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PRODUCTIVE AND REPRODUCTIVE PERFORMANCE OF TAGGAR FEMALE KIDS AS AFFECTED BY TYPE OF CONCENTRATE RATIONS UNDER DRY LAND FARMING IN WESTERN SUDAN

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SUMMARY

The experiment was conducted on Taggar female kids to evaluate the effect of supplementation with concentrate rations on growth performance. Thirty (30) female kids of Taggar goats were used in this experiment. Animals were allocated to three feeding regimes in a complete random design. The results indicated that supplemented kids secured higher birth weight 1.95±0.06 and 2.02±0.07 kg compared with control group 1.49±0.06 kg. Body weight at weaning was higher in supplemented groups as 7.96±0.34 and 8.38±0.38 kg compared with control group 6.63±0.31kg, also body weight gain was higher for kids supplemented with concentrate rations compared with control kids. Whereas the body weight was heavier at puberty and at first kidding for supplemented group compared with control group. Results indicated that concentrate rations offered to female kids increase body weight during growth phase. Kidding rate was high in supplemented groups 87.5 and 100% compared with control group 85.7%. Age at puberty and age at 1st kidding was reduced in supplemented groups compared with control group. These results indicated that the level of concentrate rations affect growth performance and onset of productive age of the goats. In conclusion, the concentrate rations showed positive impact on female growth performance which increases birth weight, weaning weight and reduces age at puberty and at 1st kidding of the Taggar goats, under dry land farming system in Western Sudan.

Keywords: Taggar goats, female kids, growth performance, weaning, puberty, 1st kidding, concentrate ration, Sudan

INTRODUCTION

Goats are important for providing rural population with milk, meat and skin, and play a potential role in the subsistence economy of Sudan. They are generally raised by poor farmers and distressed women. In the tropical area, especially for animals raised under traditional systems, energy intake fluctuates according to the season. This should have an impact on productivity of goat as reflected in slow growth rates, body weight losses, delayed puberty and age at first kidding, long kidding intervals and high rates of pre-weaning mortality. Animals may use more energy searching for grazing over long distance than the energy they gain from this poor quality feed

especially during dry seasons (Mahgoub and Lu, 2004). In domestic ruminants, dietary energy restriction results in delayed puberty and cycilicty disruption in sexually mature goats. Several studies have shown that concentrate ration supplementation during prepartum period had a positive impact on growth performance and improved goats productivity (Madibela and Segwagwe, 2008). The authors also reported that grazing alone may not be sufficient for optimizing live weight gain for meat production.

The population of goat in Sudan was estimated to be 42 million (M.A.R, 2007). The large population of goats is mainly composed of Nubian, Desert, Nilotic and mountain (Taggar) breeds (A.O.A.D, 1990). Some tropical breeds, including the Taggar are kept for meat production, rarely milked since their dairying capability are poor. The Sudanese mountain goats (Taggar) are classified as meat type, and are widely distributed in many parts of the Sudan and they are concentrated in Nuba mountain of Southern Kordofan. Their importance comes from the fact that they have a wide range of adaptability and high ability to survive and produce in harsh conditions where other livestock can not. The present experiment was designed to study the effect of type of concentrate ration supplementation during dry season on productive and reproductive performance of Taggar female kids.

MATERIALS AND METHODS

Study area:

The present study was conducted in Dalanj which lies within the medium rain (500mm) woodland savannah (Longitudes 12.02˚ N, Latitudes 29.39˚E). The total area extends over 9300 km^2 with total population of 250000 inhabitants. The soil types varied from sandy (goz) in north to heavy clays (vertisoil) and the lighter clay (gardoud) in the south. The mean monthly temperature ranged from 31.3°C in April to 25.8 °C in July, annual rainfall ranging between 500-800 mm, with peak rain in August (S.K.D.P, 2000).

Animal and their housing:

Thirty (30) Taggar female kids were used in this experiment. The female kids born belong to supplemented with concentrate ration and un-supplemented with concentrate ration dams. Female kids monitored from birth to age at 1st kidding. Kids were treated with the necessary medication against endo-and ecto-parasites (AGVET, USA 1.0 ml/50 kg body weight subcutaneously Ivomec super drench) and vaccinated against goat pox, Anthrax and Hemorrhagic Septicemia. All kids were kept in separate enclosures constructed from iron bars and wire, and equipped with feeders and water troughs. Inside each enclosure the animals were individually tethered at sufficient distance away from each other and offered supplement type in separate troughs.

Diets and method of feeding:

All kids were daily allowed grazing on pasture from 8.00 am to 6.00 pm after 30 day post birth. On their returning from pasture kids in group 2 and 3 were offered 150 g / head/day increase to 250g /day/ head of concentrate ration A (high protein) and B (low protein), respectively (Table 1). The supplement diets were fed at night when the animals were kept in individual pens. The increment of supplement diets

was based on body weight gain. The kids were weighed at weekly interval from birth to age at 1st kidding. The kids were fasted overnight before being weighed.

Experimental design:

The kids were ear tagged, weighed and blocking according to the three groups from which the born (supplemented and un-supplemented groups), the blocked groups were assigned at random to supplement diets having to different levels of protein into three groups 1: (control), 2: (high protein) and 3: (low protein) consisting of 12, 10 and 8 kids, respectively.

Statistical analysis:

Experimental data from feeding trials and reproductive traits were statistically analyzed for analysis of covariance (ANOVA) according to complete random design using SPSS (Version.14.0) software package. Duncan's Multiple Range Test (DMRT) was also used to test means significance differences.

Table 1. Ingredients and chemical composition of the experimental feed stuffs

Components (%)	**Ration A**			**Ration 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)							
Concentrate rations types	**DM%**	**CP%**	**CF%**	**EE%**	**NFE%**	**Ash%**	**ME (MJ/Kg DM)**
Ration A	93.2	20.4	10.3	4.5	58	6.8	12.20
Ration B	93.9	16.7	17.4	6.6	47.5	11.8	11.57

(DM= Dry matter, CP= Crude protein, CF= Crude fibre, EE= Ether Extract, NFE=Nitrogen Free Extract)

RESULTS

Effect of concentrate ration type on kid birth weight:

The data on birth weight of kids as affected by concentrate rations type are shown in (Table 2). The supplementary rations given to the experimental goat does, had highly significant ($P<0.01$) effect on kid birth weight. Supplemented kids recorded high birth weight compared with un-supplemented kids. Although kids in group 2 (high protein) showed significantly ($P<0.01$) lower birth weight compared with kids in an group 3 (low protein).

Table 2. Effect of type of concentrate ration on birth weight

Animal group	**N**	**Birth weight(kg)**
Group 1	12	$1.49^{ce} \pm 0.06$
Group 2	10	$1.95^{ad} \pm 0.06$
Group 3	8	$2.02^{ab} \pm 0.07$

Values in the same column followed by different letters are significantly different at $P<0.05$ and/or $P<0.01$

Effect of concentrate ration on taggar female kids weaning weight:

The weaning weight at 90 days of age in both supplement groups (supplement A &B) was significantly (P<0.01) heavier compared with the control group (Table 3). The group 3 (low protein) secured higher body weight compared with group 2 (high protein). The daily weight gain was not significantly (P<0.01) affected by the type of supplement of concentrate ration. The daily weight gains of the two supplemented groups were higher than that of un-supplemented group (control group) (Table 4).

Table 3. Effect of type of concentrate ration on body weight at weaning (kg)

Animal group	N	Weaning weight(kg)
Group 1	7	$6.63^{ce} \pm 0.31$
Group 2	9	$7.96^{ab} \pm 0.34$
Group 3	8	$8.38^{ad} \pm 0.38$

Values in the same column followed by different letters are significantly different at P<0.05 and/or P<0.01

Table 4. Effect of type of ration on body weight gain of kids from birth to weaning

Animal group	N	Daily body weight gain/g
Group 1	7	49.20±5.48
Group 2	9	55.61±6.00
Group 3	8	69.75±6.71

Effect of type of concentrate ration on conception and kidding rate:

The effect of supplement type on some reproductive traits of female kids were summarized in (Table 5). The data indicated non significant effects for concentrate rations. The highest conception rate was found in goats on group 3 (low protein) and group control group, whereas lower conception rate in group 2 (high protein). Kidding rate attained was higher in supplemented groups and lower kidding rate noticed in un-supplemented group. Where high kidding rate was noticed in group 3 (low protein) and lower in group 2 (high protein).

Table 5. Effect of type of concentrate rations on conception and kidding rate in Taggar female kids

Animal Groups	N	No. of serviced does	Conception rate (%)	No. of kidding does	Kidding rate (%)
Group1	7	7	100	6	85.7
Group 2	9	8	88.9	7	87.5
Group 3	8	8	100	8	100

Effect of type of concentrate ration on body weight changes:

The effects of type of concentrate ration on body weight at puberty and at 1st kidding were monitored on (Table 6). Supplemented female kids started to exhibit behavioral oestrus signs significantly (P<0.01) earlier than un-supplemented group (control group), where group 2 (high protein) excreted high body weight than group 3 (low protein). Whereas the weight at 1st kidding was significantly affected (P<0.01)

by type of concentrate rations, the supplemented groups recorded higher body weight compared with un-supplemented ones, since group 2 (high protein) recorded heavier body weight at 1st kidding compared with control 3(low protein) (Table 6).

Table 6. Effect of type of concentrate ration on body weight changes(kg)

Animal group	N	Body wt at puberty	Body wt at 1st kidding
Group 1	6	11.85 [c] ±0.39	18.26 [b] ±0.48
Group 2	7	14.45 [a] ±0.31	20.55 [a] ±0.38
Group 3	8	13.03 [b] ±0.37	19.92 [a] ±0.45

Values in the same column with different letters are significantly different at P<0.05 and/or P<0.01

Effect of type of concentrate ration on age:

The effects of type of concentrate rations on age at puberty and at 1st kidding were monitored on (Table 7). Age of female kids at puberty and at 1st kidding were significantly (P<0.01) affected by the ration type offered to the animals. Supplemented kids exerted lower age at puberty and 1st kidding compared with un-supplemented group. Kids in group 2 (high protein) had (P<0.01) younger age compared (P<0.01) with kids in groups 3 (low protein) in which they take longer days to attained puberty and 1st kidding (Table 7).

Table 7. Effect of type of concentrate rations on age at 1st kidding (days)

Animal group	N	Age at puberty	Age at 1st kidding
Group 1	6	221.27 [ab] ±11.44	415.75 [ac] ±13.36
Group 2	7	167.54 [ac] ±11.42	341.41 [bd] ±10.41
Group 3	8	188.80 [a] ±9.92	373.60 [b] ±8.94

Value in the same column followed with different letters are significantly different at P<0.05 and/or P<0.01

DISCUSSION

The importance of supplementation during the last trimester of pregnancy was confirmed in this study, where supplemented does kidded the heavier kids at parturition compared to the un-supplemented does. This result is in line with ELBuckhary (1998), ELimam *et al.* (2007), Zeleke (2007) and Ng'ambi *et al.* (2008). This study has shown that protein supplementation in late pregnancy (last month) had marked effect on kids birth weight and improved growth weight. The significant difference in birth weight of kids resulting from the random effects of the dams can be attributed to the natural variation occurring in the prenatal and post birth nutrient supplied by mothers. Which agree with Madibela *et al.* (2002) who attributed the low birth weight of kids to the dams nutrition during gestation, which agree with Robinson *et al.* (1999) who reported that nutrient supplementation during foetal growth and indeed during early-and-mid pregnancy could impact a legacy of developmental changes that affect size, viability and health of neonatal and its postnatal performance.

The body weight at weaning at 90 days of age was significantly higher for the supplemented kids 7.96 and 8.38 kg compared with that in the un-supplemented kids

6.63 kg, with an average weaning weight of 7.98±0.30 kg. This result was consistent with the observation of Tedonkeng-Pamo *et al.* (2006) and Acero-Camelo *et al.* (2008). The pre weaning daily weight gain was significantly affected by type of concentrate rations offered to dam's. The supplemented kids had heaviest daily weight gain (55.61±3.35 and 69.75±3.05 g/day) compared with the un-supplemented kid (49.20±2.63 g/day). Such result is consistent with Nieto *et al.* (2006) and Ng'ambi *et al.* (2008). These results are attributed to the high milk yield produced from supplemented does, since the growth rate in early age depends on milk production. Those variations in weaning weight in the present study compared with others may be due to different breeds and differences in management particularly in the time or (age) at weaning. Supplementation tends to rectify unbalanced nutritional situations of animals through supply of nutrients that are missing in their diets under a given set of circumstances. It is a common practice among livestock producers when the available forage fails to meet the nutritional requirements of a particular animal. With nitrogen-deficient diets, provision of additional nitrogen can have a dramatic improvement on the digestibility of the feed and ultimately the productivity of the animal. The superior growth rates exhibited by the supplemented animals in this study can be attributed to the additional crude protein.

Supplementary feeding offered to the breeding does had non significant effects on their conception rate. This result disagree with findings of Malau-Aduli *et al.* (2005) who reported that concentrate supplementation tended to significantly increase conception. The insignificance of results may be due to small size of the sample tested. The supplemented does showed a higher kidding rate compared with the un-supplemented ones, the results were in agreement with findings of Joshi *et al.* (2004) and Madibela and Segwagwe (2008) who stated that poor nutrition effects were reflected in reduced conception, high embryonic losses and reduced lambing rates. This was evidenced by high kidding rate of the supplemented does, since supplementary feeding at mating time had led to increased kidding rates. Despite the different conception rates in the supplemented and un-supplemented groups the kidding rate of the supplemented groups was superior compared to the un-supplemented which experienced more embryonic mortality.

Increase in feeding level reduced the age and increase the live weight at first oestrus. The supplemented group attained puberty at a higher body weight compared with the control. The mean body weight was 14.45±0.31 and 13.03±0.37 kg for supplement A and B, respectively, as compared to 11.85±0.39kg for the control group. This result is compatible with previously published data and which suggested that supplementation favours higher body weight at puberty (Chowdhury *et al.*, 2002 and Malau-Aduli *et al.,* 2005). Energy supplies have a marked effect on age of puberty and thus on age at first kidding

The effect of supplementary feeding was clearly observed in this study, where the supplemented kids reached puberty at an earlier age compared with control kids that reached puberty at a later age. These results were consistent with Malau-Aduli *et al.* (2005), Elimam *et al.* (2007), Hassan *et al.* (2007) and Zeshmarani *et al.* (2007). In this study the increase in feeding level had reduced the age at first oestrus.

The supplemented groups, supplement A maintained a heavier body weight at first kidding of 20.55±0.38kg compared with those in supplement B of (19.92±0.45kg) and the un-supplemented mates (18.26±0.48 kg), comparable results

were reported by Gubartalla *et al.* (2002) and Silva *et al.* (1998), this is indicating that high energy supplements had promoted female body weight.

The age at first kidding was slightly higher in the control group 371.25±11.47days (12.4 months) when compared with both supplemented groups. For the group fed supplement A and B the age at first kidding was 339.11±8.94 (11.3 months) and 317.83±11.45 days (10.6 months), respectively. The present result indicated that supplementation enhances maturity thus decreases the age at first kidding, a finding which comply with previous literature, Song *et al.* (2006) reported that in Korean native goats the group reared under intensive management kidded at a younger age (12.7 month) compared to that managed under range conditions (13.7 month), Mohamed and ELimam (2007), ELimam *et al.* (2007), Hassan *et al.* (2007) and Dey *et al.* (2007). The discrepancies between the cited data are mainly attributed to breed differences and small size of the flock.

CONCLUSION

The results showed that concentrate ration supplementation improved the birth weight, body weight at puberty and at first kidding and decreased age of puberty and age at first kidding of Taggar female kids in dry land farming system in western Sudan. However, the level of protein did not show any different results to studied traits.

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الأداء الإنتاجي والتناسلي لصغار إناث الماعز التقر تحت تأثير أنواع العلائق المركزة في المناطق الجافة بغرب السودان

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أجريت هذه التجربة في صغار إناث الماعز التقر لتقييم تأثير علائق مركزة اضافية علي أداء النمو. ثلاثون (٣٠) من صغار إناث الماعز التقر أستعملت في هذه التجربة. أخضعت الحيوانات لثلاثة أنظمة غذائية وفقاً للتصميم الكامل العشوائية. أشارت النتائج بأن الماعز التي أعطيت علائق مركزة إضافية سجلت أعلي وزن ميلاد 0.06±1.95 و 0.07±2.02 كجم مقارنة بالماعز الشاهد 0.06±1.49كجم.الوزن عند الفطام كان أعلي عند الماعز التي أعطيت علائق مركزة إضافية 0.34±7.96 و0.38±8.38كجم مقارنة بالماعز الشاهد 0.31±6.63كجم، أيضا وزن الجسم اليومي المكتسب كان أعلي في صغار الماعز التي أعطيت علائق مركزة اضافية مقارنة بصغار الماعز الشاهد.وزن الجسم كان أعلي عند البلوغ وعند الولادة الأولي في المجموعة التي غذيت علي العلائق المركزة مقارنة بمجموعة الشاهد،يدل هذا أن العلائق المركزة أدت إلي زيادة وزن الماعز اثناء فترة النمو. نسبة الولادات كانت مرتفعة في المجموعة التي اعطيت علائق مركزة اضافية بنسبة 87.5 و١٠٠% مقارنة بمجموعة حيوانات الشاهد 85.7%. وزن الجسم عند زمن الفطام والولادة الاولي كان أكبر في االماعز التي أعطيت العلائق الاضافية مقارنة بماعز الشاهد.العمر عند البلوغ وعند الولادة الأولي تناقص في المجموعة التي غذيت علي العلائق المركزة مقارنة بمجموعة الشاهد،هذه النتائج تدل علي أن مستويات العلائق المركزة التي أعطيت أدت الي أن يصل الماعز الي العمر الإنتاجي في وقت مبكر. خلاصة ان العلائق المركزة الإضافية أظهرت تأثيراً إيجابياً علي أداء النمو لإناث صغار الماعز التقر من خلال زيادة وزن الميلادو وزن الفطام وقللت من الفترة الزمنية لوصول الماعز لعمر البلوغ والعمر عند الولادة الاولي.