

Recent Developments in Selection for Docility in Ireland

National Seminar on Strategies for improving Safety with Cattle

Ross Evans ICBF

23rd November 2010

Teagasc Health & Safety Conference
Grange



Importance of docility

- In 2005 612 on farm accidents due to temperamental beef cattle (*McNamara et al., 2007*)
 - 27 deaths between 1996 and 2007 due to cattle livestock incidents (*Irish Health and Safety Authority – code of practice, 2007*)
 - Average of 2.25/ year. 85% of these were attacks by bulls, cows, and weanlings (HSA, 2007)

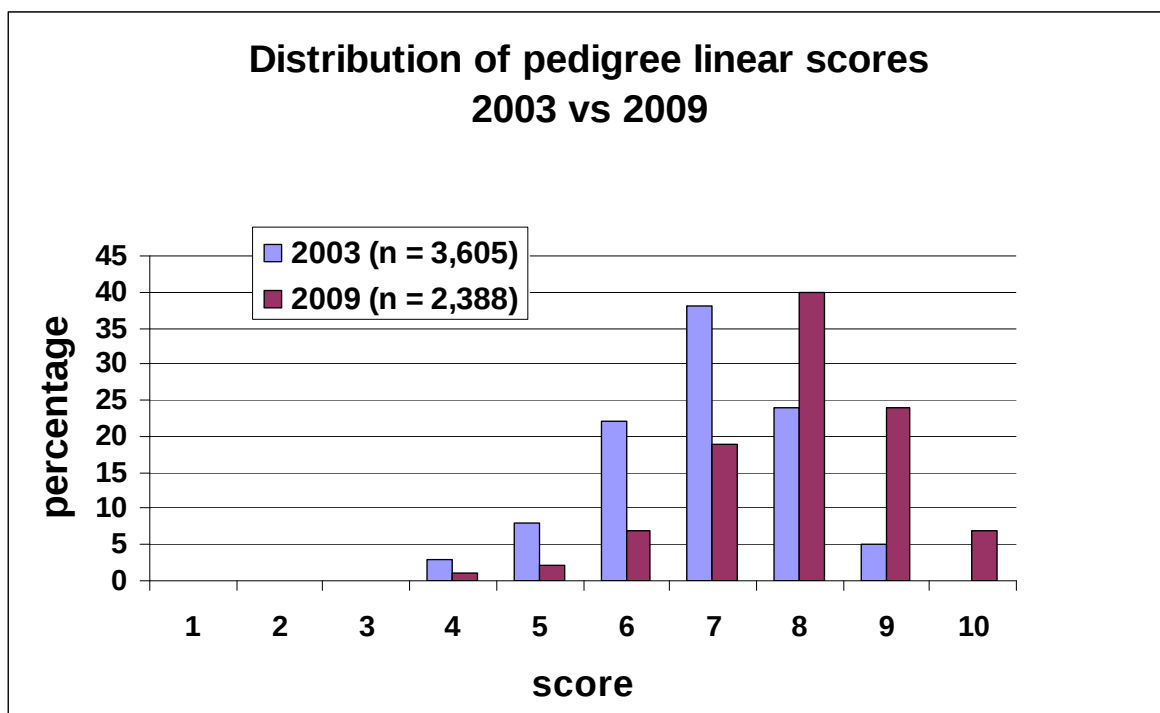


Evaluation pre -2009

- ICBF Trained Linear Scorers
- Limousine breed published figures based on pedigree animals
 - Breed average of 100, sd. of 10
- ~ 122,397 animals with docility
 - LM, CH, SI, HE, smaller numbers of other breeds including commercials
 - scale 1 to 10

Slide 3

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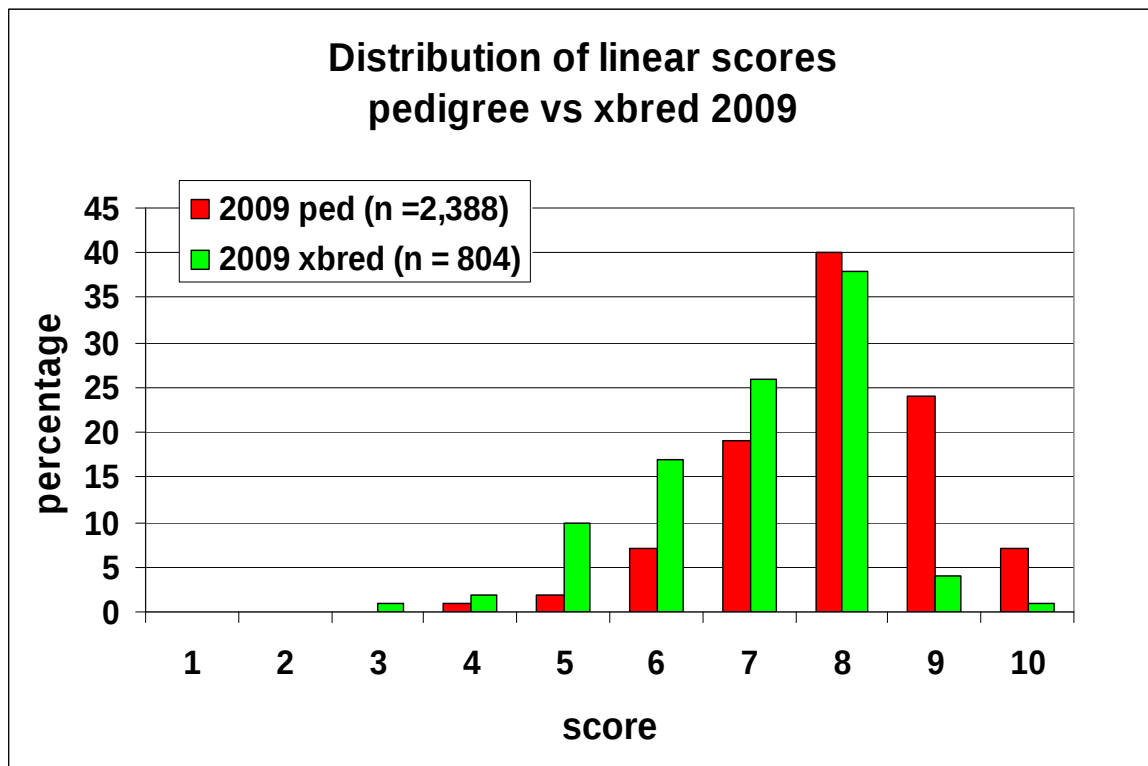
~70% of scores recorded now 8, 9, 10 (28% in 2003)

But ~ less than 50% of population measured

Genuine improvement or selective scoring

Slide 4

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More variation when scoring crossbreds
 (std = 1.24 for xbred vs 1.13 for pedigrees)

Slide 5

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Animal welfare recording and breeding scheme



- Launched in January 2008 by Dept. of Agriculture
- ~ 60,000 herds, voluntary sign-up, monetary payment
- Adhere to certain welfare measures, weaning measures
- Recording of sire, calving ease, disbudding, meal feeding, weaning, docility and calf quality

recordsource	% of total
ICBF_papersheets	83%
online_DEPT_website	12%
online_farmsoftware	2%
online_www.ICBF.com	4%

Slide 6

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Paper based recording



N.I.D. No: IE3010353

Form No: 100268875

Suckler Cow Quality and Welfare Scheme Notification Form

Date: 17-Feb-2009

B.T.E. No: S1080080

Calf Ear Tag Number		Date of Birth	Section A Date of Disbudding*	Section B Date of Castration**	Section C Date of Commencement of Meal Feeding	Section D Date of Weaning	Section E Calf Docility (near time of weaning)	Section F Calf Quality (near time of weaning)	Section G Animal Weight (if available)
1-0024 (F)	01/09/2008	12/09	FEMALE	25/11	dd/mm	1 2 3 4 5	1 2 3 4 5	dd/mm	
2-0025 (M)	23/09/2008	30/09	N/A	25/11	dd/mm	1 2 3 4 5	1 2 3 4 5	dd/mm	
3-0026 (M)	23/09/2008	30/09	N/A	25/11	dd/mm	1 2 3 4 5	1 2 3 4 5	dd/mm	
4-0027 (F)	25/09/2008	04/10	FEMALE	25/11	dd/mm	1 2 3 4 5	1 2 3 4 5	dd/mm	
5-0028 (M)	28/09/2008	04/10	N/A	25/11	dd/mm	1 2 3 4 5	1 2 3 4 5	dd/mm	

ICBF on-line recording

ICBF - Web Application - Microsoft Internet Explorer

Address: http://www.icbf.com/taurus/suckler/farmer_qual_doc_record.php

ICBF Web Application

JOHN WALSH
Logged in at: 17-Feb-2009 15:20

HOME - HerdPlus CONTACT SUPPORT LOG OUT

Record Calf Docility and Quality

Please enter the relevant scores for each animal using the scales presented below.

Total: 13 animals

Calf Tag	DOB	Dam Tag	Calf Docility	Calf Quality
IE301035310024	01-Sep-2008	IE251255310217	2: Quiet	
IE301035320025	23-Sep-2008	IE361133140052	4: Difficult	
IE301035330026	23-Sep-2008	IE301054670191	3: Average	
IE301035340027	25-Sep-2008	IE311226350087	2: Quiet	
IE301035350028	28-Sep-2008	IE251320940364		
IE301035360029	06-Oct-2008	IE201064610013		
IE301035380030	01-Nov-2008	IE201150920348		
IE301035390031	01-Nov-2008	IE141609790568		
IE301035310032	08-Nov-2008	IE201157810112		
IE301035320033	17-Nov-2008	IE251118530150		
IE301035330034	25-Dec-2008	IE251071860556		
IE301035340035	06-Jan-2009	IE221107130336		

Step 1: Select Docility and Calf Quality Score

Step 2: Save Data

Save Data

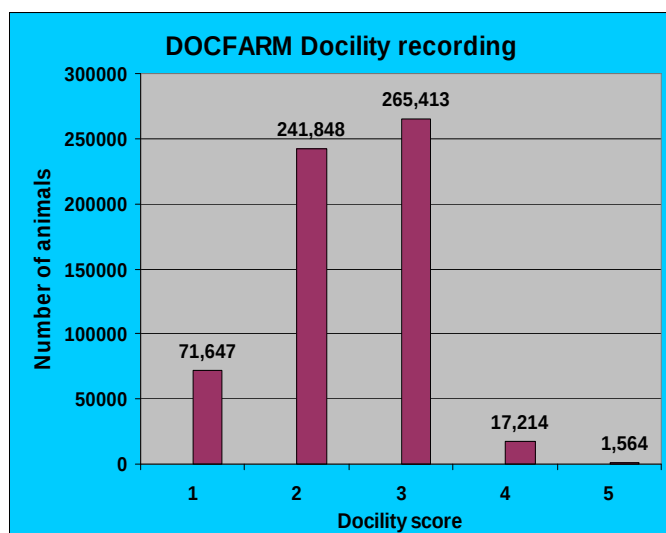
Total: 13 animals

Top Of Page | Contact Support | Disclaimer

Two Forms of Docility

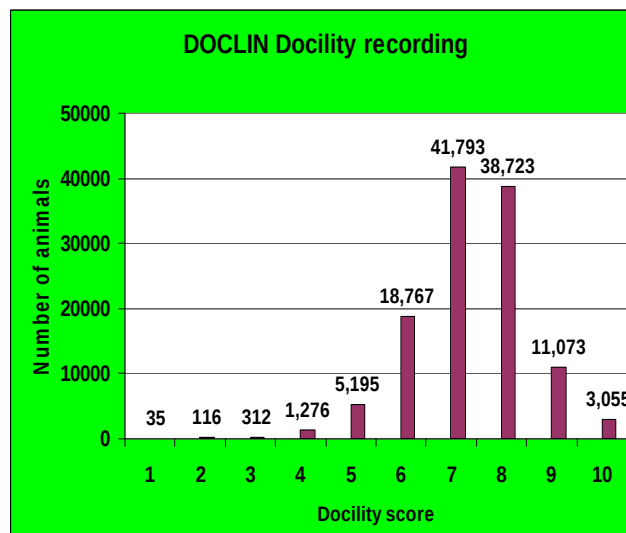
Farmer (DOCFARM)

n = 597,686



Technician (DOCLIN)

n = 122,397



Two Forms of Docility

Farmer (DOCFARM)

Breed	N-Obs	% com	% female
Angus	43,641	94	49
Aubrac	2,119	78	48
Blonde D'A	5,972	96	49
Belgian Blue	26,780	99	49
Charolais	246,811	97	49
Hereford	19,087	91	49
Limousine	190,973	97	49
Piemontese	920	89	48
Parthenaise	997	91	49
Saler	6,332	92	50
Shorthorn	7,011	89	52
Simmental	39,096	95	49

Technician (DOCLIN)

Breed	N-Obs	% com	% female
Angus	2,570	34	51
Aubrac	1,031	12	64
Blonde D'A	1,033	46	51
Belgian Blue	2,874	92	50
Charolais	28,903	21	51
Hereford	3,040	7	49
Limousine	69,287	10	51
Piemontese	322	15	52
Parthenaise	247	38	55
Saler	1,029	13	62
Shorthorn	356	49	71
Simmental	9,220	21	51

Genetic Parameter Estimation

- **Edits**

- Only Animals recorded prior to sale DOCFARM
- Animals scored between 150-300 days for both traits
- Herds with variation in contemporary group (at least 3 scores)
- Variation in calf quality score and recorded same day
- Wean to docility recording <100 days
- CGs with at least 3 different sires (*DOCFARM*), 2+ different sires (*DOCLIN*)
- Only contemporary groups with >10 animals (*DOCFARM*), >5 animals (*DOCLIN*)
- Remaining *DOCFARM* = 73,827, *DOCLIN* = 18,310

Slide 11

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Genetic Parameter Estimation

- 5 generation pedigree,

Animal model, no maternal effects

DOCFARM: CG of score date, sex, age, parity of dam, heterosis and recombination, meal feed

DOCLIN: CG of score date, sex, age, parity of dam, scorer, heterosis and recombination

Trait	N-Obs	N-Obs with both	-2LogL	h^2	r_g	r_p
DOCFARM	73,827			0.44		
DOCLIN (150-300 day)	18,310	1,238	24449	0.25	-0.68	-0.19
DOCLIN (150-600 day)	72,228	2,304	72468	0.24	-0.40	-0.16

Genetic Parameter Estimation

Fixed Effect	DOCFARM	DOCLIN
Age	Older more docile	Older more docile
Sex	Females slightly less docile	Females slightly less docile
Heterosis	Crossbreds less docile	Crossbreds less docile
Meal Feeding	More docile with longer days on meal	
Parity	Animals from 1st parity cows less docile	No significant difference

Genetic Parameter Estimation

Maternal Effects: tested on smaller dataset

Model	-2LogL	h^2_d (DOCLIN)	h^2_m (DOCLIN)	mat env (DOCLIN)	r_{gm} (DOCLIN)
Genetic effects only	32331	0.28			
Genetic & maternal environment	32312	0.28		0.03	
Genetic & maternal genetic	32276	0.24	0.04		-0.47
Genetic & maternal genetic & maternal environment	32255	0.28	0.03	0.03	-0.69

Results: similar to Beckman et al., (2007) on US Limousines

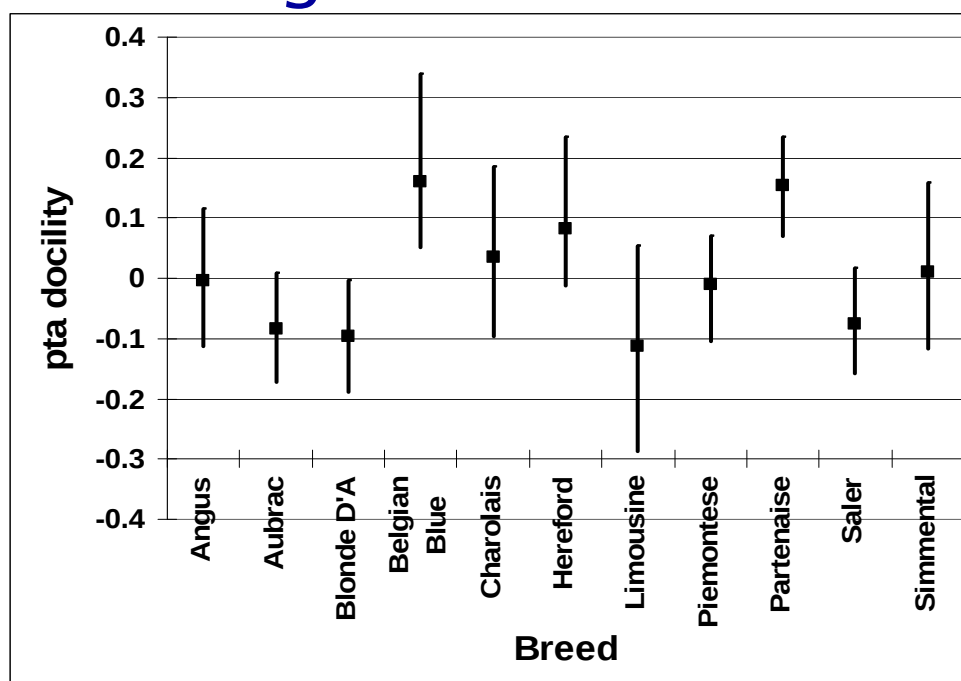
Follow up study conclusion: bias in herds due to selective recording, not all poor phenotypes recorded

Breeding Value Estimation

- Relaxed restriction on contemporary groups with at least 3 different sires represented
- % Crossbreds DOCFARM (96%) DOCLIN (39%)

Trait	N-obs	Animals with both	Average score	S.D.
AWRBS	302,065	3,816	2.4	0.76
linear scores	23,721		7.3	1.14

Average PTA Breed effects

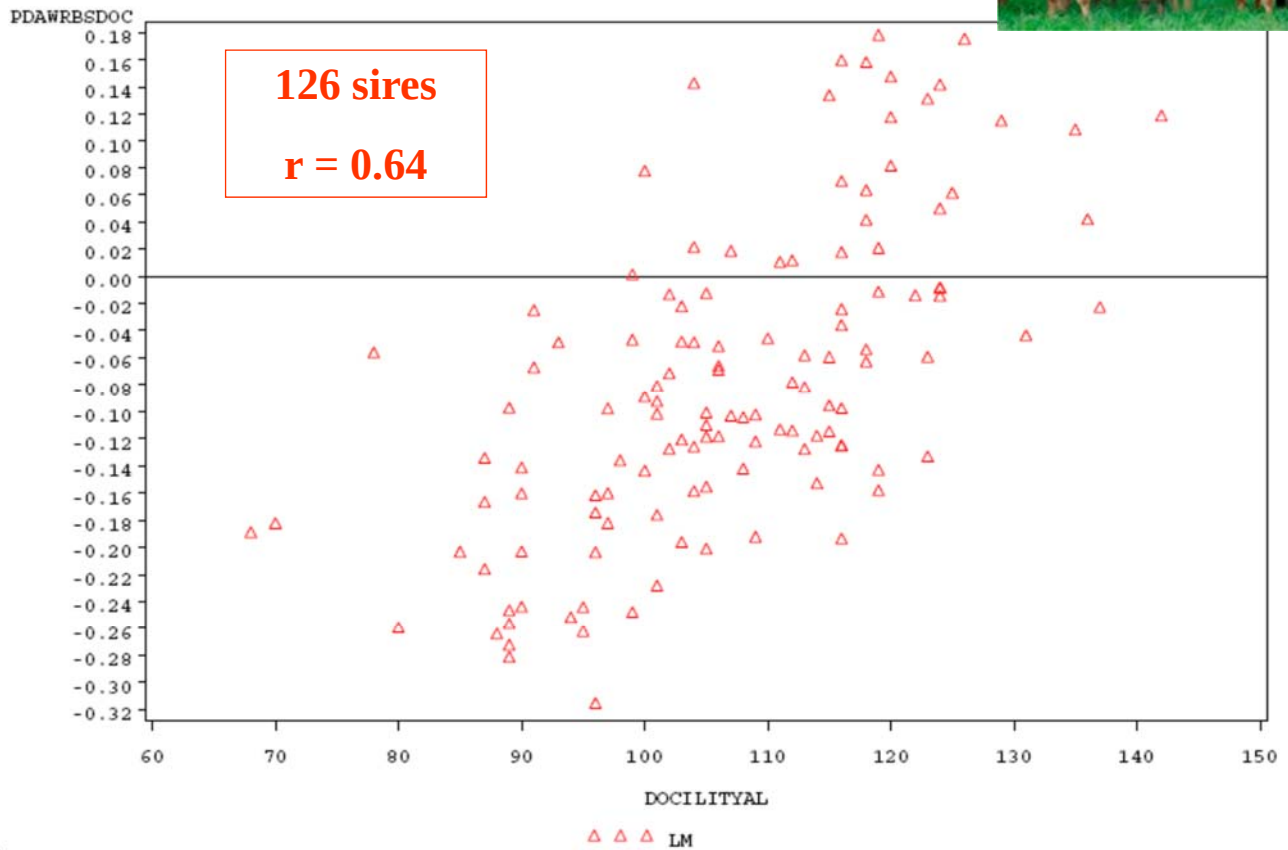


Belgian Blue highest average docility, Limousine lowest

But 2 breed highest within breed deviation in PTA

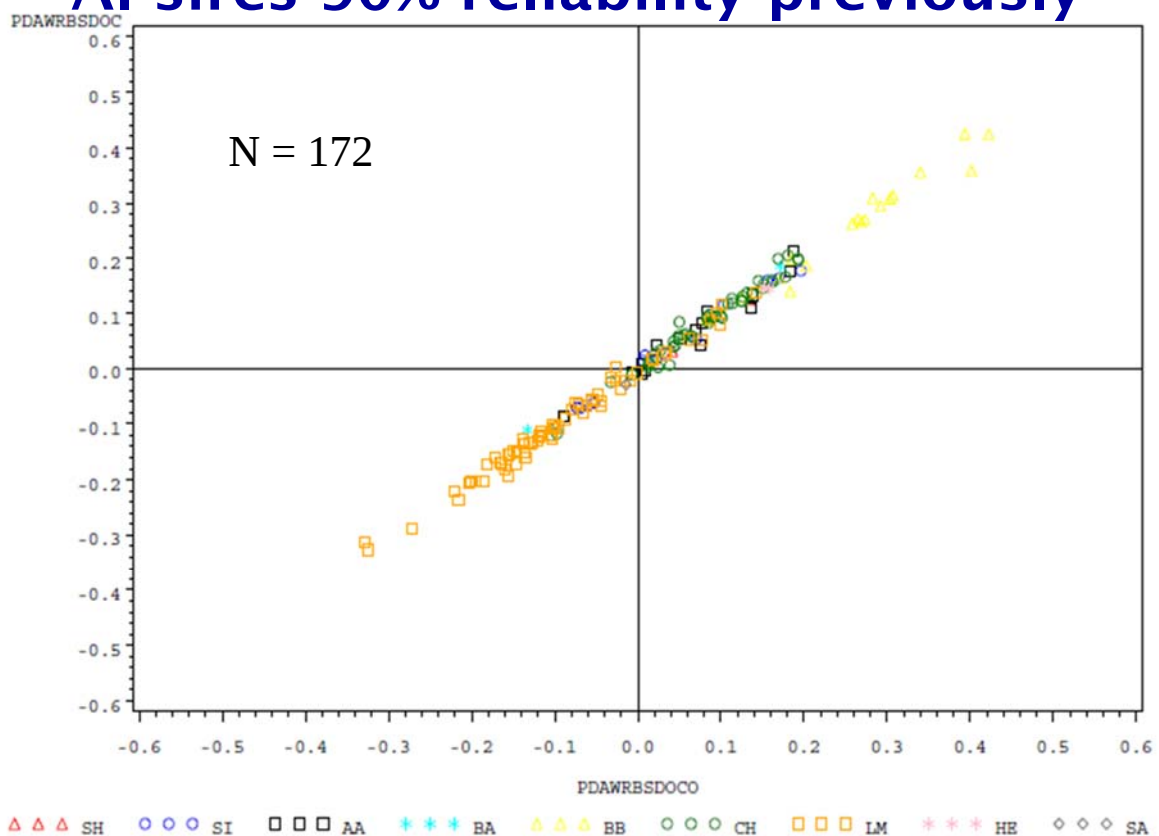
Bottom 20% of sires across breeds : 8% increase in unfavourable scores

DOCFARM PTA v Old official Limousine

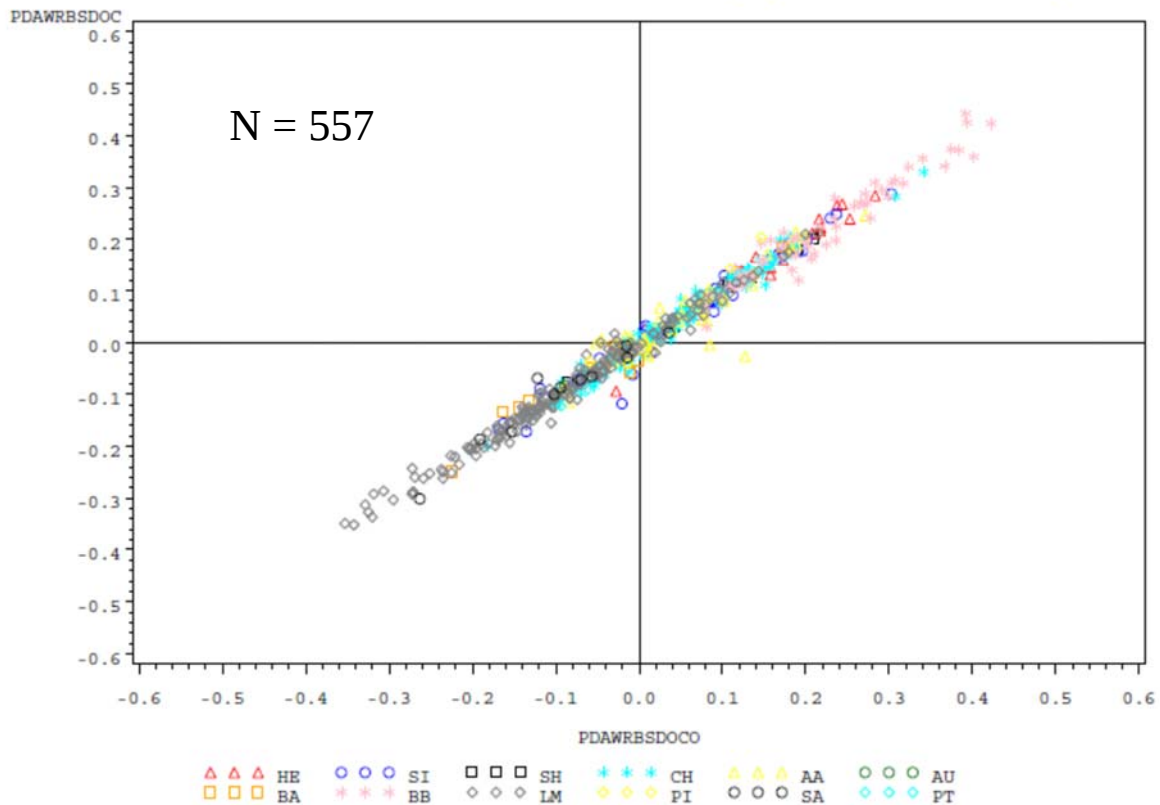


SI

AI sires 90% reliability previously



AI sires 70% reliability previously



Slide 19

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Comparison of sires >90%

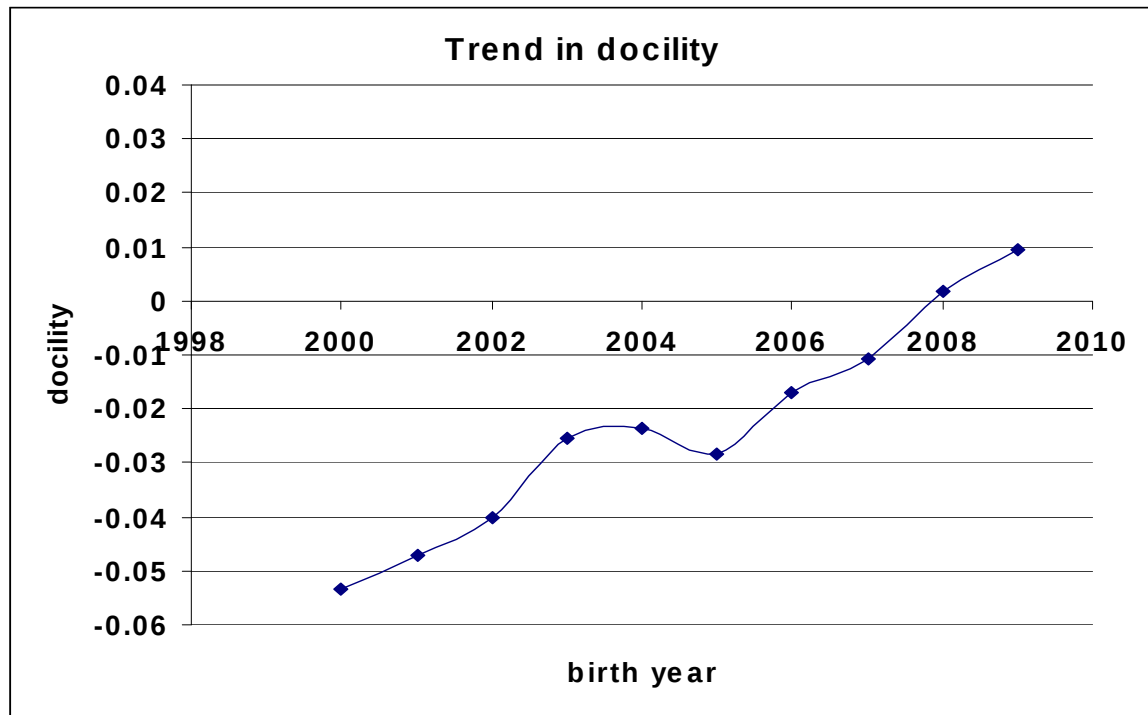
RATING	Average no. progeny with DOCFARM	Average no. of herd mates with	Average reliability	Average progeny DOCFARM score	Average herd mate DOCFARM score	Average % of progeny scored 4 or 5
across breed: ****	191	1,211	95	2.2	2.4	5
across breed: ***	160	1,101	96	2.4	2.4	9
across breed: *	182	1,128	95	2.6	2.4	13

Compared against their herdmates

Clear differences appearing

Slide 20

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Slight trend towards improved docility

Slide 21

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CBF BULL SEARCH - Windows Internet Explorer

http://www.icbf.com/taurus/bull_search/index.php?search_type=num&search=ie221152520303

Search

CBF BULL SEARCH

ICBF Genetic Evaluations Service

Search Again

AI Code: Breed: SI (100%) Sire: [HILLCREST KING / HKG](#)

Animal Name: ANATRIM SUNSHINE Owner: Dam: ANATRIM BETTY / KHA102082

Date of Birth: 24-JAN-2005 Date of Evaluation: Aug 2010 MGS: [TAU IMP.91A / 919117](#)

National ID: IE221152520303

International ID: SIMIRLM221152520303

[Blups](#)

% Rank	Star Rating (within breed)	Index and Traits	Euro-Value	Data Reliability	Star Rating (across breed)	% Rank
71%	★★★★★	Suckler Beef Value (SBV)	€129	58%	★★★★★	93%
82%	★★★★★	Weanling Export	€58	73%	★★★★★	66%
74%	★★★★★	Beef Carcass	€82	71%	★★★★★	50%
38%	★★★	Daughter Fertility	€43	2%	★★★★★	71%
38%	★★★	Daughter Milk	€85	26%	★★★★★	74%

[Other Key Traits](#)

% Rank	Star Rating	Trait	Value	Data Reliability	Star Rating	% Rank
61%	★★★★★	Calving Difficulty (% 3 or 4)	4.88%	72%	★★★★★	59%
59%	★★★★★	Gestation Length (Days)	2.15 Day(s)	26%	★★★★★	53%
32%	★★★	Docility (1-5 score)	-0.03	67%	★★★★★	47%

Data Reliability: 40% - 60% = Average 20 - 40% = Below Average < 20% = Poor

[Top Of Page](#)
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Internet 100%



Further work

- Investigate maternal effects further with repeated observations on cows
- Economic value of docility?
 - €17.87 per unit increase in weanlings
 - €33.20 per unit increase in weanlings
- International collaboration
- Mature stock bull docility - same trait?
 - Need system to collect and measure, then analyse associations
 - Use as correlated trait
 - Would include dairy herd docility
- Genomic selection

Using the DNA to select animals called “Genomic selection”

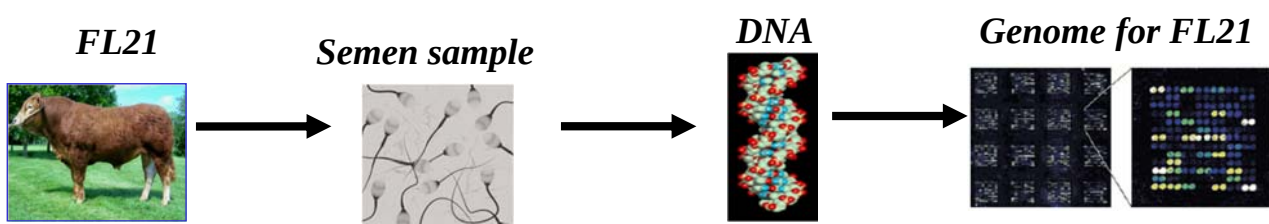
Collect DNA and get a genome for all well proven AI bulls

Why AI bulls?

So we can compare their genotype versus their EBI through their well proven daughter performance

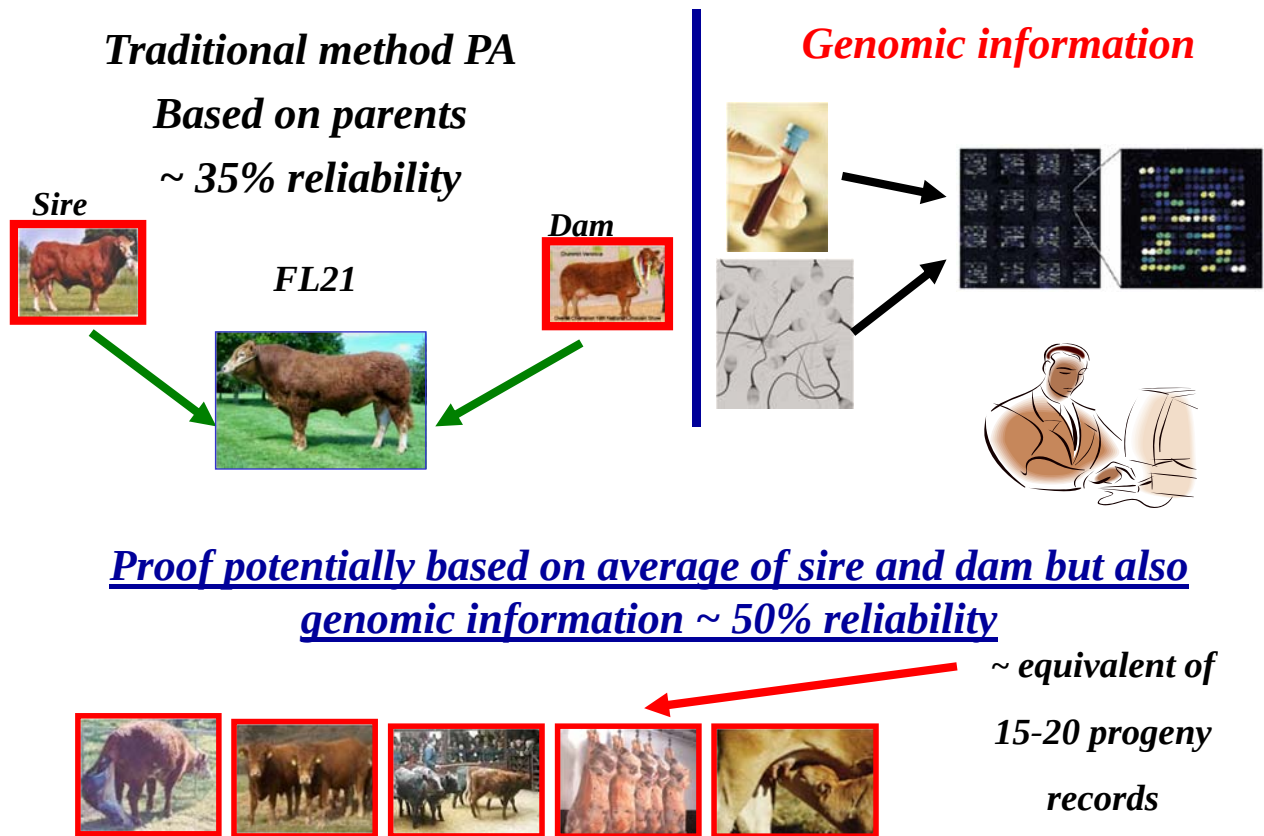
SNP	Cwt	fi
B	-50	-2.5
C	+75	+0.7
D	+30	-0.4
....		

Best source to get DNA is a blood sample Most well proven AI sires are dead so Semen, hair



About 1,000 proven bulls with genomic information at ICBF

Genomic Selection in beef cattle



Current status

- Across breed DOCFARM proofs now official for Active AI sires, natural service sires and females
- Across breed nature evaluation unique in the world
- 200,888 Farmer scores, 99,204 linear and increasing rapidly
- Will help to reduce cattle related injuries on farm if recorded properly