



***Genetic Improvement in the
Irish Suckler Herd: Industry
Expectation and experience
so far***

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19th February 2007



AGENDA



- **Overview of Irish beef industry**
 - Statistics and profiles, Production flows
- **Industry Expectation**
- **Role of ICBF**
 - Genetic evaluations
 - New beef indexes
- **Future Developments**



Overview of the Irish Beef Industry





Overview: DATABASES



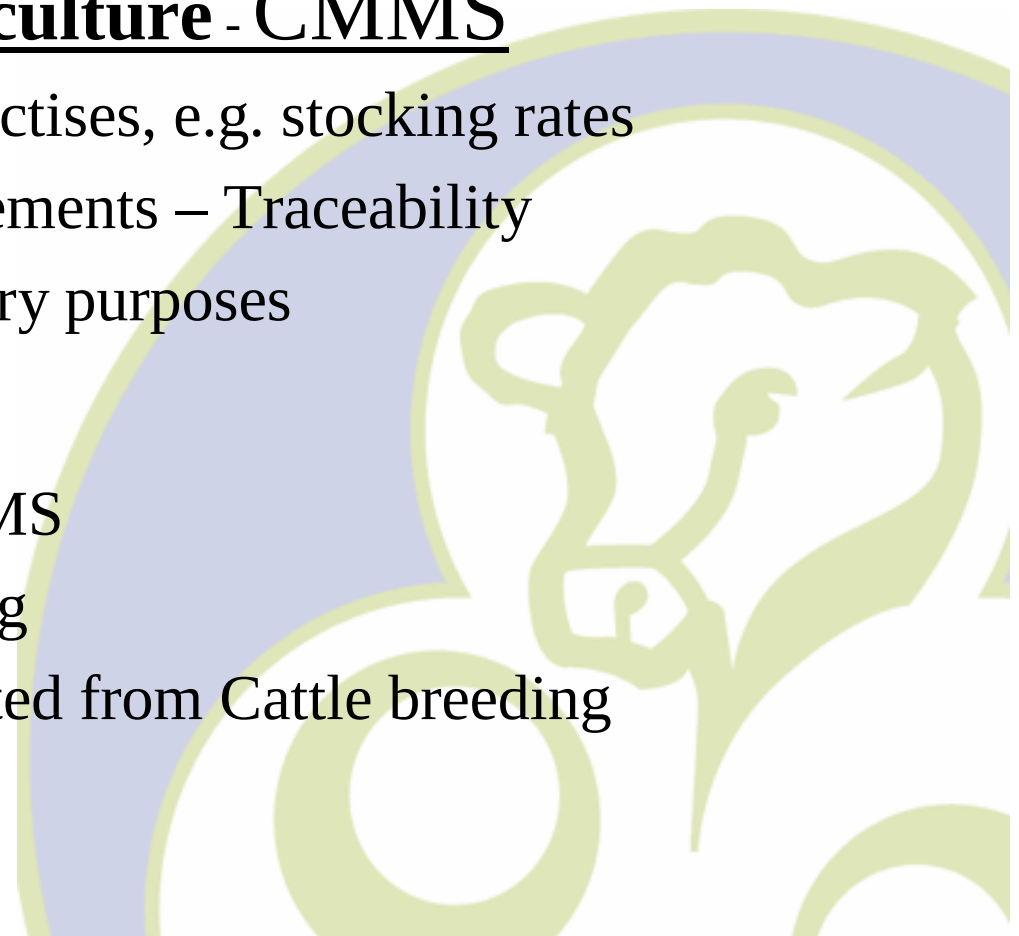
2 Main databases in Ireland for Cattle

(a) **Department of Agriculture - CMMS**

- Regulation of farming practises, e.g. stocking rates
- Monitoring of cattle movements – Traceability
- Animal Health – Veterinary purposes

(b) **ICBF – IRIS**

- Nightly update from CMMS
- Ancestry & Data recording
- Increase the profit generated from Cattle breeding



Overview: Suckler Beef Population

- **1 Million suckler cows**
 - 67,000 beef breeding herds
- **7,000 Pedigree beef herds**
 - Provide sires for beef & dairy herds
 - Ave 4 cows/herd (Pedigree)
- **Remainder (Commercial Suckler)**
 - Ave. 17 cows/herd
 - But 40% in herds <10 cows
 - Predominantly crossbred
 - Replacements heifers:
 - 32% 1st cross from dairy herds (1.1 million)
 - 68% 2nd cross from suckler herds
- **Substantial movement of animals**
- **>90% product is exported either live or first slaughtered in Ireland**

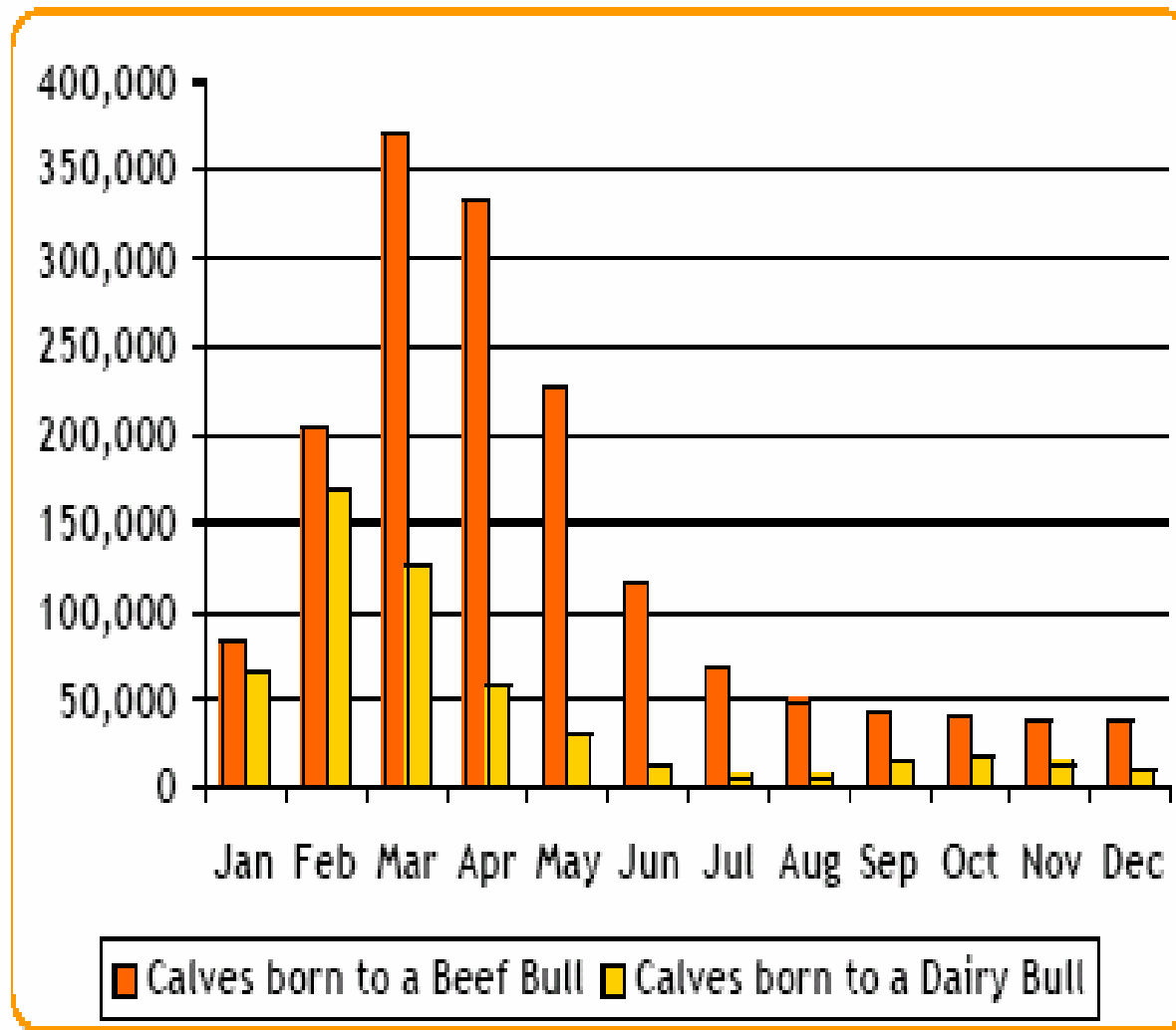


Overview: Profile of Calf Combinations

Dam Breed	Breed of Sire															
	Charolais	Hol/Fries	Limousin	Angus	Hereford	Simment	BBlue	Montbel	Sht_horn	Blonde	Saler	Rotbunt	Jersey	MRI	Other	Total
Charolais	168,419	556	52,559	9,711	4,651	11,170	7,807	117	1,245	1,156	1,123	6	3	22	561	259,106
Hol/Fries	39,698	487,285	92,520	148,908	131,275	38,874	41,959	12,656	2,851	1,744	1,577	4,455	4,135	1,157	4,211	1,013,305
Limousine	90,048	1,052	120,731	12,487	5,357	11,618	12,827	126	1,610	1,701	1,304	30	7	35	663	259,596
Angus	52,017	1,371	31,193	28,814	5,129	6,742	5,914	105	1,473	685	834	27	12	27	573	134,916
Hereford	62,654	1,534	40,474	10,428	27,400	12,246	5,949	133	1,464	965	656	22	9	19	446	164,399
Simmental	67,216	1,522	40,954	7,923	5,309	32,844	7,326	306	856	1,114	818	33	5	36	459	166,721
BBlue	20,460	848	17,111	4,314	1,890	2,958	7,349	76	478	621	317	23	11	10	235	56,701
Montbel	1,736	3,805	2,615	3,576	2,002	1,061	1,181	6,110	124	97	76	197	85	32	283	22,980
Shorthorn	13,597	538	8,754	2,844	1,675	1,992	1,373	59	7,207	219	386	20	17	10	189	38,880
Blonde	1,472	28	1,550	311	128	238	494	3	17	1,793	69	1	0	2	47	6,153
Saler	2,385	10	1,122	275	111	194	193	2	57	24	1,952	0	0	1	45	6,371
Rotbunte	115	1,212	248	939	451	78	117	108	47	36	14	1,488	110	14	58	5,035
Jersey	116	1,177	135	351	167	26	101	41	26	8	3	18	1,328	7	54	3,558
MRI	353	917	560	415	521	186	212	252	93	21	22	145	15	1,095	101	4,908
Other	802	811	839	1,229	324	253	249	119	77	34	58	66	94	9	2,472	7,436
Total	521,088	502,666	411,365	232,525	186,390	120,480	93,051	20,213	17,625	10,218	9,209	6,531	5,831	2,476	10,397	2,150,065
percent	24.2	23.4	19.1	10.8	8.7	5.6	4.3	0.9	0.8	0.5	0.4	0.3	0.3	0.1	0.5	100.0

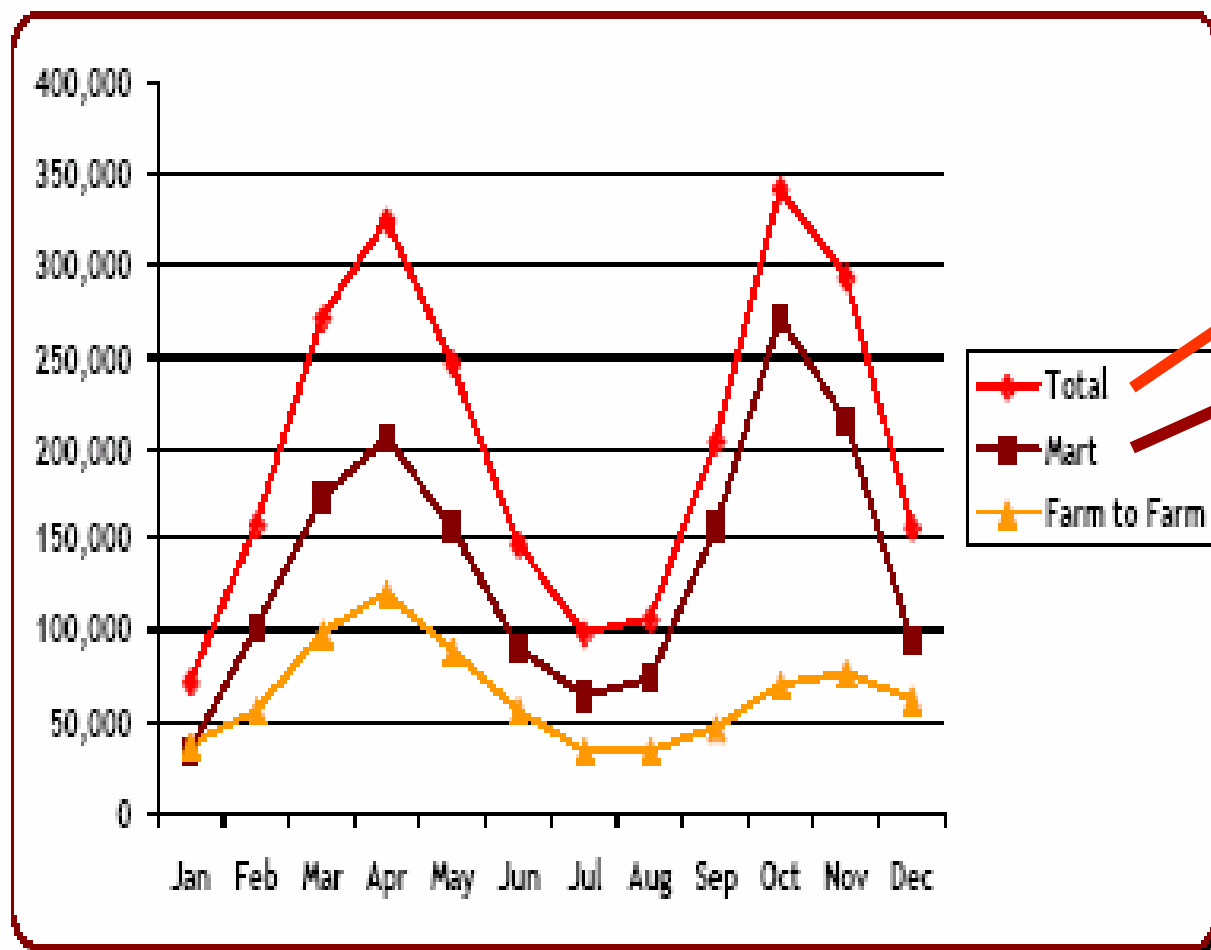
- Suckler Beef Herd combinations in Grey
- Dairy herd combinations in white, Purebred births in yellow
- Large use of Beef Sires on the dairy herd
- Large level of crossbreeding in the Suckler herd

Overview: Profile of Calf Births



- Seasonal aspect to calving
- High usage of beef sires in dairy herds at end of breeding season

Overview: Profile of Cattle Movements



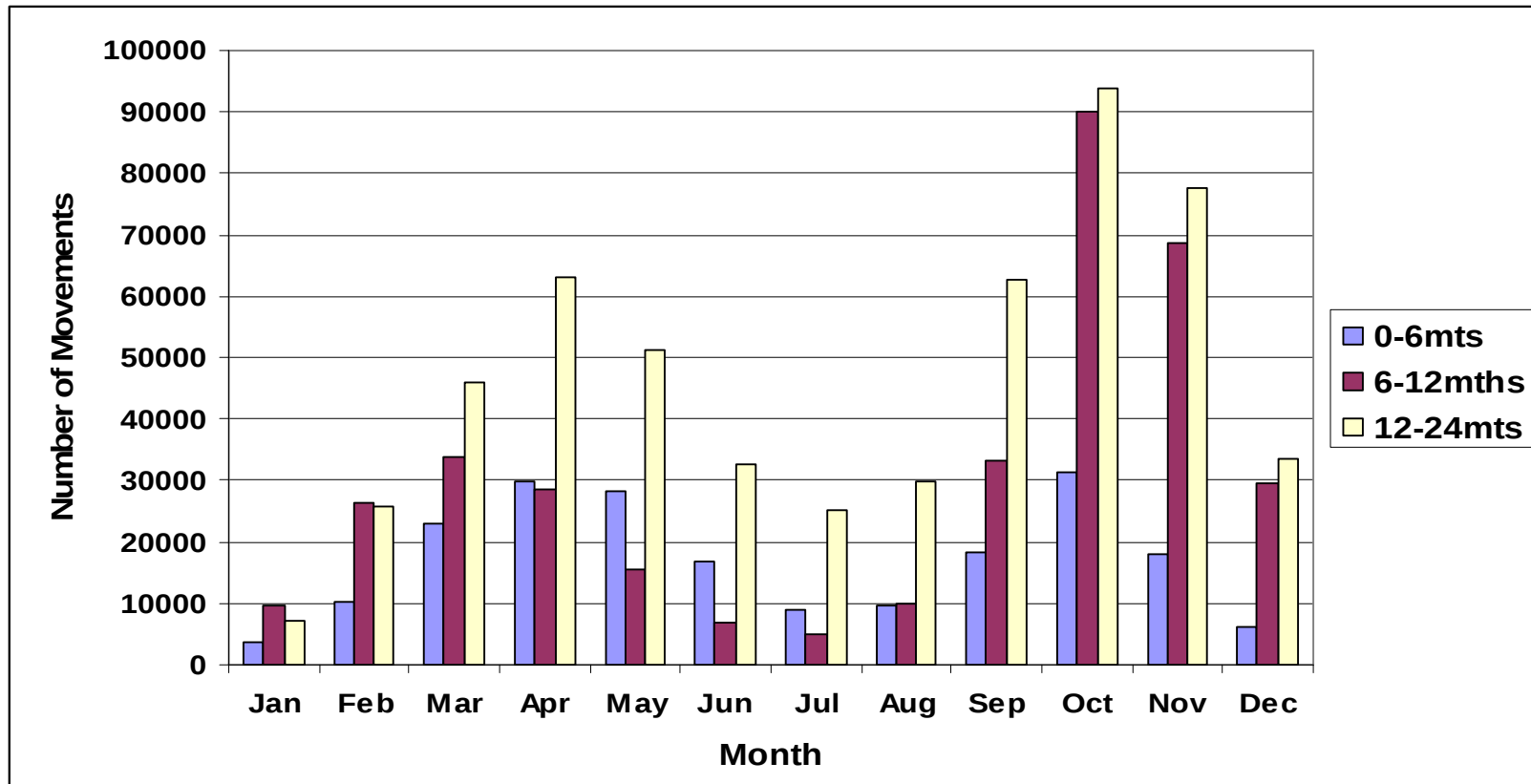
n = 2,423,756

1,637,777 (68%)

785,979 (32%)

- High level of movement of cattle in Irish systems
- Seasonal aspect (beef from dairy herd in spring, beef from suckler herd in Autumn)

Beef Sired Cattle Movements by Month & Age



Categories of interest for Suckler Beef Genetic Improvement:

150-300 days: weaning weight, maternal weaning weight, calf quality

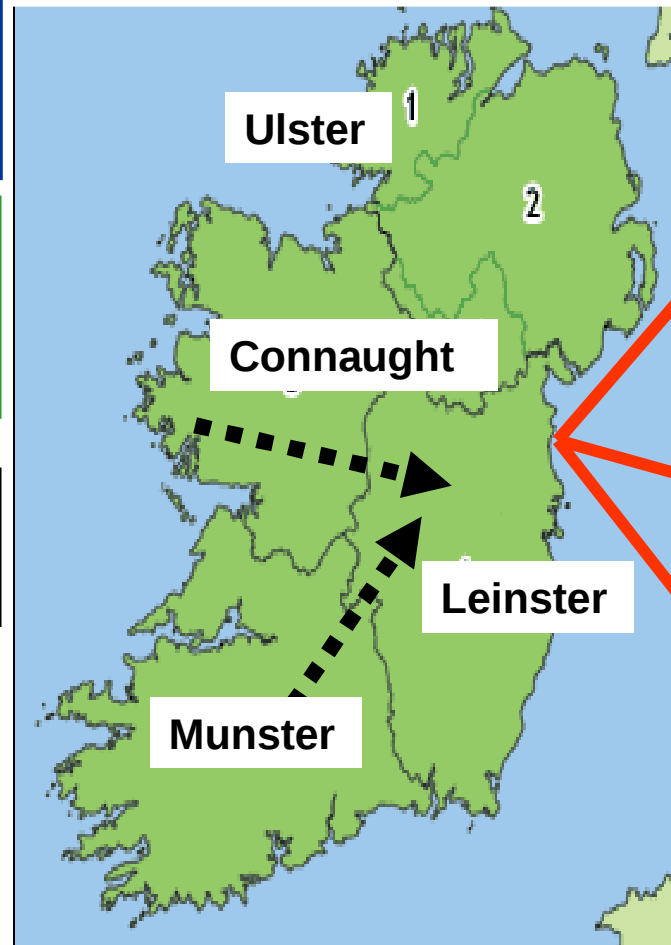
300-600 days: liveweight

Overview: Profile of Cattle Movements

Connaught & Ulster: Mainly suckler herds

Leinster: Mainly feedlot/fattening herds

Munster: Mainly dairy herds



Slaughtered in Ireland (69%)



Live Export (15%)



Replacements (15%)



The ICBF cattle breeding database

One Database, Many Partners less duplication and cost for farmers

AI

Munster AI

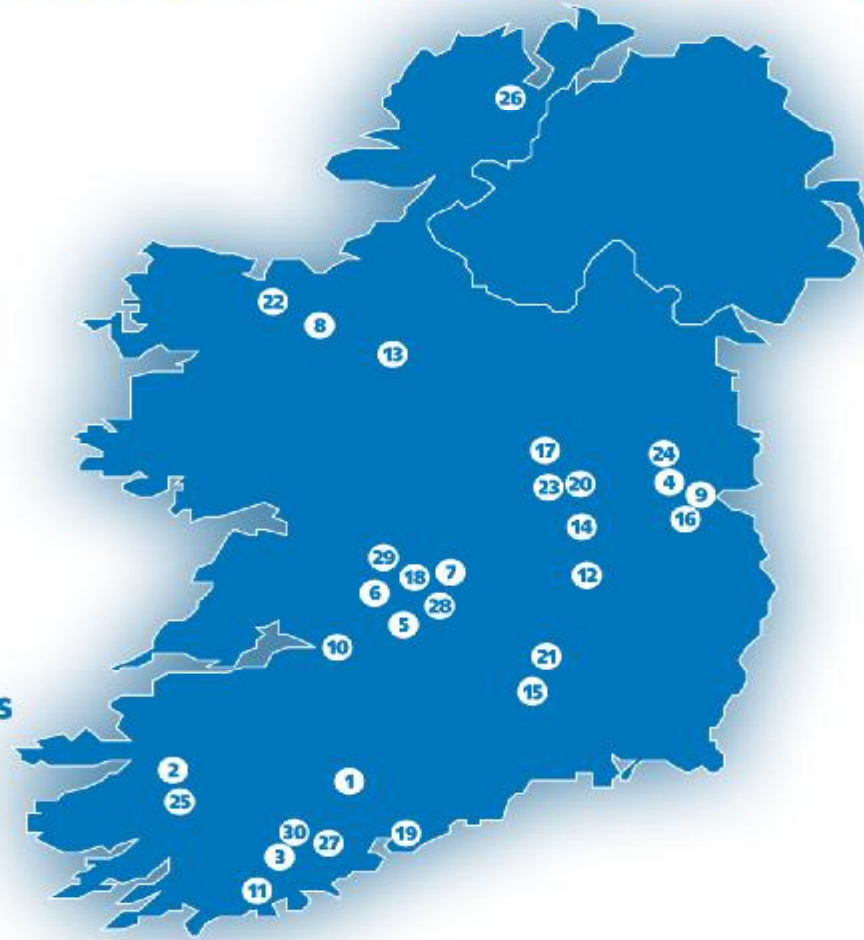
- 1** - Dairygold
- 2** - Kerry
- 3** - SWS
- 4** Progressive Genetics
- 5** Dovea AI

Milk Recording

- 1** Dairygold
- 2** Kerry
- 3** SWS
- 4** Progressive Genetics
- 6** Arrabawn
- 7** Tipperary
- 8** Connacht Gold

Farm Organisations

- 9** IFA
- 10** ICMSA



Herdbooks

- Holstein Friesian **11**
- Belgian Blue **12**
- Angus **13**
- Aubrac **14**
- Blonde d'Aquataine **15**
- Charolais **16**
- Hereford **17**
- Limousin **18**
- Normande **19**
- Parthenais **20**
- Piedmontese **21**
- Shorthorn **22**
- Simmental **23**
- Jersey **24**
- Kerry **25**
- MRI **26**
- Montbeliarde **27**
- Rotbunt **28**
- Saler **29**
- ICBF 30**

Industry Expectation

Many levels with different expectations

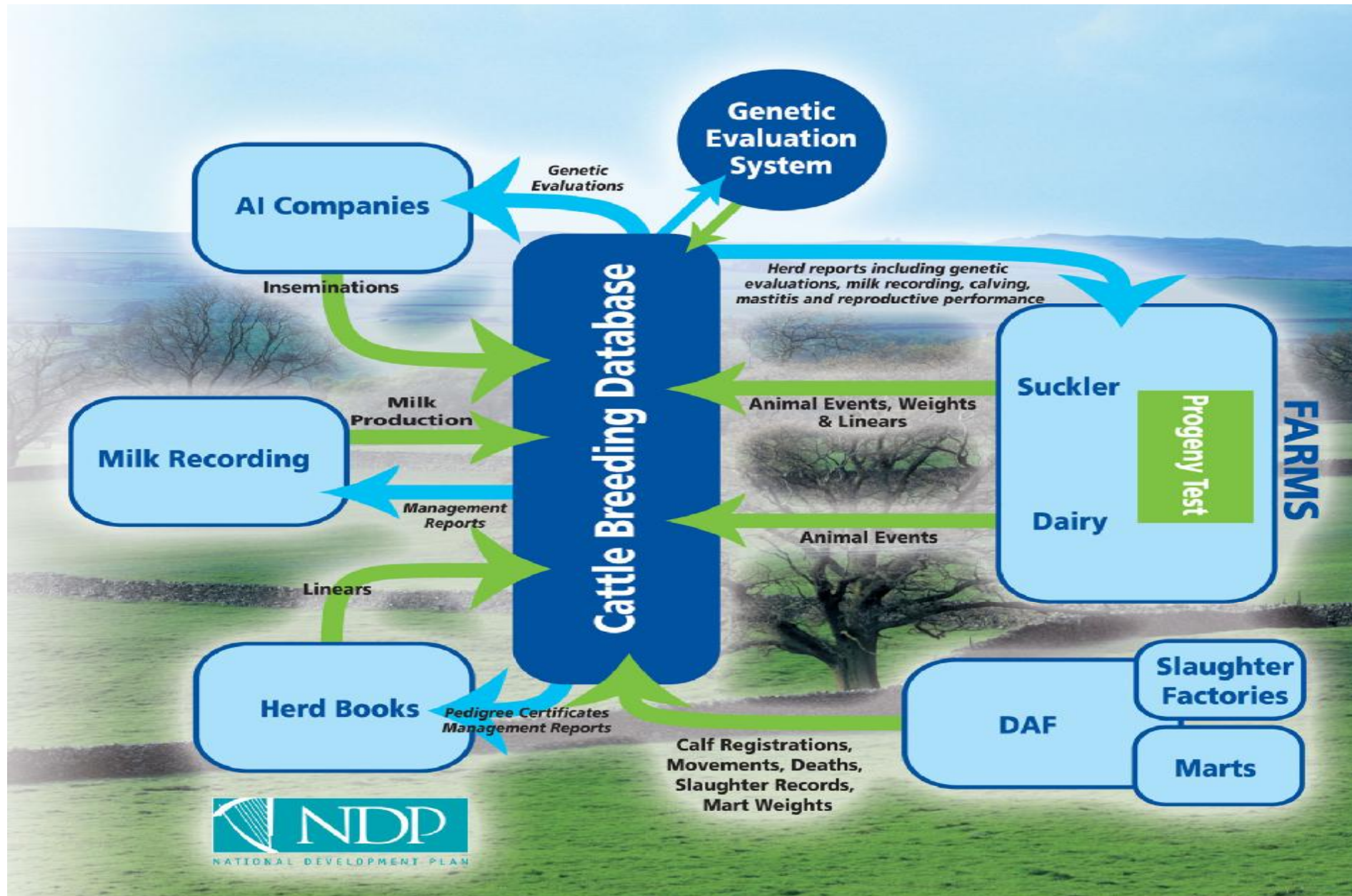
- ***Commercial farmer***: Breed/Sire selection, traditionally poor selection at cow level
 - Low level of cattle making top 2 grades E,U <25 %
 - Was many info sources: AI centres, Dept performance test
 - Very low level of sire ancestry recording <10%
- ***Pedigree farmer***: linear traits, direction regarding maternal traits, indexes on imported animals
 - Was within breed BLUP evaluation on linear traits for 4 breeds
- ***Breed Society***: Interests of members, increased market penetration, highlight the attributes of breed
- ***AI companies***: Index promotion to increase market share of their AI sires and testing program
- ***Department of Agriculture***: Transfer of cattle breeding responsibility to ICBF

ICBF Strategy for Cattle Breeding

- **How?**

- **Maintain a comprehensive database of Irish animal performance information**
 - IRIS database (developed by CR-Delta)
- **Development of genetic evaluations and indexes to cater for all relevant breeds and traits**
 - Economic Values: Peter Amer, Abacus Biotech, Teagasc
 - Genetic Evaluations: Roel Veerkamp, M. Pool, ID-Lelystad

Industry linkups Data Flow



Pedigree Data on ICBF database

	Pure and crossbred	Pure	% Pure
Charolais	835552	84429	10%
Limousine	786289	57450	7%
Angus	664078	28735	4%
Hereford	643652	24974	4%
Simmental	406929	21980	5%
Belgian Blue	320282	2858	1%
Shorthorn	55435	4770	9%
Blonde Aq	26348	2206	8%
Saler	18777	2373	13%
Aubrac	7316	1496	20%
Piemontese	3244	274	8%
Parthenaise	1988	216	11%
Romagnola	1471	14	1%
11 Others	1612	44	3%



provided by Dr. Robert Kropp



provided by Dr. Robert Kropp



© 1997 Charolais State University

Data Collected

Type of data stored in ICBF	Source	Traits Measured
Pedigree data	CMMS, Herdbooks, AE	Sire and dam Ancestry
Calving Performance	Central PT, AE	Calving Difficulty, Gestation, Mortality
Carcass data	Meat Factories	Carcass weight, conformation, fat
Weaning Weights	Marts & on-farm recording	weight at 150-300 days
Liveweights	Marts & on-farm, Tully	weight at 300-600 days
Linear Scores	On-farm, Tully	14 linear traits
Feed Intake	Tully & Teagasc	KG daily DM intake
Fertility/Survival	Animal Events, AI handhelds	culling reasons, inseminations

- **Meat Factories**

- Carcass grading done using mechanical grading machines
- DAFF exclusive access to computer
- File of data 3 times/year sent to ICBF

- **Livestock Marts**

- Links only established recently with 10 marts on board
- 90 marts in 2005
- Automated update being discussed

Tully Performance Centre

- **Data from 1976 onwards**
- **All breeds, predominantly CH, LM, SI, AA, HE**
- **1976 - 1982: Weight recording**
- **1982 – 2004: Weight and Feed Intake**
- **2004 - 2007: Weight, Feed intake, Linear type and Ultrasound measurements**
- **Farmer retains ownership with sale at end of test**
- **N = 3300 with Feed Intake**

SBV (Suckler Beef Value)

Beef Value

Index	Trait	rg	EW	%
Calving Traits (€)	Calving Difficulty (%)	2.88	1.09	53
	Gestation Length (Days)	1.5	0.79	25
	Calf Mortality (%)	0.73	2.19	22
Weanling Export (€)				
	Weaning Weight (Kgs)	30	0.774	55
	Calf Quality (€)	14.876	1.29	45
Beef Carcass (€)				
	Carcass Weight (Kgs)	20	1.17	46
	Weaning Weight (Kgs)	30	0.52	24
	Carcass Conformation (Grade)	1.54	5.37	11
	Dry Matter Intake (Kgs)	365.82	0.03	12
	Carcass Fat (Grade)	0.94	3.04	7

Replacement Value

Milk & Fertility (€)	Cow Survival (%)	3.6	8.3	26
	Calving Interval (Days)	6.58	3.16	18
	Age at First Calving (Days)	16	0.69	10
	Maternal Calving Difficulty (%)	2.7	4.31	10
	Maternal Weaning Weight (Kgs)	10	3.3	29
	Cull Cow Carcass Weight (Kgs)	40	0.21	7
Calf Quality (€)	Calving Difficulty (%)	2.88	4.08	6
	Gestation Length (Days)	1.5	2.96	2
	Calf Mortality (%)	0.73	9.76	4
	Weaning Weight (Kgs)	30	2.1	32
	Dry Matter Intake (Kgs)	365.82	0.07	13
	Carcass Weight (Kgs)	20	2.88	29
	Carcass Conformation (Grade)	1.54	13.21	10
	Carcass Fat (Grade)	0.94	7.49	4

Suckler Beef Value

Overall SBV is constructed based on the expected proportions of calves born which are:

- **Sold at weaning for live export (PE) =0.15**
- **Retained for slaughter in Ireland (PS) = 0.62**
- **Sold or retained as replacement females (PR) =0.23**

- **Suckler Beef Value (SBV) =**
- **(PE)*(Weanling Export Index)+**
- **PS*(Beef Carcass Index)+**
- **(PE+PS)*(Calving Traits Index)+**
- **(PR)*(Milk & Fertility + Calf Quality)**

Beef in the Dairy EBI (2005)

Sub-index	Trait	Economic Weight	Relative Emphasis	Relative Emphasis
Production	Milk	-0.085	-13%	
	Fat	0.96	5%	42%
	Protein	5.36	24%	
Fertility	Calving interval	-10.87	-24%	
	Survival	10.51	13%	37%
Calving	Calving difficulty direct	-3.26	-3%	
	Calving difficulty maternal	-1.95	-1%	9%
	Gestation	-6.85	-4%	
	Calf mortality	2.85	-1%	
Beef	Cull cow	0.04	0.2%	
	Carcase weight	1.38	4%	
	Carcase conformation	10.32	2%	8%
	Carcase fat	-11.71	-2%	
	Lameness	1.13	0.4%	
Health	Udder Health	-55.48	-5%	5%

Evaluations – (1) Calving Performance

Traits	Sex	Age (days)	Parity	Records	h^2	Used in Index
Calving Difficulty	M & F	> 500	1-5	1,240,000	0.23	Calving, Maternal Calf
Gestation	M & F	> 500	1-5	771,000	0.39	Calving, Maternal Calf
Mortality	M & F	> 500	1-5	668,000	0.01	Calving, Maternal Calf
Maternal Calving	M & F	> 500	1-5	570,000	0.04	Maternal Milk & Fertility

- **Model** - Sire- MGS Model Across Breed, bi-variate analyses
- **Software** - ASREML
- **Breed** - All breeds and crosses, pedigree groups
- Minimum of 5 animals in a herd x year x season contemporary group
- Fixed effects: herd x year x season (*Crump et al. 1997*), Dam breed*parity, Dam breed*sex, recombination (cow and calf), heterosis (cow and calf)

Evaluations – (2) Beef Performance

Traits	Sex	Age (days)	Records	Trait Type	h ²	Used in Indexes
Carcass Weight	M & F	M<875, F<1200	304,885	Goal	0.54	Beef Carcass, Maternal Calf
Carcass Fat Score	M & F	M<875, F<1200	304,341	Goal	0.31	Beef Carcass, Maternal Calf
Carc Conformation	M & F	M<875, F<1200	304,585	Goal	0.59	Beef Carcass, Maternal Calf
Cull Cow Weight	F	>874 & < 4000	65,000	Goal	0.40	Maternal Milk & Fertility
Feed Intake	M	300 - 600 days	2,674	Goal	0.49	Beef Carcass, Maternal Calf
Weaning Weight	M & F	150-300 days	53,659	Goal	0.44	Export, Beef Carcass, Maternal Calf
Calf Quality	M & F	150-300 days	8,349	Goal	0.40	Export
Liveweight	M & F	300-600 days	63,481	Predictor	0.51	-
7 Linear Type Traits	M & F	150-600 days	81,750	Predictor	0.28-0.36	-

- ***Model*** - Multivariate Animal Model Across Breed (15 traits)
- ***Software*** - PEST
- ***Breed*** - All breeds and crosses, Pedigrees groups, Different herd x year x season contemporary groups for each trait
- Minimum of 5 animals in a herd x year x season contemporary group
- Fixed effects: sex*age, herd x year x season (*Crump et al. 1997*), previous hys (carcass traits) scorer (linear type traits), recombination, heterosis,
- Calf Quality: age, weight, num_subs, mart x wdate, herd x year x season, recombination, heterosis

Evaluations – (3) Maternal fertility

Traits	Sex	criteria	Parity	Records	Trait Type	h ²	Used in Index
Calving Interval	F	300-600	1	74,729	Goal	0.05	Milk & Fertility
Survival	F	450 day limit if unknown	1	112,522	Goal	0.02	Milk & Fertility
Age at first Calving	F	>427 & < 1281	1	143,925	Goal	0.28	Milk & Fertility
Lifespan	F	predicted values included	all	143,925	Predictor	0.04	-

- **Model** - Animal Model Across Breed, 4 traits
- **Software** - PEST
- **Breed** - All breeds and crosses, pedigree groups
- Minimum of 3 animals in a herd x year x season contemporary group
- Fixed effects: age, hys, heterosis, recombination

Evaluations – (4) Maternal weaning wt

Traits	Source	Age (days)	Records	Trait Type	Used in Index
Maternal Weaning Wt	Marts, on farm	150-300	19705	Goal	Milk & Fertility
Weaning Weight	Marts, on farm	150-300	46241	Predictor	-
Carcass Weight	factories	M<875, F<1200	230200	Predictor	-
Liveweight	Marts, on farm	300-600 days	52240	Predictor	-

- **Heritability of 0.04 for maternal weaning weight**
- ***Model* - Sire-MGS Model Across Breed, 4 traits**
- ***Software* - ASREML**
- ***Breed* - All breeds and crosses, pedigree groups**
- **Minimum of 3 animals in a herd x year x season contemporary group**
- **Fixed effects: sex*age, herd x year x season, previous hys (carcass traits) recombination, heterosis,**

Useable data for genetic evaluations

Type of data stored in ICBF	Source	Records Available	Useable records	%
Calving Performance	Animal Events	11,000,000	1,500,000	14%
Carcass data	Meat Factories	1,500,000	369,888	25%
Weaning Weights	Marts & on-farm	900,000	52,162	6%
Liveweights	Marts & on-farm	800,000	59,045	7%
Linear Scores	On-farm	110,000	80,473	73%
Feed Intake	Tully & Teagasc	3,300	3,200	97%
Fertility/Survival	Animal Events	1,500,000	180,000	12%

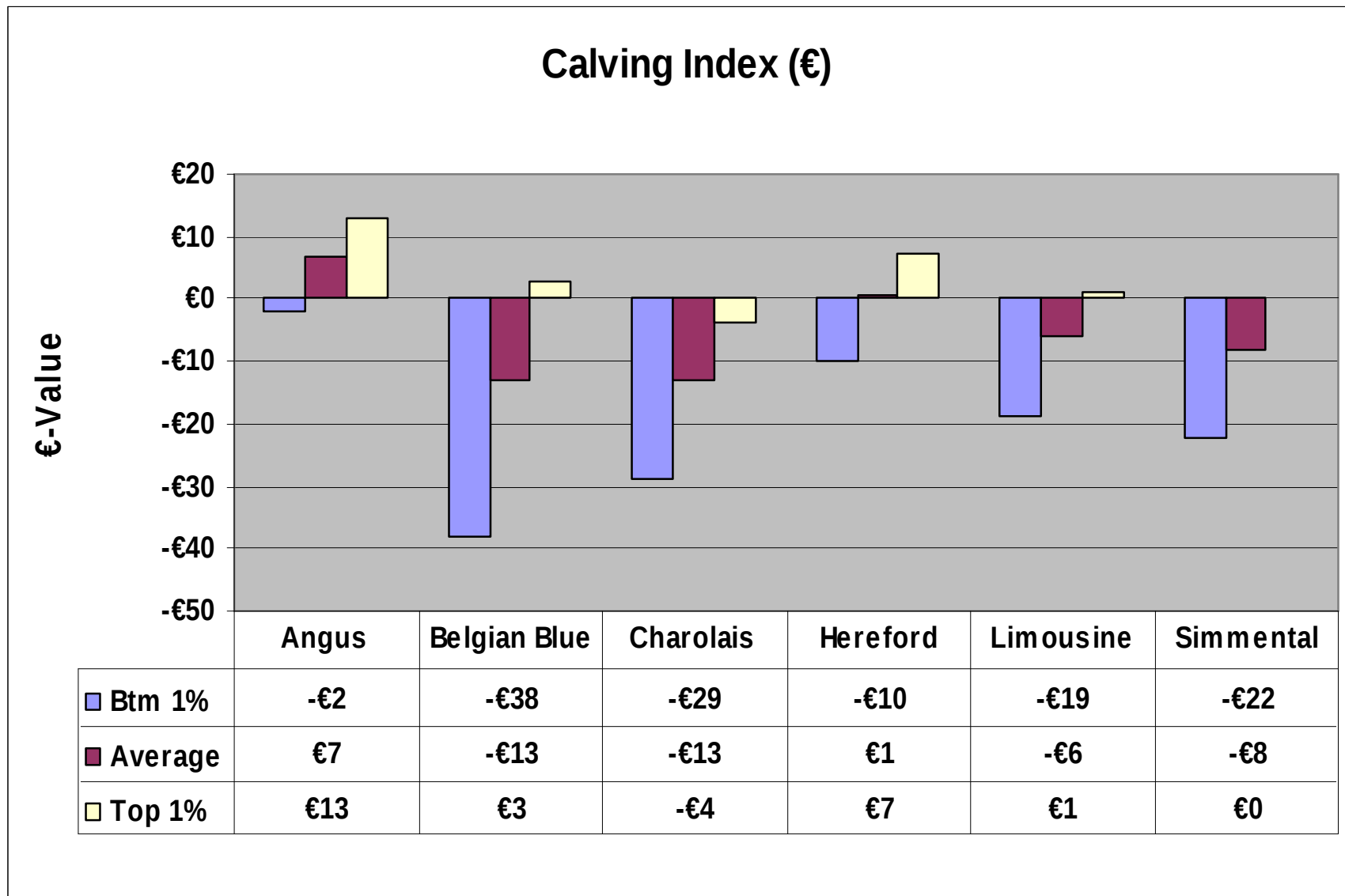
Source	Carcass Traits	Cull Cow Weight	Weaning weight	Calf Price	Live weight	Linear Type
Total Records	116534	5039	36985	6349	36370	80095
% Pedigree	3	30	62	0	70	88
% Commercial	97	70	38	100	30	12

- **Main reasons for loss of useable information is lack of pedigree data and small numbers of records per herd**

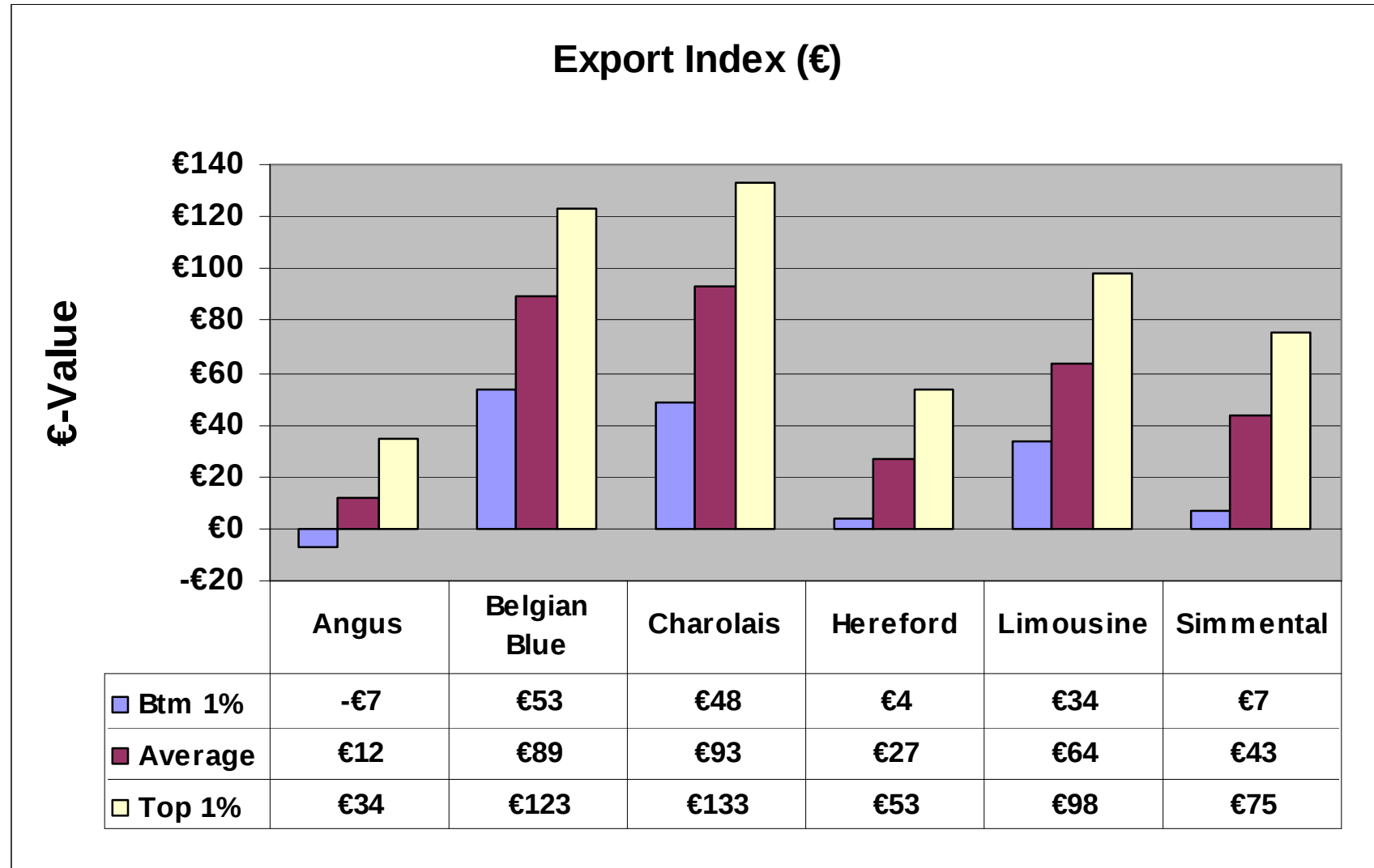
Evaluation November '06

carcass weight			Linear			Weaning Weight		
Breed	records	%	Breed	records	%	Breed	records	%
HO	134965	50	LM	33640	44	CH	16207	34
AA	28586	11	CH	28868	38	FR	11735	25
FR	27302	10	SI	7197	9	LM	9241	19
BB	18107	7	HE	1788	2	SI	4598	10
LM	17705	7	BB	1395	2	HO	2778	6
HE	15866	6	AA	1358	2	BB	1057	2
CH	10770	4	AU	446	1	AA	743	2
SI	8043	3	BA	377	1	HE	666	1
MO	3772	1	HO	195	0	BA	198	0
BA	499	0	FR	95	0	MO	68	0
Other Dairy	4553	2	Other Beef	931	1	Other Beef	300	1
Other Beef	761	0	Other Dairy	132	0	Other Dairy	209	0
Total	270929	100	Total	76422	100	Total	47800	100

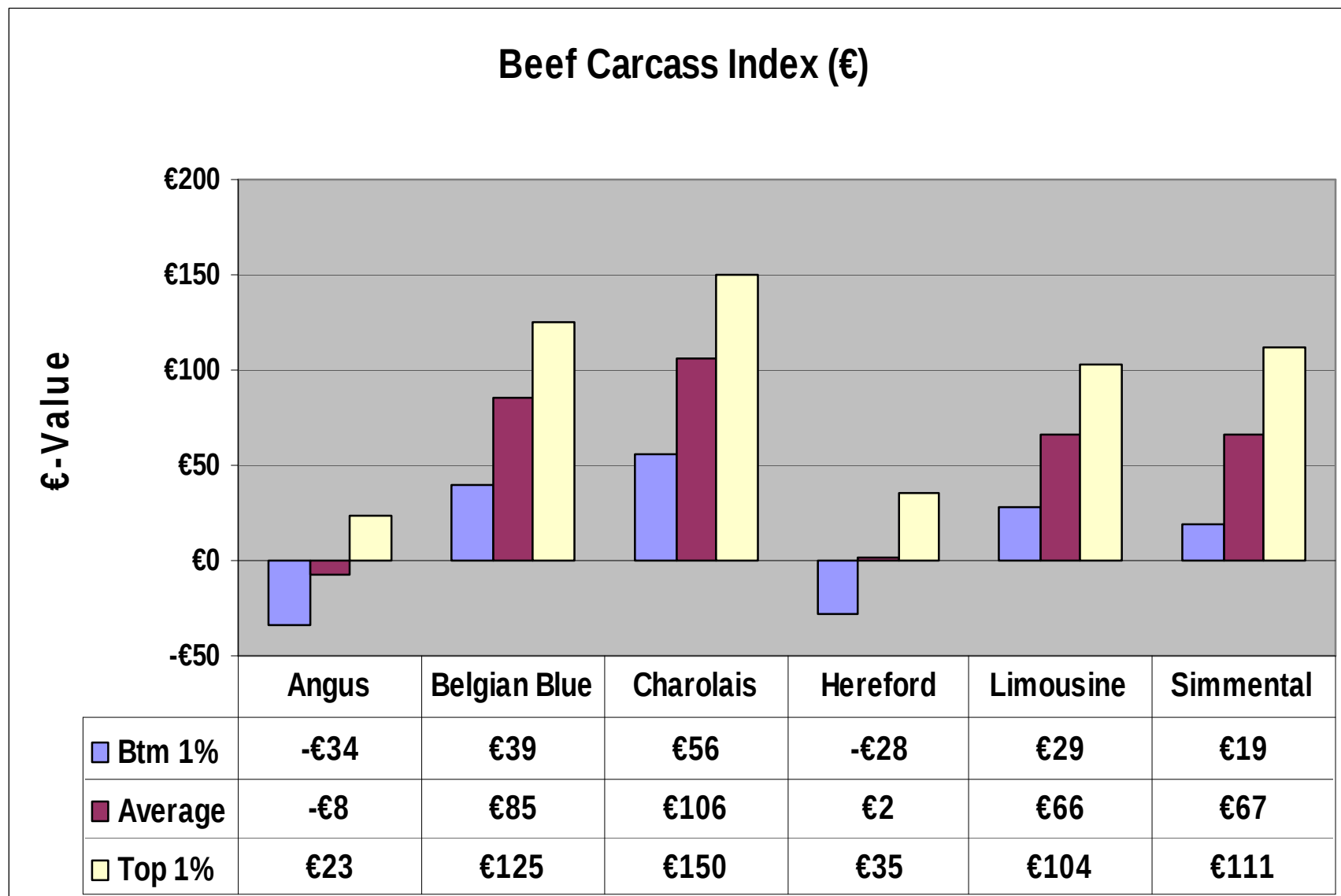
Genetic Variation in Calving Traits



Genetic Variation in Weanling traits

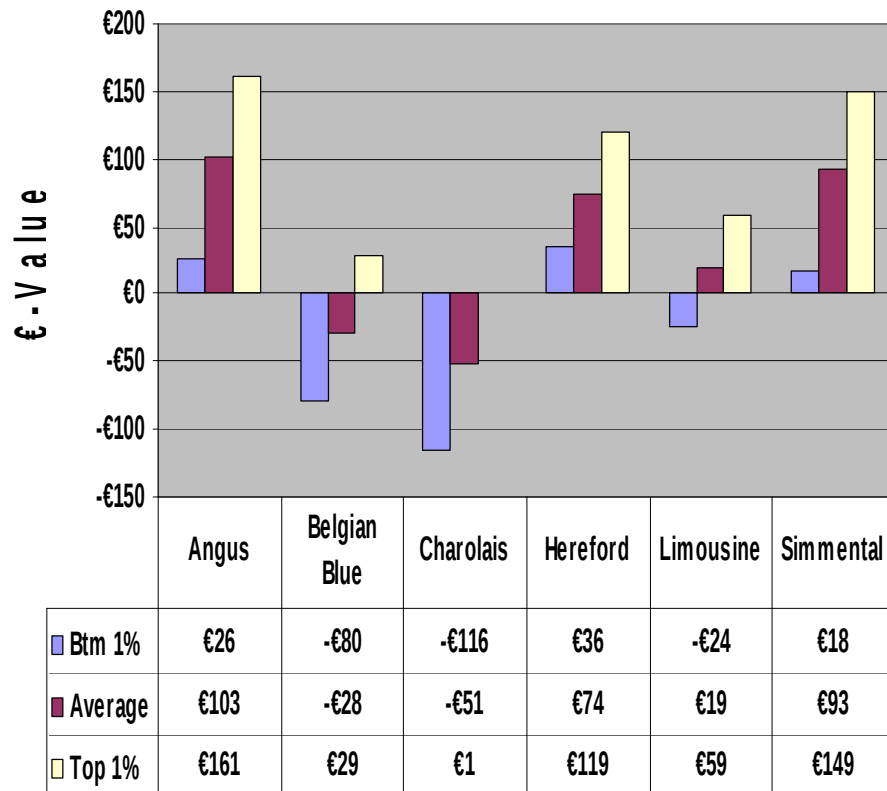


Genetic Variation in Carcass traits

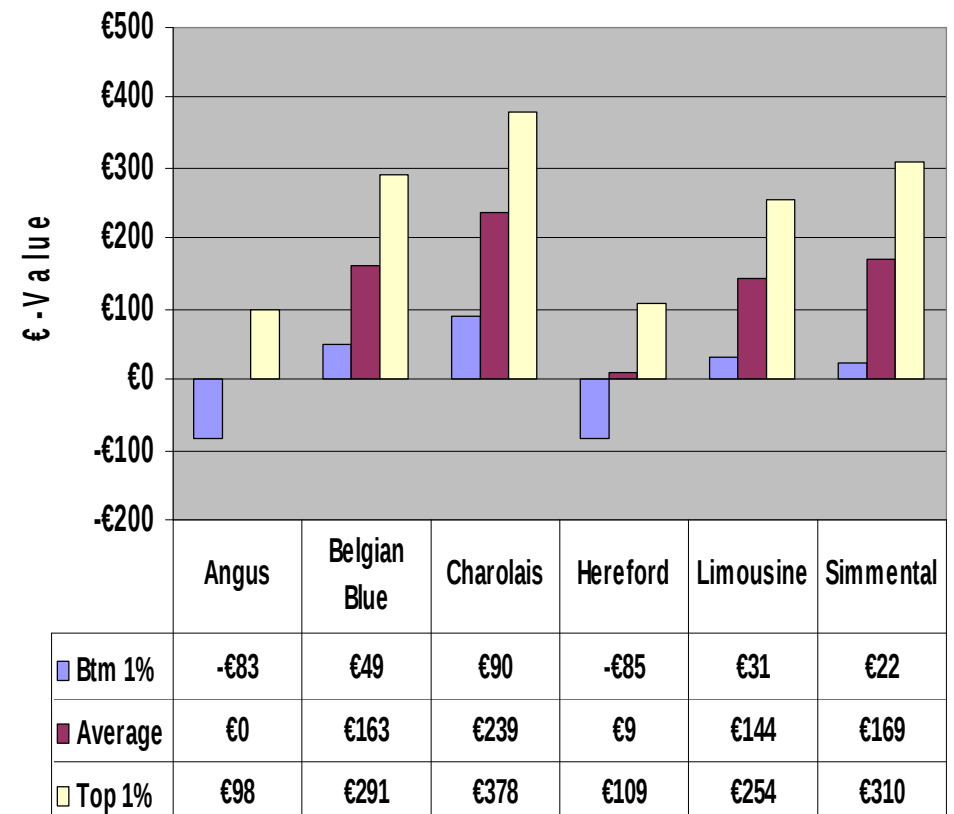


Genetic Variation in Maternal traits

Maternal - Milk & Fertility Index (€)



Maternal CALF Index (€)



- **Naming & presentation of new Indexes.**

1. **Standard template.**
2. Simple terminology
3. Euro-star approach
 - Euro (profit) value
 - Star rating.
 - ***** = Excellent (Top20%)
4. Within & across breeds.
5. Reliability of information



CF52 **Doonally New**

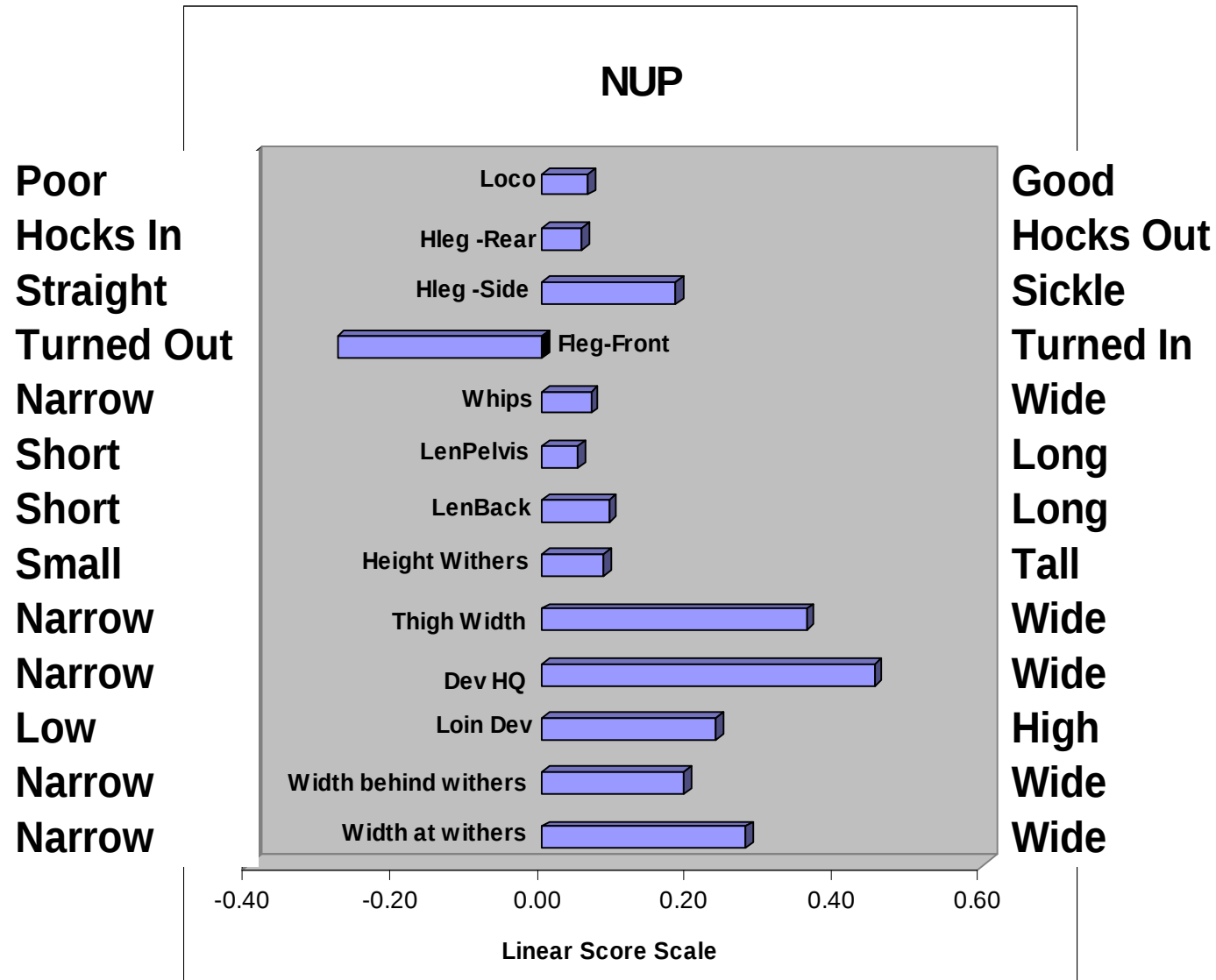
Breed: CH Owner: NCBC DOB: Jan 2000
Euro-Star rating (ICBF Jan 2007)

Star rating within breed		Star rating across all breeds	
★★★★★	Suckler beef value €145	★★★★★	
BEEF VALUE			
★★	Calving -€20	★	
★★★★★	Weanling export €123	★★★★★	
★★★★★	Beef carcass €154	★★★★★	
REPLACEMENT VALUE			
★	Milk & fertility -€148	★	
★★★★★	Calf quality €351	★★★★★	
OTHER KEY TRAITS			
★★	Calving difficulty 13%	★	
★★★	Docility 100	★★★	

Key to symbols ★ High reliability ★ Average reliability ★ Low reliability

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Linear Type Traits for Pedigree Breeders





Future developments



- **Female Fertility**: Expand CIS to later lactations
- **INTERBEEF**: develop an across country evaluation for common breeds and traits
- **Conversion**: formula in interim period
- **Software**: Testing with MIX99 to facilitate maternal components - ID-Lelystad
- **Linear Type**: Rollout of linear type trait evaluation
- **Tully** Use of indexes in selection of bulls
- **Herd Reports**: Rollout to pedigree and commercial farmers
- **Sire advice**: Commercial & Pedigree farmers
- **PhD work**: on genetic parameters within breed,
- **Individual Cuts**: Digital carcass images stored