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# USING CHICKEN GROWTH SIMULATOR IN TEACHING POULTRY PRODUCTION IN SECONDARY SCHOOL: IMPLICATION FOR EFFECTIVE POULTRY MANAGEMENT

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## Abstract

*Farm simulation software can be efficient for poultry management and agricultural-related courses. However, limited research has demonstrated their efficacy in secondary school education in Nigeria. The present study examined the effect of chicken growth simulation on students' interest in poultry production. Two hundred and nine secondary school students conveniently pooled from different secondary schools in Omoku River State participated in the study. The respondents were taught the poultry management process using the chicken simulation software. Their interest in poultry production was examined using a questionnaire. The result established a statistically significant effect of chicken growth simulation software on the respondent's intention to engage in poultry production at F (1,207), 4.60 P< .05 with adjusted $R^2$ indicating that the chicken growth simulation software contributed about 29.8% of the variance in student's intention to engage in poultry farming. The result has implications for effective poultry management.*

**Keywords:** *chicken, simulation, poultry, students*

## INTRODUCTION

The necessity for industrialization and intensification in the agriculture sector has increased due to the rising food demand in quantity and quality. Numerous creative ideas to update and pique interest in the agriculture industry have been made possible by technology. Livestock farming is one of the essential aspects in the agricultural sectors that have witnessed significant growth in recent times. Livestock farming is an essential source of animal-based food products and income in Nigeria (Shehu et al., 2011). Over 50 billion chickens are raised annually as a source of food for their meat and their eggs (Compassion in World Farming, 2011). Livestock represents an essential source of high-quality animal protein, providing about 36.5 percent of the total protein intake of Nigerians.

Nigeria has witnessed massive poultry production growth and is now Africa's largest poultry producer (Jatau et al., 2016). Poultry farming is one of the essential aspects in the agricultural sectors that have witnessed significant growth in recent times. The livestock industry is vital to the socio-economic development of Nigeria (Amos, 2006; Bamiro et al., 2012; Ekunwe et al., 2010; Hassan et al., 2016; Ibikunle Ogunyemi & Folorunso Orowole, 2020; Joshua Olorunwa, 2018; Kperegbeyi et al., 2009; Maikasuwa & Jabo, 2011; Onuk et al., 2017; Sanni et al., 2021), and a booming sector in Africa (Kiba et al., 2020). It contributes significantly to agricultural GDP (FAO, 2006). Poultry farming is raising domesticated birds, such as chickens or turkeys, to acquire meat or eggs for food. A large number of chickens are produced for meat and egg purposes. The demand for eggs and poultry meat has significantly increased in Africa due to the population rise (Heise et al., 2015).

Poultry production serves as a source of protein and revenue generation. Poultry meat accounts for most of the meat consumed globally and is one of the highest investments in the agricultural sector. Poultry production involves several stages before poultry products reach consumers, including rearing these birds from hatch to peak performance and the subsequent harvesting and processing of broilers and eggs. Therefore, converting broilers to meat products requires several processing steps before retail. Therefore, adequate knowledge is vital in all poultry meat and egg production phases. Poultry production has been a feature of human society for thousands of years. Production management must be tailored to the education system to ensure that it continues to make positive and sustainable contributions to stable human society. Smallholder poultry production has a vital role in feeding the world and maximizing the benefits; it should be accompanied by technological tools and simulation programs highlighting the relevant phases in poultry production.

Innovative farming technologies are becoming increasingly common in modern agriculture to assist in optimizing agricultural and livestock production and minimize waste and costs (Monteiro et al., 2021). The smart poultry hub's chicken growth simulator is designed for younger students and demonstrates the growth curve of broilers when temperature, lighting, and crude protein are considered. The smart simulator exercise equips the learner with farming skills to set the optimum conditions to get the healthiest and most efficient chicken. Chickens need the right amount of light and protein at an optimum temperature. The software exposes the most efficient strategy for growing the best chicken. The software design allows learners to choose the age of their chicken and then choose the lighting, temperature, and % crude protein, thus, giving them the skills to manage a poultry farm effectively. The chicken growth simulator is an app where students can see the effects of lighting, temperature, and crude protein on a particular broiler age. The student can change the variables and see their effect on both live and carcass weight. Students can also see the cost of producing that particular bird.

Many students growing up in urban and rural areas of River State have limited contact with and knowledge of poultry production and management systems. Education can be essential in students' understanding of poultry farming and animal welfare issues. This study aims to examine the effect of the chicken growth simulator on students' interest in poultry farming. Consequently, the study hypothesized as follows:

***Hypothesis:*** Chicken growth simulation software would influence students' interest in poultry production.

### Method

The research population comprises secondary school students from Omoku in River State, Nigeria. Participants were male and female high school seniors from five public and private secondary schools in the area. Two hundred and fifteen students who satisfied the inclusion requirements (such as being enrolled in the senior class and having participated in agricultural activities) were pooled from their respective schools with the assistance of school teachers and administrators between December 2022 and February 2023. Before the commencement of the study, the students were prepped and informed of its aim. In particular, all ethical issues were considered.

### Procedure

The schools were categorized into sch1 – sch5, and authorization was received from the school authorities. In particular, the respondents were assembled in a controlled laboratory setting within their school premises. They were briefly exposed to a simulation laboratory concept using the chicken simulation software. The activity lasted three days in each of the schools. However, three days gap was given after they witnessed the simulation practice before they were made to respond to a self-report measure assessing their intention to participate in real-life poultry production. The 215 participants were given the questionnaire to complete on the spot. Intention to engage in poultry production was rated on a 10-item Linkert form scale with 5-point ratings ranging from 1 (not likable) to 5 (likable). The scale was validated following a pilot study,

and a Cronbach alpha .78 reliability coefficient was obtained. A higher score indicates a high intention to engage in poultry production**.** Upon inspection of the returned questionnaires, 209 were correctly completed, while six were incorrectly completed. Thus, the 209 correctly completed forms were used for statistical analysis.

**Result**

The primary assumption of the study is that the chicken growth simulation software would exacerbate engagement in poultry production. The data from 209 respondents, 15.8% (sch1), 16.3% (sch2), 21.4% (sch3), 19.5% (sch4), and 27% (sch5), were computed using a simple linear regression model.

**Table 1:** shows the regression analysis of the result.

| | B | SEB | β | t | $R^2$ | Sig |
|---|---|---|---|---|---|---|
| Constant | 3.45 | .013 | 26.49 | .298 | .000 | |
| CGSS | .35 | .016 | .15 | .2.15 | | .000 |

*CGSS = chicken growth simulator software*

The result established a statistically significant effect of chicken growth simulation software on the respondent's intention to engage in poultry production at F (1,207), 4.60 P< .05 with adjusted $R^2$ indicating that the chicken growth simulation software contributed about 29.8% of the variance in student's intention to engage in poultry farming.

**Discussion**

The present study examined chicken simulation software as a tool that could influence students' preparedness to engage in poultry production. Two hundred and nine senior secondary school students enrolled in science and art classes with exposure to the agricultural system participated in the study. The regression analysis revealed that chicken simulation software statistically significantly predicted engagement in poultry farming among the respondents F (1,207), 4.60 P< .05. Thus, the finding suggests that the students exposed to chicken simulation software are likelier to engage more in poultry-related activities than others. Most importantly, the result indicated that exposure to the simulation tool explained about 29.8% of the differences in students' intention to engage in poultry farming. The possible explanation for this current outcome might be attributed to the easiness associated with the software. For example, Chickens require the proper amount of light and nutrition at the right temperature. The software reveals the most effective technique for raising the best chicken. The software's architecture allows users to select the age of their chicken, as well as the lighting, temperature, and percentage of crude protein. As a result, they will be able to run a poultry farm properly.

Indeed, the result supports previous findings, which applauded the use of simulation tools in farming (Basche et al., 2021; Fernandes Junior & Pinto, 2022; Hawkins et al., 2019; Woodward et al., 2008). Similarly, research in new educational technologies has suggested more simulation techniques in education due to their learning effectiveness compared to conventional teaching (Boostel et al., 2021; Budi et al., 2021; Egara et al., 2022; Shanbari & Issa, 2019; Suwarni & Budiprayitno, 2019; Talli et al., 2022). The fact that computer simulation offered a virtual interface and feedback on the poultry concept may have contributed to its attractiveness. Users can interact with computer simulations, which minimizes the rigorous examination of the poultry environment. Simulation activates experimental awareness and will enable students to visualize, explore and formulate explanations in poultry management that were otherwise impossible to understand and comprehend in the physical poultry farm. This implies that computer simulation improves students' willingness more when compared with the traditional method. Similarly, the result indicates that students who experience simulation exercises in relation to poultry management are more suitable to acquire a positive attitude toward poultry production. Thus, the chicken simulation might potentiate curiosity in livestock farming and probably instigate efficiency in poultry management and development in agribusiness.

**Limitations, strengths, and future directions**

Because the study did not adopt an experimental approach, it becomes difficult to establish the cause-effect relationship of the variables. More so, the self-reported intention to engage in poultry production might trigger biases constraining the generalization of the finding. Despite the practical limitations, the present study contributes to the literature by identifying chicken simulation modeling as a positive predictor of students' engagement in poultry farming. Thus, the result broadens our knowledge about the positive impact of technological innovation relative to agricultural education. Future researchers should utilize experimental methods to identify cause-effects and adopt multiple data collection approaches.

**Conclusion**

This study presents the first evaluation of a technology-based simulated poultry management education intervention for school students, demonstrating the benefits of incorporating chicken simulation software into poultry farming and animal welfare education. The findings will inform future practices around poultry farming and management education interventions for secondary school students. Technologies like chicken simulation software must be integrated into teaching young students agricultural productions. Simulation technologies have been applied for some years in various educational contexts. In the present study, the researcher hopes that this app will provide teachers with an additional tool to teach young learners the growth of chickens and how to control variables associated with sustainability poultry

management. Advantages claimed for the practice are lessening the risk of disease spread in livestock, reduction in sterility and increase in fertility, facilitation of improvement in quality, and economy in livestock management.

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