UNIVERSITI TEKNIKAL MALAYSIA MELAKA

THE DESIGN OF PORTABLE HEXAGON CHICKEN BROODER THAT PROVIDE BEST THERMAL COMFORT FOR THE CHICKS

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of mechanical Engineering Technology (Refrigeration and Air-Conditioning System) (Hons.)

By

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2015

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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TAJUK: **The Design Of Portable Hexagon Chicken Brooder That Provide Best Thermal Comfort For The Chicks.**

SESI PENGAJIAN: **2015/2016 Semester 1**

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I hereby, declared this report entitled “The Design of Portable Hexagon Chicken Brooder That Provide Best Thermal Comfort For The Chicks” is the results of my own research except as cited in references.

Signature **:……**

Name **: MUHAMAD FADHIL BIN JAMLUDIN**

Date **:**

APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of mechanical Engineering Technology (Refrigeration and Air-Conditioning System) (Hons.). The member of the supervisory is as follow:

…….

(Project Supervisor)

ABSTRACT

Chicken brooder is the place for the young chicks live for early periods of growth, when their normal body temperature cannot be maintained by its own body. Unique from most other animals, chicks are unable to live for any long time of periods because it dependent on others heat source to maintain optimal body temperature. There are several type of heating system used in chicken brooder or poultry houses which are force air furnace, natural brooder, radiant brooder, radiant tube heaters, high intensity radiant heaters and "alternative"heating systems. Moreover, the design of the brooder before cannot provide best thermal comfort for the baby chicks. The purpose of this study is to design portable hexagon chicken brooder that can provide best thermal comfort for the chicks. To achieve the objective and solving the problem before, different type of materials use. Other than that, the brightness of the lamp also can be control so that, the temperature of the chicken brooder can be controlled. Besides that, the behaviour of the chicks captured using digital camera so that, we can know whether baby chicks feel comfort or not. Lastly, it is expected that this design of the portable chicken brooder can provide best thermal comfort for the chicks.

ABSTRAK

"*Chicken brooder*" merupakan tempat untuk anak ayam yang baru dilahirkan dalam lingkungan (1-14 hari) apabila anak ayam tidak mampu untuk mengekalkan suhu yang diperlukan. Anak ayam merupakan binatang yang sangat unik daripada binatang-binatang lain kerana anak ayam tidak boleh hidup dalam jangka masa yang panjang jika anak ayam tidak dapat suhu yang diperlukan kerana anak ayam bergantung pada sumber haba yang lain untuk mengekalkan suhu badan yang optimum. Terdapat beberapa jenis sistem pemanasan yang digunakan untuk "chicken brooder" atau "poultry house" iaitu ("force air furnace", "natural brooder", "radiant brooder", "radiant tube heater", "high intensity radiant heater", and "alternative heating"). Oleh sebab itu, reka bentuk untuk "brooder" yang ada di pasaran sekarang tidak mampu untuk memberikan keselesaan yang baik untuk anak ayam. Tujuan kajian ini dilakukan adalah untuk mereka bentuk "brooder" mudah alih yang boleh memberi keselesaan yang sempurna kepada anak ayam. Walaubagaimanapun, untuk mencapai objektif yang diinginkan pelbagai jenis bahan digunakan. Selain daripada itu, kecerahan lampu boleh diubah-ubah supaya suhu "brooder" boleh dikawal pada tahap yang diperlukan. Selain itu, pergerakan anak ayam dirakam menggunakan kamera digital supaya kita boleh tahu sama ada anak ayam berada dalam keaadaan selesa ataupun tidak. Akhir sekali, diharapkan agar "brooder house" ini dapat memberi keselesaan yang baik kepada anak ayam.

DEDICATIONS

Specially

To my beloved parent

To my kind brothers and sisters

To my kind lectures

And not forgetting to all friends

For their

Love, Sacrifice, Encouragements and Motivation

ACKNOWLEDGMENTS

Assalamualaikum Warahmatullah Wabarakatuh.

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My deepest thanks go to all lecturers who have taught me, directly or indirectly, for all these four years of studies. I will never forget all the precious knowledge learnt and gained insyaAllah.

To my beloved family, I would like to show my appreciation to them for the unwavering moral, emotional and financial support which they have given me consistently throughout my entire time spent in managing to complete this report.

Lastly, I want to thank my fellow friend and housemates who were there for me and also, for having the willingness to lend a helping hand in completing this project when I required certain assistance.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF SYMBOLS AND ABBREVIATIONS

Ft.	=	Feet
In	=	Inch
T	=	Temperature
H	=	humidity
UTeM	=	Universiti teknikal Malaysia melaka
℃	=	Degree celcius
%	=	Percent
PE	=	Polyethylene
PP	=	Polypropylene
PET	=	Polyethylene terephthalate
PS	=	polystyrene

CHAPTER 1
INTRODUCTION

1.0 Background

Chicken brooder is the place for the young chicks live for early periods of growth, when their normal body temperature cannot be maintained by its own body. Unique from most other animals, chicks are unable to live for any long time of periods because it dependent on others heat source to maintain optimal body temperature. There are several type of heating system used in chicken brooder or poultry houses which are force air furnace, natural brooder, radiant brooder, radiant tube heaters, high intensity radiant heaters and "alternative"heating systems. Under natural brooder, brooder hen rears her own chicks using its own quill and it continues to cultivate the chicks through providing the needed warmth and protection against predators. Radiant brooder refers to some type of heated source enclosure for bringing up the baby chicks. Radiant brooders include a heat source, feeders and waterers, and bedding. Besides that, forced air furnaces is the most simplistic heating system where 100% of heat produced is the form of very hot air, since the hot air is significantly lighter than the rest of the air in the brooders. Radiant tube heater use propane or natural gas act as the sources for the combustion that place near the ceiling of the chicken brooders. Forced air heater can be combined with radiant tube heater as the sources of heat for the brooders

1.1 Problem Statements

Nowadays, chicken brooder is growly develop by many researcher with several type of heating system. Due to the brooder, the thermal comfort of the chicks depends on the design, heat source, and material use. Therefore, the heat source will provide heat to maintain the temperature required for the chicks in the brooder.

Radiant brooders provide radiant heat and air heat that will provide thermal comfort for the chicks. Other than that, radiant brooder also cost effective for smaller design, easy to maintain and also the radiant heat directly warm the floor.

Therefore, based on the above statement the radiant brooders needed to be developed with the best type of material and design that capable to provide best thermal comfort for the chicks. All the consideration while develop this project will provide many advantages to the brooders. The improvement and novelty for the brooder will ensure that the brooder give best thermal comfort for the chicks

1.2 Objectives of Research

The objectives of this project are as follows:

Main Objective:

To design portable hexagon chicken brooder that give best thermal comfort for chicks.

Specific Objectives:

1. To measure the humidity level and temperature in the brooder using temperature and humidity sensor.
2. To identify the behavior of chicks at different temperature.
3. To correlate association between design of portable chicken brooder with some of parameters.

1.3 Scope of Research

By narrowing the needs for this project, a few guidelines are proposed to ensure that this project will achieve its objectives. The scopes covered for this project are:

i. Design hexagon brooder that use radiant heat.

ii. Measuring temperature and humidity level using temperature and humidity sensor.

iii. Identified the behavior of chicks at certain temperature by captured or recorded using digital camera.

CHAPTER 2
LITERATURE REVIEW

This chapter discusses about the articles related to this project. It is consists of the products that have been developed by institutions before this project. This chapter contains the theory and implementation of the components, equipment and programming language used in the previous project.

2.0 Introduction

Solomon Demeke (2012) stated that, chicken brooder is the place for the young chicks live for early periods of growth, when they are unable to maintain their normal body temperature. Other than that, Cora Cooke (1943) stated that brooder house must be capable on maintaining the desired brooding temperature under the different weather conditions. Besides, the place must be tightly constructed to prevent drafts, and must have floor that can be cleaned and disinfected readily. The lighting that is provided in the brooder must be necessary with the number of chicks so it will receive adequate light. There are several type of heating system used in the brooders or poultry house which are force air furnace, conventional brooder, radiant brooder, radiant tube heaters, high intensity radiant heaters and “alternative” heating systems.

2.1 Heat transfer

According to Chris Long and Naser Sayma (2009), energy may exist in two forms, such as heat or work. Heat is usually the level of thermal energy transferred over a good time frame interval. Heat is said to be transferred, when it crosses the boundary. It is said to be natural that heat always flows from high temperature to the

minimal temperature region.. The most importance to make heat to be transferred is temperature difference (gradient).

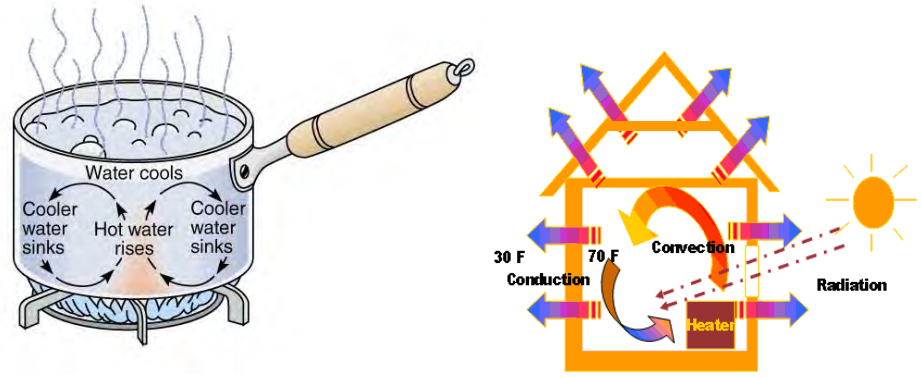


Figure 2.1: Heat transfer diagram (Chris Long and Naser Layma 2009).

Heat transfer is study on the rate at which heat is transfer, duration of heating or cooling for certain heat duty and surface area. Others, heat transfer also the thermal energy transport due to temperature different.

2.2 Modes of heat transfer

There are three fundamental type involving heat transfers which will be conduction, convection as well as radiation stated by Chris Long and Naser Layma (2009).

2.2.1 Conduction

Energy is actually transferred throughout the program boundary due to your temperature difference by the mechanism linked to intermolecular interactions. Conduction demands matter and does not demand any bulk of motion.

The rate of heat transfer per unit area is linearly proportional to the normal temperature gradient.

$$\frac{q}{A} \propto \frac{dT}{dx}$$

When the proportionality constant is inserted, then

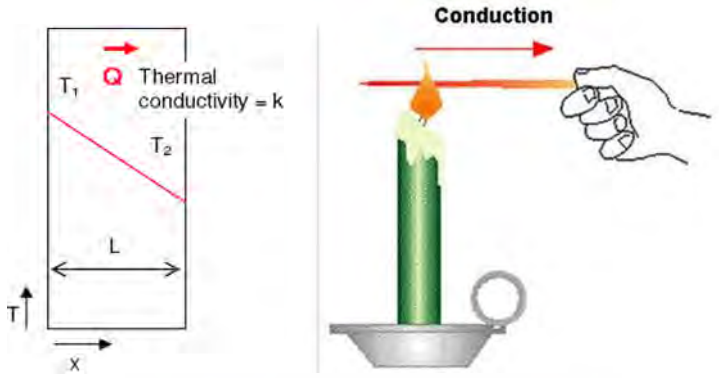
$$q_{con} = -kA\frac{dT}{dx} = -kA\frac{T_2 - T_1}{\Delta x}$$

q is the heat transfer rate (W)

k is a material **thermal conductivity** (w/m.K)

A is cross sectional area in the direction of heat flow (m^2)

dT/dx is the **temperature gradient** in direction of heat flow (K)



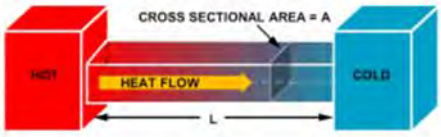


Figure 2.2: Diagram of conduction heat transfer (Chris Long and Naser Layma 2009).