IRISH CATTLE BREEDING FEDERATION

"The Financial Benefit of Genetic Improvement in Practice."

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Irish Cattle Breeding Federation (ICBF).

National Development Plan

Transforming Ireland

Thank-you.

- For the kind invitation.
- The last time I was here…….
  - British & Irish Lions Tour in 1997.
  - South Africa were world champions.
  - But the Lions won test series.

Overview of Talk.

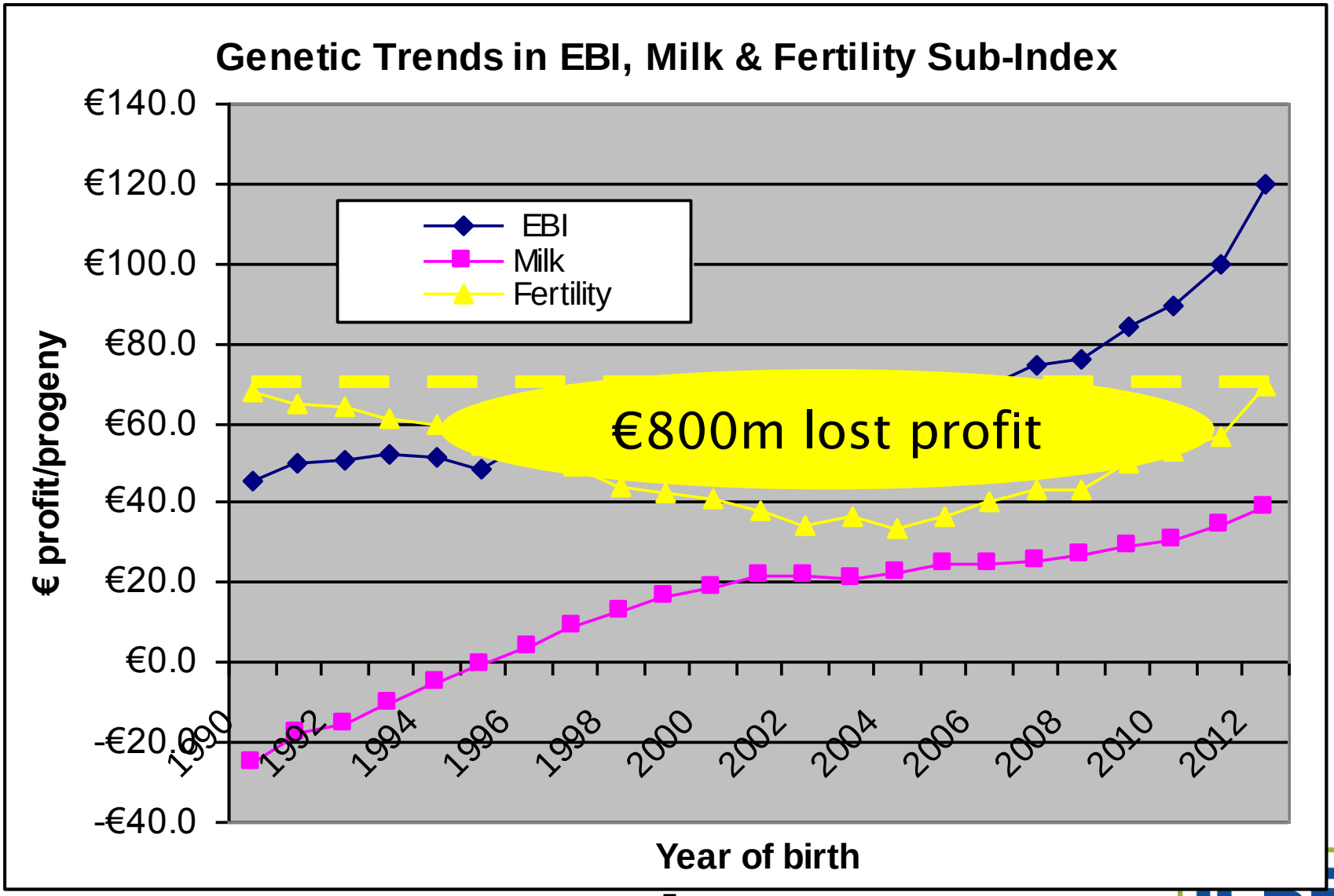
- Does genetics work?
- Overview of industry.
- Role of Genetics.
  - Data, genetic evaluations & breeding programs.
- New Developments.
  - Genomics, sexed semen, health & disease, traceability.

Does Genetics Work - Beef?

€uro Stars	€uro Index	Weanling Wt kg	Weanling Value €	Finisher Age	Finisher CWt kg	Finisher Value €	Retailer HVC kg	Retailer VHVC kg	Retailer Value €
5 Stars	€87	377	€727	565	323	€1,204	55.8	25.4	€1,820
4 stars	€63	358	€691	571	311	€1,150	53.6	24.7	€1,747
3 stars	€50	357	€676	573	305	€1,111	52.1	24.0	€1,703
2 stars	€36	350	€652	578	297	€1,078	49.6	23.1	€1,632
1 star	€10	346	€645	581	288	€1,038	47.4	22.2	€1,559
Diff	**€154**		**€82**			**€166**			**€261**

- €250k additional value (3 million rand!)
- How do we get more of these animals?
- Worth €100m/annum at an industry level.

Does Genetics Work – Dairy?



Ireland & Agri-Food.

- **Value.** 8% of GVA and increasing.
  - €10 created => €7 re-spent.
- **Exports.** 80% of dairy & beef exported.
  - Exports enough beef to feed 30m.
- **Image.** Green, traceability, health & disease
  - 20% of world baby powder manufactured.
- **Cost/profit.** Low cost, seasonal systems.
- **Harvest2020.** Target 50% increase in milk output & 40% beef output.

ICBF structure & funding.

- Established in 2000.
- Farm Orgs (46%), herdbooks (18%), milk recording (18%) & AI (18%).
  - 15 person board + 1 person DAFM.
- £2 million initial share capital.
- Annual budget of ~€5m.
  - DAFM = €2.3m, farmer tag = €0.8m, Services = €2.0m.
- Balance between "industry good" & service income.
- ~35 people directly servicing 100k farmers.

Dairy - Key Statistics.

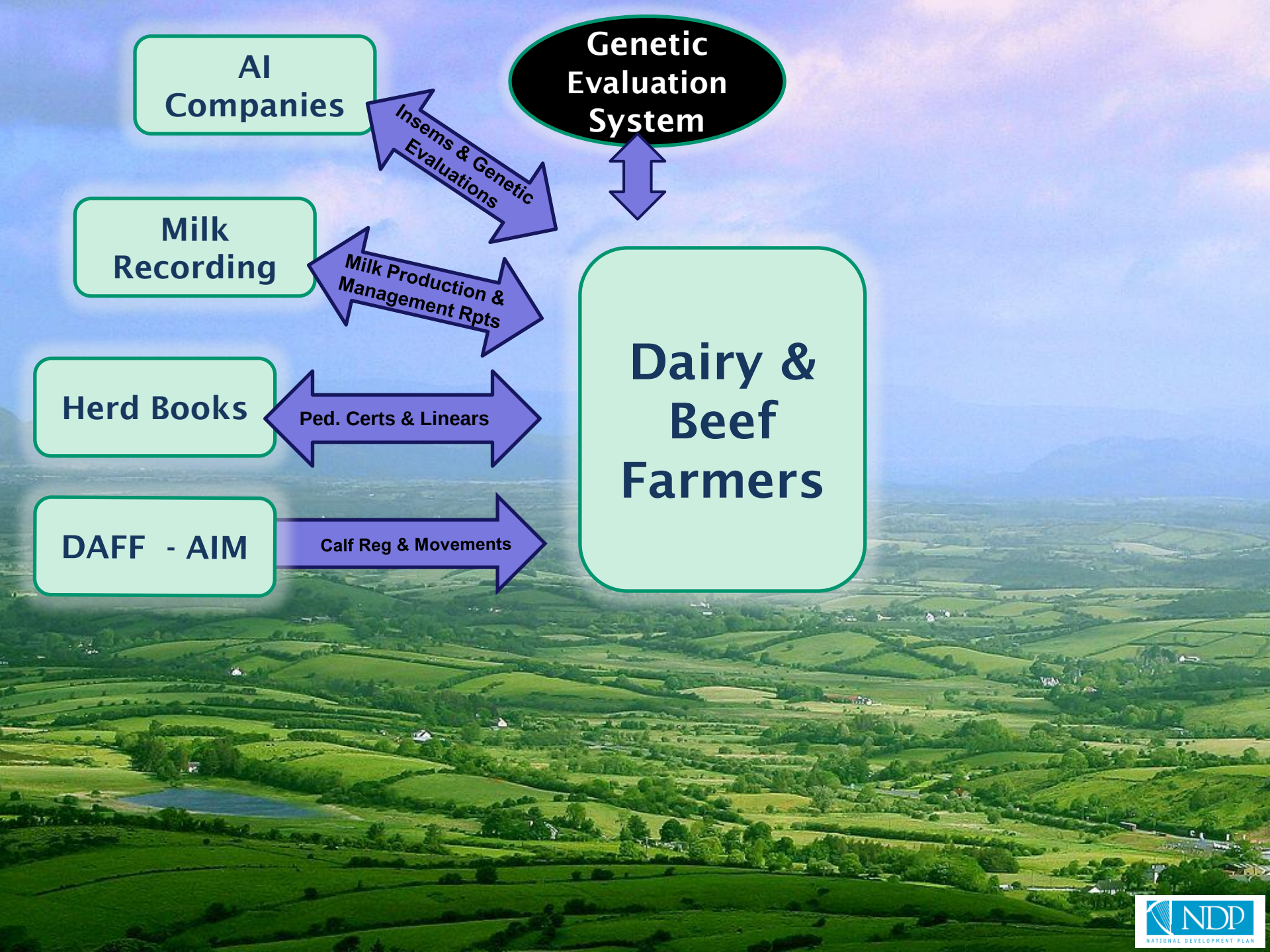
- 1.2 m dairy cows.
  - 400k dairy replacements.
  - Remainder to beef (mainly Natural Service)
- Size of herd increasing by 5%/year.
- 92% Holstein Friesian.
- 60% AI-bred (increasing by 3-5%/year)
- 600k cows in milk recording (increaing by 3-5%/year).

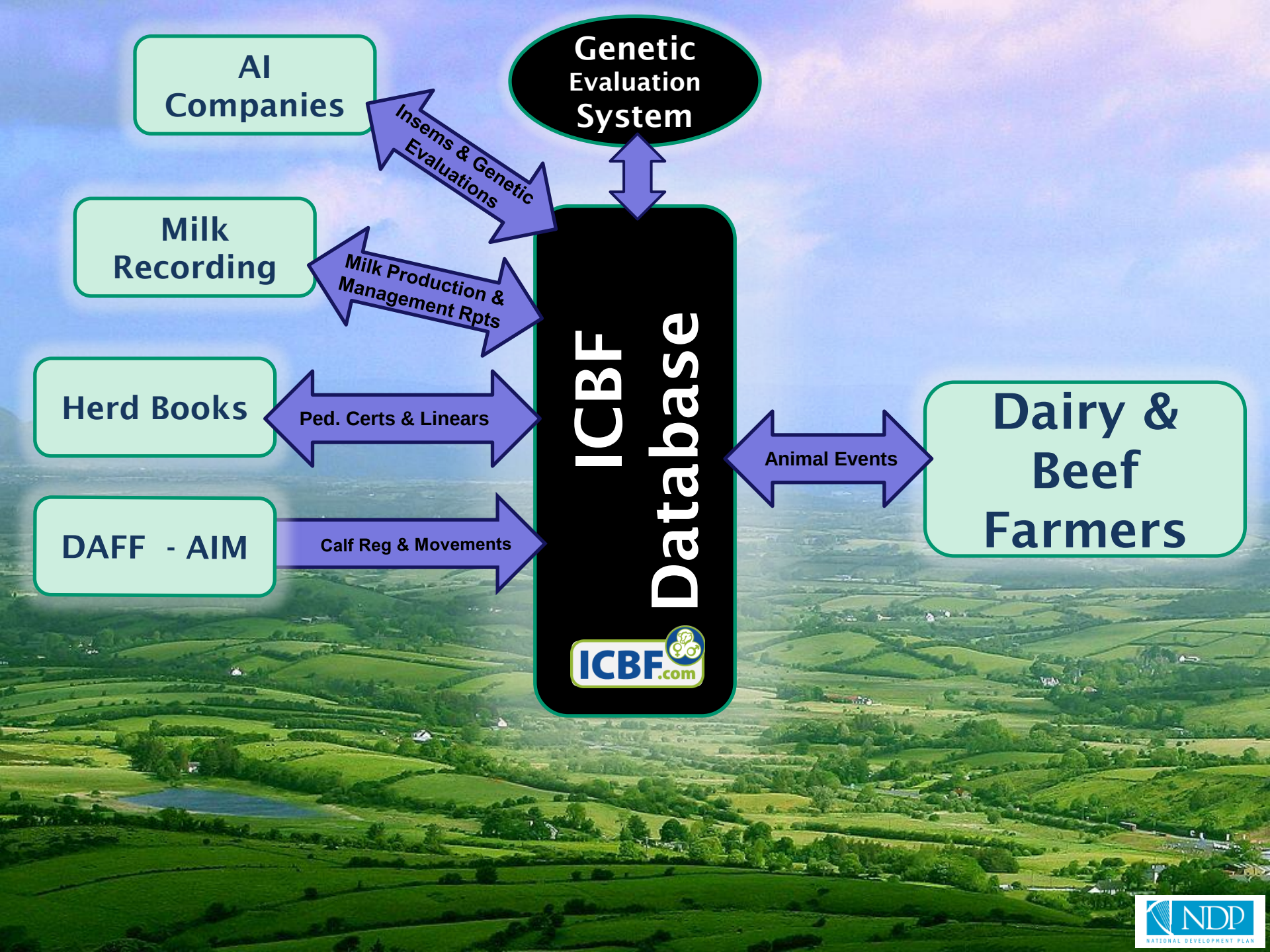
Beef - Key Statistics.

- 1.0 m beef cows.
  - 200k beef replacements.
  - Remainder to terminal beef.
- Herd size stable – expected to drop.
- Main breeds are Charolais, Limousin, Simmental, Angus & Herford.
- Herd is an inter-cross of breeds. 70% of replacements are two or more breeds
- 80% by Natural Service.

1. ICBF Database.

- DAFM National Registration Database established in 1998.
  - Mandatory EU requirement.
  - 100k cattle breeding herds
- ICBF database established in 2002.
  - Additional cattle breeding purposes.
  - Framers “release” data to ICBF.
- Initially 6k farmers, now also 100k.


AI Companies
Genetic Evaluation System
Insems & Genetic Evaluations
Milk Recording
Milk Production & Management Rpts
Herd Books
Ped. Certs & Linears
DAFF - AIM
Calf Reg & Movements
Dairy & Beef Farmers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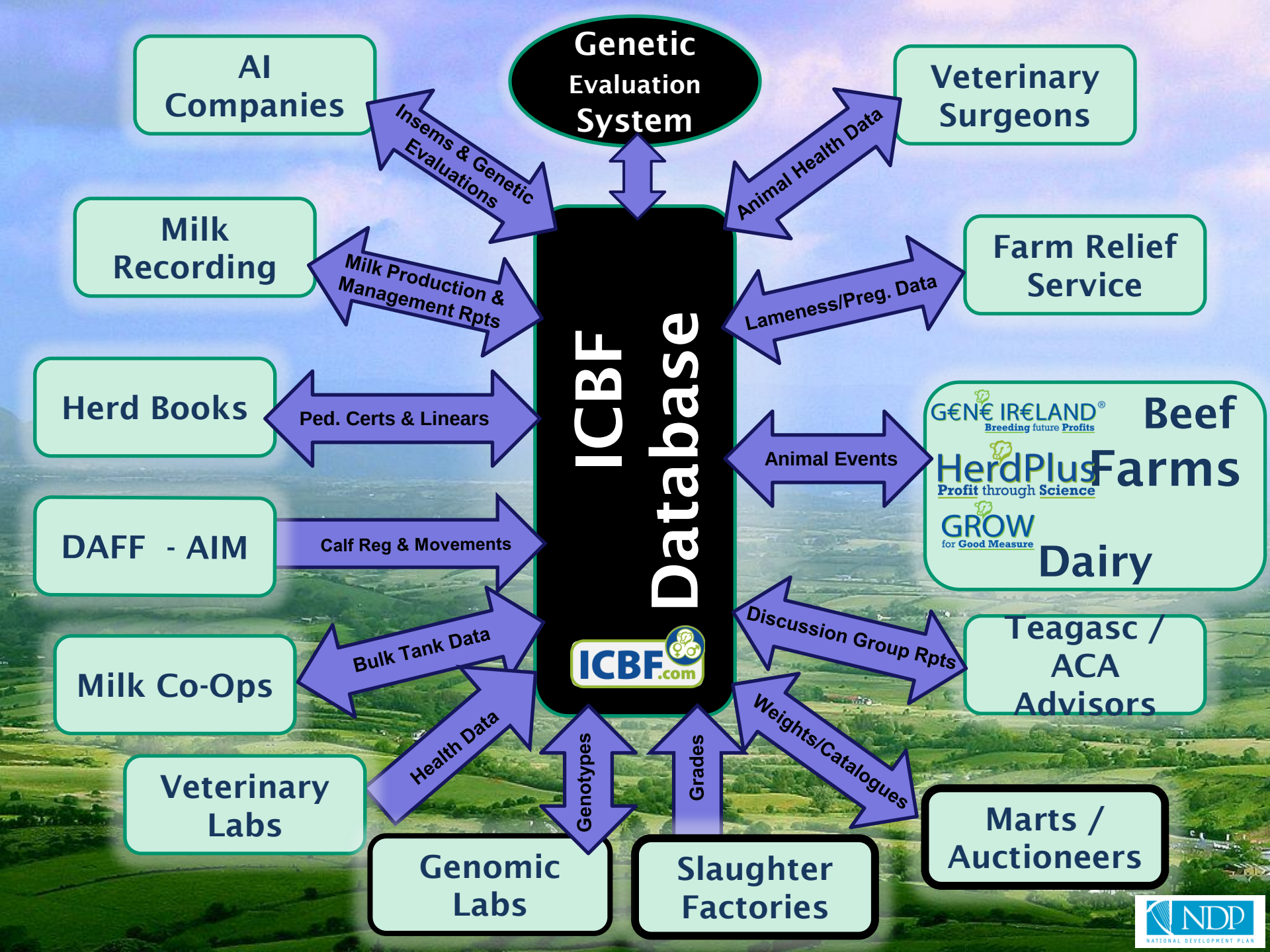
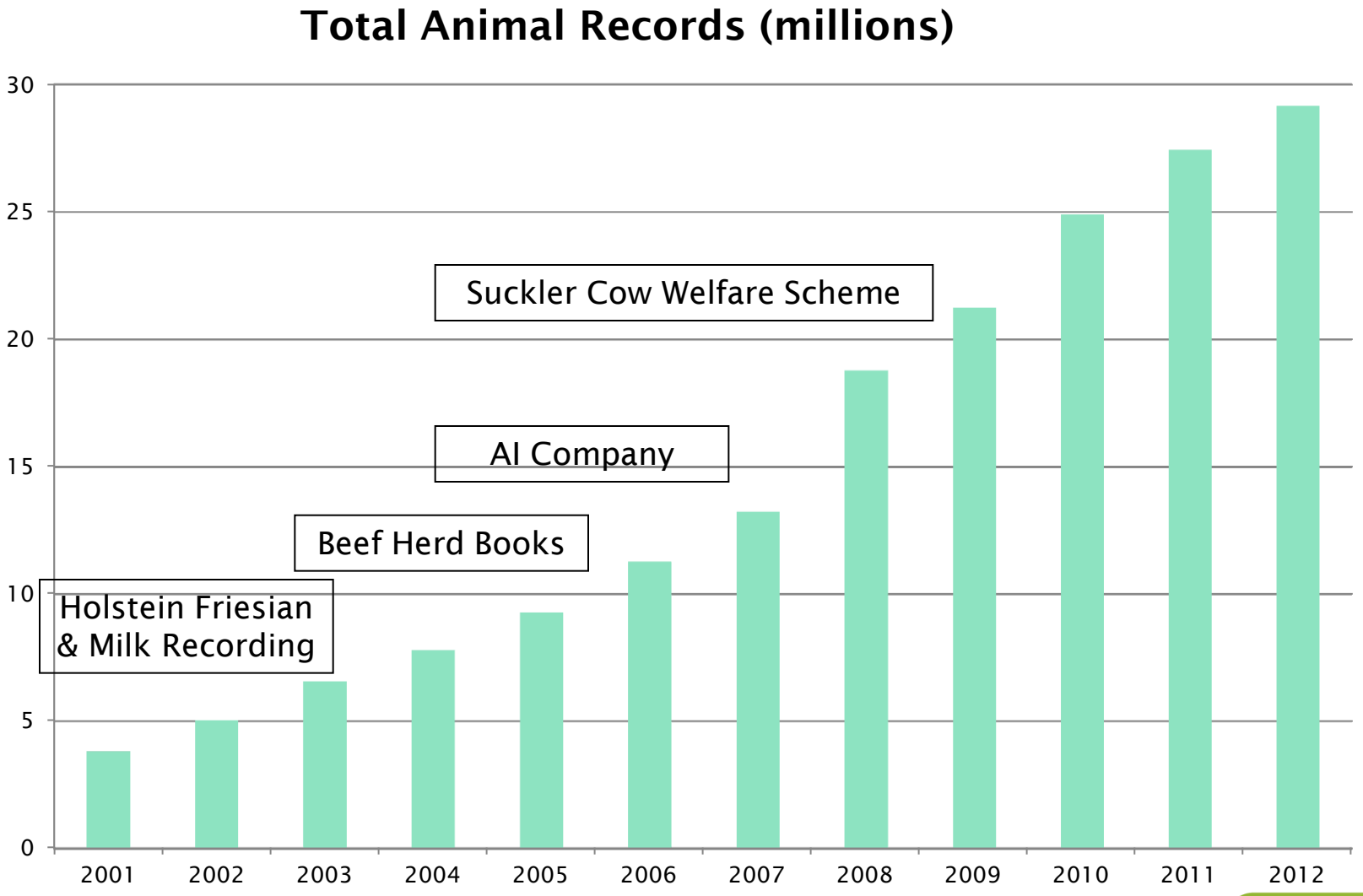
ICBF Database
ICBF.com
Animal Events
Dairy & Beef Farmers
NDP
NATIONAL DEVELOPMENT PLAN


AI Companies
Genetic Evaluation System
Veterinary Surgeons
Insems & Genetic Evaluations
Animal Health Data
Milk Recording
Milk Production & Management Rpts
Lameness/Preg. Data
Farm Relief Service
ICBF Database
Herd Books
Ped. Certs & Linears
Animal Events
GENE IRELAND Breeding future Profits
Beef
HerdPlus Profit through Science
Farms
GROW for Good Measure
Dairy
DAFF - AIM
Calf Reg & Movements
Bulk Tank Data
Discussion Group Rpts
Milk Co-Ops
Teagasc / ACA Advisors
ICBF.com
Health Data
Weights/Catalogues
Veterinary Labs
Genotypes
Grades
Genomic Labs
Slaughter Factories
Marts / Auctioneers
NDP
NATIONAL DEVELOPMENT PLAN

Increases in data recording.



2. Genetic Indexes – Beef.

- Only 35k pedigree cows, yet evaluations based on ~20m+ "commercial" beef animals.
- Evaluations operate across breed.
- €uro-Star Indexes; Terminal, Maternal & Dairy Beef.
- Big shift in focus towards "costs of production".

Table 1. ***MATERNAL*** index.

Index	% emph
Calving	15%
Docility	4%
Feed Intake	24%
Carcaas Beef	26%
Maternal Milk	13%
Female fertility	18%

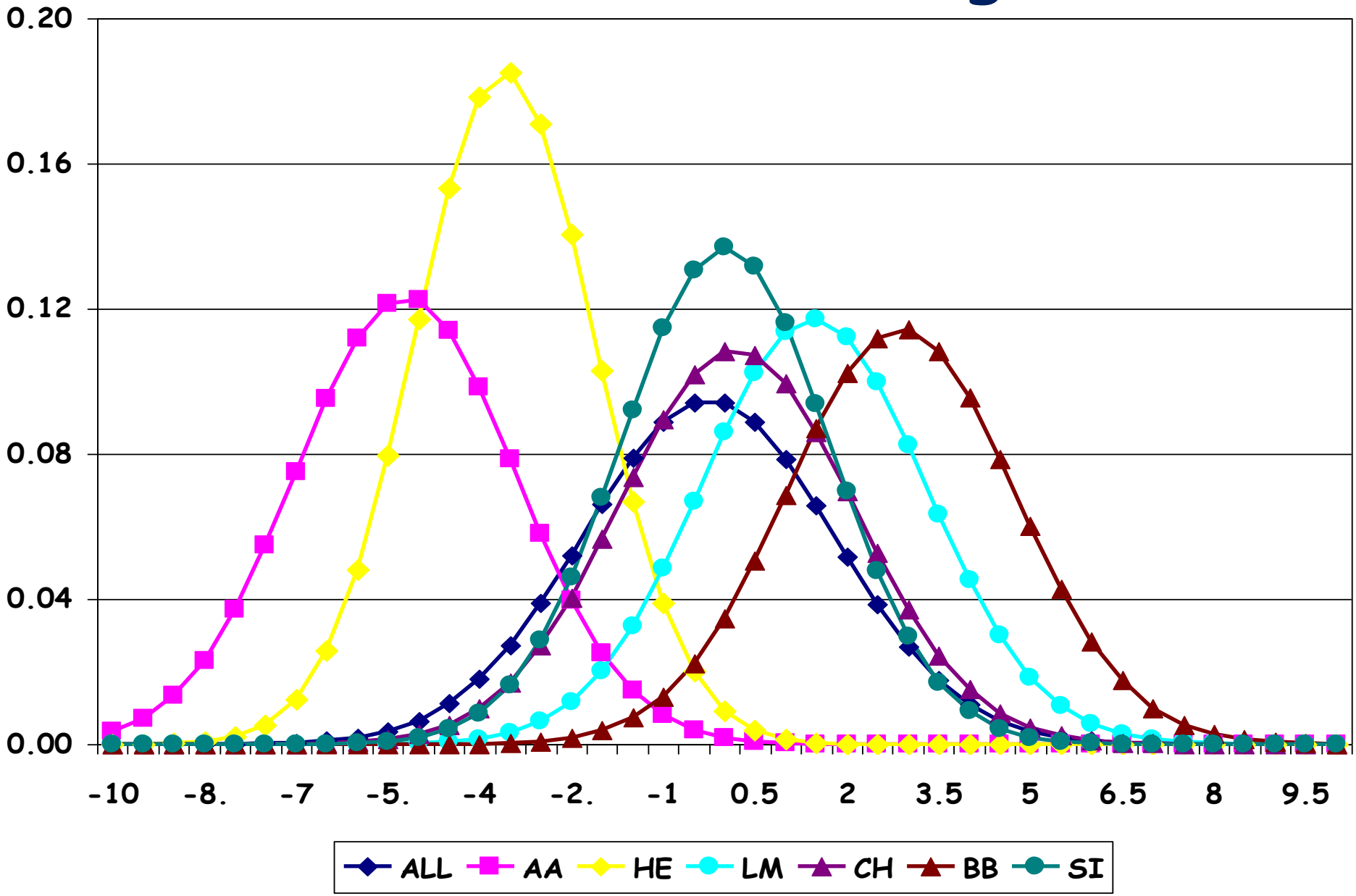
Table 2. ***TERMINAL*** index.

Index	% emph
Calving	29%
Docility	2%
Feed Intake	18%
Carcass Beef	50%

Beef data – Breed Differences.

primary breed	calving difficulty (% 3 or 4)	gestation (days)	weaning weight (kg)	calf price per kg (cents)	feed intake in Tully (kg/DM)	carcass weight (kg)	carcass grade (EUROP)	age first calving (days)	average mat wean wt	calving interval (days)	survival (%)
Angus	4%	283	287	177	10.4	308	O+	912	292	393	84%
Aubrac	4%	286	300	197	8.9	342	R+	965	281	390	88%
Blonde Aq	4%	291	318	204	9.1	369	R+	948	288	408	83%
Belgian Blue	8%	285	336	222	8.9	353	R+	917	305	398	82%
Charolais	5%	289	320	208	9.7	369	R+	936	290	401	83%
Hereford	4%	286	289	181	10.0	311	O+	923	287	394	81%
Limousine	4%	290	310	202	8.9	356	R+	946	282	399	86%
Piemontese	6%	287	291	204	9.6	365	R+	919	257	421	83%
Partenaise	7%	288	329	215	10.5	380	U-	940	284	409	83%
Romagnola	3%	284	301	210	11.1	359	R	931	258	408	84%
Saler	1%	286	306	191	9.7	356	R	932	297	388	90%
Shorthorn	3%	286	283	186	10.7	332	R-	927	283	393	87%
Simmental	4%	288	324	188	9.9	353	R	917	306	395	84%

Genetic variation – calving interval



2. Genetic Indexes – Dairy

- 600k milk recorded cows per annum (50% total)
- Big shift towards costs of production traits, especially female fertility.
  - Seasonal calving.
- Future – health, disease, labour.

2013 Economic values and % emphasis for traits in the EBI				
Sub-Index	Trait	Economic Weight	Trait Emphasis	Overall Emphasis
Production	Milk	-€0.09	9.9%	32.0%
	Fat	€1.01	3.5%	
	Protein	€6.26	18.6%	
Fertility	Calving Interval	-€11.89	23.5%	35.0%
	Survival	€12.05	11.6%	
Calving	Direct Calving Difficulty	-€3.52	3.4%	10.0%
	Maternal Calving Difficulty	-€1.73	1.5%	
	Gestation Length	-€7.49	4.5%	
	Calf Mortality	-€2.58	0.6%	
Beef	Cull Cow Weight	€0.15	0.7%	8.0%
	Carcase Weight	€1.38	4.1%	
	Carcase Conformation	€10.32	1.7%	
	Carcase Fat	-€11.71	1.5%	
Maintenance	Cull Cow Weight	-€1.49	7.0%	7.0%
Management	Milking Time	-€0.25	2.1%	4.0%
	Milking Temperament	€33.69	1.9%	
Health	Lameness	-€54.26	0.7%	4.0%
	SCC	-€43.49	2.4%	
	Mastitis	-€77.10	0.9%	

Genomics – Dairy.

- Launched in 2009. ~50% of semen used in 2012 was to young GS bulls. Increasing rapidly.
- 182 bulls marketed on GS now with daughter proof > 80% rel
- Correlation between Genomic & Daughter Proven = 0.85 for range of traits.
- Expect to genotype 12k male calves in 2013 (5k by AI and 7k by farmers).
  - Ped females also started.

3. G€N€ IR€LAND Dairy breeding program.

Test Year	Num Bulls	Ave EBI	Num Males Genotyped
2005	25	€93	
2006	45	€123	
2007	54	€134	
2008	80	€137	
2009	73	€153	
2010	51	€168	
2011	45	€177	
2012	49	**€213**	1,891
2013	44	**€275**	3,576

** Prior to 2011, candidate animals per year was ~300 (based on parent average)*

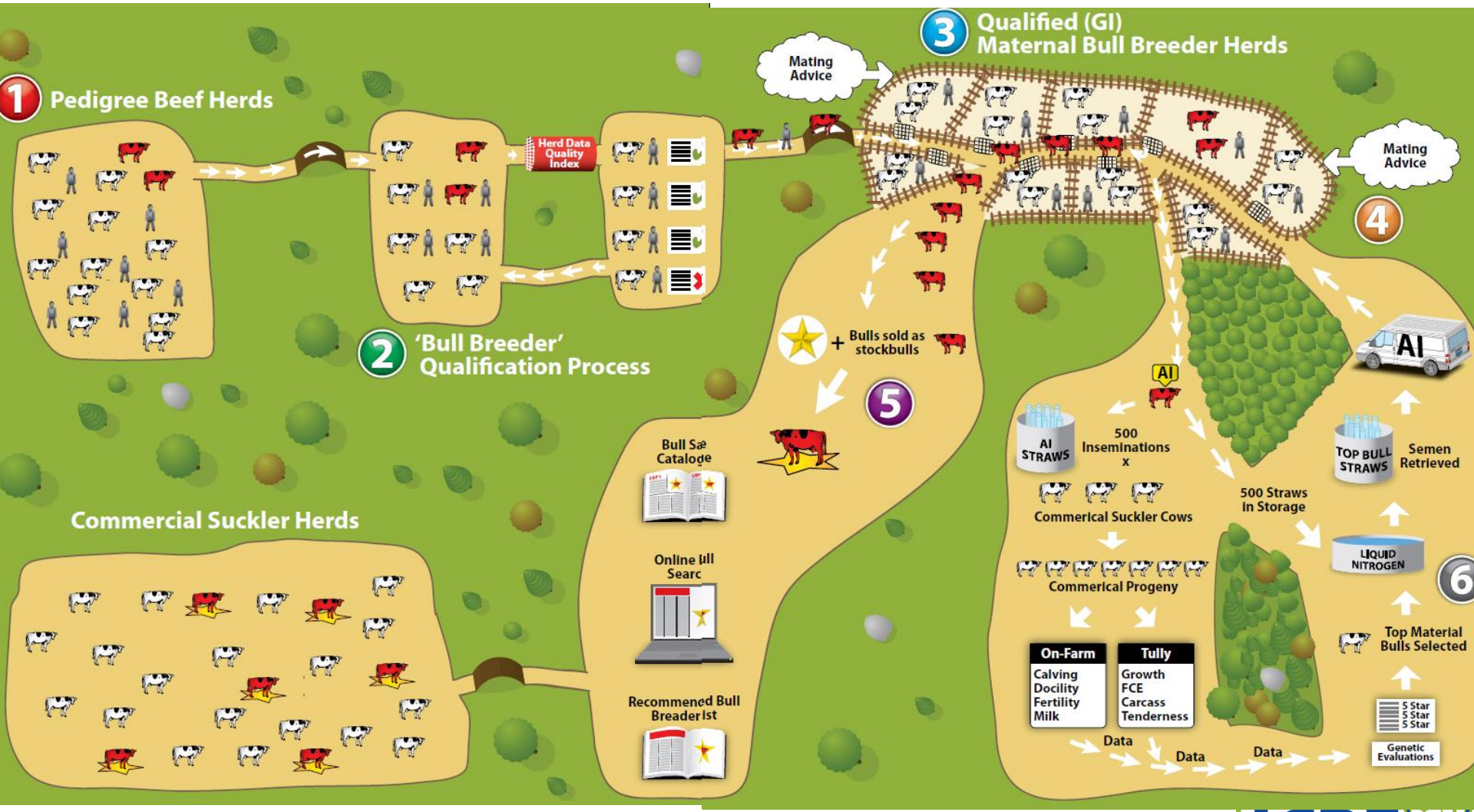
- Launched in 2005.
- Genomics is "driving" genetic gain in dairy.
- Increased selection intensity = increased genetic fain.
  - Accuracy of selection & generation interval

ICBF.com

3. G€N€ IR€LAND Beef Breeding Program.

- Genetic gain in beef 20% of equivalent gain in dairy (€5/year compared to €25/year).
  - Lower number of bulls progeny tested.
  - Lower accuracy of proofs (maternal traits).
- Addressing is major priority of new program.
  - Bull breeding herds (voluntary, Herd Data Quality Index, bull breeder stamp, AI & stock bulls)
  - Bulls for breeding program (1000 straws).
  - Commercial progeny test (Tully).
- Exploiting within breed variation – all breeds.

New G€N€ Bull Breeding Program.



G€N€ IR€LAND – Commercial progeny test.

	Final live-weight (kg)	Average daily gain (kg)	Dry matter intake (kg/day)	Feed conv efficiency (dmi/adg)
Highest	826	2.6	13.4	7.4
Lowest	558	1.2	8.6	4.4
Average	672	1.9	11.2	5.8

- First 150 commercial progeny just slaughtered. Progeny of 20 AI sires (including PTest sires).
- Significant differences in feed intake/efficiency.
- High quality phenotypes collected; feed intake, meat quality, health & disease.

4. New Developments; Genomics.

- IDB19k chip - in use.
  - Parentage, recessives & research. Available if interested? Moving to version II in Autumn.
- Multi-breed dairy
  - Other dairy breeds. Expand our HF training populations.
- Beef – 4k animals genotyped on HD chip.
  - Still at research phase. Seeking opportunities for collaboration.

4. New Developments; Sexed Semen.

- Cost: benefit of sexed semen in Ireland.
  - Seasonal -> opportunities for fresh?
  - Sexed females followed by beef (sexed beef).
  - Opportunities for beef herd.
- Largest ever “field research trial”.
  - 13.5k field inseminations.
  - ICBF, Teagasc, ST, AI, processors, IFJ.
- Major industry support & interest.

4. New developments. Health & disease.

- These traits are heritable.
  - Female fertility, lameness, mastitis incidence.
  - Genetics of TB resistance & BVD
- Need to increase quality of data in future. Move to “real-time”.
- Animal Health Ireland now using ICBF database for all services.
  - Cell-count, BVD, Johnne’s, Calf pneumonia, Others to follow. Major positive.

4. New developments. DNA-based systems.

- Can we move to 100% DNA based systems for traceability, quality assurance & genetic improvement?
  - Calf registered -> Generates DNA request -> DNA sample forwarded to lab -> genotype generated -> ICBF database -> sire & dam established -> data for all purposes. All animals – not just pedigree.
- Pilot project being developed.
- This will be the future. How are you positioned to respond?

Summary.

- Genetics works – more profit for farmers and industry.
- Combination of data, indexes & breeding programs.
- Future will focus on DNA and cost of production traits.
- Collaboration is a key aspect of success in cattle breeding.