



Beyond Traceability

Taking the Technology to the Next Level

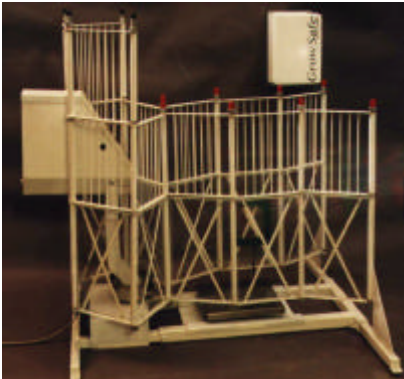
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GrowSafe RFID - 1990



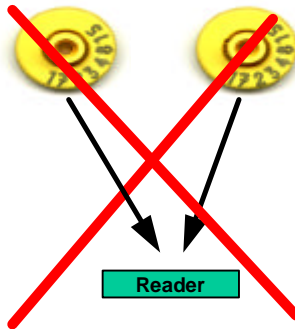
GrowSafe Systems Ltd. introduced the first electronic animal monitoring systems to the Ostrich Industry.

Challenge – Multiple Tags

Conventional RFID systems cannot read multiple passive transponders in close proximity

In the early 1990's GrowSafe developed antennas that could read multiple low frequency passive transponders in close proximity.

We further designed our systems to automatically ensure that an animal was positioned in an optimal reading range without human intervention.

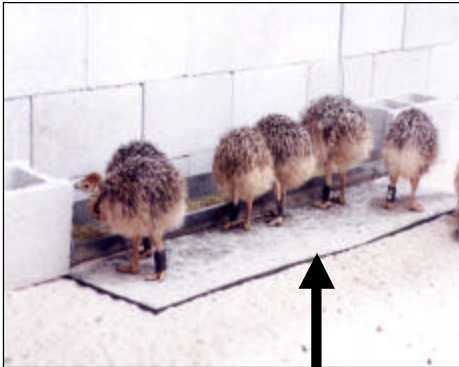


To detect the presence of multiple articles using RFID techniques is not simple.

The central issue is that there is only one communication channel between the transponders and the reader.

More than one transponder transmitting at the same time causes a confused message to be received by the reader.

Multiple Reading Capability



Average ostrich chick
survivability under
quarantine was 12%

GrowSafe improved
survivability to 92%

GrowSafe mat reading multiple tags

Challenge - Orientation

Tags and readers orientation dependent



Hand held reader – human manipulates tag and reader to acquire ID

GrowSafe automatically “reads”

A critical factor for tag readability and automation is read range.

The read range of a system is dependent on the transponder; the size of the transponder, the position of the transponder; the size of the antenna and the presence of metal relative to the antenna.

GrowSafe Antennas



1. A **GrowSafe Antenna** is affixed directly in the feedbunk, watering trough or other location – the animal continuously scanned

2. The transponder emits a signal to the antenna identifying the animal

3. When animal withdraws the signal stops

Continuous Monitoring

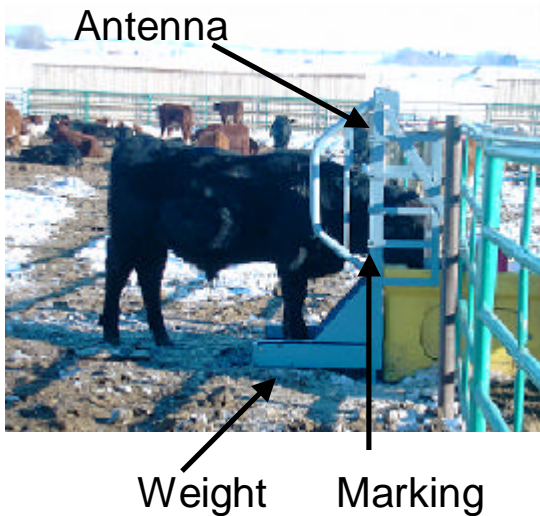
GrowSafe antennas strategically placed throughout feedyard - transmits information wireless to computer



GrowSafe Antenna



Integrated Devices



- In pen weight collection = continuous growth monitoring
- Bi-directional communication today = visible marking and identification
- Future = automated in-pen treatment

GrowSafe Technology

- Continuous monitoring – at any time - system knows **who, and where and animal weight and health**
- Integrates data from external sensors and devices
- Wireless bi-directional communication – Simultaneous DAQ from up to 60,000 locations - pen, bunk, water, chute, transport alley – 30 mile line of site

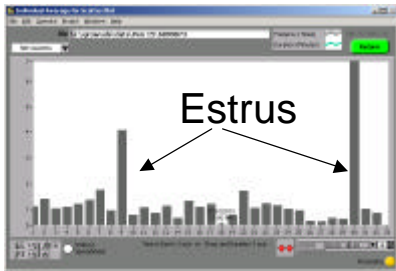
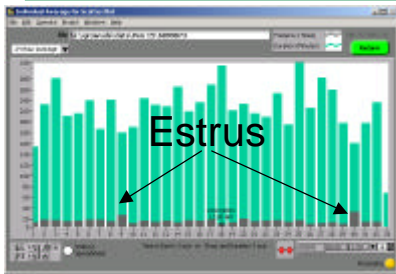
Real time acquisition & real time analysis =
Real time decision making & disease response

Scientific Discovery

GrowSafe system can identify:

- Animal sickness more than 4 days in advance of visual assessment
- 24 hours in advance of temperature
- Poor doers within 2 weeks of intake
- Animals ready for market and types of market

GrowSafe Monitoring - Dairy



Feeding behavior precedes changes in milk production

- Early detection of metabolic disease
- Detection of estrus
- Monitoring transition cows
- Identification and management of dominant cows

Feedyard Return on Investment

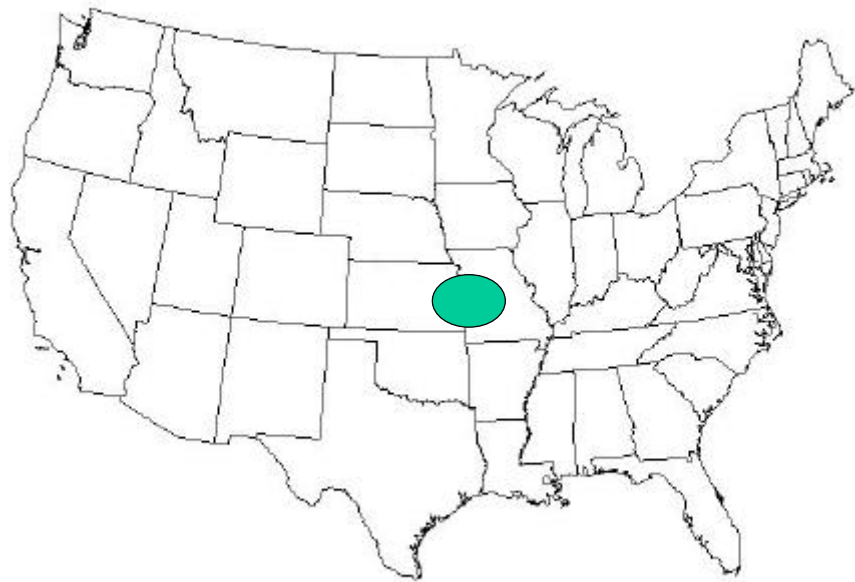
GrowSafe estimates that the value of:

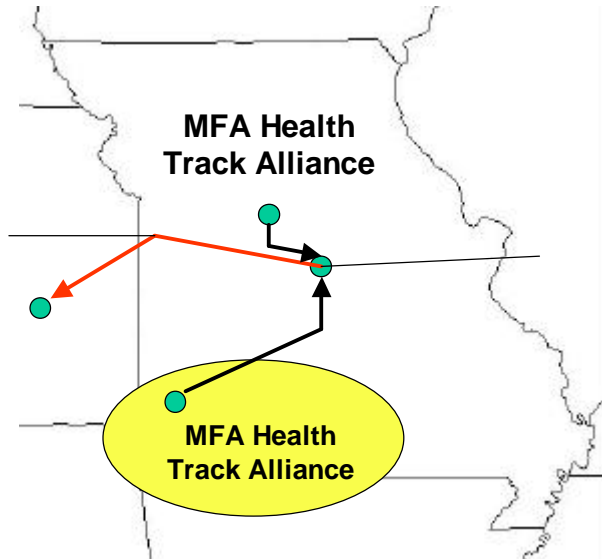
- Early Sickness ID - \$12 - \$23/head
- Poor Performer ID - \$17 - \$21/head
- Market Readiness Determination - \$2 - \$12/head
- Other' Production Efficiencies - \$1 - \$10/head

Currency = \$US

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Potentials/Gains Beyond Traceback

- **USAIP goals**
- **Identification of sick or injured animals individually**
- **Diet formulations**
- **Health monitoring**
- **Feed efficiency**
- **Progeny evaluation (epd)**
- **Real-time carcass composition**
- **Antibody free production**

Efficiency	Start Wt.	End Wt.	Trial ADG	Consumed
High	274	500	1.32	696
High	255	498	1.44	782
High	235	475	1.37	580
High	271	501	1.39	694
High	307	543	1.43	803
High	223	461	1.43	742
Averages	261	496	1.40	716

Low	286	527	1.48	1239
Low	252	483	1.35	1156
Low	243	475	1.33	1079
Low	272	552	1.67	1329
Low	283	528	1.50	1252
Low	243	525	1.70	1262
Averages	263	515	1.50	1220

Importance of Identifying Efficient Animals

- **With diet costs of \$145 per ton, animals with improved feed efficiency had the same performance as inefficient animals but consumed \$80 less feed in the feedlot**
- **With an estimated diet digestibility of 75%, animals with improved feed efficiency excreted 57% the fecal volume of inefficient calves**

Potential of Diet Formulation

	Traditional Diet	Balanced AA to Energy
ADG		
0 to 42 days	5.1	5.8
43 to 84 days	3.3	3.9
0 to 84 days	4.2	4.9
F/G		
0 to 42 days	3.7	2.9
43 to 84 days	7.6	5.5
0 to 84 days	5.0	3.9

Potential of Genetic Selection and Diet Formulation (750 lbs to 920 lbs)

ADG

5.5

4.4

4.8

4.0

3.8

3.3

Feed : Gain

1.8

2.2

2.3

3.5

3.5

4.0

Disease Recognition

Infection

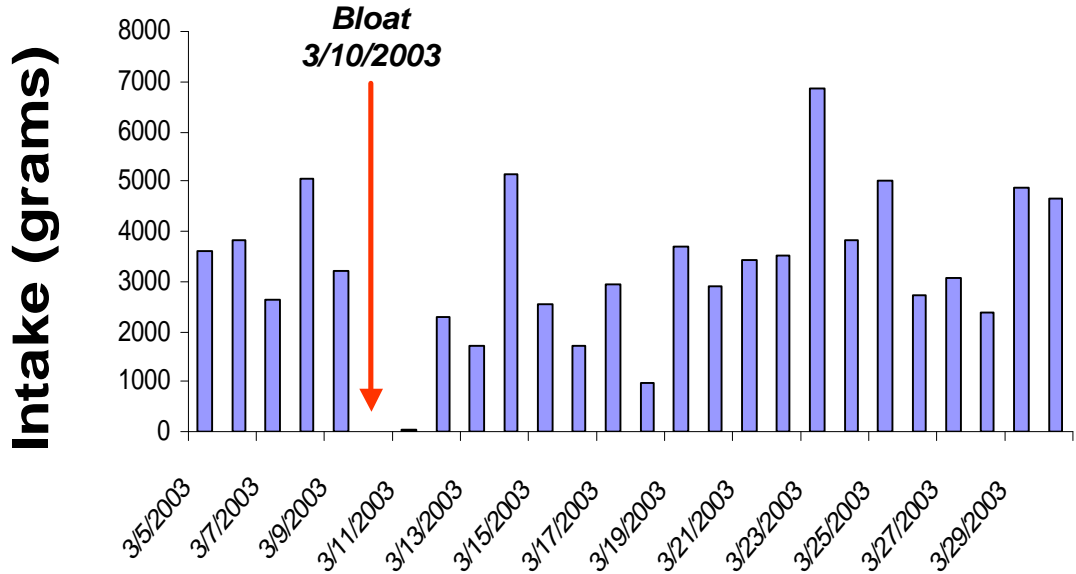
Incubation

Symptom Expression

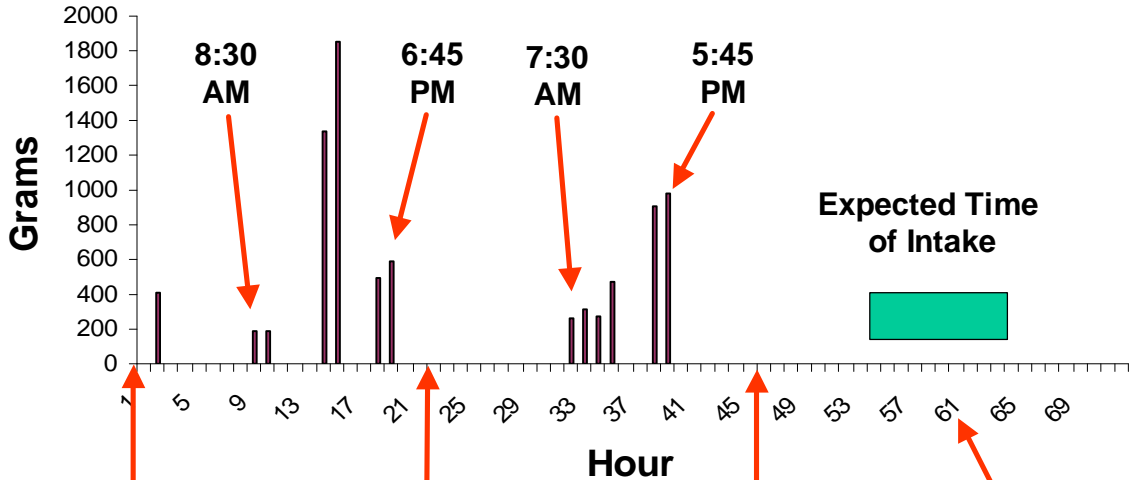
Disease Identification

Treatment / Quarantine

Intake Data (10672276)



Hourly Intake (10672276)



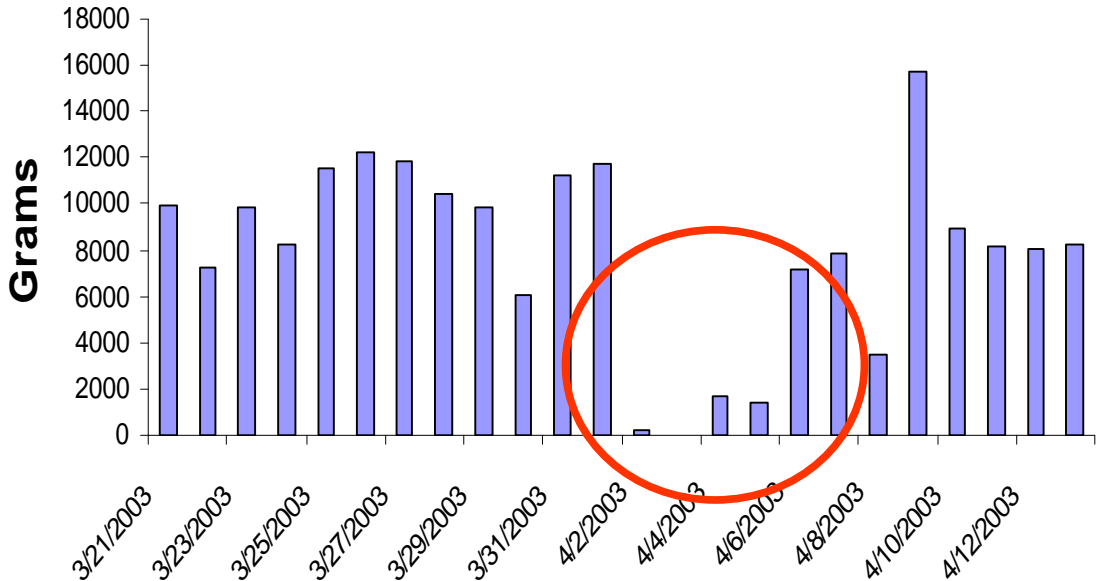
3/08/2003
12 AM

3/09/2003
12 AM

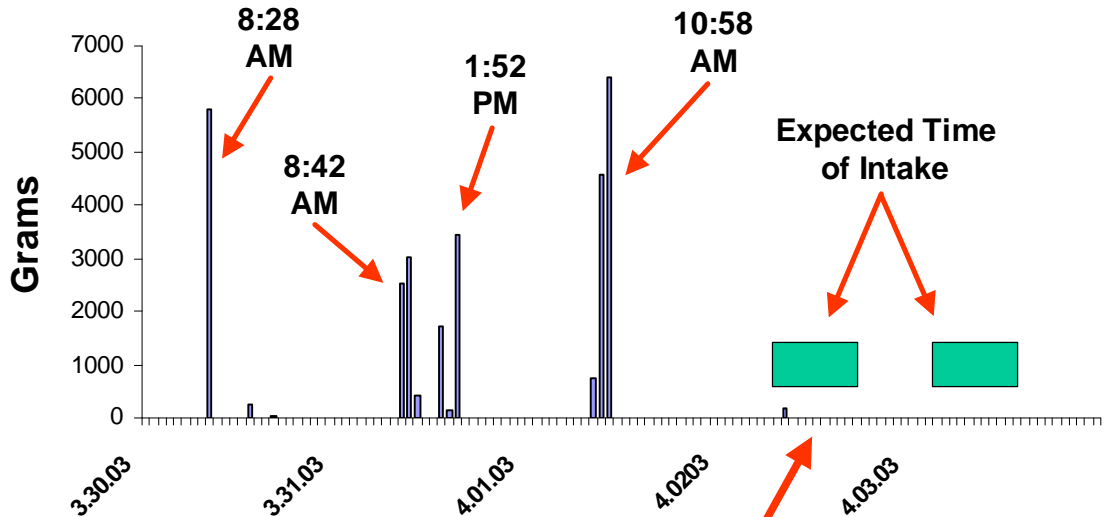
3/10/2003
12 AM

Bloat
Diagnosed
(10 AM)

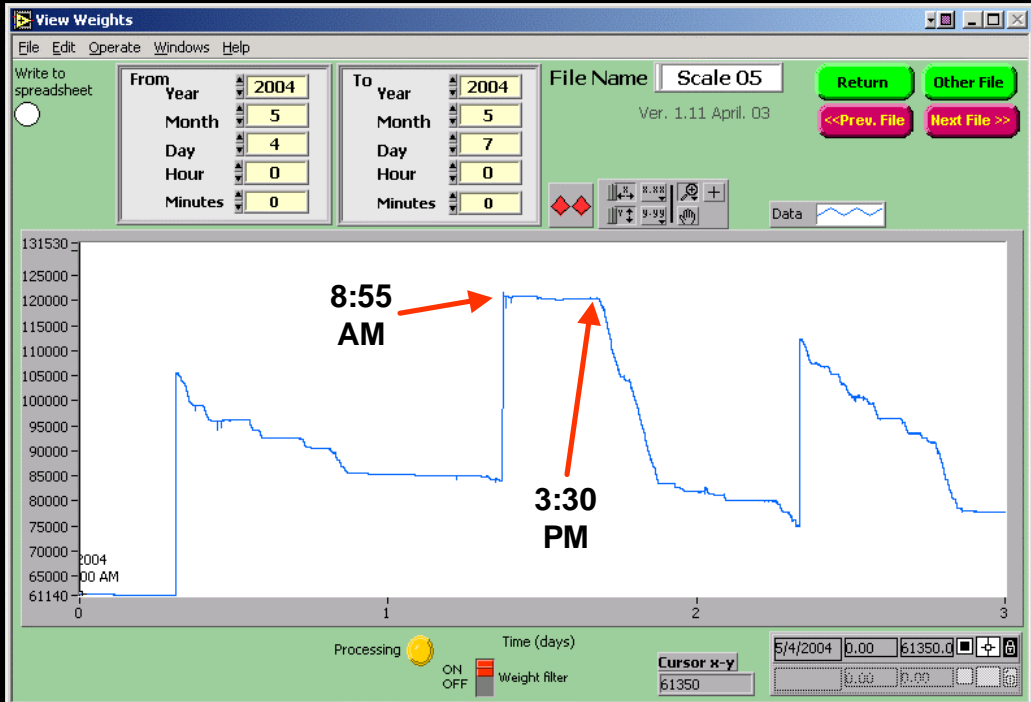
Daily Intake (19235742)



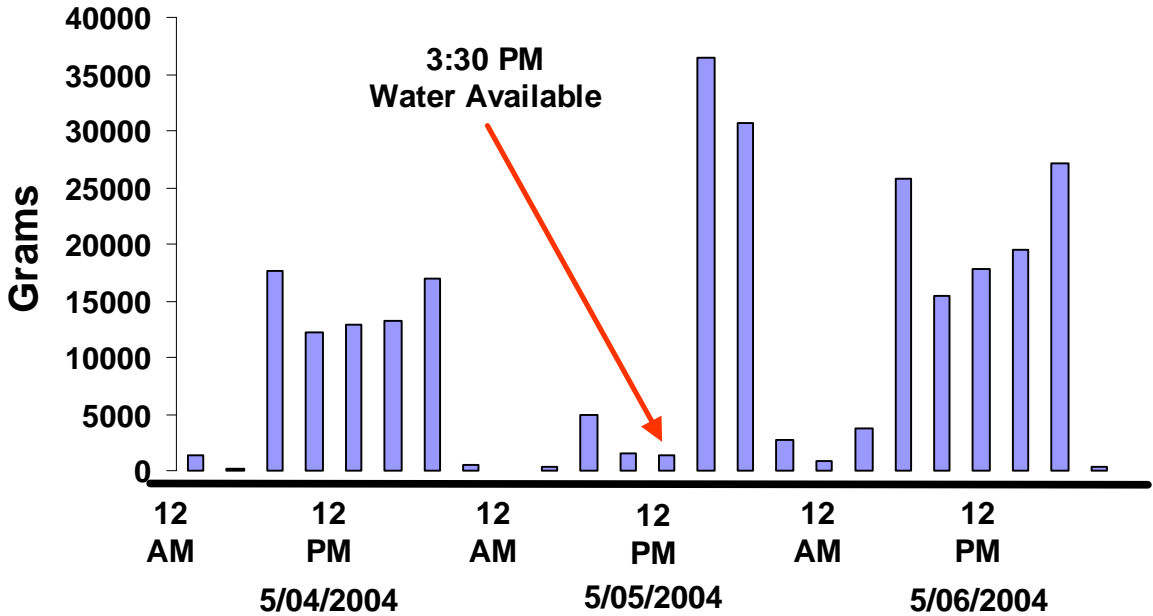
Hourly Intake (19235742)



Reduced intake was identified within 24 hours of last eating bout



Pen Intake



Going Beyond Traceback Capability

- Individual, pen, and herd disease identification within hours after behavior modifications (symptoms) occur
- Diet formulations that improve animal performance, reduce waste volume, and identify genetically superior animals
- EPD generation and genetic marker development for feed efficiency
- Feedlot costs assessed on an individual animal basis
- Progeny evaluation
- Market timing decisions based on estimatable carcass value

What We Can Do Now

MFA HealthTrack - Joplin Regional Stockyards - GrowSafe Equipped Feedlot

- At any point in time calves can be traced back to their point of origin
- Feed intake, gain, and carcass composition can be determined on a daily basis
- Health history can be accessed
- Disease/Injury can be treated/quarantined 6 to 18 hours after symptoms occur
- Individual ownership can be identified in co-mingled groups of cattle
- Diet, health, and genetics can be identified that result in over a \$120 advantage per head for fat cattle