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Effect of Germinated Sorghum Flour on the Performance of Laying Hens (Warren)

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Abstract: The experiment was conducted using laying hens. They were divided into four groups of eighty two (group I, group II, group III, group IV). They received respectively the basic feeding, and basic feedings supplemented with 0.8%, 1.2%, 1.6% germinated sorghum flour. Data were collected and laying hens weight, egg weight and the feeding efficiency index were calculated. The laying rate was also determined. Group II with 0.8% germinated sorghum had the best result in terms of laying hen weight, the laying rate and the feeding efficiency index. This group is followed by group I, group III, group IV. However, the supplementation had a detrimental effect on the egg weight.

Key words: Laying hen, laying rate, feeding efficiency index, egg weight, sorghum, flour

Introduction

Laying hens occupy a place of choice in the man's food. As a matter of fact they are raised for the production of the flesh and eggs. With a short life cycle, they constitute one of the fast and best food protein producers (Jourdain, 1980). These feeds ensure a better growth and a better performance of these laying hens by providing them essential nutrients. Making feeding supplementation could be one of the solutions for breeders to maximize the productivity. Sorghum can also be used in poultry feeding because of its nutritional content. The principal constituents of the sorghum grains are carbohydrates, proteins and lipids. It is also found in small quantity fibres, the vitamins and minerals. Lysine is one of the limiting amino acids in sorghum. The amylose content of most varieties of sorghum is between 20 and 30% (Asiedu, 1991). Because of the trace amount of alpha or beta - amylases in sorghum, germination is sometimes performed for the production these essential enzymes Alpha and beta amylases in sorghum can vary from 2/1 to 3/1 (Asiedu, 1991). During malting the amylolytic enzymes generated transform starch into fermentable sugar.

Materials and Methods

Five months laying hens (warren) used for the experiment were selected from our experimental farm. Antibiotics and vitamins such as anti-stress, "Vetacox's", "All Vit", "Vigosine", "Amin'total", "Albendazole", "flumequine" and "Virkon's" were purchased from Proveto. Germinated sorghum used was obtained according to the process described in the method section. Sodium hypochlorite was purchased from a local drugstore

Sorghum germination: Grains of sorghum were sorted out and soaked in a solution of 2% sodium hypochlorite

for 10 min to get rid off any impurity. They were then transferred in container filled with water for 12 hours to facilitate hydration. They were spread on cotton bags and covered. Germination was done in the laboratory at 25°C for 72 hours. After germination, the grains were vacuum dried at 28°C for 48 hours. Grains were then reduced in powder and incorporated at different rates in the chicken feedings

Feeding formulation: To conduct this experiment, laying hens were divided into four groups of eighty two. Feeding supplementation were done as follows:

Group I: Basic feeding

Group II: Basic feeding + 0.8% germinated sorghum

Group III Basic feeding + 1.2% germinated sorghum

Group IV Basic feeding + 1.6% germinated sorghum

Weighing of laying hens: The weight of laying hens was taken once a week. The average weight and the weight gained were calculated.

Feeding efficiency index (FEI): The feeding efficiency was determined by the feeding efficiency index. It is the ratio of the quantity of feed consumed by laying hens during a week over the weight of the laying hens.

$Ic = (\text{quantity of consumed feed} / \text{total weight of laying hens}) \times 100$

Egg laying rate: Eggs were collected everyday over a week. The mean of collected eggs was done on a daily basis. The laying rate over a week was determined by dividing the total mean by the number of laying hens. The ratio was then multiplied by 100.

Egg weight: Eggs were collected everyday and the weight was taken. The average egg weight was performed weekly over a period of seven weeks.

Statistical analysis: Data gathered was analyzed using the STATISTICA Data Management software. Multiple means comparison was performed to find out differences or similarities among different groups.

Results and Discussion

Effect of germinated sorghum flour on the

Laying hens weight: The effect of germinated sorghum flour on the weight of laying hens was studied. Data on the weight gained by the laying hens throughout the experiment were plotted on figure one. The growth curves show that the laying hens gain weight during the experiment especially during the first four weeks. Statistical analysis reveals that laying hens from group II (0.8% germinated sorghum) have the best result in terms of weight gained. This group was followed in decreasing order by group I (Basic feeding), group III (1.2 % germinated sorghum) and group IV (1.6% germinated sorghum)

The significant growth in the second group is mainly due to its nutrient content. During germination, endogenous enzymes such as α and β -Amylases are produced. These amylolytic enzymes hydrolyze starch into simple sugars that are easily assimilated by poultry (Asiedu, 1991). Furthermore, the germination process improves the sorghum protein and carbohydrate contents. The supplementation with germinated sorghum also fills up the minerals, vitamins and amino acids deficiency in the basic feeding (Asiedu, 1991). This enrichment of simple nutrients will speed up the growth of the second group. The poor performance of groups III and IV is due to the presence of anti-nutritional factors (tannins). This tannin binds to endogenous and exogenous proteins affecting thus negatively their use. The poor performance is also attributed to some growth inhibitors known as trypsin inhibitors. These inhibitors hinder the process of digestion and thus conducting to an excessive loss of amino acids (Rackis *et al.*, 1979).

Effect of germinated sorghum flour on the feeding efficiency index (FEI):

The effect of germinated sorghum flour was also studied by measuring the feeding efficiency index (Fig. 2). This figure shows the feeding efficiency index of different groups through the experiment. Laying hens from group II have the lowest feeding efficiency index (FEI) followed by the Group I, III and IV. The lower the FEI the better it is in terms of nutrient assimilation. The sorghum supplementation at 0.8% gives the best results. This is due not only to the amylolytic enzymes generated during germination but also to the increase of the phosphorus content and reduction of the phytic phosphorus. The high phosphorus content in the organism increases the affinity of D_3 vitamin facilitating thus its assimilation (Smith, 1997).

The poor performance of groups III and IV is due to the

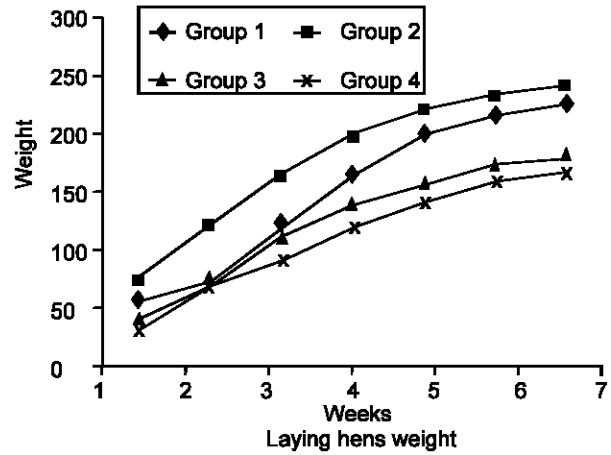


Fig. 1: Effect of germinated sorghum flour on the laying hens weight

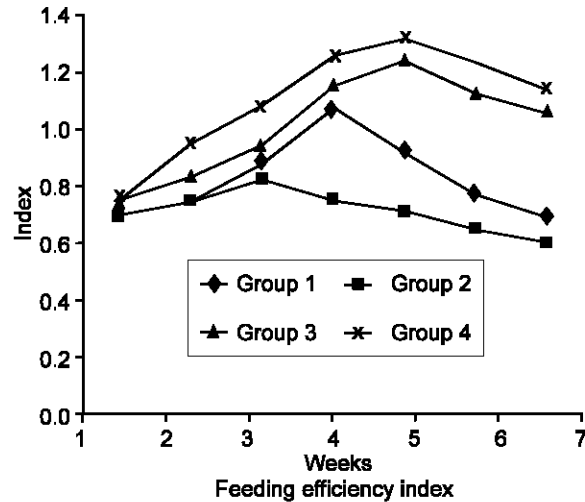


Fig. 2: Effect of germinated sorghum flour on the feeding efficiency Index

negative effect of tannins on proteins and carbohydrates digestibility. These phenolic compounds reduce the feeding efficiency, and the metabolized energy and the biological availability of amino acids (FAO, 1995).

Effect of germinated sorghum flour on the Laying rate:

The effect of germinated sorghum flour was also observed at different levels of supplementation. The curves show various trends. The best performance was obtained with laying hens from group II. This is due to its nutrient content. This feeding is rich in proteins, carbohydrate, vitamins and minerals. A deficiency of these nutrients negatively affects the laying rate. During the malting process, the reactions of the endogenous enzymes of sorghum grains cause an increase in proteins and essential amino acids. There is also an increase of the same constituents during grinding by

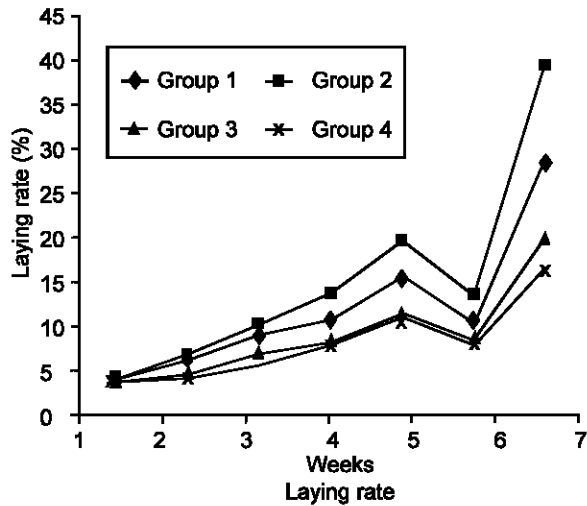


Fig. 3: Effect of germinated sorghum flour on the laying rate

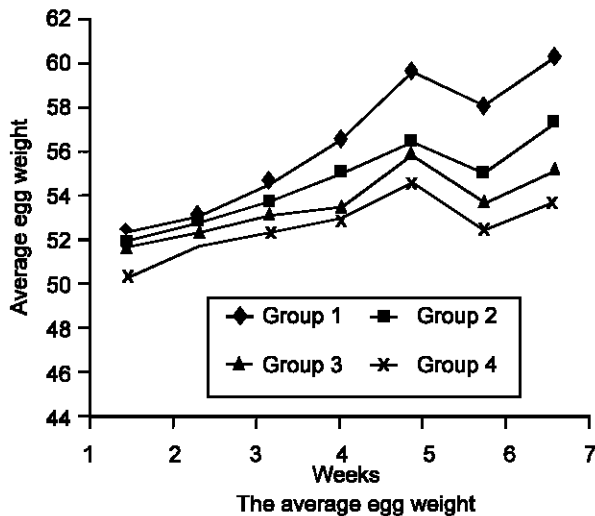


Fig. 4: Effect of germinated sorghum flour on the average egg weight

reducing the molecular weight. These proteins are fundamental because the low protein level provokes some infections capable of decreasing and stopping the laying rate (FAO, 2001).

The decrease in the performance observed with group III and IV is bound to the inhibitory action of tannin which is higher in these feeding formulations. On one hand, tannin forms some complex with feeding proteins and

amino acids and on the other hand with those coming from the animal (FAO, 1995). The first group (group I) has the best performance after the second group (group II). This group has therefore a substantial nutritional quality.

Effect of germinated sorghum flour on the egg weight:

The weight curves have all an increasing trend. The heaviest eggs were obtained with Group I, followed by Group II, Group III and Group IV. The best results were obtained with Group I (laying hens fed with the basic feeding). This could be due to its nutritional profile and its high content of protein, carbohydrate, and calcium.

The poor performance of feedings supplemented with germinated sorghum could be due to the malting process. Egg is mainly composed of the white, yolk and the shell. The egg white represents 60% of the egg weight and has a high water content. The yolk represents 30% of the egg weight and is rich in lipid; while the shell represents 10% of the weight and is rich in minerals. During the malting process, there is a decrease in the levels of these major constituents. Water, lipids and calcium content is lowered. This lost has a negative effect on the egg weight.

Conclusion: The supplementation made with the germinated sorghum at 0.8% flour improves the productivity of laying hens. Laying hens fed with this formulation have the best results in terms of laying hens weight, egg laying rate and feeding efficiency index. Used at a higher level the germinated sorghum flour has a detrimental effect. However the supplementation had a detrimental effect on the egg weight.

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