it has breathed and walked and fed and assess disease state.

**(42) Jaundice in Newborn Lambs** Congenital aplasia of bile ducts – obstructive jaundice – history of grazing herbage on previously flooded areas – has been seen on crossbreds mated to Dorset horn rams in Riverina, 1964 – rare disease.

**(43) Clover Disease** High neonatal mortality – failure of ewes to breed – lambing troubles – malpresentations – uterine inertia – dead lamb – prolapse of uterus, vagina and bladder – milking of maiden ewes and non-pregnant ewes – abnormalities of udder and milking in wethers – enlargement of bulbo – urethral glands.

**(44) *E. coli* Meningoencephalitis** Lambs affected with paralysis – stiffening – paddling motions – inflammation of meninges – green Pus-like cerebrospinal fluid. See also ‘Colibacillosis’.

**(45) Entropion** Usually the lower eyelid turned in, with the lashes irritating the eyes – leads to mismothering due to irritation and pain. and often of the young lambs.

**(46) Bladder Worm Disease** Rare to have symptoms but mass infestation of liver due to swallowing a tapeworm segment – can lead to severe liver damage – migratory tracks visible – death of lamb – lungs and spleen and peritoneal cavity have been seen infested – rare.

**(47) Cobalt Deficiency (Coast Disease)** Occurrence South Australia, Tasmania – anaemia – particularly lambs and weaners – unthriftiness – discharge from eyes – death in three or four weeks – fatigue easily – affected ewes produce sickly lambs or dead lambs.

**(48) Combined Cobalt and Copper Deficiency** Occurrence South Australia, Tasmania, Western Australia – anaemia – weight loss – lethargy – weakness – emaciation – inappetence – depression of wool growth – steely wool – paralysis in lambs – death – haemosiderosis of liver and pancreas – fragility of bones.

**(49) Vitamin A Deficiency** Drought conditions – night blindness – weak or dead lambs – occurrence six months or more after last green feed for ewes – weakness – unthriftiness in

flock – calculi – sterile rams – response to vitamin A supplements by drenching, feed or injection.

**(50) CNS Diseases** See sections under ‘Convulsions’ and ‘CNS Diseases’

**(51) Tick Paralysis (*Ixodes holocyclus*)** Wobbling – weakness – lamb goes down and dies – presence of ticks on the haired skin of the body, particularly around lips and eyelids – occurrence on coast in tick areas only.

**(52) Congenital white Muscle Disease** Low selenium – muscular necrosis under the endocardium – calcification – rarely skeletal muscular necrosis.

**(53) Complicated Starvation** Lambs breathe, walk – not fed – body fat partially metabolized – failure to obtain milk in lambs lacking vigour at birth – weakness, small size – prolonged parturition.

**(54) Uncomplicated Starvation** Lambs breathe, walk – not fed – body fat fully metabolized – failure to obtain milk by vigorous lambs – due to maternal desertion (maiden ewe, fly strike, predator worry), post – parturient infection, tongue torn out by crows, obstructed teat canal of ewes, mastitis in ewe, exhaustion in heat wave, blindness due to entropion or attack by ants (*Iridomyrma obscurus*) or bogging after flooding rains.

**(55) Hard Udders in Ewes** Hard udders – fibrous development – imperforate sinus – (see text under ‘Hard Udders’) – no milk – starvation and death of lamb (in NZ).

**(56) Haemorrhage** Haemorrhage from tail stump or scrotum – anaemic carcass – usually one day after marking.

**(57) Staphylococcal Infection** Two to four weeks lambs – navel infection by *Staph. aureus* – abscesses of heart muscle – miliary abscesses in lung and kidney.

**(58) Necrophorum infection** Death in lambs 2 to 3 weeks old – severe depression – temperature normal to subnormal – necrotic area in liver, liver enlarged – necrosis occasionally in other portions of the body – serofibrinous pleurisy – recovery *Fusobacterium necrophorum* on culture.

**(59) Clostridial Myocarditis** Infects lambs up to 12 months of age – myocardial necrosis – haemorrhages in heart –

haemorrhagic pericardial fluid – sudden death – some outbreaks, history of lamb marking or tail docking or shearing or mulesing; other outbreaks, no such history – recovery of *Clostridium chauvoei* from heart.

**(60) White Liver Disease** Lingering or sudden deaths in lambs six weeks to some months of age – ill thrift – pale or white livers – response to vitamin B12 injection.

**(61) *Clostridium perfringens* Type A, Type B (Lamb Dysentery), Type C** May all cause death in lambs somewhat similar to enterotoxaemia but do not occur in Australia.

**(62) Rotavirus** May cause diarrhoea and death in young lambs.

**(63) Rift Valley Fever** Abortion – fever – anorexia – weakness – haemorrhagic diarrhoea – heavy death rate in lambs – not in Australia.

**(64) Foot and Mouth Disease** Not in Australia – vesicles on coronary bands and interdigital skin – lameness with bacterial infection – vesicles on the dental pad and posterior dorsal surface of tongue – cardiac lesions – greyish foci with striped appearance (tiger heart)-vesicles on ruminal pillars – deaths from myocardial failure in lambs.

**(65) Parainfluenza Virus Type III** Has been shown to cause perinatal deaths in lambs in Victoria.

**(66) Mucosal Disease (Congenital Chorea, Hypomy – elinogenesis Congenita, Hairy Shaker Disease, Border Disease)** Causes stillbirths, weak lambs and deaths (see full account).

**(67) Abomasal Bloat** Distension of abdomen – breathlessness – cyanosis – Dysphagia – death from heart failure – history of excessive amounts of warm milk replacer fed to lambs or some other cause of acute abomasal distension.

### **If there is LAMENESS, STIFFNESS, STAGGERING OR PARALYSIS:**

Note also the sections on ‘Nervous Symptoms’, ‘Convulsions’ and ‘CNS Symptoms’, as practically all these show staggering and sometimes paralysis, and lists partly overlap.

**The disease may be** (in which case look for the following key features):

**(1) Foot Rot (*Bacteroides nodosus*)** Under-rum horn with stinking, greyish necrotic material – epidemic in flock – worst in wet seasons – carriers and mild cases, swelling under the horn – reddening of skin between claws just above horn – no abscess or pus formation – lameness – loss in condition – overgrowth, distortion of hooves – *Bacteroides nodosus* recoverable on smears.

**(2) Foot Abscess (*Fusobacterium necrophorum*)** Severe lameness – abscesses with yellowish – green pus which breaks out at the coronet or between toes or higher up – discharging sinuses – occurs as sporadic cases rather than epidemics – *Fusobacterium necrophorum* recoverable.

**(3) Strawberry Foot Rot or Proliferative Dermatitis (*Dermatophilus congolensis*)** Typical strawberry appearance, bleeding points on ulcerating granulomatous surface – uncommon condition – causal fungus, *Dermatophilus congolensis* recoverable – may be history of mycotic dermatitis in contacts.

**(4) Ovine Interdigital Dermatitis (*Fusobacterium necrophorum*)** Inflammation of skin between the claws – minimal lameness – history of wet conditions – absence of *Bacteroides nodosus* on smears – yields to foot bathing or dry conditions promptly.

**(5) Infectious Bulbar Necrosis (Heel Abscess) and Lamellar Suppuration (Toe Abscess)** Similar to foot abscess but lacks the necrotic pointing suppuration at the coronet.

**(6) Benign Foot Rot or Scald (*Bacteroides nodosus*)** Different from foot rot in being abenign from that dose not spread – occurs only in soft slushy conditions with lush pasture – yields to formalin foot bathing or dry conditions.

**(7) Stone Bruises** Occasional occurrence – mechanical bruising evident – extravasated blood and inflammatory exudates with pain.

**(8) Navel Ill (Polyarticular synovitis type)-fibrinous or proliferative synovitis** – abscesses in other organs – infection via navel or through marking wounds.

**(9) Arthritis, Suppurative** Acute lameness, tenderness – swelling of affected joints – abscesses may burst through skin like bolis – distortion of joint – permanent lameness – recovery unusual – sometimes abscesses in lungs and elsewhere – pus, yellowish to

greenish – recovery *Actinomyces (C.) Pyogenes*, *Staphylococci*, *Streptococci*, *Histophilus ovis*, *Haemophilus somnus*, *Mycoplasma*, *Chlamydia*, *Erysipelothrix*, *E. coli* or *Salmonella* on culture.

**(10) Arthritis, Non-Suppurative** Sudden onset – involves large number of lambs – no obvious changes in most joints, some only swollen – occurs 10 - 14 days after marking – acute lameness, tenderness – raised temperature – involves hock, carpus, elbow, stifle – emaciation – some die – chronic cases may walk on kness – posterior paralysis if intervertebral joint involved – see article on various arthritides.

**(11) Clover Burn and Foot Scald** Overgrown horn – foul, stinking, rotting material – knuckling over – wet season or irrigation – lush pasture.

**(12) Enzootic Ataxia** (One type copper deficiency) Stillborn lambs – weak lambs that die soon after birth – unable to suckle – involvement of brain and spinal cord – erratic staggering movements – blindness – older lambs one to three months fail to thrive – weak – paralysed after driving a few yards – heart beat, respiration fast – some show only swaying rump from side to side and staggering – worsens on driving – dog-sitting – death from starvation – anaemia in ewes – relieved by copper supplements – steely wool – doggy wool in fleece of affected sheep – histopathology, bilateral microscopic symmetrical demyelination of dorsolateral and ventral tracts in spinal cord.

**(13) Injuries, Fractures, Wounds, Bruisings** these and other mechanical damage will cause lameness.

**(14) Scabby Mouth** Sometimes lesions on legs cause lameness – yellowish brown scabs later become black on muzzle, face, legs; rarely anus, vulva and ears – secondary infections may produce suppuration and necrosis – runs course in three weeks – reddish spongy areas in mouth, on gums, dental pad and palate sometimes – difficulty for lambs in suckling.

**(15) Strongyloides Worms** Swelling and inflammation of the skin of the leg and knee – shifting, dancing type of lameness.

**(16) ‘Viral’ Polyarthritis** Mainly crossbred lambs which are stiff, disinclined to move – symptoms disappear after two weeks – clear eye discharge and conjunctivitis – synovia in joints

slightly increased – congestion or haemorrhages throughout the joints – fibrin plaques in joint fluid – brain changes and kidney changes at time – recovery psittacosis lymphogranuloma venereum on culture.

**(17) Melioidosis** Rare disease – coughing – respiratory distress on exertion – sheep stagger – become recumbent and die – eye and nasal discharges which may be thick and yellow – sometimes swelling of joints – loss of condition – course one week to several months – abscesses in lungs, spleen, liver, which are encapsulated in a fibrous wall and contain thick dry pus of greenish or greenish-yellowish colour and may be surrounded by zone of pneumonia in lung – suppurative joint lesions occur – abscesses on nasal mucous membrane with brown centers and ragged depressed ulcers – nasal mucosa red, swollen – sometimes inflammation of meninges of brain and of the brain itself – recovery of *Pseudomonas pseudomallei*.

**(18) Bowie or Bent Legs** Rare disease – occurrence in sheep three weeks of age upwards – front or hind legs bent outwards mainly – bones of normal strength – uncommon in New South Wales and New Zealand.

**(19) Laminitis or Founder** Acute lameness – shedding of hooves in most severe cases – history of overfeeding on new grain or some severe fever.

**(20) Trombidiosis** Reddening around coronet, biting and stamping on part – sometimes ulcers and lameness.

**(21) Eperythrozoonosis** Anaemia – watery blood – spleen enlarged – excess pericardial fluid – muscles light in colour – lambs are staggy and sluggish – lag behind if they are driven – stiffness in hindquarters – finally collapse.

**(22) Fly Strike** Will cause lameness on legs with septic involvement.

**(23) Grass seed Infestation** Massive infestation of grass seen in skin – local cellulites – septicaemia – multiple painful areas all over the body – stiff gait – lameness – eye damage – occasionally pleurisy and pneumonia – blowfly strike.

**(24) After Dipping Lameness** Really special form of non-suppurative arthritis – occurs two or three days after dipping – 90 per cent of flock may be affected – inflammation continues for

about 10 days – wool and hair may lift from around coronet – recovery usual after a fortnight – inflammation and oedema of the lower leg and pastern but condition does not extend into arthritis – history of dipping in dip with no bacteriostat in it – recovery of *Erysipelothrix rhusiopathiae* on culture.

**(25) Mastitis, Acute** Stiffness and staggering in walking – recovery of *Pasteurella haemolytica*, *Histophilus ovis*, *Actinomyces (Corynebacterium) pyogenes*, *Corynebacterium pseudotuberculosis*, haemolytic *Streptococci*, *Pasteurella* spp. (*multocida* and *mastiditis*) – straddling of the hind legs in walking – swelling of the belly – swelling, inflammation, sometimes sloughing of the udder – death in one to three days in worst cases – recoveries variable.

**(26) Blakleg** Lameness – staggering – death – may die suddenly or after lingering for some days – affected areas dark in colour, bruise – like (does not crackle like cattle lesions) – if from wound, dark purplish bloody exudate from vulva – skin pits – usual course 12-18 hours – acute lameness if in leg – straddling gait if genital tract – high temperature – haemorrhages in heart – *Clostridium italic chauvoei* on culture – sometimes bloody froth from nostrils of carcase.

**(27) Blood Poisoning** Staggering in terminal stages – local lesions – profound illness, death.

**(28) Listeriosis and Circling Disease** Circling – birth of dead or dying lambs – abortions – progressive paralysis – salivation – encephalitis – tendency to separate from the mob and walk in a circle about 15 metres [50 ft] in diameter – star gazing – paralysis about 12 hours after onset of symptoms – blindness – frothing at the mouth – panting – sometimes eye discharge – listlessness – staggering – tail twitching – drooping ears – facial paralysis – prostration – microscopic acute encephalitis – micro – abscesses.

**Note:** Abortion and nervous symptoms do not appear together in the same animal (reason unknown).

**(29) Rye grass Staggers** Stilted gait – incoordination – epileptiform convulsions if excited – many affected – age six to 20 months – recovery if shifted to non – rye grass pastures.

**(30) Phalaris Staggers** Incoordination – head nodding on excitement – loss of use forelegs – convulsions – affects animals all ages – bilateral focal pigmentation of brainstem with neuronal

pigmentation and degeneration – deaths aggravated by fright or driving.

**(31) Zamia palm** posterior incoordination leading to paralysis – no pathological changes – affects all ages.

**(32) Rough Bearded Grass Stiffness** – incoordination – leading to paralysis – no pathological features – affects sheep all ages.

**(33) Darling Pea and other Swainsona spp.** Stiffness – trembling – unsteady gait – abnormal stance – stargazing – head pushing – inability to rise from ground – high stepping – focal orange pigmentation of ventral brain stem – microscopic pseudolipid degeneration of many cells in brain and other organs.

**(34) Small-flowered Mallow** Stiff gait – arched back – head held outstretched, worse on exercise – trembling incoordination.

**(35) Stagger Weed** Staggering gait – trembling – precipitated by exercise.

**(36) Lupinosis** Staggering – convulsions – often precipitated by exercise.

**(37) Sour Sob and Sorrel** See as for ‘Hypocalcaemia’.

**(38) Tetanus** In lambs marked with rubber rings occurs typically three weeks after – stiff in walking – show spasms if startled – go down on side with legs stiffened out – muscles stiff and board-like – unable to suckle – grinning facial expression – head held high, legs wide apart – sometimes death rapid with few symptoms – sometimes bloating – usually history of, e.g., shearing, mulesing, lamb marking.

**(39) White Muscle Disease (Stiffs) (Stiff Lamb Disease)** Stillborn lamb or deaths soon after birth – tongue lesions – inability to suck – older lambs, hoggets with stiff stilted gait – lameness – arched back – prostration – symptoms precipitated by driving – occurrence in hoggets 10 to 15 months old after feeding on turnips – younger lambs on clovers – collapse on driving – take three or four days to die – excess fluid in abdominal and pleural cavities – fibrin present – liver may be swollen – white patches in skeletal muscles – grey-white patches underlining membrane of heart – some muscles swollen, friable, white chalky or yellow – grey and striated – urine reddish brown – symmetrical skeletal myonecrosis and often cardiac myonecrosis – rachitogenic factors in

green feed may cause – widened epiphyseal lines.

**(40) Congenital Progressive Muscular Dystrophy** White muscle, lameness hindquarters worse than forequarters – slow development first seen at a few weeks of age and developed largely by one to two years – not responsive to selenium – transmitted hereditarily – Merinos only – sometimes bloating – ill thrift responds to hand feeding but slow progression and regression.

**(41) Abscesses of Spinal Cord (Vertebral Abscess)** Specific infection of the spinal cord occurs occasionally with abscess formation and lameness, according to the area affected. This is most commonly in thoracic vertebrae 6 or 7, or lumbar vertebrae 3 or 4 – characterized by greenish – yellow pus – *Fusobacterium necrophorum*, *Bacteroides* spp. – mainly in lambs two to 14 weeks old – loss of function – staggering – weakness – paralysis.

**(42) Bone Fragility** Lameness – broken limbs – fragility of the skeleton – history of grazing on wheat and certain pastures, also oats – recovery on change of pasture to suitable feed.

**(43) Rickets** Occurrence in NZ or southern States of Australia – deficiency of sunlight or rachitogenic pastures – widened epiphyseal cartilages – occurrence eight to 12 months – lameness – ill thrift and even death.

**(44) Calcium Deficiency** History of feeding on cereal grain – no calcium supplement – poor wool production – broken and deformed teeth – eruption of teeth delayed – uneven molars – failure to thrive.

**(45) Grass Tetany (Hypomagnesaemia)** Muscular tremors – staggering – convulsions – excitability – frothing at mouth – rapid death – excitement precipitates nervous response – symptoms merge with hypocalcaemia in some cases – blood samples show depressed magnesium content – response to magnesium sulphate injections or magnesium sulphate/ calcium injections combined.

**(46) Hypocalcaemia** Gait stilted, proppy – tremor in muscles – hyperaesthesia – totters, goes down – pupil dilated – corneal reflex absent – sheep lies out sternum, head out, chin on ground, hind legs straddled out behind – no cudding, no rumen movements – discharge from nostrils – coma – death from a few hours to three days – temperature depressed – blood

samples show low calcium – respond to calcium injection.

**(47) Colibacillosis in Lambs** Occurrence at two to nine weeks of age (maternal immunity protects for first two weeks if ewe has contacted disease) – transitory scouring, sickness and recovery in mild outbreaks – in severe outbreaks, peracute toxæmia and septicaemia, lameness, central nervous symptoms – arched back, tails held horizontally – stiff movement of legs – diarrhoea – lie on sides with heads thrown stiffly back – paddle legs – pain reaction on handling – pallor of liver and kidneys – congestion of meninges of brain – excess cerebrospinal fluid with cream fibrinous flaky material – pleural and pericardial cavities may show excess clear straw – colored fluid which clots on exposure – carpal, elbow or any joint of the body may be involved – recovery of *E. coli* on culture. (**Note:** May confuse with tetanus and with enterotoxaemia clinically).

**(48) Botulism** History of eating cadaver or decomposing material – depression – increased pulse rate – wobbly gait – back arched – head bobbing up and down while walking – drool saliva from mouth – protrude tongue – unable to swallow – cudding ceases – usually constipated – paralysis – coma and death in from 12 hours to three days – occasionally blindness – recoveries may take two weeks or longer.

**(49) Corynebacterial Encephalitis and Meningitis** Young lambs – purulent meningitis and encephalitis – incoordination – convulsions – death.

**(50) Mycotic Dermatitis (Lumpy Wool)** Lesions on leg may cause lameness – hard scabs on coronet firmly attached to skin – lesions of mycotic dermatitis elsewhere on body – see ‘Mycotic Dermatitis’ under ‘Abnormalities in Fleece’.

**(51) Shelly Toe** Wall separated from underlying epithelium – cavity between separated horn and underlying structures may be packed with soil, dung, etc. – if wet, may be inflammation and decomposition.

**(52) Suppurative Cellulitis and Ovine Interdigital Dermatitis** Inflammation including coronet extending up leg – acute lameness – causal agent *Fusobacterium necrophorum*.

**(53) Posterior Paralysis** See article on ‘Posterior Paralysis’; and also article on ‘Staggers in Sheep’.

**(54) Ovine Posthitis and Vulvitis** Sheath rot or posthitis – external ulceration – ulceration inside sheath – swelling of prepuce – may be as large as fist – blockage of urine – arching of back – walking stiffly – obvious illness – uraemia – semi-solid pus and necrotic material expressed on pressure – destruction of part of prepuce by ulceration and sloughing – ulcerated areas covered with brownish-yellow pus – sloughing off of urethral process – erosion of the glans penis – staining of wool around sheath and fly strike – in ewe, yellow encrustation on the lip of the vulva.

**(55) Toxaemia of Pregnancy** Slow onset – hyperaesthesia – restlessness – stupidity sometimes – history of pregnancy and decreasing plane of nutrition – blindness – pushing – loss of blink reflex – walk in circle aimlessly – spasticity in limbs – abnormal posture – go down – paralysis – coma – death two to six days – twin lambs – yellow liver with peculiar fatty mottling – fat necrosis in abdomen – kidneys have pale cortex – adrenal glands have red cortex and pale medulla (reverse to normal).

**(56) Scrapie** Chronic neuritis – intense itching – weakness – incoordination – paralysis and death – long course. (**Note:** Hoped that it has been eradicated from Australia and New Zealand). Loss of wool – restlessness – excitability – muscular tremors – convulsions – sheep 18 months to 4 ½ years of age mainly – deaths from debility and emaciation.

**(57) Pasteurella Mastitis** Swelling of udder – fever – trembling – stiffness – gangrene – swollen lymph nodes and death – history of bruising by big strong lamb – recovery of *pasteurella* spp. on culture.

**(58) Toxaemic Jaundice** Affects British breeds and crosses, only rarely Merinos – yellow colouring of skin and internal organs – staggering – rapid wasting – brown or red urine – carcass yellow – liver orange – kidneys blue – black (gunmetal) – suggestive feeding history (heliotrope, paterson's curse, etc.) – first cases die rapidly, later cases linger three to five days – surviving cases fail to thrive – liver copper values above 1000 ppm.

**(59) Copper Deficiency** In particular areas only – chronic diarrhoea – occurrence after sheep on area for at least a year – anaemia – unthriftiness – emaciation – pine away and die – steely wool – loss of colour in black wool sheep – severe emaciation and scouring in pregnant and lactating ewes – lameness – spontaneous

fractures – paralysis in lambs when born or within a few days of birth – dead lambs – lesions of brain and spinal cord – blindness – staggering, dog-sitting in lambs.

#### **(60) Combined Cobalt and Copper**

**Deficiency** In particular areas only – occurrence South Australia, Tasmania, Western Australia – anaemia – weight loss – lethargy – weakness – emaciation – inappetence – depression of wool growth – steely wool – paralysis in lambs – death – haemosiderosis of liver and pancreas – fragility of bones.

**(61) Vitamin D Deficiency** Subclinical rickets – unthriftiness – flock develops a 'tail' – increased susceptibility to parasites – decreased appetite – fall in blood inorganic phosphorus – rams affected first – lameness, stiffness, humping of the back – disinclination to move – erosion of joint cartilages – overgrowth of bony tissues – poorly calcified – malformed teeth – occurrence in southern Australian States only in winter or poor sunshine periods – history of feeding on crops, turnips, green oats – response to vitamin D injection.

**(62) Tick Paralysis (*Ixodes holocyclus*)** Mainly in young lambs – sometimes in larger sheep on coast or tick areas – wobbling – weakness in hind quarters – sheep goes down on brisket – dies – presence of scrub tick on the haired skin of the body, particularly around lips and eyelids – skin around tick may be livid.

**(63) Vitamin A Deficiency** Drought or history of vitamin A deficiency feeding – anorexia – wasting – night blindness – failure to thrive – staggering – lameness – partial paralysis – breeding troubles – spermatozoa abnormalities – response to vitamin A injection or administration.

**(64) Post-Vaccinal Lameness** Lameness – destruction of epiphyseal cartilage and replacement by fibrous tissue – probably localization of *Brucella abortus* (strain 19) in bones and apiphyseal cartilages – occurrence eight to 12 months – rarely seen now (1989) .

**(65) Polioencephalomalacia** Occurs all ages – adults mainly – prostration – opisthotonus – dog-sitting – star gazing – circling – dejection – blindness – head pressing – occurrence up to 10 per cent in flock – almost invariably fatal – bilateral symmetrical necrosis of dorsal cerebral grey matter.

**(66) Bluetongue** Does not occur in Australia (1987) – high temperature – nasal discharge –



salivation – swelling, oedema of lips, gum, dental pad and tongue – tongue swollen and purple in colour – swallowing difficult – mucous membrane inflamed – saliva bloodstained – necrotic ulcers on the tongue – diarrhoea present – lameness, laminitis, coronitis and dark red to purple band on skin above coronet – wry neck – twisting of the head to one side after about 12 days – oedema of face, ears and jaws – tender wool or broken fleece – death in six days or long convalescence – during convalescence, cracking of hooves and wrinkling and cracking of skin around lips.

**(67) Sarcocystosis (prev. Sarcosporidiosis)**

Abortion three weeks or more after contact with dog faeces containing *Sarcocystis oivicanis* – inappetence – abortion – raised temperature – muscular tremors – lethargy – weakness – dyspnoea – wool break – nervous symptoms – galloping movements – opisthotonus – posterior paralysis – nystagmus – striping of muscles – haemorrhages in heart – pericardial fluid – presence of sarcocysts in oesophagus, diaphragm, heart, tongue, muscles and other tissues. Similarly after contact with cat faeces or *Sarcocystis tenella* in large concentrations. And their characteristic features such as anaemia and staggers (see text).

**(16) Copper Deficiency** Chronic diarrhoea – occurrence after sheep on area for at least a year – anaemia – unthriftiness – emaciation – pine away and die – steely wool – loss of colour in black wool sheep – severe emaciation and scouring in pregnant and lactating ewes – lameness – spontaneous fractures – paralysis in lambs when born or within a few days of birth – dead lambs – lesions of brain and spinal cord – blindness – staggering, dog-sitting in lambs.

**(17) Vitamin A Deficiency** Drought conditions – night blindness – weak or dead lambs – occurrence six months or more after last green feed – weakness – unthriftiness – calculi – sterile rams – response to vitamin A supplements by drenching, feed or injection.

**(18) Unthrift in Lambs** Other features of this ill-defined condition in New Zealand and Australia are wasting, nasal discharge and various unthrifty sequelae.

**(19) Hogget Ill Thrift and Ill Thrift in Lambs** Progressive emaciation – diarrhoea – thirst – emaciation of body – oedematous fat – ‘cardboard’ ribs – sometimes history of feeding on immature pasture – sometimes selenium deficiency (usually not).

**(20) Enterotoxaemia** Affects prime lambs, weaners – food rich and succulent – many sheep affected – occasionally affects adults – may die in convulsion (mainly lambs) – or in coma (mainly adults) – kidneys pulpy and swollen – small intestine almost empty, mayonnaise – like contents – bowel fragile – pericardial jelly like chicken fat – no temperature rise – depraved appetite – some scour – sometimes bloat – small haemorrhages in heart – sometimes darkening of skin – bowel toxins on filtration, CL. *perfringens* D in smears, glucose – positive urine.

**(21) Septicaemia** Haemorrhages in heart muscle, kidneys and other locations – scouring seen as secondary symptom in septicaemias and many conditions where a temperature is present.

**(22) Johne’s Disease** Intermittent scouring, but most sheep do not scour, they waste away – thickening and corrugation of large intestine sometimes Present in New Zealand and only rarely in Australia up to 1980 with further outbreaks, so that by 1989 is not unimportant. Recent outbreaks usually show no scouring but persistent ill thrift only – oedematous mesenteric lymph nodes. Sometimes lymphatic cording – sometimes ileal ridging – organisms in smears from jejunum, ileum and caecum.

**(23) Globidiosis** Swelling of lips, cheeks and intermandibular space – foetid diarrhoea – reddening and thickening of the folds of the abomasums – white nodules to the size of a pin’s head in abomasal mucous membrane – also throughout entire small intestine – occurrence of crescent – shaped bodies (microscopic) on crushing nodules – globidial cysts deeper in mucous membrane – occurrence of ill thrift in sheep, weaners – anaemia – appearance is similar to coccidiosis at times.

**(24) Aselenosis** May be same as unthrift or ill thrift – scouring. Nasal discharge – ‘cardboard’ ribs – response to selenium and vitamin E.

**(25) Selenium Poisoning** Due to over – drenching with selenium, e.g. in drenches – elevated temperature – rapid weak pulse – dyspnoea – bloating – colic – polyuria – abdominal pain – watery diarrhoea – cyanosis – prostration – degenerative liver changes – overdosing by drenching, by injection or by paddock . application have all caused it.

**(26) Pyaemic Hepatitis** Small abscesses in liver – inflammation of abomasums, sometimes small intestine – sometimes inflammation of the lung – may be abscesses in the spleen – presence of

*pasteurella haemolytica* on culture or other *pasteurella* spp., sometimes *Actinomyces* (C.) *pyogenes*, *Corynebacterium pseudotuberculosis*, *S. necrophorus*.

**(27) Lamb Dysentery** Rare disease in Australia – lambs one to 14 days affected – sudden death – stop suckling, listless – bloody diarrhoea – inflammation and ulceration of intestine, both small and large – liver enlarged and friable – diagnosis only by laboratory work.

**(28) Weaner Colitis** Occurs in young sheep – mucoid scouring – high morbidity – low mortality – recovery of *Campylobacter* (*Vibrio*) and inflammatory conditions – colon contents are fluid – ulceration of the colon – diarrhoea five to seven days after infection – some sheep have ascites – oedema of subcutaneous tissue – ill thrift, chronic cases.

**(29) Colibacillosis in Lambs (Enterotoxigenic Escherichia coli)** Occurrence at birth to nine weeks of age (maternal immunity protects for first two weeks if ewe has contacted disease) – transitory scouring, sickness and recovery in mild outbreaks – in severe outbreaks peracute toxæmia and septicæmia, lameness, central nervous symptoms – arched back, tails held horizontally – stiff movement of legs – diarrhoea – lie on sides with heads thrown stiffly back – paddle legs – pain reaction on handling – pallor of liver and kidneys – congestion of meninges of brain – excess cerebrospinal fluid with cream fibrinous, flaky material – pleural and pericardial cavities may show excess clear straw – coloured fluid which clots on exposure – carpal, elbow or any joint of the body may be involved recovery of *E. coli* on culture. (**Note:** May confuse with tetanus and with enterotoxæmia clinically.)

**(30) Cancers or Neoplasms** Depending on nature and site. Swelling, lumps, tumours – wasting illness – scouring or a wide range of symptoms depending upon organs involved.

**(31) Diphtheritic Enteritis** Necrotic enteritis of the ileum – gross thickening and diphtheresis of bowel wall – false membranes on bowel wall – enlargement of mesenteric lymph nodes – presence of *Clostridia* on smears from the bowel wall – stunting of recovered lamb.

**(32) Zinc Deficiency** Reported in New Zealand – excess calcium and /or phosphorus – deficiency of zinc in diet – prevented by 2.3 kg zinc sulphate per hectare [2 lb per acre] or zinc lick – anaemia – eczema – stunted growth –

depraved appetite – sexual deficiency – scouring.

**(33) Tularaemia** Not present in Australia (1987) – dark foetid diarrhoea – particularly in lambs – severe course – death in a few days – heavy mortality in flock – congestion and hepatisation of lung – pulmonary oedema – presence of tick or some vector – suggestive history of overseas contact.

**(34) Staphylococcosis** Enteritis – large pale liver – abscesses kidneys – pericarditis – rare condition.

**(35) Diverticulosis** Persistent scouring – emaciation – diverticula in bowel or mesenteric attachment – rare condition.

**(36) Giardiasis** Rare condition – wasting anaemia.

**(37) Fungal Poisonings** Mycotheciotoxicosis, for example, and quite a range of other fungi that produce toxins particularly growing on pasture or hay cause scouring – *pithomyces chartarum*, *Chlorella* algae – *prototheca* – diarrhoea sometimes haemorrhagic conditions, ill thrift – death sometimes rumenitis with patches of necrosis in the rumen, oedema, haemorrhage – sometimes *Clostridia* involved as well as fungi.

**(38) Tuberculosis** Rare condition (only diagnosed twice in Australia). Tuberculous nodules in intestine – caseous lesions in lungs – confirmation by bacterial culture.

**(39) Heartwater** Does not occur in Australia – diseased of cattle, sheep and goats – inappetence – maitaise – nervous symptoms – temperature – breathlessness – gastroenteritis – hydrothorax – hydropericardium – death.

**(40) Humpy Back** Short stepping stilted gait of hind limbs – throwing of head and arching of back – inability to continue walking – brain changes – sometimes pneumonia – probably due to ingesting *Solanum esuriale* (Quena nightshade).

**(41) Bacterial Enteritis Complex or Winter Scours** Well recognized entity sometimes due to *Yersinia*, sometimes *Cmpylobacter*, sometimes rotavirus, sometimes not definable, sometimes due to cold stress, nutritional stress, mismanagement and combined effect of viruses and bacteria and kidney failure – may be mycotoxicosis: a complex group.

**(42) Rift Valley Fever** Abortion – fever – anorexia – weakness – haemorrhagic diarrhoea – heavy death rate in lambs – not in Australia.

**(43) Sarcocystosis (Sacrosporidiosis)**

Diarrhoea – abortion three weeks or more after contact with dog and cat faeces containing sarcocysts – inappetence – raised temperature – muscular tremors – lethargy – weakness – dyspnoea – wool break – nervous symptoms – galloping movements – opisthotonus – posterior paralysis – nystagmus – striping of muscles – haemorrhages in heart – pericardial fluid – presence of sarcocysts in the oesophagus, diaphragm, heart, tongue, muscles and other tissues.

**(44) Cryptosporidiosis** A cause of scouring, particularly in young lambs six to 14 days of age – seemingly often overlooked as the protozoan is usually associated with other bacteria or viruses which attract attention as the primary cause – diarrhoea may be intermittent but recurring.

**(45) Nairobi Sheep Disease** Blood scours – high fluctuating temperature – depression – anorexia – mucoid nasal discharge – collapse within a few days – up to 70 per cent mortality – not in Australia.

**(46) Peste Des Petits Ruminants** Nasal discharge, muco – purulent, encrustation, blocking of nostrils – mucous membranes of nostrils become necrotic – conjunctivitis with ocular discharge – necrotic lesions in mouth with mucosa of lower gums, dental pad, hard palate, cheeks, cheek papillae and tongue developing into ulcers – foetid breath – severe diarrhoea with rapid dehydration and emaciation – secondary bacterial pneumonia – high mortality rate up to 90 per cent – recovery of morbillivirus – not in Australia.

**(47) Bluetongue** Clinical form not in Australia – haemorrhagic diarrhoea which is profuse – vomiting and then inhalation pneumonia – fever – reddening of mucous membranes, mouth and nose – excess salivation – clear nasal discharge – discharges become mucopurulent and bloodstained – lips and tongue swollen and the cyanotic tongue may protrude (blue tongue) – oedema may extend over the face to include ears and intermandibular space – petechial haemorrhages on oral and nasal mucous membranes – necrotic lesions after a week on the gums, cheek and tongue – heals slowly under a diphtheritic membrane – difficult breathing – foot lesions – reddening and haemorrhages of coronary band – animal won't

move – emaciation – may be 20 per cent mortality – sometimes torticollis.

**(48) Abomasal Ulceration** Rare condition – sometimes *pasteurella haemolytica* – sometimes in copper deficiency – sometimes a cause of ill thrift – wasting – failure to thrive scouring.

**(49) Hair – Balls, Wool – Balls, Phytobezoars** Wool – balls in young lambs occur occasionally – rumen packed with hair – balls, flat or oval in shape – history of lambs licking themselves or eating wool – typically in drought time – rarely from fibrous feed in older sheep.

**(50) Superphosphate Poisoning** Thirst – Weakness – inco – ordination – diarrhoea – anorexia – anorexia – death in one or two days – sheep which recover have a wool break – gastroenteritis especially duodenum – history of e.g., fine weather after application.

**(51) Diverticulosis** Rare in British breeds – Romneys, Hampshires – herniations into mesenteric side of intestine – usually duodenum – up to 8 cm [3 in] in diameter – intractable diarrhoea – sometimes peritonitis.

**If there are DISCHARGES from the nose and/ or coughing:**

**The disease may be (in which case look for the following key features):**

**(1) Pneumonia** Many types of pneumonia as detailed in text – coughing – temperature – depression – off feed – flock history – presence of parasites in lung – presence of abscesses in lung – presence of consolidation and inflammatory exudates in lung – recovery of causal organism by bacterial culture – pleuritis of various types, e.g., fibrinous.

**(2) Pasteurellosis** Pneumonia – temperature raised – sheep depressed – cough – nasal discharge – death may be sudden or delayed some days – septic pneumonia and pleurisy on post-mortem – purulent foci in lungs – red hepatisation and serofibrinous pleurisy – recovery of *pasteurella haemolytica* or *pasteurella* spp. on culture.

**(3) *Cornebacterium pneumonia*** Abscess occur in lung – coughing – depression – prostration and death.

**(4) Lung Worms** Presence of lung worms on post-mortem examination.

**(5) Nasal Bot** Presence of larvae in nasal cavities – district history.

**(6) Drenching** Faulty drenching techniques which result in purulent pneumonia, injured pharynx, larynx, and head tissues.

**(7) Plant injury** *Verbescina encelioides* and other plants will cause pneumonia and nasal discharge.

**(8) Actino infection** Actinobacillosis, actinomycosis, infections which produce nasal lesions and at time discharge.

**(9) Dusty Yards** Handling of sheep in dusty yards causes nasal clogging.

**(10) Unthrif** Lambs and weaners may show nasal discharge as one feature.

**(11) Melioidosis** Rare disease – coughing respiratory distress on exertion – sheep stagger – become recumbent and die – eye and nasal discharges which may be thick and yellow – sometimes encephalitis – blindness – mild convulsions or walking in circles – head pushing – back arched – swelling of joints – loss of condition – course one week to several months – abscesses in lungs, spleen, liver, which are encapsulated in a fibrous wall and contain thick, dry pus of greenish or greenish-yellow colour and may be surrounded by zone of pneumonia in lung – suppurative joint lesions occur – abscesses on nasal mucous membrane with brown centers and ragged depressed ulcers – nasal mucosa red, swollen – sometimes inflammation of meninges of the brain itself – recovery of *Pseudomonas pseudomallei*.

**(12) Snuffles** Nasal discharge – very common occurrence – flock incidence – most common in British breeds – very obvious during dusty conditions – nostrils filled with copious mucoid discharges – swelling and congestion of mucous membranes of nose – no systemic disturbance – mild course – Border Leicesters particularly affected.

**(13) Laryngitis** Occurrence New Zealand, possibly Australia – all breeds but mainly Southdowns – hoggets, two-tooths mainly affected – heavy rapid breathing – depression – prostration – swollen larynx – suffocation – abscesses in necrotic areas of laryngeal cartilage – occasionally lung abscesses – recovery of *Fusobacterium necrophorum* and *Actinomyces (Corynebacterium) pyogenes* on culture.