IRISH CATTLE BREEDING FEDERATION

Swedish University of Agriculture

Department of Animal Breeding & Genetics

Using Digital Images in the Irish Genetic Evaluation

Interbull meeting

Thierry Pabiou (ICBF)

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NATIONAL DEVELOPMENT PLAN

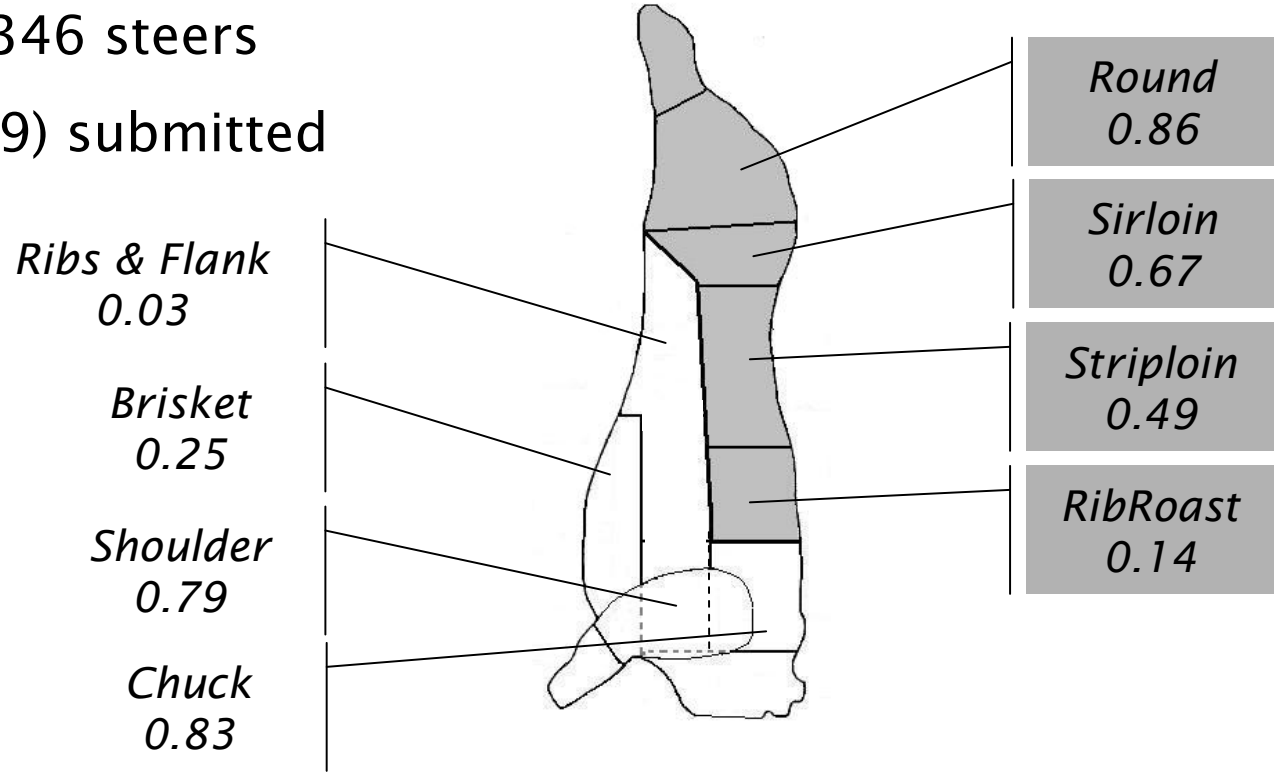
Co-Authors

- **L. Kreuchwig**, E+V GmbH, Oranienburg, Germany
- **A. Cromie**, ICBF, Bandon, Co Cork, Ireland
- **F. Fikse** & **A. Nasholm**, SLU - DABG, Uppsalla, Sweden
- **G. Keane** & **M. Drennan**, Teagasc Beef Research center, Co Meath, Ireland
- **D. Berry**, Teagasc Moorepark Dairy Research center, Co Cork, Ireland

▸ Thanks!

Heritability of meat yields

- h2 calculated on 346 steers
- Pabiou *et al*. (2009) submitted



- Variability exists within carcass cut yields
- Need to collect meat yields on a routine basis

Objective

- Using the carcass digital images taken after slaughter to predict meat yields

- Allow Irish farmers to select cattle on meat cut weight repartition
- Improve carcass payment to Irish farmers

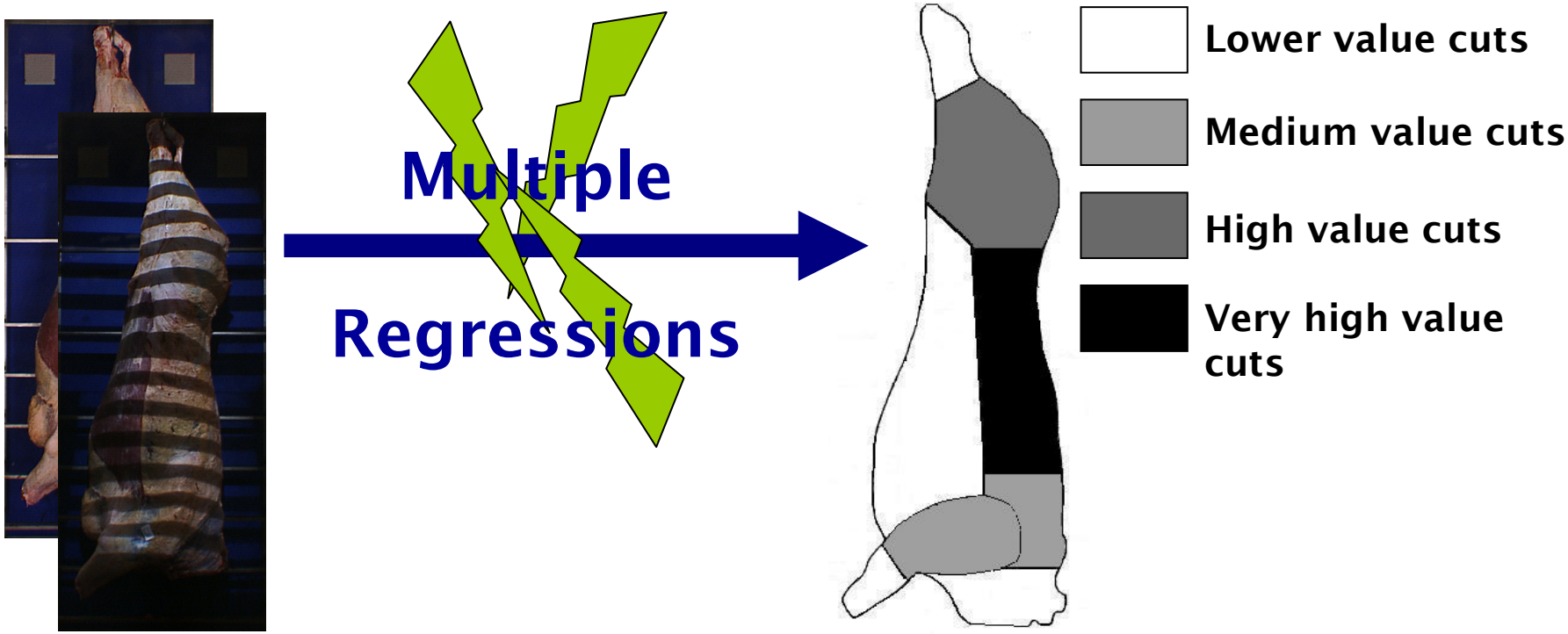
Mechanical Grading

VBS2000 (E+V, Germany)

- Approved since 2001 for EUROP beef grading in Ireland
  - fat Carcass conformation
  - Carcass
- 2D & 3D images / carcass
- Used in 26 slaughter houses across Ireland
- Images stored at ICBF since July 2005

▶ Mechanical grading used for +80% cattle slaughtered in Ireland

Multiple Regressions



- Prediction of 4 groups of cuts based on retail value

Two Datasets

- Experimental
  - 346 crossbred steers
  - 3 Overall weights
    - Total meat
    - Total fat
    - Total bone
  - 4 Wholesale cuts
    - LVC, MVC, HVC, VHVC
- Commercial
  - 281 crossbred heifers
  - 1 Overall weights
    - Total meat
  - 4 Wholesale cuts
    - LVC, MVC, HVC, VHVC

▶ Steer & heifers = +70% slaughtered animals in Ireland

Calibration / Validation

For each trait

- **Calibration file** (67%) : to built up the regressions equations

- **Validation file** (33%) : to assess regression accuracy & fit

▸ Based on similar distribution of the trait (mean, SD)

Models Tested

3 Models tested

1. Predictors = carcass weight

2. Predictors = carcass weight + EUROP classifications

3. Predictors = carcass weight + VIA variables

- Comparison based on R^2, RMSE, bias, and residual correlation
- Presentation limited to steer results

Results Steers: R^2

	Model 1	Model 2	Model 3
Weight (kg)	Carc. weight	Carc. weight + EUROP class.	Carc. weight + VIA variables
Total meat	0.91	0.97	**0.98**
Total fat	0.33	0.74	**0.77**
Total bone	0.66	0.79	**0.81**
Lower value cuts	0.87	0.89	**0.92**
Medium value cuts	0.74	0.79	**0.86**
High value cuts	0.75	0.89	**0.93**
Very high value cuts	0.74	0.85	**0.84**

- Better R^2 using VIA + carcass weight

Results Steers: RMSE

	Model 1	Model 2	Model 3
Weight (kg)	Carc. weight	Carc. weight + EUROP class.	Carc. weight + VIA variables
Total meat	11.8	7.5	**5.9**
Total fat	10.7	6.7	**6.4**
Total bone	4.3	3.4	**3.2**
Lower value cuts	6.9	6.5	**5.6**
Medium value cuts	3.7	3.4	**2.7**
High value cuts	6.0	3.9	**3.3**
Very high value cuts	2.3	1.7	**1.8**

- Lower RMSE using VIA + carcass weight

Results Steers: Bias

	Model 1	Model 2	Model 3
Weight (kg)	Carc. weight	Carc. weight + EUROP class.	Carc. weight + VIA variables
Total meat	-1.14	-1.19	-0.18
Total fat	-0.36	-0.76	-0.58
Total bone	0.00	0.18	0.32
Lower value cuts	-0.59	-0.34	0.15
Medium value cuts	0.03	-0.01	0.13
High value cuts	0.76	**1.10****	**1.18****
Very high value cuts	-0.01	-0.09	-0.11

- Limited bias across all models

Results Steers: Residual Correlation

	Model 1	Model 2	Model 3
Weight (kg)	Carc. weight	Carc. weight + EUROP class.	Carc. weight + VIA variables
Total meat	0.08	**-0.15***	0.06
Total fat	-0.03	-0.01	-0.13
Total bone	-0.03	-0.09	-0.12
Lower value cuts	-0.10	-0.07	-0.08
Medium value cuts	-0.02	-0.00	-0.10
High value cuts	-0.04	-0.01	0.05
Very high value cuts	-0.11	0.01	-0.01

- No over/under predictions across all models

Conclusion

- Similar results obtained on the heifer dataset
- Best regression results obtained with VIA + carcass weight model
- Need to apply regression to all VIA available
- Integrate results in the Irish genetic evaluation => generate EBVs