

# Veterinary agents and poisons threaten avian scavengers in Africa and Europe

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Perceived to be in competition with hunters and to prey on livestock, predators in Europe and Africa are deliberately poisoned, via carcasses laced with agricultural pesticides as baits. As communal scavengers, vulture populations in these areas have been especially hard hit by the presence of poison-laced carcasses. Species that migrate between Europe and Africa face poisoning risks in either region. Residues of veterinary agents in the carcasses available to vultures, especially in Europe, are also of concern.

Europe has a long history of poisoning wildlife,

particularly predators that are in direct competition with hunters, may prey on livestock, or are generally maligned. As communal scavengers, vultures have been hit particularly hard and have even directly targeted because of the belief that they prey on young animals. Following severe population declines in birds of prey (for example in the Imperial Eagle, the Red Kite, and Cinereous and Egyptian Vultures), antipoaching and antipoisoning initiatives have been implemented in the EU over the past decade, but these problems nevertheless persist (1). In Africa, deliberate poisoning of wildlife has been documented for hundreds of years (2). When Africa's human population began to explode in the 1980s, the increasing need for agricultural and grazing lands exacerbated conflict between people and wildlife, especially carnivores (3). The commodification of Africa's natural resources also began in earnest around this time. All these factors led to an increase in wildlife poisoning, particularly with agricultural pesticides, a practice that continues today (3). Added to these deliberate poisonings now comes a new threat from



**Vultures under threat.** A Griffon vulture lands to join others at a feeding station. The vultures are under threat both from deliberate poisonings and because they are highly susceptible to veterinary agent diclofenac used in livestock. Image next page shows Griffon vultures feeding on meat provided at the same station.

veterinary agents that are highly toxic to vultures. Thus, avian scavengers migrating between Europe and Africa face the prospect of poisoning in either region.

### Threats to vultures in Europe

In 2013, the nonsteroidal anti-inflammatory drug (NSAID) diclofenac, which nearly drove three *Gyps* vulture species to extinction in Asia (4), was registered for veterinary use in Spain, Italy, and several other EU countries (5, 6). Given that Spain is the main European vulture stronghold and that populations of some species (such as the Egyptian and Bearded vultures) in Europe are faltering, the drug's presence on the veterinary market is perplexing and troubling. Sharma et al. (7) recently showed that diclofenac is also toxic to Steppe Eagles, raising additional concerns for Aquila eagles (such as the Imperial Eagle) and other avian scavengers.

Other NSAIDs (e.g., flunixin and ketoprofen) shown to be toxic to vultures and other birds (8) are also registered for veterinary use in Europe (9). Residues of these and various other veterinary agents (e.g., antibiotics and euthanasia drugs) are therefore also potentially available to avian scavengers in livestock carcasses, whether at specially managed feeding stations, in captive/rehabilitation facilities, or in remote rural grazing areas where an affected animal cannot readily be retrieved after death. The potential repercussions of these other NSAIDs warrant further investigation (8, 9), but the relative threats (or lack thereof) in the European Union have not yet been established (10). And while the campaign against deliberate wildlife poisoning in Southern Spain is providing affected populations with temporary respite, this is still very far from resolved. A two-pronged response is still needed to address deliberate exposure to poisons and also non-deliberate exposure to veterinary agents.

### The situation in Africa

In Africa, deliberate wildlife poisoning has been implicated in population-level declines in large carnivores, raptors, and vultures, particularly in southern and East Africa (3). Scavenging species (e.g. lions, hyenas, jackals, vultures, and eagles) have been the most impacted (3), with poisoning being the main driver in >60% of vulture declines over the past 30 years (11). During 2013, known vulture poisonings exceeded 2000 individuals—the highest figure to date and likely a gross underestimate, because most poisoning incidents are never reported (3, 11). The recent surge in elephant and rhino poaching using poisons and the associated poisoning of vultures likely represents one of the most

important new threats to African vultures, one that is little reported even among conservationists.

There is also increasing concern about the use of veterinary diclofenac and other NSAIDs in livestock in Africa and their potential to harm African vultures (12), particularly in South Africa, where vulture 'restaurants' (feeding stations) are comparatively abundant and stocked primarily with the carcasses of dead livestock (13). Elsewhere on the continent, the NSAID threat to vultures is probably low because of (believed) minimal use of NSAIDs in livestock. Even where NSAIDs are used, the likelihood of vultures feeding on a treated carcass is small because dead livestock tends to be consumed by people (D. Ogada personal observation). However, residues in domestic animals kept for transportation (e.g., horses, camels and donkeys) that may not be eaten upon death must still be verified.

### Exposure to veterinary agents versus deliberate poisoning

The term "poisoning" is now frequently (and, at least for the present time, misleadingly) used in conjunction with the exposure of vultures and other species to diclofenac. The drug is highly toxic to Old World vultures, which succumb to visceral gout after ingesting residues accumulated in the tissues of animals administered the drug during veterinary treatments. Other (often mammalian) scavengers appear to be far less susceptible to the drug. The key point is that any ensuing harm to



vultures and other susceptible scavengers exposed to diclofenac-containing carcasses is unintentional. By contrast, in a "true" poisoning case, carcasses and other desirable food items (depending on the intended wildlife target) are intentionally laced with potent compounds such as strychnine, aldicarb, carbofuran, or chlorfenvinphos—anything that is readily available, highly effective, and inexpensive. All of these compounds are acutely toxic and indiscriminately kill any animal that feeds on the bait.

The availability of potentially toxic veterinary drug residues in livestock carcasses and that of toxic compounds deliberately added to carcasses and other edible lures are, for now, two distinct threats, requiring different investigatory and remedial approaches. However, if would-be poisoners in European countries where diclofenac has been registered realize its potency to vultures, they may adopt it, or other available NSAIDs, as a poison. If this happens, the line between unintentional intoxication and deliberate poisoning will be blurred, and wildlife forensic investigations will have to be adapted accordingly. This concern should also be proactively extended to other veterinary agents that have been shown to harm scavengers feeding on previously treated livestock carcasses (15).

In both Europe and Africa, the deliberate poisoning menace to predatory and scavenging wildlife is particularly pressing, as several populations are being driven towards extinction. Local wildlife poisonings undermine national and international conservation efforts. The current surge in the use of poisons to poach elephants and rhinos is extremely worrying. The slightest additional threat, in this case in the form of available toxic residues of veterinary agents, can place an unsustainable strain on an already plummeting population. Concerted and sustained vigilance and monitoring of all veterinary agents known to be in use and potentially harmful is of utmost importance. Understanding the relative magnitude of, and inherent complexities presented by, each likely threat is essential to enacting stringent legal procedures and determining penalties in the ongoing battle to safeguard scavenging wildlife and the critical ecosystem balance they help maintain.

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