Use of RFID ear tags in dairy herd management in Canada

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Distribution of dairy cattle in Canada

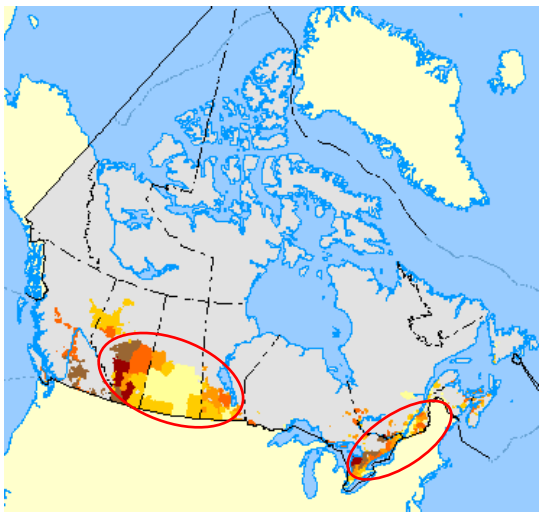
No. Dairy Cows: 988,500

Milk recorded: 706,957 74%

Breed registered: 252,645/yr

Total milk Liters 7.66 billion/yr

Distribution of beef cattle in Canada

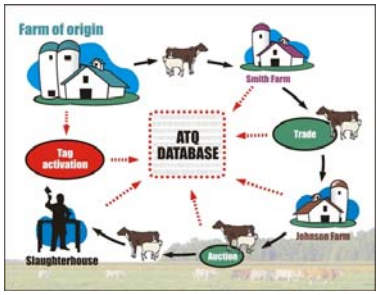


No. of Beef cattle in Canada: 10 million

Canadian Identification Tag System

- Since January, 2001 Canadian law requires that cattle must be identified with approved identification tags prior to leaving the farm of origin. Three agencies administer the system

- **Canadian Cattle Identification Agency (CCIA)**
  - Single tag – bar code and visual number least cost
  - ~10 million beef cattle
- **National Livestock Identification for Dairy (NLID)**
  - Dual tags for greater security
  - www.nlid.org
- **Agri-Traceabilite Quebec**
  - Full traceability birth to slaughter
  - Developed 2001-2005
  - RFID and visual tags
  - Cattle
  - Sheep
  - Deer
  - www.agri-tracabilite.qc.ca



Canadian RFID Tag System

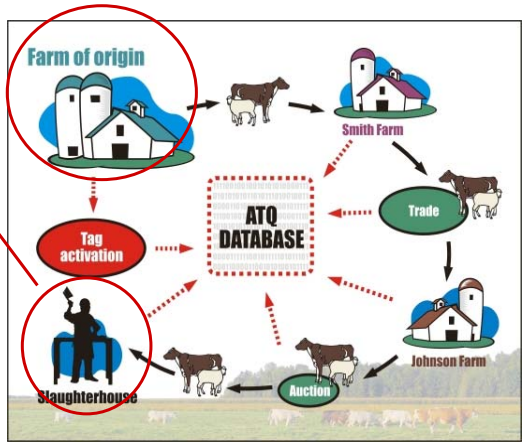
- Since January, 2004, only RFID tags have been sold as the approved identification in Canada
- CCIA single tag, competitive suppliers
- NLID – Dairy – Dual tag, Allflex Tags
- Animals are tagged at birth.
- Tags are retired at slaughter.
- Official tag once it is assigned to an animal cannot be replaced with a different number.

Canadian RFID Tag System

•National System presently only records Farm of Origin and death.

•Canadian DHI provides tracking for 74% of dairy cows.

•National system is moving toward the Quebec (province) system of full traceability.



Farmers will be much more positive towards tagging if they can use it effectively in on farm animal recognition and management

RFID Tag use in Dairy Herd Management

Pro:

- High level of compliance in the national dairy herd.
- Tag-sets are cheap - $5-6 CAD per animal

Con:

- Usefulness in management is limited as Companies tend to use proprietary equipment.
- Many commercial devices carry sensors that provide management information

RFID Tag use in Dairy Herd Management

- Automated calf feeding

- Proprietary tags not used in Canada
- Reduces investment in the system by $1000
- Saves the calf the effort of carrying a 350 gram transponder
- Lifetime ID, potentially beneficial for wider use of data

RFID Tag use in Dairy Herd Management

- Identification in the Milking Parlor, and sort lanes etc.
- Only one company (DairyMaster) relies upon RFID tags for identification

CHALLENGE:

Herds from 1000 milking cows and larger in USA

RFID System for herd management is accepted practice.

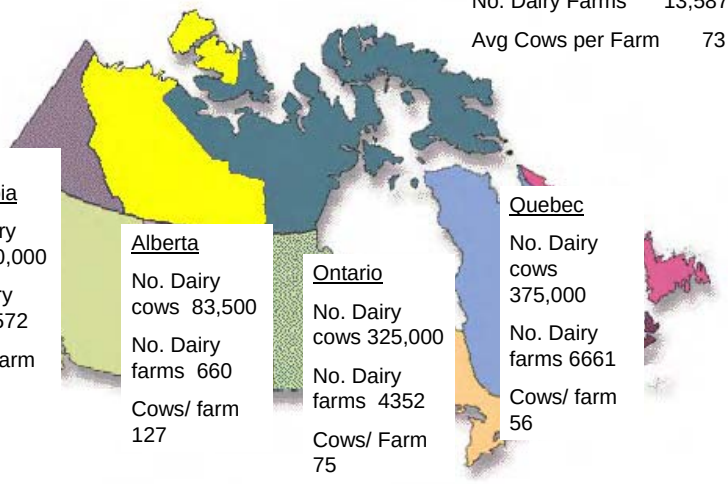
Headlock herds

Canada

Total Dairy Cows 988,500

No. Dairy Farms 13,587

Avg Cows per Farm 73



British Columbia

No. Dairy cows 70,000

No. dairy farms 572

Cows/ farm 122

Alberta

No. Dairy cows 83,500

No. Dairy farms 660

Cows/ farm 127

Ontario

No. Dairy cows 325,000

No. Dairy farms 4352

Cows/ Farm 75

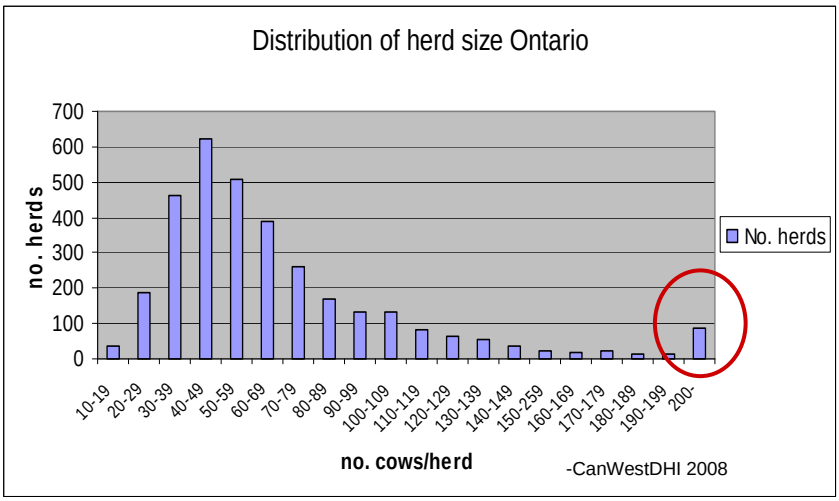
Quebec

No. Dairy cows 375,000

No. Dairy farms 6661

Cows/ farm 56

Question: Can we practically use RFID tags and software for profitable herd management in Canada?



Pilot Project:
Use of RFID in Dairy Herd management

Objective:

- To determine how RFID technology can be used in dairy herds for improved herd management, labour efficiency, treatment accuracy and traceability, in dairy herds of less than 800 cows housed in freestall barns

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2 Trial herds:

- Headlock: 325 milking cows, 250 young stock
- Management rail with sort gates: 540 milking cows, 670 young stock, veal calves

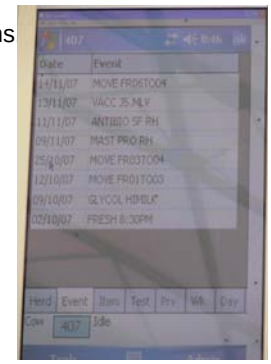
Software

Dairy Comp 305 herd management software.

- Developed and owned by Valley Ag Software (VAS)
- Marketed in Canada by CanWestDHI which provides milk recording services to Ontario and Western Canada.
- I/O software used by CanWestDHI staff on farms

Upgrades:

- Pocket Cow Card option for pda application
- RFID and wireless bluetooth communication



Hardware

- Allflex RFID wand and Dell Axim/HP Ipac handheld computer

- Psion all in one datalogger and RFID wand

- Important features to both systems:
  - Wireless communication
  - Audio messages
  - Download/upload with docking station

Tag Issues

- Tag Placement
  - Retention and avoid loss
  - Ease of reading
- Right ear or Left ear?
- All tags in a herd must be in the same ear
- Very Important to avoid mis-reads, or mis-identification

Temporary Tag

Tags for Management Purposes require 100% Compliance.

Immediate replacement in herd – use while waiting for replacement tag

Low cost, Re-usable

Approved by national agency

Re-program herd computer for interim herd ID

Time Study of Headlock Herd Before and After Adopting RFID Technology

- Learning what does NOT work
- Overcrowding: there were up to 20% more cows than headlocks

Time Study of Headlock Herd Before and After Adopting RFID Technology

- Learning what does **NOT** work
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Capturing ID of Loose cows with a wand is :

Time consuming

Frustrating work

Time Study of Headlock Herd Before and After Adopting RFID Technology

- Introduction of RFID technology was considered not a success with this farm.
- Overcrowding: there were up to 20% more cows than headlocks.
- Herdsman's routine was such that he conducted all procedures himself. Balancing the wand, ovsynch protocol, giving injections, changing needles slowed his progress.
- Time gained in rapid download of lists from computer and in uploading data were balanced out by increased time required to deal with procedures.
- The cows spent a lot of time tied up in this herd, suggesting that steps that could reduce this would improve cow welfare

Table 2b

Time Study of Headlock Herd Before and After Adopting RFID Technology

				Time in Headlock (min)	
RFID	No. observations[1]	Avg No. Treated Cows	No. Cows in Headlock	Total	per treated cow
— Lutalyse/GnRH Treatment —					
Pre	3	45	250	81	1.80
Post	2	45	250	90	2.00
—Dry Cow Vaccination —					
Pre	4	24	49	32	1.33
Post	2	57	65	120	2.11
—Milk Cow Vaccination —					
Pre	1	27	250	150	5.56
Post	2	40	250	105	2.63
— Herd Health Veterinary Visit —					
Pre	2	39	250	128	3.28
Post	2	49	250	165	3.37

[1] No. of observations = Number of days that the cow management routine was observed and recorded

Management Rail Herd

Benefits reported

- With audio prompts, possible to combine treatments on a single sort
  - Saved time for the operator
  - Cows had fewer sorts and less time away from the herd

eg. Combining lutelase injection and vaccinations into a single activity eliminated 1 day per week of sorting.

-Event recording changed form paper list entered later to direct entry in the handheld and uploading to the farm computer via a docking station.
Data entry for 90 cow events decreased from 30 minutes to 3 minutes!

-Faster identification and recording reduced the time required for biweekly veterinary herd health visits by 20% (23 minutes) .....Vets in Canada charge $100 per hour !! (The vet would like headphones too)

Table 1.
Time Study of Management Rail Herd Before and After Adopting RFID Technology

RFID	No. observations[1]	Avg No. Treated Cows	Time in Mgt Rail (min) Total	Time in Mgt Rail (min) per cow	Time Per Cow Treated (min) Make List	Time Per Cow Treated (min) Treatment	Time Per Cow Treated (min) Record Data
— Lutalyse/Fertiline Treatment —							
Pre	5	30	28.40	1.04	0.09	0.84	0.18
Post	2	12	3.95	0.35	0.02	0.31	0.02
— Vaccination —							
Pre	2	16	27.00	1.94	0.23	1.52	0.13
Post	1	24	11.20	0.47	0.01	0.46	0.01
— Herd Health Veterinary Visit —							
Pre	1	114	120.00	1.33	0.07	1.27	0.32
Post	1	91	92.00	0.93	0.01	0.92	0.03

[1] No. of observations = Number of days that the cow management routine was observed and recorded

Cost Benefit

Costs:

- Hardware handheld computer plus RFID wand $2200
- Upgrade software $ 685
- Training Time 5 hours @$15 $ 75
- Temporary neck straps 3@$15 $ 45
- Total Cost to owner $2905

Benefits – time savings:

- Operator labour saving 1hour/week $780/yr
- Veterinary time 0.4 hours every 2 weeks $1040/yr
- Total Saving $1820/yr

Cost Benefit

- Yearly benefit of RFID system $1820
- Minus yearly support costs $ 300
- Net benefit per year $1520
- Payback = $2905/1520 = 1.9 years
- Other less tangible benefits:
  - Accuracy of identification, accuracy of treatments,
  - improvement of reproduction protocols,
  - operator safety,
  - applications in foot trimming, recorded weights and treatments of veal calves

Other uses for RFID system

Veterinary checks

Veterinary college research

Hoof trimming records

Calf Weights

Pen moves

Follow-up Surveys

- Follow-up surveys have been conducted on 2 herds since the pilot study was completed.
- Herds were 425 – 450 cows in a management rail system.
- Advantages:
  - Accuracy of identifying cows
  - Decrease in paper records
  - Access to data anywhere in barn
- Time Savings:
  - Making lists for treatments
  - Transcribing data to computer
  - Reduced treatment time
  - Reduced holding time in management rail

Key factors identified as critical to the success of adoption of this technology were:

- Attitude of herdsman toward use of the technology and integrate it into the working routine.
- Ability to change routines to take full advantage of the RFID technology.
- In headlock management systems there cannot be any overcrowding.
- All cows must have an RFID button ear tag at all times. In the Canadian dairy system that means equipping the cow with a temporary tag until a replacement tag is obtained.

Summary

- Improved efficiency in management rail herds that was not expected
- Critical herd size appears to be 300 – 400 cows
  - Larger than 400 cows (+) potential
  - Smaller than 300 cows (-) potential
- Human issues are very important
- Unmeasured Factors:
  - Error rate reduced to near zero!
  - Allows innovative use of database and ID equipment
  - Operator Safety

Acknowledgements

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Thank You !

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