AUCTORES
Globalize your Research

Journal of Nutrition and Food Processing

Ibrahim Elimam *

Open Access

Research Article

Evaluation Of Feeding Residual of Sesame Capsule on Growth Rate of Sudanese Desert Kids in North Kordofan State, Sudan

Fathia, G.I. Godah[1], Ibrahim Elimam[2]**, Hind, A. Salih [3] and I, Bushara[3]**

[1]Minstery of Agricultural and Fishering , El-Obied, North Kordofan state, Sudan.

[2]Department of Animal Biotechnology, Faculty of Animal Production, University of East Kordofan, Sudan.

[3]Department of Animal Production. Faculty of Natural Resources and Environmental Studies, University of Kordofan El-Obied, Sudan.

***Corresponding Author:** Ibrahim Elimam, Department of Animal Biotechnology, Faculty of Animal Production, University of East Kordofan, Sudan.

Received date: March 07, 2021; Accepted date: March, 28, 2021; Published date: April 12, 2022

Citation: Fathia, G.I. Godah, Ibrahim Elimam, Hind, A. Salih and I, Bushara. (2022). Evaluation Of Feeding Residual of Sesame Capsule on Growth Rate of Sudanese Desert Kids in North Kordofan State, Sudan. *J. Nutrition and Food Processing*. 5(2); DOI:10.31579/2637-8914/088

Abstract

The experiment was conducted in ELobied locality, Northern Kordofan state, to evaluate the effect of supplementation of residual sesame capsule on growth performances of grazing Desert kids. Thirty-seven (37) Sudanese desert kids were used in this experiment. Kids were divided to four groups as (B, C, D) supplemented and group (A) unsupplemented as control depends on natural grazing only. Supplemented kids were allocated to three feeding regimes in a complete random design. The results indicated that the supplementary rations that given to the experimental goats, had highly significant ($p<0.01$) effect on kid birth weight, heavier at birth than control group (1.99±0.12, 2.42±0.11 and 2.22±0.12kg for B, C and D groups respectively versus 1.85±0.13kg for control). The results reveled that supplementary ration had no significant effect on kid growth from after birth up to 8th weeks pre –kidding, but during 8-12th week did. Also ration that offered to kids significantly ($p<0.01$) effected body weight at weaning and daily gain. The heavier weaning weight for groups B, C and D were 9.14, 9.55 and 9.47 kg vs 8.46 kg for A group with lightest weaning weight. Results showed that the effect of supplementary feeding was exerted no significant effect on pre weaning mortality rate. Highest rates were scored by group B 22% whereby group A, C and D were scored 12%, 9 % and 11% respectively. It may be concluded that the supplementation of with residues of sesame capsule had showed an impact on birth, growth rate and weaning weight of Desert kids under traditional farming system.

Key words: goat; Desert; kids; supplementation; birth weight; growth rate; weaning; sudan

Introduction

Goat is one of the major livestock of the subcontinent in Sudan; they play a very important role in the rural economy and provide many poor urban and rural families with milk and meat (Abu Nikhaila and EL Hag, 2003). In Sudan, goats are estimated to be about 42.5 million heads, which is a very large population compared to other African countries. In greater Kordofan total goats is estimated at 7.9 million and about 4 million are found in north Kordofan (MARF, 2012). Desert goats are mainly raised for meat production especially in rural areas, and they also provide milk for family needs. The Sudanese Desert goats are reared under traditional agro-pastoral and pastoral systems depended on grazing poor natural pastures with no supplementary feeding in arid and semi-arid areas of western Sudan particularly in Kordofan and Darfur region where they are well adapted to the local environmental conditions. This system of production (traditional agro-pastoral and pastoral) causes reduced growth and poor reproductive performance, which in turn, results severe economic losses. The genetic potentiality and productivity of these goats are deteriorating day by day due to indiscriminate breeding, lack of improved feeding and management practices.

Management practice by farmers influences the reproductive performance of all animals, and was responsible for a decrease in the overall productivity of goats (Elabid, 2008). Nutritional research to improve goat production lags behind that for goat population has increased throughout the world (Pashaa and Saithanoob, 2000). Very little information is pertinent to the performance of Desert goat`s kids under natural range conditions is available, since the level of productivity of goats is generally low, owing to poor husbandry practices, where goats are subject to wide fluctuations in the availability of feed and water (Hassan 2009).

On other hand information on Kid growth, birth and body weights of other ages and kid growth rate is important for goat breeding and production and sustainability of any goat enterprise depends upon the successful

raising of kids for replacement stock. The reproduction and production performances are always considered to be the most vital factor ensuring to increase the productivity in certain environmental situation and are directly influenced by genetic potential of animal, nutrition, environment and management of farm (Kunbhar et al., 2016).

Keeping the above points in mind, this study was therefore adopted to fill in this gap, this experiment was undertaken to investigate the effect of nutrition and supplementation on desert goat kids' performance reared under traditional management. The productive performances of the goats were measured in terms of birth weight of kids, growth rate, weaning weight and mortality rate.

Materials and Methods

The experiments carried out in ELObeid in North Kordofan State, Sudan (Latitudes 11º:15'-16º:30'N; Longitudes 27-32ºE). Average temperature varies between 30-35ºC during most of the year with peaks of above 40ºC during April, May and June. The rainy season extends from July to October with maximum rainfall in August. Long-term averages annual rainfall is about 280 mm (Technoseve, 1987).

Experimental animals

Thirty-seven (37) Sudanese desert kids were used in this experiment. The kids born belong to does supplement with concentrate ration and other does un-supplemented with concentrate ration. Kids were divided to four groups similar to their does groups as (B, C and D) supplemented and group (A) unsupplemented as control depend on natural grazing only. Kids monitored from birth up to weaning at 90 days post 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 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. Kids were kept in a separate during the night and left with their does during the day with special means to ensure no suckling.

Management and method of feeding

The newly born kids were left to suckle freely during the first week after birth, after which they were allowed suckling twice daily during the early morning before grazing time and in the evening after grazing time. 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 B, C and D were offered 100-150 g/ head/day increase to 200g /day/ head of concentrate ration 1, 2 and 3, 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 weaning (90days). The kids were fasted overnight before being weighed.

Chemical composition of feeds

The ingredients used in concentrated ration formulation, supplemented diets (ration 1, 2 and 3) and the natural grazing (Grasses, shrubs, herbs and trees) were analyzed using proximate analysis according to procedures described by the Association of the Official Analytical Chemists, AOAC (1997) (Table 1).

Statistical analysis

The data from feeding trials were analyzed statistically according to the analysis of variance procedure using the General Linear Model (GLM) applicable to the experimental design of complete random design by using the Statistical Package for the Social Sciences software package (SPSS, 2005). Duncan Multiple Range test was used to identify the significant differences between Means.

Components (%)	Ration 1(%) for group B	Ration 2(%) for group C	Ration 3(%) for group D
sesame residual capsule(Jaojaw)	99	74	49
Sorghum grains	0	10	20
Rosella seeds	0	10	20
Groundnut hulls	0	5	10
Common Salt	0.75	0.75	0.75
Lick stone salt	0.25	0.25	0.25

Supplement types	DM%	CP%	CF%	E.E%	NFE%	Ash%
Ration 1	97.75	10.8	10.8	3.04	57.75	5.7
Ration 2	96.75	20.5	20.5	8.65	34.85	4.10
Ration 3	96.55	11.4	11.4	3.45	52.9	6.75

Table 1: *Ingredients and Chemical composition of the rations*

Results

Effect of supplementation on kid's birth weight

The data on birth weight of kids as affected by feeding regime was shown in Table (2). The supplementary rations that given to the experimental goats, had highly significant ($p<0.01$) effect on kid birth weight, Kid of animals that on group C had significantly ($p<0.01$) maintained highly body weight 2.42±0.11kg compared to other supplemented animal in group D and B as 2.22±0.12kg and 1.99±0.12 kg. Does in group A (control) animal which maintained lightly bodyweight 1.85±0.13kg.

Animal Group	N	Means ±SE
Group A	8	1.85 ± 0.13^{c}
Group B	9	1.99 ± 0.12^{c}
Group C	11	2.42 ± 0.11^{a}
Group D	9	2.22 ± 0.12^{b}

Overall mean ±SE	37	2.11±0.12*

abc Values in same column with different superscripts differ at P<0.0

Table 2: *Effect of supplementation on birth weight*

Effect of supplementation on growth performance

The supplementary ration had highly significant (p<0.01) effect on kid growth from 8th week to end of weaning time (12th week) (Table 3). High growth rate were obtained by kids from group C from birth to 12 weeks.

Animal Group	N	1-4 weeks	4-8 weeks	8-12 weeks
Group A	7	4.04	6.27	8.40^{c}
Group B	7	4.10	6.39	9.14^{b}
Group C	10	4.16	6.91	9.55^{a}
Group D	8	4.30	6.40	9.45^{a}
Overall mean ± SE	32	4.15±0.25	6.53 ±0.27	9.20±0.2**

abc Values in same column with different superscripts differ at P<0.05

Table 3: *The effect of supplementation and sex kid on kid growth change*

Effect of supplementation on weaning weight

Ration that offered to does and kids significantly (p<0.01) effected body weight at weaning, body gain and daily gain Table (4). Kids weaning weight from group C weaned at 12th weeks were statistically heavier (9.55 kg) compared to kid from group D and B (9.47 and 9.14 kg respectively). Group A (control) kids showed lightest weaning weight (8.46 kg).

Animal Group	N	Weaning weight	body weight gain/kg	daily body weight gain/g
Group A	7	8.46^{c}	6.42^{c}	71.41^{c}
Group B	7	9.14^{b}	6.89^{b}	76.51^{b}
Group C	10	9.55^{a}	7.21^{a}	80.06^{a}
Group D	8	9.47^{a}	6.93^{b}	77.04^{b}
Overall mean ± SE	32	9.20±0.20**	6.90±0.15**	76.63±1.65**

abc Values in same column with different superscripts differ at P<0.05

Table 4: *The effect of supplementation on weaning and bodyweight gain*

Effect of supplementation on kid's mortality rate:

The effect of supplementary feeding was exerted no significant effect on pre weaning mortality rate Table (5). Highest number of kids died was in group B (2 kids) 22% whereby the number of kids died in group A, C and D were 12%, 9 % and 11% respectively. Average mortality rate was 13.51.

Animal Group	No. of kids	No. of kids died	Mortality %
Group A	8	1	12.5
Group B	9	2	22.22
Group C	11	1	9.09
Group D	9	1	11.11
Overall mean ± SE	37	5	13.51

Table 5: *Effect of supplementation on kid's mortality*

Discussion

Effect of supplementation on birth weight

Birth weights for Desert kids in the current study were within the range found in the literature with Bushara *et al.* (2017a) for same breed reared in Peri-urban system (2.13kg and 2.15kg) and Wang *et al.*(2011), and higher than that reported by Hagan *et al*. (2014) for WAD goat (1.20 kg) and Bharathidhasan *et al.* (2009) for Barbari goat (1.88 kg), also result here of birth weight is lower that reported by Atoui *et al*. (2015) for Tunisian local goat (2.34 Kg), Mioč *et al.* (2011) (2.28 kg), Zahraddeen *et al*. (2008), Hagan *et al*. (2014) (2.73 kg).The Sudanese deserts goat, its meat breed and its production depends on the performance starting from birth weight to weaning point. Evidence that there was a highly significant effect of feed supplementation during gestation on the birth weight of kids has been observed in this study, where supplemented does with sesame capsule residual (SCR) recorded higher birth weight compared with un-supplemented does, this results similar to Sumartono *et al*. (2016), Bushara *et al*. (2015) on Taggar goats, Zahraddeen *et al*. (2008), Ng'ambi *et al*. (2008), Zeleke (2007) and Berhane and Eik (2006) whom reported that Kids from supplemented does were heavier at birth than those from un supplemented does. The differences in birth weight may be attributed to effect of the dams uterine environmental mostly in late gestation through it availability nutrition. Low plane of nutrition during late pregnancy period will be unable to adequately nourish the foetus in the final stage of pregnancy and consequently birth weight will be reduced. The average birth weight of kids in the present study might be attributed to the dietary treatments; since it was revealed that, the higher the levels of concentrate diet, the higher the kids' birth weights. Therefore, a major factor contributing to the low birth rates in traditionally reared flocks is likely to be nutrition, since goats are kept almost

exclusively on the natural pasture, which agree with Malau-Aduli *et al*. (2004) who reported that nutrient during foetal growth in early-and-mid pregnancy could impact a legacy of developmental changes that affect size, viability and health.

Effect of Supplementation on weaning and growth performance

The growth rate and pre weaning gain of kids from supplemented does with sesame capsule residual (SCR) showed no significant effect but weaning weight did. So the supplementation in late pregnancy 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. These results agreed with Idirs *et al*. (2016), Zeleke (2007) and Oeak *et al*. (2005) whom stated that supplementation of pregnant ewes during late two month of gestation may provide adequate energy and protein so they produce more milk yield that reflected on growth rate of their lambs, which supports embryonic and foetal growth and maintenance of animal physiological needs. The average body weight gain in this study was 76.63 g, this result is lower than that obtained by Browning and Leite-Browning (2011) and higher than reported by Bharathidhasan *et al*. (2009) for Barbari goat. kids from supplementation showed higher gain compared with unsupplemented groups, Similarly, concentrate supplementation to kids has been shown to improve greatly growth performance especially when milk yield is low (Zahraddeen *et al*., 2008; Yiakoulaki *et al*., 2009**,** and Malau-Aduli *et al*., 2004) they showed that supplementation of different pastures during weaning increase average body gain of kids and lambs**.** Those results suggestion that the growth rate of kids was influenced by the type of ration offered to their dams during post and pre lactation period, Which agreed with Rankins and Pugh (2012), Andries (2011) and Mandal *et al*. (2006) who stated that the early growth rate of animals are determined not only by the genetic potential but also by maternal and environmental factors, since milk production in goats peaks within 2-3 weeks after parturition and then declines rapidly to a low level by 8-10 weeks after parturition, and higher growth performance of kids cannot only be sustained by milk supply from their dams. On contrast to those results Titi *et al.* (2010) reported that the partial to complete replacement of alfalfa in Shami goat kids did not adversely affect the growth performance.

Weaning weights are crucial and indicate the milking ability of the herds as well as the growth potential of the kids. The body weight at weaning at 90 days of age was significantly heaviest for supplemented kids. The average weaning weight for desert was 9.20 kg, these results were higher that what reported by Bushara *et al.* (2017a) for same breed 5.73 vs 6.63 managed in Urban and peri-urban respectively, also the result was lowered than reported by Bushara *et al.* (2017b) for same breed 10.84 kg. The effect of supplementation of residual of sesame capsule were clearly mentioned in this study, when kids born from supplemented scored heavier weaning weight compared with kids depended to natural grazing only, this result match the finding of Htoo *et al*. (2015), Acero-Camelo *et al.* (2008) and Tedonkeng *et al*. (2006) who reported that supplementation to the dam's significant increased kid growth rate. So, the availability of enough milk from the dams' results to faster pre-weaning weight gain.

Generally, the growth traits particularly pre-weaning in mammalian are not only influenced by the genetic effect but some other effects such as direct maternal effect and permanent environmental effects (Rashidi *et al*., 2008; Baneh *et al*., 2010). These maternal effects reflect mainly the dam's milk production and mothering ability, though effects of the uterine environment. The discrepancies may be due to breed variation and differences in management particularly the age of weaning in which highly gain is calculated when weaning is conducted in early age and that due to the weight gains during the early-pre-weaning growth stages, also the variation may be due to small size of experimental animals used in study.

Effect of supplementation on kid's survivability and mortality rate

Supplementary feeding with sesame capsule residual (SCR) was exerted no significant effect on per-weaning mortality rate, these results contrast the finding of Rastogi *et al*. (2003) and Alexandre *et al*. (2002) whom reported that mortality was less in kids from supplemented does. In this study the overall mean pre-weaning survivability was 86.49%, with mortality rate was 13.51%. These results match the finding of Turkson *et al*. (2004) and Adenaike and Bemji (2011) for the West African dwarf goat and higher than what obtained by Hagan *et al.* (2014) and Baiden (2007) 79.9% for West African dwarf goats. Bushara and Godah (2018) and Hagan *et al.* (2014) reported that birth type, parity of does and year of birth affected pre-weaning survivability. Mortality rate here were higher than what observed by Sumartono *et al*. (2016).

References

1. Abu Nikhaila, Abdel Moneim, M. A. and EL Hag, Khalid. O. (2003). Evaluation of growth rate of Sudan Nubian and crossbred kids. U. of K. J. Agric. Sci. 11:134-143.
2. Acero-Camelo, A. Valencia, E. Rodríguez, A. and Randel, P. F. (2008). Effects of flushing with two energy levels on goat reproductive performance. Livestock Research for Rural Development. 20(9).
3. Adenaike, A. S and Bemji, M. N. (2011). Effects of environmental factors on birth weights and weaning weights of West African dwarf goats under intensive and extensive management systems.Advances in Agricultural Biotechnology. 1:9-14.
4. Alexander, G. Fleury, J. Coppry, O. Archimede, H and Xandé, A. (2002). Effects of mode of supplementation upon milk and growth performances of suckling Creole goats and their kids reared at pasture in Guadeloupe. Livestock Research for Rural Development. 14(1).
5. Andries, K.M. (2011). Effects of season of kidding on doe performance in commercial Boer cross does1, 2. 26:20-24.
6. A.O.A.C. (1997). Official methods of analysis of AOAC International 16th, ed. 3rd Revision. Association of Official Analytical Chemists, Washington, DC.
7. Atoui, A., Hajejji, Z. Abaennebi, M. Gaddour, A. and Najari, S. (2015). Environmental factors affecting birth weight of Tunisian local goat population kids. Journal of new sciences. 38(1).
8. Baneh, H. Hafezian, S.H. Gholizadeh, A.R.M. and Rahimi, G. (2010). Estimation of genetic parameters of body weight traits in Ghezel sheep. Asian- Aust. J. Anim. Sci. 23(2):149-153.
9. Baiden, R. Y. (2007). Birth weight, birth type and pre-weaning survivability of West African Dwarf goats raised in the Dangme West District of the Greater Accra Region of Ghana. Tropical Animal Health and Production 39: 141-147.
10. Berhane, G. and Eik, L.O. (2006). Effect of Vetch (Vicia Sativa) hay supplementation on performance of Begait and Abergelle goats in northern Ethiopia: 1. Milk yield and composition. Small Rumin. Res. 64(3):225-232.
11. Bharathidhasan, A. Narayanan, R. Gopu, P. Subramanian, A. Prabakaran, R. and Rajendran, R. (2009). Effect of non-genetic factors on birth weight, weaning weight and pre weaning gain of Barbari goat. Tamilnadu J. Veterinary & Animal Sciences 5(3):99-103.
12. Browning, R. Jr. and Leite-Browning, M. L. (2011). Birth to weaning kid traits from a complete diallel of Boer, Kiko, and Spanish meat goat breeds semi-intensively managed on humid subtropical pasture. 89:2696-2707.

13. Bushara, I and Godah, Fathia G.I. 1. (2018). Effect of supplementary feeding with residual of sesame capsule to lactating desert goat during dry period in north kordofan state, sudan, Advances in Biology and Earth Sciences. 3(1):47-59.
14. Bushara, I. Mohamed, O. Mudalal, Hind, A. Salih, A.O. Idris, O.M.A. Abdelhadi, Elemam, M.B. Dafalla, M.Mekki. (2017b). Effect of Sex of Desert and Taggar Kids on Growth Performance under Extensive System in South Kordofan State. International Journal of Research Studies in Agricultural Sciences. 3(6):14-20.
15. Bushara, I. Hind, A. Salih and Mudalal, M. O. (2017). Birth and Weaning Weight of Sudanese Desert Goat as Affected by Management System. International Journal of Animal Husbandry and Veterinary Science. 2(3):10-11.
16. Bushara, I. Mudalal, M.O. Mekki, Dafalla. M. and Abu Nikhiala, AM. (2015). Effect dietary energy concentrate on birth weight, weaning weight, abortion and mortality rate of Sudanese Taggar goat kid's. Basic Research Journal of Agricultural Science and Review. 4(11):326-331.
17. Elabid, Kamal. Elhassan. (2008). Various Factors Affecting Birth weight of Sudanese Nubian Goat Kids. Research Journal of Agriculture and Biological Sciences, 4(6):700-703.
18. Hagan, B A. Nyameasem, J K. Asafu-Adjaye, A. and Duncan, J. L. (2014). Effects of non-genetic factors on the birth weight, litter size and pre-weaning survivability of West African Dwarf goats in the Accra Plains. Livestock Research for Rural Development. 26(1).
19. Hassan, H.M. (2009). Effects on Somali- Arabian goat doe body weight, birth weight and hay intake of rations of varying digestible energy fed in pregnancy. Animal Production Departament, Mogadishu Somalia.
20. Htoo, Nay Nang. Aung, Tun. Khaing. Yusuf, Abba. Nwe, New. Htin., Jesse, Faez. Firdaus. Abdullah., Then, Kyaw., Mohd, Azam. Khan. Goriman Khan. and Mohd, Azmi. Mohd. Lila. (2015). Enhancement of growth performance in pre-weaning suckling Boer kids supplemented with creep feed containing alfalfa. Veterinary World. 8(6):718-722.
21. Idris, A. Kijora, C. Sallh, A. M. Eltaher, H. and Bushara, I. (2016). Effect of supplementation, birth type and sex on labs growth rate under range condition. Online Journal of Animal and Feed Research. 6(2):24-29.
22. Kunbhar Hamzo Khan, Memon A. A., Bhutto A. L. Rajput Zahid Iqbal, Suthar V., Memon Azizullah and Leghari R. A. (2016). Study on female reproductive performance of Kamohri goat managed under traditional management conditions in district Hyderabad, Sindh, Pakistan. International Journal of Advanced Research in Biological Sciences. 3(3):251-260.
23. Malau-Aduli, BunmiSherifat. Eduvie, Lawrence. Lakpini, Clarence. and Malau-Aduli, Enochothniel. (2004). Crop-residue supplementation of pregnant does influences birth and weight gain of kids, daily milk yield but not the progesterone profile of Red Sokoto goats, Reprod.Nutr&Develop. 44:111-121.
24. Mandal, A. Ceser, N.F.w. Rout, P.K. Roy, R. and Notter, Dr. (2006). Estimation of direct and maternal (co)variance components for pre-weaning growth traits in Muzaffarnagari sheep. Livest. Sci. 99:79-89.
25. M.A.R.F. (2012). Ministry of Animal Resource and Fisheries, Government of Sudan. Annual report Salient situation of livestock and fisheries of Sudan. 45.
26. Mioc, B. Susi b, V. Susic, V. Antuovi, Z. Antunovic, Z. Prpi, Z. Prpic, Z. Vnu, I. Vnucec, I. Kasap, A. (2011). Study on birth weight and pre-weaning growth of Croatian multicolored goat kids n birth weight and pre-weaning growth of Croatian multicolored goat kids. Vet. arhiv 81:339-347.
27. Ng'ambi, J. W., Khitsane, L., Norris, D. and Mbajiorgu, C. A. (2008). Effect of soybean meal supplementation on pre-and post-partum productivity of Angora goats in communal rangelands of Molimo-Nthuse in Lesotho. Livestock Research for Rural Development. 20(1).
28. Oeak, N. Cam, M. A. and Kuran, M. (2005). The effect of High Dietary protein levels during late gestation on colostrums yield and lamb survival rate in singleton-bearing ewes. Small Ruminant Research, 56:89-94.
29. Pashaa, T. and Saithanoob, S. (2000). Goat meat production in South and Southeast Asia. Procedding of the 7th International Conference on Goats, May 15-21, Tours, France. 623.
30. Rankins, D.L. and Pugh, Jr. D.G. (2012). Feeding and nutrition. In: Pugh D.G, Baird A.N, 2012. editors. Sheep and Goat Medicine. 2nd ed. Maryland Heights: Elsevier, 18-49.
31. Rashidi, A., Mokhtari, M. S., Safi, J. A. and Mohammad, A. M. R. (2008). Gen etic param eter estimates of pre-weaning growth traits in Kermani sheep. Small Ruminant Research. 74:165-171.
32. Rastogi, Ankur. Narayan, Dutta. and Sharma, K. (2003). Effect of Strategic Feed Supplementation during Gestation on Intake, Blood-biochemical Profile and Reproductive Performance of Goats. Asian-Aust. J.Anim. Sci.16(12):1725-1731.
33. SPSS. (2005). Statistical Package for Social Sciences, windows evaluation program version 15, Michigan Avenue, Chicago, IL. 19-182.
34. Sumartono, Hartutik. and Nuryadi, Suyadi. (2016). Productivity Index of Etawah Crossbred Goats at Different Altitude in Lumajang District, East Java Province, Indonesia. Journal of Agriculture and Veterinary Science. 9(4):24-30.
35. Technoserve, (1987). Credit component baseline survey.Technoserve Inc. agricultural bank of Sudan and US Agency for Agricultural development, ELobied, Sudan. 204.
36. Tedonkeng, P.E. Fonteh, F.A. Tendonkeng, F. Kana, J.R. Boukila, B, Djaga, P.J. and Fomewang, G. (2006). Influence of supplementary feeding with multipurpose leguminous tree leaves on kid growth a milk production in the West African dwarf goat. Small Ruminant Research. 63(1-2):142-149.
37. Titi, H. Darawish, S. and, M. (2010). Comparing Chopped Barley Straw with Alfalfa Hay in Fattening Shami Goat Kids. 6(3):353-364.
38. Turkson, P.K. Antiri, Y.K. and Baffuor-Awuah, O. (2004). Kid mortality in West African Dwarf Goats under an intensive management system in Ghana. Tropical Anim. Health and Prod. 36:353-364.
39. Wang, D. H. Xu, G. Y. Wu, D. J. and Liu, Z. H. (2011). Characteristics and production performance of Tianfu goat, a new breed population. Small Rumin. Res.95:88-91.
40. Zahraddeen, D. Butswat, I.S.R. and Mbap, S.T. (2008). Evaluation of some factors influencing growth performance of local goats in nigeria. African Journal of food Agricultural Nutrition and Development. 8(4):464-479.
41. Zelek, Mekuriaw, Zeleke. (2007). Environmental influences on pre-weaning growth performances and mortality rates of extensively management Somali goats in Eastern Ethiopia. Livestock research for rural development. 19(12).
42. Yiakoulaki,M.D. Goetsch, A.L. Sahlu, T. Papachristou, T.G. Parissi, Z.M. Ben Salem, H. and Morand-Fehr, P.(2009). Grazing management systems:Creep grazing for suckling goat kids. Series A. Options Mediterraneennes. No. 85Ciheam/FAO/Nagref, Zaragoza. 387-392.