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Unique Sperm Depot In Camel Semen

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Mass activity of spermatozoa adjudged as intensity of swirls and waves under low magnification of microscope in neat semen spread on a pre-warmed glass slide, individual sperm motility in diluted semen (1:200 to 1:400) in isotonic buffers and sperm concentration enumeration are some of the important tests used for qualitative evaluation of semen in artificial insemination of cattle and buffaloes. Evaluation of camel semen using these traditional tests is almost impossible. Several workers reported no motility in camel semen[1,4], some other reported low motility initially in fresh state and increase on storage[6] or as semen became more liquid[7]. Yet other speculated high viscosity of camel semen hindered progressive sperm motility[3]. Lethal effect of contact of rubber funnel with camel spermatozoa was also speculated to be the reason of low or no motility in camel semen[5,6,8]. Here we show that freshly ejaculated camel spermatozoa are not free but packed in a sperm depot, these cannot move until released from this depot. Spermatozoa from this depot are liberated slowly, steadily and continuously by an unknown mechanism as visualized through phase contrast microscopy. Packaging of spermatozoa in depot has not been reported previously. Apparently, this might serve an important purpose of sperm reservoir in female genital tract. This finding resolve all the problems of camel reproduction scientists who were baffled with problems of no or low motility in camel semen. This has also disproved the speculations like lethal effects of rubber funnel contact with camel spermatozoa.

Artificially collected camel semen is sparkling white to off white in colour, frothy and gel like thick or thin in consistency. Volume varies with age and sexual libido of the animal. In young animal, it may be 1-2ml, which increases to 3-5ml in middle aged and 5-10ml in old aged animals. Similarly, in the beginning of rut period, when sexual libido of the camel is weak, the ejaculate volume is low. At the peak of the rut, the volume averages between 5-10ml and it may reach up to 20ml in some cases. Camel semen does not mix with physiological buffers and egg yolk based tris buffer extenders. Physical properties of frothy, thick, gel like consistency and non-miscibility of freshly ejaculated camel semen with semen extenders, which becomes miscible after liquefaction has been documented previously by several workers[6]. In our studies, Centrifugation of semen, separation of clear transparent supernatant seminal plasma revealed that semen pellet is quite thick, sticky and looks like gelatinous thread. This sperm rich fraction is non- miscible with the semen extender and do not liquefy for weeks together.

Qualitative laboratory evaluation of camel semen is difficult and certain evaluation tests are merely impossible. Mass activity evaluation based on intensity of swirls and waves in seminal fluid as a result of combined force of movements of billions of spermatozoa is not feasible in camel because spermatozoa are not free to move in this species, but are packaged in sperm depot. Sper-

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matozoa in cattle, buffalo, sheep, goat and other livestock species are free to move and produce swirls and waves when semen is examined under low power objective of microscope. This packaging of spermatozoa in camel semen has not been demonstrated previously.

Individual sperm motility examination of freshly ejaculated semen is also not feasible in camel. This sort of evaluation is based on dilution of semen (1:200 to 1:400) with physiological buffers and visualization of individual spermatozoa in motion under microscope with thermostatically controlled stage. This is not feasible in camel as it does not mix with buffers. No or low motility in freshly ejaculated camel semen, which improves as the semen becomes old was known. No or low motility was suspected to be due to high viscosity of freshly ejaculated semen and improvement in motility was correlated with reduced viscosity due to liquefaction of semen. We have demonstrated that no or low motility in freshly ejaculated semen is due to packed spermatozoa in sperm depot. Spermatozoa evacuating steadily from these depots have also been demonstrated. Therefore no motility in freshly ejaculated semen is due to packed spermatozoa in sperm depot. Our observations revealed that sperm remain entrapped for weeks together and are released slowly from the sperm depot, therefore any evaluation on sperm motility in camel semen is an estimate based on free pool of spermatozoa only. Moreover, it has also been observed that in a group of 10-50 spermatozoa vigorously trying to move cannot do so because of their head to head attachments do not permit them to get separated. Lethal effect of contact of rubber funnel with camel spermatozoa apparently paralyzing them to lead to low motility was reported by several workers to be a possible cause for low motility[6]. Our studies using traditional AV to collect semen, where semen come in contact with rubber and modified AV where semen is directly deposited in collection glass absolutely avoiding any contact with rubber funnel have revealed no ill effect of rubber funnel on sperm motility[2]. In fact camel spermatozoa are well protected in sperm depot that they are resistant to ordinary cold or slightly high room temperature and contact with materials like rubber etc.

Spermatozoa concentration is another criteria for qualitative evaluation of semen. This is accomplished by hemocytometric method using diluted semen samples. But, here again due to non-miscibility of camel semen and sperm depot, it is not possible to ensure uniform distribution of spermatozoa for enumeration under hemocytometer. Despite this, several workers have reported sperm concentration measurements in camel semen. In light of evidence of non-miscibility and sperm depot packing, it can be easily imagined that accurate measurement of sperm concentration in camel semen is not possible. It is also speculated in light of the present study that camel semen is much more concentrated than reported by various workers, and this is because of no knowledge about sperm depot packaging arrangement.

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