Fertility control: A new and successful paradigm for African elephant population management

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In recent years several events have conspired to intersect and draw substantial public attention to a growing problem. As Dr. Bertschinger's PhD thesis [2] and review (http://www.vetscite.org) eloquently indicates, African elephants face an uncertain future. Paradoxically, this is not because of poaching, which, while still real, is not the primary threat to rapidly growing elephant populations throughout Africa. The primary threats include limited habitat inside the parks and preserves, unrestrained human population growth and accompanying constricting habitat outside those parks, while at the same time, robust reproductive performance of this species threatens to have these magnificent animals outstrip the decreasing habitat.

Disagreement abounds regarding wise management of African elephants. There are those managers who see the destruction of habitat and call for culling. Then we have ecologists who simply say that habitat is being destroyed by elephants and more ecologists who say the habitat is being changed by elephants rather than destroyed and that we are reacting in an excessively strident manner. We also have an ambivalent public, some of who see elephants as little more than an economic force with valuable ivory, meat, hides and labour opportunities during culls, and others who view the animals as a "national treasure".

In a broad sense, this is a classic conservation issue, seemingly biological in nature, yet interlaced with sociology, economics, cultural overtones, and no little politics. It also pits classical conservationists, who are concerned with populations against the animal welfare community, which is more often concerned with the individual animal. It is unlikely that human population growth will be restrained in Africa, and it is equally unlikely that significant new habitat will be made available for elephants, thus the only real choices will be culling, or slowing elephant population growth.

The most recent player in this complex drama is fertility control. Used successfully for two decades on wild horses, urban deer, zoo populations and various other species, fertility control made its debut with elephants in 1996, in the Kruger Park. In short order one approach – immunocontraception using porcine *zona pellucida* vaccine (PZPV) – was shown to be effective and safe [7] and moved on to actual management [4] [5]. Thirteen game parks in South Africa now use fertility control to manage their respective elephant populations and that in turn has taken culling off the table. Nevertheless, controversy remains [9] [12] [13]. This approach may not be successful in all settings – we really do not know – but where it does work it bridges the gap between the conservationists who are concerned about habitat destruction (or change!) and animal welfare advocates who do not want to see animals culled.

Although only a single fertility control agent has been used successfully thus far, the dilemma that elephants pose (as well as other charismatic species) has drawn the attention of many in the scientific world, who have joined the search for useful fertility control agents. Some have proposed male contraception [3] [8], while others have opted for female fertility control without interfering with the endocrine/behavioural biology axis [4] and other for female fertility control that would interfere with reproductive and behavioural endocrinology [6] [14]. Some have even proposed abortifacients [1], and other groups have proposed permanent sterilization [11] and still others, reversible fertility control [10]. The most obvious scientific need at present is a contraceptive that, while meeting all other criteria for safety and efficacy for elephants [12], could provide several years of contraceptive efficacy following a single administration. Research into this area is ongoing [15]. But what exactly do elephant managers need? We are seeing a plethora of research into diverse methods of fertility control without an equally thorough overview of exactly what the mangers need. What exactly will be publicly acceptable? There is an equally compelling need for public input into this topic.

The most logical starting point should be a convocation of elephant managers, who can speak to the strengths and weaknesses of the different approaches. Will male contraception work? Will female contraception offer more management flexibility? Will the public accept abortifacients? Is reversibility of contraceptive action an absolute requirement? Are serious behavioural alterations acceptable? These and many other questions need to be answered and some consensus developed – by the

managers – before more resources are invested into fertility control methods that might prove less than useful.

Nevertheless, progress to date makes it clear that fertility control is a valuable tool and can be successfully applied to African elephant populations. The original research in the Kruger Park highlighted the safety of PZPV, and now the work of Dr. Bertschinger and the African team has confirmed its efficacy at the individual and the population level. It should be of historical significance that Dr. Bertschinger's PhD thesis [2] is the very first one ever awarded for research into free-ranging elephant fertility control (but, I suspect, it shall not be the last one). The idea of slowing elephant population growth through contraception is no longer a theoretical construct, but a practical, successful and humane change in our thinking and points the way to an entirely new paradigm for elephant management.

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