COMPARATIVE STUDY OF PELLET AND MASH FEED ON THE PRODUCTION PERFORMANCE OF SONALI CHICKEN

A Thesis

By

Kunjo Roy
Registration No. 1805383
Semester: July-December, 2019

MASTER OF SCIENCE (M.S.)
IN
POULTRY SCIENCE

DEPARTMENT OF DAIRY AND POULTRY SCIENCE

HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY UNIVERSITY, DINAJPUR-5200

DECEMBER, 2019

COMPARATIVE STUDY OF PELLET AND MASH FEED ON THE PRODUCTION PERFORMANCE OF SONALI CHICKEN

A Thesis

By

Kunjo Roy
Registration No. 1805383
Semester: July-December, 2019

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

MASTER OF SCIENCE (M. S.)
IN
POULTRY SCIENCE

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

DECEMBER, 2019

COMPARATIVE STUDY OF PELLET AND MASH FEED ON THE PRODUCTION PERFORMANCE OF SONALI CHICKEN

A Thesis

By

Kunjo Roy
Registration No. 1805383
Semester: July-December, 2018-19

Approved as to the style and content by

(Professor Dr. Mst. Afroza Khatun)	**(Dr. Md. Kamruzzaman (Mithu))**
Supervisor	Co-supervisor

(Professor Dr. Tahera Yeasmin)
Chairman, Examination committee
and
Chairman
Department of Dairy and Poultry Science

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

DECEMBER, 2019

DEDICATED

TO MY

BELOVED PARENTS

AND

FAMILY

ACKNOWLEDGEMENT

The author express all praise due to the "GOD" 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, ***Professor Dr. Mst. Afroza Khatun****, Department of Dairy and Poultry Science, Hajee Mohammad Danesh Science & Technology University, Dinajpur for her 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 ***Dr. Md. Kamruzzaman (Mithu),*** *Assistant Professor, Department of Dairy and Poultry Science, Hajee Mohammad Danesh Science & Technology University, Dinajpur for her constructive advices, encouragement, fruitful criticisms and scholastic supervision throughout the entire period of research work.*

The author is delighted to express his gratefulness and indebtedness to his honorable ***Professor Dr. Tahera Yeasmin, Chairman,*** *Department of Dairy and Poultry Science, Hajee Mohammad Danesh Science & Technology University, Dinajpur for her 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 and family, 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

ABSTRACT

This experiment was conducted to evaluate the efficacy of Mash feed and Pellet feed on production performance of Sonali chicken in Bangladesh. A total of 176 day old chicks (DOC) were randomly assigned into two treatment groups namely T_1 and T_2 having four replications in each treatment group. Chicks were brooded up to 28 days then randomly separate into replication wise in separate pen for rearing 11 weeks. Each treatment group contains 88 birds whereas each replication contains 22 birds. Experimental birds in T_1 and T_2 were provided Pellet feed and Mash feed respectively. The results of this study was indicated that final live weight gain and feed conversion ratio (FCR) of birds found significantly ($p<0.05$) higher in T_1 group (814.33±14.38g) that received Pellet feed compared (T_1) to Mash feed (T_2) (725.00±11.80g). This result also indicated that body weight gain, and feed efficiency were increased at Pellet feed. The low feed cost found in T_2 and high in T_1 group. Net profit Tk. found maximum in T_2 (26.30±1.88) followed by T_1 (25.78±1.60).The present study concludes that Pellet feed is more economic than Mash feed.

Key words: Sonali chicken, mash feed, Pellet feed etc.

.

LIST OF CONTENTS

LIST OF TABLES

LIST OF FIGURS

LIST OF ABBREVIATIONS

ABBREVIATIONS	ELABORATIONS
FCR	Feed conversion ratio
MS	Master of Science
mg	Milligram
g	Gram
kg	Kilogram
lit	Liter
ME	Metabolizable energy
CP	Crude protein
CF	Crude fiber
Fig	Figure
Prof.	Professor
NS	Non- significant
^{0}C	Degree Celsius
%	Percent
*	Significant at 5% level of probability
/	Per
NS	Non significant
@	at the rate of
<	Less than
>	Greater than
HSTU	Hajee Mohammad Danesh Science and Technology University

CHAPTER I
INTRODUCTION

1.1 General Background

Bangladesh is an agro-based developing country and the growth and sustainability of agricultural production are prerequisite for attaining the rate of overall growth of the economy. Livestock is an important sub-sector of agriculture. Poultry is one of the major components of livestock sub-sectors that committed to supply cheap sources of good quality nutritious animal protein to the nation. Poultry farming has turned out to be promising dynamic enterprise with enormous potential for rapid poverty reduction in Bangladesh. Poultry farming provides a substantial economic contribution and generates self-employment opportunities for the unemployed youth generation. A noticeable development has been taken place in poultry farming in Bangladesh. The increasing rate of poultry farming is satisfactory throughout the period with little exception. As an important sub-sector of livestock production, the poultry industry in Bangladesh plays a crucial role in economic growth and simultaneously creates numerous employment opportunities (Shamsuddoha and Sohel 2008a). Again, poultry plays a key role in the country's economy through its direct or indirect involvement of about 73% of people living in rural areas. Bangladesh has a long history of poultry rearing under traditional backyard farming practices (Reneta Statistical Year Book, 2005). Poultry is one of the substitutes in connection with the development of Bangladesh (Shamsuddoha and Sohel 2008b). The poultry industry, as a fundamental part of animal production, is committed to supply the nation with a cheap source of good quality nutritious animal protein in terms of meat and eggs (Shamsuddoha 2010).

The overall contribution of the broad agriculture sector at constant price was 19.95 percent of GDP in 2010/11 (BER 2011). In agriculture sector, contribution of crops, livestock and forestry were 11.24, 2.57 and 1.71%, respectively. Poultry industry in Bangladesh has made significant progress during the last two decades where commercial poultry started in 1980 in Bangladesh. Chowdhury (2013) stated that commercial poultry increased significantly during 1980-1990 (6%) and 1990-2000 (8%) in this country. Poultry plays a vital role in the rural socio-economic system as maximum households are directly involved in domestic rearing poultry farming. Around 22 core poultry are remaining in Bangladesh (DLS, 2016).The poultry sector in Bangladesh is dynamic and has potential for rapid poverty reduction through income generation

and employment creation. As commercial poultry farming gains in popularity, employment opportunities are created for rural farmers, retailers, traders, service providers, entrepreneurs etc. (Saleque , 2009; Dolberg, 2008). Poultry egg and meat in recent years become important and popular food for the 68% of non-vegetarian population (Mohpatra, 2005). Sonali birds are well adapted to the country's environmental conditions so require less care and attention than other breeds, making them easier for women and children to rear (Saleque and Saha, 2013). Traders can sell Sonali at higher prices than local chickens. The Sonali population has been increasing and in 2010 about 150.9 million Sonali DOCs were produced, representing about 35 percent of the country's total commercial broiler and layer production (Huque, 2011). Poultry farmers are interested in Sonali chicken production due to its high market price, smaller marketing age, less space requirement, less feed requirement, high quality meat production and lower mortality.

The share of commercial poultry production by the private sector is expanding rapidly in Bangladesh, and now accounts for 50 percent of egg production and 60 percent of meat production (Bhuiyan, 2011).

Sonali chicken, the crossbred of Fayoumi female and RIR (Rhode Island Red) male developed in 1986, has been reported to perform better with respect to egg and meat production. It has been taking its place besides the indigenous hens due to its adaptability and acceptability in the climatic conditions of Bangladesh. Sonali, with a phenotypic appearance similar to local chicken has higher market demand than exotic breed. As an important segment of livestock production, the Sonali chicken industry in Bangladesh is considered a great avenue for the economic growth and simultaneously creates numerous employment opportunities. About 76 percent of Sonali beneficiary has improved their conditions by rearing this type of poultry (Hossen et al. 2012). Bangladesh reportedly is turning to be a society of sick, stunted and degenerated bunch of people due to chronic protein deficiency. This country has already marked for its poverty, external dependence and unemployment problem. In this circumstance, Sonali chicken farming would be an excellent and appropriate way to promote the nutritional and economic security of the people living in rural, tribal and inaccessible areas in a sustainable manner. Sonali chicken production provides higher returns to the farmers. This enterprise is gaining popularity in the country gradually due to its high yield potentiality, although proper management and appropriate level of input use are important for achieving such higher yield and profits. Some researches have been

conducted about hatchability, fertility, growth rate and mortality rate of Sonali chicken and a few researches have been done on the comparative analysis of Sonali chicken breed with other poultry breeds. Saleque and Saha (2013) conducted a study on production and economic performance of small scale Sonali bird farming for meat production in Bangladesh; Hossen et al. (2012) conducted a study on the problems and prospects of Sonali chicken farming in different village levels of Joypurhat district in Bangladesh; Miazi et al. (2012) examined a study on fertility and hatchability of Fayoumi and Sonali chicks. However, the present research explores information on the economic aspects of Sonali chicken farming which is indeed a new study in the poultry industry. This study is very important in terms of producing meaningful information to uplift the productivity and to ensure the sustainability of Sonali chicken industry. The overall objective of the study is to estimate the profitability of Sonali chicken production and the efficiency of resources used for such production. It has been taking its place besides the indigenous hens due to its adaptability and acceptability in the climatic conditions of Bangladesh (Anisuzzaman, 1998). The Sonali chicken industry in Bangladesh is considered a great avenue for the economic growth and simultaneously creates numerous employment opportunities.

Considering the environmental factors eg: rainfall, housing and economic traits as survivability , rapid growth of male chicken as well as females egg production ,this cross bred was recommended to rear for small holder poultry farming in Bangladesh (Amber,2000). Cross-bred progenies were superior to pure bred in terms of growth rate ,meat quality ,body condition and feed conversion (Masic and Khalifah,1965). Sonali is suggested for rearing at village level because of its low cost ,small size, suitable for rearing under Bangladesh environment particularly in rural areas. Therefore, farming with this cross-bred chicken by the small holder village poultry farmers in Bangladesh may ensure sustainable poultry production in the country as well as to improve the economic condition nutritional status of the people .Bangladesh reportedly is turning to be a society of sick, stunted and degenerated bunch of people due to chronic protein deficiency .This country has already marked for it poverty, external dependence and unemployment problem. In this circumstance , Sonali chicken farming would be an excellent and appropriate way to promote the nutritional and economic security of the people living in rural ,tribal and inaccessible areas in a sustainable manner. Saleque and saha (2013) conducted a study on production and economic performance of small scale Sonali bird farming for meat production in Bangladesh ; Hossen et al. (2012)conducted a study on the problems and prospects

of Sonali chicken farming in different village levels of Joypurhat district in Bangladesh Miazi et al. (2012) examined a study on fertility and hatchability of Fayoumi and Sonali chicks . It has specially been advocated in terms of their higher production rate and better adaptability in rural situation (Ahned,1997). The major objective of poultry feed production is satisfying nutritional requirements and conversion of macro and micro element into high valuable human food. The economic importance of poultry feed become apparent when it is realized that 60-70% of the total production cost of poultry production of feed .For this reason the efficient utilization of feed is extremely important of broiler production .The objective of the literature study was to review differences in energy consumption from different studies in the grinding and pelleting process and to describe how to digestion of nutrient in poultry feeds are influence by mash and pelleted feed**.** Feed form is an important factor which directly influences the cost of mixed feed and production performance of Sonali birds (Ghazi *et al*., 2012). The physical form of a feed (mash or pellet) plays a crucial role in the meat yield of Sonali Chicken. However, there are few published researches about the effects of feed forms and different feed access times on growth performance and cost benefit of Sonali chickens. This study was therefore conducted to evaluate the growth performance and cost benefit of Sonali chickens raised on mash and pellet diet accessed at different times.

1.2 Research objectives

- To evaluate the growth performance of Sonali chicken by feeding Pellet and Mash feed.
- To Study cost effective analysis of Sonali production by feeding Pellet and Mash feed.

CHAPTER II

LITERATURE REVIEW

Successful Sonali development is dependent on optimal feed intake throughout the growing period. Optimal feed intake is dependent on a number of factors such as environmental temperature, and diet nutrient density, and physical feed quality is considered to have a very significant impact on Sonali growth. Energy and protein are very important nutrients for Sonali like other living creatures. Energy is required for body functioning and protein is an essential constituent of all tissues of animal body. Protein having major effect on growth performance of the bird is the most expensive nutrient in Sonali diets .It is a widely accepted principle in poultry nutrition that dietary energy and the essential nutrients must be considered as an entity. To ensure maximum utilization of energy, protein, and every nutrient of the diet, a right proportion of these nutrients are necessary for optimum growth of the birds and for minimization of the surplus use of vital dietary component, and because the first few days after hatch now represent a greater percentage of a Sonali life span than any time in history, it is critical that the bird be given every opportunity to get off to a good start.

Nowadays, various commercial feed mills are producing different forms of Sonali feed for different age group of bird. The physical form of feed (mash and pellet) is a crucial factor in meat yield of Sonali. Different types of feed forms have been evolved in Sonali chick production at the present time. Various feed forms pellet, mash or crumble that to be supplied to Sonali chick are the most important factor which directly influence the cost of mixed feed and production performance of Sonali chick. The major objective of poultry feeding is the conversion of feedstuff into human food. The physical form of feed (mash and pellet) is a crucial factor in meat yield of Sonali.

2.1 Dietary effect of pellet and mash feed of broiler

2.1.1 The effect of feeding pellets versus mash on performance and carcass characteristics of broiler chicks

Ahmed *et al.*, (2013*)* the effect of feeding pellets, mash and mix of pellets and mash on growth performance and carcass characteristics of Hubbard broiler chicks was studied. Ninety one day-old chicks were used in a completely randomized design with three forms of diets. Each dietary

treatment consists of 3 replicates with 10 chicks in each replicate. Live body weight (LW), weight gain (WG), feed intake (FI) and feed conversion ratio (FCR) were measured weekly from the first week to sixth week. Carcass components were recorded at the end of trial (day 42). Dressing out percentage on hot and cold base, relative and absolute weight of liver, heart, gizzard and abdominal fat and length of small intestine were recorded. All performance parameters were not affected (p>0.05) by the inclusion of different forms of diets. The results indicate that mash feed had significantly (p0.05) effect on other carcass characteristics. It is concluded that similarities in growth response between mash, mixed and pellet-fed birds may be attributed to the pellet quality and greater lysine requirements of the pellet-fed birds.

2.1.2Effect of crumble-pellet and mash diets with different levels of dietary protein and energy on the performance of broilers

Jafarnejad *et al*., (2010) this experiment was conducted to investigate the effect of the form of diets with different levels of protein and energy on broilers performance at the end of the third week. A total of 2800 male broiler chicks were fed with two forms of diet (mash and crumble-pellet), two levels of protein (23% and 21% CP), and two levels of energy (3200 and 3000 Kcal/Kg ME) from 1 to 21 days of age. The bodyweight (BW) and Feed conversion rate (FCR) were affected by the form of diet with the crumble-pellet form being better ($P < .001$). The diet with high protein significantly increased BW and decreased FCR ($P < .001$). The different levels of energy did not affect FCR and BW in crumble-pellet diet but should a significant effect on them in mash diet ($P < .05$). There were no significant interactions for any of the parameters tested except for interactions between energy and feed form. BW and FCR were improved by energy when diets were fed in the mash form (unlike the crumble-pellet form) at all ages. It is concluded that feeding crumble-pellets from 1 to 21 days of age improved BW and FCR and that an increase in the protein (unlike energy) content of the diet increased the performance of the chickens at the end of the third week.

2.1.3 A Comparative Effect of Mash and Pellet Feed on Broiler Performance and Ascites at High Altitude (Field Study)

Ghazi *et al.*, (2012) in this study, a total of 11000 Ross-308 broiler chicks, in 4 groups (2750 chicks) each were fed on mash or pellet diet from the 1 to 28 day of age to compare their

performance according to different diet. The chickens 4th groups were reared on deep litter in open poultry farm at about 2450 meter altitude above sea. The chicks were fed on Mash from koudijus (Gr. 1), Pellet from koudijus (Gr.2), Pellet from Hendrix N.V. (Gr.3) and Pellet from Hendrix N.V Merksem (Gr.4). The results showed that feeding on Pelleted ration improved the weight gain, feed intake and feed /gain compared to mash diets. The highest body weight throughout all of the4 weeks was observed in Pellet from Hendrix fed chickens (1103.73gm), while the lowest body weight in different weeks were observed in Mash from Koudijus. During the whole period it was observed that pelleting increased the feed intake compared to mash feed. The highest (1595g/bird) at 4 th week and the lowest (1474g /bird/week) feed consumption were observed in pellet Hendrix (gr 4) and Mash Koudijus (gr1); respectively. The highest (0.786)FCR value was observed in mash group, which indicated low feed conversion efficiency. The mash feed given only for the first four weeks significantly reduced the subsequent incidence of ascites. The mortality with ascites in birds receiving polluted feed was consistently the greatest and was the lowest in birds fed on mash.

2.1.4 Effects of Pelleted or Crumbled Diets on the Performance and the Development of the Digestive Organs of Broilers

Choi *et al*., (1986) two types (mash and crumble) of the starter ration (for 0 to 4 weeks of age) and two types (mash and pellets) of the finisher ration (for 4 to 8 weeks of age) were fed to broilers in a 2 × 2 factorial arrangement. Chicks fed the crumbled starter diet gained more weight and consumed more feed (P<.01). Pelleting the finisher diet also significantly (P<.01) improved weight gain and feed intake. Feeding the crumble during the starter period significantly (P<.05) decreased gizzard weight at 4 weeks of age. Pelleting the finisher diet also significantly (P<.01) reduced weights of the digestive tract and the gizzard at 8 weeks of age, compared to those fed the mash diet.

2.1.5 A Comparative Effect of Mash and Pellet Feed with Different Pelleting Temperature on Blood Metabolites, Carcass Characteristics and Broiler Performance

Hosein Amirabdollahian *et al., (*2014) this study was conducted to evaluate the effects of feeding mash versus pellet with different thermal process on blood metabolites, carcass characteristics and broiler performance. 192 (one-day) Cobb broiler chicks were used in a completely randomized design with 4 experimental groups (diets) and 4 replicates of ten chicks

each (totally 16 pens). The experimental treatment groups consisted of mash diet (control) and three experimental diets pelleted with temperatures of 72, 82 and 92 ◦C. Results indicated that effects of different temperatures of thermal process had a significant effect on feed intake in 1-42 days period (P0.05). Effect of the process on serum glucose, cholesterol, HDL, LDL and enzyme concentrations of aspartate amino transferase (AST) and alanine amino transferase (ALT) wasn't significant at 49 days (P>0.05)

2.1.6 Performance of Broiler Fed on Mash, Pellet and Crumble

M.S. Jahan*, et al., (*2006) a total of 144 ISA-i757 broiler chicks were fed on mash, pellet and crumble diet in the age duration of 21 to 56 days to compare the performance of broiler on different dietary groups. All the forms of feed were of identical composition as well as same environment and management were provided for all the treatments.

The body weight of birds fed on mash, pellet and crumble group from 4th to 8th weeks of age differed significantly (P<0.01). The highest, intermediate and the lowest body weight were observed for crumble, pellet and mash group respectively. The body weight gain also highest in crumble group (P<0.01). Feed consumption of the 3 treatments differed significantly (P<0.01). Crumble group showed high trend of feed consumption. Higher FCR value (P<0.01) was observed for mash group, which indicated low feed conversion efficiency. On the other hand crumble and pellet group showed better fed conversion efficiency. Significantly high (P<0.01) performance index and production number were observed for crumble group. Survivability percent of all treatments did not differ significantly (P>0.01). Total cost of production was significantly (P<0.01) less for crumble and this was statistically similar with pellet group. The results of this experiment give an impression that crumble form of feed is better than mash and pellet form for the production of commercial broiler for the age duration of 21 to 56 days.

2.1.7 Effect of feed form on broiler chicks performance

Farghly *et al., (*2014) the objective of the study was to evaluate the effect of feed form on Ross broiler chicks performance. A total ninety six chicks at one day old, divided into 4 treatment groups (24 birds/each), were housed in two-tier wire floor battery in a closed house. The first, second and third treatment groups (T_1, T_2 and T_3) were fed on pellets, crumbles and wet feed, respectively, and the forth group fed mash feed (T_4) and considered as control group (C). The

obtained results showed that treatments birds fed pellets and wet forms throughout the experimental period had superior body weight, feed conversation, body temperature and mortality percentages compared to birds fed mash and crumbles. Otherwise, no significant differences (P>0.05) existed in bon measurements, plumage conditions and carcass traits. It could be concluded that birds fed pellets and wet feed had high performance and economical efficiency. Consequently, diets for broiler chicks should be in pellets or wet form.

2.1.8 Effect of mash and crumbled feed forms on the performance of broiler chickens

Shoaib Ahmed Pirzado *et al*., (2015) the study was carried out to observe the influence of mash and crumbles on the performance of broilers at Poultry Production and Research Hyderabad, Department of Livestock and Fisheries, Government of Sindh. A total of 90 day-old broiler chicks were purchased from Hyderabad market and randomly divided into group A and B, each group was further subdivided three times and 15 chicks/replicate were reread. The chicks under group A and B given mash and crumbles feed respectively up to 42 days. The broilers provided crumble feeding consumed more (P<0.05) feed than that of mash provided. The overall feed intake of broilers fed crumble was higher (3964.3±0.72g/bird) than the broilers with mash feeding (3800.00±1.77g/bird). The body weight of broilers with crumble feeding was observed higher from 2nd to 6th week than that of broilers with mash feeding. The overall live body weight was recorded significantly more (2080.7±1.96g/bird) in broilers with crumble feeding than the broilers with mash (1884.80±0.57g/bird). The trend of weight gain (%) was also remained risen from 2nd to 6th week for the group of broilers fed crumbles in comparison of broilers with mash feeding. The overall FCR was recorded to be comparatively better (P<0.05) in broilers with crumble feeding (1.84±3.33) than broilers with mash (1.88±6.67). It could be concluded that the broilers provided crumble feed may gave better body weight and efficient feed conversion.

2.1.9 Broiler Performance Fed on Mash vs. Pellets.

Sena *et al*., (2014) a total of 600 broiler chicks (ROSS-308) were randomly assigned into two analogous groups to one of two treatments: one of the group was fed on mash while the other one on pellet diet in the age duration of 21 to 43 days, aiming to compare the performance of broilers on two dietary groups. Both groups of chicks consumed the same feed ration/formula and were

housed in the same building in adjacent rooms, under same environmental conditions and access to feed and water. During the whole period of trial, both body weight and the gained weight resulted to be higher (with significant difference) to the group of chicks fed with pellet feed. A clear trend was noted towards the improvement of feed consumption per unit of gained weight of the chicks under the experimental group ($p \leq 0.05$). For the entire period of the experiment, the experimental group of chicks consumed 0.27g feed/g of live weight, or 9.64% less feed/unit of gained weight compared with the control group. Use of pellet feed influenced the improvement of the performance index to a level of 15, 41%. The group fed on pellet feed during the trial period demonstrated the highest values of PEF (19.69% more) and technical performance. The results of this experiment give an impression that pellet feed is better than mash one for the production of commercial broilers, applied for the age duration of 21 to 43 days.

2.1.10 Effect of Pellet and Mash Diets Associated with Biozyme Enzyme on Broilers Performance

Shafiee Sarvestani *et al., (*2006) this experiment was conducted to investigate the effect of form of diets with different levels of biozyme enzyme on broilers performance. 800 Arbor Acres strain chickens were used in a factorial arrangement 2×3 with 2 form of diets (pellet and mash) and 3 levels of biozyme (0, 0.75 and 1.5 kg/ton) in a randomized completely design with 6 treatments and 3 replicates in each treatment and 45 birds/replicates. The weight gain (WG), feed intake (FI) and feed conversion ratio (FCR) were measured weekly from week 1-6. Carcass components were recorded at the end of trial (day 42). The WG were significantly ($P<0.05$) greater in broiler fed pellet diets than comparable groups. The birds fed diet containing 0.75 kg/ton biozyme had greater WG (56.31 vs. 54.77 and 54.57 gram) and better FCR (1.7 vs. 1.79 and 1.84) than birds fed diets containing the two others levels. The weight of breast, thigh, abdominal fat and liver were significantly ($P<0.05$) greater in broilers fed 0.75 kg/ton Biozyme and pellet diet. Heart weight in broilers fed pellet diets were significantly ($P<0.05$) heavier than the broilers fed mash diets (9.56 vs. 8.056 gram). On, the other hand, Right ventricle to Total ventricle ratio was not affected by form of diet. It is concluded that the performance and carcass characteristics were improved in pellet diets.

2.2 Dietary effect of pellet and mash feed of laying hen

2.2.1 Effect of feed form, formulation, and restriction on the performance of laying hens

Scott *el al*., (199) A laying trial was performed with 1440 DeKalb® hens caged at 18 wk of age to test the effect of feed form (expanded pellets or mash) and type of formulation (for crude protein [CP] or for specific amino acids[AA]), and five levels of feed restriction applied at either 24 wk or 32 wk of age. Formulation for CP rather than AA content resulted in 4.4% greater egg production and 7.1% greater production of egg mass in hens fed mash and 4.0% better feed efficiency in hens fed both mash and pellets. Hens fed mash had 2.3% higher feed consumption, suggesting that the hens may prefer mash. Feed restriction reduced body weight and hen–day egg production proportionate to the restriction level, but egg weight was reduced only slightly. These data suggest that care should be exercised in formulating for AA content rather than for CP, especially if feed intake is reduced. This strain of hens was very successful at regulating its feed intake for maximum production, and even a slight feed restriction produced a negative effect on production.

2.3 Dietary effect of pellet and mash feed of pig

2.3.1 Effects of Pelleting Conditions on Performance of Pigs Fed a Corn-Soybean Meal Diet

Skoc *et al*., (1983) the effects of a steam-pelleted corn-soybean meal diet on the performance of 146 pigs were examined. Pelleting variables were closely monitored during processing. Treatments included (1) mash, (2) mash with 2.5% molasses replacing corn, (3) dry-pelleted mash, (4) steam-pelleted mash and (5) mash with 2.5% liquified corn. Growth and digestibility trials were conducted with weanling (8.5 kg) and grower-finisher (48.0 kg) pigs. Steam conditioning before pelleting made pellets more durable and resulted in less starch damage and less consumption of electrical energy than did dry pelleting. Steam acted as a lubricant between the mash and die hole surface. More than 70% of the energy required for steam pelleting was used to generate steam. None of the processing methods studied improved ($P<.05$) weanling pigs' average daily gain (ADG), feed intake, feed:gain ratio or energy digestibility. Protein digestibility was lower ($P<.05$) with the steam-pelleted diet than with the mash diet. Grower-finisher pigs fed either pelleting treatment showed improvement ($P<.05$) in feed:gain ratio and energy digestibility over those fed the mash diet. However, ADG was not increased ($P<.05$).

Animal performance was not improved by the substitution of liquified corn or molasses in either growth study. Pigs preferred pelleted to mash diets and dry to steamed pellets.

2.3.2 Impact of mash feeding versus pellets on propionic/butyric acid levels and on total load in the gastrointestinal tract of growing pigs.

Longpre J*et al., (*2016) feed characteristics may influence the bacterial community composition and metabolic activities in the pig gastrointestinal tract, known to be associated with positive effects on the gut. Use of mash feed is associated with reduced excretion, but little is known of its effect on the population or of the mechanism of action. Our objectives were to assess the effect of feed texture combined with feed particle size on VFA profiles and levels, total count, and the presence of genes encoding virulence factors of pathogenic strains in the digestive tract along with their impact on pig performance of fattening pigs. Pigs (= 840) on a commercial farm received mash or pellet diets of different particle sizes during the fattening period. Caecal and colon contents from 164 pigs were sampled at the slaughterhouse for enumeration of by quantitative PCR (qPCR) and for VFA quantification by capillary gas chromatography. The gene was used to enumerate total. Improved pig performances associated with pellet texture and a 500-µm size were observed. Caecal (= 0.02) and colon (< 0.01) propionic acid concentrations were lower for pigs receiving pellet rather than mash feed. Similarly, caecal (= 0.01) and colon (< 0.001) butyric acid concentrations were also lower for pigs receiving pellet rather than mash feed, as determined by capillary gas chromatography. Moreover, caecal (= 0.03) and colon (< 0.001) butyric acid concentrations were higher for pigs receiving a feed with a 1,250-µm particle size rather than a 500-µm particle size. On the other hand, total caecal and colon levels were higher for pigs receiving pellet feed than for those receiving mash feed. For total enumeration, caecal (< 0.01) and colon (< 0.01) gene copies were higher for pigs receiving pellet rather than mash feed. No effect of particle size on fatty acid concentrations or on numbers was observed. Virulence gene quantification revealed no trend. Taken together, results showed that mash feed is associated with lower growth performance but with favorable intestinal changes linked to VFA levels and reduction in the intestine.

2.3.3 Effect of crumbled diet on growth performance, market day age and meat quality of growing-finishing pigs

DinhHai Nguyen *et al.*, (2016) this study was conducted to determine the effect of crumbled diet on growth performance, market day age, and meat quality of growing-finishing pigs. A total of 120 crossbred pigs [(Landrace × Yorkshire) × Duroc] with an average initial body weight (BW) of 25.89 ± 1.93 kg at 68 days of age were randomly allotted to 2 experimental diets based on initial BW (15 replicate pens per treatment, 4 pigs per pen; 2 barrows and 2 gilts). The trial lasted for 120 days. Dietary treatments included: (1) T1 (mash diet); (2) T2 (crumble diet). During the overall study period pigs fed the T2 (crumble diet) had significantly greater ($P < .05$) average daily gain (ADG) and gain to feed ratio (G:F). Moreover, the number of pigs reaching market age at day 177 was higher in pigs fed crumble diet than mash diet. No significant differences were observed in back-fat thickness, meat colour, sensory evaluation, cooking loss, drip loss, water holding capacity, and longgissimus muscle area (LMA) between T1 and T2 groups. Our results revealed that the growth performance was significantly enhanced in pigs fed with the crumble diet. The crumble diet reduced market day age and meat quality of growing-finishing pigs.

2.4 Dietary effect of pellet and mash feed of quail

2.4.1 Effect of mash, pellets, crumbles and wet feed on performance of Japanese quail during the summer.

Farghly, *et al.*, (2012) the influence of feed form on productive and reproductive performance was studied in 240 Japanese quail chicks from 14 to 180 d of age to alleviate high temperature effects during summer season. The experimental chicks of were housed in batteries and assigned to 4 groups (60 birds/each). Birds fed mash feed, and considered as control group (C). While, the first, second and third treatment (T1, T2 and T3) was fed on pellets, crumbles and wet feed, respectively. All experimental birds were raised under similar environmental and managerial conditions. The results showed that treatments birds fed crumbles and wet diets throughout the experimental period had superior body weight, feed conversation, egg number, shell thickness, haugh units, dressed carcass, lymphocyte, hematocrit and mortality percentages compared to birds fed mash and pellets at any time. Otherwise, no significant differences ($P \leq 0.05$) existed in feed consumption, plumage conditions and egg weight. It could be concluded

that birds fed wet during growing period and crumbles feed during laying period had high performance and economical efficiency. Consequently, diets for Japanese quail should be in crumble or wet form during high summer temperatures.

2.4.2 Pellets *Versus* Mash for Starting Bobwhite Quail

Wilson and W. G. Nesbeth (1980) two experiments were conducted to compare the performance of Bobwhite quail chicks fed mash or pellets. Three treatments were compared: mash, hatch through 5 weeks; mash, hatch through 2 weeks then pellets through 5 weeks; pellets, hatch through 5 weeks. A total of 4320 chicks were used in the two experiments.

Feeding pellets from hatch through 5 weeks of age resulted in larger body weights but did not affect feed conversion or mortality. Feeding mash from hatch through 2 weeks of age then pellets through 5 weeks of age resulted in significantly poorer feed conversion. The data suggested a possible adverse effect of changing types of feed (mash to pellets) at the end of 2 weeks.

2.4.3 Effect of Various Forms of Feed on Growth Performance of Japanese Quail

Raj put *et al.*, (2016) 300, day-old quail chicks were purchased from commercial hatchery and kept at Poultry Experiment Station Tandojam. Duration of Experiment was 6-week. Quails were divided into two groups viz. A and B, each group was consisting of 150 quails. Group A, was offered pallet feed while group B mash feed, twice daily and water was made available over 24 hours per day. Both groups were housed in similar management. The results showed that the average feed intake of Japanese quails in-group A and B (403.6 and 455.0gm/b) was significantly different ($p<0.001$). Average water intake of Japanese quail' in-group A and B (877.2 and 925.9 ml/b) was also significantly different ($p<0.05$). Average live body weight of Japanese quail of group B was relatively higher than group A (158.2 and 133.8 gm /b) respectively. Average Feed Conversion ratio of group B (2.9) was relatively high than group A (3.0). Average weight of liver, heart and gizzard of group B was slightly higher (3.2, 1.4 and 3.5 gm/b) than group A (3.0, 1.3 and 3.3 gm/b), respectively. It was concluded that the weight gain and F.C.R of Japanese quail fed on mash feed was better than fed on pellet feed.

2.5 Dietary effect of pellet and mash feed of duck

2.5.1 Effect of Different Levels of Seaweed in Starter and Finisher Diets in Pellet and Mash Form on Performance and Carcass Quality of Ducks

El-Deek *et al*., (2009) two trials were run to assess the nutritional value of seaweed as a feedstuff in starter and finisher diets for ducks. The first trial (starter period): 96, one-day old commercial ducks were weighed, wing banded and randomly distributed to battery brooders into 8 treatment groups (3 replicates x 4 ducks each). The ducks were fed the experimental diets contained 0, 4, 8 and 12% seaweed, the diets were offered ad-libitum in pellet and mash form from one day to 5 wks of age. The second trial (finisher period): 160 commercial ducklings (35 days of age) were weighed; leg banded and distributed to 16 treatment groups of ten ducks each. The ducks were fed the experimental diets contained 0, 5, 10 and 15% seaweed, the diets were offered ad-libitum in pellet and mash form from 35-63 days of age. Results of trial 1 indicate that there were no significant differences in Feed Intake (FI), Feed Conversion Ratio (FCR) due to inclusion of seaweed up to 12% in starter diet either in mash or pellet form. In general, ducks given pelleted diets utilized feed more efficiently than those given the mash one. Results of trial 2 reveal that seaweed can be included up to 15% into ducks finisher diets either in pellet or mash form without adversely affecting growth and FCR. The relative weight of dressing, liver, gizzard, thigh muscles and breast muscles were not significantly affected by including up to 15% of seaweed in finisher duck diets. Seaweed at 5 and 10% in the finisher duck diets significantly increased the relative weight of breast muscles. Seaweed up to 15% in duck diet significantly improved the texture of breast muscles and 5 and 10% seaweed improved the texture of thigh muscles. There were no significant differences in the aroma, taste, juiciness and color of meat due to seaweed up to 15% in duck diets. In conclusion, seaweed can be used in starter and finisher duck diets up to 12% and 15%, respectively, without adversely affecting growth performance and carcass quality.

2.6 Dietary effect of pellet and mash feed of turkey

2.6.1 Feed Texture Effects on the Performance of Turkey Broilers

Proud foot *et al.*, (1982) an experiment involving 2400 turkey broilers was conducted to compare feeding starter, grower, and finisher diets in the all-mash form or as crumbles and pellets. The effects of pelleted grower and finisher diets containing 0, 7.5, 15, 30, or 60% “fines”

were also comparatively evaluated. Lower body weights and poorer feed conversion resulted when birds were fed the allmash diets, but mortality, carcass grades, and monetary returns were not affected significantly ($P<.05$). Similarly, as levels of fines in pelleted grower and finisher diets increased, feed conversion was adversely affected and body weights tended to be lower, but mortality, carcass grades, and monetary re turns were unaffected ($P<.05$).

CHAPTER III

MATERIALS AND METHODS

3.1 Location of the study

The experiment was conducted at the Dairy and Poultry Science farm of Hajee Mohammad Danesh Science and Technology University, Dinajpur, during the period from 4may to 10th July, 2019. The commercial Sonali chicken was used in this experiment for a period of 9 weeks to find out the growth performance of Sonali chicken with pellet and mash feed.

3.2 Experimental birds

One hundred seventy six (176) vigorous day-old Sonali chicks were collected from Nijam poultry hatchery.

3.3 Layout of the experiment

The experiment was conducted in complete randomized design (CRD). The chicks were randomly distributed to two dietary treatment groups ($T_1$and T_2) having four replications in each treatment. The chicks were reared in separated pens according to treatments and replications, each dietary treatment group contains of 22 birds. The layout of the experiment is shown in the Following table below:

Table 3.1: Layout of the experiment

Dietary Treatment	**No. of chicks in each replication**				**Total number of chicks in each treatment**
	R_1	R_2	R_3	R_4	
T_1	22	22	22	22	88
T_2	22	22	22	22	88
				Total	176

Where,

T_1: Pellet form feed

T_2: mash feed

3.4 Preparation of the experimental house

HSTU poultry farm was used for rearing experimental birds to evaluate the efficacy of pellet and mash feed on growth performance. Experiment shed was constructed with compartment of housing for twenty two birds. Each compartment was 85x70inches for length and breadth respectively. The shed was constructed by iron net and wooden materials. At first, the experimental house was properly washed and cleaned by using tap water. Ceiling, walls, and floor were thoroughly cleaned and subsequently disinfected with bleaching powder, then the room was kept closed for two weeks. After that, the house was again disinfected with Timcen solution 1ml/3liter water. At the same time, all feeders, waterers and other necessary equipment were also properly cleaned, washed and disinfected with bleaching powder. After proper drying, the house was used for the birds rearing.

3.5 collection of feed

The pellet feed (Nourish) are collected from local market and Mash feed are made by own in Polli poultry farm.

Fig.3.1: Preparation of Mash feed

Figure 3.2: Pellet feed (Nourish)

3.6 Experimental diet

The experimental diet was divided into two phages (Sonali-starter, Sonali-grower). Sonali starter was provided 1 to 30 days and Sonali grower was provided from 31 days to end day of experiment. Commercial Sonali-starter feed was provided upto 30 days of age. Then, the rest day of the experiment was supplied grower feed .The grower was two type one is

1. Pellet form and another
2. Mash form.

Nourish pellet form feed was used as pellet form feed and mash form feed was made by own at polli poultry farm.

Table 3.2: Nutrient Composition of Sonali Starter

Chemical composition	**Starter (Up to 14 days)**
Moisture (%)	11-12
Crude protein (%)	21
Crude fiber (%)	5
Crude fat (%)	-
Ether extract (%)	4
Calcium (%)	1
Available phosphorus (%)	0.5
ME (Kcal/Kg)	2850

Table 3.3: Ingredients amount of formulated ration of Sonali Grower with their chemical Composition.

Ingredients	Percentage (%)
Maize	56.2
Soybean	27
Rice Polish	9
Soybean Oil	1.5
DCP	0.5
Propec	3.74
Oyster Shell	0.9
Limestone	0.76
Salt	0.4
Total	100

Table 3.4: Chemical composition of Sonali Grower

ME (Kcal/Kg)	2869.55
Crude Protein (%)	19.172
Crude Fiber (%)	3.13
Ether Extract (%)	4.63
Calcium (%)	0.67
Phosphorus (%)	0.7343
Lysine (%)	1.0127
Methionine (%)	0.31745

***** Added vitamin-mineral premix @ 250gm, Lysine @ 50gm, Methionine @ 50gm, Toxin Binder @ 150gm, Anti-Salmonella @ 150gm, Enzyme @ 50gm, Emulex @ 50gm and Maduramysin @ 50gm per 100 kg feed.

3.7 Routine Management

The birds were reared to similar care and management in all treatment groups throughout the experimental period. The following management practices were followed whole experimental period.

3.8 Litter Management

Fresh and dried rice husk was used as litter at a depth of 2-3 inch. After 5 weeks, old litter was totally removed and new litter was provided as same depth. The litter was stirred with rake one time per day from four weeks up to the last day of experimental period.

3.9 Floor Space

Each pen was 7×5 sq. ft. allocated for feeding, watering, and housing for 22 experimental birds.

3.10 Brooding Management

Brooding is the first management of day old chick. In brooding period, electric brooder was used to provide suitable heat in chick for maintaining their body temperature. The brooder was hanged just above the bird level at the center of chick guard. Before entrance of day old chicks, fresh dried litter was provided at depth 3 inches then covered by newspaper. Pre-heating the brooding space and temperature adjust at 33 ± 2^{0}C. After entrance, day old chicks were provided vitamin C

and glucose, one-hour later feed was provided. At first day temperature was maintained 33± 2^0C then gradually decreased 1^0C per day. Temperature and humidity were recorded by using clinical thermometer and hygrometer.

Fig. 3.2: Brooding management

Fig. 3.3: Preparation of shed

3.11 Lighting Management

The birds were exposed to 23 hours of lighting and 1-hour dark period throughout the experimental period.

3.12 Feeding and drinking

Provide adlibitum feed and water through the experimental period.

Table 3.4 Vaccination

Name of Vaccine	Name of diseases	Age (Days)	Route of administration
IB+ND	Infectious Bronchitis & New Castle	4th	One drop in one eye
IBD	Gumboro	12th	One drop in one eye
IBD	Gumboro	17th	Through drinking water
ND	New Castle	22nd	Through drinking water
ND	New Castle	42nd	Through drinking water

Vaccine, prepared by ACI pharmaceutical company was applied as per recommendation of the manufacturer

Fig.3.4: Vaccination of bird

3.13 Sanitation

Drinkers were washed daily in the morning and feeders were cleaned weekly before being used. Strict sanitary measures were followed during the experimental period.

3.14 Temperature and relative Humidity measure

Temperature (^{0}C) was recorded by clinical thermometer and relative humidity (%) was recorded by digital hygrometer three time daily.

3.15 Debeaking

Debeaking of the birds was done successfully by electric debeaker at the age of 42 days to reduce cannibalism and other external injuries.

Fig. 3.5: Debeaking of birds

3.16 Calculation

1. Total weight gain in (kg). This was computed as a group by subtracting the initial weight from the final weight.
2. Weight gain (gm) = Final weight – Initial weight
3. Total feed consumption (kg). The amount of feeds consumed by the birds from the start until the end of the experiment (70 days) .This was computed by adding the total feeds offered after the total left- over have been subtracted.
4. Feed consumption = Total feed offered – Total left over
5. Feed efficiency. This was obtained per treatment by dividing the total feed consumed by the total gain in weight. Feed efficiency is computed for the whole duration of the experiment (70 days).
6. Feed efficiency = Total feed consumed / Total gain in weight
7. Total cost of the total feed consumed (PhP). This was obtained by multiplying the cost of feed per kilogram to the total feed consumed.
8. Cost of the total feed consumed = Cost of feed per kilogram × Total feed consumed
9. Feed cost per kg gain of Sonali chicken (PhP). The feed cost per kilogram of gain in weight and this was computed as the price of feeds per kilogram multiplied by the total gain in weight.
10. Feed cost per kilogram gain = Price of feeds per kg × Total gain in weight
11. Mortality rate (%) = No. of dead chickens / Total no. of birds as a group × 100
12. Cost of production. This includes the cost of stocks, feeds and vitamins, electricity, and materials used.
13. Gross income. This was obtained as a group by multiplying the sum of the final weight of the birds by the price per kilogram of live weight.
14. Gross Income = Total weight of the birds (as a group) × Price per kilogram
15. Net income. This was obtained by subtracting the cost of production from the gross income.
16. Net income = Gross income – Cost of production

3.17 Data collection and record keeping

The following records were kept during the experimental period: Initial DOCs weight and after brooding weight of chicks. Weekly Body weight gain and feed intake was recorded replication wise in each treatment group at last day of week. Mortality was recorded daily if death occurred. Temperature and relative humidity was recorded three times in a day.

3.18 Statistical analysis

The data of feed consumption and growth performance were recorded and analyzed by SPSS version-22 software by using one way ANOVA accordance with the principles of Complete Randomized Design (CRD). All values were expressed as Mean±SEM and significance was determined when ($P<0.05$). Mean were compared among the treatment groups at the 0.5 level of significance by using Duncan multiple test.

CHAPTER IV
RESULT AND DISCUSSION

This experiment was conducted to evaluate the efficacy of Mash feed and Pellet feed on production performance in terms of weekly body weight gain, final live weight gain, feed intake and feed efficiency of Sonali chicken. This experiment was held under the department of Dairy and Poultry Science, Faculty of Veterinary and Animal Science, HSTU, Dinajpur. Day old chicks were randomly divided into two groups (T_1 and T_2) after 28 days for assessing the efficacy of Mash and pellet feed on Sonali birds.

4.1 Weekly Body weight gain

At the start of the experiment, the average body weight of the birds did not differ significantly among the treatment group. The live weight of birds in 1^{st}, 2^{nd}, 3^{rd} and 4^{th} weeks did not significantly ($P<0.05$) vary among the treatment groups (Table-1). The efficacy of Pellet feed and Mash feed up to 4^{th} weeks showed live weight same. At 6^{th} weeks the highest values was found in T_1 (711.51±10.66g) that was received Pellet feed and the lowest values was found in T_2 (616.00±13.42g) that received Mash feed. Next weeks the highest values was found in T_1 (814.33±14.38g) that was received Pellet feed and the lowest values was found in T_2 (725.00±11.80g) that received Mash feed. The result of this study clearly showed that Pellet feed live weight gain upto 7^{th} weeks of age. Live weight of 6^{th} and 7^{th} weeks significantly ($p<0.05$) differed between two treatment groups. Live weight gain was significantly ($p<0.05$) highest in T_1 compared to T_2 group. However the Pellet feed was showed maximum live weight (814.33±14.38g) and minimum live weight was showed (725.00±11.80g) in T_2 treatment group at the terminal stage of experiment. It is clearly state that Pellet feed increase more live weight of Sonali Chicken Compare with Mash Feed. The significant effect of Pellet feed on body weight gains were found higher in treated group compared to Mash feed group (Table 1).

Similarly, Asha Rajini *et al.* (1998a,b), Deaton *et al.* (1992), Kamar *et al.* (1974) and Bertechini *et al.* (1992) reported that pellet fed birds gain heavier body weight than that of mash.

4.2 Body weight gain

In (Table 1) initial body weight of Sonali chicks fed on two form of feed was similar ($p>0.05$). Final live weight gain was statistically significant ($p<0.05$) between two treatment group. The highest body weight gain was attained in birds that received Pellet feed. However, Pellet feed group T_1 was significantly ($p<0.05$) higher body weight gain compared to Mash feed group T_2. The result of this study was indicated that Pellet feed (T_1) induces highest body weight gain compared to Mash feed group at the end of feeding trial.

Table 4.1: Effect of supplementation of Mash and Pellet form of feed on weekly body weight and body weight gain of Sonali chicken

Parameter	T_1	T_2	Level of significance
4^{th} Week	179.61±1.85	182.79±4.08	NS
5^{st} week	216.87±2.38	215.18±1.90	NS
6^{nd} week	305.16±4.43	296.00±4.29	NS
7^{rd} week	371.05±4.80	360.97±6.91	NS
8^{th} week	429.73±5.11	413.52±8.50	NS
9^{th} week	528.39±7.43	498.14±11.74	NS
10^{th} week	711.51±10.66	616.00±13.42	*
11^{th} week	814.33±14.38	725.00±11.80	*

The mean values differs significantly, at least ($p<0.05$). All values indicate Mean±Standard Error of mean. NS means statistically not significant, *Means significant at 5% level of significance ($P<0.05$).

4.3 Feed intake

In (Table 2) the cumulative feed intake of Sonali chicken in two form of feed treatment during experimental periods was almost statistically similar and the differences were insignificant ($p>0.05$). However, the lowest feed intake (1665.60±20.33g) was found T_2 group. The birds of T_1group showed higher feed intake (1735.26±13.54g) compared to others groups.

Similarly, Bertechini *et al.*, (1992) reported that pelleted diets gave greater feed intake than did mash forms. At the similar way Moran (1990) and Nir et al. (1995) showed that pellet diet increased feed intake in broilers

Table 4.2: Effect of Pellet and Mash Feed on feed intake (Weekly)

Parameter	T_1	T_2	Level of significance
5th Week	101.51±1.33	101.45±1.40	NS
6st week	201.47±2.38	201.64±1.95	NS
7nd week	242.04±1.91	243.18±1.82	NS
8rd week	266.02±1.50	257.84±1.33	NS
9th week	299.43±3.78	252.27±13.25	NS
10th week	283.86±4.10	278.52±9.98	NS
11th week	340.96±1.89	330.68±2.68	NS
Total feed intake	1735.29±2.08	1665.58±4.61	

4.4 Feed efficiency

Feed efficiency of different treatment groups during the experimental period statistically significant ($P<0.05$). The birds of T_1 groups containing Pellet feed converted feed to meat most efficiently than T_2 groups. The feed efficiency of T_1 treatment groups was statistically significant ($P<0.05$) with T_2 group. From (Table 2) feed efficiency was higher at the Pellet feed group (T_1) . Highest feed conversion ratio (FCR) (2.29±0.016) was found in T_2 groups and lowest feed conversion ratio (2.13±0.02) was found in T_1 groups. It is generally accepted that, compared to mash, the feeding of pellets improves chick growth rate with an increased feed intake .

Similarly, Moran (1990) and Reece et al. (1986) who reported that pellets had a better feed efficiency over mash.

Table 4.2 Effect of form of feed on feed intake and feed conversion ratio (FCR) of Sonali chicken

Table 4.3 Effect of Pellet and Mash Feed on feed intake and feed efficiency Sonali chicken

Parameter	T_1	T_2	Level of significance
Feed intake	1735.26±13.54	1665.60±20.33	NS
FCR	2.13±0.02	2.29±0.016	*

The mean value significant, at least ($p<0.05$). All values indicate Mean±Standard Error of mean. NS means statistically not significant, *Means significant at 5% level of significance ($P<0.05$).

4.5 Cost benefit analysis of production

Production cost of Sonali chicks in this study are presented in (Table 5). Spending on feed, chick, vaccine, medicine, litter, miscellaneous (labour, electricity, transport cost) were constituted cost/chick. Lowest total production cost per bird gain was (89.33±4.57Tk.) found in T_2 group and highest was found (105.31±4.79Tk.) in T_1 group. Total feed cost per chick in two treatment was found non-significant ($p>0.05$). The highest profit (27.30±1.88TK) was found in T_1 group and lowest (24.85±1.60Tk.) was found in T_2 group.

Table 4.4 Cost benefit analysis of Pellet and Mash Feed treatments

Parameters (Tk.)	T_1	T_2	Level of significance
Chick cost	16	16	NS
Litter cost/chick	5	5	NS
Vaccine + medicine	10	10	NS
Miscellaneous cost/ chick	5	5	NS
Feed cost/ chick	69.31±4.79	53.33±4.57	
Total cost Tk./chick	105.31±4.79	89.33±4.57	
Selling price Tk./chick	130.16±5.05	116.63±3.81	
Net profit Tk./chick	24.85±1.60	27.30±1.88	

CHAPTER V

SUMMARY AND CONCLUSION

The experiment was conducted to evaluate the efficacy of Mash feed and Pellet feed on production performance of Sonali chicken in Bangladesh. A total of 176 one day old chicks were purchased. After 28 days of brooding the chick were randomly divided into five treatment groups namely (T_1 andT_2) having four replication in each treatment group. Experimental birds in T_1 was provided Pellet feed and T_2 was Provided Mash feed. At the terminal stage of experiment the cumulative body weight gain of two treatment groups wereT_1 (814.33±14.38g) and T_2 (725.00±11.80g). Birds that received Pellet feed was gained high (814.33±14.38g) body weight and low body weight was found (725.00±11.80g) in Mash feed group.

The feed intake between two treatments were non-significant ($p>0.05$). The cumulative maximum feed intake was observed in treatment T_1 group (1735.29±2.08g) and minimum in treatment T_2 group(1665.58±4.61g). All treatment groups showed non - significant difference ($p>0.05$). Feed efficiency of two treatment was statistically significant ($P<0.05$). Pellet feed treatment group (T_1) converted feed to meat most efficiently compared to T_2 treatment .

5.1 Cost benefit analysis of production

Production cost of Sonali chicks in this study are presented in Table 5. Spending on feed, chick, vaccine, medicine, litter, miscellaneous (labour, electricity, transport cost) were constituted cost/chick and cost/chick live weight. Total production cost per Chick was (105.31±4.79Tk.) found in T_1 group and highest was found (89.33±4.57Tk.) in T_2 group.

REFERENCE

Ahmed ME, Abbas TE, (2013). The effect of feeding pellets versus mash on performance and carcass characteristics of broiler chicks. Bull. *Environment, Pharmacology and Life Sciences.*2 (2):31-4.

Amirabdollahian H, Emamzadeh AN, Keramati K, (2014). A comparative effect of mash and pellet feed with different pelleting temperature on blood metabolites, carcass characteristics and broiler performance. *International journal of Advanced Biological and Biomedical Research.* 2 (1):141-5.

Asha Rajini R, Narahari D, (1998). Dietary energy and protein requirements of growing japanese quails in the tropics. *Indian journal of animal sciences.* 68 (10):1082-6.

Asha Rajini R, Kumararaj R, Narahari D, Ravindran R, Sundaresan K, (1998b). *Indian Journal of Poultry Science.* 33:346-348.

Asha Rajini R, Thanabalan S, Narahari D and Kim R, Hyoung Ho and Chung, Yuen Hoo, 1996. Effects of Kumararaj, (1998a). Influence of season, form of feed and dietary energy levels on broiler performance. *Indian Journal of Poultry Science.* 33: 36-41.

Banerjee GC, (1998). Poultry Third edition, Oxford and IBH Publishing Co. Pvt. Ltd. Calcutta, pp: 120-121.

Behnke KC, (1994). Factors affecting pellet quality. In: Proceedings of Maryland Nutrition Conference.

Bertechini AG, Hossain SM, (1992). Requirements and bioavailability of manganese from inorganic sources. *Poultry Science.* 71:32.

Bertechini AG, Rostagno HS , Oliveira AIG, (1992). *Poultry Science.* 18: 2965.

Bolton W and Blair R, (1977). Poultry Nutrition. Ministry of Agriculture, Fisheries and Food. Bulletin 174 (London, HMSO).

Briggs JL, Maier DE, Watkins BA, Behnke KC, (1999). Effect of ingredients and processing parameters on pellet quality. *Poultry Science*. 78 (10):1464–1471.

Calet C, (1965). The relative value of pellets versus mash and grain in poultry nutrition. *World's Poultry Science Journal*. 21(1):23–52.

Choi JH, So BS, Ryu KS, Kang SL, (1986). Effects of pelleted or crumbled diets on the performance and the development of the digestive organs of broilers. *Poultry Science*. 65(3):594-7.

Choi JH, So BS, Ryu KS, Kang SL, (1986). Effects of pelleted or crumbled diets on the performance and the development of the digestive organs of broilers. *Poultry Science*. 65(3):594–597.

El-Deek AA, Brikaa AM, (2009). Effect of different levels of seaweed in starter and finisher diets in pellet and mash form on performance and carcass quality of ducks. *International journal of poultry science.* 8(8):1014-21.

Farghly MF, Afifi OS, Hassanien HH, (2014). Effect of feed form on broiler chicks performance. In7th International Poultry Conference Nov 3 (pp. 3-6). Egypt: AinSukhna, Red Sea.

Farghly MF, (2012). Effect of mash, pellets, crumbles and wet feed on performance of Japanese quail during the summer. *Egyptian Journal of Nutrition and Feeds*. 15(1):161-72.

Howlider MAR, Rose SP, (1992). *Animal Feed Science and Technology.* vol.39: 71-78.

Jafarnejad S, Farkhoy M, Sadegh M, Bahonar AR, (2010). Effect of crumble-pellet and mash diets with different levels of dietary protein and energy on the performance of broilers at the end of the third week. *Veterinary medicine international*. 2010.

Jafarnejad S, Farkhoy M, Sadegh M and Bahonar AR, (2010). Effect of crumble-pellet and mash diets with different levels of dietary protein and energy on the performance of broilers at the end of the third week. *Veterinary Medicine International.* Article 328123. http://www.hindawi.com/journals/vmi/2010/328123/.

Jahan MS, Asaduzzaman M, Sarkar AK, (2006). Performance of broiler fed on mash, pellet and crumble. *International Journal of Poultry Science*. 5(3):265–270.

Kamran Z, Mirza MA, Haq AU, Mahmood S, (2004). Effect of decreasing dietary protein levels with optimum amino acids profile on the performance of broilers. *Pakistan Veterinary Journal*. 24:165–168.

Kim, Hyoung Ho and Chung, Yuen Hoo, (1996). *Journal of Agricultural Science, Livestock.* 35: 554-558

Longpre J, Fairbrother JM, Fravalo P, Arsenault J, LeBel P, Laplante B, Surprenant C, Masse D, Letellier A, (2016). Impact of mash feeding versus pellets on propionic/butyric acid levels and on total Escherichia coli load in the gastrointestinal tract of growing pigs. *Journal of animal science.* 94 (3):1053-63.

Jahan MS, Asaduzzaman M and Sarkar AK, (2006). Performance of Broiler Fed on Mash, Pellet and Crumble. *International Journal of Poultry Science*. 5: 265-270.

Mendes AA, Polity ES, Garcia EA, Sartor JRi, (1995). *Veterinaria-e-zootecnia*, 7: 31-40.

Mendes AA, Polity ES, Garcia EA and Sartori JR, (1995). Effect of ground of pelleted diets on performance and carcass yield of broiler chicken. *Veterinaria-e-zootecnia*, 7: 31-40.

Moran ET, Jr, (1990). *Poultry. Abstract.* 16: 2875

Moran ET, Jr, (1990). *Poultry. Abstract.* 16: 2875.

Moran ET, Jr, (1990). Effect of pellet quality on the performance of meat birds. *Poultry. Abstract.* 16: 2875.

Nir I, Hillel R, PtichiI, Shefet G, (1995). *Poultry Science.* 74: 771-783.

Pirzado SA, Mangsi A, Barham GS, Mari GM, Pirzado Z, Kalwar Q, (2015). Effect of mash and crumbled feed forms on the performance of broiler chickens. *Journal of Agriculture and Veterinary Science.* 8 (12):27-30.

Proudfoot FG, Hulan HW, (1982). Feed texture effects on the performance of turkey broilers. *Poultry Science.* 61(2):327-30.

Rajput N, Naeem M, Ali S, Shah AM, Rizwana H, Shah AR, Jehejo AR, (2016). Effect of Various Forms of Feed on Growth Performance of Japanese Quail. *Sindh University Research Journal-SURJ (Science Series).* Dec 21; 48(4).

Reece FN, Lott B, Deaton JN, (1986). *Poultry Science*. 65: 636-641.

Reece F.N, Lott B.N , Deaton J.W, (1984). *Poultry Science*. 63: 1906-1911.

Sarvestani TS, Dabiri N, Agah MJ, Norollahi H, (2006). Effect of pellet and mash diets associated with biozyme enzyme on broilers performance. *International Journal of Poultry Science*. 5 (5):485-90.

Scott TA, Silversides FG, Tietge D, Swift ML, (1999). Effect of feed form, formulation, and restriction on the performance of laying hens. *Canadian journal of animal science.* 79 (2):171-8.

Sena S, Sena L, Hoda A, Nikolla M, (2014). Broiler Performance Fed on Mash vs. Pellets. *Albanian Journal of Agricultural Sciences*. 2.

Skoch ER, Binder SF, Deyoe CW, Allee GL, Behnke KC, (1983). Effects of pelleting conditions on performance of pigs fed a corn-soybean meal diet. *Journal of Animal Science.* 57 (4):922-8.

Zohair GA, Al-Maktari GA, Amer MM, (2012). A comparative effect of mash and pellet feed on broiler performance and ascites at high altitude (field study). *Global Veterinaria.* 9 (2):154-9.