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GROWTH PERFORMANCE OF BROILER CHICKEN SUPPLEMENTED WITH RICE WASHED WATER PROBIOTIC DRINKS

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ABSTRACT: *The study was conducted to evaluate the effect of rice washed water (RWW) probiotic drinks on the growth performance of broiler chickens. Following the Complete Randomized Design (CRD) a total of one-hundred-day-old broiler chickens were randomly distributed into four treatments: T1 – control (commercial supplements), T2 –5 ml probiotics, T3- 10 ml probiotics, T4 –15 ml probiotics. Supplementation of RWW probiotic drinks lasted for 35 days. Statistical analysis revealed significant (P≤0.05) improvements on the weekly weight gain of broiler chicken supplemented with different levels of RWW probiotic drinks. A significant difference (P≤0.05) on feed consumption was also observed during week 1, 2 and 3 of the experimental trial. Better FCR and higher net income was also detected on broilers supplemented with different levels of RWW probiotic drinks than the control. Based on the presented results and on the environmental condition where the study was conducted, it is therefore concluded that RWW probiotic drinks can significantly improve the weight gain, feed intake, feed conversion ratio of broiler chickens.*

KEYWORDS: Probiotics, Rice Wash Water, Growth Performance, Broiler Chickens

INTRODUCTION

The large-scale addition of antibiotic growth promoters (AGPs) to animal feed has contributed to the increase in livestock production. However, the over-use of AGPs has resulted in the development of antibiotic resistance in animal microbial populations with the potential for transfer of antibiotic resistance genes from animal to human micro biota. Due to this global public health concerns the European Union introduced a total ban on AGPs in 2006 (Mingmongkolchai and Panbangred, 2017).

Over the last decades, the use of probiotics as feed supplements in animal production has increased as alternative to antibiotics. Probiotics represent potential replacement for antibiotics in the food animal industry because of their reported ability to reduce enteric disease in poultry and potential food borne pathogen contamination of poultry or poultry products. Probiotics do not leave residues in animal products and promotes animal performance and health, because they improve diet digestibility, resulting in better utilization and consequently, higher productivity Mountziuris et al., (2007, 2010). The most frequently used probiotics in poultry are Bifidobacteria, Bacillus, Saccharomycetes, and Lactobacillus. These types of probiotics are known to benefit the host animals based on different mechanism (Liu et al., 2012 and Zhang et al.,2011). Lactobacilli are known to produce lactic acids which make the intestinal environment acidic which inhibit the growth of putrefactive and potentially pathogenic bacteria (Servin, 2004). Bacillus species have potential attributes to

colonization, immune-stimulation, and antimicrobial activity (Le et al., 2004), and can secrete protease, amylase, and lipase (Santoso et al., 1995). On the other hand, Saccharomycetes play an important role in vitamin and amino acid production. Photosynthetic bacteria have effects on improving water quality, promoting growth and preventing the host from disease (Qi et al., 2009). Thus, the aim of probiotic approach is to repair the deficiencies in the micro-flora and restore the animal's resistance to disease. Despite of the known positive effects of probiotics in animal performance particularly in poultry production small hold farmers are still hesitant to adopt it because most of the probiotic which are based on lactic acid bacteria are expensive.

Recently, there have been reports that rice washed water (RWW) can be a potential medium for lactic acid bacteria and can be utilize as probiotics drinks for animal (Gil et al., 2015). However, very limited data on its efficacy as growth promoters in broiler chicken we're available. Thus, the current study was conducted to evaluate the effectiveness of rice washed water as probiotic drinks to broiler chickens. The result of this study is expected to provide valuable information to small hold poultry raisers on the potential application of rice washed water as probiotic drinks and growth promoters in broiler chickens.

METHODOLOGY

Experimental Design and treatments

Following the Complete Randomized Design (CRD), 100 day- old broiler chickens were randomly distributed into four treatments: T1 – control (w/o probiotics), T2 – 5 ml RWW probiotics, T3 – 10 ml RWW probiotic, T4 – 15 ml RWW probiotics.

Production of Rice Washed Water Probiotic Drinks

Rice washed water probiotics were produced as described by Nordqvist (2004) with slight modification. Rice washed water was collected from the selected students of the College of Agriculture who cooked rice three times a day. Collection of RWW was conducted every 5 pm. The collected RWW was then transferred to a clean jar, labeled, and covered tightly with plastics and rubber band. These jars were then stored for 5 days at room temperature. After 5 days, the water was strained, and the strained water was added with milk (2 parts of milk per 10 parts of RWW) and stored again at room temperature until floating solid mass appeared in the surface. The floating mass was manually separated from the liquid portion. After which, the liquid portion was transferred in a clean container, added with brown sugar (1/4 per liter) as the nutrient source for the lactic acid bacteria.

The RWW probiotics were then mixed to water and provided to broiler chickens according to treatments. Broiler chickens were supplemented with RWW probiotic drinks for 35 days.

Housing and Feeding Management

The experiment was conducted at the Mindanao State University, College of Agriculture Poultry Project last February 25 to March 31, 2016. The poultry house is made up of bamboo slots with manually operated curtains. Rice hulls and sawdust were used as litter. To prevent

ammonia build-up inside the poultry house, litter was replaced weekly. The poultry house, feeder, and water trough were cleaned and disinfected prior to the arrival of the chicks.

Throughout the experimental trial the broiler chickens were provided with commercial feeds based on their nutritional requirements and fed ad libitum daily with free accessed to water added with RWW probiotics.

Data Collection

Feed offered, and refusals were recorded daily. Weighing of broiler was conducted once a week, every 6 am before morning feeding. Feed conversion ratio was obtained using the formula below.

$$FCR = \frac{\text{Total body weight gain}}{\text{Amount of feed consumed}}$$

Statistical Analysis

All the date gathered were processed and analyzed using SPSS version 20 with homogeneity of variance tested using Lavene's test. Significant differences among treatments were analyzed using Least Significant Difference (LSD).

RESULTS AND DISCUSSIONS

Weekly Weight Gain

The weekly weight gain of broiler chickens supplemented with RWW probiotic drinks is presented in Table 1. Results revealed that different levels of RWW probiotic drinks significantly affected the

Table 1. Mean weekly weight gain (in grams) of Broiler chickens supplemented with different levels of rice wash water probiotic drinks.

Treatments	Weight in grams				
	Week 1	Week 2	Week 3	Week 4	Week 5
T1 - control (w/o probiotics)	74.13±3.00	242.25±16.59^{c}	611.00±38.46	982.50±12.45^{b}	1629.50±37.20^{c}
T2 – 5 ml RWW probiotics	83.94±6.75	291.00±17.86^{ab}	687.50±37.30	1293.50±65.25^{a}	1925.00±75.37^{ab}
T3 – 10 ml RWW probiotics	72.64±3.86	251.50±13.94^{b}	676.50±43.90	1223.00±55.34^{a}	1817.00±52.60^{b}
T4 – 15 ml RWW probiotics	88.75±1.26	311.20±10.63^{a}	765.00±32.77	1221.50±37.08^{a}	1997.00±60.19^{a}

Means within columns having different superscript are significantly different at LSD ($P \leq 0.05$)

weekly body weight gain of broiler chickens during week 2, 4 and 5 of the experimental trial. During the second week, broiler chickens supplemented with 15 ml RWW probiotic drinks obtained the highest weekly weight gain of 311.20 g followed by chickens supplemented with 5 ml RWW probiotic drinks, 10 ml and the control with 291.00 g, 251.50, and 242.25 g, in descending order. On the 4th week, broiler chickens supplemented with different levels of RWW probiotic drinks also showed higher weekly body weight gain compared to the control. The same observation was also noted on the final week (5th week) of the experimental trial.

This result agrees to the observation reported by Khaksefidi et al., (2006) who observed improve body weight gain and daily weight gain on broilers fed diet with 50 mg/kg probiotics containing *Bacillus subtilis*. Liu et al., (2007) also noted an improved weight gain on broilers fed with wheat-based diet added with *Lactobacillus reuteri Pg4*. Mountzouris et al., (2007) also detected improvement on weight gain on broilers fed with probiotics containing Pediococcus strain, Enterococcus, lactobacillus and Bifidobacterium strain in feed.

In the current study improvements on weight gain observed from broiler chickens supplemented with RWW probiotic drinks could be due to the positive actions of lactic acid bacteria present in probiotic drinks. These bacteria have been known to exclude pathogenic microorganism inside the gut and fortify the activities of beneficial bacteria. This action thus, improves the efficiency of digestion and nutrient absorption processes of the host (Alkhalf et al., 2010). Though not significant, higher weekly weight gain were also observed on chickens supplemented with RWW probiotics drinks compared to the control on week 1, and week 3.

Feed Consumption

The different levels of RWW probiotic drinks significantly affected the feed consumption of broiler chickens during week 1, 2 and 4 of the experimental trial (Table 2).

Table 2. Mean weekly feed consumption (in grams) of Broiler chickens supplemented with different levels of rice wash water probiotic drinks.

Treatments	Weight in grams				
	Week 1	Week 2	Week 3	Week 4	Week 5
T1 - control (w/o probiotics)	100.05 ± 4.04^{b}	223.28 ± 9.01^{b}	543.40 ± 2.18^{a}	651.15 ± 17.45^{b}	672.20±64.15
T2 – 5 ml RWW probiotics	117.70 ± 2.20^{a}	239.80 ± 7.96^{a}	397.57 ± 15.58^{b}	699.20 ± 24.6^{b}	668.4-±22.50
T3 – 10 ml RWW probiotics	113.04 ± 5.18^{a}	243.01 ± 6.67^{a}	374.71 ± 11.95^{b}	673.13 ± 13.2^{b}	661.00±43.25
T4 – 15 ml RWW probiotics	107.60 ± 3.62^{b}	211.80 ± 8.27^{c}	308.35 ± 8.83^{c}	748.40 ± 16.10^{a}	678.60±23.30

Means within columns having different superscript are significantly different at LSD ($P\leq0.05$)

During the first week of the experimental trial broiler chickens supplemented with 5ml RWW probiotic drinks obtained the highest feed intake of 117.70 g, followed by 10 ml, 15 ml and the control with 113.04 g, 107.60 g, and 100.05 g, in descending order. During second week, highest feed consumption was observed on birds supplemented with 10 ml RWW probiotic drinks of 243.01 g followed by 5 ml, control and 15 ml RWW probiotics with 239.89 g, 223.28 g, and 211.80 g. Moreover, highest feed consumption was noted on broilers supplemented with 15 ml RWW probiotic drinks during the 4th week with 748.40 g followed with 5 ml, 10 ml and the control of 699.20 g, 673.13 g, and 651.15 g, respectively.

Varied observations on the effect of probiotics on broilers feed consumption were also reported by several authors. Santoso et al., (2001) noted a significant reduction on the consumption of broiler chickens fed with 0.5% fermented products from *Bacillus subtilis.* Similarly, Correa et al., (2003) also found low feed intake on birds fed probiotics compared to the control. In contrast, Zulkifli et al., (2000) and

Boratto et al., (2004) observed higher feed consumption on birds fed with probiotics than the control without probiotics. On the other hand, Salarmoini and Fooladi (2011) found no significant effect on feed intake during 3-6 weeks of feeding trials of broilers supplemented with probiotics on water and feed.

Feed Conversion Ratio (FCR)

Feed conversion ratio of broiler chickens were significantly affected by the different levels of RWW probiotic drinks during the 2nd week and 4th week of experimental trial (Table 3).

Broiler chicken supplemented with 15 ml RWW probiotic drinks showed the most efficient feed converter during the 2nd of 1.10 kg followed by 5 ml, control and 10 ml RWW probiotic drinks of 1.36 kg, 1.55 kg, and 1.64. While on the 4th week, better of FCR was observed on broilers supplemented with 5 ml RWW probiotic drink followed by 10 ml, 15 ml and the control of 0.79 kg, 0.80 kg, 0.90 kg, and 0.97 kg

Table 3. Feed conversion efficiency of Broiler chickens supplemented with different levels of rice wash water probiotic drinks.

Treatments	Weight in kilograms				
	Week 1	Week 2	Week 3	Week 4	Week 5
T1 - control (w/o probiotics)	4.01±0.29	1.55± 0.15^{a}	0.76 ± 0.23	0.97±0.03^{b}	0.60 ± 0.07
T2 – 5 ml RWW probiotics	3.94±0.47	1.36 ± 0.11^{b}	0.877±0.04	0.79 ± 0.02^{a}	0.50 ± 0.03
T3 – 10 ml RWW probiotics	4.14±0.31	1.64± 0.117^{a}	0.84 ± 0.09	0.80 ±0.05^{a}	0.52 ± 0.05
T4 – 15 ml RWW probiotics	3.27±0.16	1.10 ± 0.01^{c}	0.60 ± 0.04	0.90 ±0.04^{b}	0.49 ± 0.02

Means within columns having different superscript are significantly different at LSD ($P \leq 0.05$)

Lactobacillus inclusion in broilers nutrition also resulted in higher broiler productivity index which is measured based on daily weight gain, feed efficiency, and mortality (Timmerman et

al., 2006). Significant increase on FCR was similarly reported by Kurtoglu et al., 2004 and Yurok et al., (2004) on laying hens supplemented with probiotics. However, Otutumi et al., (2010) reported no significant effect on FCR from quails supplemented with Lactobacillus sp. for 35 days.

This finding suggests that higher dosage of RWW probiotic drinks stimulates and promotes higher activity of lactic acid bacteria which lead to a better digestibility of protein and starch which resulted to better growth performance on broilers supplemented with RWW probiotic drinks than the control. Samanya and Yamauchi (2002), stated that probiotics are proposed to increase length of villi by activating cell mitosis and induce gut epithelial –cell proliferation. Increased villi height by probiotics is beneficial to the broilers as this also increased surface area of the villi which enhances absorption of nutrients (Caspary, 1992).

Cost and Return Analyses

The cost and return analysis of Broiler chicken supplemented with different levels of RWW probiotic drinks are shown in Table 4. Results revealed that broiler chickens supplemented with different levels of RWW probiotic drinks obtained higher net return compared to the control. Highest net return was observed on broilers supplemented with 15ml RWW probiotics of P 90.20, followed by 5ml, 10 ml and the control with P74.60, 69.70, and 45.50 in descending order.

Higher net return observed from boiler chickens supplemented with varying levels of RWW probiotic drinks can be ascribed to the higher weight gain obtained from week 1 to week 5 of the experimental trial compared to the control. The cost of probiotics did not appear to increase the cost of production but rather increase the productivity of the chicken.

Table 4. Cost and Return Analysis of Broiler chickens supplemented with different levels of RWW probiotic drinks.

	Treatments			
Parameter	1	2	3	4
Gross Income (P)/ bird	206.9	251.30	235.10	262.1
Price of day-old chick (P)	36.00	36.00	36.00	36.00
Average feed consumption (g)	2951.60	3,423.80	2,879.00	3,004.90
Booster (g)	354.79	355.68	385.38	328.35
Starter (g)	733.93	832.97	784.48	670.10
Finisher (g)	1,862.90	2,235.19	1,709.12	2,006.45
Price of Commercial Feeds/g (P)				
Booster	0.0278	0.0278	0.0278	0.0278
Starter	0.0264	0.0264	0.0264	0.0264
Finisher	0.0262	0.0262	0.0262	0.0262
Cost of Probiotic/bird (p)	0.00	2.94	5.88	8.82
Total Feed cost (P)	78.1	90.5	76.2	79.73
Other expenses	40	40	40	40
Total expenses/ bird (P)	161.4	176.7	165.40	171.9
Total Net Return	**45.50**	**74.60**	**69.70**	**90.20**

CONCLUSION

Based on the environmental condition where the study was conducted, and on the above presented results it is thereby concluded that RWW probiotic drinks could significantly improve the performance of broiler chickens and can be safely used as growth promoters in broiler chicken.

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