

# Variable rate fertiliser use in the livestock sector – Jack England *(2016 Nuffield Scholar - AWI)*



# “Shepherds Hill”- Our home



# Optical Sensors

- 2 to 7 channel infrared sensors (yield, stress points and borderline pasture quality) - Landgate
- Approx 20-50% accuracy calculating Crude Protein (nitrogen derivative)
- Can not detect senesced material
- Shadows, clouds and multiple pasture species destroy repeatability
- **Must be ground calibrated!**



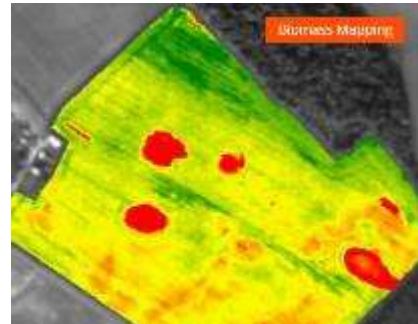


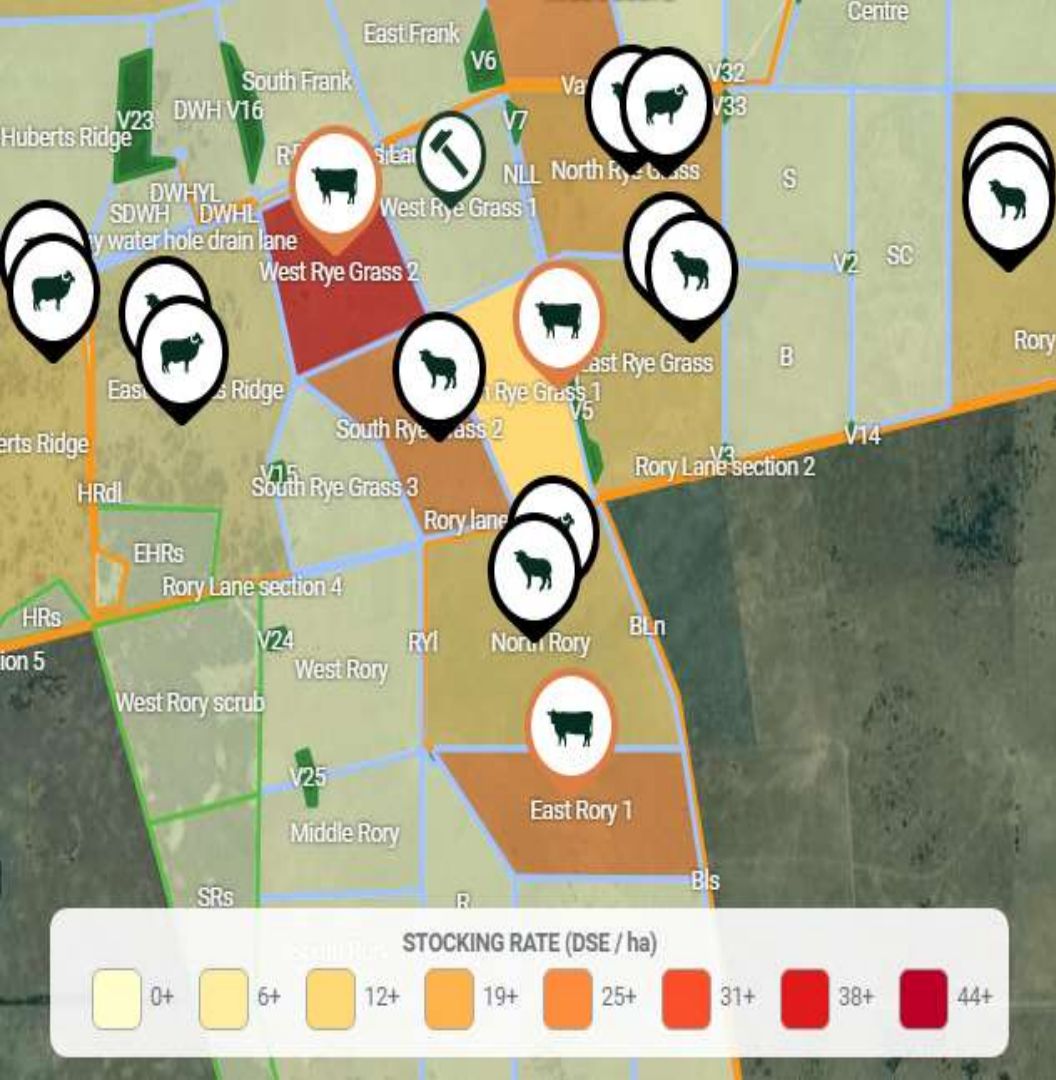
# Optical sensors – now/future

“Hyperceptions” Massey University 620 channel sensor with 98% accuracy calculating:

- Metabolisable Energy
- Crude Protein
- Digestibility

Also being used for N P K S  
“soil analyses”.





# Agriwebb

- “intuitive” nutrient removal calculator based on stocking rate.
- Growing livestock absorb P, mature stock simply re-locate it.
- Feed better performing paddocks.
- Animal mouths do the assessment.

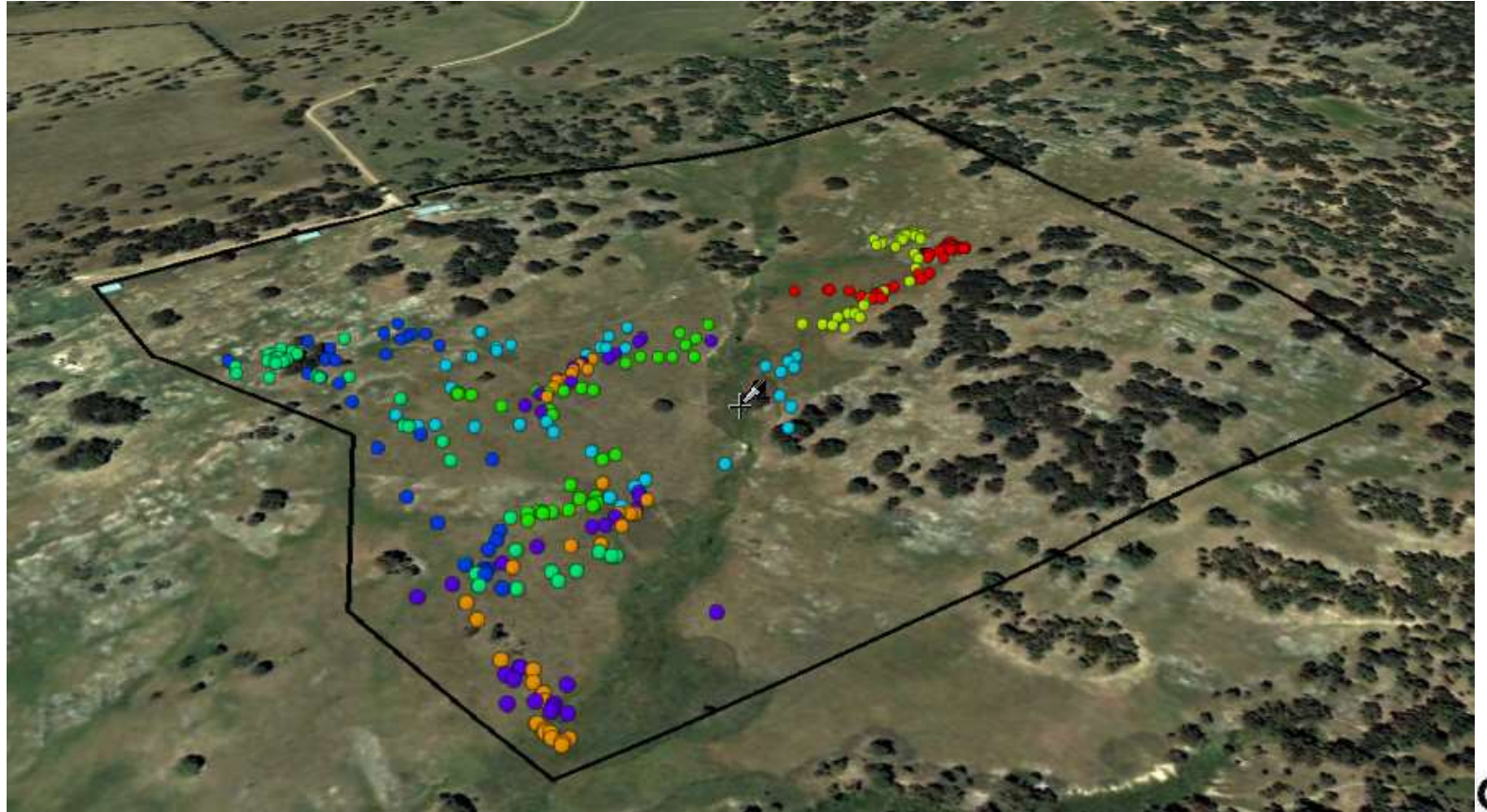
# GPS Collars

Colwell P  
(mg/kg)

High



Low





# GPS Collars – the animal is the sensor



**Israel**  
**Golan Heights**

We are overfeeding unproductive soils while  
depleting our best



# Grid based soil testing



# Grid based soil testing

Target Colwell P	30
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Product P %	9
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Paddock Name	Zone	Zone Area (ha)	Current P (Colwell)	PBI	P req'd (kg/ha)	Product req'd (t/ha)	Zone product (t)
Munsies Corner	High	2	35	68.5	-11.5	-0.1	0.0
Munsies Corner	Mid	5.1	25	68.5	11.5	0.1	0.7
Munsies Corner	Low	7.3	15	68.5	34.5	0.4	2.8
Fallow	High	11.6	38	47.0	-17.6	-0.2	0.0
Fallow	Mid	14.3	23	47.0	15.4	0.2	2.4
Fallow	Low	16.4	10	47.0	44.0	0.5	8.0
Weaner	High	3.0	50	64.0	-46.0	-0.5	0.0
Weaner	Mid	17.4	19	64.0	25.3	0.3	4.9
Weaner	Low	10.0	9	64.0	48.3	0.5	5.3

Paddock DSE	Maintenance P Req'd (kg/ha)	Maintenance zone product req'd total (t)
12	9.6	0.21
12	9.6	0.54
12	9.6	0.78
12	9.6	1.24
12	9.6	1.52
12	9.6	1.75
12	9.6	0.32
12	9.6	1.85
12	9.6	1.06

Total area:	87.1	ha
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	Capital	M'tenance	Total
Total tonnes product req:	24.14	9.29	33.4

# What is our farm doing?

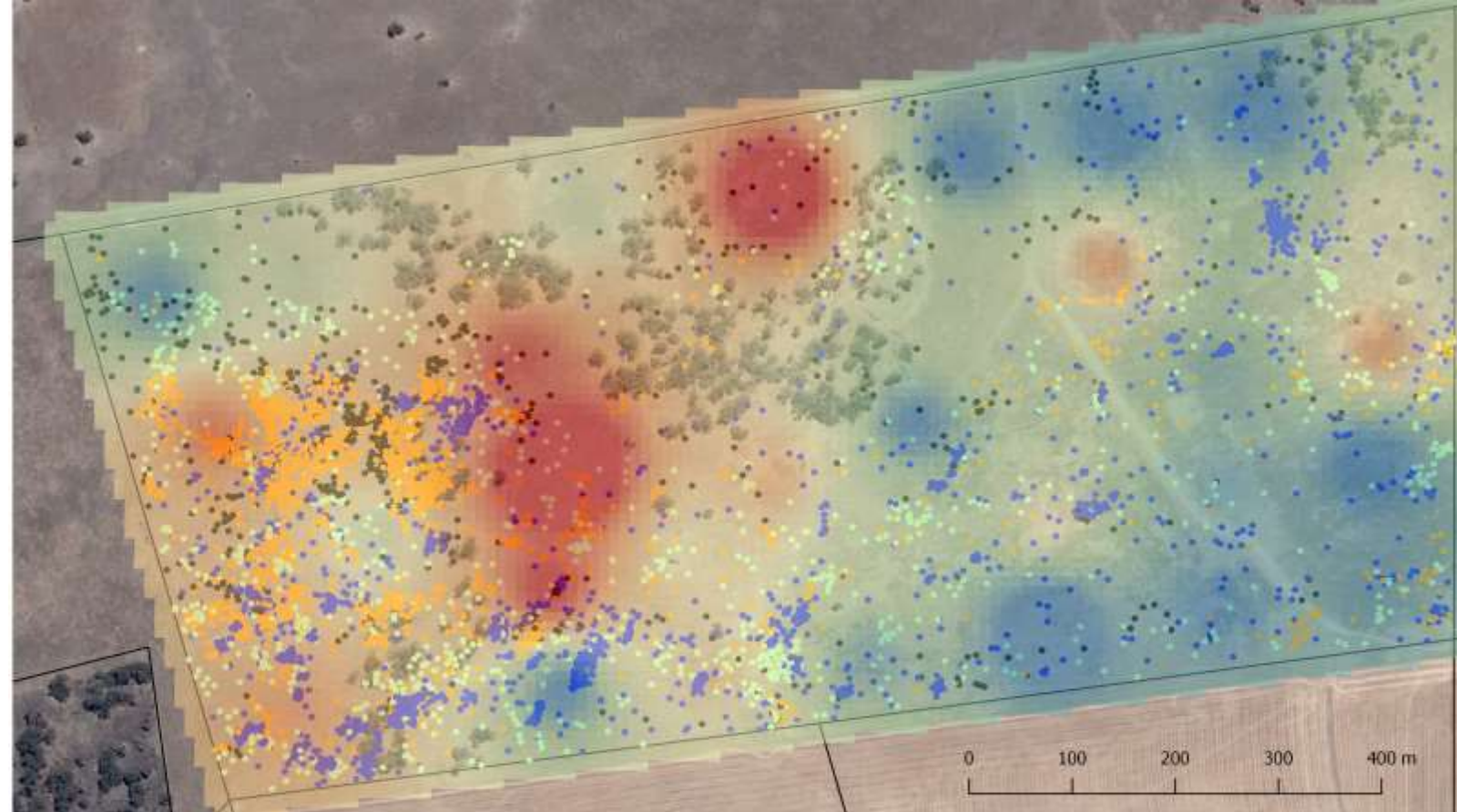
- Adopted the use of farm management software
- Targeting paddocks for grid testing that have:
  - deeper soils (better ROI)
  - distinct variations in pasture growth
- Using historic NDVI to overlay livestock grazing habit to identify 3-5 zones of soil type or biomass
- Experimented with EM and GPR – not suited





# What is our farm doing?

- GPS collars on sheep/cattle – cheap
- Nutrient rich strips
- Harvesters remove but don't dump biomass in repetitive areas – **livestock do!**



### Yellow ewe in 'North Back' paddock

Activity patterns in relation to soils

#### General Activity

- Morning active
- Day rest
- Afternoon active
- Night rest

#### P concentration using idw

- 20.3
- 26.2
- 32.2
- 38.1
- 44

- Water Points
- Paddock boundary
- Google Maps

- Restriction of both under and over fertilisation of objectively measured zones primary focus

**Soil fertility technology value for the sheep industry -  
\$84 per ha**

**Southern livestock systems – Australia**

- My report <http://nuffieldinternational.org/live/Report/AU/2016/jack-england->



# Thank you

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