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## Precision Agriculture and Pig Farming

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**Abstract:** Precision Agriculture in pig farming is about application of cameras, automatic detection and segmentation, bibliometric analysis, feeder and floor space allowances, living lab methodology, medicine administration, precision livestock farming technologies, smart pig farming, using a multiple output regression convolutional neural network, and vision-based Artificial Intelligence – among others – and their impact on animal welfare, chronic stress, growth performance, and immunity transfer in nursery pigs, piglets, and pigs, in general. The authors discuss the advantages and disadvantages of these new applications.

### • Introduction

Precision agriculture is a modern farming management strategy that uses data and technology to optimize field-level management regarding crop farming. Here are some key aspects:

- Analysis and decision-making, i.e., analysing the collected data to make informed decisions about planting, fertilizing, and harvesting;
- Data collection, i.e., using technologies like Global Positioning System (GPS), Geographic Information System (GIS), remote sensing, and drones to gather detailed data on soil conditions, crop health, and environmental factors;
- Resource optimization, i.e., applying the right amounts of inputs (e.g., water, fertilizers, and pesticides) at the right time and place to improve efficiency and reduce waste;
- Sustainability, i.e., enhancing sustainability by minimizing environmental impact and improving crop yields.

Rising demand for pork and growing pig farms make it increasingly difficult for pig farmers to keep track of individual animals. In this context, innovative animal management systems such as precision / smart livestock / pig farming allow farmers to closely monitor their animals' health and welfare.

Precision pig farming is about application of cameras, automatic detection and segmentation, bibliometric analysis, feeder and floor space allowances, living lab methodology, medicine administration, precision livestock farming technologies, smart pig farming, using a multiple output regression convolutional neural network, and vision-based Artificial Intelligence – among others – and their impact on animal welfare, chronic stress, growth performance, and immunity transfer in nursery pigs, piglets, and pigs in two different farrowing systems.

### • Material and method

The material used in this paper consists in a corpus of articles on the relationship between precision agriculture and pig farming published in the last two decades years. The research method used is corpus analysis.

### • Results and discussions

Precision Agriculture Tools. Precision agriculture employs a variety of tools to optimize farming practices. Here are some key tools used to enhance efficiency, reduce waste, and improve production:

- Data analytics software, which analyses collected data to make informed decisions about feeding, harvesting, irrigating, planting, and watering;
- Drones equipped with cameras and sensors, which capture high-resolution images and data for crop / livestock monitoring and field analysis;
- Global Positioning System / Global Navigation Satellite System, systems which help in precise field / herd mapping, soil sampling, and tractor guidance;
- Mobile devices (smartphones and tablets), which are used to access and manage data on-the-go;
- Satellite imagery, which provides large-scale data on crop / livestock health, soil / livestock conditions, and environmental factors;
- Sensors, which collect real-time soil, weather, and crop / livestock data on various parameters like moisture levels, temperature, and nutrient content;
- Variable rate technology, which allows for the precise application of inputs like feed, fertilizers and pesticides based on data collected from the field.

In precision / smart livestock / pig farming, specialists have focused mainly on 3D cameras, automatic detectors, automatic feeders, automatic weight scales, and radio-frequency identification technology.

### • Conclusions

In precision / smart livestock / pig farming, the main tools use, the main areas investigated, and the main categories of pigs that researchers have focused on are, as expected, related to the economic component of pig farming.