EFFECT OF FEEDING *KAYU ARA* (*Ficus fistulosa*) ROOT EXTRACT ON EGG PRODUCTION PERFORMANCE IN OLDER HEN

LIEW KA YAN

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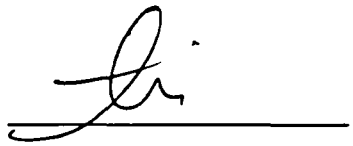

LIEW KA YAN

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VERIFIED BY

1. Assoc. Prof. Dr. Md. Shahidur Rahman
   SUPERVISOR

PROF. MADYA DR. MD. SHAHIDUR RAHMAN
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FAKULTI PERTANIAN LESTARI
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ABSTRACT

Over the age of ancestors, many medicinal plants were widely used in treating human diseases and interestingly many scientists have been found out that medicinal plants can be used in treatment of various diseases in animals and promote the growth performance of the animals as well. This study was conducted to investigate the effect of feeding Kayu Ara Extract (KAE) on egg production performance in 86 week old laying hens (older hen). Twenty older hens were collected from Prolific Farm in Sabah and divided into two groups: 1) Control group and 2) Treatment group, those were fed with 7.5 ml of KAE per 1.5 kg hen. The parameters monitored were feed intake, body weight, egg production, egg quality characteristics, reproduction system status and haematological characteristics both in the KAE and control groups. Result showed that the rate of body weight gain during 2nd week until 4th week under the control and KAE group were significantly ($p<0.05$) different. Egg quality characteristic; egg yolk and albumen weight were significantly ($p<0.05$) different in two groups. Feed Intake, RBC, WBC, Hb and Platelet data showed no significant differences ($P>0.05$). Results suggested that KAE has some beneficial effects on older hens to maintain its egg production potentials, but future studies are required emphasizing the chemical composition and different doses of KAE in different poultry species.

KESAN PEMBERIAN AKAR EKSTRAK KAYU ARA (Ficus fistulosa) TERHADAP PRESTASI PENGELUARAN TELUR PADA AYAM PENELUR TUA

ABSTRAK

Pada zaman dahulu, terdapat banyak tumbuhan herba yang digunakan secara meluas sebagai satu perubatan untuk mengubati penyakit manusia dan yang menariknya terdapat ramai sainstis yang telah mengkaji tumbuhan herba yang dapat mengubati penyakit terhadap haiwan dan ianya juga dapat menggalakkan pertumbuhan haiwan. Kajian ini dijalankan untuk mengkaji keberkesanan pemberian akar Kayu Ara Ekstrak (KAE) terhadap prestasi pengeluaran telur pada ayam penelur tua (berusia 86 minggu). Dua puluh ekor ayam tua baka penelur yang didapati dari Ladang Prolific Sabah di dekatkan untuk menjalankan kajian ini dan ia dibahagikan kepada dua kumpulan: 1) Kumpulan Kawalan dan 2) Kumpulan Rawatan yang diuji dengan 7.5 ml KAE per 1.5 kg berat ayam. Kesan pemberian KAE dilihat daripada parameter: pemgambilan makanan, berat badan, kadar pengeluaran telur, ciri-ciri kualiti telur, system pembiakan ciri-ciri hematologi berbanding dengan kumpulan kawalan. Keputusan menunjukkan bahawa kadar peningkatan atau pengurangan berat badan pada minggu kedua hingga minggu keempat dibawah kumpulan kawalan dan kumpulan rawatan ada perbezaan signifikasi ($p<0.05$) dan ciri-ciri kualiti telur: kuning telur, dan berat albumin dalam kumpulan rawatan ada perbezaan signifikasi ($p<0.05$) kecuali bentuk indeks, berat membran telur, berat kulit telur, abu kulit telur, bahan kering kulit telur, bahan kering telur kuning, bahan kering albumin dan berat telur. Pengambilan makanan, sistem pembiakan dan ciri-ciri hematologi seperti darah merah, darah putih, hemoglobin dan platelet tidak menunjukkan perbezaan signifikasi ($p>0.05$). Keputusan mencadangkan bahawa KAE boleh digunakan untuk meningkatkan kadar pengeluaran ayam penelur dan untuk kajian masa hadapan perlu lebih menekankan terhadap komposisi kimia KA dengan memperbanyakkan dos yang digunakan terhadap spesis ayam yang berbeza.

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LIST OF SYMBOLS, UNIT AND ABBREVIATIONS

%	Percent
ANOVA	Analysis of Variance
BW	Body Weight
DM	Dry Matter
FI	Feed Intake
FSA	Faculty of Sustainable Agriculture
g	Grams
HDE	Hen Day Production
KA	Kayu Ara
KAE	Kayu Ara Extract
Kg	Kilograms
SPSS	Statistical Package for Social Science
UITM	Universiti Teknologi Mara
UMS	Universiti Malaysia Sabah

LIST OF FORMULAE

Formula		Page
3.1	$\text{Feed intake } \left(\frac{g}{day}\right) = \frac{\text{Total feed given-Feed Leftover (g)}}{\text{Experimental period}}$	16
3.2	$\text{HDE} = \frac{\text{Number of eggs produced during period}}{\text{Number of hen day in the period}} \times 100$	17

CHAPTER 1

INTRODUCTION

1.1 Introduction

Nowadays, chicken industry is the most important for human consumption as stated in global egg production where egg output increased by more than 2 per cent a year (Terry, 2013). In Malaysia, egg production keep on increasing as in Sabah is the higher producer of egg production (Anonymous, 1999). There are two main purposed in raise the chickens. This study is more concern on egg production in laying hens in order to maintain the production throughout every cycle of the chicken flock and at the same time can increase the income of the farmer as well. To maintain a stable egg production in laying hens, there are several information that farmers must know on the laying hen's egg production cycle. According to Jacob (2014), usually laying cycle of a chicken flock covers a life span of about 12 months and the egg production begins when the birds reach about 18-12 weeks of ages, depended on the breed and reason. He added, egg production in lay hens can increase sharply and also reaches a peak about 90%, it's about 6-8 weeks later. Meaning that the egg production can decrease over the time, the egg weight will be reduced as their age increasing (Jacob *et al.*, 2013).

There are many factors that can affect their egg production as the age is the main factor to drag this issue to be occurred. Many scientists were investigating on the sudden drop in the egg production and many of farmers will cull the chickens as they can't make any profits to the farm. This happened, when the lay hens reach 80 weeks or two or three years and they can be described as older hens as the productivity are significantly decline at that age (Jacob *et al.*, 2013). In order to reduce the culling cost in laying hens industry, a new finding of medical

treatment can be developed to improve the egg production performance and extend their laying cycle. Perhaps the treatment can treat the poultry and increase the production after consuming it.

Medicinal treatment generally comes from plants. Plant have been the source of medicinal agents for thousands years. It is not surprising to find that in many countries of the world there is a well-established system of traditional medicine, whose remedies are still being compiled. According to Rohaiza (2009), in some instances, the Chinese and the Ayurvedic system have documented the remedies of their traditional medicines and these documents are commercially available. In this study, *Ficus fistulosa's* root are being selected as the medicinal treatment which is tested on old hens but interestingly this medicine is well known on human treatment but not in animals yet.

Ficus fistulosa can be called as Kayu Ara (KA) (in Malay name) is an evergreen tree that belongs to the Moraceae family. It is commonly distributed in Malaysia, Indonesia, Northeastern India, Southern China to New Guinea and Borneo (Rohaiza, 2009). According to Ken Fern (2014), the root of *Ficus fistulosa* is used for post-natal treatment in human as traditional medicine. To date, there is no work has been done by *Ficus fistulosa* which can act as extending productive life in bird especially in egg production of layer hens. So through this research, *Ficus fistulosa* might be one of the medicinal agents for maintenance of egg production and health in olderer hens and directly meet the additional demand.

1.2 Justification

Kayu ara can be used as post-natal treatment and it is commonly distributed in Malaysia. Therefore, this study is important to evaluate the effectiveness in maintenance of egg production in olderer hens. This is because the plant root may contain some secret function for extending the productive life egg in older hen. This may influence the reducing of culling cost in commercial laying birds industry and become more economical to keep the birds for longer period.

It will become locally available medicinal herbs for poultry industry in Malaysia. Older hens in this research can be classified as unproductive laying birds.

1.3 Objective

The objectives of the study are to investigate the effects of feeding *Ficus fistulosa* root extract to older hen on:

1. Daily feed intake
2. Egg production
3. Egg quality characteristics
4. Full blood count
5. Reproductive tract status

1.4 Hypothesis

H_0: There is no significant effect of feeding *Ficus fistulosa* root extract on any of the reproduction or body maintenance related parameters of older hen.

H_1: There is significant effect of feeding *Ficus fistulosa* root extract on at least one of the reproduction or body maintenance related parameters of older hen.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

2.1.1 Description of Kayu Ara (KA)

Ficus fistulosa is an everygreen tree belongs to Moraceae family (Chian, 2015). Borneo people commonly called *Ficus fistulosa* as Kara, Ara, Buruni-buruni and Engkuroh (Slik, 2009). According to Rohaiza (2009) who stated that ficus is a genus of about 800 species of woody trees, shrubs and vines in the family Moraceae, native throughout the tropics with a few species extending into the warm temperate zone. *Ficus fistulosa* is also known as traditional medicine practice in Malaysia and widely used by the local people (Rohaiza, 2009).

Moreover, there are many species of Ficus in Malaysia but only *Ficus fistulosa* and *Ficus sundaica* well known in Malaysia. *Ficus fistulosa* indigenous to Borneo and is collected from Kota Kinabalu forest to study. Previous study of *Ficus fistulosa* in UITM by Rohaiza (2009) has stated that they were extracting the stem of *Ficus fitulosa* which only concerning the antimicrobial activity including antibacterial and antifungal activities of *Ficus Fitulosa*. Surprisingly, all parts of tree are used in medicine especially in urinogenital diseases. She added that, the roots are also useful in haemoptysis, menorrhagia, ulcer and found to cure pimples (Rohaiza, 2009).

Mostly, the plant has potential value for human medicine purpose but still unknown status as a medicine in livestock animals especially in animal's reproduction; egg production performances. Therefore, this study is important to evaluate the effectiveness in maintenance of egg production in older hens. In product part from

Ficus fistulosa is still in unknown status and less information can be obtain especially in Malaysia.

2.1.2 Descriptions of older hens and proper nutrition required

Generally, a healthy laying hen can produce within 200 to 300 eggs per year due and their life span is long within (8 to 15 years) (Davis, n.d). They are typically productive in early years and begin laying eggs between 5 to 6 months old and vice versa for the old hens. Jen Davis (n.d) stated that usually the production of laying hens were stopped as they advance in age and this can be described that they might be experience health problems. There are few factors that can identified whether they are in good or bad health such as their egg characteristics not perform very well as the laying problems or stop producing eggs completely. For instance, in human (old lady) above the age of 45 above are discourage to pregnant or difficult to produce baby as the body function can't support them to do so. In laying hens also depends on age in determine their egg production as shown in Figure 1 (Jacob et al., 2013). As the age increased the percentage of egg production is significantly dropped.

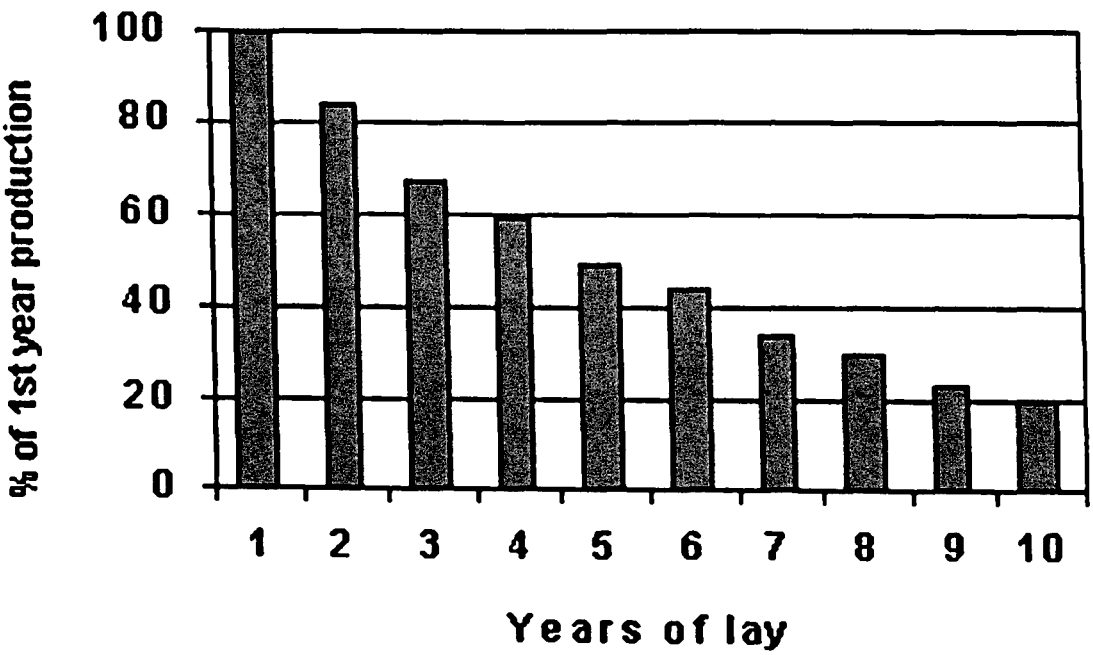

Figure 2.1 Factors of age affecting the egg production in laying hens

Source: Jacob et al., 2013

In old hens, "they are failing to produce eggs can be a sign of aging or underlying health problems which can preventing the production of eggs" (Davis, n.d). There are some possible effects of laying difficulties egg bound, egg peritonise and tumours (Davis, n.d). Egg bound can be known as egg binding that result of stress, dehydration and egg is large in size or a diet that lacks in several vitamins such as calcium. Egg peritonise can happened when a hen lays eggs into its own body cavities than laying them outward like usually they supposed to do (Davis, n.d), while tumours can always happened in older laying and can caused viruses transmitting among the chickens. In tumours, affected birds may not show in physical symptoms but poor layers are showing vary signs of discomfort and this is only discovered when birds are processed for human consumption (Davis, n.d). Plus, this disease can be treated by daily observation, regular vaccination and balance diet in order to keep them free from pain.

According to Jacob *et al.*, (2013) stated that laying chickens require a complete balance diet to sustain maximum egg production over time. A proper nutrition in laying hens should give in a constant supply to prevent stop laying and cause a drop in egg production. During feeding the chickens with commercial feed, farmer should give in right portion. Farmer's perception always is like the more feed intake of the chickens is the high egg production it will produce. Jacob et al., (2013) has been stated that imbalances diet can cause oviductal prolapsed to be occurred. Prolapsed can make the bird too fat and too large in size and this is not something can be proud for. This would make a huge losses in farm where can affect the difficulty in bird's reproductive tract to expel the egg (Jacob *et al.*, 2014). This possible can cause long term damage to the hen entire life and may some treatment in the future can be solved the problems related to this.

There are several main nutrition components needed in the feed ingredients such as salt, calcium, phosphorus, vitamin D, protein and fat. Salt is the main nutrient needed in feed ingredient and it is only needed innate desire to consume salt. A salt deficient diet will lead to increased feather pecking and a decline in egg production can be occurred. According to Jacob *et al.*, (2014) stated that most of the feed ingredients will contain added salt in the form of sodium chloride. He added that birds are very sensitive balance between necessary and toxic level of salt, thus salt requirement in bird is relatively low if excess of amounts of salt can causes highly toxics and reduce egg production.

In addition, calcium and phosphorus are the important constituents of bone. If excess of these two nutritional components it can eventually reduce egg production especially can affect the shell quality and hatchability (Jacob *et al.*, 2014). Vitamin D is needed for calcium absorption and utilization. If excess vitamin D_3 in diets can leads to increase of calcium absorption which will resulting in hypercalcemia and directly causes the reduction of egg production (Jacob *et al.*, 2014). Among livestock animals, if the excess of D_3 is detected in the diets, only poultry that can be tolerated up to 100 times of their requirement (Jacob *et al.*, 2014).

Protein is a main dietary requirement for amino acids that constitute the protein. Generally, poultry needs supply of amino acids in the diet as they cannot synthesize some of these amino acids to meet the metabolic requirement (Jacob *et al.*, 2014) . For information, the amino acids requirements are varied according to their productive rate such as growing, laying eggs, age, type, breed and strain (Jacob *et al.*, 2014).. Inadequate of protein can cause the poor egg production and hatchability as the amino acid requirements are not met (Jacob *et al.*, 2014). Fat is a source of energy and linoleic acid is an essential fatty acids that can affect the egg production if it is in adequate supply. Some fats act as absorption of vitamins but in fact the imbalance absorption of fat soluble vitamins (A, D, E and K) is the most serious consequence of a dietary deficiency (Jacob *et al.*, 2014).

As conclusion, proper balance diet is important in order to maintain the egg production as the age increasing.

2.2 Botanical description

Ficus fistulosa is a plant belong in Moraceae family. Local names of *Ficus fistulosa* in Borneo are called as Ara, Buruni-buruni, Engkuroh, Kara and Kayu Ara (Slik, 2009). In china, their local name is shui tong mu and in Indonesia is called as Beunying (Slik, 2009).

2.2.1 Plant morphology

Ficus fistulosa is a very common figure tree in secondary forests and it can be easily recognized by two characters (Saman, 2012). The shape of the leaves is being elongated and broader at the ends (Figure 2). It is only one of the two native Ficus tree species that produce figs on their trunks and branches; the other being Ficus variegate (Saman, 2012). Moreover, the young twigs are hollow.

According to Fern (2014) who stated that *Ficus fistulosa* is an evergreen tree which can grow up to 20 meters tall but is generally rather smaller. The bole is up to 21 cm in diameter and the twigs are often hollow (Figure 3). In physical observe the root is grey in color but the inner root is yellowish white (Figure 4).

Figure 2.2 Leaf shape
Source: Saman, 2012

Figure 2.3 Cross-section of twig showing its hollow interior
Source: Saman, 2012

Figure 2.4 Root of Kayu Ara (*Ficus fistulosa)*
Source: Taken from Puan Anika's house

2.2.2 Ecology

This plant is an understory tree in undistributed mixed dipterocarp to sub-montane forests at elevations up to 1700 m (Slik, 2009). It is located on hillsides and ridges with sandy to clay soils environment and often along streams. Moreover, *Ficus fistulosa* is distributed from native to tropical Southeast Asia (Heim, 2015).

According to Fern (2014) who studied the plant is geographically distributed in southern China, India, Bangladesh, Myanmar, Thailand, Vietnam, Malaysia, Indonesia, Philippines to New Guinea.

2.3 Nutritional Value and Chemical Composition

There are a data collected from (Prakash, et al., 2009) where *Ficus fistulosa's* macro mineral concentration comprised of 21.1% Calcium, 3.4% Phosphorus, 5.4% Magnesium, 0.1% Sodium, 23.9% Potassium (Prakash, et al., 2009). While micro mineral concentration of *Ficus fistulosa* consisted of 11.3% Copper, 172% Iron, 57% Manganese and 35% Zinc (Prakash, et al., 2009).

According to (Prakash, et al., 2009) research data stated that chemical composition of *Ficus fistulosa* comprised 347 g/kg of Dry Matter, 133 g/kg of crude protein, 15 g/kg ether extract, 522 g/kg neutral detergent fibre, 384 g/kg of acid detergent fibre, 164 g/kg of lignin (Sulphuric acid lignin), 151 g/kg of ash and 29 g/kg condensed tannin (Figure 5)

2.3.1 Uses of medicinal plants

Plant has been the source of medicinal agents for thousands of years and impressive number of modern drugs has been isolated from natural sources, many based on their uses in traditional medicines (Rohaiza, 2009). In some instances, ficus species from Moraceae family are widely used by local people in traditional medicine practice. Surprisingly, all the parts of tree (*Ficus fistulosa*) are used in human medicine especially for skin diseases. Thus, the part of them; fruit, root and peel stems have an effect of herb which have been studied by Juthaporn Rossurang and Bussana Theppaluk (2012).

Ficus is a genus of about 800 species of woody trees, shrubs and vines in the family Moraceae. This genus contains a great potential secondary metabolic including flavanoid, coumarins, alkaloid, steroid, triterpines and salicylic acid. Some of these compound exhibit interesting biological properties such as anticancer, anti-inflammatory remedy, antibacterial and culvunsions and respiratory disorders (Rohaiza, 2009). According to Rohaiza studies, this plant is a part of discovery of traditional medicine and also a discovery of nature pesticide.

Furthermore, the bark is useful in menorrhagia, leucorrhoea and other vaginal disorders and is found to cure diarrhea and dysentery (Rohaiza, 2009). Other than that,

the latex and young buds are used in urinogenital diseases (Rohaiza, 2009). Then, leaves are hypotensive and cardiac depressant. But based on Heim (2015) studies the young leaves are eaten raw as a salad and the mature leaves used as a narcotic which is being smoked with opium. This plant as human medicinal practice which have been studied by Chian (2015) who stated that a decoction of the leaves is given to women after childbirth, the latex has been used to treat headache and in some parts of Indonesia the young leaves are eaten as salads.

Moreover, the fruits are used to treat diarrhea, dysentery, dyspepsia and hemorrhage. The most important part in this study is the *Ficus fistulosa's* root. According to Rohaiza (2009) who stated that the roots are also useful in haemoptysis, menorrhagia, ulcer and found to cure pimple. Base on Heim (2015) studies the root is boiled and the infusion is taken for 3 days as a diaphoretic, it is used for post-natal treatment in human.

Therefore, this study is important to evaluate the effectiveness in maintenance of egg production in older hens. This is because the plant root may contain some secret function for extending the productive life egg in older hen. This may influence the reducing of culling cost in commercial laying birds industry and become more economical to keep the birds for long period.

It is might become locally available medicinal herbs for poultry industry in Malaysia. Older hens in this research can be classified as unproductive laying birds. Further research on the *Ficus fitulosa* is needed to determine the effectiveness on the maintenance of egg production in older hens.

Other than that, this plant can used for items such as temporary constructions, moldings, interior work, cladding, drawers, and laundry tubs, fruits crates and floats (Fern, 2014). Meaning, the wood can also used for fuel. Then, the tree is sometimes harvested from the wild for local use as a food, medicine and source of low quality food.

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