



Feeding Yacca Extract Diets Influence the Live Body Weight, Carcass Characteristics, Feed and Water Intake in Broiler Chickens

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Received 1st July 2015 and Revised 22nd January 2016

Abstract: Effect of feeding Nutrafito plus on the live body weight, carcass weight, feed and water intakes were assessed in broiler chicks. One hundred twenty chickens were randomly weighed and divided into two groups. Birds in group A was as control group while, in group B, birds were supplemented Nutrafito (*Quillaja Saponaria* + *Yucca schidigera*) in feed. *Yucca schidigera* 50 gram was mixed into feed and refusal were weighed and recorded. Body weight (live) of experimental chicken (Figure-1) was significantly higher (2400.67 g/bird) in birds of group B (fed nutrafito plus) followed by group A (control) with average live body weight of (2154.83 g/bird). Broilers in group B (fed nutrafito plus) consumed significantly ($P<0.05$) greater amount of feed (4202.21 g/bird) than group A (control) with average feed intake of (4023.91 g/birds). The result indicated that broilers in group B drink more volume of water (8404.43 ml/bird) as compared to (8047.33 ml/bird) in broilers of group A. The carcass weight was significantly ($P<0.05$) higher in group B with average value of (1342.25 g/bird) as compared (1170.83 g/bird) to broilers in group A. The highest dressing percentage were examined in group B (55.94%) followed by group A (54.42%). Overall, the supplementation of nutrafito plus significantly influence on the live body weight, carcass weight, feed and water intake in broiler chicks.

Keywords: Yacca Extract, Diet, Broiler, Growth, Nutrafito Plus

1. **INTRODUCTION**

Commercial poultry farming is the most significant source of quality protein of high biological value to meet the required quantity of protein from animal origin through poultry meat in Pakistan. The industry is currently investing Rs. 200.00 billion, contributes 9.8% in Livestock and 4.8% in Agriculture of Pakistan, and employs 1.5 million people (GOP, 2013). However, despite a robust annual growth rate of 8-10%, infectious diseases caused by viruses, bacteria, fungi or parasites in poultry still remain a major impediment causing illness, deaths, low production, and economic losses.

Nutrafito plus is a nutrient obtained from plant species *Quillaja saponaria* and *Yucca Schidigera*. Naturally, it contained in higher quantities of polyphenols, triterpenic, steroidal saponins, yuccaols and resveratrol. It is free from any artificial preservative, chemical extract or carrier. In natural conditions, *Yucca Schidigera* plants are found in the deserts of Baja California. Whereas, *Quillaja saponaria* is mostly occur in South America especially in deserts of Chile.

Generally, quillaja and yucca extracts are added in soft drinks and cosmetics products. These are also fed to chickens and farm animals to gain high production and to improve the immunity (Kensil *et al.*, 1996). The three

major classes of saponins are triterpene, steroid, and steroid alkaloid (Hostettman and Marston, 1995).

Yacca contained higher amounts of polyphenols that combine with hydrogen sulfide and ammonia in the air and thus improve the ventilation system of poultry farms. Quillaja and yucca plants are also rich in saponins. Saponins are found to have been found to regulation of hypocholesteromic actions and reduction of cholesterol level in poultry eggs. The saponins bind to animal cell membrane and alter the structural and functional activities of cell membrane. The binding ability of the saponin with cholesterol is also well known for its anti-parastatic actions (McAllister *et al.*, 2001).

Therefore, quillaja saponin extracts are used in the preparation of nematodal products for crops. Yacca extracts are rich in polyphenolics (Yaccaols and resveratrol) and these have been found to produce anti-inflammatory effects (Marzocco *et al.*, 2004). Yaccaols and resveratrol are active in reduction of cytokine formation and producing positive influence on growth and immune response (Niewold, 2007). Nutrafito Plus is added as feed additive in the formulation of diet for poultry, in order to produce nutrient rich and cost effective feed (Ravindra, 1993).

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Yacca schidigera belongs to family of Lily plants. The extracts of yacca plant contained the ingredients that have ability to bind ammonia and steroidal saponin and produce surface active functions. Due to surface active function characteristics of the yacca extracts make them suitable for the application and synthesis of feed for livestock and poultry production (Ryan and Quinn, 1999). The yacca extracts in the diets of chicken flocks decrease the free ammonia level in the poultry farms, thus improve the feed intake efficiency and production performance of broilers (Erdogan *et al.*, 2001). It has been reported that yacca extracts in poultry feed have been useful in maintenance of metabolic and environmental ammonia concentration to required level (Ayasan *et al.*, 2005). Overall, the extract of yacca plant extracts are added in poltry feed in order to maintain ammonia concentration in farm environment, to improve metabolic activities and feed conversion (Ayasan *et al.*, 2005; Guclu, 2003). Another yacca extract saponin as main chemical component present in steroidal form has been found useful in reduction of fatty acid absorption by sequestering the bile acids required for micelle formulation and fat absorption (Kim *et al.*, 2003). The saponin has been found to produce bactericidal actions (Wang 2011). Keeping in view, yacca extract is useful in diets of chickens; the present study is designed to determine the influence of yacca extract components on live body weight, carcass quality, growth characteristics, water and feed intake in experimental birds.

2. MATERIALS AND METHODS

Day-old Cobb broiler chickens were used for this study. One hundred twenty chickens were randomly weighed and divided into two groups. Birds in group A was as control group while, in group B, birds were supplemented Nutrafito (*Quillaja Saponaria* + *Yucca schidigera*) in feed. *Yucca schidigera* 50 gram was purchased and mix into feed and refusal were weighed and recorded. Each group was consisted of three replicates (20 birds per replicate).

The broilers of all groups were vaccinated against various diseases protection according to schedule recommended by Pakistan Poultry Association, Hyderabad.

Table-1 Feed composition of experimental broiler

CP (%)	21%
ME (Kcal)	2800
Moisture	12%
Ash	7%

Parameters Recording Procedure

Body weight (live) gain

Before the start and end of the experimental period each bird was weighed using electric weight balance. Also the weights of birds were noted at the each week during the entire experimental period.

Feed intake

Feed was provided *ad libitum* two times in a day to each group and consumed and un-consumed feed was calculated on daily basis. For this practice, the following formula was used:

$$\text{Feed intake (g/b/d)} = \frac{\text{Total feed offered} - \text{Total feed refused}}{\text{Total broiler (\#)}}$$

Water intake

Each group of experimental chickens was given fresh water. Water intake and refusal were measured on daily basis. Water intake was recorded by using the following

$$\text{Formula: Water intake (ml/b/d)} = \frac{\text{Total water offered (ml)} - \text{Total water refused (ml/group/d)}}{\text{Total broiler (\#)}}$$

Feed conversion ratio

Feed conversion ratio (FCR) was masured on the basis of total feed consumed by a broiler bird for gaining one kg weight. The following formula was used:-

$$\text{FCR} = \frac{\text{Total feed intake} \times 100}{\text{Total live body weight}}$$

Dressing percentage

On the completion of experimental period of 42 days, five birds from each group were selected for dressing percentage. Before the slaughter each bird was weighted. After dressing, the carcass weight was recorded and its dressing percentage was calculated by the following

$$\text{Formula. Dressing (\%)} = \frac{\text{Total Carcass weight (kg)} \times 100}{\text{Total Live body weight (kg)}}$$

3. RESULTS AND DISCUSSION

The application of *Yucca schidigera* extract in poultry diet may play role metabolic efficiency, control ammonia contents in farm environment, and improve growth performance (Ayasan *et al.*, 2005), feed conversion and improves digestibility (Ayasan *et al.*, 2005; Guclu, 2003). Saponin, as the main chemical component of *Yucca schidigera* extract, is present in steroidal form, whereas it is in triterpenoid form in others plants, such as *Quillaja saponaria* (Teferedegne, 2000). It has been reported that *Yucca schidigera* extract has been successfully used as feed additives in the poultry industry. It enhances the growth and productivity in broiler production (Sahoo *et al.*, 2015).

Body weight (live) of experimental chicken (Fig.1) was significantly higher (2400.67 g/bird) in birds of group B (fed nutrafito plus) followed by group A (control) with average live body weight of (2154.83 g/bird). The analysis of variance indicated that the live body weight of broiler chicken differed significantly among the groups ($F=425.35$; $DF=1$; $P=0.000$; $CV=2.87\%$). Group (B) fed added with nutrafito plus which contains (*Yucca Schidigera*; *Quillaja saponaria*) that as promote absorption of nutrients through enhancing the permeability of intestinal mucosal surface which

favoring higher growth rate and better feed efficiency. The high body weight gain may be in relation to high absorption of steroid saponins of intestinal mucosa. Previously, it has been shown nutrient absorption in intestinal mucosa due to steroid saponins effects (Wang and Kim, 2011). The current findings supported by Sahoo *et al.*, (2015) recorded the average body weight was significantly ($P < 0.05$) higher in chicken fed yacca extract diet (1995 g) in comparison to control group which lagged behind with the average body weight of 1822 g.

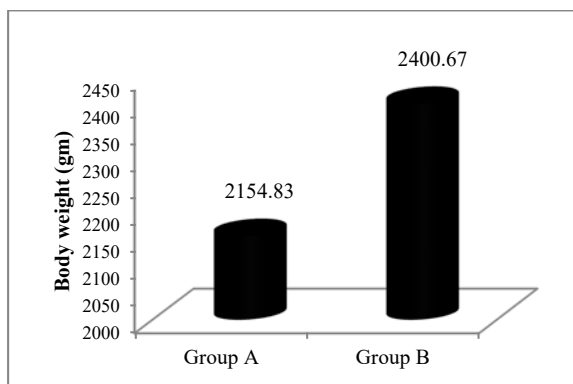


Fig. 1 Mean livebody weight (gm/bird) of broiler chicken.

SE± = 8.4337
LSD 0.05 = 11.927
P-value = 0.0000**

Data on the feed intake of broiler chicken are shown in (Fig.2). Broilers in group B (fed nutrafito plus) consumed significantly ($P < 0.05$) greater amount of feed (4202.21 g/bird) than group A (control) with average feed intake of (4023.91 g/birds). Feed intake indicated numerically higher consumption in Yucca group than control group chicks. The efficiency of utilization of feed was significantly better in Yucca group than control group. Overall data for protein efficiency ratio indicated significant improvement in the efficiency of broiler chicks to convert the protein into body weight gain among the yacca extract fed group in comparison to control group. During the entire period of experiment, significantly higher protein, energy net feed consumption by the chicks of the treatment group associated with more weight gain thus improved FCR values indicated better efficiency of utilization of feed, protein, and energy in broiler chicks with the Yucca supplementation than control group. Another finding are further supported by (Elliot *et al.*, 1991), they reported the addition of *Yucca schidigera* to the broiler diet increased numerically the body weight of the broiler compared to control. Another study on chickens and rabbits showed that *Yucca schidigera* powder has beneficial effect on chickens and farm animals (Walker, 1993).

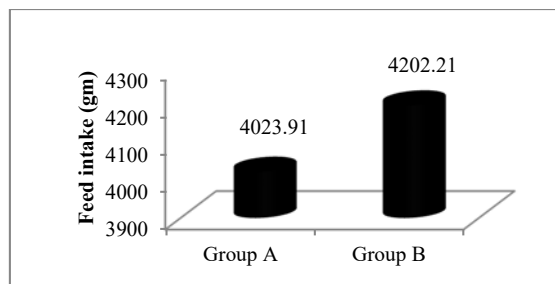


Fig. 2 Mean feed intake (gm/bird) of broiler chicken.

SE± = 16.145
LSD 0.05 = 22.833
P-value = 0.0000**

The influence of nutrafito plus on water intake is presented in (Fig.3). The result indicated that broilers in group B (nutrafito plus) drink more volume of water (8404.43 ml/bird) as compared to (8047.33 ml/bird) in broilers of group A (control). The analysis of variance indicates that water intake of broiler chicken differed significantly among the groups ($F = 60.98$; $DF = 1$; $P = 0.000$; $CV = 3.04\%$). The findings of water intake in this study supports the previous report (Cave, 1984).

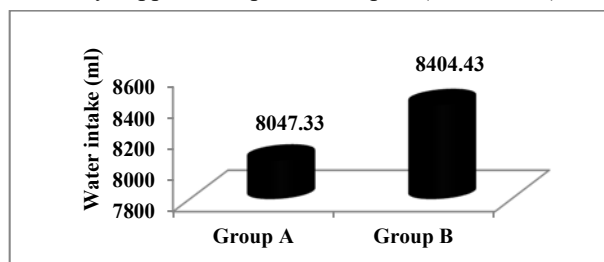


Fig.3 Mean water intake (ml/bird) of broiler chicken.

SE± = 32.291
LSD 0.05 = 45.666
P-value = 0.0000**

The performance trait of broiler chicken such as carcass weight is presented in (Fig.4). The results showed that carcass weight was significantly ($P < 0.05$) higher in group B (nutrafito plus) with average value of (1342.25 g/bird) as compared (1170.83 g/bird) to broilers in group A (control). The analysis of variance indicated that carcass weight of broiler chicken differed significantly among the groups ($F = 669.39$; $DF = 1$; $P = 0.000$; $CV = 2.89\%$).

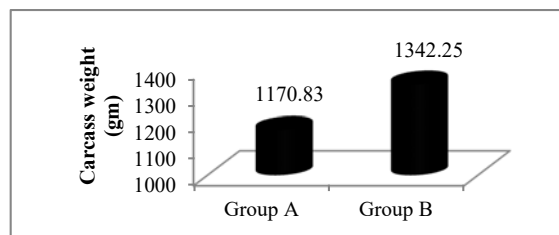


Fig. 4 Mean carcass weight (gm/bird) of broiler chicken.

SE± = 4.6849
LSD 0.05 = 6.6254
P-value = 0.0000**

The dressing percentage was calculated in broiler chicken and results depicted in (Fig.5). The highest dressing percentage were examined in group B (55.94%) followed by group A (54.42%). The analysis of variance concluded that dressing percentage of broiler chicken differed non-significantly among the groups ($F=11.99$; $DF=1$; $P=0.0007$; $CV= 14.34\%$). The diets containing yacca extract improve the microbial quality of chicken carcass (Windisch *et al.*, 2014).

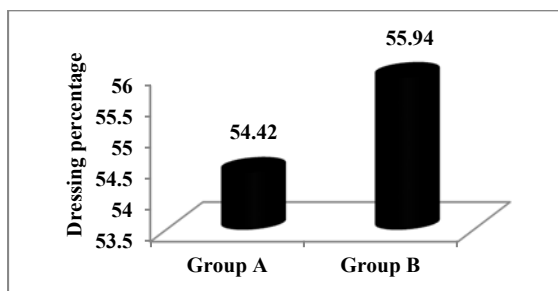


Fig.5 Mean dressing percentage of broiler chicken.

SE±	= 0.3088
LSD 0.05	= 0.4368
P-value	= 0.0007**

CONCLUSIONS

From the present finding it was concluded that all the growth traits of broiler chicken was significantly and linearly increased when nutrafito plus were incorporated in the diet. Furthermore, the overall data on growth revealed that the use of nutrafito plus had a significant effect on growth performance, which might be acting as bio-stimulant and growth promoter in broiler chicks. The supplementation of nutrafito plus significantly influence on the live body weight, carcass weight, feed and water intake.

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