

# CONTENTS

	<b>Page no.</b>
<b>1. INTRODUCTION</b> .....	<b>1</b>
<b>2. REVIEW OF LITERATURE</b> .....	<b>3</b>
2.1 The beneficial effect of feed additives.....	<b>3</b>
2.2. Botanical dietetic ingredients as feed additives.....	<b>3</b>
2.3. Definition of botanical dietetic ingredients.....	<b>3</b>
2.4. Functional properties of herbal and spices.....	<b>4</b>
2.4.1. Nutritional properties.....	<b>4</b>
2.4.2. Antioxidant properties.....	<b>4</b>
2.4.3. Antimicrobial properties .....	<b>4</b>
2.4.4. Insect repellent properties.....	<b>5</b>
2.4.5. Medicinal properties.....	<b>5</b>
2.5. Mode of action of medicinal plants and development of resistance.....	<b>6</b>
2.6. Rosemary.....	<b>8</b>
2.6.1. Description.....	<b>8</b>
2.6.2. Chemical composition of rosemary.....	<b>9</b>
2.6.3. Uses of rosemary.....	<b>9</b>
2.6.3.1. Food processing.....	<b>9</b>
2.6.3.2. Medicine.....	<b>10</b>
2.6.3.2.1. Traditional medicine.....	<b>10</b>
2.6.4. Active compound of rosemary as antioxidants.....	<b>10</b>
2.6.5. Effect of rosemary leaves on poultry.....	<b>11</b>
2.7. Chamomile.....	<b>12</b>
2.7.1. Common name.....	<b>12</b>
2.7.2. Botanical name.....	<b>12</b>
2.7.3. Parts and where grown.....	<b>12</b>
2.7.4. Effect of Chamomile flower heads on poultry.....	<b>13</b>
2.8. Basil.....	<b>14</b>
2.8.1. Common name.....	<b>14</b>
2.8.2. Botanical name.....	<b>14</b>

	<b>Page no.</b>
2.8.3. Parts used and where grown.....	14
2.8.4. Historical or traditional use.....	14
2.8.5. Active constituents.....	15
2.8.6. How much is usually taken.....	15
2.8.7. Side effects of basil volatile oil.....	15
2.9. Effect of medicinal plants on digestibility coefficients of nutrients	16
2.10. Effect of medicinal plants on carcass traits.....	16
2.11. Effect of medicinal plants and spices on blood constituents.....	17
2.12. Effect of medicinal plants and spices on counts of harmful microorganisms.....	19
2.13. Probiotic preparation as non-feed additives.....	21
2.13.1. Definition.....	21
2.13.2. Characteristics of probiotics.....	22
2.13.3. Mode of action of probiotics.....	23
2.13.3.1. Immune enhancement.....	23
2.13.3.2. Alteration of microbial metabolism.....	23
2.13.3.3. Probiotics of acidifiers.....	23
2.13.4. Probiotics as growth promoters for poultry .....	24
2.13.4.1. Growth stimulation.....	24
2.13.4.2. Effect on feed conversion ratio.....	24
2.13.4.3. Effect on mortality rate.....	24
2.13.4.4. Effect on carcass characteristics.....	24
2.13.4.5. Effect on blood constituents.....	25
<b>3. MATERIAL AND METHODS .....</b>	<b>26</b>
3.1. Experimental birds.....	26
3.2. Experimental design.....	26
3.3. Experimental diets.....	26

	<b>Page no.</b>
3.4. Housing and management.....	27
3.5. Vaccination and medication.....	28
3.6. Measurements.....	28
3.6.1. Average body weight.....	28
3.6.2. Average body weight gain.....	28
3.6.3. Feed consumption.....	28
3.6.4. Feed conversion ratio.....	28
3.6.5. Viability percentage.....	29
3.7. Apparent digestibility of nutrients.....	29
3.8. Slaughter test.....	29
3.9. Microbiological study.....	29
3.10. Blood samples and analyses.....	30
3.10.1. Haematological parameters.....	30
3.10.1.1. Hemoglobin determination (Hb).....	30
3.10.1.2. Packed cell volume (PCV).....	30
3.10.1.3. RBCs count.....	30
3.10.1.4. WBCs counts.....	30
3.10.1.5. Differential leucocytes count.....	30
3.10.2. Blood biochemical characteristics.....	31
3.10.2.1. Total protein, total albumin, total globulin and total Cholesterol.....	31
3.10.2.2. Serum ALT and AST.....	31
3.10.2.3. Serum leptin hormone determination.....	31
3.11. Economical efficiency.....	31
3.12. Statistical Analysis.....	32

	<b>Page no.</b>
<b>4. RESULTS AND DISCUSSION.....</b>	<b>33</b>
4.1. Effect of experimental herbs and probiotic on growth performance	<b>33</b>
4.1.1. Live body weigh.....	<b>33</b>
4.1.2. Body weight gain.....	<b>35</b>
4.1.3. Feed consumption.....	<b>41</b>
4.1.4. Feed conversion ratio.....	<b>47</b>
4.1.5. Viability percentage.....	<b>48</b>
4.2. Coefficients of nutrient digestibilities.....	<b>52</b>
4.3. Carcass traits.....	<b>54</b>
4.4. pH of intestinal treated birds.....	<b>57</b>
4.4.1. pH of jejunum.....	<b>57</b>
4.4.2. pH of duodenum.....	<b>57</b>
4.4.3. pH of ileum.....	<b>57</b>
4.5. Microbiological study.....	<b>60</b>
4.6. Effects of experimental treatments on hematological parameters at 16 weeks of age. ....	<b>62</b>
4.6.1. Hemoglobin concentration (Hb).....	<b>62</b>
4.6.2. Packed cell volume (PCV%).....	<b>62</b>
4.6.3. Red blood cells (RBCs) count.....	<b>62</b>
4.6.4. White blood cells (WBCs) count.....	<b>62</b>
4.6.5. Effect of treatments on differential leucocytic counts of Gimmizaha chick at 16 weeks of age.....	<b>62</b>
4.6.5.1. Lymphocytes.....	<b>62</b>
4.6.5.2. Monocytes.....	<b>63</b>
4.6.5.3. Basophils .....	<b>63</b>
4.6.5.4. Eosinophils.....	<b>63</b>
4.6.5.5. Neutrophils.....	<b>63</b>

	<b>Page no.</b>
4.7. Effect of experimental treatments on biochemical traits at 16 weeks of age.....	<b>66</b>
4.7.1. Serum protein, albumin and globulin concentration.....	<b>66</b>
4.7. 2. Serum total cholesterol concentrations.....	<b>66</b>
4.7.3. Serum ALT and AST .....	<b>71</b>
4.7.4. Serum leptin hormone.....	<b>73</b>
4.8. Economical efficiency.....	<b>73</b>
<b>5. SUMMARY. ....</b>	<b>77</b>
<b>6. REFERENCES.....</b>	<b>81</b>
<b>7. ARABIC SUMMARY .....</b>	

## 5. SUMMARY

Three hundred and thirty six, 2-weeks old male Gimmizah chicks, obtained from the basal flock of El-Sabahia Poultry Station were used in this study. Chicks were wing-banded, weighed and divided randomly into 16 treatment groups with 21 chicks in each group and each sub-group was allotted into three replicates (7 each).

The present experiment was designed to study the possibility of using probiotic (Moreyeast) and different medicinal herbs (rosemary leaves (*Rasmarinus officinalis* L.), chamomile flower heads (*Matricaria chamomilla* L.) and sweet basil (*Ocimum basilicum* L.) and their combination at different levels as supplements to male Gimmizah chicks diets to evaluate its effect on performance, digestibility of nutrients, carcass quality, and blood constituents and also, their effects on economical benefit.

Chicks in all experimental groups were fed a basal starter diet from 2-8 weeks of age and a basal grower diet from 8-16 weeks of age. The basal diets were either un-supplemented or supplemented with the following:

1. Basal diet + 0.1 % rosemary leaves (RL)
2. Basal diet + 0.2 % RL
3. Basal diet + 0.1 % chamomile flower heads (CF).
4. Basal diet + 0.2 % CF
5. Basal diet + 0.1 % sweet basil (SB)
6. Basal diet + 0.2 % SB
7. Basal diet + 0.1 % (RL + CF at ratio 1 : 1)
8. Basal diet + 0.2 % (RL + CF at ratio 1 : 1)
9. Basal diet + 0.1 % (RL + SB at ratio 1 : 1)
10. Basal diet + 0.2 % (RL + SB at ratio 1 : 1)
11. Basal diet + 0.1 % (CF + SB at ratio 1 : 1)
12. Basal diet + 0.2 % (CF + SB at ratio 1 : 1)
13. Basal diet + 0.1 % (RL + CF + SB at ratio 1 : 1 : 1)
14. Basal diet + 0.2 % (RL + CF + SB at ratio 1 : 1 : 1)
15. Basal diet + probiotic (Moreyeast) 1 g / Kg diet.
16. Basal diet only without supplementation (Served as control).

### Results obtained could be summarized as follows:

- 1- The highest live body weight at the end of the starter period (at 8 weeks of age) was observed in birds fed diet supplemented with 0.1% mixtures of (CF + SB). It was significantly ( $P \leq 0.01$ ) the superior in live body weight by 14.4 and 10.3 % than those birds fed control diet or birds fed probiotic in their diet. However, including the mixtures of (RL + SB) at 0.2 % level in the diet of male Gimmizah chickens recorded the best body weight at the end of growing period (at 16 weeks of age). It significantly ( $P \leq 0.01$ ) increased by 13.6 % as compared to control birds and insignificantly surpassed the group fed probiotic in their diet by 3.7%.
- 2- Most of the medicinal plants used in this study significantly ( $P \leq 0.05$  or 0.01) decreased feed consumption from the beginning of the study at 2 weeks of age up to 16 weeks of age. Throughout the whole experimental period, the birds fed the combination of 0.1 % (RL + CF + SB), 0.2 % CF, 0.1 % RL and the mixture of 0.2 % (CF + SB) recorded the lowest ( $P \leq 0.05$ ) values of feed consumption and those fed probiotic and control

- diets recorded the highest ( $P \leq 0.05$ ) values of it, as compared to the other experimental groups.
- 3- The improvements in feed conversion ratio due to supplementing diets with 0.1 % CF, 0.2 % SB, 0.2 % (RL + CF), 0.2 % (RL + SB), and the combination between the three medicinal plants (RL + CF + SB) at both levels (0.1 and 0.2 %) in Gimmizah chickens' diets during the starter period were 18.5, 18.5, 18.5, 21.1, 30.7 and 26.1 % in comparison to the control, respectively. The corresponding values during the grower period were 26.7, 29.2, 24.5, 19.3, 26.2 and 22.0 %, respectively.
  - 4- By inclusion of different types and levels of medicinal plants either alone or in combination of two or three medicinal plants and also supplementing diet with probiotic, average feed conversion ratio from 2 to 16 weeks of age insignificantly improved as compared to control, however, birds fed 0.2 % CF and the combination between the three medicinal plants (RL + CF + SB) at 0.1 % level were significantly ( $P \leq 0.05$ ) more efficient in improving feed conversion ratio as compared to the other experimental groups.
  - 5- Numerical increase due to supplemented diets with mixture of (RL + CF), (CF + SB) and (RL + CF + SB) and also probiotic supplementation in crude protein digestibility was observed and yield further improvement in digestibility of crude protein over that of control, showing a synergistic effect. Insignificant increase in ether extract digestibility of birds fed diets containing 0.2 % RL, 0.1 and 0.2 % CF and 0.1 and 0.2 % SB reached to 16.0, 9.9, 7.7, 11.6 and 11.7 % from control.
  - 6- The results showed that birds fed diets supplemented with 0.2 % RL, 0.1 and 0.2 % CF, 0.1 and 0.2 % SB, 0.1 and 0.2 % RL + SB, and 0.1 and 0.2 % RL + CF + SB were significantly more efficient in digestion of crude fiber (CF) than birds fed the control diet without supplementation.
  - 7- Different medicinal plants and probiotic did not significantly affect relative carcass weight and total edible parts. However, 0.2 % (CF + SB) resulted in increasing liver percentage over the control group by 12.3 %. Also, heart percentage significantly decreased due to feeding birds diets containing 0.1 % SB, 0.1 and 0.2 % (RL + CF), 0.2 % (CF + SM) and 0.2 % (RL + CF + SB) as compared to control.
  - 8- Most of the feed additives used in this study resulted in decreasing intestinal length and weight (%) as compared to control, except in the group of birds given 0.1 % SB in their diet.
  - 9- pH of jejunum significantly ( $P \leq 0.05$ ) increased due to containing 0.1 and 0.2 % RL, 0.1 % CF, 0.2 % SB and due to all mixture of the medicinal plants, except 0.1 % (RL + CF + SB) which was insignificantly increased comparing to control. Also, probiotic supplementation resulted in increasing pH of jejunum.
  - 10- The presence of 0.2 % CF, 0.1 and 0.2 % SB, 0.1 % RL + CF, 0.1 CF + SB and 0.1 or 0.2 % RL + CF + SB resulted in decreasing pH of duodenum as compared to control. Also, probiotic supplementation, 0.2 % RL and 0.2 % RL + SB decreased level of pH in the duodenum, but the decrease was insignificant.
  - 11- Ileum pH was significantly increased by supplementing diets with all of the feed additives used in this study as compared to control, except 0.2 % (CF + SB) which was equal to the control group.
  - 12- The results showed that all medicinal plants and also probiotic reduced aerobic plate counts, total coliform counts and total anaerobic counts. The greatest reduction in aerobic plate counts, total coliform counts and total anaerobic counts was observed

- with the groups fed diet containing the combination between the three medicinal plants (RL + CF + SB) at both levels (0.1 and 0.2 %).
- 13- The results showed that Hb concentration and PCV % were insignificantly affected by different supplementations as compared to control group, except the birds fed diet containing 0.2 % CF + SB, where this mixture caused a significant ( $P \leq 0.05$ ) decrease in PCV % reached to 24.9 % from control.
  - 14- Red blood cells were not affected by either the medicinal plants inclusion in the diet or the probiotic supplementation, except in the groups that fed diets supplemented with 0.1 and 0.2 % CF, 0.1 and 0.2 % SB, and 0.1 % RL + CF + SB showed significant decrease in RBCs count, however, the group fed 0.2 % RL + CF showed significant increase in it.
  - 15- White blood cells were not affected by either the medicinal plants inclusion in the diet or the probiotic supplementation, except in the groups that fed diet supplemented with the combination of (RL + CF + SB) at 0.1 % level, where it showed significant increase as compared to control.
  - 16- Results indicated that there were significant differences in lymphocytes, monocytes, basophilus, eosinophils and neutrophils due to different treatments as compared to control.
  - 17- Inclusion of medicinal plants either alone or in a mixture form in male Gimmizah chicks, irrespective of probiotic supplementation significantly decreased serum total protein as compared to control group or chicks fed diet supplemented with probiotic.
  - 18- Significant decrease in serum albumin was only observed in the groups received 0.2 % CF, 0.2 % (RL + SB), 0.2 % (CF + SB), 0.1 and 0.2 % combination of (RM + CF + SB) in their diets.
  - 19- Addition of 0.1 % SB, 0.1 or 0.2 % (RL + CF), 0.1 % (RL + SB) and the combination between (RL + CF + SB) at 0.1 % level did not significantly affect serum globulin, however, the other supplementations resulted in a significant ( $P \leq 0.05$ ) decrease in this trait.
  - 20- Cholesterol concentrations tended to significantly decrease in all groups fed medicinal plants and probiotic as compared to the control group.
  - 21- Adding 0.1 and 0.2 % SB, 0.1 % (RL + CF), 0.2 % (RL + SB), 0.1 and 0.2 % (CF + SB) and 0.1 % (RL + CF + SB) to the basal experimental diets significantly ( $P \leq 0.05$ ) increased AST transaminase concentrations.
  - 22- The concentrations of transaminase enzyme ALT were insignificantly affected by the experimental feed additives, except in the groups fed 0.1 % SB, 0.1 % (RL + CF) and 0.1 and 0.2 % (RL + SB) it significantly increased comparing to control group.
  - 23- Most of the medicinal plants used in this study, at 8 and 16 weeks of age, decreased concentrations of leptin hormone than control, but without significant differences between them, except in the group fed diet supplemented with 0.1 % (RL + CF) at 8 weeks as it significantly ( $P \leq 0.05$ ) decreased by 21.6 % and those received 0.1 % RL in their diet at 16 weeks of age significantly ( $P \leq 0.05$ ) decreased by 23.6 % than in control.
  - 24- Net revenue and economic efficiency of medicinal plants and probiotic supplemented diets showed improvement compared to un-supplemented control diet.



**We concluded that.**

- All tested medicinal plants have favorable effect as natural growth promoter on the performance and health of birds.
- Medicinal plants like (RL, CF and SB) either individually or in combination had better effect than using probiotic (Moreyeast).
- The use of medicinal plants (RL, CF and SB) had the best synergistic effect and was more economically than control.