Response of the Immune System in Small Ruminants to Environmental Stresses and Its Relation to Their Reproductive Performance

By

Muhammed Ahmed-Hilmy Abdulazizz El-Rayes

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A Thesis Submitted in Partial Fulfillment

of

The Requirement for the Doctor of Philosophy Degree

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ABSTRACT

The present study was carried out in Maryout Research Station (32º N Latitude), 35 kilometers southwest of Alexandria that belongs to Desert Research Center (DRC). This work was conducted to test the hypothesis that sheep and goats can tolerate the feed shortage under semi-arid condition and if there is a difference between sheep and goats in their ability to withstand this shortage and harsh condition. Twenty female small ruminants were used in the present study. Ten adult Barki sheep and ten adult Baladi goats were divided into two groups (5 animals each) according to the feeding levels, 50% or 100% of the energy requirements of maintenance. The present study was designed to detect the impacts of feed restriction (protein and energy requirements) on live body weight, physiological responses, blood picture and some immunological and biochemical responses of adult female small ruminants. In addition, histological, histopathological and cell ultrastructural investigations were performed to estimate some reproductive performance of both ewes and does at non-pregnant, non-lactating status.

Feed restriction decreased ($P<0.05$) respiration rate, skin temperature, RBC's count, Hb, MCH, MCHC, Hit, WBC's, platelets count, total protein, globulin, lactatedehydrogenase, alkaline phosphatase, iron, copper, and immunoglobulin A. This restriction decreased oxidation by decreasing respiration rate, haemoglobin, RBC's, iron and copper. Nutritional shortage in sheep and goats for 4 months resulted in an increase in monocytes count, A/G ratio, total lipids, cholesterol, LDL, HDL, ALT, AST, GGT, urea, BUN, immunoglobulin G and M and complement 4. Moreover, it increased lipolysis and immunity by increasing lipid fractions and immunoglobulins against diseases. Sheep and goats fed 50% for 4 months had no significant effect on body weight, RT, CT, infrared radiation, MCV, neutrophils count, lymphocytes count,

Eosinophils count, basophils count, albumin, glucose, triglycerides, creatinine and complement 3.

Sheep were significantly higher than goats in the live body weight, respiration rate, Hb, PCV, MCV, MCH, platelets count, total lipids, AST, GGT, alkaline phosphatase, urea, BUN and iron and this indicated that sheep are higher in metabolic activity and oxidation than goats. On the other hand, sheep were significantly lower in the skin and coat temperatures, infrared radiation, monocytes, lactatedehydrogenase, triglycerides, cholesterol, HDL, and LDL and so sheep are lower in lipolysis than goats, since they have a stock of energy in their fat tails.

Generally, histological and ultrastructural studies indicated that feed restriction had negatively affected lymph nodes, ovarian and uterine tissues as indicated by massively necrotic ovarian follicles, hyperplasia of uterine glandular cells and severely necrotic follicles in the lymph nodes.

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