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HUMP BIOPSY ON LARGE CAMELIDS (*Camelus dromedarius* and *Camelus bactrianus*)

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ABSTRACT

Composed essentially of adipose tissue containing a high proportion of fat, the hump is a particularity of the camel. The collection of hump fat by biopsy is an easy way for monitoring the composition of fat storage or for the follow-up of xenobiotic lipophilic molecules. The method of biopsy is described. It was tested in dromedary and bactrian camel and can be used repetitively without risk for the animal to sample approximately 1g of tissue in kinetic studies.

Key words: Bactrian camel, biopsy, dromedary, hump

Among all farm species, the large camelids, dromedary (*Camelus dromedarius*) or bactrian (*Camelus bactrianus*) are the only species having hump containing fat as the hump of the zebu –(*Bos indicus*)- is a muscle-fat organ. As for other farm species, camels are confronted to alternations of abundant and of insufficient feed resources, either for climatic (dry/rainy season) or physiological reasons (feeding imbalances at the beginning of lactation). The camel is able to manage the periods of under-feeding by the mobilisation of the fat stored in the hump and other fat storage sites, mainly around kidney, abdominal wall and mesentery (Faye *et al,* 2012). From this point of view, the presence of the hump could be regarded as an adaptive device in a very harsh environment where the feed availability is highly fluctuating.

The camel hump could represent between 30 and 50% of the total fat storage in dromedary (Maghoub and Kadim, 2013). The dromedary hump is composed of adipocytes (Bengoumi *et al,* 2005) with 64 to 85% fat with a very high content of saturated fatty acids of about 63% (Kadim *et al,* 2002). No data is available for bactrian camel, but except that the hump is double, its composition and fat concentration is probably close to that of dromedary. In the same time, the hump by its high proportion of fat could be target organ for the storage of xenobiotic lipophilic molecules as organic pollutants or organo-chlorinated pesticides. In consequence, the biopsy of the hump could be a convenient method to assess the dynamics of storage-destocking of such molecules.

The present paper is describing the method of hump biopsy tested both in dromedary in Saudi Arabia and in bactrian camel in Kazakhstan in the frame of monitoring of contamination in organic pollutants.

Materials and Methods

Location and animals (Figs 1 and 2)

In Saudi Arabia, two dromedary camels (young males 3 years old) were used for biopsy. The biopsy was carried out in the camel farm of Al -Jouf "Camel & Range Research Centre" located in north-west Saudi Arabia, 950 km from Riyadh. Average annual temperature was 20°C, ranging from 12°C to 27°C, and average annual rainfall was 55 mm. The herd was composed by camels of four ecotypes (Malhah, Wadhah, Hamrah and Safrah). The weight of the animals selected for the experiment was 627 and 642 kg. Animals were weighing in the morning just before the trial with a platform scale Mettler Toledo©, 3000 kg capacity.

In Kazakhstan, four female Ongtüstik bactrian camels weighing between 400 and 530 kg, two primiparous and two multiparous were selected for biopsy. The trial was carried out in the farm Aigene (43°20′ N, 79°58′ E) in South Kazakhstan (Suzak region) situated on the borderline between steppe and the desert Moyumkum. This zone is characterised by few rainfall (<150 mm per year) and huge variations between summer (average of 28°C with some peaks over 40°C) and winter temperature (average of -17°C with some peaks under -30°C).

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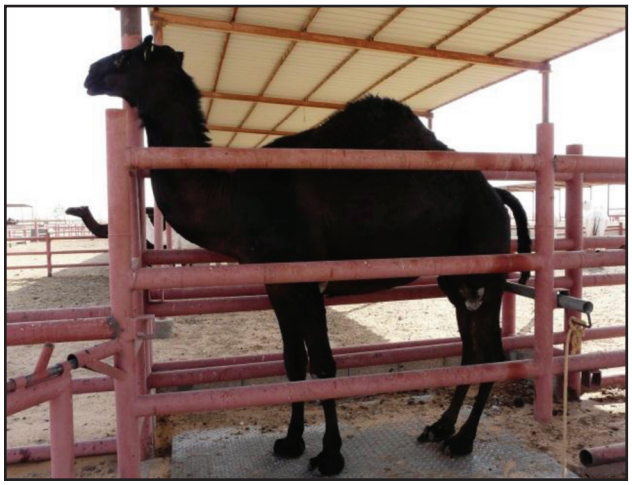

Fig 1. Dromedary camel, Al-Jouf, Saudi Arabia.

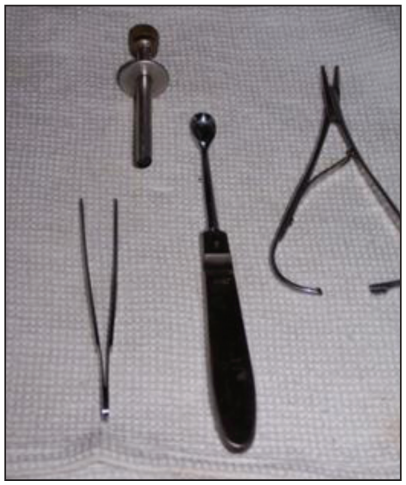

Fig 3. Biopsy tools (from left to right): tweezers, trocar, Luer-spoon and pliers.

Fig 2. Bactrian camel, Aigene, Kazakhstan.

Fig 4. Introduction of cannula with twisting movement.

The following equipment was used for implementing the biopsy (Fig 3):

- Plier for suture's needle
- Plier with flat extremity
- Luer spoon for fat extraction
- Cannula with its trocar (8mm diameter x 10 cm length)
- Sterile surgical blade for skin incision – size 18,
- Needle and catgut for suturing the incision
- Syringes for local anaesthesia (10 ml.) and for sedative (5 ml)
- Local anaesthesia
- Sedative
- Glass bottles for storage of fat samples

Other material: cotton, sterile gauze wipes, iodine, blue spray and alcohol solution (70%).

Procedure

The animals were sadated with IM injection of Xylazine.

The site of biopsy on the hump was aseptically prepared and 2% lignocaine hydrochloride chloride was infiltrated in 5-6 different places "in crown" around the proposed site of incision.

A small incision of the skin was achieved (no more than 1cm large) approximately at the middle of the side of the hump (left or right is without importance). Then, the trocar was introduced through the wound straight in the fat of the hump (only the cannula without the trocar). The cannula was turned in the hump fat during the progressive introduction in order to cut the fat and to get a cylindrical piece of hump tissue (Figs 4 and 5).

More fat tissue was be extracted by introduction of the cannula in different directions through

Fig 5. Cannula entirely introduced into the fat.

Fig 6. Carrot of hump fat after biopsy (≈0.5 to 1g).

the same wound according to the same twisting procedure.

The cannula was withdrawn and the fat was collected with Luer spoon. For each coring, approximately 0.5 to 1g of fat was collected (Fig 6).

Biopsy wound was closed by non-absorbable suture.

Results and Discussion

The hump biopsy was easy to achieve aseptically in sedated animals. The duration of the biopsy from the immobilisation of the animal up to the end of suturing did not exceed 15-20 min. Moreover, the hump biopsy can be renewed regularly (even weekly) on the same animal in case of monitoring of hump fat composition, change in adipocyte patterns (Kamili *et al,* 2008) or dynamic of contamination with lipophilic molecules. Of course, such repetitions are easier with bactrian camel due to his double hump as sampling points can alternate the hump and the incision side of each hump. The experience showed that these repetitions at one week interval were well supported by the animal.

The hump is poorly innervated and vascularised, contrary to other organs which could

Fig 7. Bactrian camel remaining quiet after biopsy (The blue circle on the forehump is the biopsy site).

be submitted to biopsy as the liver (Cherrier *et al,* 1991). In consequence the risk of bleeding is quite low and out coming blood can be easily dried with cotton swaps. Therefore, a general anaesthesia is not necessary. Elsewhere, the hump volume is generally sufficient and placed on the back above the spine well isolated from the abdomen. In consequence, the risk to reach one vital organ is nil, even in case of untimely movement of the camel during the intervention.

However, sometimes, in very thin animals, the hump could almost disappeared (dromedary), or like empty bag (bactrian). In that case, the biopsy is not possible, not because there is any risk, but because, the fat storage is not sufficient to be collected properly.

Finally, and contrary to biopsy of vital organ, it is not necessary to suppress watering or to impose preoperative fasting.

Conclusion

The hump biopsy is an easy method, without risk and useful for monitoring fat composition or any intoxication with lipophilic molecules.

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