



## A retrospective study on clinical findings of 7300 cases (2007–2014) of barren female dromedaries

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### ABSTRACT

The objective of this study was to investigate the clinical findings in barren female dromedaries examined for different complaints. Female camels were examined for repeat breeding with regular heat interval (RB-R, n = 5444), refused mating (RM, n = 1299), repeat breeding with long heat interval (RB-L, n = 489), difficulties or bleeding during mating (DM, n = 53), and for manifestation of male-like behavior (MB, n = 15). The genital tracts of all females were evaluated using transrectal palpation, ultrasonography, and exploration of the vagina. Cervical swabs were obtained for bacteriologic examination. Clinical endometritis, ovarian hydrobursitis, and vaginal adhesions were the main clinical findings in the female camels examined for RB-R, RM, and RB-L, respectively. Parity affected the frequency of occurrence of these findings. The incidences of clinical endometritis, ovarian hydrobursitis, and vaginal adhesions in nullipara and multipara were 28% versus 32.3% (P = 0.004), 37.1% versus 23.7% (P = 0.001), and 5.7% versus 18.3% (P = 0.001), respectively. Vaginal adhesions, persistent hymen, pelvic abscess, and vulvar atresia were the clinical findings in the female camels presented due to bleeding at mating or with a history of an incomplete intromission of the penis. The male-like behavior was associated with an enlargement of the clitoris and narrowing of the vulva and vagina. *Trueperella pyogenes*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Klebsiella pneumonia*, *Streptococcus zooepidemicus*, and  $\beta$ -hemolytic *Streptococcus* were isolated from females presented for repeat breeding syndrome. In conclusion, clinical endometritis, ovarian hydrobursitis, and vaginal adhesions were the main clinical findings in barren female dromedaries. Parity affected the frequency of the clinical findings.

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### 1. Introduction

Poor fertility is a major cause of economic loss. The reasons for low fertility are related to events before insemination or mating including inadequate oocyte and/or follicular development, or after insemination or mating, due to failure of the fertilized ovum to undergo development [1–4]. The direct causes of low fertility are many

and can be complex. Malnutrition, infections, congenital defects, management errors, and ovulatory or hormonal imbalances can all result in low fertility [5–8].

The problems of reproduction in the camel have not been as extensively investigated as in other animal species. The data collected regarding these problems have been derived mainly from information provided by camel owners and from slaughterhouse material. Very limited information has come from clinical and farm observations [5,9–11]. Examination of abattoir specimens has provided some information about possible diseases encountered in the reproductive tract, which include pyometra, bursal and ovarian adhesions, endometritis associated with a partially

This study was conducted at the Veterinary Teaching Hospital, Department of Veterinary Medicine, Faculty of Agriculture and Veterinary Medicine, Qassim University, Saudi Arabia.

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involved uterus, and cystic ovarian degeneration [10]. In addition, more recent clinical studies have indicated ovarian hydrobursitis as being an important cause for infertility in dromedary camels [12–15].

Nawito [9] has recorded the bacteriologic findings in the uteri of 2075 dromedary camels of unknown history from Cairo abattoir. In 94 cases, clinical symptoms such as abscesses in the uterus, catarrhal endometritis, hemorrhagic endometritis, pyometra, and pyometra with macerated fetuses were found, along with the presence of *Micrococcus pyogenes* var. *aureus* as a prominent factor. Furthermore, the researcher was able to isolate *Micrococcus pyogenes* var. *albus*, beta-hemolytic streptococci, *Escherichia coli*, and *Pseudomonas aeruginosa* from the uteri of animals that had exhibited clinical symptoms.

Studies on the etiology of reproductive disorders in female camels based on a large clinical database are needed to investigate the magnitude of each problem and to plan efficient strategies for their management. The objective of this study was to investigate the clinical findings in large number of barren female dromedaries examined for different complaints.

## 2. Materials and methods

### 2.1. Animals and management

A total of 7300 female camels (*Camelus dromedarius*) aged between 5 and 18 years were examined for repeat breeding with regular heat interval (animals that show estrus at regular intervals, 12–14 days, but fail to conceive after three or more services, RB-R, n = 5444), refused mating (a female camel that curls her tail dorsally when approached by a rutting male, RM, n = 1299), repeat breeding with long heat interval (animals which refuse the male 2 weeks after mating as if they were pregnant; however, later on, >30 days, they return to estrus and accept the male, RB-L, n = 489), difficulty or bleeding during mating (DM, n = 53), and for manifestation of male-like behavior including vocalization, chasing estrus females, protrusion of the soft palate, and refusing to mate (MB, n = 15). The average durations ( $\pm$ standard deviation) of these reproductive disorders were  $5 \pm 2.4$ ,  $17.5 \pm 12$ ,  $12 \pm 5.6$ ,  $7.8 \pm 2.5$ , and  $9.5 \pm 1.8$  months for RB-R, RM, RB-L, DM, and MB groups, respectively. The study was carried out during seven breeding seasons (from September 2007–February 2014). The examinations were conducted at the Veterinary Teaching Hospital of Qassim University, Saudi Arabia. Of the animals examined, 2263 (31%) were nullipara and 5037 (69%) were multipara. Body condition scoring, on a scale of 1 to 5 [16], ranged from 2.5 to 4. All examined females were generally healthy with no systemic illnesses. The majority of animals were left unconfined in open desert areas and fed mainly on alfalfa hay and barley concentrate. They were continuously exposed to fertile males during the breeding season.

### 2.2. Gynecologic examinations

The reproductive tract of each animal was examined through standard transrectal palpation and by

ultrasonography using the Aloka SSD-500 model equipped with a 5-MHz linear-array transducer (Aloka Co., Ltd., Tokyo, Japan). The ovaries were examined for structure and size. The uterus was palpated for consistency, movability, and contents. Vaginal examination with a gloved hand was performed to estimate the patency of the vagina and cervix and to evaluate the nature of the vaginal discharges. Catarrhal (turbid mucus), mucopurulent (turbid mucus with flakes of pus), or purulent (profuse pus) vaginal discharges were regarded as signs of clinical endometritis [17–19]. According to the amount and viscosity of the vaginal discharges, degrees of clinical endometritis were categorized as (1) mild: females with small amount of mucopurulent vaginal discharge; (2) moderate: females with moderate mucopurulent discharge; and (3) severe: females with highly viscid and thick or pasty vaginal discharges.

### 2.3. Bacteriologic examinations

A total of 45 female camels with repeat breeding syndrome (failure of conception in spite of mating with a fertile bull more than three times) were randomly selected for bacteriologic examination. Cervical swabs were obtained under aseptic conditions. All cervical samples were inoculated onto blood and MacConkey's agar plates as described by Collee et al. [20]. The inoculated plates were incubated at 37 °C for 48 hours. Gram-stained films were prepared from the growing colonies, and isolates were tested for motility. Gram-negative bacilli and gram-positive cocci were identified by means of API 20E and API 10S systems (Biomérieux SA, Montalieu Vercieu, France). A commercially available latex agglutination test was used for identification of Lancefield groups of Streptococci.

### 2.4. Statistical analysis

The effect of parity on the frequency of different clinical findings in barren female dromedaries was evaluated using the chi-square test. GraphPad Prism program for Windows, version 300 (1999) was used for analysis. Significance was set at  $P < 0.05$ .

## 3. Results

Clinical findings for the different forms of reproductive disorders are shown (Table 1). Clinical endometritis, ovarian hydrobursitis (fluid accumulation and encapsulation of the ovary by the ovarian bursa), and vaginal adhesions (occlusion of the vaginal passage) were the common clinical findings in female camels examined for RB-R, RM, and RB-L, respectively. Vaginal adhesions, persistent hymen, and vulvar atresia were the clinical findings in female camels presented due to bleeding at mating or with a history of an incomplete intromission of the penis (DM).

Parity affected the frequency of occurrence of these clinical findings. Clinical endometritis and ovarian hydrobursitis were the common clinical findings in the barren multipara and nullipara, respectively (Table 2).

Clinical endometritis was found in mild, moderate, and severe degrees in frequencies of 45%, 32%, and 23%, respectively. Vaginal discharges were observed after

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