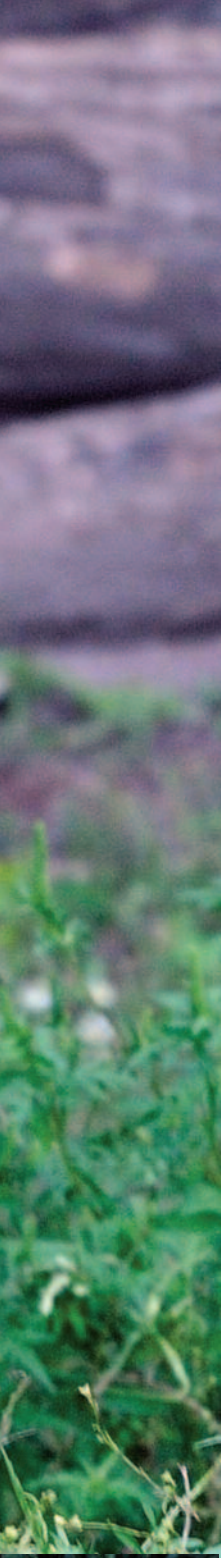
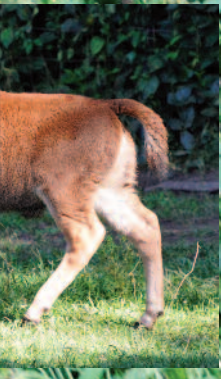
our new baby wood bison

Artificial insemination project gives birth to a very special newcomer





research pays off

Three years have passed since the Reproductive Physiology Unit at the Toronto Zoo initiated a research program investigating the development of assisted reproductive technologies for wood bison (Bison bison athabascae). The long-term goals of the study are to implement reproductive biotechnologies to preserve the genetics, in the form of sperm and embryos, of the remaining wild wood bison as an alternative method for producing non-infected offspring in an effort to expand the current wood bison population and reduce or eliminate the incidence of tuberculosis and brucellosis in the wild. These extensive objectives require the efforts of a collaborative team known as the Wood Bison Reproductive Research Group, which includes researchers from the Toronto Zoo, University of Saskatchewan, University of Calgary, Calgary Zoo and the Wood Bison Recovery Team.

artificial insemination – an important technology

Reproductive biotechnologies have become commonplace in animal management strategies for food and companion animal businesses. Artificial insemination and embryo transfer techniques have been applied with great success for over 30 years in both domestic species and humans. Artificial insemination (AI), in particular, has been stated to be the most powerful tool in the repertoire of assisted reproductive techniques for genetic improvement, distribution and preservation. The benefits of AI for population management includes maximizing the genetic contribution of valuable males, prolonging their reproductive lifespan, overcoming behavioural/physical deficiencies that prohibit or hinder natural breeding, avoiding transfer of live animals, and reducing space required to house necessary genetic diversity. In recent years, sperm sexing technologies have added another important benefit to the use of AI: gender selection in the offspring. This can be especially valuable in captive situations in which multiple males are difficult to house and a breeding hierarchy prevents all but the dominant male from mating.

many species benefit

In the past 10 years, breakthroughs have begun to emerge in the field of AI for non-domestic species. Use of fresh, chilled or frozen sperm has resulted in multiple offspring in several iconic species. One of the more successful implementations of AI in an endangered species has been in black-footed ferrets, which resulted in 139 kits being born. Giant pandas have also greatly benefitted from AI, with 10 or more panda cubs being produced every year since 2001. Numerous offspring have also been produced following AI in cheetahs and other endangered cat species. Although fraught with numerous challenges, including the large size of the animals, insemination of elephant females has resulted in 36 baby elephants since 1999. Interestingly, a skew towards male offspring (69% male: 28% female) has prompted several efforts to investigate the use of sex sorted semen in this species. The sperm sorting technique has been proven highly effective in bottlenose dolphins, with nine female calves born to date.

breakthrough advances

During these past three years, working with our wood bison herd in the Canadian Domain at the Toronto Zoo, progress has been made in the development and implementation of protocols for the manipulation of egg production, ovulation induction, insemination and embryo production in vitro. Although related to domestic cattle, bison reproductive technologies can be challenging due to species-specific differences that limit the success of these techniques. The free-ranging nature of the Zoo's bison has also presented interesting difficulties that are not commonly dealt with in domestic cattle. The slow progress in establishing repeatable and consistent techniques is commonly observed in non-domestic species where animal numbers are lower and handling is more difficult than typically experienced for domestic animal research studies. However, despite all of these obstacles, July 25, 2011 was a great day in the Canadian Domain as last fall's insemination attempts resulted in the birth of a healthy female wood bison, that can be seen lingering close to her mother amongst the other members of the herd. After 261 days of pregnancy and an uneventful labour, the six-year-old mother delivered her baby to the excitement of all staff who worked tirelessly to carry out the procedures last October and November, 2010.

a special baby

What is all the excitement about? This new female wood bison has a very special genetic background. Her father is a wild-caught bull that is currently housed at the bison research facility at the University of Saskatchewan. The semen was collected early in the morning on November 1, chilled and transported on an Air Canada flight to Toronto Zoo. This is a primary example of introducing new genetic material into a herd without the need for transporting live animals. With this milestone, thoughts move to this year's research plan, which will involve the use of both chilled and frozen sperm for insemination, in anticipation of our plans to develop sex-sorted sperm techniques for this species. Although our new female bison signifies the first step of a long journey, it provides us with renewed energy to tackle more of the species-specific challenges of bison reproduction.

Grasslands in Crisis: Conserving a Forgotten World

Mark your calendars for this exciting symposium that will bring together researchers and advocates of grassland ecosystems. Happening February 22 - 23, 2012 at the Royal Ontario Museum and sponsored by the Bison Collaborative - a newly formed initiative between the Toronto Zoo, ROM, Parks Canada, and Earth Rangers this event will highlight one of the most endangered ecosystems in North America.

Want to learn more? Check out upcoming events (page 19) for a Bison Collaborative symposium next year