

REDDISH BROWN CLAY LOAM ON LIMESTONE

General Description: *Well-structured but compacted clay loam over reddish brown light clay on cherty and fragmented Gambier Limestone.*

- Landform:** Rises (jumbled dune appearance).
- Substrate:** Fragmented and cherty Gambier Limestone (possibly originally wind-deposited).
- Vegetation:** Grass-dominant permanent pasture under centre-pivot irrigation.



Type Site:	Site No.:	SE166	1:50,000 mapsheet:	7022-4 (Kalangadoo)
	Hundred:	Young	Easting:	472640
	Section:	92	Northing:	5824650
	Sampling date:	23/11/10	Annual rainfall:	755 mm average

Midslope (2%). Hard surface. Worms were evident to 54 cm.

Soil Description:

Depth (cm)	Description
0–16	Hard (strong/compacted), black, clay loam with moderate, fine polyhedral structure. [The hard nature is a result of trampling and compaction by dairy cattle; in its natural state this soil would be friable.
16–54	Hard (strong/compacted), dark reddish brown light clay with moderate, fine polyhedral structure.
54–115	White to pale yellow, very weak, fragmented Gambier Limestone, that textures as a sandy loam, with 2-10% chert fragments (6–20 mm).
115–140	Abundant chert fragments (20–200 mm) surrounded by a matrix of pale yellow and dark greyish brown, very weak, Gambier Limestone, that textures as a light sandy clay loam.



Classification: Haplic, Eutrophic, Red Dermosol; medium, non-gravelly, clay loamy / clayey, moderate.



Summary of Properties

Drainage:	Soil profile is well drained.
Fertility:	Inherent fertility within the soil profile is high, as indicated by the sum of cations. Surface soil phosphorus levels are also high; as are calcium levels on clay exchange surfaces. Surface soil organic carbon levels are good; while subsoil carbon levels are high.
pH:	Soil profile pH is within the neutral range (slightly alkaline); while limestone substrate pH is alkaline.
Rooting depth:	Most root growth is in the soil profile (to 54 cm), with a few roots extending into the upper substrate (to 115 cm).
Barriers to root growth:	
Physical:	Soil structure is good; however, soil compaction by cattle hooves has caused hard condition that would be restrictive to root growth to some extent. Limestone substrate forms a barrier to roots. Owing to already high calcium levels, it is unlikely that the addition of gypsum would ameliorate compaction to any extent. Incorporate of vegetative matter is likely to be the best option, as well as keeping stock off saturated or very wet soil (where possible).
Chemical:	There are no chemical barriers to root growth in the soil profile. Conditions in the limestone substrate are less favourable, however, with very low fertility and alkaline conditions.
Waterholding capacity:	Approximately 100 mm in the potential rootzone for crop and pasture plants. $[(0.16 \times 200) + (0.38 \times 170) + (0.61 \times 100 \times 0.1)]$ This is variable owing to considerable variation in soil depth over short distances.
Seedling emergence:	There are slight limitations to seedling emergence owing to the compacted nature of the surface soil.
Workability:	Possibly slight limitation owing to soil compaction.
Erosion Potential:	
Water:	Low.
Wind:	Low.

Laboratory Data

Depth cm	pH H ₂ O	pH CaCl ₂	CO ₃ %	EC 1:5 dS/m	ECe dS/m	Org.C %	Avail. P mg/kg	Avail. K mg/kg	Cl mg/kg	SO ₄ mg/kg	Boron mg/kg	Al CaCl ₂ mg/kg	Trace Elements mg/kg (DTPA)				Sum cations cmol (+)/kg	Exchangeable Cations cmol(+)/kg					Est. ESP
													Cu	Fe	Mn	Zn		Ca	Mg	Na	K	Al	
Paddock	7.3	6.5	0.13	0.332	1.38	4.96	97	306	79.8	35.4	1.56	<0.2	1.44	130	51.1	5.00	33.95	29.6	2.87	0.84	0.66	0.0	2.47
0–16	7.3	6.6	0.48	0.343	1.54	4.76	149	238	135.1	38.3	1.44	<0.2	1.42	131	45.0	3.78	32.95	28.4	2.98	1.09	0.49	0.0	3.31
16–54	7.6	6.6	0.67	0.177	0.78	1.93	6	191	101.4	15.5	1.04	<0.2	0.56	8.68	19.6	0.26	26.85	23.1	1.92	1.38	0.48	0.0	5.12
54–115	8.3	7.3	96.40	0.140	1.20	0.18	<2	23	129.0	6.1	0.14	<0.2	0.54	13.3	3.21	0.18	8.51	7.91	0.16	0.38	0.06	0.0	4.47
115–140	8.3	7.3	92.16	0.133	1.11	0.06	2	35	107.8	8.5	0.11	<0.2	0.37	<1	4.32	0.14	9.26	8.58	0.20	0.40	0.08	0.0	4.32

Note: Paddock sample bulked from 20 cores (0–10 cm) taken around the pit.

Sum of cations approximates the CEC (cation exchange capacity), a measure of the soil's capacity to store and release major nutrient elements.

ESP (exchangeable sodium percentage) is derived by dividing the exchangeable sodium value by the CEC, in this case estimated by the sum of cations.

Further information: [DEWNR Soil and Land Program](#)

