NSAP 47th Annual Conference (JOS 2022) CONFERENCE PROCEEDINGS
THEME: SECURING ANIMAL AGRICULTURE AMIDST GLOBAL CHALLENGES

COMPUTER AND LIVESTOCK MANAGEMENT: A SOLUTION TO EASY PRACTICE

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Abstract

The aim of this review is to present a review of the current scientific viewpoints about the computer and the definition of animal husbandry innovations. Microcomputers will increase in use and importance and will take over some of the functions previously performed with large computers. Their low cost and increasing capability make it possible for their direct use in the laboratory, animal facilities, classroom, and office of the extension specialist, industry representative and livestock producer. Computers on farms will allow more efficient use of resources. They allow easy use of complex prediction and evaluation models, making it possible to evaluate many more variables and alternatives. Individual producers will be able to modify programs to fit their unique resources and conditions, allowing them to set management priorities and to develop the best management systems for their unique conditions. Good software will be developed. However, it must be carefully tested before widespread distribution, and good user manuals must be developed before the software can readily be used by the typical farmer. Livestock farmersrapidly adapt computer infrastructures to exploit changes in technology for better production.

Keywords: Computer, Livestock, Management, Animal and information

Introduction

The increase in world population is demanding for more reliable quality livestock products but the number of farms is decreasing,while the number of animals per farm and animal production is increasing(Sera and Cahit, 2018). In addition to this trend livestock production challenges are also increasing (Thornton, 2010). However, as the number of animals increases, error burden, and workloadalso increase. Currently, most data are extracted manually, yet manual observation is gradually being replaced by many milking systems by automated recording (milk yield, milk conductivity, activity recording, and body weight measurements) leading to better data, both in quantity and quality(Ipema*et al.*,2018).The operation and management of livestock enterprises have become very competitive and complex. The ability of an individual operator to survive and compete depends on his or her ability to make correct long- and short-range decisions and to avoid management errors (Danny,1983). A few wrong decisions can lead to financial disaster because of the size and cost of operation, amount of capital being managed, and small profit margins. Producers must be able to decide which practices adopting, which components of the operation should receive the highest management priority, and when to adjust systems, as well as be able to make correct daily management decisions (Danny,1983).

Advanced digitalization technologies can help modern farms optimize economic contribution per animal, reduce the drudgery of repetitive farming tasks, and overcome less effective isolated solutions. There is now a strong cultural emphasis on reducing animal experiments and physical contact with animals in order to enhance animal welfare and avoid disease outbreaks (Suresh and Bas,2021). This trend has the potential to fuel more research on the use of novel biometric sensors, big data, and blockchain technology

for the mutual benefit of livestock producers, consumers, and the farm animals themselves. Farmers' autonomy and data-driven farming approaches compared to experience-driven animal management practices are just several of the multiple barriers that digitalization must overcome before it can become widely implemented (Sureshand Bas, 2021).

The benefits of new technology are plentiful and include increased cost efficiency, improved animal welfare, improved working conditions, better production monitoring (e.g. remote monitoring, access to real-time data), and improved provision of important production data(Ipema*et al.*, 2018). The new technology means producers can work easier and improve cattle welfare, production efficiency, and profitability. The aim of this review is to present the current scientific viewpoints about the computer and the definition of animal husbandry innovations. Successful livestock farmers will be capable of rapidly adapting their infrastructures to exploit changes in technology for better production.

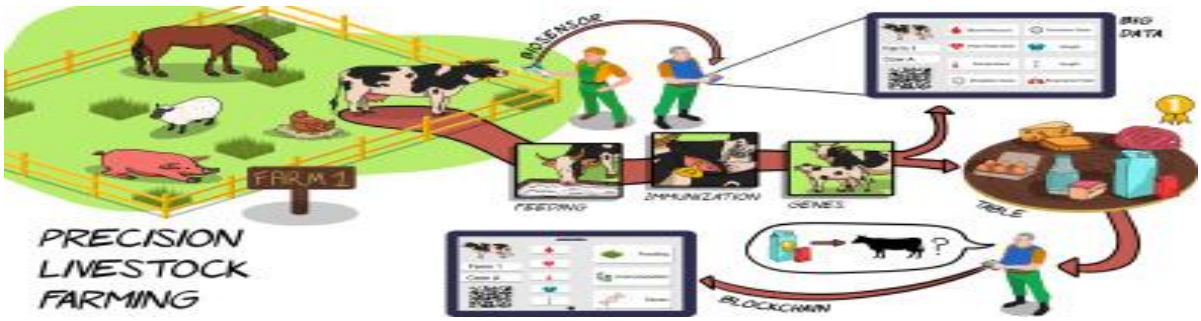

Figure 1: Precision Livestock farming (Sureshand Bas, 2021)

The use of computers in livestock

Geo-Informatics Technologies in Animal Disease Surveillance

Early identification of an infectious disease outbreak is an important first step towards implementing effective disease interventions and reducing resulting mortality and morbidity (Xiaoxu*et al.*, 2016). Both geographical and seasonal distributions of many infectious diseases are linked to climate, therefore the possibility of using seasonal climate forecasts as predictive indicators in disease early warning systems (EWS) has long been a focus of interest. Geographic Information System (GIS), Remote Sensing (RS), and Global Positioning System (GPS) are the three commonly used veterinary geo-informatics technologies employed in this information era for rapid worldwide communication of data for the management of animal diseases (Xiaoxu*et al.*, 2016).

Artificial Intelligence in Health Management

Artificial intelligence may be defined by comparing computer and human functions. If the computer performs a task that seems intelligent when it is done by humans it can be said to be exhibiting artificial intelligence (Neethirajan and Bas, 2021). In medicine, most artificial intelligence research has been devoted to creating computer systems that contain detailed information about a specific medical subject. By focusing relevant knowledge on the problems facing the physician, these programs are designed to act as consultants and thereby have the potential of expanding the practitioner's expertise.

Computer in Instrumentation

Another important area of contribution of computer is in the instrumentation side. The modern molecular methods of diagnosis require sophisticated electronic equipment. It is impossible for a researcher to have sufficient knowledge in electronics to handle this equipment (Neethirajan and Bas, 2021). To simplify this, all the modern equipment like ELISA reader, HPLC, RIA, UV Spectrophotometer, Atomic Absorption Spectrophotometer, Flow cytometer, freeze drier, ultra-low freezer, PCR machine etc., are now controlled by microcomputers and user-friendly software are provided to operate them. With this software, even a beginner can start handling this equipment with minimal training.

Geographic Information System is a computerized database management system for capturing, storing, checking, integrating, manipulating, analyzing and displaying data related to location.

Quality control

Well-defined quality control and continuous improvement methods based on (i) Total Quality management (TQM) systems (Landesberg, 1999) and (ii) Hazard Analysis Critical Control Point (HACCP) principles are used widely in the manufacturing industries throughout the world (von-Borell*etal.*, 2001; Noordhuizen&Frankena, 1999). These processes are engaged to ensure all products froman industrial plant meet specifications with little tolerance for error. The HACCP principles weredeveloped originally by the United States Army and the National Aeronautics and Space Administration(NASA) to guarantee that food poisoning would not occur in astronauts during early space flights in the1960s. Similar processes are now used widely for food safety across the food processing and agriculturalindustries (Petersen *et al.*, 2002, Snijders& van Knapen, 2002 and Valdimarsson*et al.*, 2004) and have alsobeen applied in the management of cropping systems (Aubry*et al.*, 2005). Indeed, the HACCP principlescan be applied to any sector of agriculture to control risk and ensure high levels of productivity andproduct quality at all stages along a production chain (Snijders& van Knapen, 2002). The HACCPprinciples provide the ideal structure for ensuring that the most important processes determiningproductivity and profitability in an animal enterprise are adopted and performed with the least chance offailure. The HACCP principles are now being used by several sectors of the Australian animal industriesto aid the adoption of existing knowledge.

The essential steps that need to be incorporated within a well-designed and controlled production process are (Beattie, 2001; Cumby & Phillips, 2001; Webster, 2001): (i) integration of automated data measurement

and acquisition systems into the production chain (Frost, 2001; Banhazi*et al.*, 2007b); (ii) establishment of protocols for data-integration and automated data analysis to identify inefficiencies in processes and to facilitate decision making (Schofield *et al.*, 1994; 2002); (iii) transfer of the results from data analysis as inputs into automated decision making processes and trigger certain management actions (Banhazi*et al.*, 2002; 2003; Black, 2002); (iv) activate control systems, which could be either automated or appropriately documented in standard operating procedures (SOPs) (Gates &Banhazi, 2002; Gates *et al.*, 2001); and (v) include procedures to monitor the outcome of control actions and documentation for quality assurance (QA) purposes (Black, 2001).

Conclusion

Livestock farmers can rapidly adapt computer infrastructures to exploit changes in technology for better production.

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