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A Comparative Study on Diet Supplementation with a Mixture of Herbal Plants and Dandelion as a Source of Prebiotics on the Performance of Broilers

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Abstract: In this study a mixed herbal plants (Anise, Cinnamon, Peppermint) and Dandelion were added to the basal diet during the experimental period of 6 weeks. The study aimed to find out the effect of these treatments on productive and physiological traits of 200 broilers unsexed Hubbard chicks at the age of one day. These chicks were randomly divided into five groups equally (40 chicks each). Each group was subdivided into two equal subgroup, and fed with the following treatments. The first group (T1) was fed the basal diet and kept as a control, the second group (T2) was fed the same diet with adding 0.25% of mix herbal plants, where as the third group (T3) was fed the basal diet with adding 0.25% of Dandilion, while the fourth group (T4) was fed the basal diet with adding 0.50% from the mixed herbal plants and the fifth group (T5) was fed the same basal diet with adding 0.50% of Dandilion. The feeding period for all groups lasted for 42 days. The results appeared that there is an improvement in performance traits for all treated groups compared with the control group. However, the chicks fed with 0.25% Mix herbal plants performed better than those fed with 0.50% concerning weekly body weight gain, live body weight and mortality rate. However chicks fed with Dandelion (0.50%) were better in body weight gain, feed conversion ratio, live body weight and mortality rate than those fed with 0.25%. No significant effect was noticed on the addition of Mix herbal plants or Dandilion to the diet on blood traits and stress coefficient as compared with the control group. There was no significant effect on dressing percentage or edible giblet organs.

Key words: Dandelion, herbal plants, prebiotics, performance

INTRODUCTION

Herbs, spices and various plant extracts have received increasing attention as possible Growth Promoters (GP) additives references. There is an evidence to suggest that some of these components have different active substances. Essential oils in aromatic plants are used extensively in medicine and in food and cosmetic industries references. In addition to their antimicrobial activity and antioxidants increasing production of digestive enzymes and improving where also demonstrated absorption of digestive products through enhancing liver functions (Langhout, 2000; Williams and Losa, 2001; Hernandez *et al*., 2004). To be effective on a practical scale, it is likely that these compounds will be needed to be provided in more concentrated form than as found in their natural sources (Bill, 2002). As an aromatic plants, Anise has been used as a stimulating effect of digestion (Cabuk *et al*., 2003) antibacterial (Singh *et al*., 2002; Tabanca *et al*., 2003), antifungal (Soliman and Badea, 2002) and antipyretic (Afifi *et al*., 1994). Furthermore, it has been shown to have anticonvulsant effects and it has also been used for the treatment of constipation (Curtis *et al*., 1996; Pourgholam *et al*., 1999; Chicouri and Chicouri, 2000). They also possessed muscle relaxant effect (Albuquerque *et al*., 1995), As for Cinnamon, the cinnmaldehyde in the cinnamon bark's essential oil acts as antibacterial, fungistatic and promotes motility. It also increases gastric secretions slightly and is an insecticide. (Medical Economical Company, 2000). The plant peppermint (menthe piperita) is commonly used for treatment of losing appetite, common cold, bronchitis, sinusitis, fever, nausea and indigestion as an herbal agent (Akdogan *et al*., 2004). Some times Peppermint is also used as antibacterial (Moreira *et al*., 2005), acarisidal (Kim *et al*., 2004), anti-inflammatory (Carmin *et al*., 2000), antioxidant (Runnie *et al*., 2004), insecticide (Rajaa *et al*., 2001), antispasmodic (Carmin *et al*., 2000), vasodilatory (Runnie *et al*., 2004).

Of particular interest is the use of a new termed Nondigestible Oligosaccharides (NDO). Due to their unique chemical structure some of these carbohydrates resist digestion by the human and animal alimentary tract. Consequently, it reaches the caeco-colon essentially as intact molecules, not providing the body with digestible monosaccharides.

Because these carbohydrates enter the colon as intact molecules it elicits systemic physiological functions and act as fermentable substrates for colonic microflora-influencing the species composition and metabolic characteristics of the intestinal microflora and therefore provide an important health attributes .

Inulin is a natural NDO extracted in large quantities from chicory with potent use in producing

physiological functional foods and promoting human health. Evidence of the growing interest in

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inulin is led to increase researches in both short-chained Fructooligosaccharides (FOS) and the longer chained inulin . A number of review have been published dealing with various aspects of the health benefits of FOS and inulin These include: Gibson and Roberfroid, 1995; Gibson *et al*., 1996; Roberfroid, 1999) The aim of the present study is to determine the effect of different medical plants (herbs) used in the diets as a possible feed additives in enhancing and promoting growth of broilers chicks.

MATERIALS AND METHODS

Two hundred a day-old chicks (Hubbard) were divided into 5 groups of 40 chicks. They were randomly assigned to 5 treatments diets. The experiment were carried out in 42 days. Each Treatment group was further more sub-divided into 2 replicates of 20 chicks per replicate. The chicks were fed on the starter and grower diets. The ingredients and chemical compositions of the diets are presented in Table 1, were analyzed using AOAC (1996) procedure. Feed and water were provided *ad libitum* during the experiment. In control group, chicks were fed the basal diet. Two different levels of the mix herbal plants (0.25% and 0.50%) and the Dandelion (0.25% and 0.50%) were added to the basal diets, A continuous light of 24 hours for the 6 weeks was applied. The chicks were weighted individually on days 1, 7, 14, 21, 28, 35 and 42 per pen. The average live body weights, body weight gains, feed intake and conversion ratio were measured on a weekly basis.

Mortality for each treatment were recorded. Birds were slaughtered by cutting the throat and jugular vein using a sharp knife near the first vertebra. From each replicate (10 bird group); were picked for eviscerating to calculate the dressing percent without the edible giblets (Heart, Liver and Gizzard). After recording their weight, two birds from each replicate were slaughtered and blood samples were collected from the bronchial vein to determine the RBC, WBC count, PCV and Hb. The blood samples were collected in test tubes with an anticoagulant (Sodium Eythllene Ditetra amino).

So Data were analyzed by using the General Linear Model Procedure of SAS Institute (2001). The means were compared by the Duncan's Multiple Range Test at 5% probability (Steel and Torrie, 1980).

Table 1: Composition of the basal diets used in the periods of the experiment

Ingredients (%)	Finisher 1-21 day	Starter 22-42 day
Yellow corn	58.0	64.0
Soybean meal (45% protein)	38.0	32.0
*Premix	3.0	3.0
Oil (8900 kcal/kg)	0.5	0.5
Salt (NaCl)	0.3	0.3
Methionine	0.1	0.1
Lysine	0.1	0.1
Total	100	100
Calculated chemical analysis		
ME (Kcal/kg)	2850	2900
Crude protein (%)	22.4	20.2
Calcium (%)	0.13	0.23
Avial.Pho. (%)	0.17	0.16
Methionine + Cystien	0.80	0.75
Lysine	1.22	1.15

Premix: (1%) provided the following (per kg of complete diets), 1400IU Vit. A, 3000 IU Vit. D3, 50 mg Vit. E, 4 gm Vit. K, 3 mg Vit. B6, 6 mg Vit. B12, 60 mg niacin, 20 mg pantothenic acid, 0.2 mg folic acid, 150 mg choline, 4.8 mg Ca, 3.18 mg P,100 mg Mn, 50 mg Fe, 80 mg Zn, 10 mg Cu, 0.25 mg Co, 1.5 mg Iodine. Requirements were adjusted according to NRC, 1994

RESULTS AND DISCUSSION

At the end of the experiment, all treatments recorded an increase in their weight as compared with the control group (Table 2). A highly significant ($p>0.05$) increases were shown in treatment T2 (0.25%) mixed herbal plants and T5 (0.5%) Dandelion they were (2585.94) gm and (2622.06) gm respectively. Also the accumulative weight gain showed that all treatments recorded a highly significant ($p<0.05$) body weight as compared with the control. The highest live body weight gain was recorded at T5 (0.5%) dandelion (2582) gm and T2 (0.25%) mixed herbal plants (2545.9) g. Results showed no significant differences among treatments, in feed intake and feed from the other hand conversion ratio.

Mortality percent in which the control group was higher than the rest of the other groups lower was shown in group T2 (0.25%) mixed herbal plants (Anise, Cinnamon, Pepperment) followed T5 (0.50%)

Table 2: Effect of different level of Mix herbal plants (Anise, Cinnamon and Peppermint) and Dandelion on live body weight, body weight gain, feed intake, feed conversion ratio and mortality rate on broiler ±SE

Items	T1 Control	T2 (0.25%) (Mix herbal plants)	T3 (0.25%) (Dandelion)	T4 (0.50%) (Mix herbal plants)	T5 (0.50%) (Dandelion)
Live body weight (gm)	2428.38±52.0^{b}	2585.94±57.9^{a}	2559.72±42.4^{ab}	2486.84±46.5^{ab}	2622.06±55.9^{a}
Body weight gain (gm)	2388.38±52.0^{b}	2545.94±57.91^{a}	2519.72±42.4^{ab}	2446.84±46.5^{ab}	2582.06±55.9^{a}
Feed intake (gm)	679.77±20.7^{a}	679.59±1.9^{a}	671.95±6.2^{a}	621.21±45.3^{a}	640.07±16.3^{a}
Feed conversion ratio	1.71±0.07^{a}	1.58±0.06^{a}	1.58±0.06^{a}	1.56±0.05^{a}	1.48±0.07^{a}
Mortality rate (%)	12.5±5.3^{a}	5.0±3.5^{a}	7.5±4.2^{a}	7.5±4.2^{a}	5.0±3.5^{a}

$^{a-b}$Means with different superscripts in each column differ significantly ($p<0.05$)

Dandelion. These results are in agreement with several studies which showed the addition of prebiotics to the diets of broiler, improve their performance through improving gut microflora (Pelicano *et al*., 2004; Spring *et al*., 2000; Xu *et al*., 2003). On the other hand Rehman *et al*. (2007) found that the supplementation of inulin resulted in an increase in the villi height of jejunal mucosa of broilers and it is speculated that may increase the absorptive area then enhanced digestion and absorption.

Further more the improvement provided by the mixed herbal plants may be due to its active ingredient such as anethol in Anise, menthol in Peppermint, cinnamaldihyd in Cinnamon. References so the Anise is considered a digestive stimulant (Cabuk *et al*., 2003) while cinnamon act as antimicrobial (Tabak *et al*., 1999) whereas Peppermint acts as digestibility accelerator. These compound enhance gut microbial ecosystem and stimulating secretion of digestive system (Lovkova *et al*., 2001; Williams and Losa, 2001; Cross *et al*., 2007).

In Table 3 the treatments T3, T4, T5 showed a significant increase in dressing percent compared with the control group except T2 (0.25%) mix herbal plants, that showed no significant increase in dressing percent compared with control group. Our result agreed well with (Ocak *et al*., 2008) who reported that the carcass weight and dressing percentage were not significantly affected by peppermint. Also (Durrani *et al*., 2007) reported that the use of 40mL L^{-1} of wild mint infusion in drinking water had a significant ($p<0.05$) effect on mean dressing percentage, as compared with prebiotic. Akinleye *et al*. (2008) reported that the effects of symbiotics on carcass and organs weights were not significantly ($p>0.05$) differ among treatments. Mean weight of heart and gizzard showed no significant difference among treatments but there was a significant difference in liver weight among them. Liver weight of the control group was higher than that of others. This result was in contrast with Debersac *et al*. (2001) who reported that the use of essential oil extract increases the relative liver weight in rats. Our findings could be supported by the findings of Hernandez *et al*. (2004). Elangovan *et al*. (1996) who reported that dietary treatments with herbal plants (alkali-treated) did not cause any pathological change in liver, heart, gizzard and intestine which showed no differences in the mean weight of these organs and abdominal fat were reported.

In Table 4 the haematological parameter was not significantly ($p<0.05$) different between treatments and the values were in correspond with the normal range for healthy birds stated by Mitruka and Rawnsley (1977), No significant difference was noticed in all types of WBC except in Hetrophil, a remarked increase was shown in control group which was about (27.0) while the lowest appeared in T4 Mix herbal plants (0.50%) which was about (12.3), a remarked significant increase difference was also noticed in Esinophil in T3 Dandelion which was (1.0). No significant effect in H/L ratio among treatments but in treatment T5(0.50%) Dandelion and T3 (0.25%) Dandelion there was a little decrease in H/L ratio compared with control group. Our result agreed with AL-Kassie (2008) who reported that the use of *Aspergillus niger*, as a source of probiotic and *Taraxacum officinali* as a source of prebiotic caused a significant decrease ($p<0.05$) in H/L compared with control group, this may be due to the effect of prebiotic

Table 3: Effect of different level of Mix herbal plants (Anise, Cinnamon and Peppermint) and Dandelion on dressing% liver weight% heart weight% and gizzard weight% of broiler ±SE

Items	T1 Control	T2 (0.25%) (Mix herbal plants)	T3 (0.25%) (Dandelion)	T4 (0.50%) (Mix herbal plants)	T5 (0.50%) (Dandelion)
Dressing %	87.18±1.07^{b}	70.82±0.41^{b}	79.21±1.32^{a}	77.05±1.55^{a}	76.50±0.96^{a}
Liver %	2.91±0.5^{a}	2.52±0.31^{ab}	2.27±0.07^{b}	2.31±0.16^{b}	2.20±0.01^{b}
Gizzared %	2.01±0.3^{a}	2.22±0.18^{a}	2.14±0.14^{a}	2.07±0.12^{a}	2.15±0.1^{a}
Heart %	0.64±0.05^{a}	0.59±0.06^{a}	0.63±0.12^{a}	0.66±0.67^{a}	0.67±0.01^{a}

$^{a-b}$Means with different superscripts in each column differ significantly ($p<0.05$)

Table 4: Effect of adding Mix herbal plants (Anise, Cinnamon, Peppermint) and Dandelion in different level on blood picture on broiler chicks ±SE

Items	T1 Control	T2 (0.25%) (Mix herbal plants)	T3 (0.25%) (Dandelion)	T4 (0.50%) (Mix herbal plants)	T5 (0.50%) (Dandelion)
PCV%	31.33±0.88^{a}	28.00±3.72^{a}	29.25±1.70^{a}	28.50±4.87^{a}	30.50±1.76^{a}
Hb g/%	11.03±0.39^{a}	9.83±1.30^{a}	9.58±0.92^{a}	9.90±1.49^{a}	10.50±0.59^{a}
RBCs Cell/mm^{3}	5.6000±0.10^{a}	4.8500±0.64^{a}	5.5500±0.19^{a}	5.0500±0.86^{a}	5.5000±0.35^{a}
WBCs Cell/mm^{3}	266.00±40.45^{a}	297.50±30.06^{a}	251.00±20.94^{a}	235.50±7.85^{a}	306.50±35.62^{a}
Lymphosit	72.5±0.29^{a}	81.3±7.67^{a}	73.0±1.15^{a}	85.0±3.79^{a}	72.67±2.85^{a}
Hetrophil	27.0±0.58^{a}	16.3±8.3^{ab}	24.0±1.5^{ab}	12.3±3.93^{b}	25.3±3.76^{ab}
Eosinophil	0.0±0.0^{a}	0.0±0.0^{a}	1.0±0.58^{a}	0.0±0.0^{a}	0.0±0.0^{a}
Basophil	0.0±0.0^{a}	1.3±0.3^{a}	0.3±0.3^{a}	1.0±0.58^{a}	0.67±0.67^{a}
Monocyte	4.3±3.84^{a}	1.3±0.67^{a}	2.0±0.58^{a}	1.67±0.3^{a}	1.3±0.88^{a}
H/L	0.37±0.01^{a}	0.23±0.14^{a}	0.32±0.01^{a}	0.15±0.05^{a}	0.35±0.06^{a}

$^{a-b}$Means with different superscripts in each column differ significantly ($p<0.05$)

which could be inhibit the nutrition stress or any stress that cause the increase in H/L ratio, because the stress could increase the stimulation of adrenal gland to produce some hormones such as estrone which has a direct effect to analyze a lymphatic cell which causes increase in H/L ratio (Gross and Siegel, 1983). Little increase was also noted in T2(0.25%) mix herbal plants and T4(0.50%) mix herbal plants. This may be due to the effects of the most important activities of essential plant oils which cause improve the endogenous enzymes secretion and stimulation of appetite, digestibility and nutrients absorption. Improvement of the microflora balance and the decrease of *E. coli* and C*lostridium* population and stimulating of the *Lactobacillus* spp. Proliferation. Were also concerned in the advantage of these oils. Intestinal villi layer production, antibacterial, antiviral and anti diarrhea activity and stimulation of the immune system were also enhanced (Horobowicz, 2000; Jamaroz *et al*., 2004).

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