Methane in indexes: Brief history, global status, and future.

AGBU Summit 2023: Livestock Sustainability Indexes

Michael Aldridge

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Australia's genetics institute for agriculture

SUSTAINABILITY indexes: Brief history, global status, and future.

AGBU Summit 2023: Livestock Sustainability Indexes

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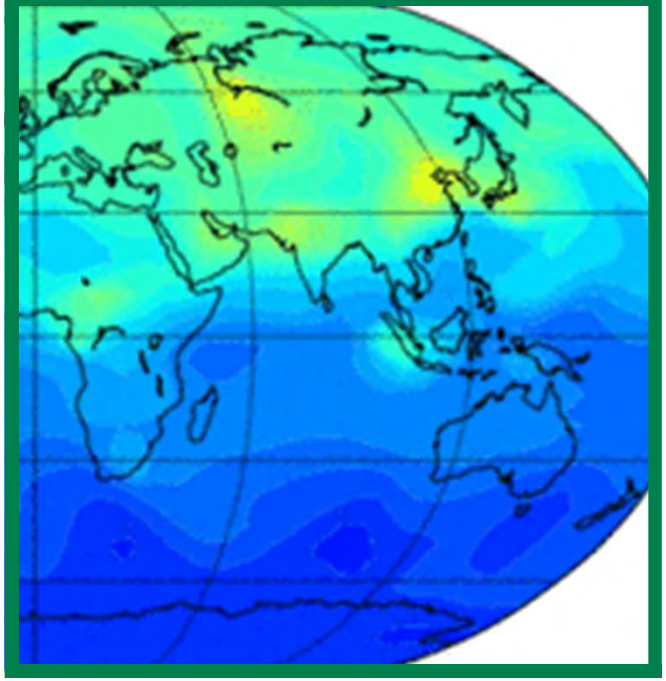
Australia's genetics institute for agriculture

Setting the scene for methane indexes…

Methane traits and breeding goals



Methane indexes of the past

Methane indexes of today

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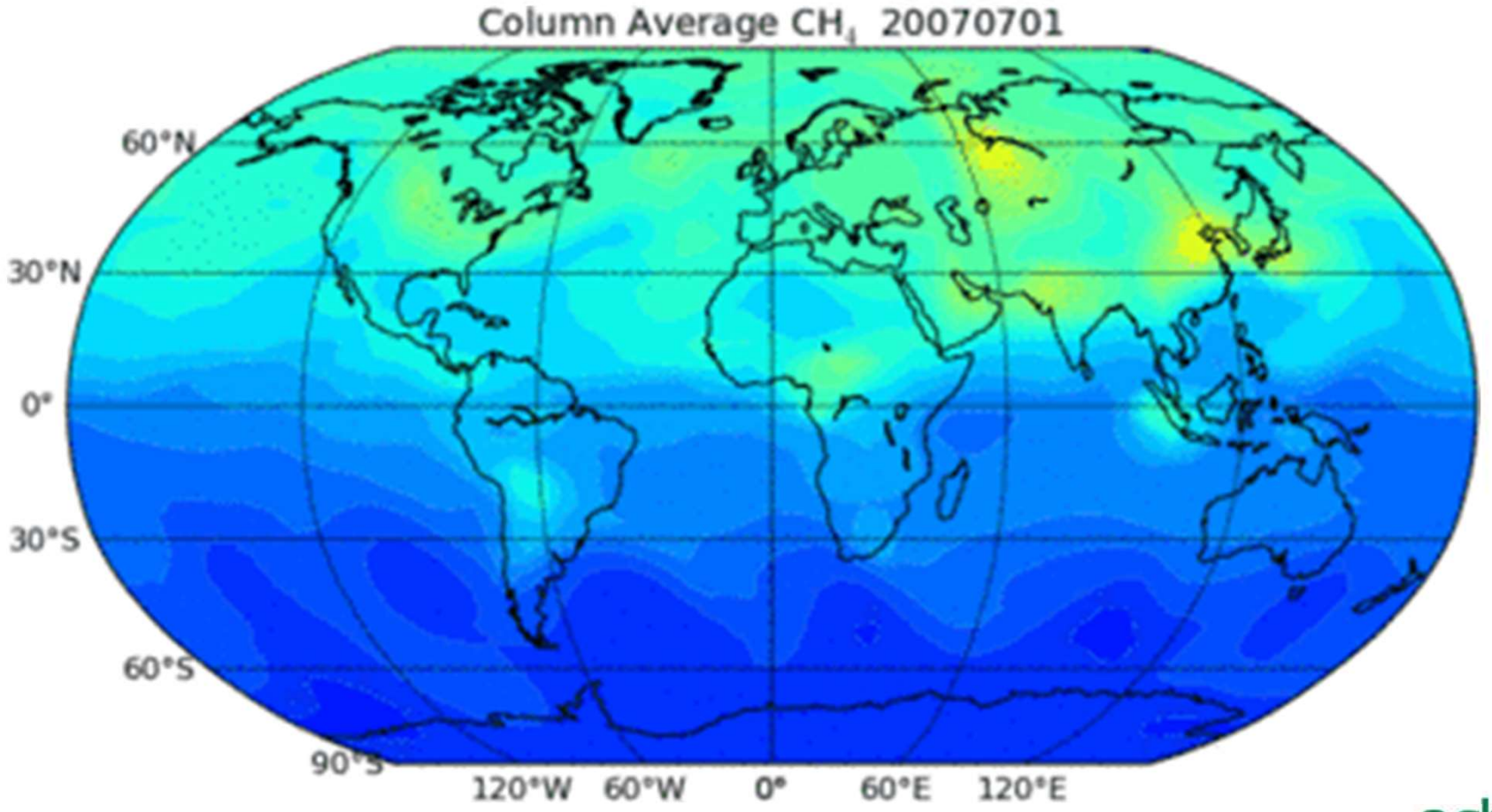
Methane traits and breeding goals



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Methane traits and breeding goals

Methane **production** (g per day, t per year)

Methane **intensity** (per product unit)

Methane **yield** (per feed unit)

*Methane **utilization** (per $, per ha, etc.)*

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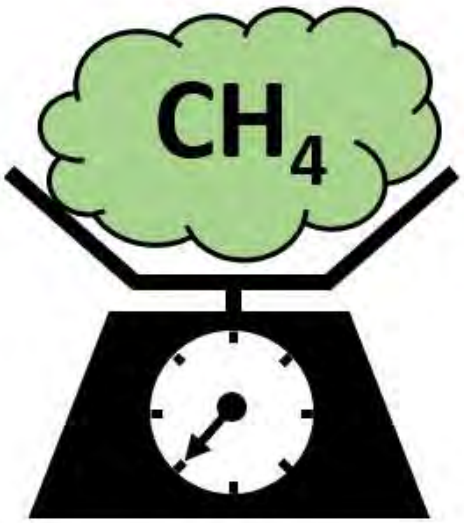
Methane production (g per day, t per year)

Methane or carbon-equivalent produced.

Easy to understand, price, and select for.

Ideal for climate targets.

Reduce this and you'll reduce total methane.
(assuming herd/flock size and feed remains the same)



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Methane intensity (per product unit)

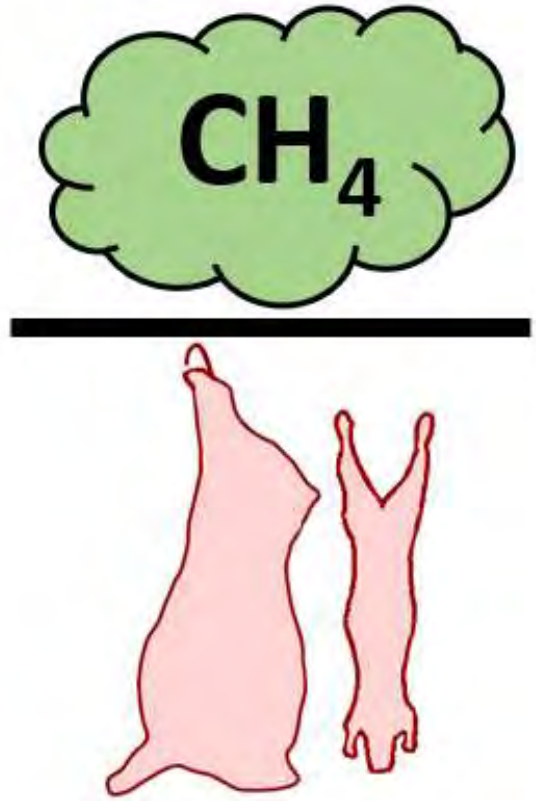
Methane produced as a bi-product.

Likely to reduce methane production.

Limiting due to the nature of the ratio.

Conceptually understandable.

Desirable for industry reporting.



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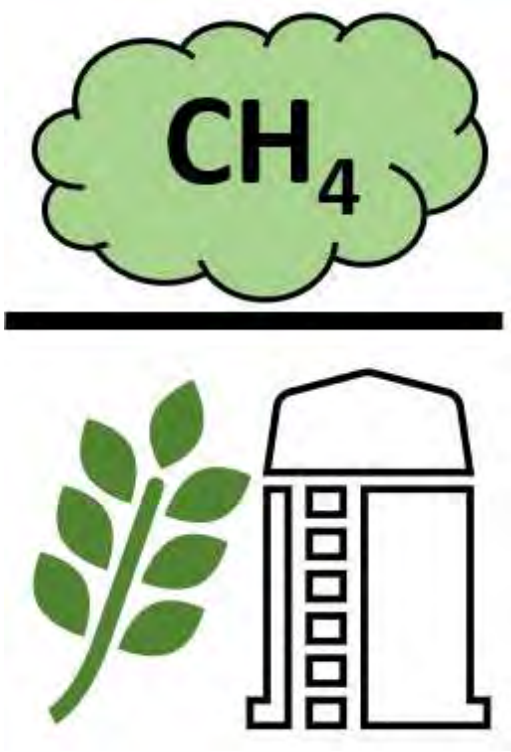
Methane yield (per feed unit)

Methane produced per unit of feed.

Conceptually understandable.

Desirable for industry reporting.

Feed is strongly tied to methane prediction.



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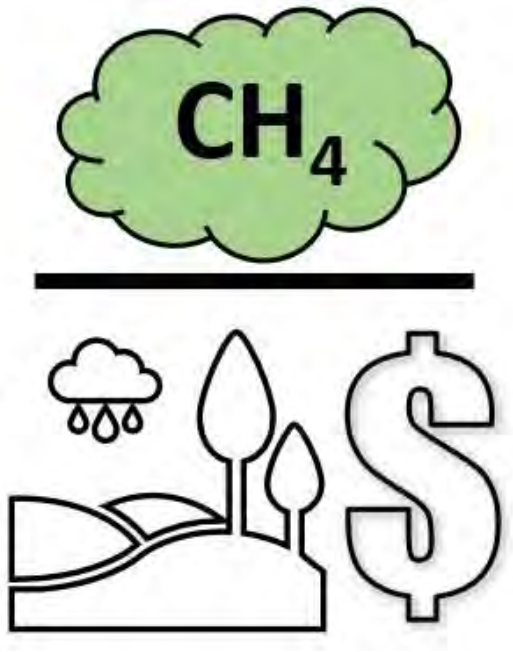
Methane utilization (per $, per ha, etc.)

Methane produced in relation to the system.

Useful for optimization.

Does it reduce total methane?

Methane is going to be produced, how do we get the most out of it?



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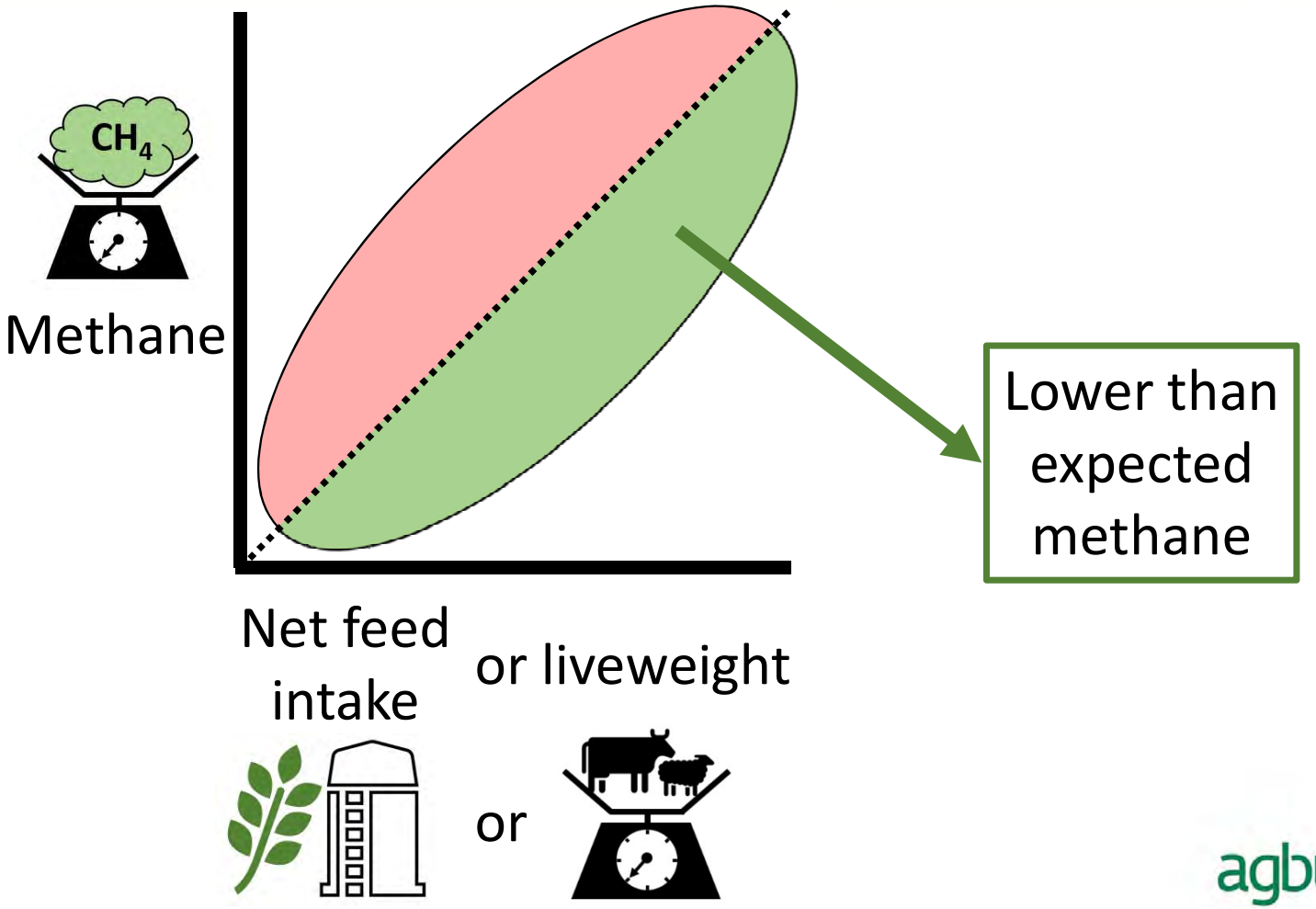
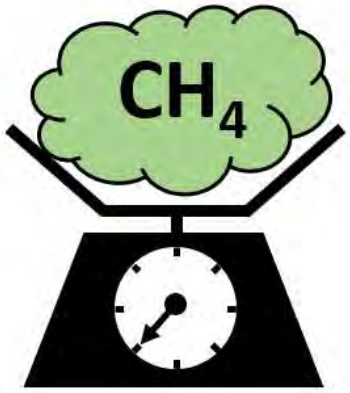
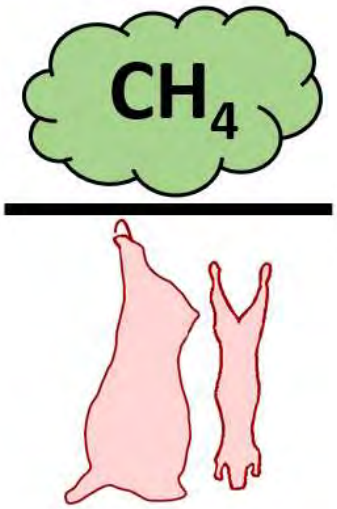
Residual methane traits



Do you have any clarification questions about these?

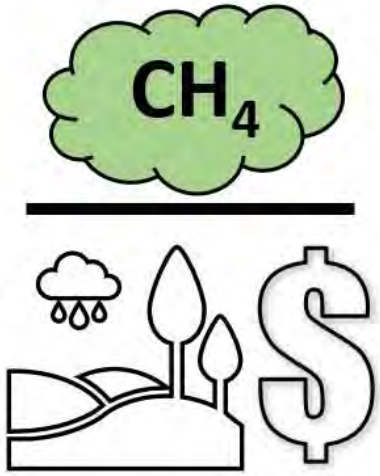


Methane
Production

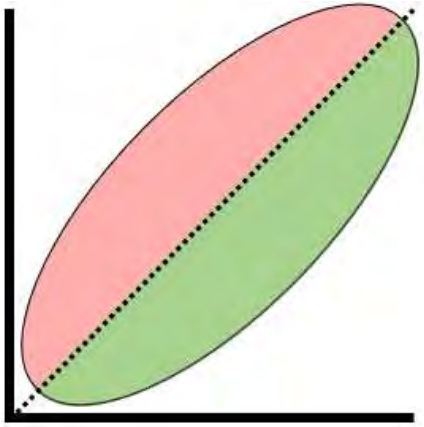


Methane
Intensity

Methane
Yield



Methane
Utilization



Residual
methane

Methane indexes of the past

Methane indexes of the past

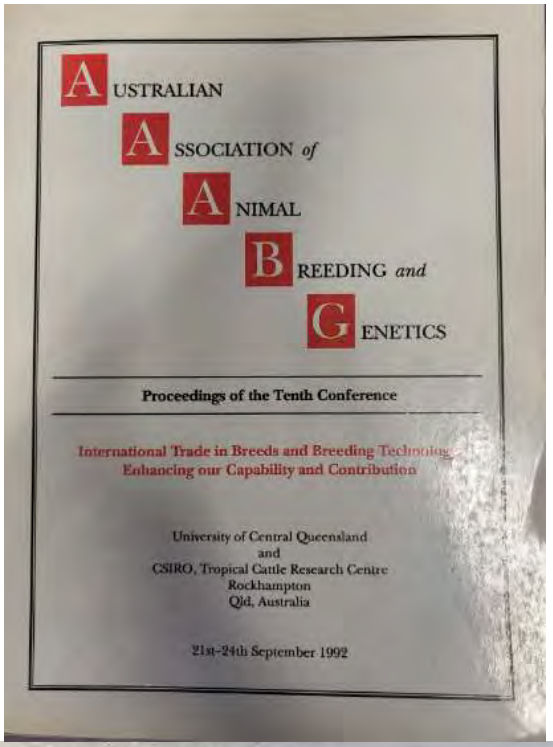
Previous fundamental research opened the door.

Using available data (not CH_4) to reduce methane was recommended.

Research methane indexes were developed and the tools are in place.

A parallel sheep story was happening at the same time.

Feed intake is the father of methane research



AUSTRALIAN ASSOCIATION of ANIMAL BREEDING and GENETICS

Proceedings of the Tenth Conference

International Trade in Breeds and Breeding Technology – Enhancing our Capability and Contribution

University of Central Queensland
and
CSIRO, Tropical Cattle Research Centre
Rockhampton
Qld, Australia

21st-24th September 1992

A BREEDING OBJECTIVE AND SELECTION INDEX PACKAGE FOR USE WITH BREEDPLAN

S.A. BARWICK[1], W. FUCHS[1], G.P. DAVIS[2] and K. HAMMOND[1]

[1]Animal Genetics and Breeding Unit*
University of New England
Armidale 2351

[2]CSIRO Tropical Cattle Research Centre
PO Box 5545
Rockhampton Mail Centre 4702

CSIRO PUBLISHING
www.publish.csiro.au/journals/ajea

Australian Journal of Experimental Agriculture, 2004, **44**, 393–404

Economic evaluation of beef cattle breeding schemes incorporating performance testing of young bulls for feed intake

J. A. Archer[A,C], *S. A. Barwick*[B] *and H.-U. Graser*[B]

Cooperative Research Centre for Cattle and Beef Quality
[A]NSW Agriculture, Agricultural Research Centre, Trangie, NSW 2823, Australia.
[B]Animal Genetics and Breeding Unit[†], University of New England, Armidale, NSW 2351, Australia
[†]The AGBU is a joint venture of NSW Agriculture and the University of New England.
[C]Author for correspondence; present address: AgResearch Ltd, Invermay Agricultural Centre, Private Bag 50034, Mosgiel, New Zealand; e-mail: jason.archer@agresearch.co.nz

Genetic and phenotypic variance and covariance components for feed intake, feed efficiency, and other postweaning traits in Angus cattle[1,2]

P. F. Arthur*[3], J. A. Archer*, D. J. Johnston†, R. M. Herd*[4], E. C. Richardson*[5], and P. F. Parnell*[4]

*NSW Agriculture, Agricultural Research Centre, Trangie, NSW 2823, Australia and †Animal Genetics and Breeding Unit[6], University of New England, Armidale, NSW 2351, Australia

J. Anim. Sci. 2001. 79:2805–2811

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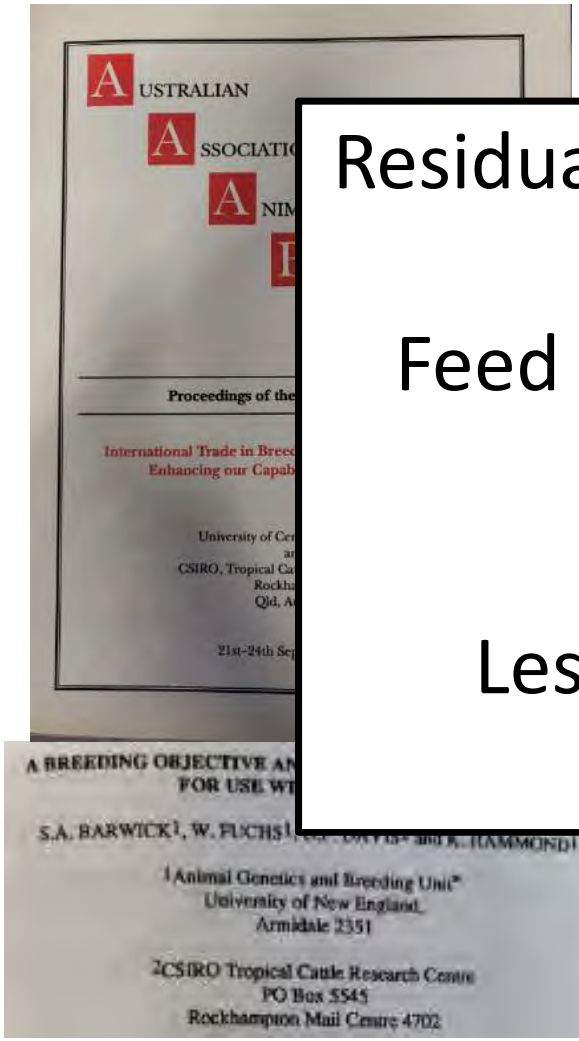
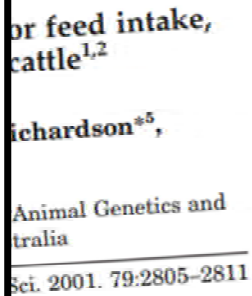
Feed intake is the father of methane research



Residual feed intake is heritable (0.30 to 0.39)

Feed intake is strongly related to methane production.

Lessons learnt helped guide methane recording and are still relevant.



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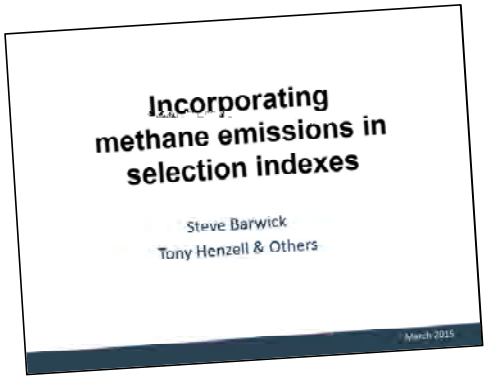
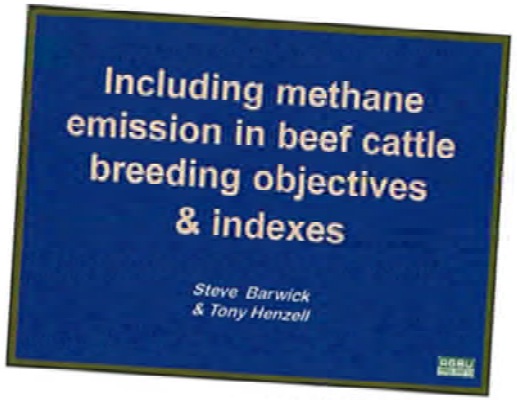
We haven't just been ruminating





Project B.CCH.6310 Milestone 6.1 Report:

Genetic Strategies for Reducing Methane, including Incorporating Methane in the BREEDPLAN Selection Indexes Used in Beef Cattle Breeding

Milestone 4 report for NSW DPI project sub-contract ('Genetic technologies to reduce methane emissions from Australian beef cattle'):

Incorporating methane emissions in profit indexes for beef cattle breeding

S.A. Barwick and A.L. Henzell, Animal Genetics and Breeding Unit

Lifting Beef Industry Productivity through Genetic Improvement: Progress and Challenges in a Changing Climate

Steve Barwick, Senior Research Scientist, Animal Genetics and Breeding Unit, Armidale (AGBU is a joint venture of Industry & Investment NSW and the University of New England)

Final Report on Incorporating Methane in Indexes (sub-project contributions to Project B.CCH.6310 Milestone 8)

S.A. Barwick and A.L. Henzell, Animal Genetics and Breeding Unit

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We haven't just been ruminating

Feed cost was a step towards methane predictions.

Methane predictions were useful for methane recording strategies.

Refinement of methane in BreedObject has been ongoing for the past decade.

Final Report on Incorporating Methane in Indexes (sub-project contributions to Project B.CCH.6310 Milestone 8)

S.A. Barwick and A.L. Henzell, Animal Genetics and Breeding Unit

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Hypothetical benefit of including methane in indexes is well documented.

Proc. Assoc. Advmt. Anim. Breed. Genet. 18:472-475

THE ROLE OF ANIMAL GENETIC IMPROVEMENT IN REDUCING GREENHOUSE GAS EMISSIONS FROM BEEF CATTLE

P. F. Arthur[1], K. A. Donoghue[2], R. M. Herd[3] and R. S. Hegarty[3]

CSIRO PUBLISHING
www.publish.csiro.au/journals/an
Animal

Ruminant enteric methane mitigation: a review

D. J. Cottle[A,C], J. V. Nolan[A] and S. G. Wiedemann[B]

Animal (2015), 9:9, pp 1431–1440 © The Animal Consortium 2015. This is an Open Access article, distributed under the terms of the Creative Commons Attribution licence (http://creativecommons.org/licenses/by/3.0/), which permits unrestricted re-use, distribution, and reproduction in any medium, provided the original work is properly cited.
doi:10.1017/S1751731115000968

animal

Animal board invited review: genetic possibilities to reduce enteric methane emissions from ruminants

N. K. Pickering[1a], V. H. Oddy[2], J. Basarab[3], K. Cammack[4], B. Hayes[5,6,7], R. S. Hegarty[8], J. Lassen[9], J. C. McEwan[1], S. Miller[10,11b], C. S. Pinares-Patiño[12c] and Y. de Haas[13†]

J. Dairy Sci. 105:9297–9326
https://doi.org/10.3168/jds.2022-22091
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This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

Invited review: Current enteric methane mitigation options

Karen A. Beauchemin,[1] Emilio M. Ungerfeld,[2] Adibe L. Abdalla,[3] Clementina Alvarez,[4] Claudia Arndt,[5] Philippe Becquet,[6] Chaouki Benchaar,[7] Alexandre Bernd[8] Tim A. McAllister,[1] Walter Oyhantçabal,[10] Saheed A. Salami,[11] M. Mauricio,[9] Juan Tricarico,[14] Aimable Uwizeye,[15] Camillo De C[16] an Sun,[13] and Ermias Kebreab[17] hy Robinson,[15]

J. Dairy Sci. 103:5366–5375
https://doi.org/10.3168/jds.2019-17732
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Symposium review: Genomic selection for reducing environmental impact and adapting to climate change*

Jennie E. Pryce[1,2]† and Mekonnen Haile-Mariam[1]

Contents lists available at Scienc

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The international journal of ani

ELSEVIER

Contents lists available at ScienceDirect

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ıtional journal of animal biosciences

ELSEVIER

Animal board invited review: Genomic-based improvement of cattle in response to climate change

I. Strandén *, J. Kantanen, M.H. Lidauer, T. Mehtiö, E. Negussie

Review: Diving into the cow hologenome to reduce methane emissions and increase sustainability

Oscar Gonzalez-Recio[a,*], Natalia Scrobota[a,b], Javier López-Paredes[c], Alejandro Saborío-Montero[d,e], Almudena Fernández[a], Evangelina López de Maturana[b,f,g], Beatriz Villanueva[a], Idoia Goiri[h], Raquel Atxaerandio[h], Aser García-Rodríguez[h]

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Hypothetical benefit of including methane in indexes is well documented.

Globally people tested methane in their indexes.

1-4% methane reduction per generation.

Including a residual methane trait = faster progress.

Proc. Assoc. Advmt. Anim. Breed. Genet. 18:472-475

THE ROLE OF ANIMAL GENETIC IMPROVEMENT IN REDUCING GREENHOUSE GAS EMISSIONS FROM BEEF CATTLE

CSIRO PUBLISHING

Ruminant enteric

D. J. Cottle[A,C], J. V. Nol

Animal (2015), 9:9, pp 1431–1440 © The Animal Consortium 2015. This is an Open Access article, distributed under the terms of the Creative Commons Attribution licence (http://creativecommons.org/licenses/by/3.0/), which permits unrestricted re-use, distribution, and reproduction in any medium, provided the original work is properly cited.
doi:10.1017/S1751731115000968

Animal board invited review: genetic possibilities to reduce enteric methane emissions from ruminants

N. K. Pickering[1a]

, R. S. Hegarty[8], . de Haas[13†]

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The international journal of ani

Symposium review: Genomic selection
environmental impact and adapting to climate change

Jennie E. Pryce[1,2†] and Mekonnen Haile-Mariam[1]

biosciences

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Review: Diving into the cow hologenome to reduce methane emissions and increase sustainability

Oscar Gonzalez-Recio[a,*], Natalia Scrobota[a,b], Javier López-Paredes[c], Alejandro Saborío-Montero[d,e], Almudena Fernández[a], Evangelina López de Maturana[b,f,g], Beatriz Villanueva[a], Idoia Goiri[h], Raquel Atxaerandio[h], Aser García-Rodríguez[h]

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Animal board invited review: Genomic-based improvement of cattle in response to climate change

I. Strandén*, J. Kantanen, M.H. Lidauer, T. Mehtiö, E. Negussie

Methane recording and association with feed

CSIRO PUBLISHING
Animal Production Science, 2016, **56**, 169–180
http://dx.doi.org/10.1071/AN15365

A universal equation to predict methane production of forage-fed cattle in Australia

E. Charmley[A,G], S. R. O. Williams[B], P. J. Moate[B], R. S. Hegarty[C], R. M. Herd[D], V. H. Oddy[D], P. R... Staunton[E], A. Anderson[F] and M. C. Hannah[B]

Proxies to adjust methane production rate of beef cattle when the quantity of feed consumed is unknown

R. M. Herd [A], J. I. Velazco [B C], P. F. Arthur [D E] and R. S. Hegarty [B]

+ Author Affiliations

Animal Production Science 56(3) 231-237 https://doi.org/10.1071/AN15477
Submitted: 24 August 2015 Accepted: 11 November 2015

Baseline and greenhouse-gas emissions in extensive livestock enterprises, with a case study of feeding lipid to beef cattle

Robert M. Herd [A C], V. Hutton Oddy [A] and Steven Bray [B]

+ Author Affiliations

Animal Production Science 55(2) 159-165 http...
Submitted: 12 March 2014 ...

Phenotypic relationships among methane production traits assessed under ad libitum feeding of beef cattle[1,2]

T. Bird-Gardiner, P. F. Arthur, I. M. Barchia, K. A. Donoghue, R. M. Herd

Journal of Animal Science, Volume 95, Issue 10, October 2017, Pages 4391–4398, https://doi.org/10.2527/jas2017.1477

Article history ▾

CSIRO PUBLISHING
Animal Production Science, 2018, **58**, 1006–1010
http://dx.doi.org/10.1071/AN15425

Effect of measurement duration in respiration chambers on methane traits of beef cattle

P. F. Arthur[A,E], K. A. Donoghue[B], T. Bird-Gardiner[B], R. M. Herd[C] and R. S. Hegarty[D]

Measures of methane production and their phenotypic relationships with dry matter intake, growth, and body composition traits in beef cattle[1,2]

R. M. Herd, P. F. Arthur, K. A. Donoghue, S. H. Bird, T. Bird-Gardiner, R. S. Hegarty

Journal of Animal Science, Volume 92, Issue 11, November 2014, Pages 5267–5274, https://doi.org/10.2527/jas.2014-8273
Published: 01 November 2014 **Article history** ▾

Daily methane emissions and emission intensity of grazing beef cattle genetically divergent for residual feed intake

J. I. Velazco [A B], R. M. Herd [C], D. J. Cottle [A] and R. S. Hegarty [A D]

+ Author Affiliations

Animal Production Science 57(4) 627-635 https://doi.org/10.1071/AN15111
Submitted: 27 February 2015 Accepted: 15 January 2016 Published: 27 May 2016

Methane recording and association with feed

Australia was (and is) a leader in methane recording across beef and sheep.

Animals that eat more produce more methane.

Lessons were learnt, especially about recording difficulties.

Methane is variable and heritable

Proc. Assoc. Advmt. Anim. Breed. Genet. 20:290-293

PRELIMINARY GENETIC PARAMETERS FOR METHANE PRODUCTION IN AUSTRALIAN BEEF CATTLE

K.A. Donoghue[1], R.M. Herd[2], S.H. Bird[2], P.F. Arthur[3] and R.F. Hegarty[4]

Feed efficiency, methane emission and fertility

GENETIC PARAMETERS FOR METHANE PRODUCTION AND RELATIONSHIPS WITH PRODUCTION TRAITS IN AUSTRALIAN BEEF CATTLE

K.A. Donoghue[1], T.L. Bird-Gardiner[1], P.F. Arthur[2], R.M. Herd[3] and R.F. Hegarty[4]

Feed efficiency, methane emission and fertility

GENOMIC ESTIMATED BREEDING VALUES FOR METHANE PRODUCTION IN AUSTRALIAN BEEF CATTLE

B.J. Hayes[1,2], K.A. Donoghue[3], C. Reich[1], B. Mason[1], R.M. Herd[4] and P.F. Arthur[5]

Repeatability of methane emission measurements in Australian beef cattle

K. A. Donoghue [A E], T. Bird-Gardiner [A], P. F. Arthur [B], R. M. Herd [C] and R. S. Hegarty [D]

+ Author Affiliations

Animal Production Science 56(3) 213-217 https://doi.org/10.1071/AN15573

Submitted: 14 September 2015 Accepted: 14 November 2015 Published: 9 Febru

Genomic heritabilities and genomic estimated breeding values for methane traits in Angus cattle[1]

B. J. Hayes ✉, K. A. Donoghue, C. M. Reich, B. A. Mason, T. Bird-Gardiner, R. M. Herd, P. F. Arthur

Journal of Animal Science, Volume 94, Issue 3, March 2016, Pages 902–908, https://doi.org/10.2527/jas.2015-0078

Published: 01 March 2016 **Article history** ▾

Genomewide association study of methane emissions in Angus beef cattle with validation in dairy cattle[1]

C. I. V. Manzanilla-Pech ✉, Y. De Haas, B. J. Hayes, R. F. Veerkamp, M. Khansefid, K. A. Donoghue, P. F. Arthur, J. E. Pryce

Volume 94, Issue 10, October 2016, Pages 4151–4166,

Genetic and phenotypic variance and covariance components for methane emission and postweaning traits in Angus cattle[12]

K. A. Donoghue, T. Bird-Gardiner, P. F. Arthur ✉, R. M. Herd, R. F. Hegarty

Journal of Animal Science, Volume 94, Issue 4, April 2016, Pages 1438–1445, https://doi.org/10.2527/jas.2015-0065

Published: 01 April 2016

Methane is variable and heritable

Methane is heritable (0.1 to 0.2).

Unfavourable genetic correlations with production.

We can select for lower methane.

Methane has and can be included in indexes now!

Consequences of using different economic selection index methods on greenhouse gas emissions in beef cattle

B.J. Walmsley[1*]

[1] AGBU, a joint venture of NSW Department of Primary Industries and University of New England, 2351, Armidale, Australia; [*]brad.walmsley@dpi.nsw.gov.au

Breeders Days Adoption

THE INFLUENCE FEED COST HAS ON CHANGING BEEF CATTLE GREEN-HOUSE GAS EMISSIONS

B.J. Walmsley, A.L. Henzell and S.A. Barwick

Animal Genetics & Breeding Unit*, University of New England, Armidale, NSW, 2351 Australia

Proc. Assoc. Advmt. Anim. Breed. Genet. 19:423-425

USE OF RESIDUAL FEED INTAKE AS AN INDIRECT SELECTION TRAIT FOR REDUCTION OF METHANE EMISSIONS IN GRAZING BEEF CATTLE

D.J. Cottle

Animal Feed Science and Technology 166–167 (2011) 291–301

Contents lists available at ScienceDirect

Animal Feed Science and Technology

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

Reducing GHG emissions through genetic improvement for feed efficiency: effects on economically important traits and enteric methane production

J. A. Basarab[1†], K. A. Beauchemin[2], V. S. Baron[3], K. H. Ominski[4], L. L. Guan[5], S. P. Miller[6] and J. J. Crowley[5]

[1]Alberta Agriculture and Rural Development, Lacombe Research Centre, 6000 C & E Trail, Lacombe, AB, Canada T4L 1W1; [2]Lethbridge Research Centre, Agriculture and Agri-Food Canada, Lethbridge, AB, Canada T1J 4B1; [3]Lacombe Research Centre, Agriculture and Agri-Food Canada, 6000 C & E Trail, Lacombe, AB, Canada T4L 1W1; [4]Department of Animal Science, University of Manitoba, Winnipeg, MB, Canada R3T 2N2; [5]Department of Agricultural, Food and Nutritional Sciences, University of Alberta, Edmonton, AB, Canada T6G 2P5; [6]Department of Animal and Poultry Sciences, Centre for Genetic Improvement of Livestock, University of Guelph, ON, Canada N1G 2W1

(Received 14 January 2013; Accepted 15 April 2013)

Lowering ruminant methane emissions through improved feed conversion efficiency

G.C. Waghorn[a,*], R.S. Hegarty[b]

animal

Animal (2018), 12:9, pp 1815–1826 © The Animal Consortium 2018
doi:10.1017/S1751731118000976

Invited review: Improving feed efficiency of beef cattle – the current state of the art and future challenges

D. A. Kenny[1†a], C. Fitzsimons[2a], S. M. Waters[1] and M. McGee[2]

[1]Animal and Bioscience Research Department, Animal & Grassland Research and Innovation Centre, Teagasc, Grange, Dunsany, Co. Meath, C15 PW93, Ireland; [2]Livestock Systems Research Department, Animal & Grassland Research and Innovation Centre, Teagasc, Grange, Dunsany, Co. Meath, C15 PW93, Ireland

(Received 18 May 2017; Accepted 15 March 2018; First published online 21 May 2018)

agbu

Methane has and can be included in indexes now!

Animals that eat more produce more methane.

Larger animals produce more methane.

Predicted methane from feed intake and weight can be selected.

Breeders Days Adoption

Consequences of using different economic selection index methods on greenhouse gas emissions in beef cattle

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[1] AGBU, a joint
England, 2351, A

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dale, NSW, 2351 Australia

USE OF RESIDUAL F
REDUCTION OF M

animal

Reducing GHG em
efficiency: effects
methane producti

cattle –

J. A. Basarab[1†], K. A. Bea
J. J. Crowley[5]

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Methane has and can be included in indexes now!

Barwick *et al. Genet Sel Evol* (2019) 51:18
https://doi.org/10.1186/s12711-019-0459-5

Genetics Selection Evolution

RESEARCH ARTICLE Open Access

Methods and consequences of including reduction in greenhouse gas emission in beef cattle multiple-trait selection

Stephen A. Barwick[1*], Anthony L. Henzell[1], Robert M. Herd[2], Bradley J. Walmsley[1] and Paul F. Arthur[3]

Increasing feed price = carbon cost

This method is already available for implementation in BreedObject

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Methane indexes of today

Methane indexes of today

Methane indexes are here and on the way

- Irish Cattle Breeding Federation
- Semex Canada and Lactanet
- Beef + Lamb New Zealand

Irish Cattle Breeding Federation

IRISH FARMERS JOURNAL

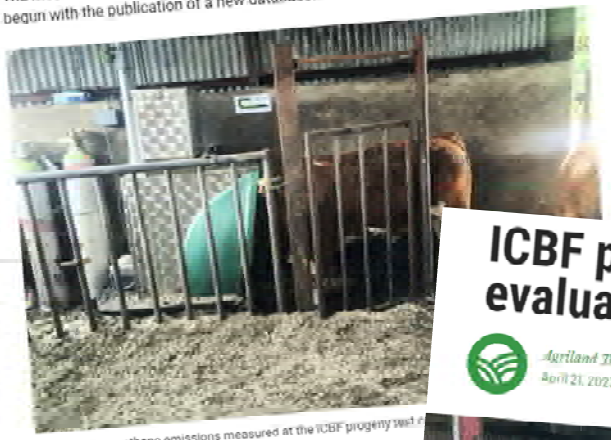
ICBF publishes world-first methane data for breeding bulls

The move towards selecting bulls based on their progeny's methane output has begun with the publication of a new database.

Caitriona Morrissey

BEEF > NEWS

21 April 2023



Cattle having methane emissions measured at the ICBF progeny test
Hubert

ICBF publishes first methane evaluations for AI sires

Agriland Team

April 21, 2023 5:00 pm

Ireland confident genetics and breeding can help meet 25pc methane reduction target

James Nason, 26/10/2022

d Australia's Dr Rod Polkinghorne at the ICBF's bull progeny
at Tully in Ireland last week.

AgCARBON CENTRAL

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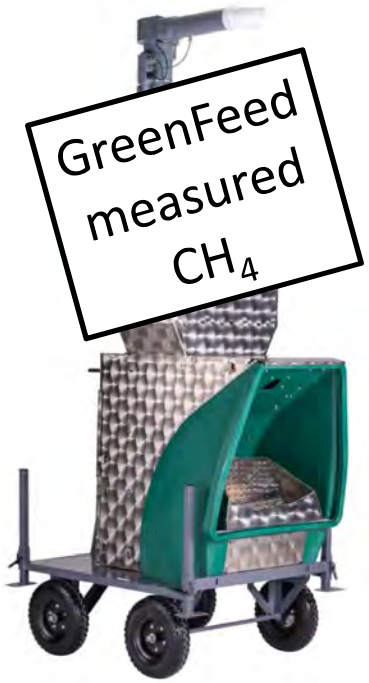
Irish Cattle Breeding Federation



>1,500 Irish beef cattle

Methane EBVs

CH_4 Selection by industry

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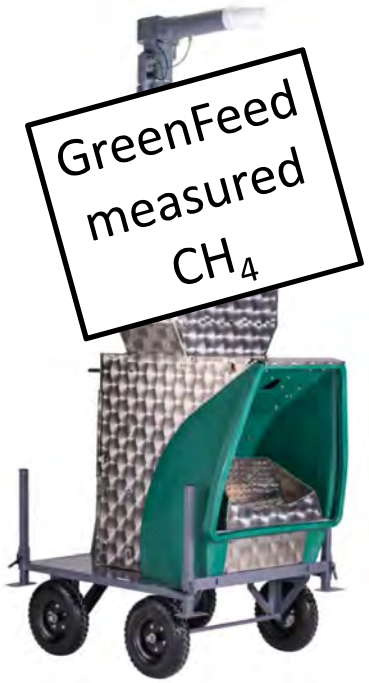
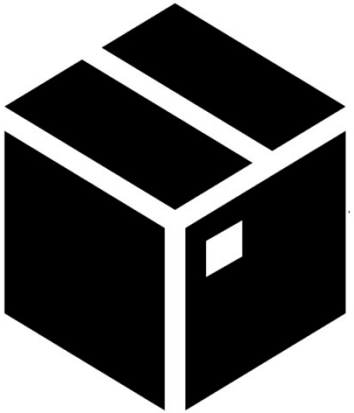
Irish Cattle Breeding Federation



>1,500 Irish beef cattle

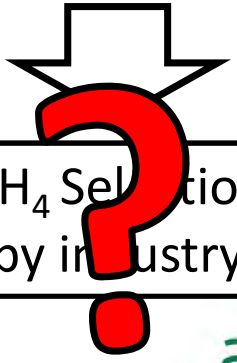


RBVs for 320 bulls from across 19 breeds.

Not clear what the trait is.

Not included in any index.

CH_4 Sel tion by in ustry



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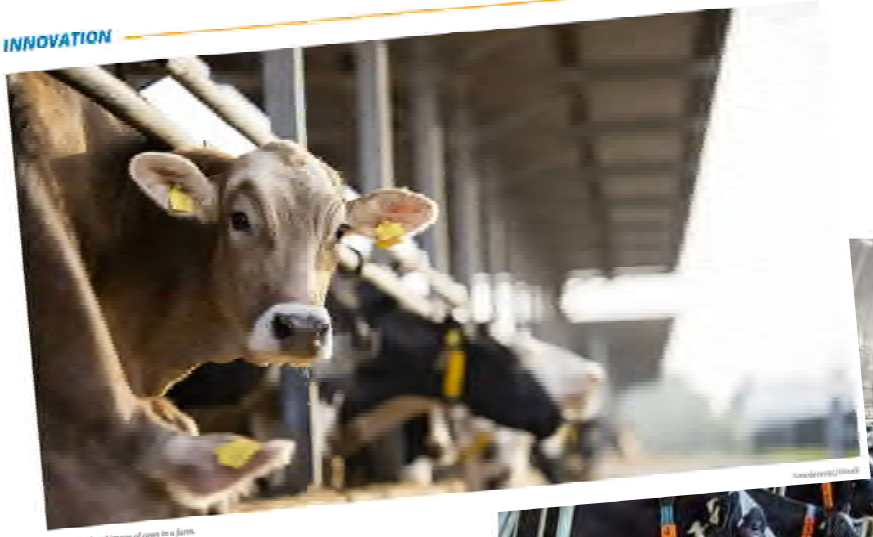
Semex and Lactanet

INTERESTING ENGINEERING

First ever bull semen modified to produce cows that burp less methane

Cattle are responsible for 14.5 percent of the world's greenhouse gas emission

INNOVATION



Representational image of cows in a farm.

NEWS.UOGUELPH.CA

Lower-Burp Cows to Be Bred with World-Leading Methods Based on U of G Research

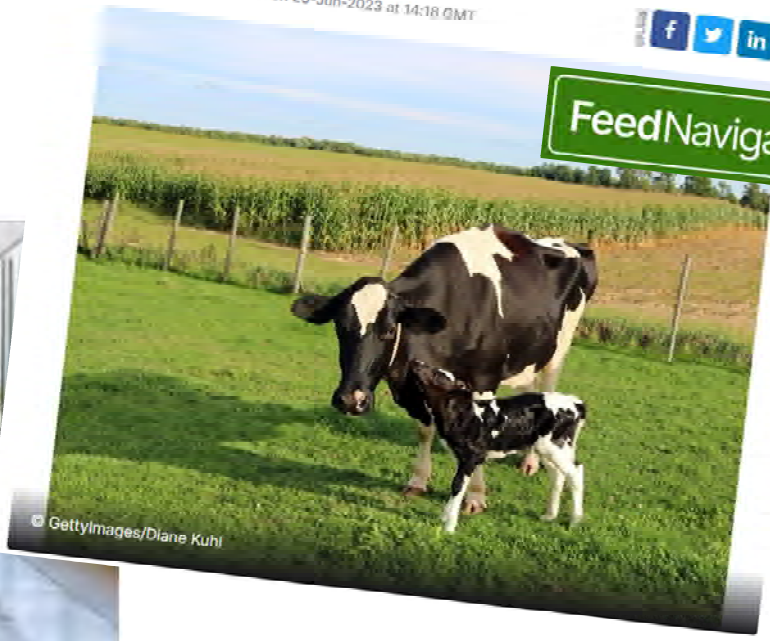
UNIVERSITY of GUELPH News

Canada can now breed for methane efficient dairy cows

By Jane Byrne

23-Jun-2023 - Last updated on 23-Jun-2023 at 14:18 GMT

FeedNavigator



© GettyImages/Diane Kuhl

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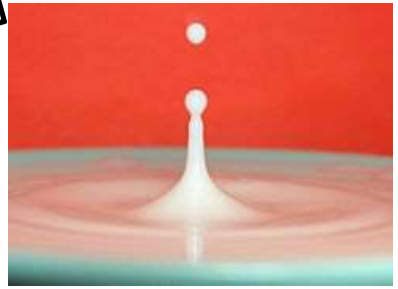
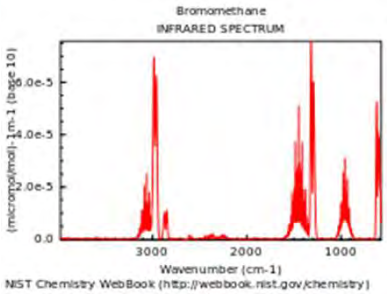
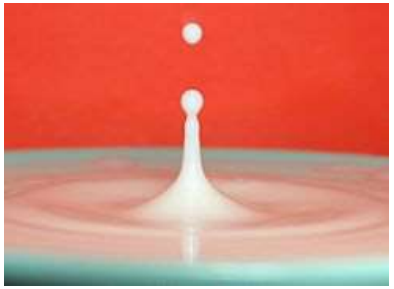
Semex and Lactanet

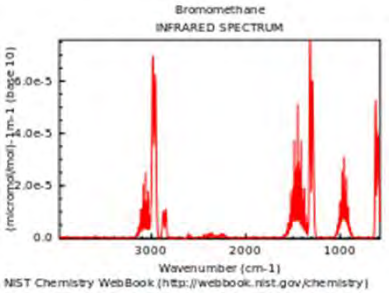
GreenFeed measured CH_4



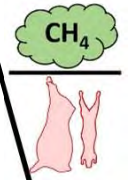


Prediction equation for CH_4





Proxy index for CH_4 intensity



Elevate™ Management tool

CH_4 Selection by industry

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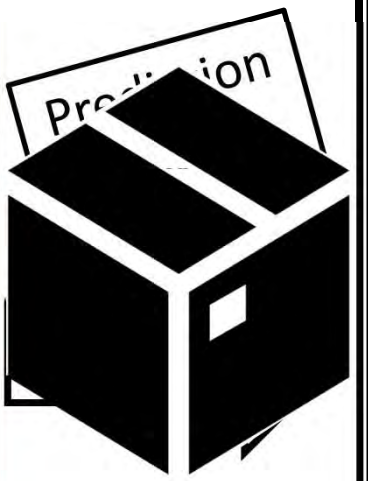
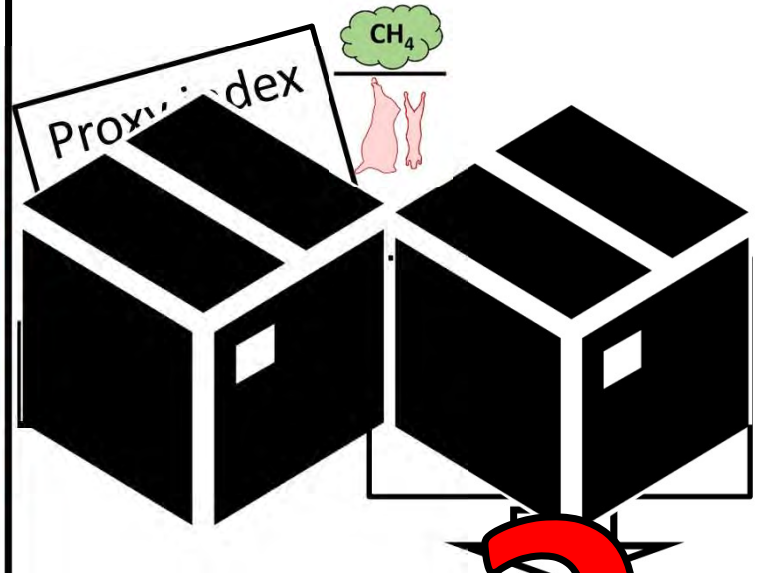
Semex and Lactanet

~600 cows with CH_4, Milk, MIR



515,000 Cows with Milk MIR



CH_4 Selection by industry

?

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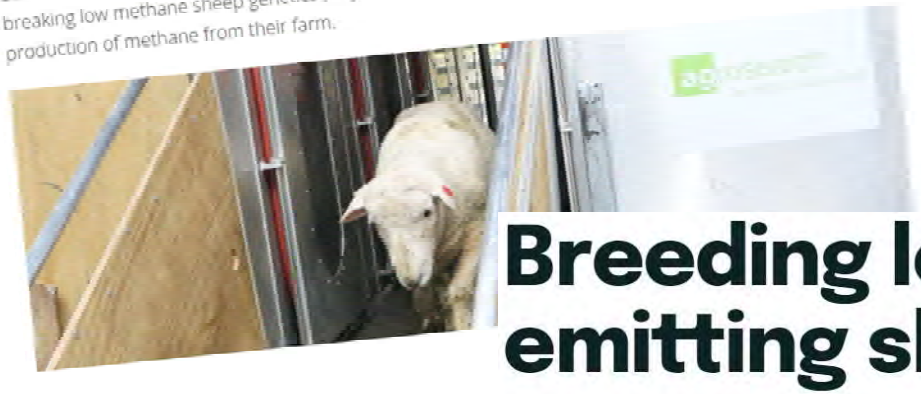
Beef + Lamb New Zealand

beef+lamb new zealand | BY FARMERS. FOR FARMERS

Low methane sheep project a game-changer for farmers

Wednesday, 30 Nov 2022 // Climate Change

Beef + Lamb New Zealand (B+LNZ) today welcomed an investment by the Government in a ground-breaking low methane sheep genetics project to give more farmers access to animals to help reduce the production of methane from their farm.



New Zealand

Ben Smee

@BenSmee

Sun 1 Dec 2019 11.11 AEDT

Breeding low-emitting sheep

New Zealand sheep breeders can now measure their sheep and rank them for breeding based on methane emissions, thanks to research funded by the NZAGRC and the PGgRc.

NEW ZEALAND AGRICULTURAL GREENHOUSE GAS Research Centre

The Guardian — A decade of making a difference

This article is more than 3 years old

New Zealand begins genetic program to produce low methane-emitting sheep

'Global first' project will help tackle climate change by lowering agricultural greenhouse gases

The New Zealand livestock industry has begun a 'global first' program to breed low methane-emitting sheep. Photograph: Carly Earl/The Guardian

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Beef + Lamb New Zealand

~20,000 Sheep with methane measured.

Capacity for 5,000 sheep a year, 25 studs, and increasing.

Research index used on research flock (AUD$92/$tCO_2$-eq).

RBVs available, Index with RBVs coming

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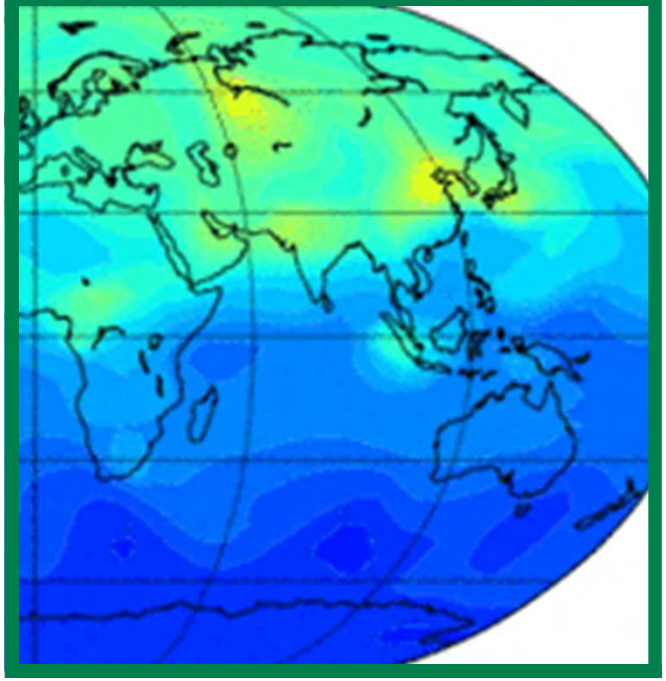
Setting the scene for methane indexes…

Methane traits and breeding goals



Methane indexes of the past

Methane indexes of today

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Setting the scene for methane indexes…

Methane indexes
of the future

Methane indexes of the future

Globally there is a rush to publish methane EBVs

- Did they sacrifice quality for speed?

AUS has too few records for direct methane EBVs.

BreedObject and SheepObject can predict methane.

Both are adaptive and we can update them with the best science and new methane traits.

We want to breed animals with superpowers!

Increase:

- Production and quality
- Reproduction
- Sustainability (↓CH_4 & …)

AGBU already has the tools to do it.

How are we doing it and why is collaboration so important?

- See the following talks

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Roadmap to a sustainability index at AGBU

The The long and winding road to sustainability

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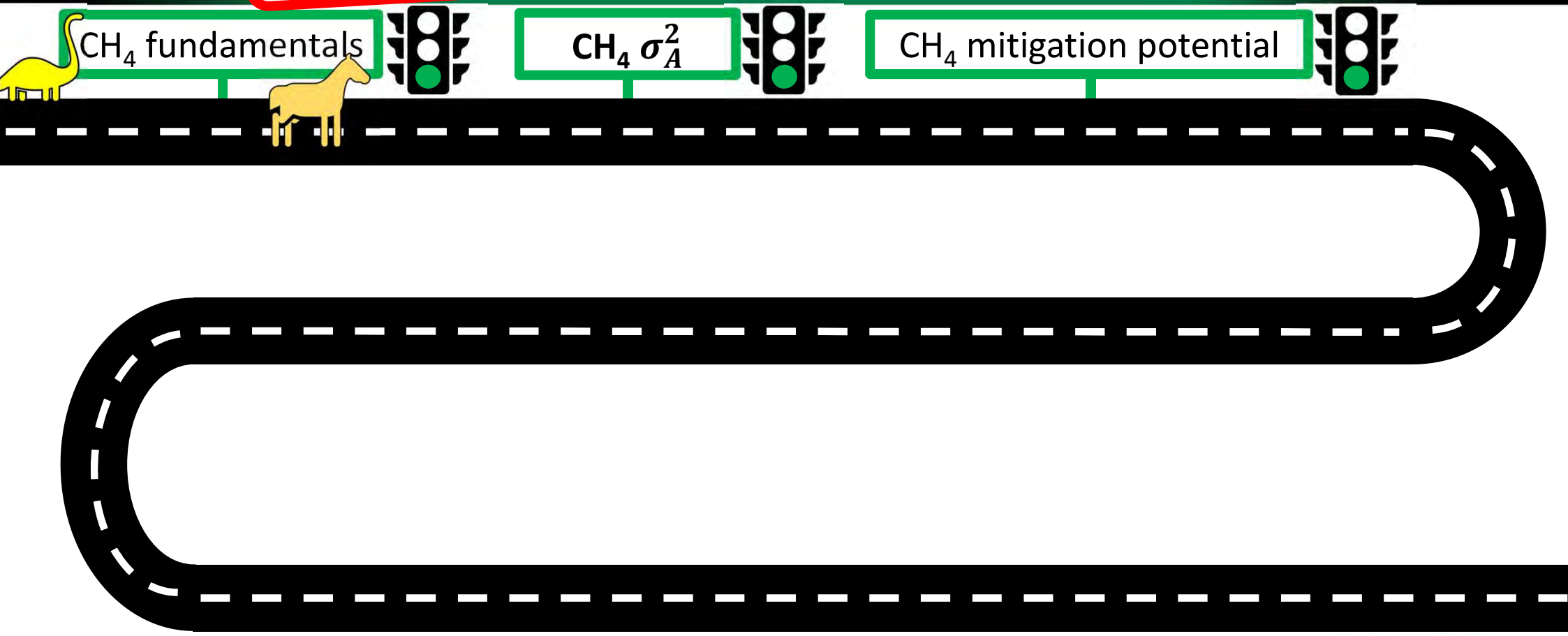
The The long and winding road to sustainability



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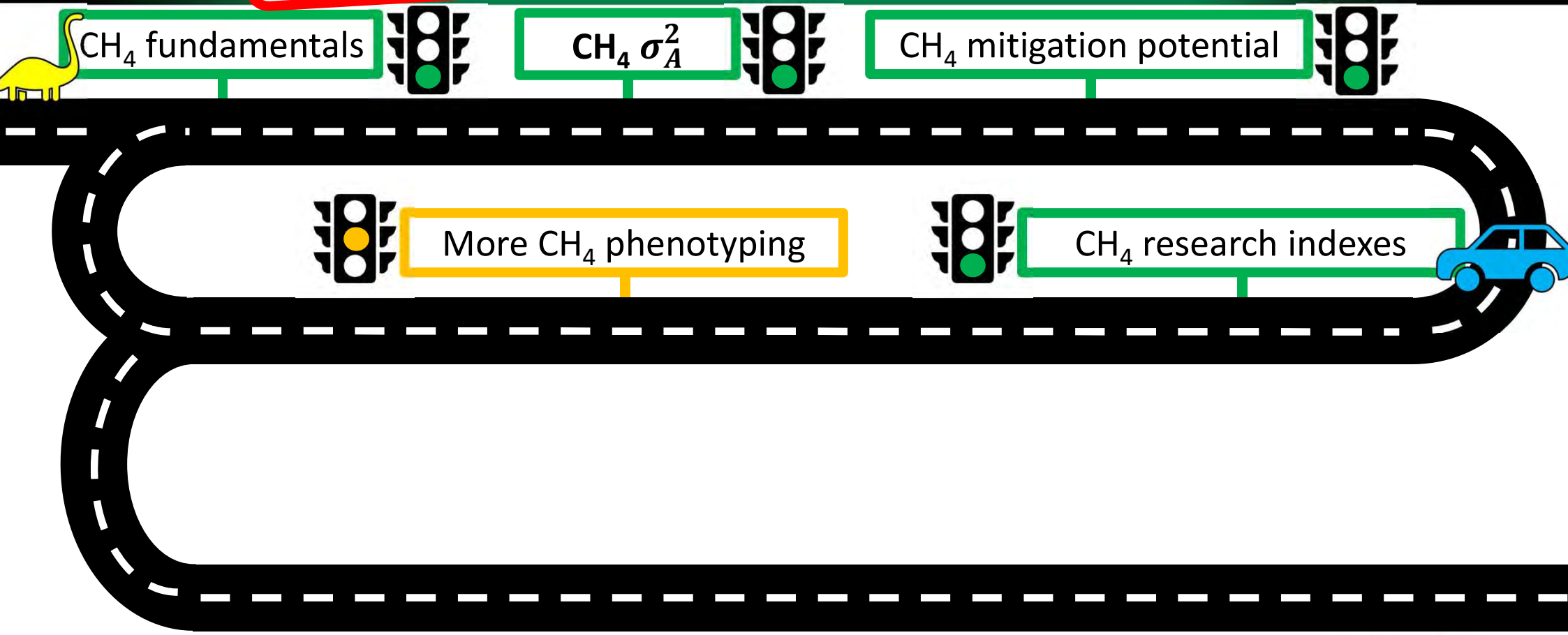
The The long and winding road to sustainability



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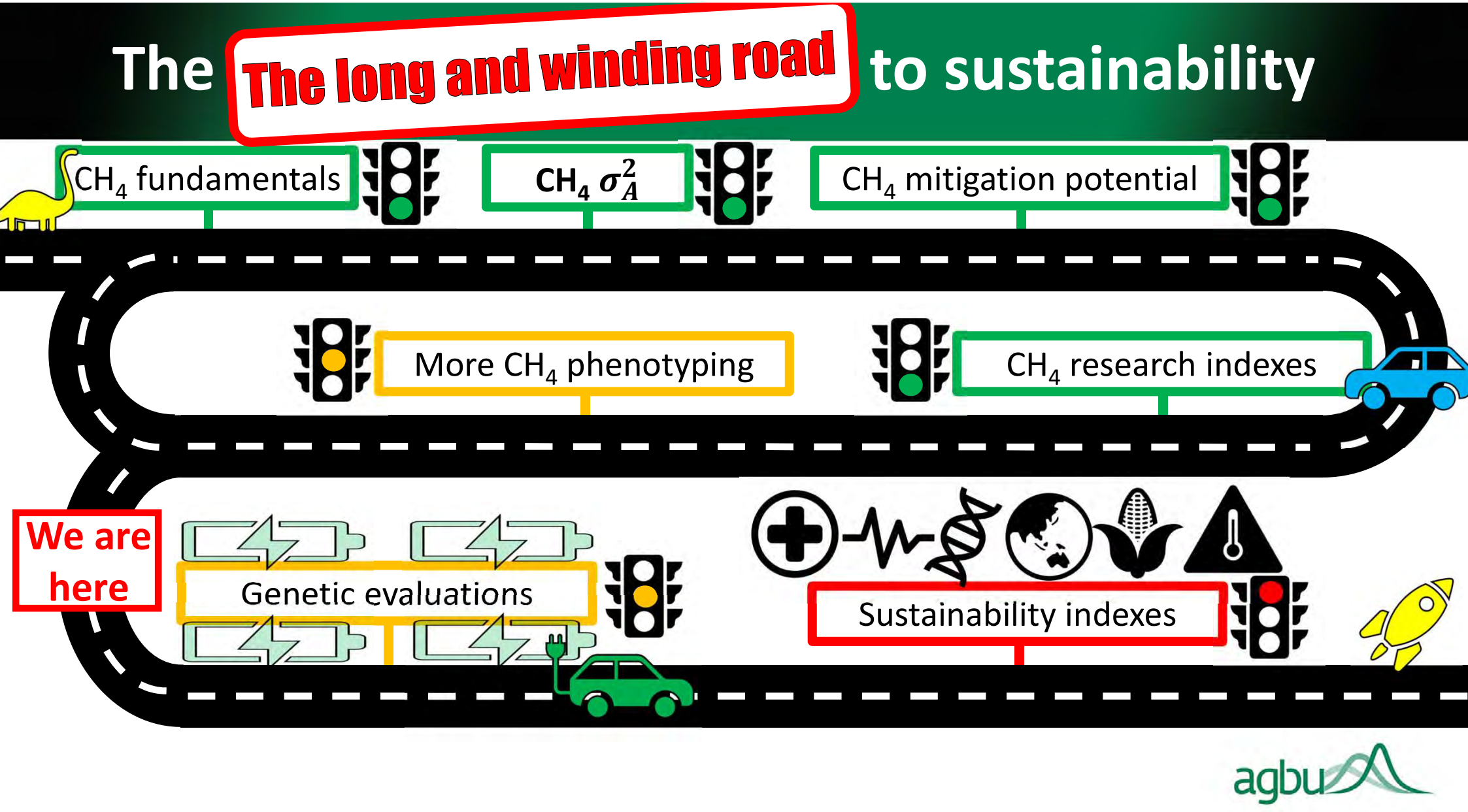
The
The long and winding road
to sustainability
CH_4 fundamentals
CH_4 σ_A^2
CH_4 mitigation potential
More CH_4 phenotyping
CH_4 research indexes
We are here
Genetic evaluations
Sustainability indexes

Take home message.

Consensus on a methane trait and objective is needed.

(We're not here to answer this today. Residual CH_4 is a good option for the future)

We know selection is a good tool for reducing methane.

EBVs for methane are being published globally (kind of).

We can provide a methane index / RBVs (See next talks).

What we really want is a sustainability index.

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SUSTAINABILITY indexes: Brief history, global status, and future.

AGBU Summit 2023: Livestock Sustainability Indexes

Michael Aldridge

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agbu

Australia's genetics institute for agriculture