Evaluating pre and post mate flushing on reproductive performance of ewes and growth performance of lamb in Bonga Sheep

Progress Report

Muluken Zeleke
Jane Wamatu

Introduction

The interaction between nutrition and reproduction has long been known to have important implications for the reproductive performance (Smith RD, 2010) which directly influences fertility through mechanisms such as the development of oocytes, egg-laying, fetal survival, blood metabolites and hormones (Robinson et al. 2006). Economically speaking, fertility is considered as the most prominent characteristics in livestock breeding. Moreover, they are regarded as the most important determining factors for the efficiency of livestock breeding and genetic evidences (Ahmad fazel et al., 2014).

A protein or energy based supplementary feeding often refers to as "flushing" around the time of mating improves reproductive performance (Reese et al., 1990; Downing et al., 1995). According to Landau and Molle (1997) a short-term feed supplementation before mating positively influenced ovulation, enhanced lambing and twinning rates (Degen et al., 1987), onset of puberty (Kassem et al., 1989), the response to the ram effect (Hamidallah et al.,2000; Thimonier et al., 2000).

Failure to flush the ewes may result in delayed estrus activity and ovulation rate (OR) (Gunn et al., 1979), fertilization failure (Restall et al., 1978), embryonic mortality and higher rate of ova wastage (Rhind et al., 1989). In another report, the litter weight increased by extending the flushing period from 17 to 34 days, whereas the effect on litter weight (Sormunen-Cristian and Jauhiainen, 2002).

Collectively, these findings highlight that nutritional levels before mating are particularly important to subsequent reproductive success in sheep. Ethiopia is well known in Bonga Sheep breed and demand is increasing dramatically however; flushing to enhance reproductive performance of sheep has not been extensively demonstrated, there is no trend and standard level of flushing in Bonga sheep, there is no study and limited effort has been made to untap the reproductive performance of Bonga sheep.

Objectives

General Objective

To evaluate the effect of pre and post mating nutritional flushing on major reproductive performance of Bonga sheep

Specific Objectives

To evaluate the effect of graded level of flushing on conception rate

Materials and Methods

2.1 Study Location

The experiment was conducted at Bonga Sheep Breeding and Improvement Ranch of Bonga Agricultural Research Center located in Decha district; Kaffa zone, Southern Nations, Nationalities, and Peoples' Region of Ethiopia, 474 km south west of Addis Ababa. The Ranch is located at an altitude of 1807 m above sea level and latitude and longitude range of 7.0°11' N and 36°18'E. The mean range annual rainfall and temperature of the study area were 1001-2000mm and 15.1-27.5°C, respectively (RSA, 2009/10).

2.2 Animal Feeding and Management

Ewes (*n*=56) of same parity 56 ewes were blocked by body condition score and allotted randomly into five experimental diets of 0 g, 250g, 350 g and 450 g of concentrate per animal per day, respectively. The flushing which lasted for 30 days began at the same time in all groups, 20 days before mating and terminated individually 10 days after service.

T1= Desho grass (control)

T2= 250g+ Desho grass

T3= 350g+ Desho grass

T4= 450g+ Desho grass

Experimental animal selection and synchronization

Non pregnant ewes were identified by ultrasound. Non pregnant ewe will be registered and five sheep will be selected randomly. To manage the experiment, ewes were injected prostaglandin PGF2α and the ewes comes to heat was naturally mated by top ram at the same time.

Data to be collected

- Conception rate
- Litter size
- Delivery type (single/twin)
- Birth weight of lamb,
- Survival rate
- Cost benefit analysis

Data analysis: data will be analyzed using ANOVA procedure of SAS 9.3. Data was separated by least significant difference (LSD). Mean differences were considered significant when $P \leq 0.05$, whereas $0.05 < P < 0.10$was considered to show a statistical tendency for difference. The appropriate model used for data analysis was depicted here under:

$$Y_{ij} = \mu + T_i + B_j + e_{ij}$$

Where:

Y_{ij} = response

μ = overall mean
$T_{i=}$ treatment (feed) effect
B_j= block (birth type and body condition score) effect
eij= random error








Result and Discussion

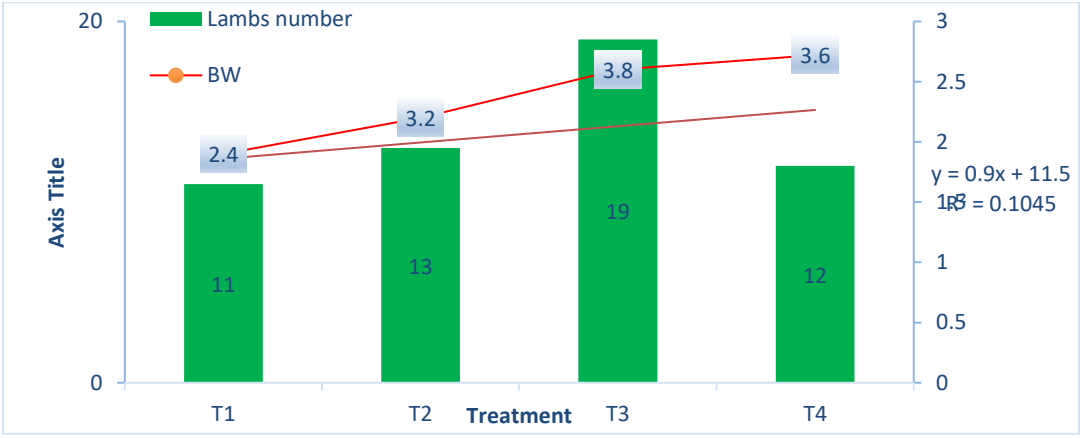
Reproductive performance of the ewes

The conception rate (%) was higher T3 (93%) in flushed ewes as compared to, T2 (78%) and T4 (71%). Lower conception in the case of non-flushed control group (69%) was a clear reflection of their poor nutritional status as they were not able to meet their nutrient requirements solely from *desho* grass. This may due to effects of increased levels of nutrition on the blood concentrations of reproductive and metabolic hormones in the ewe and some of the intraovarian changes that take place in response to nutritional stimulation. These findings are in agreement with the reports of Chaturvedi O.H (2008) which suggest that short-term flushing with protein and energy rich feed resources might be beneficial to increase conception rate. Also, Daghighkia et al. (2011) have demonstrated that the use concentrate feed in flushing rations, improves reproductive performance and pregnancy. This may due to increased levels of nutrition on blood concentrations of reproductive and metabolic hormones in the ewe and intraovarian changes that take place in response to nutritional stimulation.

However, when the concentrate level is increasing T4 (450g) conception rate is decreasing (69%). The same result was reported previously (Funston R.et al 2007, Blanchard T. et al, 1990, Smith RD et al, 2010) which reported excessive feeding decrease conception rate. Excessive concentrate intakes can lead to “fat ewes” problems. Ewes that are over-conditioned when they lamb have a higher incidence of retained placenta, more uterine infections and more cystic ovaries. Additionally, It expose to high levels of ammonia or urea may impair maturation of oocyte and subsequent fertilization or maturation of developing embryos.

3.2 Lambing rate

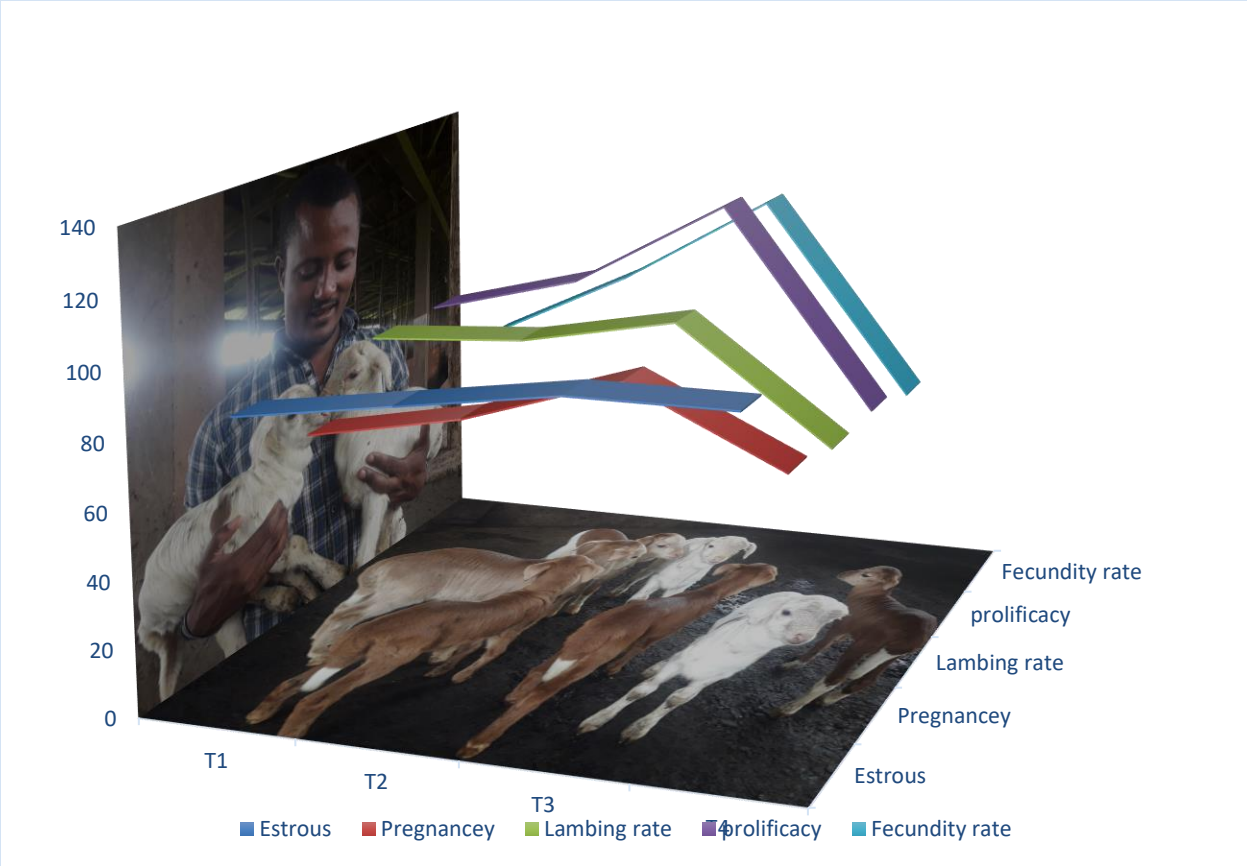
The effect of graded level nutritional flushing on lambing rate are shown in fig 2. In current study the lambing rate T1 (88%), T2 (91%), T3(100%) and T4 (66%). The lambing rate of T3 was significantly higher compared to other treatment. Differences in lambing rate may be associated with adequate nutrient fulfillment to fetus. Flushing around breeding time increases the lamb/kid crop by 20-30%, primarily by increasing the number of twins born.



3.3 Prolificacy rate

The effect of graded level nutritional flushing on prolificacy rate are shown in fig 2. In current study the lambing rate T1 (88%), T2 (100%), T3(126.6%) and T4 (66%). The lambing rate of T3 was significantly higher compared to other treatment.

Flushing increased lambing, fertility, prolificacy, fecundity, pregnancy, weaning rate, and lamb weight, as observed for Sudanese desert sheep by Wilkins (1997), El-Hag et al (2006), El-Toum (2005) and Bukhari (2005).



Conclusion

It is concluded that the biomass yield of the community rangeland is low and insufficient to meet the nutrient requirement of ewes prior to the mating season. Concentrate supplementation at the rate of 350gm to ewes during this critical stage enhanced their conception rate

References

Ahmad Fazel, A., Daghigh kia, H., Hosseinkhani, A., Moghaddam, Gh., Alijani, S., Olfati, A. 2014. Investigating the Effectiveness of Nutrition on the Sexual and Breeding Behaviors in Ghezel Sheep. *International journal of Advanced Biological and Biomedical Research*, 2(3), 715-722.

Chaturvedi, O. H., A. S. Mishra, A. Santra, S. A. Karim and R. C. Jakhmola. 2001. Effect of supplementary feeding during late gestation on production performance of ewes grazing on community rangeland. Ind. J. Anim. Sci. 71:714-717.

Downing JA, Scaramuzzi RJ. 1991. Nutrient effects on ovulation rate, ovarian function andthe secretion of gonadotrophic and metabolic hormones in sheep. J Reprod Fertil Suppl 43: 209–227

Gunn, R. G., J. M. Doney and W. F. Smith. 1984. The effect of level of pre-mating nutrition on ovulation rate in Scottish Blackface ewes in different body conditions at mating. Anim. Prod. 39:235-239.

Landau DJ, Molle G. 1997. Nutrition effects on fertility in small ruminants with an emphasis on Mediterranean sheep breeding systems. In: Recent advances in small ruminant nutrition proc. CIHEAM-IAMZ meeting. Zaragoza, Spain. pp: 203-216.

Restall, B. J., R. D. Kearins, J. Herdegen and P. Carberry. 1978. The induction on reproductive activity in lactating ewes. J. Agric. Res. 29:181-187.

Rhind, S. M., W. A. C. McKelvey, S. McMillen, R. G. Gunn and D. A. Elston. 1989. Effect of restricted food intake, before and/or after mating, on the reproductive performance of Greyface ewes. Anim. Prod. 48:149-155

Robinson, J. J. C. J. Ashworth, J. A. Rooke. (2006). Nutrition and fertility in ruminant livestock. *Animal Feed Science and Technology. Review,* 126,259-276.

Sormunen-Cristian, R. and L. Jauhiainen. 2002. Effect of nutritional flushing on the productivity of Finnish Landrace ewes. Small Rumi. Res. 43:75-83.

Smith, S. L. 1933. Flushing and winter grain feeding results with sheep NSt. Wool Grower. 23:17-19. Sept.