

# Creation of database for meta-analysis



# Researchers Sharing Data Was Supposed to Change Science Forever. Did It?

By Lily Hay Newman



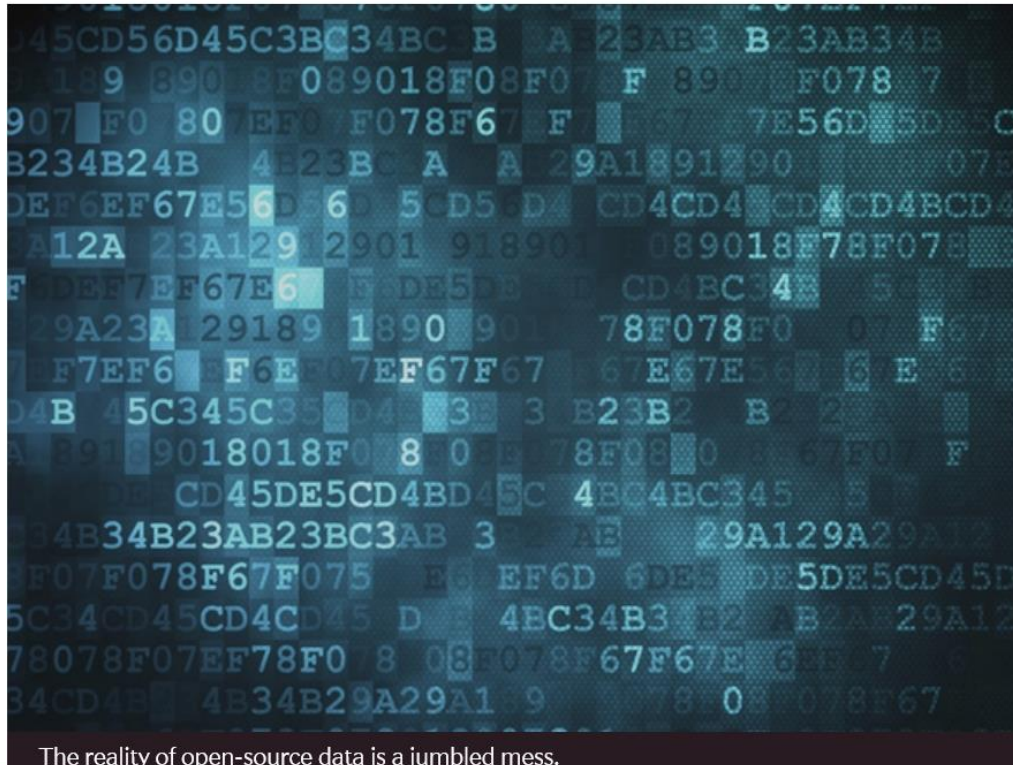
34



116



25



The reality of open-source data is a jumbled mess.



# Databases

- Why do we need big data?
  - “We have tiny little brains. We can’t understand the big stuff anymore” – The Defense Advanced Research Projects Agency
- The hard thing is not actually to dump your data into the public domain, It’s to dump it in an intelligible way. To make data from a project usable, it takes about 20 percent of a researcher's total work.



# Databases

- Creation of the database will be the first step towards analysis
- Once the contracts are signed all participants will be asked to provide their data
- The data will be held under strict confidence and access will be discussed and finalized today



# Databases

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# Databases

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# Databases - Australia

The screenshot shows the NLMP (National Livestock Methane Database) website. The browser address bar displays 'ckan.cloudapp.net:8080/organization'. The website header includes the NLMP logo and navigation links for Experiments, Projects, Organisations, and About. A search bar is located in the top right corner. The main content area is titled 'Projects' and features a sidebar with a 'What are Projects?' section. The main content area displays a list of projects, with a search bar and a '72 projects found' indicator. The projects listed include:

- RELRP: A genomic strategy to identify archaeal viruses in the rumen**  
Phage therapy is becoming increasingly important as a means of eradicating or...  
1 Experiment
- RELRP: Application and extension of FarmGAS decision support tool – trainer to trainer program**  
The free online FarmGAS Scenario Tool was developed with funding from the...  
1 Experiment
- RELRP: Blood**  
2 Experiments
- LMRC: An evaluation of limits to scanning open path laser and open path FTIR techniques and design of grazing research protocols**  
Recently, the approach taken to measure methane emissions from grazing...  
0 Experiments
- NLMP: Best choice shrub and inter-row species for reducing emissions and emissions intensity**  
The objective of this project is to quantify the effects of grazing shrub and...  
2 Experiments
- RELRP: Antimethanogenic bioactivity of Australian plants for grazing systems**  
In vitro information has been collected on bioactive properties of over 130...  
1 Experiment
- RELRP: Archaeophage therapy to control rumen methanogens**  
Phage therapy is becoming increasingly important as a means of eradicating or...  
1 Experiment
- RELRP: Breeding for**

The Windows taskbar at the bottom shows various application icons and the system clock indicating 5:47 PM on 26/06/2015.



# Databases - Australia

Belmont research - Belmont

ckan.cloudapp.net:8080/dataset/belmont-research/resource/39dec12-0d15-4aea-9413-95fb444dab83

Julian Hill

NLMP  
National Livestock Methane Database

Experiments Projects Organisations About Search datasets...

/ Projects / NLMP: Impacts of Leucaena ... / Belmont research / Belmont VFA CSV

Belmont VFA CSV

Manage Download

URL: http://ckan.cloudapp.net:8080/dataset/34eab38c-5653-4fc0-a52a-d4f506ea99e1/resource/39dec12-0d15-4aea-9413-95fb444dab83/d...

Grid Graph Map 127 records 0 - 100 Search data Go Filters

Experi...	Site	Collectio...	Collectio...	Diet	Animal No.	AcOH	Pr	IsoBu	nBu	IsoVal
NLMP/Le...	Belmont	1	Apr 2013	Rhodes	120142	33.73	7.05	0.92	5.36	0.77
NLMP/Le...	Belmont	1	Apr 2013	Rhodes	120085	61.56	11.51	1.08	7.71	0.96
NLMP/Le...	Belmont	1	Apr 2013	Rhodes	120006	46.37	9.65	1.02	6.50	0.93
NLMP/Le...	Belmont	1	Apr 2013	Rhodes	120506	51.21	10.31	0.75	6.78	0.75
NLMP/Le...	Belmont	1	Apr 2013	Rhodes	120058	42.22	8.41	0.58	5.10	0.37
NLMP/Le...	Belmont	1	Apr 2013	Rhodes	120411	39.31	7.52	0.52	4.75	0.23
NLMP/Le...	Belmont	1	Apr 2013	Rhodes	120066	51.91	10.24	0.79	6.18	0.52
NLMP/Le...	Belmont	1	Apr 2013	Rhodes	120251	55.52	11.94	0.76	7.46	0.52
NLMP/Le...	Belmont	1	Apr 2013	Rhodes	120106	31.84	6.53	0.49	3.94	0.07
NLMP/Le...	Belmont	1	Apr 2013	Rhodes	120473	34.41	6.56	0.48	3.72	0.12
NLMP/Le...	Belmont	1	Apr 2013	Rhodes	120500	57.89	11.81	0.90	7.32	0.75
NLMP/Le...	Belmont	1	Apr 2013	Rhodes	120393	69.33	13.82	0.78	8.37	0.96
NLMP/Le...	Belmont	1	Apr 2013	Rhodes	120086	57.68	10.72	0.65	6.36	0.38
NLMP/Le...	Belmont	1	Apr 2013	Rhodes	120203	50.60	9.99	0.71	6.62	0.42
NLMP/Le...	Belmont	1	Apr 2013	Rhodes	120012	57.84	10.58	0.79	6.58	0.66
NLMP/Le...	Belmont	1	Apr 2013	Rhodes	120475	25.00	4.45	0.45	2.06	-0.05
NLMP/Le...	Belmont	1	Apr 2013	Rhodes	120159	43.12	8.28	0.61	4.92	0.36
NLMP/Le...	Belmont	1	Apr 2013	Leucaena	120498	60.83	13.35	1.21	10.00	0.91
NLMP/Le...	Belmont	1	Apr 2013	Leucaena	120064	37.77	7.66	0.81	4.96	0.33
NLMP/Le...	Belmont	1	Apr 2013	Leucaena	120502	49.73	10.26	1.03	7.47	0.70
NLMP/Le...	Belmont	1	Apr 2013	Leucaena	120333	55.35	12.34	1.29	9.34	0.94
NLMP/Le...	Belmont	1	Apr 2013	Leucaena	120288	38.10	7.07	0.56	3.94	-0.03

Windows Taskbar: ENG 5:48 PM INTL 26/06/2015



# Databases – Treatment Means

- At the minimum we need information on:
  - Number of observations
  - Some measure of variability. SD is preferred but SEM or SED will also be usable by converting it to SD
  - Measurement methodology (e.g., VHC, GreenFeed etc for methane)
- Need to conduct ‘quality control’ to make sure numbers are within the expected range



# Analysis

- A meta-analytical approach will be used.
- All analysis will be conducted using R statistical software or WinBugs
- A correlation matrix will be developed in order to avoid multi-collinearity issues
- Variable selection will be conducted using reversible jump Markov Chain Monte Carlo method



# Bayesian Hierarchical Model

- Model for the data given model parameters
  - Let  $y_{ijk}$  denotes the  $k^{\text{th}}$  ( $i = 1, \dots, n_{ij}$ ) record on the  $i^{\text{th}}$  ( $i = 1, \dots, I$ ) animal in the  $j^{\text{th}}$  ( $j = 1, \dots, J$ ) study

$$y_{ijk} \mid \boldsymbol{\beta}, \alpha_i, \delta_j, \tau, \nu \sim t(\mathbf{X}'_{ijk} \boldsymbol{\beta} + \alpha_i + \delta_j, \tau, \nu)$$

- Data modeled through a student's- $t$  density
- Expected value modeled through covariates selected by RJMCMC plus animal and study random effects



# Selected Models

- MCMC Posterior means

Model	Posterior Prob.	Prediction Equation
GE	-	$\text{CH}_4 = 3.25 (0.429) + 0.043 (0.001) \times \text{GEI}$
Dietary	0.74	$\text{CH}_4 = 0.225 (0.7133) + 0.042 (0.001) \times \text{GEI} + 0.125 (0.015) \times \text{NDF} - 0.329 (0.094) \times \text{EE}$
Animal	0.86	$\text{CH}_4 = -9.31 (1.06) + 0.042 (0.001) \times \text{GEI} + 0.094 (0.014) \times \text{NDF} - 0.381 (0.092) \times \text{EE} + 0.0078 (0.001) \times \text{BW} + 1.62 (0.119) \times \text{MF}$

