Advancing Data Interoperability Standards for Animal Welfare and Production Systems

Confirmation of Candidature

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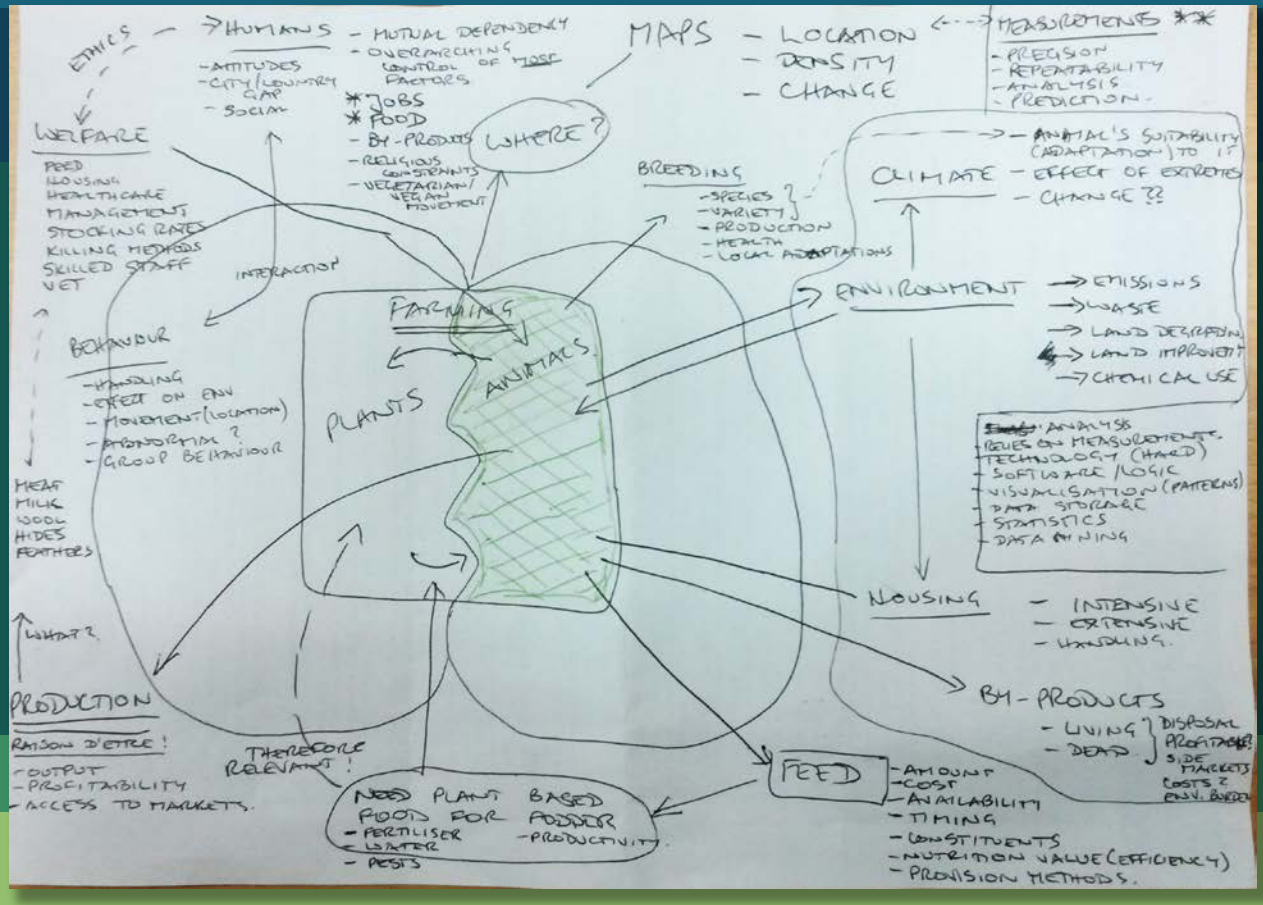
Regional Futures Australia

Start where?

Focus on:

- Livestock production and welfare
- Extensive livestock systems
- Interoperability standards
- Technical outcome



Precision livestock farming

advanced technologies

production indicators

welfare indicators

individual animals

early disease detection

maximise production potential

Data interoperability

exchange between systems

interaction across domains

federation with other data

data re-use

achieve common goals

maximise data utility

Review of international literature

1

Issues and problems

Challenges for PLF in extensive livestock production systems

- System complexity
- Economics
- Social
- Technical
- Data limitations

2

Emerging responses and solutions

Comprehensive and specific solutions, such as:

- Farm Management Information Systems
- Decision support tools
- Spatial tools with farm decision support
- Automated compliance systems
- Fodder production measurement

3

Technology review

- Animal identification
- Animal sensors & measurements
- Other farm sensors
- Networks and protocols
- Computation & analysis
- Geospatial tools, e.g. GIS
- Models & visualisation

4

Data collection and management

- Data storage and web services
- Metadata standards
- Interoperability and open data
- International standards – particularly: Open Geospatial Consortium (OGC)
- Public vs. private data
- Technical challenges

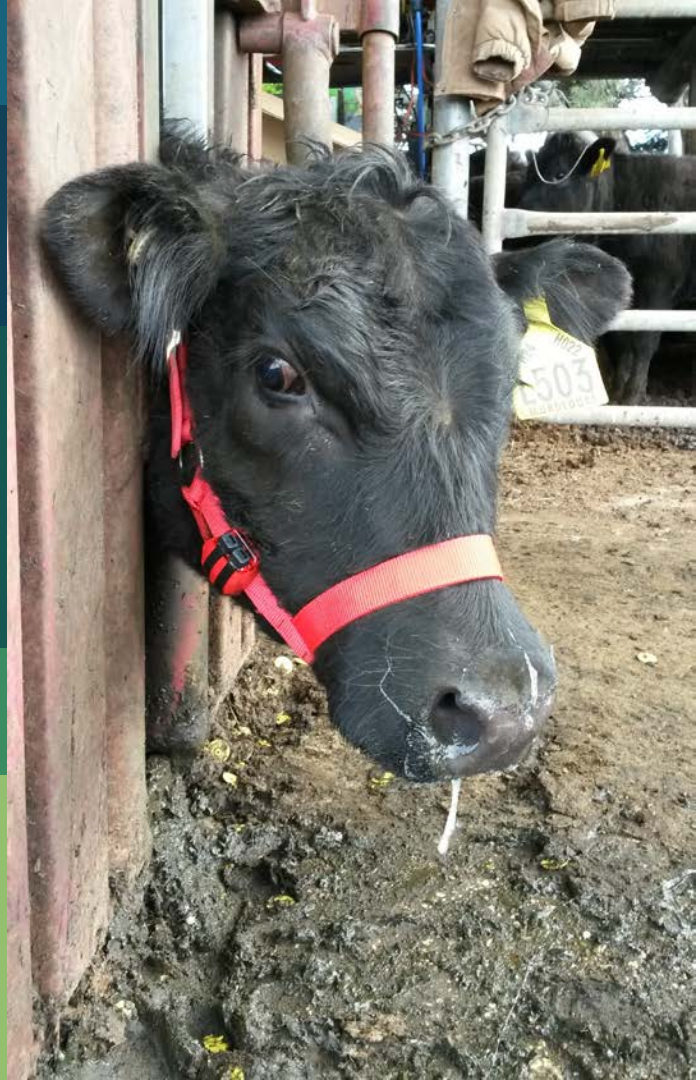
Conclusions & Gaps

- Smart farming adoption in extensive systems is limited
- Information needs are increasing
- Information should be shown in meaningful, geospatial context
- Public vs private data issues
- High degree of complexity
- New technologies, e.g. IoT, wearable sensors

- Lack of livestock farming models and applications that show model output
- Need for decision support for extensive livestock production
- Lack of interoperable standards for data, metadata, models

Capalbo et al., 2016
Ferrández-Pastor et al., 2016
Wolfert et al., 2017

Antle et al., 2016
Ehrlich & Harte, 2015
Jones et at., 2016



Research Questions

Research Question 1

Can standards be used to benchmark or measure livestock production and welfare “performance”?

Research Question 2

What livestock production and welfare data can be federated with geospatial data from different domains and how can this enhance production models and decision-useful information at different scales?

Research Question 3

How can such livestock production models be visualised within a spatial decision support system and could they help answer questions about trade-offs between different agricultural uses of land?

Research contribution & significance

Why do we need this research?

- Contribution to standards applicable to livestock farming
- Benefits for multiple users groups and a variety of use cases
- Increased use and re-use of data collected by research and industry
- Early adoption of interoperable data standards will benefit industry

Anticipated outcomes

Use case examples:

- compare running sheep vs cattle in on a farm
- decision support: do we need to treat for XX this season?
- information request: what is the average stocking rate for this area?
- strategic: identify problem areas to assist with resource allocation

Potential real world application

Decision support at different geographical scales

Detection and mitigation of risks to livestock welfare and production

Calculation of trade-offs between different land uses including livestock

Assist benchmarking and raise local/regional performance alerts

Progress to date

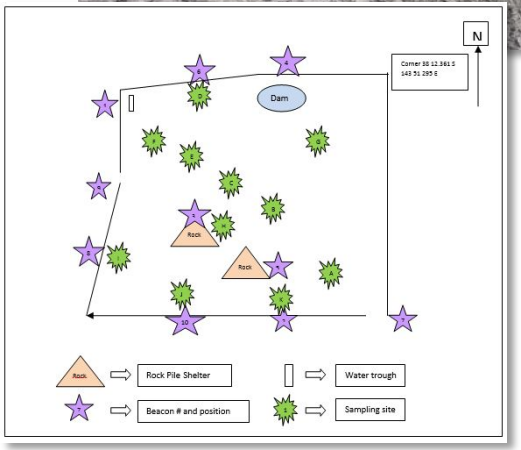
- Literature review
- Developed research questions
- Investigated datasets
- Became versed with GIS software
- Experimented with sensor hardware and IoT applications
- Conference, expo attendance

UNE data set

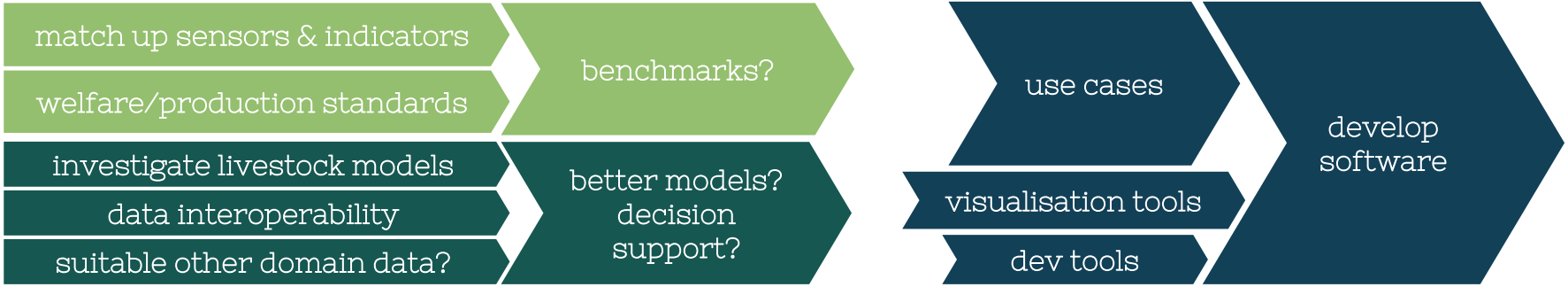
- Armidale NSW
- 1 year
- 10 Merino wethers
- GPS collars
- SensorNet data
- GreenSeeker & Crop Circle for pasture data

Murdeduke data set

- Winchelsea, Victoria
- 4 weeks
- 80 Angus heifers
- weekly weight records
- accelerometers on cattle
- proximity sensors in paddock
- pasture quantity and quality: dry matter and feed tests



Research Plan



1 Can standards be used to benchmark or measure livestock production and welfare "performance"?

2 What livestock production and welfare data can be federated with geospatial data from different domains and how can this enhance production models and decision-useful information at different scales?

3 How can such livestock production models be visualised within a spatial decision support system and could they help answer questions about trade-offs between different agricultural uses of land?

Thank you

Questions?

bit.ly/2pmCoC4CB