# Perspectives on carcass pricing for the Irish beef sector

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Beef Task Force

Tuesday, 9 March 2021

Teagasc
Agriculture and Food Development Authority

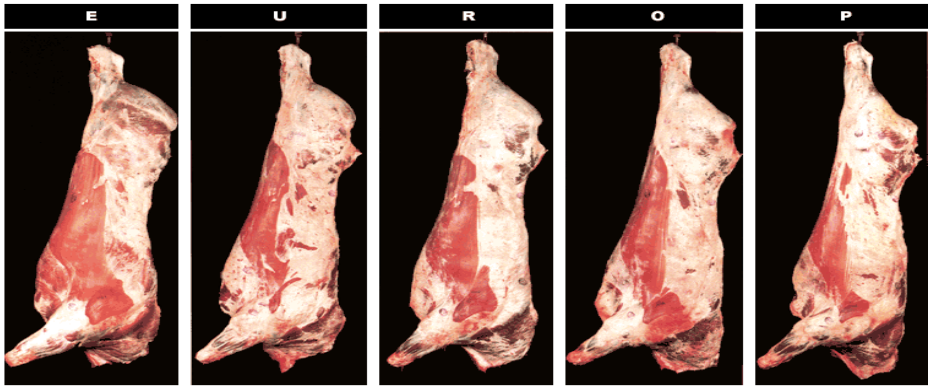
# Irish Beef Sector Agreement

- Teagasc would scope out … in depth study to look at a revised system (of beef pricing).

**(Beef Task Force, 9 January 2020)**

**Presentation outline**

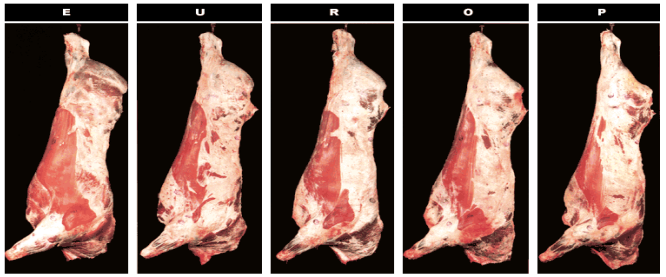
- Review of current pricing model
- Review of meat processing technologies
- Overview of ‘cuts-based’ pricing concept

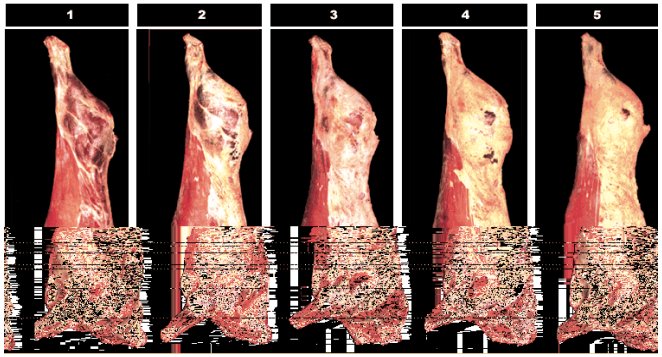



# Current Pricing Model

# Current pricing model

- Based on research by Michael Drennan (Teagasc)
  - Objective: to quantify the relationship between carcass grading (conformation and fat scores) and carcass value
- Carcasses mechanically grading
  - Video imaging analysis (VIA) system
  - 507 steers, 115 bulls, 40 heifers
  - Carcasses dissected in meat, fat & bone
  - 13 hindquarter cuts and 11 forequarter cuts



# Impact of carcass grade on carcass proportions and value

| | Intercept[1] | Conformation score | Fat score | $R^2$ |
|---|---|---|---|---|
| **Meat (g/kg)** | 698[a] | **+11.8** (0.40)*** | **-9.6** (0.47)*** | 0.73 |
| **Fat (g/kg)** | 113 | **-4.4** (0.36)*** | **+12.0** (0.56)*** | 0.67 |
| **Bone (g/kg)** | 190 | **-7.4** (0.20)*** | **-2.4** (0.24)*** | 0.71 |
| **Carcass value (c/kg)** | 296 | **+5.6** (0.30)*** | **-5.1**(0.36)*** | 0.60 |

[1] Intercept chosen = conformation & fat scores of 8 (Scale 1-15)

**Source:** Drennan et al.

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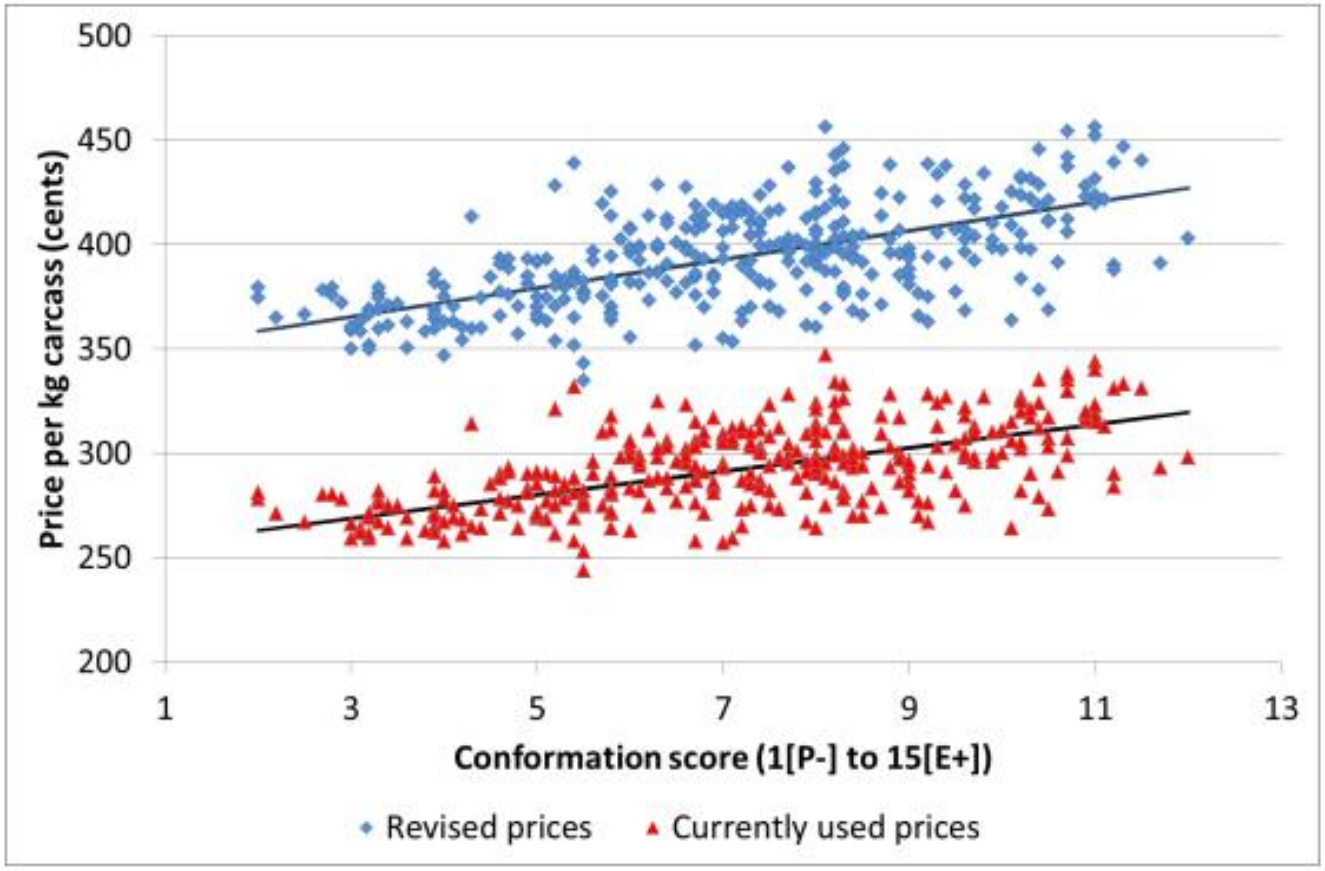
# Review of QPS –December 2020

- Updated prices used in the derivation of the price differentials between each carcass conformation and carcass fat subclass
- Price per kg differential between each conformation score subclass increases from 5.6 c/kg to 6.9 c/kg




**Source:** Donagh Berry

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# Recent technological innovations & implications for beef pricing



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# Comparison of carcass classification & grading schemes

| Australia | | Brazil | Canada | Europe | Japan | South Africa | USA |
|---|---|---|---|---|---|---|---|
| **AUS-MEAT** | **MSA** | **-** | **Canada** | **EUROP** | **JMGA** | | **USDA** |
| Carcass weight | Cut-based | Carcass weight | Sex | Carcass weight | Sex | Carcass weight | Sex |
| Sex | Quality | Sex | Quality | Sex | Quality | Sex | Quality (12th rib) |
| Dentition | Carcass weight | Dentition | Conformation | Conformation | Marbling | Dentition | Marbling |
| Grain fed | Sex | Fat cover | Maturity | Fat cover | Colour and brightness | Conformation | Maturity |
| Optional: | Tropical breed | | Colour muscle | | muscle | Fat cover | Firmness |
| Maturity | Hanging method | | Colour fat covering | | Firmness and texture | | Yield |
| Meat colour | HGP | | Yield and marbling on 12th rib | | Fat colour and lustre | | Carcass weight |
| Fat colour | Ossification | | Carcass weight | | Yield | | Kidney, pelvic and heart fat |
| Marbling | Marbling | | Ribeye area | | Left side weight | | External fat |
| Fat thickness | Rib fat thickness | | Fat thickness | | On 6th rib: | | Ribeye area |
| Eye muscle area | pH | | Intramuscular fat | | Ribeye area | | |
| | Hump height | | | | Rib thickness | | |
| | Meat colour* | | | | Fat thickness | | |
| | Ageing time | | | | | | |
| | Cooking method | | | | | | |

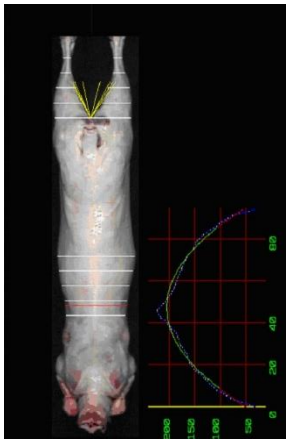
# Technology Overview

- Video Image Analysis (VIA)
  - E+V
  - Can determine subcutaneous fat cover but loses accuracy as the fat depth increases
  - Poor prediction of intramuscular fat
- X-ray based technologies
  - Computed Tomography (CT) – ‘gold-standard’
  - Dual energy x-ray absorptiometry (DEXA; sheep)
- Nuclear Magnetic Resonance (NMR)
  - Magnetic Resonance Imaging (MRI)
- Bioelectromagnetic Methods
  - Total-body electrical conductivity (TOBEC)
- Ultrasound (US)
  - Auto FOM

# VIA Innovations

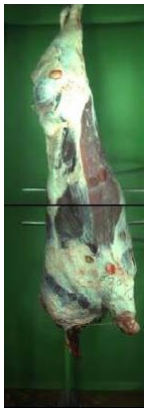
| Manufacturer | 2000 trials | Software Innovations | Hardware innovations | Commercial presence |
|---|---|---|---|---|
| **Cedar Creek** | ✓ | Minor | Minor | Presence in sheep NZ |
| **E+V (installed presently)** | ✓ | Minor | Minor | >70 in EU |
| **Normaclass** | X* | Intermediate | Minor | ~50 systems in France |

*Normaclass not tested in 2000 –not suited to untrimmed carcass at the time



**Cedar Creek VIAScan**

**E+V VBS2000**



**Normaclass MAC**

# Findings from a recent French study

**(Monteils et al., 2017)**

- The EUROP grid is well adapted to estimate yield but it does not reflect marbling (e.g. explains 21% of variance in marbling score for steers).
- A set of 5 indicators was proposed: hindquarter weight, meat colour, retail-cut yield, rib-eye area and marbling score.
- This set of indicators is the first step in developing a new way to assess the overall quality of beef carcasses in Europe.
- Will take further research and investment at industry level – long term project
- In the short term yield of meat will remain paramount

# Cuts-based pricing concept

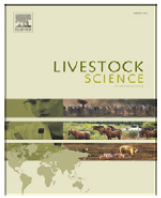
# Prediction of cut yields using VIA

Livestock Science 137 (2011) 130–140

Contents lists available at ScienceDirect

Livestock Science

journal homepage: www.elsevier.com/locate/livsci




## Use of digital images to predict carcass cut yields in cattle ☆

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| | CCW plus EUROP | | | | CCW plus VIA | | | |
|---|---|---|---|---|---|---|---|---|
| | Bias (s.e) | RMSE | $R^2$ | $r_e$ | Bias (s.e) | RMSE | $R^2$ | $r_e$ |
| Overall weights (kg) | | | | | | | | |
| Total meat | −1.06 (0.70) | 7.43 | 0.97 | −0.16* | −0.74 (0.63) | 6.77 | 0.97 | −0.02 |
| Total fat | −0.76 (0.62) | 6.67 | 0.74 | −0.01 | −0.58 (0.60) | 6.38 | 0.77 | −0.13 |
| Total bone | 0.18 (0.32) | 3.38 | 0.79 | −0.09 | 0.32 (0.30) | 3.22 | 0.81 | −0.12 |
| Wholesale weights (kg) | | | | | | | | |
| Lower value cuts | −0.34 (0.61) | 6.54 | 0.89 | −0.07 | 0.15 (0.52) | 5.60 | 0.92 | −0.08 |
| Medium value cuts | −0.01 (0.31) | 3.36 | 0.79 | −0.00 | 0.13 (0.26) | 2.73 | 0.86 | −0.10 |
| High value cuts | 1.10 (0.37)** | 3.91 | 0.89 | −0.01 | 1.18 (0.31)** | 3.27 | 0.93 | 0.05 |
| Very high value cuts | −0.09 (0.16) | 1.74 | 0.85 | 0.01 | −0.11 (0.16) | 1.75 | 0.84 | −0.01 |

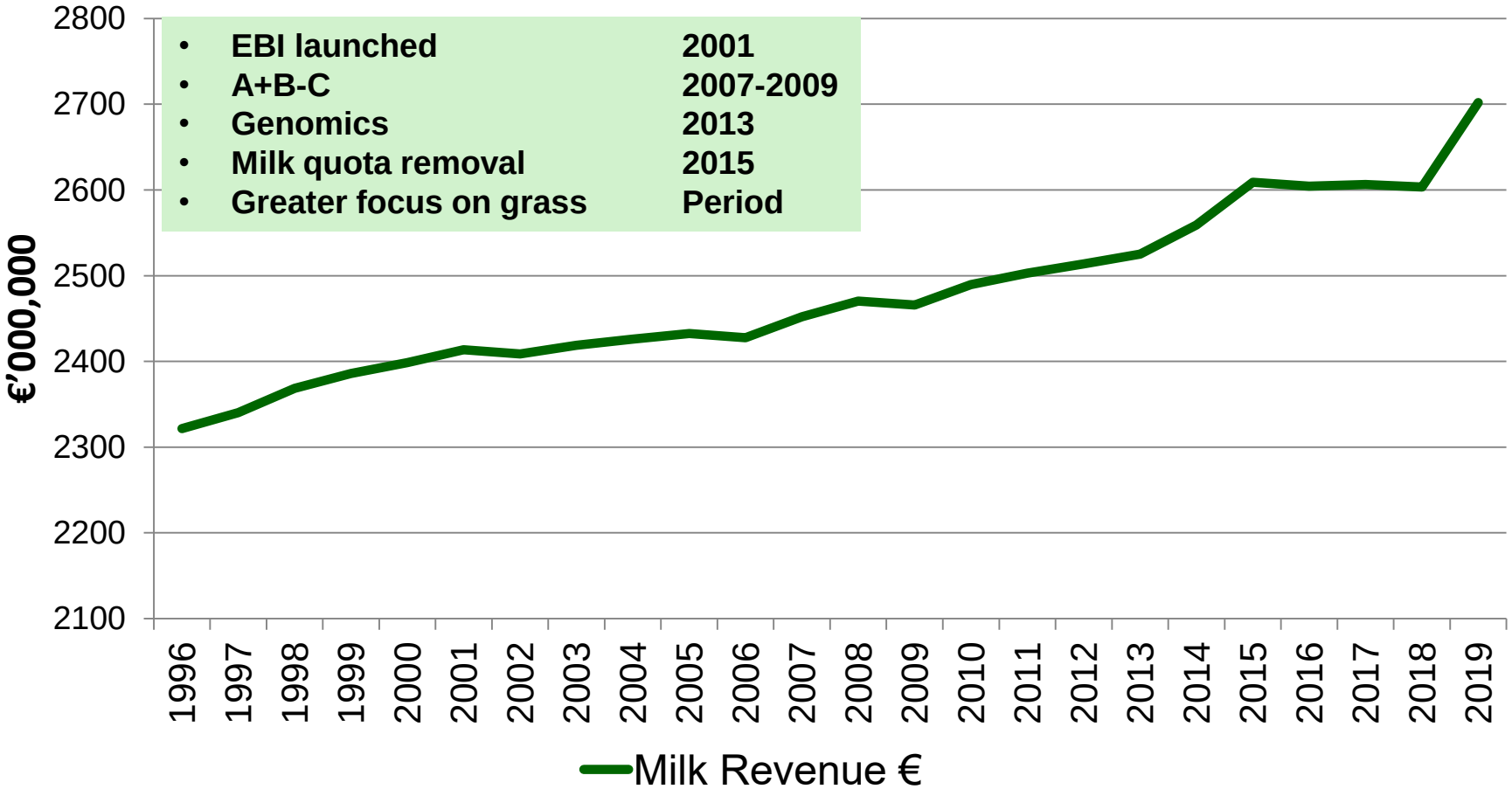
More recent analysis have confirmed these relationships (Source: Shalloo & McHugh)

# What is Multiple Component Pricing

- Each component that has a value is included in the price and the items that have a cost are also included.
- Example: A + B – C in milk pricing
  - Protein has a value (A)
  - Fat has a value (B)
  - Processing has a cost (C)

# Trend in milk value – assuming base price of 30 c/l

**Solids alone worth €274 million per annum between 2006 and 2019**

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# Multiple Component Pricing in beef

**Source:** Shalloo & McHugh

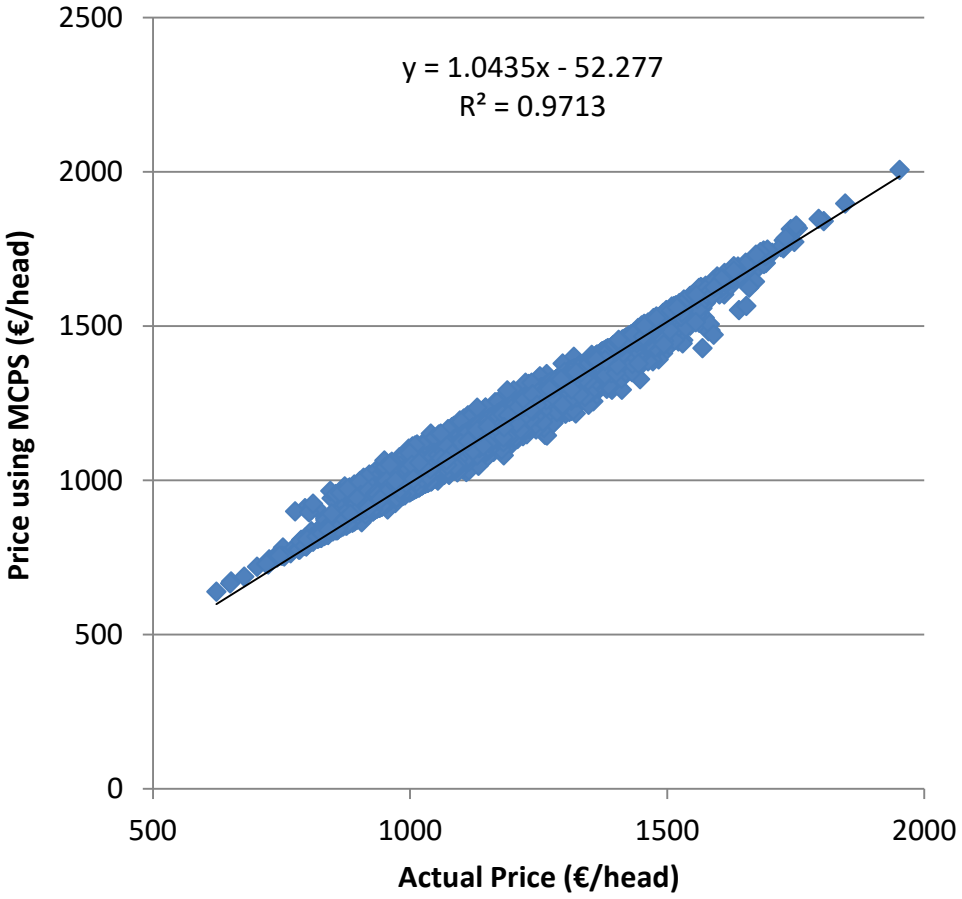
- A – High value
  - Striploin, fillet, rump, cube roll
- B – Medium value
  - Topside, knuckle, silverside flat, eye of round
- C – Lower value
  - Flank, brisket, chuck and neck, heel/shank, chuck tender, LMC
- D - Fifth quarter
- E - Processing costs

**Carcass value = A+B+C+D-E**

# Description of the carcass valuation model

- Assumptions – for discussion
  - A – High value =1
  - B – Medium value = 0.66
  - C – Lower value = 0.33
  - Fifth quarter worth €0.27/kg
  - Processing costs =€150/animal

# Impact on price per head




| Price diff (€/hd) | No. of carcases | Percentage of carcases |
|---|---|---|
| -<120 | 16 | 0% |
| -100 | 103 | 1% |
| -80 | 11 | 0% |
| -60 | 551 | 6% |
| -40 | 2440 | 25% |
| -20 | 1990 | 20% |
| 0 | 1950 | 20% |
| 20 | 1838 | 19% |
| 40 | 794 | 8% |
| 60 | 157 | 2% |
| 80 | 32 | 0% |
| >100 | 10 | 0% |

Data from 9,892 animals.

**Source**: Shalloo and McHugh



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# Summary of Multiple Component Pricing in beef

- Provides more detailed signals for producers to breed animals with attributes that are desired by consumers
  - Reflects cut returns and market preferences
  - Allows cut off based on size of cuts rather than size of animal
  - Allows additional components to be included in pricing
    - Marbling for certain cuts
  - Currently a concept that requires feedback and further research

# Summary

- Historically, Ireland have been innovators in carcass grading systems
- Pre-automation: manual classification by >65 DAFM staff
- First to adopt automated grading by VIA in 2004 (following review of systems by Teagasc and application to EU by DAFM)
- ‘Drennan’ model of carcass payment adopted in 2009/2010
- Current VIA technology could be developed to facilitate ‘cuts-based’ payment
- Can be aligned to the beef breeding programme to increase genetic gain
- Research on grading and valuing carcass quality ongoing