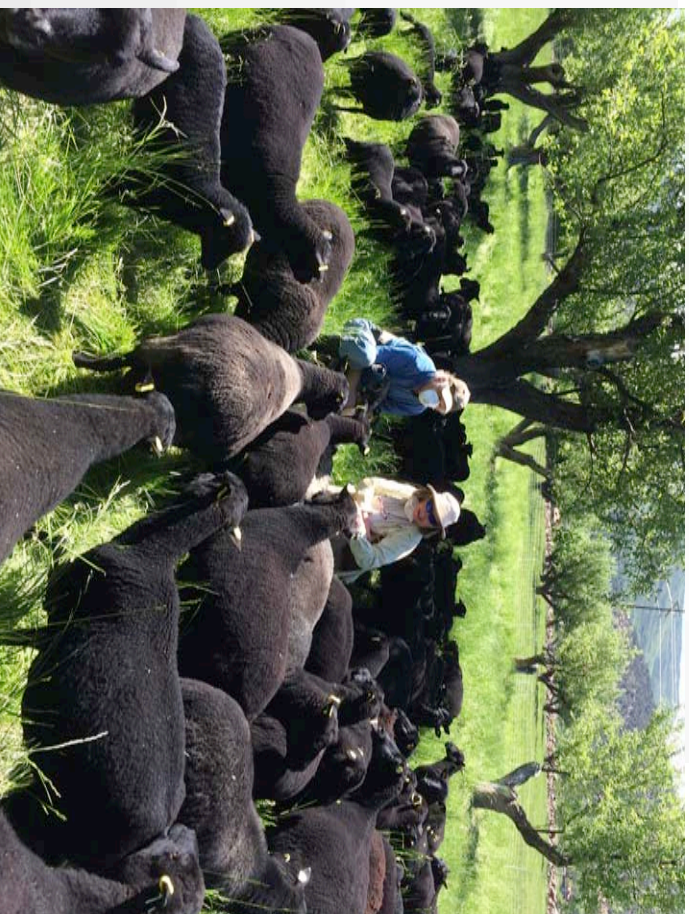
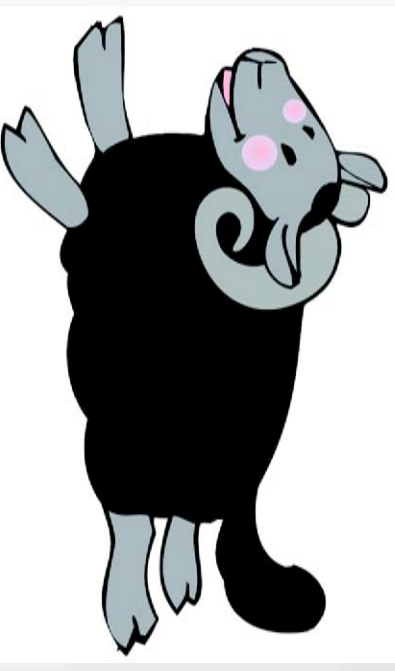


# Records for Rare Breeds



Oogie McGuire  
Desert Weyr, LLC  
Paonia, CO



## Save Breeds & Bloodlines

- Loss of Identity
- Loss of Diversity
- Loss of Bloodlines
- Loss of Breeds

## 3 Reasons to Keep Records

- Pedigree
- Performance
- Politics

# Pedigree

- Who is this?
- How does this animal relate to the breed as a whole?
- What is the genealogy of this animal?
- What are the genetics of this animal?

# What to Keep

- Animal Registration, Name and ID
- Sire Registration, Name and ID
- Dam Registration, Name and ID
- Information on Bloodline Group if Available
- Birth Date
- Progeny Records

# Performance

- *Who to Keep vs Cull*
- *Production Records*
- *Management Tasks*
- *Breed Characteristics*

# What to Keep

- Evaluation data
- Birth Type (Single, Twin etc.)
- Weights at various ages
- Carcass or Loin Scanning Data
- Notes on Disposition or Injury or?
- Drugs Given
- Vaccine or Dewormers
- Hoof Trims, Shearing & Other Management Tasks
- Rank within the Flock or Herd

# Politics

- State or Federal Mandated Programs
  - Slaughter Withdrawal Rules
  - Brucellosis Testing/Tagging
  - Federal Scrapie Program
- Voluntary Certification Programs
  - Grass Fed
  - OPP Free



# What to Keep

- Date of Drugs given
- Date off Slaughter Withdrawal
- Blood Draw dates and test results
- Ownership History
- Off Label Veterinarian Prescriptions
- Verification required for other programs

# What Are your Options?

- Human Memory
- Paper Records
- Computer Records

# Memory Pros and Cons

- Pros
  - Easy to use – Everyone has a brain
- Cons
  - We all forget things
  - We remember things inaccurately
  - Connections can be impossible to see
  - What if you die or are incapacitated?

# Paper Pros and Cons

- Pros
  - Easy to use
  - Low Cost
  - Portable
- Cons
  - Hard to make correlations
  - Time consuming to keep current
  - Can become illegible over time

# Computer Pros and Cons

- Pros
  - Easy to make correlations
  - Easy to back up
  - Easy to share with others
  - Can reduce data entry errors
- Cons
  - Can be expensive
  - Formats can be ephemeral
  - Requires knowledgeable user & infrastructure

# Our History

- Kate's Calendar
  - Hard to read
  - Missing identification
- Spreadsheets
  - 14 years worth of data
  - Hard to extract useful bits
  - Time consuming to keep updated
- Starting looking for replacement in 2012

# What Needed to Change

- Better Identification
- Less Time Spent Collecting Data
- Easier to make Correlations
- Easier to produce Reports
- Less Time Handling Sheep
- Fewer Errors
  - Problems Reading Tags
  - Data Transcription Issues

# Review of Commercial SW Solutions

- Most are expensive (\$750/yr)
- Inexpensive ones didn't keep all the records we wanted
- Most run on Windows Only
- None are Open Source so we can't change them
- Most have limits on numbers of animals
- Most still require transcription from chute side
- No integration with EID except in high end ones
- No integration with NSIP reporting



# Ground Rules for Our System

- Must be Open Source
- Readily available hardware parts
- Free software development tools
- Development environment on Macintosh, Linux and Windows systems
- Use a standard, portable, cross-platform programming language (Java)
- Use a standard, portable, cross-platform database (SQLite)

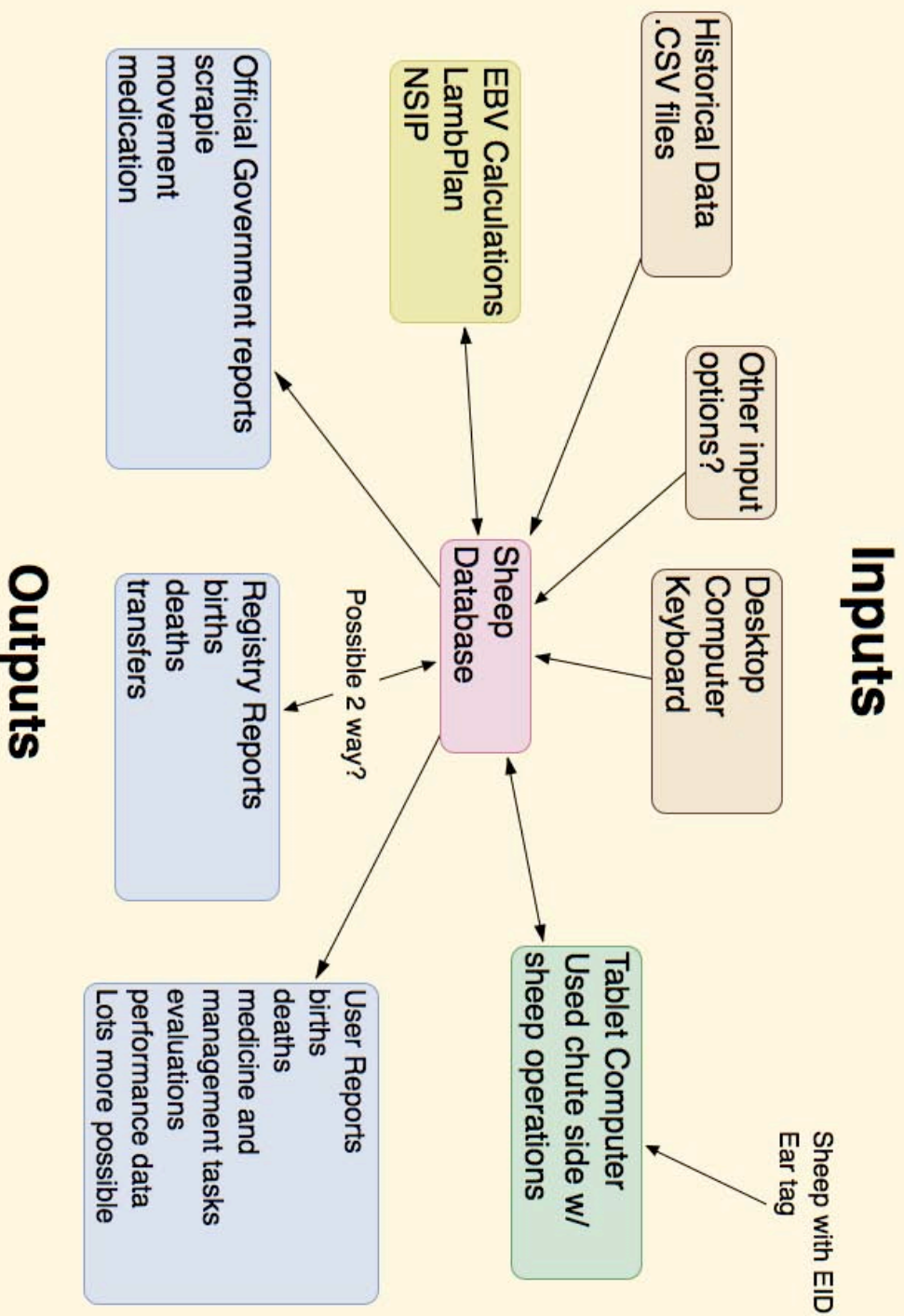
# What Do We Use Now?

## LambTracker System

Suite of technologies we use to keep our flock records



# Overall System Design



## What is Our LambTracker Setup?

- Shearwell EID tags in all sheep
- Home Built EID Reader
- Handheld Computer for Field Use
- SQLite Database
- LambTracker Mobile Software
- LambTracker Desktop Software

# Why Use EID?

- Reduce Tag Reading Errors
- Save Labor
- Allows easy tracking of individual Sheep
- Performance Data linked easily
- Management Data linked easily
- Smaller tags are better for our small sheep



# Shearwell SET Tags

- Very low cost
  - ~\$1.49 each including Shipping from UK
  - Varies with exchange rate
- Very good retention
  - Canadian 2 year trial
  - 46,538 tags applied
  - 332 tags reported lost 0.7%
- Approved as US Official Tags
  - Sheep, goats, pigs, deer and elk.



# Our EID Reader Design

- RFID Reader Module from Australia \$43 + \$19 shipping (Reads both HDX & FDX-B tags)
- Antenna (Included with reader but options are available)
- Bluetooth Radio \$10-15
- Battery Pack Varies
- Plumbing parts under \$10
- **Total Cost Under \$100**
- **You need to be a “hobbyist” to build one.**



# Handheld Computer

- Kids Android Tablet Nabi Jr. \$99-\$139
- Other Android Tablets and Phones
- Future Plans for rugged and sunlight readable Android systems





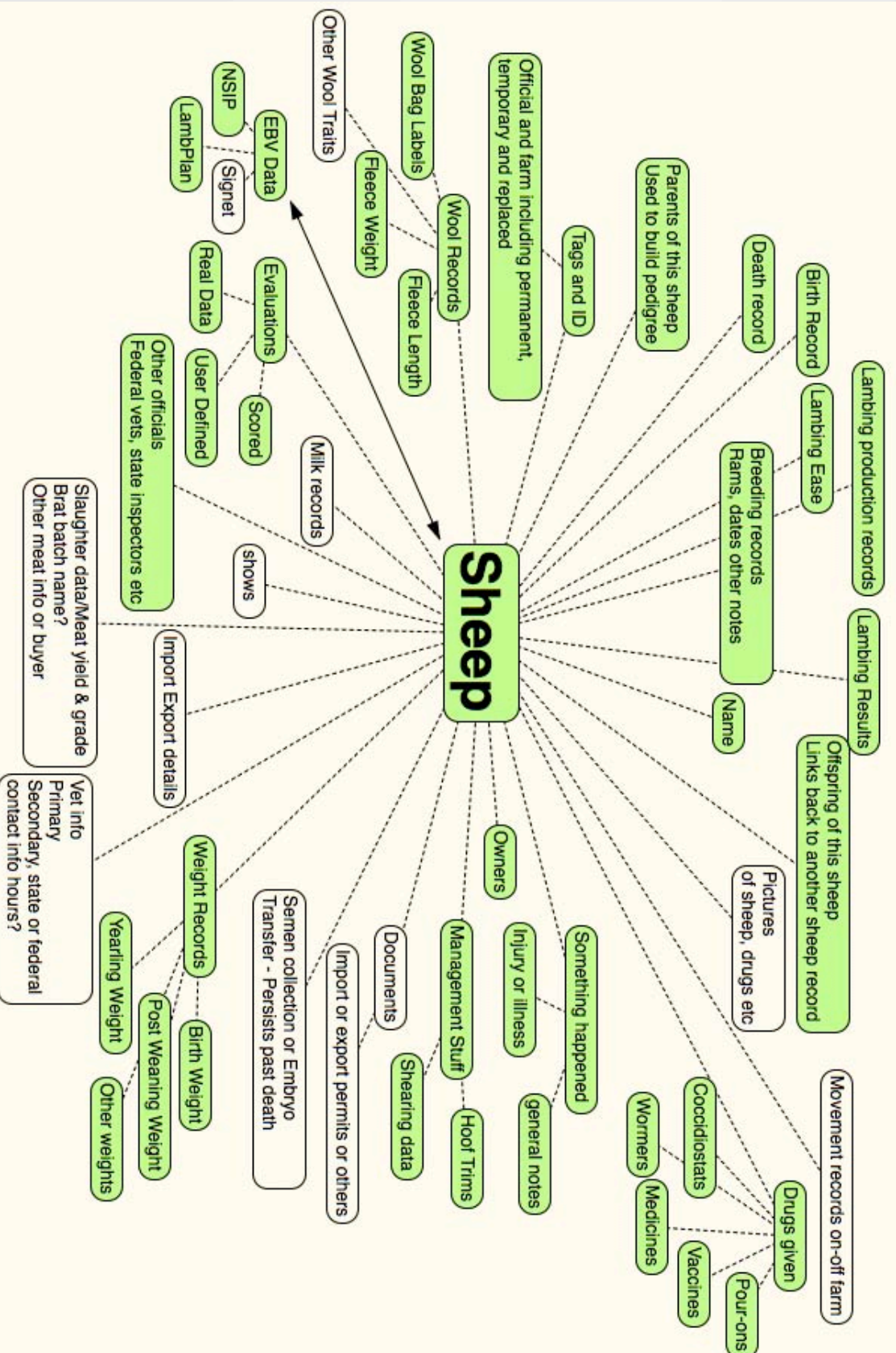
# Why Android?

- 2 Choices for handheld - Apple iOS and Android™
- Apple requires a license to use bluetooth in your application
  - Secret Agreement
  - Undetermined cost
  - Undetermined Ts&Cs
  - Requires special chips in your device i.e. custom hardware
  - App has to be approved by Apple
- Android™ has an open bluetooth environment
  - Uses any standard bluetooth radio
  - Open Source Development Environment
  - Access is easy

# Our Current Software Design

- LambTracker Mobile Version
  - Android™ Application written in Java
- LambTracker Desktop Version
  - Application will be written in Java
  - Leverage off the handheld system using Chrome browser as the platform.
- Database is using SQLite
  - Common to both Handheld and Desktop

# LambTracker Database Overview



# What's Running Now?

- LambTracker Mobile
  - All 2014 Data collection was using LambTracker
  - We have modules written for most of our common flock tasks.
- EID Reader Works
- SQLite Database Designed and Working
- Desktop Software in process



## 2 Flocks Using LambTracker



# LambTracker Mobile Modules

- ID Management
  - Insert and Delete Ear Tags, Paint Brands etc.
  - Keeps full ID History
- Look Up a Sheep
- Sheep Management
  - Drugs, Vaccines, & Dewormers
  - Shearing and Toe Trimming
  - Blood Draws

The screenshot displays the LambTracker Mobile application interface. At the top, there are two input fields: "Input Search String" with the value "727" and "Sheep Name" with the value "Maggie". Below these fields is a grid of buttons for various actions: "Search Federal Tag", "Search Farm Tag", "Scan to add EID Tag", "Update Database", "Alert", "Clear", "Add Non EID Tag", "Remove Fed Tag", "Remove Farm Tag", "Back", "Take Note", "Help", "New Tag Number", and "Update Display". The interface is organized into sections for different types of tags: "Federal ID", "Tag Color", "Tag Location", "Farm ID", "Tag Color", "Tag Location", "Electronic ID", and "Tag Color". The "Federal ID" section shows "727" and "White". The "Farm ID" section shows "50" and "Brass". The "Electronic ID" section shows "50" and "Brass". The "Tag Location" section shows "RE". The "Tag Color" section shows "White". The "Tag Location" section shows "RE". The "Tag Color" section shows "White". The "Tag Location" section shows "RE".

Section	Value
Input Search String	727
Sheep Name	Maggie
Federal ID	727
Tag Color	White
Tag Location	LE
Farm ID	50
Tag Color	Brass
Tag Location	RE
Electronic ID	50
Tag Color	Brass
Tag Location	RE

# LambTracker Mobile Modules

- Evaluate Sheep
  - Scored Evaluations - Scale 1-5
  - Real Scores - Weights and other measurements
  - Custom Evaluations
- Lambing
  - Add Lambs
  - Collect Lamb ID and Birth Data
- Print Labels



# LambTracker Desktop

- Currently reports are hand produced using direct SQLite Queries in Firefox browser with SQLite extensions
- chromeos-apk/archon is working on Macintosh and Linux systems
- Development of the desktop activities is proceeding



# LambTracker Development

- Ready, Fire, Aim!
- Like any Battle Plan, LambTracker rarely survived first contact with the sheep
- Get something running
- Test with live sheep
- Debug and refine
- Document future enhancements and move on



# Chute Side Debugging



# Tasks We've Used LambTracker For

- Convert from visual to EID tags
- Evaluate sheep in fall
- Breeding
  - Set up mating plans
  - Sort ewes into breeding groups
- AI Research w/ USDA NAGP
  - Collect CIDR Insertion times
  - Collect Teasing data
  - Collect Insemination data
  - Collect Ultrasound data



# Evaluating Sheep



# AI Research with USDA NAGP



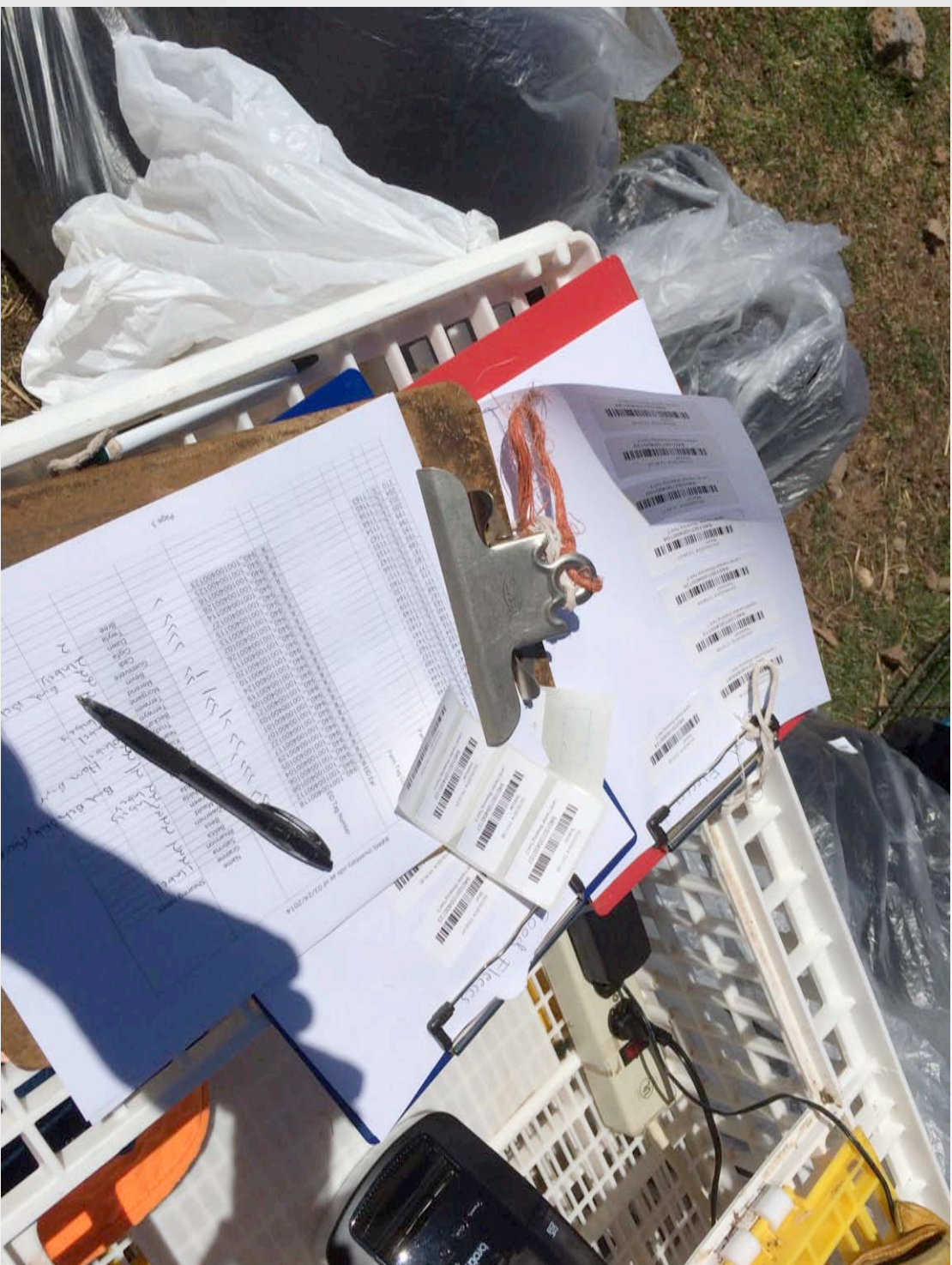




# Tasks We've Used LambTracker For

- Spring Tune-Up
  - Document Toe Trimming
  - Deworm and Vaccinate before lambing
- Shearing
  - Collect notes on sheep health, behavior and fleece quality
  - Print labels for wool bags

# Shearing Data





# Tasks We've Used LambTracker For

- Lambing
  - Document permanent and temporary IDs
  - Collect Lambease, birth weights and lambing notes
- Performance Data
  - Collect weanling, yearling and adult weights
  - Collect blood for scrapie genetics and OPP testing
  - Print labels for blood tubes

# Find a New Lamb





# Who is the dam?





# Tag the Lamb





# Collect Lamb Data





# Data Entry Quality Control





All Done





# Sometimes There are "Issues"





# Some Problems

- Some Tags broke.
  - Broken tags could still be read.
  - Shearwell changed the plastic for the US producers.
- Some Tags lost but less than other tags
  - 2012 before Shearwell lost 34 old tags
  - 2013 before conversion to Shearwell lost 13 old tags
  - 2013 after conversion lost 2 Shearwell tags
- Snow and Rain on Handheld were problems
  - Saran Wrap on screen solved the problem

# Guardian Dog



# LambTracker Saved Time

- From 1 August 2013 to 15 October 2014
- We worked sheep for 212 hours (2 or more people)
- Would have taken us 145 more hours w/o LambTracker
- Example – Sort 10 rams from a flock of 62
  - Total elapsed time 1 hour including moving rams to and from their pasture.
  - Normally that would have taken us 2-2.5 hours due to tag look-up time

# LambTracker Costs

- Programming time - 1 April 2013 to 15 October 2014
- 1145 hours programming
- Over 20,000 lines of code
- 2 Nabi Jr. Handhelds \$238
- 2 EID Readers ~\$200
- 200 EID tags \$218 inclu. shipping from UK \$75.78
- 200 Pairs EID & Visual Tags ~\$300 inclu. shipping



# Future Plans

- Better Integration with NSIP and LambPlan
- Full ownership and movement history
- More refined User Interface
- Improved entry of historical data
- Better reporting out
- Additional Language versions
  - Have had requests for Spanish and French
- More Developers
- Test with Automatic Sorting and Weighing Equipment

# Why?

- Our goal is not to make \$ on this but to enable the sheep raising community to use appropriate technology.
- Other people can adapt the software to their own specific needs or for other species.
- Us giving back to the sheep industry.
- We are doing things the “big guys” can't or won't.

# The shoulders we stand on

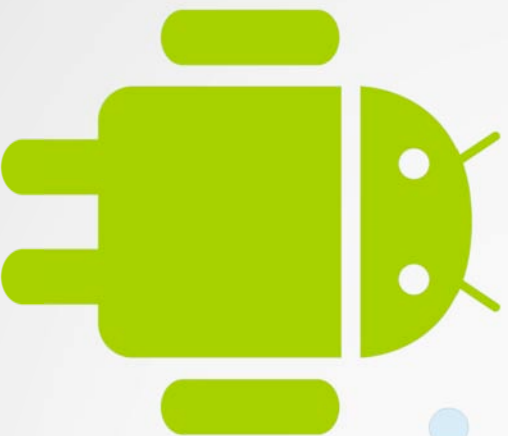
- Dr. Dan Love
- Dr. Susie Hirsch
- Dr. Phil Purdy
- Dr. Wayne Wiitanen
- Neil Oughton
- Eric Coker
- DXR
- Ray McGuinness
- Revolution Brewing
- Google
- Sun Microsystems & James Gosling
- Shearwell UK
- Allflex US
- Priority 1 Design
- Linus Torvalds
- Dennis Ritchie & Ken Thompson
- Donald Chamberlin & Raymond Boyce



# For More Information

- Hardware Design on GitHub now
  - However, it's missing lots of details, by design.
- Presentation and information on our website
  - <http://www.lambtracker.com>
- Source Code on GitHub now
  - <https://github.com/OogieM>
- Got Questions? Contact us
  - [oojiem@desertweyr.com](mailto:oojiem@desertweyr.com)
  - [kenn@desertweyr.com](mailto:kenn@desertweyr.com)
  - 970-527-3573

# Androids DO dream of Electric Sheep...



# Status of EID Worldwide

- Australia
  - Varies by State
  - Tagging Required – Can be EID
- New Zealand
  - EID Mandatory for Cattle & Deer
  - Optional for sheep
- Canada
  - EID Mandatory for Sheep as of 1 Jan 2013

# Status of EID Worldwide

- United Kingdom
  - Double Tagging Mandatory for Sheep as of 1 Jan 2010
  - 1 Tag must be EID
  - Can use Rumens Bolus in place of EID tag but still need visual tag
  - Slaughter lambs under 1 year rules vary by country
- United States
  - Tagging Required for Sale or Transport
  - EID is an option but not required

# EID Devices

- Microchips
  - Implanted behind ear
  - Can Migrate
  - Fragile
- Rumen Bolus
  - Can Be Reusable
  - Expensive

Not suitable for use in sheep, esp. rams.



Processors won't recover  
Cannot be read w/o  
equipment





# EID Devices

- Ear Tags
  - Many Styles
  - Can be very inexpensive
  - Human Readable
  - Easy to Apply
  - Standards ISO 11784/11785
  - HDX and FDX
- Various Manufacturers
  - Retention rates vary
  - Costs vary



# EID System Requirements

- EID Devices
  - Microchip
  - Rumen Bolus
  - Ear Tag
- Software for Handheld Devices
  - Typically task oriented
  - Often subset of total data
- Reader Hardware
  - Handheld
  - Computer Connected
  - Chute Side
- Software on Desktop Computers
  - Easy to edit and update

# Some Common EID Ear Tag Companies

- Allflex - US
    - Button & Flag Styles
      - \$1.75-\$2.90
  - Y-TeX - US
    - Flag Style
      - \$3.39-\$4.00
  - Destron Fearing - US
    - Button Style
      - \$2.35
    - Bought Out by AllFlex
  - Shearwell - UK
    - SET Tag
      - \$1.09 EID only
    - \$1.40 Pairs (Visual & EID)
  - Ritchey - UK
    - Snapp Tag
      - \$1.40 Pairs (Visual & EID)
    - Competes with Shearwell
- US – Optional
- UK – Mandatory

# EID Reader Hardware

- Pocket or Portable Devices
  - Some are attached to computer
  - Prices range from \$400-\$1500 or more
- Panel Readers
  - Used in raceways, chutes and on scales
  - Can talk to sort gates
  - Prices start at \$3900 and go up
  - Usually integrated with computer



# When does EID make sense?

- Making Genetic Changes to your flock
- Scrapie Free Export Flocks
- NSIP or other Performance Recording (LambPlan, EBLEX, Signet etc.)
  - Weights
  - Ultrasound Scans (Fat Depth, Loin Eye and Pregnancy)
- Disease Status and Recording
  - Brucellosis
  - OPP
- Breeding and Lambing Data Recording
  - Recording labor and number of assists (Pulling lambs)
- Reduce Labor costs



# What EID Isn't

- Cannot track sheep at distance
  - You must be within touching distance to read an EID device
  - Cell phone collars exist prices range from \$100-300 each
  - Satellite collars start at \$500 each
  - GPS requires good view of the sky
- Communications Infrastructure does not exist on range
- This would sure be nice but not today. Give it another 15 years or so and perhaps.

# Why We Personally Need EID

- We are an Export Qualified Scrapie Free flock
- We record NSIP data
- We need detailed lambing records for our work with the USDA on artificial insemination
- We are an OPP Free flock and test regularly
- We are working to improve our flock performance on a number of management characteristics
- Before EID we invariably misread 1-2 tags every time we worked the sheep
  - This means we had to put all the sheep back through to verify tag numbers costing us time and labor.
  - It's just us, we are unlikely to get more accurate as we get older!
- We are not a hobby flock but are small and can be an experimental flock

# What is Open Source?

- Free as in Freedom not Free as in Beer
- Free to use
- Free to modify
- Leverage many developers worldwide
- Often quicker to handle new technology
- Developers “Stand on the shoulders of giants”

# The 4 Open Source Freedoms

- The freedom to run the program for any purpose.
- The freedom to study how the program works and change it so it does your computing as you wish.
- The freedom to redistribute copies.
- The freedom to distribute copies of your modified versions to others.

# Why Not Windows?

- We don't have any Windows Development capability.
- Since the Desktop version will be written in Java and run under the Chrome browser “it should just work”.
- Open Source means anyone is welcome to fix any problems that occur or develop in a direction that we don't want to.

# Why Not Windows Handhelds?

- Windows Phones and Tablets is a small population
- Tablets are very expensive i.e. Microsoft Surface
- Phones have limited capability and failing in marketplace
- This may change in future but not for now



# LambTracker Database

- Proper Relational Database design
- Ease of set-up and editing
- Robust design to allow for expansion of types of records kept

# LambTracker Scoreboard

- If we used LambTracker and it had bugs or didn't work sheep got a point.
- If we used LambTracker and it worked properly with no database issues LambTracker got a point.
- As of middle of October
- LambTracker 1662
- Sheep 584

# Expand SW for our Flock

- This is one Flock's Perspective, YMMV
- This is a work in progress. We have no idea how long it will take. We are focusing on these 4 pieces:
- Desktop Software Running
- Manage Alerts for sorting and other activities
- Automatic input and output of NSIP data
- Official Scrapie Flock Inspection Reports