The use of veterinary drugs and their potential toxicity to vultures and avian scavengers in Spain, an update from research projects

Dr. Ignasi Marco
Departament de Medicina i Cirurgia Animal
Facultat de Veterinaria
Universitat Autònoma de Barcelona
Vultures, as species at the top of food chains, are at risk of exposure to poison and accumulation of contaminants such as heavy metals and pesticides.

More recently, their exposure to veterinary drugs (VD) (antiinflammatory, antibiotics, anesthetics, antiparasitics) is of increasing concern.

Supplementary feeding sites are a strategy for their conservation. But there are no regulations and medicated carcasses may be a risk of exposure to VD.
2013
Despite the risk to vultures, Spain authorized diclofenac as a VD for use in cattle, pigs, and horses
EVIDENCE OF TOXICITY OF VD
ANTIINFLAMMATORY

Diclofenac

- Toxic to *Gyps* vultures, but to most accipitriforms is largely unknown

- Diclofenac and other NSAIDs are toxic to raptors, storks, cranes and owls *(Cuthbert et al., 2007)*

- Steppe eagle (*Aquila nipalensis*) has been described as susceptible *(Sharma et al., 2014)*

- Decline of Egyptian vulture (*Neophron percnopterus*) and red-headed vulture (*Sarcogyps calvus*) in India, but no direct evidence to link
ANTIINFLAMMATORY

Flunixin

- Also nephrotoxic to *Gyps* vultures
- Spain: 2 cases of griffon vult. deaths associated to flunixin
  - 2012. Andalucia (*Zorrilla et al., 2015*)
  - 2016. Alicante (*María-Mojica et al., 2018*)
ANTIINFLAMMATORY

Flunixin, Carprofen and Phenylbutazone

- May also be nephrotoxic to *Gyps* vultures

- Experimental study in Cape vulture (*Gyps coprotheres*) (Fourie et al, 2015)
  - No deaths/pathological lesions but toxic clinical signs, clinical pathological changes and long half-lives of elimination
  - All three drugs have a potential for toxicity
ANTIINFLAMMATORY

Ketoprofen

- Nephrotoxic in African Gyps vultures when feeding on treated carcasses (Naidoo et al., 2010)

- Ketoprofen and meloxicam detected in 2/3 unfertilized eggs of Bearded vultures (S Spain). But the two adult females lived in captivity and never treated with either drug (Zorrilla et al., 2018)
ANTIINFLAMMATORY

Nimesulide

- Associated with visceral gout in 4/5 asiatic Gyps vultures. May have similar toxic effects to those of diclofenac (Cuthbert et al., 2016)

Aceclofenac

- Metabolizes into diclofenac in some mammal species, like cattle: same risk to vultures (Galligan et al., 2016)
ANTIINFLAMMATORY

Meloxicam

- The only effective and vulture safe alternative
- Residues of meloxicam on its own have never been associated with lesions (visceral gout) or death
ANTIINFLAMMATORY

Others

− Several NSAIDs whose safety to vultures has not been tested are in widespread veterinary use within the range of vultures (metamizole, ibuprofen, naproxen) \(\text{(Naidoo et al., 2010)}\)
“Diclofenac and other non-steroidal anti-inflammatory drugs (ketoprofen, carprofen, flunixin) in avian scavengers in the Iberian Peninsula” (2017-19)

- 160 griffon vult., 8 cinereous vult., 8 bearded vult., 7 Egyptian vult.
- No diclofenac detected
- NSAIDs residues in 7 griffon vult. (4.4%): flunixin in 4 (2.5%), meloxicam in 2 (1.3%) and nimesulide in 1 (0.63%)
Domestic animal carcasses

- Low levels to cause acute intoxication
- Diclofenac found only in muscle at injection site (not in liver and kidney)
ANTIBIOTICS

Fluoroquinolones

- In high number of nestling griffon vultures (C Spain) → chronic contamination with potential negative health consequences (Blanco et al., 2016)

- N Spain: Detected in 65% (n=106) (16 (15.1%) quantifiable amounts of ENRO and 6 (5.7%) of CIPRO) (Casas et al., 2016)

  • Low concentrations, unlikely to have toxic effects but evidence of access to carcasses contaminated with Ab
ANTIBIOTICS

Others

- Trimethoprim, sulfadiazine, tetracycline, oxytetracycline, chlortetracycline, erythromycin, nalidixic acid and nafcillin in griffon vulture SE and C Spain (García-Fernández et al., 2013; Blanco et al., 2016)
ANTIBIOTICS AND FUNGAL INFECTIONS

- Ab may alter microbiota and facilitate opportunistic fungi

- Nestling cinereous and griffon vultures in C Spain show frequent oral lesions, associated with chronic exposure to Ab from medicated livestock carcasses (Pitarch et al., 2017)
ANTIBIOTICS AND FUNGAL INFECTIONS

− Nestlings are good sentinels to be sampled
ANTIPARASITICS

Topical antiparasitics (diazinon and permethrin)

- Found in bearded vultures (*Gypaetus barbatus*) and livestock carcasses used in supplementary feeding in Pyrenees *(Mateo et al., 2015)*
  - Low detected levels but diazinon may affect brain acetylcholinesterase and thermoregulation if chronic exposure
ANESTHETICS

Pentobarbital

- Carcasses of euthanized animals can kill scavenging wildlife
- In Spain, pentobarbital has been detected in horse carcasses and has been suggested as a risk for vultures (Aldeguer et al., 2009)
- 5 griffon vultures diseased due to pentobarbital from a domestic goat at a feeding site in Spain, but recovered (Mojica et al., 2017)
FICHA TÉCNICA O RESUMEN DE LAS CARACTERÍSTICAS DEL PRODUCTO

1. DENOMINACIÓN DEL MEDICAMENTO VETERINARIO

DICLOVET 50 mg/ml solución inyectable

4.5. Precauciones especiales de uso

Precauciones especiales para su uso en animales

“No administrar a animales susceptibles de entrar en la cadena alimentaria de la fauna salvaje. En caso de muerte o sacrificio de los animales tratados, asegurarse de que no son puestos a disposición de la fauna salvaje”
“Los cadáveres de animales sacrificados con este medicamento veterinario no deben utilizarse para alimentar a otros animales debido al riesgo de intoxicación secundaria”
CONCLUSIONS

In Spain, vultures are exposed to many VDs through domestic animal carcasses.

Effects still largely unknown.

Despite assessment in technical sheet, vultures are exposed to diclofenac.

Flunixin.
THANK YOU FOR YOUR ATTENTION!