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Upwards and onwards: Using partnerships with scientists to improve animal management services

PAULEEN BENNETT

Director of Regional Operations, School of Psychological Science, La Trobe University, Victoria

Abstract

Animal Management Officers work in a complex regulatory environment, embedded in an even more complex social environment. While just keeping up with daily demands can be challenging, the future is likely to become even more complex as governments struggle to deal effectively with larger populations, increased urbanisation and an environment that makes it increasingly difficult to own pets. The conference theme of 'upwards and onwards' is an important one. Developing effective policies and procedures requires a 'bottom-up' approach, informed by input from those who deal everyday with practical management issues, rather than a 'top-down' approach whereby bureaucrats try to impose policy from above. To develop a stronger voice, however, those at the coal face need to work closely with those whose work directly influences the attitudes of politicians, media representatives and the general public. In this presentation the potential benefits of working more closely with scientists will be discussed, as will strategies for developing cost-effective partnerships.

What is this thing called science?

Science and scientists were once held in high esteem by the general public but have taken a battering in recent years. Common complaints are that scientists can 'fiddle with the numbers' to prove anything they like and, conversely, that science cannot 'prove' anything so why bother. Both of these claims are understandable. Scientific data can often be interpreted in numerous different ways and it is theoretically impossible to 'prove' something using the scientific method. Nonetheless, science has contributed much to our understanding of the modern world and it can be used effectively to solve 'real-world' problems.

The best way to think about science is as a tool or method for helping well-informed people make the best guess possible about some part of the real world. Scientists are experts in acquiring knowledge, using careful observations and experimentation to describe and explain events. Scientists are also trained to understand the limits of their investigations. A good scientist will readily acknowledge that even their best guess, informed by years of careful study, might be wrong, but it is still the case that it is usually better to make a best-guess, informed by science, than to use a more arbitrary method of making sense of the world.

How science can help solve 'real-world' problems

There are two different types of science; pure science and applied science. Pure science is science directed towards finding out about the world for its own sake. We might like to understand how tsunamis are generated or how dogs behave when they are socially isolated. Applied science is all about applying knowledge from one or more scientific fields to practical problems. How can we use our knowledge of tsunamis to prevent loss of life following an earthquake? How can we use our knowledge of the effects of social isolation on dogs to improve their welfare and management?

The application of scientific knowledge to 'real-world' problems has huge potential in the area of animal management, because it provides a framework of evidence upon which policies, procedures and practices can be built. Most contemporary professions insist that their practice is evidence-based. This simply means that practitioners and policy-makers make decisions based on evidence collected through careful investigation and statistical analysis of available data. We expect this of the medical profession, the legal profession, the mental health profession and the teaching profession, among others. People in these fields who operate outside the framework of evidence-based practice are held to be charlatans, engaging in little more than quackery, and they are legally vulnerable should something go wrong. Although the field of animal management has developed rapidly in recent years, it would gain credibility and legal protection were it to be more rigorously informed by evidence.

The scientific method

Success in science depends on the use of something called the scientific method. This involves a sequence of formal steps that ensure each issue is addressed in a systematic way. This same method is used in many other contexts and by many non-scientists, but generally in a less formal manner. The method is relatively straightforward, comprising a number of steps.

STEP 1: ASK A QUESTION

This first step in any scientific investigation is a critical one, and is where scientists need to work closely with those working in the field. An enthusiastic scientist can generate dozens of research questions in any short session but these questions may not be relevant or practical, or there may be other 'big issues' affecting the work place, of which the scientist is unaware. In applied settings those working in the field are best placed to 'brain-storm' research questions. Scientific input can then be useful to structure these questions in a way that can be adequately addressed.

In the context of animal management there are many questions that might reasonably be asked and then answered using the scientific method. These include:

- Are off-lead parks associated with more dog attacks than on-lead parks?
- Are trap-neuter-release programs an effective means of controlling stray cat populations?
- What is the most effective method to control barking and does this vary according to other factors?
- Do educational campaigns encourage more people to responsibly own previously semi-owned cats?
- Are some dog breeds more likely to be involved in attacks against humans than others?
- Is cat welfare reduced by permanent or semi-permanent confinement?
- Is breed-specific legislation an effective way to reduce injuries due to dog bites?
- What happens to cats reported as lost by their owners?
- What strategies motivate owners to pick up dog waste in public areas?

STEP 2: CONDUCT BACKGROUND RESEARCH

Often, when we initially think of a research question, it has already been addressed by someone else, somewhere else in the world. This is precisely why professional conferences are so important in terms of information sharing, although getting to these can sometimes be difficult. Unlike most members of the population, scientists are encouraged to attend professional meetings both nationally and internationally. They also have ready access to any information that has ever been published in a scientific journal or report. Much of this information is now stored electronically, but access is often limited to university libraries. Collecting and collating this information is therefore relatively challenging and, because it is time-consuming, can be expensive.

Conducting a thorough literature search can, however, prevent needless repetition of data collection and save many thousands of dollars. Literature reviews are also sometimes published, allowing those with access to them to use another person's work to inform our practice rather than replicating the process. Even when there is no published literature on a certain topic, doing background research helps to ensure that your own study is as well designed and informative as possible. Simply talking to other people who are working in a similar environment, using a carefully structured interview approach, can provide a wealth of useful information.

STEP 3: CONSTRUCT A HYPOTHESIS

An initial literature review may be informative but it is often insufficient to answer your original question. It may reveal that a particular intervention is effective in some contexts but not others, perhaps because social or cultural differences influence the results, or it may reveal that nobody has addressed the exact question you have raised. On the basis of the background research that is collected, then, scientists often generate one or more hypotheses. These are nothing more than formal statements of what the scientist might predict given all available knowledge.

For example, it might be found that some existing literature suggests that some breeds of dog are more likely to be involved in attacks on humans than others. While some people might immediately conclude that this breed of dog is inherently dangerous, a careful scientist might want to investigate a series of alternative explanations. He or she might hypothesise (predict):

- that the breed is inherently dangerous
- that the breed of dog is more likely to be owned by people who fail to adequately manage their pet
- that people who report dog attacks might tend to describe the dog as being of a certain breed, even if it is not

Each of these alternative explanations, and perhaps many others, may be equally plausible, so experiments must be conducted to test the hypotheses.

STEP 4: TEST THE HYPOTHESIS BY DOING AN EXPERIMENT OR SURVEY

This is one of the most difficult steps in the scientific process and is where most non-scientists (and some scientists) go wrong. If experiments or surveys are not carefully designed they may not adequately answer the research hypotheses posed. The initial literature review and background research is critical in informing experimental design, but it is also subject to constraints imposed by resource limitations and ethical standards, as well as by simple practicalities. Getting 'the most bang for your research buck' might involve spending quite a few weeks or months fine tuning your experimental approach. You may even decide to run a small 'pilot' experiment to test that your methodology is viable before embarking on a more ambitious project.

It is in actually conducting experiments or surveys that partnerships between scientists and practitioners can be most rewarding. Scientists may be able to help you design your survey questions so that they elicit the information you require, or they may provide personnel to help you collect data. Alternatively, you may be able to help collect data as part of your normal daily activities, with the scientist collaborator helping you to structure your observations in a way that facilitates analysis and interpretation. In some cases the data you need may already be collected, in the form of council or pound records. In this case you may simply need help from a scientist to extract the information in a format that is readily analysed and interpreted.

STEP 5: ANALYSE YOUR DATA

Once the experiment has been conducted and the data collected, it must be analysed appropriately. If the data are straightforward this might be a simple exercise – comparing the average score of two groups of owners on some measure of responsible ownership perhaps, or examining whether an educational campaign increases the number of stray cats surrendered to a local pound. In other cases, though, data analysis can be a complex undertaking requiring a great deal of statistical expertise. This is particularly the case with large studies involving numerous different community groups or multiple measures. Deciding how to analyse data appropriately is a step best left to the experts.

STEP 6: INTERPRET THE RESULTS

This is another step where it is easy to make mistakes. Imagine that you live in a perfect world where you have unlimited resources and absolute control over who does what. You want to find out whether non-desexed dogs are more dangerous to humans than desexed dogs. You carefully design an experiment where you place four hundred dogs in randomly selected homes within your municipality. There are exactly two hundred males and two hundred females and one hundred dogs of each sex are desexed, but you use surgical implants so that it is impossible for the new owners to guess whether their dog is desexed or not. The dogs are all genetically identical clones, produced and raised in a laboratory under carefully controlled conditions. You assign each one to its home and then sit back and wait – but every Friday for the next ten years you contact the human participants in the study to record whether their dog has caused any injuries in the preceding week. At the end of the ten year study you count the number of injuries caused annually per experimental group and draw a graph, similar to that presented below. How would you interpret these results and, more importantly, how confident are you about your interpretation?

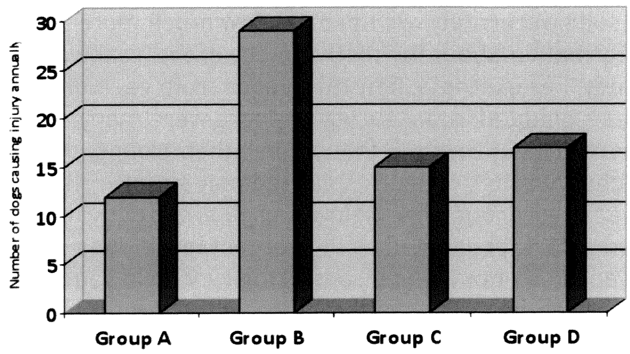

Figure 1 Results of a hypothetical 'perfect world' study to investigate the effects of dog sex and desexing status on injuries caused to humans.

From Figure 1, you would be entitled to conclude that dogs in Group B, whatever that represented, were more likely to injure people. In fact, given that the number of dogs in each group was identical, you could confidently conclude that dogs in Group B were almost twice as likely to inflict injury as dogs in other groups.

Now imagine that you live in the real world and want to study the exact same question - whether non-desexed dogs are more dangerous to humans than desexed dogs. You can't force people to randomly select dogs or desex their pets, so you conduct a survey to find out which dogs have caused injury in the past ten years, collecting data retrospectively from 400 dog owners. The graph below presents the results of this hypothetical study – how would you interpret these results and how confident are you about your interpretation?

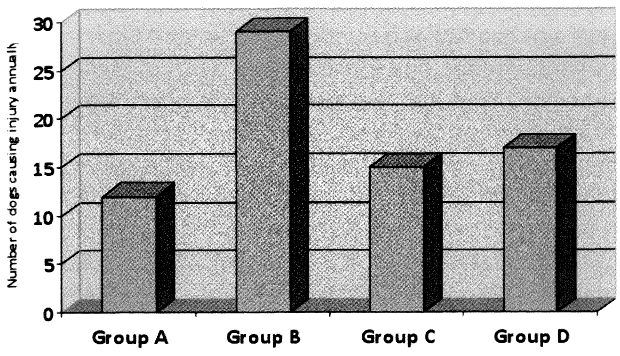

Figure 2 Results of a hypothetical 'real world' study to investigate the effects of dog sex and desexing status on injuries caused to humans.

A first glance at Figure 2 suggests that dogs in Group B are again more likely to cause injury to humans than all other groups. However, to interpret these results accurately, we need to know much more information about the methodology of the 'real world' study. For example, how many dogs from each group were included in the survey? If there were many more dogs in Group B than in the other groups, the higher number of injuries caused may simply reflect the larger group size. Below (Fig. 3) are exactly the same data, presented as the percentage of dogs in each category which caused injury. Would you interpret the results differently now that group size is taken into account?

We might also want to ask whether there were any differences in the circumstances of the different groups of dogs that might have influenced our results. For example, perhaps people with young children (the age-group most likely to be injured) are more likely to desex their dog or perhaps certain breeds are more or less likely to be desexed because of the 'type' of person that chooses to own that breed. Or perhaps people with some categories of dogs are less likely to report injuries caused by their dog and so on and so on and so on. Because hidden 'third variables' may be influencing the data, the results need to be carefully analysed and interpreted by experts who know about these things.

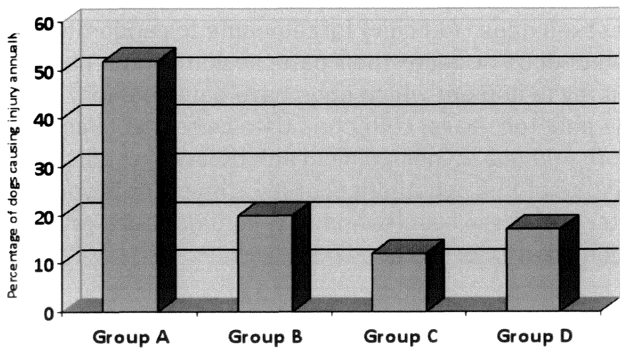

Figure 3 Standardised results of a hypothetical 'real world' study to investigate the effects of dog sex and desexing status on injuries caused to humans.

The moral of this story is not that one type of study is 'better' than the other. While we need to be especially careful when interpreting the results of the 'real-world' study, the fact that it is conducted in an applied setting means that the results are more likely to have what is called ecological validity – to actually tell us something about the real world. The important point is that interpretation is difficult and, particularly in applied settings, must be done cautiously. Misinterpreting data can have implications for policy development that may be unwarranted and even have the opposite effect to that intended.

STEP 7: COMMUNICATE NEW INFORMATION

Once data have been analysed and interpreted, it is important that the results of the research be communicated to key stakeholders in a relevant and unambiguous manner. Writing and speaking skills can be developed by anyone, but many scientists have extensive experience in communicating complex ideas in a simple format. They may be able to work with you to help express your ideas in a way that influences those around you.

STEP 8: UPWARDS AND ONWARDS

Unfortunately, the complaint about science never proving anything is a valid one. Even the most carefully designed study tends to raise many more questions than it answers. This is the nature of working in the real world - things do keep changing and providing one more piece of the 'real-world' puzzle is often just a beginning. Ongoing collaborative relationships between researchers and those working in an area are most fruitful, with each study being able to build upon what is already established.

COST-EFFECTIVE STRATEGIES FOR WORKING WITH SCIENTISTS

One of the perceived barriers to working more closely with scientists is that their time can be expensive. The average hourly consulting fee can be prohibitive and many hours can be devoted to even a small project.

One strategy for reducing research costs is to work collaboratively with scientists to support student research projects. In the Australian university system undergraduate and graduate students from many different disciplines are required to undertake small projects as part of their training. These projects generally need to be completed within a short time-frame and are usually limited in scope. However, they can present a great opportunity to get a small literature review completed and data collected and analysed without having to invest anything beyond direct project costs. Some of these costs may even be met by the university. Supervision of the project is usually conducted by an experienced scientist at no cost to the participating community group.

Post-graduate students, those undertaking larger scale research projects as they work towards a Master's degree or PhD, also present excellent opportunities for cost-effective research. These higher degree students may require a scholarship to support their living costs, although some may be able to obtain one from their host institution. These generally provide between $AUD25,000 and $35,000 annually for two or three years depending on the degree being undertaken. Direct project costs (transport, accommodation, materials if required) must also be met, but are often minimal. Supervision costs are again met by the university, as are indirect costs associated with the project, such as access to scientific literature and insurance. Postgraduate students have already demonstrated that they are capable of conducting research under supervision of an experienced scientist. They are also highly motivated and enthusiastic workers. They therefore provide an excellent resource for those wanting to conduct larger-scale research projects in a cost-effective manner.

For some projects, particularly those with national applications, it may be appropriate to apply for federal government funding. A number of schemes are available, one of the most attractive being the Australian Research Council Linkage Program. Proposals for funding under this scheme must involve a partner from outside the higher education sector, and this partner must make a significant contribution, in cash and/or in kind, to the project that is equal to, or greater than, the ARC funding. Effectively then, this provides a way of doubling the funds available for a project. Many post-graduate students are also funded by this scheme, reducing project costs even further. Additional information about linkage projects is available at www.arc.gov.au/ncgp. Success rates for linkage applications tend to be higher than for other government schemes, so many scientists will be prepared to work with you to develop an application if you have a research question of interest.

Conclusion

While animal management services have developed rapidly in sophistication over the past two decades, there is much that can be done to improve them even further. To be effective, innovations must be well thought-out, strategically significant and evidence-based. Conducting scientific studies is one way of gathering the evidence required to support reform, but this can be an onerous undertaking for those with demanding jobs and limited scientific expertise. The Australian university sector represents a relatively untapped resource for collaborative opportunities. Scientists are expected to undertake research as part of their professional activities and many have an interest in working in applied settings. They also have access to library resources and students willing to work very hard at very little cost to those supporting the project. These resources have traditionally not been well utilized, perhaps because the animal management sector is under-resourced and not well informed about cost effective ways to conduct research. The Australian Institute of Animal Management is well placed to develop and auspice a research agenda focusing on the needs of major stakeholders. A strategically developed ARC linkage application could be used to move the field of animal management upwards and onwards.

BIOGRAPHY

Assoc Professor Pauleen Bennett

Director of Regional Operations, School of Psychological Science, La Trobe University, Victoria

Email: pauleen.bennett@latrobe.edu.au

Pauleen is director of the Anthrozoology Research Group, a group of researchers who specialise in understanding and improving human-companion animal relationships. She has been instrumental in initiating many research projects in the area which have direct application to the field of animal management and has recently taken up a new position in the School of Psychological Science at La Trobe University, based at the lovely rural campus in Bendigo.