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RESEARCH ARTICLE

EFFECT OF SUMMER HEAT STRESS ON PHYSICAL CHARACTERISTICS OF CERVICO-VAGINAL MUCUS IN RELATION TO CONCEPTION IN MURRAH BUFFALOES

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ABSTRACT

Material and method: The study was conducted on 16 apparently healthy Murrah buffaloes, maintained at dairy farm GADVASU, Ludhiana. Study was conducted in two phases i.e. Pre-summer and Summer season. Cervico-vaginal mucus samples were taken from all the animals at the time of artificial insemination during both the seasons. Various physical parameters of CVM viz, Transparency, Viscosity, Fern pattern, pH and Spinnbarkeit were observed.

Results and Discussion: CVM samples of the buffaloes during pre-summer were more transparent with typical fern pattern, low viscosity, higher pH and spinnbarkeit value as compared to summer stressed buffaloes. Further when the data was compared according to the conception status the parameters were found to be favourable in conceived animals as compared to non-conceived ones. Data so obtained was analyzed between the two seasons and according to the conception status of the animals.

Conclusion: It is concluded that physical parameters of CVM at the time of insemination may alter due to heat stress in buffaloes. Higher transparency, more typical fern pattern, lesser viscosity, higher pH and more spinnbarkeit are favorable for conception in Murrah buffaloes. Thus these physical properties of CVM at the time of insemination in summer season influence the chances of conception and can be used as an important indicator for prediction of conception in Murrah buffaloes.

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INTRODUCTION

Proper estrus detection is essential for artificial insemination (A.I.) practices so as to achieve optimum reproductive efficiency. As the estrus signs in buffaloes are less obvious than in cattle, the accuracy of estrus detection is one of the major problems limiting the use of A.I. in this species. Sub-estrus or silent estrus is perhaps the most important factor leading to poor reproductive efficiency in buffaloes (Prakash, 2002, Madan and Prakash, 2007) especially during hot summer months. Therefore cervico-vaginal mucus (CVM) examination could be an easy and more reliable tool for estrus detection (Fehring, 2002) in buffaloes. In farm animals, physical characteristics of CVM show alterations around estrus, which might explain some important relationships between timing of insemination and probability of conception (Bigelow *et al.,* 2004). There are consistent and definite gradual changes in the physical characteristics of CVM with the cyclic rhythm of the reproductive process.

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The physical characteristics of CVM at the time of insemination may influence the chances of conception and can be used as important indicator for prediction of conception in Murrah buffaloes (Khan *et al.,* 2010). Seasonal suppression of reproductive performance has been documented by a shorter duration of estrus, silent heat, apparent prolongation of interval from estrus to ovulation and few ever ovulatory cycles during the summer months in buffaloes (Kanai and Shimizu 1983). As the Physical characteristics of cervico-vaginal mucus/estrual discharge have direct bearing on the fertility status of the animals (Panchal *et al*., 1994, Rangnekar *et al*., 2002), there is possibility of some seasonal changes in the physical characteristics of the CVM. Therefore, the present investigation was carried out to study the relation between seasonal changes in physical characteristics of buffalo CVM in relation to reproductive performance of Murrah buffaloes.

MATERIALS AND METHODS

Study was conducted on 16 Murrah buffaloes (age group of 2-6 years) with clear transparent/translucent cervico-vaginal mucus and normal sexual behavior, maintained at the dairy farm of Guru Angad Dev Veterinary and Animal Sciences

University (GADVASU), Ludhiana during pre-summer (April to May; n=8) and summer season (June to August; n=8). Heat checking was started three days prior to the expected date of onset estrus by observing the signs of estrus and also by bull parading (morning and evening). The animals in intense estrus were artificially inseminated (A.I.). The conception of buffaloes was confirmed by non-return of estrus for at least two consecutive estrous cycles, per rectal examination (eight weeks post insemination) and high levels of progesterone on 20th day after A. I. CVM samples were collected directly from the cervix of the animal at the time of A.I. These samples were examined for various physical parameters viz transparency, fern pattern, viscosity, pH and spinnbarkeit by standard techniques. Blood samples were also collected by veni-puncture of jugular vein from all the animals on day 0 and day 20 of estrous cycle, plasma was separated and stored at -20^{0}C till analyzed for progesterone by Radioimmunoassay for confirmation of pregnancy. The conception rates were found to be 50% (4/8) and 37.5% (3/5) in pre-summer and summer, respectively. The data so obtained for all the parameters was compared between pre-summer and summer groups and also between conceived and non-conceived animals using one way ANOVA with the statistics package SYSTAT VERSION 6.0.1 copyright© 1996,SPSS INC.

RESULTS AND DISCUSSION

In the present study 100% of the CVM samples were found to be transparent during pre-summer whereas 62.5% of the samples were found to be transparent and 37.5% as translucent during summer.

Table 1. Physical characteristics of buffalo CVM during pre-summer and summer

Season/parameter		Presummer	Summer
Transparency	Transparent	100% (8/8)	62.5% (5/8)
	Translucent	0% (0/8)	37.5% (3/8)
Viscosity	High	75% (6/8)	62.5% (5/8)
	Low	25% (2/8)	37.5% (3/8)
Fern pattern	Typical	87.5% (7/8)	75% (6/8)
	Atypical	12.5% (1/8)	25% (2/8)
pH		7.87 ± 0.06	7.93±0.06
Spinnbarkeit (cm)		25 ± 0.56	22.83±0.70

The figures in parentheses indicate the number of animals

The number of animals showing transparent cervico-vaginal mucus was decreased during summer. Further the conception rate was higher (46.15) in pre-summer group as compared to that in summer group (37.5%) suggesting that chances of conception are higher in animals having transparent mucus then those having translucent mucus. CVM discharge two days before estrus to 1 day after estrus has been reported to be almost transparent or slightly translucent (Hamana *et al.,* 1971) and as opaque during luteal phase (Elstein, 1974). Clear estrual mucus has been previously suggested to be propitious for sperm penetration and fertilization in female reproductive tract (Agarwal and Datta, 1977). In the present study typical fern pattern of cervico-vaginal mucus at the time of A.I. in pre-summer and summer group were found to be in 87.5% and 75 % samples respectively, and atypical fern pattern in pre-summer and summer group were found in 12.5% and 25% samples. An increasing number of buffaloes tend to achieve typical or complete fern pattern at the peak of estrus (Noonan *et al* 1975). Further, conception rate in the animals showing typical and atypical fern pattern in their CVM was found to be 53.84% and 0% respectively suggesting that animals showing typical fern pattern of CVM have more chances of conception. The increased ferning is caused by estrogen stimulated electrolyte metabolism of cervical epithelium thereby facilitating sperm penetration (Eltohamy *et al.,* 1990). The number of animals showing high viscosity of the CVM was more (75%) in pre-summer group as compared to summer group (62.5%). However, the conception rate was higher in animals showing low viscosity (60%) as compared to those showing higher viscosity in their CVM (45.45%).Lower viscosity of CVM on day of ovulation has been reported in cattle (Tsiligianni *et al.,* 2001). Low viscosity mucus assists in the migration of spermatozoa and builds up a cervical reservoir of spermatozoa leading to higher conception rate (Moghissi, 1973). The mean pH of cervico-vaginal mucus at the time of A.I. of buffaloes during pre-summer and summer was found to be 7.87 ± 0.06 and 7.93 ± 0.06, respectively. But when the data was sorted as per the conception status of the animals, it was found that conceived animals had higher pH at the time of A.I. (8.14 ± 0.05) as compared to non-conceived ones (7.933 ± 0.07). Low pH causes reduction in sperm motility and may be detrimental due to direct effect on sperm or an alteration in the structure of CVM (Eggert-Kruse *et al.,* 1993). The mean spinnbarkeit (cm) of cervico-vaginal mucus at the time of A.I. in pre-summer and summer group was found to be 25.9 ± 0.56 and 22.83 ± 0.70 indicating that spinnbarkeit value decreases due to effect of heat stress in summer stressed animals. Furthermore the spinnbarkeit value in conceived animals was found to be higher (22.9 ± 0.58) than non-conceived animals (21.13 ± 0.54). Similar findings have been reported by Mehmood *et al.,* (1991) in estrual mucus of Nili-Ravi buffaloes.

Conclusion

It is concluded that physical parameters of CVM at the time of insemination may alter due to heat stress in buffaloes. Higher transparency, more typical fern pattern, lesser viscosity, higher pH and more spinnbarkeit are favorable for conception in Murrah buffaloes. Thus these physical properties of CVM at the time of insemination in summer season influence the chances of conception and can be used as an important indicator for prediction of conception in Murrah buffaloes.

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