Chapter VI

INVESTIGATION IN CASES OF ILLEGAL POISON USE:
INVESTIGATION, TECHNIQUES AND PROCEDURE.
NEW CHALLENGES, NEW METHODS

Iñigo Fajardo and Antonio Ruiz, Andalusian Strategy against Poison (Estrategia Andaluza contra el Veneno: EAV)
Francisco Velasco, SEPRONA
Irene Zorrilla, Diagnosis and Analysis Centre (Centro de Análisis y Diagnóstico: CAD)
Ngaio Richards, Working Dogs for Conservation

“There’s no such thing as a lost cause, only people without hope”

We have now got used to saying and hearing on all forums that the placement of poison is a crime, meaning that anyone who does so is a criminal and should be made to pay for the damage wreaked on our wildlife. But we have not yet assimilated what this means. According to our legal system crimes have to be investigated by the proper authority, clarified and turned over to the justice system for it to make the requisite ruling. But all crimes? All of them, including those of poisoning, although we have not yet quite taken this fact fully onboard and we still see it as the stuff of TV series or only for crimes involving human victims. We therefore need to draw a line in the sand and understand that police investigation of these illegal acts is not only in order but also a legal obligation, to which all necessary resources have to be dedicated. We should therefore not be surprised by the fact that investigation of the death of an allegedly poisoned Egyptian Vulture involves experts and police officers taking finger prints, DNA samples or any other sample that had hitherto been reserved for crimes considered to be major. Times have changed, and ipso facto our working methods too.

But what does the investigation of a poison-use crime consist of and how is it carried out? This chapter aims to shed some light on the matter.

Unlike most other crimes dealt with by laws, wildlife crimes occur in the countryside. In general they involve poisoning, death of threatened species, poaching and illegal trading. At the moment, as a result of past inertia and inexperience, government authorities still tend to tackle each one separately, independently of the rest.

The use of poisoned-baits is a world in itself, involving a host of diverse situations, motives, compounds, regions, districts, modus operandi, target species, among many other variables of a
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local nature. These variables may even in turn have many idiosyncrasies within the same province. By way of analogy, it is like the human spoken language: there are many different languages, which can in turn be broken down into countless dialects or local forms. It is a world in constant evolution and change, a factor that has to be borne firmly in mind when a police investigation is underway.

Illegal poison use is sometimes a one-off event, at a given time and given place, without forming part of a reiterated behaviour pattern. In most cases, unfortunately, it is a habitual, recidivist practice. Moreover, it is also often associated with other illicit behaviour to the same end, i.e. the systematic extermination of non-specialist predators (placement of traps, wire snares, cage traps) especially when tied up with improperly run hunting grounds. It is not unheard-of either for there even to be a certain degree of association, sometimes under legal cover, whereby the use of poisoned-baits is only one of several illegal activities carried out. In some investigations of illegal poison use there has been a serendipitous effect of the most incriminating evidence coming to light within the field of forensic ballistics or others. Neither is it exceptional for an investigation of forest fires or organised poaching to unearth associated use of poison among the suspects.

For all these reasons the number of convictions of poisoners is in fact higher than the official figure of direct judgments for placement of poisoned-baits, since many wrongdoers could not be indicted for this latter crime specifically and had to be charged on other associated crimes. Investigators of poisoning episodes therefore have to be perfectly prepared to investigate the whole set of wildlife crimes and be well-versed in the idiosyncrasies, similarities and differences of each case.

Knowing the enemy; the characteristics of the crime

Criminal investigation of poisoning cases poses a stiff challenge due to its difficulty and complexity. The better we know it, therefore, the higher our chances of success.

The common denominator of most cases is the absence of real or functional witnesses. Other particularities to be taken into account derive from the fact that the events only come to light a time later (sometimes even weeks or months later). They are almost always covered up and are often committed in remote areas of difficult access.

When investigating poisoning cases, moreover, we are operating in alien territory (sometimes completely unknown), whereas the wrongdoers themselves know it like the palm of their hand. They will often have been born in the area and have in-depth knowledge passed down from one generation to another. This all obviously places us at a great disadvantage, which we have to offset with caniness, meticulousness and an impeccably professional approach.

The investigation is constrained by all these idiosyncrasies, making this crime one of the most slippery and hardest to deal with among all those covered by our voluminous Spanish Penal Code. Whenever a conviction is achieved, therefore, due consideration has to be given to the vast amount of work behind it and its exceptional character.
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According to the Criminal Procedure Law (Ley de Enjuiciamiento Criminal: LECRIM), the responsibility for investigating poison-use crimes falls directly on the corresponding agents in each CCAA within the framework of their respective functional and organic limitations, whether or not they belong to the law enforcement agencies. Here too there are interregional variations. In the specific case of Andalucía, this work is reinforced in the field by the help of highly specialised experts.

All the above may help to explain why there has only been one arrest for every 40 poisoning crimes committed, according to sources of the Guardia Civil, whereas the arrest rate is far higher with other environmental crimes like forest fires, etc. In common crimes committed in built-up areas the long-term arrest ratio is close to 1/1 of the recorded crimes.

In this long-odds working environment it is vital for law-enforcement officers (environment officers and the Guardia Civil’s nature-protection service, SEPRONA) to be technically qualified and to work with the necessary resources and tools to help them recognise and identify suspects and direct the investigations and visual examinations towards the desired end. This chapter will give some keys and guidance to help clear up wildlife poisoning episodes.

Investigating the crime

Until very recently only cases in which the accused were surprised in fragranti (caught in the act of committing a crime) had any chance of success in criminal proceedings, given the sheer difficulty of coming up with conclusive evidence linking events with the alleged perpetrator. On very few occasions would anyone be caught while actually carrying out the crime. In practice no associated investigation was conducted; the agents’ work was limited solely to collecting the carcass without abiding by any established protocol or any thoroughgoingness in the chain-of-custody. In this unfavourable context only one conviction was achieved in Andalucia in 2001 even though the region was at that time immersed in an all-time high of recorded poisoned-baits use.

As has been said elsewhere, the investigation is geared towards providing conclusive answers to the following questions: Who placed the poison? Can the suspect’s presence in the site be linked with the moment the crime was carried out. Why was it done? How and why? Was it a one-off event or part of a habitual practice?

At the end of the whole procedure the answers have to be accompanied with the corresponding set of evidence backing up our claims. We should never forget here that it is not ourselves we need to convince but the judiciary, which is who will judge the event. The Spanish Constitution is crystal clear here: the judge is bound to apply the principle of in dubio pro reo, meaning that the defendant is always given the benefit of the doubt, so any dubious case will be dropped.

Progress has been made on this score. Witness the fact that Andalucía has now incorporated into its routine procedures policing and forensic investigation techniques applied to this crime; there are now specialist brigades on the ground with specific training for this task.
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The immediate upshot has been a sharp increase in the number of convictions brought in, whether in administrative or criminal proceedings, with another clutch of well-directed cases in the pipeline that are likely to increase this number in the future.

More than a decade of past struggles against poisoned-baits use has now shown us that this crime can be effectively combated, and it is now time to debunk the myth that only those caught in fraganti can be convicted. In criminal proceedings the key is a well-run, meticulous and conscientious police investigation carried out unhurriedly by a well-organised multidisciplinary team.

Investigation Phases

The police investigation is divided into three classic phases: On-the-spot visual inspection (ITO in Spanish initials), ensuing investigation and laboratory analysis.

We don’t need to get bogged down in details here since the procedure is described in any police protocol manual. What we do need to stress is that the ITO is the key component; the quality of the whole procedure is up to 80% dependent on this pivotal point. Everything we might say here is only the tip of the iceberg and we cannot stress strongly enough that this crucial point calls for our maximum care and attention. Any mistakes here will vitiate the whole procedure thereafter. This inspection therefore has to be carried out by a well-trained and experienced expert.

Defects, errors and reasons for failure in the investigation of poisoning cases

Unfortunately, the clearing up of poisoning cases is no easy task. Quite the contrary, it is a long-winded, tedious process that has nothing to do with facile TV series in which cases are always solved in record time. Reality is very different. Fewer than half of the cases provide sufficient evidence for the judiciary to give its go-ahead to the trial. The most likely outcome, in fact, is that the poisoning episode will never be cleared up, as is shown only too clearly by the figures to hand. At the moment we are beginning to solve episodes that occurred over six years ago. The main prerequisite, therefore, is patience and a cast-iron will power. It is not too far-fetched to conclude that the working teams should be made up only by personnel with the due motivation. Time and experience will then do the rest.

Past experience has also shown the main stumbling blocks we need to overcome to carry out our work successfully. A close look at Chart I (modified by M.A. Pacheco, 2009), showing the habitual set of other crimes usually associated with poisoning incidents and Chart II (administrative infringements) gives a good idea of the habitual reasons for failure in the investigation procedure, given the complexity and concurrence of criminal activities.

A sine qua non of a successful outcome is without doubt coordination and liaison among the team members and mutual respect for the duties of each one. The most efficient teams have a disciplinary makeup of members from various government levels and corps. The more cohesive
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<th>Chart I: Crimes habitually committed in concurrence with poisoning</th>
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<td>Conspiracy</td>
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<td>Crime against public health</td>
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<td>Documentary forgery</td>
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<td>Illegal hunting</td>
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<td>Substantial modification of legal weapons</td>
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<th>Chart II: Habitual administrative infringements in poisoning-related cases</th>
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<td>Illegal tenure of banned wildlife-capture methods</td>
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<td>Tenure of illegal toxic compounds per se or in illegal circumstances (packaging or labelling)</td>
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<td>Disturbing, molesting or killing threatened/wild species</td>
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<td>Breach of territorial surveillance obligations</td>
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<td>Breach of conditions laid down in technical hunting plans</td>
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<td>Bearing and using banned wildlife-capture resources</td>
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<td>Unauthorised possession of wild species</td>
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<td>Obstructing or resisting agents' inspection work</td>
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<td>Use of toxic substances</td>
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<td>Breach of closed seasons and working periods</td>
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is the group, therefore, the more successful it is likely to be, and vice versa. There are dozens of cases that have been thwarted by infighting, power struggles and one-upmanship among the team members, even when the particular poisoning case was straightforward and backed up by a wealth of evidence. It goes without saying, therefore, that this drawback of team discrepancies should be avoided at all costs. The overriding objective should be shared by the whole team and this objective is none other than identifying the perpetrator of the act, obtaining solid evidence and bringing it properly to the knowledge of the court. Any straying from this overarching maxim will lead only to the squandering of public funds, failure and frustration. Fortunately, we have more and more examples of excellent work worthy of the highest praise, in which teams of up to thirty members, of different profiles, corps and even countries, worked together with surgical synchrony; the results were astonishing.

These are the so-called general mistakes. There is another type of error known as technical-specific mistakes (colloquially called syndromes); these are often fruit of inexperience or lack of attention; they are habitual during the on-the-spot visual inspection.

Police investigation of poisoning crimes is becoming increasingly sophisticated and complex, due mainly to the need of incorporating advanced methods and technologies traditionally used in crimes against people. The longer and more complex the investigation, the more likely are mistakes. Such mistakes, however, are all part of the trial-and-error learning process.

The best way of cutting down faults in the investigation procedure is setting up proper protocols for the ITOs, with well-structured report forms, controlled access of the crime scene only by essential personnel and previous planning of the on-the-spot work.

We should never lose sight of the fact that a simple, error-free investigation is always preferable to a complex, error-strewn one.
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The most frequent syndromes can be summed up as follows:

- **Carcass syndrome.** This involves granting too much importance to the carcass, especially if it is a threatened species, leading to a glut of surplus people around it. The opposite syndrome can occur in the case of common or putrefied species with a disagreeable aspect or giving off a strong smell.

- **Clean-sheet syndrome.** An instinctive act when picking up a poisoned carcass to send it to the laboratory is to turn it about and agitate it to shake off the carcass larvae (vulgarly known in Spain as *bicheríuo* or *gusanera*) and send it off in as clean a state as possible. This eliminates crucial evidence for the laboratory staff in terms of dating the death and carrying out a complete and reliable necropsy.

- **Bait syndrome.** For many good reasons the bait is a crucial element in the police investigation of poisoning episodes. Even we investigators ourselves sometimes underestimate the importance of this, to the point that we sometimes limit ourselves to removing it without more ado. A detailed analysis thereof (whether separately or as part of the whole set placed on the site) could afford vital and conclusive information for dealing with the case comprehensively. The bait is the palimpsest of the criminal’s wrongdoing or the language with which he or she communicates with us; we need only to learn to interpret his or her handwriting to gain access to this information. No two baits are identical and there is no single way of placing it.

- **Conditioned reflex syndrome.** This involves shortening the investigation due to preconceived ideas of deadlines, leaving it half done. Any evidence not collected at the proper moment or in the proper form will be lost for good, either due to environmental factors or tampering by the perpetrator.

- **Prejudgments and biases** (cause of death and perpetration). It is all too often the case that we turn up on the spot with preconceived ideas of the perpetration of the crime or the cause of the animal’s death (not all animals die from poisoning, or at least directly therefrom). A priori judgments are never good travelling companions.

- **Geographical imprecision.** In areas of reduced extension, or where many closed hunting grounds border on each other, etc, special care should be taken ensure that the crime is attributed to the right land tenure holders and that there is no confusion arising from common borders, errors in the measurement of coordinates or map reading.

- **Imprecisions in the police reports.** The police report is the main evidence, recording the core of the case. Any shortfall therein could undermine the whole procedure thereafter. There are many past examples of this.

- **Wrong carcass dating** (mistaken thanatocronology). It is common practice for us agents and field experts to give our personal opinion on the age of a carcass, duly reflected in our report. This appreciation (generally subjective) might turn out to be right but in other cases it might be belied by laboratory tests based on forensic entomology. Any glaring difference between both assessments is undesirable, so unless we are sure of our ground it is best not to trespass on the rightful domain of forensic diagnosis.
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- **Incomplete, deficient or hasty on-the-spot visual inspection.** This section almost speaks for itself. It is clear that the fewer items we record on the spot, the lower our chances of clarifying what happened: who, why and how. The likelihood of a wrong diagnosis also increases in inverse proportion to the amount of information recorded. A frequent error among highly motivated inexperienced people is to fall upon the most striking features immediately upon arriving at the crime scene. We have all made this mistake. At this moment, driven by our enthusiasm we tend to zoom in on the epicentre of events, to the detriment of our peripheral vision. This epicentre is usually the carcass and, to a lesser degree, the bait. Instead of this keyhole vision, we fervently recommend that officers should stop beforehand to take in the whole scene from some distance. After all, unless aided by other forces, the carcass is not going to go anywhere. There is no hurry. We can take time to analyse the whole scene, look around us, try to ascertain possible routes whereby the perpetrator has entered or left the scene, his or her modus operandi and any other factor that may help us to recapitulate events in our mind. This will make it much easier to pinpoint any elements transferred from perpetrator to the environment or vice versa. This unblinkered outlook is priceless.

- **Failure to record the postural clues of the carcass.** The postural clues of the carcass are an open book, again written in its own decipherable language. We only have to learn to read this language and we will learn reams of useful information to flesh out the on-the-spot visual inspection. It will also help us to descray any post-mortem tampering, analyse the compacted soil under the carcass and other essential aspects. We also have to bear in mind that once we have picked up the body and put it in the bag to be sent to the laboratory, all information afforded by the initial posture is forfeited unless we have recorded it properly beforehand.

- **Contamination of samples** (finger prints, DNA). Many samples of huge value have been spoilt because we ourselves have contaminated them by failing to wear gloves, or even wearing the same gloves to handle different samples and intermingling their properties. These mistakes are easily avoidable by means of proper training and abidance by minimum protocols in the field.

- **Contamination of the crime scene,** by means of our own finger prints, residues or any other item that might mistakenly be attributed to a possible transfer by the perpetrator to the crime scene.

- **Wrong sample-taking and -labelling procedure.** This error could invalidate the sample(s) taken during the on-the-spot visual inspection. We should not forget that DNA samples and fingerprint samples have to be sent to the laboratory in different types of containers and kept apart thereafter. The agent must make sure each bait is kept separate from the rest of the samples, each being duly identified.

- **Photograph report absent or wrongly carried out.** Both close-up and panoramic photos have to be presented, without forgetting to use numerated benchmarks or standardised reference scales or at least some sort of makeshift yardstick.

- **Poor sample packaging.** Unfortunately a high percentage of samples sent to the laboratory consist of carcasses, often in an advanced state of decomposition. Samples of this type must be frozen before being sent to laboratory to minimise smells and spills, thus preventing the documentation (reports of the visual inspection and chain-of-custody) from being stained and
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steeped in the fluids of decomposition. The best practice is to place the sample in a first weatherproof container (bag or PVC tub) and then in a second plastic bag that will be duly sealed. This whole set will then be placed in an airtight outer container, which will also be sealed. Accompanying documentation will be placed in an envelope and attached to the outside of the lid of the outer container during transport to the laboratory.

- **Failure to secure the chain-of-custody and seal the samples.** No further comment is needed here.

- **Fall prey to traps/pitfalls/red herrings.** These are set to throw us off the scent. Perpetrators such as more-or-less professional poachers sometimes go to the most astonishing and unimaginable lengths to mislead us and pull the wool over our eyes. Illegally poached game and illegal toxic products are often hidden away in false gaps in cars. Poisoned carcasses are often placed on roads or near power lines to simulate, respectively, a road accident or electrocution. One of the commonest wiles of poisoners during the on-the-spot inspection is to lead agents towards parts of the hunting ground or animal farm that are far removed from the site where the bait has been set. Meanwhile accomplices will be removing all evidence of the illegal act from the crime scene while the agents’ attention has been directed elsewhere. It is therefore essential to spread out the agents in such a way as to ensure surveillance of all the personnel of the site under inspection. Crucially important here is a good command of basic techniques of Nonverbal Communication, which will give agents and field experts invaluable information. We can personally vouch for striking finds of poisoned-baits after many hours of fruitless searching, simply by analysing the gestures and body language of the suspects.

- **Conflicts of competence between enforcement agents (regional vs. nationals).** Although these should never rightfully occur, the sad truth is they do happen throughout the whole country, so we need to deal with them here. Their consequences are always the same: failure of the case under investigation. Conflicts and friction usually arise from conflicts of competence due to the lack of any official protocols. But all problems disappear when everyone is pulling together towards the same goal, i.e., the mutual struggle against this crime and the duty of bringing the perpetrators to book. Even though corporate disputes might have some sort of justification, they have to be dealt with at other levels without ever impinging on day-to-day work.

We can therefore see at a glance that practically all the abovementioned mistakes or faults revolve around the on-the-spot visual inspection, which, as we have already pointed out, is without doubt the most pivotal and delicate phase of any investigation. However competent is the ensuing investigation, however reliable the sample-analysis lab, all their work will come to naught if the underlying investigating system is not solid enough. This point cannot be stressed too strongly.

**Investigation Resources**

It strays well beyond our remit here to write a treatise on the investigation of illegal acts. In truth there are as many ways of investigating them as there are investigators and varieties of poison,
and it is not our intention here to spoon-feed the many agents who will have by now built up a wealth of experience in Spain, with many convictions, penalties and solved cases behind them.

What we can do, however, is to give some information on the methods and tools that are proving to be tremendously effective in the fight against poison, used hitherto only to clear up other crimes bearing no relationship to biodiversity.

The first point to stress is that any investigation has to abide by a standardised protocol, designed by the agents and guaranteeing before any court unimpeachable compliance with the provisions laid down by the LECRIM.

The best protocol we would put forward for ensuring a top-quality investigation process would be not so much a list of “do’s” as a list of “don’ts”. Experience has shown that each place, each officer and each poisoned-bait is a world in itself, and no one better than someone on the ground to decide the best procedure in these particular circumstances. Even for the same team it is not the same thing to work on a case of saltmarshes in summer and high mountains in winter; they are two different worlds.

In short, any method is valid on condition that it is based on a solid, standardised protocol, pursues the goal of identifying the perpetrator and locate him or her within the crime scene and avoiding (or at least minimising) the abovementioned mistakes.
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Police investigation of wildlife crime, including illegal poisoning, cannot therefore be reduced to a one-size-fits-all procedure. It is, on the contrary, a procedure that has to be tailored to each particular case. The components thereof may vary in intensity and order without any fixed rule of thumb, depending rather on the particular circumstances and availability in each case.

Nonetheless there are three main groups of clues or evidence in this section, which we are calling trails (huellas). There are thus three investigation trails: the toxicological trail, the forensic trail and the circumstantial-evidence trail.

For this fundamental reason we prefer not to call them methods but investigation resources, which can be summed up as follows:

- **Toxicological analyses.** These are the basis of the toxicological trial on the one hand and also the technical basis underpinning any investigation of a poisoning case. Unfortunately, not all regional authorities (CCAA) run trustworthy toxicological labs, either their own or contracted. Most of the wildlife poisoning cases involve carbamates and, to a lesser degree, organophosphorus compounds, both of them inhibitors of the enzyme acetylcholinesterase. Exact diagnosis of a poisoned-baits or carcass, therefore will call for a direct identification of the compound itself or confirmation that this enzyme has in fact been inhibited after intake of the compound. In many circumstances poisoning episodes do not feature in the official statistics because they are diagnosed on sight without any analysis of compounds or possible cholinesterase inhibition, so any ensuing police investigation will be at least impaired if not completely vitiated. The toxicological analysis can often turn out to be negative even if the animal has in fact died from swallowing poisoned-baits. There are several reasons for this ostensibly surprising result: degradation of the compound if it is not recent; vomiting immediately after intake of the bait and other complex causes of a physiological nature or bound up with the nature of carbamate itself. Nowadays we have managed to overcome this false-negative problem thanks to the forensic trail: postural clues, carcass fauna and circumstantial trails. From a technical point of view, however, analyses of this type should be carried out by forensic scientists with the necessary expertise and training.

- **Forensic entomology.** This is yet another arrow that has only been recently brought into the quiver of poison investigators. Today, fortunately, many regions have now incorporated it into their necropsy reports. It offers a huge forensic value, not only helping to date the death but also giving information on the underlying causes and concomitant circumstances. Obviously this part of the analysis should also be carried out only by highly skilled personnel.

- **Fingerprinting / dermatoglyphics.** There is little to be added here about this widely known technique, which has now also been brought into the poison investigator’s toolkit in some specific teams. As a caveat, it should be noted that some procedures, such as access to Spain’s Automatic Fingerprint Identification System (Sistema Automático de Identificación Dactilar: SAID) sometimes calls for direct participation by the law enforcement agencies, according to the region involved. Although this has given rise to some remit disputes we recommend that this technique be used in close liaison with the forces that habitually include it in their daily working methods or as specified by the judicial police.
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• Forensic ballistics. Prima facie this may seem in principle to have little to do with the poisoning problem, but for the reasons mentioned at the beginning of this chapter, concerning the various crimes often associated with poisoning, this discipline has often helped to clarify and reinforce police procedures in some important cases. It should obviously be carried out by expert forensic scientists with a certain experience and specific training. By way of example, there have been cases of concurrent crimes in which the poisoned animal showed negative results in the toxicological analyses due to the degradation of the sample. Luckily, however, carcasses that had clearly been shot could serve as evidence to prove a clear and direct intention to kill wildlife in illegal circumstances (SEO-BirdLife is currently bringing a private accusation in an important case of this type). This fundamental tool provides new procedural and evidential elements, to be added to the set of our investigations. It obviously comes into its own, however, in the investigation of organised poaching or firearm shooting of threatened species.

• Signs of the perpetrator in objects. In the purest forensic style this classic police criminal-investigation resource has now been successfully used in some cases that led to convictions. It calls, however for great and specific forensic skill. Indeed the conventional judicial police now run instrumental trace-evidence laboratories with specialist personnel and an incalculable professional and human value. Once more, proper liaison and well-knit teams are essential if this tool is to give good results. We should not enter into details here for reasons of forensic prudence. Suffice it to point out, however, that many habitual poisoners (as opposed to ad hoc practitioners) tend to follow well-established and even inherited patterns when concocting a poisoned-bait. Much the same goes for forest fires, where pathological arsonists tend to make up their wicks with an almost liturgical ritual and rejoice in contemplating their work. Both of these factors could play key parts in the investigation. In our particular case the baits, postures and poisoning modus operandi point towards their perpetrator, and if we know how to read the runes it will not be difficult to track him or her down. We should not forget that the poisoner puts all of his or her personal expertise and personality into his or her work (the bait), which can at times reach levels of sophistication that afford crucial clues.

• DNA studies. We can safely claim from our particular vantage point that many of the success stories in the investigation of poisoning episodes have been achieved on the strength of this tool, totally inconceivable until very recently. Some teams nowadays process not only individualised DNA of the victims but also of the poisoned-baits and even of the suspects themselves. This is without any doubt one of the resources to hand with the brightest future. Witness the investigation carried out by our team, published in Quercus in 2013 (Cuaderno 323, January) proving the perpetrator of the poisoning of two Bearded Vulture s, thanks to a DNA study in the Analysis and Diagnosis Centre (Centro de Análisis y Diagnóstico) of the poisoned-baits, which turned out to be a piece of sheep carcass. This was then compared with the DNA of the sheep of several suspected shepherds, discovering a coincidence with one of them. Another similar case was conducted in our own laboratory. A person accused of poisoning an Iberian lynx in 2008 was found guilty in 2013 after DNA proof that his own chickens had been used as bait. To our knowledge this is the first ever conviction in Spain for killing a lynx. We had to wait until systematic use of DNA analysis to achieve a lynx-killing conviction in Spain.
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- **Postural clues.** The posture taken up by an animal upon dying often gives telltale clues to the cause of death. These insights are often crucial. Poisoning cases in particular usually lead to very clear postural clues if we know how to read the signs. The downside is that they can lead to error if hasty pre-judgments are made. Initial appreciations should always be confirmed in the lab by means of the due analyses.

- **Forensic psychology.** This is a thrilling field with the brightest future (already taken up by many working teams). It pools several scientific disciplines (psychological profile, geographical profile, nonverbal communication and forensic analysis of the bait). As well as the well-known aspects of psychological and geographical profiling, attention should also be given to the following:

  - **Nonverbal communication.** This can serve as a tremendous aid in recognition and identification of suspects. It is based on interpretation of the body language of the suspects, who might claim verbally to have had absolutely nothing to do with the poisoning episode, while their non-verbal traits are clearly manifesting their involvement in the incident. The Boston marathon terrorist attacks were cleared up in record time largely thanks to the use of this technique, i.e., analysing the gestures and attitudes of the passers-by caught on security cameras installed on the public thoroughfare. On its own, however, nonverbal communication has no value as evidence, though it can help to guide the investigation in the right direction. In the case of Andalucía, to give one example, the members of the *Unidad Forense de Apoyo* (UFOA) have been specifically trained up in this technique by leading national specialists specially hired for that purpose. Our advice is that this resource should not be taken up unless the agents have the necessary minimum knowledge to use it properly.

  - **Forensic analysis of the bait.** Just as handwriting can betray the hand of the writer, we can safely say the bait is the handwriting of the poisoner. The bait is the language with which the perpetrator communicates with the environment. Correctly tackled, its study can input a huge amount of useful information and probative evidence. This could input priceless information on the number of people who have participated in the crime. In our own experience the technique comes into its own when there have been problems of common borders between properties, in order to ascertain which property the poison came from.

- **Search warrants.** This is without doubt a resource of capital importance, both of enforcement and deterrence. It gives the poisoner the impression that the law is empowered to prosecute the crime to the last degree and final consequences. Actions of this sort have also brought to light sizeable stashes of poison ready for illegal use, sometimes even already used in prepared bait. It goes without saying that the best procedure is that which prevents the poison from being placed in the countryside in the first place, and this principle argues in favour of taking preventive action before the perpetrator goes ahead with the crime, with unforeseeable consequences. There have not been many house-search authorisations granted in Spain to date, but further headway has to be made in this direction.

- **Indoor inspections.** The private home should not be confused with the sort of all-purpose storehouse/outhouse known in Spain as *nave de aperos/caseta de aperos*. It should be borne
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in mind here that many of the forbidden resources and other elements unlawfully held are stored in storehouses of this type. They are also ideal sites for finding fingerprints and other fundamental samples that might have evidential worth for the investigator. Their inspection is therefore de rigueur in any well-conducted on-the-spot visual inspection.

- **Use of Dog Units (Unidades Caninas: UCE).** In the ten years and more since this technique was first taken up in Andalucía in 2003, huge progress has been made in the use and training of sniffer dogs.

Fortunately, many other Spanish regions and countries have now taken it up too. Special mention here must go to the magnificent Cynological Unit of the Guardia Civil (Unidad Cinológica de la Guardia Civil), which is assisted by an impeccable dog-man team boasting an extraordinary experience and professional prowess. Nonetheless, it must also be pointed out that dog units are often mistakenly thought to be a panacea for the poison problem. Nothing further from the truth. Dogs do not enforce penalties or decide where inspections need to be carried out or draw up reports. They are a powerful tool of deterrence and for removing poison from the countryside but they are not, unfortunately, the definitive solution.

After over ten years of experience, one of our most timely recommendations here is the need for setting up a standardised quality certification system, with each working dog and all would-be intakes being periodically checked on an “MOT” basis. The assessment procedure has to take in the dog itself, its interaction with its guide and also its detection capacity in different environments, sites, poison hidden among clothes and concentration threshold, among other variables.
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• **Phone tapping.** As with house searches, this technique needs to be authorised by the judicial authority; any request therefore needs to be based on sound grounds. We have few records of phone-tapping authorisations having been granted, although the ones granted to date led to convictions, providing as they did a valuable amount of information on various types of crimes in which the suspects were involved. Given the close relationship of this resource and the former one with the habitual work of the Guardia Civil or other law-enforcement agencies, it follows that takeup will be easier in the case of teamwork involving agents of varying nature.

• **Vehicle inspections.** Unlike house searches and phone tapping, this does not call for a court order, providing the vehicle involved has not been fitted out as a dwelling. The conventional vehicle of any suspect, therefore, can and should be inspected if deemed fitting during the course of the inspection/investigation. This is a resource of astonishing efficacy and a great dissuasive power. It has by now led to so many excellent results that it has been taken up habitually by some teams. In the case of Andalucía the internal inspection of vehicles is so important and routine, that the dog-unit certification tests involve a particular standardised vehicle-search trial that each dog has to pass before being taken into the team.

• **Ascertainment of the origin of the poison.** Another of the key lines of investigation for linking the poison with the perpetrator is a check of the various registers kept by retail outlets of pesticides, biocides and zoosanitary products and also any ledgers recording the chemical treatment of crop- and animal-farms.

• **Specific specialised training.** This is fundamental, not only because it fills in knowledge loopholes and trains up the personnel properly but also because it represents a very important boost of motivation. Training sessions are also the ideal framework for tackling such matters as liaison and honing working protocols. Training programmes should logically take in all forensic aspects and the investigating and operational factors dealt with in this chapter.

Working capacity and material equipment for investigating the poison

Although each investigator specialising in poison is already cognisant of the matter in hand, whether an environment/forestry officer or member of any law-enforcement force, we can give some guidelines that might help. Although procuring the ideal equipment is a pipedream, not all is lost. As the saying goes ‘necessity is the mother of invention’ and this is no less true in this case. Many colleagues have cobbled together their own makeshift versions of missing equipment, sometimes coming up with results that outperform expensive manufactured products. We ourselves have successfully used the Spanish cocoa product Cola-Cao® as fingerprint-revealing dust, also using the synthetic filaments of bargain-store dusters instead of brushes. We have likewise made portable cyanoacrylate scanners for less than 4 euros, when the factory versions cost about 7000. That said, obviously the best is the enemy of the good and we should not fall prey to the Nirvana fallacy. The best policy will always be to equip ourselves whenever possible with top-quality material for reasons of safety and convenience.

Table 8 shows the investigation possibilities, equipment and services currently being used by the teams of the Andalusian Strategy against Poison (Estrategia Andaluza contra el Veneno: EAV) and the Diagnosis and Analysis Centre (Centro de Análisis y Diagnóstico: CAD).
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<table>
<thead>
<tr>
<th>CONCEPT/SERVICE</th>
<th>EAV</th>
<th>CAD</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toxicological analysis</td>
<td>No</td>
<td>Yes</td>
<td>Complete thoroughgoing analysis</td>
</tr>
<tr>
<td>Conventional necropsy</td>
<td>No</td>
<td>Yes</td>
<td>Complete thoroughgoing analysis</td>
</tr>
<tr>
<td>Specific ballistic report of wildlife injuries</td>
<td>Yes</td>
<td>Yes</td>
<td>On requirement</td>
</tr>
<tr>
<td>Human fingerprint scanning, storing and transfer</td>
<td>Yes</td>
<td>Yes</td>
<td>* **</td>
</tr>
<tr>
<td>Human and non-human DNA sample taking</td>
<td>Yes</td>
<td>Yes</td>
<td>Only in important cases</td>
</tr>
<tr>
<td>Analysis of gunshot residues (OSR)</td>
<td>Yes</td>
<td>No</td>
<td>Only in important cases</td>
</tr>
<tr>
<td>Detection of invisible biological residues (human and non-human fluids and fibres)</td>
<td>Yes</td>
<td>Yes</td>
<td>By means of forensic light and filters</td>
</tr>
<tr>
<td>Latent blood detection (luminol technique)</td>
<td>Yes</td>
<td>No</td>
<td>*****</td>
</tr>
<tr>
<td>Infrared monitoring cameras</td>
<td>Yes</td>
<td>No</td>
<td>*****</td>
</tr>
<tr>
<td>Metal detectors</td>
<td>Yes</td>
<td>Yes</td>
<td>For traps and wire snares hidden in the countryside and preliminary in situ diagnosis of death by firearm</td>
</tr>
<tr>
<td>Specific expert reports</td>
<td>Yes</td>
<td>Yes</td>
<td>*****</td>
</tr>
<tr>
<td>Genetic analysis for forensic studies</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

Table 8. Investigation possibilities, equipment and services currently being used by the teams of the Andalusian Strategy against Poison (Estrategia Andaluza contra el Veneno: EAV) and the Diagnosis and Analysis Centre (Centro de Análisis y Diagnóstico: CAD).

* Not including identification because this is only done through Spain’s Automatic Fingerprint Identification System (Sistema Automático de Identificación Dactilar: SAID) by judicial police forces (Guardia Civil or National Policeforce: Cuerpo Nacional de Policía: CNP).
** Including conventional, magnetic, fluorescent, cyanoacrylate and chemical methods (methyl violet).
*** Limited availability. The analyses are conducted on the hands and face of the suspect in cases of unlawful shooting of threatened species or serious poaching cases.
**** These infrared cameras are especially designed with undetectable LED flashes.
***** In those cases where technical departments or Conservation Programmes need additional forensic support.

EAV’s experts have this resource and have mastered the application techniques, although its use preferably has to be countenanced by law-enforcement forces (SEPRONA) for purely operational reasons and the LBRCEM.
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Table 9 lists the recommended material currently used by Andalusian teams, broken down by levels of basic or advanced.

<table>
<thead>
<tr>
<th>Concept</th>
<th>Observations</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labelling and packaging material according to the nature of the samples</td>
<td>Includes paper and plastic bags, glass and plastic flasks, sticky labels, felt-tipped pen.</td>
<td>Basic</td>
</tr>
<tr>
<td>Aluminium foil</td>
<td>For poisoned-baits</td>
<td>Basic</td>
</tr>
<tr>
<td>GPS</td>
<td>Basic</td>
<td></td>
</tr>
<tr>
<td>Camera</td>
<td>Basic</td>
<td></td>
</tr>
<tr>
<td>Resistant plastic bags and outer containers for sending samples to the lab</td>
<td>Basic</td>
<td></td>
</tr>
<tr>
<td>Numbered seals</td>
<td>Guaranteeing the chain of custody</td>
<td>Basic</td>
</tr>
<tr>
<td>Forms for recording removal from the site of samples and carcasses, chain of custody and delivery</td>
<td>Basic</td>
<td></td>
</tr>
<tr>
<td>Investigation Manual published by the Regional Council of Andalusia (Junta de Andalucía) for agents</td>
<td>Basic</td>
<td></td>
</tr>
<tr>
<td>Buckets or toolkits</td>
<td>Basic</td>
<td></td>
</tr>
<tr>
<td>Sundry metal and throwaway plastic peg</td>
<td>Basic</td>
<td></td>
</tr>
<tr>
<td>3m measuring tape</td>
<td>Basic</td>
<td></td>
</tr>
<tr>
<td>Scoop for collecting earth</td>
<td>Basic</td>
<td></td>
</tr>
<tr>
<td>Set of numbered benchmarks and scales</td>
<td>Basic</td>
<td></td>
</tr>
<tr>
<td>Throwaway protection overalls and gasmask, nitrile mittens</td>
<td>Equipo básico de protección individual (EPI)</td>
<td>Basic</td>
</tr>
<tr>
<td>Forehead LED’s or torches</td>
<td>Basic</td>
<td></td>
</tr>
<tr>
<td>Magnifying glass</td>
<td>Basic</td>
<td></td>
</tr>
<tr>
<td>Multipurpose picket</td>
<td>Basic</td>
<td></td>
</tr>
<tr>
<td>Gunshot residues (GSR) sample-taking kit</td>
<td>To be used only by law-enforcement forces</td>
<td>Advanced</td>
</tr>
<tr>
<td>DNA swab kit</td>
<td>To be used only by law-enforcement forces</td>
<td>Advanced</td>
</tr>
<tr>
<td>Digital hygrometer</td>
<td>For dating of the death by studies of carcass fauna</td>
<td>Advanced</td>
</tr>
<tr>
<td>Slide Hammer</td>
<td>To be used only by experts</td>
<td>Advanced</td>
</tr>
<tr>
<td>Magnetic, fluorescent and non-magnetic fingerprint visualization reagents</td>
<td>Advanced</td>
<td></td>
</tr>
<tr>
<td>Fingerprint visualization material: magnetic brush, wands, lifter, adhesive, calibrated protection roll</td>
<td>Advanced</td>
<td></td>
</tr>
<tr>
<td>Digital caliper</td>
<td>Advanced</td>
<td></td>
</tr>
<tr>
<td>Barrier tape</td>
<td>Advanced</td>
<td></td>
</tr>
<tr>
<td>GoPro camera</td>
<td>Advanced</td>
<td></td>
</tr>
<tr>
<td>Infrared trail camera</td>
<td>Advanced</td>
<td></td>
</tr>
<tr>
<td>Forensic light source</td>
<td>Toolkit with complete set of all wavelengths of forensic use and filter goggles</td>
<td>Advanced</td>
</tr>
<tr>
<td>Camouflage net for hidden waists</td>
<td>Advanced</td>
<td></td>
</tr>
<tr>
<td>Entomological aspirator</td>
<td>For collecting carcass fauna</td>
<td>Advanced</td>
</tr>
<tr>
<td>Luminal</td>
<td>Use by experts</td>
<td>Advanced</td>
</tr>
<tr>
<td>Metal detector</td>
<td>Regional legislation on the matter has to be taken into account</td>
<td>Advanced</td>
</tr>
</tbody>
</table>

Table 9. List of material used and recommended in the fight against poison.
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It should never be forgotten that the use of much of this material calls for specific training and experience and expertise in handling it. We therefore need to stress once more the need for training programmes given by experts in the use of these advanced resources as part of their professional activity. Working in multidisciplinary teams is the best guarantee of taking in the whole clutch of special skills required in the investigation of crimes against biodiversity in the current context. Nowadays there are many professionals who are past masters in each one of these disciplines, working in the country’s various judicial police laboratories, and they are ideal candidates for the training needed.

Another aspect to stress is the nature of many of these materials. We always recommend a rational use of these techniques, carried out where possible under the aegis of law enforcement agencies, for the purposes of abiding scrupulously by police investigation procedures and the LECRIM.

Coordination, the most efficient weapon against poison

We could spend hours talking about the worth of investigation resources, about the latest state-of-the-art innovation. But, when it comes to the crunch, there is no shadow of a doubt that the most important attribute is willingness and proper coordination and liaison between all stakeholders in this struggle, whether individuals or members of the law-enforcement agencies or government officers intervening in each case; this should also be extended to people who are
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not actually intervening but should be. We could spend hours, maybe too many, speaking about all the cases that have been ruined due to lack of coordination between members of the working team.

Police investigation procedures in poisoning cases are tedious and tetchy. Failure, an insurmountable stumbling block, might lie round any corner; the likelihood of failure soars when proper communication is lacking. Down the years we have heard countless sob stories from agents, blaming their failure on a lack of resources when it fact it stemmed from a lack of communication. We have also heard countless complaints about inequalities in equipment and procedures between different corps. But we can safely say that, even if we have the most complete and modern equipment on the market, even if we have perfectly mastered all techniques of fingerprinting, ballistics and boast the most expert nose for snifing out the most slippery suspects, all this will come to naught if we are incapable of coming to an agreement with our colleagues in the struggle. In our humble view, most equipment shortfalls and lacks can be overcome if we are all pulling together towards a common goal. The daily fight against poisoned-baits does not hit the headlines or win awards. It involves hard, disagreeable work that does not lend itself to frequent celebrations; rather the opposite. The best news is often no news, since nearly all the news that does break is bad.

For this very reason no one is superfluous in the fight against poison; the more brought into the fold, the better. The key words are motivation and common sense. To put it in a nutshell: the more people working on the case and the better coordinated they are, the less poison there will be in the countryside.

Success is measured not by where we are but by where we are headed.

Practical Case I: Clarification by means of new technologies

Halophilic bacteria and physico-chemical parameters of the poisoned-baits as conclusive evidence in penal incrimination

Irene Zorrilla¹, Ngaio Richards², Antonio Valero Garruta³, Isabel Fernández Verón¹, Rosa Martínez Valverde¹, Francisco Javier Salcedo¹

¹Centro de Análisis y Diagnóstico de la Fauna Silvestre, Consejería de Agricultura, Pesca y Medio Ambiente, Junta de Andalucía, Avda. Lope de Vega 9, Málaga 29010 (Spain).
²Working Dogs for Conservation, 52 Burtis Street, Three Forks, Montana 59752, USA.
³Estrategia de Control de Venenos y Otras Amenazas a la Fauna Amenazada, Agencia de Medio Ambiente y Agua de Andalucía, Avda. Johan Gutenberg s/n., 41092 La Cartuja, Sevilla (Spain).

Until very recently investigation of poisoning cases was practically non-existent. On the very few occasions when any sort of investigation was tackled, it was very rudimentary. Nowadays, the desire to wipe out this crime by means of criminal proceedings and the greater availability of human and material resources to call on mean we can set our sights at levels that were un-
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thinkable in the past. The real case described herein shows the current efficacy of the new technologies and advanced scientific methods when called up for the fight against poisoned-baits.

Back story

In April 2012 several warnings were received about the appearance of poisoned-baits and affected wildlife carcasses in a hunting ground, located in an area with a long history of illegal poison use in the province of Sevilla. A routine joint inspection of the site was made, involving experts of the Regional Environment Delegation (Delegación Territorial de Medio Ambiente), experts from the Estrategia Andaluza de Veneno (EAV) and environment officers and agents from the Guardia Civil’s Nature Protection Service, SEPRONA, helped out by the Specialised Dog Unit (Unidad Canina Especializada).

Following established procedure, an inspection was made of the hunting ground, the storehouse/outhouse (caseta de aperos) as well as the suspect’s vehicle. The inspection methods were those described in this chapter of this book, being particularly careful not to commit the mistakes explained herein.

Initial inquiries suggested that the hunting-ground manager might be responsible for the crime, so special attention was paid to the facilities used by this person in particular. The inside of the vehicle was meticulously checked by three experts, two officers and the dog unit, finding an empty packet of tobacco of a known brand and screwed up in a characteristic way, a cage with remains of bird food and a sack containing steel wire like the type traditionally used for making wire snares for wild boars and maize grain, habitually used for baiting wild-boar feeding stations.

Hard by the parked vehicle stood a storehouse/outhouse, which may also have been classifiable as a living quarters, so the Guardia Civil officers decided to ask the judge in person and urgently for the requisite search warrant. This being conceded on the spot, they proceeded to search the outhouse-cum-living quarter with the help of the dog unit.

No trace of poison was found, not the ideal outcome in terms of the chances of any criminal investigation prospering. One suspicious item that did come to light, however, was a bag with sardines, with a characteristic aspect.

At the same time an inspection was made of the hunting ground, finds including several items of poisoned-baits, a cage trap and several dead foxes trapped in wire snares for predators. Around most of the baits the investigators also found dog-ends of the same brand of tobacco found inside the car and, very close to one of the baits, another packet of the same brand of coarse tobacco, empty and screwed up in the same way as the packet of the same brand found inside the car. Carcasses of two Egyptian mongooses and a fieldmouse were also found.

The baits withdrawn from the site comprised chicken remains and carcasses and, surprise, surprise, several sardines identical to the ones found inside the storehouse frequented by the manager. All the baits found by the Dog Unit contained black pellets compatible with aldicarb in appearance; this was subsequently confirmed by the toxicological analysis conducted in the
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Centro de Análisis y Diagnóstico (CAD). It goes without saying that all this evidence, baits, clues, etc., was gathered in with absolute guarantee of the chain-of-custody by the law-enforcement officers, following the protocols laid down in this CCAA. The role played by all intervening forces was impeccable.

For certain operational reasons it was not possible to conduct fingerprinting or DNA tests on the fag-ends or packets of tobacco, to provide conclusive evidence. Neither was any poison found in possession of the suspect or in his belongings and facilities (vehicle and storehouse). Prima facie all this would work against the investigation and trial prospects of the case, especially when the public prosecutor, along these lines, opined that the mere coincidence of fag-ends and tobacco around the baits and in the car, and the identical way of screwing up the tobacco packet was not enough reason for the suspect to be indicted. Neither did the find of sardines set as poisoned-baits and identical foodstuff among the belongings of the suspect, withdrawn from the storehouse, offer sufficient guarantees; such a find could be pure coincidence, without offering the procedural guarantees laid down by Spain’s Constitution of 1978.

When judge and public prosecutor were questioned, both argued that only a firm and objective link showing that the sardines set as poisoned-baits in the field and those stored by the suspect came from the same purchase batch could be deemed to be sufficient incriminatory evidence. In the hypothetical case that this fundamental proof be obtained, it would then be considered an irrefutable set in combination with all the rest of the circumstantial evidence.

At this point the investigation seemed to be going nowhere and doomed to be shelved as a criminal case. Nonetheless the working team asked CAD to look into and harness all analytical possibilities currently provided by science to try to establish a conclusive link between both groups of sardines, proving that both of them came from the same purchase batch. The challenge thus posed would not be met with a simple toxicological analysis or forensic examination. New ground had to be broken, hitherto unexplored in the investigation of poisoning cases.

CAD concluded from its investigations that the likelihood of any positive outcome was low. The only possible way forward would be to analyse the population of bacteria on the surface of the sardines (responsible for the typical colouration that appears on sardines-herrings), unique in each manufacturing batch, plus other physico-chemical parameters contained in the skin of both groups of sardines. Should exclusive coincidences in said parameters be found between both groups of sardines, the police and procedural case would be considered to be resolved. All this was as yet still theory, however. There was no past experience to go on in terms of this specific methodology.

Although the cost of this analysis was considerable, it still fell far short of the annual sum spent by the Regional Environment Ministry (Consejería de Medio Ambiente) in tackling the reiterated poisoning episodes in this particular part of Sevilla. Should this case turn out to be successful, therefore, and hit the headlines, it could even save money in the future due to the deterrent effect and the resulting reduction in poison use in the area, not to mention the knock-on benefits for the environment. The short-term outlay, therefore, albeit large, might pay for itself in the future by cutting down the number of investigations needing to be carried out. Furthermore, in the event of a conviction the defendant would have to pay all analytical costs, with the consequent saving for the anti-poison team. On the basis of all these considerations the Environment
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Management Directorate General (Dirección General de Gestión del Medio Natural) decided to go ahead with the analysis of the samples and try to carry the case through to a successful conclusion, always with the direct involvement of SEPRONA of the Guardia Civil and the experts of the Provincial Delegation (Delegación Provincial) of the Consejería in Sevilla.

This small chapter recounts what was done from that moment on and how events panned out afterwards.

Methods and analyses carried out

The sardines found in the field used as poisoned-baits and those found in the storehouse were meticulously examined. For comparative analytical purposes other similar batches of sardines were bought (known as “sardinas-arenques” [herring-sardines]) in two different shops of the city of Málaga.

The analyses conducted and methods used can be summed up as follows:

- Macroscopic and biometric study, detailing the external aspect, weight and length both of the sardines taken from the site (groups 1 and 2, images 8 and 9) and the shop-bought controls (groups A and B, images 10 and 11).
- Toxicological analysis by liquid and gas chromatography-mass spectrometry (GC-MS/MS; UPLC-MS/MS) on the sardines taken from the site (groups 1 and 2).
- Physico-chemical and microbiological analysis: Presence and concentration of halophilic bacteria (responsible for surface colouration in canned fish of this type) by means of microbiological methods, fat content (acid hydrolysis and Soxhlet), protein content (Kjeldahl method) and other organoleptic parameters such as the degree of humidity and concentration of sodium (potentiometry). These values would be similar in the same batch of sardines (similar processing), so it was regarded as a viable method for correlating the possibly poisoned sardines with those taken from the storehouse. The shop-bought sardines were also analysed as controls (groups A and B).

Results and Discussion

Toxicological analysis

Although all the sardines found on the site were analysed (groups 1 and 2), only those of group 2 containing the black pellets were found to contain aldicarb (386.2 mg/kg) and its degradation products, aldicarb sulfoxide (994.4 mg/kg), and aldicarb sulfone (131.5 mg/kg) (Table 1).

Macroscopic, biometric study and physico-chemical characteristics

No significant weight and size differences were observed between the three groups of sardines (hunting ground, storehouse and shop-bought) (Table 10). There was, however, a notably similar
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aspect of the two groups of hunting-ground sardines, differing from those bought in the two shops of Málaga (groups 1, 2, A and B; images 8, 9, 10 and 11).

The sardines of group 1 (taken from the storehouse), and group 2 (in the field with aldicarb) had similar values in terms of protein content (44.1% and 40%), fatty matter (28.4% and 28.6%) and fat/protein ratio (0.64 and 0.71). These values were different from those of the sardines used as control (31.5% protein, 35.7% of fatty matter and a fat/protein ratio of 1.13). Another notable finding is that the content of sodium chloride (ClNa) and humidity found in group 2 differ from the other groups. This could be explained by the handling of the sardines in the field to add the poison (aldicarb), leading to partial desalination, or possible desiccation due to sun exposure or the dry environment it was left in (Table 10).

Quantification of halophilic microorganisms

Results were assessed in light of official criteria for determining the concentration of these bacteria as the basis of perceptible product deterioration: 10⁶ CFU/g (10 million bacteria /g). In groups 1 and 2, sardines taken from the site, the values were way above the reference value (1 million); in the control group, on the other hand, the value was well below this threshold (Table 1).

Conclusions

This practical case represents one of the stiffest challenges we have taken on in recent years; it is a clear example of the efficacy of today’s technological resources that can now be used in the conservation of biodiversity.

As requested by judge and prosecutor, science proved capable of establishing the crucial link between the sardines used as poisoned-baits and those taken from the suspect’s storehouse, proving that both came from the same purchase batch. In other words the sardines used as poisoned-baits came from the same tin as those found among the suspect’s belongings inside the storehouse. The presented analyses have been accepted by the court as crucial evidence in the investigated case. This evidence, together with the rest of the circumstantial evidence, enabled the prosecution to show that the suspect was heavily involved in the placement of poisoned-baits in the countryside, doing so intentionally.

If the agents had found aldicarb during the search of the suspect’s storehouse, the detailed analysis of the sardines would not have been necessary. In default of this proof, however, the sardines proved to be crucial evidence in this case. No two cases are the same.

As far as we know this is the first time that the presence of bacteria and the assessment of the physico-chemical parameters of baits from a forensic point of view have been used to solve a wildlife poisoning case.

At the moment of writing the suspect has been formally arrested and indicted for the crime of placing poisoned-baits and the use of other illegal wildlife-capturing resources, resulting in the death of the captured animals. The ensuing investigation also disclosed other alleged crimes associated with unlawful hunting practices, which we have not mentioned here for operational reasons and due to the sub judice rule. The case has now been taken to court, thanks to all this spadework by the multidisciplinary teams and the evidence then presented to the judicial authority.
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This case has enabled us to add one more arrow to the burgeoning quiver of methods for dealing with similar cases in this CCAA.

Acknowledgements

Our special thanks go to Dr. Íñigo Fajardo for adapting the original article to the chapter of this book and his ongoing professional and personal support in the management and guidance of forensic cases. We would also like to thank the lab personnel of the Centro de Análisis y Diagnóstico de la Fauna Silvestre (CAD) in Málaga, and Silliker in Barcelona, for their speed and expertise in analysing the samples. We are also grateful to SEPRONA of the Guardia Civil of the province of Sevilla and the Environmental Officers (Agentes de Medioambiente: AMA) of Osuna. Special thanks to Fernando Ortega, head of the Servicio de Geodiversidad y Biodiversidad, Dirección General de Gestión del Medio Natural, Junta de Andalucía, for his support.

References


