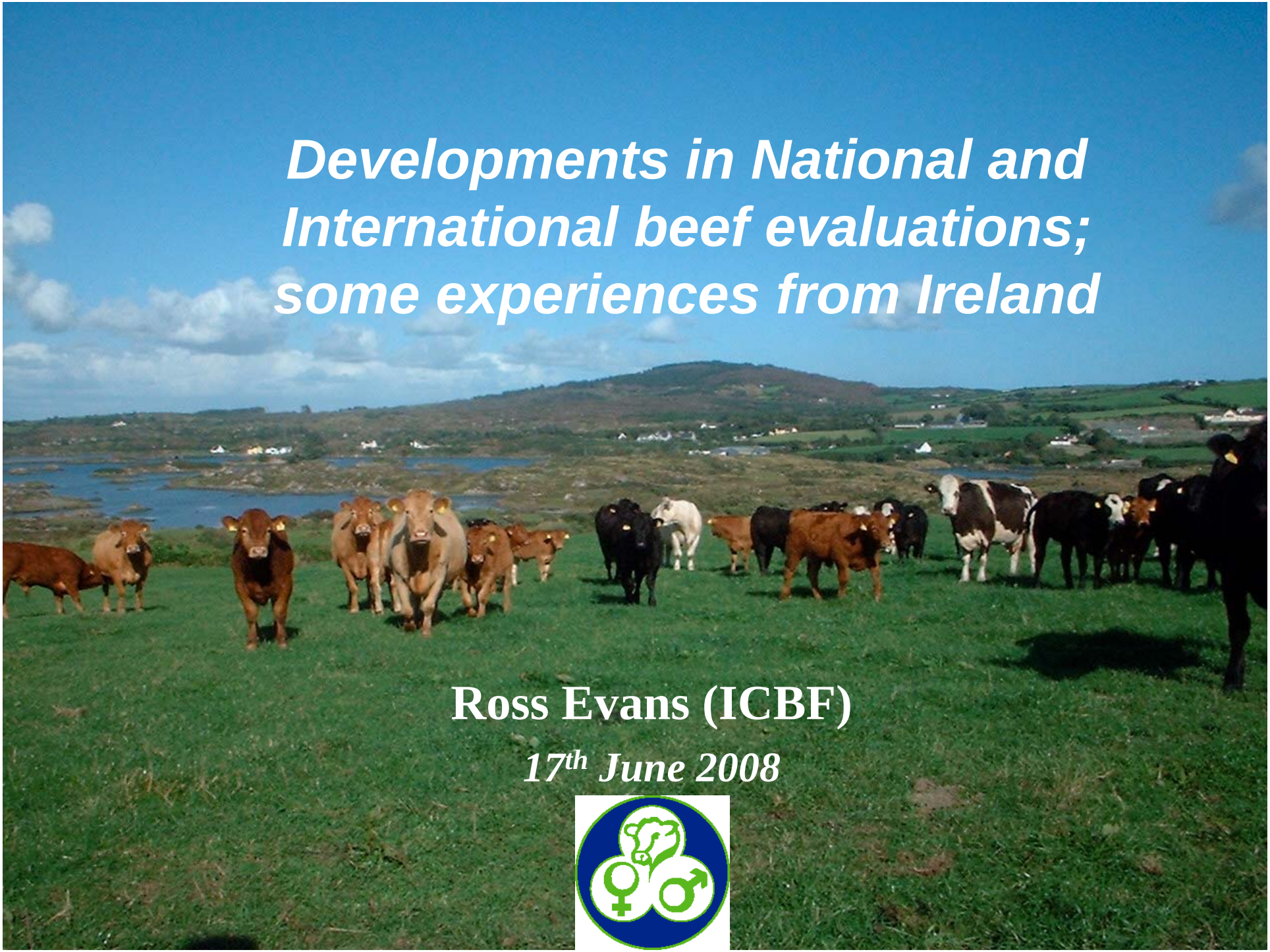


Developments in National and International beef evaluations; some experiences from Ireland

Ross Evans (ICBF)

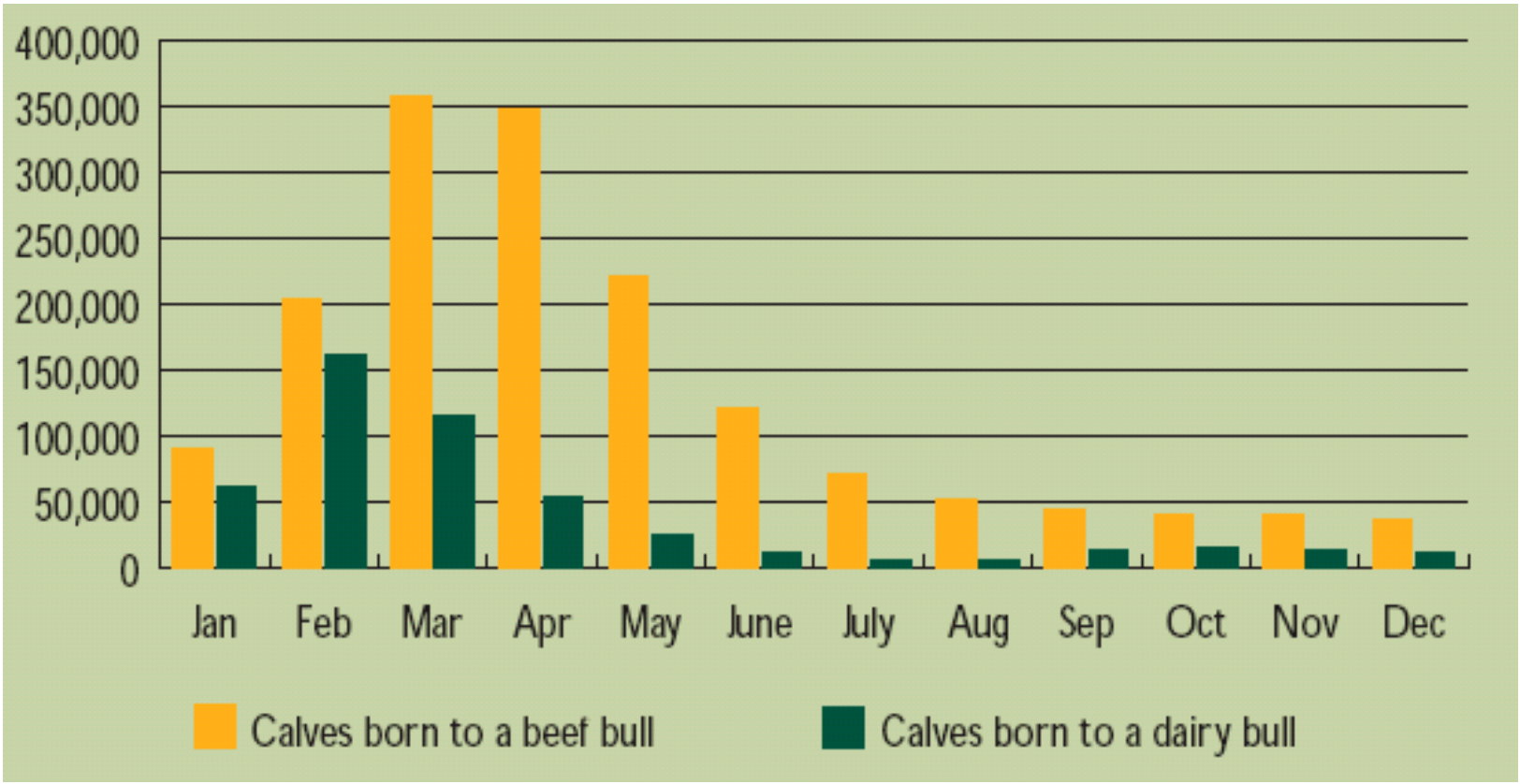
17th June 2008

Overview: Calf Births

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

- **Large use of Beef Sires on the dairy herd**
- **Large level of crossbreeding in the Suckler herd**

Overview: Profile of Calf Births



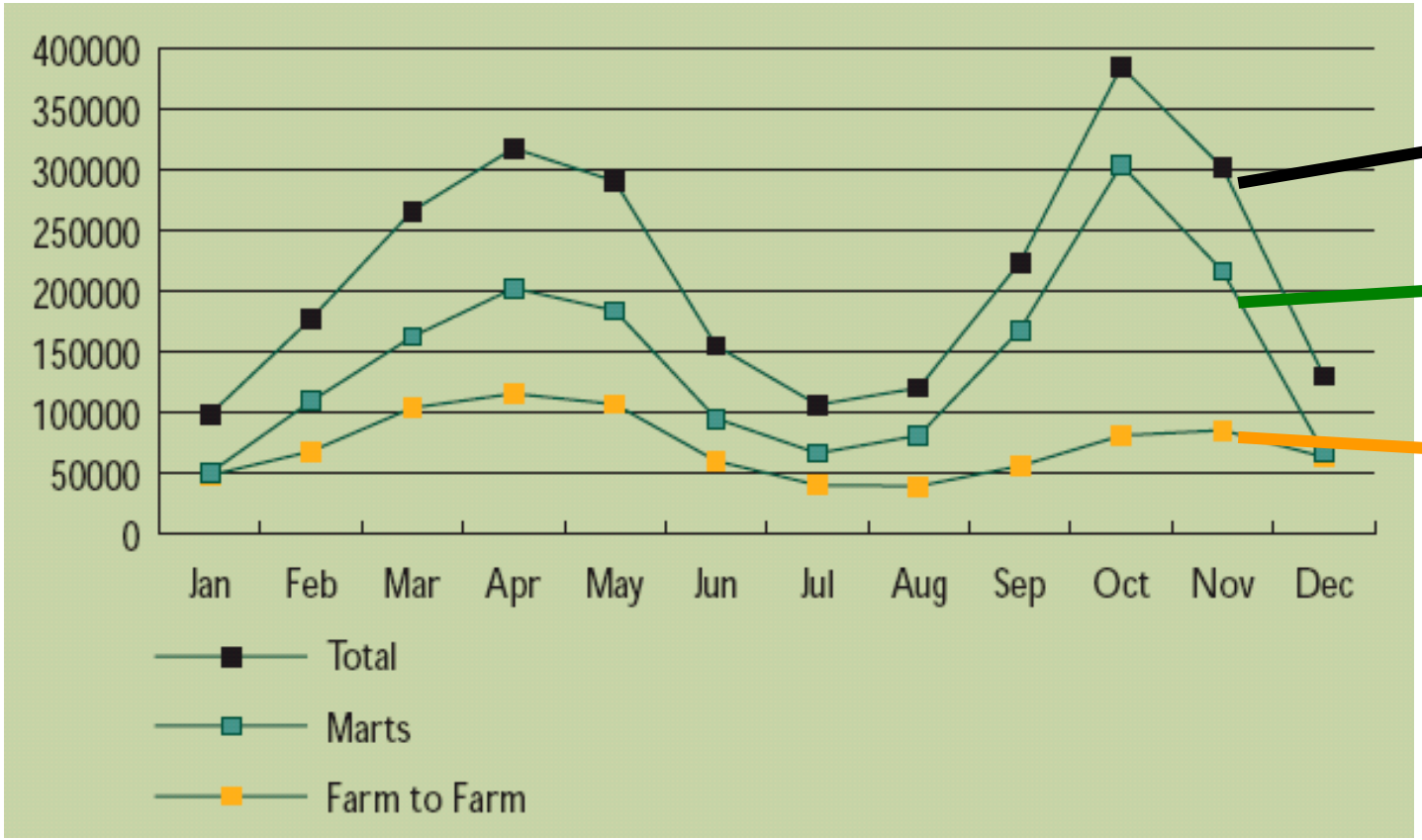
- **Seasonal aspect to calving**
- **High usage of natural service beef sires in dairy herds at end of breeding season**

Profile of Beef Calving herds

Type of Calving herd on ICBF database	Count of herds	Count of cows calved	Averages no. of cows per type of herd		Count of calving herds in various categories of herd size (total beef cows only)					
			pedigree	crossbred	<5	5 to 9	10 to 24	25 to 49	50 to 99	>100
Crossbred beef cows only	40,482	503,270	0	12	10,786	10,328	14,439	4,238	651	40
Pedigree beef & crossbred beef cows	5,905	126,512	4	17	385	1,036	2,704	1,375	382	23
Pedigree beef, crossbred beef & dairy cows	967	17,712	4	14	135	227	377	168	52	8
Pedigree beef cows only	702	5,028	7	0	366	171	135	29	1	0
Pedigree beef & dairy cows	214	1,061	5	0	146	38	24	5	1	0

- **Pedigree herd size is small but substantial linkage with commercial herds**
- **~30% of herd replacements in commercial herds sourced from dairy herds**

Overview: Profile of Cattle Movements



n = 2,575,546

1,708,307 (66%)

867,239 (34%)

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

Profile of Fattening beef herds

Type of fattener herd on ICBF database	Count of herds	Count of animals	Averages no. of animals per type of herd			Count of fattening herds in various categories of herd size				
			Dairy	Beef	Dairy x Beef	<25	25 to 49	50 to 99	100 to 499	>500
beef animals only	11,598	57,919	0	5	0	11,303	241	46	8	0
beef, dairy & 1st cross dairy-beef animals	7,257	273,193	13	12	13	3,574	2,100	1,169	402	12
dairy & 1st cross dairy-beef	6,384	120,927	12	0	7	4,792	1,236	331	25	0
beef & 1st cross dairy-beef	5,250	89,065	0	14	3	4,207	706	264	73	0
dairy animals only	2,937	26,562	9	0	0	2,700	192	40	5	0
1st cross dairy-beef	1,216	2,855	0	0	2	1,215	1	0	0	0
beef & dairy animals	959	10,223	6	4	0	874	74	10	1	0

Data Collected

Type of data stored in ICBF database	Source of Information	Data Recording and Traits Created
Pedigree Data	Herdbooks, Animal Events	Sire and dam ancestry, breed of sire and dam, sex of calf
Cattle Movements	DAF - CMMS	CMMS: All cattle movements
Calving Performance	Animal Events	Calving difficulty, gestation, mortality, maternal Calving difficulty
Weaning Weight	Livestock Marts & on-farm recording	Individual weight at 150 - 300 days
Calf Quality	Marts	Mart price per kg at 150 - 300 days
Linear Score	On-farm, Tully	15 linear type traits
Liveweight	Marts, Tully & on-farm	Individual weight at 300 - 600 days
Feed Intake	Tully & Teagasc	KG daily DM intake on test
Carcass data	Meat Factories	EU grading systems, Carcass weight, conformation, fat, Digital Carcass images
Fertility/Survival	Animal Events, AI technicians	Age at first Calving, Gestation, calving to service intervals, Calving interval, survival, Lifespan,

Useable data for genetic evaluations

Type of data stored in ICBF	Total Records Available	With a sire recorded	Qualifying for evaluation	% purebred in evaluation
Calving Performance	11,911,056	43%	15%	9%
Carcass data	2,740,449	37%	20%	4%
Weaning Weights	366,257	41%	21%	38%
Liveweights	491,716	42%	18%	41%
Linear Scores	146,257	97%	65%	86%
Calf Price per kg	297,476	20%	8%	0%
Feed Intake	3,300	100%	97%	100%
Fertility/Survival	1,276,595	20%	17%	16%

- ***Main reasons for loss of available information in data edits is lack of pedigree data and then small numbers of records per herd***

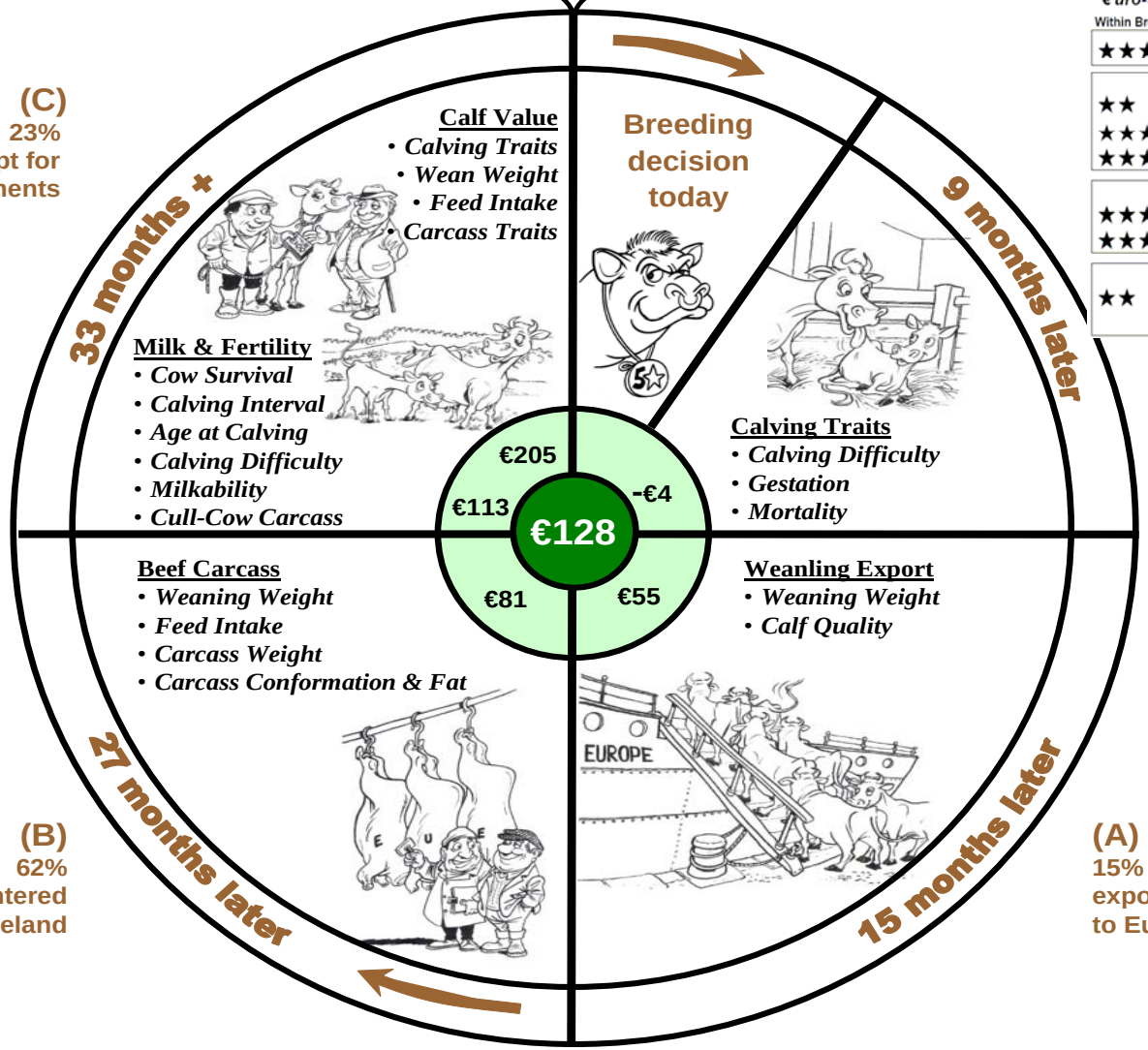
Evaluation details

Index	Traits	Sex fixed effects	Age	Parity of dam	heritability
Calving Traits Index €	calving difficulty	Male, Female	dam >500 days	1 - 9	0.23
	gestation	Male, Female	dam >500 days	1 - 9	0.39
	mortality	Male, Female	dam >500 days	1 - 9	0.01
Weanling export Index €	weaning weight	Male, Female	150-300 days	1,2 3+	0.44
	mart price per kg	Male, Female	150-300 days		0.4
Beef Carcass Index €	liveweight	Male, Female	300-600 days		0.51
	feed intake	Male	300-600 days		0.49
	7 linear type traits	Male, Female	150 - 600 days		0.28 - 0.36
	carcass weight	heifer, bull, steer	300 <875 (1200 if male)		0.54
	carcass conformation	heifer, bull, steer	300 <875 (1200 if male)		0.59
	carcass fat	heifer, bull, steer	300 <875 (1200 if male)		0.31
Milk & Fertility Index €	age at 1st calving	Female	427 - 1281days	1	0.28
	maternal calving difficulty	Female	dam >500 days	all	0.04
	maternal weaning weight	Female	150-300 days	1,2 3+	0.05
	calving interval	Female	300-600 days	1	0.05
	survival	Female	450 days post calving	1	0.02
	lifespan	Female	all parities <20	1	0.04
	cull cow carcass wt	Female	874 - 4000 days	all	0.4

- **4 evaluations: Calving performance, Beef performance, maternal, linear**
- **All breeds and crosses included, pedigree groups in pedigree file**
- **Minimum of 5 animals in a herd x year x season contemporary group**
  Within herd calving patterns *(Crump et al. 1997)*
- **General heterosis & recombination (cow and calf in calving evaluation)**

Presentation of SBV and sub-indexes

SBV = Overall profit measure, per calf born to a bull.



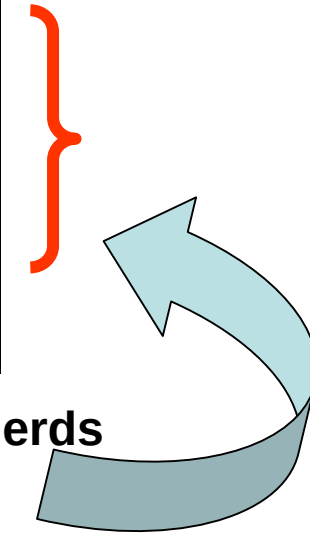
€uro-Star Rating (ICBF, Feb 2008)

Within Breed		Index	Data rel	Across Breed
★★★★★	Suckler Beef Value	€ 76	73%	★★★
	Beef Value			
★★	Calving Traits	€ 0	81%	★★★★
★★★★★	Weanling Export	€ 29	72%	★★
★★★★★	Beef Carcass	€ 43	71%	★★
	Replacement Value			
★★★	Milk & Fertility	€ 82	22%	★★★★★
★★★★★	Calf Quality	€ 116	75%	★★★
	Other Key Traits			
★★	% Difficulty Calving	4.96%	93%	★★★
	Docility	%	%	

- ***Herd reports issued to participating farmers***
- ***All AI and pedigree natural service bulls available on ICBF website***

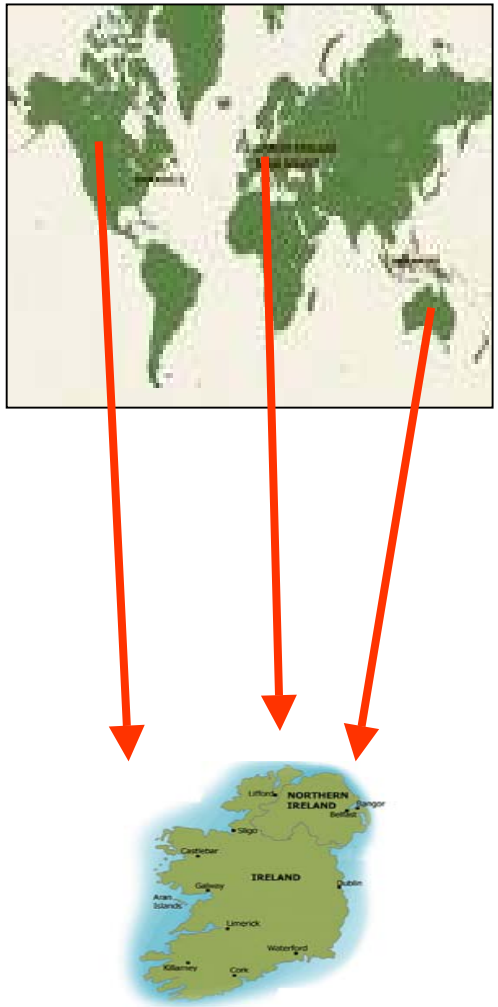
Dairy Breeding Index 2008

Traits	Economic Value €	relative emphasis	Sub indexes
Milk Yield	-0.09	12	Milk 42%
Fat Yield	1.26	5	
Protein Yield	6.91	25	
Calving Interval	-11.97	24	Fertility 34%
Survival	11.17	11	
Direct Calving difficulty	-3.65	4	Calving 11%
Maternal Calving difficulty	-1.73	2	
Gestation	-7.5	5	
Calf Mortality	-2.85	1	
Cow weight	-0.51	2	Beef 9%
Carcass weight	1.38	4	
Carcass conformation	10.32	2	
Carcass fat	-11.71	1	
Somatic Cell Count	-57.21	3	Health 4%
Locomotion	1.13	1	

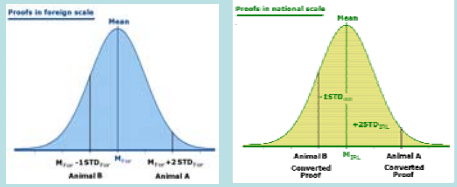


- Includes influence of 1st cross beef x dairy heifers entering beef herds

Best use of available foreign EBVS



1. Ranking method: smaller breeds SA, PT, AU ¿



2. Conversion formulae: French CH and LM ¿

Converting French proofs into Irish scale Using multiple linear regression PD(IRL) = a + b1BV1(FRA) + b2BV2(FRA) + … + bnBVn(FRA)

3. Integration directly in Evaluation: Currently under test. Advantage: no blending

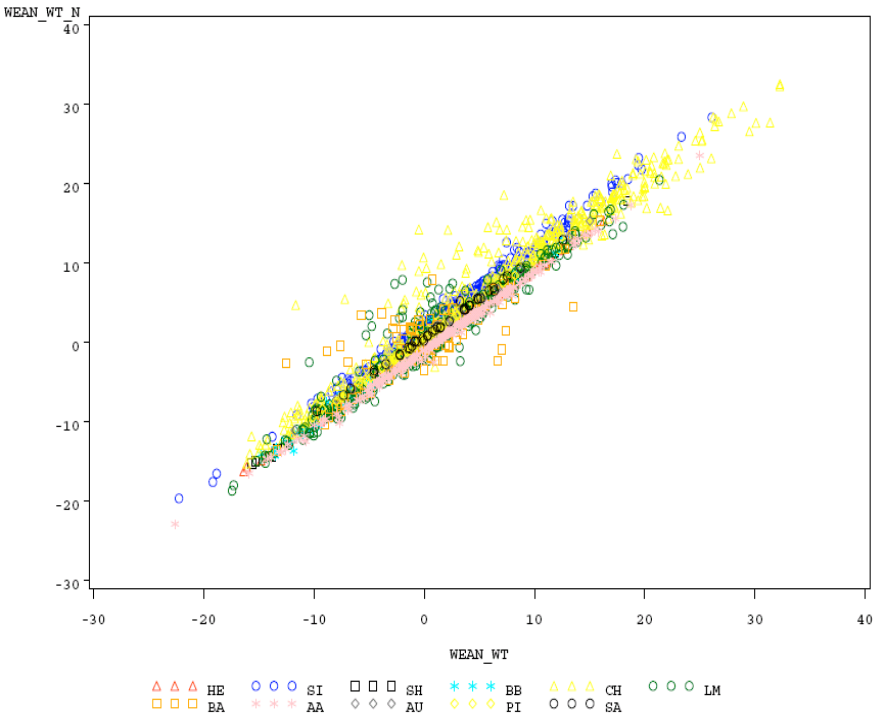
Using MIX99 (Lidauer et al. 2006)

4. INTERBEEF: Involved in initial pilot study with France, UK using performance data for Limousine & Charolais

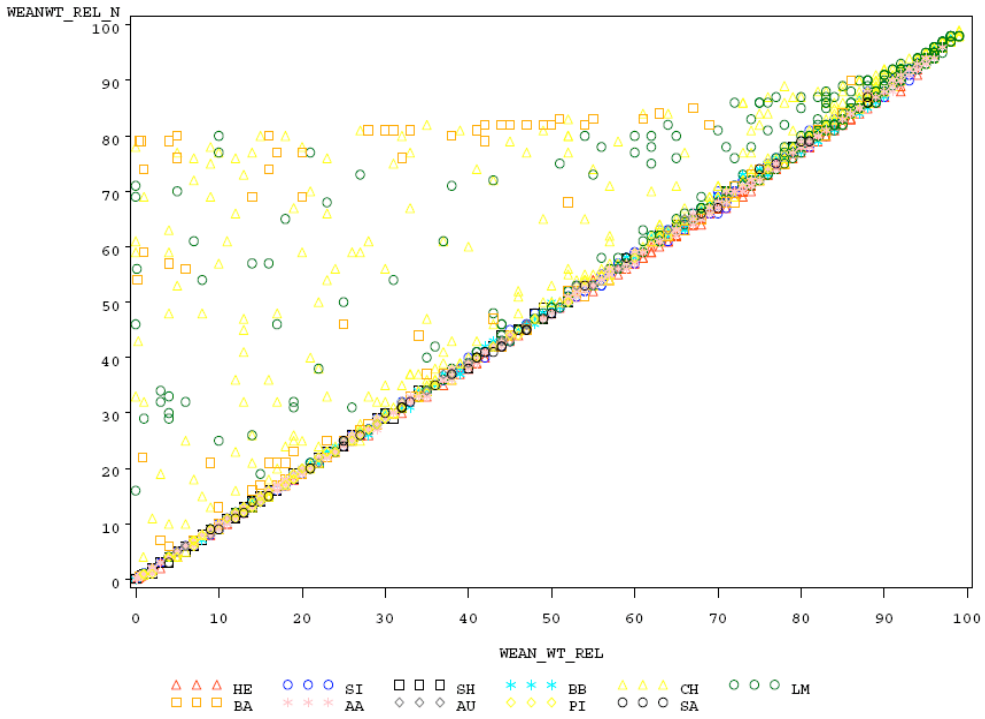
Integration of foreign EBVs

- **MIX99 genetic evaluation software (Lidauer et al., 2006)**
- **French EBVs for Charolais, Limousine, Blonde d'Aquitaine and pedigrees**
  - **Weaning weight direct and maternal**
- **Issues under investigation: Scaling and deregressing proofs, foreign heritabilities, Genetic correlations for foreign EBVs and 15 Irish traits, weighing of EBVs in evaluation depending on reliability**

Weaning wt – existing vs new with foreign EBVs integrated



Weaning wt rel – existing vs new with foreign EBVs integrated



Future developments

- ***Female Fertility:*** Expand CIS to later lactations and incorporate the insemination data now being collected
- ***Heterogeneity of variance*** across the breeds (Hickey et al. 2007)
- ***Refining of genetic groups*** sampling method developed by Hickey et al. 2008 to determine accuracy of across breed EBVs. Use to determine data quality, adequate data?
- ***Specific heterosis*** and recombination effects
- ***Research on new traits:***
  - Digital carcass images stored, EBVs individual cuts
  - Incorporation of new traits into SBV, docility, polledness


Thank You!