There are an estimated 41 million donkeys (Equus asinus) worldwide, 96% of which inhabit developing countries. The use of humane population management has become an important subject of concern in the Caribbean and other developing countries, as uncontrolled breeding leads to depletion of food resources, poor body condition, and ultimately starvation of donkeys.

Nevis, the sister island of St. Kitts where Ross University School of Veterinary Medicine (RUSVM) is located, has an overpopulation of donkeys. The number of donkeys found on the island causes human-animal conflicts that often result in vehicular accidents, depletion of crops, and increased frustrations for tourist attractions.

A research team led by Dr. Hilari French at RUSVM has investigated the potential use of immunocontraceptives using the porcine zona pellucida (pZP) vaccine and a recombinant form developed by collaborators from the University of Pretoria and the Council for Scientific and Industrial Research, South Africa. Initially, in 2017, RUSVM funded a study in which 25 reproductively sound jennies were immunized with either pZP or recombinant zona pellucida (reZP) vaccines, both formulated with Freund's adjuvants. Although both vaccines were successful in inducing infertility, severe local injection site reactions, many of which were associated with lameness, were noted. This prohibited further use of Freund's adjuvants in donkeys.

A follow-up study in 2019, funded by the Botstiber Institute for Wildlife Fertility Control, of a new group of reproductively sound jennies combined pZP and reZP vaccines with a new adjuvant formulation (6% Pet Gel A and 500 µg Poly[I:C]). Vaccination with both pZP and reZP was associated with ovarian shutdown in 44% (4/9) and 71% (4/7) of jennies, beginning an average (± SD) of 118 ± 33 days and 91 ± 20 days after vaccination, respectively (P > .05). Vaccination also delayed the time until jennies became pregnant (P = .0005; control, 78 ± 31 days; pZP, 218 ± 69 days; reZP, 244 ± 104 days), and only mild local injection site reactions were observed in the jennies after treatment. This study concluded that the use of ZP vaccines will delay and/or decrease the reproductive cycle of fertile jennies.

However, the mechanism of action through which the vaccines caused infertility was still unresolved. The primary mechanism of action for ZP vaccines is generally considered to be an antibody-mediated interference with sperm-oocyte binding and/or fertilization; however, ZP vaccines have also been associated with ovarian dysfunction. Evidence suggests that ovarian suppression may be an inherent feature of effective ZP-based immunocontrception, but the mechanism of action at the level of the ovaries and its contribution to the vaccine’s contraceptive effect is not well described in any species. Therefore, the goal of the most recent study conducted at RUSVM in 2021 was to evaluate the effect of reZP vaccine on ovarian dynamics and histology of jennies. The preliminary results of the study suggest the reZP vaccine induces ovarian shutdown in jennies through an immune response against the ZP and consequent blockage of follicle growth.

The availability of feral donkeys on the island provides RUSVM with unique opportunities to protect and promote animal and human health through animal research in reproduction. The team continues to explore the use of immunocontraceptives for humane population management of feral donkeys and is developing resources for a future field trial.