WiFi – no password needed to join Lyrath Conference

GLOBAL CONFERENCE ON SUSTAINABLE BEEF

SUSTAINABILITY IN ACTION: IMPACT ON THE GROUND

October 9-12, 2018
Lyrath Estate, Kilkenny, Ireland

Co-hosted by
Scott Stuart
Chief Executive Officer, Cattlemen's Beef Promotion and Research Board

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@scottstuart
@scottstuart1215
Claudio Cabral, DVM
Technical Director for Latin America, Silvateam
TANNINS AS AN ALTERNATIVE TO THE USE OF ANTIBIOTIC GROWTH PROMOTERS

SUSTAINABILITY IN ACTION:
IMPACT ON THE GROUND
October 9-12, 2018
Lyrath Estate, Kilkenny, Ireland

Claudio Cabral, MV – ccabral@silvateam.com
Feedlot fattening in Argentina

6 million animals are currently fattened in feedlots in Argentina

70% of the total number of animals slaughtered each year
Over thousands of years ruminants have developed a very particular digestive system with **three large sized pre-stomachs**

The Rumen is populated by bacteria (among other microorganisms) that constitutes the **ruminal microbiota**.

**Symbiosis**

Allows cows to obtain **nutrients from fibrous foods** (structural carbohydrates)
a process that takes place under natural conditions

- High fiber feed
- Long rumination time
- High saliva production

High ruminal pH that favors cellulolytic microbiota
causes important changes for ruminants and their microbiota

**Feedlot diet:**

- Contains much less fiber (structural carbohydrates)
- Has a high proportion of concentrated feeds instead (highly degradable carbohydrates, such as starch).
Might cause some issues in Ruminants’ health

This low rumination time - caused by feeding ruminants with high starch diets - places the system in a **delicate balance** between **maximizing the efficiency of food use** and the appearance of **metabolic diseases**.
Low rumination time places the system in a delicate balance.

<table>
<thead>
<tr>
<th>Metabolic diseases</th>
<th>Nutrient utilization efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ruminal acidosis</td>
<td>1. Loss of feed efficiency</td>
</tr>
<tr>
<td>2. Liver abscesses</td>
<td>2. Loss of efficiency</td>
</tr>
</tbody>
</table>

Each of these illnesses can affect ruminants in different ways/varied intensities:

1. Ruminal acidosis
   - **Subclinical** → Loss of feed efficiency
   - **Clinical** → Mortality

2. Hepatic abscesses
   - **Confiscation in slaughterhouse**
   - **Loss of efficiency**
prevalence in countries such as the USA

In South America there is less information about its incidence, but some studies estimate that 5% of animals in feedlots present this pathology
In the second half of the last Century, antibiotic growth promoters (AGPs) began to be included in animals’ feed.

- Increase the **efficiency of food use**
- Prevent episodes of **ruminal acidosis**
- Decrease the prevalence of **liver abscesses**
- Prevent the appearance of **Clostridial diseases**
- Reduce the emission of **greenhouse gases**
The use of low doses of AGPs over several decades has caused the appearance of resistant bacterial strains with the potential risk of transmission of this resistance to other bacterial species that affect not only animals but humans as well.

IN JANUARY 2006 THE EUROPEAN UNION BANS THE INCLUSION OF AGPS IN FOODSTUFFS FOR ANIMALS

CURRENTLY SEVERAL COUNTRIES IN LATIN AMERICA ARE BEGINNING THE PATH TOWARDS ELIMINATING THEIR USE
What is the alternative?
**Tannins are a highly effective alternative to AGPs**

**COMPOUNDS MUST FULFIL CERTAIN CONDITIONS TO BE CONSIDERED AS VALID ALTERNATIVES TO AGPS**

- Increase the nutrient utilization efficiency
- Prevent metabolic diseases (ruminal acidosis, hepatic abscesses)
- Decrease the emission of greenhouse gases
- Do not generate bacterial resistance
- Improve the quality of meat (vfa composition, lipidic oxidation, shelf life, etc)
- Sustainable obtainment

**TANNINS ARE NATURAL COMPOUNDS THAT FULFILL THESE CONDITIONS AND OFFER SOME OTHER BENEFITS**

- From the chemical point of view, tannins are polyphenols.
- Classified into 2 groups - condensed and hydrolysable -
- Tannins have the following properties:
  - Powerful bacteriostatic effect and selective bactericide
  - High affinity to bind reversibly to proteins
**Tannins: Mechanisms of action**

**Known mechanisms**
- Natural antioxidant activity
- Modulation of the inflammatory response in the gastrointestinal mucosa
- Ruminal by-pass of proteins

**Unknown mechanisms**
- Decrease in the ruminal degradation of urea
- Selection favors beneficial bacteria in the ruminal microbiota
- Decrease in the ruminal degradation of starch and prevention of ruminal acidosis
- Modulation of the gastrointestinal peristaltic activity, increasing exposition time to enzymes
Meta-analysis of trials done in the USA, Mexico and Argentina measuring daily weight gain and feed conversion.
Tannins against liver abscesses. Published trial

TANNINS ARE A USEFUL TOOL TO AVOID LIVER ABSCESSSES IN FEEDLOT CATTLE

C. Cabral¹, E. Redondo², F. Delgado³*
¹Silvateam, Indunor SA, Argentina; ²Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina; ³Instituto de Patobiología, CNIA-INTA, Argentina. *E-mail: delgado.fernando@inta.gob.ar

1. % of animals with liver abscesses on the total of animals of the treatment according to time of permanence in the fattening

2. % of prevalence accumulated of livers abscesses, according to time in fattening
Using genomic sequencing technology we can know the exact bacterial composition of ruminal microbiota.

Research Article

Impact of Chestnut and Quebracho Tannins on Rumen Microbiota of Bovines

Juan María Díaz Carrasco, Claudio Cabral, Leandro Martín Redondo, Natalia Daniela Pin Viso, Dario Colombatto, Marisa Diana Farber, and Mariano Enrique Fernández Miyakawa

1Instituto de Patobiología, Centro Nacional de Investigaciones Agropecuarias, Instituto Nacional de Tecnología Agropecuaria, Calle Las Cabanas y Los Reseros s/n, Castilla de Correo 25, Castiela, 1712 Buenos Aires, Argentina
2Consejo Nacional de Investigaciones Científicas y Técnicas, Godey Cruz 2290, 1425 Buenos Aires, Argentina
3Animal Nutrition, Silvateam, Indunor, Cerrito 1136, 1010 Buenos Aires, Argentina
4Instituto de Biotecnología, Centro Nacional de Investigaciones Agropecuarias, Instituto Nacional de Tecnología Agropecuaria, Calle Las Cabanas y Los Reseros s/n, Castilla de Correo 25, Castiela, 1712 Buenos Aires, Argentina
5Departamento de Producción Animal, Facultad de Agronomía, Universidad de Buenos Aires, Av. San Martín 4453, 1417 Buenos Aires, Argentina
**Diet improves Firmicutes/Bacteroidetes ratio...**

**TWO OF THE MOST IMPORTANT PHYLUM WITHIN RUMINAL BACTERIA ARE **FIRMICUTES AND BACTEROIDETES**

<table>
<thead>
<tr>
<th><strong>Firmicutes:</strong> gram +, anaerobic and in general sporulate</th>
<th><strong>Bacteroidetes:</strong> gram -, anaerobic and do not sporulate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Tannins</td>
<td>After introducing Tannins in the diet</td>
</tr>
<tr>
<td>Abundance</td>
<td>Time</td>
</tr>
</tbody>
</table>

- **Phylum Firmicutes** is associated to a greater efficiency in the use of dietary energy than **bacteroidetes**

- When studying the genomic sequencing of ruminal microbiota, the **firmicutes / bacteroidetes ratio** should be analyzed

- An *increase in this relationship* is generally associated to a much more efficient animal from a productive point of view
This family of bacteria is the producer of methane.

A high concentration of these bacteria in the ruminal liquor implies a high emission of greenhouse gases as well as a great loss of energy from the diet.

The graphic shows that the addition of tannins to the diet produces a significant decrease in methanogenic archaea.
not generate resistance against tannins

• The evolution of bacterial resistance to tannins vs antibiotics was analyzed

• Strains of Clostridium perfringens were isolated from both chicken and cattle

• After 400 generations, the minimum inhibitory concentration of bacitracin and avilamycin increased several times, while it was not altered for quebracho and chestnut tannins

Hydrolyzable and condensed tannins resistance in Clostridium perfringens

L.M. Redondo a,b,*, J.E. Domínguez a,b, B.C. Rabinovitz a,b, E.A. Redondo a,b, M.E. Fernández Miyakawa a,b,*

a Instituto de Patobiología, Centro Nacional de Investigaciones Agropecuarias, Instituto Nacional de Tecnología Agropecuaria, Calle Las Caobas y Los Reserios s/n, Casilla de Correo 25, 1712, Castelar, Buenos Aires, Argentina
b Consejo Nacional de Investigaciones Científicas y Técnicas, Rivadavia 1947, 1033, Ciudad Autónoma de Buenos Aires, Argentina

<table>
<thead>
<tr>
<th>Inoculo según DO600</th>
<th>120</th>
<th>Numero de veces de aumento de la MIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cepe</td>
<td>DO600</td>
<td>Inoculo (μl)/10ml</td>
</tr>
<tr>
<td>Aves</td>
<td>88 avilam</td>
<td>1.586</td>
</tr>
<tr>
<td>88 bacitrac</td>
<td>1.63</td>
<td>74</td>
</tr>
<tr>
<td>88 cas</td>
<td>1.622</td>
<td>74</td>
</tr>
<tr>
<td>88 que</td>
<td>1.564</td>
<td>77</td>
</tr>
<tr>
<td>Bovino</td>
<td>152 avi</td>
<td>1.504</td>
</tr>
<tr>
<td>152 bac</td>
<td>1.524</td>
<td>79</td>
</tr>
<tr>
<td>152 cas</td>
<td>1.604</td>
<td>75</td>
</tr>
<tr>
<td>152 que</td>
<td>1.558</td>
<td>77</td>
</tr>
</tbody>
</table>
Zsolt Szeidemann
BRD Segment Manager, Bayer
Animal Health
Global Conference on Sustainable Beef

Innovation in Action

Dr Zsolt Szeidemann, Beef Species Team

11 Oct 2018
150 years of innovation

Bayer Animal Health: our shared responsibility drives our actions

Bayer

„Science for Better Life“

people-food-animals

Animal Health

1,5B€ sales
3000 employees
100+ products

CAP&FAP

Beef Group

Parasiticides & BRD
Innovation #1

Customized Parasite Control
External parasites – Why bother?

Economic (in USD), health and well-being impact

**USA**
(Talley 2016)
- Horn fly 1,360M
- Stable fly 672M
- Horse fly 296M
- Face fly 191M
- Ticks 162 M
- Mosquitos 78M
- Lice 56M

**Brazil**
(Grisi et al 2014)
- GI parasites 7,100M

**Mexico**
(Rodriguez-Vivas et al 2016)
- Ticks 573M
- Gl parasites 445M
- Horn fly 231M
- Liver fluke 130M
- Coccidia 23M

**Australia**
(AFI 2015)
- Ticks 156M (N)
- Buffalo fly 99M (N)
- Ephemeral fever 60M (N)
- Intestinal parasites 82M (S)
- Theileria 18M (S)
- Pink eye 11M (S)

Direct health damage + vector borne diseases

+ animal well-being aspects

---

/// GRSB Conference 2018 /// Innovation in Action @BAH /// 11 October 2018
Challenges to parasite control

Resistance not IF but WHEN?

- Diminishing governmental support
- Environmental safety and pesticide handling
- Limited education
- Generic market
- Diverse customer preferences by regions
- Rising regulatory requirements and development costs
- Climate change and trade facilitating spread of parasites
- Immature alternative parasite control technologies
- Rampant resistance to parasiticides

Constant battle for the cattle industry

<table>
<thead>
<tr>
<th>Date of introduction</th>
<th>1st resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>arzenicals</td>
<td>1893</td>
</tr>
<tr>
<td>DDT</td>
<td>1846</td>
</tr>
<tr>
<td>organophosphates</td>
<td>1944</td>
</tr>
<tr>
<td>amidines</td>
<td>1975</td>
</tr>
<tr>
<td>pyrethroids</td>
<td>1977</td>
</tr>
<tr>
<td>macrocyclic lactones</td>
<td>1981</td>
</tr>
<tr>
<td>fipronil</td>
<td>2008</td>
</tr>
</tbody>
</table>
Holistic approach required

Customized Parasite Control

- Collaboration with all stakeholders
- Environmental aspects
- Safety
- Education & training
- Resistance monitoring
- Pasture management
- Product/portfolio development
Product development

Tradition, combined expertise and sustained innovation with Bayer Crop Science and Pharma

Customer need

- Broad spectrum
- Resistance-breaking
- Convenience

**Cattle ecto & endoparasiticides**

- new compound class
- multiple projects progress

**Discovery**

- (2-4 years)
- 15-20M€

**Development**

- (3-8 years)
- 60M€

**Registration**

- (2 years)

**BCS & BPH**

1 development compound
5 development candidates
10 POC
200-2,000 synthetized compounds
1M screened compounds

Discovery

(2-4 years)
15-20M€

Development

(3-8 years)
60M€

Registration

(2 years)
Broad portfolio fc

Example: Defense Point (US)

**Pyrethroids**

**Organophosphates**

**Neonicotinoids**

---

---

---

---
Resistance monitoring and diagnostics

Example: on farm diagnostic (MX)

**Tick Control Rules**

#1 use the right active ingredient
#2 follow product label
#3 rotate
#4 vaccinate
#5 strategic control
#6 other management tools
#7 justified macrocyclic lactone use

Digital fly counting (in the works)
Pasture management

Example: weed management on pastures and grazeland (US)

“The hardest thing for most livestock producers to realize is that we are not in the cattle business. We are in the grass business. We are in effect, grass farmers.”

Allan Nation
(editor, The Stockman Grass Farmer)
The challenge

- Complex disease: stress + pathogens
  - *M. haemolytica*, *P. multocida*, *H. somnus*, Mycoplasma spp., IBR, BVDV, PI3, BRSV

- Growing intensification:
  - 30% more beef
  - 30% less cattle\(^1\)
  - Feedlot mortality increased from 10.3 to 16.0 per 1000 cattle between 1994-2011\(^2\)

- Consumer pressure:
  - On antibiotic use
  - 59.3% of feedlot cattle in US receives AB on arrival\(^3\)

---

\(^1\) Capper: The environmental impact of beef production in the United States: 1977 compared with 2007 JASc Vol 89 Issue 12 2011
\(^2\) Maday, The ongoing battle with BRD, Bovine Veterinarian (September) 30-33 3 NAHMS 2011
\(^3\) NAHMS 2011
Focus on the host`s immune status rather on the bugs.
Novel Mode of Action

Stimulation of innate immunity¹

anti-inflammatory activities

// counters *Mannheimia haemolytica* LPS effects

// prevents extensive lung inflammation, fibrosis,…

antiviral and antibacterial activities

// aids in combatting *Mannheimia haemolytica*

¹Ilg, Investigations on the molecular mode of action of the novel immunostimulator Zelnate: activation of the cGAS-STING pathway in mammalian cells, Molecular Immunology, 90 (2017) 182-189
First licensed immunostimulant with BRD indication

Extract from the USDA label

Indication
Aid in the treatment of Bovine Respiratory Disease due to *Mannheimia haemolytica* in cattle 4 months of age or older, when administered at the time of, or within 24 hours after, a perceived stressful event.

Dosage and administration
2 mL IM single dose

Withdrawal time
21 days

Zelnate is based on technology developed by Juvaris BioTherapeutics and is patent protected. Animal health applications are being exclusively developed by Bayer Animal Health and are the subject of Bayer patent applications.
Challenge studies demonstrated high efficacy\(^1\)

Zelnate as a stand-alone therapy...

\[
\begin{align*}
\text{Average Lung Lesions (%)} & \\
\text{Zelnate} & 12.1\% \\
\text{Control} & 18.4\% \\
\text{Statistically significant reduction} & (P < 0.05)
\end{align*}
\]

\[
\begin{align*}
\text{Mortality} & \\
\text{Zelnate} & 2.5\% \\
\text{Control} & 10.0\% \\
\text{Statistically significant reduction} & (P < 0.05)
\end{align*}
\]

...significantly reduces lung lesion scores associated with BRD when administered in the face of disease challenge

...significantly reduces the risk of mortality when administered in the face of clinical BRD

\(^1\) USDA label

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Field study suggests potential to replace antibiotics on arrivals\(^1\)

In defined cattle population and in metaphylactic setting

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Micotil Group:</th>
<th>Zelnate Group:</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 mL/100 lbs SC injection (n=1,002 steers)</td>
<td>2 mL/100 lbs IM injection (n=1,002 steers)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Avg. 501 lbs</td>
<td>Avg. 569.4 lbs</td>
<td></td>
</tr>
<tr>
<td>BRD morbidity (%)</td>
<td>7.65</td>
<td>13.84</td>
<td>non-inferior*</td>
</tr>
<tr>
<td>Time to treatment (days)</td>
<td>28.1</td>
<td>22.6</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>BRD repulls (%)</td>
<td>17.90</td>
<td>11.10</td>
<td>0.5929</td>
</tr>
<tr>
<td>BRD chronicity (%)</td>
<td>27.90</td>
<td>29.10</td>
<td>0.9942</td>
</tr>
<tr>
<td>Overall BRD mortality (%)</td>
<td>0.44</td>
<td>0.50</td>
<td>0.7643</td>
</tr>
<tr>
<td>BRD case-fatality (%)</td>
<td>3.95</td>
<td>2.99</td>
<td>0.7287</td>
</tr>
<tr>
<td>ADG (lbs)</td>
<td>2.96</td>
<td>2.91</td>
<td>0.6759</td>
</tr>
<tr>
<td>DMI (lbs)</td>
<td>12.96</td>
<td>12.81</td>
<td>0.3768</td>
</tr>
<tr>
<td>Feed:Gain</td>
<td>4.50</td>
<td>4.55</td>
<td>0.7302</td>
</tr>
</tbody>
</table>

No statistical differences between treatment groups across all clinical and economic parameters.

In this study, Zelnate was shown to be a viable non-antibiotic option for metaphylaxis in medium-risk feedlot cattle.

Nickell et al. A comparison of clinical and economic outcomes when metaphylactically administering either a novel DNA immunostimulant or tilmicosin to beef calves at medium – high risk of developing bovine respiratory disease in the feedlot; RUAA, Den Hague, 2016

\(^1\) GRSB Conference 2018 /// Innovation in Action @BAH /// 11 October 2018

delivering science based products and services

introducing smart digital technologies

enabling collective intelligence of all stakeholders
Kevin Downing
HerdPlus Team Lead, Irish Cattle Breeding Federation
How ICBF and cattle genetics are changing the sustainability game
Introduction

• ICBF – Make-up & Role

• National Cattle Breeding Database & Industry Links

• Beef Euro-Star Index

• Impact of the Euro-Star Index

• Focus areas that are driving innovation
One Database, Many Partners
less duplication and cost for farmers

Stakeholders in cattle breeding control decision making
Farmer owned & controlled
Role of ICBF

- Focus on genetic improvement as a tool for improving future profit on Irish cattle farms.
- Establish & maintain a central database of performance data.
- Define a breeding goal and selection index (e.g. Euro-Star Index).
- Provide routine genetic evaluations for all breeds and traits.
- Ensure a breeding scheme of optimal design is operating in Ireland (e.g. Gene Ireland).
- Ensure continuous improvement base on science.
Data in the ICBF Database

- Herds: 107k
- Live Animals: 6.2m
- Calving Records: 2.1m/yr
- Milk Recording: 2.6m/yr
- Farm Movements: 7m/yr
- AI Inseminations: 700k/yr
- Slaughter Data: 2m/yr
- BVD records: 2.1m/y
Big Data - Genotype Data

- 77.7 Billion Genotype SNP @ Sep 2018
- 62.7 Billion Genotype SNP @ Mar 2018
- 18.3 Billion Genotype SNP @ Mar 2016
- 8.6 Billion Genotype SNP @ Jan 2015
- 1.8 Billion Breeding Value Records
What is the Beef Euro-Star Index?

- Profit Index, e.g., €80 more per calving
  - Multi-breed evaluations.
- Star system; 5 star versus 1 star.
  - Across all breeds, including commercial.
- Two main profit indexes; (i) Replacement and (ii) Terminal
<table>
<thead>
<tr>
<th>Trait</th>
<th>Goal</th>
<th>Relative wt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calving Difficulty</td>
<td>Less</td>
<td>16%</td>
</tr>
<tr>
<td>Feed Intake</td>
<td>Less</td>
<td>18%</td>
</tr>
<tr>
<td>Carcass wt (for age)</td>
<td>More</td>
<td>21%</td>
</tr>
<tr>
<td>Maternal milk</td>
<td>More</td>
<td>18%</td>
</tr>
<tr>
<td>Female fertility</td>
<td>More</td>
<td>23%</td>
</tr>
<tr>
<td>Docility</td>
<td>More</td>
<td>4%</td>
</tr>
</tbody>
</table>

The ideal Irish beef cow - A weaned calf every year of good weight & quality.
### ICBF Spring Active Beef Bull List 2018

<table>
<thead>
<tr>
<th>Rank</th>
<th>Code</th>
<th>Bull Name</th>
<th>Breed</th>
<th>Gene Ireland</th>
<th>Index</th>
<th>Rel %</th>
<th>Stars Within</th>
<th>Stars Across</th>
<th>Calv Diff %</th>
<th>Calv Recs</th>
<th>Daughter Milk (kgs)</th>
<th>Rel %</th>
<th>Price</th>
<th>Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SA4059</td>
<td>Beguin</td>
<td>SA</td>
<td>No</td>
<td>€252</td>
<td>59</td>
<td>5</td>
<td>5</td>
<td>1.6</td>
<td>83</td>
<td>121</td>
<td>15.8</td>
<td>€26</td>
<td>Munster, PG</td>
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<tr>
<td>2</td>
<td>SA2189</td>
<td>Ulcan</td>
<td>SA</td>
<td>No</td>
<td>€203</td>
<td>63</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>96</td>
<td>780</td>
<td>11.7</td>
<td>€10</td>
<td>Dovea</td>
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<td>3</td>
<td>SI4383</td>
<td>Derreen Declan</td>
<td>SI</td>
<td>No</td>
<td>€192</td>
<td>54</td>
<td>5</td>
<td>5</td>
<td>3.2</td>
<td>74</td>
<td>69</td>
<td>12</td>
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<td>Dunmasc</td>
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<tr>
<td>4</td>
<td>ZAG</td>
<td>Castleview Gazelle</td>
<td>LM</td>
<td>Yes</td>
<td>€191</td>
<td>77</td>
<td>5</td>
<td>5</td>
<td>4.4</td>
<td>99</td>
<td>27072</td>
<td>0.9</td>
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<tr>
<td>5</td>
<td>SFL</td>
<td>Du Stordeur Flaneur</td>
<td>BB</td>
<td>No</td>
<td>€183</td>
<td>96</td>
<td>5</td>
<td>5</td>
<td>5.1</td>
<td>99</td>
<td>10244</td>
<td>4.4</td>
<td>€99</td>
<td>Bova</td>
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<tr>
<td>6</td>
<td>VTA</td>
<td>Vaillant</td>
<td>SA</td>
<td>No</td>
<td>€179</td>
<td>77</td>
<td>5</td>
<td>5</td>
<td>2.1</td>
<td>93</td>
<td>300</td>
<td>6.2</td>
<td>€85</td>
<td>Bova</td>
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<tr>
<td>7</td>
<td>ISL</td>
<td>Islavale Cracker 11</td>
<td>SI</td>
<td>No</td>
<td>€171</td>
<td>76</td>
<td>5</td>
<td>5</td>
<td>7.2</td>
<td>97</td>
<td>1148</td>
<td>8.6</td>
<td>€86</td>
<td>Dovea</td>
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<tr>
<td>8</td>
<td>SI2469</td>
<td>Lisnacarran Fifty Cent</td>
<td>SI</td>
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<td>€170</td>
<td>57</td>
<td>5</td>
<td>5</td>
<td>4.4</td>
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<td>27072</td>
<td>0.9</td>
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</table>

- **Range of breeds on Top Bull Listing** => Focused on promoting these bulls within the relevant breeds.
The Irish Beef Breeding Goal

- To generate more 5-star cows (i.e., for milk, fertility, weight for age.....) for Irish beef farmers.....which when crossed with 5-star terminal index sires, produce progeny with better weight for age, feed efficiency, etc.
Are we making progress? => YES

Trends from National data.

- Past focus on terminal traits => decline in maternal traits & no gain in replacement index. Beef genomics scheme introduced (2014), replacement index has turned around => Major gains in calves/cow/year and carcass traits.
- Clear evidence that commercial beef farmers are responding positively to new technologies such as Euro-Stars & beef genomics.

* Based on data from 24k herds involved in Beef Data and Genomics Program.
Are we making progress? => **YES.**
*Trends from Teagasc-ICBF validation.*

- Validation study based on 46 suckler herds & ~7k cows. All cows & calves weighed for last 3 years on participating farms.
- Initial results based on Teagasc-ICBF validation study indicate that 5 star cows are €136 more profitable per parity and produce 550 kg less CO2e in their lifetime.
- **Breeding for profit & breeding for sustainability are effectively same.**

<table>
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<tr>
<th>Star Rating</th>
<th>No. Animals</th>
<th>Replacement Index/parity</th>
<th>Lifetime CO2e*</th>
<th>AFC (days)</th>
<th>CIV (days)</th>
<th>Cow Wt (kg)</th>
<th>Wean Wt (kg)</th>
<th>Progeny Carc Wt (kg)</th>
<th>Progeny Carc Age (days)</th>
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<td><strong>-550</strong></td>
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<td>73</td>
<td>26</td>
<td>13</td>
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*Based on Gross Emissions Output over the cows lifetime. Includes emissions from the cow and her progeny.*
Are we making progress? => YES
Trends from Bord Bia-ICBF validation
Increasing Profitability & Carbon Efficiency

How quickly can we move our suckler herd to having a herd replacement index of €200+?

*About 15 years => Can we shorten this process?*

- Moving National Herd from €82 to €200 => a reduction in carbon emissions (CO2 eq) per kg beef from 11.6 kg to 10 kg (-14%).
Focus Areas - Driving Innovation

- Beef Data & Genomics Program (BDGP)
- Weight recording pilot
- GreenBreed project
- DNA based calf registration
- Health & Disease traits
- Meat Eating Quality
Current Problem

- 12% of global GHG emissions are from agriculture (figure is 33% for Ireland).
  - Cattle are worst offenders.
- Environmental Solution; cut our cattle herd.
- Irish Solution; Breed more sustainable animals => BDGP 2015-2020.

Scheme was sold on the basis of climate change benefits
Beef Data and Genomics Program (BDGP)

- Breed more profitable, sustainable & carbon efficient cows.
- €300m total funding 6 years (2015-2020).
  - Farmers paid ~€90/cow/year to complete key actions re: the scheme, e.g., targets for 4/5 star cows & bulls
  - Data recording x 14 e.g. Scour & Pneumonia, Calf Vigour & Quality
  - ~23k suckler herds & ~550k cows
  - ~1.4m animals genotyped to-date
  - Genotyping costs €22/animal

- Other countries now looking at introducing similar schemes.
Weight Recording Pilot

Budget 2019: suckler scheme worth €20m confirmed

Further details of the suckler support scheme, revealed by the Irish Farmers Journal on Monday night, were confirmed as part of Budget 2019.

- New €20 million Beef Environmental Efficiency Pilot (BEEP) scheme launched by DAFM
- Weights from up to 500k Suckler cows and their calves!
- Payment of €40 per Suckler cow for providing weight data on both cows and calves.
Greenbreed Project

- €3m DAFM funded project
- Aims to develop tools & resources to improve the environmental footprint.
- For same meat or milk output, there still is a ~15-20% in GHG output between individual animals.
- Opportunity to breed even more climate efficient cows for the future.
DNA Calf Registration

- Very successful pilot project undertaken this Spring.
- 18 herds & ~2,000 calves DNA registered.
- Further pilot for this Autumn - App

Database predicts
- Sire
- Dam
- Sex
- Breed

Output (by day 14)
- EU Registration
- Parentage
- Genomic Evaluation
- Major Genes
- Herdbook (optional)
- Quality Assurance
Health & Disease Traits

- Farmer Recorded
  - Lameness & Mastitis
  - Pneumonia & Scour
- Factory Data
  - Liver Fluke
  - TB
Scenario: Bull has an EBV of -0.05 or +0.05 for TB

What will be the expected prevalence of TB in his progeny if my herd gets infected?

(66.692 * -0.05) + 6.6432 = 3%

(66.692 * +0.05) + 6.6432 = 10%
Progeny Prevalence Per Sire

≥ 50 daughters
≥ 10 herds
New Traits - Meat Eating Quality

- ~2,000 animals analysed to date, based on “trained panel” data (~14k records).
- Initial parameters indicate significant opportunity to increase meat eating quality through genetics.
  - High genetic correlations (>0.8).
- Test EBV’s generated and validation work undertaken.
- Target for release through MTI & ICBF later this year.

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# Genomics for Meat Eating Quality

## Tenderness EBV by A.I. Sires Breed

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Graph limited to 1040 A.I. sires of AA, BB, CH, HE, LM, SA, and SI breeds.
Summary

- Beef breeding is delivering. Goal is to now increase gain & deliver herd target of €200+. These cows are also more climate efficient.
  - Current and future programs will help to deliver on this opportunity (e.g. BEEP).
- DNA calf registration a major opportunity.
- GHG/weanling efficiency a key focus trait.
- ICBF is driving change in the beef industry. Not always popular, but “high level” industry metrics are now moving in right direction.
ICBF.com

Our Farmer & Government Representation

Our AI & Milk Recording Organisations

Our Herdbooks

Acknowledging Our Members