**PHEROMONATHERAPY: THE USE OF SEMIOCHEMICALS TO CONTROL ANIMAL EMOTION. FIRST PRINCIPLES**

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**INTRODUCTION**

The term pheromonatherapydescribes the use of chemical signals normally involved in intraspecific communication within a clinical context to help manage the behaviour of animals. There are three features of this definition to note:

* Range of chemicals used: To avoid spurious academic debate, the definition embraces a range of semiochemicals (chemical signals used in communication), many of which, but not all, have an intrinsic emotional impact which create biases in behaviour, others influence behaviour in other ways. For example, some of the chemicals deposited during scratching may simply encourage this behaviour at the given site. This signal can be used to redirect scratching away from furniture and on to more appropriate substrates, without necessarily containing an affective element. Such chemicals are included in pheromonatherapy, since like pheromones, they are part of the social signalling repoertoire that are not dependent on learning for their effect.
* Species involved: The chemicals are derived from the chemicals that are normally used in intraspecific communication; that is, the communication between individuals of the same species. However, we might use them in another context to that originally intended in nature; for example, we might use a cat pheromone to help a cat to accept a dog in the house.
* Clinical context: When we talk about something being used in a clinical context, it means it is being used in order to treat the sort of problem that we would see in a clinic, not a clinical-medical issue.

BEHAVIOURAL Bias VERSUS BehaviourAL TRIGGER and the role of pheromones

Historically, many ethologists have considered an animal’s behaviour to be organised as a series of discrete elements controlled by specific internal and external triggers, but this is an oversimplification of the processes which control behaviour. Among the species we commonly encounter, it is perhaps more useful to consider how animals can use a range of behaviours to serve its strategic priorities. This implies by the form and control of behaviour is much more flexible than the historial view suggests. Accordingly we should not consider pheromones in terms of them being “releasers” of behaviour but rather we should consider them as environmental stimuli which bias the priorities of the individual. Accordingly, when using pheromonatherapy we need to consider all of the information about the environment available to the animal through its senses, in order to try to set things up so that the animal makes choices which are consistent with what we want. It is therefore useful to understand which pheromonal signals are used to send which messages. The exact meaning of the signals is an area of on-going research focused on emotional regulation in animals.

Typically the semiochemicals used in pheromonatherapy have the following characteristics:

* They are secreted by specialised sebaceous, sweat or mucous glands associated with the skin or related ectodermal structures.
* They are organic molecules of variable volatility. Many of these signals appear to be based on fatty acids, though the steroid precursor, squalene, has recently been attracting attention too. Although it might seem strange that such common substances can have such a significant impact on animals, it is now recognised in many species that it is the ratio of the molecules to each other which appears to be key to conveying a particular message. The relative volatility of the molecules also relates to the biological function of the signal, since some need to be more enduring in the environment and others less so.
* Naturally, very small amounts are produced, but when used clinically, much higher levels are required. This is to maximise the chances of the signal being detected, especially in the absence of an accessory signal, such as visual mark or attractant odour, to encourage the engagement of the VNO. Needless to say it is important to retain the ratio of ingredients at these higher concentrations, for the message to be maintained.
* The semiochemicals are unconditional signals insomuch as they bring about a change in behaviour without the need for prior conditioning. However, that does not mean that their impact cannot be unaffected by learning or experience, nor that other signals may take precedence in shaping behaviour when multiple signals, possibly relating to other sensory channels, are present.

An important point to appreciate about pheromonatherapy is that, because the semiochemicals encourage the animal to make a strategic choice about what to do in a particular type of situation (rather than trigger specific behaviours), then once a new style of response has become established and reinforced appropriately, it can be expected to be maintained in similar circumstances even in the absence of the semiochemical. This is a very important feature of pheromonatherapy, because by bringing about changes in behaviour in a natural multisensory way, the animal learns in effect to self-correct the problem behaviour and maintain the response in the longer term, without becoming dependent on an exogenous supplement to brain chemistry. This is one way in which pheromonatherapy differs from psychopharmacy, which has both its advantages and disadvantages.

Pheromonatherapy Versus Pharmacotherapy

Given that pheromone products are typically applied to the environment in which the animal lives, and from there are detected using the olfactory–vomeronasal apparatus, rather than being administered directly into the patient, these chemicals are quite different to medicines. This has both therapeutic and legal implications. Knowledge of the disciplines of chemodynamics and chemokinetics are largely irrelevant to pheromonatherapy unlike pharmacotherapy, but instead an understanding of animal behaviour and its regulation is useful.

While animals may relapse after a course of pheromone therapy, the reasons for this may be quite different to those described for pharmacological agents, and we do not have the same problems of withdrawal with pheromonatherapy. Relapse following the use of pheromonatherapy often indicates that the treatment period was not long enough, that a more fundamental problem with the environment needs to be addressed or that a new problem has arisen with a similar manifestation. Whereas in the case of psychopharmacology, the potential for withdrawal effects needs to be considered, which is why animals tend to be weaned off drugs by reducing the dose over an extended period of time. Another significant consideration relating to the use of psychopharmacology for the management of behaviour problems relates to the risk of unwanted side effects during treatment, which can be the inevitable consequence of their potency and mechanism of action. This risk is much lower with pheromonal products, because of their mechanism of action. There are also many contraindications for the use of drugs, since they need to be metabolised and excreted efficiently if they are not to become toxic. Again, such problems are not seen with pheromonal products, assuming they are indicated for the problem. This risk may be one reason for choosing a pheromone product in preference to a drug. But that is not to say the two cannot be used together.

Drugs are only available through veterinary prescription, whereas pheromonal products are more widely accessible, but this should not be a reason for deciding between the two. If medication is indicated, it should be used, regardless of the clinician’s professional training. Pheromones are not alternatives to drugs, but rather an integral part of the arsenal available for case management, which should include pharmacological intervention as well. The aim should always be to provide the most appropriate management programme for the case in question, not to advocate a personal preference.

Some owners may look for a medical solution, while others are vehemently opposed to the use of drugs in the management of behaviour problems, and while this opinion needs to be acknowledged by the consulting clinician, it should not necessarily mandate his/her decisions. Although the final decision about the choice of specific therapies is the decision and responsibility of the client (in consultation with the clinician over a range of recommended treatment techniques), clients should not simply enforce their preferences without the clinician making it clear that there may be reasons why the client’s stance may not be in the best interests of their pet. This is part of the skill of client management that is essential to problem behaviour management. Another client-related consideration in the decision to use pheromonatherapy or pharmacotherapy concerns compliance. Delivering oral medication is typically more difficult than the environmental application of pheromones. Indeed, in some cases it may not be safe for the client to attempt dosing with tablets. However, in other cases the process of medication may itself become part of the behaviour modification plan, as it requires close interaction between the pet and its owner. Assuming this is safe to do, it may become a structured activity that helps to reframe their relationship, with concomitant benefits. Unfortunately, however, client compliance is often quite limited when it comes to medicating their pets. One study has suggested that if medication needs to be given once a day, 80% compliance can be expected; twice a day and the figure drops to just under 70%; three times a day and the figure drops below 40%. By contrast, pheromonatherapy requires, at most, daily or as-needed application of a spray to affected areas, and at best simply plugging in a diffuser and leaving it on for a month. However, there can be problems even with this. For example, even in the absence of specific instruction of how to use the devices, many owners still do not read the instructions and so may not realise that there are two parts to the diffuser which need to be put together; that the device should be left on the whole time (not switched on and off) and that the reservoir level should be monitored and replaced as appropriate.

Feline Facial Fraction F3 (Feliway®)

The F3 facial fraction is widely used as an aid in the management of urine spraying, for reducing hospital stress and improving behaviour in the veterinary clinic (possibly including anaesthetic recovery), in the control of scratching and as an aid in the management of chronic interstitial cystitis. It also helps to reduce the impact of transport and overnight roaming. For all of these indications, there have been clinical trials. In the management of scratching, F3 used as a diffuser may reduce some forms of scratching, while the spray applied to specific areas will help to redirect the behaviour to another location.

Feline Facial Fraction F4 (Felifriend®)

There have been far fewer studies on the use of F4 than on F3. But F4 has been trialled in the following situations:

* Reduction of aggression towards unfamiliar people.
* Reduction of aggression between cats.
* Helping cats settle in shelters.

It seems that the F4 fraction is involved in social familiarisation; that is, helping a cat to accept new or existing members into its social group or at least to tolerate their physical proximity with less distress.

Dog appeasing pheromone (Adaptil®)

DAP is available commercially as a spray, a diffuser and an impregnated collar, and has been reported in trials to be useful in the management of the following behaviour problems: separation-related problems (especially where there are issues with the dog’s sense of safety when left), sound sensitivity (in this indication, it should be noted that because it does not sedate the animal, it should not be expected to reduce the initial startle response, but it should reduce the subsequent fear), adaptation to a new home, travel-related problems in the car, performance in puppy classes and the long-term outcome of such classes on the behaviour of the dog, adaptation to the veterinary hospital, barking and adaptation to the kennel environment. There are also a number of case studies relating to its use in a wider range of anxiety-related problems, including attention-seeking behaviour, some cases of owner and object protectiveness including certain forms of territoriality and some forms of compulsive behaviour; these typically relate to anxiety associated with insecurity.

**CONCLUSION**

Pheromonatherapy has justifiably established a reputation for being a relatively safe and effective aid to the management of a wide range of behaviour problems in the cat in the dog, but should not be considered either a panacea or “silver bullet” to be used in isolation. However, when used with an understanding of its indications and limitations, it can be an indispensable part of the behaviourist’s armoury.

**FURTHER READING**

Mills D.S., Braem Dube M., Zulch H. (2013) Stress and Pheromonatherapy in Small Animal Clinical Behaviour. Wiley Blackwell, Chichester.