PERFORMANCE OF LAMBS FED ON RATIONS CONTAINING JOJOBA MEAL

BY

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B.Sc. Agric. Sci. (Animal Production), Fac. Agric., Cairo Univ., 2004

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APPROVAL SHEET

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SUPERVISION SHEET

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ABSTRACT

Two experiments were conducted to study the effect of using jojoba meal in rations of growing lambs performance. The first experiment was carried out to determine the *in-vitro* disappearance of dry and organic matter (IVDMD and IVOMD) of the different experimental concentrate feed mixtures containing different levels of jojoba meal from 0 to 24% instead of undecorticated cottonseed meal. Depending on the results of first experiment 20 growing Rahmany lambs (about 6 mouths old and 21kg body weight) were used to evaluate the effect of feeding no different levels of jojoba meal on the growth performance. Animal were randomly assigned into 4 similar feeding groups (5 animals of each) to fed one of the experimental rations, all rations consisted of 50% roughage (25% clover hay + 25% rice straw) and 50% concentrate feed mixture (CFM) without jojoba meal (R1 control), 3% jojoba meal(R2),6% jojoba meal (R3), 9% jojoba meal (R4).Rations were formulated to cover maintenance and productive performance of the growing lambs according to NRC, 1994.At the end of feeding trial nutrients digestibility, blood, ruman and carcass trails were be carried out.

The results of the second indicated that the digestibility of DM, OM, CP, EE,NFE and nutritive value expressed as TDN experiment decreased($P<0.05$) with increasing the level of jojoba meal in the rations, except CF digestibility revealed that the *in vitro* dry and organic matter disappearance (IVDMD and IVOMD) decreased with increasing the level of jojoba meal in concentrate feed mixture. In the second experiment, results indicated that the digestibility of DM, OM, CP, EE, NFE and nutritive values expressed as TDN decreased ($P<0.05$) with increasing the levels of jojoba meal in the rations, except CF digestibility and nutritive value expressed as DCP of lambs fed R2 recorded higher value ($P<0.05$) than values of blood serum albumin and globulin, feed efficiency expressed as kg DM, TDN and DCP /kg gain among the other groups. On the other hand total protein, ALT and AST concentrate, ruminal pH values and DCP intake were not significantly ($P<0.05$) affected by the jojoba meal levels.

Lambs received R1 and R2 showed higher values in ($P<0.05$) albumin/ globulin ratio, NH_3-N, weight gain, feed intake expressed as DM or TDN, hot carcass weight, dressing percentage, rumen full and empty, pelt, tail weight separable fat, meat and fat in carcass compared with those in other treatments.

On the other hand, the carcass characteristics of lambs were significantly ($P<0.05$) less affected by addition of jojoba meal to rations.

Conclusively, it could be recommended that replacing undecorticated cottonseed meal with jojoba meal (till9%) in growing lambs rations seems to be the best for good economic efficiency.

Keywords: Jojoba meal, lambs, digestibility, blood, growth and economic efficiency**.**

DEDICATION

I dedicate this work to whom my heart felt thanks; to my father and my mother for their patience and help, as well as to brothers for all the support they lovely offered along the period of my post graduation.

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INTRODUCTION

Jojoba (*Simmondsia chinensis*) is one of some nutritional sources of feed proteins which contain high protein, approximately 30 % or more (Elliger *et al*., 1973). Jojoba could be used as a feed ingredient to formulate balanced rations. It is a dioeciously desert shrub that grow on arid or semi arid regions. It cultivated to provide renewable source of high quality oil (Sabien *et al*., 1997). The meal remaining after the oil has been extracted contains high protein and therefore should be interest for livestock producers as a feed supplement (Motawe, 2005).

Jojoba is now cultivated in some countries, Argentina (2.kt yr^{-1}), Israel (1.1 kt yr^{-1}), USA (1.0 kt yr^{-1}) and some Mediterranean and African lands are the main seed producers and there are 7930 ha in the world planted with jojoba. Jojoba is being examined for its potential as a crop in many countries around the world with climate and soil conditions similar to these of its native habitate (IJEC, 2004). The rest of jojoba seed can be used as animal feed (Flo *et al*., 1998; Jones and lewis, 1999; Brown, 2003 and Motawe, 2006). Unfortunately, this meal contains approximately 15% of group of toxic glycosides, namely simmondsin, (Boven *et al*., 2000). The simmondsin has been identified as the most responsible feed intake inhibition and appetite suppression in rodents, rats and chickens (Hawthorne and Butterwick, 1998; Flo *et al*., 1999; Cokelaere *at al*., 2000; Ham *et al*., 2000 and Lievens *et al*., 2003).

The major problem of using jojoba meal is the high level of anti-nutritive compounds as simmondsin, and simmondsia-2-ferulate which can be mitigated by various treatments. (Boven *et al*., 2000).

The major jojoba proteins were albumins 79% and globulins 21%, which have similar amino acid compositions and also showed a labile thrombin – inhibitory activity (Shrestha *et al*., 2002).

The Egyptian Natural Oil Company introduced jojoba plant in Egypt. It has been planted in areas near Ismailia Governorate with promising crop production. The plant requirement from water in

volume and quality is very moderate. It is expected that it will be propagated in the Egyptian deserts. Jojoba meal as a by- product of jojoba seeds, is promising feedstuff being detoxified (Motawe, 2006)

Swingle *et al.* (1985) showed that untreated jojoba meal could become an important feed ingredient for gradual adoption at jojoba meal by steers fed 10% jojoba meal.

Khalel *et al*. (2008) showed a positive effect in decreasing concentration of anti nutritive compounds, and could be used at 10% of concentrate feed mixture without any a derse effect on sheep performance Also Khalil *at al.* (2009) indicated the usefulness of replacing of 29% of fish meal by supplemented jojoba meal in the diet of Mono-sex niloticus to over come the high international and local fish meal price.

The lambs given diets containing 5% or 10% jojoba meal, residues of simmondsin and simmondsia-2-ferulate were not detected in kidney, liver, muscle or blood (Manos *et al*., 1986)

Swingle *et al*. (1985) reported that the digestibility of dry matter, organic matter, gross energy, nitrogen retention and daily gain were lower ($P<0.05$) for the concentrate rations containing 10% treated jojoba meal compared with the concentrate rations containing 10% cottonseed meal.

Carcass characteristics of lambs were not significantly affected by addition of jojoba meal to rations, but slaughter weight of jojoba meal was significantly less with both 5% and 10% of jojoba meal in rations (Charies *et al*., 1986).

Accordingly, the present study aims to evaluate the partial replacement (0, 12.5, 25 ad 37.5%) of cotton seeds meal by jojoba meal on growth performance, blood, rumen liquor parameters and carcass traits and economic efficiency of lambs.

REVIEW OF LITERATURE

1-Botanical and ecological characteristics of jojoba plant:

a. History

Jojoba (*Simmondsia chinensis*) is a perennial woody shrub native to the semiarid regions of southern Arizona, southern California (Fig. 1) and northwestern Mexico. Jojoba (pronounced hohoba) is being cultivated to provide a renewable source of unique high-quality oil. Native Americans extracted the oil from jojoba seeds to treat sores and wounds centuries ago. Collection and processing of seed from naturally occurring stands in the early 1970s marked the beginning of jojoba domestication. In addition, the ban on the importation of sperm whale products in 1971 led to the discovery that jojoba oil is in many regards superior to sperm oil for applications in the cosmetics and other industries.

Fig. 1. Jojoba (*Simmondsia chinensis*) flied in USA

Today, 40,000 acres of jojoba are under cultivation in the southwestern U.S. Much of the interest in jojoba worldwide is the result of the plant's ability to survive in a harsh desert environment. The utilization of marginal land that will not support more conventional agricultural crops could become a major asset to the global agricultural economy.

The oldest commercial jojoba plantings in the U.S. were established in the late 1970s, and present production of jojoba oil is in the range of thousands of tons per year. The major world producers are the United States and Mexico, with considerable quantities of oil being exported to Japan and Europe.

b. General botanical characteristics

The life span of jojoba was detected previously by many authors (Brooks and William, 1978 and Buchmann, 1987) to be over 100 years and may exceed 200 years.

Brooks and William, (1978) and Hickman (1993) stated that jojoba is a native, drought-resistant, evergreen shrub that may grow to10 feet (3 m) or remain as a low mound 8 to 20 inches (20-50 cm) tall (Fig. 2).

Gentry (1958) and Nord and Kadish (1974) reported that the form of plant varies in different environments the more erect form is generally found on moist sites, whereas the semi prostrate form is found on desert sites.