



**Immunity and reproductive performance of small ruminants under the impact of water stress**

**By**

**Masouda Abd El-Wahab Abd El-Ghany Allak**

B. Sc, Facof Agric, El- Fayoum University, 2007

M.Sc. Animal Production, Fayoum University, 2013

**Thesis**

Submitted in Partial Fulfillment of the Requirement for  
the  
Degree of Doctor of Philosophy in Agriculture Sciences  
(Animal Physiology)

**In**

Agriculture Sciences (Animal Physiology)

Department of Animal Production

Faculty of Agriculture

**Fayoum University**

**2018**



**Immunity and reproductive performance of small  
ruminants under the impact of water stress**

**By**

**Masouda Abd El-Wahab Abd El-Ghany Allak**

**Thesis**

Submitted in Partial Fulfillment of the Requirement for  
the

Degree of Doctor of Philosophy

**In**

Agriculture Sciences (Animal Physiology)

Department of Animal Production

Faculty of Agriculture

**Fayoum University**

**Supervised by:**

**1- Prof. Dr. Mona Abdel-Tawab El-Khashab**

Professor of Animal Physiology and Dean of Faculty of  
Agriculture, Fayoum University

.....

.....

## **2- Dr. Ahmed Ibrahim Semaida**

Lecturer of Animal Physiology, Faculty of Agriculture, Fayoum  
University

.....

.....



## **Immunity and reproductive performance of small ruminants under the impact of water stress**

**By**

**MasoudaAbd El-WahabAbd El-GhanyAllak**

**Thesis**

Submitted in Partial Fulfillment of the Requirement for  
the

Degree of Doctor of Philosophy

**In**

Agriculture Sciences (Animal Physiology)

Department of Animal Production

Faculty of Agriculture

# Fayoum University

## Approved by:

### **1- Prof. Dr. GamalAshour Hassan**

Professor of Animal Physiology and Head of Animal Production  
Department, Faculty of Agriculture, Cairo University

.....

.....

### **2-Prof. Dr. EssmatBakriAbdallah**

Professor of Animal Physiology and PreVice – Dean for Post  
Graduate Studies and Research, Faculty of  
Agriculture, AinShamsUniversity

.....

.....

### **3- Prof. Dr. Mona Abdel-Tawab El-Khashab**

Professor of Animal Physiology and Dean of Faculty of  
Agriculture, Fayoum University

.....

.....

## ABSTRACT

This study was carried out at the Experimental Farm of Animal Production, Faculty of Agriculture, Fayoum University, Fayoum governorate, Egypt. The experiments were achieved at Demo area which is a semi-arid desert near Fayoum, about 15 km from the Faculty of Agriculture. The present study aimed to investigate the effect of water stress (water restriction, salinity and water deprivation) in small ruminants under semi-arid desert and their impact on physiological response, immunity and reproductive performance. 24 Ossimi ewes and 20 Baladi does were equally and separately divided into four groups (for each species). G<sub>1</sub> received restricted water (50% of requirement), G<sub>2</sub> were offered diluted salty water containing 5500 ppm TDS, G<sub>3</sub> were received water once every three days and G<sub>4</sub> served as control group (daily received ad libitum water (280 ppm TDS).

Thermoregulatory responses (RT and RR), haematological parameters (CBC) and total water intake were determined. Serum constituents (total protein (TP), albumin (Alb), globulin (Glb), triglycerides (TG), cholesterol (Chol), glucose (Glu), Na<sup>+</sup>, Cl<sup>-</sup> and K<sup>+</sup>, ALT, AST, creatinine and urea) as well as hormones and immunological responses (T<sub>3</sub>, T<sub>4</sub>, Aldosterone, E<sub>2</sub>, P<sub>4</sub> and IgG) were assayed. Results indicated that the highest daily water intake was observed in water deprivation group. Thermoregulatory responses indicated that RT and RR were not affected by water stress. Blood biochemical analysis indicated that water deprived group had higher means of TP, Alb, Glb, TG, Chol, ALT, urea, Na<sup>+</sup>, Cl<sup>-</sup>, Ald, T<sub>4</sub> and E<sub>2</sub>, while water restricted group had

higher TP, TG, Chol, Na<sup>+</sup>, Cl<sup>-</sup> and MCHC. Furthermore, salinity in water tended to increase IgG and K<sup>+</sup> and decrease Cl<sup>-</sup> and MCV than that found in control group. Generally, there were no differences in T<sub>3</sub>, P<sub>4</sub>, AST, RR, creatinine, Hb, RBCs, MCH, WBCs, platelets and WBC differentiation in water stress groups compared to control group. Regardless treatment and periods goats showed significantly (P<0.05) higher E<sub>2</sub>, P<sub>4</sub>, T<sub>4</sub>, RT, TG, MCHC, MCH and monocyte percent and significantly (P < 0.05) lower RR, Alb, ALT, Na<sup>+</sup>, MCV, Hb, Ht, RBCs and WBC counts as compared to sheep. T<sub>3</sub>, IgG, Chol, TP, K<sup>+</sup>, Glu, glb, creatinine, urea and platelets did not differ between species. No significant differences were found in reproductive traits such as conception rate, litter size, litter weight and birth weight in water stressed animals as compared to control group, species effect was insignificant except for litter weight and birth weight.

**Key words:** ossimi ewe; Baladi does; salty water; water stress; water deprivation; water restriction; blood metabolites; hormones; immunological responses; reproductive performance.