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Occurrence of Abortions in Goats Reared under Different Farming Systems

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ABSTRACT

Background: Abortion is a very common health problem of animals including goats and it causes heavy economic losses to the farmers. The current study was planned to assess the occurrence of abortions in goats reared under different farming systems and association of occurrence of abortions with stage of pregnancy, season and parity of the aborted goats.

Methods: The data on caprine abortions from semi-intensive and free range farming systems was compiled and analysed. Occurrence of abortion in the goats reared under field conditions and at organized farms under semi-intensive management system was categorized on the basis of stage of pregnancy, season and parity of aborted goats. The statistical analysis of the abortion data was done by using Chi-Square test.

Result: Abortion rates in goats reared at different management systems (semi-intensive and free range systems) differed significantly ($p<0.01$). Occurrence of the abortions was found highest in the field goats. Occurrence of the abortions in the different stages of pregnancy (early, mid and late) in the goats reared at organized farms under semi-intensive management system and field conditions differed significantly ($p<0.01$). Maximum abortions were seen in the later stage of pregnancy. Likewise, occurrence of the abortions in various seasons (rainy, winter and summer) in the goats reared at organized farms under semi-intensive system and field conditions differed significantly ($p<0.01$). Highest occurrence of abortion was noticed in winter season. Occurrence of abortion was also significantly associated with parity of pregnancy in the goats from the organised farms as well as in the field goats. The study concludes that abortion rate in goats are significantly associated ($p<0.01$) with management practices, season, parity and stage of pregnancy.

Key words: Abortion, Goat, Parity, Season, Stage of pregnancy.

INTRODUCTION

Goats provide nutrition, employment and source of income to small, marginal and landless farmers (Ørskov, 2011; Wodajo *et al*., 2020). Goats are playing an important role in poverty alleviation of rural people across the country. The success of goat farming is assessed by either production (meat/milk/wool) or reproduction efficiency. When an immature fetus, either live or dead is delivered by the pregnant animal before the completion of the gestation period, it is called abortion and if fully matured dead fetus is delivered at full term, it is called a stillbirth (Shaapan, 2016). Likewise, when a new born dies within the first 7 days of its life, it is called neonatal death (Gelaye *et al*., 2014). Abortion is a major reproductive problem of goats inflicting significant financial losses to goat farmers (Alemayehu *et al*., 2021). It is responsible for the reduction in the productive animals and milk production and increases the number of unproductive females in a herd (Ali *et al*., 2019; Lokamar *et al.*, 2020). In a healthy herd of goats, the proportion of visible abortions should be below 2%, abortion rate between 2 to 5% indicates its endemic nature and abortion level exceeding 5% requires aggressive investigation (Menzies, 2011). In case of cattle, 3 to 5 abortions per 100 pregnancies per year is generally considered as “normal” (Hovingh, 2002).

The current study was planned to assess the occurrence of abortions in goats reared under different farming systems and to determine the association of season, parity of the aborted goats and stage of pregnancy with occurrence of abortions.

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MATERIALS AND METHODS

For collection of the abortion data from the field goats, a total of 507 farmers from two districts of Uttar Pradesh (Mathura and Agra) and two districts of Rajasthan (Bharatpur and Karauli) were selected randomly. Each farmer approached in our study was keeping at least 10 goats. In

the current investigation, the farmers visited were rearing the goats under free range farming system. To collect the data from the farmers, a format/questionnaire was developed and the farmers were enquired about various information regarding abortion such as parity of the aborted goat/s, stage of pregnancy and season at the time of abortion/s during year 2020 to 2021 and 2021-2022. The information given by the farmers was based mostly on their memories recall basis of the last one year. In the current investigation, upto 2 months of pregnancy, 2-3.5 months of pregnancy and after 3.5 months of pregnancy were regarded as early stage, mid stage and late stage of pregnancy, respectively. Likewise, durations between June 15 to September 30, October 1 to Feb 29 and March 1 to June 15 were considered as rainy, winter and summer seasons, respectively. The abortion rate was calculated in percentage by the following formula:

$$\frac{\text{Total number of abortions}}{\text{Total number of pregnant or conceived goats}} \times 100$$

Abortion data from 20 All India Coordinated Research Project on Goats (AICRP) units for the duration starting from 2014 to 2021 (8 years' duration) was compiled and analyzed.

Abortion data for the goats reared under organized farming system was obtained from the goats reared at ICAR-Central Institute for Research on Goats (ICAR-CIRG), Makhdoom, Farah, Mathura, Uttar Pradesh (India). The data collection was done for 10 year's duration from 2011-2012 to 2020-2021. These goats were being reared in semi-intensive management system.

The statistical analysis of the abortion data to find the association between variables was done by Chi-Square test using Microsoft Office-Excel Sheet.

RESULTS AND DISCUSSION

Under field conditions, the goat rearing was being done by the farmers in an unorganized way. Majority of the farmers were illiterate (59.56%; 302/507), were having desi/cross/mixed/nondescript goats (90.13%; 457/507), did not receive any training/course regarding goat farming (97.04%; 492/507), were having experience of goat farming more than 5 years (68.83%; 349/507), had not heard about brucellosis (96.84%; 491/507), and did not wear gloves/goggles or other protective gears while handling the aborted goats/fetus/placenta (92.18%; 401/435).

Out of 6286 pregnant goats under field condition, a total of 576 abortions were observed during one year. Hence, mean annual abortion rate under field condition was determined as 9.16%. This finding indicates that abortion is a very serious problem in the field goats which requires immediate and intensive veterinary care to reduce the abortion rate to the standard state (around 2%) (Menzies, 2011). Reason behind such high abortion rate in the field goats may be attributed mainly to the poor management, because under field conditions, goats are generally reared in an un-organized way. Sharma *et al*. (2008) reported abortion outbreaks in 51 flocks/herds and sporadic abortions in 114 flocks/herds out of 203 flocks/herds of field sheep/goats. The mean annual abortion rate was reported as 16.1% in the field goats in Ethiopia by Alemayehu *et al*. (2021). Further, occurrences of the abortions in field goats were categorized on the basis of stage of pregnancy and season at the time of abortions (Table 1). Different stages of pregnancy and various season had significant association ($p<0.01$) with occurrence of abortions in the field goats. Most of the abortions were noticed in late stage of pregnancy (52.25%; 301/576) and winter season (42.01; 242/576). Abortions in animals including goats are generally caused by infectious agents (Pretzer, 2008) and most of the infectious agents cause abortions in the later stage of pregnancy (Smith and Sherman, 2009). That is why, in our study, majority of abortions were seen in the later stage, but further investigations are required to substantiate this statement. Likewise, maximum abortions were seen in winter season which may be due cold stress to the goats, but similarly, further studies are required to confirm this finding. There was significant association of abortions and parities of pregnancy ($p<0.01$). Maximum abortions (88.02%; 507/576) were seen in the goats with parity 1 to 3 (Table 2). We assume that older goats acquire immunity against variety of abortion causing infectious agents in due course of time, hence occurrence of abortions amongst them was lesser in

Table 1: Categorization of occurrence of abortions (proportional) in the field goats on the basis of stage of pregnancy and season during one year at the time of abortion.

	Stage of pregnancy			Season		
	Early	Mid	Late	Rainy	Winter	Summer
Abortion rate (%)	25.86 (149/576)	21.87 (126/576)	52.25 (301/576)	28.99 (167/576)	42.01 (242/576)	28.99 (167/576)
Chi-square value		94.1** (df:2)			19.2**(df:2)	

**p<0.01.

Table 2: Abortion rate with respect to parity of the aborted goats under field conditions.

Parity	1	2	3	4	5	6	≥7
Abortion rate (%)	26.90 (155/576)	38.71 (223/576)	22.39 (129/576)	8.68 (50/576)	2.95 (17/576)	0.17 (1/576)	0.17 (1/576)
Chi-square value	233.5** (df: 4, the parities 5,6 and ≥7 are merged)						

**p<0.01.

number (Table 2). Likewise, further investigations are needed to verify this finding.

A total of 6,033 abortions were observed amongst 1, 33, 221 pregnant goats during 8 years' period starting from 2014 to 2021 at AICRP Units. Average abortion rate for the said period was found 4.52%. The result shows that the problem of abortion at AICRP Units was endemic in nature. Hence, intensive investigation is to be followed to bring back the herd to the healthy state from endemic one.

In goats reared at organized farms under semi-intensive management system, a total of 146 abortions were seen during 10 years' duration starting from 2011-2012 to 2020-2021. Total number of goats conceived was 6,547. Mean decadal abortion rate was recorded as 2.23% (Table 4). Like field goats, the different stages of pregnancy had significant association ($p<0.01$) with abortions. Majority of abortions occurred in the late stage of pregnancy (47.26%; 69/146) and winter season (48.63%; 71/146) (Table 3). The current finding indicates that the herd could be called almost healthy with respect to abortion problem during the aforesaid period. Hence, if we follow proper management at the farm, occurrence of abortion could be kept at the minimum level (Table 4). Like field goats, there was significant association ($p<0.01$) of abortions and parities of pregnancy. The goats, reared under organized farming system having parity 1 to 2, encountered with most abortions (60.95%; 89/146) (Table 5).

Yaqoob *et al*. (2016) reported a higher frequency of abortion in summer season in case of cattle. The reason behind this finding was claimed due to heat stress (Yakoob *et al*., 2016). However, Lopez-Gatius *et al*. (2004) did not find any significant association between season and occurrence of abortions in cattle. Similar to our finding, the maximum incidence of abortion in dairy cattle was recorded in first parity by Yaqoob *et al*. (2016). Further contrary to our finding, be Skjærven and Melve (2007) reported higher number of abortions in older cattle. Hence, extensive investigation is further to be carried out to substantiate the current findings.

If we take abortion data of one year from two farming systems (semi-intensive and free range), abortion rate had significant association ($p<0.01$) with the management systems as shown in Table 6. Rate of abortion increased from semi-intensive to free range farming system. Hence, in our opinion, management is key factor which can affect abortion rates in the goats.

CONCLUSION

Table 3: Categorization of occurrence of abortions (proportional) in the goats reared under organized farming system on the basis of stage of pregnancy and season during 2011-2012 to 2020-2021 (10 years' duration) at the time of abortion.

	Stage of pregnancy			Season		
	Early	Mid	Late	Rainy	Winter	Summer
Abortion rate (%)	20.54 (30/146)	32.19 (47/146)	47.26 (69/146)	41.09 (60/146)	48.63 (71/146)	10.27 (15/146)
Chi-square value		15.7** (df:2)			36.1** (df:2)	

**p<0.01.

Table 4: Occurrence of abortions (proportional) in the goats reared at the different farming systems.

Farming system	Abortion rate (%)	Duration
Organized farms	2.23 (146/6547)	2011-2012 to 2020-2021(10 years' duration)
AICRP units	4.52 (6033/133221)	2014-2021(8 years' duration)
Field condition	9.16 (576/6286)	1 Year

Table 5: Abortion rate with respect to parity of the aborted goats under organized farming system.

Parity	1	2	3	4	5	6	≥7
Abortion rate (%)	30.82 (45/146)	30.13 (44/146)	10.27 (15/146)	13.01 (19/146)	6.16 (9/146)	5.47 (8/146)	4.10 (6/146)
Chi-square value			80.6** (df:6)				

**p<0.01.

Table 6: Yearly abortion rates in the goats reared at different farming management systems.

Farming management system	Yearly abortion rate (%)	Duration
Organized farms and AICRP goat units	4.17 (753/18778)	2021-2022 (One year)
Field condition	9.16 (576/6286)	One year#
Chi-square value	249.1**	

**p<0.01.

The data collection was done during 2020-2021 and 2021-2022, but the data taken from the farmers was for the duration of one year from the date they were visited/enquired.

The study concludes that abortion rate in goats is significantly associated ($p<0.01$) with farming practices (semi-intensive and free range), season (winter, rainy and summer), parity and stage of pregnancy (early, mid and late). Abortion rate was found highest in the late stage of pregnancy in the goats reared in organized farms under semi-intensive system as well as in the goats reared under free range system. Similarly, abortion rate was found highest in winter season in the goats reared under both semi-intensive as well as field conditions. In the current study, we also found significantly higher ($p<0.01$) abortion rate in the field goats than that of goats reared under semi-intensive farming system.

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Ethical statement

The sample collection from the animals was not done. Hence, approval from Institutional Animal Ethics Committee (IAEC) and Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA) was not required.

Conflict of interest

None.

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