Chapter one

1. Introduction

Goats are the most abundant species of domestic animals in the world and are grown in different geographical and climatic conditions (Petrovic, *et al*. 2012). In Sudan goats were estimated at 31.227 million heads (Ministry of Animal Resource and Fishers (MARF), 2015).This population composed of four major local breeds Nubian, Desert, Nilotic and Dwarf. The Nubian goats are considered as milk breed while the other breeds are generally considered as meat breeds (Alnaeem, 2007).

The animal wealth of the countries is among its major resource and together with agricultural product forms the back bone of its economy. The goats are important to the subsistence, economic and social live hold of large human population in the Sudan. It provides both tangible benefits, (i.e. cash income from animal sale, meat, manure, fiber and skin) and intangible benefits (i.e. saving an insurance against emergences culture and ceremonial purpose) (Jaitner, *et al*, 2001). In addition goats complement other livestock in the utilization of available feed resource and provide one of the practical means of using vast areas of natural grassland in regions where crop production is impractical (Rege, 1994).

Environment in north of the Sudan varies from hot, dry weather in summer, rainy in autumn and moderate cold in winter, the environment of the Sudan under desert and tropical where feed resources are poor quality and limited quantity. Adaptation in the tropic includes not only disease resistance but also heat resistance, tolerance of water shortage and the ability to cope with poor quality and quantity of food. The goat living in harsh environment this ability is multi factorial, the goats characterized

by small size, low body mass, low metabolic requirement of goats can be regarded as an important asset to them for it minimize their maintenance and water requirements in areas where water source are widely distributed and food source are limited by their quantity and quality (Nissim, 1999).

The objectives of this research to study:

1. The effect of shearing on respiration and pulsation rates and body temperature.
2. The effect of exercise on pulsation and respiration rates and body temperature.
3. The association between the anthelmintic use and helminthes infestation.

Chapter two

2. Literature review

2.1 Goat distribution:

Goats are small ruminants and mammals distributed all over the world (Selma, 2010). The goat is characterized by small size and short tail. It is clever and active animal, survive under harsh condition and some times stand on its legs to feed on the leaves of the trees (Abu Alazayim, 1995). Of the world's sheep and goat populations about 28% and 52% are found in the developing countries of the tropics respectively (FAO, 2003). The goats' population has been described as comprising three main types namely, fiber goats (e.g., Angora and Cashmere), dairy goats (e.g. Saanen, Toggenburg and Nubian) and meat goats (Boer, and Spanish) (Selma, 2010). The Saanen is Swiss breed which originated in the Saane Valley; it is now the most popular dairy goat breed in many countries, including Australia. The coat is all white or all cream and the hair is generally short and fairly fine although some may have longer hair along the spine, hindquarters or both, the ears are generally pointed and erect and the head is usually lightly structured. The breed is sensitive to excessive sunlight and performs best in cooler conditions, the provision of shade is essential and tan skin is preferable (NSW1997). The Nubian goats originated may be associated with the groups of Sahel goats which include many Saharan types from Egypt, Libya and Sudan. Main location: inhabits in the dry areas of the Republic of Sudan, generally to the north of $12N^{\circ}$ but north of $10N^{0}$ in Darfur and western Kurdofan also in parts of Eritrea and westward in to Chad (Mellado and Gomez, 1991). Special characteristic is fairly large, long legged, short coat of light, brown or black, pendulous ear of moderated size, twisted horns and best

milk composition and yield (Hassbo, 2008). Recently goat's breeders introduced Saanen bucks to improve the productivity of Nubian goats. One of most important steps to achieve this goal is their milk yield and reproductive potential be known and exploited, the weaning weight, growth rate, age at complete separation of prepuce from the pins (Nasir, *et al*, 2013).

2.2 Importance of small ruminant in the tropic

The agriculture potential in the tropic varies and consequently array of livestock production system with different production goal and priorities management strategies and practice are found. Mixed crop livestock farming system is currently on the increase due to increase human population pressure on finite land base. In this traditional system the goats provide both tangible benefit and intangible benefit (Lebbie and Ramsay, 1999).

2.3 Body condition score

Body condition scoring describes the systematic process of assessing the degree of fatness of animal. The score reflects the plane of nutrition on which an animal has been exposed over reasonable length of time. The loin, ribs, tail head, brisket, flank, vulva/or rectum and udder are the important parts of the body used in determine the score. Physiologically, the proportion of protein and water of the animals body weight decrease as it gain back (Todd, 2008).).The physiological important in study resulted of goats pregnant were high body weight, reported that, the body weight of does before mating (average=34.6kg) and scanning 42 days after mating (average=38.6kg), body weight different significantly among all the studies (Snymon. 2010). The study shown was compare of late pregnant (lp), lactation, non pregnant and non lactated (control), period kept room (20c degree and 30c). Reported that the respiratory frequency

of (l p)goats increased markedly in response to hemorrhage but the most rapid respiratory rate was absorved in lactating goats and resulted indicated the plasma concentration increase in late measuring up to full maturity. Increase of back bone increase body weight (Otoikhan, *et al*.2008). In resulted reported on heat stress cause excessive drink in fed and food deprive showed that late pregnant goats, temperature was increased from 20c to 39.5 for 5.15 hr during heat stress. Fed goats started to drink 13min after heater, the body weight increase simultaneously with decease plasma Na concentration and osmolatity showing that the goats stored water (Olsson and Hernealin, 1995).

2.4 Body defense mechanism against stress

There are many mechanisms work against stress including: physiological mechanism, body temperature, pulsation and respiration.

2.4.1 Physiological mechanism

Include not only disease resistance but also heat resistance, tolerance of water shortage and the ability to cope with poor quality and quantity food in environment. Livestock under go varies kinds of stress, such as Physical, nutritional, chemical posy ecological and thermal stress. The stress is reaction of body to stimuli that disturb homeostasis often with detrimental effect (David, *et al*. 1990). In tropical and sub tropical region is high ambient temperature is major constrain on animal production (Nardone, *et al.* 2010). Thermal stress affects almost all systems of body. Heat stress reduces libido by reducing level of testosterone, sperm out put, decreasing sperm motility and by increasing up proportion of morphological abnormal spermatozoa in ejaculate (Perez, *et al*, 2008). In females, it lowers fertility, conception rate and embryonic survival in animals (Sakatani, *et al*, 2004).

2.4.2 Body temperature

Domestic animals don't have constant normal temperatures and considerable variations will be found in the temperature of normal animals under different condition. In general animal temperature will vary depending on physical activity, stage of pregnancy, the time of day and environmental surrounding (Prendiville, *et al*, 2002).The temperature determines metabolic rate, heart rate and other important factor within the body of animal. It has been consistently shown in that goat perform better than other domesticated ruminant in harsh environment (Devendra, 1990). The adaptability of goats to thermal stress is due to water conservation capability, higher sweating rate, lower basal metabolism rate(B M R), higher respiration rate, higher skin temperature, constant heart rate and cardiac out put. Although goats are resistance to thermal stress at greater extend but they suffer heat and cold stress beyond their comfort zone (Sonna, *et al*.2002). This is environment temperature 13-27c^0 for Indian goats (Mishra, 2009). Browsing goat to open field during most of the day hour makes them susceptible to environment conditions.

2.4.3 Pulsation and respiration rate

The pulsation rate and respiration rate per minute were found to be increase by effect of environmental temperature. Increase respiration rate is an attempt to increase heat loss by evaporative cooling. Reported that change of metabolism and muscle activity of goat also change pulsation and respiration rate. Heat loss via high respiration rate was reported as higher than that via other ways (Devendra, 1987). Increase in heart rate and pulse rate is attributed to tow cause; one is increase in muscular activity controlling the rate respiration, concerned with elevated

respiration rate. Second is the reduction in resistance of peripheral vascular beds and atterrovenous anatomizing. Increase in pulsation rate to increase blood flow from the core to the surface as result of it more heat is lost by sensible by conduction, convection and radiation and heat loss by insensible by diffusion water from the skin (Marai, *et al*. 2007).The increase in Cardiac out put and blood flow by heat stress. Due to blood redistribution from deep splanchnic to more peripheral body region have implicated in goat (Silanikove, 2000) reported that daily change in respiration rate per minute from the effect of environmental temperature may not be parallel with change in body temperature and pulsation number. Higher values of means of this parameter (RR, RT and PR) have been reported than that of value in thermo neutral zone (Al- Tamimi, 2007). Exercised of Saanen goats, mean respiration rate (RR) rose progressively from 19.4±0.6 to 164.4±0.06/min during 2h of exercise ($p<0.01$) at the end of which time the rate in male goat (233/min) was more than 2* that in female (96/min, $p<0.001$). It was concluded that male goats responded more to exercised in the heat than females, and that the higher respiratory rates were effective in controlling their body temperatures. The results indicate the exercise causes stress to the animals in both sexes (Kasa, et al, 2015).

2.5 Physical mechanism

Goats are haemotherm there for excess heat must be eliminated for the animal to be thermal balance state (Adedji, 2012). In some goat breeds enlarged appendage are means to increase surface area as result promoting heat loss. However, the capacity to eliminated heat from the body to reach thermal balance may very indifferent species, examination of thermoregulatory behavior in different goat breeds inhabiting a highly seasonal dry semi arid areas showed that goats travel shorter distance and

rest more during the hottest and drier hours of the day. They extend their tongues to lower body temperatures via evaporated cooling. This makes goats more efficient in thermoregulatory especially in the dry season which is characterized by high humidity and the near absence of rainfall. Variation within morphological traits provides ecological adaptation climatic variability; Goats have special ecological adaptation for browsing such as split upper lip, narrow muzzle and long leg for climbing and different tolerance to plant chemicals, the narrow muzzle place goats at an advantage when only very shorter pasture is available(Assan,2013). Low body mass and metabolic requirement of goat can be regarded as important asset to them for they minis their maintenance and water source are widely and food source are limited in their quantity and quality. An ability to reduce metabolism allows goat to survive even often prolonged period of severally limited food availability. Ask full grazing behavior and efficient digestive system enable goat to obtain maximal food intake and maximal food utilization in a given condition. Some of physiological feature of ruminant define as intermediate feeder such as large salivary gland, large absorptive area of their rumen epithelium and capacity to change the volume of the foregut rapidly in response to environmental change. Are most likely responsible for the goat's superior digestion capacity (Assan, 2014), reported that goats will assume critical role in livestock production due to there adaptive feature such as feeding behavior, disease and heat tolerance. These behavioral morphological and physiological characteristic enable. The ability to survive reproduction and production of goats in harsh environment condition has been attributed to adaptation as they deliver multiple product and service make valuable contribution especially to the poor in the rural areas. The goats can with stand heat stress and can endure prolonged water deprivation.

Making them more adaptable to adverse climate and geographical condition where cattle and sheep cannot survive (Aziz, 2010).

2.5.1 Water regulation and deprivation

The rumen plays on important role in the evolved adaptation by serving as huge fermentation vat and water reservoir. The water stored in the rumen is utilized during dehydration and the rumen serves as a container which accommodates the ingested water upon rehydration. The rumen, the salivary glands and the kidney coordinately function in the regulation of water intake and water distribution following acute dehydration and rapid rehydration (Lechner-Doll *et al.* 1995). Breeds of ruminants indigenous to arid land are known for their capacity to withstand prolonged periods of water deprivation and graze far away from watering sites (Silanikove, 1994). Desert goats seem to be the most efficient among ruminants concerning their ability to withstand dehydration (Silanikove, 1994). The black Bedouin goats and the Barmer goats herded in the extreme desert of Sinai (Middle East) and Rajasthan (India) often drink only one in every four days (Shkolnik and Silanikove, 1981). The research physiological response of three breed goats (Anglo-Nubian, Ballade and crossbred) to water deprivation under subtropical during dehydration period. The resulted indicated the body weight of the groups gradually declined ($p<0.01$), 16.6, 9.2 and 10.9% respectively loss of body weight was attributed to decrease ($p<0.01$) water and feed intake. RT increase slightly particulars in Anglo-Nubian goats but respiration rate and pulsation rate were decreased significantly ($p<0.05$) in all group. This change was more pronounced in Anglo-Nubian than the Ballade and crossbred goats (Gamal Eldin and Hassan, 1980).the research important of local breed goats in Saudi Arabia to water deprivation under hot summer condition, three breed (Hipsi, Aardi and Zumri) of these study

showed great tolerance to water deprivation during hot summer conditions of Saudi Arabia. There were no apparent difference between breeds in their ability to with stand water deprivation and restoration of body weight loss or physiological parameter RT, RR and HR (Mohammed, 2006).

2.5.2 Goats hair color and structure

In goats have an important role to play in the adaptability to different ecological plots? Color has significance in thermo regulation (Hetem and Sheila 2010). Reported white and Swiss make goat had the least rectal temperature and heat stress index. Indicated that, this lighter colored more tolerance environment increased respiratory rate is an immediate response of goat to environment stress. The lighter coat pigmentation ability absorbs less solar radiation coupled with heat regulation ability. The highest respiratory rate absorbed in black goats could have result from attempt to dissipate body heat by panting in order to increase body cooling by respiratory rate (Adedeji, 2012). Cross breed goat tolerated change in environmental condition due to prominent white coat color and skin pigmentation (Otoikhian, *et al*, 2009). In semi arid and humid zone short coat of coarse fiber enable goat to withstand high rate of radiation or humidity. Goats in habiting the arid zone have long haired coarse fiber fleece to protect against heat during the day and cold night. Goats color had significant influence on heat tolerance trait which includes rectal temperature, pulse rate, respiration rate and heat stress index (Adedeji, 2012).

2.5.3 Physical characteristic of coat

The color of the pelage controls the degree of radiant heat reflection as the white color reflects higher proportion of radiant heat and the black

color absorbs it (Mishra, 2009). The coat insulation represents thermal resistance to the flow of heat from the skin to the surface of the hair coat and its presence helped reduce the rise in both rectal temperature and respiratory rate. Angora goats are known to be vulnerable to cold stress, especially after shearing, but their thermoregulatory responses to shearing have not been measured we recorded activity, and abdominal and subcutaneous temperature. Angora goats entered heat conservation mode after shearing in both March and September, that the transition from fleeced to the shorn state had greater thermoregulatory consequences in March than in September may provide mechanistic explanation for Angora goats vulnerability to cold in summer (Hetem, *et al*, 2009). It was concluded that long haired goats tolerate radiant heat better than short haired goats and that white or light brown goats do better than dark brown or black goats. Short haired black goats had lowest tolerance water and feed intakes. Thus it will be important to select long haired white or light brown goats for breeding and rearing in the hot tropics for higher productivity during summer month (Achary, *et al*, 1995). Shearing is common practice for lamb hygiene and health, which can also influence the animal survival and productivity in stressful environments. The result indicated that the thermo regulation of desert ram were influenced by season and shearing significant ($p<0.05$). Lower the morning rectal temperature (Ta) value both and afternoon T, value during summer only compared to value obtained for the control group. The season change in the afternoon T, was significant ($p<0.05$) in unshorn rams and both group shored diurnal change in T, for unshorn. The result indicated that certain blood constituent was influenced by the experimental treatment. Shearing of desert ram significant ($p<0.05$) decreased the packed cell volume (p c v) level during summer. In unshorn ram, the serum albumin(S A) concentration was significant ($p<0.05$) higher during winter compared to

summer value compare to unshorn ram. And summer value winter shorn ram maintained significant ($p<0.05$), higher plasma glucose level in winter how ever shearing did not significance (Mohammed and Abdelatif, 2013).

2.5.4Effect of Shearing

Shearing and season change influenced characteristic, significance reduction in the Ejaculate volume. Was absorved in unshorn ($p<0.05$) and shorn ($p<0.01$) ram during summer compared to winter value. It is concluded that shearing in different season significantly effected thermoregulation, blood parameters and seminal traits of Desert ram. (Mohammed and Abdelatif, 2013).

2.6 Improvement of animal productive traits and adaptive traits

Goat improvement can not be overemphasized; however the retention of adaptability traits will be crucial taking into account the challenge of climate change. In the context of climate change, any future goat improvement research it is imperative to target productive traits but at the same time retaining the adaptive traits for sustainable livestock production. Goat improvement should be pursued to simulated effects of climatic change such as water deprivation, heat and nutritional stress (Assan, 2014).

2.6.1 Selection in the local breed

The main objective of animal breeding is to genetically improve population of livestock which is achieved through selecting the best individual of the current generation and using them as parents of the next generation. Genetic improvement aimed to exploit the present within and between breed variations (ILCA, 1994). The individual animals used

content population breed in the future was selection by, records does good performance, should be udder is developed, the weight birth acceptable, the animal resistance disease and animal adaptation of harsh environment. The programs used in the inbreeding depression over.

2.6.2 Replacement

Saanen goat recently imported from Netherlands and kept as a dairy goat to raise milk production in Sudan among poor people especially in rural area. Sudan as a tropical country is hot temperature and low source feed. The study used compares Saanen in Sudan and Swiss. Reported that, the kids' weight at the time of birth was lower in Sudan than Swiss, kids in Sudan reached puberty and mating age later than Swiss condition, mortality rate particular among kids was higher in Sudan (55%). Milk production per day of the goat comes down in Sudan and was not effected by the change location. It can be concluded from these study that this exotic breed of goat is not well suitable to the hot environment of Sudan. There for cool condition environment are necessary for optimum performance of this breed. Moreover cross between the breed and local breeds should be focal point of the future research (Tag Eldin, *et al*.2011).

2.6.3 Cross programs between local breed and exotic breed

The Saanen goat is the best known representative of dairy goat breeds. Saanen goats have been used success to increase milk yields of the indigenous tropical breeds of goat where adequate year- round feeding is assured. They were introduced to Sudan since 1993 in order to upgrade the local breeds (Gol, 1996).The simplest way to farm anew breed is to crossbred between breed Saanen(S) with breed Nubian(N) to farm first cross {F1= S*N} then mate S*N males with S*N females (

inters mating). To farm of F2 population and then continue the process of inter breeding to the FN generation (Backer and Gray, 2004). Reported that, the present study concluded that, the crossbred goat have good capability for adapting themselves to Sudan local environmental condition. However, some condition must be taken into concentration of the diet. Selection within Nubian breed must go in line for improving Nubian goat and consequently crossing process can be used with Saanen goat even to bring out a good crossbred. Moreover, an extra effort is needed to determine the most efficient percentage of crossbred between Nubian and Saanen goat (Abd ElGadir and Ibtisam, 2005).

2.6.4 Heritability (h^2)

The heritability (h^2) a central in quantitative genetics is the proportion of variation among individual in population that is due to variation in the additive genetic effect. Are liable estimate of heritability will help to decide which breeding program should be used. If the trait heritability is high, mass selection with little pedigree records may be enough for rapid selection response. Is the efficiency of transmission of parental phenotypic superiority to the next generation and in theory can vary from zero to one but for animal product traits it pairs from zero to about 0.6 Nubian (h^2)=0.54, and 0.16 (Ballal, *et al* 2008), and Saanen (h^2) 0.31 (Muller, 2005).

2.7 The management of goats

Included that, breeding, reproductive and disease of goats

2.7.1 Breeding and reproduction

Goats are seasonal in their breeding habit. Goats are most fertile in the fall and seasonality varies by breed, goats' estrus cycle last 21days

and pregnancy last 5month litter size affected by breed, age, season and nutrition. Doe determines number of offspring but buck determines sex of offspring (Kossgey, 2004).

2.7.2 Disease of goats

Normal goats behavior are head up, ear up, tail up, bright eyed, healthy hair coat, good appetite, chew cud, normal gait and keep up with herd. Preventative health care is Biosecurity, (health stock, don't loan goats. vaccination programs (bacterial disease and viral disease). Good nutrition and feeding (pasture or browse, concentrate feed and minerals). Parasite control, hoof care and predator management. Common health problems are (Digestive nutritional, respiratory complex, Internal parasite, reproductive, hoof, skin and chronic).The most prevalent animal disease includes {trypansomiasis, foot and mouth disease, bovine pneumonia, paste de-petites ruminant, contagious caprice pleura pneumonia, and lumpy skin disease, mastitis, and helminthes parasites. These diseases have major impact on morbidity and mortality rates.

2.8 Goats helminthes

The helminthes parasite disease there fore depends on factors such as the infection pressure in the environment and the susceptibility of the host species (or individual). The infection pressure in turn depend on factor that effect, the free living and intermediate stage such as, temperature, rainfall and moisture. Gastro- intestinal nematodes (gi) important are haemonchus contortus, teladorsagia circumcincta and trichostrongylus, spp. And loss important is, pseudo mars haliga, nematodurius, spp, bunostomum, trigonocepholum, chabertia ovia and Taenia, moneiza, (Hansen and Perry, 1994). Liver fluke and gastro-

intestinal trematodes example of trematodes is Fasciola hepatica, Fasciola gigantic, parampisomose spp and dicrocoelium spp of small ruminant.

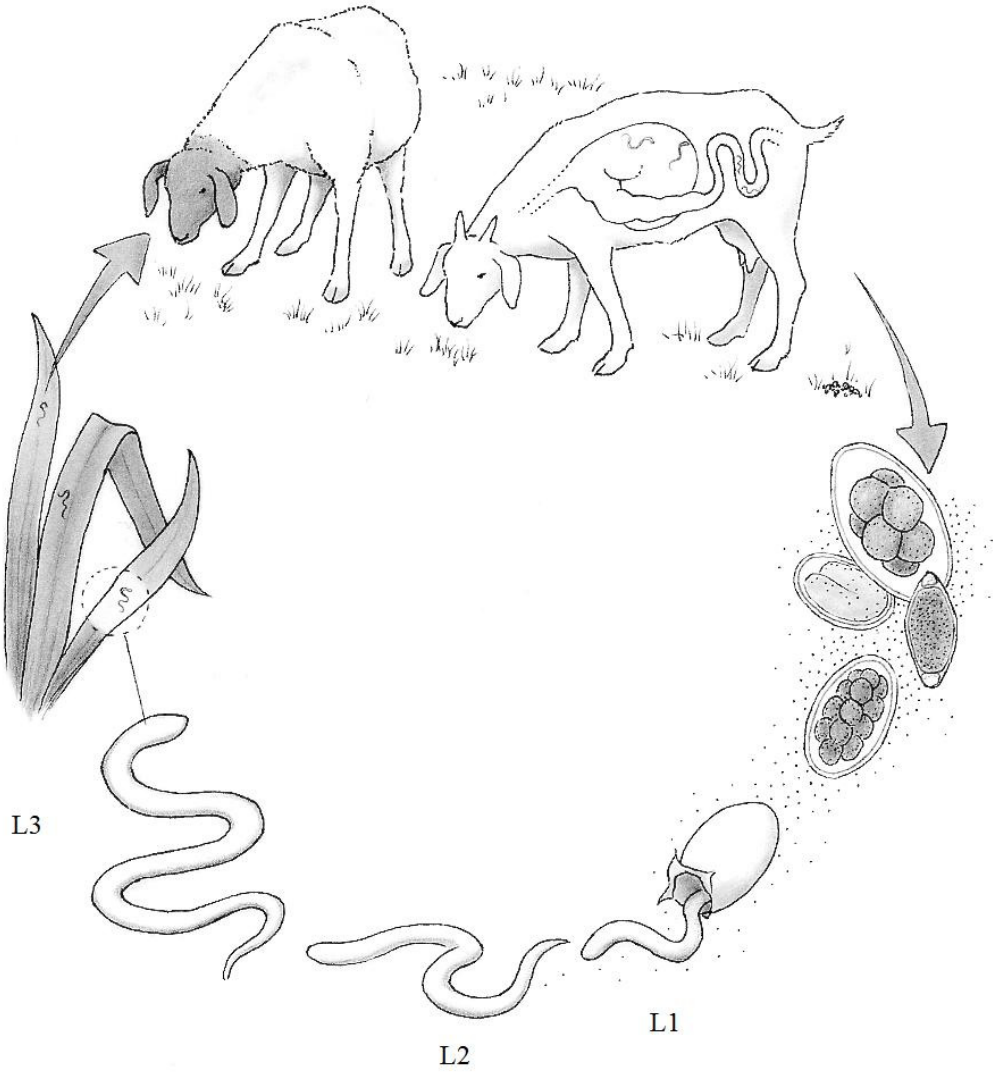

Figure 1: life cycle of *Nematodes spp*.

2.8.1 The life cycle of parasite

The cycle are direct- requiring no intermediate hosts, in these cycle, adult female parasite in the (gi) tract produce eggs that are passed out with the faeces of the animal. Development occur within the faecal mass, the eggs embryonic and hatch into first- stage larvae (*l*1) which in turn molt into

second- stage larvae (*l*2), shedding their protective cuticle in the process, during these time the larvae feed on (bacteria,). The (*l*2) molt into third-stage larvae (*l*3) but retain the cuticle from the previous molt the (*l*3) constitute the infective stage and these migrate on to surrounding vegetation where they become available for ingestion. The (*l3*) larvae pass to the abomasums or intestine, the (*l3*) molt within 2 – 3 days to become four- stage larvae (*l4*) which remain in the mucous membrane, for further, 10-14, days finally. The (*l4*) emerge and molt to become young adult parasite. The time between ingestion of (*l3*) and the parasite become mature adult between 3and 5 weeks by varies parasite species. The development and transmission of the free living stage of nematodes and trematodes parasite are influenced by micro climatic factor within the faecal pellets and herbage these include, sunlight, temperature, rainfall, humidity and soil moisture (O Connor, *et al*, 2006).

2.8.2 Goat's resistance to endo parasite

Resistance to infection with endo parasites is defined as the initiation and maintenance of responses provoked the host to suppress the establishment of parasite and/ or eliminated parasite burdens.

Resilient (or tolerance) is defined as the ability of the host to survive and be productive in face of parasite challenged (wool stone and Baker, 1996). For live stock challenge with (gi) nematode parasite, the degree of resistance has usually been assessed intern of worm count at faecal eggs count (f e c). During on infection period in live animal although all grazing goats may be infected with above mentioned parasite low worm bounding usually, have little impact an animal health but as the worm number increase effect in the form reduce weight gain and decrease appetite occur with heavier bunds clinical sign such as weight loss, diarrhea, anemia, bloat, and sub mandibular edema (bottle jaw), (Baker,

1996). Reported by population parasite resistance of anthelmintic, Study of El bendazole in 48 male and female goat of mixed age in four groups treated with 2.5 to 10mg/kg and exposed to natural infection there was a75% reduction in FEC in the group given lowest dose and 100% in the other (Subandriyo, 2002). The EPG increased during the short rain period and reached peak just after end period and in the long rain the peak increased in September of each year (Sissay. 2007).Are groups received a daily oral dose (50g/ goat) of poly ethylene glycol (PEG) while other groups acted as control (No PEG) on free range feeding in the Ankole range land, Uganda. The goats were monitored for fecal nematodes egg count and body weight. Resulted that goat treated (PEG) had significance ($p<0.05$) higher fecal helminthes egg loads (290epg) was more than double that of the control groups (129 egg/g). The gain body weight during gestation was lower ($p<0.05$) in the PEG group (70.4 g/goat/per day) than in control group (91.8g/ goat/per day). The PEG deactivates condensed tannins and it was concluded that condensed tannins play significance role reducing the negative effect of gastro intestinal helminthes bunds in neutral free range feeding system (Kabasa *et al.*, 2009). The resulted reported of breed resistance parasite infection in Haemonchus, Contortus native goats (Aged 3-4 months) had lower FEC, lower worm burden and higher PCV than Anglo- Nubian grade goat. This is the only evidence safer brought to the attention of the project which indicate difference in resistance between any tow breeds in Philippines (Gray *et al*., 2004). The internal parasite in tropical was infection goats; the goats breed resistance of nematodes by researchers {Gray *et al*., 2004). Which population nematodes effected health and resistance of anthelmintic about reduce effected by Sissay (2007).

2.8.3 Endo parasites control

Controlling grazing to minimize build up of infection in grazing area, managing manure to prevent spread of eggs and larvae from housed animals, increased stall feeding to reduce – pasture intake, during risk period, avoiding grazing completely during the risk wet month, using cut and carry forage grasses and weeds to boast nutrition and enhance resilience. Using anti parasite free forage such as (mulberry), to reduce parasite burdens, using nutritional supplementation purchase as by product such as rice polish, and mustard cake, using non- conventional feed for goats, such as poultry manure and Brower grain. Treating kids strategically with anthelmintic to suppress build up of infection during risk period, using supportive therapy for sick goats including symptomatic treatment to permit and recovery, for example, protein, and energy supplementation and anti- scouring agents and managing breeding to reduce the number of susceptible animal present during the risk period(Joshi, 1997).

2.8.4 The anthelmintic

Use the correct drugs, make sure you use the right dose of drugs- don't under time an animal weight, doesn't use anthelmintic too frequently or animal may develop resistance, use drugs before expiry, most drugs work best of given when the animal has an empty stomach, if giving drugs by mouth, it should be given as for back in the mouth as possible. Drugs bottle content should be will mix before use and store drugs away from direct sunlight and children (Joshi, 1998).

2.8.5 Parasite control without drugs

Before considering the use of drugs, think about what can be done without them. There are actions that can be taken to control parasites by reducing the ingestion of infective larvae include that. Safe larvae- free pasture should be used when possible, such as pastures ungrazed by cattle, sheep, or goats for at least three months in the humid tropics, or crop-stubble fields, if labour is available to split the flock, kids should be grazed ahead of adult goats, in the wet season, the grazing day should start after the sun is up and the grass is dry, goats should not be grazed intensively; they should not be forced to eat close to the ground: bushy areas should be selected when possible and the farmer should consider adopting cut-and carry feeding, and wilt wet forage before feeding (Coop and Kryiazakis, 1999).

2.9 Factors effecting body weight and parameters

2.9.1 The body weight of goats

Effect on the body measurement parameter as function assessing body weight goat to age animal, tail length, ear length, different management system, show that in the increase tail length, ear length and age does, show the rate of goats growth increase rapidly again between 2-2.5 year measuring up to full mature (Pesmenand and Yardimct, 2008). The management system had significant influence on reproductive performance of does, higher reproductive rate were recorded under those management system where additional of supplementary feeding at various stage of reproductive cycle (Snymon, 2010).

2.9.2 Temperature

Is the detection of internal body temperature is actually the result of the balance between heat produced by the basal metabolism and muscular activity of the body and the heat lost (Natural Resource Design, 2010). The temperature of goats importance in diagnosis and prognosis of the disease and adapted goats, measuring of internal temperature by thermometer of range normal (38.6-40.2 centigrade) average (39.5).the factors were, female pregnancy and young animal have relatively higher temperature than male, non pregnant and old animal, the temperature varies during the day, high atmospheric temperature increases the normal body. Exaction forced exercise increase the temperature and the body temperature increase after feeding.

2.9.3 Respiration rate

Breathing is drawing air in to the lungs (inspiration) and expelling it from the lungs (expiration), the respiration rate is the number of time per minute that air it inhaled and exhaled when animal breathe air flow in lungs which be freely in the thoracic (chest), if the rib and chest increase size the lung expand due to air pressure within them and the inspiration of air through the nostril or mouth. Air exhaled from the lungs by the contraction of the thoracic. The physiological effect exam, exposure to high at morphemic temperature just after exercise and ingestion feed. Pathological, Fever, Anemia, Sever cardiac disease, various disease, condition making respiration. The each respiratory cycle three phase, inspiration, expiration and pause.

2.9.4 Pulsation rate

Help in diagnosis of circulatory disturbance, use arteries, because arteries is superficially situated of medium size lying in adherence with solid mass as bone (femoral artery), Rate is the number of blood waves (beats) felt in minute time. Physiological factors affecting the pulse rate in normal Animal, Species, Size, Age, Sex, Parturition, and Late of pregnancy relative more pulse rate, Exercise, Ingestion food and Posture (Natural Resource Design, 2010).

2.9.5 Internal parasite

Effect by multifactor, the temperature, rainfall, moisture, goats individual or breed and other factor of management (Baker, 1996).

Chapter three

3. Materials and methods

3.1: Study area

The study carried out of Sudan in two regions. First region of Gezira state {width14.733 and length 33.3} and second region of Khartoum state, South Khartoum (width15.78333 and length32.71667) and north eastern region Bahri. The studies from periods in wet summer on September, the temperature of time study equal over (40 to 41c).

3.2: Experimental animals

Sixty four of goats (Nubian=28, Saanen=12 and their crosses=24). The goats were divided into two groups effect of shearing, one group was completely shorn (n=29) while other group was unshorn (n=35). The crossbred on shorn goats were selected and divided into two groups, one group (n=6) were exercise, while other group (n=9) were unexercised.

3.3: Methodology:

3.3.1: Body weight

Spring balance was used for weighing animals and the weight was recorded.

3.3.2: Rectal temperature

Rectal temperature was taken using grab thermometer by inserting it through the rectum for at one minute and reading temperature was recorded (Gaughan, *et al*, 1999)

3.3.3. Pulsation rate

To take pulse, she was calm and resting, the goat is arête below and slightly in side the legs (femoral artery) with the finger, watching clock and count the number of (heart beats) in one minute.

3.3.4: Respiration rate

The flank is the side of the body between the ribs and the hip. to count respiration simply watch the goats' side when she calm and resting for 60 second count one respiration for each time, the goat side raised and falls.

3.3.5: Collection fecal sample

Rectal sample collect by use glove and container plastic. The sample saved on formalin10% concentrate.

3.3.6: Diagnosis parasite

Direct methods before dilution the entire sample was exammed to it's consistently and composition fecal material. Apply drop of tap water to microscopic slide on which pain head of faeces is spread out should be able read a newspaper through it. The largest particle can be moved aside. Used cover glass is laid on the transparent liquid. Easy methods it is possible to detect warm eggs. Due to the limited amount of faeces examine (Arcari *et al* 2000).

3.3.7: Statistical analysis

A cross-sectional study of 4 farms was done and the generated data was subjected to Analysis of Variance (ANOVA), Independent t test and Chi square tests. The SPSS software was used for data analysis.

Chapter four

Results and Discussion

The values of the body weight, rectal temperature, respiratory rate and pulse rate were shown in table (1, 2 and 3).

4.1. Effect of shearing on physiological parameters:

The effect of shearing on the studied parameters was not significant (table, 1). This might reflect adaptation of the tropical breeds to harsh environment (Devendra, 1990), however, a reduction in respiratory rate and pulse rate in the shorn animals accompanied by an increase in body weight was observed. This might be due to the fact that the shorn animals can get rid of the thermal load by both sweating and panting unlike the unshorn animals. The adaptability of goats to thermal stress is due to higher sweating rate, lower basal metabolism, and higher respiratory rate. Rectal temperature and respiration rate increases from 38.9ºC and 43.66 to 39.35 and 77.33 respectively (Phulia *et al*, 2007). Pulsation and respiration rate per minute was found to be increased by the effect of environmental temperature in an attempt to increase heat loss by evaporative cooling. The increase in heart rate is attributed to two causes (Marai *et al*, 2007). The first cause is the increase in muscular activity controlling the rate of respiration concurrent with elevated respiration rate. The second is the reduction in resistance of the peripheral vascular beds and atterrovenous anatomizes. Increase in pulsation increases blood flow from the core to the surface as a result of it more heat is lost by sensible (loss by conduction, convection and radiation) and insensible (loss by diffusion water from the skin) means. A significant increase in rectal temperature and respiration rate was observed for German Blackhead sheep breed(Al-Ramamneh *et al*, 2011) and Comisana ewes (Piccione *et al*, 2011) in shorn animals compared to unshorn ones. On the

other hand the saved metabolizable energy from panting might be used for body growth as the body weight of the shorn animals was higher than that of the unshorn animals.

4.2. Effect of exercise on physiological parameters:

The results of the current study showed that the effect of exercise on body weight, rectal temperature, respiratory rate and pulse rate was not significant (table, 2). This result compared to analyses study was by Karnuah, *et al.(*1992) on 76 does of five genotypes which varied in their proportions of the two breeds, from 100% Anglo-Nubian to 50% Anglo Nubian and 50% Native goats. They concluded that crossbred animals were more productive across a range of parameters. Crossbred goat was tolerated change in environmental condition due to prominent white coat color and skin pigmentation (Otoikhian, *et al,* 2009). But it can be seen that higher values for all parameters were obtained by the sheared animals. Exercise needs more energy i.e. more oxygen and more blood flow and this will result in high heat increment.

4.3. The effect of breed on physiological parameters:

The effect of breed (Saanen, Saanen X Nubian and Nubian) on the studied parameters (table, 3) showed that rectal temperature was highly affected by breed ($P<0.01$). The rectal temperature of Saanen was significantly higher than that of Nubian and their crossbred. Pulsation rate was significantly affected by breed. The pulse rate of Saanen breed was significantly higher than that of Nubian goats. This resulted agree with exercised of Saanen goats, mean respiration rate (RR) rose progressively from 19.4±0.6 to 164.4±0.06/min during 2h of exercise ($p<0.01$) at the end of which time the rate in male goat (233/min) was more than 2* that

in female (96/min, $p<0.001$). It was concluded that male goats responded more too exercised in the heat than females, and that the higher respiratory rates were effective in controlling their body temperatures. The results indicate the exercise causes stress to the animals in both sexes (Kasa, et al, 2015). And agree of the research physiological response of three breed goats (Anglo-Nubian, Ballade and crossbred) to water deprivation under subtropical during dehydration period. The resulted indicated the body weight of the groups gradually declined ($p<0.01$), 16.6, 9.2 and 10.9% respectively loss of body weight was attributed to decrease ($p<0.01$) water and feed intake. RT increase slightly particulars in Anglo-Nubian goats but respiration rate and pulsation rate were decreased significantly ($p<0.05$) in all group. This change was more pronounced in Anglo-Nubian than the Ballade and crossbred goats (Gamal Eldin and Hassan, 1980). These results indicate that Nubian goats and Nubian X Saanen are well adapted to high temperature compared to Saanen.

4.4. The association between anthelmintic and helminthes infestation:

Infections with gastrointestinal nematodes remain a major thread for ruminant production, health and welfare associated with outdoor breeding. The control of these helminthes parasites has relied on the strategic and tactical used of chemical anthelmintic drugs. The association of this practice and the infestation by helminthes was studied for Saanen, Nubian goats and their crosses. The results revealed that no significant association was observed as shown in tables (4, 5 and 6). The highest true negative value obtained was 41.7% which is very low. On the other hand lower false positive value was obtained for Saanen (8.1)

compared to Nubian (21.4) and their crosses (20.8) %. Reported by population parasite resistance of anthelmintic, Study of El bendazole in 48 male and female goat of mixed age in four groups treated with 2.5 to 10mg/kg and exposed to natural infection there was a75% reduction in FEC in the group given lowest dose and 100% in the other (Subandriyo 2002).after a trickle Haemonchus contortus infection Native goats (age3-4month) had a lower FEC, lower worm burden and higher PCV than Anglo- Nubian grade goats (Joshi, 1998). Currently, internal parasites are controlled by regular administration of anthelmintic, but resistance to these drugs is emerging in Indonesia and other parts of Southeast Asia (Venturina, *et al*, 2003). This could either be due to the misuse of the anthelmintic by the owners (i.. either low dosage or incorrect protocol) or due to the infestation with anthelmintic resistant parasites (Hoste and Torres-Acosta, 2011).

Table 1: The effect of the shearing on some physiological parameters

	Physiological parameters			
Shearing (N)	Body weight (kg)	Rectal temperature (°C)	Respiratory rate	Pulse rate
Shorn (29)	27.69±6.8	39.74±1.0	31.92±3.5	80.77±4.2
Unshorn (35)	24.26±5.2	39.70±0.9	33.29±5.5	83.71±4.9
Significance	NS	NS	NS	NS

NS: Not significant

Table (2): The effect of the exercise on some physiological parameters

	Physiological parameters			
Exercise (N)	Body weight (kg)	Rectal temperature (°C)	Respiratory rate	Pulse rate
Exercised (6)	26.17±6.5	40.20±1.5	33.00±5.2	82.17±6.2
Unexercised (9)	25.56±6.2	39.12±0.6	31.00±3.2	79.33±3.5
Significance	NS	NS	NS	NS

NS: Not significant

Table (3): The effect of the breed on some physiological parameters

Breed (N)	Physiological parameters			
	Body weight (kg)	Rectal temperature (°C)	Respiratory rate	Pulse rate
Saanen (12)	28.33±5.2	40.58±0.9[a]	33.92±3.0	84.67±4.2[a]
Saanen X Nubian (24)	24.42±6.0	39.51±0.9[b]	32.17±5.3	81.30±5.5[ab]
Nubian (28)	25.93±7.0	39.51±0.7[b]	32.21±6.5	79.89±5.9[b]
Significance	NS	**	NS	*

NS: Not significant
*: Significant at P<0.05
**: Significant at P<0.01

Table (4):The association between anthelmintic drenching and helminthes infestation of Saanen goats (X^2=1.5/P=0.221)

Helminthes infestation	Anthelmintic drenching (%)	
	yes	No
No	3 (25.0)	3 (25.0)
Yes	1 (8.3)	5 (41.7)

Table (5):The association between anthelmintic drenching and helminthes infestation of Saanen× Nubian crossed goats (X^2=0.0/P=1.0)

Helminthes infestation	Anthelmintic drenching (%)	
	yes	No
No	10 (41.7)	6 (25.0)
Yes	5 (20.8)	3 (12.5)

Table (6):The association between anthelmintic drenching and helminthes infestation of Nubian goats (X^2=0.05/P=0.82)

Helminthes infestation	Anthelmintic drenching (%)	
	yes	No
No	4 (14.3)	8 (28.6)
Yes	6 (21.4)	10 (35.7)

Chapter five

Conclusion and recommendations

The study concludes that:

- Some practical measures those are applicable under extensive conditions, such as shearing caused decline in goat rectal temperature, respiratory rate and pulse rate.
- Accessibility of goats to shade during summer is simple and yet on efficient tool to minimize solar radiation induced heat stress.
- Saanen goat had less ability to tolerate the local environment management and endemic diseases.

The study recommended that:

- Any future goats improvement research it is imperative to target production traits but at the same time retained the adaptive traits for sustainable.
- Include the use of the most suitable drugs, correct dosage and reused 14 days.
- The practice shearing important in summer season.

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