

Inside The Herd

Knowledge Transfer Session

Neil Huth and Brett Cocks | 12 September 2018











Background

- Inside the Herd is project 7 for Agricultural Land Management in Qld
- Addresses research gaps raised by stakeholders in previous communications activities.
- Impacts on soil, pastures and livestock
- Grazing is the largest land use within Qld CSG development areas





Some themes for today's presentation

- What we do and how we do it?
- Remote sensing of soils and pastures
- Livestock behaviour
- Intro to Soil Science
- Science Communication
- Making the Invisible, Visible.







CSG Footprint for Victoria Park

- 955 ha Grazing Property
- 20 CSG Wells
- CSG Footprint 6.8% of property
 - 19.8 ha Well Lease Areas
 - 45.3 ha Right of Ways
 (Access, Gathering,
 Pipelines, Powerlines)

- Soils found in grazing systems are often fragile and need to be carefully managed.
- Damage to roads by erosion processes can be a common and ongoing occurrence.
- Traffic volumes on properties with active CSG infrastructure is highly variable in space and time.
- Traffic on properties involves a wide range of vehicle types and sizes.
- Dust emissions from vehicles is also likely to be highly variable.
- This project found no evidence of livestock avoiding CSG infrastructure.
- Use of the CSG footprint by livestock may present a problem for rehabilitation of soils and pastures.
- The variation in productive capacity across the property should be considered when planning CSG infrastructure and compensation arrangements.

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Fragile Soils in Grazing Systems

Red Vertosol

Red Vertosol

FIELD PROPERTIES			CHEMICAL PROPERTIES						EXCHANGEABLE CATIONS (cmol/kg)					
Soil horizon	Field texture	Depth	OC	рН	Ρ	Cl	EC	Al	Ca	Mg	К	Na	ECEC	ESP
		cm	%		ppm	ppm	dS/m							%
A11	Medium clay (0 - 6 cm)	0 – 15	1.05	5.6	30	759	0.8	0.1	5.4	10.1	0.3	3.9	19.6	19
B21	Medium heavy clay (6 - 30 cm)	15 – 30	0.82	5.0	30	1450	0.9	0.2	4.4	9.4	0.2	6.1	20.2	30
B22	Medium heavy clay (30 - 80 cm)	30 - 60	0.75	4.7	28	3050	1.6	0.5	3.4	9.8	0.2	8.7	22.5	38
		60 - 90	-	4.4	30	3900	1.9	0.6	2.7	9.8	0.2	9.5	22.9	42
B23	Medium heavy clay (80 - 150 cm)	90 - 120	-	4.8	32	4150	2.0	0.7	2.3	9.9	0.3	14	27.1	52
		120 – 150	-	4.4	35	4200	2.1	0.7	1.9	9.9	0.3	11	23.4	46

- High Chloride
- Acidic Subsoil
- Mg can impact Ca availability
- High ESP increased dispersion
- Shrink-swell can increase sensitivity to dispersion, crusting and compaction and therefore crab holes or tunnel erosion

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Erosion and road damage

Unsealed rural roads are a known source of sediment into waterways

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- Indonesia: 5% Area \rightarrow 40% sediment
- China: 1% Area \rightarrow 42% sediment
- **Brazil**: 2% Area $\rightarrow 28-38\%$ sediment
- UK: 30% sediment
- Australia: 30-80% of sediment, half sediment in streams from 4% of the network

An example of recurring problem

Road base before rainfall event

Road base after rainfall event

Road base after road repair

- Fixing the road is important to allow for safe use of the road
- Fixing the cause of the erosion will minimise costs and loss of road base into water ways
- Putting the road in the right place may help to avoid the issue.

We use imagery to show risks and options

Green – before, Gold - after

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Traffic levels are highly variable

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Most of the vehicles have four wheels BUT, most of the wheels are on trucks and it's wheels that relate to damage.

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Causes of dust variation

Native grey sandy soil
Imported red gravel
Native sandy soil
Imported white gravel
Native grey clay soil
Native grey sandy loam soil

Causes of dust variation

Site	Description	Proportion by mass (%)								
		>5600 μm	>4000 μm	>2000 μm	>1000 μm	>530 μm	>125 μm	>75 μm	<75 μm	Organic Matter
1	Native grey sandy soil	1.4	1.5	4.6	5.8	10.0	55.3	11.4	9.4	0.4
2	Imported red gravel	15.3	8.7	17.1	10.2	7.7	28.1	5.5	7.1	0.0
3	Native sandy soil	0.1	0.2	2.3	4.0	8.1	52.0	13.8	18.5	1.1
4	Imported white gravel	2.1	2.9	9.8	7.8	8.6	58.9	5.0	3.2	0.2
5	Native grey clay soil	0.3	0.1	3.4	2.2	8.7	66.9	9.8	7.2	1.3
6	Native grey sandy loam soil	0.1	0.1	0.7	1.8	6.8	69.7	9.3	10.5	0.1

What about dust impacts?

Impact of vehicle Size

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How did we study cattle behaviour

Time spent at various distances from CSG

Cows and cars work on different schedules

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Cattle make use of right-of-ways

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- Economic or production footprint may be larger than physical footprint.
- Placement of CSG infrastructure may preference productive areas.
- Occupancy of Right-Of-Ways 18% higher than open pasture areas.

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