INVESTIGATING THE USE OF ARTIFICIAL INTELLIGENCE AND LEARNING ALGORITHMS IN DAIRY COWS

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The aim of the project is to develop a comprehensive, artificial intelligence-based decision support system (IntelliFarmMoo or "Smart Farmer's Eye") for dairy farms. The system employs a multimodal sensor platform (image, sound, thermal imaging) to continuously (24/7) collect data on the vital signs and behavioral patterns of individual cows and animal groups.

The system covers five key areas:
1. Animal Health— Capable of early detection of diseases (particularly mastitis and hoof diseases), even before clinical symptoms appear.
2. Feeding— Monitors and optimizes feed intake and utilization.
3. Individual Identification— Uses cameras and other sensors to individually identify and track animals.
4. Animal Welfare— Continuously monitors animal behavior, stress levels, and environmental conditions.
5. Economic Efficiency— Optimizes operational efficiency of the farm by analyzing collected data.

The project's innovative approach includes utilizing environmental DNA (eDNA) sampling technology, enhancing the measurement capabilities to a new level, and employing multi-level AI models for data analysis. An advantage of the system is that it does not require attaching sensors to animals, which can cause stress and frequent malfunctions .
The system is flexible and adaptable to various environments (e.g., farms with different husbandry technologies), enhancing competitiveness and broadening the potential market uptake.

Dairy farms today face numerous challenges related to animal health, optimizing feeding practices, and achieving economical operations. Traditional monitoring systems often rely on invasive sensors, causing stress to animals and frequently malfunctioning. This project aimed to develop an artificial intelligence-based decision support system addressing these issues. The IntelliFarmMoo system collects data using multimodal sensors (image, sound, thermal imaging) and environmental DNA sampling technology, analyzed through multi-level AI models. The system optimizes five key areas: animal health (early disease detection), feeding (monitoring intake and utilization), individual identification (camera-based animal tracking), animal welfare (stress-level monitoring), and economic efficiency (optimization of operational effectiveness). The system is widely adaptable to farms employing various husbandry technologies, significantly enhancing competitiveness through precision farming.