EFFECT OF PROTEIN SUPPLEMENTATION ON THE PRODUCTIVITY OF TAGGAR GOATS UNDER DRY NATURAL GRAZING, WESTERN SUDAN

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المستخلص

اجريت هذه التجربه في ماعز التقر لتقييم تاثير عليقتين اضافيتين مختلفتين في نسبة البروتين علي بعض الصفات الانتاجيه والتناسلية . سبعة واربعون عنزه تقر بالغه استعملت في هذه التجربة وزعت الحيوانات على انظمة للتغذية المجموعة ٢ (١٦.٧% بروتين)، المجموعة ٣ (٢٠.٤% بروتين) والمجموعة الاولي (بدون عليقة اضافية) في تصميم كامل العشوائية .

اظهرت النتائج ان الماعز المغذية علي عليقة اضافية اعطت نسبة اعلي للمواليد هي ١.٥ و ١.٣٣ في المجموعة الثانية والثالثة علي التوالي ، مقارنة مع ١.٢ للمجموعة بدون عليقة اضافية . اما معدل المواليد فكان عاليا في المجموعتين المغذيه علي عليقة اضافية (١٠٠%) مقارنة مع المجموعة بدون عليقة اضافية (٩٣.٨%) .

Key words: Taggar, goats, protein supplement, dry land, Sudan

كما ان وزن الجسم كان اكبر في وقت الولادة والفطام للماعز المغذي علي عليقة اضافية مقارنة مع الماعز بدون عليقة اضافيه . اما الفترة بين الولادتين كانت اقصر في الماعز المغذي علي عليقة اضافية (٧.٨٨ ±٢٤٢.٦٠ و ٨.٣٨ ± ٢٤٧.٨١) للمجموعتين ٢ و٣ علي التوالي مقارنة مع الماعز بدون عليقة اضافيه وهي (٦.٨٤±٢٨٨.٩٦) . كما ان فترة التلقيح قد نقصت في الماعز المغذية علي عليقة اضافية مقارنة مع الماعز بدون عليقة اضافية وهي ٤.٩٦ ± ٧٤.٣٢ ، ٤.٦٧ ± ٨٣.٤٩ ، ٤.٢٢ ± ٩٣.٠٨ يوميا للمجموعات ٢، ٣، ١ علي التالي.

اما نتائج مكونات اللبن فاظهرت ان الماعز المغذي علي عليقة اضافية سجل نسبة اعلي للبروتين ، اللاكتوز ، والجوامد الكلية اما الدهن فكان اعلي في الماعز بدون عليقة اضافية . العليقة الاضافية

المقدمة للماعز ادت الي تقليل معدل الاجهاد والموت مقارنة مع الماعز بدون عليقة اضافية.

Abstract

The experiment was conducted in Taggar goats under natural grazing to evaluate the effect of two supplements varying in protein on some reproductive and productive traits. Forty seven mature Taggar goats were used in this experiment. Animals were allocated to three feeding regimes, group 2 (16.7% CP), group 3 (20.4 % CP) and group 1 (un-supplemented) in a complete randomizes design. Results indicated that supplemented does secured higher litter size of 1.5 and 1.33 in group 2 and group 3 respectively, compared with 1.2 in un-supplemented group(1). Where kidding rate was high in supplemented groups (100%) compared with un-supplemented group (93.8%). Body weight was heavier at time of kidding and weaning for supplemented does compared with un-supplemented does. The kidding interval for the supplemented does was shorter (247.81±8.38 and 242.60±7.88 days) for does in group 2 and 3 respectively compared with does in un-supplemented group (288.94±6.84 days). Similarly, the service period had been reduced in supplemented does compared with un-supplemented does, the respective values were 74.32±4.96, 83.46±4.67 and 93.08±4.22 days for group 2, 3 and 1

respectively. The results of milk component indicated that supplemented does recorded higher protein, lactose and total solid content whereby the fat content was higher in un-supplemented does. The supplementation which was given to does had reduced abortion and mortality rates compared with the un-supplemented does.

Introduction

Goats play a crucial role in the subsistence economy of rural communities in Sudan, where they are generally raised by poor farmers and distressed women. Sudan's wealth of goats is estimated as 42 million head (MAR, 2007). The major breeds being Sudanese Nubian, Desert, Nilotic and Mountain (Taggar) breeds (AOAD, 1990).The Taggar's breed is kept for meat production since its milking potential is poor, and are widely distributed in many parts of the Sudan. They are concentrated in Nuba mountain of Southern Kordofan. Their major domain is Nuba Mountains in Southern Kordofan state. The breed is characterized by its agility in mountainous regions where the supply of meat in a small community is required (Devendra, 1990).

In the tropics area and especially for animals raised under traditional systems, suffer from nutritional deficiencies of energy and protein. This affects negatively growth rate as well as reproductive efficiency (Ohiokpehai, 2003). Several studies have shown that supplementation during prepartum period had a positive impact on growth and improved goats productivity (Totanji and Lubbela, 2000, Madibela and Segwagwe, 2008).The former authors also reported that grazing alone may not be sufficient for optimizing live weight gain for meat production. Therefore, the present experiment was designed to study the effects of dietary protein supplementation on productivity performance of Taggar goats under natural grazing.

Material and Methods

This study were conducted in Dalanj area (longitudes 12.02˚ N, Latitudes 29.39˚E).

Forty seven pregnant Taggar does ranging in age between 1-4 years, with three bucks were acquired by direct purchase from local markets. On arrival to experimental site they were divided into three groups G1, G2 and G3, each group with 16, 16 and15does, with respective average body weight of 19.16±6.53kg, 19.14±4.17kg and 19.17±4.05kg. All groups were eared tagged and treated against endo-and ecto-parasites (AGVET, USA 1.0 ml/50 kg body weight administered subcutaneously plus Ivomec super drench). The animals were vaccinated against goat pox, Anthrax and Hemorrhagic Septicemia. The does were housed in three separate enclosures constructed from iron bars and wire, and were provided with feeders and water troughs. Inside each enclosure, the animals were individually tethered at sufficient distance to allow individual feeding of the concentrate. All animals were allowed free grazing on an early pasture from 8.00 am to 6.00 pm. On their returned from pasture G2 and G3 were individually feed an 350g/day/head of supplement A (16.7% CP) and supplement B (20.4% CP) respectively, G1 left as a un-supplemented. The ingredients and proximate analysis of the concentrate mix was done according to AOAC (1985) is shown in (Table 1).

The does were weighed at weekly interval for 8 weeks before kidding and 12 weeks post kidding .The does were fasted overnight before being weighed.

Milk samples were collected at monthly interval, for three consecutive months post kidding and were analyzed for milk composition according to AOAC (1990).The data was statistically analyzed using SPSS (1990). Duncan's Range Tests was used to test significance between means.

Results

Effect of supplement type on litter size and kidding rate:

Type of supplementation affected litter size significantly (P<0.05). Does in group 2 secured the largest litter size followed by does in groups 3. The smallest litter size was obtained by the un-supplemented does in group 1(Table 2). The supplemented groups (2 and 3) showed higher kidding rate compared the un-supplemented group (group1) (Table 2).

Table 1. Ingredients and chemical composition (%) of type of supplement

Components (%)	Supplement A	Supplement B
Sorghum grains	15	15
Groundnut Cake	45	-
Rosella seeds	-	50
Wheat bran	19	19
Groundnut Hulls	20	15
Common Salt	0.75	0.75

Proximate analysis (DM basis)

Supplement types	DM	CP	CF	E.E	NFE	Ash	ME(MJ/Kg DM)
Supplement A	93.2	20.4	10.3	4.5	58	6.8	12.20
Supplement B	93.9	16.7	17.4	6.6	47.5	11.8	11.57

Table 2. Effect of protein supplement level on litter size and kidding

Animal groups	No. of does	No.of kidding does	No. of kids	Litter Size	Kidding rate %
Group1	16	15	18	1.2	93.8
Group2	16	16	24	1.50	100
Group3	15	15	20	1.33	100
Overall mean	47	46	62	1.36	97.9

rate of Taggar goats under natural grazing

Effect of type of supplement on body weight at kidding and weaning:

The results showed that the body weight at kidding of both supplemented groups (2&3) was significantly ($P<0.05$) higher than that of the un-supplemented (Table 3).The body weight of the does at weaning of their kids was monitored. The results indicated that the dams experienced variable body weight losses imposed by type of supplement. The weaning body weight of the supplemented groups (2 and 3) was significantly ($P<0.05$) higher than the un-supplemented group. Similarly, body weight losses were significantly ($P<0.05$) higher in the un-supplemented group compared to the supplemented groups (Table 3).

Kidding interval and service period:

The data pertinent to the effect of supplement type on kidding interval and service period is presented in (Table 4). The results indicated that kidding intervals of both supplemented groups were significantly ($P<0.01$) shorter than that of the un-supplemented group.

Table 3. Effect of protein supplement level on body weight at kidding and weaning of ….

Animal groups	N	Body wt at kidding (Kg)	Body wt at weaning (Kg)	Body wt change (Kg)	Change (%)
Group 1	15	23.86±0.30 [b]	20.10±0.37 [b]	-3.76±0.27 [a]	15.7
Group 2	16	25.45±0.35 [a]	22.70±0.43 [a]	-2.75±0.39[ac]	10.8
Group 3	15	24.83±0.29 [a]	23.02±0.36 [a]	-1.81±0.28 [bd]	7.3

Values in same column with different superscripts differ significantly (P<0.05)

Table 4. Effect of type of supplements on kidding interval and service period

Animal groups	N	Kidding interval(days)	Service period(days)
Group 1	14	288.94±6.84 [ac]	93.08±4.22 [ac]
Group 2	16	247.81±8.38 [b]	74.32±4.96 [b]
Group 3	14	242.60±7.88 [bd]	83.46±4.67 [bd]

Values in same column with different superscripts differ significantly (P<0.05)

Milk composition:

The effect of type of supplement on milk chemical composition of experimental goats is illustrated in (Table 5). The data indicated that type of supplement had exerted a significant (P<0.01) effect on fat and total solid content. The fat content was higher in the un-supplemented group than in supplemented groups. The total solid content was significantly (P<0.01) higher in the supplemented groups compared with the un-supplemented group. The data also indicated insignificant effects of supplementation on crude protein, lactose and ash content.

Table 5. Effect of protein supplement level on milk composition.

Animal groups	N	Fat	Crude protein	Lactose	Ash	Total solid
Group 1	10	3.60± 0.05b [c]	3.49± 0.04	4.25± 0.06	0.79± 0.01	12.36± 0.02 [c]
Group 2	9	3.04± 0.04 [a]	3.50± 0.04	4.29± 0.06	0.79± 0.01	12.48± 0.02 [a]
Group 3	10	3.48± 0.05 [c]	3.78± 0.04	4.31± 0.07	0.80± 0.01	12.38± 0.02 [bc]

Values in same column with different superscripts differ significantly (P<0.05)

Abortion and mortality rate:

The data indicated that the un-supplemented group suffered significantly (P<0.01) from abortion compared with the supplemented groups. The supplementation exerted insignificant effect on mortality rate (Table 6). However, supplemented goats in group 2 recorded zero mortality compared with un-supplemented group and group 3.

Table 6. Effect of protein supplement on some reproductive traits.

Animal groups	N	No. of aborted	Abortion rate %	No.of kidding does died	Mortality rate (%)
Group1	16	2	12.5	1	6.3
Group 2	16	0	0	0	0
Group 3	15	0	0	1	6.7

Discussion:

The current results comply with the previous claims adapted by Kudouda (1985) and Acero-Camelo *et al* (2008), who authenticated that supplementation favors litter size positively. Ikwuegbu and Ofodile (1994) and Gubartalla *et al* (2002) findings are in consistent with present results. The positive impacts of supplementation on litter size reflect the importance of plane of nutrition on goat production systems. Sachdeva *et al* (1973) advocated that the level of feeding goats affects litter size.

Goats are the most prolific domesticated ruminants under tropical and subtropical conditions, and able to breed throughout the year (Greyling, 1988). The results dealing with kidding rate obtained here are similar to Alexandre *et al* (2001) who reported 90.5 for kidding rate for Creole goats. The present results however are higher than that observed by Saddul *et al* (1999), Kale and Tomer (1999) of 51.98±2.11 for kidding rate and Kumar *et al* (2002) 83.6% for kidding rate for Kutchi goats.

The highest kidding rates were obtained in goats that had been supplemented prepartum. Nonetheless, it was observed that goats that had been supplemented were serviced and conceived within a shorter time compared with the un-supplemented group, similar results were obtained by Alexandre *et al* (2001) for Creole goats, however, the present results

are higher than that reported by Saddul *et al* (1999), Kale and Tomer (1991) and Kumar *et al* (2002) for Kutchi goats. This could be attributed to the supplementary feeding which had led to increased goat fertility, hence, leading to high kidding rate. Plane of nutrition, body weight of the mother and system of management were found to be an important factor to improve kidding percentage (Sachdeva *et al*, 1973). Clearly, they confirmed that maintenance of pregnancy was supported by prepartum supplementary feeding. This is in agreement with the findings of Oyeyemi and Akusu (2002) who reported that high fertility and prolificacy were observed in the highly supplemented groups. Similar results were obtained by Hossain *et al* (2003) and Johi *et al* (2004) whom claimed that the number of pregnant does were higher in high energy supplemented groups. The postpartum weight in the supplemented goats obtained was higher than un-supplemented un-supplemented group, and this could be due to the prepartum supplementary feeds. It's evident that the prepartum supplementation increased weight in this study. Those results also are on line with the findings of Ebro *et al* (1998), Totanji and Lubbadeh (2000) for Shami goats, Madibela et al (2002) and Madibela and Segwagwe (2008) who reported that supplementation of grazing goats with concentrate and or Lablab hay result in increasing live weight gain.

Body weight at weaning was very high for the supplemented goats compared with the un-supplemented goats. The change in body weight mass after parturition throughout the lactation and weaning periods was highly significant, that could be due to the high milk secretion to offspring. Similar results were reported by Gubartalla *et al* (2002) who reported that in early lactation the dry matter intake was low and the daily milk yield was high so the energy supplies is below maintenance and milk production requirements. Hence, more energy was mobilized from body reserve resulting in animal losing weight. The results of this study also showed positive utilization of the supplementation feeds. However, a significant body weight gain or loss in supplemented groups compared with non-supplemented groups showed positive influence of concentrate supplementation during pregnancy in goats which reduced the mass losses

in entire lactation period. These findings are in agreement with data reported by Guessous *et al* (1989) and Hussain *et al* (1996) who reported that a decrease in quantity and quality of available biomass as grazing progressed was accompanied by loss of live mass in non-supplemented ewes. The results also agreed with Oyeyemi and Akusu (2002) who reported that the nutrition have a significant influence on mass changes at different period of gestation and in the pre-weaning period, confirming that adequate feeding prevents large losses in body weight at time of parturition and pre weaning post body weight.

Un-supplemented goats had longer kidding interval compared with supplemented goats. Considerable evidence showed that adequate feeding prevents large losses in body weight at time of kidding and therefore reducing the time to reinitiate ovarian activity. The results were in consistence with Chiboke *et al* (1988) and Chowdhury *et al* (2002).

The service period in present study was similar to those reported by Gubartalla *et al* (2002) in Sudanese Nubian goats and Malau-Abuli *et al* (2005); and higher than that reported by Akusu and Oyeyemi (1998) and Greyling (2000). However, it was lower than that reported by Rout *et al* (2000) and Hassan et al (2007). The difference in service period and kidding interval in present study and other studies could be due to different management practices and levels of nutrition. The nutritional stress appears to be a prime probable cause of cyclicity and long kidding interval in the goats, body weight changes support this hypothesis.

Milk fat and total solid content of the un-supplemented group was significantly ($P<0.05$) higher than that of supplemented groups. This may be a reflection of the low milk yield; since fat content and yield are inversely proportional. Similar results were obtained by Gubartalla *et al* (2002), Min *et al* (2005) and Stella *et al* (2007) who reported that average of fat and protein were lower in milk of goats given zero concentrate compared with other supplemented groups. This result confirms with Fedele *et al* (2000) that increasing the level of energy intake in dairy goats improved their milk yield and decreased the fat percentage. The fat content observed in the present study were lower than that reported by

Ciappesoni *et al* (2004) and Zahraddeen *et al* (2007) 4.77%, and higher than that obtained by Szymanowska and Lipecka (2000) 3.4% for Poland goats. The crude protein, lactose and ash were not affected by the supplement types, but the protein content in present study was higher than that reported by Szymanowska and Lipecka (2000), and lowered than that reported by Zahraddeen *et al* (2007).

Supplementation reduced the incidence of abortions, so it was high in the un-supplemented goats. Similar results were reported by Johi *et al* (2004), Tedonkeng-Pamo *et al* (2006) and Mellado *et al* (2006), who reported that abortion rate may be increased or lowered according to feed condition. The causes of abortion may be due to infection of vibrosis bacteria and may be also due to environmental agent and/or deficiency in feed nutrient, since the shortage of energy especially under range conditions are known to cause abortion in goat (Tedonkeng-Pamo *et al*, 2002).The mortality rate was lower than that obtained by Mahanjana and Cronje (2000) for South Africa goats, and higher than that observed by Rout *et al* (2000) for Jamunapari goats (3.4%). The low mortality rate may reflect the good management that was practical during the study.

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