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# **How can data from different sources be combined to improve the reliability of the dataset to produce robust results in animal welfare impact assessments?**

**Petra Thobe<sup>a</sup>, Craig Chibanda<sup>a</sup>, Mavis Boimah<sup>a</sup>, Thomas Banhazi<sup>b,c</sup>**

<sup>a</sup> Thuenen Institute, Institute of Farm Economics, Bundesallee 63, 38116 Braunschweig, Germany.

<sup>b</sup> InnoTech Vision ApS, Niels Pedersens Allé 2, 8830 Tjele, Denmark.

<sup>c</sup> Wroclaw University of Environmental and Life Sciences, ul. Chelmońskiego 38C, 51-630 Wroclaw, Poland

## **Abstract (150 words)**

There is a general consensus that improved animal welfare (AW) benefits both farmed animals and humans. However, the types of animal welfare measures that can be implemented at different stages of the value chain vary considerably. In order to reliably assess their socio-economic and environmental impacts, an appropriate dataset is essential.

This study aims to report on the process of data collection for the assessment of animal welfare strategies in the broiler and pig production chains. Therefore, this study details the identification and validation of indicators, the development and validation of questionnaires, and the data collection process on different stages of the production chain. The study contributes to the debate on how to combine data from different sources to obtain a reliable dataset. The data collection strategy is illustrated by an intervention study on how weight sensors in pig fattening can alert possible diseases and avoid additional costs.

**Keywords:** animal welfare, data collection, pig production, profitability, weight detection

## **1. Problem statement (max 100 words)**

As the types of animal welfare interventions that can be implemented at different stages of the value chain vary significantly, their socio-economic and environmental impacts may also vary. Moreover, while there is a widespread agreement on the societal benefits of improved animal welfare, some interventions related to animal welfare may have negative economic, environmental, or social implications. In order to understand the impacts of different AW strategies and reliably assess benefits and trade-offs, an appropriate dataset is essential. This study examines a data collection strategy used for spontaneous intervention studies in the aWISH project (Animal Welfare Indicators at the Slaughterhouse) which is funded by the European Commission.

## **2. Research objectives (max 100 words)**

This study aims to report on the process of data collection for the assessment of economic, environmental, and social impacts at different levels of the broiler and pig production chains. Therefore, this study details the identification and validation of indicators (economic, environmental, and social), the development and validation of questionnaires, and the data collection process on different stages of the production chain. The study contributes to the debate on how to combine data from different sources to obtain an appropriate dataset as basis for socio-economic assessment. The application of the data collection strategy is illustrated by a spontaneous intervention study.

## **3. Methods (300 words)**

The aWISH AW intervention studies follow a predefined data collection strategy:

**1. Identification and validation of indicators.** Relevant economic, environmental, and social indicators were identified. First, an in-depth literature review was conducted to identify which indicators have been used in previous studies. Second, consultations were held with experienced researchers. The TIPI-CAL (Technology Impact Policy Impact Calculations) model approach was applied for the selection of farm-level economic indicators (Chibanda et al., 2020; Ndambi, et al., 2008). After the indicators were identified, they were validated with project partners.

**2. Development and validation of questionnaires.** Questionnaires for collecting data from various actors along the broiler and pig value chains were developed. Specifically, for the broiler pilots, questionnaires were created to gather data from the following focus companies: farms, catchers, transporters, and slaughterhouses. For the pig pilots, questionnaires were developed to collect data from farms, transporters, and slaughterhouses. These questionnaires were designed based on the validated indicators and are Excel-based, as this software is user-friendly. Each questionnaire includes three sheets, focusing on economic, environmental, and social aspects. The questionnaires were validated with relevant project partners.

**3. The data collection process.** The data collection process followed a hybrid approach, combining both physical (face-to-face) and remote data collection methods. Physical data collection was conducted through semi-structured interviews and expert consultations. The physical data collection provided valuable input for validating the questionnaires. The data

collection process has been supported by regular data collection update meetings with the participating pilots and scientific leads.

**4. Spontaneous intervention study.** The TIPI-CAL model was used to calculate the economic impact of taking action on data received from weight sensors in pig production. The study reveals how the use of weight sensors can alert possible disease and avoid additional costs and reduction in profit and production efficiency (Banhazi, 2022).

#### **4. Results (400 words)**

The data from different sources were combined to obtain a proper data set as a basis for socio-economic and environmental evaluation on different stages of the poultry and pig production chain. While some socio-economic and environmental information can come from the integrator or other sources, most of the data should be farm-specific (e.g., mortality rate, feed quantities, etc).

Data exchange and usage between the aWISH project and focus companies in 6 pilots in the Netherlands, Spain, France, Poland, Austria and Serbia were legally regulated and followed a data collection action plan. The data exchange was regularly documented in a table presenting the status of data collection from the six pilots. More specifically, it shows the total number of focus companies (farms, catchers, transporters and slaughterhouses) per pilot, the number of focus companies who (1) received the questionnaires, (2) sent back the questionnaire or (3) (almost) finalised the completion of the questionnaire.

The completed questionnaires were reviewed by Thünen researchers and the project and pilot partners involved were contacted with questions and assumptions. Challenges occurred in some pilots regarding the collection of sensitive data (price and cost data). To cope with data deficiencies, quantitative information from further data sources such as KWIN (WU, 2025) were used.

To analyse the impact of welfare improving strategies (practice change analysis), in the first stage, the data for the focus company's current situation (baseline) has been collected. The physical data collection in Spain involved 19 farms, 1 transporter and 1 slaughterhouse. Remote data collection was implemented for the other pilots, where the questionnaires were distributed to the scientific leads. These scientific leads then coordinated the data collection process with the focus companies involved in their respective pilots.

Data for the second stage analysis will be collected after the welfare intervention to assess the socio-economic and environmental impact.

The spontaneous intervention study is based on some data collected in the Spanish pig pilot. The collected data is being applied to the economic indicators of a synthetic farm to calculate the economic impact. Preliminary qualitative evaluations indicate that the implementation of weight sensors aimed at providing alert on possible diseases (Banhazi, 2022) can realise cost savings and avoid a reduction in profit and production efficiency.

The data collection strategy developed within the aWISH project provides further evidence on how to combine data from various sources, enhancing the reliability of the dataset and generating robust results.

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