VISUAL SOIL ASSESSMENT

VOLUME 1

Field guide for cropping and pastoral grazing
on flat to rolling country

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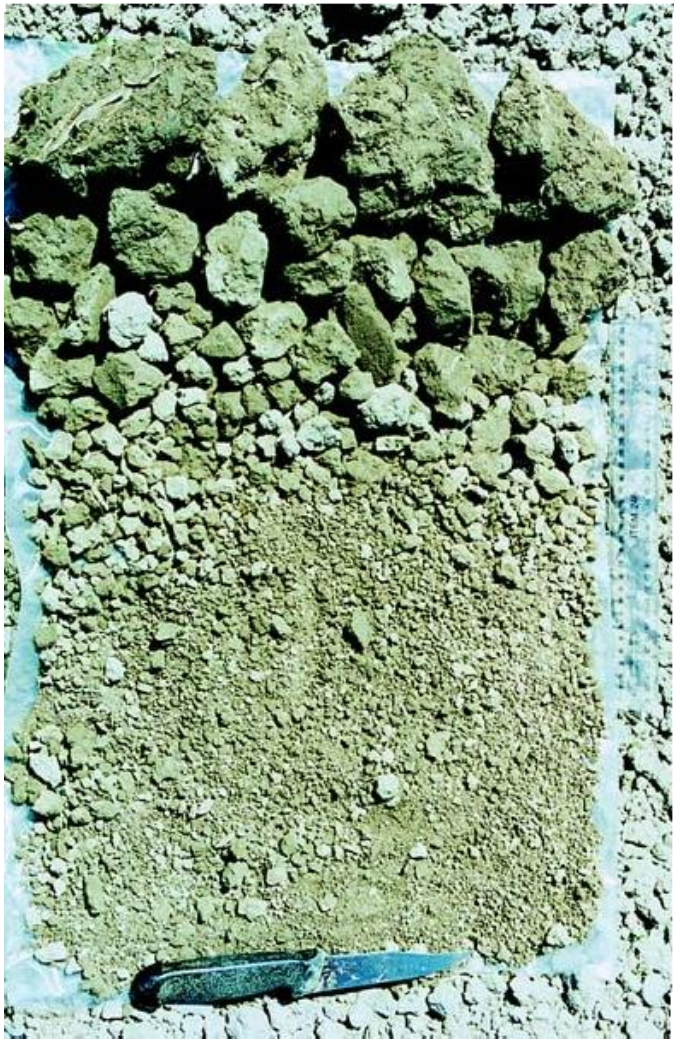
Visual assessment provides an immediate effective diagnostic tool to assess soil quality, and the results are easy to interpret and understand. Compare a soil under well-managed pastoral grazing (on the right of the palm), and poorly managed long-term continuous cropping (on the left).

FIGURE 1: Visual scoring (VS) of soil structure and consistence under cropping

GOOD CONDITION VS = 2
Good distribution of friable finer aggregates with no significant clodding



MODERATE CONDITION VS = 1
Soil contains significant proportions of both coarse firm clods and friable, fine aggregates

POOR CONDITION VS = 0
Soil dominated by extremely coarse, very firm clods with very few finer aggregates

FIGURE 2: Visual scoring (VS) of soil porosity under cropping

GOOD CONDITION VS = 2

Soils have many macropores between and within aggregates associated with readily apparent good soil structure

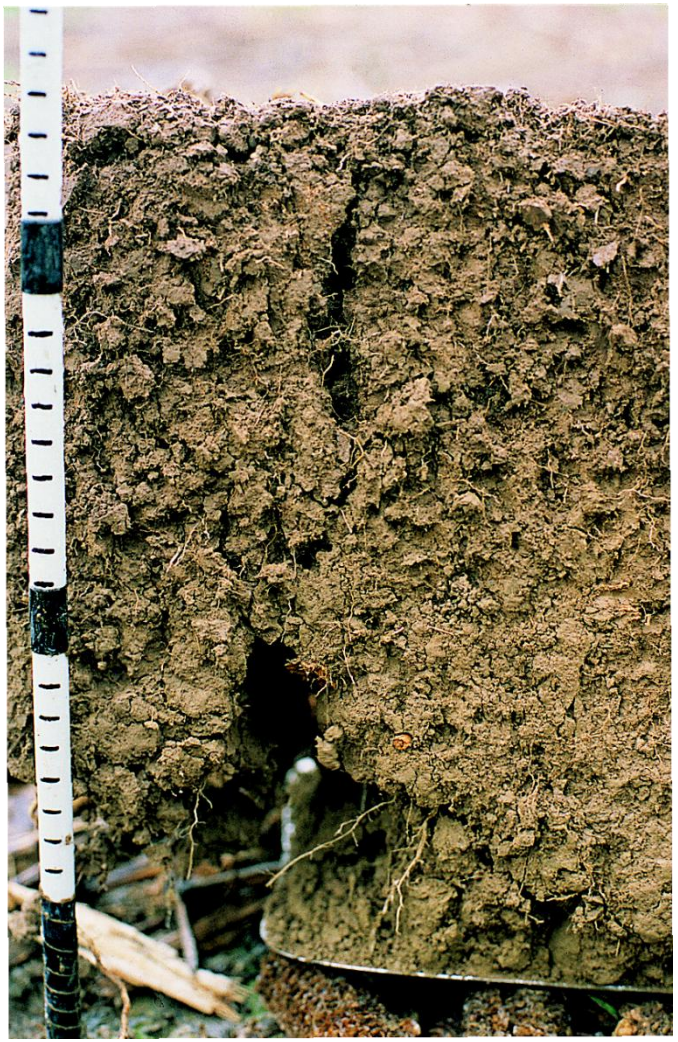
MODERATE CONDITION VS = 1

Soil macropores between and within aggregates have declined significantly but are present on close examination of clods showing a moderate amount of consolidation

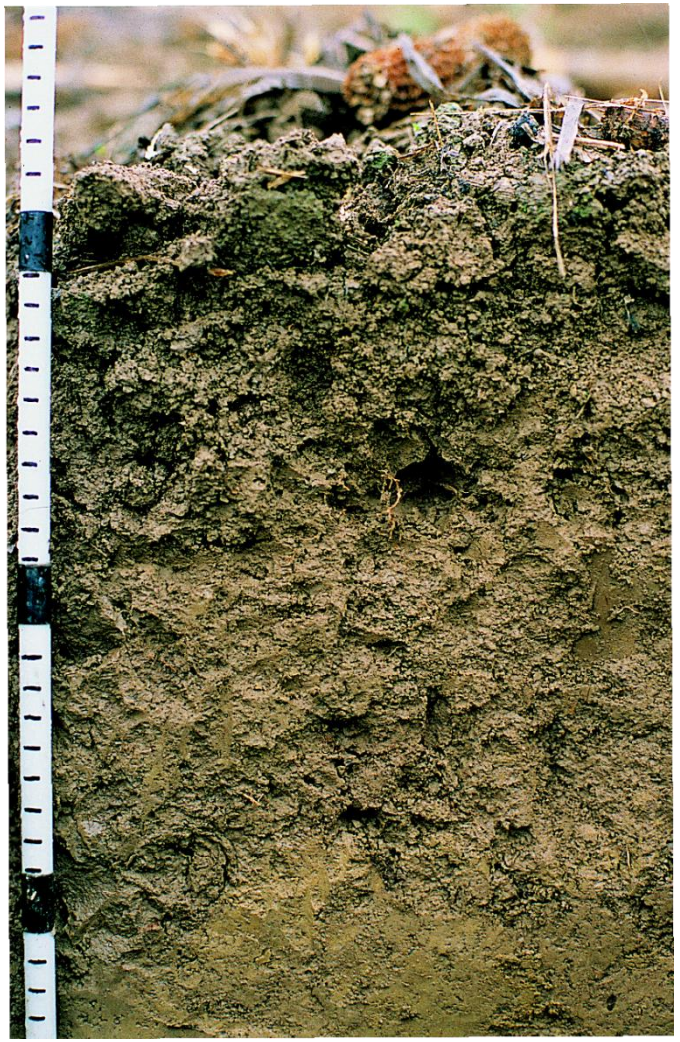
POOR CONDITION VS = 0

No soil macropores are visually apparent within compact, massive structureless clods. The clod surface is smooth with few cracks or holes, and can have sharp angles

FIGURE 6: Visual scoring (VS) of the presence of a tillage pan under cropping



GOOD CONDITION VS = 2
No tillage pan with a friable, clearly apparent structure and soil pores throughout the topsoil



MODERATE CONDITION VS = 1
Firm, moderately developed tillage pan in the lower topsoil showing clear zones of consolidation but including areas with weakly developed structure, cracks, fissures and a few macropores

POOR CONDITION VS = 0
Very firm to hard, well-developed tillage pan in the lower topsoil, showing severe consolidation with no structure, no macropores and few or no cracks

Compaction

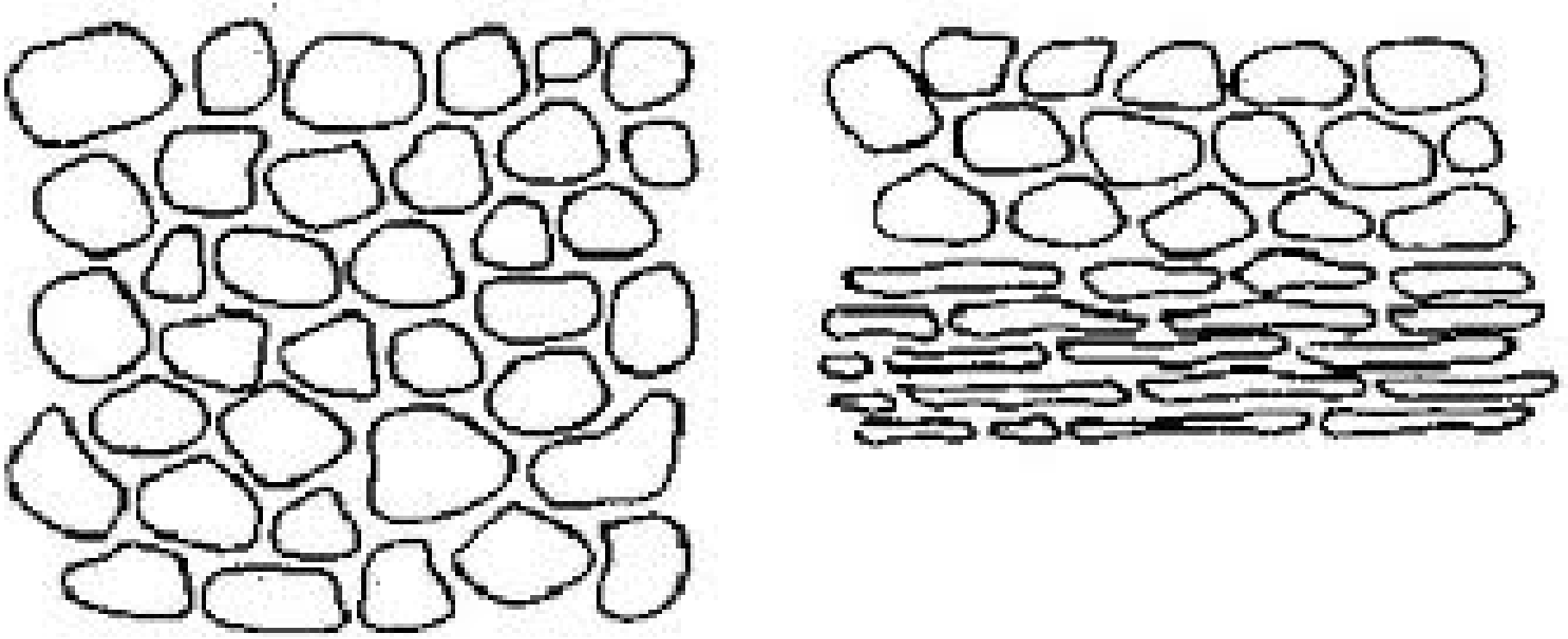


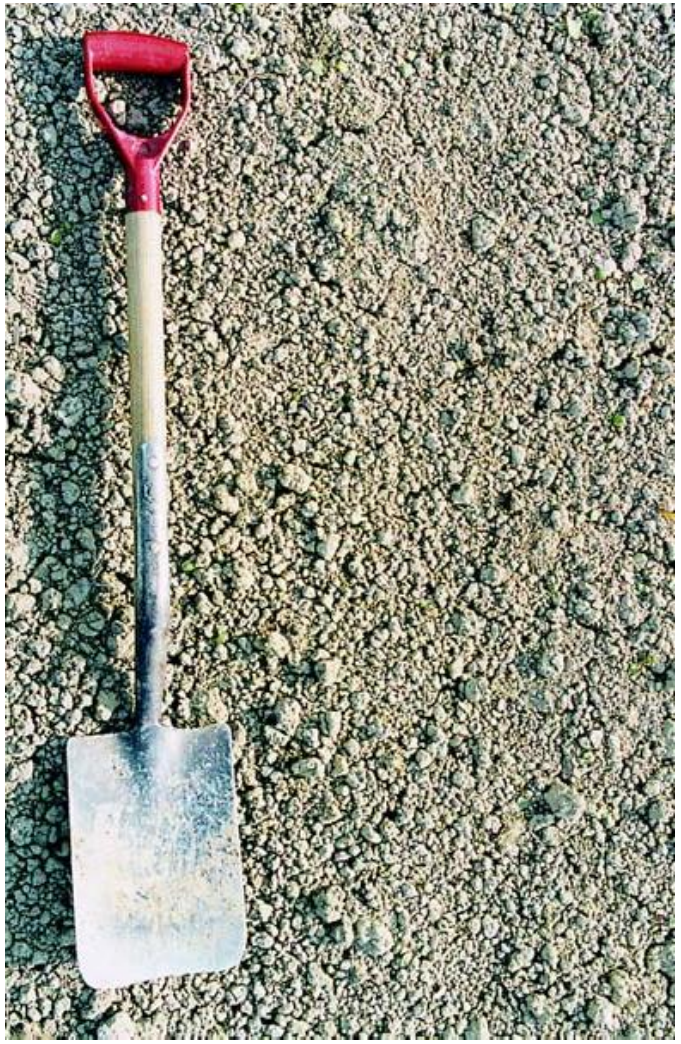
FIGURE 15: Visual scoring (VS) of surface ponding under cropping

GOOD
CONDITION
VS = 2
No evidence of surface ponding after 1 day following heavy rainfall on soils that were already at or near saturation

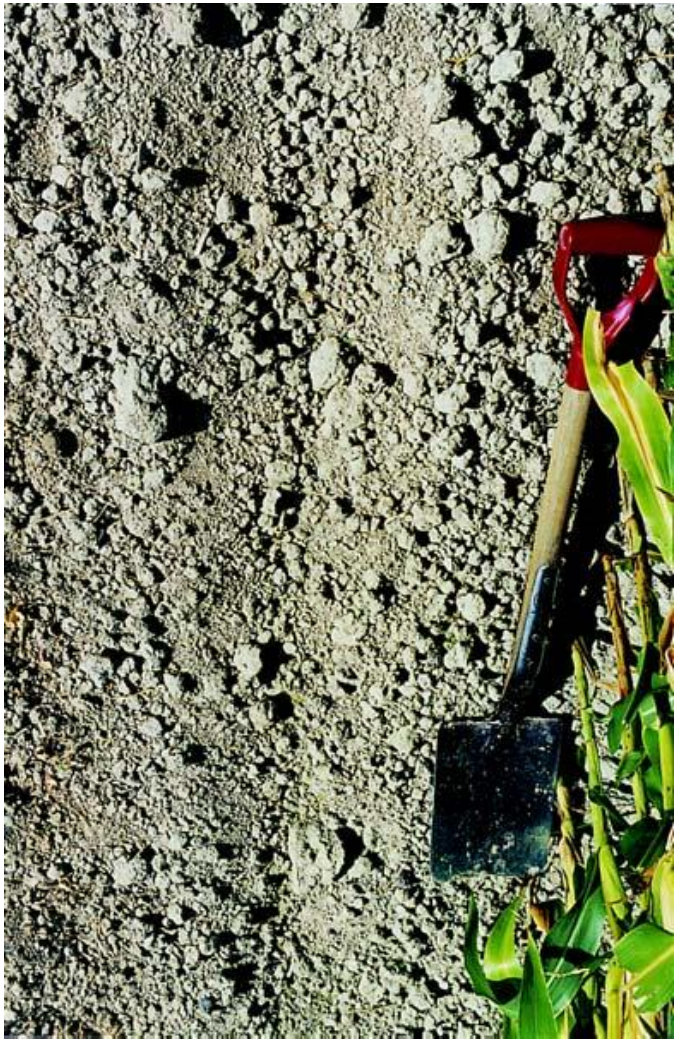
MODERATE
CONDITION
VS = 1
Moderate surface ponding can occur up to 3 days after heavy rainfall on soils that were already at or close to saturation

POOR
CONDITION
VS = 0
Significant surface ponding can occur for longer than 3 days after heavy rainfall on soils that were already at or close to saturation

FIGURE 7: Visual scoring (VS) of the degree of clod development under cropping



GOOD CONDITION VS = 2
Good distribution of the friable, finer aggregates with no significant clodding. A good seedbed is readily prepared



MODERATE CONDITION VS = 1
Soil contains significant proportions of both coarse firm clods and friable, fine aggregates. If cultivation is not carefully timed, clods show significant tillage resistance

POOR CONDITION VS = 0
Soil dominated by coarse, very firm clods with fewer finer aggregates. Clod resistance is high and the window for cultivation is very narrow

FIGURE 9: Visual scoring (VS) of crop emergence under cropping

GOOD CONDITION VS = 2
Good emergence and plant establishment, with few gaps along the planting row and crop showing an even height

MODERATE CONDITION
VS = 1
Moderate emergence and plant establishment, with a significant number of gaps along the planting row and a significant variation in seedling height

POOR CONDITION VS = 0
Poor emergence and plant establishment, with a large number of gaps along the planting row and a large variation in seedling height

FIGURE 5: Visual scoring (VS) of earthworm counts under cropping

FIGURE 4: Visual scoring (VS) of number and colour of soil mottles under cropping

GOOD CONDITION VS = 2
Mottles are generally absent.

MODERATE CONDITION VS = 1
Soil has common (10–25%) fine and medium orange and grey mottles

POOR CONDITION VS = 0
Soil has abundant to profuse (> 50%) medium and coarse orange and particularly grey mottles

FIGURE 8: Visual scoring (VS) of susceptibility to wind & water erosion under cropping

GOOD CONDITION VS = 2
Wind erosion is not a concern: only small dust plumes emanate from the cultivator on windy days. Most wind-eroded material is contained within the paddock. Water erosion is not a concern as there is only a little rill and sheet erosion. Topsoil depths in footslope areas are <15 cm deeper than on crests

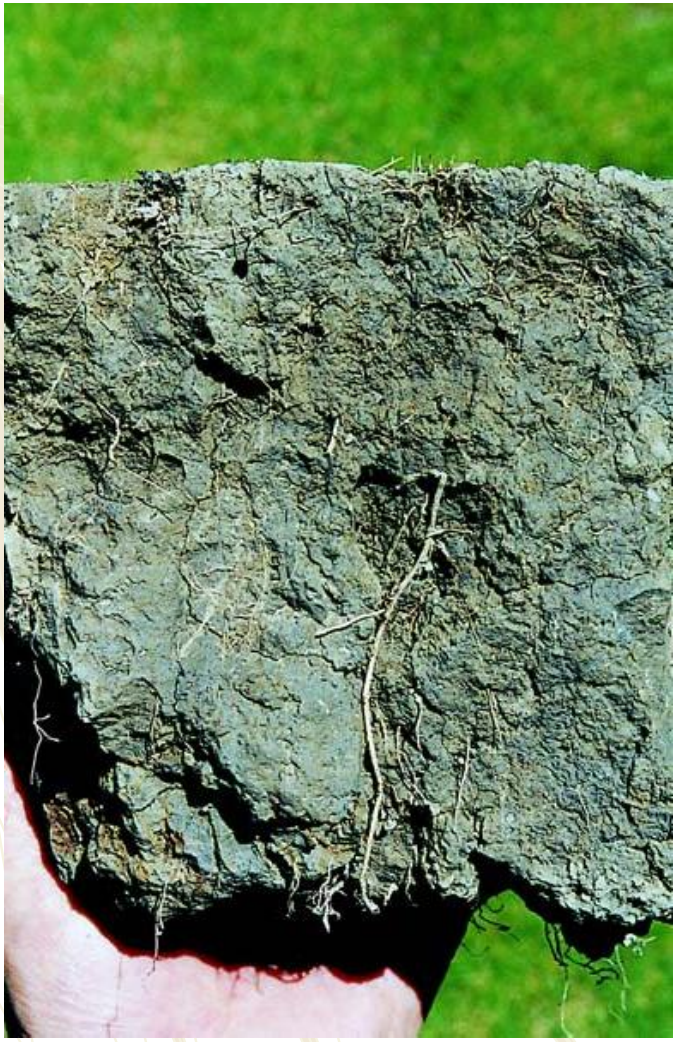
MODERATE CONDITION VS = 1
Wind erosion is of moderate concern where significant dust plumes can emanate from the cultivator on windy days. A considerable amount of material is blown off the paddock but is contained within the farm. Water erosion is of moderate concern with a significant amount of rilling and sheet erosion. Topsoil depths in footslope areas are 15–30 cm greater than on crests, and sediment input into drains/ streams may be significant

POOR CONDITION VS = 0
Wind erosion is a major concern. Large dust clouds can occur when cultivating on windy days. A substantial amount of topsoil can be lost from the paddock and deposited elsewhere in the district. Water erosion is a major concern, with severe rilling and sheet erosion occurring. Topsoils in footslope areas are more than 30 cm deeper than on the crests, and sediment input into drains/ streams may be high

FIGURE 3: Visual scoring (VS) of soil colour under cropping

GOOD CONDITION VS = 2
Dark coloured topsoil that is not too dissimilar to that under the fence line

MODERATE CONDITION VS = 1
The colour of the topsoil is somewhat paler than under the fence line, but not markedly so



POOR CONDITION VS = 0
Soil colour has become significantly paler compared with under the fence line

FIGURE 3: Visual scoring (VS) of soil colour under pasture

GOOD CONDITION VS = 2
Dark coloured topsoil indicating a well-aerated soil with a good turnover of organic matter

MODERATE CONDITION VS = 1
The colour of the topsoil is somewhat paler due to the early stages of gleying because of moderate pugging

POOR CONDITION VS = 0
Soil colour has become significantly paler due to gleying because of persistent pugging

FIGURE 1: Visual scoring (VS) of soil structure and consistence under pasture

GOOD CONDITION VS = 2
Good distribution of friable finer aggregates with no significant clodding

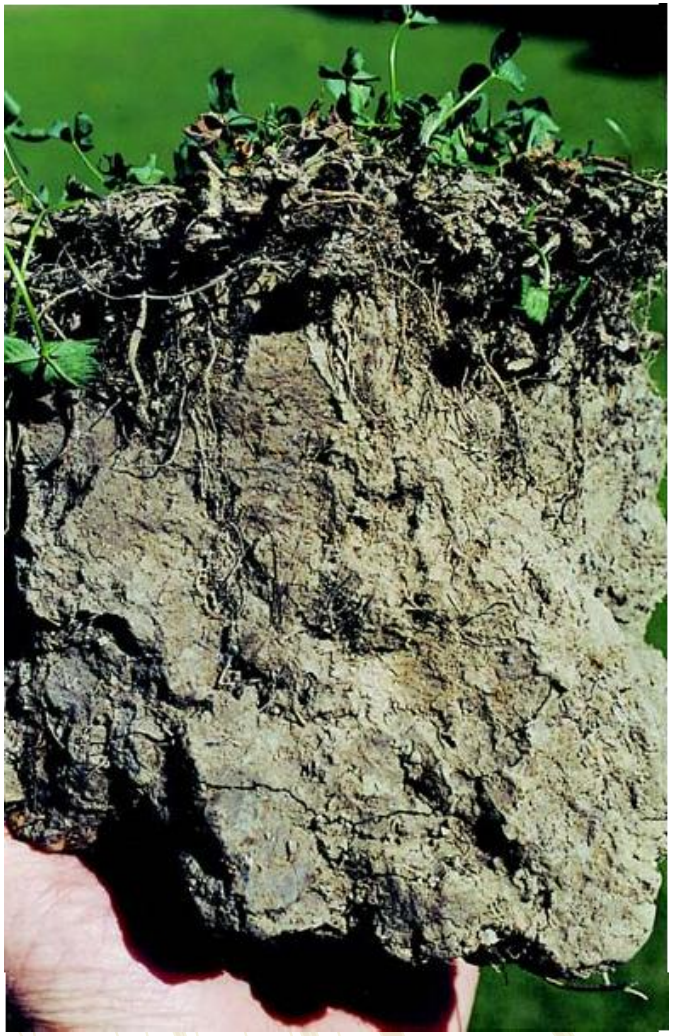
MODERATE CONDITION VS = 1
Soil contains significant proportions of both coarse firm clods and friable, fine aggregates

POOR CONDITION VS = 0
Soil dominated by extremely coarse, very firm clods with very few finer aggregates

FIGURE 2: Visual scoring (VS) of soil porosity under pasture

GOOD CONDITION VS = 2
Soils have many macropores between and within aggregates associated with readily apparent good soil structure

MODERATE CONDITION VS = 1
Soil macropores between and within aggregates have declined significantly but are present on close examination of clods showing a moderate amount of consolidation



POOR CONDITION VS = 0
No macropores or coarse micropores are visually apparent within compact, massive structureless clods that typically show smooth faces with sharp angles, and have few cracks or holes

FIGURE 7: Visual scoring (VS) of pasture composition

GOOD CONDITION VS = 2

Pasture composition has a good mix of high producing pasture species (e.g., ryegrass, white clover and cocksfoot) and species intolerant of poor aeration and waterlogging; few weeds. Pasture composition reflects the original mix

MODERATE CONDITION VS = 1

Pasture species with a range of tolerances to waterlogging and stock treading are present, and pastures may contain a number of weeds and forage herbs including dock, mayweed, pennyroyal and plantain. Pasture mix differs somewhat from that originally sown

POOR CONDITION VS = 0

Pastures are often dominated by species that are more tolerant of poor aeration and waterlogging due to pugging, by species such as ryegrass that are more tolerant of stock treading, and species such as white clover that quickly colonise bare ground created by severe treading. Weeds are also very common and may include pennyroyal, buttercup, duckweed and dock. Pasture composition has little relationship to the original seed mix

FIGURE 5: Visual scoring (VS) of earthworm counts under pasture

FIGURE 6: Visual scoring (VS) of surface relief under pasture

GOOD CONDITION VS = 2
Surface is relatively smooth and unbroken

MODERATE CONDITION VS = 1
Surface terrain is somewhat broken up and incised by occasional heavy treading events but it is not difficult to walk over

POOR CONDITION VS = 0
Surface is very broken and deeply incised by severe repeated treading. The terrain is difficult to walk across and care must be taken to avoid twisting ankles

FIGURE 10: Visual scoring (VS) of area of bare ground

GOOD CONDITION VS = 2
Pasture growth is vigorous and covers almost the whole surface area

MODERATE CONDITION VS = 1
Pasture shows significant areas of bare ground and sporadic growth with the ingression of weeds and white clover caused by treading damage

POOR CONDITION VS = 0
Large areas of bare ground occur because of treading damage and the subsequent reduction in the density and vigour of pasture plants. White clover and less desirable pasture species and weeds may have invaded degraded and bare areas