EFFECT OF DIFFERENT LEVELS OF DHANIA *(CORIANDRUM SATIVUM)* IN THE PERFORMANCE OF BROILER

A THESIS

BY

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REGISTRATION NO. 1705036
SEMESTER: JULY-DECEMBER, 2018
SESSION: 2017-2018

MASTER OF SCIENCE (MS)
IN
POULTRY SCIENCE

DEPARTMENT OF DAIRY AND POULTRY SCIENCE
HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY UNIVERSITY, DINAJPUR - 5200

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Submitted to the
Department of Dairy and Poultry Science
Hajee Mohammad Danesh Science and Technology University, Dinajpur in partial fulfillment of the requirements for the degree of

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Approved as to style and content by

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DEPARTMENT OF DAIRY AND POULTRY SCIENCE
HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY UNIVERSITY, DINAJPUR - 5200

DECEMBER, 2018

Dedicated to
My
Beloved Parents

ACKNOWLEDGEMENT

The author express all praise due to the "Almighty Allah" who has created us to explore the hidden fact of the nature for the benefit of mankind and enabling the author to pursue his higher study and to submit his thesis for the degree of Master of Science in Poultry Science.

The author express his sincere appreciation, deep heartfelt gratitude and indebtedness to his reverend ***supervisor, Dr. Kamruzzaman, Assistant Professor,*** *Department of Dairy and Poultry Science, Hajee Mohammad Danesh Science & Technology University, Dinajpur for his scholarly guidance, supervision, inspiration, instruction, constructive criticism, valuable advice and untiring assistance in all phases of the research work, and as well as successful completion of the thesis.*

The author deeply indebted and sincerely grateful to his research ***co-supervisor and Chairman Professor Dr. Tahera Yeasmin,*** *Department of Dairy and Poultry Science, Hajee Mohammad Danesh Science & Technology University, Dinajpur for his constructive advices, encouragement, fruitful criticisms and scholastic supervision throughout the entire period of research work.*

The author is also delighted to express his gratefulness and indebtedness to his honorable ***Professor Dr. Mst. Afroza Khatun,*** *Department of Dairy and Poultry Science, Hajee Mohammad Danesh Science & Technology University, Dinajpur for his valuable suggestions, encouragement and kind help during the study period.*

The author would also express his sincere thanks to all the lab staffs, Department of Dairy and Poultry Science, Hajee Mohammad Danesh Science & Technology University, Dinajpur for their sincere help and cooperation throughout the study period.

Finally, the author has much pleasure to express his heartfelt indebtedness and gratitude to his beloved parents, sisters specially his Father who opened the gate and paved the way for his higher study and relatives who had always sacrificed their causes of happiness for his constant inspiration throughout his academic life.

The author

EFFECT OF DIFFERENT LEVELS OF DHANIA *(CORIANDRUM SATIVUM)* IN THE PERFORMANCE OF BROILER

ABSTRACT

A total of 80 as hatched Lohmann Meat broilers were fed *ad libitum* on a diet with 0 %, 2.0 %, 2.5 % and 3 % of coriander seed (CS) meal to assess the performance of broiler. Treatment group contains 2.5 % of coriander seed that is (1666±49.50), significantly ($P < 0.05$) affect live weight of broilers at the age of 21 and 28 days. Among the other dietary groups there is no significant difference of feed intake that is ($1200±16.13^{a}$) at 2.5% and ($1210±62.20^{a}$) at 3% and feed conversion efficiency was more or less similar. Meat yield characteristics especially abdominal fat level decreased significantly ($P < 0.05$) at 2.5 % level of Coriander seed meal. Cost of production per kg broiler increased when dietary inclusion level of coriander seed increased. Profit per broiler and per kg broiler was gradually increased significantly ($P < 0.05$) in higher coriander seed containing dietary level. These results suggested that coriander seeds could be considered as a potential natural growth promoter for poultry and showed the best responses at a 2.5 % level of inclusion.

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ABBREVIATIONS

ANOVA = Analysis of Variance

BCRDV = Baby Chick Ranikhet Disease Virus

BSTI = Bangladesh Standard and Test Institute

CF = Crude Fiber

Conc. = Concentrate

Contd. = Continued

CP = Crude Protein

CRD = Completely Randomized Design

CS = Coriander seed

CS = *Coriandrum sativum*

CSM = Coriander Seed Meal

CY = Carcass yield

DCP = Di-Calcium Phosphate

DM = Dry matter

EE = Ether extract

FAO = Food and Agricultural Organization

FCR = Feed Conversion Ratio

FI = Feed Intake

IBD = Infectious Bursal Disease

Kcal = Kilo Calorie

Met. = Metheionine

Min. pre = Mineral Premix

NS = Non-significant

CHAPTER I

INTRODUCTION

In recent times consumers of poultry products have become more concerned about synthetic additives in animal feed, which have reportedly shown DNA damage induction in the gastrointestinal organs of mice at low doses (Sasaki *et al.,* 2002) and may pose a serious threat to human health. The use of herbs and spices is a promising alternative to these synthetic additives. Herbs for their potential antimicrobial and stimulating effects on the digestive system (Windisch *et al*., 2008). Lippens *et al*. (2005) reported that broiler chicks supplemented with plant extract had better feed conversion ratios (FCRs) and reached higher bodyweights than the control and avilamycin groups. In general, the use of herbs, spices and their extracts improved the flavour and palatability of feed, thus enhancing production performance. Coriander (*Coriandrum sativum* L.) is regarded as both a herb and a spice, and reputedly has health advantages. It has been used in medicine for thousands of years (Nadeem *et al*., 2013). Certain parts of this plant, such as the leaves, flowers, seeds and fruit, possess antioxidant, diuretic anti- diabetic, anthelmintic and anti-mutagenic qualities (Pathak *et al*., 2011; Rajeshwari and Andallu, 2011).

However, reports about the effects of herbal extracts and seeds on broilers are inconsistent. Some authors found that many herbs and spices had positive effects on animal nutrition (Wenk, 2006; Al-jaff, 2011), whereas others did not find clear evidence (Windisch *et al*., 2008). Synthetic non-nutritive feed additives are extensively used in poultry diet as growth promoter (GP) and prophylactic measures to overcome various diseases and stress. The use of antibiotics as GP in the chicken feed develops resistance in the pathogenic microorganisms that is a serious threat to human health (Botsglou and Fletouris, 2001). For that reason the use of antibiotic as GP has been banned in many countries. For public concern about their residues in animal products and development of antibiotics resistance bacteria (Schwarz *et al.,* 1998; Lee *et al.,* 2004), force the nutritionist to search for an alternative to antibiotics.

Aromatic plants as Coriander have become more important for their potential antimicrobial and stimulating effects in the animal digestive system. *Coriandrum sativum (CS)* (Dhania) used traditionally as anti-parasitic, anti-helmintic, analgesic,

sedative, anti-septic and anti-diabetic substances in many parts of the world (Lee *et al.,* 2004). In addition, it possess antimicrobial activity, (Elgayyar *et al.,* 2001; Singh and Sriroth, 2002; Valero and Salmeron, 2003), biological activities such as that of antioxidants (Chithra and Leelamma, 1999; Miura *et al.,* 2002).

Recent studies shown that *CS* has a stimulating effect on the digestive systems of poultry through the increasing production of digestive enzymes and by improving the utilization of digestive products. It also enhanced liver function (Langhout, 2000; Hernandez *et al.,* 2004).

As an aromatic plant, coriander is an annual species of the parsley family, native to the South Asian region and especially in Bangladesh. It is used primarily as a flavor agent in the food industry or as a spice in bread, cheese, curry, fish, meat, sauces, soup, and confections. *CS* is used as a medicine for thousands of years. As a medicinal plant, *CS* has been used to manage diabetes (Swantson *et al.,* 1990; Gray and Flatt, 1999), used as antioxidant (Chithra and Leelamma, 1999), hypolipidemic (Chithra and Leelamma, 2000), antimicrobial hypocholesterolemic (Chithra and Leelamma, 1997) and anticonvulsant (Hosseinand Mohammed, 2000) agent. *Coriandrum sativum* has also appetizing and stimulatory effects in digestion process (Cabuk *et al.,* 2003).

Moreover herbs and spices are known for their preservation and medical value (Souza *et al.,* 2005). *Coriandrum sativum* is considered as an herb and a spice. The seed of *Coriandrum sativum* contains 0.5% - 1.0% essential oil rich in beneficial nutrients including carvone, geraniol, limonene, borneol, camphor, elemol and linalool. Flavonoides compound in coriander include phenolic acid. It is also suggested that the volatile oils having antimicrobial properties against food borne pathogen such as Salmonella species. Essential oils in Coriander seed (CS) have become more important for their potential. Coriander seed is an unconventional feed stuff but with feed it has been recognized as an important tool for improving growth performance and feed conversion (Collington *et al.,* 1990).

In recent years organic poultry is a relatively new expression in western countries going to popular also in our country. In this kind of poultry method, farmers do not use chemical compounds at all or in a very low level for sake of customers. They use alternatives like organic acids, probiotics, and medicinal plants in this method. These products have more fans in the customers (Ipu *et al.,* 2006). As one of the alternatives,

herbal extracts are already used as feed supplements to improve growth in intensive management (Manzanilla *et al.,* 2001). Plant extracts and spices as single compounds or as mixed preparations can play a role in supporting both performance and health status of the poultry (William and Losa, 2001, Gill 2000).

With all these beneficial properties of Coriander seed, limited research has been done with Dhania plants and it's seed to improve feed consumption (FC), feed conversion ratio (FCR) and carcass yield (CY) of broilers (Ather, 2000; Hertrampt, 2001).

In the context of information reviewed by many researchers the present study concern with the following objectives:

- To assess the effect of coriander seed meal on productivity and meat yield of broilers.
- To assess and compare the growth and economic feasibility of using coriander seed meal as poultry.

CHAPTER II

REVIEW OF LITERATURE

In Poultry industry, the production of broiler is very rapid in Bangladesh for its return. FAO programmed also focuses on increasing the feed based production systems locally available feed resources in developing countries (Sansoucy, 1993). Among energy feeds, Coriander seed (Dania) are less costly than other grains. Availability of quality feed at a reasonable cost is a key to successful poultry production. As energy source, Coriander seed is less costly than other grains. Availability of quality feed at a reasonable cost is a key to successful poultry production. Use of unconventional feed in diet formulation reduces the production cost for poultry rearing. Coriander seed is an unconventional feed which is available all over of Bangladesh. The purpose of these reviews was to assess the production potentials and use of coriander seed on growth, survivability, profitability, and meat yield of broiler to reach to some generalized conclusion.

Coriandrum sativum L. (Coriander)

Coriandrum sativum L. is an important spice crop and occupies a prime position in flavoring substances. Coriander is available throughout the year providing a fragrant flavor that is reminiscent of both citrus peel and sage, originated around the Mediterranean and is cultivated mainly in the tropical areas. In Bangladesh it available and cultivate in summer season (Kisnisin *et al.,* 2011).

Botanical Description

Coriandrum sativum L. belongs to the family Umbelliferae with botanical classification:

Division : Angiospermae

Class : Dicotyledonae

Sub-class : Calyciflorae

Order : Umbellales

Genus : Apiaceae

Species : Umbellifera.

(Kisnisin *et al.,* 2011).

Nutrient composition of coriander seed powder/100g

Nutrient composition: The nutrient composition of coriander, commonly called as 'cilantro' is given in this table.

Composition USDA	**Composition USDA**
Water (g) 7.3	Water (g) 7.3
Food energy (kcal) 279.00	Food energy (kcal) 279.00
Protein (g) 21.83	Protein (g) 21.83
Fat (g) 4.76	Fat (g) 4.76
Carbohydrates (g) 52.10	Carbohydrates (g) 52.10
Ash (g) 14.02	Ash (g) 14.02
Calcium (mg) 1.246	Calcium (mg) 1.246

Main Components % of all fatty acids	**Main Components % of all fatty acids**
Petroselinic acid	68.6
Linoleic acid	16.6
Oleic acid	7.5
Palmitic acid	3.8

Fatty acids in coriander seeds

(Minor Components: Stearic acid, Vaccenic acid, Myristic acid). (Kisnisin *et al.,* 2011) Its seeds contain put 1.8% volatile oil according to origin. The distilled oil (coriander oil BP) contains 65 to 70% of (+)-linalool (coriandrol), depending on the source (Bhat S. *et al.,* 2013).

Essential oils in coriander seeds

Main Components % total essential oil	**Main Components % total essential oil**
Linalool	167.75
alpha-pinene	10.5
Gamma-terpinene	9.0
Geranylacetate	4.0
Camphor	3.0
Geraniol	1.9

Chemical Structure

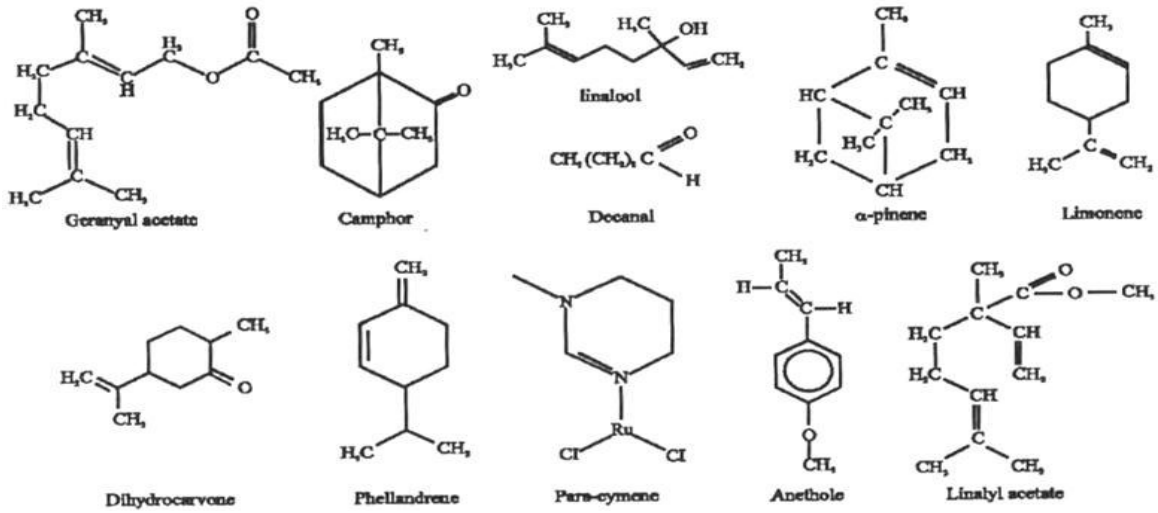

Fig. 2.1: Structures of the major compounds identified in the essential oil of coriander *(Coriandrum sativum L)* (Kisnisin *et al.,* 2011).

Linalool

Linalool [2,6-dimethylocta-2,7-dien-6-ol, Chemical) is a natural plant product (Figure 1), an essential oil with known antifungal (Pattnaik *et al.*, 1997; Edris and Farrag, 2003; Alviano *et al.*, 2005; Duman *et al.*, 2010 and Özek *et al.*, 2010), antimicrobial (Powers and Beasley, 1985; Suppakul *et al.*, 2003; Alviano *et al.*, 2005; Peñalver *et al.*, 2005; Duman *et al.*, 2010 and Park *et al.*, 2012), and insecticidal properties (Ryan and Byrne, 1988; Weaver *et al.*, 1991). Linalool has a well-documented history of repelling insects. It is an effective pesticide for the control of ticks and fleas (Hink and Duffey, 1990), and for control of the mite Tyrophagusputrescentiae (Sánchez-Ramos and Castañera., 2001). Linalool is the major bioactive compound in basil oil Active against tephritid fruit flies, Ceratitiscapitata (Wiedemann) and Bactroceradorsalis (Hendel and Chang *et al.*, 2009). Also, linalool inhibits feeding, oviposition.

Linalool is slightly volatile, with a pleasant aroma associated with the fragrance of lavender and laurel. This property has made it useful in commercial products such as flavoring agents, perfumes, and cosmetics, and linalool is considered generally recognized as safe (GRAS) for these purposes (Opdyke, 1975 and Bickers *et al.*, 2003). Additionally, linalool is an important intermediate in the manufacture of vitamin E

(Özek*et al.*, 2010). Linalool strongly suppressed oxidant-induced genotoxicity, which is predominately mediated by radical scavenging activity (Mitic-Culafic *et al.,* 2009).

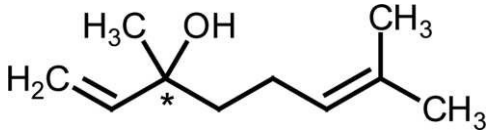

Fig. 2.2: Chemical structure of linalool.

Linalool does, however, have effects on the central nervous system. Linalool is a reversible inhibitor of acetyl cholinesterase, which may account for its insecticidal properties (Ryan and Byrne, 1988; Weaver *et al.,* 1991). Plants containing linalool have been used in folk medicine for their anticonvulsant effects, their sedative effects, and antinociception effects (Elisabetsky *et al.*, 1995; Sugawara *et al.*, 1998; Peana *et al.,* 2002, 2004, 2006 and Bickers *et al.*, 2003).

The gastrointestinal tracts of commercial poultry, chickens, and turkeys are typically colonized with microbes capable of causing human foodborne illnesses such as campylobacteriosis and salmonellosis (Hui *et al.,* 1994 and Beier *et al.,* 2004). Reducing or eliminating these organisms from live commercial poultry or poultry houses has not been possible, yet their presence poses a considerable human health hazard because there is inevitable carcass-contamination and cross contamination during processing. There is potential for outbreaks of human illness to occur when contaminated poultry are sold at retail, and when proper food handling, hygiene, sanitation, and storage (refrigeration) are not practiced.

Because linalool has antimicrobial, antifungal, and insecticidal properties, the addition of linalool to poultry feed or to poultry bedding has the potential to address several problems the poultry industry faces. Besides possible reduction or elimination of enteropathogens, linalool might also protect feed from spoilage by insects or fungi, and reduce insect infestation in the poultry house. However, the linalool toxicology literature is devoid information on the safety of using linalool in poultry. Therefore, we conducted a study of the effects of linalool-treated chicken feed on performance (weight gain and feed conversion), gross pathology, and clinical chemistry. (Ross C. Beier *et al.,* 2013).

2.1 Effect of Coriander Seeds (CS) on Broiler Performance

Farah (2011) reared broilers on different proportional Coriander seeds (CS) between 0 and 42 days of age. Body weight was higher on 2% Coriander seed on than that of on other doses. He noted higher live weight and increased feed conversion on that proportion. Saeid and Nasry (2010) determined the effects of Coriander seed on broiler performance with 240 day-old broilers. Diets contained 0.1, 0.2 and 0.3% of Coriander seed. Broilers fed 0.3% CS supported maximum growth and meat yield. Jafar (2011) supplemented 0.75%, 1%, 1.5% and 2% CS in broiler diets. Coriander seed had positive growth increased breast meat, thigh meat and lower abdominal fat with the growth of broiler. Ansari *et al.* (2006) determined that potentials of supplementary coriander seed in broiler diet. He showed that 2% dietary Coriander seed increased live weight, live weight gain and feed conversion.

In order to test the effect of the inclusion of coriander seed grain in broiler diets Cossu *et al.* (2002) fed 20 male and female broiler with a control diet or a diet containing 20% of Coriandrum grain (Cg) in finishing period. The dressing yield were the highest (P> 0.05%) for 20% Cg group. Broilers fed 20% Cg also showed the lowest FCR. Live weight was also higher in 20% Cg group than control diet containing broiler. Eidi *et al.,* (2008) studied on *Coriandrum sarivum (CS)* on broiler diet to find out the effects of different levels on its performance. The results showed that administration of 2% Coriander seed on the diet had the highest body weight, lowest FCR and also maximum meat yield than that of 0.5%, 1% and 1.5% Coriander seed containing diet.

Deepa and Anuradha (2009) used Coriander seed as a traditional drug for the treatment of diabetes and also showed performance of Coriander seed containing diet. The antioxidant and free-radical-scavenging property of Coriander seed in vitro was studied and also investigated whether the administration of seeds curtails oxidative stress in the kidney of streptozotocin-induced broilers. These results show that *CS* not only possesses antihyperglycemic properties but antioxidative properties also. Higher dietary intake of Coriander seed increased the body weight and meat yield in broilers whereas unchanged the feed conversion efficiency. Chithra and Leelamma (2002) studied the antiperoxidative effect of Coriander seed in broiler administered high fat diet. For higher intake of Coriander seed containing diet significant decrease in the levels of lipid peroxides, free fatty acids and glutathione whereas body weight increased and FCR

decreased compared to control group. Pascal *et al.* (2011) showed that Coriander seed and it's essential oils have efficacy in broiler against *Listeria monocytogenes* and on body weight of broiler. Mixing of Coriander seed and its fractions resulted as additive. For that reason as an additive Coriander seed containing diet have better effects upon the experimental broilers.

2.2 Effect of Coriander seed on Quails Performance

Guler *et al.* (2005) determined the potential of coriander seed as a natural growth promoting substance in quail nutrition. Quails receiving the diet containing 2% Coriander seed showed the highest weight gain and the control had the lowest weight gain. The FCR was significantly better in the group receiving 2% Coriander seed than in the other treatments. The highest carcass and liver yield were also recorded on 2% coriander group. However the lowest abdominal fat depositions were present in the 1%, 2% and 4% coriander groups. These results suggested that CS could be considered a potential natural growth promoter. In human nutrition great challenge is reducing saturated fatty acid consumption. In the study by Ertas *et al.* (2006) demonstrated the potentials of dietary supplementation by Coriander seed on carcass lipid composition in quails. Dietary supplementation of Coriander seed greatly affected the lipid composition in carcass for decreasing saturated fatty acid (SFA) contents and by increasing monounsaturated and polyunsaturated fatty acid (MUFA and PUFA) proportions in comparison with that on control diet. Highest dosage of Coriander seed (4%) has systematic induced the greatest effects on fatty acid deposition. Consequently, dietary supplementation of Coriander seed could improve the quality of lipid of quails by lowering SFA proportions and enhancing contents of PUFA.

Guler *et al.* (2006) investigated the effect of Coriander seed on egg production performance and nutrient retention in laying Japanese quails. The feed intake of the quails fed on diets containing coriander seed was higher than control diet. Egg production was similar in all groups. The best feed utilization was recorded on 2% coriander seed group. Use of (1-2) % Coriander seed for laying quails diet was recommended. Pongsak *et al.* (2000) noted Coriander oil (CO) to exhibit the strongest antimicrobial activity. The CO had a bactericidal effect on the target bacteria. In evaluating the antimicrobial potency of CO against *C. jejuni* on Quail meat at 4 °C an

bacterial cell load. This study indicates the potentials of CO to serve as a natural antimicrobial compound.

2.3 Anti-Stress, Anti-Oxidant, and Cholesterol Lowering Property of CS and its Extract

Koppula and Choi (2011) studied the anti-stress and anti-amnestic properties of CS and its extract on broiler. In this study urinary levels of vanillylmandelic acid (VMA) and ascorbic acid (AA) were used to evaluate antistress activity in broiler. Coriander seed extract was also evaluated for its antioxidant activities by inhibition of lipid per oxidation in brain and liver homogenates. Daily administration of Coriander seed prior to induction of stress decreased stress and increased AA excretion levels in broilers. The Coriander seed extract also inhibited lipid per oxidation in broiler liver and brain to a greater extent. They decided Coriander seed may be useful remedy to manage stress and stress related disorders on account of its multiple actions such as anti-stress, antiamnestic and antioxidant effects. Moustafa *et al.* (2012) found Coriander seed in food increased the antioxidant content acted as a natural antioxidant and inhibited undesirable oxidation processes. Thioacetamide (TAA) is a potent hepatotoxincaused centrilobulal necrosis and nephrotoxic damage following acute administration. The antioxidant activity of CS on TAA-induced hepatotoxicity in the broiler for Phenolic content and antioxidant activity in coriander leaves and seeds. In conclusion, coriander leaves attenuate hepatotoxicity induced by TAA more than that of seeds for the higher content of phenolic compounds and antioxidants in Coriander seed and leaves of coriander.

Aissaoui *et al.* (2011) reported that Sub-chronic administration of Coriander seed-extract on quail normalized glycemia and decreased the elevated levels of insulin, LDL-cholesterol and Triglyceride (TG). The CS-extract decreased several components , it was found that CO reduced the metabolic syndrome and decreased atherosclerotic and increased cardio protective indices. Coriander seed-extract may have cardiovascular protective effect. The present study validates the traditional use of Coriander seed in diabetes. Dhanapakiam *et al.* (2008) recommended *Coriandrum sativum* can be used as a traditional treatment for cholesterol and diabetes patients. The seeds had a significant hypolipidemic action. For incorporation of Coriander seed into diet increased in beta-hydroxy, beta-methyl glutaryl CoA reductase and plasma lecithin cholesterol acyl transferase activity. The level of low density lipoprotein (LDL) + very low density

lipoprotein (VLDL) cholesterol decreased while that of high density lipoprotein (HDL) cholesterol increased. The increased activity of plasma enhanced degradation of cholesterol to fecal bile acids and neutral sterols appeared to account for hypocholesterolemic effect. Chithra *et al.* (1999) administrated Coriander seed had significant hypolipidemic action in broilers. The levels of total cholesterol and triglycerides decreased significantly in the tissues of Coriander seed receiving broilers. The increased activity of plasma enhanced hepatic bile acid synthesis and the increased degradation of cholesterol to ecal bile acids and neutral sterols appeared to account for its hypocholesterolemic effect on broler.

Gray and Flatt (2010) documented Coriander seed incorporated in the diet and drinking water reduced hyperglycaemia of streptozotocin-diabetic in quail. Insulin secretion by hyperpolarized B-cells was further enhanced by the presence of Coriander seed extract. Chithraand Leelamma (2010) showed that the concentrations of cholesterol and cholesterol is to phospholipid decreased while the level of phospholipid increased in the dimethyl hydrazine (DMH) control compared to the Coriander seed administered group. Fecal dry weight, fecal neutral sterols and bile acids showed a sharp increase in the Coriander seed group compared with the DMH administered group. Thus, coriander plays a protective role against the deleterious effects in lipid metabolism in experimental colon cancer. Chaudhry and Tariq (1999) focused antibacterial potentials of *Coriandrum sativum.* The results showed that Coriander seed did not show any antibacterial effect against bacteria. Ebtesam *et al.* (2009) reported on the effects of *Coriandrum sativum* to treat hyperglycemia and hyperlipidemia on endocrine functions and structures on rabbits. Significant changes in cortisol levels occurred during treatment but they could not be attributed to *Coriandrum sativum* treatment. The traditional herbal medicine *Coriandrum sativum* does not appear to exert negative effects on rabbit's growth and cholesterol levels. The interrelationship between growth and cholesterol level is an important concern when medicinal plants are used; therefore, use of *CS* requires further study before it can be recommended for use as a medicinal plant.

CHAPTER III

MATERIALS AND METHODS

3.1 Statement of experiment

In a local poultry farm located at Barrister bazar Panchagarh sadar upazilla, Panchagarh an experiment was conducted with 80 Lohmann Meat day old broilers reared up to 28 days to find out the effect of dietary inclusion of different levels of *Coriandrum sativum* (Dhania) seed meal on feed consumption, weight gain, FCR, mortality, cost of production in diet formulation to maximize the performance of broilers. In this chapter a brief description of the experimental approach and methodology are described below-

3.2.1 Source of broiler and Coriander seed (CS)

A total of 80 as hatched Lohmann Meat day old broilers were purchased from a commercial hatchery "R.R.P Group" and Coriander seed was purchased from local market of Dinajpur

3.2.2 Experimental design

All growth performance, meat yield and profitability were distributed into four dietary groups with three replications for each treatment. The four dietary groups were having 0%, 2%, 2.5% and 3% coriander seed. There were also 5 newly hatched broilers in each replication. The allocation of broilers in different dietary groups and replications is shown in Table 3.1.

Table 3.1: Layout of the experiment

Treatments (Dietary level of CS%)	T1	T2	T3	T4
	0	2.0	2.5	3.0
Replication				
R1	5	5	5	5
R2	5	5	5	5
R3	5	5	5	5
R4	5	5	5	5
Total	20	20	20	20
Grand Total	80			

3.2.3 Preparation of ration

Locally available ingredients were used to formulate diet for broilers. The diets were prepared with 4 different levels of 0, 2.0, 2.5 and 3.0% CS, where 0% was considered as control. Two types of diet; Starter and Finisher were supplied to the broilers. In first 16 days starter diet was supplied and then from 17-28 days finisher diet was supplied to the broilers. The nutrients requirement of broilers was satisfied according to BSTI standard.

3.3 Management

3.3.1 House preparation and management

The experimental room was cleaned and disinfected first by bleaching powder solution prepared at the rate of 3g per 5 liters of water and later with Vircon S (Antec International Limited, USA). After drying, the experimental house was divided into 16 equal sized pens, separated by bamboo materials and wire. Pen and wire net partitions were also disinfected by phenyl solution after cleaning and washing. The experiment was conducted in a gable type open sided tin-shed house. Proper management procedures were followed during experimental period and identical management practices were maintained. The house was partitioned into 16 pens using wire-net (90 cm height) where a group of 5 birds were randomly allocated in each pen. The area of each pen was (8 × 7.5) sqft and was allotted for broilers. Therefore, floor space for each broiler was 1.46 sqft for comfort ability of broilers during winter. One tube (90 cm × 11.5 cm × 6 cm) feeder and one pot drinker with a capacity of one litter were provided in each pen up to 28 days. Feeders were cleaned every week and drinkers were cleaned every morning. Broilers had *ad libitum* access to diets and fresh drinking water. Saw dust was used as litter material at a depth of 5 cm. After third week previous litter was mixed up with new dry saw dust. Every two days interval litter was stirred to prevent ammonia gas and maggot formation.

3.3.2 Schedule of vaccination

All of the experimental broilers were vaccinated against New Castle disease (Ranikhet) and Infectious Bursal Disease (IBD) (Gumboro) at the age of day 4th and 12^{th} respectively. All the vaccines were administered as per recommendation of the manufacturer (one drop in each eye) at the cooler part of the day (morning). The vaccination schedule followed is presented in Table 3.2.

Table 3.2: Vaccination schedule followed for the experimental broilers

Age (days)	Disease	Vaccine	Type	Route
4	New Castle Disease (Ranikhet)	BCRDV	Live	Eye drop
12	Infectious Bursal Disease (Gumboro)	Gumboro	Live	Oral
16	RDV Vaccine	Ranikhet	Live	Oral
22	IBD Vaccine (Booster)	Gumboro	Live	Drinking Water

3.3.3 Management during brooding period

The chicks were brooded up to 7 days. Adjust the brooder for 24 hours before the arrival of chicks and adjust the temperature to 30°C at the edge of the brooder 2 inches (5cm) above the litter during the first week. Lower the temperature by 2.5°C. A temperature of 21°C appears to be ideal during growing period. Too low or too high temperature will cause poor growth rate and ultimately poor performance of birds. At low temperature, chicks will try to huddle below the light source. At high temperature the chicks will try to huddle around the chick guard. To maintain lighting programme and brooding, electric bulb (100 watt, 1 in each pen) were used up to 14 days of age of broilers. Broilers were exposed to 24 hours continuous light in first 14 days. Next 9 days 1 hour dark then 5 days 2 hr dark and last 5 days 4 hour dark was provided. To maintain optimum temperature one 60 watt bulb was replaced between two cages instead of 100 watt bulb.

Fig. 3.1: Management of chick during brooding period

Ventilation: Fresh air is required for well being and good health of chicks. Poor ventilation results in accumulation of carbon monoxide, ammonia and wet litter condition in brooder house. If concentration of carbon monoxide

Fig. 3.2: Hover used during brooding period

higher than 0.01 percent it will poisonous to chicks. Ammonia irritates the eyes of chicks and retards growth. The level of ammonia should be less than 10 PPM. Coccidiosis is result from high amount of moisture in litter

3.3.4 Biosecurity measures

Strict biosecurity measure taken during the experiment. There are three basic concepts of biosecurity.

Record-keeping is a vital aspect of biosecurity; records need to become part of the daily routine and accessible - an advantage in favour of electronic systems

Proper management generally improved biosecurity standards, better cleaning and disinfection practices and a shift from live bird markets to more processed and further-processed poultry meat products.

Good shower system which must be one-way; hot water and cleansing materials provided make compliance more likely, No items should be brought through the entry without being disinfected, including mobile phones and recording equipment - preferably using a formalin fumigation. Personnel entrance was restricted except assigned worker,

researcher, supervisor and co-supervisor. Before entrance, shoes were changed and feet were dipped in a footbath containing disinfectant solution (potassium permanganate).The footbath was at the entrance point of the experimental house. No dead birds were found during the experiment.

3.3.5. Methods of processing of broiler

Preslaughter handling

When the birds have reached "harvest" time, they are generally taken off of feed and water. This allows their digestive tracts to empty and reduces the potential for contamination during processing.

At night the birds are caught by specially trained crews and placed into plastic or wooden transport cages. The handling and transfer of birds both on the farm and at the slaughterhouse can be stressful. Stress can have negative effects on the quality of the final meat product, and therefore efforts are constantly being made to improve the preslaughter processes.

Slaughtering

Stunning and killing

The birds are usually stunned by running their heads through a water bath. Stunning produces unconsciousness, but it does not kill the birds. The birds are killed by hand or by a knife that cuts the jugular veins and the carotid arteries at the neck. The birds are permitted to bleed for a fixed amount of time, depending on size.

Defeathering

After complete bleeding, the slaughtered broilers were immersed in water heated to 51-55°C for 120 seconds in order to loosen the feathers of the carcasses.

Removal of heads and legs

The heads of the birds are pulled off mechanically; the legs of the birds are removed with a rotary knife (much like a meat slicer) either at the hock or slightly below it.

Evisceration and inspection

At this point the preen, or oil, gland is removed from the tail and the vent is opened so that the viscera (internal organs) can be removed. The equipment is cleaned (with relatively high levels of chlorine) after each bird.

Following inspection, the carcasses are further cleaned. The viscera are separated from the carcasses, and the edible offal are removed from the inedible offal. The lungs and kidneys are removed separately from the other visceral organs. A final inspection is carried out at this point, and the carcasses are then washed thoroughly.

Chilling

After the carcasses have been washed, they are chilled to a temperature below 4 °C (40 °F).

The broiler processing data were calculated and recorded as follows:

i) **Blood weight:** Blood weight was calculated by deducting the slaughtered weight from the live weight of broilers after complete bleeding.

ii) **Feather weight:** Feather weight was calculated by deducting the complete de feathering broiler weight from the slaughtered weight of broilers.

iii) **Cut-up parts weight:** The weight of head, neck, viscera, heart, liver, gizzard, thigh meat, drumstick meat, back meat and breast meat were determined individually by weighing in a sensitive digital balance.

iv) **Dressing yield:** Dressing yield was calculated by subtracting the weight of blood, feathers, viscera and shank from the live weight.

v) **Giblet weight of broiler:** Giblet weight was the total weight of liver, heart, gizzard, lungs and spleen.

vi) **Dressed weight of broiler:** Dressed weights of broilers were calculated deducting the weights of head, neck and giblet

3.3.6 Data collection and record keeping

The following records were kept during the experiment

3.3.7 Body weight of broiler

The weight of broilers were taken group-wise i.e. group of 5 broilers at the beginning of the experiment and thereafter, at weekly intervals and at 28 days after termination of the experiment. The broilers were weekly weighed only in the morning prior to feeding.

3.3.8 Live weight gain

The live weight gain of broilers up to different weeks of age in each replication was calculated by deducting initial live weight from the recorded live weight and to get weight gain per bird, the balance was divided by the number of birds of the respective replication.

3.3.9 Feed consumption (FC)

The amount of feed consumed by the experimental broilers of each replication was calculated out by deducting the amount retained from the amount supplied.

3.3.10 Feed conversion ratio

The feed conversion was calculated and recorded replication wises dividing the total feed consumed by average body weight gain.

3.4 Slaughtering data

During processing following meat yield data were recorded for some parameters from each pen. The recorded data were on live weight, selection of broiler. Individual broiler weighing average of the pen weight was collected, slaughtered, blade, defeathered, eviscerated, dressed and dissected to determine meat yield. Parameters are: blood loss, feather loss, head weight, neck weight, shank weight, viscera weight, dressed weight, breast weight, thigh meat, drumstick weight, wing meat, trimmed meat, total meat and dark meat.

3.5 Production cost

Cost of production per broiler was calculated by considering chick cost, feed cost, adding all vaccination cost, labor cost, litter cost and transportation cost.

3.6 Statistical analysis

All recorded and calculated data were statistically analyzed using analysis of variance technique by a computer using a SPSS statistical computer package program in accordance with the principles of Completely Randomized Design (CRD).

CHAPTER IV

RESULTS

The data generated related to effects of dietary coriander seed on broiler performance are presented and discussed in this chapter.

4.1 Growth performance

4.1.1 Live weight

Generally live weights increased with increasing the age of birds (Table 4.1). Live weights of broilers were similar on levels of Coriander seed at 14 a days of age (Table 4.1). However, definite differences appeared at 21 ($P<0.05$) at 3% level of dhania (920±52.2) and at 2.5% level of dhania (930±55.15) and 28 days of age ($P<0.05$) at 3% level of dhania (1650±46.30) and at 2.5% level of dhania (1666±49.50) where live weight increased in linear pattern at the increasing levels of Coriander seed.

4.1.2 Feed intakes (FI)

There was no difference found on FI which could be explained by different dietary level of CS (Table 4.1). However, in the advancement of age the feed intake increased at different dietary Coriander seed groups. But there was no significant difference appeared. It was found that at 2.0 (1120 ± 56.50^{ab}), 2.5 (1200 ± 60.13^{a}) and 3.0 (1210 ± 62.20^{a}) dietary CS consuming groups are eventually more or less similar to control (0%) CS consuming group.

4.1.3 Feed conversion ratio (FCR)

Feed conversion (FC) of broilers on different dietary CS did not differ at 28 days of age. It was found that all dietary CS- 0.0 (1.59±0.60), 2.0 (1.60±0.78), 2.5 (1.63±0.80) and 3.0 (1.66±0.83) were similar.

Table 4.1: Live weight, feed intake and feed conversion efficiency of broiler fed diet with coriander seed (CS) at different levels at different ages

Parameter	Age (Day)	Dietary coriander seed (%)				Level of significance
		0	2.0	2.5	3.0	
Live weight	Initial Weight	40.50±0.70	40.6±0.67	40.7±.88	40.3±0.80	NS
	7	110±7.46	140 ±8.90	150±8.98	145±6.45	*
	14	370±10.18	415±8.25	420±11.25	400±9.39	NS
	21	700±49.20	910±50.4	930±55.15	920±52.2	NS
	28	1450±40.40	1610±45.45	1666±49.50	1650±46.30	*
Feed Intake	7	140±8.98	180±10.90	190±11.43	185±9.30	NS
	14	531.4±5.20	535.9±6.25	506.8±7.24	538.3±6.30	NS
	21	750±18.20	800±20.40	820±26.88	880±21.98	NS
	28	950±50.20^{b}	1120±56.50^{ab}	1200±60.13^{a}	1210±62.20^{a}	NS
Feed Conversion Ratio(FCR)	7	1.27±0.03	1.28±0.04	1.26±0.05	1.28±0.04	NS
	14	1.44±0.45	1.29±0.35	1.21±0.30	1.35±0.40	NS
	21	2.2±1.54	1.61±1.40	1.60±1.39	2.09±1.45	NS
	28	1.59±0.60	1.60±0.78	1.63±0.80	1.66±0.83	NS
Mortality rate	7	1.4	1.3	1.2	1.3	NS
	14	1.5	1.4	1.3	1.4	NS
	21	1.6	1.5	1.4	1.5	NS
	28	1.5	1.4	1.3	1.4	NS

abc, mean values with dissimilar superscripts are significantly different; NS; *; P<0.05, All values indicate mean ± Standard error of mean

4.1.4 Carcass characteristics

Dietary CS did not modify the breast meat, thigh meat and wing meat which could be explain for the variation of coriander seed (Table 4.2). Highly significant differences (P>0.05) were found for the percentage of abdominal fat at 2.5% level of dhania (0.40±3.12) and at 3% level of dhania (3.00±4.12) among all the dietary groups. For increasing the CS level decreasing the fat level and vice versa in a linear fashion.

Table 4.2: Effect of coriander seed meal (CSM) diets to broilers on carcass characteristics

Parameter	Dietary Coriander Seed (%)				Level of significance
	0	2	2.5	3.0	
Live body weight (kg)	1.45±0.01	1.61±0.03	1.67±0.05	1.65±0.04	**
De-feathered body weight (kg)	1.10±0.03	1.31±0.04	1.37±0.06	1.35±0.05	NS
Empty abdomen carcass (Kg)	1.00±1.41	1.20±0.04	1.22±0.05	1.21±1.43	NS
Eviscerated carcass (%)	66.00±2.12	66.10±0.20	67.50±0.33	67.00±1.21	NS
Breast (rel[1])%	20.9±1.98	22.7±0.30	21.5±0.64	23.8±1.12	NS
Drumsticks (rel[1])%	17.40±0.35	17.20±1.21	16.20±0.40	16.00±2.12	NS
Wings (rel[1])%	4.30±1.21	5.15±0.15	4.68±0.33	5.87±0.40	NS
Liver and bile (rel[1])%	0.50±3.12	0.46±0.26	0.40±0.30	0.52±1.21	NS
Heart (rel[1])%	1.80±0.60	1.70±0.65	2.00±0.80	1.90±0.50	NS
Gizzard (rel[1])%	2.00±0.64	1.90±1.21	2.20±0.85	2.10±2.45	NS
Abdominal fat (rel[1]) %	2.90±0.80	4.00±1.21	4.40±3.12	3.00±4.12	**
Intestine (re[1])%	5.00±0.46	4.00±0.30	5.50±0.55	6.10±0.93	NS

All values indicate mean±Standard error of mean, NS=Non significant, * statistically significant (P<0.05)

Table 4.3: Live weight gain, feed intake and feed conversion ratio of broiler fed diet with coriander seed upto 28 days of age

Parameter	Dietary coriander seed (%)				Level of significance
	0.00	2.00	2.50	3.00	
Body weight gain (g)	1450±40.40	1610±45.40	1666±49.49	1650±46.30	**
Feed consumption (g)	2370±80.67	2635±95.07	2716±70.13	2813±30.29	NS
Feed conversion ratio (g)	1.59±0.60	1.60±0.78	1.63±0.80	1.66±0.83	NS

All values indicate mean±Standard error of mean, NS=Non significant,*statistically significant (P<0.05)

Table 4.4: Cost analysis of broiler feed diet with coriander seed at different level

Parameter	Dietary coriander seed powder (%)				Level of significance
	0.00	2.00	2.50	3.00	
Feed cost/kg	40.10	41.10	40.00	41.10	*
Total production cost/kg broiler	98.00±3.12^{a}	92.50±2.69^{ab}	85.40±2.41^{bc}	88.90±4.20^{c}	*
Total production cost (taka/broiler)	103.40±2.30	102.20±1.20	99.00±0.80	101.50±0.93	NS
Sale Taka/broiler	124.40±3.40^{c}	127.67±2.39^{bc}	138.50±4.12^{ab}	130.00±3.00^{a}	**
Sale Taka/kg broiler	121.00	121.00	121.00	121.00	NS
Profit (Taka/broiler)	21.80±1.21^{c}	25.50±8.70^{bc}	39.00±4.54^{ab}	29.50±2.42^{a}	*
Profit (Taka/kg broiler)	23.00	24.00	36.00	33.00	*

abc, mean values with dissimilar superscripts are significantly different; NS;*;P<0.05, All values indicate mean±Standard error of mean.

CHAPTER V

DISCUSSION

5.1 Growth Performance

5.1.1 Live weight

A gradual increase in live weight (Table 4.1) at 28 and 35 days of age (finishing period) is observed, best result is obtained in the group where 2.5% dietary CS is supplied. There is significant change of live weight is observed for increasing dietary CS is in another experiment supported by Farah (2011), Saeid and Nasry (2010), Jafar (2011), Ansari *et al.* (2006), Cossu *et al.* (2002) and Eidi *et al.* (2008). They reported that broilers fed on 1.5 % to 2.0 % coriander had higher ($P < 0.05$) live body weight and body weight gain. Other researchers reported that broilers supplemented with diet 3.0 or 4.0 % CS showed higher live body weight ($P < 0.05$) (Guler *et al.,* 2005, Tewe, 1993). The improvement in weight gain of the broilers using CS in their diets may probably be for its anti-oxidant properties which act as natural growth promoter.

5.1.2 Feed intake (FI)

Feed Intake (FI) up to 28 days of the experiment was more or less similar (Table 4.1). But there is tendency decreasing feed intake is observed by increasing dietary CS level. Sing *et al.* (2009) and Ansari *et al.* (2006) observed that FI up to 42 days of age with the advancement of DCS becomes significant. FI decreases in the conducted experiment probably for change of weather. The experiment was conducted when the temperature was comparatively higher but in the finishing period it was winter. It may be one of the causes to vary in feed intake of broilers.

5.1.3 Feed Conversion (FC) Ratio

Feed conversion appeared to remains more or less similar in the entire dietary Coriander seed groups (0, 2, 2.5 and 3%) irrespective of age. Deepa and Anuradha (2009) reported that, up to 2% inclusion level of DCS, Feed Conversion Efficiency (FCE) remained unchanged. It may be due to very insufficient level of CS in the formulated diet. The result of this study contradict Farah (2011), Saeid and Nasry (2010) and Eidi *et al.* (2008). They reported that higher CS containing diet had higher FCE and shows also

higher body weight. This unsimilarities may probably for the impact of environmental insult.

5.2 Carcass characteristics

Dietary CS did not modify the breast meat, thigh meat and wing meat which could be explain for the variation of Coriander seed (Table 4.2). Highly significant differences (P>0.05) were found for the percentage of abdominal fat among all the dietary groups. For increasing the Coriander seed level decreasing the fat level and vice versa in a linear fashion. Sahoo *et al.* (2008) and Iheukwumere *et al.* (2001) observed there was no difference (P >0.05) among the average dressing yield, heart, gizzard, liver, breast meat drumstick meat and thigh bone of broilers fed diets with or without supplementation of Coriander seed(Dania).There was highly significant differences (P <0.05) in abdominal fat percentage with the dietary 1.5 % Dania group. Many investigators found that dietary advancement of Coriander seeds between 1.5 to 4 % decreases the cholesterol level (Aissaoui *et al.,* 2011, Dhanapakiam *et al.,* 2008, Chithra, *et al.,* 1999, Gray and Flatt 2010, and Chithra and Leelamma, 2010). The highest significant difference (P <0.05) in abdominal fat percentage for lipolytic effect of Coriander seed. In addition the relatively higher live weight may have an additional effect in live weight gain attributed to slaughter weight. Highest significance was observed at control (0 %) and 0.5 % Coriander seed containing diet group.

5.3 Cost of production

In the experiment broiler feeded with 2.5% dietary Coriander seed is more beneficial and cost effective than 2% or 3% dietary Coriander seed. The experimented results for cost analysis was coincide with Maust *et al.* (1999), who reported supplementation of Coriander seed at 1.5% diet was more beneficial and profitable in broiler production than that of 0.5% level. Ihsan (2003) also reported that the broilers fed diets with added Coriander seed, fetched more profit than those using rations without supplementation of this herbal growth promoter. Increase in the profit margin of the broilers fed diets containing herbal growth promoters may be attributed to the better efficiency of feed utilization.

CHAPTER VI

SUMMARY AND CONCLUSIONS

An experiment was conducted at local poultry farm located at Barrister bazaar Panchagarh sadar. A total of 80 as hatched Lohmann Meat broilers were fed coriander seed (CS) (Dhania) at different levels. All broilers were fed diet with (0, 2.0, 2.5, 3.0 %) levels of dietary CS. Floor space per broiler was 1.46 sq. ft. Rice husk was used as litter at a depth of 3 cm. Feed and water was *ad libitum* throughout the experimental period. A dietary level of Coriander seed has significance on live weight at 21 and 28 days of ages. However, live weight gain increased in linear fashion on diet with the increasing level of Coriander seed in the diet. Feed conversion efficiency (FCE) were more or less similar at different levels of Coriander seed containing diet regardless of age in broiler. Meat yield characteristics had little change for the inclusion of dietary Coriander seed especially in lowering of abdominal fat level. Cost of production per kg broiler is decreased with the increasing level of Coriander seed. Sale of per broiler was highly significant in 2.5 % dietary Coriander seed level. Profit per broiler and per kg broiler was higher in 2.5 % CS group than that of 3.0, 2.0 and 0.0 % Coriander seed containing dietary groups. These results suggested that CS could be considered a potential natural growth promoter for poultry, and showed the best responses at a 2.5% level of inclusion.

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APPENDICES

Appendix I: Daily temperature (^{0}C) was recorded by clinical thermometer at 6 AM, 2 PM and 7 PM

Sl. No	Date	6 AM	2 PM	7 PM
1	1-7-18	27	30	25
2	2-7-18	25	30	28
3	3-7-18	29	31	30
4	4-7-18	31	32	32
5	5-7-18	29	30	27
6	6-7-18	28	31	29
7	7-7-18	29	33	29
8	8-7-18	30	32	29
9	9-7-18	29	32	29
10	10-7-18	28	33	30
11	11-7-18	29	33	31
12	12-7-18	30	34	30
13	13-7-18	32	33	30
14	14-7-18	32	33	29
15	15-7-18	29	31	29
16	16-7-18	30	32	31
17	17-7-18	25	23	24
18	18-7-18	26	22	23
19	19-7-18	22	25	24
20	20-7-18	27	29	28
21	21-7-18	31	32	30
22	22-7-18	28	32	29
23	23-7-18	30	32	29
24	24-7-18	31	33	30
25	25-7-18	29	32	31
26	26-7-18	29	33	30
27	27-7-18	30	34	30
28	28-7-18	29	33	30

Appendix II: Relative humidity (%) was recorded by digital hygrometer at 6 AM, 2 PM and 7 PM

Sl. No	Date	6 AM	2 PM	7 PM
01	1-7-18	91	90	88
02	2-7-18	92	78	85
03	3-7-18	94	75	84
04	4-7-18	88	71	82
05	5-7-18	87	75	88
06	6-7-18	88	77	87
07	7-7-18	89	76	82
08	8-7-18	94	78	89
09	9-7-18	92	76	86
10	10-7-18	89	77	84
11	11-7-18	86	75	86
12	12-7-18	94	82	86
13	13-7-18	88	72	76
14	14-7-18	79	71	75
15	15-7-18	78	73	78
16	16-7-18	81	75	82
17	17-7-18	85	74	90
18	18-7-18	86	79	90
19	19-7-18	80	82	87
20	20-7-18	90	95	97
21	21-7-18	93	79	84
22	22-7-18	96	77	86
23	23-7-18	85	76	82
24	24-7-18	80	71	85
25	25-7-18	83	78	81
26	26-7-18	81	77	83
27	27-7-18	79	64	78
28	28-7-18	84	73	84