PERFORMANCE OF FATTENING BALADI BULLS FED RATIONS CONTAINING BIOLOGICALLY TREATED OLIVE CAKE

By

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B.Sc. Agric. Sci. (Animal Production), Fac. Agric., Cairo Univ., Egypt, 2006

THESIS
Submitted in Partial Fulfillment of the Requirements for the Degree of

MASTER OF SCIENCE

In

Agricultural Sciences
(Animal Production)

Department of Animal Production
Faculty of Agriculture
Cairo University
EGYPT

2010

APPROVAL SHEET

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SUPERVISION SHEET

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ABSTRACT

This study was conducted at the Arab Society of Islamic Education in Wadi EL-Natroon; Behira Governorate to investigate the effect of using biologically treated olive cake (BTOC) in rations on performance of fattening bulls.

The study consisted of three experiments with fifty fattening Baladi bulls (aged 18 months, and weighed 275 Kg).The animals were randomly allotted to ten groups (five for each)

The trail lasted 127 days from January to July, 2008. One group (group No. 1) was used as a control for all three experimental. All groups included three sub groups. The animals in different groups were fed the rations at 3% of their live body weight (2% from concentrate mixture and 1% from corn silage).

The first experiment (EXP.I) was aimed to investigate the partial substitution of yellow corn in the rations with BTOC at rate 11, 22, or 33%.

The second experiment (EXP.II) aimed to study the partial substitution of wheat bran by BTOC at rate of 20, 40 or 60 % of wheat bran in the rations.

The third experiment (EXP.III) was carried out to study the partial substitution of concentrate feed mixture by BTOC at 5, 10 or 15% in the rations.

Digestibility, blood samples, average daily gain of animals, feed efficiency and economical efficiency was studied. The results indicated that using BTOC in fattening bulls ration by partial substitution of both yellow corn, or wheat bran up to 33% or partial substitution of concentrate mixture at rate up to 15% in the rations improved the average daily gain of fattening bulls and decreased the feeding cost of one Kg gain in live body weight by 15- 27% compared to control ration with no adverse affect on animal health.

The partial substitution of concentrate feed mixture with BTOC up to 15% in fattening bulls ration was economical and with no side effects on health of fattening Baladi Bulls.

Keywords: Biological treatment, olive cake, bulls performance, digestibility, nutritive value, blood parameters.

أداء عجول التسمين البلدية المُغذاة على علائق تحتوى على تفل الزيتون المُعامل بيولوجياً

رسالة مقدمة من

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للحصول على درجة

الماجستير

فى

العلوم الزراعية

(إنتاج حيواني)

قسم الإنتاج الحيوانى
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٢٠١٠

ACKNOWLEDGEMENT

Thanks to Allah, the most gracious, beneficent and merciful for his blessing to achieve goals and make them possible. My deep thanks and sincere appreciation to ***Dr. ABD EL-RAHMANMAHMOUD ABD EL-GAWAD*** *Professor of Animal Nutrition, Animal Production Department, Faculty of Agriculture, Cairo University for his direct supervision, encouragement, keen follow up of the work and great help in writing and preparation of this thesis. Deep thanks are also due to* ***Dr. MOHAMED MOHAMED HASSAN ABD EL-GAWAD*** *Assistant Professor of Animal Nutrition, Animal Production Department, Faculty of Agriculture, Cairo University for his continuous help and suggesting the techniques for solving problem during the experimental work. Many thanks are also due to* ***Dr. MOHAMED FADEL SOLIMAN*** *Professor of Microbial Chemistry Department, National Research Center for his collaboration in supervision, advice and encouragement during the experimental work.*

Deep thanks are also due to ***the Arab Society of Islamic Education*** *in Wadi EL-Natroon, Behira Governorate for its support by their animals and feeds during whole the trial period. My special thanks and sincere regards to* ***my family*** *specially my mother, my father, my brother and my sisters. Finally my great thanks to all staff members of* ***Animal Production Department, Faculty of Agriculture, Cairo University.***

إسم الطالب : محمد حسن محمد بكر **الدرجة** : ماجستير
عنوان الرسالة : أداء عجول التسمين البلدية المُغذاة على علائق تحتوى على تفل الزيتون المُعامل بيولوجياً
المشرفون : **دكتور** / عبد الرحمن محمود عبد الجواد
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قسم: الإنتاج الحيوانى **فرع:** تغذية الحيوان **تاريخ المناقشة:** / /٢٠١٠

المستخلص العربى

أجرى هذا البحث فى مزرعة خاصة بالجمعية العربية للتربية الإسلامية بوادي النطرون محافظة البحيرة بهدف دراسة تأثير استخدام تفل الزيتون المعامل بيولوجياً فى العلائق على الأداء الإنتاجى لعجول التسمين.

واشتملت الدراسة على ثلاث تجارب استخدم بها ٥٠ عجل تسمين متوسط عمرها ١٨ شهراً ومتوسط أوزانها ٢٧٥ كيلو جرام قسمت إلى ١٠ مجموعات بكل مجموعة ٥ حيوانات منها ٥ حيوانات كمجموعة كنترول لجميع المعاملات وتسع مجموعات مختبرة بمعدل ثلاث مجموعات بكل تجربة وكانت التغذية على عليقة مكونة من مخلوط علف مركز بمعدل ٢ % من وزن الحيوان وسيلاج ذرة كامل بمعدل ١ % من وزن الحيوان .

التجربة الأولى وتهدف إلى دراسة الإحلال الجزئى للأذرة الصفراء بتفل الزيتون المعامل بيولوجياً بمعدل ١١، ٢٢ أو ٣٣% من الذرة الصفراء وتهدف التجربة الثانية إلى دراسة الإحلال الجزئى لنخالة القمح بتفل الزيتون المعامل بيولوجياً بمعدل ٢٠ ، ٤٠ أو ٦٠ % من النخالة والتجربة الثالثة وتهدف إلى دراسة الإحلال الجزئى لمخلوط العلف المركز بتفل الزيتون المعامل بيولوجياً بمعدل ٥، ١٠ أو ١٥% وذلك على معاملات هضم المركبات الغذائية للعلائق المختبرة ومعدل الزيادة اليومية فى وزن الجسم لعجول التسمين وبعض قياسات الدم والكفاءة الغذائية والإقتصادية .

وانتهت الدراسة إلى أن استخدام تفل الزيتون المعامل بيولوجياً فى علائق عجول التسمين من خلال الإحلال الجزئى سواء للذرة الصفراء بمعدل حتى ٣٣% أو نخالة القمح بمعدل ٦٠% أو مخلوط العلف المركز بمعدل حتى ١٥% أدى إلى تحسن فى معدل الزيادة اليومية لعجول التسمين وتقليل تكاليف التغذية لانتاج ١ كيلو جرام زيادة فى وزن الجسم بمعدل حتى ٢٧% بالمقارنة بعليقة المقارنة مع عدم وجود أى تأثيرات سلبية على صحة الحيوانات وكانت أفضل معامله هي الإحلال الجزئى لمخلوط العلف المركز بتفل الزيتون المعامل بمعدل ١٥%.

الكلمات الداله: المعاملة البيولوجية، تفل الزيتون، أدء العجول، الهضم، القيمة الغذائية، قياسات الدم.

CONTENTS

INTRODUCTION

The shortage in feed resources represents a major constraint to animal production in many developing countries. Expanding the feed resource base through utilization of non-conventional feed resources (NCFRs), especially those that do not compete with human food has become a compelling task. The NCFRs include a variety of feeds from perennial crops, multipurpose trees and shrubs, and agro-industrial by-products such as olive cake. This source is still not fully and appropriately integrated into livestock feeding.

The gap between the availability and requirements of animal feeds in Egypt is about nine million tones of dry matter, equivalent to almost four million tones of total digestible nutrients per year. It has been suggested that efforts should be done to efficiently use all the available by-products and wastes to decrease the animal feed shortage in Egypt. Use of Olive by-products could partially over come feed shortage and aid to close the gap, particularly there are sufficient quantities of this product in desert and newly reclaimed area. Olive cake could be incorporated in ruminant diets as untraditional feedstuffs to decrease the feeding cost and reduce farm waste. There are about 118, 382 feddans planted with olive trees in Egypt, the fruitful area 96, 810 feddans, produce about 314, 450 tons of olive, representing 3.25 tons/feddans (ministry of Agriculture and land reclamation, 2004/2005).

The production of olive oil is the main goal of cultivating olive. Crude olive cake is a mixture of skins, pulp and seeds which produced after the extraction of olive oil (Sansoucy, 1987). Olive pulp is obtained

when the stone has been separated from the pulp before extraction of the oil. It has a high water content (60%) so it is difficult to store. These residues represent 30 to 40% of the original quantity of olive production (Nefzaoui., 1983). This means that about 110, 057.5 tons of olive cake and olive pulp are produced per year in Egypt; these amounts can be used as a partial substitute for corn or as a source of energy in ruminant's diets.

But there are some constraints for using some agro-industrial by-products such as olive cake. These constrains are the reasons to limited utilization of these by-products, which are:

1. Low nutritive value is the reason to limited utilization
2. Short period of utilization (seasonal products).
3. High moisture content. High cost of handling and transportation from the production site to the farm.
4. Farmers are not aware of the nutritive value of some feed sources and the way for their efficient integration in livestock feeding.
5. Competition with alternative users.
6. Presence of anti-nutritional factors (phenolic compounds mainly tannins).
7. Dehydration may cause loss of protein value (Maillard reactions).
8. Lipid per oxidation (rancidity of high fat products).
9. Mould growth (aflatoxins) may cause toxicity.

There are many methods for improving the nutritive value of these by-products such as physical, chemical and biological treatments. Mechanical and chemical treatments of poor quality roughages have been frequently used for improving the quality of such materials.

However these methods are either costly or have hazardous impact on ambient environment. So the biological treatments may be a good method for improving the nutritive value of agricultural by-products.

The main objective of this study was to determine the most appropriate level of biologically treated olive cake replaces yellow corn, wheat bran or concentrates farm mixture in feeding of Baladi bulls.

REVIEW OF LITERATURE

Several agriculture and agro-industrial by-products are produced yearly during the production or processing of fruit and vegetable crops which may contribute to environmental pollution

Olive by-products derived from the olive trees and olive oil extractions are generally known as “olive by-products”. Both cultivation of olive trees and olive oil extraction generate substantial amounts of by-products, which are potential pollutants Olive industry by-products could partially contribute to overcome feeds shortage in Egypt; especially in desert and newly reclaimed area where there are sufficient quantities of these by-products. They could be incorporated in ruminant diets as unconventional feedstuffs to decrease the feeding cost and to alleviate the pollution problems.

1. Olive production

The land area occupied by olive orchards in the world has increased in recent years, largely in response to the worldwide rise in olive oil consumption (International Olive Oil Council, 2006). Mediterranean countries represent 65% of the world’s surface area cultivated by olives; 76% of the trees in production and, 74% of total olives are harvested. Globally, olive orchards occupied 8046 thousand Ha in 1981 and 10,149 Ha in 2001. The world production of olive oil has risen from 2,459.4 thousand tons in 1996/97–1999/2000 to 2,765.1 in 2000/01–2003/04. The estimation for olive oil production in 2005/06 is 2,584.5 thousand tons. Production across the 25 countries of the European Union, where Spain (45%), Italy (31%) and Greece (22%) are the largest producers, is expected to account for almost 75% of the

world’s olive oil. in Egypt There are about 118382 feddns cultivated by olive trees; the fruitful area of 96810 feddns, produces about 314450 tons of olive representing 3.25 tons/feddns (Ministry of Agriculture and Land Reclamation, 2004/2005).

The production of olive oil is the main goal of cultivating olive, which produces olive cake as by-products. crude olive cake is a mixture of skins, pulp and seeds from olives after the extraction of olive oil (Sansoucy, 1987)" and olive pulp is the paste obtained when the stone has been separated from the pulp before extraction of the oil, it has a high water content (60%) and is difficult to store all these residues were estimated to be 30 to 40% of the original quantity of the crop produced. (Nefazaoui, 1983).This means that about 110057.5 tons of olive cake is produced per year in Egypt.

Feeding by-products to livestock is a practice as old as the domestication of animals. The main advantages are less dependency of livestock on grains that can be consumed by humans, and the reduction of costs related to waste management (Grasser *et al*., 1995; Orskov, 1998; Aregheore, 2000).

The physical composition of olive is shown in Fig. (1). as reported by Maymone *et al*, 1961and Nefzaoui, 1983.

(a) (b)

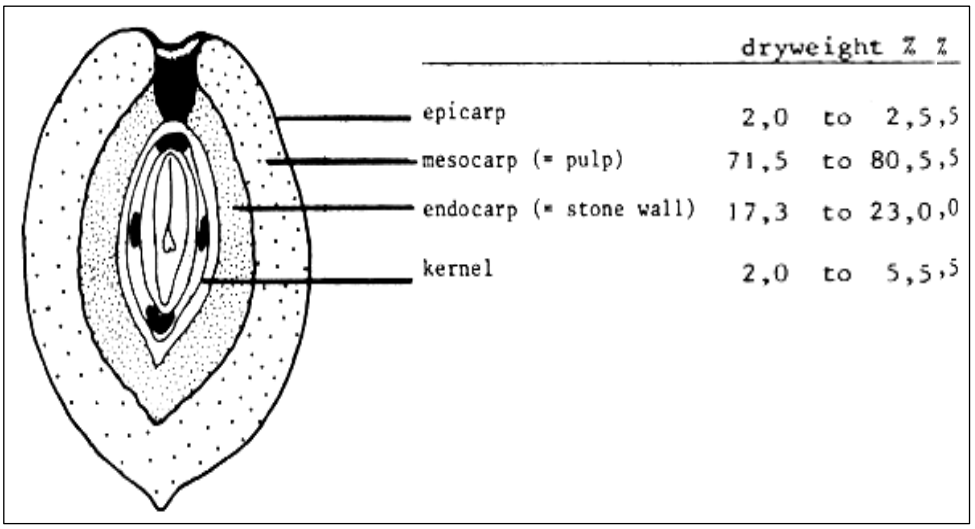

Figure 1. The olive: (a) cross-section and (b) physical composition

2. Oil Extraction By-products

a. Olive cake (OC)

1. Crude olive cake

It represents the residue of the first extraction of oil from the whole olive by pressure. It's relatively high water (24%) and oil (9%) content causes rapid spoilage when it is exposed to air. Olive cakes consist of olive pulp, skin, stone and water. Different terms may be given depending on factors such as composition and oil content.

The different oil extraction procedures and resulting by-products have recently been documented by Alburquerque *et al*. (2004). It is worth distinguishing between OC from three (3POC) and two-phase (2POC) centrifugation extraction procedures.

The main difference is the higher moisture and the lower oil content from the 2POC procedure, due to a more efficient and environmentally friendly centrifugation process, compared to the