By the name of Allah, the gracious, the merciful.

Sudan University of Science & Technology

College of graduate Studies

Effect of Castration on some Blood Metabolites of Fattened Nubian Male Kids

اثر الخصي علي بعض نواتج التمثيل الغذائي بالدم لجديان الماعز النوبي المسمنه

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قال تعالي :

وألأنعام خلقها لكم فيها
“ دفء
ومنافع ومنها تأكلون “

(الذحل ا لآيه 5)

Dedication

This work is dedicated to:

My dearest mother,

My dearest father, who always encourages me,

My sisters, brothers and family members

Teachers, Colleagues and Students

And above all of them for the Islam and every one who will find help and guide by this work.

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ABSTRACT

Ten male Nubian kids at sexual maturity age ranged between (7-8) months were used in a study to investigate the effect of castration on feed intake, feed conversion ratio, body weight gain and some blood parameters which include: glucose, cholesterol, total protein, albumin, globulin, urea and uric acid.

The kids were randomly divided into two groups. Group (A) were all intact males and (B) were castrated using Burdizzo castration method. Each group contained five kids. The average initial weight of the two groups were matching 14.6±3.41 and 14.8±3.36kg respectively.

The kids were individually accommodated and fed *adlibitum*. The daily feed intake and weekly weight and blood samples for the metabolites tests were taken. This experiment continued for eight weeks. The data obtained were then analyzed using student t test to examine the significance of the effect of castration on the feedlot performance and the blood metabolites levels.

The study showed that there was no significant differences between the intact and castrated kids in feed intake, although, the intact kids showed significantly ($P<0.05$) higher body weight gain compared to the castrated kids. There were no significant differences between the intact and castrated kids in feed conversion ratio, although the castrated kids had a higher value than the intact kids which suggest that the feed conversion ratio of intact kids was better than the castrated.

The results of blood metabolites showed that there were no significant differences between the two groups except for the glucose level which was significantly higher for the castrated kids and the urea level was significantly higher for the intact kids.

Correlation and regression among the examined parameters showed that there were significant correlations between feed intake, weekly weight gain and blood urea levels with the weekly body weight, total cholesterol, albumin and urea levels.

The study showed no significant effect on most feedlots performance and metabolic parameters studied.

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خلاصة البحث

أجريت هذه الدراسة علي عشرة ذكور من صغار الماعز النوبي والتي تتراوح اعمارها بين (7-8 اشهر) في مرحلة النضج الجنسي وذلك لمعرفة مدي تاثير عملية الخصي علي كمية العلف المتناولة ومن ثم علي اوزانها (الزيادة الوزنية) ومعدل الكفاءة التحويلية وعلي بعض نواتج التمثيل الغذائي بالدم والتي تشمل : الجلكوز ، الكلسترول ، البروتين الكلي بالدم ، الالبيومين ، الجلوبيولين ، اليوريا وحمض اليوريك .

قسمت الحيوانات عشوائياً الي مجموعتين ، كل منهما يحتوي علي خمسه حيوانات : مجموعة (أ) لم تجري لها عملية الخصي ومجموعة (ب) تم اجراء الخصي لها بطريقة البرديزو.

أعطيت الحيوانات كمية مفتوحه (حره) من عليقة التسمين ، كل علي حده ، ومن ثم حساب المتناول اليومي من العلف واخذ الوزن الاسبوعي وعينات الدم لتحليل نواتج التمثيل الغذائي بهما . إستمرت هذه التجربة علي مدي ثمانيه أسابيع .

تم تحليل البيانات المأخوذه باستخدام إختبارات (ت) لمعرفة معنوية تأثير الخصي علي تسمين ونواتج التمثيل الغذائي بالدم لصغار ذكور الماعز النوبي .

لم تظهر الدراسة اي فروق معنويه بين المجموعتين في كمية العلف المتناوله خلال فترة التجربة (8 اسابيع) بينما أظهرت الدراسة وجود فروق معنويه في الاوزان حيث كانت اعلي في الغير مخصيه عنها في المخصيه .

أما بالنسبة لمعدل التحويل الغذائي فلم تظهر فروق معنويه بينهما الا ان الغير مخصيه أعطت معدل تحويل غذائي أقل من المخصيه ، عليه فان معدل التحويل الغذائي للغير مخصيه يكون افضل عنه في المخصيه .

كما لم تظهر الدراسة فروق معنويه بين المجموعتين لبعض نواتج التمثيل الغذائي للدم عدا في الجلكوز حيث كان تركيزه اعلي في المجموعة المخصيه مقارنه بالغير مخصيه ، بينما كان مستوي اليوريا بالدم اعلي في المجموعة الغير مخصيه من المجموعة المخصيه.

وعند مقارنة هذه الخصائص ببعضها البعض اظهرت ان هنالك علاقة قويه بين كمية العلف المتناوله والوزن الاسبوعي واليوريا وبين الوزن الاسبوعي ، الكلسترول والالبيومين واليوريا.

خلصت الدراسة الي ان خصي صغار ذكور الماعز النوبي ليس له اثر ، اي لا توجد فروق معنويه بين المجموعتين في معظم تغذية او الأداء التسميني ونواتج التمثيل الغذائي بالدم والزياده الوزنيه.

INTRODUCTION

There are more than million heads of goats word-wide presently producing more than 4.5 million tons of milk and million tons of meat besides other byproducts. (Internet)

According to the latest estimation of M.A.R (2006), the animal population in Sudan is about 138million heads: 41million heads of cattle, 50million head of sheep, 43million head of goat and 4million head of camel.

Sudan is mainly an agricultural country with a large livestock population; however nomads own most of this population (Fao, 1992). Goats in Sudan play an important role in the economy of the country and in the life of many Sudanese families as a favorite household dual purpose animal (milk and meat). Goats contribute to the health and nutrition of several million people in the developing countries, especially those in the poverty line.

There are four local breeds of goats exist in the Sudan: Nubian goat, Desert goat, Nilotic goats, and the upland Tegri goat.

The Sudanese Nubian goats breed the most numerous and widely distributed especially in the urban and Reverian areas. It comprises 70% of the total of goats in the Sudan. Although it is characterized as milking type, it may also recognize as a very dual purpose (meat and milk) breed. Therefore, it is not however as good as milking goats of Swiss origin. (Shalash *et al.*, 1970)

Because of some changes in eating habits of people there is demand for the goat meat.

Castration is defined as the removal of the testes of the male, to prevent animals with inferior blood lines from reproducing and this is important in improving all breeds of animals. (Frandsom, 1974)

Castration of animal intended for slaughter is an almost universal and long-standing practice widely used in cattle and sheep. (Turton, 1962)

Male goat kids that are not being kept as future flock sires are usually castrated, so that they will no longer be fertile (Stanton, 1999). Also, males that are not of high quality were called as a meat source. (Ensminger *et al.*, 1986)

The biochemical traits of the domestic animals have been investigated by various workers (Zubcic, 2001, Doornenbal *et al.*, 1988 and McDougall *et al.*, 1991). However, relatively few studies have been carried out on indigenous goat breeds of Sudan (Hassan, 1967, Amin, 1993, and Ibrahim et al., 2005).

The effect of castration on biochemical parameters in the blood needs more investigations especially in Sudanese goat breeds.

The objective of the present work is to investigate:

1. The effect of castration on feed intake and feed conversion Ratio.
2. The effect of castration on some blood metabolites.
3. The correlation between FI &blood metabolites.

Chapter one

1. LITERATURE REVIEW

1.1: Sudanese Nubian Goats:

The Sudanese Nubian goat is the only specialized dairy type, although it may be recognized as a very useful dual-purpose (meat and milk) breed. (Shalash *et al.*, 1970)

According to A.O.A.D, (1990), Ibrahim (2000), and Mason, (1988); this type of goats characterized by a typical dairy body conformation with small to medium size head, convex facial profile and large drooping ears usually turned out at the lower tips. Both sexes carry medium size lateral or back-ward sweeping horns, which are simple in female but slightly twisted in males. Some are polled especially females. The neck is of moderate length. The chest is deep and wither is prominent. The back is long and straight. The legs are long and strong. The coat is relatively long. Black color is common but multi colors are found.

1.2: Kids Body Weights:

Gubartella et al.,(2002), reported that the average daily gains ranged between 56 and 80g for the Nubian male kids. And the live seights are 7.78, 13.3, 17.4 and 22.4kg for growing Nubian kids at 3,6,9and 12months of age.

Turner, et al.,(2005), studied the performance of young goats and they observed that the body weights of the Nubian were higher than the Boer cross and Spanish and their weights were 33.4kg, 25.9kg and 27.3kg, respectively.

1.3 Feed lots Performances of Goats:

The factor of nutrition and its major effect on the rate of growth of animals was described by many authors.

Mc Donald *et al*., (1985) reported that the growth curve of an animal is obviously dependent on it is level of feeding. They also noted that if the level of feeding is high, the growth will be rapid and the animal reaches a specific weight at early age, while the reduction in the level of feeding will cause the curve of growth to flatten and perhaps even to reverse its slope when animals lose weight.

Ibrahim (2000) mentioned that when considering the dietary needs of animals particularly ruminants, it is normal to categorize the animal according to its physiological or productive state. He added that if an animal is mature and it is not pregnant or lactating, it will require only nutrients enough to maintain the body functions i.e. Maintenance requirements.

Alan (1988) noted that the dry matter intake (DMI) of goats is about 3-5% of their body weight/day.

Gubartalla (1998*)* showed that the average dry matter intake (ADMI) of Sudanese Nubian goats was (1.46) and (1.44) kg for groups fed on Iso-caloric molasses and sorghum based diets, respectively. Where as, Ahmed (1995) estimated the dry matter intake for the same breed and groups to be 1.27 and 1.26 kg respectively and when the intake was expressed as percentage of live weight it was 4.1 and 4.2% respectively.

Turner *et al.*, (2005) studied the feed intake and performance in young male goats when offered high forage diets of Lespedeza of Alfalfa hay, the dry matter intake was higher for Lespedeza (42.1g/kgBw/day) than for Alfalfa

hay (38.7g/kgBw/day) Bucks offered Alfalfa had higher average daily gain than those offered Lespedeza

Aregheore *et al.,* (2004) studied the effect of supplementation of a basal diet of urea treated maize Stover with some legumes: *Erythrina variegata* (EV), *Gliricidia speium* (GS) and *Leucaena Leucocephala* (LL) in feeding of Nubian goats. They showed that the dry matter intake of urea treated Stover was lower than that supplemented with forage legumes. Also, they reported that the dry matter intake of the diets improved with molasses did not differ significantly.

Charray Molah (2005) studied the effect of different ratios of Ground Nuts Hulls (GNH) and molasses in feed lot performance of Crossbred goats (Nubian x Seanen). He concluded that the feedlot performance was not affected by the dietary treatment. However, parameters such as final weight, body gain and intakes tended to increase by the increase of molasses and decrease of GNH but the reverse trend was shown by feed conversion Ratio (FCR) values.

According to Garray Molah (2005) the amount of dry matter intake increases the rate of growth and also improves the feed conversion ratio of the feed to gain and this phenomenon was constrained by the energy concentration of the diet and the rumen capacity.

Also, he reported that when fed Sudan desert sheep Humra supplemented with different levels of concentrate diet of wheat bran (WB) and cotton seed cake (CSC), it was realized that the feed conversion ratio improved with the increase of concentrate level supplementation (10.6, 8.36, 7.3, and 6.8g of DMI/daily body gain for the 0, 25, 50 and 75% concentrate level diets, respectively) and the feed intakes were (1.25, 1.41, 1.38 and 1.43kg/DMI/day) for the four diets, respectively and were not significantly different.

1.4: Animal Castration:

This operation involves the destruction of testicular function either by the removal of the testis or by stopping the development of the testis by cut off their blood supply. (Frandson, 1974)

Sex has long been recognized as a major source of variation in growth. Influence of sex on growth of animals in well pronounced and is due to the direct effect of genetically differences between males and females and the indirect effect of sex hormones estrogen and androgens. (Everitt and Jury, 1966)

Castration of animal intended for slaughter is universal and long-standing practice, (Turton, 1962). Male goat kids that are not being kept as future flock sires are usually castrated so that they will no longer be fertile. (Stanton, 1999)

1.4.1: Castration methods:

1.4.1.1: Open method:

This method is surgical, carried by qualified people. The best age to carry out castration by this method is between 1-4months. (Fowler N.G., 1972)

1.4.1.2: Burdizzo method:

In this method, Burdizzo instrument will be champed across each of the spermatic cords in the scrotum just above the testicle. Each cord is separately crushed,

(twice) and obliterated while the skin of scrotum remains unbroken. Occasionally failure occurs if done by unskilled hands. (Fowler N.G, 1972)

For this method, the suitable age is ranged between 8-12wks being an ideal age. It is not as reliable as other methods because it doesn't give the assurance that the cords have been crushed of not. Well used in rainy (fly) season. (Stanton, 1999)

1.4.1.3: Rubber ring method (elastrator):

According to Fowler,(1972), this method has to be carried out within the first week after birth. A special rubber ring is expanded on a special instrument (the elastrator). Most of the scrotum and the two testicles are passed through the ring, which is then released. This results in stopping of ht circulation below he ring and in 10days to 3wks the scrotum and the testicles will shrink and fall off.

1.5: Blood Metabolites:

Blood is a complex mixture which contains suspended cellular components (erythrocytes, leukocytes) and dissolved substances (electrolytes, proteins, carbohydrates, amino acids, etc…)(Swenson, 1992)

1.5.1: Blood Glucose:

Glucose is the only sugar which found in the blood. It is also stored in the form of its polymer glycogen, which is normally

found only in the intracellular fluid where as Glucose id found in the extra cellular fluid. (Coles, 1967)

Also, Glucose is used as an evident reflect of weight changed (Kelly *et al.*, 1988). A decrease in its level is recorded when the temperature was lowest noted by (Ibrahim, 2000)

The normal blood Glucose level in goats is ranged between 50-75mg/dl. (Dhanotiya, 2004)

Significant variations in blood glucose level in Sudanese Nubian goats was reported by Ibrahim, (2000), when fed hummra, hummra +GN.C and Hummra + molasses with an average of 46, 98, 59.61, and 36.4mg/dl respectively. Also, he noted that goats fed lower digestible fiber tended to have lower peak concentration of Glucose than those fed diets of higher digestible fiber.

Zubcic, (2001) studied the concentration of Glucose in improved fawn goats, when fed extensively in terms of the lactation level. He found the glucose level to be about 2.1mmol/l. while Turner et al.,(2005) found that the concentration of plasma's glucose in young goats was highest for the Nubian (66.3mg/dl) and was lowest for Boer cross (60.9mg/dl) and that for Spanish was intermediate (63.6mg/dl).

In addition Ting et al.,(2003) conducted that castration by using Burdizzo had no effect on plasma's glucose in cattle.

1.5.2: Blood Proteins:

The plasma proteins transport calcium (Ca), phosphate (PO4) and other substances in the blood by the attachment to Albumin, which accounted for nearly 80% of the plasma Swenson, (1993).

In goats the normal concentration of total protein (TP) was ranging between 6.4 and 7g/dl. While the Albumin ranged between 2.7 and 4.1 g/dl. (Dhanotiya, 2004).

Globulin is part of the body defense formed in response to infection. The normal concentration in goats ranged between 2.7 and 4.1g/dl.noted by Dhanotiya, (2004).

Season of the year was found to affect the level of the protein in the blood. Hind (2007) reported that the concentration of Albumin and Globulin were higher during winter than summer. And a decrease in Albumin plasma level during summer.
Also, she noted that the total protein, Albumin and Globulin in the serum increased under intensive management.

Zubcic (2001) studied the concentration of total protein and Albumin. He found that they were with in the normal range. He also noted that lactating fawn goats when fed ad-libitum, the concentration levels were (74.8g/L) and (33g/L).

Daramola *et al.*, (2005) found that serum total protein of West African Dwarf goats was (7.1±0.1g/100Ml).

While Ibrahim *et al* (2005) obtained the concentrations of total protein, Albumin and Globulin in Sudanese Nubian goat to be 6.98±8.9, 3.31±0.53 and 3.72±1.28g/100Ml, respectively.

1.5.3: Blood Total Cholesterol Concentration:

According to Dhanotiya (2004), Cholesterol is a poor conductor of heat hence acts as an insulator and it is an abundant constituent of brain, nerve and spinal cord tissues. The normal concentration of plasma total cholesterol level in goats ranged between 80 and 130 mg/dl.

Zubcic (2001), found that concentration of plasma total cholesterol in lactating fawn goats, when fed *ad-libitum* was 1.74mmol/l.

Modruga (2001) concluded that castration had a significant effect on total cholesterol contents, where meat from castrated goat had higher cholesterol content than that from intact ones.

1.5.4: Blood Urea and Uric Acid Concentrations:

Urea, uric acid and Ammonium salts are a fraction from the non-protein nitrogen, which are called the waste products of protein metabolism. mentioned by Frandson (1974).

In goats the normal level of urea concentration in blood ranged between 10 and 20 mg/dl. Where as the normal concentration of uric acid ranged between 0.3 and 1mg/d. (Dhanotiya, 2004).

Blood urea level was associated with the dietary protein level (Ide, 1971), Kelly *et al.*, (1988) noted that lower blood urea concentration indicated inadequate effective rumen degradable protein (ERDP). Ibrahim (2000) reported that an increase in protein intake causes an increase in blood urea level. And he noted that goats fed rapidly degradable diets compared with those fed slowly degradable diet had higher plasma concentrations of urea. Also he mentioned that a significant variation in blood urea due to different

stages of reproduction. Andre *et al*, (1987), found that urea reached its maximum level a month after calving.

Doornenbal *(1988*) reported that the serum urea increased with age of the animal. Also he noted that uric acid was present at higher concentration in lactating than non-lactating cows.

Daramola *et al*, (2005) showed that the concentration of serum urea of West African dwarf goats was 2.7±0.3mmol/l.

Chapter two

2. Material & Methods

2.1: Study Area:

The experiment was conducted at Helat Kuku in Khartoum North, eastern Khartoum State at Animal Production Research Center, small ruminants' research department. For three months since November 2006 to January 2007.

2.2: The experimental animals:

Ten of male Nubian goat's kids of body weights ranging between (9-14)kg at sexual maturity age (7-8) months. The animals had been divided into two groups of matching average body weight (14.6±3.41) group (A), and (14.8±3.36) group (B). Each group composed of five animals. One of these groups was randomly selected to be castrated (Group B). The other group remained intact (group A). Closed method of castration (crushing of the spermatic cords with Budizzo) was applied to avoid the problem of contamination of the open wound.

2.3: Housing & Adaptation:

Animals were kept in an individual pens through out the experiment. The roof was constructed with zinc sheets the floor was made of concrete. The house ws well ventilated. Each pen contains a plastic pucket for water, a metal feeder secured by a metal holder and free licking salt. Animals were treated against

Endo and Ecto parasites using Ivomec super (1ml/50kg) injected subcutaneously).

Animals were allowed to the experimental diets (concentrates and chopped Abu70).

2.4: Weighing of the animals:

Live body weight was taken a week before castration for all kids as a control, then weekly through out the experimental period in the morning before blood sampling, feeding and watering.

2.5: Feed Intake:

The feed intake was offered daily in one meal on the rate that assures 10% weigh back as refusal. This was adjusted weekly.

The ingredients and composition of the diet were shown in the table below:

Ingredients	%	Proximate analysis	%
Sorghum feterita	50	DM	94.5
Wheat bran	22	Ash	7.49
Ground nut cake	25	Crude protein	22.81
Lime store	2	Crude fibre	6.97
Salt	1	Ether Extract	4.9
		NFE	57.33
		Met Energy (MJ/Kg)	11.4

ME was calculated from Ellis (1981).

ME(MJ/kg DM)= 0.12cp+0.031EE+0.005CF+0.014NFE.

- The daily feed intake was calculated by subtracting the refusal feed from that offered.
- The feed intake was converted as average.

2.6: Blood Sampling:

The goats were bled through jugular vein and 3ml of blood collected using disposable syringes at a week before castration and continued weekly through out the experimental period (8wks).

Quickly after blood collection, samples were put into antiagulant (fluoride oxalate containers), blood samples were centrifuged at 3000rpm for 5min followed by the analyzed for the blood metabolites content.

The analysis of Glucose was done immediately after plasma separation, while the rest of plasma were kept in plain containers and stored in deep freezing for the analysis of T. cholesterol, total protein, Albumin, Urea and Uric acid.

2.7 Blood Metabolites Determinations:

2.7.1: Glucose determination:

It was determined by using the enzymatic colorimetric method (Trinder, 1969) by using commercial (crescent) kits (LTD, KSA).

The plasma Glucose level was determined by the following formula:

Plasma glucose (mg/dl):

$$\frac{T}{STD} * \text{conc. of STD}$$

Where:

T: the reading of the optical density of the sample at 540nm.

STD: the reading of the optical density of the reagent standard (STD) at wavelength 540nm.

Conc. of STD: 100mg/dl.

2.7.2: Total Cholesterol determination:

It was measured by using the enzymatic calorimetric method (Richmond, 1973) using commercial (crescent) kits (LTD, KSA).

The plasma Cholesterol level was determined by the following formula:

Plasma cholesterol (mg/dl):

Where: $\frac{T}{STD} * \text{conc. of STD}$

T: the reading of the optical density of the sample at 540nm.

STD: the reading of the optical density of the reagent standard at wavelength 540nm.

Conc. of STD: 200mg/dl.

2.7.3: Total Protein determination:

It was measured using calorimetric/biuret method using commercial (crescent) kits (LTD, KSA). The plasma total protein level was determined by the following formula:

Plasma T. Protein (g/dl): $\frac{T}{STD} * \text{conc. of STD}$

Where:

T: the reading of the optical density of the sample at 540nm.

STD: the reading of the optical density of the reagent standard at wavelength 540nm.

Conc. of STD: 8g/dl.

2.7.4: Albumin Determination:

It was determined using colorimetric method, by using commercial (crescent) kits (LTD, KSA). (Tietz, 1986).

Plasma's Albumin concentration was determined by the following formula:

$$\text{Plasma's Albumin (g/dl):} \quad \frac{T}{STD} * \text{conc. of STD}$$

Where:

T: the reading of the optical density of the sample at 580nm.

STD: the reading of the optical density of the reagent standard at wavelength 580nm.

Conc. of STD: 4g/dl.

2.7.5: Globulin Determination:

The plasma globulin was calculated by subtracting the Albumin from the total protein by the following formula:

The plasma globulin (g/dl): T. protein – Albumin.

2.7.6: Urea Determination:

Blood urea concentration was determined by using colorimetric method by using commercial (crescent) kits (KSA, LTD). (Chaney, 1962).

The plasma urea level was determined by the following formula:

$$\text{Urea (mg/dl):} \quad \frac{T}{STD} * \text{conc. of STD}$$

Where:

T: the reading of the optical density of the sample at 580nm.

STD: the reading of the optical density of the reagent standard at wavelength 580nm.

Conc. of STD: 80mg/dl.

2.7.7: Uric acid Determination:

It was measured using colorimetric method, by using commercial (crescent) kit (LTD, KSA) (Trinder, 1949).

Plasma's uric acid was determined using the following formula:

$$\text{Plasma uric acid (mg/dl):} \quad \frac{T}{STD} * \text{conc. of STD}$$

Where:

T: the reading of the optical density of the sample at 540nm.

STD: the reading of the optical density of the reagent standard at wavelength 540nm.

Conc. of STD: 8mg/dl.

2.8: Statistical Analysis:

Using the Statistical Package for Social Science (SPSS) the data obtained were analyzed by the independent student T. test.

Correlations among the traits examined were tested using the same statistical package. For the significant correlations linear regressions were done to quantify relationships. (Gomez and Gomez, 1984).

Chapter Three

3. Results

3.1: The feedlots performance:

Table (1) shows the Dry matter intake (DMI), weight gain and feed conversion ratio (FCR) of intact and castrated kids. The results revealed values of weight gain (Wt gain) and (FCR) significantly higher in the intact kids group.

The results also showed that there are no significant differences in the DMI (absolute and percentage of body weight (BWT)) between the two groups.

3.2: Blood Metabolites of the kids:

Table (2) shows the examined blood metabolites of the intact and castrated kids. It was observed that there are no significant differences between the two groups in total cholesterol, total protein, Albumin, Globulin and Uric acid.

Glucose blood level in intact kids is significantly lower, where as for urea level the intact showed significantly higher level.

3.3: Correlations between the parameters:

Table (3) shows the coefficients of correlations among the feed intake, weekly weight and the examined blood metabolites of the intact and castrated kids.

The results revealed that feed intake is significantly positively correlated with the weekly weight and urea but negatively with total protein and Globulin.

The weekly body weight is significantly and positively correlated with cholesterol, Albumin and urea but negatively with total protein and globulin.

Glucose blood level showed no significant correlations with all of the examined parameters.

Cholesterol is significantly and positively correlated with Albumin and negatively with globulin.

Total protein level in the blood is correlated significantly and positively with globulin only.

Where as, Albumin is positively correlated with uric acid and negatively with globulin.

Fig (1) illustrated the (non linear) regression of daily weight on daily feed intake.

Fig (2) illustrated the (non linear) regression of weight gain on feed intake ratio.

Fig (3) illustrated the (non linear) regression of globulin concentration daily feed intake.

Table (1): The feedlot performance of the intact and castrated kids:

Item	No	Intact M±SD	Castrated M±SD	t	p
DMI(g)	5	751±318.4	585.5±49.7	1.205	.274 NS
initial weight	5	14.6±3.41	14.8±3.36	-	-
daily wt gain(g)	5	103.5±14.09	76.2±14.4	2.62	0.04*
FCR	5	7.3±2.83	7.8±.88	_0.40	0.701 NS
DM%	5	4.4±.96	3.4±0.4	2.05	0.08 NS

In this table the following:

M: Mean

SD: Standard Deviation.

t: Calculated (t)

P: Probability of the significant.

NS: Not Significant.

*: Significant at (P<0.05)

DMI: weekly Dry mater intake.

FCR: Feed conversion ratio.

DM%: Dry mater percentage.

Table (2) the blood metabolites of the intact and castrated kids:

Item	Intact	Castrated	t	p

	M±SD	M±SD		
No. of observation	45	45	-	-
Glucose (mg/dl)	55.3±9.4	61.4+15.8	-2.2	0.04*
Total Cholesterol (mg/dl)	70.8±20.4	58.5±18.1	3.02	0.613 NS
Total protein (g/dl)	6.03±0.8	6.4±1.3	-1.6	0.281 NS
Albumin (g/dl)	4.2±0.5	4.2±0.5	-0.34	0.516 NS
Globulin (g/dl)	1.9±1	2.2±1.3	-1.3	0.723 NS
Urea (mg/dl)	57.2±19.7	51.5±11.2	1.7	0.05*
Uric acid (mg/dl)	0.3±0.4	0.5±0.5	-1.3	0.190 NS

In this table the following:

M: Mean

SD: Standard Deviation.

t: Calculated (t)

P: Probability of the significant.

Table (3): Correlations coefficients matrix for the feed intake, weight gain and blood metabolites:

	feed intake	**weekly**	**glu**	**cholest**	**t.protein**	**albumin**	**globulin**	**urea**

		weight						
weekly weight	0.61*	1.00						
glu	0.18	0.18						
cholest	0.18	0.24*	-0.08					
t.protein	-0.33*	-0.38*	-0.08	-0.15				
albumin	0.11	0.43*	-0.12	0.35*	0.10			
globulin	-0.35*	-0.55*	-0.02	-0.30*	0.89*	-0.36*		
urea	0.33*	0.26*	0.00	0.14	-0.09	0.17	-0.16	
uric acid	-0.14	0.00	-0.17	0.02	0.13	0.24*	0.01	-0.14

Marked correlations are significant at p < .05000

N=89

In this table the following:

Glu: glucose

Cholest: cholesterol

t.protein: Total protein

Figure (1) Rgression of the daily weight gain on the daily feed intake of the intact and castrated kids

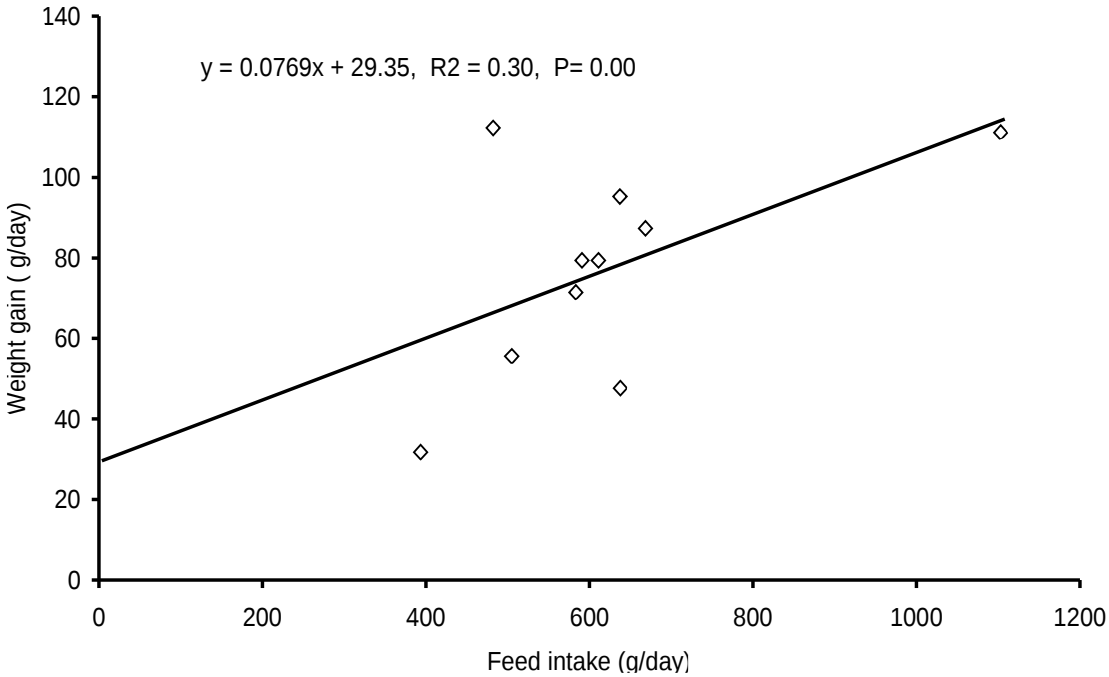


Figure (2) Regression of weight gain on the feed intake ratio

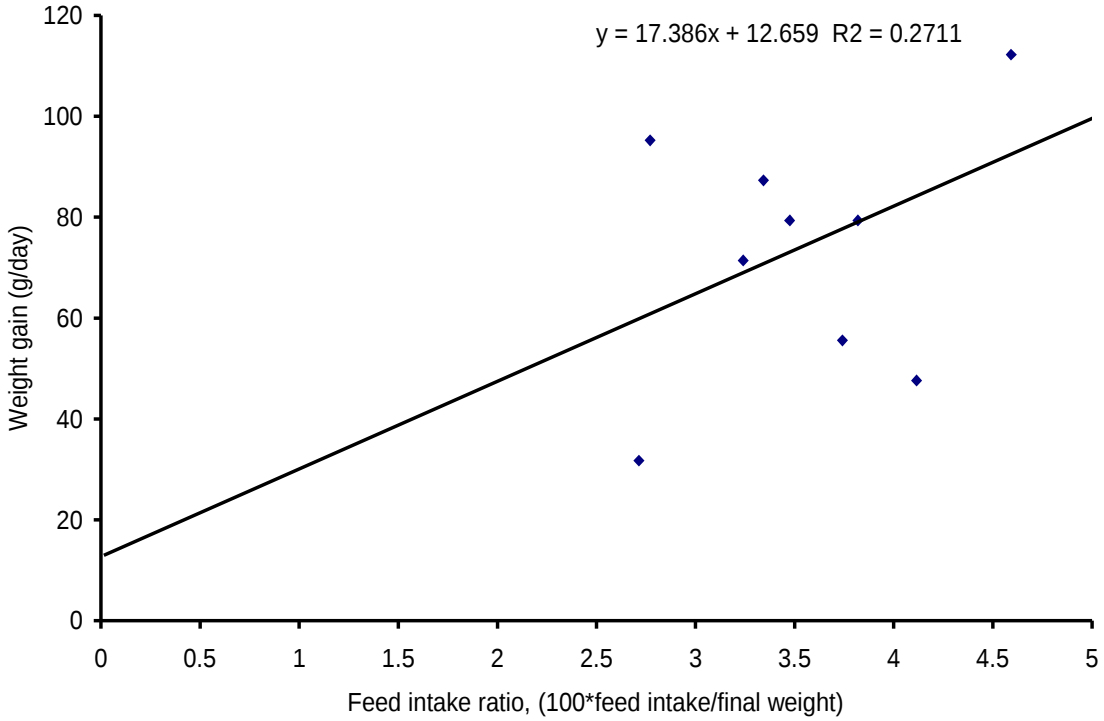
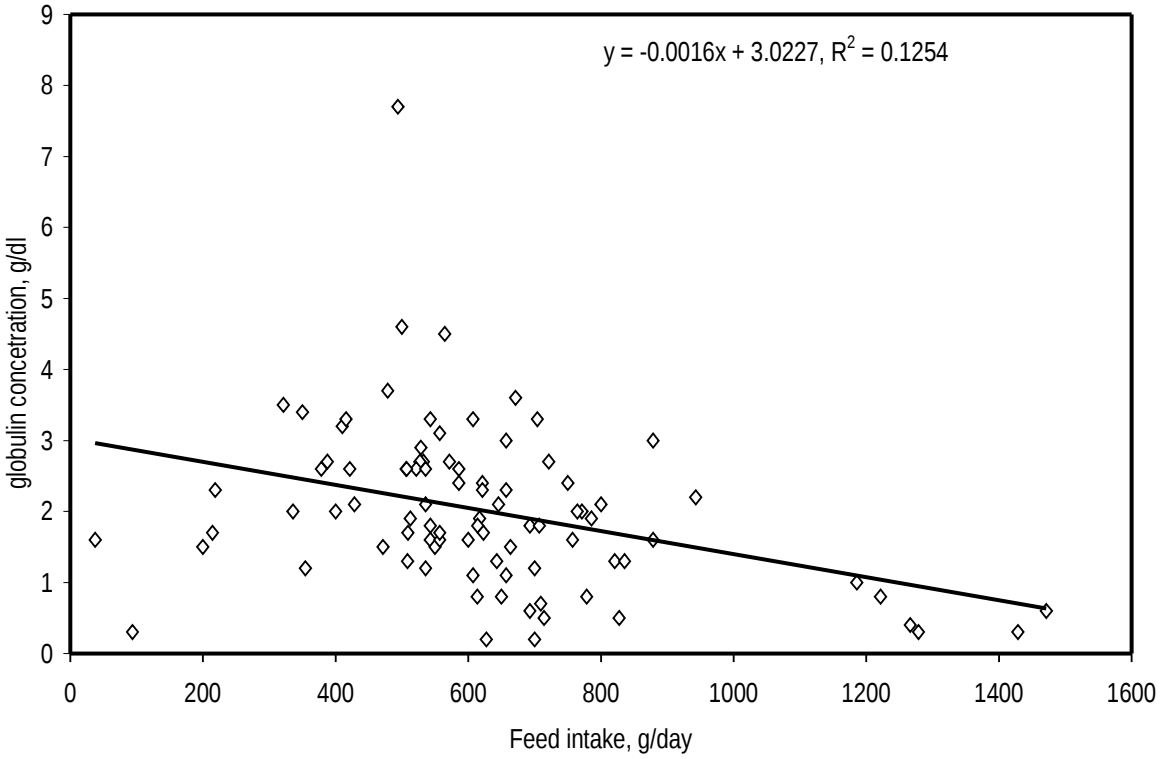


Figure (3) regression of glubulin concentraion on the daily feed intake



Chapter four

Discussion of the Results

4.1 Feed lots Performance:

The dry matter intake as percent (DMI %) of body weight in this study were higher for the intact kids (4.4±1) % than that of castrated ones (3.4±0.4) %. Although, there is no significant difference between the two groups, the results were in agreement with that of Alan (1988), who noted that for the same breed the DMI% of body weight ranged between 3-5% of BWT. However, the present results were higher than that reported by Charray *et al.*, (1992) who mentioned that the DMI% were 2.5% of BWT for West African Dwarf sheep. This is may be attributed to the different breeds and species.

The findings of the weight gain in this research were significantly higher for the intact kids (103.5±14.1) g/day than that of castrated ones (76.2±14.4)g/day. This may be attributed to the fact that testosterone hormone is considered as growth promoter and responsible for the distinguishing characteristics of the masculine body, Arthure, (1981). These findings were in agreement with that reported by Gubartalla *et al.,* (2002) gain weights of Nubian male kids ranged 56 and 80 g/ day.

The feed conversion Ratio (FCR) in this study were higher value for the castrated kids (7.8 ± 0.88) DMI/ BWT gain than that of intact kids (7.3 ± 2.8) DMI/ BWT gain) although, there is no significant differences between the two groups. There fore, the intact FCR were better than the castrated ones. This may be due to the fact that the amount of DMI increases the rate of growth and also improves the FCR of the feed to gain, Garray (2005).

These results were in agreement with Garray (2005) who concluded that FCR improved with the increase of DMI and increase of wt gain. Also,

McDonald and Rove (1979) reported that the extra activities of goat and their relatively high maintenance requirement to make them of poor growth rate when compare with sheep.

4.2 Blood Metabolites:

The examination of basic biochemical indicators contributes to the knowledge of metabolic profiles in feedlots performance of goats and their possible disorders, whether of a latent or clinical nature.

The concentration of Glucose determined in this research was significantly higher for the castrated kids (61.4± 15.8) mg/dl than that of intact ones (55.3± 9.4) mg/dl. These results were in agreement with the normal range (50-75 mg/dl) of goats, which reported by Dhanotiya (2004). The present results were lower than those obtained by Turner *et al.,* (2005) 66.3 mg/dl. However, the results were in disagreement with Ting *et al., (*2003) who concluded that castration by using Burdizzo method had no effect on plasma's glucose in cattle. This may be attributed to the differ in age, feed and breed as noted in Williamson and Payne (1978) that it has been estimated that there are approximately 300 breeds and types of goats.

Although, the total cholesterol concentration which determined in this research were not significantly different but the concentration was higher for the intact group (70.8± 20.4 mg/dl) than that for the castrated kids (58.5± 18.1mg/dl), this is may be due to the usual quantity of testosterone secreted by the testes during active sexual life increase the rate of metabolism some 5 to 10% above the value recorded when the testis were not active, Arthure (1981).

The results in this study were lower than the normal range of goats (80-130) mg/dl reported by Dhanotiya (2004). This may be attributed to the difference in breed, environment and breed. The findings were disagreement

with Madruga (2001) who concluded that castration had significant effect on total cholesterol contents in castrated goat meat.

The concentration of total protein reported in this study was not significantly difference between the intact kids (6.03± 0.8) g/dl and castrated kids (6.4±1.3 g/dl). These results were comparable to the normal range of goats (6.4-7g/dl) reported by Dhanotiya (2004). However, the results were lower than (98± 8.9g/l) = (9.8± 8.9g/dl) reported by Ibrahim *et al.,* (2005) and (74.8 ± 9.4g/l) = (7.48 ± 9.4g/dl) reported by Zubcic (2001). This is may be due to the variation in the age, feed and the breeds of goats. According to Williamson and Pyne (1978) there has been estimated that there approximately 300 breeds of goats.

The concentrations of Albumin observed in the present study were not significantly different between the intact kids (4.2± 0.5 g/dl) and the castrated ones (4.2± 0.5 g/dl). These results were higher than the normal range (2.7-3.9g/dl), which reported by Dhanotiya (2004), (3.3± 0.5g/dl) reported by Ibrahim *et al.,* (2005) and (3.3 ±6.1g/dl) noted by Zubcic (2001), this is may be attributed to the breed, age and feeding.

The Globulin levels mentioned in this research was also not significantly different among the intact (1.9±1g/dl) and castrated kids (2±1.3 g/dl). These findings were lower than the normal range (2.7 ± 4.1 g/dl), which noted by Dhanotiya (2004) and (3.7± 1.28g/dl) reported by Ibrhaim *et al.,* (2005) for lactating Nubian goats. This may be attributed to the less vaccination programs and due to the fact that Globulins considered as the body defense and formed in response to infection (Swenson, 1992).

The Urea levels mentioned in this research were significantly higher for the intact kids (57.2 ±19.7 mg / dl) than those of castrated kids (51.5 ±11.2 mg / dl). This is may be due to the fact that the usual quantity of

testosterone hormone secreted by the testes during active sexual life increase the rate of metabolism some 5 – 10 % above the value that would be when the testes was not active. Arthure, (1981).

The present findings were higher than the normal range (10 – 20 mg / dl) which mentioned by Dhanstiya (2004).

The concentrations of uric acid observed in the present study were not significantly different between the intact kids (0.3 $\pm$ 0.4 mg / dl) and the castrated kids (0.5 $\pm$ 0.5 mg / dl). These results were in agreement with the normal range of gouts (0.3 – 1 mg / dl) noted by Dhanotiya (2004).

The results showed that the increase of Albumin by one unit improve the weight by 2.98. And the increases of total protein by one unit decrease the weekly wt by 1.17 where as, the increase of Globulin decrease the weekly weight by 1.59.

Conclusion & Recommendation

This study was conducted to investigate the effect of castration on some blood metabolites of fattened Nubian male kids.

The result revealed that there are no significant differences among the blood metabolites between the intact and castrated kids except in Glucose and urea blood levels.

This indicated that castration as method for alteration of meat production will not affect intake metabolism or body gain; however, it may alter the meat quality by affecting its characteristics.

It recommended that more studies should be carried to investigate the effect of castration on the quality of meat in term of tenderness, Juiciness, texture and chemical composition.

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