Carbon values

Jonathan Herron

Teagasc, AGRIC, Moorepark, Fermoy, Co Cork.
Phone: 025 42 306
Email: jonathan.herron@teagasc.ie

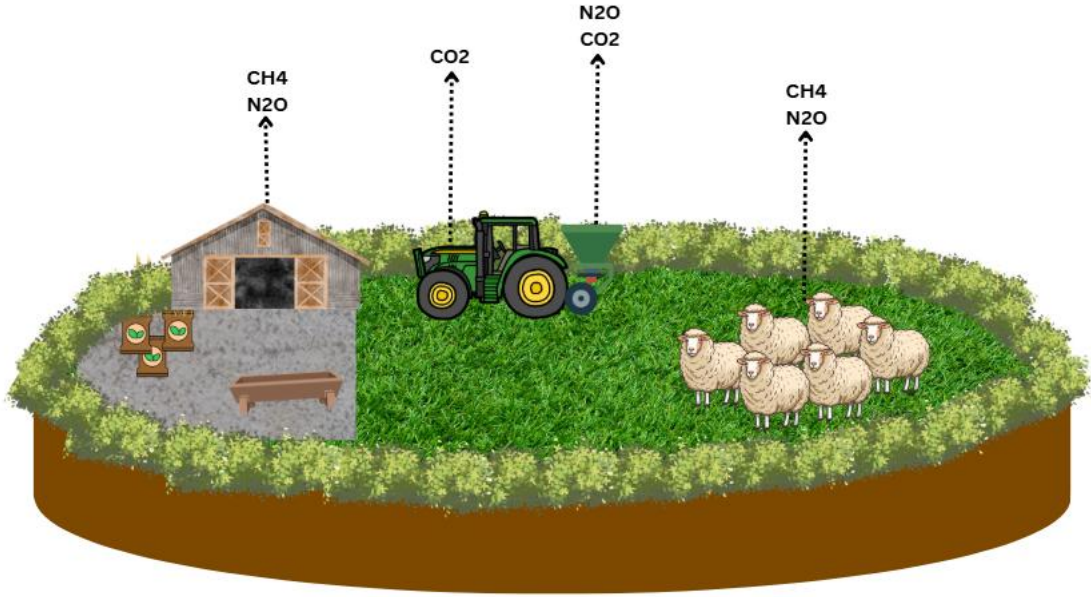
Agriculture and Food Development Authority

Sheep Ireland
www.sheep.ie

How to calculate GHG emissions

- GHG emissions from agriculture
  - Numerous sources
  - Large variation in sources

- Research informs us of the relationships between farm activities and GHG emissions
- Models developed to replicate farm activities, nutrient flows and interaction within a farming system



Bio-economic model

Flock net energy

Grass, silage, concentrates

Inputs

- Lambing pattern
- Land and capital
- Livestock
- Production
- Animal health
- Sales
- Variable costs
- Fixed costs
- Labour

Outputs

Financial
Economic
Physical

Net profit

Agricultural Systems 148 (2016) 124–134

Contents lists available at ScienceDirect

Agricultural Systems

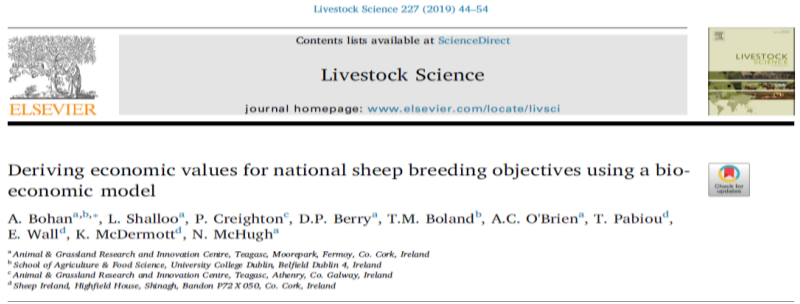
journal homepage: www.elsevier.com/locate/agsy

Description and validation of the Teagasc Lamb Production Model

A. Bohan [a,b,*], L. Shalloo [a], B. Malcolm [d,e], C.K.M. Ho [d], P. Creighton [c], T.M. Boland [b], N. McHugh [a]

[a] Animal & Grassland Research and Innovation Centre, Teagasc, Moorepark, Fermoy, Co. Cork, Ireland
[b] School of Agriculture & Food Science, University College Dublin, Ireland
[c] Animal & Grassland Research and Innovation Centre, Teagasc, Athenry, Co. Galway, Ireland
[d] Department of Economic Development, Jobs, Transport and Resources, Carlton, Vic. 3053, Australia
[e] University of Melbourne, Vic. 3010, Australia

ARTICLE INFO ABSTRACT



Livestock Science 227 (2019) 44–54

Contents lists available at ScienceDirect

Livestock Science

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

Deriving economic values for national sheep breeding objectives using a bio-economic model

A. Bohan[a,b,*], L. Shalloo[a], P. Creighton[c], D.P. Berry[a], T.M. Boland[b], A.C. O'Brien[a], T. Pabiou[d], E. Wall[d], K. McDermott[d], N. McHugh[a]

[a] Animal & Grassland Research and Innovation Centre, Teagasc, Moorepark, Fermoy, Co. Cork, Ireland
[b] School of Agriculture & Food Science, University College Dublin, Belfield Dublin 4, Ireland
[c] Animal & Grassland Research and Innovation Centre, Teagasc, Athenry, Co. Galway, Ireland
[d] Sheep Ireland, Highfield House, Shinagh, Bandon P72 X 050, Co. Cork, Ireland

Life Cycle Assessment

Goal

Extend bio-economic models to calculate GHG emissions from a sheep farm

Scope

Cradle to farm gate

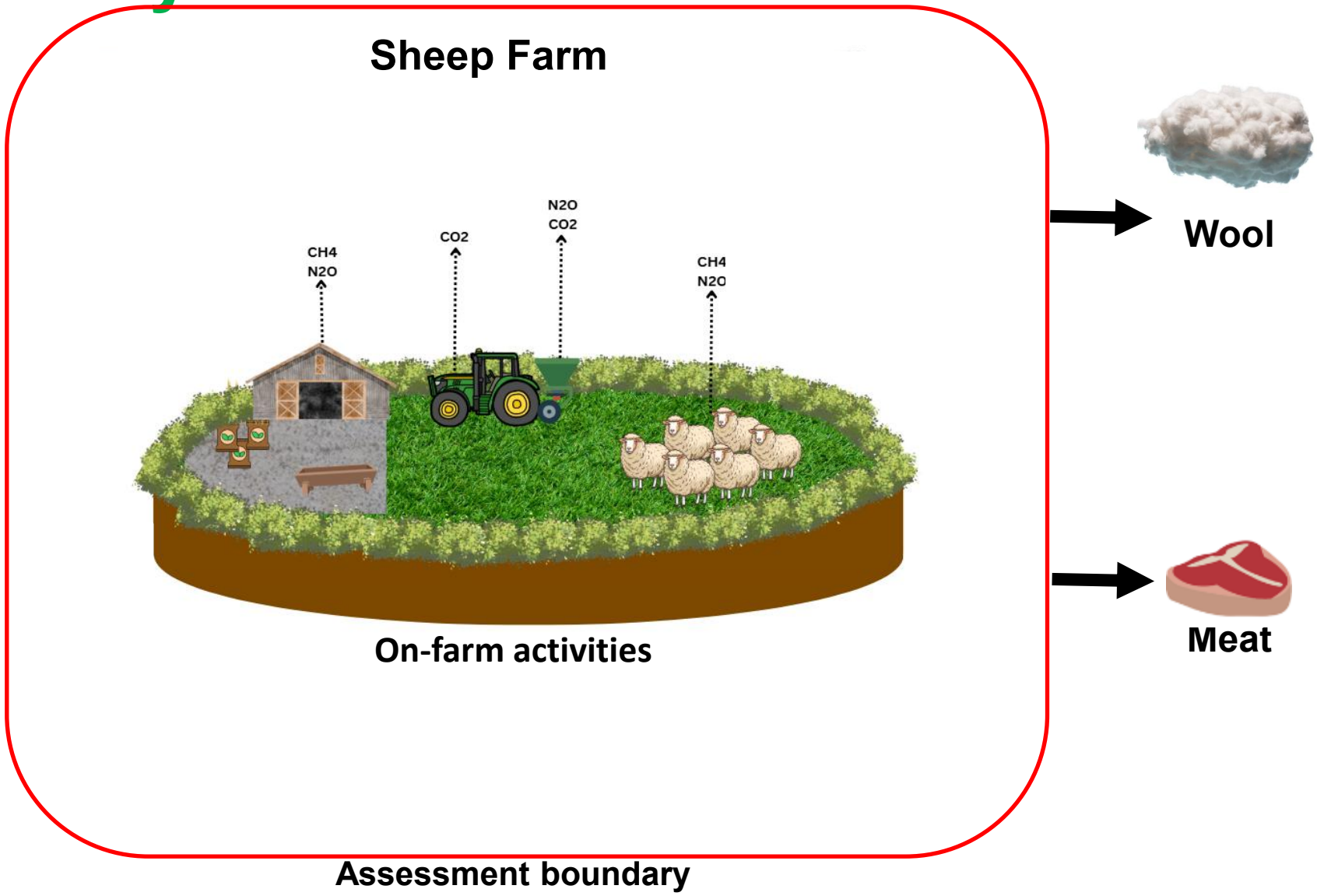
- Total farm emissions
- Carbon footprint

Type of emissions

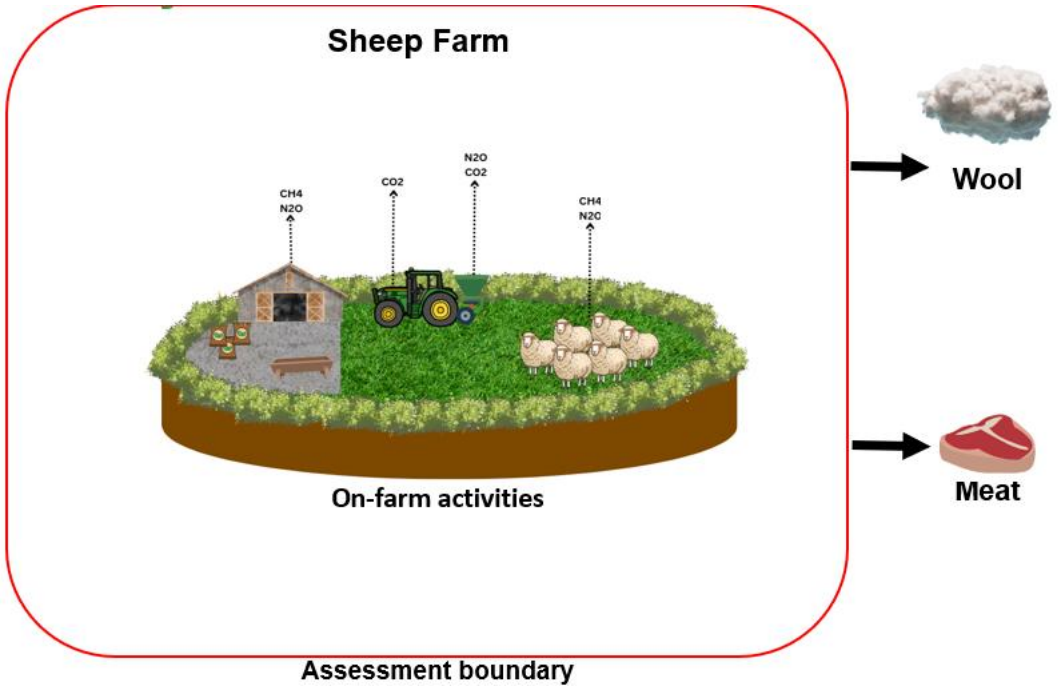
Methane – CH_4

Nitrous Oxide – N_2O

Carbon Dioxide – CO_2



Modelling GHG emissions



Teagasc sheep LCA model is an extension of the Teagasc sheep bioeconomic model

Allow calculation of both economic performance and GHG emissions at the same time

Agricultural Systems 148 (2016) 95–104

Contents lists available at ScienceDirect

Agricultural Systems

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

A life cycle assessment of the effect of intensification on the environmental impacts and resource use of grass-based sheep farming

D. O'Brien [a,*], A. Bohan [b], N. McHugh [b], L. Shalloo [a]

[a] Livestock Systems Research Department, AGRIC, Teagasc, Moorepark, Fermoy, Co. Cork, Ireland
[b] Animal & Bioscience Research Department, AGRIC, Teagasc, Moorepark, Fermoy, Co. Cork, Ireland

Greenhouse gas intensity of average sheep systems in Ireland

Jonathan Herron
Teagasc, Animal & Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork

Contents lists available at ScienceDirect

Agricultural Systems

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

Modelling the production, profit, and greenhouse gas emissions of Irish sheep flocks divergent in genetic merit

L. Farrell [a,*], J. Herron [b], T. Pabiou [c], N. McHugh [b], K. McDermott [c], L. Shalloo [b], D. O'Brien [d], A. Bohan [c]

[a] Teagasc Animal & Grassland Research and Innovation Centre, Mellows Campus, Athenry, H65 R7, Co. Galway, Ireland
[b] Animal & Grassland Research and Innovation Centre, Teagasc, Moorepark, Fermoy, P61 C996 Co. Cork, Ireland
[c] Sheep Ireland, Highfield House, Shinagh, Bandon P72 X050, Co. Cork, Ireland
[d] Crops, Environment and Land Use Research Centre, Teagasc, Johnstown Castle, Co. Wexford, Ireland

Sheep Euro –Star index

- Index aimed at helps farmers in the selection of more profitable breeding animals
  - Replacement Index
  - Terminal Index.
- Each index consists of traits that impact profitability according to its specific objective

- **The weighting on each trait in a breeding objective is called the economic value**
- **Economic value**
  - Change in profit per unit change in the trait under investigation holding all other traits constant

- **Derived from the Teagasc Lamb Production Model bio-economic model (TLPM)**
- **Index needs to be updated routinely based on:**
  - EU policy changes
  - Price of products change
  - Costs of production change

Carbon value

Economic value

Change in profit per unit change in the trait under investigation holding all other traits constant

Carbon Value

Change in **total emissions** per unit change in the trait under investigation holding all other traits constant

- **Only traits that impact productivity and therefore GHG emissions have a carbon value**

- **Total carbon value is converted to an economic value by a price per tonne of carbon**

Deriving carbon value

CH4

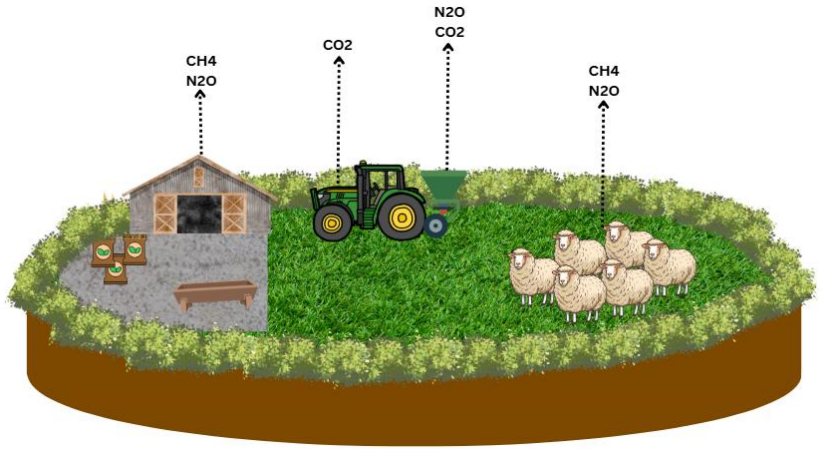
Measured methane

Change * €80/tonne CO2eq

Carbon value for trait

Non CH4

Calculated using LCA



Change * €80/tonne CO2eq

Carbon value for trait

Summary

- Focused on **Total Emissions** and not emissions intensities
- Increases economic weight of traits that reduce emissions
- Reduces economic weight on traits that increase emissions
- Direction towards more efficient animals and sustainable farming systems