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EVALUATION OF SOME HERBS AND PROBIOTICS AS GROWTH PROMOTERS IN BROILER DIETS

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By

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ABSTRACT

Two experiments were conducted to evaluate some of natural growth promoters in broiler diets. The aim of the first experiment (Exp.1) was to evaluate three selected medicinal herbs, sage leaves (*Salvia officinalis*), rosemary leaves (*Rosmarinus officinalis*) and fennel seeds (*Foeniculum* vulgare) in three different mixtures as growth promoters. The study consisted of seven experimental treatments. Each treatment consisted of 3 medicinal herb mixtures: 1) Sage leaves 30%+ Fennel seeds 20%+ Rosemary leaves50 %(Mix-1), 2) Sage leaves 50% + Fennel seeds 30%+Rosemary leaves20 %(Mix-2) and 3) Sage leaves 20%+ Fennel seeds 50%+Rosemary leaves30 %(Mix-3). Each mixture was added at 0.25 and 0.50 % of the diets, in addition to the control. The second experiment aimed at studying the bioefficacy of adding a mixture of some herbs without or with probiotics to broiler diets varying in energy and protein content. A 4 x 2 factorial design was used in this experiment using two diets. The first diet contained the strain catalog recommendation of energy and protein (R). The second diet contained low energy low protein levels (L). Each of the experimental diet was either without supplementation (controls) or supplemented with 0.5% herbal mixture (HM), 0.1% probiotics, or 0.5% HM+0.1% probiotics. Accordingly, a total of 8 experimental groups were studied. The herbal mixture composed of the following medicinal herbs :(44% cumin seed+ 18% turmeric rhizome+ 36% hot red pepper+ 2% ginger rhizome) . The results of the 1st experiment showed that supplemented diet with Mix3 at 0.50% gave the best performance and least feed cost (LE)/kg weight gain.. Mix3 at 0.25 or 0.50% also improved the digestibility of CP. All additives decreased abdominal fat and total bacterial count in chicken meat. The results of the 2st experiment showed that adding the HM to broiler diets, containing the nutrient requirement (R) improved the growth performance through improving feed conversion ratio. While, adding probiotics+HM to low energy low protein diet (L) resulted in almost same total body weight gain as that of the control containing the (R) diets. Adding the HM or probiotics+HM to (L) diets improved broiler performance and decreased blood lipids.

Key words: Herbal mixture, probiotics, growth promoters, broiler

تقييم بعض الأعشاب و البروبيوتيك كمنشطات نمو فى علائق بدارى التسمين

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في العلوم الزراعية
(علوم دواجن)

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المستخلص العربى

تهدف الدراسة المقدمة إلى تقييم بعض منشطات النمو الطبيعية في علائق الدواجن وذلك من خلال تجربتين .هدفت التجربة الأولى الى تقييم ثلاثة اعشاب طبية مختارة هى اوراق المريمية و اوراق حصى لبان و بذور الشمر وذلك فى ثلاث خلطات مختلفة كمنشطات نمو فى علائق دجاج اللحم. تم توزيع الكتاكيت عشوائيا إلي ٧ معاملات تكونت من ثلاث خلطات:

١- ٣٠% اوراق مريمية + ٢٠% بذور شمر +٥٠% أوراق حصى لبان (خلطة ١)
٢- ٥٠% أوراق مريمية + ٣٠% بذور شمر +٢٠% أوراق حصى لبان (خلطة ٢)
٣- ٢٠% أوراق مريمية + ٥٠% بذور شمر +٣٠% أوراق حصى لبان (خلطة ٣)

تم اضافة كل مخلوط بمستويين الى علائق دجاج اللحم (٠.٢٥% أو ٠.٥٠%) بالاضافة الى عليقه الكنترول (بدون اضافات).

التجربة الثانية تهدف الى دراسة الاستفادة من إضافة خليط من بعض الأعشاب مع أو بدون البروبيوتيك في علائق دواجن مختلفة فى محتواها من الطاقة و البروتين. استخدمت فى هذه التجربة عليقتين الاولى تحتوى على أحتياجات الطاقة و البروتين الموصى بها للسلالة بينما العليقة الثانية أحتوت على بروتين وطاقة منخفض عن احتياجات السلالة .تم أضافة كل من العليقتين بدون أضافات (كنترول) أو مع أضافة مخلوط عشبى بنسبة ٠.٥ % أو البروبيوتيك بنسبة ٠.١% أ و مع أضافة مخلوط عشبى بنسبة ٠.٥ % + البروبيوتيك بنسبة ٠.١% .المخلوط العشبي يحتوى على النباتات الطبية الآتية
(٤٤% بذور كمون + ١٨ % ريزومات الكركم + ٣٦ % فلفل أحمر حار + ٢% ريزومات الجنزبيل)

أوضحت نتائج التجربة الاولى ان إضافة خلطة ٣ بمستوي٠.٥% الى العليقة سجلت أفضل نمو و أقل تكلفة غذاء / كجم زيادة في وزن الجسم. وقد أدت إضافة خلطة ٣ بمستوي ٠.٢٥ أو ٠.٥٠% الي تحسين معامل هضم البروتين. قد أدت كل الإضافات إلي خفض معنوي في كل من دهن البطن و العد البكتيرى فى اللحم.

أوضحت نتائج التجربة الثانية أن أضافة المخلوط العشبى لعليقة الدواجن المحتوية على أحتياجات السلالة أدى الى تحسين النمو من خلال تحسين معامل التحويل الغذائى . أضافة المخلوط العشبى + البروبيوتيك الى العليقة المنخفضة فى الطاقة و البروتين أدى الى الحصول على زيادة فى وزن الجسم مقاربة لعليقة الكنترول المستوفية. أضافة المخلوط العشبى و المخلوط العشبى+ البروبيوتيك للعليقة المنخفضة كان له تأثير محسن على الأداء الانتاجى لبدارى التسمين و خفض دهون الدم.

الكلمات الدالة : مخاليط عشبية – بروبيوتيك – منشطات نمو – دجاج لحم

Dedication

I dedicate this work to my father, soul of my mother, sisters, my brother and my husband for their love continuous encouragement and kind help they offered during my life.

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INTRODUCTION

The poultry industry has developed in several areas such as nutrition, genetics, and management to maximizing the efficiency of growth performance and meat yield. However, nowadays, the poultry industry has focused more attention towards addressing public concern for environment and food safety. Animals including poultry are vulnerable to potentially pathogenic microorganisms such as *Escherichia coli, Salmonella ssp, Clostridium perfringens* and *Campylobacter sputorum.* Pathogenic microbial flora in the small intestine compete with the host for nutrients and also reduce the digestion of fat and absorption of fat-soluble vitamins due to deconjugation of bile acids (Engberg *et al*., 2000). This leads to depressed growth performance and to increased incidence of disease.

Antibiotic added as growth promoters, have long been used in poultry feed to stabilize the intestinal microbial flora and improve the general performances and prevent some specific intestinal pathologies (Truscott and Al-Sheikhly, 1977; Miles *et al*., 1984; and Waldroup *et al*.,1985). However, the adding antibiotic as growth promoters have been under scrutiny for many years and have been removed from the market in many countries (Ratcliff, 2000). Their usefulness has seldom been contested, but their relation to similar antibiotics used in human medicine and the possibility that their use may have contributed to development of antibiotic resistant bacteria have caused concerns (Philips, 1999). Previous studies indicated that antibiotic are deposited as residues in animal and poultry tissues especially liver, kidney and fat depots as a result of using chemical compounds as additives in their

diets. Swann, (1969) indicated that antibiotic residues found in food could affect human health by the following means:

1- A direct toxic action if given in sufficiently large dosage.

2- Exceptionally, susceptible or allergic individual may have a severe, or even fatal reaction to a dose of antibiotic which could be tolerated by normal individuals.

3- A direct effect on the gastro intestinal flora when antibiotics are given in therapeutic dosage. .

4-The development of antibiotic resistant variants when an adequate concentration of antibiotic is administered.

Recently, it is interesting to note that, many countries tend to prohibit those chemical products for their deleterious side effects on both birds or animals and man kind (Henry *et al.*, 1986).

In light of that situation, the feed manufacturers and the animal growers have been actively looking for an efficacious alternative to antibiotic growth promoters. Probiotics and herbs are the most promising alternative to antibiotics. Probiotics are viable microbial additives which assist in the establishment of an intestinal population that is beneficial to the animal and antagonistic to harmful microbes (Green and Sainsbury, 2001). It was reported that probiotics benefit the host animal by stimulating synthesis of B-group vitamins, stimulating immunity, preventing harmful microorganisms, providing digestive enzymes and increasing of production of volatile fatty acids (Coates and Fuller, 1977 and Rolfe, 2000).

The use of medicinal herbs and aromatic plants is well known from old civilizations of the ancient Egyptians, Chinese and Greek. They have

been important components in food flavours, food preservation and in popular medicine.

Many efforts have been done to obtain detailed references concerning these herbal and aromatic plants. Sabra and Mehta (1990) used herbal plants as growth promoters in broiler diets and observed pronounced improvements in their body weight gain, mortality rate and feed conversion.

On the other hand, poultry, as a source of dietary protein for human consumption, helps in prevention of malnutrition in Egyptian populations. However, feed cost of poultry is the most expensive item, particularly dietary protein and energy. Therefore, attempts are usually made to reduce its level without adversely affecting bird's performance. Addionally, excretion of nitrogen (N), originating from intensive livestock and poultry operation, is one of the greatest environmental concerns to the public. Beside polluting air and water, N in poultry excreta is converted to volatile ammonia through microbial fermentation and can affect the health of birds and farm workers. Approximately 70-75% of the N consumed by animals is lost or excreted due to the inefficiencies associated with protein digestion and or absorption (Nahm, 2007). Schutte *et al*. (1993) reported that for each percentage of decrease in N in the feed, N excretion is reduced by 10%. In response, dietary means to decrease N excretion by feeding low crude protein (CP) diets to poultry have been extensively studied (Aletor *et al.*, 2000). However, feeding low protein diets has been reported to affect growth performance and carcass yield of broiler chickens (Bregendahl *et al*., 2002). Supplementing low protein or

energy diets with natural feed additives may be an alternative way to improve growth, feed conversion efficiency and reduce production costs and environmental pollution. They also help satisfy consumer demands for more and better quality products.

Many spices have been recognized to have medicinal properties and possess many beneficial effects on health, such as antioxidant activity, digestive stimulant action, anti-inflammatory, antimicrobial, hypolipidemic, antimutagenic and anticarcinogenic potential (Pizzale *et al*., 2002 and Lampe, 2003). Also, Rouault and Steiner (2009) suggested that a well-balanced and scientifically developed combination of active ingredients with different properties may function synergistically to bring about the desired benefits for the producer.

Therefore, two experiments aimed at evaluating some of natural growth promoters as feed additives in broiler diets have been conducted. The aim of the first experiment was to evaluate adding mixtures containing different ratios of some plants as natural growth promoters to broilers diets. The second experiment aimed at studying the bioefficacy of adding a mixture of some herbs with or without added probiotics to broiler diets varying in energy and protein content.