



A novel framework for estimating the carbon footprint of beef animals in national database based on genetic and performance data.

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An Roinn Talmhaíochta,
Bia agus Mara
Department of Agriculture,
Food and the Marine



AgTech - it's in our DNA

Background & Objective

- Climate Action Plan 2023:
 - Agriculture accounted for 33.33% of Irelands greenhouse gas(GHG) emissions in 2021
 - Ireland committed to cut gross GHG in the agriculture sector by 25% by 2030



Rialtas na hÉireann
Government of Ireland

CLIMATE ACTION PLAN 2023 CAP23

Changing Ireland for the Better



Background & Objective

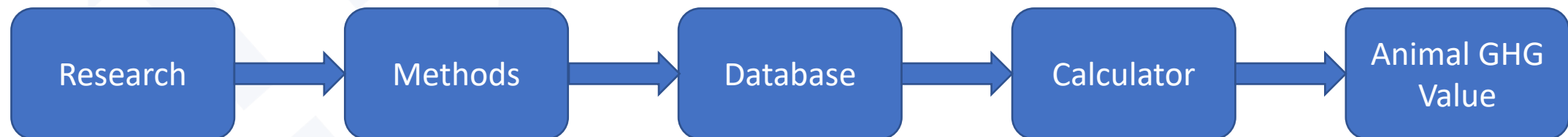
- ICBF responsible for genetic improvement of Beef/Dairy and Sheep
- Large Database of animals
- Multiple dashboards and processes around different genetic evaluations of animals.
- **Develop a similar process within the database to calculate a GHG figure for an animal at a given time.**

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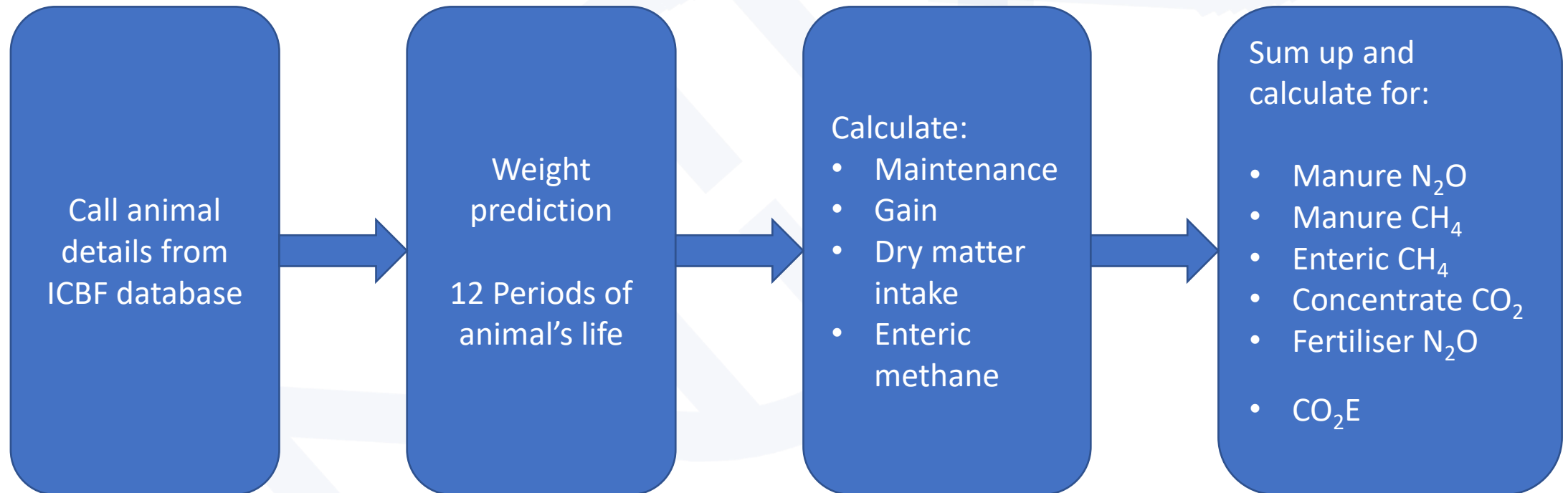


Approach

- Peer approved methods for calculating carbon currently exist.
- To take these methodologies, constantly being reviewed and improved upon by partners, and to load them into our database.



Process




- [Crowley, J et al. WCGALP\(2022\) – WCGALP animal footprintJC3](#)

Application – Dashboard - Herd Owner

Finished animals


Death date	Finish Age	Finish Weight	Ent Methane	CO2E	Dam CO2E	Total CO2E
08-Feb-21	670	594	82	3442	4328	7771
08-Feb-21	670	639	89	3665	3242	6907



Moves ^	Birth ^	Death ^	Slaughter Age ^	Slaughter Factory ^	Carcass Type ^	Dairy Beef Flag ^	Grade ^	Fat ^	Carcass Weight (kg) ^	Slaughter Weight (kg) ^	Ent. Methane Total (kg) ^	CO2 equiv (kg) ^	CO2 equiv (kg lwt) ^	CO2 equiv (kg cwt) ^	Dam CO2E per prog ^	Total CO2E ^
1	10-APR-19	08-FEB-21	670	Donegal Meat Processors (DMP)	STEER		R=	3+	324	594	82	3442	5.79	10.62	4328	7771
1	10-APR-19	08-FEB-21	670	Donegal Meat Processors (DMP)	STEER		R-	4-	348	639	89	3665	5.74	10.53	3242	6907

Application – Dashboard - Herd Owner Live Animal Tracker

Age	Predicted Liveweight	Ent Meth	CO2E	Dam CO2E	Total CO2E
31	78	0	89	238	326
377	372	27	1238	2789	4027



Movements	Birth Date	Age	Type	Dairy Beef Flag	Predicted Liveweight	Ent Meth Total	c02 Equivalent	c02e kg lwt	c02e Dam/prog	c02e Total
1	01-APR-23	31	HEIFER		78.18	0	88.67	1.13	238	326.48
1	01-MAR-23	62	HEIFER		104.27	.4	113.84	1.09	420	533.92
1	20-APR-22	377	STEER		372.46	27.49	1238.45	3.33	2789	4026.95
3	15-AUG-21	625	HEIFER		495.02	67.25	2762.61	5.58	2564	5326.44

Application – Dashboard - Processers

Weekly reports

Week: 10-Apr-23 → 17-Apr-23

Death date	Finish Age	Carcass Weight	CO2E	Dam CO2E	Total CO2E
11-Apr-23	724	383	4551	3134	7686
11-Apr-23	773	285	3804	271	4075
13-Apr-23	800	292	3961	271	4232

Ent Meth Total	Manure Meth	N2O Total	Co2e	Co2e kg lwt
108.11	11.9	1096.08	4551.2	6.73
89.66	12.71	868.62	3804.3	6.99
93.12	13.15	917.53	3961.06	6.86

Death Date	Slau Age	Sex	Carcass Type	Carcass Weight
11-APR-23	724	F	HEIFER	383
11-APR-23	773	F	HEIFER	285
13-APR-23	800	M	STEER	292

Lifetime Conc	Lifetime Dm	N Intake	Total advised N ani kg	N Stocking Rate	Fert N2O	Manure N2O	Conc CO2 kg
557.08	4962.42	148.87	85.78	127.94	1.64	2.03	94.7
409.02	4111.45	123.34	63.59	103.39	1.22	1.7	69.53
399.79	4268.36	128.05	68.79	103.68	1.32	1.76	67.96

Dam Breed	No. of Parities	Cow Co2e	Cow Co2e per prog day	Cow Co2e for Ani	Total Co2e
PT	4	10080	4.33	3134.85	7686.05
HO	5	11238.36	0	0	4075.3
HO	5	11798.36	0	0	4232.06

Application – Reports - Processors

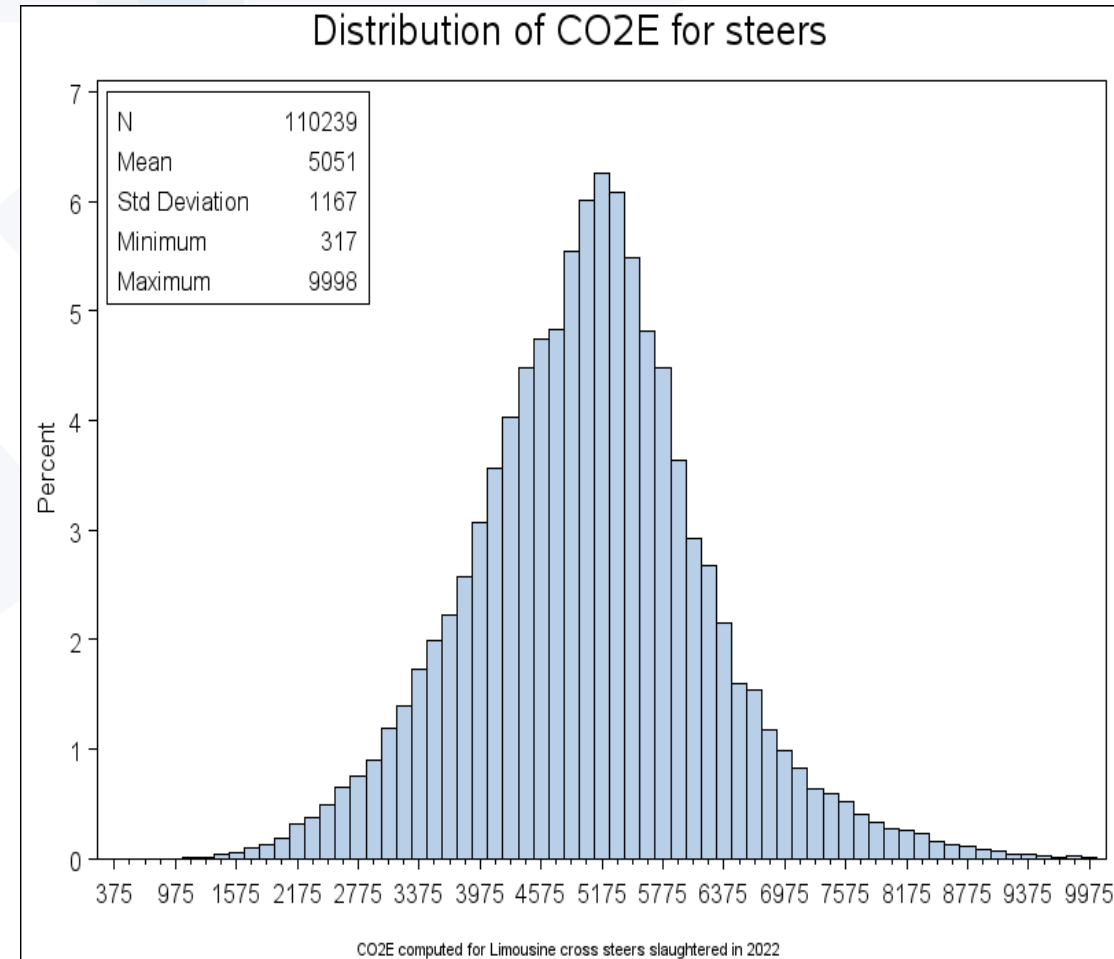
Yearly report of averages

Year	Sire	Dam	Gender	Age	Direct CO2E	Carcass CO2e
2020	Beef	Beef	Steer	<16 months	2338	4708
2020	Beef	Beef	Steer	16-18 months	2834	5483
2020	Beef	Beef	Steer	18-20 months	3250	6157

SLAU YEAR	SIRE	DAM	GENDER	AGE	COUNT	AVG. WEIGHT	AVG. AGE	AVG. CONF	AVG. FAT	AVG. PRICE	DMM CODE	PER PRODG	DIRECT CO2E	CARCASS CO2E
2020	beef	beef	STEER	<16 months	542	118.520843	446.184251	7.8220312	7.19172917	168.431617			1881.18479	2188.22679
2020	beef	beef	STEER	16-18 months	1133	136.337158	522.8003986	7.962047661	7.616061548	171.3426125			2080.71792	2834.08562
2020	beef	beef	STEER	18-20 months	2751	151.2651081	582.9359475	8.100090058	8.067975282	167.1948344			2226.11122	3250.220399
2020	beef	beef	STEER	20-24 months	13096	177.661246	679.4797894	8.367152591	8.381035578	161.939613			2441.601912	4081.914009
2020	beef	beef	STEER	24-28 months	25837	196.2046937	797.2978351	8.537948452	8.676278206	167.2306984			2663.929548	4944.209227
2020	beef	beef	STEER	28-30 months	23341	187.506209	888.1890125	8.669380006	8.615826229	177.4864225			2821.107348	5557.250339
2020	beef	beef	STEER	30-36 months	17158	414.7421202	998.2080111	8.8227998	8.48179184	148.197825			3651.416115	6276.360262
2020	beef	beef	STEER	>36 months	3661	422.212102	1284.666862	8.326959847	8.63975141	159.0726113			3493.157947	7539.649214
2020	beef	dairy	STEER	<16 months	360	285.322222	446.1849537	5.822222222	7.55	167.5303889	0		1142.369263	1896.50137
2020	beef	dairy	STEER	16-18 months	662	291.4622356	522.0121285	5.896791541	7.77903122	178.4604959	0		2521.218912	3138.423893
2020	beef	dairy	STEER	18-20 months	2339	301.070784	586.4909005	5.473181878	6.04031152	171.6184641	0		2888.264778	3940.76579
2020	beef	dairy	STEER	20-24 months	19387	324.8837881	679.5941446	5.700830453	6.746289885	171.697261	0		3658.59588	4404.083456
2020	beef	dairy	STEER	24-28 months	26707	341.5367507	792.9341197	5.71564983	6.131613435	166.7882413	0		4434.920715	5271.680978
2020	beef	dairy	STEER	28-30 months	21274	351.9450405	888.4709511	5.652141729	6.23389962	174.8003655	0		5036.558775	5943.282534
2020	beef	dairy	STEER	30-36 months	11249	363.4939995	983.0382997	5.711353898	6.095741844	152.1767642	0		5493.139831	6683.074589
2020	beef	dairy	STEER	>36 months	1828	381.1777899	1236.886579	5.68995624	6.288105033	143.2504639	0		7091.177328	8235.039795
2020	dairy	beef	STEER	<16 months	3	264	461.5	5	6.333333333	354	1639.055151	2025.561259	4606.254811	
2020	dairy	beef	STEER	16-18 months	8	275.625	518.3125	4.25	6.25	351.5	1086.113704	2338.994886	4130.10175	
2020	dairy	beef	STEER	18-20 months	18	291.8333333	589.1798111	5.333333333	7.166666667	359.6283333	1908.92245	2806.196012	5105.201217	
2020	dairy	beef	STEER	20-24 months	92	326.8080957	679.3229167	4.71791104	7.91204478	355.2054455	1819.858238	3591.127202	5945.98993	
2020	dairy	beef	STEER	24-28 months	177	326.8646468	794.2156209	4.680118119	6.06779661	329.8620319	2137.012395	4267.310501	6841.496641	
2020	dairy	beef	STEER	28-30 months	122	342.0491803	888.1911715	4.62295082	6.442622951	355.7169394	2262.78954	4913.080643	7827.091836	
2020	dairy	beef	STEER	30-36 months	111	348.8778626	987.1113212	4.211740658	6.427480916	318.9764122	2476.069884	5546.77912	8811.79314	
2020	dairy	beef	STEER	>36 months	24	353.0438667	1263.282886	4.5	6.833333333	331.8529167	3921.376589	6697.576331	11800.64893	

Deliverable to date

Action	Implement	Test	Deploy
GHG Beef Animal calculator	✓	✓	✓
Dam calculator	✓	✓	✓
Validation	✓	✓	✓
Dashboard: Live Animal Tracker	✓	✓	✓
Dashboard: Finished Animal	✓	✓	✓
Dashboard: Processor	✓		
Extract: Processor	✓	✓	
Weight prediction model			
Diet Breakdown	✓		
GHG Dairy Animal calculator			



Thank You!



Our Farmer & Government Representation



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Department of Agriculture,
Food and the Marine



Our AI & Milk Recording Organisations



Our Herdbooks



Acknowledging Our Members

