



Research Article

Effect of yeast (*Saccharomyces cerevisiae*) fermented commercial moist diet on the performance of broilerJesmin Aktar¹✉, Ashik Iqbal Emon² and Khan Md Shaiful Islam¹¹Department of Animal Nutrition, Faculty of Animal Husbandry, Bangladesh Agricultural University, Mymensingh-2202²Department of Poultry Science, Faculty of Animal Husbandry, Bangladesh Agricultural University, Mymensingh-2202

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ABSTRACT

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The aim of this experiment was to evaluate the effect of *Saccharomyces cerevisiae* fermented commercial moist feed (pellet) on the growth performance of broiler. The feeding trial was conducted for 35 days where commercial pellet feed was fermented for 48h at room temperature (26-28 Degree Celsius) with 2% *S. cerevisiae* and 50% moisture content. About 150-day old Indian River commercial broiler chicks were allotted for the experiment where first week were offered commercial pre-starter diet for adaptation. From age 8, the chicks were divided into five dietary treatment group (30 chicks each) with three replication (10 chicks each). The dietary treatments group were 1. Commercial Dry Feed (CDF) 2. Commercial Moist Feed (CMF) 3. Yeast added Commercial Dry Feed (Y-CDF) 4. Yeast added Commercial Moist Feed (Y-CMF) and 5. Yeast Fermented Commercial Moist Feed (YF-CMF), respectively. Maximum live weight gain was recorded in CMF (1867g) followed by 1665, 1598, 1583 and 1542g in Y-CMF, CDF, Y-CDF, YF-CMF groups, respectively. Feed intake was significantly increased in CMF (2472g) group compared to CDF group (2162g). After intaking commercial moist feed Feed Conversion Ratio (FCR) value was improved in CMF group (1.33) than CDF group (1.35). Fermentation of commercial pellet feed with yeast have no significant effect on growth performance of broiler. But moist pellet feed can increase feed intake that ultimately improve body weight gain and feed conversion ratio.

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Introduction

Efficiency of poultry production to convert feed into meat is essential because poultry industry contributes major quality protein (egg, meat) to fulfil the protein requirement of increasing population. But feed contributes major part of total production cost in commercial broiler production. Therefore, it is high time to improve the quality of these feed by using different methods like adding wet feeding, fermentation of feed and others (Sugiharto & Ranjitkar, 2019).

Wet feeding is a valuable tool to enhance birds' capability to survive in high ambient temperatures and to understand the feed consumption limitations when broilers are fed dry diets (Fargly *et al.*, 2018; Abd El-Moneim *et al.*, 2020). After feeding the mash diet in moist condition, significant improvements in the FI, FCR and daily weight gain (DWG) of commercial broilers were observed (Aktar *et al.*, 2024; Afsermanesh *et al.*, 2016; Tabeidian *et al.*, 2015). However, some other

research did not report noticeable changes in the DWG and FCR of broilers, ducks and geese due to feeding the moist mash diet compared to dry feed (Liu *et al.*, 2019; Farghy *et al.*, 2018; Emadinia *et al.*, 2014; Saleh *et al.*, 2013). However, no information is available on wet feeding of commercial pellet diet on broilers where commercial pellet diet is mainly recommended for broiler production.

On the other hand, fermentation of feed increase number of single cell which acts as probiotic and modify gastrointestinal microbial community also improves crude protein content and quality of protein in fermented material which is related to higher biological value through increased the utilization of protein in the body (Debi *et al.*, 2022; Sugiharto *et al.*, 2015). Several research found that the cell wall of yeast (*Saccharomyces cerevisiae*) is widely used in animal nutrition which is rich in β -glucan and mannan oligosaccharide that has beneficial effect on intestinal villi development and can regulate immunity of host

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(Teng *et al.*, 2017; Aristides *et al.*; 2018; Chuang *et al.*, 2019).

Yeast fermented moist feed (mash diet) have beneficial effect on broiler growth performance and bone mineralization in broiler (Aktar *et al.*, 2024). But in case of commercial feed, no research was performed although maximum farmer uses commercial feed for their broiler diet. Considering these facts, the aim of current research is to elucidate the effect of dry, wet and *Saccharomyces cerevisiae* fermented moist pellet feeds on growth performance of the broiler chickens.

Materials and method

Feed fermentation and chemical analysis

Yeast (*Saccharomyces cerevisiae*) and commercial pellet feed were collected from local market where yeast was imported from Angel Yeast Co. Ltd., China. Then, 2.0% yeast and 50.0% moisture was added with pellet feed and fermented anaerobically at room temperature (26-28°C). After fermentation moist fermented feed were collected for chemical analysis. Before and after fermentation pH was observed. Five dietary groups were 1. Commercial Dry Feed (CDF) 2. Commercial Moist Feed (CMF) 3. Yeast added Commercial Dry Feed

(Y-CDF) 4. Yeast added Commercial Moist Feed (Y-CMF) and 5. Yeast Fermented Commercial Moist Feed (YF-CMF), respectively. Yeast was added at 2.0% level in all the groups except CDF & CMF group, where 50% water was added in CMF, Y-CMF and YF-CMF dietary groups, respectively.

Feeding trial & Bird management

The experimental procedures and animal handling were reviewed and approved by the Animal Welfare and Experimental Ethics Committee of Bangladesh. Feeding trial was conducted with 150-day old straight run Indian River commercial broiler chicks for a period of 35 days. The chicks were randomly divided into 5 dietary groups (30 chicks per group; 3 replicates and 10 birds per cage). Considering animal welfare, birds were kept in the floor cage and saw dust was spread on the floor considered as bedding materials. Water and Commercial starter broiler feed of Nourish Company “Nourish Poultry & Hatchary Ltd” were offered *ad libitum* (Table 1). Birds were vaccinated against New Castle Disease (3 d and 18 d) and Infectious Bursal Disease (10 d & 21 d). Live weight, feed offered, feed refusal and mortality rate were recorded and calculated weekly.

Table 1: Chemical composition of Commercial pellet feed

Parameters	Composition
DM	88.47
CP	21.87
CF	3.17
NFE	7.31
EE	6.44
Ash	61.21

DM: Dry Matter; CP: Crude Protein; CF: Crude Fibre; NFE: Nitrogen Free Extract; EE: Ether Extract

Statistical analysis

Raw data were recorded using computer excel program. Then all recorded and calculated data were analysed using “IBM SPSS statistics 26” statistical program for one-way analysis of variance (ANOVA) in a Completely

Randomized Design (CRD) to test the significance of group effects. Comparison of group mean was performed using Turkey’s honestly significant difference test. Significance were designed at 5% level of significance ($p < 0.05$).

Table 2: Effect of feeding commercial moist feed and yeast (*Saccharomyces cerevisiae*) fermented commercial moist feed on growth performance and feed efficiency of broiler from day 08-35 (n=30)

Item	Groups					Sig
	CDF	CMF	Y-CDF	Y-CMF	YF-CMF	
IBW	165±4.6	167±1.1	165±8.6	171±6.0	164±4.1	NS
FBW	1763±28.3	2034±57.1	1768±49.7	1836±31.4	1740±40.0	NS
BWG	1598±30.8	1867±56.1	1603±41.2	1665±29.1	1576±39.9	NS

CDF: Commercial Dry Feed; CMF: Commercial Moist Feed; Y-CDF: Yeast added Commercial Dry Feed; Y-CMF: Yeast added Commercial Moist Feed; YF-CMF: Yeast Fermented Commercial Moist Feed; IBW: Initial Body weight; FBW: Final Body Weight; BWG: Body Weight Gain; SD: Standard Deviation; **= highly significant at 1% level ($p < 0.01$); N.S =Not significant; ^{a,b,c}Values of different variables under different programme indicates (Mean ± SD).

Result

Changes of pH after fermentation

In case of fermented feed, pH is a crucial parameter to indicate the presence of microbes. Among all dietary treatment group, YF-CMF group was fermented group

where the feed was fermented with 2% yeast at 50% moisture content. In YF-CMF group, fermentation reduces pH from 6.10 to 4.88 compared to control (CDF) group. Result is shown in Figure 1.

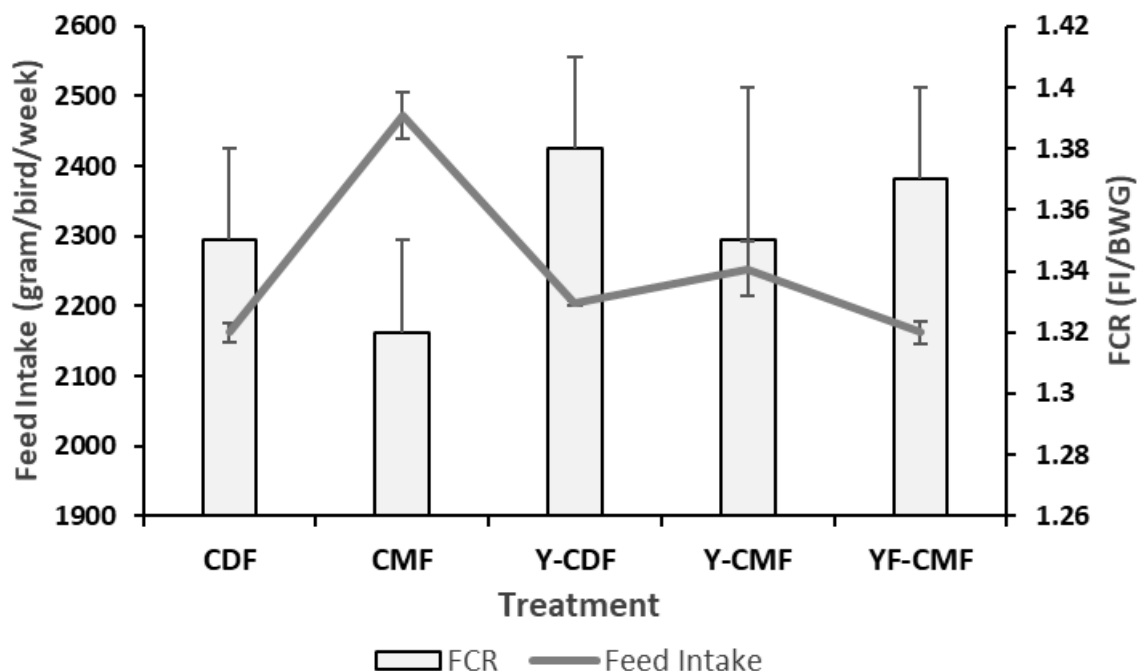


Figure 1: Changes of pH after fermentation of feed

Growth performance

Initial weight of the birds was 164-171g, but final body weight was recorded higher in CMF group (2034g) compared to control group (1763g). An increasing trend of weight gain was observed in CMF (1867g), Y-CMF (1665 g) and CDF (1598 g) group.

Figure 2 represents the data on Feed intake (FI) and Feed Conversion Ratio (FCR). FI was higher in CMF group (2472g) than CDF group (2162g) and FCR was best in CMF group (1.32) where broilers fed moist diet. FCR was lower in CMF group and higher in Y-CDF group than control diet (CDF).

Discussion

Changes of pH value after fermentation

The pH value was reduced after 48-hour fermentation that may be due to the production of organic acids and the period of rapid yeast growth due to fermentation (Mackenzie *et al.*, 1965). The conversion of sugar molecule to equimolar mixture of organic acids, ethanol

and carbon dioxide by fermentative action of yeast may reduce pH of feed (Prabhu *et al.*, 2014).

Growth Performance

Highest body weight and body weight gain was observed in broilers those fed commercial starter moist diet and lowest weight was recorded after feeding fermented moist diet. This may be due to the suppression of the effect of various growth promoter, additives (antimicrobials, antioxidants, emulsifiers, binders, pH control agents) and enzyme that are used in commercial feed (Langhout, 2000). Fermented commercial moist feed have no effect on growth performance where commercial moist diet has non-significant effect on body weight gain of broiler.

Cumulative feed intake was recorded highest in broiler chickens those fed moist diet (Figure 2). But in case of fermented pellet feed no significant difference was observed in feed intake compared to control. For 48 hours of fermentation may reduce the palatability of

feed that ultimately reduce feed intake and growth performance. Where several studies found that fermented mash diet increase feed intake as well as growth performance of broiler (Nelson *et al.*, 2018; Rehman *et al.*, 2020). Because *S. cerevisiae* acts as a biodegrading agent that increases the length of villi,

reduces intestinal pH, reduces intestinal microbes, increase the secretion of auxiliary digestive enzymes and improves nutrient absorption, leading to enhanced growth of broilers, might be similar to the several experiments (Aktar *et al.*, 2024; Zhang *et al.* 2014).

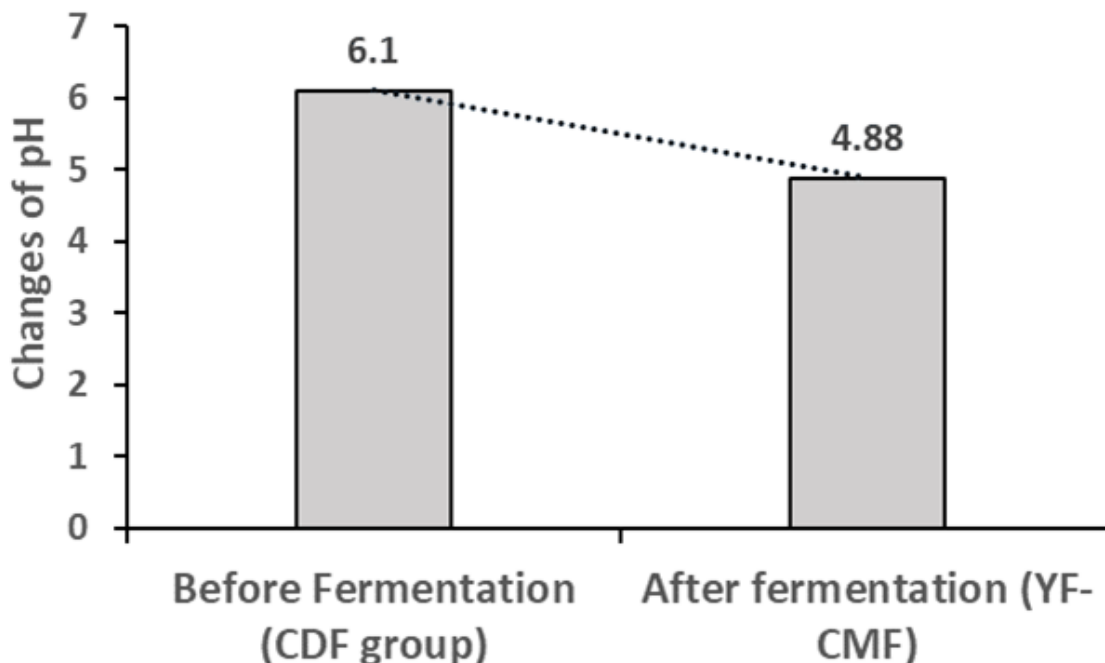


Figure 2: Effect of feeding commercial moist feed and yeast (*Saccharomyces cerevisiae*) fermented commercial moist feed on Feed intake and feed conversion ratio of broiler from day 08-35 (n=30)

FCR value was improved in CMF group those were fed commercial moist diet compared to other treatment group. According to Uchewa and Onu. (2012), broilers intaking moist feed showed significantly better feed conversion ratio compare to the control group that also aline with our findings. On the other side, Afsharmanesh & Mehdipour, (2016) observed that moist feed can improve feed conversion ratio compared to dry feed that also in agreement with the results.

Nikpiran *et al.* (2013) observed better FCR with the addition of *S. cerevisiae* in broiler mash diet. This might be associated with the reason that a more balanced biota population in the gut due to availability of substrate could lead to a greater efficiency in digestibility and utilization of feed, lead to an enhanced growth and improved FCR (Bedford, 2000). According to Rahman *et al.* (2009), better FCR might be due to maintaining normal microbiota and better ileal digestibility by the addition of *S. cerevisiae*.

Conclusion

Commercial moist feed increases feed intake and improve growth performance of broiler. But fermentation of commercial pellet feed using yeast (*Saccharomyces cerevisiae*) reduces pH of feed but have no significant effect on weight gain and feed efficiency. Commercial feed may contain different additives, growth promoter and other chemicals that may suppressed due to fermentation.

Authors contribution

Jesmin Aktar: Performing field and lab experiments, collection and analysis of data, and writing of manuscript. Ashik Iqbal Emon: Performing field experiments, collection and analysis of data. Khan Md. Shaiful Islam: Design, formulation and supervision of experiment and review of manuscript

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