بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

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MONA MAGHRABY

PRODUCTIVE PERFORMANCE, PHYSIOLOGICAL AND IMMUNOLOGICAL RESPONSES AS AFFECTED BY SOME PHYTO-ADDITIVES AND PROBIOTICS IN RABBIT'S DIETS

By

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B.Sc. Agric. Sci. (Poultry Production), Fac. Agric., Fayoum Univ., 2012

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APPROVAL SHEET

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Title of Thesis: Productive Performance, Physiological and Immunological Responses as Affected by Some Phyto-Additives and Probiotics in Rabbit's Diets

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ABSTRACT

Present study was conducted to evaluate the effect of thyme oil and *lactobacillus acidophilus* (supplement) as growth promoters in rabbit. Seventy-two weaned V-Line male rabbits were randomly allocated into 4 equal groups. The first group (G1) was considered as the control group without any additives. The second group (G2) treated was with the addition of *lactobacillus acidophilus* in drinking water in a concentration of 10^8 cfu/ml. The third group (G3) treated was with the addition of thyme oil in drinking water in a concentration of 1 ml/ liter. The fourth group (G4) was treated with the addition of both *lactobacillus acidophilus* and thyme oil in drinking water in a concentration of 10^8 cfu/ml plus 1ml/L, respectively. The obtained results showed that, all treatments had significant improvement effects on the measured parameters (performance characteristics, cecum characteristics, RBCs, WBCs, kidney function, triglycerides, total cholesterol, sheep RBC's titer, liver antioxidant markers and hormones markers) when compared to the control group. The live body weight values in G3 and G4 groups were higher (2116 and 2058 g) than those found in G2 and G1 groups (1958 and 1850 g) respectively. In addition, the body weight gain of G3 and G4 groups were higher (1364 and 1307 g) than those found in G2 and G1 groups (1207 and 1100 g). Moreover, the daily weight gain of G3 and G4 groups were higher (32.49 and 31.13 g/d) than those found in G2 and G1 groups (28.74 and 26.19 g/d). In addition, feed conversion ratio of G3 and G4 groups were higher (3.41 and 3.61) than those found in G2 and G1 groups (3.66 and 4.67). While G4, G2 and G3 groups had a significant enrichment effect on the intestinal beneficial bacteria.

In conclusion, in the present experiment, inclusion of thyme oil and / or *lactobacillus acidophilus* in the drinking water stimulated body weight gain and increased feed conversion rate, and can be used as growth promoters in rabbit nutrition successfully without notable side effects on growing rabbits. Furthermore, it showed a significant positive effect on the physiological parameters in groups G3, G4 and G2 respectively compared to the control group.

Key words: Immunity, *Lactobacillus acidophilus*, Performance, Probiotic, Rabbit, Thyme oil.

DEDICATION

I dedicate this work to whom my heartfelt thanks; to my parents for their patience, help and love; as well as to my brothers for all the support and lovely offered during my post-graduate studies.

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CONTENTS

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LIST OF ABBREVIATIONS AND SYMBOLS

°C	Celsius
A	Albumin
AOAC	Association of Official Analytical Chemists
ALT	Alanine aminotransferase
AST	Aspartate aminotransferase
BW	Body weight
BWG	Body weight gain
Cal	Calorie
CF	Crude fiber
cfu	Cell forming unite
Cho.	Cholesterol
cm	Centimeter
CP	Crude protein
D	Day
DC	Digestibility Coefficients
DCP	Digestible Crude Protein
DCF	Digestible Crude Fiber
DE	Digestible energy
DEE	Digestible Ether Extract
dl	Deciliter
DM	Dry matter
DNFE	Digestible Nitrogen free extract
E.coli	Escherichia coli
EE	Ether extract
FCR	Feed conversion ratio
G	Globulin
g	Gram
GC–MS	Gas chromatography/mass spectrometry
GSH	Glutathione
GE	Gross energy
HDL	High density lipoprotein
hrs.	Hours
Kcal	Kilo calorie
Kg	Kilogram
L	Litter

LBW	Live body weight
LDL	Low density lipoprotein
LE	Egyptian pound
MDA	Malondialdehyde
ME	Metabolizable energy
mg	Milligram
min	Minute
ml	Milliliter
N	Nitrogen
ND	Not detected
NDF	Neutral detergent fiber
NDV	Newcastle disease virus
NFE	Nitrogen free extract
NZW	New Zealand White
OM	Organic matter
pH	minus log of hydrogen ion potential
ppm	Part per million
PT	Proficiency Testing
REE	Relative economic efficiency
rpm	Round per minute
SAS	Statistical analysis system
TDN	Total digestible nutrients
TSH	Thyroid stimulating hormone
T3	Triiodothyronine
T4	Thyroxin
vLDL	Very low density lipoprotein
IBV	Infection bronchitis virus
WHO	World Health Organization
FAO	Food and Agriculture Organization

INTRODUCTION

Rabbits suffer from many digestive disorders related to caecum microflora, which cause high mortality and morbidity rates (Bäuerl *et al*., 2014). During the first growing period, changes in feeding behavior together with immature digestive and immune systems could promote the development of potentially pathogenic microflora, which could cause digestive troubles and reduce the performance parameters.

In intensive rabbit farms, antibiotics are often added to feed or water for rabbits till 8 weeks of age, in order to prevent enteric diseases (Cesari *et al*., 2008). The European Union banned the use of subtherapeutic levels of antibiotics to prevent disease or promote growth. The European Union has already banned antibiotics on all remaining growth promoters (Delsol *et al*., 2005).

Therefore, the searches for alternative feed supplements have been increased extensively and considerable attention has been given to the essential herbs as replacements for antibiotics growth promoters, which should have the same beneficial effect as antimicrobial growth promoters (AGPs). The most well known mechanism to be proposed is that AGPs have an antibacterial action that favors performance through reducing the microbial use of nutrients and improving absorption of nutrients due to thinning of the intestinal wall. Probiotics have beneficially affected the host by boosting the properties of the indigenous microbiota (Huyghebaert *et al*., 2011).

Probiotics can be used as feed additives that improve feed intake and digestion (Abd El-Hack *et al*., 2017). In addition, Markowiak and Śliżewska (2018) stated that probiotics maintain stimulation of intestinal microbiota and protection of the intestine, which is important to combat pathogens for stimulation of immunological response and increased production capacity.

The mechanism of action of probiotics includes establishing and maintaining healthy gut microflora as well as improving digestion and utilization of nutrients (Alagawany *et al*., 2018). Probiotics has a role in competitive exclusion of harmful bacteria/pathogens, decreases pH, releases various antibacterial substances, neutralization of toxins, competition for nutrients with pathogens, reduction in ammonia production and stimulation of the immune system (Dhama *et al*., 2011).

As feed additive, probiotics show a good impact on the rabbit performance in improving digestion, nutrient metabolism and utilization of nutrients by offering digestible proteins, vitamins, enzymes and other important cofactors and by decreasing the gut pH by production of lactic acids (Dhama *et al*., 2008).

On the other hand, plant extracts have been considered among the important alternatives of antibiotics in animal production as Losa and Kohler (2001) reported a reduction of *Clostridium perfringens* in the intestine of poultry supplemented with a commercial preparation of essential oils in its diet. Moreover, Taha *et al*. 2019 stated the importance of *Clostridium difficile* as pathogens causing diarrhea and enteritis in rabbits followed by intestinal damage and deaths.