International Journal of Life Sciences Research (IJLSR)
Vol. 1, Issue 1, pp: (37-42), Month: October-December 2013, Available at: www.researchpublish.com

Goats (mini-Review)

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Abstract: **This paper is mini – Review in the subject of goats which are important role in national economy in Jordan; However. Management and disease problem, particularly respiratory diseases and mastitis constitute major constraints for effective sheep and goat husbandry in Jordan.**

Keyword: **Goat, Nutrition, Breeding, Reproduction, Management, Jordan.**

1. INTRODUCTION

Jordan is a small country with a population estimated at five million. Whilst many Jordanians live in modern cities, part of the population lives in rural area depending on agriculture and rearing animals as their main source of income. Small ruminant husbandry is becoming increasingly important due to its meat and milk products. Livestock in Jordan is composed mainly of sheep and goat and animal production is playing an important role in the national economy. However, management and disease problem, particularly respiratory diseases and mastitis constitute major constraints for effective sheep and goat husbandry in Jordan. The goat was one of the first animals to be domesticated by humans, about 9,000 years ago (Coffey et al., 2004). Female goats are called does or sometimes doling if they are less than a year old. Males are bucks or buckling. Young goats are called kids. Goats adapt well to hot environments because of their small size and higher ratio of body surface area to body weight. Goats evolved in Europe and Asia in forest country and being ruminants depend for their nutrition on wide range of pasture grasses, herbaceous plants, shrub and tree foliages (Glimp, 1995; Huston, 1994). Their metabolism can cope with a wide range of feed, that at times contain toxic secondary plant compounds (Glimp, 1995).There are some 200 different breeds of goats that produce a variety of products (Coffey et al., 2004). Goats are multipurpose animals, which provide milk, meat, fiber and skins (Glimp, 1995; Kabir et al., 2004). The American dairy goat association recognize six breeds of dairy goats in the United States. The five principle breeds are Alpine, American LaMancha, Nubian, Saana and Toggenburg. A lesser known dairy breed is the Oberhasli (Harris et al., 2003). The production of meat from goats and sheep play an important role to supply animal protein for the people (Kabirt et al., 2004).Goats meat is one of the most commonly eaten red meat and highly acceptable to people of all castes and religion (Kabirt et al., 2004). Glimp (1995) reported that goats are not as efficient meat producers as other domestic livestock species, because growth rates are lower and feed efficiency is poor in confinement. On other hand, Amoah et al, (1996) reported that the goat is being recognized as a significant food source, because does can convert feed dry matter into milk as efficiently as other ruminant; 1884 Kg milk/ 100 Kg of dry organic matter for does compared with 162 Kg for cows in temperate environment.

2. NUTRITION OF THE GOATS

Goats are called "selective browsers" because of their to choose from a large variety of vegetative types. Goats are inclined to forage or browse from the top of a plant downward, making them an effective biological herbicide for controlling many undesirable plants and shrubs. Goats are ruminants; that is, they have four compartment stomach designed to digest large quantities of forages (Coffey et al., 2004). Coffey et al, (2004) reported that the health and productivity of the goats depends on the rumen function; micro organisms in the rumen digest fibre and carbohydrate and protein to supply the animal with nutrients. Each goat is able to consume up to 3 to 5% of its body weight in dry matter daily (Coffey et al., 2004). Meat goat producers will need feeds that are economical and easily managed. Grain-based commercial supplements may not be economical for growing and finishing meat goats, and feeding these traditionally high-starch supplements may lead to reduced ruminal PH and fibre digestibility (Morre et al., 2002). Some by-product feeds contain highly digestible fibre, which could potentially provide adequate gain without the management problems associated with high-starch (high-grain) diets (Morre et al., 2002). Dairy goats need both high-quality forage and supplemental grain to reach their full potential, especially during peak lactation or growth (Coffey et al., 2004). During period of growth, goats should be maintained on a moderate to heavy plane of nutrition. The primary nutritional concern in females between birth and maturity is to maintain a level of intake and thus growth that will (1) not delay puberty; (2) ensure that adequate size be attained at the desired breeding age; (3) maintain growth during gestation so that parturition is not made more difficult by the impaired size of the mother. In growing males, the nutritional regimen should be sufficient to (1) not delay puberty and (2) not reduce libido and protozoa production after puberty (Bearden and Fuquay., 1997a). Goats need a proper balance of energy in the form of roughage or grain, as well as protein, vitamins, minerals and clean water (Coffey et al., 2004). Protein may be the limiting in many forages, particularly in the tropics, and protein availability decline in plant leaves as they mature (Kronberg and Malechek, 1997). Kronberg and Malechek (1997) found that some goats can conserve and recycle nitrogen better than some sheep when both species consume low-quality diets. Kabir et al, (2004) reported that feeding of goats with high protein diet significantly increased crude protein intake compare with low protein diet. Also, Huston, 1994) results that feeding supplements that provide equal amounts of protein but increasing amounts of energy may not increase total nutrient intake above that attained when a relatively small amount of a high protein supplement is fed. However, feeding a total diet containing more that 13% crude protein will result in lower reproductive efficiency. Also, diets deficient in protein have resulted in weak expression of estrus, cessation of estrus; repeat breeding, fetal resorption and birth premature and/or weak offspring (Bearden and Fuquay, 1997a). Requirements of most minerals are increased per unit of body weight by gestation, lactation, and growth. Minerals mixes containing calcium, phosphorus, iodized salt and trace minerals are recommended in the nutritional management of animals for meat and milk production (Bearden and Fuquay, 1997a). Selenium, cobalt, copper, zinc and iodine deficiencies can result in a 5-20% decrease in animal performance in terms of poor growth rates of young stock, reduced reproductive efficiency and decreased milk production (Bearden and Fuquay, 1997a). Remedial action such as bullets, drenches and minerals mixes as blocks, loose mixes and liquid mixes are available to correct these problems. Wherever, molasses is provided to stock, the minerals in the molasses usually suffice to prevent trace minerals deficiencies. It is rarely necessary to supplement grazing livestock with any vitamins. Vitamin B groups are produced in the rumen by microbial growth. Vitamin A is stored in the liver when animals are on even the slightest green pasture, and only requires supplementation when drought feeding is prolonged (Bearden and Fuquay, 1997a). Sympathomimetic phenolic amines it is a compounds which are though to represent plant chemical defenses against herbivory, can affect different physiological processes of higher animals of they enter into the systemic circulation (Vera-Avila et al., 1997). The Sympathomimetic phenolic amines present in A. berlandieri and A. rigidula have been implicated in the development of a toxic condition in sheep and goats when this shrub is consumed for extended periods (Vera-Avila et al., 1997). Vera-Avila et al, (1997) reported that under certain environmental conditions (drought and decreased availability of alternative source of forage), grazing pastures dominated by phenolic amine-containing vegetation can adversely affect testicular size and function by the failure of testosterone to increase in buck goats during the breeding season and they results that may affect the function of the pituitary-gonadal axis in domestic goats.

3. BREEDING AND REPRODUCTION OF THE GOATS

Most wild species have a breeding season that is a time when the environment will allow for the best survival of the young at their birth (Bearden and Fuquay., 1997b). Goats are typical polyestrus seasonal breeders (Bearden and Fuquay., 1997b; Fonseca et al., 2005). Day length regulates breeding activity in goats by affecting pineal secretion of melatonin. Light program can change the timing and duration of the breeding season, and melatonin application can mimic changes in day length (von Brackel-Bodenhausen et al., 1994). The estrous cycle is defined as the time between periods of estrus. The average length of the estrous cycle in does is about 21 days (Coffey et al., 2004). The periods of estrous cycle are Proestrus (2-3 days), estrus (30-40 hours), metestrus (2-3 days) and diestrus (13-15 days) (Bearden and Fuquay., 1997b). Does in heat (estrus) are at the proper stage for breeding; at this time, they will receptive to the buck (Harris et al., 2003). Sings of heat include tail wagging, swollen valva, mounting behaviour, decrease in milk yield if lactating, and a general increase inactivity (Bearden and Fuquay., 1997b; Coffey et al., 2004). Harris et al,(2003) reported that during the breeding season bucks have a strong odor and should be kept in separate pens at all times (Harris et al., 2003). Puberty in females is defined as the age at the first expressed estrus with ovulation. Puberty occurs when gonadotropin (FSH and LH) and produced at high enough level to initiate follicle growth, Oocyte maturation and ovulation (Bearden and Fuquay., 1997b). Does reach puberty at seven to ten months of age, depending on the breed and nutrition and should be at 60 to 70% of their adult weight at breeding to prevent difficult kidding (Bearden and Fuquay., 1997b; Coffey et al., 2004; Harris et al., 2003). Bucks reach puberty earlier than females and must either be separated from them by the age of four month or be castrated to prevent unwanted breeding (Bearden and Fuquay., 1997b; Coffey et al., 2004). Age at puberty is affected by month of birth because it affects their age at the onset of their breeding season, other environmental factors that might delay puberty include poor health and poor sanitation rearing facilities (Bearden and Fuquay., 1997b). Gestation is the period of pregnancy. It start with fertilization and ends with parturition (the birth process). The length of the gestation period is 147-150 days, but five months is the average time (Bearden and Fuquay., 1997b). The major opportunities for increasing productivity include increasing reproductive efficiency through selection and crossbreeding; improving the genetic potential for growth; and improving nutrition and management practices to improving reproductive rate, kid survival, and rate and composition of growth (Glimp, 1995). Huston, (1994) has reported that there are three conditions limit productivity: (1) kids that do not develop adequate body size have decreased lifetime productivity, (2) does that are underfed at breeding fail to ovulate and conceive at high levels, and (3) pregnant does that are underfed tend either to abort or to give birth to small, weak offspring that often die within the first week.

3.1 ESTRUS SYNCHRONIZATION

As the popularity of goat production continues to increase, pressure to develop efficient and cost-effective methods for estrus synchronization in goats become more important. In goat, the control of estrous cycle and ovulation is a valuable tool to improve and maintain the production of milk and meat throughout the year (Dogan et al., 2005). The efficacy of estrus synchronization depends on many factors, including season, exposure to males, breed and age among others (Whitley and Jackson, 2004). Estrus induction or synchronization presents available efficient protocols, progesterone or a progestagen analogue is generally used to synchronize estrous cycle in does during breeding and non-breeding seasons (Dogan et al., 2005), and has been used with or without accompanying treatments such as gonadotropin or prostaglandin analogs (Whitley and Jackson, 2004). The commercially available progestogen sponges formulated for goats, including those containing fluorogestone acetate (FGA) and methylacetoxy progesterone (MAP) can be used (Dogan et al., 2005; Whitley and Jackson, 2004). Similarly, controlled internal drug releasing devices (CIDR) in the form of silicone intravaginal progesterone insert (Whitley and Jackson, 2004). For successful estrus synchronization during the breeding season (100% in estrus within 4 days), 60-mg MAP sponges (14-dats treatment), with or without 500 IU of eCG at sponge withdrawal (Whitley and Jackson, 2004). Fonseca et al, (2005) reported that using gonadotropin such as equine chronic gonadotropin (eCG) as an inductor of ovarian follicular activity and estrus. The use of FGA for 14 days in combination with intramuscular injection of PMSG at withdrawal was also successful for estrus synchronization during the breeding season in goats (Whitley and Jackson, 2004) and a synthetic PGF2α analogue 48 hours before or at sponge withdrawal (Dogan et al., 2005). Dogan et al, 2005 found that the use of MAP/PMSG and FGA/PMSG intravaginal progestagen treatments with or without synthetic PGF2α (cloprostenol) are equally efficient in synchronizing estrous in non-lactating hair goats during the natural breeding season. On other hand, Whitley and Jackson, (2004) reported that prostaglandin (PGF2α) injection intra-muscular given 11 day apart resulted in maximum fertility compared with other treatment. Exposure to males after a period of isolation can be used for induction and estrus synchronization during the breeding and nonbreeding season without additional treatment in goat (Whitley and Jackson, 2004). The other treatment like light treatment to alter photoperiod response in a well-known estrus synchronization method for out-of-season breeding. Administration of melatonin to mimic altered photoperiod may be effective alternative (Whitley and Jackson, 2004).

3.2 ARTIFICIAL INSEMINATION

The first reported use of artificial insemination (AI), although not documented, was in 1300 by some Arabian horse breeders. Rival chieftains reportedly stole stallion semen from one another to breed their own mares. The main value of AI lies in its use as a tool for the improvement of livestock, by extending the use of bucks that possess desirable characteristics (Harris et al., 2003). The success of artificial insemination (AI) is based on the ability to efficiently collect and cryopreserve spermatozoa from quality bucks for use on does over generations (Bearden and Fuquay, 1997c). There are three methods are used in AI. Vaginal inseminations were accomplished by simply inserting a tube into vagina and depositing semen at the mouth of the cervix. Cervical insemination involves deposition of sperm on the uterine side of the cervix. Conception rate using this method ranges from 50 to 70% depending on the season of insemination (Amoah and Gelaye, 1997; Bearden and Fuquay, 1997c). Laparoscopic insemination, the third method, involve the use of laparoscope and manipulating probe to aid in depositing fresh or frozen-thawed sperm directly into the uterine horns (Bearden and Fuquay, 1997c). More than 80% success rate of conception is realized (Amoah and Gelaye, 1997). Because of the size of the doe it is necessary to use either the vaginal or cervical method. A small stainless steel spreading speculum is usually used. With aid of a head light, the inseminating instrument is inserted into the mouth of the cervix where the semen is deposited. The insemination unit contain 60 X 106 to 500 X 106 motile sperm in a small volume such as the 0.25 ml straw (Bearden and Fuquay, 1997c). Karatzas et al, (1997) reported that the fertility levels of fresh and frozen-thawed buck semen were compared in does synchronized with intravaginal sponges impregnated with MAP during nonbreeding season and inseminated at a predetermined time after sponge withdrawal was higher in fresh semen than frozen-thawed semen. The kidding rate with fresh semen (65.5%) was higher than with frozen-thawed semen (53.4%) (Karatzas et al., 1997). Amoah and Gelaye, (1997) found that the goat Cowpers gland secretion has an egg yolk coagulation enzyme. In the present of calcium the egg yolk coagulating enzyme hydrolyzed egg yolk lecithin to fatty acids and lysolecithin. With the proportions of egg yolk being buffers, lysolecithin are released in quantities that are highly toxic to spermatozoa.

3.3 THE LACTATION CYCLE

Milk production of goats typically peaks 3 to 4 weeks after parturition and progressively declines thereafter (Paape and Capuco, 1997). Milk production efficiency can be increased by development and use of schemes that increase persistency of lactation and minimize the duration of the dry period (Paape and Capuco, 1997). The dry period allows the mammary system time to repair and regeneration for the next lactation (Harris et al., 2003). Does which are not given a normal dry period usually produced only 65 to 75% as much milk in the subsequent lactation as does given a dry period (Harris et al., 2003). In contrast, a dry period dose not seem necessary for optimal milk production in dairy goats, which, Paape and Capuco, (1997) found that one gland was milked during the prepartum period and the other was dried-off 24 weeks (170 days) before parturition. So, these scientists suggest that a dry period is not necessary for optimizing milk production in the next lactation in goats. Milk secretions in the goat is aporcrine, compared to merocrine secretion in cows, and results in the shedding of nucleated cytoplasmic particles into milk, which are included in somatic cell count (Paape and Capuco,1997). The first line of defence against mammary infection is the teat canal. Bacteria that pass this barrier and enter the teat cistern meet the second line of defense: phagocytic leukocytes (Paape and Capuco, 1997). Poutrel et al, (1997) reported that somatic count is a reliable way to detect goats with subclinical intramammary infections caused by minor or major pathogens. So, systematic antibiotic treatment of goat at drying-off is an efficient method to control sub clinical mastitis and control somatic cell count at the beginning of the following lactation and that effectiveness of post milking teat disinfections in goats.

4. MANAGEMENT OF THE GOATS

4.1 SYSTEM OF REARING

There are three main system of rearing sheep and goats in Jordan: (McDermott, persa.com).
The "traditional" system of the village Bedouin. Around 70% of sheep and goats are in this system. Livestock movements are restricted to short distances from the village. Barely and other crops are grown. Sheep and goats graze on crop residues after the harvest. Movements are seasonal and more extensive in drought years. Mainly found in Northern and Eastern Jordan (Badia area). Smallholder "village" systems in crop-livestock farming area. Most farmers have less than 100 sheep and goats that graze on pasture and crop residues. More common in the North and West and some in the South of Jordan. Fattening system, in which investors/small traders buy 100-150 sheep at weaning and fatten them. This is usually a seasonal trade associated with the Haj and other festivals. Goats require tight fencing which is the most critical factor in raising goat on pasture (Coffey et al., 2004). A small bran or shed is needed to reduce the exposure of goats to wind, rain and solar radiation (Harris et al., 2003).

4.2 MILKING PROCEDURES

Harris et al, (2003) presented the milking procedures, the udder and particularly the teats should be washed with warm water (110 degree F) that contains an appropriate sanitizer. This not only stimulates the animal for milking, but also has the potential of destroying organisms on the teat that might contaminate the milk. The first few strips of milk from each teat should be examined for abnormalities with a strip plate. Milking, whether by machine or hand, should begin within 2-3 minutes of washing the udder. If milking is done by hand, specials precautions should be taken to prevent contamination of the milk. After milking it is desirable to dip each teat in a dairy teat dip. Teat dips have proven quite successful in the prevention and reduction of mastitis. Finally, milk should be filtered through commercial filters and cooled immediately.

4.3 DISEASE MANAGEMENT

A number of common diseases occur frequently in dairy animals, such as: mastitis, which is simply an inflammation of the udder. The udder may appear hot, painful, tense and hard. Sanitation during milking is important in the control of mastitis and the making of a clean wholesome dairy product. If milking machines are used, the teat cups should be kept clean and dipped into clean water and then a sanitizing solution between goats. Foot rot, another disease which can best by prevented by housing your goats in a relatively dry area. Symptoms include a greyish cheesy discharge and foul odor with lameness and intense pain. Treat by carefully trimming a way the rotten area and treating the infected area with 10 to 30% copper sulfate. Enterotoxaemia (overeating disease) is caused by a sudden change in feed or overeating by very hungry animals, where the causative bacteria undergoes rapid growth and releases a toxin in the intestines. Regular feeding and vaccinating with Clostridium perfringens, type C and type d toxoid will prevent this disease.

4.4 KIDS MANAGEMENT

Kid are raised for replacement stock, sold as breeding stock, or slaughtered for meat. Therefore, raising healthy, productive kids is essential to the profitability of our operation (Coffey et al., 2004). Mortality is a critical component of the goats productivity, and the occurrence of the high mortality rate can dramatically reduce farmer incomes (Mandonnet et al., 2003; Olde et al., 1996). Herd management can be improved to reduce risk of death in kids during the critical period between weaning and 11 months of age when the immune system is developing (Mandonnet et al., 2003). The adverse effect of artificial rearing on survival is probable due to poorer grazing ability and fewer contacts with parasites before weaning (Mandonnet et al., 2003). Mandonnet et al,(2003) reported that the effect of sex on probability of death is consistent with the known higher resistance to strongyles in females. The risk of death was found to decrease in females and increase in males during the fattening period. This probably due to females more quickly acquiring immunity to strangles than males between 3 and 11 months of ages. Kida are born without antibodies circulating in their blood and rely antibodies in Colostrum, or fist milk, for protection against disease during the first few weeks of life (Coffey et al., 2004; Harris et al., 2003). Also, colostrums are high in nutrient value, especially vitamin A, B-vitamin, protein, and minerals. The protein content of Colostrum is about 20% as compared to 3.5% for normal milk (Harris et al., 2003). However, for dairy production, it may be more economical to separate the kids from the mother; feed kids with a milk replacer after the kids receive colostrums on the first day of their lives (Coffey et al., 2004). Males should be castrated at an early age to reduce stress on the animal (Coffey et al., 2004). Also, all kids should be dehorned at 2 days to 1 week of age, expect those that are naturally hornless (Harris et al., 2003). During the suckling period, relatively little development of the Reticulorumen occurs because closure of the oesophageal groove shunts milk directly to the Omasum (Odle et al., 1996). Harris et al, (2003) reported that as soon as the kid starts eating, the rumen starts developing and eventually the kid will start chewing its cud. This is an indication that all four compartments of the stomach (rumen, reticulum, Omasum and abomasums) are developing. Clean, fresh water and salt blocks should be available at all time and especially as the kid is weaned from receiving milk at 8 to 12 weeks of age (Harris et al., 2003).

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