GHG Emissions Analysis – Cranswick Pork and Poultry Facility

Introduction

1. I have prepared this report to assess the total quantity of greenhouse gas ("GHG") emissions that can be attributed annually to the specific pork and poultry farms under consideration in these applications in accordance with standard methodologies. This analysis demonstrates the significant impact that these farms will have on the climate.

Expertise

2. I hold a degree in Physics from Oxford University with a specialization in Atmospheric and Climate Physics and have built a career spanning over nine years in the fields of climate change and sustainability. My professional experience includes over six years in consultancy where I specialised in carbon assessments, focusing on corporate GHG accounting and carbon footprinting. I have been a Climate Change Specialist at WWF for over two years, where I lead our engagement with food businesses on climate change, including our work with retailers through the WWF Basket where retailers have committed to achieving a reduction in GHG emissions aligned with a 1.5-degree trajectory.

Application

3. Cranswick has submitted two planning applications for the demolition and subsequent reconstruction of an industrial pork and poultry facility in Norfolk (the details are set out in WWF's consultation response). The applicant originally stated that climate change impacts would be scoped out of the EIA, as the "Proposed Development will be built to the appropriate regulatory standards, such as climate change and environmental performance standards".[1]

4. I have conducted an analysis to estimate the total GHG emissions that can be attributed to the pork and poultry that will be produced at the proposed development. This analysis focuses on the operational emissions of the development, i.e. the emissions that can be attributed to pork and poultry produced at the facility. The analysis does not consider the emissions associated with constructing the proposed development, or the embodied emissions associated with the materials used to construct the facility. These figures should

[1] See "Environmental Impact Assessment – Scoping Report" (dated April 2021), pg 11, which was accepted by the LPA

have been included in the environmental statement. I understand that the obligation is on the applicant to provide information and consultees are not expected to fill gaps where information should have been provided but was not.

5. I note that in the revised environmental and planning statements the applicant has now provided business-wide emissions intensity figures for both their pork and poultry based on a carbon footprint conducted in 2023. As set out below and addressed further in WWF's consultation response, whilst the applicant has made various references as to what is included within the intensity figures, it is not possible to ascertain precisely which emissions are included, how these figures have been calculated, nor whether all sources of emissions have been correctly factored into the analysis, because the carbon footprint analysis underpinning these figures has not been made publicly available. Without seeing the analysis, WWF cannot validate the figures provided. Nor is a business-wide approach acceptable (as set out further in the Finch Opinion). In the second part of this statement, whilst I do not endorse these figures, I have used them to calculate an estimate of the total annual GHG emissions that can be attributed to the proposed pork and poultry farms to demonstrate that it is possible to do so.

Methodology and Assumptions

6. To undertake this analysis, I have estimated the total volume of pork and poultry that will be produced by the facility, and multiplied these figures with GHG emissions intensities, to estimate the total annual GHG emissions that can be attributed to the facility. This is the standard approach to calculating GHG emissions in relation to agricultural products.

7. Information from the environmental statement about the proposed development has been used to estimate the total volume of pork and poultry that will be produced at the proposed facilities each year. The sources used in this calculation are found within Table 1 and include data on the animal capacity of the proposed facility, the lifecycles of the animals on the farm (including buffer periods between cycles), and typical weights and yields of the birds and pigs that we would expect to see in these types of facilities. To calculate the total volume of pork and poultry, I have taken the total capacity of the proposed facilities, and multiplied this by the total number of animal cycles each year, and multiplied this by typical weights and yields for these animals. From this, I estimate that annually the proposed development would process approximately 3,800 tonnes of pork, and 8,750 tonnes of chicken.

8. To estimate the total GHG emissions associated with producing this volume of pork and poultry, I have used two sources for the GHG emissions intensities. Firstly, I have adopted the figures used by the applicant. Cranswick have stated in their updated environmental statement that the emissions intensities of chicken and pork produced by Crown Chicken

(a subsidiary of Cranswick) in 2023 were 1.56 kgCO2e/kg LW and 1.62 kgCO2e/kg LW respectively. I have called this 'Scenario 1'. Within the updated environmental statement, they state that these figures encompass both upstream and downstream emissions, including any land-use change implications from growing feed. As set out above, the analysis however has not been published and as such, it is not possible to ascertain what assumptions have been made in the calculation of these figures, and whether all sources of emissions have been properly accounted for. I additionally expect that there is an error within the updated environmental statement, as they claim the same emissions intensity for both pork and poultry which would be unlikely given the differences between the two supply chains.

9. Secondly, I have used GHG emissions intensity data taken from the publicly available Centre for Innovation Excellence in Livestock's report 'Net Zero & Livestock, How Farmers Can Reduce Emissions'.[2] I have called this 'Scenario 2'. This study includes sources of emissions that arise up until farm-gate - that is until the animals are transported off farm for processing. It is a reputable industry standard source.The CIEL report relies upon the Agrecalc carbon calculator, which is an industry assessment tool, and the assumptions in that calculator align with the IPCC methodology.[3] This study identifies the single largest source of emissions within pork and poultry systems arises from producing animal feed and in particular, the assumed land-use change associated with growing the crop,[4] namely the soya used in animal feed that is typically sourced from South America. It also identifies the other major sources of emissions to be the management of pig manure or poultry litter.[5]

10. The GHG emissions intensities provided by the applicant were stated with the unit 'kgCO2e / kg live weight, whereas the unit of the GHG emissions intensities taken the the CIEL report used the unit kgCO2e / kg deadweight. These two metrics use either the live weight of the animal (live animal weight including bones, internal organs, blood etc) or the dead weight of the animal (including only those animal parts suitable for eating), as the intensity measure. In order to convert between these two units I have used standard conversion factors with values and sources stated in Table 1, below.

11. The key assumptions and sources used for this analysis are in Table 1 below.

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[2] Net Zero & Livestock, How Farmers Can Reduce Emissions, 2022, Centre for Innovation Excellence in Livestock (CIEL) ("CIEL Report"), available at: https://cielivestock.co.uk/expertise/net-zero-carbon-uk-livestock/report-april-2022/

[3] ibid, pg 12

[4] ibid, pgs 44, 46, 48

[5] Ibid, pg 44

Table 1: Assumptions Used to Calculate Pork & Poultry Volumes

Assumption	Value	Source
Poultry capacity	714,000 birds	Environmental Statement Volume 1 – Main Report (October 2024), paragraph 1.2 and 4.43, Bidwells
Bird cycle length	41 days	Environmental Statement Volume 1 – Main Report (October 2024), paragraph 11.4, Bidwells
Buffer period between cycles - poultry	7 days	Environmental Statement Volume 1 – Main Report (October 2024), paragraph 4.49, Bidwells
Weight of edible chicken per bird	1.61 kg	Food and Agriculture Organization of the United Nations (2023) – with major processing by Our World in Data
Pig capacity	14,000 pigs	Environmental Statement Volume 1 – Main Report (October 2024), paragraph 1.2, 4.2, Bidwells
Pig cycle length	105 days	Environmental Statement Volume 1 – Main Report (October 2024), paragraph 4.37, 4.10, Bidwells
Buffer period between cycles – pork	7 days	Environmental Statement Volume 1 – Main Report (October 2024), paragraph 4.37, 4.12, Bidwells
Pig finishing weight	115 kg	Environmental Statement Volume 1 – Main Report (October 2024), paragraph 4.10, Bidwells
Conversion factor pork – Liveweight to edible meat & offal	1.396	AHDB pork yield, WRAP Emission Factor Database V2.0
Conversion factor poultry – Liveweight to edible meat & offal	1.870	Poore & Nemecek, WRAP Emission Factor Database V2.0

Pork emissions intensity – scenario 1	1.62 kgCO_2e/kg deadweight	Planning Statement for pig farm (October 2024), paragraph 7.148
Poultry emissions intensity – scenario 1	1.56 kgCO_2e/kg deadweight	Planning Statement for poultry farm (October 2024), paragraph 7.173,
Pork emissions intensity – scenario 2	5.41 kgCO_2e/kg deadweight]	Net Zero & Livestock, How Farmers Can Reduce Emissions, 2022, Centre for Innovation Excellence in Livestock (CIEL)
Poultry emissions intensity – scenario 2	3.82 kgCO_2e/kg deadweight	Net Zero & Livestock, How Farmers Can Reduce Emissions, 2022, Centre for Innovation Excellence in Livestock (CIEL)

Results and Discussion

12. Using the methods and sources described above, I have estimated the total GHG emissions that can be attributed to the pork and poultry that will be produced at the facility each year. I have estimated this in two scenarios, firstly using the GHG emissions intensities provided by Cranswick in the updated environmental statement and secondly, I have used typical GHG emissions intensities for pork and poultry produced in the UK taken from CIEL's Net Zero & Livestock report.

13. Scenario 1 is based on the limited information within the environmental statement on GHG emissions intensities from the carbon footprint analysis from Alltech UK. The figures provided by the applicant are not accepted by WWF. The second scenario gives an indication of the emissions I would typically expect to see from this type of facility.

14. I estimate that the emissions that can be attributed to the pork and poultry that will be produced at the proposed development, to range annually between 34,000 tCO_2e – 53,700 tCO_2e depending on the scenario. The calculated emissions are broken down between pork and poultry in Table 2 below, in each scenario.

Table 2: GHG emissions analysis of proposed development

Scenario	Pork GHG Emissions (tCO_2e)	Poultry GHG Emissions (tCO_2e)	Total GHG Emissions (tCO_2e)
Scenario 1 - GHG emissions intensities from updated Environmental Statement	8,500	25,500	34,000
Scenario 2 - Typical GHG emissions intensities in UK pork and poultry systems	20,300	33,400	53,700

15. The large range between the two figures for the total annual GHG emissions can be attributed to the GHG emissions intensities Cranswick have provided in the updated environmental statement. Without providing more information as to how these figures have been calculated, I cannot verify the figures. Given this, I would typically expect that the emissions arising from this type of facility would be closer to the upper end of the range.

16. Rather than relying only on the GHG emissions intensities, the total annual emissions that can be attributed to the proposed development is the critical factor determining its overall climate impact.

Cumulative emissions

17. I have also provided an estimate of the total GHG emissions that can be attributed to pork and poultry produced at mega-farms within both West Norfolk and Norfolk as a whole. We estimate that the number of pigs housed within these facilities in West Norfolk to be approximately 64,800 and the number of chickens to be approximately 1,420,000. We estimate that the number of pigs housed within these facilities across Norfolk to be approximately 153,000, and the number of chickens to be approximately 26,000,000. We have drawn these figures from the permitted livestock numbers in industrial pig and poultry farms in Norfolk as regulated by the Environment Agency. To estimate the total emissions we have used the same methodology and assumptions surrounding animal lifecycles and yields as outlined in paragraphs 6 - 11 above.

Table 3: Cumulative GHG emissions

Scenario	Location	Pork GHG Emissions (tCO_2e)	Poultry GHG Emissions (tCO_2e)	Total GHG Emissions (tCO_2e)
Scenario 1 - GHG emissions intensities from updated Environmental Statement	West Norfolk	39,000	50,714	90,084
Scenario 2 - Typical GHG emissions intensities in UK pork and poultry systems	West Norfolk	94,000	66,409	160,584
Scenario 1 - GHG emissions intensities from updated Environmental Statement	Norfolk	93,000	919,000	1,012,000
Scenario 2 - Typical GHG emissions intensities in UK pork and poultry systems	Norfolk	223,000	1,203,000	1,426,000

18. I estimate that the total emissions that can be attributed to housing this quantity of pigs and poultry for meat production in West Norfolk to be between 90,000 - 161,000 tCO_2e each year and across the whole of Norfolk, to be between 1,012,000 - 1,426,000 tCO_2e each year.

Business-wide approach

19. Finally, using only an intensity-based GHG emissions metric, without assessing the emissions from the development under consideration as set out in the Finch Opinion, is not a valid way to assess the climate impacts of these farms (as set out in the Finch Opinion sent alongside WWF's consultation response and reports). If the local authority were to additionally consider a business-wide approach, then they would have to take into account the total GHG emissions across the business. The applicant chooses not to publish their scope 3 emissions on their website, so in lieu of this, I have taken information on the total number of birds and pigs they process each week, and used this to estimate the total GHG emissions that can be attributed to this.

20. The applicant states in their most recent annual report that they process on average 1.4 million birds each week, and the size of their pig herd is at least 800,000. To estimate the total emissions we have used the same methodology and assumptions surrounding animal lifecycles and yields as outlined in paragraphs 6 - 11 above.

Table 4: Business-wide figures

Scenario	Pork GHG Emissions (tCO_2e)	Poultry GHG Emissions (tCO_2e)	Total GHG Emissions (tCO_2e)
Scenario 1 - GHG emissions intensities from updated Environmental Statement	486,000	343,000	829,000
Scenario 2 - Typical GHG emissions intensities in UK pork and poultry systems	1,162,000	449,000	1,620,000

21. I estimate that the total emissions that can be attributed to housing this quantity of pigs and poultry for meat production to be between 829,000 - 1,620,000 tCO_2e each year.

STATEMENT OF TRUTH

I, Paul Marsh, am providing this Report as an expert and confirm that the factual matters are true to the best of my knowledge and belief and the opinions expressed are my true and professional opinions based on the facts I regard as relevant.

[redacted]

Dated: 24/01/2025