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Improving thermal confort of young chicks brooding by introducing fire wall brooding technology system

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Abstract
Abstract owing to the unavailability of electric power it is difficult to adopt electric brooders by the African rural household poultry producers. Application of fire wall brooding technology for brooding chicks can solve the problem efficiently. The fire wall is heated by inserting the burning material such as wood, dry grass, charcoal from inlet to the fire wall, the brooding house will get warm through fire wall transmitting heat and the room temperature can reach 36 ºC, check the fire wall and make fire before day old chicks get in to make the room get ideal temperature and without smoke from fire wall. In this experiment, the chicks house is 7 m long and 4 m width, while the fire wall was 3.6 m length, 0.8 m width 1.5 m height and the chimney is 2.5 m height, internal diameter is 20 cm, the outside inlet size is 40cm width and 55 cm height. The site is located at the middle of the back wall. The brooding house maintained a temperature range of 34-36 ℃ during the days of brooding. The indication is that Fire wall system could be a good temperature moderating device in poultry brooding houses. Test using broiler chicks showed average body weight of 320 grams, and o% mortality rate at the end of session of three weeks.

Keywords: Fire wall technology, chick brooding, poultry house

1. Introduction

1.1 Background: Poultry production is one of the key livestock subsectors of Ethiopia focused on producing meat and eggs for consumption. In Ethiopia, the activity has attracted attention, and investments, due to its economic and social role, aligned with the continuously increasing country demand for chicken meat and eggs.

Artificial chick brooders are devices or setups used to provide a warm and controlled environment for newly hatched chicks. These brooders typically consist of a heat source, such as a heat lamp or heating pad, to maintain the appropriate temperature for the chicks. The brooder also provides protection from drafts and predators, as well as access to food and water for the chicks. Artificial chick brooders are commonly used in poultry farming to ensure the health and well-being of young chicks during their early stages of development.

There are several artificial chick brooders of every conceivable type and size, heated by oil, coal, wood, water gas and electricity. Unlike most small animals, baby chicks are unable to live for any length of time without an additional source of heat other than their own bodies. Chick brooding refers to the early periods of growth (0 to 8 weeks) when young chicks are unable to maintain their normal body temperature without the aid of supplementary heat.

Owing to the unavailability of electric power, it is difficult to adopt electric brooders by the poultry producers. Application of fire wall technology can solve the problem efficiently. The fire wall is heated by inserting the burning material such as wood, dry grass, charcoal from inlet to the fire wall, the brooding house will get warm through fire wall transmitting heat and the room temperature can reach 38 ºC, check the fire wall and make fire before day old chicks get in to make the room get ideal temperature and without smoke from fire wall (Xiangli and Roro, 2020) [8].

Brooding work is the most important and carefully works in poultry production, reasonable and comfortable environment is the guarantee of getting good production performance and temperature is the most critical environment factors, the variation towards higher or lower side leads to more mortality or slower growth. In Holeta and its surrounding area, the air temperature is about 8 ℃ to 35 ℃ daily, especially at night time the room temperature is very low. At the same time the electric power supply is unstable.

Under this kind of situation it's very difficult for day old chicks to survive without additional heat supply. This condition limited the development of poultry production seriously, especially for chick producer of small and micro enterprise in the area.

To solve this problem it's proved by fact that Fire wall Technology can solve this difficulty successfully and supply warmth for brooding chicks whether the power supply is available or not. In this case study, a fire wall is established to create good and reasonable brooding environment for brooding chicks.

1.2. Problem Statement

In traditional poultry farming practices, providing a suitable and controlled environment for newly hatched chicks is essential for their health and development. However, the reliance on natural heat sources or rudimentary brooding methods may result in inconsistent temperatures, inadequate protection from predators, and limited access to food and water. This can lead to high mortality rates, decreased growth rates, and overall poor performance of the chicks. Therefore, there is a need for an efficient and reliable artificial chick brooder system that can maintain optimal temperature levels, ensure proper ventilation, offer protection, and facilitate easy access to essential resources for the chicks' well-being and growth.

To solve this problem it's proved by fact that Fire wall Technology can solve this difficulty successfully and supply warmth for brooding chicks whether the power supply is available or not., The researcher was try to tackle problems of heat source faced by the small and micro enterprise/any chick producer by using new innovated technology of fire wall brooding.

1.3. Research question

1. What extent fire wall technology improves the thermal comfort of chick?
2. How is other related parameter manage when fire wall system technology implement in chick house?

1.4. Objectives

The general objective of firewall chick brooding technology is to provide a safe and controlled environment for newly hatched chicks to ensure their health, growth, and development.

Specific objective

- To measuring of fire wall design system.
- To measuring feed intake of young chick under this system.
- To measuring growth rate of young chick under this system.
- To measuring mortality rate of young chick under this system.

1.5. Research Significances

There are at least three significance contributions gained from this study. They are as follows:

1. The poultry producer

The poultry producer improve the skill of chick rearing process by choosing fire wall system technology as heat source

2. The researcher

The researcher gets invaluable experience which can be used to improve poultry production and provide information also starting point for other researcher in improving the other technique in helping poultry producer. The researcher will prepare himself for action research competition at national level.

Chapter II

2. Literature Review

2.1. Brooding Temperature: One of the critical requirements of successful chick brooding is regulation of brooding temperature and provision of adequate space. As chicks grow and mature, the need for supplemental heat is less important whereas, the need for adequate space becomes critical. Generally there is no agreement among poultry men as to the exact brooding temperature of baby chicks, just transferred from an incubator. The initial brooding temperature below the hover should be 35 °C at 5 cm from the floor and this initial brooding temperature should be reduced by approximately 3 °C per week until 21 °C is reached (Amanda, 2007).

Maintaining the correct temperature is critical in chick brooding, especially during the first two weeks of the chick's life. Early in life, the chick is poorly equipped to regulate its metabolic processes to adequately control its body temperature. As a result, the young chick is dependent on environmental temperature to maintain optimal body temperature. If the room temperature decreases, the chick's body temperature will decrease.

Likewise, if room temperature increases, the chick's body temperature will increase. Chilling or overheating during this crucial period can result in poor growth, feed conversion and increased susceptibility to disease. Proper brooding practices must maintain the chick's body temperature so that it does not have to use energy to lose heat by panting or generate heat through metabolism (Brian Fairchild, 2012).

2.2. Charcoal Brooder

In this brooder charcoal is used as heat source which applicable to remote & rural areas. Charcoal brooder is widely used since it is easily available & has low cost. In the economic sense charcoal is very efficient fuel. It burns easily & for longer period Along with such benefits it carries some disadvantages that are; it creates smoke in high quantity which is harmful to chicken's health. In rainy season there is higher possibility that charcoal may get wait due to rain so proper care of storage is needed. Charcoal takes some time for initial heating (Akshay Sable *et al.*, 2018).

2.3. Temperature and Chick Physiology

Maintaining the correct temperature is critical in chick brooding, especially during the first two weeks of the chick's life. Early in life, the chick is poorly equipped to regulate its metabolic processes to adequately control its body temperature. As a result, the young chick is dependent on environmental temperature to maintain optimal body temperature. If the room temperature decreases, the chick's body temperature will decrease

Proper brooding practices must maintain the chick's body temperature so that it does not have to use energy to lose heat by panting or generate heat through metabolism.

Research has shown that the chick develops the ability to regulate its body temperature around 12 to 14 days of age. The chick can be easily stressed if its body temperature decreases or increases by as much as one degree. Once the body temperature changes the bird will try to compensate and in most cases this means that it will have a negative effect on performance. The body temperature of a day-old chick is approximately 103 degrees F (39 degrees C), but by about five days of age body temperature is 106 degrees F (41.1 degrees C), the same as the adult. Extreme temperatures (high or low) often result in chick mortality, but even mild chilling or overheating can affect the performance of young chicks without causing death. While chicks are more tolerant of high temperatures than adult birds, high temperatures for extended periods of time increase mortality and have negative impact on performance.

2.4. Temperature and Chick Performance

One of the goals during brooding is to maintain chicks within their comfort zone, which is where they are not using energy to gain or lose heat to maintain body temperature. When birds are kept in environmental temperatures above or below their comfort zone, more energy must be expended to maintain body temperature. This extra energy will ultimately be supplied by the feed consumed. Therefore, the energy from the feed will be used to maintain body temperature instead of growth and development resulting in poorer feed conversion. Thus, the environmental temperature plays a major role in determining the cost of producing a pound of meat or a started pullet. Proper brooding not only consists of maintaining proper temperature but also the use of good husbandry practices. Brooding temperatures will vary depending on whether the heat source is air furnace, conventional brooder or radiant brooder (Brian Fairchild, 2012).

2.5. Conceptual Framework

The fire wall brooder, technology can utilize some local materials such as charcoal, wood, dry grass, wood branch and the burning material to supply heat through the fire wall. The wall is hollow and the waste burning material is filled inside. The fire wall has an entrance inlet from which the burning material is insert to the wall together with a concrete board for cover the inlet, and a smoke channel installed at the closed end of the wall which reach out from the roof of the chick house used to release the smoke outside. This heat system can be used to supply temperature for 0-3 week's chicks brooding.

The brooding house will get warm through fire wall transmitting heat and raise the room temperature to 38 ºC. Normally for the first 3 days, the brooding room temperature must be keep 33-35 ºC, as chicks grow they need less heat, thus brooding room temperature are reduced about 1 ºC each two days (2-3 ºC reduction for each week) until the temperature reaches 21-24 ºC, the temperature can be reduced slightly by reducing the amount of burning material inside the fire wall and the times of fire. Under reasonable and comfortable temperature, the chicks will be evenly spaced around the brooding and will make soft "cheeping" sounds, and actively feeding and drinking

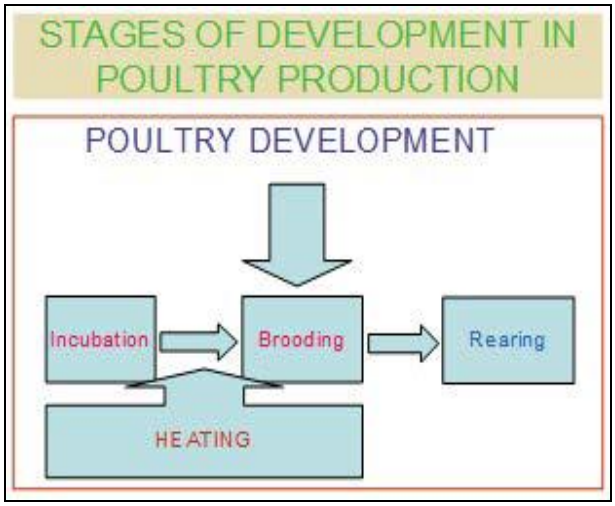
Chapter III

3. Research Methodology

3.1. Theorical Consideration: Poultry production requires the provision of heat in an enclosed environment in order to keep the body temperature of the poultry within a comfort zone. The reason is that the poultry perform maximally under this condition without the adverse effect of environmental change in climate. Of the three major stages in poultry development namely egg incubation, day old chicks brooding and rearing of chicks, only egg incubation and day old chicks brooding operations need heating. Brooding day old chicks needs between 4-6 weeks for a complete operation.

Brooding system with evenly distributed temperature regime of between 26 °C-35 °C has considerable merit for a successful operation depending on the age of the chicks. This enables wider distribution of birds in environmentally suitable areas with more space available for the chicks. This improves growth and reduces the likelihood of disease outbreak by chicks clustering in one end due to non-uniformity of temperature leveling.

To ensure even spread of chicks in a brooding house, the room temperature is very important and must be within a range. A temperature range of 32 °C to 35 °C could be a good reference point.



3.2. Fire wall design

Heat the fire wall by inserting amount burning material such as wood, dry grass, charcoal from inlet to the fire wall, fire the material the brooding house will get warm through fire wall transmiting heat.it can make the room temperature reach 36 °C, check the fire wall and make fire before day old chicks get in, get experience about how much amount burning material needed to insert can make the room get ideal temperature. And whether there is smoke run out from fire wall.

Normally for the first 3 days, the brooding room temperature must be keep 33-35 °C, as chicks grow they need less heat, thus brooding room temperature are reduced about 1 °C each two days (2-3 °C reduction for each week) until the temperature reaches 21-24 °C, the temperature can be reduced slightly by reduce some amount of burning material inside the fire wall and the times of fire.

3.3. Operation process

First design draft, you have to think about the site and the size of the fire wall that you want to build according to the space of the chick brooding house. for example in brooding house size of the chicks house is 7 m long and 4 m width, we design the fire wall 3.6 m length, 0.8 m width 1.5 m height the chimney is 2.5 m height, internal diameter is

2ocm the outside inlet size is 40 cm width 55 cm height the site is located at the middle of the back wall. See Figure 1.

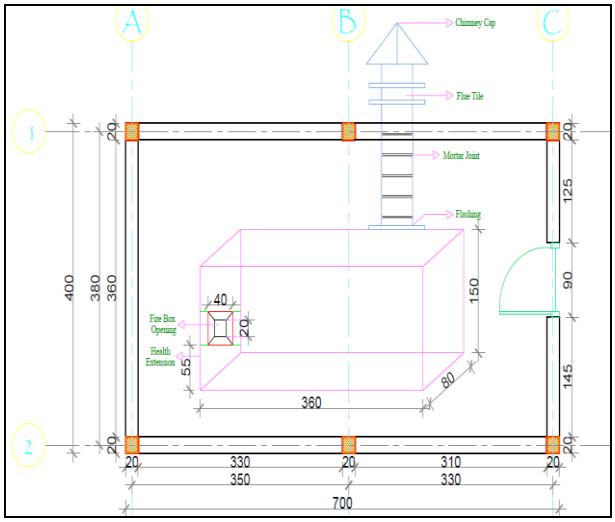


Fig 1: Fire wall design

3.4. Research method: Qualitative and quantitative

3.4.1. Data Collection Instrument and Technique

In this action research, the data which are collected by the researcher are using qualitative and quantitative method. The data in the form of qualitative method are got from the observation done by the researcher about the whole activities. The observation will do by making notes about the activities during the research process. Besides that, the observation is also supported by taking a photograph during the process and the interviews will do after the process. Data will collect on growth performance parameters to achieve the objectives of the study.

3.4.2. Research Method

Physical and biological performance evaluations was conducted. The physical performance evaluation involved the testing of the long-term thermal effect measured as temperature of the brooding house and the fire wall using thermostat located at strategic positions. The temperatures was obtained in degree centigrade at one hour intervals through the day. Solar radiation and wind data for the period will be obtained from the meteorology Department of the Holeta research center.

The biological performance evaluation involves the use of 150 broiler day-old chicks per batch for the brooding operation to test the efficiency of the brooder house. The chicks will be procure from a reputable hatchery and lasted for five weeks brooding period. The chicks are fed continuously (ad libitum) with commercially made broiler starter feed for the three (3) weeks period. Good drinking water was given to the chicks throughout the period while disease preventive measures will take as prescribed by veterinary personnel. The chicks are weighed at every four-day intervals and also will be measure the average body weight, rate of feed consumption and feed conversion ratio of the chicks.

3.4.3. Research location

The action research will be conduct at Brooding house of Holeta town of selected small and micro enterprise which is located in West Showa Zone, Oromia Region 29km far from the main city of the count at Latitude/longitude) of 9º 00’ N and 38º30’ E and an Altitude 2400 M.A.S.L. The study area receives a mean annual rainfall of about 1144 mm. The Temperature (Min / Max) is 6 ºC and 22 ºC respectively (Holeta Agricultural Research Center, http://www.eiar.gov.et/holeta). This research will conduct within 45days of brooding period. Based on having brooding house which is suitable for construction of fire wall and having poultry production back ground two small and micro enterprise will be purposely selected.

3.5. Research procedure

Action research is a systematic process of inquiry that involves Cycles:

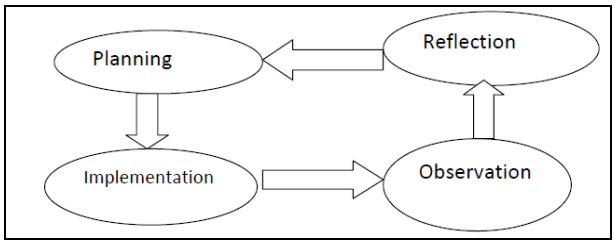


Table 1: Procedure and Activities of Intervention

Focus high mortality rate of chicks due to low temperature and low growth rate of chick						
S/N	**What**	**Who**	**When**	**Where**	**How**	**Why**
1.	Preparation of Plan	Researcher	December. 2023	At Selected SME		
2.	Implementation of Action Plan	Researcher	Dec. 2023	At Selected SME		Monitoring Thermal Comfort
3.	Data collection	Researcher	December. 2023	At Selected SME	Recording, Observation	To Analysis
4.	Report writing	Researcher	Nov, 2023	At Holeta PTC	Using Internet and Computer	Reflection

3.5.1Methods of data analysis

3.5.1.1. Data Analysis Technique

Analyzing the weekly chick body weight gain and feed intake is important for monitoring the growth and development of the chicks and ensuring they are receiving adequate nutrition. Here is a general guideline for analyzing the data: To calculate the average weekly body weight gain, subtract the initial body weight from the final body weight at the end of each week. Then, divide this difference by the number of days in that week to get the average daily weight gain. You can then multiply this by 7 to get the average weekly weight gain.

Monitor feed intake: Keep track of the amount of feed consumed by the chicks on a weekly basis. This was help to determine if they are eating enough to support their growth. Compare the feed intake with the expected feed consumption for their age and breed to ensure they are getting adequate nutrition. To calculate the feed conversion ratio (FCR), divide the total amount of feed consumed by the total weight gain over a specific period. A lower FCR indicates more efficient feed utilization by the chicks. Based on the analysis of body weight gain and feed intake, you may need to adjust the feeding program by increasing or

decreasing the amount of feed offered to ensure optimal growth and development of the chicks.

Ethical issues

The ethical issues related to fire wall chick brooding technology may include:

1. Animal welfare: Ensuring the well-being and humane treatment of the chicks involved in the research is paramount. Researchers must take steps to minimize any potential harm or distress to the animals during the experimentation process.
2. Environmental impact: The environmental implications of using fire wall chick brooding technology, such as energy consumption and carbon emissions, should be carefully considered. Researchers should strive to minimize the environmental impact of their research activities.
3. Informed consent: Obtaining informed consent from all stakeholders involved in the research, including farmers, researchers, and other parties impacted by the technology, is essential. Transparency about the purpose, methods, and potential risks of the research is crucial.
4. Conflict of interest: Researchers should disclose and manage any potential conflicts of interest that may arise during the research, such as financial interests in the technology or relationships with industry partners. Maintaining objectivity and impartiality in the research process is key. By addressing these ethical issues thoughtfully and responsibly, researchers can conduct fire wall chick brooding technology action research in an ethical and socially responsible manner.

Chapter IV

4. Research findings and Discussion

The aim of researching could be to explore the potential benefits and effectiveness of this method in providing heat and maintaining optimal temperature levels for the chicks. By using a fire wall as a source of heat, researchers may investigate its ability to evenly distribute warmth, reduce energy costs, and potentially improve the overall efficiency of the brooding process. Additionally, studying the impact of a fire wall on humidity levels, air quality, and disease prevention in the brooding environment could also be a focus of the research.

4.1. Research Findings

This section shows the findings of the research. The findings are taken from the situation prior to the research, implementation of the research and result of the research**.**

1. Situation Prior to the Research

In conducting the research, we worked collaboratively with the one of model SME chick producer namely TATAK and their friends. Before conducting the research, we told them that we would conduct an action research. We shared the Action Research knowledge with TATAK and their friends. TATAK and their friends were interested in it since they wanted to know the chick raising improvement through the research.

To know the situation prior the research, we did an observation, interviewed the enterprise. The situation prior to the research can be seen in Table 4, 1

Table 2: Situation Prior to the Research

Problem identified	High mortality rate of chicks due to low temperature and low growth rate of chick
Indicators	High mortality rate of chicks due to low temperature and low growth rate of chick Handle to gather Daily feed intake was low Feed left over was high Non uniformity was observed Mortality rate was high
Causes	Brooding environment temperature was not monitored Electric light did not fulfill the temperature requirement of chick Electric light instability was observed

As seen in Table 4.1, the high mortality rate and low growth rate of problems came from 1. Low brooding environment temperature 2. Electric light instability

The observation and interview result in the pre-research showed that the enterprise use charcoal and sometimes heated water as heat source which is labor intensive and had cost implication.

Based on those problems emerged because some cases we decided to create fire wall brooding technology in order to improve the thermal comfort of chick

Conducting a comprehensive physical evaluation of chicks raised under fire wall chick brooding technology, producers can gain valuable insights into the impact of this technology on chick health, development, and performance. Monitoring key physical indicators can help ensure that chicks are thriving in the brooding environment and support successful poultry production outcomes

1. **The first finding is improved heat distribution:** Researchers may find that the fire wall technology provides more even and consistent heat distribution throughout the brooding area, which can help create a comfortable and stable environment for the chicks.
2. **The second finding is Energy efficiency:** Studies may show that using a fire wall as a source of heat for chick brooding can be more energy-efficient compared to traditional heating methods, potentially leading to cost savings for poultry farmers.
3. **The third finding, reduced risk of hot spots:** By utilizing a fire wall for heat, researchers may discover that the risk of hot spots in the brooding area is minimized, which can help prevent overheating and improve overall chick health and welfare.
4. **The fourth findings, Enhanced disease prevention:** Research could reveal that the use of a fire wall technology in chick brooding may contribute to better air quality and reduced humidity levels, creating a less favorable environment for pathogens and bacteria,

ultimately leading to lower disease incidence among the chicks.

5. The fifth findings, Growth and development benefits: Findings might suggest that chicks raised in a brooding environment with a fire wall technology experience improved growth rates, better feed conversion efficiency, and overall enhanced development compared to those raised using conventional heating methods

Overall performance and success: Research outcomes could indicate that utilizing fire wall technology for chick brooding results in improved performance metrics, such as higher survival rates, lower mortality rates, and better overall success in poultry farming operations. These research findings could provide valuable insights into the potential benefits and effectiveness of using fire wall technology for chick brooding, offering practical implications for poultry farmers looking to optimize their brooding practices and improve the health and well-being of their chicks.

2. Research Implementation

After knowing the situation prior to the research, we did the research implementation. We implemented the action by introducing fire wall technology and we observed the Physical and biological performance evaluations

This introduction of fire wall technology action research covered one cycles which consisted four steps include: 1.) planning the action, 2.) implementing the action, 3.) observing the action, 4.) reflecting the observation result.

The summary of the research implementation can be seen in table 4.2. It was undertaken from October, 1-October 21days.

Table 3: Summary of Research Implementation

Problem Identified	**High mortality rate of chicks due to low temperature and low growth rate of chick**
Proposed Solution	Introduction of fire wall brooding technology
Enterprise used for Action research	TATAK and their friends having (5 members)
Cycle	2 cycles
Implementation	Different discussion
Planning	We preparing fire wall construction material and construct as per design standard
Action	Placing and arranging waterer and Federer in the brooding house Preparation of burning materials Arranging bedding material in the brooding house placing of chick in brooding house placing of thermostat at diffident corner of brooding house
Observation	The observation result: The chicks more focused on feeding and watering Normal distribution of chicks in the brooding house was observed Chicks are grown at uniform manner
Reflection	The reflection were: Chick growth rate was recorded uniformly The chicks were show good watering and feeding behavior Even though external temperature was fluctuated the thermal requirement of chick were monitored No Mortality rate Normal feed conversion efficiency was observed Normal body weight gain was recorded

5. Result and Discussion

To determine the efficiency of the poultry brooding house 150 day old broiler chicks per batch was used to evaluate the house at three replicates. Measurements were taken at for four (4) days intervals and these lasted for four weeks (28 days) per batch of brooding session. Figures 7 and 8 showed the body weight and cumulative feed consumption and, average weight gain and feed consumption versus age.

At the end of four weeks brooding period an average body weight of 0.786 kg was observed from initial body weight of 0.052 kg while cumulative feed consumed within the same period was 1.24 kg when the average weight gain was 0,184 kg at 0.318 kg average feed rate consumption per chick.

The fire wall brooding system showed better thermal load levelling. Observation showed that the body weight increased with increase in the amount of feed consumed per period. For the first eight days the average body weight was higher than the cumulative feed. However, the trend changed towards the end of brooding session. This was attributed to the fact that chicks consume more feed as they grow older than the rate at which feed is converted to flesh. Feed conversion rate decrease at old age. Better feed conversion ratio was observed between the 8th and 16th day of the brooding operation at 1.35 and 1.42 respectively than 2.6 at the first 4 days and 8 days (Figure 9). At this period chicks make better use of feed consumed. At the end of the performance evaluation the system showed high efficiency with non-mortality rate

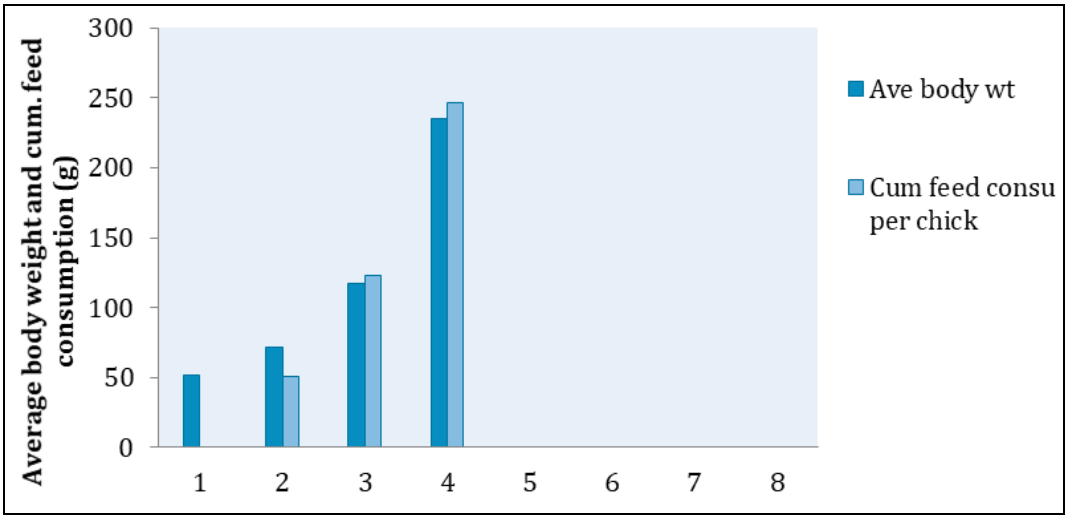


Fig 2: Average body weight and cumulative feed consumption versus time (days)

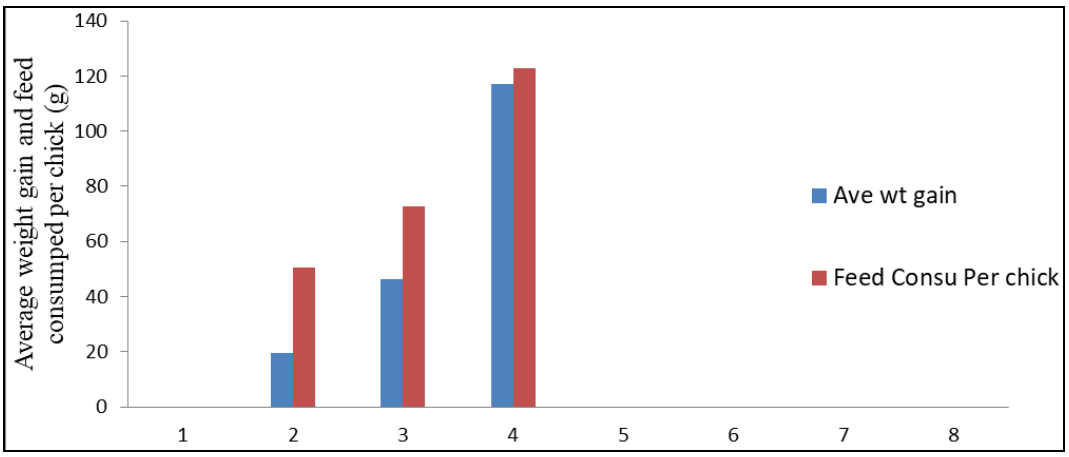


Fig 3: Average weight gain and feed consumed per chick versus time (days)

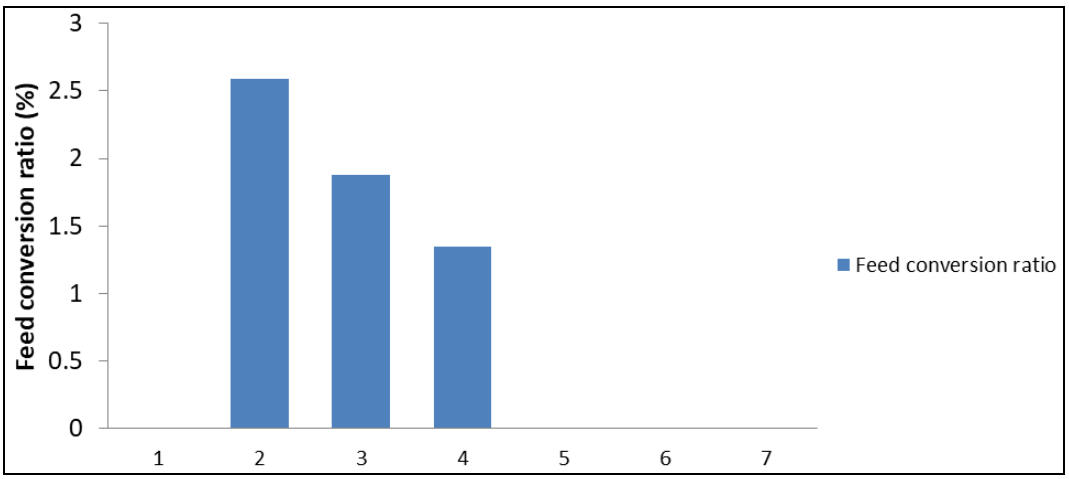


Fig 4: Feed conversion ratio versus age of chicks (days)

1. Biological performance evaluation: By conducting a comprehensive biological performance evaluation that considers these key factors, researchers can gain a better understanding of how fire wall brooding technology affects the biological performance of chicks and make informed decisions about its potential benefits and drawbacks in poultry production. The performance data was gathered for a four week performance evaluation of the poultry brooder house, covering the period October, 1, 2023 - Oct 21, 2023.

Table 4. Historical Data obtained for October 2020 in Holeta, Ethiopia

Table 5.2 shows the Daily observations temperature at day time and night time of the fire wall brooder house. While the fire wall brooder temperature profiles ranged between 24-35 °C at day time for 21 days at day time and. The Daily observations temperature profiles are shown in table 5. The minimum and maximum fire wall temperatures at night were 13 °C and 28.5 °C respectively.

Maintain acceptable temperature level for young chick brooding operation irrespective of the season. The overall rate of change in the brooder temperature against the outdoor temperature suggests the moderating effects of fire wall massive for the poultry brooding house. The temperature spread in the brooding room was good enough for chicks' brooding at least for the first four weeks

Table 4: Historical Data for October 2020 in Holeta, Ethiopia

Temperature	Max	Average	Min
Max Temperature	20.5 °C (68.9°F)	19.63 °C (67.33°F)	17.27 °C (63.09°F)
Average Temperature	17.27 °C (63.09°F)	16.05 °C (60.89°F)	15.11 °C (59.2°F)
Min Temperature	12.95 °C (55.31°F)	9.71 °C (49.48°F)	7.55 °C (45.59°F)

Table 5: Weekly observations

Time	Temperature at day	Temperature at day
Oct,1,-7, 2023	34-36 ℃	27-30 ℃
Oct,8,-15,2023	27-34 ℃	12-20 ℃
Oct,16-21,2023	23-30 ℃	20-24 ℃

Biological performance evaluation: one brooding operations were conducted in October. 2023. Fig. 2 showed a batch of broiler: fire Wall System for Poultry Brooding.

6. Conclusion and Suggestion

The action research of a Fire wall technology chick brooding house has been presented Results of work showed that brooding temperature range between 34-36 °C temperature could be maintained in the brooder house under ambient. Biological evaluation using chicks showed no mortality rate, indicating 100% efficiency. The above results indicate the ability of fire wall system in moderating the temperature fluctuations within poultry house. It further suggests that fire wall could collect/store enough heat for day old chick brooding purposes in the tropics.

I t is proved that the fire wall can supply the temperature for the brooding room and keep the warmth for a long time especially in the cold night time, it can keep the room temperature reach up to 38 ℃ as you want, The ideal burning material is wood, the advantage of the material is less smoke more heat the fire wall can supply ideal temperature which can meet the need of chicks growth.it can solve the temperature difficulty in Holeta, Oromia where electric power is not normal, this technology can be used in all kinds of animals

Suggestion

After concluding the result of the research, the researcher would like to propose some suggestion to the following:

After completed building fire wall: 1. watering the wall 2. Check the function of the fire wall before using pay attention to whether the smoke run out of the fire wall.3. Be careful the wall crack because of high temperature.

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