

THE ROLE OF ADVANCED TECHNOLOGIES IN CREATING SMART LIVESTOCK

Khoshniyazova S. J.

Karakalpakstan Institute of Agriculture and Agrotechnologies,
Assistants of the "Zooengineering and Veterinary" Department

Karimov R. P.

Karakalpakstan Institute of Agriculture and Agrotechnologies,
Assistants of the "Zooengineering and Veterinary" Department

Shernazarov S. J.

Karakalpakstan Institute of Agriculture and Agrotechnologies,
Assistants of the "Zooengineering and Veterinary" Department

ANNOTATION

Precision livestock farming (PLF) is a digital management system that uses information and communication technologies (ICT) to continuously measure productivity, reproduction, animal health and welfare, and the herd's impact on the environment. controls all stages of the process. In traditional livestock management, decisions are largely based on the assessment, judgment and experience of the farmer, veterinarian and workers.

Keywords: Livestock Data Management Monitoring Tools, Precision Livestock, Acoustic Monitoring.

INTRODUCTION

Prior to the Industria 4.0 revolution, livestock management decisions were largely based on human observation, judgment and experience. As a result of the unprecedented development of IT in the last decade, a new concept called "Precision Livestock Farming (PLF)" appeared. PLF is an advanced digital technology management system that periodically or continuously monitors productivity, reproduction, animal health, welfare and environmental impact of the herd using a "per animal" approach. It measures and monitors all stages of the production process using the Internet of Things (IoT)¹. PLF technology - the combination of the use of computers and ICT leads to a more efficient production chain, increased animal welfare due to increased control, optimal use of resources and reduced environmental pollution. The introduction of process control procedures has led to significant improvements in other industries.

MATERIALS AND METHODS

Another characteristic of Industria 4.0 is the Internet of Things (IoT). Agents (such as machines, devices, etc.) are connected to the Internet to exchange information in various applications. This technology enables data collection, integration and processing, intelligent identification and management. IoT has been widely applied in smart cities, smart manufacturing, healthcare, transportation, logistics management, air pollution, robot motion planning, product tracking, and

¹ Koray Tekin, Begm Yurdak, Dikmen, Halit Kanca. Precision Livestock Farming Technologies: Novel Direction of Information Flow // Ankara Univ Vet Fak Derg, 68, 193-212, 2021. DOI: 10.33988/auvfd.837485

parking systems. Thanks to these important advances, mankind can enjoy a high quality and comfortable daily life.

Recent advances in sensor devices, measuring instruments, and receivers are bringing significant advances in both industry and agriculture. Most of the common problems revolve around industrial sites that emit solid waste and damage the environment. However, there is little research on breeding or husbandry, and the existing work is not detailed. In the past, agriculture relied mainly on human observations and natural phenomena. In this case, it is natural that the data collection from farms is irregular or the manual recording is imprecise. Animal growth is linked to climate change, food resources, farming opportunities and farmer intelligence. But there is no clear understanding of the animals' growth cycles or breeding plans. However, this situation can be changed in terms of the introduction of online data collection techniques through the use of IoT-based systems. In fact, it is widely recognized that there is a great potential to transform rural areas through better awareness of the local environment, artificial movements and the application of IoT concepts. The application of such technology raises new issues, offers potential opportunities and shows a bright future².

RESULTS AND DISCUSSION

Despite the advances in electronics, the use of wireless networks and embedded sensors in small-scale data collection still requires more attention from researchers. In particular, it is necessary to collect a lot of information about environmental parameters or animal lifestyle to predict the future demands of agriculture. Various datasets have been constructed for object detection in the field.

As a result of the research conducted on the issue of intelligent livestock, it can be said that initially, it is necessary to determine the basic infrastructure issues for the development of the intended intelligent platform. In the case of E.S.Babajanov, the sequence of issues that must be fulfilled based on the local approach is defined as follows³:

1. Clarify the flow of information;
2. Creating a database;
3. Clarification of advanced technologies that can be applied to the activity and their localization;
4. Creation of communication infrastructure of Sensors;
5. Dynamic data collection and writing to the server;
6. Creating software interfaces for users;
7. Formulation of norms or standards for animal breeds, such as biological changes, nutrition and productivity;
8. Automation of veterinary activities;
9. Creation of mathematical-algorithmic hardware and software for intellectual data processing for the purpose of observation and decision-making;
10. Setting up a remote control system.

In general, the final goal of these tasks is to obtain maximum demand-satisfying products (such as milk, meat) at the lowest cost in farm activities, to assist in making management decisions, and to automate management.

² Ha Quang Thinh Ngo, Thanh Phuong Nguyen and Hung Nguyen. Research on a Low-Cost, Open-Source, and Remote Monitoring Data Collector to Predict Livestock's Habits Based on Location and Auditory Information: A Case Study from Vietnam. *Agriculture* 2020, 10, 180; doi:10.3390/agriculture10050180

³ E.S. Babadjanov, The main tasks in the organization of intelligent livestock farms. A collection of lectures of the republican scientific and practical conference on the topic "Problems and solutions of data protection in the introduction of information technologies to the process of digital transformation". Against 2022. 20-22 p.

Based on the above, the main problems in livestock farming are:

- 1) Cattle passport and identification using microchips;
- 2) Individual and continuous automatic recording of milk yield.

CONCLUSION

The development of new technologies and informatics has increased the worldwide demand for the integration of PLF systems into local farms. As physiological, behavioral and environmental parameters monitoring and software analysis tools evolve around the Internet of Things; PLF provides cost-effective production with rational/less drug consumption and is relatively more environmentally friendly. For PLF, IoT technologies are still in the development phase and since information is more valuable in this era of big data world, laws and regulations unfortunately lag behind in terms of security and data ownership. Deanimalization and commodification are the main ethical issues discussed around the topic of PLF. It is inevitable to increase the efficiency and sustainability of farming and animal husbandry through proper application of PLF; where animal welfare reflects animal health. It allows monitoring of the food chain and food safety.

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