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Collection, evaluation, processing and preservation of semen from Dromedary camels (*Camelus Dromedarius*)

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**Introduction**

Unlike with other farm animals, artificial insemination (AI) is not popular in camels owing to the difficulties in collection (El-Hassanein, 2002) and preservation of semen, and poor success of AI especially with frozen semen (Tibary & Anouassi, 1997). Even though research studies are being carried out, there are certain problems in performing AI as a routine tool for breeding camels. In this context, research trials were initiated on semen preservation and AI in camels at the newly established Centre for Artificial Insemination and Embryo transfer under Abu Dhabi Food Control Authority. Preliminary studies were carried out in collaboration with a private farm to develop techniques such as semen collection, quality evaluation and processing for preservation of camel semen.

**Materials and Methods**

The study was conducted using nine adult male camels maintained under ideal management conditions on a private farm situated in Al Saad, 60 km from the Center. The camels were trained for semen collection using a modified bovine Artificial Vagina (AV) (Bravo et al. 2000, El-Hassanein et al. 2004, Tibary & Anouassi, 1997), and a female camel as the mount. The study started in November 2010 and, after 3-5 weeks of training, semen was collected at regular 3-7 days intervals until the middle of May 2011. Collected semen samples were subjected to quality evaluations where the volume, concentration, motility, proportion of dead sperm and sperm abnormalities were recorded.

Samples of optimum quality and quantity were diluted 1:2 to 1:4 (semen:extender) ratios depending upon sperm concentration, (El-Hassanein, 2006, Tibary & Anouassi, 1997, Wani et al., 2008), with the commercially available extender Triladyl, or Tris based diluents with 20 % Egg-yolk plus Gentamycin (50 µg /ml) added (Morton et al., 2009, Valliancourt et
al., 1993). No chemical agents or enzymes were used to achieve liquefaction, but gentle agitation with a plastic straw was found to be useful for mixing the viscous semen with the extender. Extended semen samples were put in a water bath and placed in a refrigerator and sperm motility was assessed at daily intervals.

Other semen samples with at least 70 % initial motility in Triladyl extender were loaded into 0.5 ml straws and frozen in liquid nitrogen vapour for 7-8 minutes, after which they were plunged into Liquid Nitrogen (-196°C). These straws were subsequently thawed in a water bath at 37 °C for 1 minute and post-thaw motility was assessed.

Nine female camels with a mature follicle, of between 1.3 - 2.0 cm in diameter, were inseminated with fresh, extended semen after hormonal induction of ovulation (Tibary & Anouassi, 1997). The success rates of these inseminations were determined by behavioral signs such as “tail cocking” 15 days after insemination, and ultrasound scanning 25 days after insemination. Qualitative and quantitative data from the observations and semen studies were recorded, analyzed and the findings described.

Results and Discussion
Male camels were easily trained for semen collection although they showed varying levels of interest in serving into the AV. Throughout the breeding season a total of 178 semen samples were collected from 197 attempts using a bovine artificial vagina with minor modifications, but without an imitation cervix (Skidmore 2004) or special inner liners.

Reaction time (Deen et al., 2005) before mounting was less than 30 seconds and mean duration of mating was 5.08 +/- 0.14 minutes. The volume of semen ranged from 0.2 ml to 16 ml (mean 4.5+/-.022 ml), which was similar to that reported by Wani et al., (2008). The color of the majority of the ejaculates varied between samples from grayish white to white as described by Skidmore, (2004) and Tibary & Anouassi, (1997), but occasionally it was yellow, dark brown or dark grey in color attributable to unusual contents or contamination. The larger volume samples however were whiter, homogenous, viscous and sperm rich.

There was frequent contamination of semen with extraneous particles (21 %) and the occurrence was higher with increased mating duration and number of interruptions. High numbers of desquamated cells were also a common occurrence (33 %) in camel semen.

Almost 50 % of the samples were rich in spermatozoa and sperm concentration ranged from 1 - 1640 x 10^6/ml (mean 364.66 x 10^6+/-.34.51) which was similar to that reported by El-Hassanein et al. (2004). The initial oscillatory motility of the semen was graded before extension of the ejaculates and was expressed in terms of symbols ‘+’ to
‘++++’. The results yielded “++++” grading for 33% of the samples. Oscillatory type movement and progressive forward motility recorded within 5 minutes of extension was 68.85 (+/- 2.35) % and 54.50 (+/- 2.36) % respectively, which increased to 74.2 (+/- 2.58) % and 57.93 (+/- 2.33) %, respectively, after 20-30 minutes of extension. Tibary & Anouassi (1997) reported a similar improvement in motility a few minutes after extension. The number of semen samples maintaining at least 50 % progressive motility after storage at 4˚C for 24, 48 and 72 h was 46 %, 23% and 10 % respectively. These results are similar to the mean progressive motility of around 40 % after 24 hours of storage at 4 °C reported by Morton et. al. (2009) and Wani et al., (2008).

The proportion of dead spermatozoa in these samples was 14.95 (+/- 0.95) %, which is less than that reported by El-Hassanein (2002) for semen collected using an AV. The number of dead spermatozoa was less in the less viscous compared with the highly viscous samples. Sperm abnormalities observed included detached heads (8.34 +/- 0.71 %), bent tails (6.7 +/- 0.71 %), structural defects of head (3.3 +/- 0.81 %), coiled mid pieces (3.15 +/- 0.31 %) and broken tails (1.4 +/- 0.20 %). Protoplasmic droplets were negligibly low in these samples unlike the frequent occurrence of protoplasmic droplets reported by El-Hassanein et al., (2004) and Tibary&Anouassi ,(1997).

Freezing of semen samples using Triladyl extender resulted in post thaw motility of ≥40 % in 34 % of the freezing attempts, which is lower than the figure reported by El-Hassanein, (2006). Only 4 samples yielded post thaw motility of ≥50% and all the samples showed a drastic reduction in post thaw motility after 3 months of storage; the reasons for which need to be investigated.

Of the nine camels inseminated with fresh semen, 5 showed behavioral signs of conception (“tail cocking”) at 15 and 20 days after insemination and two were confirmed pregnant by ultrasound scanning. Further ultrasound examinations followed the development of these pregnancies for 45 days of gestation, but the growth rate was unsatisfactory beyond 30 days, and the conceptus had completely disappeared by 60 days of gestation. These inseminations were carried out during the beginning of the season (December) for various management related reasons and no AIs could be performed thereafter due to non-availability of animals.

Conclusion

Training and semen collection from camels using a modified bovine AV was accomplished in this study and confidence was gained in evaluation and processing of camel
semen. Problems associated with viscosity were overcome by physical means and trials were carried out with fresh, chilled and frozen semen. More studies are planned in the coming season to try and improve collection techniques, compare different extenders, improve motility of chilled and frozen/thawed semen, and more trials will be performed to try and improve pregnancy rates after insemination of fresh, extended, chilled and frozen/thawed semen.

References


