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Impact of dietary supplementation of rice dried distillers' grain on Estrus behavior of Barbari goats

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Abstract
Present study was conducted to investigate the effect of feeding varying levels of rice dried distiller grains (rDDGS) on Estrus behavior and physiological peculiarities during estrus period of barbari goats. Twenty-four Barbary goats of 1-2 year age were randomly allocated into 4 groups on average body weight (14.90±0.02) basis (Control, T1, T2, and T3) having 6 animals in each groups. Estrus behavior was monitored twice a day, using a teaser buck. Control group of animals were fed with basal diet, Whereas, T1, T2 and T3 groups of animals were fed with basal diet supplemented with of 10%, 20% and 30% of rDDGS on dry matter basis, respectively for the period of 90 days. The movements of goats were tracked during 10-min observational period by using a video camera recorder, trajectory data were used for the analysis. There were no significant differences in Length of oestrus cycle (days) but the Duration of estrus (hours) affected significantly (p<0.05) lie within the range in the control and treatment groups. The durations of standing and walking of barbari goats another manual observation method determine length of estrus cycle and its duration did affected significantly (p<0.05) lie within the range with treatment groups. The rectal and vaginal temperature during normal and estrus were recorded as (38.50±0.05 °C) and (39.50±0.01 °C), respectively, which is lie within the range. Present result defined rDDGS up to 30 % concentration on DM basis were not any detrimental effect on reproductive parameter of barbari goats.

Keywords: Barbari goat, rDDGS, Estrus behavior, video recording

Introduction
Goat husbandry provides glimpses of future hope for employment generation, nutritional security and prosperity to the millions of small and marginal farmers in the country. As such goat producers are shifting to husbandry practices. The majority of the goat population can be found in Asia and Middle East. Well-known amongst Indian breeds are Jamunapuri, Barbari, Beetal, Surti, Jakhrana. Barbari is mainly evolved and adopted around Agra, Etawah, Aligarh, Hathras, Mathura district of Uttar Pradesh. Goats produce about 2% of the world's total milk supply. Goat milk is having medicinal properties (Pal, 2014) [20]. Now as per the 20th livestock census goat population in the country in 2019 is 148.88 Million showing an increase of 10.1% over the previous census. At present, the country faces a net deficit of 35.6% green fodder, 10.95% dry crop residues and 44% concentrate feed ingredients (IGFRI, 2013).The high cost and less supply of conventional animal feed ingredients and for achieving high productive potential, which requires specific feeding having higher nutrient requirements. (Novais *et al*. 2015) [18]. (Rice Distillers Dried Grains with Solubles (rDDGS) is a byproduct of the processing of alcohol industry (Huang *et al*., 1999) [12]. It contains 30-47% protein (NRC, 1989) [19] and around 3500 kcal/ kg ME.). Estrus behavior becomes even more important when exhibits in the absence of the male, as is the case with cows/does (Hafez, 1996) [10]. Automated video recording systems for studying animal behaviors (limited to laboratory mice (Steele *et al.* 2007 and Takahashi *et al.* 2010) [25, 26] and small insects (Martin, 2004) [15] in barbari goats also determine estrus as well as physiological parameters like length of estrus cyclic (days), duration of estrus cycle (hours), and rectal and vaginal temperature change during estrus. Scientific studies regarding the effect of inclusion different concentration levels of corn DDGS in goat ration was mostly available. But the studies on rice DDGS was very few in small ruminant species and nil in case of Indian goat breeds. To determine the effect of feedstuffs on reproductive and physiological parameters, it is necessary to evaluate the influence of feed upon estrus behavior of barbari goats.

2. Materials and Methods

2.1. Ethical approval

All of the procedures carried out and animal welfare were reviewed and approved by the Institutional Animal Ethics Committee of the, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, India (IAEC/SVPUAT/2022/80).

2.2. Experimental protocol

This experiment was conducted at Livestock Farm Complex II, Sardar Vallabhbhai Patel University of Agriculture & Technology, Modipuram, Meerut-250110 (U.P.). Total 24 female barbari goats of similar age group (1-2 years) were divided randomly into 4 groups on 1st group was treated as control, whereas 2nd, 3rd and 4rd groups were taken as treatment group. nutrient requirement of barbari goat was met by as per NRC standards. Estrus behaviors were observed in two ways during the whole experimental period such as all morphological and physiological changes during estrus. First one is Behavioral changes consist; the length of estrous cycle in days was calculated from the interval between onsets of one estrous cycle to another. The estrous cycles were classified as short (<17 days), normal (17-25 days) or long (>25 days) as suggested by Chemineau *et al.* (1992) [5]. The estrous cycle duration was measured in hours. It was the interval between the start up time of one estrus and the time at which it ended up in the same estrous cycle. Estrus behavior was monitored twice daily (6:00 am and 5:00 pm) using teaser buck. Immobilization of the female when mounted by the male was considered to be sign of occurrence of estrus (Mauleon and Dauzier, 1965) [16] also fallow tracking method tested 16 goats (age = 1-2 years, body weight = 14.90±0.02 kg) that we confirmed as being in estrus (n = 10) or not in estrus (n = 10). An observation pen (2.5 m × 2.5 m) was set up camera (Panasonic Corporation) was fixed to the ceiling. The standing and walking parameters were 10 min video recording than obtain video tracking dataset comprised 100 frames. Second one is, Rectal and vaginal temperatures were taken with the help of the clinical thermometer during estrous cycle and at normal condition of the does. This work was performed by inserting a clinical thermometer into the rectum and vagina. The differential behavioral changes that were found during the time of the experiment are mounting flock mates or willing to be mounted, mucus discharge from the vulva, tail flagging, mock fighting, licking and rubbing each other, sniffing the vulva, increased vocal activity, interest in male or male pen, restlessness and Nervousness.

2.3. Statistical analysis

The experimental data were subjected to analysis by completely randomized design with the simple analysis of variance technique (Snedecor and Cochran, 1994) [23] using Statistical Package for the Social Sciences (SPSS, 2011) [24]. The concordance of the results obtained by video-recorded observation by a human observer was examined according to Cullens *et al.* (2012) [6]. Homogenous subsets have been separated by using Duncan's multiple range test described by (Duncan, 1955) [8]. Differences among treatments were considered to as significant when $p \leq 0.05$.

3. Results and Discussion

3.1. Effect of rDDGS on estrus cycle of barbari goats

The data pertaining to effect of different level of rice DDGS on length and duration of oestrous cycle of barbari goats has been presented in Tables 1. It shows that the rDDGS had no apparent effect on the average length of the estrous cycle ($p>0.05$), but not significantly ($p<0.01$) affected duration of estrous cycle. The mean length of estrous cycles was 21.17, 20.96, 19.69 and 19.95 days in control, T1, T2 and T3 Groups, respectively. The average length of estrous cycles in goats was 20.9±6.9 days Aurion *et al.* (1980) [2] and Babumathi and Mukherjee (1981) [3] reported an average length of estrous cycle as 19.6±0.04 days. The present result strongly agreed with findings of Simplicio *et al.* (1986) [22] who reported an average length of 21.2±0.45 days in goats. Chemineau *et al.* (1992) [5] observed that the estrous cycle were 20.2±1.0 days for Alpine goats. Lopes *et al.* (2001) [14] conducted a study with Saanen goats found the average length of estrous cycles as 19.1±0.35 days. The length of estrous cycle for Boer doe was 20.7±0.70 days (Greyling, 2000) [9]. This result also coincided with the findings of the present study.

Tables 1: Effect of different level of rice DDGS on length and duration of oestrous cycle of barbari goats.

Groups	Length of oestrus cycle (days) (Mean)	Duration of estrus (hours) (Mean)
Control	21.17	37.11[a]
T1	20.96	36.32[b]
T2	19.69	35.33[b]
T3	19.95	35.90[b]
SEM	0.60	0.37
P value	NS	*

Mean with different superscripts within the same column differ significantly ($p<0.05$).
NS= Non-significant ($p>0.05$).
SE= Standard error of mean.

On the other hand, the duration of estrus was recorded 37.11, 36.32, 35.33 and 35.90 hours in, Control, T1, T2 and T3 Groups, respectively, Similar result was reported by Greyling (2000) [9] who observed the duration of estrus in Boer doe as 37.4±8.6 hours. However, an approximately 36 hour's estrus duration was reported from the study of several investigators (Bliss, 1980; Mishra and Biswas, 1966) [4, 17]. On the other hand Chemineau *et al.* (1992) [5] found an average of 30 hours duration in Alpine goats. A lower estimate of 30 hours duration in Barbari goats were reported by Sahni and Roy (1967) [21]. This little variation might be due to variation in breed, season, parity and feeding regime and/or physiological profile of the animals.

3.2. Effect of rDDGS on body and vaginal temperature during estrus in barbari goat.

The statistical analysis showed that the temperature of rectum and vagina during estrus and normal condition of among the groups of barbari goats (Table 2). The rectal temperature of goat in normal cycle was found significant ($p<0.01$) lie within the range and The highest temperature of rectum recorded in T1 group (38.67±0.05 °C) followed by the T3 group (38.50±0.05 °C), T2 (38.46±0.05 °C) and control (38.39±0.05 °C). On the other hand, higher rectal temperature during estrus recorded in goat T3 (39.28±0.02 °C) followed by goat T2, control (39.27±0.02 °C), (39.27±0.02 °C) and goat T1 (39.23±0.02 °C) Moreover, the higher vaginal temperature during normal condition recorded in goat T3 (39.17±0.02) and

goat T2 (39.14±0.02 °C) followed by goat control (39.13±0.02) and goat T1 (39.12±0.02 °C). The higher temperature in vagina during estrous cycle recorded in goat T3 (39.58±0.01) followed by goat T2 (39.57±0.01), goat T1 (39.57±0.01 °C) and control (39.56±0.01 °C).

Tables 2: Effect of different level of rice DDGS on temperature change of barbari goats during estrus

Groups	Temperature (°C)			
	Rectal		Vaginal	
	Normal (Mean)	Estrus (Mean)	Normal (Mean)	Estrus (Mean)
control	38.39	39.27	38.13	39.56
T1	38.67	39.23	38.12	39.57
T2	38.46	39.27	38.14	39.57
T3	38.50	39.28	38.17	39.58
SEM	0.05	0.02	0.02	0.01
P value	**	NS	NS	NS

Mean with different superscripts within the same column differ significantly
** (p<0.01).
NS= Non-significant (p>0.05).
SE= Standard error of mean.

Hossain *et al.* (1986) [11] obtained the rectal and vaginal temperature of goat were 39.4 °C and 39.6 °C respectively. They obtained that the rectal temperature of the animals during estrus varied from 39.2 °C to 39.4 °C. The vaginal temperature varied from 39.5 °C to 39.6 °C during the period of estrus, which was more or less similar with the finding of the present study.

3.3. Effect of rDDGS on behavioral patterns in and absence of estrus of barbari goat by video recorder.

Behavioral patterns of goats in and not in estrus analyzed using video tracking data (Tracking) and video-recorded observations by a human observer (Observation) given in Table 3. It is generally recognized that animals in estrus are more active than when not in estrus. Duration of walking (min/10 min) were increases simultaneously in Control, T1, T2, and T3 groups during estrus like (0.99±0.05), (0.98±0.05), (1.04±0.05) and (1.05±0.05). In another duration of standing in Estrus (min/10 min) were higher in T2 (6.35±0.05) followed by T1 (6.28±0.05), T3 (6.26±0.05) and control (6.18±0.05). Similar results were obtained in dairy goats Doherty *et al*. (1987) [7] when their activities were monitored continuously throughout the estrus cycle.

Table 3: Behavioral patterns of goats in and not in estrus analyzed using video tracking data (*Tracking*) and video-recorded observations by a human observer (*Observation*).

Item	Group	Analysis	Estrus (Mean)	Not in Estrus (Mean)
Duration of Walking (min/10 min)	Control	Tracking	0.99	0.58
	T1	Tracking	0.98	0.62
	T2	Tracking	1.04	0.62
	T3	Tracking	1.05	0.64
	SEM		0.05	0.04
	P value		NS	NS
Duration of standing (min/10 min)	Control	Tracking	6.18	7.23
	T1	Tracking	6.28	7.22
	T2	Tracking	6.35	7.30
	T3	Tracking	6.26	7.22
	SEM		0.05	0.05
	P value		NS	NS

Data represent the mean±SE. * p<0.05 and ** p<0.01 compared with goats not in estrus.

4. Conclusion

Present result defined rDDGS up to 30 % concentration on DM basis were not any detrimental effect on reproductive parameter of barbari goats.

5. References

1. Arakawa T, Tanave A, Ikeuchi S, Takahashi A, Kakihara S, Kimura S, *et al*. A male-specific QTL for social interaction behavior in mice mapped with automated pattern detection by a hidden Markov model incorporated into newly developed freeware. Journal Neurosciences Methods. 2014;234:127-134.
2. Aurion SA, Gerardo RS, Jose NR Estrous cycle and period evaluation in an undefined breed type (SRD) for goats in Northeast Brazil. Sobral, Ceara, Brazil; c1980.
3. Babumathi T, Muhgerjee TK. Estrus Cycle Length and Estrus Behavior Studies in the Kambing Katjang (Goats). Department of Genetics and Cellular Biology, University of Malaya, Kuala Lumpur, Malaysia; c1981
4. Bliss EL. Dairy goat reproductive management. Dairy Goat. Journal. 1980;58:12-13.
5. Chemineau P, Daveau A, Maurice F, Delgadillo JA. Seasonality of estrus and ovulation is not modified by subjecting female Alpine goats to a tropical photoperiod. Small Ruminants Research. 1992;8:299-312.
6. Cullen DA, Sword GA, Simpson SJ. Optimizing multivariate behavioural syndrome models in locusts using automated video tracking. Animal Behavior. 2012;84:771-784.
7. Doherty WC, Price EO, Katz LS. A note on activity monitoring as a supplement to estrus detection methods for dairy goats. Applied Animal Behavior Sciences. 1987;17:347-351.
8. Duncan DB. Multiple range and f-test. Biometrics. 1955;11:1-42.
9. Greyling JPC. Reproduction traits in the Boer goat doe. Small Ruminant. Research. 2000;36:171-177.
10. Hafez ESE. Reproductive Behaviour. In: Reproduction in farm animals, Hafez E.S.E (editor), 5th Ed. Lea and Ferbiger, Philadelphia, 1996, 263.
11. Hossain MI, Islam AF, Mannan MA, Zaman MA. Detection of oestrus in Black Bengal Nanny goat (*Capra hircus*). Bangladesh Journal of Animal. Science. 1986;15:35-40.

12. Huang HJ, Chioua PWS, Chiang CRCJK, Yu B. Effects of dried rice distillers' and grain supplementation on the performance of lactating cows. Animal Feed Science Technology. 1999;77:303-315.
13. IGFRI. Vision 2050. Indian Grassland and Fodder Research Institute (Indian Council of Agricultural Research) Gwalior Road, Jhansi; c2013.
14. Lopes JES, Rondina D, Simplício AA, Freitas VJF. Oestrus behaviour and performance *in vivo* of Saanen goats raised in northeast of Brazil. Programa de Pós-Graduação emCiências Veterinárias–FAVET–UECE–Av.Paranjana, 1700. Itaperi. CEP 60740-000. Fortaleza, Ceará, Brazil; c2001.
15. Martin JR. A portrait of locomotor behaviour in Drosophila determined by a video-tracking paradigm. Behavoir Processes. 2004;67:207-219.
16. Mauleon P, Dauzier L. Variations de duree de l'anoestrus de lactation chez les brebis de race Ile-de-France. Annales de Biologie Animale, de Biochimie et de Biophysiquw. 1965;5:131-143.
17. Mishra HR, Biswas SC. A study on distribution of oestrus in Deshi goats. Indian Journal of Dairy Science. 1966;19:132-134.
18. Novais DL, Leite LC, Eiras CE, Leite MCP, Queiroz MAA. Desempenho de cabrasemlactaçãoalimentadas com dietas com concentrado a base de feno da parteaérea da mandioca. Archivos de Zootecnia. 2015;64:311-315.
19. NRC. Nutrient requirements of dairy cattle. 7th Revised edition. National research council, National Academy Press, Washington, DC; c1989.
20. Pal M. Goat milk and its potential in dairy industry. MSc Lecture Notes. Addis Ababa University, College of Veterinary Medicine, Debre Zeit, Ethiopia; c2014. p. 1-11.
21. Sahni KL, Roy A. A study of the sexual activity of the Barbari goat (*Capra hircus* L.) and conception rate through artificial insemination. Indian Journal of Veterinary Science. 1967;37:269-276.
22. Simplicio AA, Riera GS, Nunes JF, Foote WC. Frequency and duration of oestrous cycle and period in genetically non-descript (SRD) type of goats in the tropical northeast of Brazil. Pesquisa Agropecuaria Brasilera, 1986;21:535-540.
23. Snedecor GW, Cochran WG. Statistical methods. 9th edition. The Iowa, state university press, Ames, Iowa; c1994.
24. SPSS. Statistics version 20.0. IBM SPSS Inc., USA; c2011.
25. Steele AD, Jackson WS, King OD, Lindquist S. The power of automated high-resolution behavior analysis revealed by its application to mouse models of Huntington's and prion diseases. Procces National Acadamy Science USA. 2007;104:1983-1988.
26. Takahashi A, Tomihara K, Shiroishi T, Koide T. Genetic mapping of social interaction behavior in B6/MSM consomic mouse strains. Behavior Genetics. 2010;40:366-376.

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