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Effect of Using Cinnamon Powder on Performance of Broiler Chickens

Research Project

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1. INTRODUCTION

The main sources of animal protein in the human diet worldwide are poultry meat and eggs (Nkukwana 2018). Chickens reared for their meat rather than their ability to lay eggs are referred to as "broilers" in this situation. Chickens raised for broiler production have been chosen for their quick rate of growth and high carcass yields (Meluzzi & Sirri 2009).

The utilization of antibiotic growth promotors (AGPs) in the chicken industry has been outlawed due to rising bacterial opposition to synthetic antibiotics and enhanced transparency of health and food safety issues, (Reuben *et al*.,2021). The poultry industry has been looking for alternatives, such as feed additives made from plants, as a result of restrictions on the use of antibiotics in chicken the past few years. Due to their potential antioxidant and anti-microbial effects, plant bioactive substances, such as phytochemicals, are growing progressively and increasingly popular in poultry diets, (Hashemi and Davoodi 2011). Cinnamon is a different organic additive that can be added to poultry feed as a nutritional booster to improve nutrient digestibility, hypocholesterolemia, blood physiological profile, gene function, immunity, and especially gut health to reduce the effects of disease and heat stress by maintaining water and electrolytic stability and feed consumption (Ali *et al*,.2021). Recently have seen increased interest from researchers in cinnamon, one of the most popular spices, as a natural good for poultry. Because of above mentioned properties, as well as their capacity to trigger digestive enzymes in the gut, cinnamon natural oils in especially are of importance. The main focus of this research is to find out the effects of using cinnamon powder on performance of broiler chickens.

This research will address the current gap and offer insights into Kurdistan's perspective on this problem as there haven't been many studies and research on this matter in the Kurdistan region of Iraq. Until this day antibiotic growth promoters are widely used in the poultry industry even with the known risks of antibiotic resistance on consumer’s health. The findings of this study may also assist the ministry of agriculture in determining the most effective methods for using cinnamon powder in the Kurdish setting for breeding broiler chickens.

The objective of the study is to find out the effects of using cinnamon powder on performance of broiler chickens, and to focus on the usage of cinnamon feed additive as an alternative for antibiotics.

2. LITERATURE REVIEW

2.1 Effect of Cinnamon Powder on Body Weight of Broiler Chickens:

Body weight effect by many things such as a significant impact on the broiler chickens' ability to grow, which in turn affects how much meat they produce. Body weight in broiler chickens could be influenced by feed additive, for instance plants including (Cinnamon).

Safa Eltazi (2014) has studied the effect of feeding broiler chicks on diets containing different levels of cinnamon powder as natural feed additive on productive performance and carcass characteristics. A total of two hundred one-day old, unsexed (Habbard) broiler chicks were randomly divided into four experimental groups. Each group was further subdivided into five replicates at the rate of ten chicks per pen in complete randomized design. The birds were fed on two basal diets (starter and finisher diets). The cinnamon powder (*Cinnamomumverum*) was added to the basal diets at level (0.0, 3.0, 5.0 and 7.0%) resulting in four formulae respectively to group A, B, C and D with group A serving as control group. The experimental diets were fed for 6-weeks duration. Health of the stock and performance parameters were recorded.

Table 1: The effect of feeding different levels of cinnamon powder on performance of broiler chicks (1-42 days).

Parameter	A	B	C	D	SEM
Initial live weight(g/chick)	45.18	45.13	45.37	45.01	-
Final live weight (g/chick)	1851.11^{c}	1950.01^{b}	2096.11^{a}	1981.20^{b}	9.74
Body weight gain(g/chick)	1805.93^{c}	1920.91^{b}	2050.74^{a}	1936.19^{b}	9.60
Total feed intake (g/chick)	3611.86^{c}	3726.56^{b}	3937.42^{a}	3775.57^{b}	9.66
Feed conversion ratio	2.00^{a}	1.94^{b}	1.92^{c}	1.95^{b}	0.006

(Safa Eltazi,.2014)

^{ab}Means on the same raw with the different superscripts are significantly different (P<0.05), A: Control (without cinnamon powder), B: 3.0% cinnamon powder, C: 5.0% cinnamon powder, D: 7.0% cinnamon powder, SEM: Standard error of the mean

Table (1) displays how feeding broilers at various doses of cinnamon powder affects their performance. Different levels of cinnamon powder had a significant (P0.05) impact on final body weight, body weight increase, total feed intake, and feed conversion ratio. In general, the performance of the broiler was significantly (P 0.05) improved by adding cinnamon powder to the experimental diets. In compared to the other experimental diets, the diet containing 5% of cinnamon powder demonstrated the highest end body weight and body weight gain, the highest total feed intake, and the best feed conversion ratio.

On the contrary, Bahera *et al* (2020)'s study aims to find out ways to enhance broiler chicken's growth**,** the study involves feeding of ration including cinnamon to varying degrees to broiler birds and observing their growth performance. A total number of 160-day-old broiler chickens were taken and divided into 4 groups with 2 replicate groups of 20 broiler chickens each. These birds were kept for 35 days under study. Table (2) shows the design of the different treatment groups. Meanwhile, Table (3) the effect of feeding different levels of cinnamon powder on the body weight of the broiler chickens.

Table 2: Experimental design of different treatment groups.

Groups	Dietary Treatment
T1	Basal diet
T2	Basal diet+0.5% cinnamon powder
T3	Basal diet+1% cinnamon powder
T4	Basal diet+2% cinnamon powder

(Bahera *et al*.,2020)

Table 3: The effect of feeding different levels of cinnamon powder on the body weight of the broiler chickens.

Age	T1	T_2 (0.5%)	T_3 (1.0%)	T_4 (2.0%)
0 day	42.50 ± 1.58	43.00 ± 1.32	43.50 ± 1.21	42.50 ± 1.27
7th day	134.68 [a] ± 5.27	142.45 [a] ± 6.55	138.79 [a] ± 5.91	155.00 [b] ± 7.01
14th day	414.00 [a] ± 11.32	462.50 [b] ± 14.37	438.00 [b] ± 16.66	404.00 [a] ± 14.40
21st day	843.50 [a] ± 21.36	909.50 [b] ± 24.52	962.00[c] ± 19.64	868.35[a] ± 22.89
28th day	1379.00 [b] ± 25.24	1464.00 [c] ± 27.68	1576.50[d] ± 31.57	1317.79 [a] ± 29.73
35th day	2038.77 [a] ± 34.27	2109.33 [b] ± 41.61	2214.68 [c] ± 46.18	1981.23 [a] ± 42.52

[ab]Means bearing different superscripts differ significantly along the rows. (Bahera *et al*.,2020)

According to table (3) there was no significant variation ($p>0.05$) in the mean day-old body weight. The day-old body weight ranged from 42.50 ± 1.58 g (T1) to 43.00 ± 1.32 g in (T3). On 7th day, T4 showed the highest value i.e., 155.00 ± 7.01 and on 14th day, T2 (462.50 ± 14.37) showed the highest body weight which was comparable to the group T3. On 21st, 28th and 35th day, birds of the treatment group T3 showed the highest body weight i.e., 962.00 ± 19.64, 1576.50 ± 31.57 and 2214.68 ± 46.18 respectively.

2.2 Effect of Cinnamon Powder on Dressing Percentage of Broiler Chickens:

Safa Eltazi (2014)'s study also focused on examining the effect of Cinnamon powder on dressing percentage of broiler chickens.

Table (4): Means values for the dressing carcass percentages and commercial cut of broiler carcasses.

Parameters	A	B	C	D	SEM
Hot dressing percentages	68.22^{c}	69.70^{b}	70.02^{a}	69.75^{b}	0.16
Cold dressing percentage	67.92^{c}	68.60^{b}	69.03^{a}	68.63^{b}	0.13
Breast as % of cold carcass	24.05^{c}	25.48^{b}	26.62^{a}	25.50^{b}	1.33
Drumstick as % of cold carcass	14.32^{c}	15.70^{b}	16.11^{a}	15.72^{b}	0.30
Thigh as % of cold carcass	15.31^{c}	16.56^{b}	17.85^{a}	16.65^{b}	0.02

(Safa Eltazi.,2014)

A: Control (without cinnamon powder),B: 3.0% cinnamon powder, C: 5.0% cinnamon powder, D: 7.0% cinnamon powder, SEM: Standard error of the mean N.S. Not statistically significant ($P>0.05$), Means on the same raw with the same superscripts are not significantly different ($P>0.05$).

Table 4 shows the effect of feeding different levels of cinnamon powder on carcass characteristic of the broilers. All the measured parameters were significantly ($P<0.05$) affected by the different levels of cinnamon powder. The inclusion of cinnamon powder in the broiler diets significantly ($P<0.05$) improved the dressing percentages and commercial cuts percentages (breast, drumstick and thigh) in comparison with the control diet. Birds fed with 5.0% level of cinnamon powder gave significantly ($P<0.05$) the highest of these values.

2.3 Sensory Evaluation of Meat:

Singh *et al,*. (2014) has studied to evaluate cinnamon powder as a phytobiotic alternative to antibiotic growth promoters in broilers. A total of 210 one-day old broiler chicks (IBL 80) were randomly distributed to five treatments each with three replicates of 14 birds. The dietary treatments comprised of feeding a basal diet as a control (CON), or the basal diet supplemented with either 0.1g oxytetracycline per kg diet as negative control (OXT), or cinnamon powder at low (0.5%; CPL), medium (1.0%; CPM) and high (1.5%; CPH) levels.

The present finding are in agreement with Sang *et al*., (2013) who reported that supplementing the diet of broilers with 5% cinnamon powder can improve the quality of chicken meat including colour, flavour, texture and overall acceptability. The improvement in flavour, juiciness, tenderness and overall acceptability in cinnamon supplemented treatments is likely due to presence of essential oil of cinnamon powder in the muscle tissue of the meat.

Table 5. Effect of dietary cinnamon powder levels on sensory scores of meat

Parameters	CON	OXT	CPL	CPM	CPH	SEM
Appearance and color	6.17^{a}	6.67^{ab}	7.13^{b}	6.83^{b}	6.96^{b}	0.10
Flavor	6.33^{a}	6.42^{a}	6.75^{b}	6.75^{b}	6.98^{b}	0.10
Tenderness	6.67^{a}	6.58^{a}	6.60^{a}	6.76^{b}	6.67^{a}	0.05
Juiciness	6.42^{a}	6.42^{a}	6.67^{b}	6.70^{b}	6.83^{b}	0.08
Overall acceptability	6.17^{a}	6.67^{b}	6.75^{b}	6.83^{b}	6.75^{b}	0.08

(Singh *et al,*.2014)

Basal diet with no suppliment (CON), Supplimented with oxytetracycline (OXT), Cinnamon powder at low (CPL), medium (CPM) and high (CPH) levels.

2.4: Effect of Dietary Cinnamon Powder on PH and Water Holding Capacity of Broiler Chickens.

Sang *et al.*, (2011) also examined the pH and water holding capacity of chicken meat from birds fed cinnamon powder as shown in Table 6. The pH of the chicken meat did not differ significantly among groups. However, the water holding capacity was significantly higher in the CNP groups than the control group. Drip loss or water loss percentage is a widely investigated approach used to measure the water holding capacity, which in turn influences savoriness, tenderness, color, fragrance, and nutrient content in the muscle. A lower water holding capacity in muscles can induce liquid out flow, loss of soluble nutrients and flavor. Therefore, the muscle becomes dry, hard and tasteless, and the meat quality is decreased (Barbut, 1996).

Table 6 : Effect of dietary cinnamon powder for 5 weeks on pH and water holding capacity in chicken meats.

Weeks	0	3.0%	5.0%	7.0%	PSE
PH	5.79	5.82	5.79	5.80	0.0584
Water Holding Capacity	57.08 b	59.63 a	60.29a	59.80 a	0.5729

(Sang et al.,2011)

PSE, pooled standard error of mean values, a,b Mean values with different superscripts are significantly different at $p < 0.05$

3.CONCLUSION

This paper sheds light on the importance of cinnamon powder to reduce antibiotic resistance and use cinnamon as a replacement. The benefits of cinnamon powder are enormous, as is mentioned above and they include its positive effect on body weight; its positive effect on dressing percentage; and the improvement of the quality of meat including flavor, color, and texture. The results of various researches confirm that cinnamon powder can be a great replacement for antibiotics as it is much safer to be used and will have better production results.

4. REFERENCES

Ali, A., Ponnampalam, E.N., Pushpakumara, G., Cottrell, J.J., Suleria, H.A. and Dunshea, F.R., 2021. Cinnamon: A natural feed additive for poultry health and production—A review. *Animals*, 11(7), p.2026.

Barbut, S., 2015. The science of poultry and meat processing.

Behera, S., Behera, K., Babu, L.K., Sethy, K., Nanda, S.M. and Biswal, G., 2020. Effect of Supplementation of Cinnamon Powder on Growth Performance in Broiler Chickens.

Hashemi, S.R. and Davoodi, H., 2011. Herbal plants and their derivatives as growth and health promoters in animal nutrition. *Veterinary research communications*, 35(3), pp.169-180.

Meluzzi, A. and Sirri, F., 2009. Welfare of broiler chickens. *Italian Journal of Animal Science*, 8(sup1), pp.161-173.

Nkukwana, T.T., 2018. Global poultry production: Current impact and future outlook on the South African poultry industry. *South African Journal of Animal Science*, 48(5), pp.869-884.

Reuben, R.C., Sarkar, S.L., Roy, P.C., Anwar, A., Hossain, M.A. and Jahid, I.K., 2021. Prebiotics, probiotics and postbiotics for sustainable poultry production. *World's Poultry Science Journal*, 77(4), pp.825-882.

Safa Eltazi, M.A., 2014. Effect of using cinnamon powder as natural feed additive on performance and carcass quality of broiler chickens. *International Journal of Innovative Agriculture and Biology Research*, 2(3), pp.1-8.

Sang-Oh, P., Chae-Min, R., Byung-Sung, P. and Jong, H., 2013. The meat quality and growth performance in broiler chickens fed diet with cinnamon powder. *Journal of Environmental biology*, 34(1), p.127.

Singh, J., Sethi, A.P.S., Sikka, S.S., Chatli, M.K. and Kumar, P., 2014. Effect of cinnamon (Cinnamomum cassia) powder as a phytobiotic growth promoter in commercial broiler chickens. *Animal Nutrition and Feed Technology*, 14(3), pp.471-479.