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# PRODUCTIVE AND PHYSIOLOGICAL EVALUATION OF SOME COMMERCIAL FEED ADDITIVES AS GROWTH PROMOTERS FOR GROWING MUSCOVY DUCKS.

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## SUMMARY

A total number of two hundred and seventy, one day old, unsexed, Muskovy ducks were used to compare the effect of adding Zinc bacitracin, Lincomix, Ovo-Stark. N-Fac, and verginiamycin to the control diet, at levels of 1000, 250, 1000, 500, and 1000 gm/ton ration respectively, on the performance, some metabolic concentrates and carcass characteristics. Birds were divided equally into 6 groups containing 45 birds each. Each group contained 3 replicates. of 15 birds. Experimental diets supplemented or not one source of the growth promoters. The experiment was terminated when birds were 11 weeks old. Weight gain and feed intake were recorded at 0, 3, 5, 7 9, and 11 weeks of age. Feed conversion (feed/gain) was calculated. Some plasma constituents were determined. At the end of the experiment, some of carcass characteristics were measured.

Body weight, body gain, and feed intake were improved ($P<0.05$) by adding the examined growth promoters during the entire period (0 to 11 weeks of age). Birds fed dietary N-fac or verginiamicin presented the greatest ($P<0.05$) values of body weight and body gain. However, the highest ($P<0.05$) feed intake was noticed when birds fed dietary verginiamycin. Adding Ovo-stark or N-fac to the control diet recorded the best ($P<0.05$) feed conversion efficiency.

Blood plasma samples showed enhancement ($P<0.05$) in the concentrations of total protein, albumin, globulin, total lipids, glutamic oxalcetic transaminase (GOT), glutamic pyrovic (GPT), and triiodthyronine ($T_3$) during the 9th and 11th weeks of age. Dietary growth promoters improved ($P<0.05$) plasma calcium and potassium concentration. The birds fed dietary Zinc bacitaracin or verginiamycin presented the highest ($P<0.05$) values of calcium. However, birds fed diets supplemented with Zinc bacitracin, Lincomix, or N-Fac recorded the best ($P<0.05$) values of potassium.

Dietary N-fac and verginiamycin improved ($P<0.05$) the absolute carcass weight. However, verginiamycin ration recorded the greatest percent ($P<0.05$) of the dressing and lowest ($P<0.05$) values of edible giblets, abdominal fat, and offals proportions. In conclusion, feeding growing Muscuvy ducks on dietary growth promoters enhanced the productive and metabolic responses. Birds fed N-fac and Verginiamycin rations recorded the best enhancement.

***Keywords:*** *growth promoters, Muscuvy ducks, performance, metabolic concentrates*

## INTRODUCTION

Nowadays, feed additives are widely used in poultry rations. It may added to broiler rations in very small quantities to improvement the growth performance and economical efficiency (Ali, 1994, Omar 1996 and Ibahim *et al.*, 1998). These components can be classified into two categories:- 1) Additives are essential for the biological functions of animal such as vitamins and trace minerals. 2) Additives

are not essential for biological function, but have demonstrated a positive effect upon the animal including growth promoters, absorption enhances, technological additives, antimicrobial agents, metabolic modifiers, probiotics and prophylactics (Namur *et al.*, 1988).

The use of antibacerials in the diets of poultry to improve performance has become an accepted husbandry practice. Bird (1968) summarized the response of broiler chickens at or near market weight and fed diets containing procaine penicillin, Zinc bacitracin, chlortetracycline, or oxytetracycline at levels from 2 to 20 ppm. The median live weight gain over the corresponding controls fed unmedicated diets was 4% (range 1 to 15%) and the median improvement in feed conversion was 2% (range 1 to 6%). No trend to decreased effectiveness was apparent throughout the series. Also, Ravindran *et al.* (1984) reported that Verginiamycin, tended to improve utilization of some minerals such as phosphorus, calcium, magnesium and iron. Moreover, El-Gendi *et al.* (2000) found that. Chicks fed 0.5 Kg Zinc bacitracin /ton rations improved ($P<0.001$) feed conversion efficiency. The performance index was enhancement (86.70 and 82.59%, respectively) for chicks fed diets containing 0.5 kg/ton either Zinc bacitracin or bio-Tonic.

Khodary *et al.* (1996) carried out an experiment to investigate the efficiency of herb, edible plants and some plant seeds as neutral tonic, restoratives, antibacterial, and anti parasitic drugs on improving the productive performance in poultry.

The present experiment was aimed to evaluate the performance, some metabolic concentrates, and carcass characteristics for growing Muscovy ducks fed diets inclusion Zinc bacitracin, Lincomix, Ovo-Stark, N-Fac and Verginiamycin as growth promoters, by recommended levels 1000, 250, 1000, 500, and 1000 gm/ton ration respectively.

## MATERIALS AND METHODS

***Birds management and diets:***

Two hundred and seventy, one day old, unsexed, Muskovy ducks were housed in light and temperature controlled room. Free access to water and feed were available during all times. Ducklings were divided into 6 groups (45 bird each) according to dietary control, Zinc bacitracin, Lincomix, Ovo-Stark, N-Fac, and verginiamycin. Each group contained 3 replicates of 15 birds.

The control diet contained adequate levels of nutrients for growing ducks as recommended by the National Research Council (NRC, 1994) with no feed additives. Five additional diets were obtained by adding Zinc bacitracin, Lincomix, Ovo-Stark, N-Fac, and verginiamycin as growth promoters to the control diets. Each additional diet contained one source of the growth promoter at levels of 1000, 250, 1000, 500, and 1000 gm/ton ration, respectively. Composition of starting and growing control diet are shown in Table (1).

**Table 1. The chemical and proximate analyses of the control diet.**

| *Ingredient* | Starting diet (0 to 2 weeks) | Growing diet (2-11eeks) |
|---|---|---|
| Ground corn. yellow | 60.25 | 66.75 |
| Wheat bran | 7.00 | 12.50 |
| Soy bean meal (44%CP) | 22.50 | 10.50 |
| Broiler concentrates (52%CP) | 10.00 | 10.00 |
| Vitamins Minerals mixture* | 0.25 | 0.25 |
| Total | 100.00 | 100.00 |
| ***Chemical composition*** | | |
| Metabolizable energy** | 2873 | 2889 |
| Crude protein[1] | 21.73 | 17.76 |
| Crude fiber[1] | 3.97 | 3.94 |
| Ether extract[1] | 4.24 | 4.09 |
| Calcium | 0.980 | 0.925 |
| Av. Phosphorus | 0.541 | 0.523 |
| Methionine&cystine | 0.741 | 0.614 |
| Lysine | 1.162 | 1.008 |

* Each 2.5 kg of vitamins and minerals mixture contain:
12000.000 IU vitamin A acetate; 2000.000 IU vitamin D3; 10.000 mg vitamin E acetate; 2000 mg vitamin K3; 100 mg vitamin B; 4000 mg vitamin B2; 1500 mg vitamin B6; 10 mg vitamin B12; 10.000 mg Pantothenic acid; 20.000 mg Nicotinic acid; 1000 mg Folic acid; 50 mg Bioten; 500.000 mg Chorine; 10.000 mg Copper; 1000 mg Iodine; 30.00 mg Iron; 55.000 mg Manganese; 55.000 mg Zinc, and 100 mg Selenium.
[1] Determined values
** According NRC 1994

***Composition of feed additive:***

1- Zinc bacitracin (is an antibiotic 10%).
2- Lincomix (each One Kg contains - 44 gm of Lencomix hydrochloride monohydrate; 1% mineral oil; 98.14% soybean or corn glutein).
3- Ovo-Stark (each one Kg contains:- 15000,000 IU vitamin A acetate; 250,000 IU vitamin D3; 2500 IU vitamin E acetate; 8gm vitamin C; 7gm Copper; 0.86gm Iodine; 71.312gm; Iron; 33.187 gm Manganese; 49.500gm Zinc; 59.500 gm Calcium:0.412 Cobalt; 62.500 gm sodium bicarbonate; 50gm Magnesium; 0.45 gm Selenium and complete to 1000 gm by Calcium bicarbonate).
4 - N-Fac (it is dried solubles. dried extracted and fermentation meal. and corn distillers dried grains with soluble fish meal)
5 - Verginiamycin (is an antibiotic. 10%)

***Measurements and determinations:***

Body weight and feed intake were recorded for birds at 0, 3rd, 5th, 7th, 9th, and 11th weeks of age. Feed conversion values (feed/gain) were calculated. At 9th and 11th weeks of age; blood samples were collected from randomly five birds of each treatment from the wing vein in heparinized tubes and centrifuged at 3000rpm/15minutes. The plasma was obtained and immediately stored at -20° C till analysis. Total protein, albumin, total lipids, GOT & GPT, were determined according to Weischelbaum (1946), Doumas (1971), Frings *et al.*, (1972) and Wallnofer *et al.*, (1974), respectively. Triiodothyronine ($T_3$) were determined by the double antibody radioimmuno assay with commercial kits purchased from antibodies incorporated (P. O. Box 442. Davis, California 95616). The radioactivity was measured by gamma counter as described by Peebles and

Marks (1991). Calcium and potassium were determined by flamphotometer.

At the end of the experiment (11 weeks of age), three birds from each replicate were scarified after 12 hours fasting. After bleeding out, the birds were scalded, plucked with electrical cyclomatic picker and eviscerated. Eviscerated carcasses were individually weighed. The percentages of dressing, edible giblets (liver, gizzard, heart, and abdominal fat) and offals (blood, head, legs, and feathers) were calculated in relation to the live body weight.

Analysis of variance and LSD procedures were performed as outlined be Snedecor and Cochran, (1980).

## RESULTS AND DISCUSSION

***Productive performance:***

Effect of dietary growth promoters on body weight, body gain, feed intake, and feed conversion (feed/gain) are shown in Table (2).

***Body weight, body gain, and feed intake:***

It was observed that, all the dietary growth promoters used in this experiment enhanced ($P \leq 0.01$) body weight, body gain and feed intake at the market age (11 weeks old). Birds fed dietary N-fac presented the heaviest ($P \leq 0.05$) body weight during all the experimental periods. However, birds fed dietary verginiamycin recorded the best ($P \leq 0.05$) values of body gain and feed intake during the periods 5 to 7, 7 to 9, 9 to 11 and 0 to 11 weeks of age.

The improvement in body gain and feed intake due to growth promoters supplementation may be attributed to the mode of action of probiotics which may operate by producing antibiotic substances and inhibiting harmful bacteria, altering microbial metabolism and decrease intestinal pH ( Sissons 1988 and Makled, 1991). Moreover, the presence of some valuable nutrients such as vitamins and minerals in some growth promoters (Ovo-stark) may essential for growth performance. Also, the enhancement in body gain and feed intake as a result of using some antibiotics (Zinc bacitracin, Lincomix, or verginiamycin) may be insure the important of these components as growth promoters, for improving birds productivity (El-Gendi *et al.*, 2000). Similar enhancement in body gain and feed intake obtained by Ali (1994) using Lacto-Sacc and Omar (1996) using Yea-Sacc, Lacto-sacc, and Fermacto.

***Feed conversion efficiency:***

Feed conversion efficiency was improved ($P \leq 0.05$) for birds fed dietary N-fac and Ovo-Stark (Table 2), during the entire period (0 to 11) weeks of age. This may be related to the enhancement in body gain without subsequence improving in feed intake. Results obtained agree with those of El-Gendi *et al.*, (1994) who found productive improvement due to herbal products supplementation as a result of improving feed conversion which may be attributed to its effect on improving the digestibility of dietary protein in small gut. Also, El- Gindi *et al.*, (2000) found that chicks fed 0.5 Kg Zinc bacitracin/ton ration had better feed conversion.

***Metabolites changes:***

Changes in plasma Total protein, albumin, globulin, total lipids, GOT, GPT, $T_3$, Calcium and Potassium as affected by dietary growth promoters are listed in Tables (3 and 4).

***Total protein, albumin, globulin, total lipids, GOT, and GPT:***

In general, the obtained date demonstrated that, adding Zinc bacitracin, Lincomix, Ovo-Stark, N-Fac, or verginiamycin as growth promoters to the growing Muskovy ducks diet, in generally, enhanced ($P \leq 0.05$) plasma total protein, albumin, globulin, total lipids.

**Table 2. Effect of adding some sources of growth promoters in growing Muscovy ducks diet on growth performance.**

| Item | Age. Weeks | Dietary treatments | | | | | |
|---|---|---|---|---|---|---|---|
| | | Control | Dietary Zinc bacitracin | Dietary Lincomix | Dietary Ovo-Stark | Dietary N-fac | Dietary Virginia-mycin |
| Body weight (Kg) | 0 | 0.054 ±0.005 | 0.055 ±0.001 | 0.051 ±0.019 | 0.052 ±0.002 | 0.051 ±0.003 | 0.052 ±0.002 |
| | 3 | 0.827$^{b}$ ±0.024 | 0.843$^{b}$ ±0.049 | 0.8475$^{b}$ ±0.096 | 0.818$^{b}$ ±0.012 | 0.909$^{a}$ ±0.046 | 0.833$^{b}$ ±0.025 |
| | 5 | 1.866$^{bc}$ ±0.079 | 1.928$^{b}$ ±0.087 | 1.955$^{b}$ ±0.098 | 1.798$^{c}$ ±0.087 | 2.397$^{a}$ ±0.189 | 1.890$^{b}$ ±0.099 |
| | 7 | 2.875$^{bc}$ ±0.851 | 2.942$^{bc}$ ±0.086 | 2.941$^{bc}$ ±0.091 | 2.866$^{bc}$ ±0.078 | 3.308$^{a}$ ±0.168 | 3.025$^{ab}$ ±0.086 |
| | 9 | 3.352$^{c}$ ±0.209 | 3.550$^{b}$ ±0.124 | 3.767$^{ab}$ ±0.108 | 3.499$^{c}$ ±0.189 | 3.912$^{a}$ ±0.164 | 3.864$^{a}$ ±0.115 |
| | 11 | 3.602$^{d}$ ±0.105 | 3.944$^{c}$ ±0.012 | 4.113$^{b}$ ±0.098 | 3.972$^{c}$ ±0.079 | 4.248$^{a}$ ±0.089 | 4.286$^{a}$ ±0.089 |
| Body gain (Kg) | 0 to 3 | 0.773 ±0.089 | 0.788 ±0.091 | 0.796 ±0.095 | 0.766 ±0.069 | 0.858 ±.089 | 0.781 ±0.89 |
| | 3 to 5 | 1.039$^{b}$ ±0.058 | 1.085$^{b}$ ±0.079 | 1.108$^{a}$ ±0.065 | 0.980$^{b}$ ±0.107 | 1.488$^{a}$ ±0.059 | 1.057$^{b}$ ±0.097 |
| | 5 to 7 | 1.009$^{b}$ ±0.089 | ±1.014$^{b}$ ±0.109 | 0.986$^{c}$ ±0.097 | 1.068$^{b}$ ±0.096 | 0.911$^{bc}$ ±0.098 | 1.135$^{a}$ ±0.097 |
| | 7 to 9 | 0.477$^{c}$ ±0.120 | 0.608$^{b}$ ±0.116 | 0.826$^{a}$ ±0.125 | 0.633$^{b}$ ±0.215 | 0.604$^{b}$ ±0.106 | 0.839$^{a}$ ±0.128 |
| | 9 to11 | 0.200$^{abc}$ ±0.065 | 0.394$^{bc}$ ±0.045 | 0.346$^{abc}$ ±0.025 | 0.473$^{b}$ ±0.025 | 0.336$^{c}$ ±0.035 | 0.422$^{a}$ ±0.045 |
| | **0 to 11** | **3.498$^{c}$ ±0.265** | **3.889$^{c}$ ±0.165** | **4.062$^{b}$ ±0.265** | **3.920$^{bc}$ ±0.248** | **4.197$^{a}$ ±0.265** | **4.234$^{a}$ ±0.235** |
| Feed conversion (feed/gain) | 0 to 3 | 2.860$^{a}$ ±0.094 | 2.837$^{ab}$ ±0.084 | 2.793$^{b}$ ±0.164 | 2.910$^{a}$ ±0.067 | 2.890$^{a}$ ±0.087 | 2.920$^{a}$ ±0.090 |
| | 3 to 5 | 2.630$^{abc}$ ±0.065 | 2.680$^{ab}$ ±0.065 | 2.633$^{abc}$ ±0.065 | 2.567$^{c}$ ±0.065 | 2.713$^{a}$ ±0.065 | 2.590$^{bc}$ ±0.065 |
| | 5 to 7 | 3.120$^{b}$ ±0.105 | 3.240$^{b}$ ±0.137 | 3.523$^{a}$ ±0.155 | 2.946$^{c}$ ±0.106 | 3.051$^{bc}$ ±0.116 | 3.577$^{a}$ ±0.141 |
| | 7 to 9 | 3.099$^{b}$ ±0.165 | 2.953$^{b}$ ±0.198 | 3.606$^{a}$ ±0.097 | 3.581$^{a}$ ±0.185 | 3.696$^{a}$ ±0.245 | 3.636$^{a}$ ±0.265 |
| | 9 to11 | 2.298$^{c}$ ±0.065 | 2.994$^{b}$ ±0.065 | 3.035$^{b}$ ±0.065 | 2.422$^{c}$ ±0.065 | 2.932$^{b}$ ±0.065 | 3.645$^{a}$ ±0.065 |
| | **0 to 11** | **14.007$^{c}$ ±0.645** | **14.704$^{bc}$ ±0.762** | **15.590$^{b}$ ±0.365** | **14.426$^{bc}$ ±0.753** | **15.283$^{b}$ ±0.494** | **16.368$^{a}$ ±0.668** |
| | 0 to 3 | 3.699 ±0.036 | 3.600 ±0.042 | 3.508 ±0.062 | 3.798 ±0.085 | 3.370 ±0.077 | 3.749 ±0.090 |
| | 3 to 5 | 2.531$^{ab}$ ±0.265 | 2.470$^{bc}$ ±0.199 | 2.376$^{c}$ ±0.189 | 2.619$^{a}$ ±0.165 | 1.823$^{d}$ ±0.265 | 2.450$^{bc}$ ±0.142 |
| | 5 to 7 | 3.092$^{bc}$ ±0.201 | 3.195$^{bc}$ ±0.134 | 3.574$^{b}$ ±0.215 | 2.757$^{c}$ ±0.198 | 3.349$^{a}$ ±0.312 | 3.151$^{bc}$ ±0.165 |
| | 7 to 9 | 6.496$^{a}$ ±0.364 | 4.856$^{c}$ ±0.540 | 4.365$^{c}$ ±0.465 | 5.657$^{b}$ ±0.249 | 6.119$^{a}$ ±0.198 | 4.333$^{bc}$ ±0.651 |
| | 9 to11 | 11.490$^{bc}$ ±0.187 | 7.598$^{ab}$ ±0.124 | 8.775$^{a}$ ±0.125 | 5.120$^{c}$ ±0.109 | 8.726$^{a}$ ±0.187 | 8.637$^{a}$ ±0.135 |
| | 0 to 11 | 4.004$^{ab}$ ±0.045 | 3.781$^{ab}$ ±0.070 | 3.839$^{a}$ ±0.061 | 3.680$^{b}$ ±0.025 | 3.641$^{b}$ ±0.044 | 3.867$^{a}$ ±0.043 |

Values followed by unlike letters in the same row differ significantly at 0.05 level probability

**Table 3. Effect of adding some sources of growth promoters in growing Muscovy ducks diet on some metabolic functions.**

| Item | Age, Weeks | Dietary treatments | | | | | |
|---|---|---|---|---|---|---|---|
| | | Control | Dietary Zinc bacitracin | Dietary Lincomix | Dietary Ovo-Stark | Dietary N-fac | Dietary Virginia-mycin |
| Total protein, gm/100ml | 9 | 4.97$^{b}$ ±0.82 | 5.09$^{b}$ ±0.65 | 6.14$^{a}$ ±0.62 | 4.87$^{b}$ ±.98 | 5.88$^{ab}$ ±.53 | 6.21$^{a}$ ±0.58 |
| | 11 | 4.39$^{b}$ ±0.50 | 5.88$^{a}$ ±0.21 | 5.90$^{a}$ ±0.40 | 5.29$^{ab}$ ±0.11 | 5.56$^{a}$ ±0.34 | 5.65$^{a}$ ±0.42 |
| Albumin, gm/100ml | 9 | 1.33$^{c}$ ±0.02 | 1.36$^{c}$ ±0.23 | 1.69$^{b}$ ±0.55 | 2.152$^{a}$ ±0.41 | 2.17$^{a}$ ±0.25 | 2.19$^{a}$ ±0.97 |
| | 11 | 1.13$^{c}$ ±0.43 | 1.97$^{ab}$ ±0.52 | 1.69$^{ab}$ ±0.46 | 1.38$^{bc}$ ±0.37 | 1.62$^{ab}$ ±0.39 | 2.04a ±0.19 |
| Globulin, gm/100ml | 9 | 3.64$^{b}$ ±0.32 | 3.73$^{b}$ ±0.23 | 4.45$^{a}$ ±0.39 | 2.718$^{c}$ ±0.33 | 3.71$^{b}$ ±0.43 | 4.02$^{ab}$ ±0.46 |
| | 11 | 3.26$^{b}$ ±0.33 | 3.91$^{b}$ ±0.25 | 4.21$^{a}$ ±0.43 | 3.91$^{ab}$ ±0.33 | 3.94$^{ab}$ ±0.23 | 3.61$^{b}$ ±0.42 |
| Total lipids, gm/dl | 9 | 3.64$^{b}$ ±0.12 | 3.73$^{b}$ ±0.43 | 4.45$^{a}$ ±0.53 | 2.718$^{c}$ ±0.43 | 3.71$^{b}$ ±0.40 | 4.02$^{ab}$ ±0.31 |
| | 11 | 3.26$^{b}$ ±0.40 | 3.91$^{ab}$ ±0.35 | 4.21$^{a}$ ±0.43 | 3.91$^{ab}$ ±0.33 | 3.94$^{ab}$ ±0.34 | 3.61$^{b}$ ±0.22 |
| GOT, Units, ml | 9 | 25.00$^{b}$ ±2.12 | 25.01$^{b}$ ±2.41 | 28.33$^{ab}$ ±3.12 | 27.02$^{ab}$ ±3.01 | 29.33$^{a}$ ±2.48 | 29.04$^{a}$ ±2.31 |
| | 11 | 27.67$^{b}$ ±4.40 | 27.69$^{b}$ ±4.35 | 32.67$^{ab}$ ±3.63 | 32.33$^{ab}$ ±3.33 | 35.07$^{a}$ ±3.14 | 33.98$^{a}$ ±3.22 |
| GPT, units/ml | 9 | 30.00$^{c}$ ±1.02 | 29.01$^{c}$ ±1.21 | 30.00$^{bc}$ ±2.12 | 32.33$^{b}$ ±2.41 | 35.00$^{a}$ ±2.14 | 33.67$^{ab}$ ±2.39 |
| | 11 | 32.33$^{b}$ ±1.25 | 32.19$^{b}$ ±1.87 | 33.67$^{ab}$ ±1.60 | 33.00$^{ab}$ ±1.83 | 35.00$^{a}$ ±1.54 | 34.33$^{a}$ ±1.62 |

Values followed by unlike letters in the same row differ significantly at 0.05 level probability ± SE

**Table 4. Effect of adding some sources of growth promoters in growing Muscovy ducks diet on some thyroxin ($T_3$), calcium, and potassium.**

| Item | Age, Weeks | Treatments | | | | | |
|---|---|---|---|---|---|---|---|
| | | Control | Dietary Zinc bacitracin | Dietary Lincomix | Dietary Ovo-Stark | Dietary N-fac | Dietary Virginia-mycin |
| $T_3$, Ng/ml | 9 | 6.58$^{c}$ ±0.43 | 7.81$^{b}$ ±0.52 | 8.06$^{b}$ ±0.46 | 8.03$^{b}$ ±0.37 | 8.96$^{a}$ ±0.39 | 8.95a ±0.19 |
| | 11 | 6.12$^{c}$ ±0.50 | 8.80$^{a}$ ±0.21 | 8.04$^{b}$ ±0.40 | 7.57$^{b}$ ±0.11 | 8.89$^{a}$ ±0.34 | 8.66$^{a}$ ±0.42 |
| Calcium, mg/100ml | 9 | 4.17$^{c}$ ±2.02 | 8.06$^{a}$ ±1.05 | 5.44$^{b}$ ±1.08 | 5.66$^{b}$ ±1.43 | 5.72$^{b}$ ±1.25 | 7.64$^{ab}$ ±1.97 |
| | 11 | 5.36$^{c}$ ±2.41 | 8.58$^{a}$ ±1.52 | 6.12$^{b}$ ±1.46 | 6.12b$^{b}$ ±1.37 | 6.72$^{b}$ ±1.19 | 7.98ab ±1.29 |
| Potassium, mg/100ml | 9 | 2.87$^{c}$ ±0.78 | 4.37$^{a}$ ±0.65 | 4.44$^{a}$ ±0.26 | 3.46$^{b}$ ±0.35 | 4.06$^{a}$ ±0.66 | 3.57b ±1.39 |
| | 11 | 2.89$^{c}$ ±0.36 | 4.89$^{a}$ ±0.51 | 4.51$^{a}$ ±0.36 | 3.91$^{b}$ ±0.39 | 4.49$^{a}$ ±0.37 | 3.67$^{b}$ ±0.32 |

Values followed by unlike letters in the same row differ significantly at 0.05 level probability ± SE

GOT, and GPT during all tested period 9th and 11th weeks of age (Table 3). Birds fed diets inclusion N-Fac. or verginiamycin presented the highest (P≤0.05) concentrations of total protein. albumin, GOT, and GPT. However, the greatest (P≤0.05) concentration of plasma total lipids was noticed when birds fed dietary Lincomix. At the 9th week of age, the greatest (P≤0.05) value of blood plasma globulin was for birds fed dietary Lincomix. While, At 11th week birds fed dietary Lincomix, Ovo-Stark. or N-Fac recorded the highest (P≤0.05) values of globulin. These results were in the same trend of the improving of body gain, feed intake and feed conversion.

The enhancement in metabolic concentrates as a result of adding growth promoters may be due the potential of probiotics as an alternative to antibiotics. Havenaar *et al.*, (1992) defined probiotic as live microbial preparations. when ingested by animal or man (as viable mono or mixed culture of microorganisms) can benefit the host by balancing the intestinal microflora. Moreover, El- Sherbiny *et al.*, (1990) reported that supplemented Flavomycin or Zinc bacitracin to the diet tended to increase the total plasma protein, albumin, globulin and A/G ratio in broiler chicks compared with those obtained from the birds receiving the non supplemented control diets.

***Triiodothyronine ($T_3$) , Calcium and Potassium:***

Plasma $T_3$ concentration was improved (P≤0.05) by adding growth promoters to the control diet (Table 4). The highest (P≤0.05) value of $T_3$ was noticed when birds fed dietary contain Zinc bactrin, N-Fac or Verginiamycin. The consistency of body gain and feed intake trends and thyroid activity asserted the biological role of growth promoters in activating metabolic functions and biosynthesis of hormones. Moreover, the thyroid hormones are obligatory with growth hormone, also, many actions of thyroid hormones mentioned on stimulation of cellular protein synthesis (Hinkle and Kinsella, 1986).

Supplementing diets with growth promoters improved (P≤0.05) utilization of some minerals such as calcium and potassium (Table 4). Dietary Zinc bacitaracin or verginiamycin presented the highest (P≤0.05) value of calcium when bird received these diets. However, birds fed diets inclusion Zinc bacitracin, Lincomix, or N-Fac recorded the best (P≤0.05) values of potassium. These results are in agreement with Buresh *et al.*, (1985) found that Verginiamycin has been tend to increase bone ash percentage and improved utilization of phosphorus in chicks. Also, Ravindran *et al.*, (1984) demonstrated that apparent absorption and retention of phosphorus, calcium, and manganese were improved by virginiamycin in Swine fed high fiber diets.

***Slaughter test:***

Table (5), indicated that diets supplemented with N-Fac or Verginiamycin improved (P≤0.05) the absolute carcass and edible giblet weights compared with the other dietary treatments. Birds fed diet supplemented with Verginiamycin enhanced (P≤0.05) dressing percentage and depressed (P≤0.05) offal proportions. Abdominal fat proportions increased (P≤0.05) when birds fed diets supplemented with Ovo-stark. or N-fac. The enhancements in absolute carcass weight and dressing percent for birds fed dietary verginiamycin confirm the plasma metabolic concentrates (Table 4) and give proof to the metabolic role of the growth promoters (El-Gindi *et al.*, 2000 and Mervat 999).

**Table 5. Effect of adding some sources of growth promoters in growing Muscovy ducks diet on some carcass measurements.**

| Item | | Dietary treatments | | | | | |
|---|---|---|---|---|---|---|---|
| | | Control | Dietary Zinc bacitracin | Dietary Lincomix | Dietary ovostark | Dietary N-fac | Dietary Virginia-mycin |
| Live body. | Kg | 3.684$^{b}$ | 3.743$^{b}$ | 3.913$^{ab}$ | 3.892$^{ab}$ | 4.175$^{a}$ | 4.215$^{a}$ |
| | | ±0.205 | ±0.217 | ±0.205 | ±0.325 | ±0.311 | ±0.312 |
| Carcass. Kg | | 2.552$^{c}$ | 2.608$^{bc}$ | 2.758$^{b}$ | 2.738$^{b}$ | 2.947$^{a}$ | 3.023$^{a}$ |
| | | ±0.143 | ±0.150 | ±0.134 | ±0124 | ±0.102 | ±0.108 |
| Edible giblets[2]. Kg | | 0.206$^{b}$ | 0.217$^{b}$ | 0.215$^{b}$. | 0.212$^{ab}$ | 0.242$^{a}$ | 0.217$^{ab}$ |
| | | ±0.029 | ±0.012 | ±0.019 | ±0.024 | ±0.021 | ±0.025 |
| Abdominal fat. Kg | | 0.037$^{b}$ | 0.040$^{ab}$ | 0.040$^{ab}$ | 0.043$^{ab}$ | 0.048$^{a}$ | 0.040$^{ab}$ |
| | | ±0.018 | ±0.019 | ±0.013 | ±0.015 | ±0.016 | ±0.016 |
| Offals[3]. | Kg | 0.813 | 0.818 | 0.840 | 0.841 | 0.887 | 0.783± |
| | | ±0.031 | ±0.030 | ±0.026 | ±0.023 | ±0.021 | 0.030 |
| Dressing. | % | 69.272$^{c}$ | 69.676$^{bc}$ | 70.483$^{b}$ | 70.349$^{b}$ | 70.587$^{b}$ | 71.720$^{a}$ |
| | | ±0.826 | ±0.717 | ±0.725 | ±0.594 | ±0.906 | ±0.739 |
| Edible giblets. | % | 5.591$^{a}$ | 5.797$^{a}$ | 5.494$^{ab}$ | 5.447$^{ab}$ | 5.796$^{a}$ | 5.148$^{b}$ |
| | | ±0.242 | ±0.411 | ±0.295 | ±0395 | ±0.344 | ±0.316 |
| Abdominal fat. | % | 1.004$^{b}$ | 1.068$^{ab}$ | 1.022$^{b}$ | 1.108$^{a}$ | 1.149$^{a}$ | 0.948$^{b}$ |
| | | ±0.100 | ±0.092 | ±0.089 | ±0.099 | ±0.099 | ±0.096 |
| Offals. | % | 22.068$^{a}$ | 21.854$^{a}$ | 21.166$^{a}$ | 21.608$^{a}$ | 21.245$^{a}$ | 18.576$^{b}$ |
| | | ±1.068 | ±1.057 | ±1.038 | ±1.115 | ±1.048 | ±1.014 |

Data followed by unlike letters in the same row differ significantly at 0.05 level probability

1 Carcass weight = Live body weight (without edible giblets) - offal weights

2 Edible giblets = Liver. heart. and gizzard weights 3 Offals = Blood. feather. intestine. head. and legs weights

* ($P<0.05$) significant level ns = Not significant level ± S.E

***Economical efficiency:***

The economical efficiency as affected by dietary growth promoters are presented in Table 6. The price of control diet was lower than the supplemented diets because new stuffs were added to the control diet. The profitability of using the new stuffs depends upon the dietary price and feed conversion (feed/gain) of birds fed on such new diets. The feed cost of one kg weight gain was reduced by 5.4, 3.8, 7.9, 8.8, 3.2% for dietary Zinc bacitracin, Lincomix, Ovo-Stark, N-Fac, or Verginiamycin respectively, comparing with the control diet. Also, the supplemented diets reported the greatest percent of economic efficiency (expressed as % of net revenue/feed cost) compared with control diet.

Mervat Ali. (1999), reported that chicks fed Lact-A-Bac (L), Fermacro 500 (F), and L plus F as probiotics supplemented diets represented 91.0, 97.9, and 101.1% in respect of feed cost/kg gain and 116.3, 103.6 and 98.3% in respect of the economical efficiency respectively. Also, Ibrahim *et al.*, (1998), speculated that broiler chicks fed dietary Bio- Tonic, Comprisol, or Bio- Tonic & Comprisol (1:1) resulted a reduction in feed cost of 1 kg weight gain by 10.86, 8.61, and 7.49% respectively.

The obtained results showed that, supplementing growing Muskovy ducks diet with Zinc bacitracin, Lincomix, Ovo-Stark, N-Fac, or verginiamycin, as growth promoters improved performance and metabolic functions. However, N-Fac, and verginiamycin showed the best results of these components.

**Table 6. The economical efficiency of the experimental diet (L.E in 2001)***

| Prices (L.E.) | Dietary treatments | | | | | |
|---|---|---|---|---|---|---|
| | Control | Zinc bacitracin | Lincomix | Ovo-Stark | N-fac | Virginia-mycin |
| Growth promoters** | ------ | 1.20 | 2.10 | 1.70 | 1.80 | 2.00 |
| Control diet (1000Kg)*** | 650.00 | 650.00 | 650.00 | 650.00 | 650.00 | 650.00 |
| Total prices for new diets (1000kg) | 650.00 | 651.200 | 652.10 | 651.70 | 651.80 | 652.00 |
| Feed / gain ratio (a) | 4.004 | 3.781 | 3.839 | 3.680 | 3.642 | 3.867 |
| Cost of 1Kg feed (b), L.E | 0.6500 | 0.6512 | 0.6521 | 0.6517 | 0.6518 | 0.6520 |
| Feed cost of 1 kg weight gain(a.b) | 2.603 | 2.462 | 2.503 | 2.398 | 2.374 | 2.521 |
| Market price of 1Kg live weight (c) | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 | 8.00 |
| Net revenue [c-(a.b)], L.E | 5.397 | 5.538 | 5.496 | 5.602 | 5.626 | 5.479 |
| Percent of net revenue/feed cost | 207.384 | 224.914 | 219.56 | 233.576 | 237.00 | 217.298 |

* L.E. = Egyptian pound
** This is the price of the amount of growth promoters added/ton diet
*** The average price for starting and growing diet

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# تقيم بعض الاضافات المغذية التجارية كمنشطات نمو للبط المسكوفى النامى.

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استخدم فى هذه التجربة عدد ٢٧٠ طائر من البط المسكوفى النامى عمر يوم وذلك لمقارنة استخدام كل من الزنك باستراسين واللنكومكس والاوفوستارك الانفاك والفرجينياميسين كمنشطات نمو تضاف إلى العليقه التقليدية بنسب ١٠٠٠، ٢٥٠ ،١٠٠٠ ، ٥٠٠، ١٠٠٠ جرام لكل طن عليقة على التوالى، وتأثير ذلك على معدلات النمو والكفاءة التمثيلية ومواصفات الذبيحة. قسمت الطيور إلى ٦ مجاميع (٤٥طائر/مجموعة)بكل مجموعة ٣مكررات(١٥طائر /مكررة) وانتهت التجربة عند عمر ١١ اسبوع.

- ومن نتائج التجربة اتضح أن استخدام منشطات النمو كإضافات إلى العليقة التقليدية حسن من وزن الجسم والزيادة فى وزن الجسم والمأكول من الغذاء. كما أن علائق الانفاك والفرجينياميسين أعطت افضل نمو.وحققت عليقة الفرجينياميسين افضل مأكول من الغذاء، أما علائق الاوفوستارك والانفاك فحققت افضل كفاءة تحويلية للغذاء.
- واتضح أيضاً أن منشطات النمو المستخدمة فى التجربة حسنت كل من مستوى البروتين الكلى والالبيومين والجلوبيولين وإنزيمات الجسم GOT GPT والثيروكسين والدهون الكلية فى بلازما الدم إضافة إلى تحسن بعض المعادن مثل الكالسيوم والبوتاسيوم .
- كما أن استخدام عليقتى الانفاك والفرجينياميسين أدى إلى تحسن وزن الذبيحة. بينما عليقة الفرجينياميسن أدت إلى رفع نسبة التصافى *وخلاصة يمكن القول بان منشطات النمو المستخدمة فى هذه التجربة أدت إلى التحسن فى معدلات النمو وبعض الوظائف التمثيلية وكان أفضلها عليقتى الانفاك والفرجينياميسن.