



AgBio Applications

Richard A. Vierling, Ph.D.

Indiana Crop Improvement & Purdue University

vierling@indianacrop.org

Who We Are

**Official State Agency administered by
Purdue Agricultural Research Programs.**

**Largest agricultural, public genetics testing laboratory in the
country.**

Over 200 partner companies worldwide.

Contract testing.

Contract and joint research.

Continuing education and training programs.

Grant funded research.

Since 1900.

Production Systems

Commodity

Parity products, lowest price wins

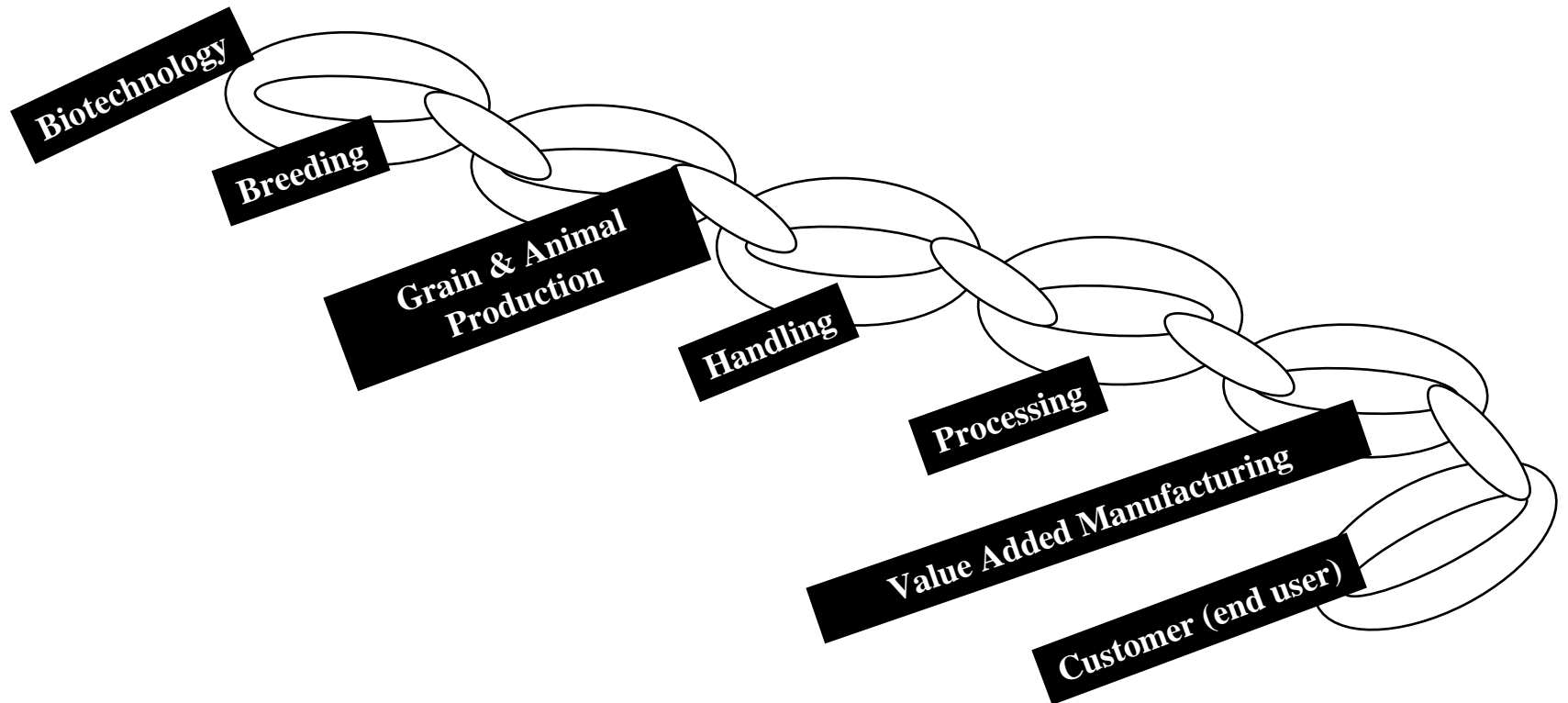
Identity Preserved

Tracking a specific attribute



Value Added Chain

Identity preserved (IP) refers to the maintenance of a product's specific traits or characteristics through breeding, production, transportation, handling, processing and marketing channels. Products are identity preserved because they have specific attributes with increased value compared with commodities.



Biotechnology

- 1. Nucleic acid detection**
- 2. mRNA expression**
- 3. Protein quantification**

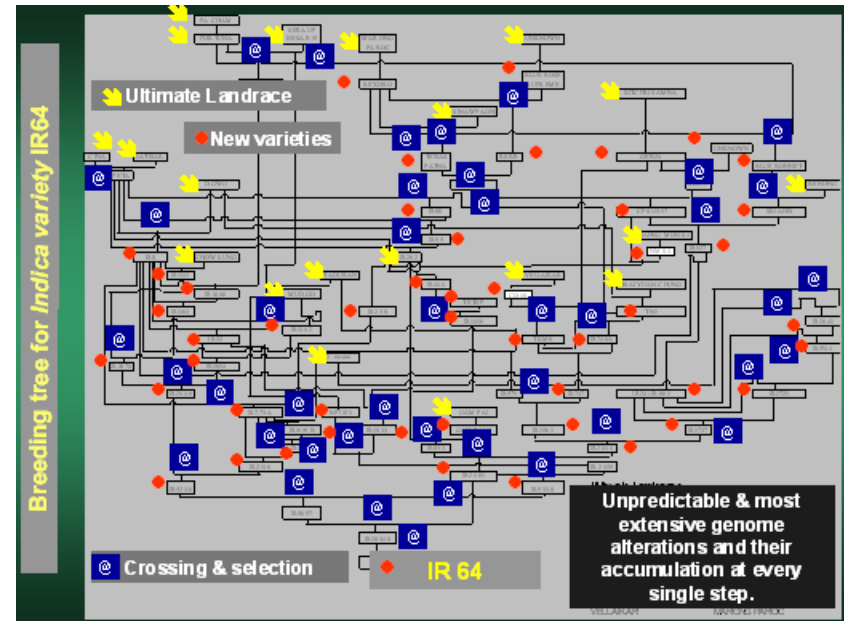
Breeding

Association and Trait Mapping

Genome-wide commodity markers

Selection

Value-added markers



Production

Quality Control

Correct genetics



Pathology Screening

Corrective actions

Remove from population



Handling & Processing

Correct Genetics

Food Safety



Microbial Testing on Food

- Batches
- Process control
- Investigational sampling
- Surveillance



What We Are Currently Doing

We use 96 well plates and liquid handling for ELISA assays. Single and two-plex now.

PCR for molecular markers and transgenes. Three-plex is the largest we do.

What Do I See in the Future For Ag

I see the majority of the assays we will run will be nucleic acid (SNP) based and not antibody.

Detection is no longer satisfactory, characterization is essential.

How I Evaluate Technology Platforms

- Accuracy
- Flexibility
- Speed
- Cost per data point
- Set up cost

Multiplexed oligonucleotide pairs (MOL pairs): Overview, what they are and how they work

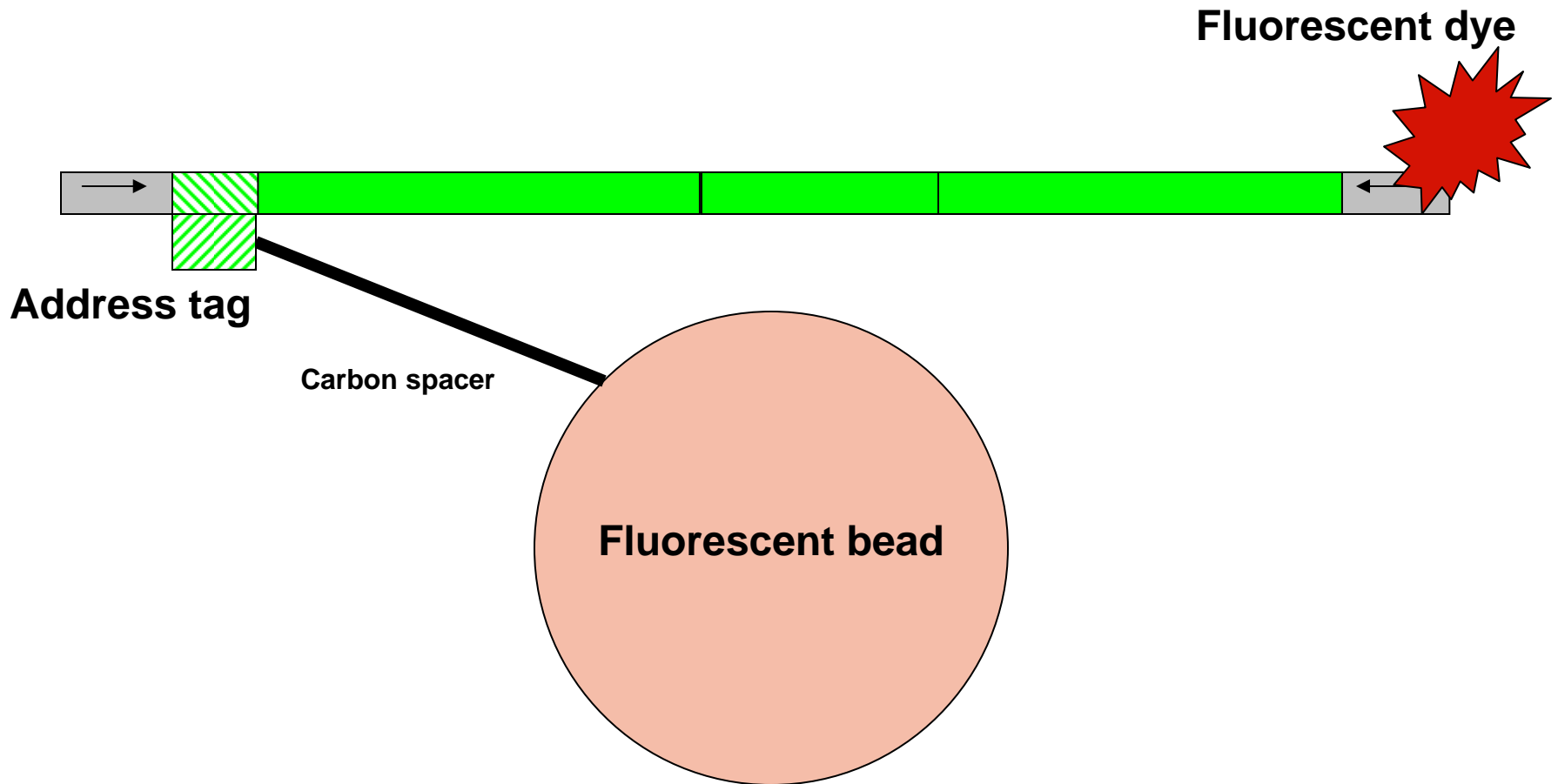
Step 3. PCR amplification products are captured onto beads using unique capture tag sequences. The capture tag sequences and homologous bead address tags are unique for each marker.

...temperature to the target DNA and then ligated, which causes fewer errors. The allele call is therefore done on the target DNA prior to PCR.



Step 2. PCR amplification of all markers is accomplished with the same forward and reverse PCR primer sites. This allows for greater multiplexing since PCR amplification of all markers regardless of target sequences are performed using a single optimum condition. The PCR 2 primers are fluorescently labeled.

Multiplexed oligonucleotide pairs (MOL pairs): Overview, what they are and how they work



xMAP Technology Platform and MOL-PCR

- **Accuracy-** MOL-PCR uses ligase for discrimination, not PCR or hybridization
- **Flexibility-** xMAP beads allow customization of assays, xMAP tags allow for markers to easily be added or dropped from assays
- **Speed-** high throughput of multiplexed assays on Luminex machine
- **Cost-** low cost per data point by multiplexing

What I Worry About

The cost of raw materials

I would like flexibility on number of beads in a given set that I can order

Dist. by Universal Uclick, Florida 32801-4000

 © 2005 WALT DISNEY CO., INC.



GO.COMICS.COM/HOUSEOFMICE

WALT DISNEY EARTHLINE.NET