IRISH CATTLE BREEDING FEDERATION

# ICBF Dairy & Beef Genetic Evaluations Meetings.

Wednesday 21st July 2010.
Maldron Hotel, Portlaoise.

National Development Plan
Transforming Ireland

# *Agenda 2. Dairy & Beef Traits*

- **Agenda 2 (11.45 – 3.00)**
- 11.45. Female fertility traits – Ross.
- 12.30. Male fertility traits – Ross.
- 1.00. Lunch.
- 1.30. Calving traits – Francis.
- 2.15 Carcass cut data & other beef traits – Thierry.
- 2.30 AI application process – Pat.
- 2:45 Catalogues – Brian W

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# Female & Male Fertility Evaluations

Ross Evans.

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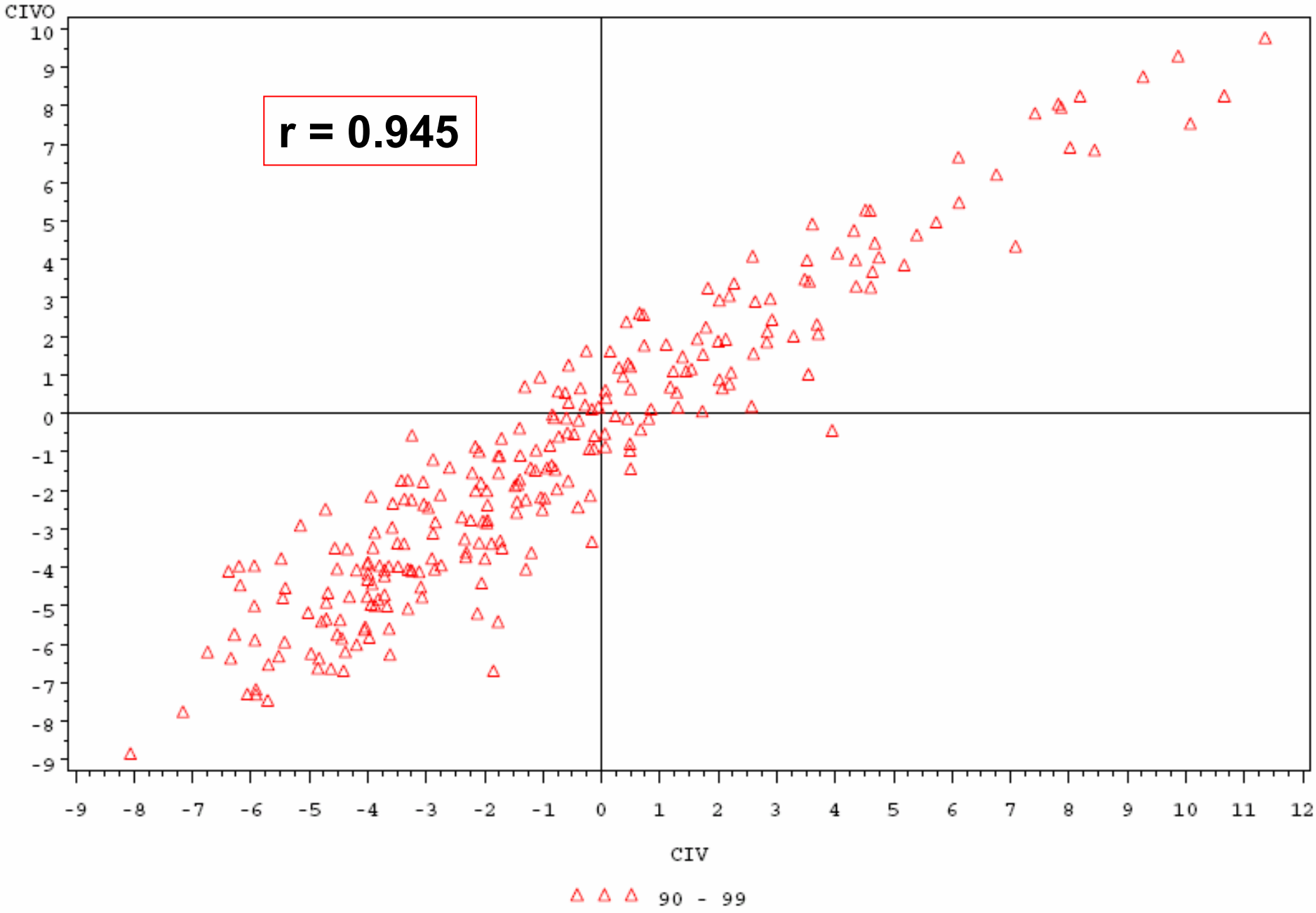
# *New female fertility evaluation update*

- Extra traits: parity 4,5, CFS, NS
- New genetic parameters: reduction of genetic relationship between milk and fertility with CFS introduction
- New software
- Increase CIS cut-off limit 600-800 day
- Similar model to apply for beef animals

# *New female fertility evaluation update*

- Jan 10 update: Still too much re-ranking concerns to switch to new yet
- Attempted to run new model on old software but no success so testing focused on reducing differences in proofs with new software
- Correlations improving for both calving interval and survival
- Problematic re-ranking cases still being investigated

# AI sires CIV combined old v new 1st 3 par



# *Female Fertility - Next phase*

- Work is nearing completion
- Re-run of genetic parameters for some trait relationships causing problems
- Hoping to enter INTERBULL test run for September
- Circulation of test proofs and decision on new proof introduction made after that

# Male Fertility

- Use of insemination data to provide early indicators of sire fertility rates to AI companies
- Models developed by Teagasc (Donagh Berry) based on existing evaluations worldwide
- Evaluation developed in MIX99 and made operational in May 2010
- 4 updated runs done and provided to AI companies upon request

# Male Fertility: Model

- Fixed effects:
  - Parity of cow
  - Dystocia in previous calving
  - Stillbirth in previous calving
  - Calving to service days
  - Heterosis and recombination, cow and embryo
  - Service number
  - Month of service
  - Herd x year of service
  - Day of week
  - Straw type

# Male Fertility: Model

- Random effects:
  - Cow: Genetic and repeatability
  - Service sire
  - Sire x year
  - Technician
  - Technician x year

# Male Fertility: Data Edits

- **Gestation lengths assumed**
  - **265 to 295 if a Holstein-Friesian sire**
  - **265 to 300 if sire was not Holstein-Friesian**
- **Services within 10 days of calving discarded**
- **Services within 5 days treated as same service**
- **Services >400 days post calving discarded**

**Pregnancy status coded as missing if AI service was:**

- **within 25-days of the end of the AI breeding season**
- **within 25-days of cow being culled**
- **within 25-days of the date of data extraction**

# Male Fertility: Data Edits

- **Inseminations are categorised into 5 states**

| Count of Total straws analysed | % where insemination is validated by a subsequent calving | % where cow had a subsequent service | % where cow was scanned not in calf | % where subsequent calving date suggests a later conception | % Assumed pregnant unless proven otherwise |
|---|---|---|---|---|---|
| 1,492,121 | 27% | 31% | 7% | 23% | 34% |

- **insemination starts off where cow is assumed pregnant unless proven otherwise**

# Male Fertility: Results

| | All AI sires n= 2202 | Sires >500 straws n= 410 | Sires >1000 straws n= 244 | Sires >2000 straws n= 135 | Sires >3000 straws n= 86 |
|---|---|---|---|---|---|
| No. of Sires | **2202** | **410** | **244** | **135** | **86** |
| Preg: avg | **51.3%** | **51.9%** | **52.3%** | **52.5%** | **52.4%** |
| Min | **0%** | **23.1%** | **39.5%** | **40.4%** | **41.1%** |
| Max | **100%** | **64.7%** | **62.1%** | **62.1%** | **62.1%** |
| Adjusted Difference | **-9.2 to + 4.9 14.1 %** | **-9.2 to + 4.9 14.1 %** | **-7.0 to + 4.2 11.2 %** | **-7.0 to + 3.7 10.7 %** | **-6.2 to + 3.7 9.9 %** |
| Correlation with raw | **0.31** | **0.68** | **0.70** | **0.72** | **0.72** |

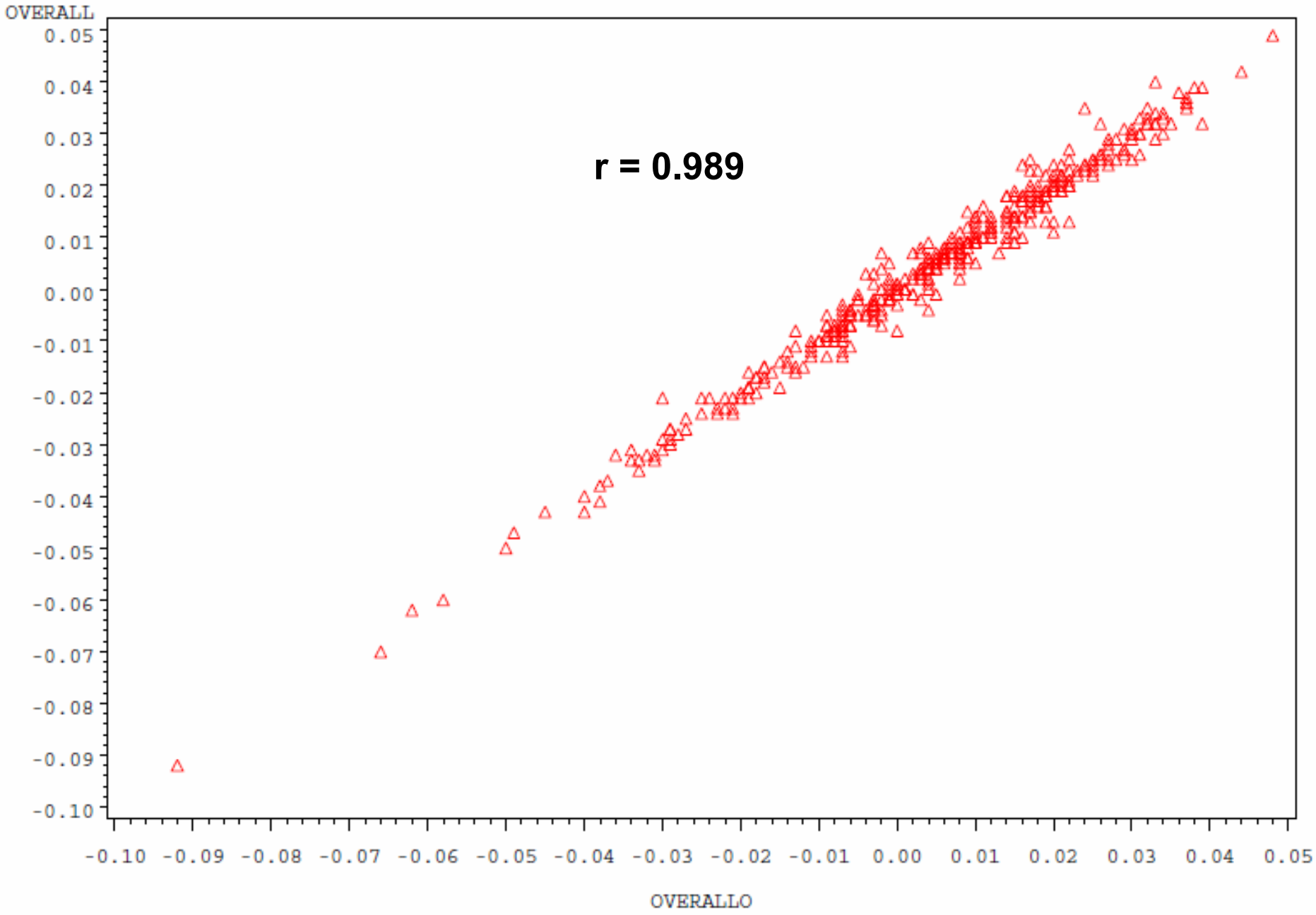
# Effect of calving difficulty on pregnancy rate

| Type of Calving | | No. of records | Effect |
|---|---|---|---|
| 1 | no assistance | 820,327 | Base |
| 2 | some assistance | 196,111 | -2.4% |
| 3 | serious assistance | 34,686 | -6.1% |
| 4 | veterinary/casarean | 21,973 | -10.4% |

## Other cow and fixed effects on pregnancy rate

| covariable | effect |
|---|---|
| heterosis in cow | 0.7% |
| recombination | -0.9% |
| calvserv | 0.3% |
| no_serv | 20.8% |

# old and new proofs 500 straws in old eval



# Male fertility - Summary

- New evaluation system available for AI companies.
  - Bull information.
  - Technician information.
  - Semen type.
- Valuable male fertility information for industry.
- Genetic differences between bulls (+/- 6% on pregnancy rate).
- Economic value of this trait?
- Feedback welcomed.

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# Calving Performance Evaluations

Francis Kearney

National Development Plan
Transforming Ireland

# Calving Performance

- Separate calving on heifers vs calving on later parities rather than including overall parity effect (test-runs underway)
- New genetic parameters (done). Heritability is lower so more records needed to reach the same level of reliability. Also individual score will not impact on proof as much.
- ET calves are currently not included but only if ET animals are recorded properly
- Include foreign breeding values for imported bulls

# Calving Performance

- Considering dropping calving scores for purebred BB due to elective sections – can influence proof for bull used in both pedigree and commercial herds – what about elective sections for other breeds?
- Consider dropping all data from pedigree herds. Parent average calving proofs for young animals (identifying easy calving lines would come from calving results of bulls used as AI bulls or stock bulls on commercial farms) – may be an issue for bulls used only in Pedigree herds?
- Historical information will no longer be used due to processing time.

# Calving Performance

- Currently based on parameters that were estimated a number of years ago
- Large increase in data in the last number of years
- Estimates of heritability based on records across all lactations
- Is heifer calving/gestation a different trait?

# Current Model

- Evaluate calving difficulty, maternal calving difficulty, gestation, mortality
- No correlation between traits except a negative 0.7 correlation between direct and maternal calving difficulty
- Historical calving data used as a correlated trait for each trait

# Heritabilities

Current Estimates

| | heritability |
|---|---|
| **Calving Diff** | 0.25 |
| **Gestation** | 0.40 |
| **Mortality** | 0.01 |

New Estimates

| | heritability |
|---|---|
| **Calving Diff** | |
| 1st | 0.13 |
| Later | 0.07 |
| **Gestation** | |
| 1st | 0.45 |
| Later | 0.40 |
| **Mortality** | No estimate |

New estimates in line with those in the literature

# Correlations

| | CD | MCD | Gestation |
|---|---|---|---|
| **1st – Later** | 0.72 | 0.29 | 0.93 |

Correlation between two traits less than 0.8 indicate traits are not controlled by the same genes

# Correlations

Correlation between direct and maternal – current estimates indicate that daughters of bulls that are easy calving have difficulty calving themselves

| | Current | New |
|---|---|---|
| CD-MCD | -0.7 | |
| CD-MCD -1st | | -0.48 |
| CD-MCD - later | | -0.24 |

# Implications

- Lower heritabilities for calving diff will result in lower reliabilities especially for new test bulls
- Biologically a model with 1st and later parities evaluated separately should be used for CD, MCD
- Weighting between 1st parity and later parities must be calculated
- Direct calving will have less of an impact on maternal calving due to a lower correlation

# Implementation

- Test-runs underway
- Feedback on the other issues welcome
- Target to submit to Interbull test run in Sept 2010
- Test result distributed for consideration by Industry
- Implementation for Spring 2011 evaluation (Dec 2010)

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# Using Wholesale Carcass Cuts Predicted from Digital images

T. Pabiou

ICBF

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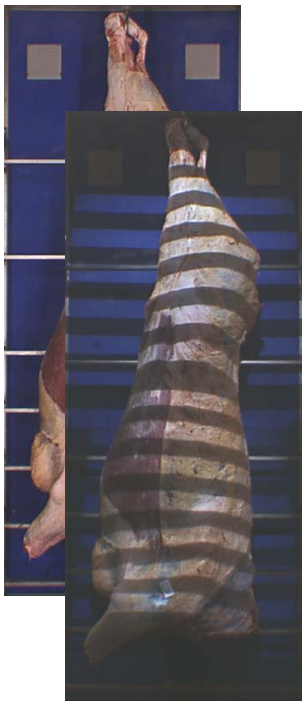
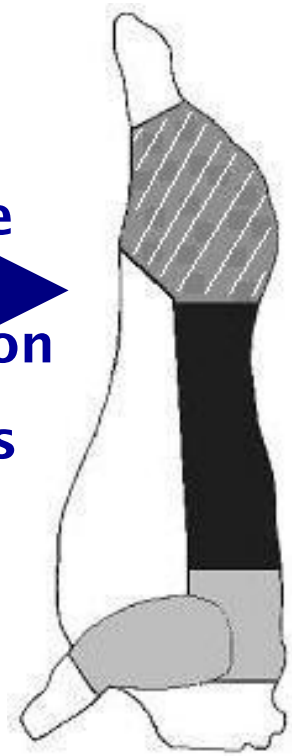
# Motivation

- **Principle**



**Multiple Regression Analysis**



**Lower value cuts**

**Medium value cuts**

**High value cuts**

**Very high value cuts**

**Also available on steers:**

- **Total meat weight**
- **Total fat weight**
- **Total bone weight**





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# Motivation

- **$R^2$ of regressions**

| Wholesale Cut Weight | Dataset | |
|---|---|---|
| | Steer | Heifer |
| Lower Value Cuts | 0.92 | 0.65 |
| Medium Value Cuts | 0.86 | 0.70 |
| High Value Cuts | 0.93 | 0.85 |
| Very High Value Cuts | 0.84 | 0.72 |

# Objective

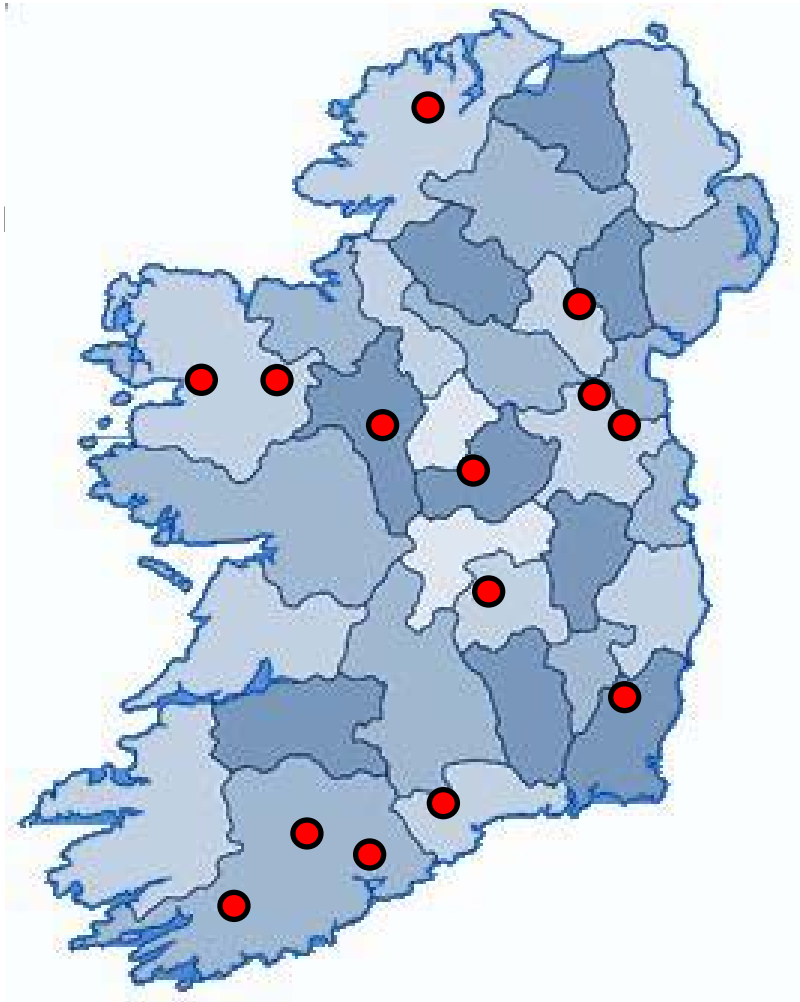
Using wholesale cuts predicted from digital images

=> Calculate genetic parameters & genetic associations

# Data Used

- Digital images collected
  - (x2) images of steers & heifers slaughte between Nov. 2006 and May 2009
  - Across 14 slaughter houses in Ireland
  - Raw data = 515,494 x 2 images

- Main edits on carcasses
  - Absence of parentage (n = 355,704)
  - Insufficient contemporary group size (n = 63,379)
  - Error in recovering historical files (n = 30,760)



# Predicted Traits

**Steer data**

**N = 38,404**

- Total meat (kg)
- Total fat (kg)
- Total bone (kg)

- Lower value cut (kg)
- Medium value cuts (kg)
- High value cuts (kg)
- Very high value cuts (kg)

**Heifer data**

**N = 14,318**

- Total meat (kg)

- Lower value cut (kg)
- Medium value cuts (kg)
- High value cuts (kg)
- Very high value cuts (kg)

# Mean Performances

| | Heifers | |
|---|---|---|
| | Mean | CV |
| Carcass weight (kg) | 290 | 15% |
| *Overall Predicted weights (kg)* | | |
| Total meat | 175 | 11% |
| Total fat | *n/a* | *n/a* |
| Total bone | *n/a* | *n/a* |
| *Wholesale predicted weights (kg)* | | |
| Lower Value Cuts | 91 | 16% |
| Medium Value Cuts | 20 | 18% |
| High Value Cuts | 46 | 18% |
| Very High Value Cuts | 21 | 17% |

# Mean Performances

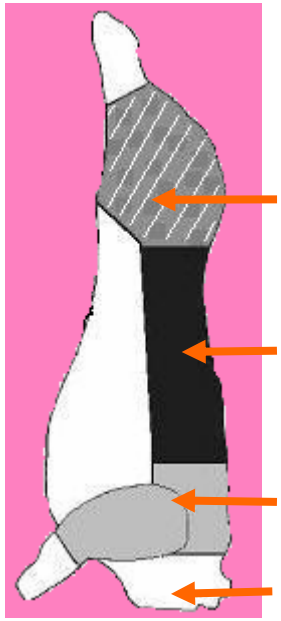
| | Heifers | | Steers | |
|---|---|---|---|---|
| | Mean | CV | Mean | CV |
| Carcass weight (kg) | 290 | 15% | 344 | 14% |
| *Overall Predicted weights (kg)* | | | | |
| Total meat | 175 | 11% | 231 | 15% |
| Total fat | *n/a* | *n/a* | 44 | 34% |
| Total bone | *n/a* | *n/a* | 76 | 12% |
| *Wholesale predicted weights (kg)* | | | | |
| Lower Value Cuts | 91 | 16% | 88 | 21% |
| Medium Value Cuts | 20 | 18% | 49 | 16% |
| High Value Cuts | 46 | 18% | 60 | 15% |
| Very High Value Cuts | 21 | 17% | 25 | 15% |

# Heritability

*Heifers*

*Steers*

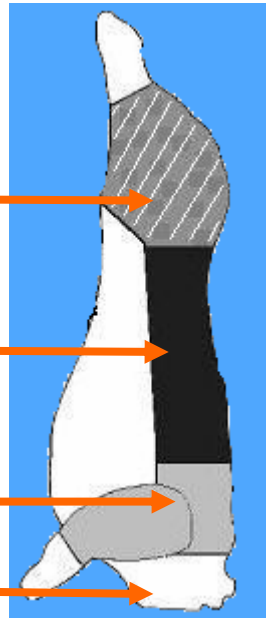
**Wholesale predicted weights**



| | | |
|---|---|---|
| **0.13** | High V. Cuts | **0.26** |
| **0.37** | Very High V. Cuts | **0.47** |
| **0.15** | Medium V. Cuts | **0.24** |
| **0.30** | Lower V. Cuts | **0.16** |

*s.e. < 0.06*

*s.e. < 0.03*







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# Genetic Correlations

| Heifers \ Steers | Carc. weight | Low. V. cuts | Med. V. cuts | High V. cuts | Very H. V. cuts |
|---|---|---|---|---|---|
| Carcass weight | | 0.4 | 0.32 | 0.43 | 0.45 |
| Lower V. cuts | 0.26 | | 0.45 | 0.66 | 0.57 |
| Medium V. cuts | 0.10 | 0.47 | | 0.79 | 0.86 |
| High V. cuts | 0.26 | 0.80 | 0.82 | | 0.89 |
| Very H. V. cuts | 0.38 | 0.69 | 0.82 | 0.82 | |

**Genetic correlations between steer & heifer traits > 0.55**
**=> same trait in the evaluation**





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# What's Next?

- Estimates genetic correlations with existing traits used in the evaluation (linears…) => Autumn 2010

- Streamlining the process of cut conversion
  - Interaction with EplusV => From summer 2010

- Integrating the new traits in the current genetic evaluation
  - In the carcass evaluation => Spring 2011

# *New AI Code Approval System*

Pat Donnellan



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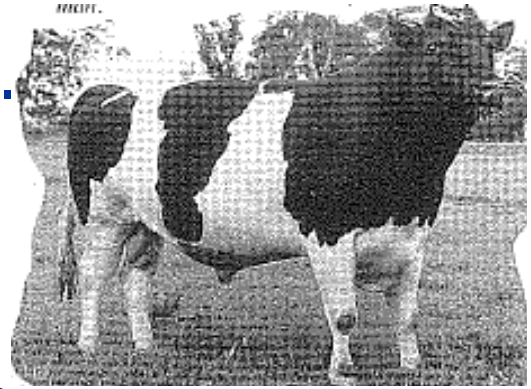
# New AI Code Application System

**Backround**

- **Historically DAF administered all AI Codes – 1950's – 2000.**
  - 'PP' – Friesian - Pewsey Primate born 14th April 1952
- **ICBF started administration of AI Codes in 2000.**
  - **Paper based application process.**
  - **Pedigree Certs & other.**

    **documentation included with applications.**
  - **@ 300 AI Codes per annum.**
- **2010 – Opportunity to modernise & improve this system.**
  - **Web based.**
  - **Database now allows each Breed Society be in control of pedigree data for Bulls of their Breed.**



# AI Code Application System

## Currently

- **Paper Based Application System**

**AI Company**

**1.** AI Company sends application for AI Bull to ICBF

**DAF** ◄ ▪▪▪▪▪▪▪▪ **ICBF**

ICBF provides DAF with a list of AI Bulls on request

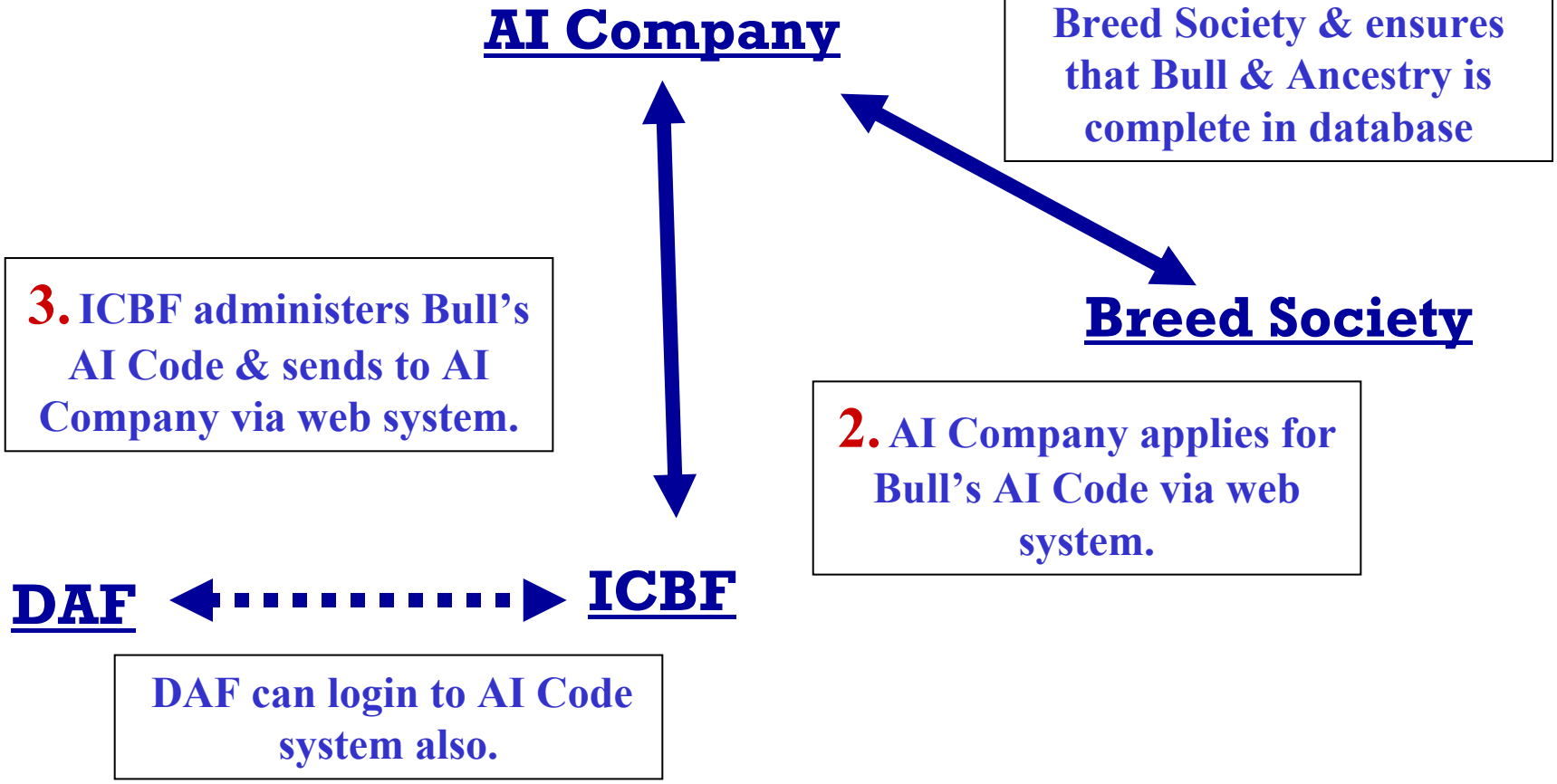
**2.** ICBF:

1. Ensures Bull receives correct Approval Status.
2. Administers AI Code
3. Enters Bull & Ancestry if necessary

# AI Code Application System

## New System

- **Web Based Application System**



# Why Change the AI Code Application System?

## Breed Society

- **Pedigree Status of Bull approved by Breed Soc before calves are born – prevents confusion over Ped status after straws used.**
- **Aware of Bloodlines being used by Breeders earlier.**
- **DNA/Blood details definitely entered at time of coding.**
- **Names entered in format preferred by Breed Society (imp'08, ET).**
- **Extra information entered by Breed Society –** EX92, Polled, Red Factor Carrier, Genetic Defect Results.

## AI Company

- **Quicker Turnaround time of AI Code.**
- **AI Code receipt is not email dependant.**
- **Anyone in the Organisation can log in and see what the status of a Bull's AI Code approval is.**

# Ancestry (e.g. 2009)

| Beef AI Bulls | | |
|---|---|---|
| Breed | Bulls | Backped Edited |
| Angus | 21 | 17 |
| Aubrac | 1 | 1 |
| Blonde | 8 | 8 |
| Belgian Blue | 30 | 25 |
| Charolais | 15 | 14 |
| Hereford | 2 | 1 |
| Limousin | 21 | 15 |
| Piedmontese | 9 | 9 |
| Parthenaise | 6 | 6 |
| Saler | 6 | 5 |
| Shorthorn | 10 | 8 |
| Simmental | 17 | 14 |
| | **146** | **123** |

| Dairy AI Bulls | | |
|---|---|---|
| Breed | Bulls | Backped Edited |
| Ayrshire | 3 | 3 |
| Brown Swiss | 3 | 3 |
| Friesian | 9 | 4 |
| Holstein | 84 | 8 |
| Jersey | 17 | 9 |
| Montbeliarde | 5 | 5 |
| MRI | 2 | 2 |
| Normande | 5 | 5 |
| Norwegian Red | 5 | 4 |
| Pinzgauer | 7 | 7 |
| | **140** | **50** |

| Other AI Bulls | | |
|---|---|---|
| Breed | Bulls | Backped Edited |
| Belted Galloway | 1 | 1 |
| Dexter | 1 | 1 |
| Galloway | 1 | 1 |
| Irish Maol | 1 | 1 |
| Rep Poll | 1 | 1 |
| Speckled Park | 2 | 1 |
| | **7** | **6** |

- **Whether Bull & Ancestry data has to be entered depends on:**
  - **Breed & Origin of Bull**
  - **Outcross Pedigree of Bull**

# What next?

- Role out to commence immediately.
- Summer & Autumn period allow system to bed in before Spring 2011.
- AI Companies already have logins & passwords.
- Instruction document to be circulated to

  Breed Soc's & AI Companies.