

INSULIN CONTENT IN RAW DROMEDARY MILK AND SERUM MEASURED OVER ONE LACTATION PERIOD

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ABSTRACT

The insulin content was measured in raw milk and serum of individual dromedaries over a period of 310 days. The mean milk insulin concentration was 40.5 ± 10.7 $\mu\text{U/ml}$ and the mean serum insulin concentration was 12.77 ± 7.62 $\mu\text{U/ml}$.

Key words: Dromedary, insulin, lactation, milk

Over the past years camel milk is experiencing a novel awareness in the western world after it has been consumed for centuries by nomadic people for its nutritional and medicinal properties. According to Agrawal *et al* (2003) it contains high levels of insulin and can therefore be used to treat *Diabetes mellitus* (Agrawal *et al*, 2005). However, Wernery *et al* (2006) reported that the insulin content in camel milk is only slightly higher than in cow milk. In animals there are large discrepancies in reported insulin concentrations which may be explained by the stage of lactation and methodology used.

This paper therefore tries to clarify this point by testing insulin in camel milk of 7 dromedaries during one lactation period. Furthermore, it compares the values found in the milk with values in serum.

Materials and Methods

Milk samples were aseptically collected from 7 individual dromedaries immediately after parturition and then regularly over a period of 310 days. The dromedaries were milked by hand and the milk pooled from all 4 teats into sterile plastic containers. At the same time, when the dromedaries were milked, a blood sample was withdrawn from the jugular vein.

The camel received pelleted concentrate (2 kg/day), fresh alfalfa (4 kg/day) and hay *ad libitum*.

Camel insulin concentrations were measured by radio immune assay (RIA) using a commercially available human insulin kit (INS-Irma, KIP 1251 - KIP 2154, Biosource Europe S.A., Belgium) following the

manufacturer's recommendations. This kit detects insulin in human serum or plasma. According to the manufacturer, a strong cross reactivity with porcine and bovine insulin (100%) has been observed with this kit. Human serum was used as control.

The insulin values were calculated as mean with standard deviation from 7 dromedaries.

Results and Discussion

Insulin concentrations measured over a period of 310 days in camel milk and serum are shown in Figure 1 and 2.

The results show that the insulin content varies widely between the different camels as described before (Wernery *et al*, 2006). Marked variations also occur during the different lactation stages. The highest insulin content is reached after parturition with a mean of 286.5 $\mu\text{U/ml}$ during the first 48 hours. After 48 hours the insulin amount in dromedary's milk declines rapidly and reaches a plateau which last approximately 160 days. Before dry-off the insulin content increases again.

A similar insulin pattern has been described both in animals and human varying considerably depending on the stage of lactation (Ontsouka *et al*, 2003). The concentration is highest around parturition and declines rapidly within 14 days to reach a steady level. This process is fast in cows, more gradual in women and most prolonged in sows (Nowak and Nowak, 1989). Other factors than stage of lactation which have an influence on milk insulin concentrations include breed, quantity of milk

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