

**GROWTH PERFORMANCE OF MAGHRABI  
CAMEL CALVES UNDER DIFFERENT  
MANAGERIAL CONDITIONS**

**By**

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**B.Sc. Agric. Sci. (Animal Production), Fac. Agric., Cairo Univ., Egypt, 2007**

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### ABSTRACT

The present study was carried out at The Camel Studies and Production Development Center in Matrouh governorate which belongs to Camel Research Department, Animal Production Research Institute, Agricultural Research Center, Giza, Egypt, to determine the growth performance of growing Maghraby camels under different levels of ZADO addition. ZADO is a biotechnical product prepared from natural source to elevate the level of cellulase enzymes.

Eighteen growing male Maghraby camels ( $192.42 \pm 1.41$ kg, aged 14 months) were used in 115 days growth trial. The camels were randomly divided into 3 equal groups (6 in each) of similar weight and age, which were offered complete rations at 3% (on dry matter basis) of camel body weight with two levels of ZADO product. The first group was Zero g/h/d (control), the second group received 20 g/h/d of ZADO and the third group had 40 g/h/d.

The results indicated that camels that received 20g were higher in average weight gain than the control, The 40g group was the best one (804 g vs. 628 g, 910g, for 2, 1 and control respectively.). The DM intake did not differ significantly among the three groups (6.24, 6.28 and 6.29kg/h/day) for control, 20g and 40g, respectively.

The metabolic function was improved in treated groups as a result of ZADO supplementation as shown by increasing in hemoglobin, hematocrit, total proteins, albumin, glucose and insulin like growth factor-I, while blood nitrogen, total lipids, triglycerides and cholesterol slightly decreased, compared to control group.

T3 hormone increased significantly in G2 and G3 both T4 in all treated groups, but insignificantly.

It could be concluded that growing male Maghrabi camels fed diets containing ZADO performed better than those offered the control ration. Moreover, adding ZADO in camel ration (40g/h/d) was the better, as confirmed by the highest body weight gain, and increase in most of blood metabolites and metabolic hormones.

**Key Words:** Camel, growth, ZADO, blood biochemical , hematology, feed additives.

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## LIST OF ABBREVIATIONS

<b>ADG</b>	<b>Average daily gain</b>
<b>Alb</b>	<b>Albumin</b>
<b>ALT</b>	<b>Alanine amino transferase</b>
<b>AST</b>	<b>Aspartate amino transferase</b>
<b>BUN</b>	<b>Blood urea nitrogen</b>
<b>BW</b>	<b>Body weight</b>
<b>CFM</b>	<b>Concentrate feed mixture</b>
<b>CR</b>	<b>Creatinine</b>
<b>dl</b>	<b>Deci liter (<math>10^{-2}</math> liter)</b>
<b>DMI</b>	<b>Dry matter intake</b>
<b>FBW</b>	<b>Final body weight</b>
<b>FDW</b>	<b>Free drinking water</b>
<b>g</b>	<b>Gram (<math>10^{-3}</math> kilogram)</b>
<b>G1</b>	<b>Group 1, control group</b>
<b>G2</b>	<b>Group 2, that supplemented with 20 g/h/d of ZADO</b>
<b>G3</b>	<b>Group 3, that supplemented with 40 g/h/d of ZADO</b>
<b>Glb</b>	<b>Globulin</b>
<b>Glu</b>	<b>Glucose</b>
<b>Hb</b>	<b>Hemoglobin concentration</b>
<b>Ht</b>	<b>Hematocrit value</b>
<b>IBW</b>	<b>Initial body weight</b>
<b>IU</b>	<b>International unit</b>
<b>mg</b>	<b>Milli gram (<math>10^{-3}</math> gram)</b>
<b>ng</b>	<b>Nano gram (<math>10^{-9}</math> gram)</b>
<b>NH<sub>3</sub></b>	<b>Ammonia nitrogen</b>
<b>nm</b>	<b>Nano meter (<math>10^{-9}</math> meter)</b>
<b>RIA</b>	<b>Radioimmuno assay</b>
<b>SRL</b>	<b>Strained rumen liquor</b>
<b>T3</b>	<b>Triiodothyronine hormone</b>
<b>T4</b>	<b>Thyroxine hormone</b>
<b>TBG</b>	<b>Total body gain</b>
<b>TC</b>	<b>Total cholesterol</b>



**TG**  
**TP**  
**TVFAs**

**Triglycerides**  
**Total protein**  
**Total volatile fatty acids**

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## INTRODUCTION

The one humped camel (*Camelus dromedarius*) is most widely distributed in the hot arid and semiarid areas of the Middle East and Africa. It is very important in many countries as they are used as food and draft animal. Of all the domesticated animals, the camel occupies a unique place for its efficient adaptive mechanisms under harsh conditions. It is traditionally and economically animal, thus, playing an important role in the socioeconomic up life of the desert communities. Al Haj *et al.*, (2012) stated that camel is a typical desert animal that has developed physiological and anatomical adaptation to cope with harsh climatic changes of the desert.

In Egypt, the total number (000 head) of camels was recently increased by about 23.4 % from 111 in 2010 to be 137 in 2011 (CAPMS, 2013). On the other hand, during the same period, the corresponding number (000 head) increased by about 23.8% from 110.57 to 136.93 with about 53.5 % of these in the desert and new lands according to MOALR (2012). In contrast, according to statistics of FAO (2011), camels' population (000 head) in Egypt has been declining from 110.6 to 107.0 during the same period. It is clear that local and national authorities are very interested in camels to ensure the development and safeguarding. Unfortunately, data on the actual number of the camels in Egypt is not very accurate for judging their contribution capacities in agriculture sector that is because camels exist mainly in the desert areas with difficult accessibility.

Recently, camel has more important situation as a meat producing animal in Egypt for its great capacity to produce meat. Therefore, camels' meat consumption increased markedly during the last years as a healthy and highly nutritional meat compared with other farm animals. In Egypt, the slaughtered camels (000 head) increased by about 25% from 28 in 2010 to be 35 in 2011 (CAPMS, 2013). The contribution of camels in meat production in Egypt was about 21 % compared to 33 % and 46% for buffaloes and cattle, respectively (FAO, 2000). Camels' meat contained 20.50, 2.72 and 1.02% of protein, fat and ash, respectively. In addition, camels' meat characterized by lower ( $p < 0.05$ ) fat (2.72%) than buffaloes' meet (3.31%). (El-Kholy *et al.*, 2006) Also, they concluded that meat of camels is a good source as animal protein after giving sufficient feeding for economically extent. Both camel breed and feeding management system play an important role in improving meat quality (Basmaeil *et al.*, 2012).

Furthermore, findings of Iqbal *et al.* (2001) indicated that great potential possessed by camel calves which can further be exploited under optimum feeding and management conditions for alleviating the animal protein deficiency prevailing in overpopulated and under development countries.

Blood biological markers are good indicators of growth performance of the animals, particularly the metabolic hormones i.e. thyroid hormones and insulin like growth factor-I, IGF-I (Ashour *et al.*, 2013). So, these biomarkers are important for many metabolic

functions and metabolites disorders in farm animals. However, information about the IGF-I in camels is rare or very limited (Salhab *et al.*, 2012 and Al-Haj *et al.* 2012). Efficient daily weight gain of the animal as a good indicative of growth performance is basically governed by the individual's genetic makeup, adequate feeding and proper management.

Camels are survive in an arid environment where the supply of good quality forage is very limited. Mostly camels are raised under true nomadic husbandry system, therefore, they depends on saltbush such as *Atriplex halimus* in animal feeding. It is an evergreen shrub, widely distributed in Egypt, along the Mediterranean coastal zone and the Suez gulf. It is characterized generally by high content of ash and fiber, moderate protein and deficient in energy content (El-Shaer, 1981).

Therefore, technological development in a variety of scientific and engineering disciplines will be needed to support the growing world population. To meet this need, it will be essential that scientists continue to develop new technologies that increase productive efficiency of food production (Etherton and Bauman, 1998). With respect to animal agriculture, a wide range of exogenous fibrolytic enzymes, as ZADO<sup>®</sup>, are currently commercially available to be used with ruminants (Beauchemin *et al.*, 1999, Gado *et al.*, 2009 and 2011). ZADO<sup>®</sup> addition is one biotechnology that increase the food output, milk (Ashour *et al.*, 2010) and meat (Ashour *et al.*, 2013) per unit of feed resources input.

ZADO<sup>®</sup> is a biotechnical product prepared from natural sources to elevate the level of cellulases enzymes. This product contains some specific enzymes such as Alpha amylase (61.5 unit/g), protease (29.1 unit/g), cellulose, (7.1 unit/g), and xylanase (2.3 unit/g). ZADO<sup>®</sup> has been shown to improve; ruminal fermentation, N balance, nutrient digestibility, milk yield and compositions, feed conversion and body gain (Gado, 1997; Gado et al., 2007 and Salem et al., 2007a and b). However, there is a lack of information in the literature on the effect of ZADO<sup>®</sup> in the growing camel rations. To date according to our knowledge and available literature, this is the first attempt.

Therefore, the objective of this study was to assess and evaluate the various blood metabolites, hematological traits, enzymes and metabolic hormones as physiological indicators of growth performance (body gain) as affected by dietary supplementation of a biotechnical product (ZADO<sup>®</sup>) under semi-arid conditions in growing Maghrabi camel calves.

# REVIEW OF LITERATURE

## 1. The Maghrabi camel

The Maghrabi: is classified as dual purpose breed reared for meat and milk production. Found in most coastal zones of the North African territories that extend from Egypt in east to Morocco in west. The Maghrabi camel had several strains that vary in size, color and body conformation.

The Egyptian Maghrabi camel is medium in size with small and pointed hump. Besides pack use, the Maghrabi camel is used for all kinds of agricultural, industrial and draft purposes. A number of types is locally developed serve certain functions. The Maghrabi camel generally responds to feeding and might gain about 700-1000 grams per day during the first year under intensive conditions. Wardeh, (2004).

## 2. *Atriplex* as fodder shrubs for ruminants

Saltbush such as *Atriplex halimus* is an evergreen shrub, widely distributed in Egypt, along the Mediterranean coastal zone and the Suez gulf. It is one of the common natural forage communities that its chemical composition is greatly affected by the stage of growth. It is characterized generally by high content of ash and fiber, moderate protein and deficient in energy content. El-Shaer, (1981).

Earlier studies indicated that yearling and older camels can be maintained and even fattened on clover hay, grain straws or native halophytes (e.g. *Atriplex spp.* and *Acacia saligna*)