



# DNA Technologies from IGENITY

Practical Applications for  
Real World Producers



Nothing improves confidence like inside information.



# Merial Company Overview

- Established in 1997
- 17 Research and Development Centers
- 16 Manufacturing Sites
- Sales Presence in 150 Countries
- 5,000 Employees Worldwide
- Merial Ltd. is a joint venture between Merck & Co., Inc. and sanofi-aventis.



# The Brand



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# Why did .....

- USDA spend \$50 M on this cow?...



- Cargill collaborate with MMI?....



# IGENITY® Products

- IGENITY DoubleBLACK™
- IGENITY TenderGENE™
- IGENITY OptiGRID™
- IGENITY ParentMATCH™ MultiSIRE

**IGENITY  
MultiMARK™**



# IGENITY DoubleBLACK

An accurate, inexpensive coat-color test:

- Determines if an animal is homozygous black
- A homozygous black bull can be worth as much as \$800 more over his lifetime versus a heterozygous black bull when mated to red cows.



# IGENITY DoubleBLACK

## Value Proposition

- \$3 to \$5 per cwt. premium
- 100 progeny weaned in bull's lifetime
- Sell 80 calves @ \$20 premium (500 lbs.@ \$4/cwt.) = **\$1600**

	Homozygous Black Bulls	Red Carrier Bulls
Homozygous Black Cows	100% black calves <b>\$1600</b>	100% black calves <b>\$1600</b>
Red Carrier Cows	100% black calves <b>\$1600</b>	75% black calves <b>\$1200</b>
Red Cows	100% black calves <b>\$1600</b>	50% black calves <b>\$800</b>



# The New...

# IGENITY TenderGENE



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# IGENITY TenderGENE

## Three SNPs:

- **CAPN316:** Developed by U.S. Meat Animal Research Center (MARC). First released in 2003
- **CAPN4751:** Developed by MARC. Released in 2005
- **UoG-CAST1:** Developed by University of Guelph (Ontario, Canada). Released in 2005.



# Calpastatin and Calpain

## Both Are Important

- **Calpain**: Enzyme that weakens muscle fibers during the post-mortem aging process.
- **Calpastatin**: Enzyme that regulates the activity of Calpain.

Markers	WBSF	Pct. of Total
CAPN316 and CAPN4751	-1.44 lb	63%
UoGCAST	-0.83 lb	37%
<b>Total</b>	<b>-2.27 lb</b>	

# GENITY TenderGENE Scores

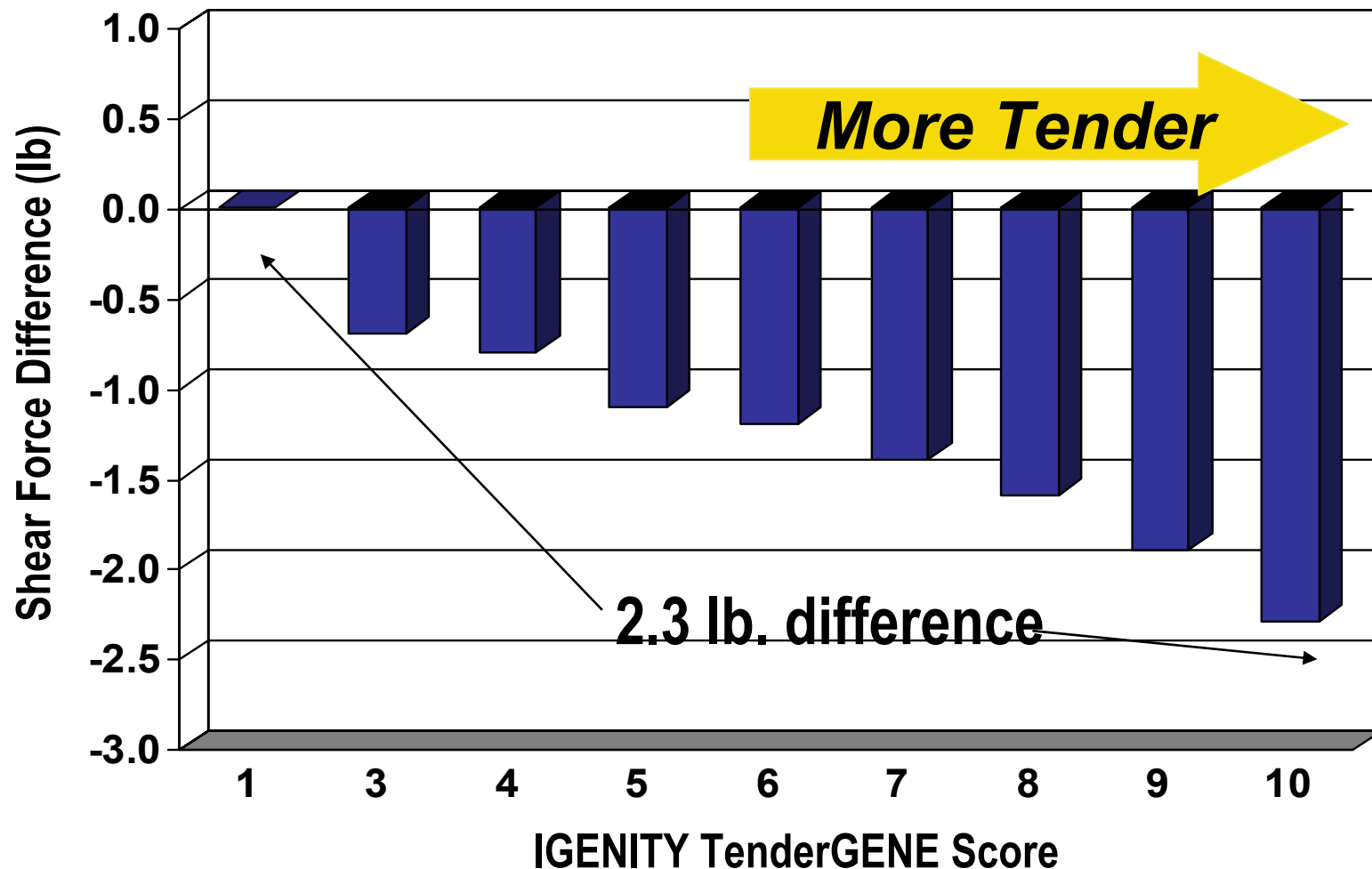
Score	Genotype			WBSF Effect
	UoG-CAST1	CAPN316	CAPN4751	
10	CC	CC	CC	-2.27
9	CC	CG	CC	-1.95
8	CG	CC	CC	-1.85
7	CC	GG	CC	-1.63
7	CC	CC	CT	-1.55
7	CC	CG	CT	-1.55
7	CG	CG	CC	-1.53
7	GG	CC	CC	-1.44
6	CC	GG	CT	-1.23
6	CG	GG	CC	-1.21
5	CG	CC	CT	-1.13
5	CG	CG	CT	-1.13
5	GG	CG	CC	-1.11
4	CC	CC	TT	-0.83
4	CC	CG	TT	-0.83
4	CC	GG	TT	-0.83
4	CG	GG	CT	-0.81
4	GG	GG	CC	-0.79
4	GG	CC	CT	-0.72
4	GG	CG	CT	-0.72
3	CG	CC	TT	-0.42
3	CG	CG	TT	-0.42
3	CG	GG	TT	-0.42
3	GG	GG	CT	-0.40
1	GG	CC	TT	0.00
1	GG	CG	TT	0.00
1	GG	GG	TT	0.00

Genotypes in the shaded areas are rare. The assigned score is based on the best estimate of the tenderness value of this genotype given the information available today. The score for this genotype is subject to change as more information is obtained.



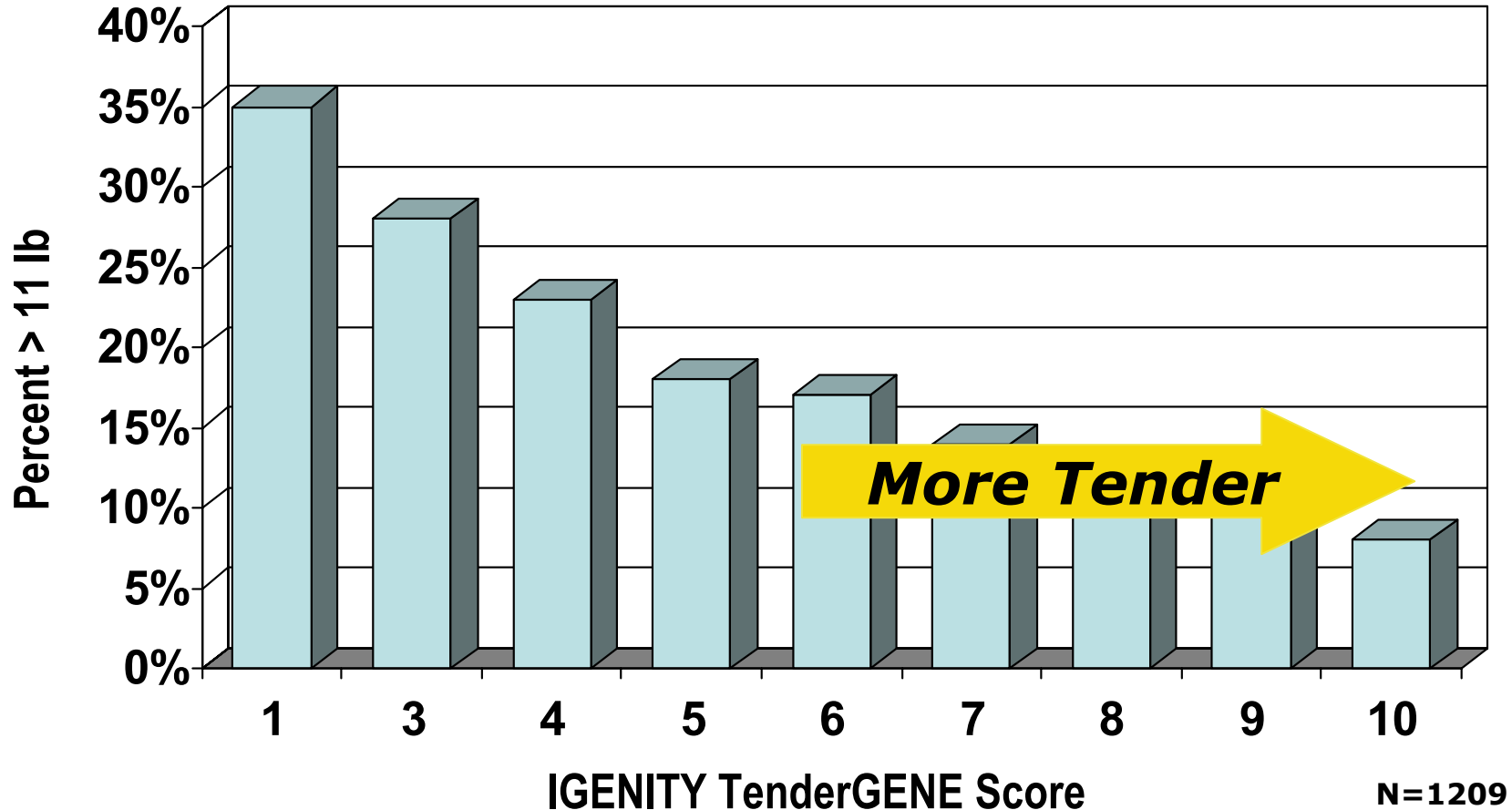
# WBSF vs. IGENITY TenderGENE Score

Red Angus, Charolais X Angus, Brangus, Brahman N=1209



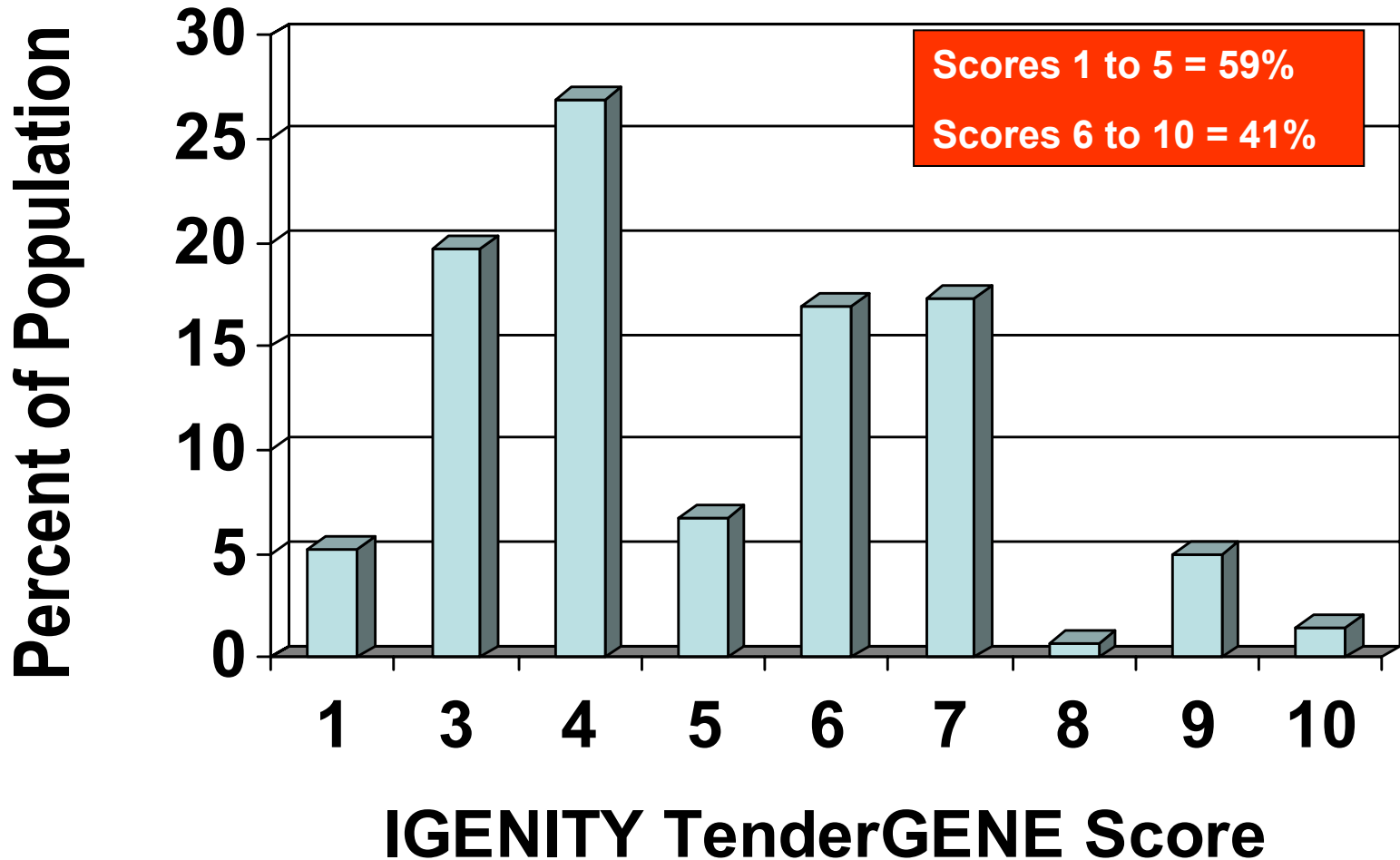
# Percent > 11 Pounds WBSF

When Population average = 9 lb



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# IGENITY TenderGENE Distribution



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# IGENITY TenderGENE

## Allele Frequencies by Breed

		UoG CAST1 (%)		CALP 316 (%)		CALP 4751 (%)	
Breed	No.	C	G	C	G	C	T
Char. X Ang.	339	79	21	23	77	46	54
Red Angus	307	74	26	23	77	47	53
Brangus	219	79	21	18	82	55	45
Brahman	344	43	57	1	99	8	92

Data derived from NBCEC Validation, Nov. 2005



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# IGENITY OptiGRID

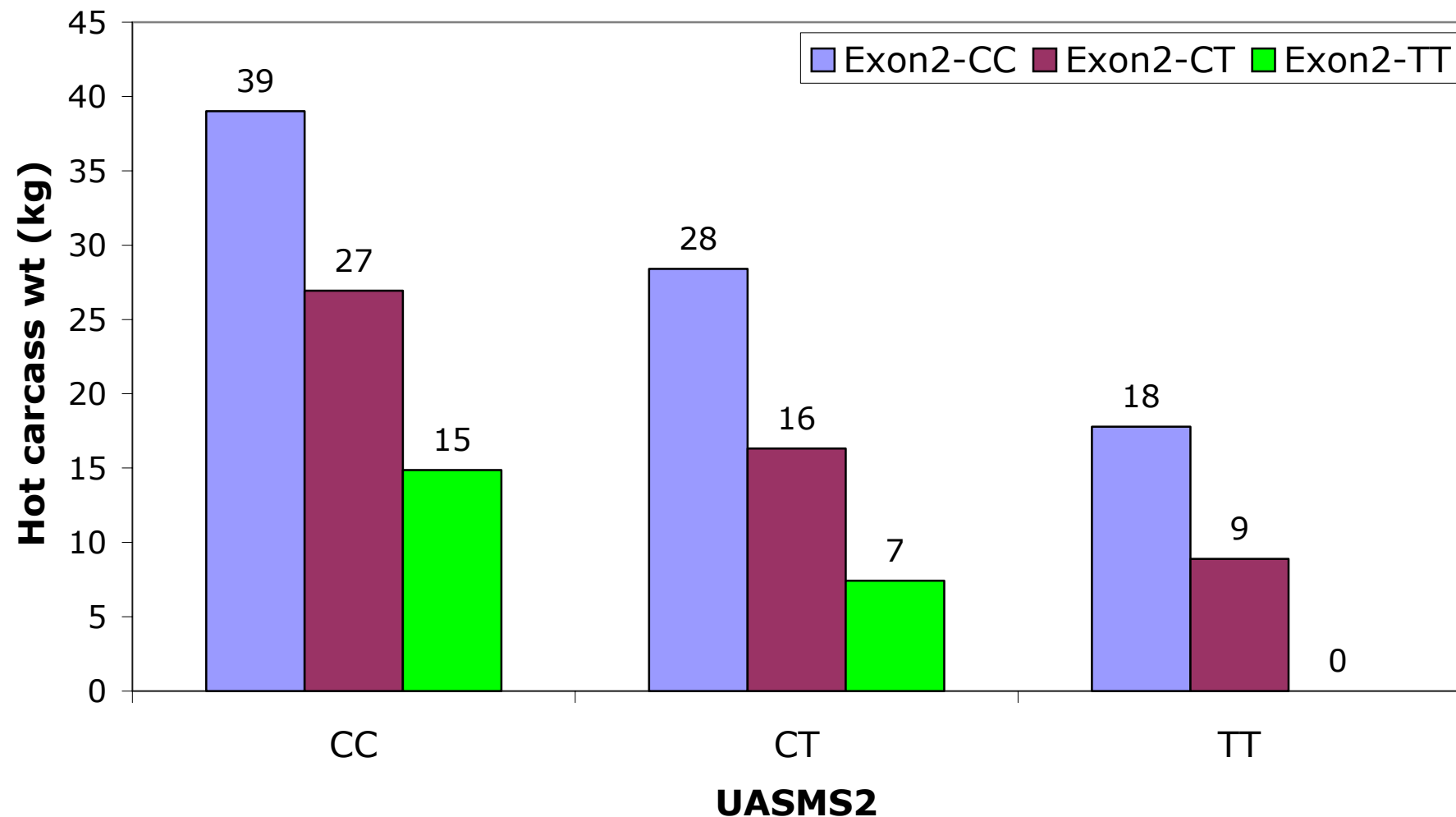
- A multiple marker analysis
- Relationship to Carcass Traits
  - Yield Grade - 1.1
  - Fat Thickness - .23 in.
  - Hot Carcass Weight - 86 lb.
  - Ribeye Area – 2.0 sq. in.
- Each trait is scored 1 to 10

**Marker-Assisted  
Management**

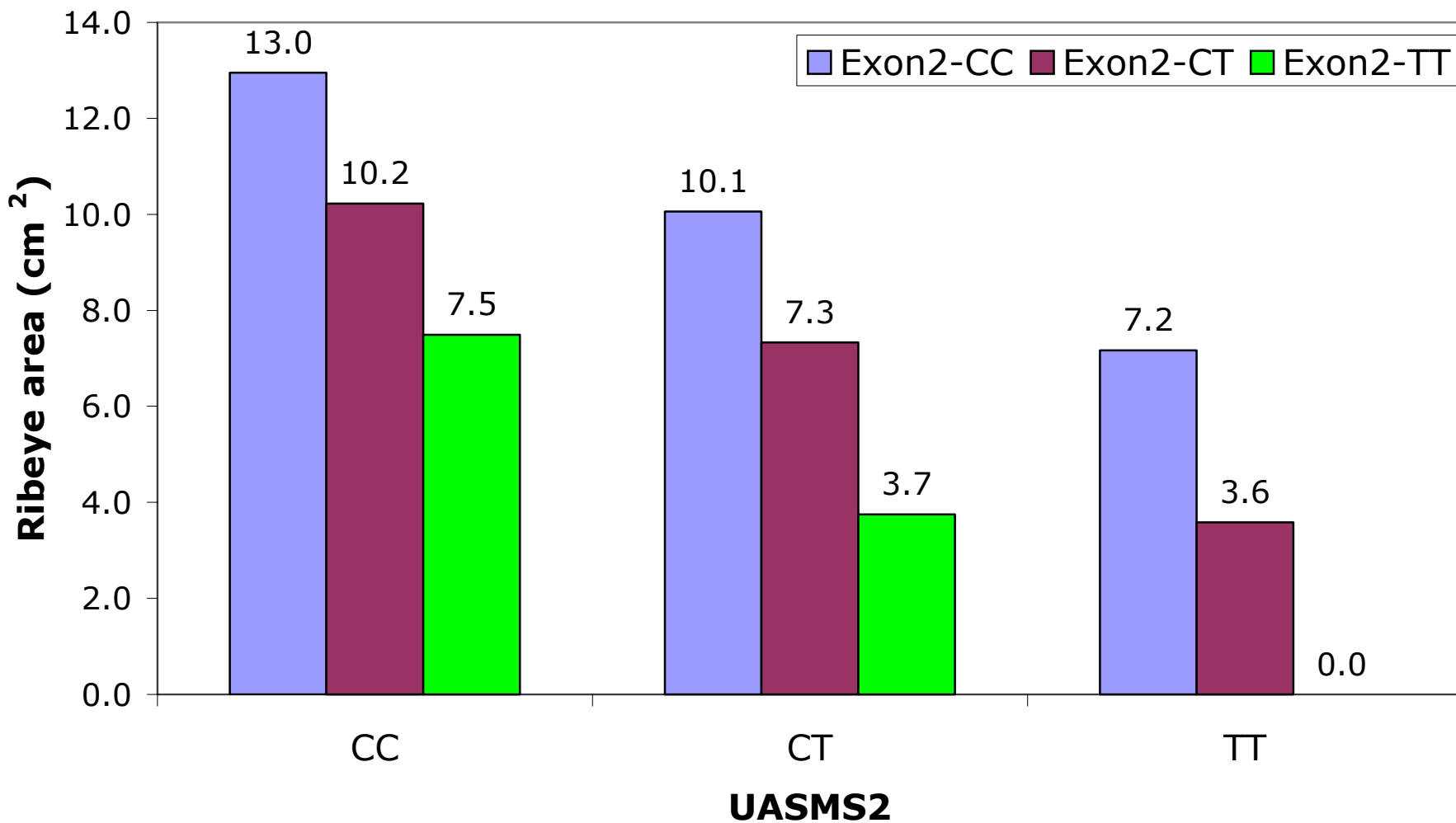




## Genotype Differences for Hot Carcass Weight Estimated from Haplotypes

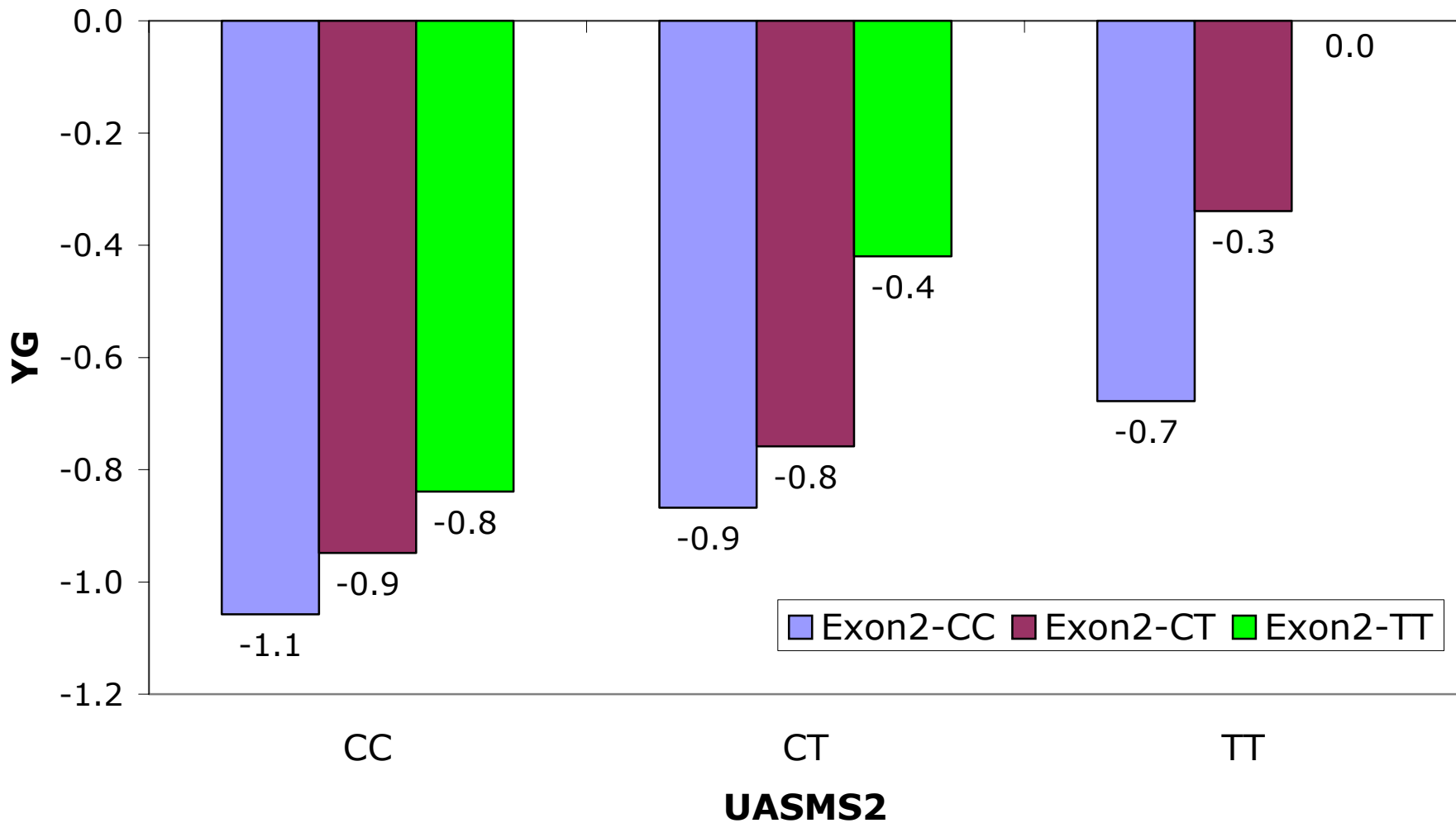


## Genotype Differences for Ribeye Area Estimated from Haplotypes



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## Genotype Differences for Yield Grade Estimated from Haplotypes

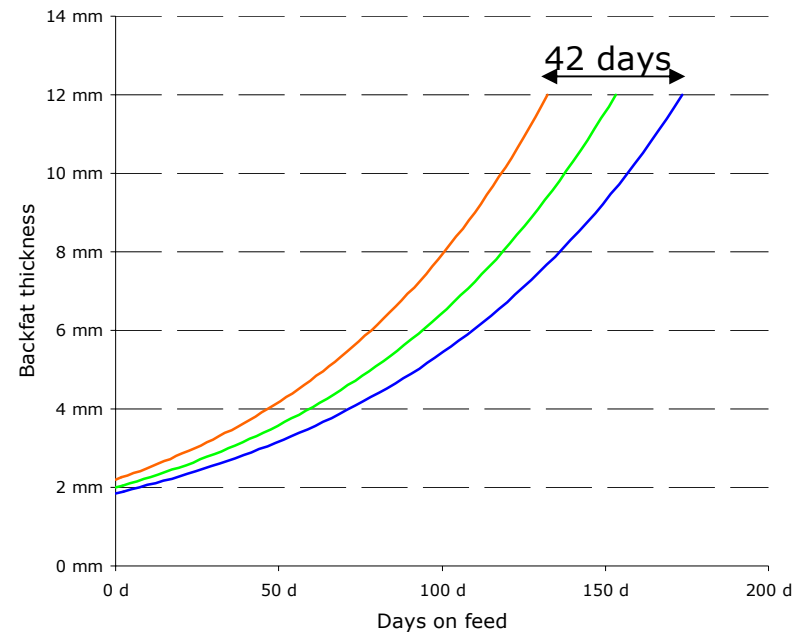


Clear differences in times to finish have been demonstrated between IGENITY™ genotypes.

Enter any starting backfat thickness and the desired backfat thickness at slaughter to determine the days on feed required for each genotype.

	OptiGRID 1	OptiGRID 5	OptiGRID 10
<b>Starting backfat</b>	2.20 mm	2.00 mm	1.85 mm
<b>Backfat at slaughter</b>	12.00 mm	12.00 mm	12.00 mm
<b>Starting backfat</b>	0.087 in	0.079 in	0.073 in
<b>Backfat at slaughter</b>	0.472 in	0.472 in	0.472 in
<b>Marbling Scores</b>			
<b>Current</b>	3.90	3.73	3.60
<b>Target</b>	5.00	5.00	5.00
<b>Gain</b>	0.79	0.71	0.62
<b>Days on feed</b>	132 d	153 d	174 d

Backfat and days on feed



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# Marker Assisted EPDs

- Improved accuracy for young sires
- Spreads out the sires
- Lower cost of genetic evaluation for traits difficult and/or costly to measure
- Other traits will follow

CW acc	YG acc	Marb acc	BF acc	REA acc	<b>Shear acc</b>
-8.4	-0.02	.18	0.00	0.01	<b>-0.36</b>
0.92	0.92	0.92	0.92	0.92	<b>0.50</b>

Spring 2005 ASA Sire Summary



# Marker-Assisted EPDs from Genomic Data

- Develop the methodology
- Standardized validation to generate “adjustment factors”
- Standardized SNP nomenclature for genomic data
- Standardized data transfer template
- Producer authorization to transfer data to association
- Breed association database acceptance



# IGENITY ParentMATCH

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- Parental Validation
- Sire Determination



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# IGENITY ParentMATCH

## Parental Verification

- Verify sire and/or dam as per breeder records.
  - Usually to fulfill breed association requirements.
  - Listed parent either qualifies or is excluded.
  - American Simmental and American Shorthorn Associations use a panel of 14 micro-satellite markers.
  - Move to “SNP” panels to allow parentage and diagnostic markers from the same sample/same lab analysis?????





# IGENITY ParentMATCH

- Sire Determination
  - Multi-sire testing. “Most likely sire” based on screening potential sires and selecting the sire that has the most genes in common with each calf.



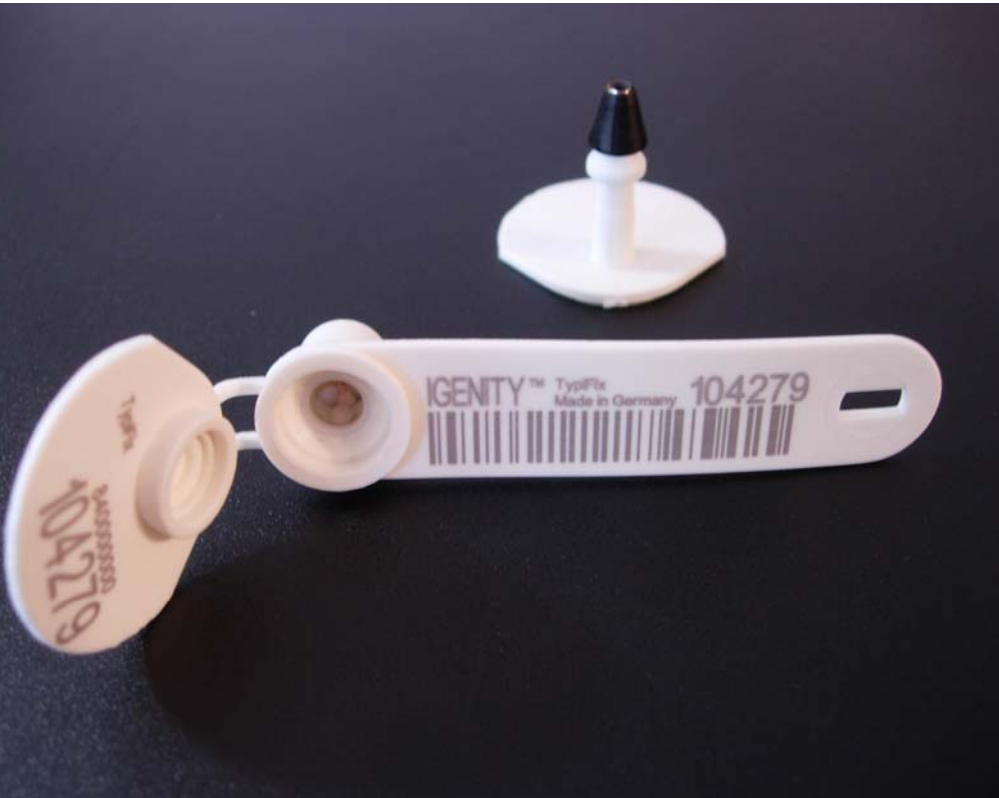
- Genetic Evaluation
  - Genetic evaluation available on herd sires, using commercial parentage results.
  - Available through collaboration with Colorado State University
  - EPD's for your sires in your environment, for traits that you want measured







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# Why IGENITY MultiMARK

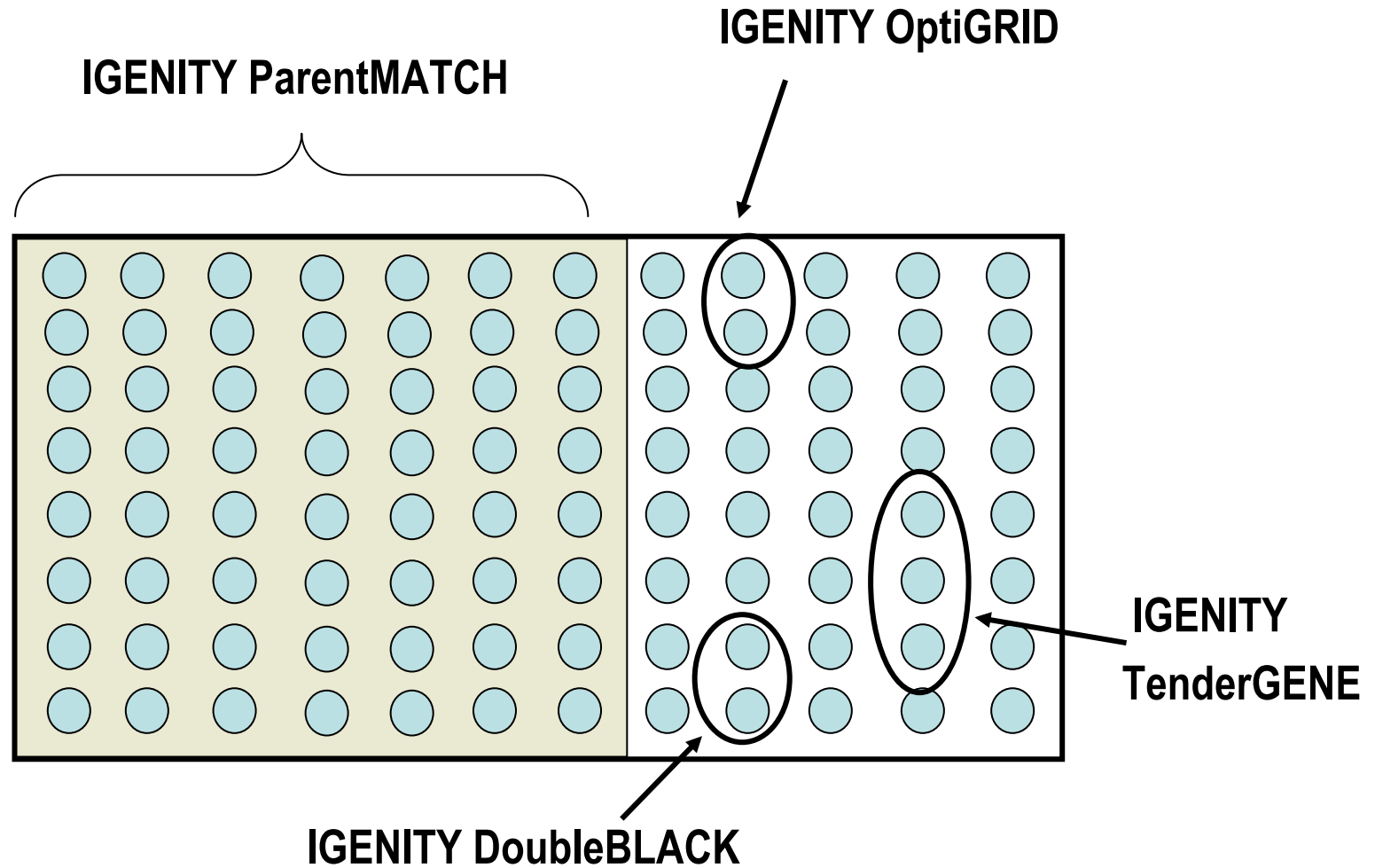
## Large SNP panel

### *Advantages:*

- All tests run up-front on all animals
- Higher throughput in the lab = lower lab costs = lower test costs.
- Expandable



# IGENITY MultiMARK





## BVD Testing

- BVD PI testing available from IGENITY
- BVD results together with genotype results
- Identify persistently infected animals from the same sample used to test for parentage and diagnostic markers
- Example      IGENITY MultiMARK \$35  
                         IGENITY MultiMARK plus BVD \$37.50







# Using IGENITY

- Multiple test results from one sample for reasonable price.
- Simple
- Meaningful
- “Friendly” Reports
- Value (ROI)
- Part of a system
- Focus on traits that are difficult and/or expensive to measure with significant economic relevance



Complete both sides of this form and mail it with the Sample Information Form(s), payment, and Sample Collectors in the Returnable Box.

**Profile options for TISSUE collection tags**

	Price*	X	Qty	=	Total
<b>IGENITY MultiMARK</b> Includes all of the following: IGENITY TenderGENE IGENITY OptiGRID IGENITY DoubleBLACK IGENITY ParentMATCH MultiSIRE	\$35	x	_____	=	_____
<b>IGENITY MultiMARK plus BVD PI</b>	\$37.50	x	_____	=	_____
<b>IGENITY ParentMATCH MultiSIRE</b>	\$17.50	x	_____	=	_____
<b>Tissue Collection Tag</b> (multiples of 50)	\$2.50 x 50	x	_____	=	_____
<b>Optional Archiving of Samples</b>					
5 year Sample Archive	\$5	x	_____	=	_____
10 year Sample Archive	\$10	x	_____	=	_____
	<b>Total Due \$</b>			=	_____

Prices valid through December 2006

**Profile options for HAIR collection cards**

**OR**

	Price	X	Qty	=	Total
<b>IGENITY MultiMARK</b> Includes all of the following: IGENITY TenderGENE IGENITY OptiGRID IGENITY DoubleBLACK IGENITY ParentMATCH MultiSIRE	\$40	x	_____	=	_____
<b>Individual Results for IGENITY TenderGENE, OptiGRID or DoubleBLACK</b>					
Choose any single result	\$30	x	_____	=	_____
<b>IGENITY ParentMATCH MultiSIRE</b>	\$20	x	_____	=	_____
<b>Optional Archiving of Samples</b>					
5 year Sample Archive	\$5	x	_____	=	_____
10 year Sample Archive	\$10	x	_____	=	_____
	<b>Total Due \$</b>			=	_____

**IGENITY ParentMATCH MultiSIRE Genetic Evaluation also available. Additional records required. For more information, contact your IGENITY Specialist.**

To order your IGENITY Hair Collection Kit or IGENITY Tissue Collection Kit, please call IGENITY Customer Care at: 1-877-IGENITY.

Please complete both sides of this form.

# Two ways to order test kits:

- Online: [www.igenity.com](http://www.igenity.com)
- Phone: 877-443-6489

# Get test results:

- Online: [www.igenity.com](http://www.igenity.com)
- Email
- Fax
- US Mail

