



Dietary Influence of *Yucca schidigera* on Broilers and Layers: A Review

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ABSTRACT

In current research dietary influence of *Yucca schidigera* on broilers and layers were reviewed, whereby obtained results were found to be much interesting as well useful. It was revealed that dietary inclusion of *Yucca schidigera* in broilers significantly improve the feed consumption, average live body weight, water consumption, Feed Conversion Ratio, dressing percentage and weight of carcass weight. Digestibility significantly improves and lowest mortality occurs. In layers, production of eggs, weight of egg, egg white index, yolk, shell thickness, diet intake and feed conversion efficiency are considerably improved. Moreover, glucose, total protein, albumin, triglycerides, inorganic phosphorus, total antioxidant capacity (TAC), malondialdehyde (MDA) and glutathione are significantly improved with dietary *Yucca schidigera* in layers as well as broilers. In conclusion, dietary *Yucca schidigera* is the best support the production and overall performance of broilers and layers.

Key words: Broilers, Carcass weight, Layers, Performance, Production

INTRODUCTION

Poultry industry is rapidly expanding worldwide in order to meet ever increasing demand of broilers and layers for higher growth rate, meat and eggs production (Alam and Khan, 2000). Broiler production is a highly integrated industry from breeding stock to poultry processing. The larger companies maintain all stages facilities like breeding, hatchery, slaughter and meat processing within their company or under close contract systems (Ayaz *et al.*, 2003). Feed producers have considered new strategies for balancing the nutrients need of broilers and increasing the performance of birds. Protein feeding cost most in the poultry production, thus it is important to adjust amino acid supply from least cost feed resources in order to gain maximum economic return (Baker *et al.*, 2002). There are several factors though may affect the amino acids needs of chicks at different stages. The diet related factors include energy level, protein level and protease inhibitors. Environmental factors include crowding, disease, heat or cold stress and feeder space, however genetic factors include sex and capacity for lean versus fat growth (Kim *et al.* 2003).

The *Yucca schidigera* is originated from lily plants. The extract of *Yucca* contains 2 active compounds. The

first component is named as glycol that actually binds to the ammonia, while the second is named as steroidal saponin fraction, which possess surface active properties. Due to these properties of *Y. schidigera*, researchers are focusing on the application of *Y. schidigera* in poultry diet (Ayasan *et al.*, 2005). Researches have reported that *Y. schidigera* decreases the free ammonia level in the poultry barns, when used in the poultry diet (Erdogan *et al.*, 2001). *Y. schidigera* extract also maintain metabolic activities controls environmental ammonia levels, improves feed conversion and production (Guclu, 2003). The main component of *Y. schidigera* extract i.e. saponin possess steroidal properties. This saponin component reduces absorption of fatty acids by impairing the bile acids though play an important role in micelle formulation and fat absorption. In addition to that saponin also possess antibacterial properties (Wang and Kim, 2011).

Generally, the feed accounts for about 70 percent cost of total production in poultry. Any improvement in overall performance birds by dietary manipulation could be a key aspect for successful poultry enterprise. Dietary supplementation with *Yucca schidigera* may possibly improve the performance of broilers and layers. Current review was thus planned in order to explore whether dietary *Yucca schidigera* has any influence on the broilers and layers.

Influence of *Yacca schidigera* on broilers

Yacca schidigera has been studied by many scientists worldwide. In broilers this has been studied from various aspects Figure 1. Alfaro *et al.* (2007) studied the influence of *Yacca schidigera* extract ingredients relation to immunity against the coccidiosis in broilers. The study was also performed for the growth performance and influence on intestinal anatomy of the chickens. The experimental chickens were immunized against the coccidiosis vaccine at day six. The immunized chickens increased the weight gain and improved the feed conversion ratio. They also reported synergistic correlation between the *Yacca schidigera* and coccidiosis vaccine. Baker, (1997) on other hand formulated basal diets containing *Yacca schidigera* extract along with aluminum cholode and experimented on the broiler. They divided birds into three groups and a control group. Their results showed that *Yacca schidigera* extract along with aluminum cholode treated diets supported live body weight in comparison to control group. However, feed intake did not differ among the treated diets. The supplementations of *Yacca schidigera* extract in the diets caused decrease in urea and urease concentration and enhance total proteins, pH and triiodothyronine concentration in blood. The significant difference was observed in relative anatomy in treated groups contrast to control group.

Similarly, Begum *et al.* (2015) reported that *Yacca schidigera* (YS) and Caprylic acid (CA) extracts are important applications for poultry production. They possess several nutritional and functional properties though can influence the broilers' production. The beneficial effects may be improved immunity, growth performance and antimicrobial activity. In this regards a research was performed for assessing the influence of dietary supplementation of CA and YS extract on the growth performance, relative organs' size, blood parameters, caecal microbial shedding and overall production in broilers. Study focused a total of 672-day old Ross 308 broiler chicks. Chicks were randomly distributed into three treatment groups. The study was carried out for period of five weeks. Chicks fed the CAY100 diet showed overall higher body weight gain (BWG), feed intake (FI) and feed conversion efficiency compared to chicks fed with NC diet. Mortality remained lower among the chicks fed CAY100 diet compared to NC and PC treatments. Further chicks though were fed containing CAY100 in diet furnished higher weight of bursa of Fabricius and relative organs. On other hand PC supplemented diet showed reduced weight of gizzard and gizzard in comparison to NC treatment. Weights of spleen, liver, visceral lipid and chest were not influenced with any of dietary supplements. WBC counts remained higher in CAY100 treated group compared to NC. Redness of breast meat (α^*) recued in chicks fed CAY100 diet contrast to NC and PC. Lymphocytes counts significantly improved in the CAY100 treated group compared to PC and NC. Chicks with CAY100 diet showed decreased *E. coli* counts in caeca compared to NC dietary regime. Further, higher growth performance, caecal *E. coli*, bursa of fabricius weight and breast muscle α^* were noticed in the chick's diet containing CAY.

In another study, Çabuk *et al.* (2004) studied the influence of natural zeolite in combination with *Yacca schidigera* in broilers. They focused the production

performance, moisture content in litter, ammonia level in poultry house, fecal crude ash and dry matter. They observed that there was positive influence on feed intake and feed conversion efficiency with feeding of natural zeolite and *Yacca schidigera*. Dietary supplementation of both ingredients significantly decreased fecal crude ash and dry matter, and that indicates the better digestibility. Further, Chepete *et al.* (2012) conducted a study on feeding of hens with different doses of powder *Yacca schidigera*. The treatment reduced NH₃ emissions, and improved the performance and production of birds. In their study birds were divided equally into four groups. Diets of birds were supplemented with *Yacca* powder on level 0.0, 50 100, and 200ppm. Using gaseous emission system, the emission rate of NH₃ was recorded. Supplementation of diet with *Y. schidigera* powder favored performance of birds and decreased emission of ammonia by 44 to 28% (Figure 2 and 3).

Moreover, in another research effects of various concentrations of *Yacca schidigera* spray on garbage material were evaluated. Qualities of garbage in term of moisture, pH, ammonia, microbial count were assessed. Further the breast burns and production was observed. *Yacca schidigera* spray on a different level improved the qualities of garbage and reduced burns breast (Onbaşilar *et al.*, 2013). In another study Gurbuz *et al.* (2011) studied influence of *Yacca* plant extracts on the growth efficiency, immune response, and intestinal tissue integrity in broilers. Chickens were fed ration supplemented with different concentrations of *Yacca schidigera* plant extract. Their results showed that chicken fed *Yacca* extract diets produced higher live weight contrast to birds in control group. They noticed that diet intake in chicken is not influence by supplementation of feed *Yacca* extract. The daily weight gain and feed conversion ratio remain higher in birds though are fed dietary *Yacca* extract. Therefore, they recommended the supplementation of extract *Yacca schidigera* in diet of chicken flocks. Johnston and his co-workers studied feeding of *Yacca schidigera*. They applied *Yacca schidigera* at the dose of 63 ppm. They indicated that addition *Yacca schidigera* in diet of broilers improves the birds' performance and suppress the ammonia release of manure. The broilers received *Yacca schidigera* were found much heavyweight than control at the age of day 28th and 51st. Further, feed efficiency was improved and mortality was lower (Johnston *et al.*, 1980). Few other researchers studied the extract of *Yacca schidigera* as feed additive for broilers. It was reported that *Yacca schidigera* enhances growth and productivity of broiler chickens. *Y. schidigera* also improves carcass quality and behavior of the broilers (Sahoo *et al.*, 2015). In another research the effects of few concentrations of *Yacca schidigera* were assessed by spraying the litter. Researchers considered some litter traits such as breast burn, litter moisture, ammonia, pH, total colony count, number of *Enterobacteriaceae*, number of yeast and mold at the age of 5th week. (Onbaşilar *et al.*, 2013). Further, in a research 430 broiler chicks with age of two days were considered. 12 chicks were reared in each pen of 170 x 94 x 90cm size. 50% litter was consisted of wood shavings and 50% with rice hulls. Extract of *Yacca schidigera* was pulverized at 0, 4 and 8% concentrations. Their results showed improved litter parameters as well as decreased breast burns in broilers, when litter was treated with extract of *Yacca schidigera*.



Fig. 1: *Yucca schidigera* extract

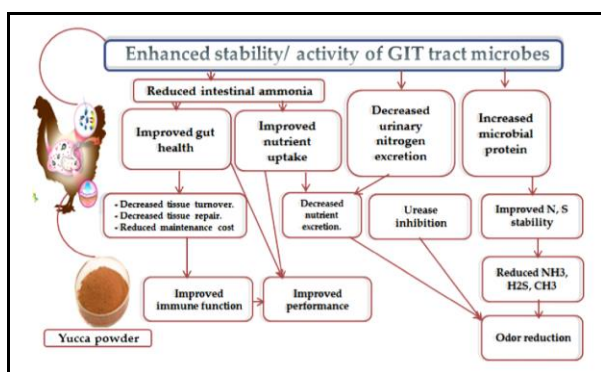


Fig. 2: Influence of *Yucca schidigera* powder on broilers and layers

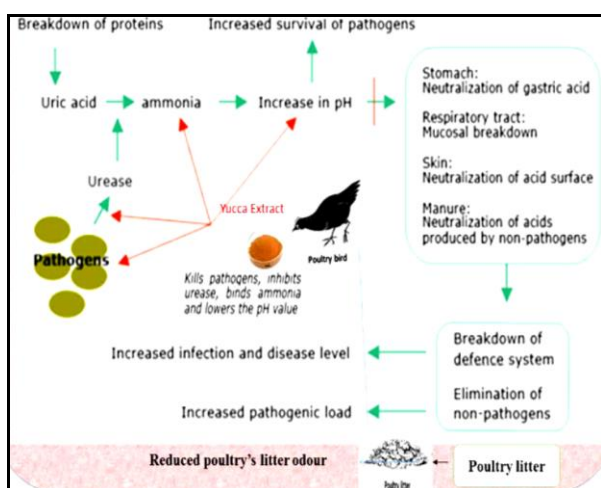


Fig. 3: Influence of *Yucca schidigera* on broilers and layers

Influence of *Yucca schidigera* on layers

Yucca schidigera is frequently used in the layer diets and in this regards various studies have been reported. Wang and Kim, (2011) studied the influence of dietary *Yucca schidigera* and caprylic acid on blood properties, growth performance, excreta microflora and quality of eggs in layers. Chickens were fed *Yucca schidigera* extract, caprylic acid and control diets. There was improvement in feed conversion efficiency and egg weight when diet was supplemented with *Yucca schidigera* extract and caprylic acid. However cholesterol and triglyceride level in plasma

are reduced with the supplementation of *Yucca schidigera* extract diets. The microbial flora of *Escherichia coli* counts are decreased with *Yucca schidigera* extract in comparison to control group diet. However, there is no obvious effect on *Lactobacillus* counts of control and treated groups. Inclusion of caprylic acid and extract of *Yucca* at the inclusion level of 120 mg per kg improve egg weight as well as feed conversion efficiency. In another study, Ayasan *et al.* (2005) determined that supplementation of *Yucca* extract in the feed of layers may influence production and quality of eggs. The *Yucca* extract powder fed laying birds showed increased in feed conversion ratio and weight gain. While egg production and feed intake are not influenced. Similar findings regarding the dietary supplementation of *Yucca schidigera* extract powder fed to layers were reported by Tugay *et al.* (2005) (Figure 2).

It has been observed that dietary *Yucca schidigera* extract affect the growth, blood physiology and egg quality in laying hen. In this regards study was carried out, whereby diet of layer birds was containing 0, 100 and 200 ppm *Yucca* extract. Weight gain, egg production, feed intake and feed efficiency were improved with supplementation compared to control. *Yucca* extract reduced cholesterol level, serum glucose level and triglyceride level in the birds. Serum total protein level was not influenced with the dietary treatments but albumin content was reduced in birds fed 100 ppm *Yucca* extract. Blood cells count, mean corpuscular volume, packed cell volume, packed cell volume (PCV) and mean corpuscular haemoglobin were positively influenced with supplementation of *Yucca* extract (Kaya *et al.*, 2003). Further, Kutlu *et al.* (2001), studied effect of *Yucca schidigera* powder on the performance and cholesterol content of eggs in laying hens. Experiment was conducted by providing 0.30 and 60 ppm L20 powder of *Yucca schidigera* in the diet. They reported *Yucca* supplementation in the diet positively influenced the eggs production, feed conversion efficiency, body weight, egg shell, egg white, egg weight and egg yolk. *Yucca* supplements also reduced the yolk cholesterol content in the relevant dose. It has also been investigated that the rations containing 0.30, 60 and 90 ppm *Yucca schidigera* extract supports eggs production, feed intake, feed efficiency and quality of eggs and some blood components of layers. Study was performed on two hundred and forty birds having age eight weeks. *Yucca schidigera* extract was given at the level of 0.30, 60 and 90 ppm. Results indicated *Yucca schidigera* supplementation to the diet did not influence eggs production, feed efficiency, egg weight, white index, egg yolks, egg shell thickness, but reduced body weight. Results on blood biochemistry showed statistically significant differences among the groups for total protein in the blood, albumin, triglycerides, cholesterol and inorganic phosphorus. However, calcium levels in the blood was higher significantly the group fed rations containing 90 ppm *Yucca schidigera* extract. Overall results depicted that *Yucca schidigera* extract supplementation to the birds' diet does not favor the performance and feed consumption (7.20%) (Guclu *et al.*, 2003).

Similarly, Aslan *et al.* (2005) studied *Yucca schidigera* with respect to influence on some blood markers, anti-oxidation properties and serum cholesterol in layers. A total of 256 laying hens having age of 41 weeks were selected.

Birds were divided into 4 groups. Control group was fed basal diet only, however remaining 3 groups received Deodorase at the concentration of 100, 150 and 200ppm. Parameters such as glutathione, malondialdehyd, total antioxidant capacity, glucose, cholesterol, erythrocyte, leukocyte, platelets, hematocrit, hemoglobin, growth rate and production of eggs were recorded were recorded. In groups supplemented with 100 and 150 ppm Deodorase, eggs production increased significantly, while eggs' weight was higher in birds receiving 100 and 200 ppm Deodorase. Blood sugar and cholesterol remained low, while increased level of glutathione was noticed. Deodorase supplementation at level of 100 ppm supported eggs production, promoted antioxidant property and reduced level of cholesterol and sugar in blood. In another study Enaiat *et al.* (2009) worked on Silver Montazah cocks with respect to *Yucca schidigera*. In their study basal diet was fed to the birds in group 1 and was kept on untreated litter. Birds in group 2 were provided 0.2g *Yucca* per kg diet in addition to basal diet and were reared on untreated litter. Birds in third group were provided basal diet and were reared on litter treated with 250 g Aluminum Chloride / m². Birds in group 4 were given basal diet in addition to 0.2g *Yucca* per kg diet and were reared on litter treated with 250 g Aluminum Chloride / m². They reported that AL and YU-AL treatments significantly increase the final body weight compared to control group. Parameters such as semen volume, semen pH, color, sperm concentration and motility were significantly favored in all research treatments

Conclusions and recommendations

On the basis of present review, it could be concluded that all the growth traits of broilers and layers are significantly favored by dietary *Yucca schidigera*. *Yucca schidigera* improve overall production performance of broilers as well as layers. Use of *Yucca schidigera* also supports digestibility in broilers and layers, and that might have contributed for performance and production.

Further, it is recommended that in addition to *Yucca schidigera* some more species should explore that could have beneficial effect on broiler and layers. Dietary manipulation with *Yucca schidigera* supplementation in broiler feed improves the desirable traits such as weight gain, feed efficiency, and carcass characteristics by improving the micro-climatic conditions and health status of broiler chicks. Hence, *Yucca schidigera* extract should be safely used in broilers and layers rearing for higher economical return without any adversity.

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