



ALMA
Alberta Livestock & Meat Agency Ltd.



Agriculture et
Agroalimentaire Canada

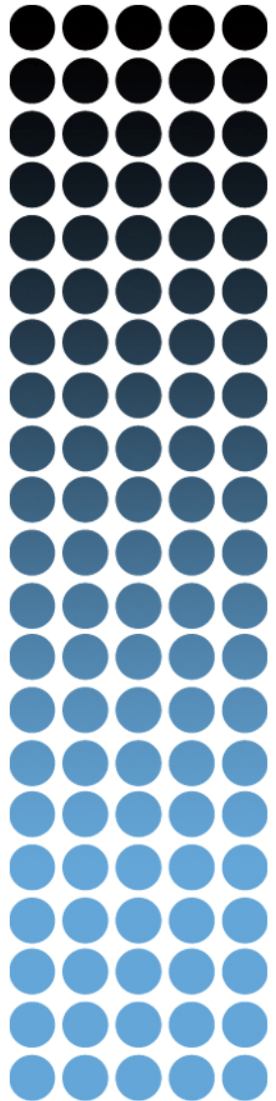
Government of Alberta ■

Canadian Bovine Genomics Workshop

September 14, 2009

Calgary, Alberta

Genomics in Beef Today – a vision of genomics from farm to fork



IdentiGEN

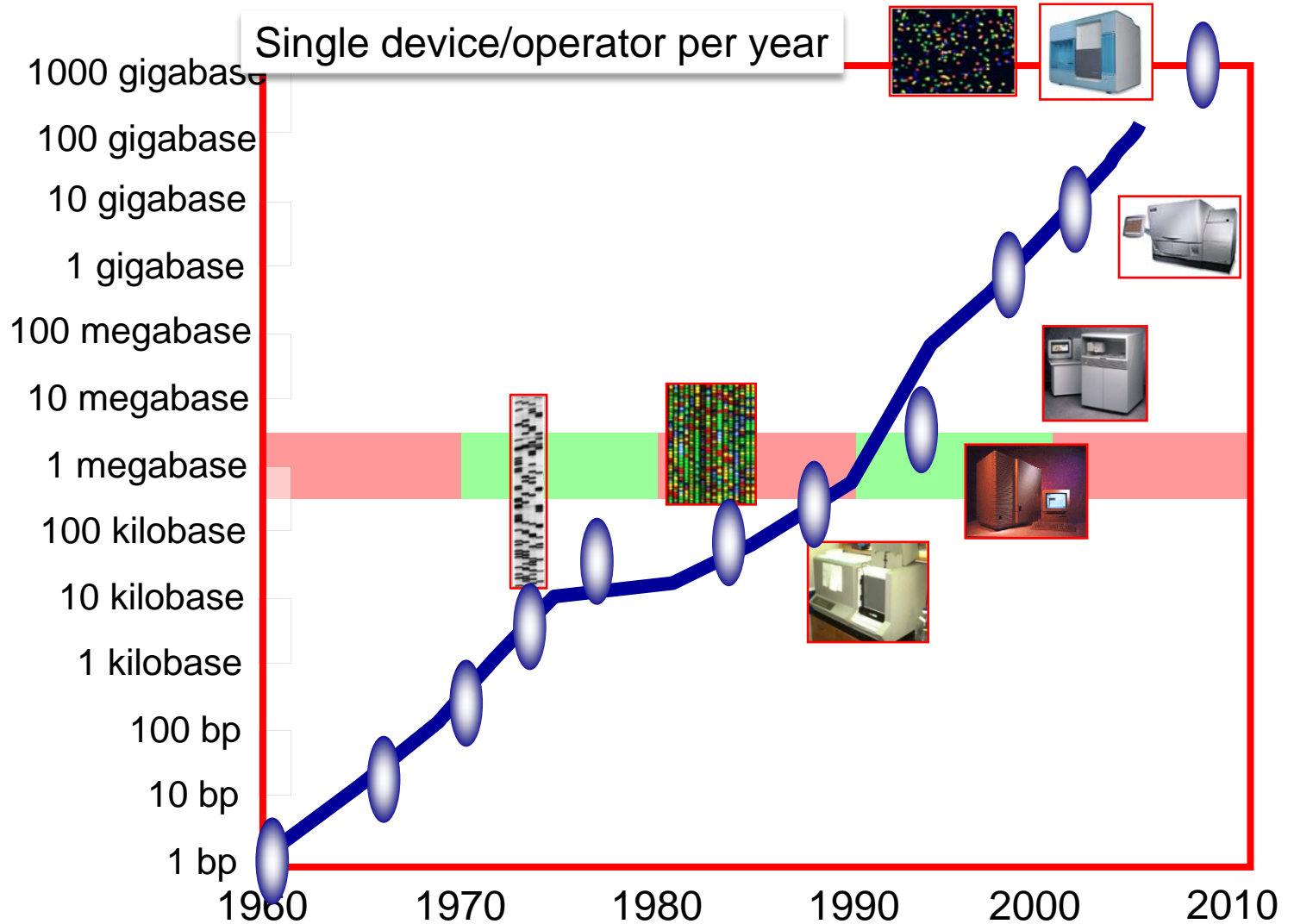
Ronan Loftus – IdentiGEN
Canadian Bovine Genomics Workshop
Calgary – Sept '09

Introduction to IdentiGEN

- **Established in 1996** – operations in 3 countries
 - Europe HQ – Dublin, Ireland
 - UK Operations – Newport, Wales
 - US – Lawrence, Kansas
 - Strategic Partners in Asian Markets
- **Product areas**
 - ‘Worlds first’ DNA based traceability system for meat
 - Diagnostics – BSE, Food & Feed
- **Market focus**
 - Technology neutral (within limitations!)
 - Commitment to delivering value
 - Detailed Industry knowledge
- **New product development**
 - In-house R&D
 - Partnering with academic & research institutions



Moore's Law for genomics: DNA sequencing capacity doubling time ~15 months

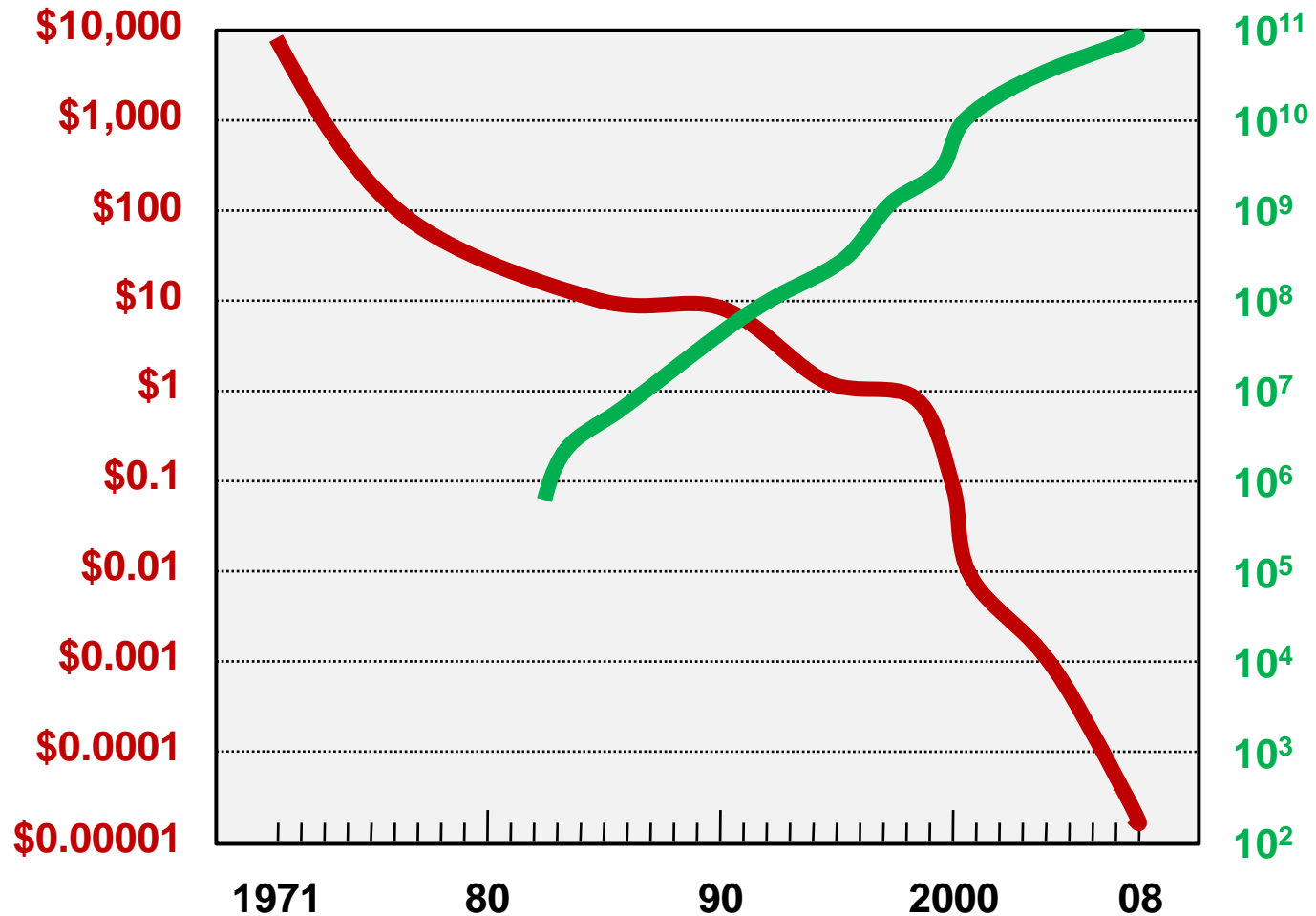


DNA sequencing costs and the growth of DNA sequence data



Sequencing cost per base pair (bp)

Growth in GenBank DNA sequence data (bp)

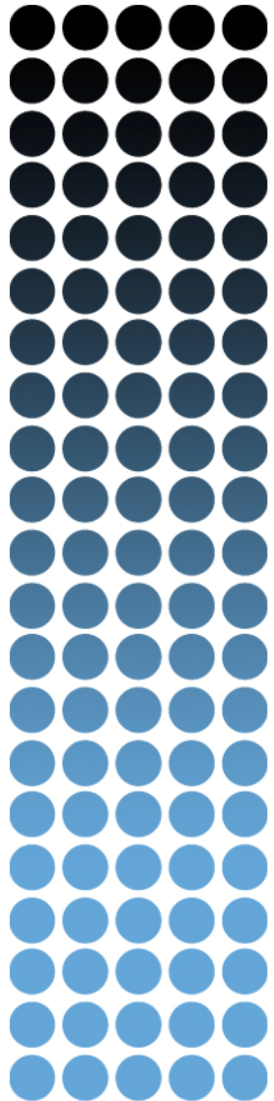


Genomics: Potential Roles



- **Breeding and Selection**
 - Parentage & Performance testing of breeding stock
 - DNA based selection of economically important traits
 - Environmentally-sensitive traits (e.g. methane production)
 - Behavioural traits (e.g. docility and pain sensitivity)
 - Nutritional traits (e.g. milk and meat composition)
 - Animal health traits (e.g. disease resistance)
 - Genomic information for crossbreeding and heterosis
 - Segregation of animals based on desirable attributes
- **Genetic Modification**
 - Transgenics
 - Cloning
 - Engineering rumen micro-flora
- **Food Quality & Consumer Confidence**
 - Animal & breed identity/ authenticity
 - Product traceability & Consumer Confidence

Genomics: Potential Roles



What is traceability?

- Definition “... the capacity for establishing a products origin, process history, use and provenance by reference to written records...” (ISO 8402)
 - Breadth – amount of information covered e.g. animal feed, veterinary care, breed, age...
 - Depth or scope – how far back system tracks e.g. to the animal, farm, slaughter plant, country...
 - Precision – degree of certitude required...
 - Tracking unit e.g. animal code, boning batch code, retail packing batch code...
- Key components of traceability systems
 - Product identification
 - Information recording
 - Movement recording
 - Verification systems



Traceability – Why?



- Building consumer trust!
 - Consumer confidence - Effective traceability as a proxy for quality, safety,...
 - Consumer preference - Credence Attributes (Age verification, Angus, Product of Alberta...)
- International Trade
 - Many markets are increasingly demanding whole chain traceability
- Crisis Management
 - Identify the source of a problem
 - Limit the scope of a crisis - recall
 - Provide confidence that problem can be effectively managed
- Brand Management & Differentiation
 - Tools to support marketing claims
- Value chain alignment
 - Effectively communicating signals along the value chain

Traceability & Consumer confidence



Hen House - US retailer



Pedigree – UK Pet food



McDonalds - Ireland



Tesco/Homeplus - Korea retailer

International Trade



Europe – traceability mandatory
Brazilian export ban due to lack of traceability



Japan – traceability mandatory
Key focus of New Administration?



Korea – traceability mandatory
DNA Sampling for cattle mandatory



“The announcement by South Korea reinforces the message that the U.S. industry needs to move forward with a traceability program if it is serious about remaining competitive in the international marketplace,”



Crisis Management



Jan '08 - U.S. Department of Agriculture announced the largest beef recall in its history ~ 150 million Lbs

Irish Dioxin Crisis (Dec '08)

Pork – 10 farms involved

3 months pork production recalled

\$250 million government support

Beef – 50 farms involved

Minimized recall

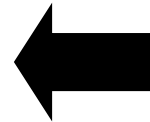
Industry reputation & damage limited



The traceability challenge!



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**Domestic
Retail**



Export



Foodservice



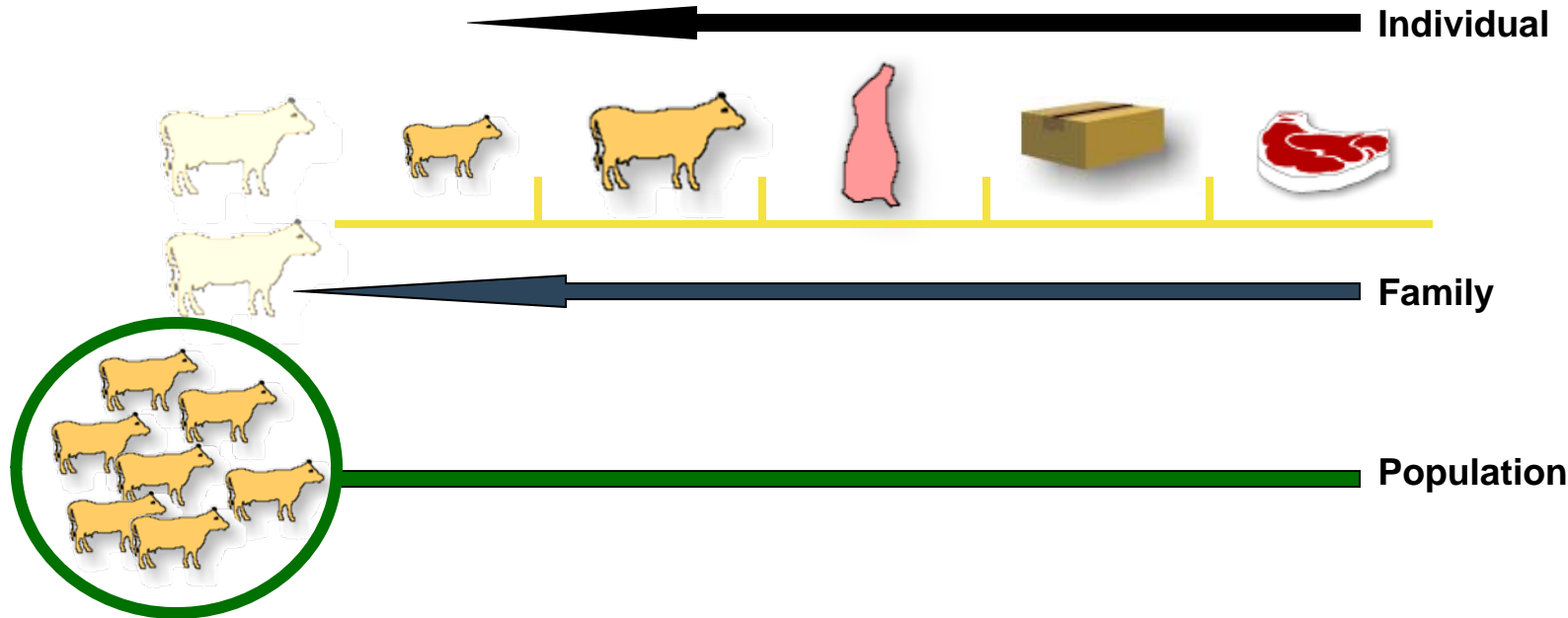
Consumer Perception

How can genomics help?

- DNA for identification & tracing
- DNA as an identifier
 - Tamper proof, accurate & permanent
 - Scope - full supply chain
- Operational Requirements
 - Sample collection
 - DNA analysis
 - Regular Reporting
- Key Features
 - **Guaranteed** traceability to the animal/herd of origin
 - **Proven Technology** – implemented in 7 countries
 - No modification to existing production practices
 - No legacy infrastructure – low cost of ownership



DNA Traceability concepts



1. Traceability to the individual of origin	Higher	Higher	Lower
Comparison of meat & individual animal profiles	↑	↑	↓
2. Traceability to the family of origin			
Comparison of meat & sire/dam profiles			
3. Traceability to a population of origin	Lower	Lower	Higher
Comparison of meat to population profile			
	Precision	Price/ Head	Test Complexity

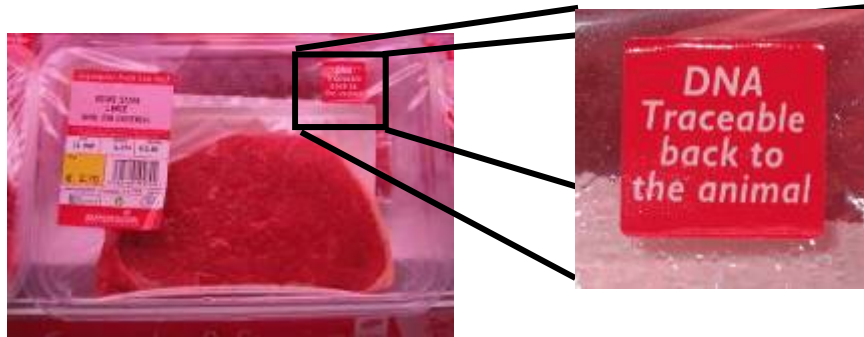
Technology Requirements



- DNA Sampling solutions
 - Integrated
 - Amenable to field use – speed of commerce
 - Capture sample of sufficient quality & quantity for analysis
 - Associated with animal/product ID
 - Amenable to laboratory automation & analysis
 - Low-cost
- IT Infrastructure
 - Interoperable
 - Capable of managing supply chain complexity (post harvest!)
 - Integrate with LIMS systems
- DNA Analysis
 - Sufficiently powerful & robust - ‘fit for purpose’
 - Very low cost – sample receipt to result generation
 - High-throughput & automated
 - Sufficiently flexible to accommodate different query types

DNA Traceability & the Consumer

- DNA is widely recognized by consumers
- Associations with incontrovertible, scientific & independence
- Creates opportunities to build consumer brands



TESCO
Irish Beef
Sirloin steak

This beef is traceable to animals of origin
Matured for 21 Days

QUALITY ASSURANCE SCHEME BORD BIA ORIGIN-IRELAND

DNA TraceBack

Serves 10

A typical sirloin steak fried then trimmed of fat contains

Calories	Sugar	Fat	Saturates	Salt
321	0.2g	7.5g	3.0g	0.5g
16%	<1%	11%	15%	9%

of your guideline daily amount.

Confirms our Beef comes from approved suppliers only

Fully traceable to animals of origin

Trusting Our Traceability

At Dunnes we know how important the quality and safety of beef is to our customers. That's why we promise that all our beef is sourced from approved Irish farms and with our DNA Traceback programme we can scientifically guarantee the origin of every single cut of our beef, tracing it back to the original animal from our selected farms.

- Guaranteed Safety
- Guaranteed Quality
- Guaranteed origin from approved farms

traceback

Guaranteed Reassurance



Benefits of a DNA Approach

- The ultimate product identifier
 - Scope - Span the full meat-chain birth to final product
 - Works with cooked products
 - Precision – Potential to trace meat back to the animal/farm of origin
 - Accuracy - Trace products as distinct from associated labels which are subject to error/fraud
- Low-cost of entry – Doesn't require any up-front capital expenditure, 'plug-n'-play'
- Consumer Marketing – DNA is understood by many consumers making it a potentially effective marketing tool
- International trade – sends strong signal on supply chain integrity
- Potential for Value-Add – can integrate other DNA services
 - Parentage
 - Value chain alignment



Perspectives – Regional/ National Programs

- Key challenge is not technological but market related
- Gain stakeholder buy-in
 - Commercial proof of concept - Demonstrate the value!
- Define objectives
 - Market/brand protection - domestic
 - Market access – (technical Vs commercial)
 - Consumer confidence
 - Value chain alignment
- Operational model to take account of different stakeholder needs
- Potential to form a critical component of the ‘value chain’ concept





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Thank You



www.identigen.com

For further information please contact rloftus@identigen.com