REVIEW

By: prof. dr. Zornitsa Dimova Stoyanova, Professional field of Economics, scientific specialty Economics and Management (Agrarian and Environmental Management), University of National and World Economy

Author of the PhD thesis: eng. Petar Angelov Chernaev

Topic of the PhD thesis: DIGITAL TRANSFORMATION OF LIVESTOCK – PROBLEMS AND OPPORTUNITIES

I. General presentation of the PhD thesis:

The PhD thesis was discussed and proposed for defense in accordance with the Academic Staff Development Act of the Republic of Bulgaria by the Department of Agrarian Economics at the D. A. Tsenov Academy of Economics – Svishtov. In terms of content, it consists of an introduction, an exposition in three chapters, and a conclusion.

1. Object – the opportunities and challenges in the digitalization and creation of the "IDEAL FARM" with own feed production and market realization (meat production orientation).

2. Subject – The subject of the research is digital tools and the use of artificial intelligence (AI) for more profitable and environmentally sustainable management of livestock farms and product realization (meat).

3. Volume – The PhD thesis comprises 266 pages.

4. Structure – The structure of the PhD thesis includes an introduction, an exposition in three chapters, and a conclusion.

5. References – The list with references includes 160 sources, of which 9 in Cyrillic and 151 in Latin.

6. Appendices – none.

II. Assessment of the Form and Content of the PhD thesis.

1. Assessment of the relevance of the scientific problem, the formulated subject and object, PhD thesis, research objectives, tasks and methods, clarity and soundness of ideas, and identification of novelty;

The aim of the PhD thesis is to develop and validate a comprehensive framework for planning, implementing, and evaluating digital transformation in livestock farming, enabling informed managerial decision-making and sustainable value creation under various production and institutional conditions. To achieve this objective, in the PhD thesis are formulated the following research tasks: 1) theoretical analysis of digitalization opportunities in the livestock business at European and national levels; 2) systematization of technological opportunities for digitalization and optimization of processes from feed preparation to product realization (meat); 3) optimization of management processes in livestock farms, slaughterhouses, and meat processing enterprises, considering the specifics of cattle and buffaloes, sheep and goats, and pigs; 4) creation of a classification of farms according to their participation stages in the agri-food chain, business models, and animal types, and assessment of technological solutions from the perspective of economic feasibility; 5) analysis of different farms through comparison with established classifications and definition of standardized enterprise profiles; 6) implementation of ERP systems or hardware innovations and comparison of results; 7) assessment of the level of digitalization, challenges, and opportunities for future development.

The thesis aims to prove that the implementation of carefully selected, interconnected, and effectively applied digital technologies and innovative methods can simultaneously increase the quality and profitability of livestock production while minimizing environmental impact. Five hypotheses are tested: A) digitalization depends on farm size, animal type, breed, production orientation, and technology used; B) The digitalization strategy for each individual farm must be carefully selected depending on the form of management, the views and

qualifications of the owners and management team.; C) software solutions for control and management of the livestock business by the State are of key importance for the speed and direction of business digitalization; D) the livestock business support system creates prerequisites for serious discrepancies and incorrect practices due to the lack of a sufficient level of digitalization on the farm; E) Tracking the process "from field to fork" and the quality of production is achievable with the digitalization of all processes along the chain.

The object of research is the opportunities and challenges in digitalization and the construction of the "IDEAL FARM" with its own feed and sales (meat production).

The subject of research is digital tools and the use of artificial intelligence (AI) for more profitable and ecological management of the livestock farm and realization of production (meat).

The relevance of the researched scientific problem stems from the urgent need to increase the profitability and competitiveness of Bulgarian livestock farming in the conditions of increasing technological, climatic and consumer pressure, as well as from compliance with European strategic priorities aimed at green transformation, sustainable development and digitalization.

The clarity and argumentation of the ideas are ensured by applying a complex approach that combines in-depth theoretical analysis, practical studies on real farms, comparison with international practices and development of economic models for assessing the impact of digital technologies, with scientific novelty manifested in the creation of a model for the "Ideal Farm", the formulation of classifications according to the degree of digital readiness and participation in the "farm to fork" chain, the proposal for a strategic framework for digital transformation and the implementation of a systematic approach for assessing the effect of the application of ERP systems, artificial intelligence technologies and automated processes.

The first chapter presents the theoretical foundations of digital transformation in livestock farming and examines the main areas such as identification, traceability and automation of processes. It examines the main areas of digital development of livestock farming as a business, as well as general characteristics and opportunities for the development of automation in animal husbandry processes. The second chapter analyzes the challenges and opportunities in implementing digital solutions in farms, classifying the processes according to the type of animals and their method of raising. The problems with financing, personnel qualification and the effectiveness of state support are presented. The presented model for managing the "Ideal Livestock Farm" deserves high evaluation. The third chapter offers practical digital solutions and models for intelligent and efficient livestock farming, through the analysis of specific farms and the implementation of technologies in individual processes. It presents good practices, innovative projects and recommendations for the future development of digitalization in the sector.

All these argues for the need to develop a PhD thesis “Digital Transformation of Livestock Farming - Problems and Opportunities". The results achieved in the study allow to be to highlighted the main challenges facing the digitalization of the livestock sector, and the PhD thesis proposes specific, applicable solutions and models for optimizing processes and increasing efficiency through the implementation of digital technologies.

2. analysis of the degree of development of the researched issues by other scientists and to what extent the author's own attitude to the issues under consideration is reflected;

The PhD thesis provides a thorough review of the existing scientific literature on digitalization in animal husbandry, analyzing established theoretical and practical approaches applied by leading researchers. The author builds on these theoretical views through critical analysis based on his own empirical observations and models, clearly stating his personal view to the issues under consideration. By developing farm classifications and the "Ideal Farm" model, the PhD student contributes new solutions and demonstrates a significant personal contribution to the researched topic.

3. opinion on the volume of the dissertation;

The volume of the dissertation – 266 standard pages meets the requirements for this type of scientific research. The content of the work is balanced and the individual chapters are of a size that allows the implementation of the tasks set in the PhD thesis and gives PhD student Chernaev the opportunity to reveal his views and ideas.

4. opinion on the quality and number of the proposed illustrative material – diagrams, graphs, tables, etc.;

The work is well illustrated, with the research ideas clearly visualized through appropriate figures and tables. The PhD thesis includes 36 figures and 24 tables, which help to perceive the results.

5. attitude to the scientific, linguistic and stylistic editing – soundness of the scientific apparatus, presence of deviations, repetitions, logical contradictions, proportionality of the parts, etc.;

The PhD thesis has a scientific style and is written in high economic language. No deviations, repetitions or contradictions are found. The thesis is balanced and proportionate.

6. assessment of the correctness and necessity of statistical processing of empirical data – computational procedures, significant figures, etc.;

For the purposes of the scientific research, the author applies a wide range of classical scientific research methods, including statistical, analytical, comparative and economic analysis, as well as approaches to assessing the effectiveness and impact of digital technologies. Within the framework of the study, a thorough review and processing of statistical data from the State Fund "Agriculture", the Ministry of Agriculture and Food, European information platforms, the National Statistical Institute and results of author's studies in real livestock farms were carried out.

7. opinion on the extent to which the candidate has complied with the rules of scientific ethics (incorrect citation of literary sources, publication of the same manuscript in different places, plagiarism, the new problem of "copy-paste" in scientific work);

The texts of other authors that have been used are correctly cited, and a positive point is that PhD student Chernaev includes his own view in the interpretation of the author's views. The declaration of originality signed by the author guarantees that the presented work is the author's and of an original nature.

8. opinion on how accurately and completely the abstract reflects the work.

The abstract correctly reflects the content of the PhD thesis, containing the necessary logical sequence. It includes the general characteristics of the work, the structure and content, and a brief presentation of the PhD thesis and contributions.

III. Scientific and scientific-applied contributions of the PhD thesis.

1. Does the proposed text contain a development of existing and/or promotion of new scientific ideas and results with an opinion on their significance?

The following scientific and scientific-applied contributions could be formulated and highlighted in the PhD thesis:

✓ The theoretical foundations related to digitalization in livestock farming have been enriched, by systematizing the directions and technologies related to identification, traceability, automation and intelligent process management.

✓ A methodology has been developed for studying the degree of digitalization and the effectiveness of implementing digital solutions in livestock farms, including the author's own classification and evaluation criteria.

✓ The main problems and barriers to the digitalization process have been identified, related to financing, management processes, the lack of qualified personnel, as well as shortcomings in state support and digital infrastructure.

✓ A model of the "Ideal Farm" has been proposed and practical and applied solutions have been developed for optimizing production processes based on ERP systems, artificial intelligence technologies and integrated automated systems.

✓ A systematic approach is proposed to assess the effects of digitalization on the profitability, sustainability and competitiveness of livestock farms, including in the context of the "farm to fork" chain.

✓ Perspectives and recommendations for the development of the sector are derived, consistent with European policies for digital and green transformation, as well as with the specifics of the agricultural sector in Bulgaria.

2. is there evidence that the proposed ideas and results have already found resonance and recognition in the specialized scientific literature.

The author presents evidence of the resonance of his research in the specialized literature. PhD student Chernaev has presented five publications related to the PhD thesis, which are directly connected with the topic of the PhD thesis and reflect its main parts. The publications are in the period 2022-2024.

IV. Critical notes, questions and recommendations on the PhD thesis.

I have a recommendation for PhD student Chernaev that the research conducted and the scientific results of the PhD thesis to be published as a monographic work, with the ideas presented in the dissertation being further developed.

V. Conclusion and statement.

The PhD thesis of eng. Petar Chernaev represents an independent study of a current problem, developed in depth and containing all the necessary contributions for the required degree. The PhD student demonstrates in-depth knowledge in the field of digital transformation in animal husbandry and the ability to conduct independent scientific research. The PhD thesis meets the requirements of the LDASB and the regulations for the organization and conduct of competitions for acquiring a scientific degree and for occupying academic positions at the SA "D.A.Tsenov" Svishtov.

Based on the above, I positively evaluate the work and propose to the esteemed members of the Scientific Jury to take a decision to award the educational and scientific degree "doctor" in the PhD program "Economics and Management (Agricultural Economics)" to eng. Petar Chernaev.

Data: 8.12.2025

Reviewer: .....
(prof. dr. Zornitsa Stoyanova)