

Goal and Scope Definition

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Defining the goal and scope of analysis is a foundational step in any assessment of animal welfare. This step is foundational as it determines the direction, methodology, and ultimate outcomes of your research. The goal and scope must align with the broader objectives, whether they are to assess the amount of suffering embedded per unit of animal product, compare the impacts of various welfare interventions, estimate the magnitude of suffering associated with a disease, practice or policy, or establish standards for acceptable welfare practices in the industry. The following protocol is designed to guide researchers, policymakers, and industry stakeholders in systematically establishing the goal and scope for such an analysis.

Defining the Research Question

Below are a number of suggested aspects to consider when formulating the research question. These guidelines are not rigid; instead, they are intended as a flexible starting point that can be tailored to fit a wide range of objectives and scenarios in animal welfare research and decision-making.

- In preparing the research question, articulate the purpose of the analysis. This could be to compare production conditions, establish the magnitude of suffering embedded in a harm or product, inform a specific policy or decision-making process, monitor progress or establish improved welfare standards.
- Justify the relevance of the question: it should address a gap in existing knowledge or a specific decision-making need.

- Identify the primary audience, which may range from regulatory bodies to animal welfare advocates, researchers, industry stakeholders, and consumers.

Example: What would be the welfare impact, as measured by time in pain of different intensities averted per Kg of chicken meat produced, with the replacement of electrical waterbath stunning systems by multistage CO2 systems in the stunning of broiler chickens in the European Union and the US?

Defining the Scope of Analysis

This process involves determining the breadth and focus of the analysis. This includes determining the types of production systems that will be considered (e.g., intensive, semi-intensive), the stages of production, the types of animals (life-fates) included in the analysis (e.g. breeders, meat animals, animals used as feed), and the temporal and spatial scale of analysis (e.g. global, 10 most recent years). These steps are critical to identify the welfare harms that should be considered in the analysis, to establish the criteria for data collection (e.g., data on the prevalence of different harms should be restricted to the production systems, temporal and spatial scale defined) as well as to determine the conclusions that can be drawn from the analysis. They are typically informed by the research question, as well as by the availability of data.

Production system boundaries: Definition of Production System, Life Fates and Production Stages

Which production systems will be considered? (e.g., intensive, semi-intensive, pasture, free-range, organic). Within those systems, which life-fates will be analyzed? And for each of those, which production stages? For example, to understand the impact of a reform affecting a specific production stage for a specific animal (e.g., meat animals), you may be able to focus the analysis only on one life-fate and one production stage. Alternatively, if you want to determine the welfare footprint of an animal-sourced product, you will need to consider the entire production chain. For example, should you want to determine the welfare footprint of an

egg, you need to consider all stages that all life-fates in the production chain (breeders, layers, mortalities, male chicks) undergo, from birth to death (in this case from the hatchery till slaughter).

Another consideration to take into account is whether the analysis will consider animals typically outside the production system of interest. This category includes animals used as feed (e.g., fishmeal, fish oil), as 'auxiliary' in the production chain (e.g., cleaning fish), animals affected as a consequence of the production system activities (e.g., affected by pollutants, by disease spreading from farms), and as a consequence of the intervention studied (e.g., use of alternative animal products as a result of bans on certain categories of farming methods, species or life-fates).

Spatial and Temporal Scale

Is the analysis global, regional, or local? Which locations/countries does it include/exclude? (consider the availability of data in different geographies to define your answer)

Is the analysis restricted to any specific period? If so, specify. For example, in the illustrative research question proposed in the first section, we could restrict the period to the last 5 years: *"What would be the welfare impact, as measured by time in pain of different intensities averted per Kg of chicken meat produced, with the replacement of electrical waterbath stunning systems (considering data on their performance in the last 5 years) by multistage CO2 systems in the stunning of broiler chickens in the European Union and the US?"*

Measurement Unit

Consider whether you would like to communicate your results in terms of time in pain averted:

- For the average individual in the population of interest, and/or
- Per unit of product, and/or
- The total time in pain averted (considering the number of individuals affected), and/or



- Relative changes in the comparison of the scenarios of interest.

Depending on your choices, you will need to collect data on parameters such as the productivity (and losses) and proportion of each life fate in the production system of interest, estimate mortality and losses, and the number of individuals produced in the locations of interest.