



# Technology Developments in Tracking the Age, Performance and Genetics of Your Cattle

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**Western  
Forage/Beef  
Group**



Agriculture and  
Agri-Food Canada



Agriculture et  
Agroalimentaire Canada



**Alberta**

AGRICULTURE, FOOD AND  
RURAL DEVELOPMENT

# Technology for tracking animal attributes

(age, performance, genetics, etc)

## Why:

- adding value,
- market access,
- identity preservation for new product development,
- increased profit,
- lower costs,
- improved carcass quality & consistency

## BOVINE DENTITION/ DENTITION DES BOVINS



First pair permanent incisors erupting (>24 mo, <30 mo )  
Première paire d'incisives permanentes qui sort (>24 mois, <30 mois )



First pair permanent incisors present (>24 mo, <30 mo )  
Première paire d'incisives permanentes présente (>24 mois, <30 mois )

## Age Verification

**Eruption of 1<sup>st</sup> pair of permanent incisors**  
**Mean = 24 months (SD=2)**

**1<sup>st</sup> pair reach full size in 4 weeks**

Over 30 month (OTM)  
825 lb carcass  
-\$35/cwt discount

-\$289/hd discount

**Practical application of value based marketing using electronic identification and a pricing grid to identify carcass value differences among sires**

**Basarab, J.A., Snelling, W.M. and McKinnon, J.J.**

Carcass value of progeny from different sires differed by as much as \$343.47/hd.

Net return from various breeding programs differed by as much as \$110.55/hd.

Tracing carcass data back to breeding programs and sires has a tremendous potential to improve profitability and remove carcass nonconformities from the feeder cattle population.



# Product Attributes that may have value

- Feeding program (CLA, Omega-3s, etc)
- Hormone-free
- Health practices (not treated for sickness)
- Specific genetics
- Certified Humane practices
- Environmentally Friendly – “carbon footprint”
- Certified Organic/Natural
- Certified Herd/Region of Origin
- GMO free
- Performance and feed efficiency
- Carcass information
- Transportation data



# Technology for tracking animal attributes

(age, performance, genetics, etc)

- ❑ Multi-Panel RFID Reader Systems & associated systems/infrastructure
- ❑ RFID enabling technologies
- ❑ DNA/RFID technologies

# Dual Lane Multi-Panel RFID Reader Systems

As of Nov/06

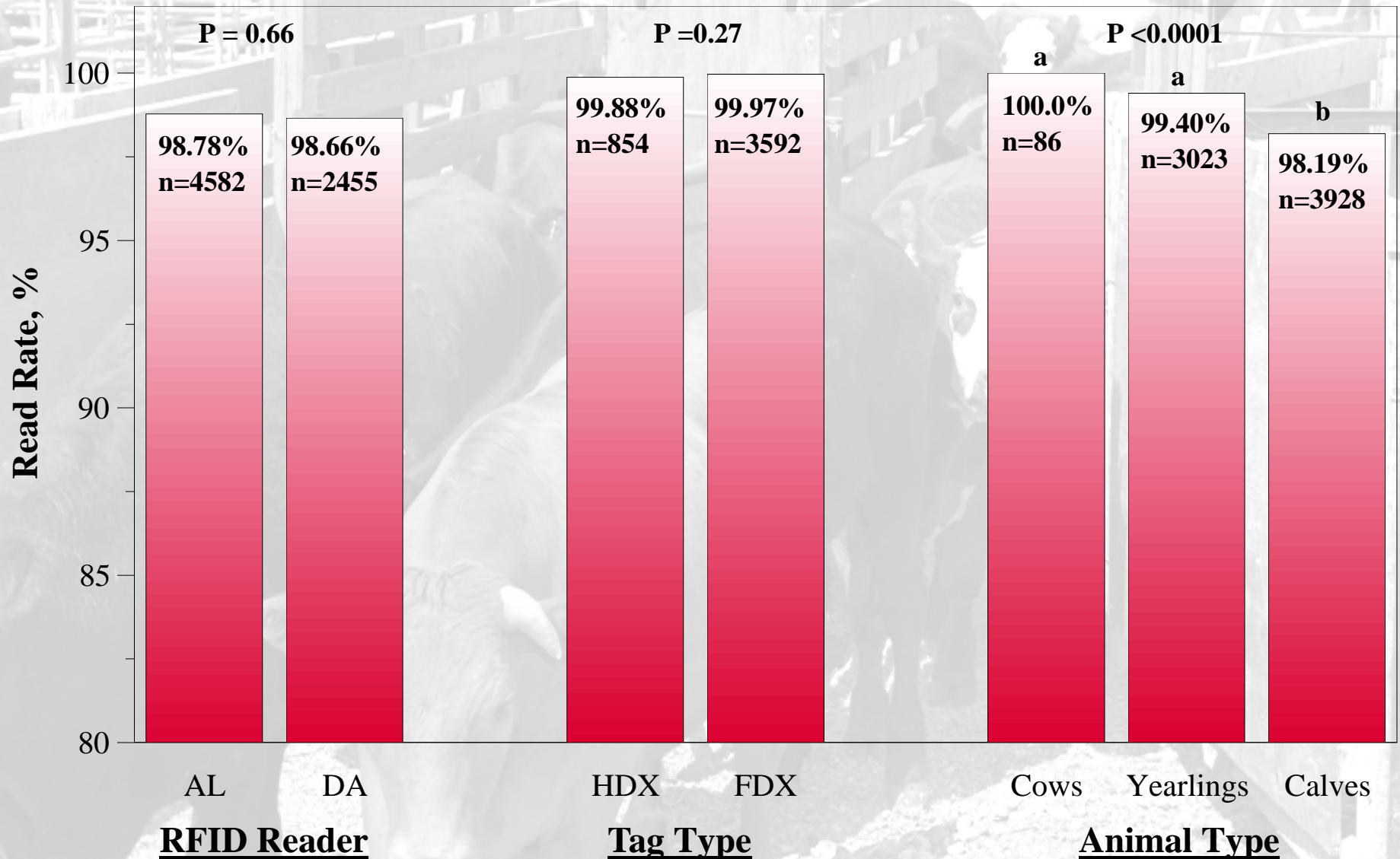
-7037 read at 3 Auction Markets

-98.74% read rate

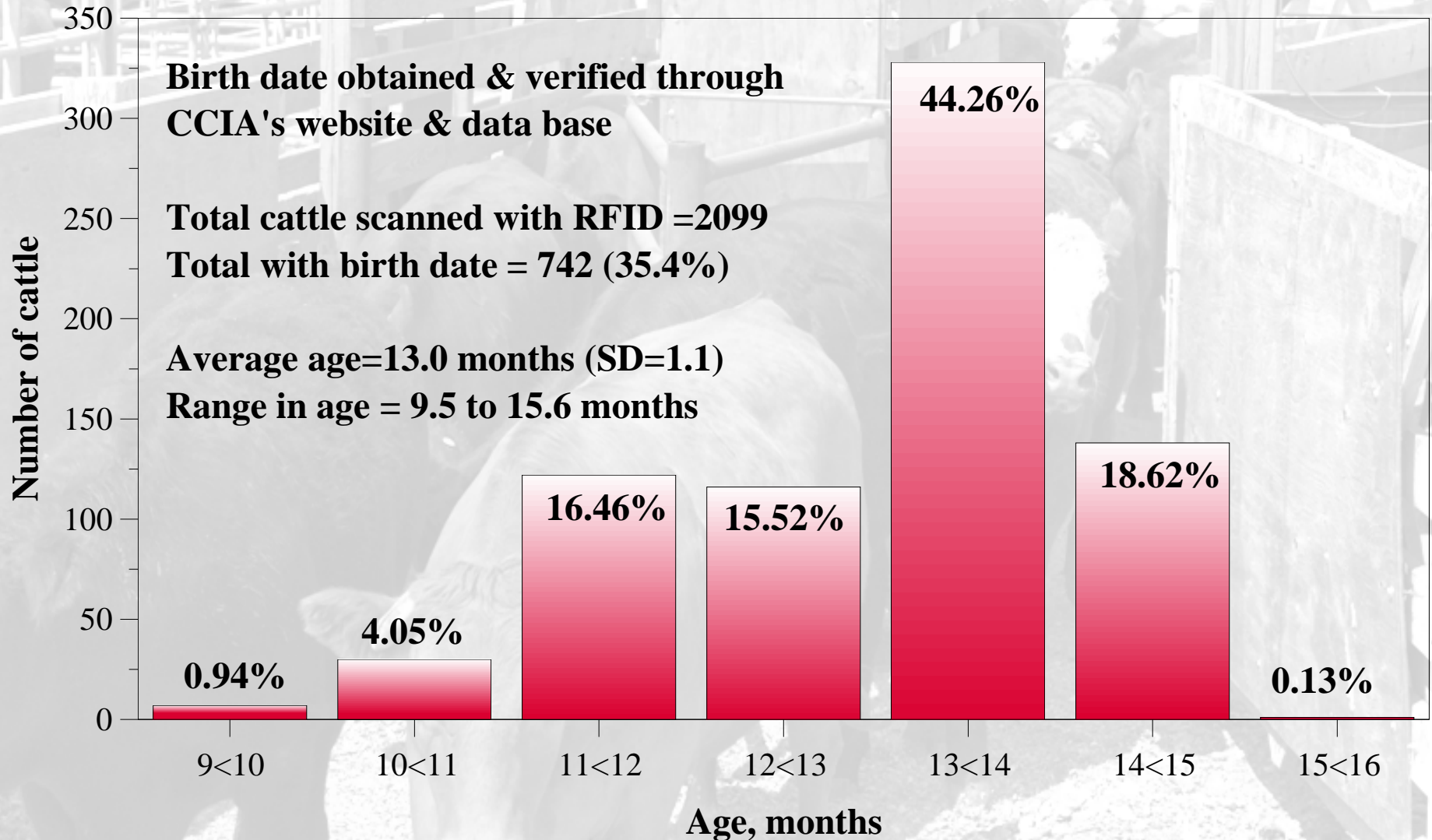
- 57.77% age verified



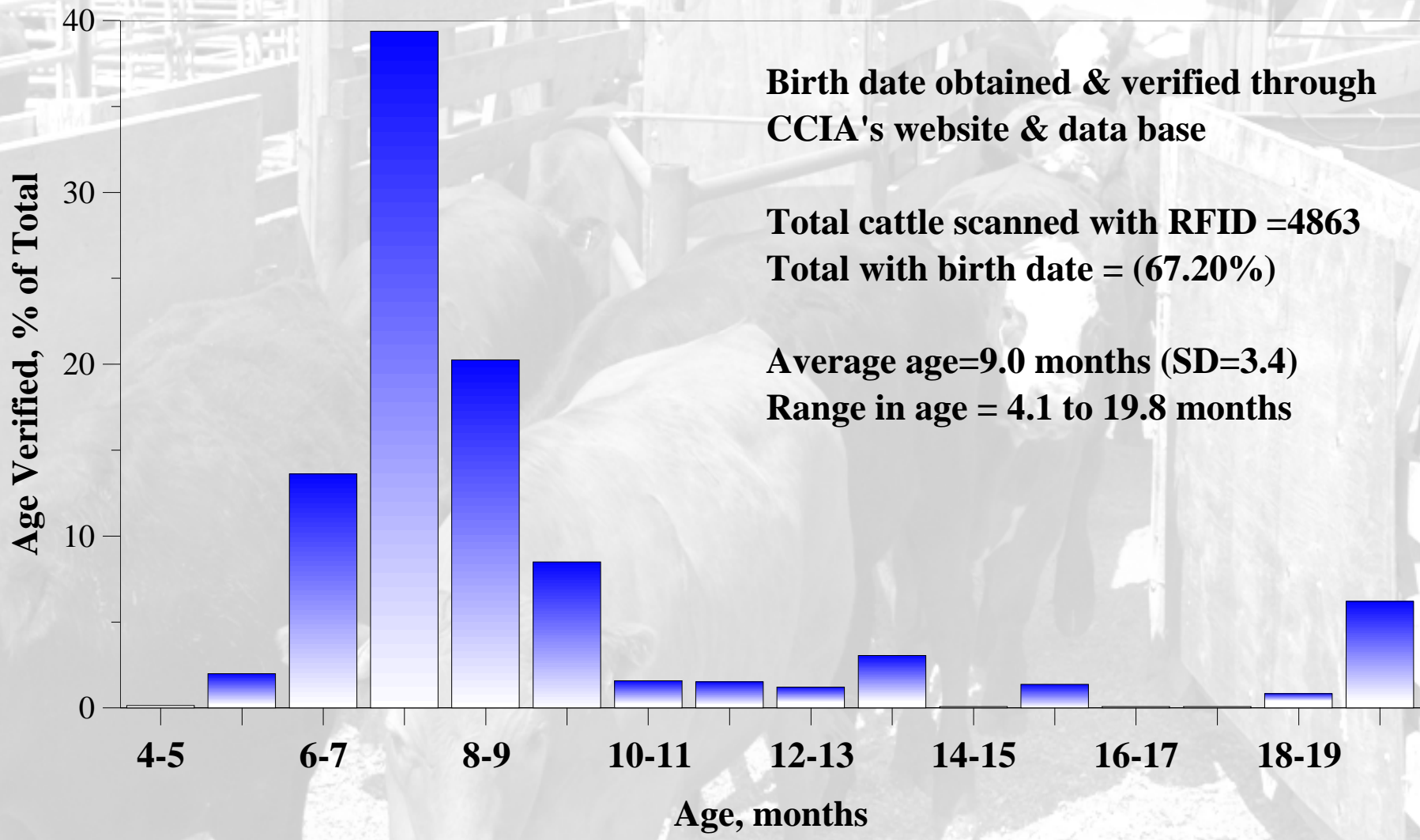
# Effect of RFID reader (Allflex, Digital Angel), tag type (half and full duplex) and animal type on read rate of Radio Frequency Identification (RFID) eartags.



# Age distribution of cattle RFID scanned at VJV Auction Market from Feb 6 to Apr 11/2006



# Age distribution of cattle RFID scanned at Burnt Lake and Fort Macleod Auction Markets from Aug to Nov/2006



# Fort Macleod Auction Market

## Demonstration of real-time age verification



# Reading RFID tags in the Auction market

## Benefits:

1. Information Management efficiency  
automation of manifest information transfer, brand entry, invoice transfer, transportation permit, tag destination to CCIA data base
2. Inventory control within Auction market
3. Opportunity of value-adding  
(age verification)

# RFID Enabling Technologies



**Animal Signals: How They Feel About Our Management**

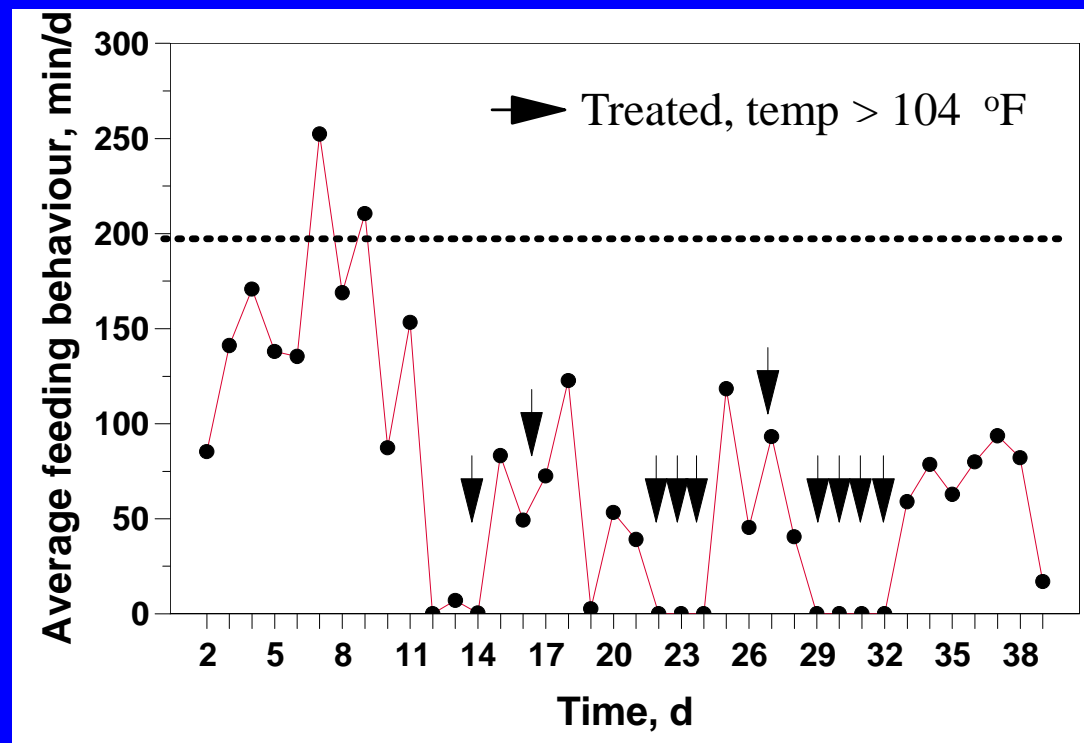


# Early detection of sickness/poor performance

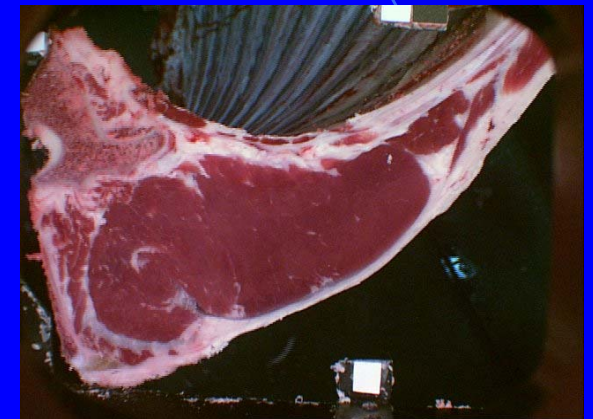


Reduced feeding behaviours are linked to early detection of morbidity, reduced performance and poor carcass quality in feedlot cattle (Basarab et al. 1997; Sowell et al. 1999)

Daily pattern of feeding behaviour for steer 16941096



620 lb initial weight  
Carcass weight=527 lb;  
B1; < 4 mm BF;  
54.7 sq cm;  
-\$252.15 net return



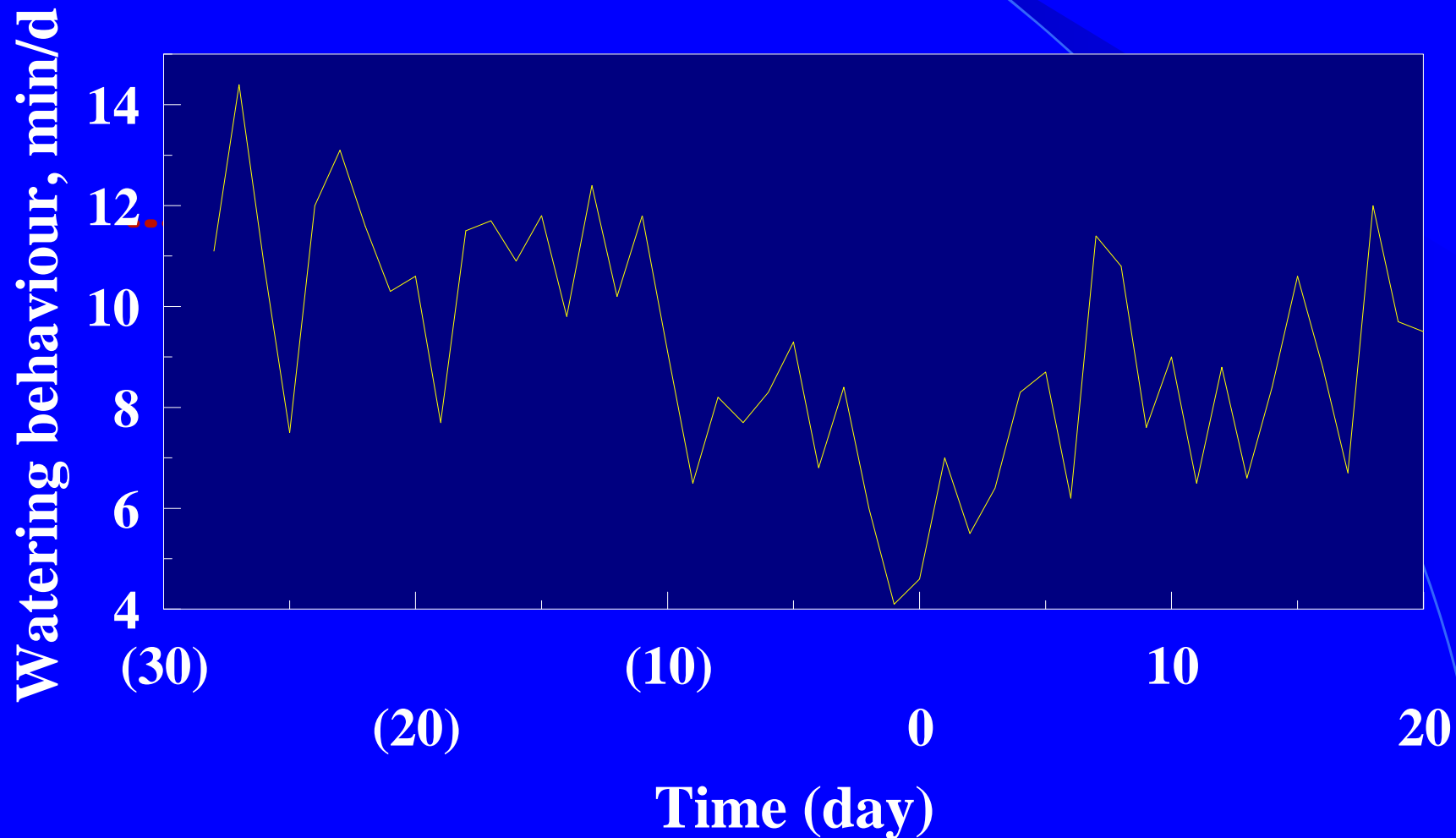
(Basarab et al. 1997, *Can. J. Anim. Sci.* 77: 554; Sowell et al. 1999, *J. Anim. Sci.* 77:1105)

# Automatic monitoring of watering behaviour in feedlot steers

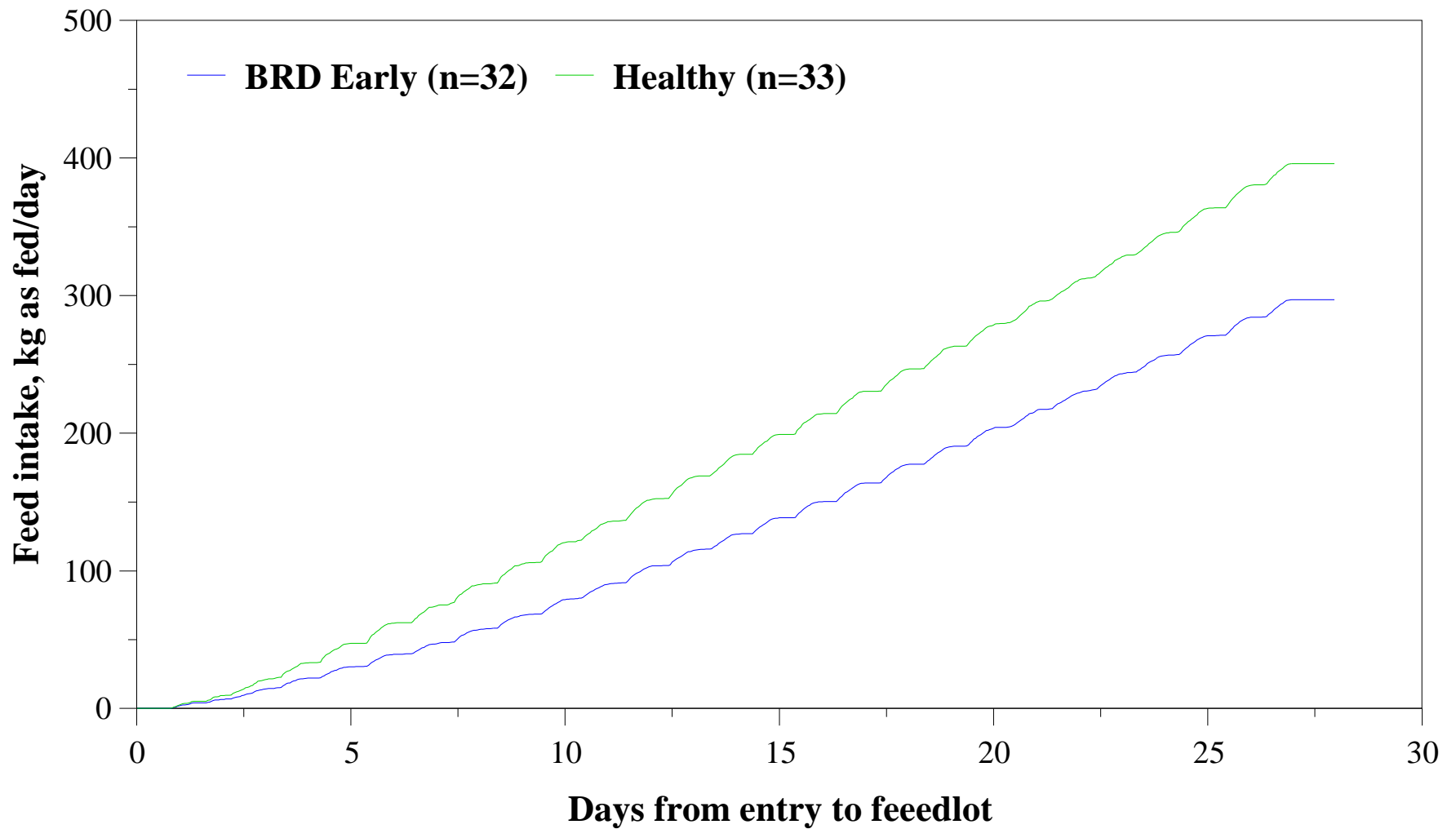
Basarab, J.A., Milligan, D., Hand, R. and  
Huisma, C.



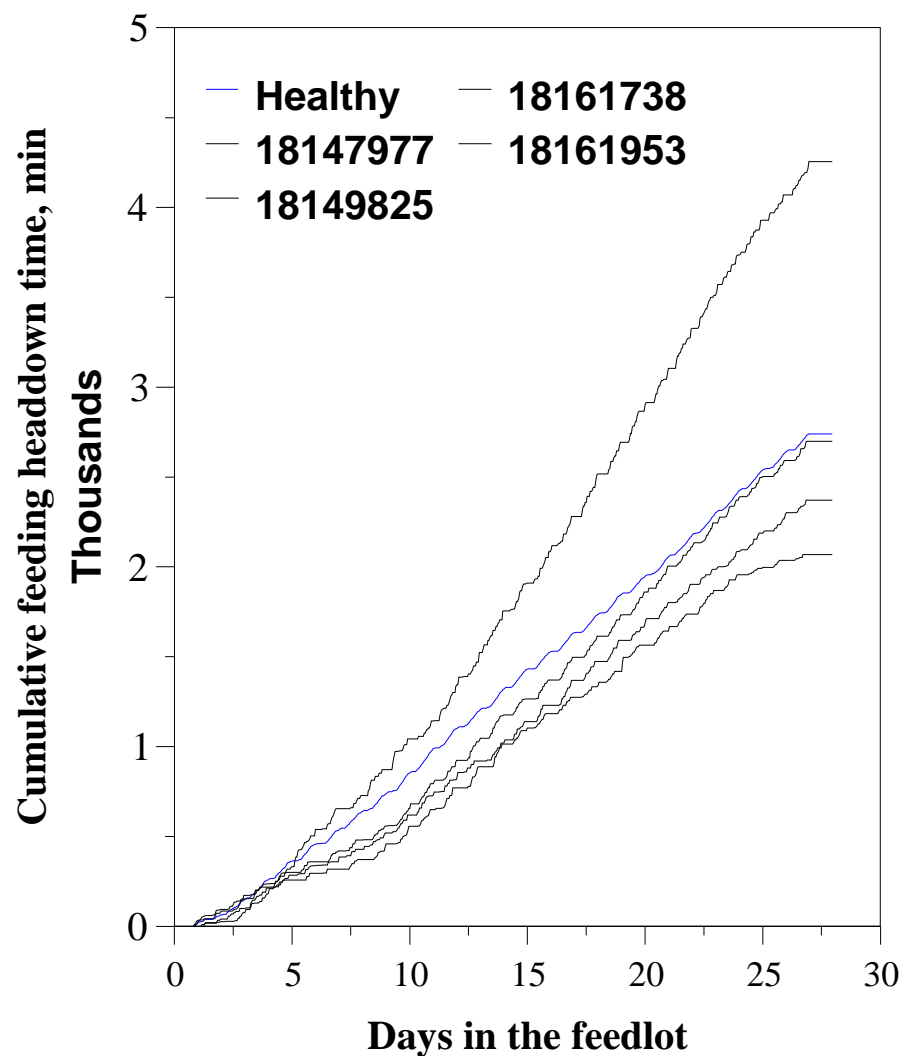
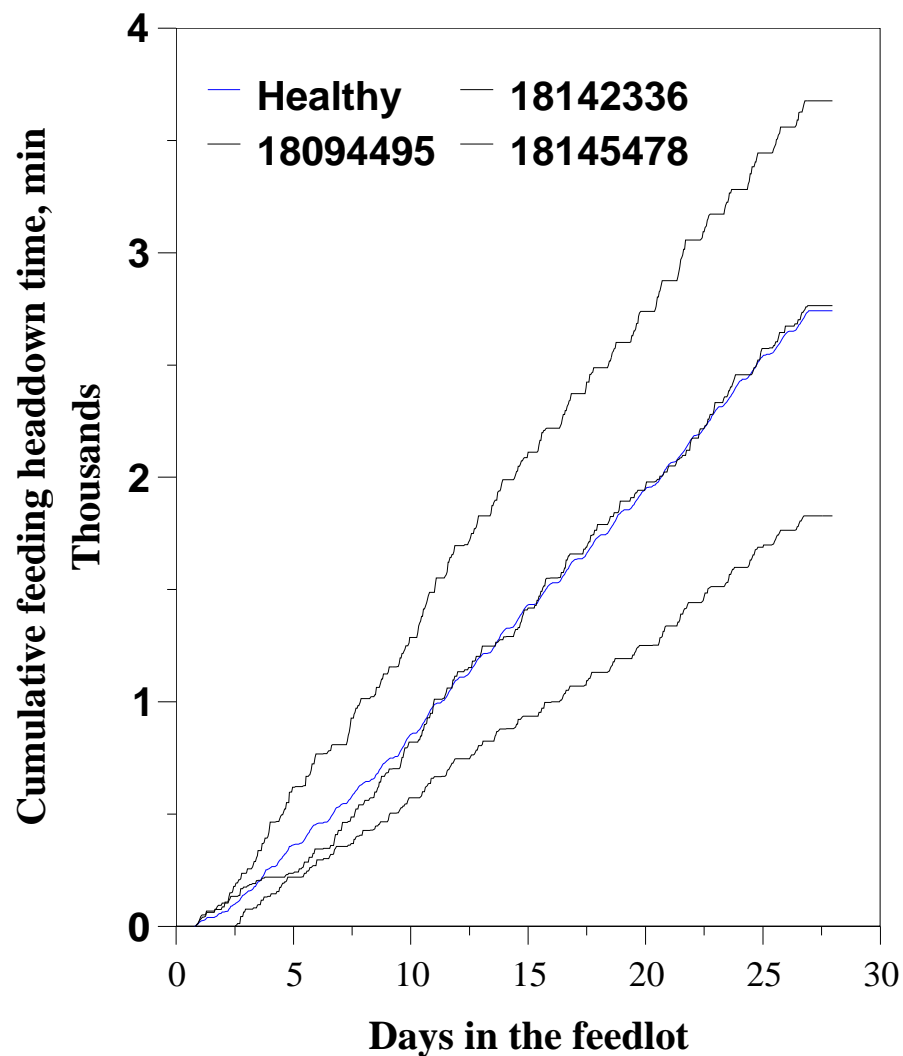
# Mean daily watering behaviour of feedlot steers treated for respiratory disease (n=11; SEM=1.7)



# Cumulative feed intake for healthy, newly weaned steers and steers diagnosed with BRD on day 4-6 (BRD Early) of the feedlot period



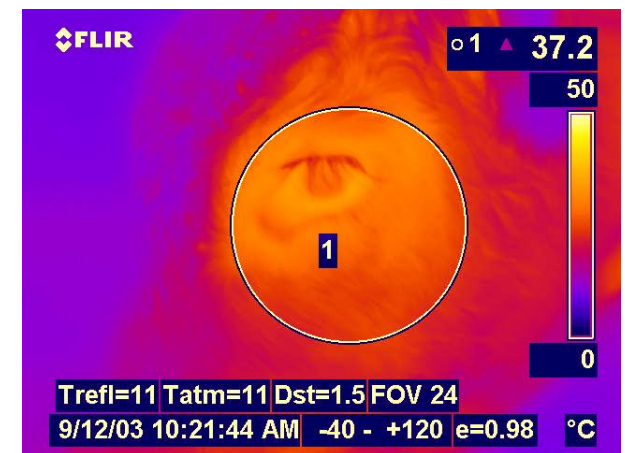
# Average cumulative feeding headdown time of healthy newly weaned steers (n=33) compared to newly weaned steers diagnosed with BRD on day 4-6 of the feedlot finishing period.



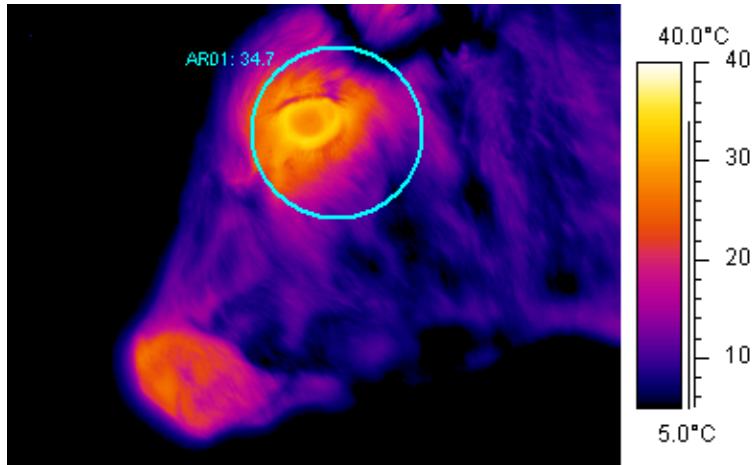
# Remote Sensing: Infrared Thermography Site

## Lacombe Research Centre

Source: Dr. Al Schaefer

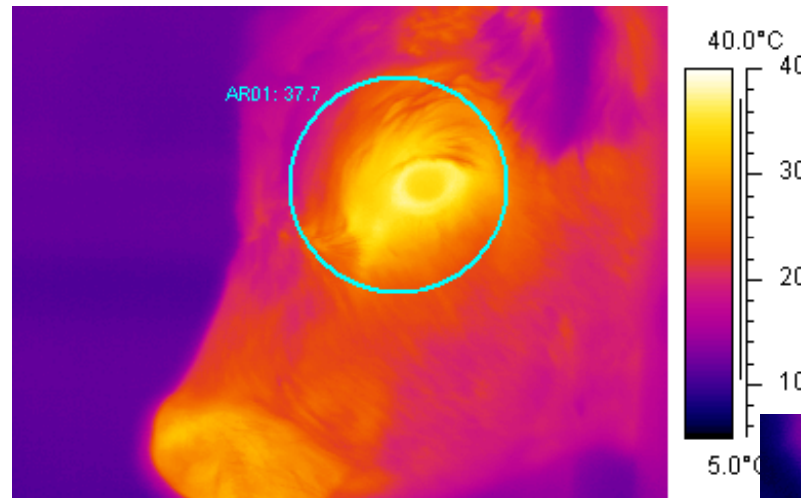


**Day 1**

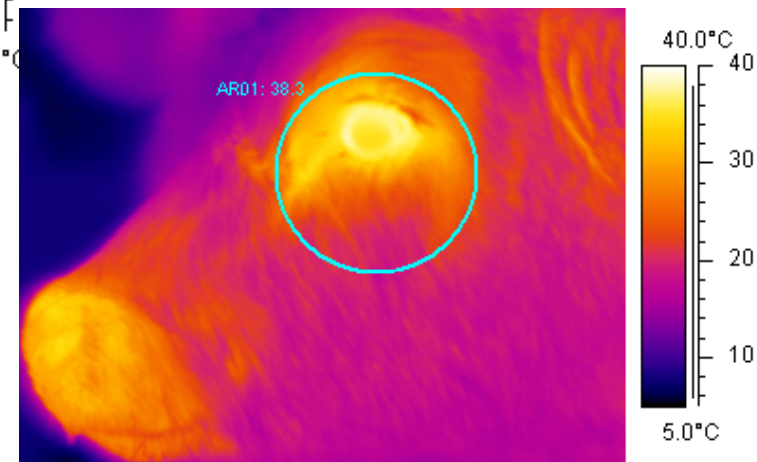


# Infrared thermographs of BRD Progression in Same Animal

**Day 4**



**Day 8**



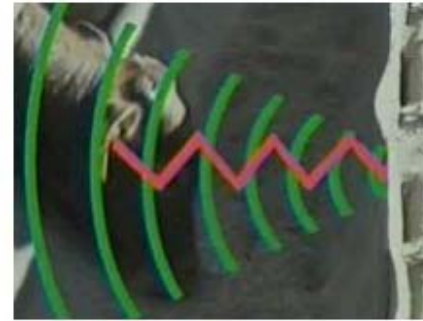
**35.1 C**

**37.7 C**

**38.4 C**



**Source – Dr. Al Schaefer, 2007**



Upon activation, transponder tag emits a signal to the antenna to identify the animal



Each time an animal drinks, GrowSafe technology measures growth and behavior.



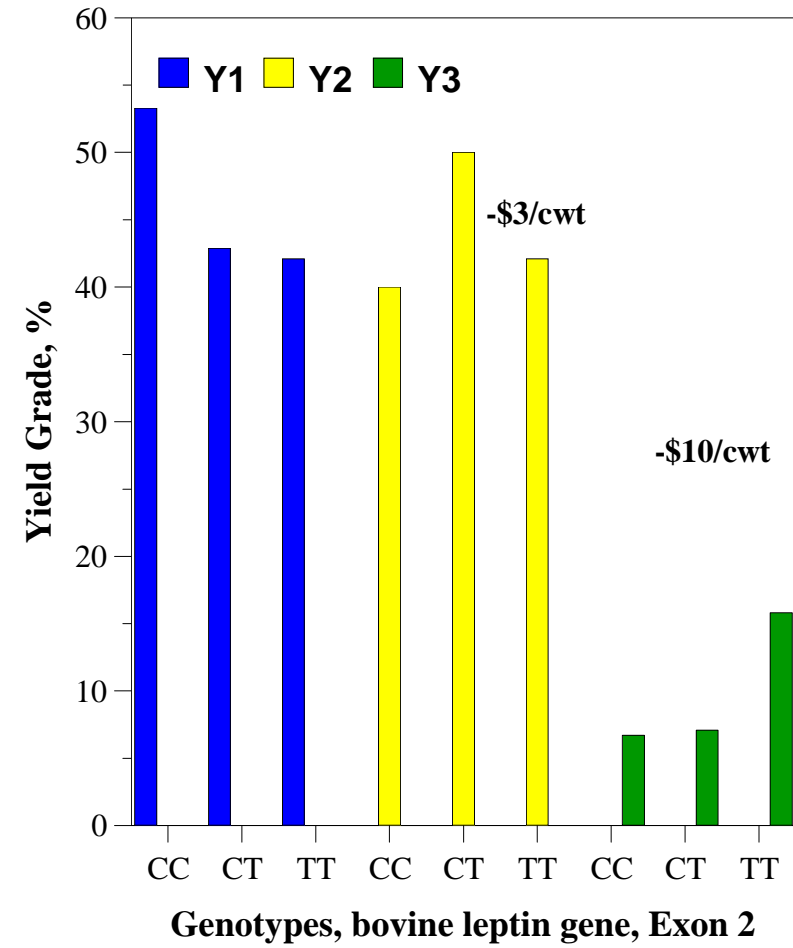
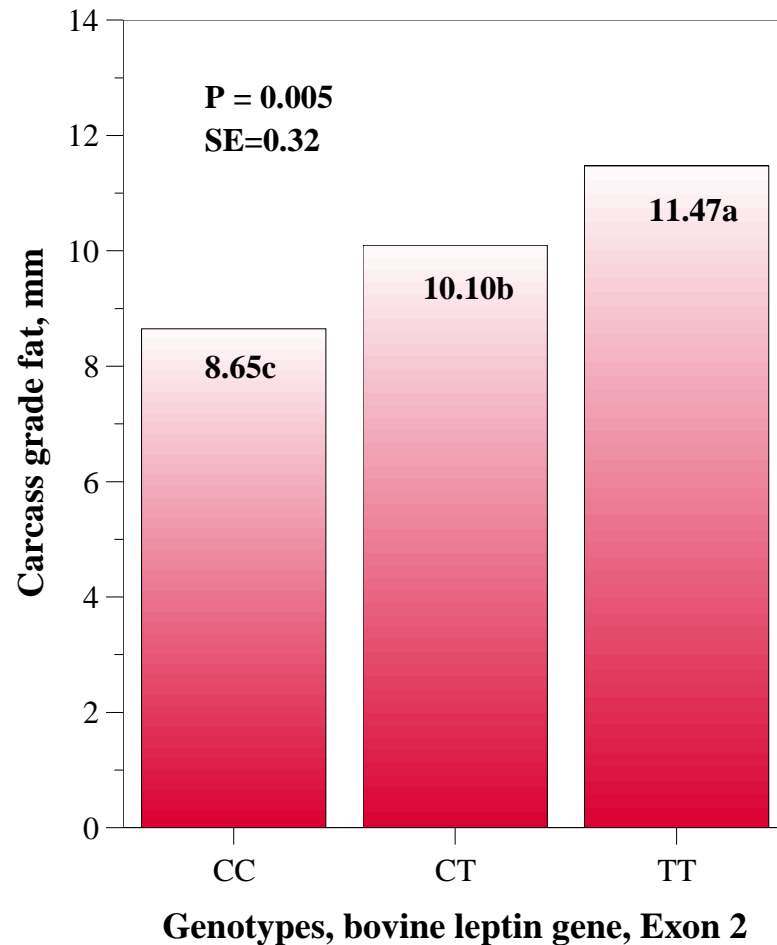
Measurement data is sent wireless up to 30 miles to the data acquisition computer.



# RFID/DNA based traceability systems For value added beef production



## Association of a single nucleotide polymorphism in the bovine leptin gene with carcass quality (Nkrumah et al 2004)






cytosine (C) to thymine (T) mutation; Amino Acid: arginine to cysteine; reported by Buchanan et al. 2002 in Genet. Sel Evol. No difference in carcass marbling and quality grade



## **Key points:**

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-  **RFID/DNA technologies will play a critical role in tracking individual animal and production system attributes**
-  **RFID/DNA technologies will continue to grow in the identification of feed efficient cattle**
-  **RFID/DNA will find an expanded role in the real-time monitoring of sickness, performance and prediction of slaughter end point.**