INTERNATIONAL WORKSHOP ON POISONING AND VULTURES IN ÁFRICA-ANDALUCÍA

Ronda, Málaga 8-11 April 2014

Conventional and nonconventional samples used in toxicology analysis

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International workshop on poisoning & vultures: what is the situation in Africa and how can Europe help? **April, 8-11. 2014**

Which sorts of compounds are we considering?

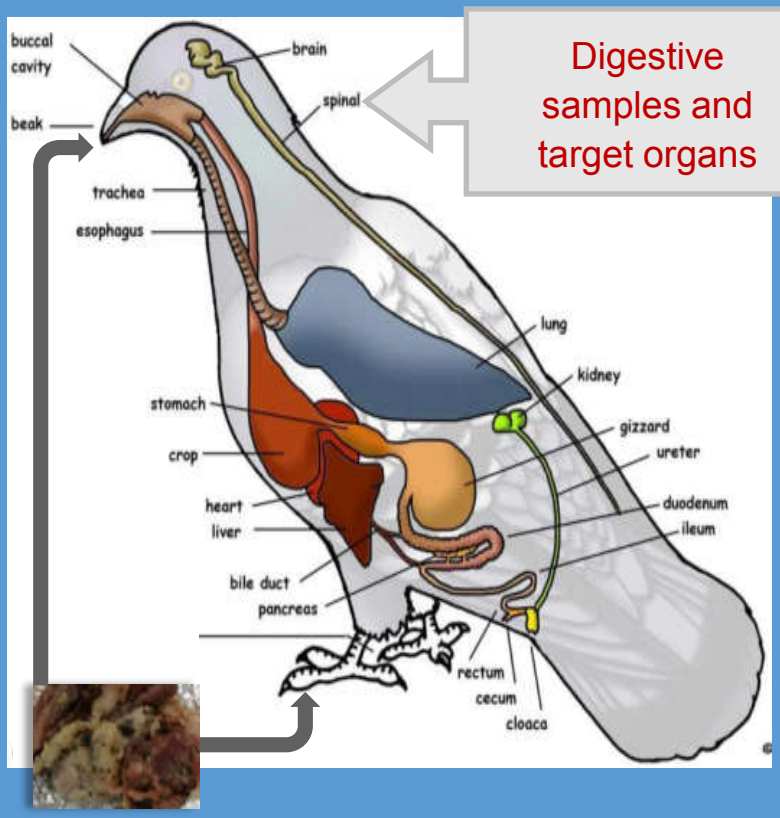
- Organophosphates
- Carbamates
- Organochlorines
- Fungicides
- Pyrethroids
- Rodenticides

What is considered a conventional sample?

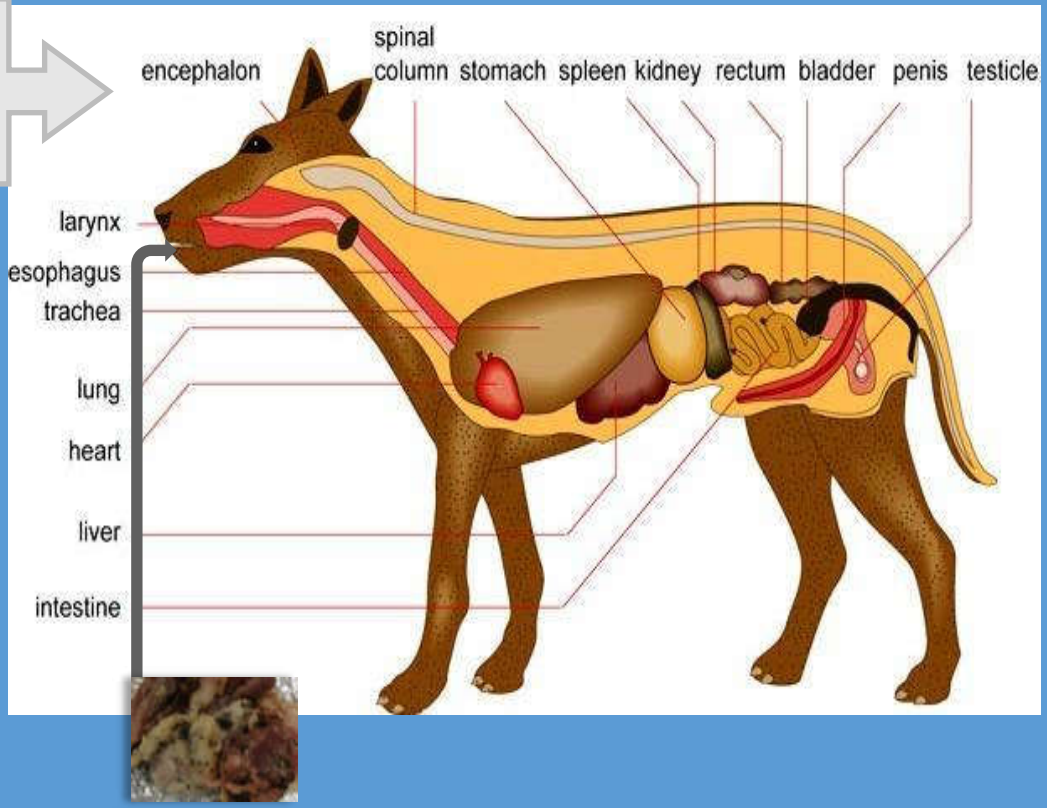
- Samples typically favoured – or collected - for toxicological analyses
- Soft tissues (e.g., kidney and liver)
- Blood **
- Ingested material**
- Digestive tract
- Brain tissue

**Can also be collected from living birds

How are poisons incorporated into samples?



Digestive samples and target organs

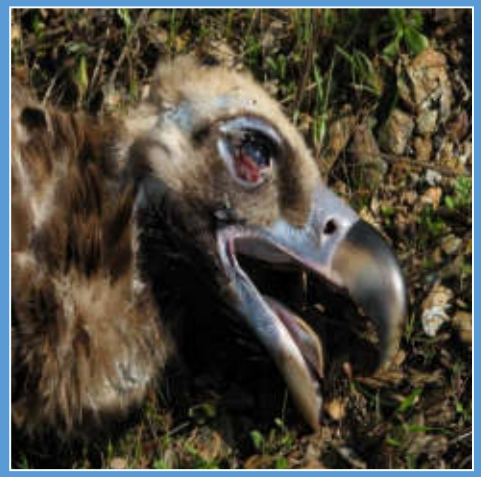


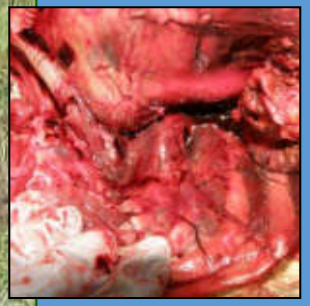
How are poisons incorporated into samples?

Compound	Time to death	Detectable (compound or metabolites)
Strychnine	Fast – minutes	Stomach?
Organophosphates Carbamates	Depends can be hours	Mouth Talons Stomach *plasma, brain ChE
Rodenticides anticoagulants	Depends can be 24-48-72 hours	Stomach Liver
Organochlorines	Hours -years	Mouth Talons Stomach Fat (with except endosulfan)

When are these samples at their best?

- Living bird: balance taking blood sample ASAP and potential health repercussions
- Carcass: has to be fairly fresh and intact or still contain undamaged target sample
- Cause of death cannot have been too fast-acting
- Presence of acute toxins may only be measured in some samples (e.g. inside mouth)
- If you can freeze or even refrigerate the samples to stop the degradation of toxins





Signs a carcass is fresh

- Body still ‘squishy’ but firm, retaining moisture
- Absence of living or deceased insects on or around…
- …BUT in parts of Spain and in Africa insects may be present even before death
- Bait residues dicernible

Bait residues

- Individual grains visible, colour stains
- Easy to see inside the craw, ventricle, stomach
- If an organophosphate, you can sometimes smell it, e.g. chlorphenvinfos – NOT the case for carbamates
- **take pictures that can readily be linked to carcass

Signs a carcass is decomposed

modera

advanced

Mummification/desiccation/skele

What is considered ‘unconventional’?

- Samples not typically collected or considered

- Talons
- Foot washes (with solvent)
- Beaks/tongues/palates
- Oral swabs
- Vomit
- Insects
- Soil/ground under the carcass
- Feathers
- Pellets
- Bone
- Eyes

IMPORTANT: Carcass components that withstand degradation

talons

beak & mouth/oral cavity

palate bone

Valuable alternative samples in wildlife forensic cases

carcass fauna

digestive tract


Tongues of degraded birds and mammals

Pellets

Eyes

Samples of limited/variable value for detecting poisons?


Ground under the carcass


Bones

Feathers

Talons

Studies

toxin	sample	reference
diazinon	Gosling feet	Vyas et al. 2003
carbofuran	Screech-owl talons	Vyas et al. 2005
carbofuran	Vulture talons *& beaks	Otieno et al. 2010, 2011

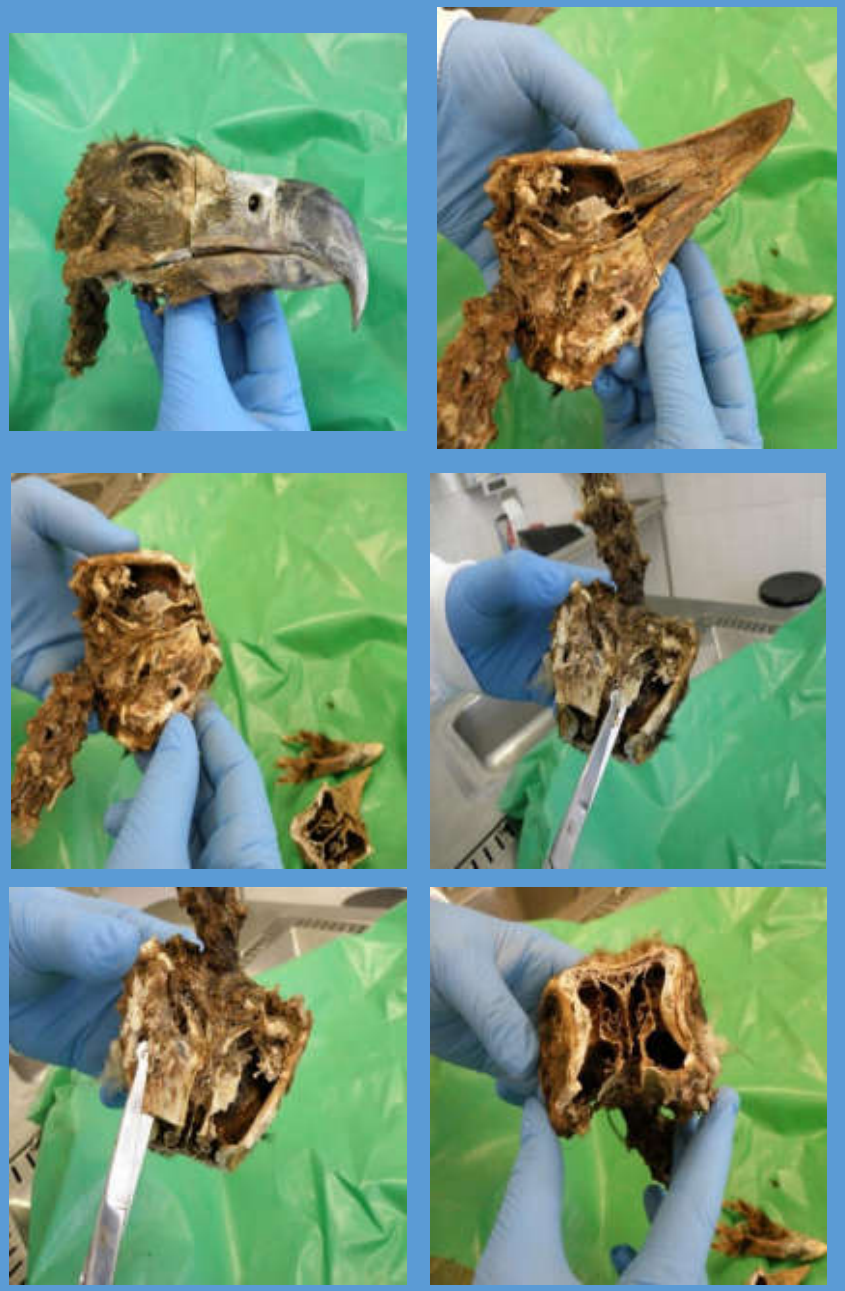
Our experience

Toxin	level detected mg/kg	species
Aldicarb Aldicarb sulfoxide Aldicarb sulfone	0.74 0.57 0.02	black kite
Chlorfenvinphos	0.45	griffon vulture

*Often best sample when presented with autolyzed carcasses, talons may be clenched around bait material

Beak & oral cavity, palate

- If highly acute or high concentration of poison is ingested
- Rapid onset of death, toxins not metabolized or spread to organs
- Chlorpyrifos detected in mouth/oral cavity of black kite (bait)
- Carbofuran detected in vulture beak simple by Otieno et al.
- Chlorfenvinphos detected in vulture palate



Carcass insects

- Important to analyze, even if dry
- Some toxins can accumulate in chitin -including lead-
- Carbofuran and chlorfenvinphos have been detected in insects recovered with carcasses

Vomit & digestive tract

- Vomit may contain poison in original – unmetabolized - form
- Remains in digestive tract may be protected from environmental conditions
- Both provide direct evidence that poison was consumed

Ground/soil beneath carcass

- Still working with this sample, but should be considered
- Soil under victim's head may contain vomit
- Fluids from carrion decomposition and/or bait (poison source) may have leached into ground