Journal of Animal and Veterinary Advances 6 (12): 1367-1370, 2007
ISSN: 1680-5593

Effect of Housing and Vitamin B Complex on the Survival of Goat Kids Born During Winter

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Abstract: A study was undertaken to investigate the effect of housing and parenteral vitamin B complex administration on the survival of goat kids born during winter. Some pregnant does were flushed in the last month of pregnancy. Kids born to these does were housed at night and injected with vitamin B complex, using the subcutaneous route. Ninety percent of these goat kids survived in the first 12 weeks of life. In the control group only 23.3% of the kids survived. For successful winter kidding, the does should be flushed, kids injected with vitamin B complex and housed in order to reduce kid mortality.

Key words: Goat kids, born in winter, survival, housing, vitamin B complex, flushing of pregnant does

INTRODUCTION

Most households in Botswana keep goats as a source of meat, milk and manure. Goat farming promotes poverty alleviation and is a sustainable alternative to cattle production. One of the key indicators of the efficiency of a goat production system is the degree to which goat kids survive to a marketable weight and/or to a sustainable reproductive life (Wilson, 1984). Mortality of goat kids is an important cause of losses, which may reach up to 50% of a crop of kids. A mean annual mortality of 29% in indigenous goats in the Limpopo Province in South Africa has been reported (Donkin and Boyazoglu, 2004). A goat kid mortality of 38% has been recorded in Botswana, (Segwagwe and Ramabu, 1999). Reduction in goat kid mortality would play a pivotal role in poverty alleviation of the resource limited rural population who depend on goat keeping.

Other studies have shown that the chance of survival of goat kids up to one year of age was only 55% (Davendra and Burns, 1970; Lebbie and Manzini, 1989). Most deaths occur during the neonatal period, that is up to one month of age (Mackinon, 1985). The main causes of these deaths are weak kids at birth, underdevelopment, exposure to cold and starvation (Mackinon, 1985).

In this study, the pregnant does were flushed in the last month of pregnancy and received supplementary diet after kidding so as to enhance milk production. The kids were injected with vitamin B complex in order to stimulate their metabolism and were housed at night to reduce the environmental stress due to cold exposure.

MATERIALS AND METHODS

The study was conducted in Lobatse, located in the south-eastern district in Botswana. Four goat flocks were randomly selected and monitored for the survival of kids born during the cold winter months of May and June 2007. Kid survival was monitored for the first three months of life. The does were of the Tswana breed and their crosses with the Boer goat. Bucks of the Boer breed were used to improve the weight of the kids from this indigenous goat breed. The goats were allowed to range freely and browsed on Acacia shrubs. Supplementary feeding was not provided but water was given *ad libitum* at the homestead. The prevalent weather conditions including minimum and maximum temperatures and rainfall were obtained from the Metereological department (Fig. 1).

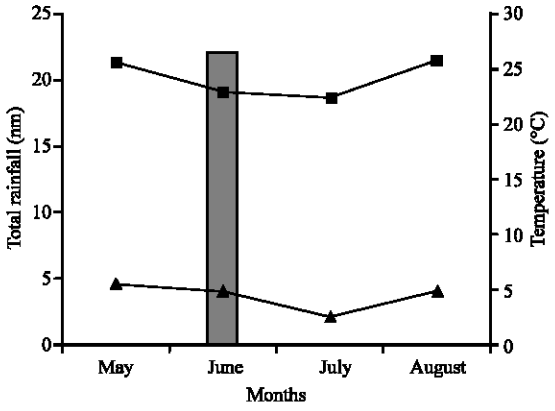

Fig. 1: Mean miniumum and maximum temperatures and total rainfal

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Table 1: Nutrient composition of a complete growth diet for goats as indicated by the manufacturer

Nutrient	Quantity	Unit
Moisture	120.0	g kg^{-1}
Protein	170.0	g kg^{-1}
Urea	8.5	g kg^{-1} of total feed
Urea-protein	14.35	% of total feed
Crude Fiber	100.0	g kg^{-1}
Fat	30.0	g kg^{-1}
Calcium	9.0	g kg^{-1}
Phosphorus	4.0	g kg^{-1}
Iron	125.0	mg kg^{-1}
Manganese	50.0	mg kg^{-1}
Zinc	75.0	mg kg^{-1}
Copper	25.0	mg kg^{-1}
Iodine	1.0	mg kg^{-1}
Cobalt	0.3	mg kg^{-1}
Selenium	0.3	mg kg^{-1}
Energy	10.5	MJ kg^{-1}

On one of the goat farms the following interventions were applied in order to improve the survival of goat kids born during winter. Firstly, the pregnant does were provided with supplementary feeding in the last month of pregnancy to provide higher levels of carbohydrates and proteins (Table 1). This rationale would help in the development of heavier kids. Upon kidding, the birth weights of the kids were recorded within 24 h post parturition. Subsequently the body weights of the kids were recorded fortnightly until weaning at 12 weeks of age.

On the first day of life, each kid was injected with 2 mL vitamin B complex+Hepatis Extractum (Phenix, South Africa) using the subcutaneous route. Each millilitre of vitamin B complex contains vitamin B_1 10 mg, vitamin B_2 4 mg, vitamin B_6 4 mg, nicotinamide 25 mg, calcium pantothenate 5 mg, liver extract 50 mg, methylparaben 0.1% m/v. At post partum, the does were injected with 5 mL vitamin B complex using the subcutaneous route. They were also dewormed using an injectable antiparasitic remedy, Ivermectin 1% (m/v) also known as Virbamec at a dose rate of 2 mL injected sub cutaneously.

For the first two days after kidding the kids were confined in a house together with their does to ensure that the kids received colostrum. Thereafter, the does were allowed to browse from 10.00-15.00 h daily. On their return to the kids they were supplemented with 0.5 kg commercial goat diet as recommended by the manufacturer. These does were housed in a shed with half walls and plastic sheet curtains on the open walls. The curtains were closed at night to cut the chill factor.

RESULTS

During the period of this study, the average minimum temperature was 4.45°C and only a total of 22.0 mm rainfall was recorded for the four months (Fig. 1). Ninety percent

Table 2: Survival of goat kids

Farm	Number born	Housing	Vitamin B complex	Number surviving	Percent surviving
1	10	-	-	2	20
2	10	-	-	2	20
3	10	-	-	3	30
4	10	+	+	9	90

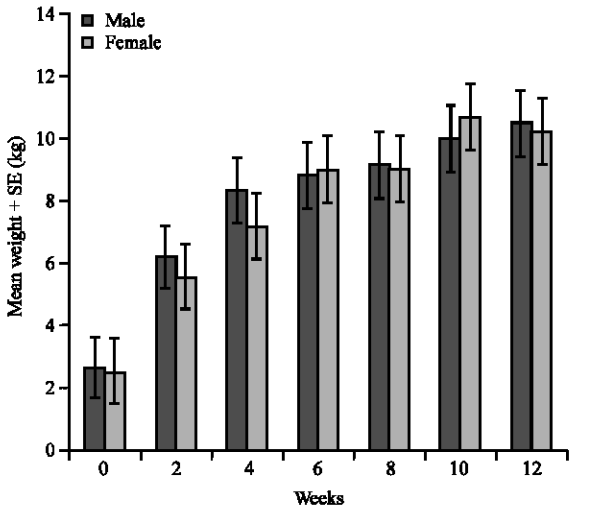

Fig. 2: Growth rate of goat kids

of the goat kids that were housed and injected with vitamin B complex survived for the first 12 weeks of life (Table 2). For the goat kids that were neither housed nor injected with vitamin B complex only 23.3% survived. The mean birth weights of the kids born to supplemented does was 2.6±0.43 and 2.5±0.57 kg for male and female kids, respectively. These kids grew rapidly attaining a mean weight of 10.5±0.70 and 10.2±1.3 kg by week 12 for males and female kids, respectively (Fig. 2). Among the housed kids only one died after 4 weeks and post mortem examination did not reveal any visible pathological changes. For the control, unsupplemented group, the kids were born weak and most of them died in the first 2 weeks of life.

DISCUSSION

In the present study, provision of housing of the perinatal kids and concomitant parenteral administration of vitamin B complex resulted in improvement of kid survival by 66.7% over untreated counterparts by the age of 12 weeks. The study showed that only a 23.3% survival rate was obtained in kids where no housing was provided and no vitamin B complex was administered. Cold chilly nights with temperatures dropping to -1°C were recorded in this district in the period of May to August 2007. High wind speeds, though not measured, are not uncommon

during winter making night temperatures bitterly cold. The situation was further aggravated by drought prevalent at this time of the year resulting in unavailability of good quality forage for pregnant and nursing does. It was therefore apparent that neonatal and perinatal deaths among untreated kids could have been in part due to the nutritional and cold stress. Housing of the goat kids at night helped to reduce the chill factor common in winter nights. It is suggested that supplementary heating should be provided during the bitterly cold nights. This is similar to brooding the goat kids during winter.

In South Africa, stress-related problems have been linked to the inability of kids to maintain blood glucose levels during stress (Engelbrecht *et al*., 2000). In response to stress, mammals release Corticotrophin Releasing Factor (CRF) from the hypothalamus. The CRF stimulates the secretion of adrenocorticotropic hormone from the anterior pituitary gland (Gemma *et al*., 1994), favoring glucose production (Munich, 1971). Previous research has shown that an abrupt decrease in blood glucose levels to be a crucial factor for metabolic heat production (Wentzel *et al*., 1974). It is therefore apparent that vulnerability to nutritional and cold weather stress depends on the ability to produce metabolic heat (Vallerand *et al*., 1995; Buckingham. 1996). However, whether the latter is effected is dependent on the functional status and integrity of the hypothalamus-pituitary adrenocortical axis (Gemma *et al*., 1994).

Parenteral administration of vitamin B complex to the neonatal kids in this study may have worked in enhancing the latter pathway. Vitamin B complex has been shown to promote gluconeogenesis. In this investigation, vitamin B complex administration may have worked to support the well-known rapid pre-weaning ability of the Boer goat kids. Vitamin B complex is known to stimulate the metabolic rate of young goats for vitamin B_1 (thiamine) helps to convert carbohydrates to glucose (www.tennes seemeatgoats.com). Vitamin B complex group are critical to the intermediary metabolism of all cells. They are co-enzymes for many important enzymatic pathways of the glycolytic, tricarboxylic, hexose monophosphate as well as many other subsidiary pathways of energy metabolism (Newberne and Conner, 1989). Although, adult ruminants can produce their vitamin B utilizing their rumen microbes, goat kids do not possess such microbes and consequently are deficient in vitamin B. The kids injected with vitamin B complex were seen to be very active. Ninety percent of these kids survived for the first 12 weeks.

While adult Boer goats are well adapted to extreme temperatures due their long hair coats providing an insulating layer, their neonatal kids are very susceptible to cold exposure, tolerating an optimal temperature range of 20-28°C (Alexander, 1974). According to these authors, newborn kids become extremely susceptible to hypothermia as was the case throughout the course of this investigation. The goats were exposed to low day and night temperatures as seen in Fig. 2. Frequent severe losses of young goat kids during cold spells hampers the goat industry. Weaning weight is controlled by how much the mother produces along with how long she allows each kid to nurse in cases of twinning. Amelioration of stress in the doe allows channeling of energy for milk production instead of maintaining the body temperature of the doe.

Farmers advocating for winter kidding should flush the does for this helps in producing a strong and vigorous kid. Most of the kids that die are those that are weak and have a low birth weight. Flushing is therefore, critical during the winter months when the vegetation is poor in nutrients. Sustained supplementation of post parturient does maintains a steady supply of milk for the fast growth of the goat kids. Deworming the does at kidding time would improve their health ensuring good milk yield.

CONCLUSION

Survival of goat kids can be increased by giving pregnant does supplementary diet in the last month of pregnancy. Kids should be housed at night to cut the chill factor and given vitamin B complex to stimulate their metabolism and overcome stress..

ACKNOWLEDGEMENT

The willingness of the farmers to provide information on the management of goat kids was highly appreciated.

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