Understanding and Reducing Your Carbon Footprint

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Alltech: Global Snapshot in 2023

5 Bioscience Centers

80+ Facilities

Trading in **120+** Countries & Regions

TOP **5** Animal health company

600 Patents

40,000+ Customers around the world

>5,000 Team Members with over **100** Scientists

20+ Global research alliances

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Alltech®
E-CO2
CARBON TRUST
CERTIFIED MODEL
INCREASING YOUR PROFIT AND PROTECTING THE ENVIRONMENT

We believe *that agriculture has the greatest potential to* ***positively*** *shape the future.*

Planet of Plenty™

Alltech®

1. *What is a carbon footprint?*

2. *Why and how do I measure a carbon footprint?*

3. *How do to reduce the carbon footprint of broiler production?*

4. *What are the benefits?*

What is a carbon footprint?

Why calculate carbon footprint?

INCREASED LEGISLATION

Increasing requirements from policy.

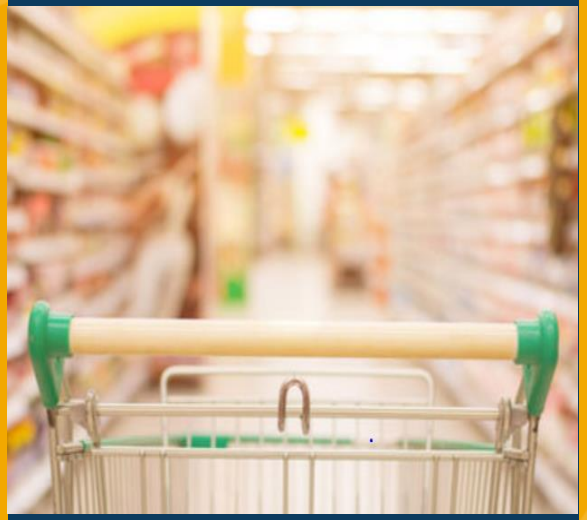
COST SAVINGS

Improve efficiencies

COMPETITIVE ADVANTAGE

Distinguish your fam/product

CONSUMER DEMAND



Meet consumer demands for more sustainable practices

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Why calculate carbon footprint?

Benchmark your farm's performance

Compare against industry data

Implement and evaluate changes on your farm

"If you can't measure it, you can't improve it."

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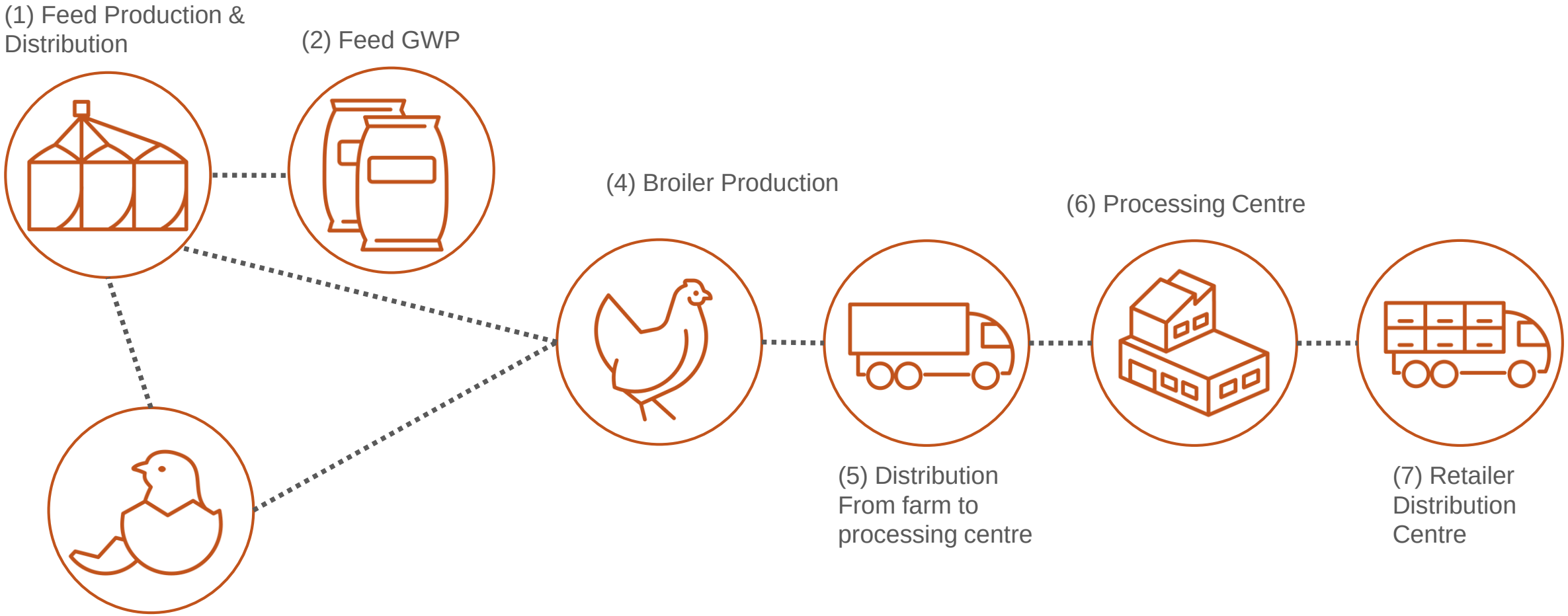
How to calculate the carbon footprint of a broiler farm?

Carbon Footprint of Broiler Production



Measure and Monitor

EA environmental assessment

Recommendations
Inputs and management advice

Implementation

Re-assessment

Farm Reporting

Your carbon performance

A	<1.99
B	2.00 - 2.99
C	3.00 - 3.99
D	4.00 - 4.99
E	5.00 - 5.99
F	> 6.00

This Assessment: 2.05 kg CO_2e/kg LW

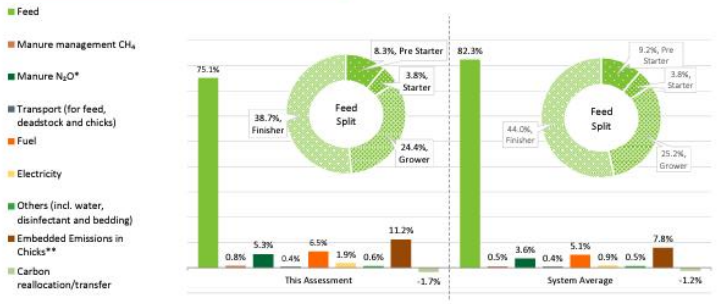
Alltech Average†: 3.04 kg CO_2e/kg LW

† Alltech averages are specific for your system type and is taken from the carbon result not individual key points of data.

What does "kg CO_2e/kg LW" mean?
Kilograms of carbon dioxide equivalent per kilogram of liveweight chicken produced.
The sum of all emissions generated on farm in the analysed period, divided by the total kilograms of liveweight chicken produced.

The footprint of a finished bird is...
5.24
(kg CO_2e/ bird)

Your farm emissions by source



This bar chart demonstrates the percentage contribution towards total farm emissions from the broiler enterprise, by their source for this assessment, and a system average.

*Manure may display a minus figure if the credit from exporting manure exceeds the manure emissions on-farm
**Emissions associated with chicks placed on farm

What does a carbon reduction mean?

If you manage to make a 5% reduction in your carbon footprint, you could save:

103 grams CO_2e per kilogram of chicken produced

Across total production, this would be equivalent to:

18 Cars off the road a year

32 Less return trans-Atlantic flights (LHR - JFK)

This assessment:	-	Total Crops Completed:	1
System Type:	Standard	Breed:	Ross 308

Crop details

	Alltech Average (Averages are based on previous projects conducted by Alltech E-CO_2)		This Assessment	
Number of crops assessed	Average	-	1	
Total number of chicks placed in crop	Average	955,920	109,896	birds
Age at thinning	Average	33	33	days
Percentage thinned	Average	31	30	%
Killing out percentage	Average	69	70	%
Overall average DLWG	Average	66.97	72.82	grams/day
Overall Feed Conversion Ratio	Average	1.66	1.53	kg feed used/gross kg bi

The overall Feed Conversion Ratio (FCR) is calculated using total feed used for total weight finished. Daily liveweight gain (DLWG) is an important indicat for efficiency and performance. If DLWG is too low, or FCR too high, it could indicate issues with flock health or the bird's physical environment. Identifying a low DLWG or high FCR could show an area for a potential increase in flock profitability. Limiting the amount of feed waste is key to increas the efficiency of the conversion from feed to liveweight gain.

Output

Total number finished (gross)	Average	911,597	105,819	birds
Total weight finished (gross)	Average	2,115,136	270,480	kg
Average weight of finished bird	Average	2.36	2.56	kg/bird

Carbon footprint is impacted greatly by LW of finished chicken. A greater LW of finished chicken allows for carbon emissions to be offset against a larger volume of product. Management of inputs needs to be balanced against the increased broiler production. Limiting waste often allows for ar increased conversion into LW of chicken.

Feed

Feed per bird per day	Average	105.49	108.68	g / bird / day
Protein per bird per day	Average	21.77	22.40	g / bird / day
Starter Period FCR	Average	2.12	-	kg / kg LWG
Protein % of starter feed		22.79	22.80	%
Soya % in starter feed		27.70	0.90	%
Starter Period DLWG		27.38	-	g / day
Grower Period FCR	Average	2.76	-	kg / kg LWG
Protein % of grower feed		21.16	21.20	%
Soya % in grower feed		27.40	1.45	%
Grower Period DLWG		45.84	-	g / day
Finisher Period FCR	Average	1.17	0.92	kg / kg LWG
Protein % of finisher feed		19.78	19.80	%
Soya % in finisher feed		22.50	0.35	%
Finisher Period DLWG		243.88	142.80	g / day

The use of soya products on this farm are from a certified sustainable source

Feed rate is the biggest impact to the carbon footprint of broiler production. If grown efficiently, home-grown cereals can be a low carbon feedstuff due the low transport and processing emissions. Feeds like soya have a large emissions tag due to the high processing emissions associated with growing an transporting the crop. Feed rate is measured against kg liveweight so an efficient diet plan can also help reduce your carbon emissions. The Feed Conversion Ratio (FCR) is calculated specifically for each growth stage, according to kg feed used per kg liveweight gained by the birds.

Strengths & Opportunities

Milk yield is below average for the system type at 5,356 litres (butterfat and protein are good) – this means that the enteric emissions from the cow are being allocated over a smaller level of production. As discussed, ensure your milk yields are optimised from feed and for cow type to ensure herd productivity is maximised and emissions minimised. The largest dairy herd cost, feed, almost certainly offers potential for improving profitability and carbon performance. Ensuring the correct balance of feeds in daily diets to give the most efficient rumen fermentation, is another area offering major potential for improvement. Lower milk yields can often be attributed to cow comfort in housing. Lower milk yields are not always due to the feed that the animal consumes. Look into aspects such as fertility, the overall health of the animal and the numbers of lame cows. These can all affect cow productivity and feed may not resolve these. If the average milk yield was increased from 5,356 to 6,000 per cow from the same feed and system type, the emissions would be reduced from 1,425 to 1,304 g CO2e per kg FPCM.

Yield from forage is 2,419 which is a little low compared to the average - maximising the yield from forage will reliance on bought-in feeds with high associated embedded emissions. Continue to monitor and analyse the forage quality, as this will allow you ensure that silage quality is maintained and effectively balanced with purchased feeds. Whether grazed or fed silage, grass provides over half the dry matter intake of most dairy cows. This means small improvements in utilisation can have a major impact on production costs. To ensure your milk yields are optimised from feed and for cow type to ensure herd productivity is maximised and emissions minimised, evaluate your cattle manure consistency to assess the digestibility of your feed ration. Dung sieve testing allows you to analyse the digestibility of feed and rumen fermentation. If you were to reduce reliance on bought-in feeds by 10%, by further optimising the yield from forage and maintaining milk yield, the carbon footprint for milk production would be reduced by 21 g CO_2e per kg FPCM, from 1,386 to 1,365 g CO_2e per kg FPCM.

The fertiliser use is four times as high as the system average and now accounts for 22% of the overall production emissions (average is a 9% contribution). To reduce fertiliser usage, look to analyse muck and manures as changes in animals and diets can impact the NPK content. Assuming a 6% dry matter slurry, this could potentially have a nutrient value of 1.2 kg N per m^3 available to crops. Alongside this, ensure soil analysis is conducted frequently to calculate N, P, K and S requirements, so the correct level of artificial fertiliser is applied, matching nutrient supply to crop requirement. Also look into the possibility of practices such as aeration and sub soiling to help improve soil structure and in turn increase productivity from grass. Improved soil structure will additionally reduce fertiliser runoff and N_2O emissions from soil. If fertiliser use is reduced by 1/4, then the emissions would be reduced by 68 g CO_2e per kg FPCM, from 1,386 to 1,318 g CO_2e per kg FPCM.

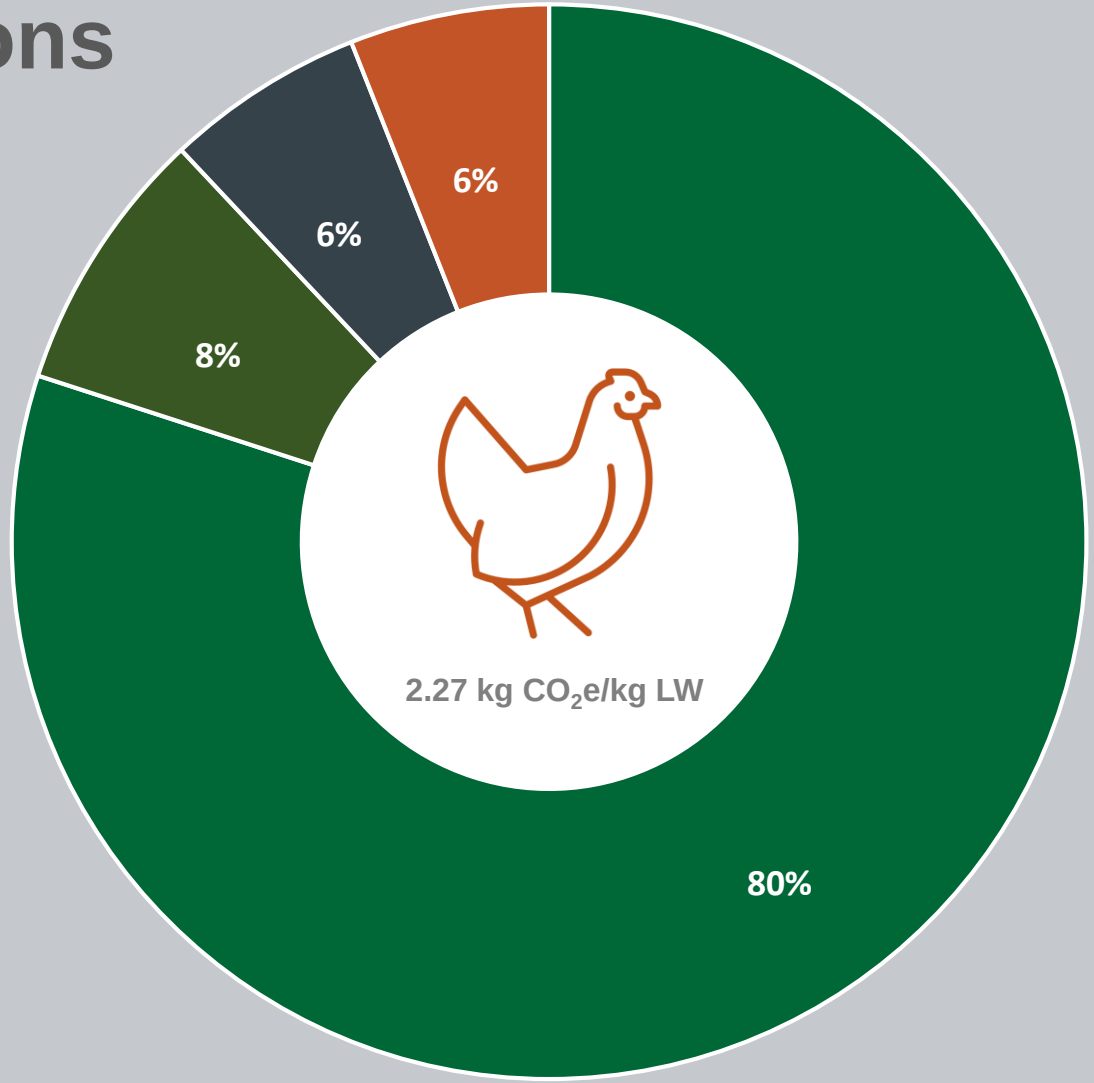
Next steps

To improve your on-farm efficiency, profitability and sustainability you should aim to:

- Continue to optimise milk yield and quality
- Monitor the feed rate, ensuring that the yield from forage is optimised as much as possible
- Ensure the use of fertiliser is optimal for the land and manures are used to full potential

How can I reduce my carbon footprint?

Poultry Farm Emissions



- **Feed use**
- **Birds**
- **Manure emissions**
- **Energy (Fuel and electricity)**

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Feed

GWP of feed
Precision nutrition
Feed Quality/Safety

Bird

Gut health
Feed efficiency
Optimal bird health
Reduced mineral excretion

Farm

Water usage and quality
Pathogen control
Feed waste
House management

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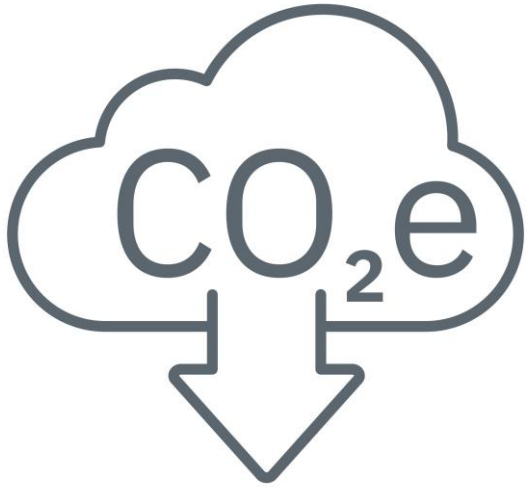
Broiler Case Study:

Broiler Unit	Year 1 - 2021	Year 2 - 2022
Carbon Footprint	3.83 kg CO2e/kg LW	2.03 kg CO2e/kg LW

The % of emissions associated with feed **went from 85% to 73.4%**. The main driver behind this is reducing the amount of soya in the diet and changing from non-sustainable soya to **sustainable soya in the diet**. They went from having no soya certification to SSAP (Soy sustainability Assurance Protocol).

The **FCR improved by 6 points.** This was achieved through management practices and improving gut health using Alltech expertise and technologies.

By following advice from Alltech E-CO_2 reports and focusing on different input areas of the business the customer has **reduced their footprint by 47%.**



Alltech E-CO_2

What are the benefits of calculating my carbon footprint?

INCREASING PROFITABILITY

INCREASING PRODUCTIVITY

REDUCING EMISSIONS

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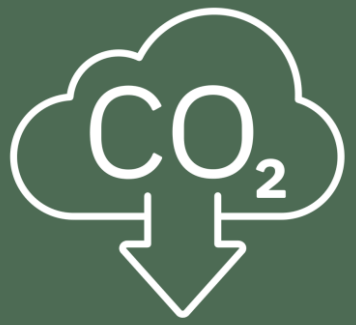
Conclusion

Drive to Net Zero



Measuring carbon footprint

Reducing carbon footprint = increased efficiency = **increased profit**