Weighing up the secrets of African elephant body fat

July 3 2014

A research team from The University of Nottingham has carried out the first molecular characterisation of the African elephant's adipose tissue—body fat. This new information will form the basis of future studies aimed at securing the health and future survival of captive elephants.

The population of captive elephants, both Asian and African, in Europe and North America is not self-sustaining, largely due to poor fertility, resulting in a fewer baby elephants being born. It is acknowledged that if a solution for these reproductive difficulties cannot be found quickly, captive elephants will face demographic extinction in North American zoos within the next 50 years.

This new study, carried out by a team of scientists at the School of Veterinary Medicine and Science, will form the building blocks for later

studies that will help scientists start to identify important dietary components for health and reproduction in African elephants to enable better management of this species in captivity and in the wild.

The research, Molecular Characterization of Adipose Tissue in the African Elephant, led by Dr Lisa Yon, and in equal part by her colleagues Dr Nigel Mongan, Dr Richard Emes and Dr Alison Mostyn, has been published in the open access journal *PLOS ONE*.

Using expertise in molecular biology and bioinformatics at the Nottingham vet school and with access to unique samples from the African elephant researchers were able to explore some important basic biological questions to achieve a better understanding of elephants.

Leptin—a hormone made by fat cells to regulate the amount of fat stored in the body – is a crucial molecular link between nutritional status, amount of adipose tissue and fertility in many species. This research has shown that it has a similar function in the African elephant.

Dr Yon said: "This research provides important information on the structure and function of adipose tissue in the African elephant, highlighting the crucial genes and nutrients present during different times of life—particularly reproduction and lactation."

Since the discovery of Leptin, adipose tissue has been shown to play a key role in reproduction, energy sensing and regulation, and inflammatory responses. It has been linked with reproductive activity both in terms of the onset of puberty and in maintenance of reproductive function so it may play an important role in building up and maintaining the elephant's reserves to ensure health and fertility.

This work forms an important first step to help maintain a healthy, reproductively viable captive population. This would also eliminate the

need to catch additional animals from the wild to supplement the captive population.

Dr Yon said: "The information we gained can help us to know how to better provide for elephants' dietary needs, and what possible impact this may have on their reproductive success. These same methods can be applied to further our understanding on a range of domestic or non-domestic species."

Elephant samples were obtained from management-organized culling operations in Save Valley Conservancy (SVC) in Zimbabwe during 2009-2010. The Zimbabwe Parks and Wildlife Management Authority (PWMA) gave permits to SVC to cull the animals and SVC gave the authors permission to use the samples. No animals were killed specifically for this study, and all permission was obtained from the relevant authorities.

More information: Molecular Characterization of Adipose Tissue in the African Elephant, www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0091717

Provided by University of Nottingham