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About The Journal

The 'National Police K9 Journal' is a biannual professional journal for the Police Service K9 (PSK) Community, including but not limited to supporting combat teams of Central Armed Police Forces, Central and State Police Forces and Law Enforcement Agencies. The inaugural issue of the Journal was published in the year 2020 and formally released by the Hon'ble Union Home Minister Sh. Amit Shah on 02nd January '2021. The journal is published bilingually and aims at providing a platform to exchange ideas and information, sharing experiences, innovations, discussions on best practices and methodologies, strategic planning, continuous education, and capacity development on the subject of PSKs and related topics.

The Journal's Editorial Board reviews all articles for content and readability, and reserves the right to edit accepted articles for readability and space, and to reject articles at will.

Authors who submit articles to the journal are expected to do so in good faith and are solely responsible for the content therein, including the accuracy of all information and correct attribution for quotations and citations.

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Slithering by Dr. Anurag Arya, Deputy Commandant(Vet), Training Officer
of National Training Centre for Dog(NTCD) BSF, Tekanpur with K9 Pushpa



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EDITORIAL



Dr. Manjur Uddin Ahmed

**Editor-in-Chief
National Police K9 Journal**

On behalf of the Editorial Team of the MHA National Police K9 Journal, it is my pleasure to present Volume VII, Issue I (2026), a biannual publication dedicated to advancing practice-oriented research and professional excellence in the training, breeding, management, and operational deployment of Police Service K9s (PSKs).

Over the past several years, the National Police K9 Journal has been published regularly with academic rigor and editorial integrity. Its uninterrupted publication reflects our commitment to disseminating high-quality informations that supports CAPFs, State/UT Police and other Law Enforcement Agencies.

This issue highlights emerging training methodologies, innovative practices, operational case studies, and future directions in the field of recent advances related to PSKs. It also features the sagacious technical articles, training notes, inspiring stories and operational achievements of K9s from various CAPFs, State/UT Police and other Law Enforcement Agencies. The remarkable accomplishments of K9 Julie, Meti, Glory, and Rumba (SSB), K9 Vimla (Chhattisgarh Police), together with outstanding field photographs, illustrate the extraordinary bond between Police Service K9s and their handlers. In addition, this issue includes practical insights presented through a question-and-answer section with trainers and handlers from DTS (CISF) and NTCD (ITBP, Bhanu). These contributions will serve as valuable references for future professionals.

The journal continues to expand its academic visibility and is pursuing for inclusion in the National Academy of Agricultural Sciences (NAAS) approved journal list to strengthen its national recognition and global reach.

Globally, the canine population is estimated at approximately 900 million, of which nearly 470 million are companion animals. India's domestic dog population is projected to exceed 51 million by 2028, alongside an estimated 60 million street dogs. Beyond companionship, nearly 6,000 Police Service K9s serve with CAPFs, State/UT Police and other Law Enforcement Agencies for the assignments like Explosive detection, Narcotic detection, Tracker, Patrol, Assault and Search & Rescue operation etc. Among these organization, CAPFs alone maintain about 4,000 working dogs comprising of Belgian Malinois, German Shepherds, Labrador Retrievers, Dutch Shepherds, Golden Retrievers, Dobermanns, Cocker Spaniels, and other breeds as vital force multiplier.

Despite rapid technological advances, well-trained working dogs remain indispensable. Indigenous breeds such as

the Mudhol Hound, Rampur Hound, and Kombai are increasingly being evaluated for their adaptability, resilience, and operational suitability under Indian conditions.

To bring the best practices amongst different CAPFs in the last few months of this year, several significant initiatives have been undertaken by this Ministry to strengthen Police Service K9 capabilities:

- (a) Revision of ration scales based on the duty profile and energy requirements.
- (b) Constitution of a CAPFs Board to formulate the QRs/TDs of Pups of different breeds with the aim to standardize selection criteria, quality requirements and reduce the risk of procuring unsuitable animals.
- (c) As per the direction of Hon'ble HM, a K9 project is undergoing among CAPFs with regard to Develop a roadmap for scientific genetic improvement and progressive induction of indigenous breeds suitable for police work in Indian condition within a time frame of 15- 25 years.
- (d) Furthermore, to meet the growing requirements and overcome existing deficiencies in the country, MHA has authorized 4 Dog training and Breeding Centres (DTBCs) to various CAPFs with the aim to produce quality pups for the police duties which would substantially enhance their capacity to produce pups and supply to other Forces to meet their requirement. After inception of these centres i.e. 2020 onwards, the puppy productions as on dated at different DTBCs have been increased upto 89% and the sanctioned strength of PSKs of various CAPFs and current holding have been increased upto 38% and 44% respectively.

This edition celebrates the invaluable contribution of PSKs to National security while acknowledging the growing importance of dogs in society. Their dedication, intelligence, and unwavering partnership with handlers continue to strengthen public safety and National resilience.

I sincerely thank all the National and International authors, contributors for their scholarly contributions and members of the Editorial Team for their valuable support. Your continued encouragement enables the journal to maintain the highest standards of quality and relevance. We welcome your feedback, ideas, comments and suggestions that could improve the quality of the journal for future editions.

I hope, you find this issue enthralling, informative and professionally rewarding.

Sincerely,



(Dr. Manjur Uddin Ahmed)
Editor-in-Chief
National Police K9 Journal

ARTICLES/ FEATURES

WHEN MINUTES COUNT: TRAINING AVALANCHE DOGS IN THE ALPS

Bertram Klehenz, SAR K9 Specialist



An avalanche dog often makes the work look easy: it moves across the snow, picks up scent, turns, digs, barks and within moments

it becomes clear about a person burial status beneath the snowpack. But in reality, it achieved after years of Training hard physical work, and

a very precise training structured programme.

Avalanche dogs are trained to locate human scent under snow.

The decisive point is not just any trace on the surface, but the point where the scent actually escapes from the snow. This is one of the greatest challenges in training.

Many people imagine that you simply dig a hole, place a person inside, shovel snow over them, and let the dog search. In practice, that would be far too easy and even dangerous for the training. A clever dog learns very quickly. If it recognizes where digging has taken place, where there are footprints, or where the snow structure has changed, it may no longer search cleanly with its nose. Instead, it may indicate the digging site rather than the place where scent is escaping.

That is why good avalanche training must be structured so that neither the dog nor the handler knows where the buried person is. The avalanche field has to look real. Tracks must be erased, snow surfaces restored, and obvious digging sites made unrecognizable. Sometimes the area also has to be compacted or prepared so that it does not look like a training field.

The goal is clear: the dog must not learn to indicate where people have been working. It must indicate

where human scent is coming out of the snow.

Three hours of work for a few minutes of dog training

What hardly anyone sees is the enormous physical effort behind a single good exercise. If we want to train realistic burial depths, we need several people, shovels, time, and stamina. It can happen that six people have to dig deep holes in the snow by hand. Three hours of hard work so that one dog can train for only a few minutes.

To outsiders, this may sound disproportionate. For us, it is necessary.

If the burial depth is too shallow, too much scent reaches the surface. The dog then has an easy job. It does not learn to work carefully, to fight through difficult scent conditions, or to locate the strongest scent exit point. An exercise that is too easy may make a dog look successful in the short term, but it does not help the dog in the long run.

An avalanche dog must also be able

to work at greater burial depths. It has to learn to analyze scent and work against wind, terrain shape, snow conditions, and distractions. Snow is not always the same. Powder snow, wet snow, wind-packed snow, old avalanche debris all of these influence how scent escapes and how difficult the work becomes for the dog.

The handler must not help

Another challenge is that the handler must also work cleanly. If the human knows where someone is buried, their body language often changes unconsciously. A slower step, a glance in one direction, a held breath — dogs read us better than we realize.

That is why, it is important that the handler also does not know where the hidden person is. Only then does the search become honest. The dog must lead, and the human must read the dog. This is the opposite of what many people are used to in normal dog training. In an avalanche deployment, the human is not the one who knows the solution. The dog has the nose.



The human has the responsibility to deploy the dog correctly, trust it, and interpret its indication accurately.

What an avalanche dog must have

Not every dog is suitable for this work. We need dogs that are physically resilient, mentally stable, and extremely motivated. They must be able to work in cold, wind, noise, and difficult terrain. They must cope with helicopters, snowmobiles, snow groomers, many people, probe lines, shovel teams, and hectic situations.

An avalanche dog must not become insecure when conditions become unfavourable. It needs inner stability, resilience, and the will to continue working even under difficult circumstances. This explicitly does not mean harshness in handling the dog, but rather a dog with strong character: clear-headed, eager to work, steady-nerved, and willing to work through difficult terrain, cold, noise, and stress.

Most of these Dogs are Belgian Shepherd Malinois which can deliver enormous performance,

but they require a clear, fair, and consistent training structure. Pressure or harshness toward the dog has no place in this work.

At the same time, it needs a close bond with its handler. Without trust, nothing works. At the end, there is success, play, confirmation, joy. For the dog, the search is not a tragedy. For the dog, it is highly motivated work.

From play to real operational readiness

For many dogs, the beginning is based on a simple principle: the person disappears, the dog finds them and the reward is fantastic. This creates search motivation. Later, the tasks become more difficult. The hiding places become deeper, the scent conditions more complex, the terrain larger, and the distractions stronger.

A good avalanche dog keeps learning throughout its life. Even a certified dog must train regularly in order to remain operational. The foundation can take years. In a real emergency, every minute counts, which is why the work has to be practiced again and again under realistic conditions.

Transport training is also part of this. Avalanche dogs must be able to travel by helicopter, snowmobile, lift, snow groomer, or on skis. A dog that searches well in technical terms but mentally collapses during transport or in the operational environment. That is why, resilience is just as much a part of the training as the actual nose work.

How a deployment works

When an avalanche occurs and people are missing, a race against time begins. First comes companion rescue avalanche transceiver, probe, shovel. At the same time, rescue forces are alerted. Depending on the situation, mountain rescue, emergency doctors, helicopters, police, avalanche commissions, and dog teams may be deployed.

The avalanche dog is a biological locating system. It does not replace technical tools; it complements them. Where an avalanche transceiver signal is present, the technical search is used. Where there is no signal, where several people are involved, or where an area must be searched quickly, the dog can be decisive.



At the site, the dog is deployed. The handler assesses terrain, wind, danger situation, and search strategy. This is where my experience in avalanche control and mountain rescue helps me a great deal. One must understand not only the dog, but also the terrain, the snow situation, the hazards, and the dynamics of an operation.

Then the dog works the avalanche field. When it finds scent, its behavior becomes more intense: it searches with greater focus, circles more tightly, and begins to dig or bark. The handler must read this indication and act immediately. After that, probing and shoveling begin.

Five avalanche deployments in a row

One deployment from this winter shows how demanding this work can be. I was on standby duty with the helicopter. It started at around 11:00 a.m. After that, one

avalanche deployment followed another — five deployments in a row. We were out until 4:30 p.m., without a break.

Days like that show what operational readiness really means. It is not just about a dog searching well once. After the first deployment, the dog must get back in, fly on, get out again, and work again. At the same time, the handler must make decisions, communicate with other emergency personnel, read the dog, and maintain concentration.

For the dog, every deployment is physically and mentally demanding. The same is true for the human. Cold, noise, rotor wash, adrenaline, unclear information, and the knowledge that people may be lying under the snow — all of these are part of the work. In such moments, it becomes clear whether the training has been honest. A dog that only knows pleasant exercises will quickly reach its limits there. A dog that has been prepared realistically can work.

Conclusion

Avalanche dog work is fascinating, but it is not a show. Every training day reminds us how much effort is necessary so that a few minutes can function in a real emergency. Digging deep holes, erasing tracks, preparing terrain, transporting dogs, checking indications, analyzing mistakes — all of this is part of the work.

In the end, one simple truth remains: the dog is only as good as its training, its handler, and the team around it. An avalanche dog needs talent, inner stability, and motivation. The handler needs patience, experience, and trust. And both need an environment that is willing to invest enormous work before the emergency happens.

When, on a real avalanche field, the dog suddenly stops, becomes intense, digs, and indicates, you know why every hour of training was worth it.



Bertram Klehenz is an Austrian search-and-rescue canine specialist, instructor, and court-certified canine expert with more than two decades of experience in mountain rescue operations. He served for nine years as Deputy State Director of Mountain Rescue Vorarlberg and has been an operational handler of rescue and avalanche search dogs with the Search and Rescue Unit Vorarlberg (SARUV).

THE EVOLUTION OF TRAINING POLICE AND MILITARY WORKING DOGS:

Principles, Practice, and the Role of Modern Technology.

Dr. Michael Morgan, Master K9 Trainer



The training of police and military working dogs (MWDs) has evolved significantly over the past two decades, shaped by operational demands, advances in behavioral science and the integration of new technologies. Despite the several developments, the foundation principles that govern how dogs learn have remained remarkably consistent. At its core, effective K9 training is rooted in clear behavioural conditioning: behaviors that are rewarded are repeated, while those that are not reinforced diminish over time. This enduring framework, combined with proper dog selection, consistency, and disciplined leadership, continues

to define successful working dog programs, regardless of the sophistication of modern tools.

Historically, early K9 training programs relied heavily on compulsion-based methods, emphasizing obedience through correction. While these methods produced functional results, they often lacked precision, sustainability, and welfare considerations. Over the time, the field shifted toward evidence-based training approaches grounded in learning theory. Today, successful programs emphasize positive reinforcement as the primary driver of behavior,

supplemented by clear boundaries and structured feedback. The principle is straightforward: dogs will repeat behaviors that benefit them. Whether the reward is a toy, food, praise, or engagement with the handler, the outcome must be meaningful to the dog. Conversely, undesirable behaviors are not reinforced and are redirected appropriately. This balanced, humane approach produces more reliable, confident, and resilient working dogs.

Consistency remains one of the most critical variables in K9 training. Dogs thrive on clear expectations and predictable outcomes. Trainers and handlers alike must take responsibility for their mistakes. Success, or failure, should not fall completely on the dog. Inconsistent handling, whether in timing, commands, or reinforcement, creates confusion and degrades performance. Handlers must operate with discipline, ensuring that every interaction reinforces the desired behavior. Equally important is the understanding that dogs cannot perform tasks for which they have not been prepared. Operational failure is often not a failure of the dog, but a failure of preparation.

A foundational element that precedes all training is selection.

Not every dog is suited for every mission. The success of a K9 program begins with matching the right dog to the right role, based on drives, temperament, physical capability, and environmental stability. High-drive detection dogs, for example, require strong hunt and play instincts, while patrol or apprehension dogs must demonstrate courage, controllability, and environmental confidence. Attempting to force a dog into a role for which it is not suited is inefficient and counterproductive. As the adage suggests, “you cannot teach a goldfish to climb a tree.” Proper selection reduces training time, improves outcomes, and enhances long-term operational reliability.

While the principles of learning have not changed, technology has introduced new tools that enhance training efficiency and operational capability. Devices such as remote ball launchers, including the Dogtra Ball Trainer Pro, Dogtrace D-Ball Up, and specialized systems like the K9 BSD (Behaviour Shaping Devices) (Picture-i), allow trainers to deliver immediate, high-value rewards at a distance. These tools are particularly effective in detection work, where they reinforce independent search behavior and reduce the handler's influence on the dog's decision-making process. Importantly, these devices do not change how dogs learn; they simply improve the timing, consistency, and delivery of reinforcement.

Similarly, advancements in wearable technology, such as tactical camera (Picture-ii) and



Picture-I: BDDS System

K9 Helcam System (Picture-iii) mounted on working dogs, have expanded situational awareness in operational environments. These systems provide handlers and command elements with real-time visual intelligence, enhancing decision-making during high-risk deployments. However, like reward-based tools, these technologies do not alter the learning process. Dogs still require foundational training, repetition, and conditioning to perform reliably. Technology enhances capability, but it does not replace sound training methodology.

Modern K9 training also reflects a more sophisticated understanding of the handler's role. Dogs respond best to calm, assertive leadership characterized by clarity, confidence, and emotional control. Heavy-handed or inconsistent handling undermines trust and degrades performance. Effective handlers maintain composure, communicate clearly, and reinforce behaviors with precision. The relationship between handlers and dogs is not merely functional; it is a critical component of operational success. Trust, built through consistent training and fair reinforcement,

enables the dog to perform under stress and uncertainty.

Repetition and scenario-based training remain essential in preparing working dogs for real-world conditions. Exposure to varied environments, distractions, and operational variables ensures



Picture-II: Vest Camera



Picture-III: K9 Helcam

that behaviors are not context-dependent but are instead reliable across all varied settings. Training must be deliberate and progressive, building from foundational skills to complex tasks. Debriefing and continuous evaluation further strengthen the training programs by identifying gaps and reinforcing lessons learned.

In conclusion, while the tools and technologies supporting police

and military working dog training programs have advanced, the underlying principles of learning remain unchanged. Dogs learn through repetition, consistency, and reinforcement. They perform behaviors that benefit them, guided by clear expectations and effective leadership. Technology serves as a force multiplier, enhancing training efficiency and operational effectiveness, but it

does not replace the fundamentals. The success of the any K9 program ultimately depends on selection of the right dog, applying sound training principles, and disciplined, consistent execution. In an increasingly complex threat environment, these enduring principles ensure that working dogs remain one of the most effective and reliable assets in modern security operations.



Dr. Michael Morgan, is a Master K9 Trainer with over twenty years of experience in K9 training and program development globally, including India, Nigeria, Thailand, Philippines and the Kingdom of Bahrain. He is now a physical security executive specializing in threat assessment, facility & asset protection, and counterterrorism. He has published several domestic and international articles and participated in international policy and counterterrorism forums, including at Reichman University in Israel.

FROM SOURCE ODOUR TO SCENT LANDSCAPES-

Recent Scientific Insights into Detection Dog Performance

Philip A. Butt, Dean, RRU Commando K9 Academy



For over a century, detection dogs have remained among the most effective tools available to law enforcement, military and security agencies. Detection dogs do not operate in a world of static odours and hidden targets; they navigate dynamic scent landscapes shaped by airflow, temperature, humidity and environmental conditions. Understanding how dogs interpret these complex odour environments is becoming central to modern detection dog science and future operational capability.

Dogs Navigate Scent Landscapes

From the dog's perspective, there is no hidden bag, vehicle compartment or cargo container. There is only odour. Recent plume research has confirmed that odour rarely travels in a straight line from source to detector. Airflow, temperature, humidity and physical barriers create complex and constantly changing scent

environments that the dog must interpret before locating the source.

A 2024 study published in Scientific Reports by researchers working on odour plume behaviour in Europe demonstrated that trained detection dogs altered their search behaviour depending on the physical properties of odorants present within a plume environment.

This helps explain why experienced dogs may indicate away from the source, overshoot an area before returning, or display search patterns that appear unusual to inexperienced observers. Such behaviour may reflect the dog's attempt to resolve a complex odour landscape rather than a training deficiency.

Generalisation: The Difference Between Training Success and Operational Reliability

One of the most important findings from recent detection dog research is that successful training performance does not automatically translate into operational reliability.

Similar findings have emerged from canine cognition research groups in the Netherlands, Sweden and Germany, where researchers have examined how dogs categorise and

generalise odours beyond specific training sample

This creates a fundamental training challenge: such as , is the dog learning to recognise a specific training sample, or is it learning to recognise a broader target odour class? The distinction is critical. A dog trained repeatedly on a limited range of odour presentations may perform exceptionally during training and certification yet struggle when confronted with operational targets that differ chemically from those encountered during training.

Recent studies suggest that generalisation should not be viewed as an automatic outcome of training. It is a capability that must be deliberately developed and assessed. Emerging evidence indicates that dogs exposed to greater odour diversity during training develop stronger generalisation abilities and greater operational robustness.

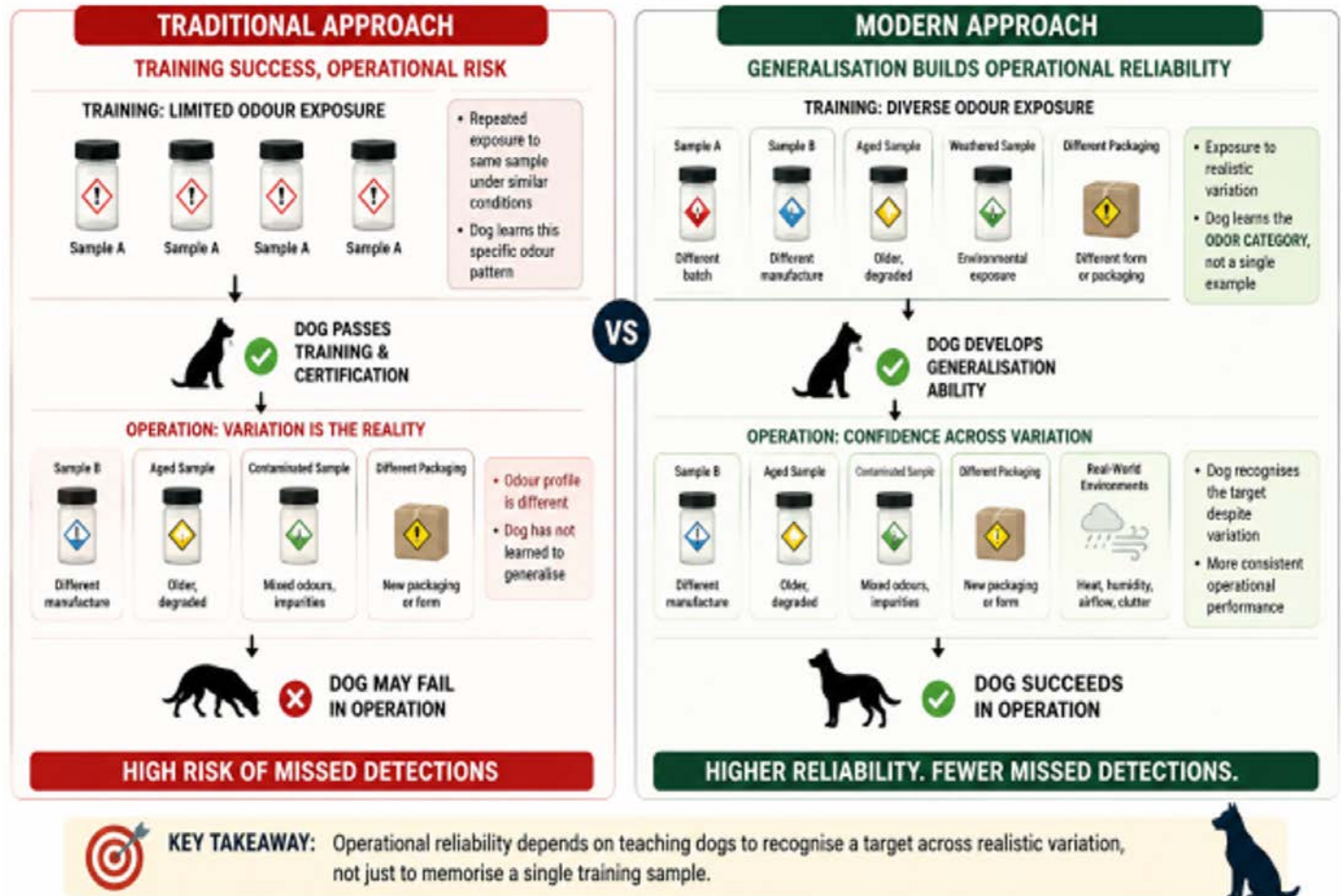
Environment, Odour Availability and Detection Thresholds

Recent research is forcing detection programmes to reconsider the role of environmental conditions in operational performance.

Traditionally, factors such as heat, humidity and fatigue were

TRAINING SUCCESS vs OPERATIONAL RELIABILITY

Modern research shows that dogs must learn to generalise to odour variation, not memorise a single training sample.



viewed primarily as welfare and management concerns. New studies suggest that they directly influence detection capability. Research on explosive detection dogs has demonstrated measurable reductions in detection sensitivity under high-temperature and high-humidity conditions, while other studies indicate that environmental exposure can affect performance even when target odour concentrations remain unchanged.

The reason is simple: environmental conditions affect both the odour and the dog.

Temperature, humidity, airflow and surface characteristics influence how odour is released, transported and retained within an environment. At the same time, heat, fatigue and environmental stress can affect a dog's ability to process odour information efficiently.

Recent research has also highlighted the importance of odour availability—the amount of target odour actually accessible to the dog at a given moment. Packaging, containment, age of the material, airflow and environmental

conditions all influence odour availability.

Operationally, this means that the presence of a target does not necessarily guarantee the presence of a strong odour picture.

Training Aid Integrity, Contamination and the Science of Odour Education

Recent work by organisations such as NIST (National Institute of Standards and Technology - USA) and OSAC (Organization

of Scientific Area Committees for Forensic Science - USA) has brought renewed attention to an often-overlooked aspect of detection training: is training aid integrity.

The principle is straightforward. A detection dog can only learn from the odour information presented during training. If that odour picture is incomplete, altered or contaminated, the dog may learn something different from what the trainer intended.

This is why training aid validation has become an increasingly important scientific and operational issue. Modern standards efforts are focused not only on whether a training aid contains the target substance, but also concern

whether it accurately represents the odour profile that the dog is expected to encounter operationally.

From the dog's perspective, there is no distinction between odour intentionally presented during training and odour unintentionally transferred through handling, storage or environmental contact. If target odour is transferred from a training aid to another object, the dog may respond to that transferred odour just as readily as it responds to the source itself.

This distinction matters because contamination can create the illusion of training success while introducing unintended odour cues into the learning process.

Consequently, leading standards organisations are placing increasing emphasis on training aid validation, contamination control and handling procedures.

Ultimately, detection training is a process of odour education. Every exposure teaches the dog something about the target. The quality of that education depends directly on the quality of the odour information presented.

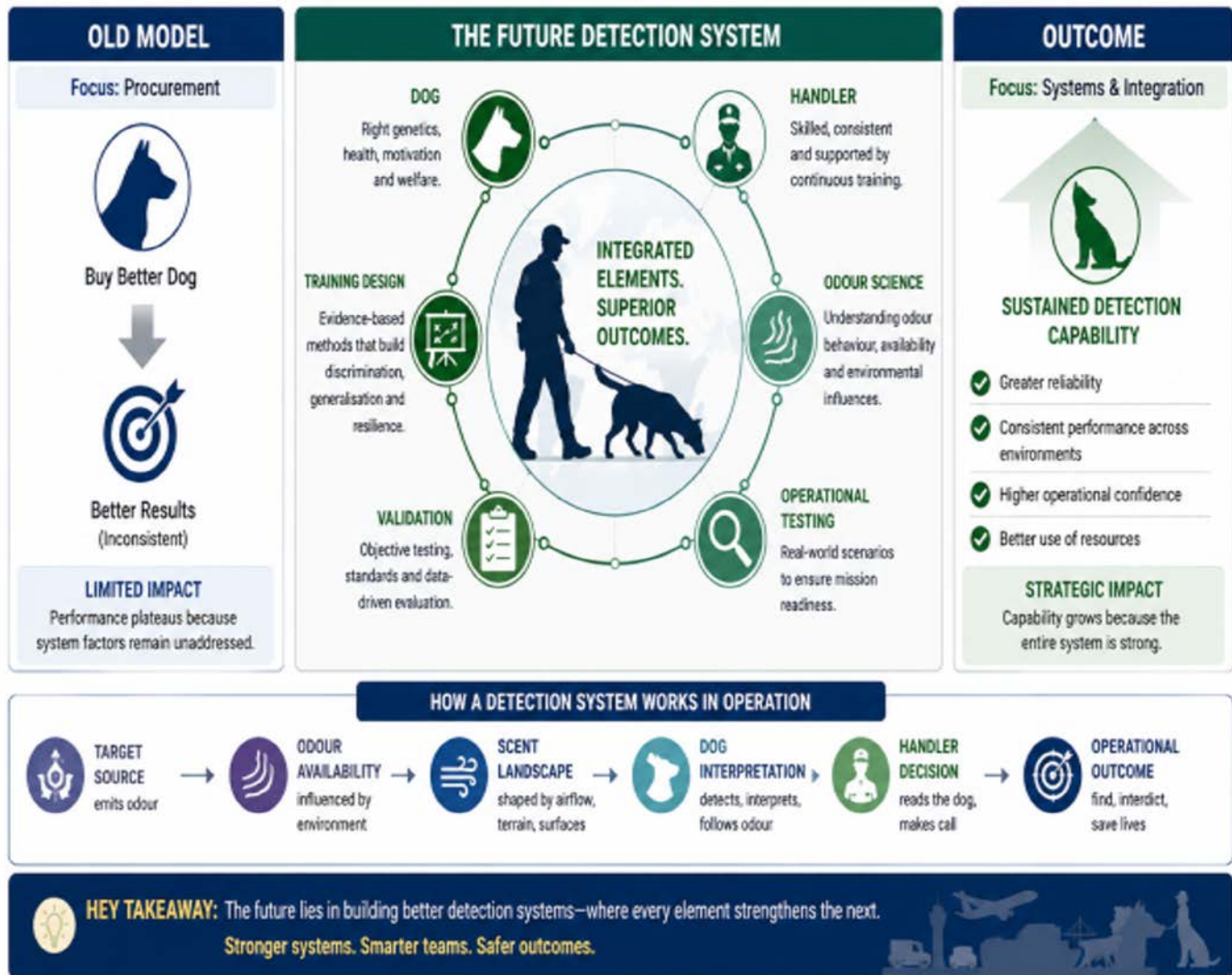
From Static Searches to Dynamic Detection: Vapour Detection and Passenger Screening

One of the clearest indicators of where detection dog programmes



THE FUTURE DETECTION SYSTEM

Tomorrow's capability will come from integrated systems, not just better dogs.



are heading is the growing adoption of vapour detection and passenger screening methodologies.

Traditional deployments focus on searching static targets such as vehicles, baggage, cargo and buildings. Passenger screening programmes reverse that model. Rather than locating hidden objects, these dogs are trained to detect explosive odours associated

with moving individuals in complex public environments.

The challenge is considerable. Dogs must detect trace quantities of odour, discriminate relevant scents from thousands of background odours and maintain reliability despite constantly changing airflow conditions.

In many respects, passenger screening represents the practical

application of the scent landscape concept. The dog is no longer searching for a location. It is interpreting a dynamic odour environment in real time.

As threats become more mobile and operational environments more complex, future detection programmes are likely to place increasing emphasis on airborne odour detection, rapid screening and real-time odour interpretation.

The field is moving beyond the search for hidden objects. It is moving towards the interpretation of dynamic odour environments.

Implications for Indian K9 Programmes

The growing recent work emerging from North America, Europe and other international K9 programmes provides an opportunity for Indian agencies to adopt evidence-based practices while developing solutions tailored to local operational realities.

Indian detection teams routinely operate in environments characterised by high temperatures, humidity, dense crowds, transportation hubs, extensive border regions and complex urban landscapes. These conditions amplify many of the challenges highlighted by recent research, including odour movement, environmental effects, generalisation and operational validation.

The most significant lesson emerging from the scientific literature is that future capability gains are unlikely to come from procurement alone.

For decades, improvements in

detection capability were often pursued through better dogs, better equipment and expanded infrastructure. While these remain important, recent research suggests that the next major advances will come from a deeper understanding of scent science and the development of more sophisticated training systems.

Detection dogs are increasingly being recognised as biological sensors operating within complex odour environments. Their effectiveness depends as much on training and validation systems as on canine capability itself.

Several themes emerge consistently across recent studies:

- Dogs work scent landscapes, not static odour sources.
- Generalisation must be deliberately developed and tested.
- Environmental conditions influence both odour behaviour and canine performance.
- Training aid integrity matters.
- Operational validation must reflect operational reality.

Collectively, these findings point towards a future in which detection

programmes become more scientific, evidence-based and performance-oriented.

For India's growing K9 ecosystem, institutions such as Rashtriya Raksha University can play an important role in bridging operational experience with emerging global research, helping ensure that international scientific advances are translated into practical capability improvements for Indian agencies. The objective is not to replicate international models. The objective is to understand the science and apply it intelligently within Indian operational realities.

Conclusion

Over the past decade, detection dog science has undergone a significant shift. The dog's nose remains one of the most powerful detection tools available. The challenge before us is not to improve the dog's nose. The challenge is to build scientific, evidence-based systems that allow us to make full use of the extraordinary capability that already exists. The future of detection dogs will not be defined solely by what the dog can smell, but by how well we understand the world of scent that the dog is already navigating.



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VAPOR PRESSURE AND SCENT CONES:

A SCIENTIFIC LOOK AT HOW TEMPERATURE, HUMIDITY, AND AIRFLOW AFFECT THE AVAILABILITY AND MOVEMENT OF SCENT MOLECULES

Dr. Pratap Surapaneni, Veterinary Surgeon, Andhra Pradesh police

Abstract:

The efficacy of police canines in detecting target odours is profoundly influenced by environmental variables that govern the liberation, dissemination, and detectability of scent molecules. This article provides a rigorous scientific analysis of how vapor pressure, temperature, humidity, and airflow modulate the molecular dynamics of scent from explosives, narcotics, and specifically, human emanations pertinent to tracking. A comprehensive understanding of these factors is critical for optimizing canine deployment, enhancing training paradigms, and advancing the scientific foundation of canine olfaction in law enforcement.

Keywords: Police Canine, Scent Detection, Vapor Pressure, Temperature, Humidity, Airflow, Scent Cone, Explosives, Narcotics, Human Scent, Tracking, Olfaction.

Introduction

Police canines are indispensable tools in modern law enforcement, leveraging an olfactory acuity that far surpasses human capabilities. Their capacity to identify minute concentrations of specific volatile organic compounds (VOCs) underpins their success in a multitude of roles, including

contraband detection, suspect apprehension, and critical to this discussion, human tracking. However, the operational effectiveness of these highly trained animals is not solely a function of their innate biological prowess; it is inextricably linked to the physicochemical properties of the target odorants and the prevailing meteorological and environmental conditions. This article systematically examines the intricate interplay between vapor pressure, temperature, humidity, and airflow, elucidating their collective impact on the generation, persistence, and detectability of scent cones originating from explosives, narcotics, and the complex human scent signature utilized in tracking.

The Molecular Basis of Scent: Vapor Pressure and Volatility

Scent, at its core, represents the perception of airborne VOCs by an olfactory system. For a substance to generate a detectable odour, its constituent molecules must transition from a condensed phase (solid or liquid) into the gaseous phase. This phase transition is directly quantified by its vapor pressure, defined as the pressure exerted by a vapor in

thermodynamic equilibrium with its condensed phases at a specified temperature within a closed system. Substances exhibiting high vapor pressures are inherently volatile, readily releasing scent molecules into the ambient atmosphere. Conversely, substances with low vapor pressures are less volatile, releasing fewer molecules and consequently generating fainter or more spatially restricted scent profiles.

The spectrum of target odours for police canines encompasses a wide array of compounds, each possessing distinct volatilities:

Explosives: Many energetic materials (e.g., TNT, RDX, PETN, smokeless powder) are characterized by relatively low intrinsic vapor pressures. This implies a limited release of primary molecules into the air, often necessitating the canine's close proximity to the source. However, the overall scent signature is frequently augmented by more volatile accessory chemicals, manufacturing impurities, and environmental breakdown products.

Narcotics: Common illicit narcotics (e.g., cocaine, heroin, methamphetamine, cannabis) also display varied vapor pressures. For

instance, the primary psychoactive cannabinoid, tetrahydrocannabinol (THC), is semi-volatile, while the highly volatile terpene profiles associated with cannabis significantly contribute to its characteristic and often pervasive odour.

Human Scent for Tracking: Human scent is an exquisitely complex and dynamic chemical signature, comprising a myriad of VOCs emitted from the skin, breath, and biological excretions. These include fatty acids, aldehydes, ketones, and nitrogenous and sulfur-containing compounds, originating from both endogenous metabolic processes and the metabolic byproducts of commensal skin microbiota. The aggregate human scent signature presents a broad distribution of vapor pressures, from highly volatile components that rapidly disperse to semi-volatile compounds that persist longer on surfaces. It is this persistent, albeit decaying, molecular trail that forms the basis of canine

Environmental Modulators of Scent Availability and Movement

Temperature

Temperature exerts a profound influence on scent availability, as vapor pressure exhibits a direct exponential relationship with temperature. An elevation in temperature imparts greater kinetic energy to molecules, thereby increasing their propensity to overcome intermolecular forces and transition into the gas phase at an accelerated rate.

Enhanced Scent Release: Elevated temperatures promote the accelerated volatilization of scent molecules from explosive materials, narcotics, and critically, from human skin and discarded cells. This leads to an increased concentration of odorants in the immediate vicinity of the source (or the track line) and a more rapid, albeit potentially more diffuse, formation of a scent cone. For instance, a human track laid on warm asphalt will shed scent molecules more rapidly than one laid on cold ground.

Accelerated Dispersion: Concomitantly, elevated temperatures enhance molecular motion within the air itself, contributing to faster diffusion and dispersion of scent molecules. While this can result in a larger scent cone, it also facilitates more rapid dilution of the odorant concentration.

Substrate Effects: The temperature

of the substrate upon which the scent is deposited (e.g., ground, clothing, vegetation) is equally important. Warmer substrates will outgas scent molecules more efficiently than colder ones.

Canine Physiological

Considerations: It is imperative to acknowledge that extreme ambient temperatures can significantly impair canine physiological performance and endurance, independent of their direct impact on scent dynamics.

Humidity

Humidity, defined as the concentration of water vapor in the ambient air, presents a complex and multifaceted influence on scent detection.

Scent Trapping/Solubility:

The effect of humidity is highly dependent on the polarity of the scent molecules. For highly polar VOCs, elevated humidity can, counterintuitively, diminish their effective airborne availability by promoting their dissolution into airborne water droplets. This "trapping" mechanism can reduce the concentration of free odour molecules accessible for canine olfaction. Conversely, for non-polar molecules, water vapor might act as a carrier, or high humidity might reduce electrostatic charges, allowing easier release.

Olfactory Mucosa Hydration:

Adequate ambient humidity is indispensable for the optimal physiological function of a canine's olfactory epithelium. Desiccation of the mucous membranes in extremely dry air can compromise

Figure 1: Illustration of vapor pressure and the liberation of scent molecules from the solid source into a gaseous phase within a closed system.

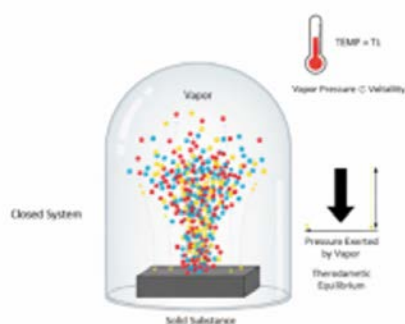


Fig 1: Illustration of vapor pressure and the liberation of scent molecules from a solid source into a gaseous phase within a closed system.

the solubility of odorants in the olfactory mucus and impair the efficiency of odorant-binding proteins in transporting scent molecules to the chemoreceptors. Canines frequently exhibit reduced efficiency in arid conditions.

Adsorption/Desorption Dynamics: Scent molecules readily adsorb onto various environmental surfaces (e.g., soil particles, vegetation, clothing fibres). High humidity can influence the rate of desorption. In some scenarios, a moist surface might retain scent molecules more effectively, thereby extending the longevity of a track. Conversely, excessive moisture might facilitate microbial activity, alter the scent profile or accelerate degradation. For human tracking, skin rafts (desquamated epidermal cells) are key scent carriers; humidity can affect their adherence to surfaces and their subsequent release of VOCs.

Airflow (Wind)

Airflow, encompassing both wind speed and direction, is the paramount determinant of scent cone morphology, trajectory, and dilution. It directly dictates how a canine perceives and navigates a scent trail.

Scent Cone Formation and Dispersion: Airflow acts as the primary transport mechanism for scent molecules, carrying them downwind from the source or along a trackline to form a "scent cone" or "plume." Canines are rigorously trained to interpret these plumes, typically working into the wind or systematically bracketing the cone until they successfully converge upon the origin of the scent.

Dilution and Concentration Gradients: Strong, laminar winds lead to rapid and extensive dilution of scent molecules, spreading them over a vast area but reducing their concentration at any singular point. In contrast, quiescent or stagnant air allows scent molecules to accumulate closer to the source or track, forming a more concentrated but spatially restricted scent cone.

Turbulence and Eddies: Turbulent airflow, frequently encountered in built-up urban environments, forested areas, or around vehicles, generates unpredictable eddies, vortices, and updrafts/downdrafts. These turbulent structures can fragment scent cones, rendering them erratic and exceptionally challenging for canines to consistently follow. Laminar flow, characteristic of open, unobstructed terrain, generally results in more predictable and coherent scent trails.

Convection Currents: Localized thermal gradients can induce

convection currents. For example, solar heating of a road surface can create an updraft, carrying human scent molecules vertically, which a tracking canine might interpret as an "air scent" rather than a ground-based track. Similarly, the heat radiating from a human body can create a micro-convection current that lifts scent molecules.

Integrated Impact on Scent Cones from Target Odors

Explosives

Given their generally low intrinsic vapor pressures, explosive odours are exceptionally sensitive to environmental fluctuations. In conditions characterized by high temperature and moderate airflow, the increased volatilization, potentially coupled with interactions with water molecules, can lead to a more readily detectable, yet potentially more dispersed, scent cone. Conversely, in cold, still air, the scent cone will be highly localized and faint, demanding extreme proximity of the canine to the source. The presence of higher vapor pressure accessory chemicals (e.g., plasticizers, stabilizers) or more volatile degradation products can significantly bolster detectability under otherwise challenging conditions.

Narcotics

The chemical heterogeneity of narcotics results in diverse responses to environmental factors. Cannabis, rich in highly volatile terpene profiles, frequently generates a broad and persistent scent cone

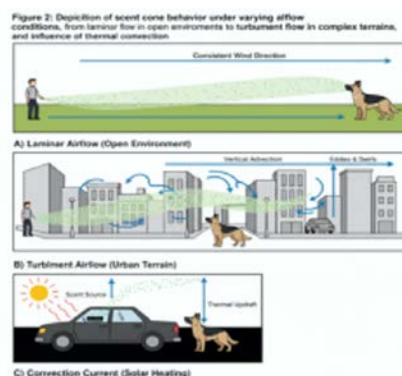


Fig 2: Depiction of scent cone behaviour under varying airflow conditions, from laminar flow in open environments to turbulent flow in complex terrains, and the influence of thermal convection.

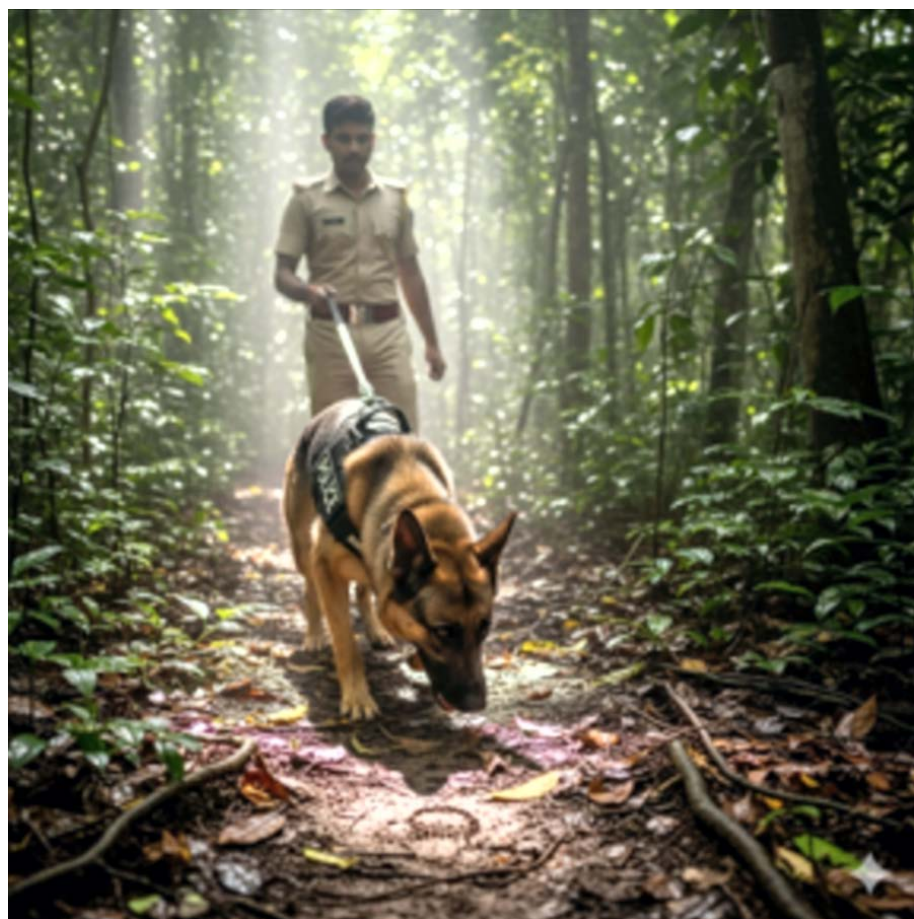


Fig3: A police canine actively engaged in human tracking, navigating a complex outdoor environment, with environmental factors influencing the scent trail.

Human Scent in Tracking

The human scent signature is dynamic and rapidly degrading. Temperature is paramount: warmer ground temperatures accelerate the volatilization of human-derived VOCs from skin rafts and residues, creating a stronger initial scent trail. However, this increased volatilization also leads to faster dispersion and degradation. Conversely, cold temperatures slow volatilization, preserving a fainter, more localized scent trail for longer periods, particularly on surfaces like snow or frozen ground. Humidity plays a nuanced role; moderate humidity can enhance the adherence of skin rafts to surfaces and potentially facilitate the transport of some VOCs. However, heavy rain can rapidly wash away scent molecules. Airflow is the ultimate determinant of track directionality and longevity.

In turbulent conditions, the scent trail can be broken, lifted, or dispersed erratically, making sustained tracking exceptionally difficult. Canines often work in "footstep patterns," detecting the individual scent pools left by each footfall, which are then influenced by these environmental factors.

even in moderate conditions. The primary active components of cocaine and heroin, possessing lower volatilities, may produce less expansive plumes. Generally, elevated temperatures enhance narcotic detection by promoting increased volatilization. However,

in enclosed environments (e.g., vehicle compartments), elevated humidity could theoretically facilitate the dissolution or adsorption of some polar narcotic molecules, marginally increasing detection difficulty.



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THE K9 GUARDIANS OF INDIA'S ECONOMIC FRONTIERS: A COMPREHENSIVE OVERVIEW OF THE CBIC K9 ESTABLISHMENT.

Mahesh Jandera, Assistant Commissioner, Directorate of Logistics, CBIC.

Introduction

The Central Board of Indirect Taxes and Customs (CBIC) stands as the vanguard of India's economic security, diligently protecting the nation's financial interests through its multifaceted operations. As the nodal agency for all matters related to K9 establishment of Indian Customs under the Directorate of Logistics, we have witnessed the transformative impact of these four-legged guardians in securing our borders and safeguarding national security.

The Indian Customs K9 establishment represents more than just a detection programme; it embodies a strategic shift towards scientific, technology-enabled enforcement that combines the unparalleled olfactory capabilities of specially trained canines with the expertise of dedicated handlers. This synergy has proven invaluable in our mission to intercept narcotics and the items that threatened our economic and social fabric.

Evolution and Strategic Development.

The journey of Indian Customs K9 operations began in 1984, when the department first introduced canines for detection purposes. However, these early efforts were limited in scope and relied heavily on local initiatives by Customs offices. The K9 units were being trained at National Training Centre for Dogs (NTCD), Tekanpur of BSF helped in establishing the K9 Unit by providing the Pups from their Breeding centre as well as imparting



Indian Customs K9 Unit handlers walking their trained detection dogs during a formal activity, highlighting the specialized canine team at the Attari training Centre.

desired Training to the Pups. The establishment of Customs own training infrastructure marked a watershed moment in 2020 with the inauguration of the Customs Canine Centre (CCC) at Attari, Amritsar. This pioneering facility, India's first centre dedicated to training dogs in anti-smuggling operations is strategically located at the India-Pakistan border checkpost, symbolizing our commitment to border security.

Unlike Paramilitary Forces that operate in high-threat scenarios requiring aggressive dog behaviour, Customs operations primarily involve interactions with genuine passengers and legitimate trade in controlled environments such as airports, ports, Foreign Post Offices, Inland Container Depots, and Land Customs Stations etc. This necessitated specialized training modules focused on passive indication techniques—silent sitting, observing, and detecting—rather than the active indication methods like barking and aggression traditionally employed by security force.

Infrastructure and Training Excellence

The Customs Canine Centre at Attari represents a world-class training facility that has been meticulously designed to meet international standards. The centre exemplifies efficient resource utilization by renovating existing structures at the Land Customs Station, Attari.

The training methodology follows a scientifically designed 32 week programme that begins when dogs are 3-4 months old and

continues until they reach 11-12 months of age. This comprehensive curriculum includes three months of basic obedience training followed by five months of specialized detection training. The programme emphasizes a completely non-punitive, reward-based approach, utilizing special diets and positive reinforcement rather than punishment-based methods.

Currently, the centre imparting training to three primary breeds: German Shepherds, Cocker Spaniels, and Labrador Retrievers, each breed selected for specific operational advantages. Labrador Retrievers are preferred for their excellent detection capabilities and adaptability to air-conditioned environments, while Cocker Spaniels are valued for their compact size, enabling them to access confined spaces during searches. The training encompasses detection of methamphetamine, heroin, cocaine, MDMA, and marijuana, with plans to expand to tobacco products, wildlife articles, and currency detection.

Operational Deployment and Achievements

The strategic deployment of K9 units across India's critical entry points demonstrates the programme's national significance. Currently, K9 units are deployed at major sensitive locations viz: New Delhi, Amritsar, Mumbai, Kolkata,



Bhubaneswar, Vishakhapatnam, Ahmedabad, Cochin, Trivandrum, Pune, Trichy, Coimbatore, Ramnathpuram, Tuticorin and Chennai. This network ensures comprehensive coverage of India's primary international gateways, with particular emphasis on airports and seaports that serve as primary conduits for international trade and travel.

The operational success of our K9 programme is reflected in impressive detection statistics. Our K9 units trained at the Customs Canine Centre, Attari, have been instrumental in detection of 627.443 Kgs of Narcotics



substances in 128 cases across India up to March, 2026. These achievements underscore the critical role of K9 units in disrupting drug trafficking networks and preventing dangerous substances from entering Indian communities.

Recent notable successes include the September 2024 operation where K9 Nancy and K9 Yasmi from Kolkata Customs, along with K9 Jano from Cochin Customs, seized 31.448 kilograms of ganja. Similarly, at Chennai airport, the induction of K9 Snow Boy and K9 Rock, both specialized in and narcotic detection, has strengthened capabilities to address the growing challenge of exotic pet smuggling, particularly from Bangkok, Thailand.

The effectiveness of our K9 units extends beyond mere detection capabilities. These highly trained canines serve multiple operational functions including alerting handlers

to suspected smugglers, acting as visible deterrents to potential violators, searching for contraband evidence, and providing rapid screening capabilities in high-traffic environments. Their ability to detect substances even when masked by strong-smelling agents like perfumes, coffee, and spices makes them invaluable assets in sophisticated smuggling operations.

Future Expansion and Modernization

Recognizing the growing need for enhanced border security capabilities, CBIC has ambitious plans for expanding the K9 establishment. This expansion includes specialized categories of detector dogs: Narcotics Detector Dogs, Currency Detector Dogs, Tobacco Detector Dogs, and Wildlife Detector Dogs.

The establishment of a second Customs K9 training and breeding centre in South India is currently

under development, which will significantly enhance our training capacity and geographical coverage. This southern facility will complement the Attari centre and will ensure the training capabilities are distributed across different regions of the country.

Advanced training modules are being developed to address emerging threats, including counterfeit currency detection. Additionally, research is ongoing to enhance detection capabilities for new types of synthetic drugs and psychotropic substances that are increasingly being used by trafficking networks.

The programme continues to embrace technological advancement while maintaining the fundamental principle of positive reinforcement training. Modern training equipment, including advanced scent detection systems and environmental simulation



K9 unit of Indian Customs detects drugs concealed in a backpack at an airport, highlighting their role in drug interdiction.

facilities, ensures that our K9 units remain at the forefront of detection technology.

Welfare and Retirement Protocol

The Indian Customs K9 programme places paramount importance on the welfare of its canine partners throughout their service and post retirement. Dogs serve until nine years of age, after which they retire with full honors. The department has established a comprehensive welfare protocol ensuring that retired dogs are adopted by their handlers, with whom they have

developed strong bonds during their service life. Importantly, these retired heroes continue to receive ration allowances for the remaining lives, reflecting our commitment to their wellbeing.

The healthcare protocol includes veterinary care, regular health monitoring, vaccination programmes, and specialized isolation facilities for sick or quarantined animals. This comprehensive approach to animal welfare not only ensures optimal performance during service but also demonstrates our ethical

commitment to these remarkable animals who serve the nation.

Conclusion

The journey of the Indian Customs K9 establishment reflects the broader transformation of Indian Customs into a modern, technology-enabled, and internationally respected organization. As guardians of India's economic frontiers, our K9 units embody the values of dedication, precision, and unwavering commitment to national service that define the ethos of the Central Board of Indirect Taxes and Customs.



Shri Mahesh Jandera is an Assistant Commissioner, Directorate of Logistics, CBIC, and serves as the nodal officer for all matters related to K9 establishment of Indian Customs.

DYNAMIC CANINE TRACKING METHOD FOR EXPLOSIVE DETECTION (DCTED)

Maj. Attinder Pal Singh & Maj. Nishant Verma, NSG

'Dynamic Canine Tracking Method for Explosive Detection (DCTED)' or 'Vapour Wake Detection (VWD)' technique is an advanced method of training of canines to detect the hand-carried or body-worn explosives on a moving target. This is a novel technique in the field of canine training, where the dogs are trained to follow the explosive target to its source in real time, while the target is in motion.

It is a novel "Dog-driven" detection method, instead being "Handler driven". A canine and a handler are used in which the canine leads the handler. The trained dog (usually on a lead) picks up the scent of the explosive being carried by the person or moving objects (target). After the handler positions the trained canine at a desired location, the canine detects scents in the air that comes to its olfactory approach. When the dog detects a trained scent, the canine leads the handler or follows behind the carrier of the item with the scent.

How Does Vapor Wake Dogs Work

Scent particles are carried behind a person in a "thermal plume", produced by the body's natural heat. A person's natural thermal plume goes upwards when a person is standing still, but as soon as they begin moving, the thermal plume extends behind them much

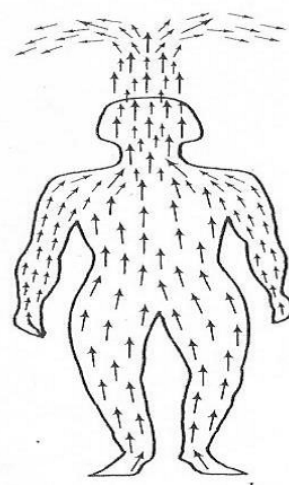
like the wake behind a boat in the water (thus the name "Vapor Wake"). As soon as a Vapor Wake dog detects explosive odor, it will follow the source of the odor.

Plume Growth And How Plume Is Dispersed

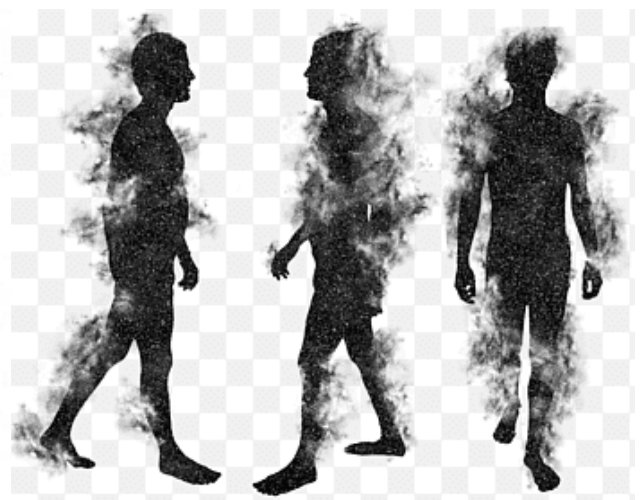
The first phase occurs when the odor patch is smaller than the smallest eddies within the airflow. This occurs when the odor is first being liberated from its source. The spatial distribution of the odor is localized around the source, and the airflow contains a wide range of eddies, all of which are larger than the odor plume. At this phase, eddies serve to move the odor plume around as a whole. This causes meandering of the odor plume in space. Downwind,

the canine will experience this as large shifts in odor concentration from exceedingly high levels to complete absence of the plume. It is expected that the canine will begin large lateral movements to locate the odor plume as the signal meanders over larger distances.

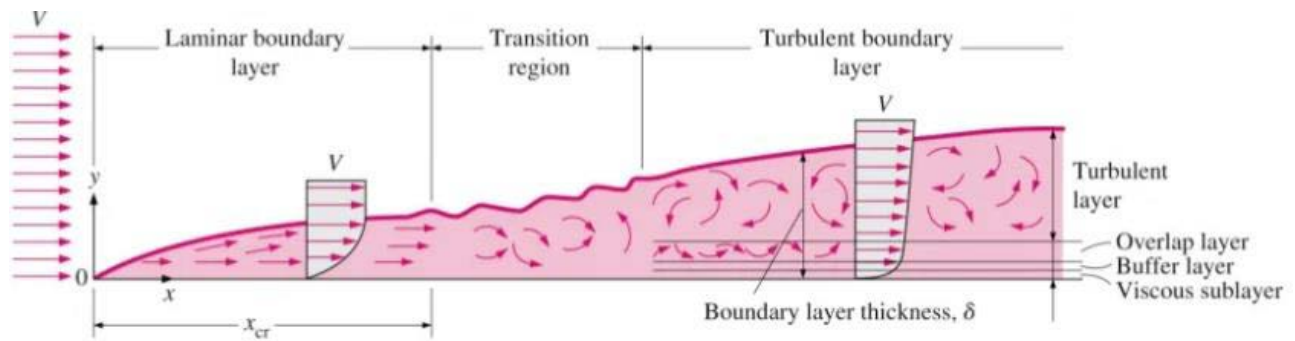
The second phase begins as the odor plume expands in size such that the plume is approximately the same size as the turbulent eddies within the airflow. At this point of time, shear dispersion is the dominant dispersal process and causes the odor patches to be torn apart and distributed in space as smaller and smaller patches. Rather than moving the plume as a whole, this phase causes the odor plume to form filaments of odors where there is still a very



Plumes of Static Person



Plumes of Dynamic Person



sharp concentration boundary between air parcels with odor and those without odor. Downwind, the canine experiences this phase as fast shifts in concentration over smaller spatial scales. The odor plume changes rapidly in concentration, but instead of the signal disappearing (as in phase 1), the signal rapidly fluctuates in concentration. At this point, the canine would be expected to perhaps stop and take several sniffs at a singular point in space as the signal fluctuates in concentration.

The final phase of plume development is where the odor plume is much larger than even the largest eddies and mixing becomes the dominant process. At this point, the concentration differences between odor-laden air packets and those without odor become blurred and eventually disappear as

the plume becomes homogenous. At large distances downwind, the canine will experience this phase of plume development as a slowly fluctuating but fairly constant signal. Concentrations of odor rarely vary, and any differences in signal concentration across space are almost entirely absent.

Training of VWD

Vapor Wake training begins at puppyhood. Dogs go through an 11-month programme, that includes socialization, health assessments, basic training, acclimation, and olfactory testing. Individual prison inmates are paired with these dogs to develop basic skills and to become acclimated to a busy, regimented environment. The dogs complete their training over the next several months and are usually ready for service when they're about 18 months old.

The Foraging Model

Standard training trials use heavy human interaction to teach initial odor recognition and discrimination, which can be taxing on the dog and the trainer alike. However, training that utilizes the natural sequence of foraging model patterns can remove the mundane and labor-intensive portion of the training and actually compel it into a motivator simply because the dog is rewarded by and enjoys the act of executing the pattern. The

FIGURE 13.1 Standard training trial.

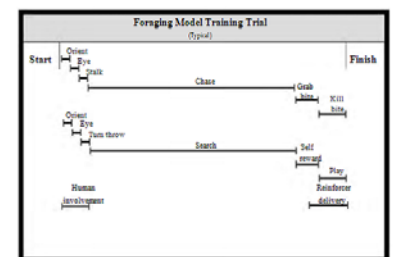


FIGURE 13.2 Foraging model training trial.

sequence described as “orient, eye, stalk, chase, grab bite, kill bite” is hard-wired within the canine and provides an avenue of intrinsic action performed by the dog from which it receives tremendous pleasure. This is much more than a retrieval game as not all dogs are retrievers but all dogs exhibit some form of foraging model patterns. By utilizing the foraging model of training patterns and teaching the dog to accept target odor as replacement for survival odor, it highlights the intrinsic behavior in each dog while focusing on the new paradigm.

Methodology of Training

A dog-driven detection method of detecting hazardous or illicit substances, comprises detecting a source of a target odour and leading a handler to the source of the target odour via a canine, wherein the source of the target odour comes within a detectable range of the canine. The canine searches the air for vapour trails or scent pools of the target odour generated by a moving or stationary target. The canine accommodates dissipation of the target odour over time. The method comprises choosing canines that are not overly sociable. This method of training a canine for detection comprises choosing a detector canine that demonstrates a high level of independent search behaviour, and to follow a vapor-wake of a moving target and give a final response. A method of detection of or person-screening of hand-carried and/or body-worn hazardous or illicit substances, materials or objects in dynamic environments is used. A sniffing

target comes to the dog (usually on a lead) rather than the dog going to the sniffing target. It is a method of canine interrogation and detection of the vapour or volatile wake emanating from persons. This technique provides the ability to:-

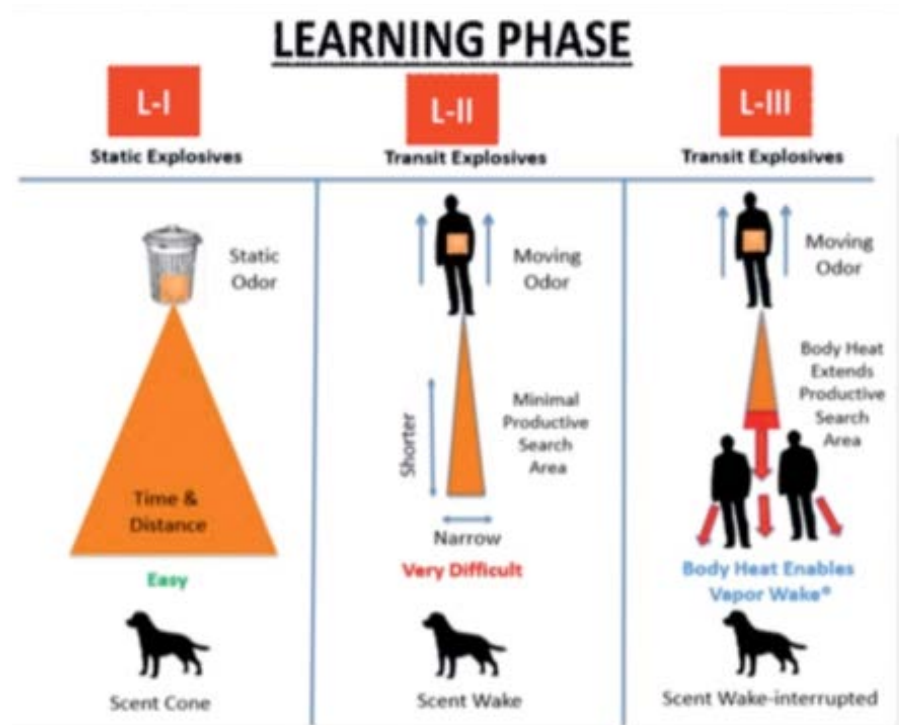
- Screen large numbers of persons passing through a given space without affecting the throughput of the persons through the space.
- Design a specific dog deployment strategy.
- Accommodate the dogs to dissipation or decay of target odour over time.
- Overcoming distractions such as noise, commotion and ancillary environmental odours to prevent loss of tracking of the target odorant.

Protocol For Training

- Controlled conditioning
- Dynamic scent marking
- Dynamic tracking with distraction

Controlled Conditioning (Training On Static Explosives)

This include introducing dog to different explosive odors one at a time. As soon as dog do well with the first odor, introduce the next scent alongside the first one. This process (introducing a new scent along with a known sent) continues until the dog has learned all the required scents. It is possible to train dog to recognize more than one scent at a time, which is a faster method. However, the step-by-step approach is more effective, when training dog in this way, you



can be sure it knows and recognizes each odor.

Always begin scent training with an explosive scent that is not unpleasant or likely to elicit an adverse response in your dog. For instance, some dogs find that ammonium nitrate stings their nose. But just as different people experience scents in different ways, you can expect different dogs to have different reactions to the same odor. Try to discover an explosive scent that your dog likes and start with that. If your dog sniffs once at a certain explosive and then avoids it, you know the dog doesn't like the explosive's smell because it is repulsive, stings the nose, or is otherwise too strong. If this happens, you would not, of course, use this scent when you begin scent training. Also consider that the first scent you train your dog, should not be one whose odor spreads too quickly in larger areas, such as nitroglycerin (NG) or ethylene glycol dinitrate (EGDN), because it is possible that too many objects in the search area will then take on the odor, making it difficult for dog to pinpoint the exact hiding place of the explosive. When practicing search for different explosives use of pure and clean product is a must. Substances can be reused as long as they are not contaminated with other odors. When using pure explosives, make sure dog cannot access them directly and that, for example, powder cannot enter the dog's mouth or nostrils. Re-sealable plastic bags provide fine storage for explosives and can be used in training.

Dynamic Scent Marking

In this phase the dog is given a formal training to indicate a trained substance carried on or worn by a person. The vapor wake detection canine is worked on-leash. The canine is trained to analyze a vapor wake which is a path or course a target has taken, leaving behind an invisible suspension in the air of odor emitted from the target. A handler assesses air currents/movement in the training area and ensures the canine has access to vapor. The handler does not influence the canine once the canine has initially encountered the substance odor. The canine searches independently of the handler without guidance or direction to work differential thresholds to target. The canine is specifically searching the air for the substance odor vapor trails and/or scent pools generated by a moving or stationary target. The target is the location from which the odor originates. Vapor wake training begins with a detector dog that demonstrates a high level of independent search behavior. During this phase the canine learns the source of the target odor is not limited to stationary objects. The canine learns to follow a moving target. Following a moving target includes upon identifying a moving target, the dog pursues the target from behind, at a distance determined by the handler. The canine learns to sample air currents. The canine learns to follow the vapor-wake to the target and give a final response (e.g. a behavior that a dog has been trained to exhibit in the presence of a target odor source such as sitting).

Dynamic Tracking With Distraction

Training aids are placed in items including, but not limited to, backpacks, rolling luggage, carried luggage, purses and packages. Any possibility is replicated, and the training perpetrator is able to look like any pedestrian or commuter. When replicating a suicide bomber, the use of a second-chance vest (after removing the body armor) works well and is covered with clothing. Additionally, a hunter's Vest or jacket with interior pockets works well depending on the season. During training, the amount of time the training aid is in place before training begins is varied. When training first begins with a new team, the training aid is in place at least 30 minutes prior to the canine encountering the explosive odor. This time is able to be slowly reduced using successive approximation. Eventually, the canine is capable of detecting explosives placed out for shorter amounts of time. During vapor wake screening training, the canine is notable to cue visually off the training perpetrator by noticing unusual bulk or recognition of the person and/or baggage. Therefore, frequently new training perpetrators are used along with new baggage, backpacks, packages and garments.

The same training perpetrator is able to be used several times during a training day, but once it is determined to change training perpetrators, the old training perpetrator departs the area. The canine should not encounter this

person even outside of training until after the person has bathed and changed clothes to remove all explosives odor, especially when replicating a Suicide bomber scenario.

When conducting training, extension of the time in which the canine is capable of effective vapor wake screening is done by using Successive approximation. Good documentation of training sessions and a strong objective-oriented training program is essential to achieve this objective. Variation of time before encountering explosive odor, from the shortest to the longest times achieved in training, is important. If training always is consistent with a certain amount of time, the canine begins to anticipate this time and not search during other periods of time. Occasionally, extending the longest time searched, by adding a couple of minutes before the canine encounters explosive odor, is beneficial. As long as the canine is successful, continue to occasionally extend the time is helpful, but variation of the search time is more important to the Success of the

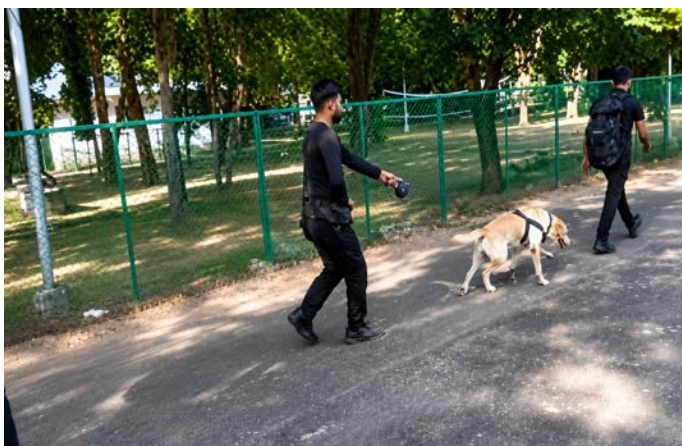
canine's capability. While doing vapor wake screening training, support from various people to perform the role as the training perpetrator is used. Enlisting a variety of people to perform this function, utilizing various sizes, races, males and females is beneficial. Since inevitably the person used will not be familiar with vapor wake screening, canine training, or even dogs in some cases, precise instructions should be given to ensure proper behavior and performance. They should understand the following: -

- (a) If they are moving, they should know where to position themselves in a crowd of people and how close to come to the canine as they move through a choke point or area.
- (b) After they walk past the canine, they should know the precise direction of travel, exact route to take. Additionally, they should understand if at any time they are to stop and how soon they should remain still before moving again, and then the final location they should stop at. Upon stopping they

should understand how long they should remain still before they turn 180 degrees, face the canine, remove the canine's reward and toss the reward directly to the canine's mouth. During training, the number of stops the perpetrator makes before stopping at the reward stop should be varied. Additionally, various paces for the canine to follow should be used, from a slow walking pace to a run. This is the only time the handler is allowed to run with the canine however, the handler should still maintain a taut leash for better leash manipulation and control.

Blank Searches

It is important for the search team to occasionally use a scenario in which there is no aid present. In training, an aid should not always be found, the team, when conducting a search in which no aid is present, should not become anxious and induce a false response. Since many actual searches result in no explosive present, the team should regularly train for blank searches.



Desired Behaviour After Training

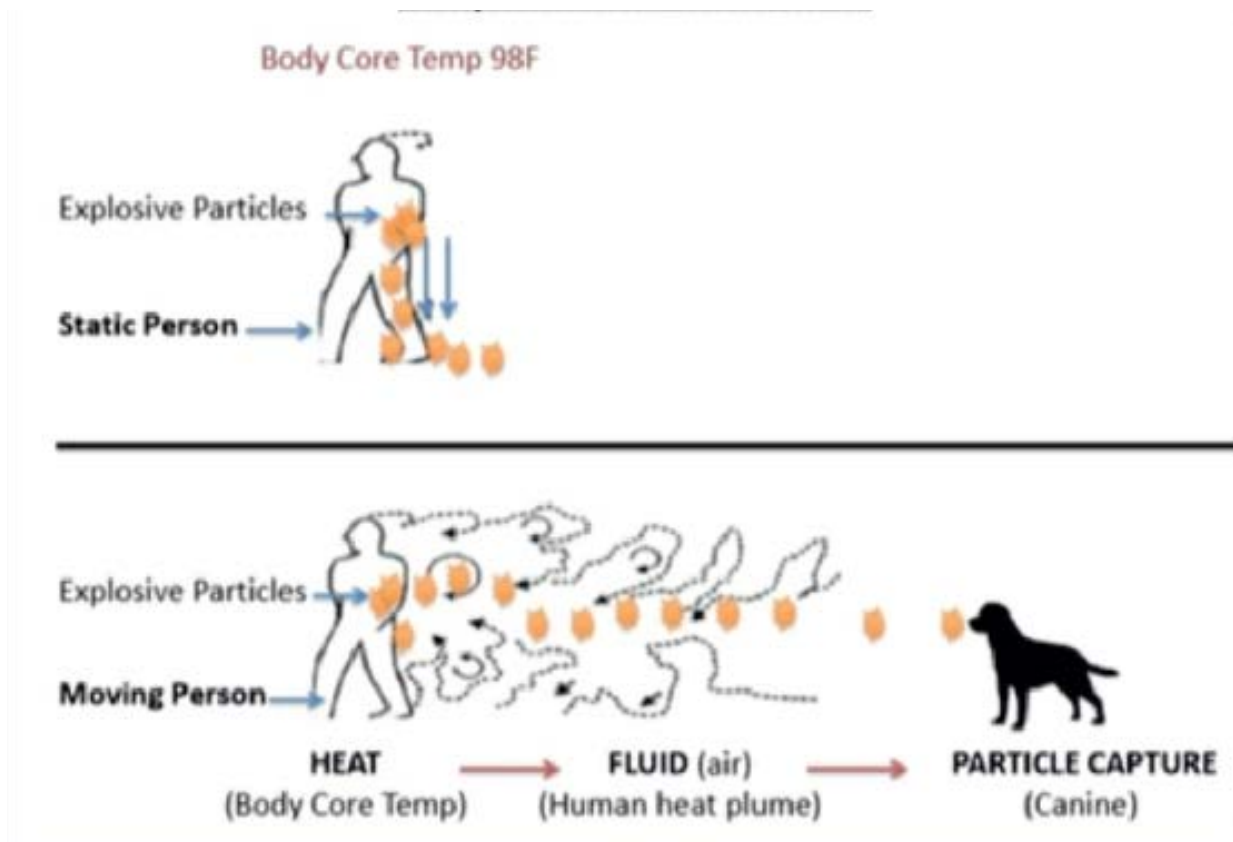
To utilize the dynamic canine tracking method, training is performed initially. The training includes determining a canine appropriate for training, preparing a training plan and having the canine learn to detect target odors, follow the carrier of the odor and take an action Such as sitting when the carrier is identified. Then, once the training is completed, the canine is utilized by placing the canine in an appropriate location (e.g. near a choke point), allowing the canine to Sniff the air attempting to detect a specified odor, following a carrier of the item emitting the odor, identifying the carrier and contacting the appropriate personnel to monitor and/or apprehend the carrier. In

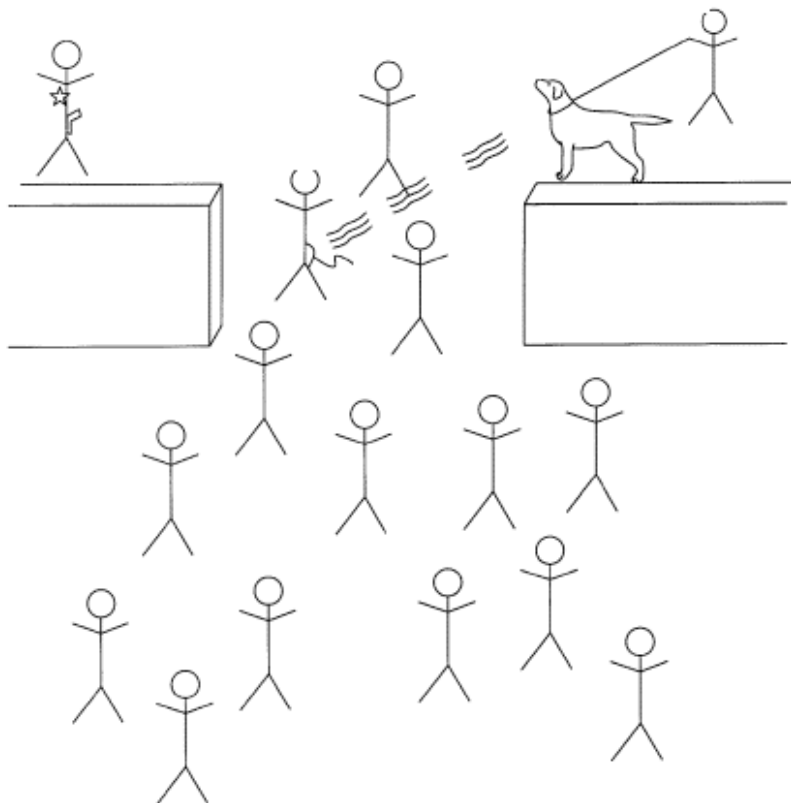
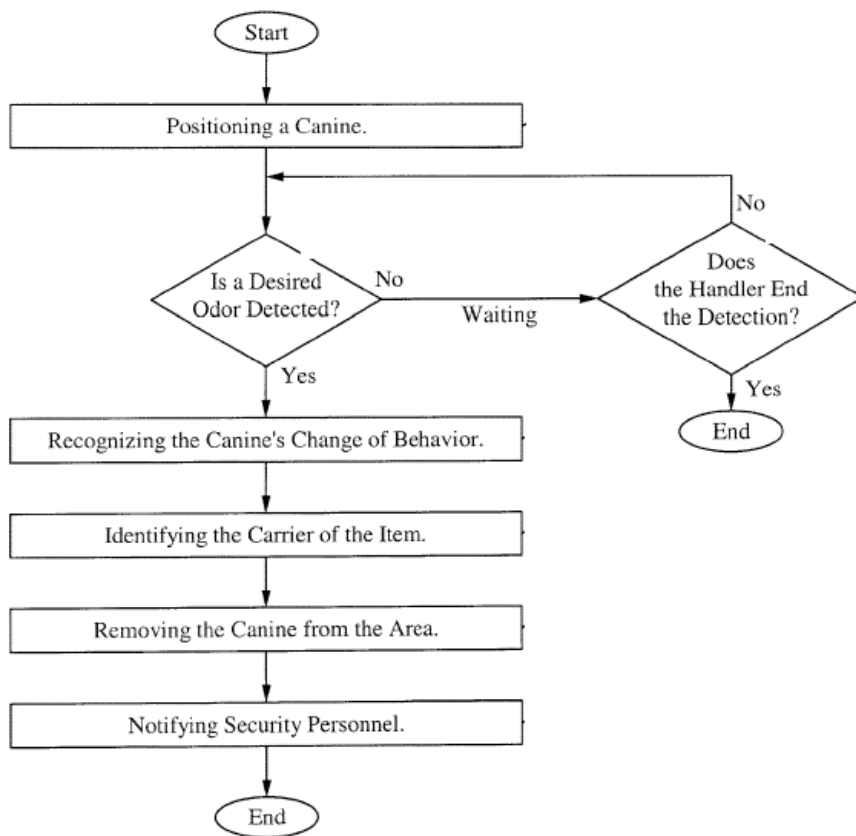
operation, the method is a "dog-driven detection method which is distinguished from traditional canine detection methods which are "handler driven." The method is referred to as Vapor-wake Detection. Some features of this method include the ability to Screen large numbers of persons passing through a given space without affecting the through put of the persons through the space and dogs are able to overcome distractions such as noise, commotion and ancillary environmental odors, to prevent loss of tracking of the target odorant. Applications of the methodology include the interdiction and capture of suicide bombers, narcotics handlers and purveyors or illicit chemical/ biological warfare materials. The methodology is able to be applied in varied environments such as

transit systems, venues for large public even gatherings such as stadiums and buildings and areas of commerce such as shopping malls and military environments.

Dynamic Canine Tracking Method For Explosive Detection (DCTED) Deployment

If the explosive odour is detected while screening of air, the canine is trained to follow behind the perpetrator or approach a non-moving perpetrator from behind. Upon recognizing the canine's change in behaviour and identifying the person carrying the explosives, the handler takes away the canine from the area as to not alert the perpetrator. This is to be done before the canine begins the signal response (sit).





The handler then tactfully notifies security personnel so they are able to covertly approach or follow and observe the perpetrator.

Choke Points

The detection at choke points is easier as compared to crowded area. The canine is allowed to freely move side-to-side within the choke point, without interfering or making physical contact with persons passing through the choke point. The vapour wake screening dogs are trained to sample the plume of air coming off the person's body as they pass by the K9 team.

Crowd Screening

Screening of crowds is conducted throughout an area. This is more difficult than at a choke point but is achievable for the canine team. The handler is conscious of air currents. However, these currents become more disturbed with the movement within the crowd. The handler utilizes leash manipulation to navigate the canine through and around the people forming the crowd. If the crowd is moving in a certain direction, the canine should be cast from side-to-side behind the crowd while moving in the same direction. This requires the handler to move from side-to-side to allow the canine to sample the plume of air coming off the individuals. If the crowd of people is moving various directions, the handler takes advantage of available air currents while moving the canine in and out of the crowd to air scent in all directions. If the crowd is standing still, the handler moves to the downwind flank of the crowd and discretely begins to



move the canine into the crowd in a quartering fashion.

People Standing In Line

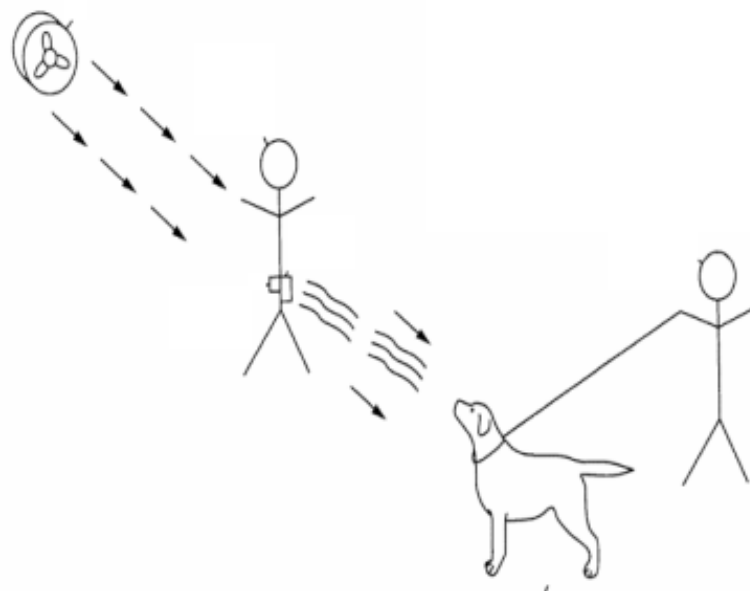
If the team is to screen people standing in line, a screening point or choke point where the line of people must pass by the canine team should be established. When necessary to screen an established line of people, the handler first evaluates existing air currents in determining the best way to conduct the screening. The best scenario to screen people standing in line is to have an air current perpendicular to the direction of the line. The handler would then move the canine in the direction of the line while staying on the downwind side of the line. When the air current is moving in the direction of the line, the handler begins downwind of the line. As the team approaches the line, the handler moves the canine close to

the people in the direction of the line, occasionally moving through the line to the other side and then again in the direction of the line.

Manipulation Of Air Currents

A very important factor the handler should fully understand about

positioning the canine properly is direction of air currents. This is a constant process since air current direction is able to change with changes in the environment. A hard or fast breeze will reduce the width of the scent cone and lessen the canine's capability. Therefore, as people pass by the canine, the



handler should cast the canine behind the people, positioning the canine downwind of the people moving through the choke point.

Conclusion

Vapor Wake detection is a highly advantageous method and system for detecting person-worn or concealed-carried explosives and firearms. With Vapor Wake, both the canine and handler are trained and certified under the program. However, unlike other detection methods, the canine leads the handler. The primary function of the handler is to position the canine in the desired location while the canine searches the air. This unique nose-up 'air scenting' approach allows the canine to identify and follow vapor trails or scent pools

of the target odor generated by both moving and stationary targets. When the canine detects a trained scent, the canine leads the handler to or follows behind the carrier of the item with the scent. Once the carrier is identified by the canine and confirmed by the handler, the proper authorities are alerted. Other primary benefits include: -

- (a) Non-Disruptive – Does not impede traffic flow, and is intended for use where rapid screening for explosives and firearms is required for a large number of people.
- (b) Non-Invasive – Vapor Wake canines sniff air and not people. They sample plumes of air coming from people and anything that anyone in

the crowd is carrying as they pass through a choke point or within a crowd.

- (c) Mobility – Vapor Wake canines can work all types of venues. While check point screening equipment is stationary, canines can move quickly when deployed.
- (d) Deterrence – Canines provide a strong visible and psychological deterrence against criminal and terrorist acts.
- (e) Screening a high-congested pedestrian checkpoint and crowds of people without being intrusive or impeding traffic.



Maj. Attinder Pal Singh is a dedicated professional with extensive field experience in military K9 operations. A Postgraduate in Veterinary Medicine was commissioned into the Indian Army's Remount Veterinary Corps, where he gained diverse operational and technical exposure across challenging terrains such as Joshimath, Harsil Sector, Uri Sector and Charri.



Maj. Nishant Verma is post graduate in Veterinary Surgery & Radiology from GADVASU, Ludhiana. Upon joining the Indian Army's Remount Veterinary Corps, Maj Nishant Verma completed the Army Dog Training Officer Course (ADTO) & the AEM course. The officer has performed duties of Veterinary Officer at various units like EBS (Hisar), 13 MFVH (Kargil), & 6 AFVH (Bareilly).

NUTRITIONAL MANAGEMENT FOR THE ELITE WORKING CANINE:

A Phased Approach to Gestation, Lactation and Cognitive Development at the National Training Centre for Dogs (NTCD)

Dr. Anmol Dhiman, AC(Vet), NTCD, BSF

The operational success of a working dog is fundamentally rooted in its early developmental environment. Traditionally, canine breeding centers have focused on meeting the basic caloric demands of the dam. However, modern veterinary nutrition emphasizes "nutritional programming" the concept that maternal diet directly dictates the neurological development, trainability and survival rates of the litter. In order to maintain optimal reproductive health and neonatal development, a phased nutritional strategy must be implemented during the pre-breeding, gestation, and lactation periods. This approach maximizes litter viability and the long-term cognitive aptitude of both traditional working breeds and indigenous hounds (Mudhol hound/Rampur hound) ultimately reducing the washout rate of Police Service K9s (PSKs).

1. Introduction

NTCD at BSF Gwalior maintains a unique operational mandate: breeding high-drive traditional breeds like the Belgian Malinois, German Shepherd and Labrador Retriever, alongside the pioneering integration of indigenous breeds

such as the Mudhol Hound and Rampur Hound for border deployment.

Recent advancements in ethology indicate that the maternal environment, largely dictated by nutrition acts as the primary architect for a puppy's central nervous system and metabolic health. This article outlines a progressive, three-phased approach to maternal and neonatal nutrition

designed for high-performance government breeding centers, moving away from rudimentary feeding practices toward macro-level dietary interventions that yield measurable behavioural results in the field.

2. Phase I: Pre-Breeding and Uterine Conditioning

The foundation of a successful

BCS Score	Condition	Description
1/9	Emaciated	Ribs, spine, and pelvic bones very prominent; no body fat; severe muscle loss
2/9	Very Thin	Ribs easily visible; minimal fat cover; marked waist and abdominal tuck
3/9	Thin	Ribs easily felt with little fat cover; obvious waist
4/9	Under Ideal	Ribs palpable with minimal fat covering; noticeable waist
5/9	Ideal	Ribs palpable without excess fat; waist visible from above; abdominal tuck present
6/9	Slightly Overweight	Slight excess fat over ribs; waist less distinct
7/9	Overweight	Ribs difficult to feel; noticeable fat deposits; minimal waist
8/9	Obese	Heavy fat deposits over thorax and spine; no visible waist
9/9	Severely Obese	Massive fat deposits; marked abdominal distension; mobility may be affected

working litter is established well before conception. The physical condition of the dam at the time of mating directly impacts embryonic survival, the physiological progression of whelping and the prevention of dystocia.

Body Condition Scoring (BCS) and Neonatal Mortality: Studies demonstrate a significant negative correlation between excessive maternal body weight and the number of live-born puppies. Overweight dams face higher risks of prolonged parturition and increased neonatal mortality, which is highly detrimental in a high-stakes facility. Conversely, high-energy breeds in optimal, lean working condition exhibit better conception rates.

The Accelerated Starvation Risk: While overweight dams are at risk during whelping, underweight dams face pregnancy toxemia as fetal demands grow. A baseline commercial performance diet must be established prior to estrus to ensure the bitch enters the breeding window at an ideal BCS (typically a 4 or 5 on a 9-point scale), taking into account the varying metabolic rates between a stocky Labrador and a lean-muscled Mudhol Hound.

3. Phase II: Gestation and Fetal Cognitive Programming

During the first two trimesters, the dam's energy requirements remain relatively stable at adult maintenance levels. Overfeeding during this period only contributes to abdominal fat deposition. The critical nutritional shift must occur in the final trimester.

Energy Scaling for Varying Litter Sizes: In the last 3 to 4 weeks of gestation, fetal growth accelerates exponentially. Energy requirements increase by 25% to 50% depending on the expected litter size. Due to the enlarging uterus restricting stomach capacity, the dam must be transitioned to a high-density, nutrient-rich diet fed in multiple small meals (every 5hrs).

DHA and EPA for Neurocognitive Development: This is a crucial advancement for developing elite trackers and detection dogs. Docosahexaenoic acid (DHA) and Eicosapentaenoic acid (EPA), derived from marine sources, incorporate directly into the fetal brain and retina. NTCD is using Cotglo syrup (Intas), containing Omega-3 & Omega-6 fatty acids, Vitamins A, D3 & E, Biotin, Zinc and Selenium. The syrup is administered orally at a dose of 0.5ml/kg.

Clinical studies evaluating cognitive learning in puppies have shown that maternal DHA supplementation significantly improves object discrimination, learning speed and problem-solving abilities.

4. Phase III: Lactation and the Neonatal Transition

Lactation is the most metabolically demanding phase, where peak milk production occurs 3 to 4 weeks post-whelping. A dam may require up to three times her normal maintenance energy.

Colostrum Management and Immunity: The absorption of colostrum during the first 24 hours is non-negotiable for the passive transfer of maternal antibodies.

Nutritional Weaning (Early Offloading): To mitigate the severe metabolic burden on the dam and preserve her operational readiness, semi-solid food (a gruel made of high-quality puppy kibble and water) should be introduced by 3 to 4 weeks of age. This minimizes the behavioral stress of sudden weaning, promoting environmental stability in the young pups.

5. Practical Implementation for BSF Breeding Operations

To integrate these nutritional



Fig. 1: Cross-species foster nursing of Belgian Shepherd neonates by a Labrador Retriever dam.

advancements into the daily Standard Operating Procedures (SOPs) at the NTCD breeding facility, the following protocols are implemented:

Standardized DHA Protocols:

Mandate marine-sourced DHA/EPA supplementation beginning at the 5th week of gestation and continuing until the pups are fully weaned, tailored to the specific breed (e.g., higher dose requirements for hyper-active Belgian Malinois i.e 20 kg - 2000 mg, 25 kg-2500mg).

Trimester-Specific Ration

Adjustments: Implement strict veterinary oversight of maternal food intake during the final two weeks of pregnancy, shifting to high-frequency feeding of performance-grade diets (04 times – 05 times) to prevent sudden anorexic episodes or hypoglycemia.

Feeding Colostrum: Though, first preference is given to the weakest pup for feeding on rear teats as it contain more milk to protect against neonatal mortality in large litters. If milk is less foster mother can also be used for nursing. If a foster mother is not available, artificial milk can be given, but it should be warmed first.

Note: -

a) If suckling reflex is absent, pup

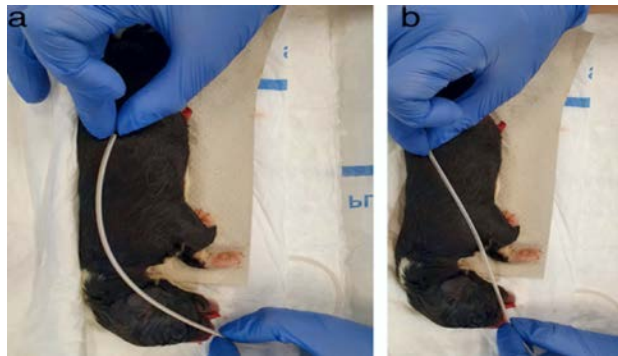


Fig. 2a) BENT measurement in a neonate. b) STRAIGHT measurement in a neonate for orogastric intubation



Fig. 3: In the absence of a suckling reflex, the pup may be fed milk through orogastric intubation.

can be given milk by orogastric intubation.

b) It is essential to initiate nutritional support for weak neonates only when the rectal temperature exceeds 95°F (35°C) to ensure proper gastrointestinal motility.

6. Conclusion

The modernization of working dog breeding at the national level requires treating the dam's diet as a strategic operational tool

rather than basic sustenance by optimizing the maternal Body Condition Score, strategically supplementing DHA for fetal brain development and employing advanced lactation management techniques. Ultimately, precision nutrition ensures that both foreign and indigenous breed puppies are born physically robust and cognitively primed for the rigors of border security and law enforcement training.



Dr. Anmol Dhiman is an alumnus of Dr. G.C. Negi College of Veterinary and Animal Sciences, Palampur and pursued his M.V.Sc. in Veterinary Medicine from Indian Veterinary Research Institute, Bareilly. He joined BSF in 2023 and currently posted as Officer-in-Charge of the Canine Breeding at the National Training Centre for Dogs, BSF Academy, Tekanpurr.

OPERATIONAL CHALLENGES AND EFFECTIVE UTILIZATION OF K9 IN DIVERSE TERRAIN OF TRIPURA BORDER

Dr. Avinash, AC(VET),SHQ, BSF, Panisagar

Abstract

Tripura shares a highly sensitive international border characterized by two distinct operational terrains — dense hilly forest regions and heavily populated plain areas. Both terrains present unique operational challenges for Border security force and demand specialized deployment and management of

K9 for effective border domination, counter-insurgency, anti-smuggling operations, and troop protection.

Hilly and Dense Forest Terrain

Areas such as Nalakata, Ambasa, and adjoining forest belts are dominated by steep undulating ground, dense vegetation, sparse

population, and tribal settlements near border areas. These isolated and difficult terrains provide favorable movement corridors for insurgent groups such as the National Liberation Front of Tripura (NLFT).

The terrain is highly vulnerable to ambushes, and earlier this region evidenced several incidents of



deadly attacks/ ambush . The thick vegetation , lack of visibility, and poor network of border roads make this region highly vulnerable. During the rainy season, operational challenges increase manifold as muddy tracks and slippery slopes often render even 4×4 vehicles ineffective. This severely affects the mobility of troops as well as K9.

The North-East region has historically witnessed some of the deadliest ambushes due to terrain advantage enjoyed by hostile elements. Breaking or countering such ambushes becomes extremely challenging without proper tactical preparation and specialized operational support.

Operational Challenges for troops and K9

1. Dense forest, thick vegetation, and undulating hilly terrain significantly restrict visibility, mobility, and surveillance capabilities, making patrolling and tracking operations physically demanding for both troops and K9.
2. Extensive rubber plantations along the border belt provide ideal natural camouflage and concealment to smugglers, insurgent groups, and anti-national elements. The dense plantation structure limits visibility and enables covert movement, increasing the difficulty of detection and interception operations.
3. Extremely poor road connectivity, absence of all-weather border tracks, and difficult terrain conditions delay troop movement, logistics

support, casualty evacuation, and rapid operational response during emergencies.

4. Operational effectiveness reduces considerably during the monsoon season due to heavy rainfall, waterlogging, slippery terrain, leech infestation, and flooding of low-lying areas, which adversely affect mobility, communication, and K9 deployment.
5. Prolonged exposure to harsh environmental conditions like high humidity negatively impact the endurance, sniffing capability, hydration levels, and overall health of K9s.

Role of K9 in Overcoming Operational Challenges

- K9s play a vital role in tracking movement of smugglers, insurgents, and anti-national elements in dense forests and difficult hilly terrain where human visibility is limited.
- Their superior sniffing capability helps to detect hidden suspects, concealed routes, arms, explosives, narcotics, and smuggled items even in thick vegetation and rubber plantation areas.
- K9s provide early warning during jungle patrols, ambush-prone movements, and area domination operations, thereby improving troop safety.
- In inaccessible terrain with poor road connectivity, K9s remain operationally effective and support long-duration foot patrols and tracking operations where vehicle movement is not feasible.

- K9 deployment acts as a strong psychological deterrent against smugglers, insurgent groups, and anti-national elements operating in border areas.

2. Plain and Highly Populated Border Areas

The second type of operational environment in Tripura consists of densely populated plain areas situated close to the international border. These areas are highly vulnerable to organized trans-border smuggling activities and illegal immigration from neighbouring country.

Operational Challenges across border areas

1. Continuous movement of civilian near border areas creates difficulty in identifying suspicious individuals and tracking illegal activities.
2. Frequent public gatherings, markets, and cross-border social interactions reduce the effectiveness of surveillance and tracking of suspects/ infiltrators.
3. Congested habitation areas and narrow village routes restrict rapid troop movement

SRL NO.	COMMONLY SMUGGLED ITEMS/ ANIMAL
1	GANJA
2	YABA TABLETS
3	PHENSEDYL SYRUP
4	BIRI, HOUSE HOLD ITEMS
5	CATTLE & BUFFALOES

and operational deployment during emergencies.

4. Presence of domestic animals and livestock in populated border villages creates operational difficulties during tracking and search operations.
5. High humidity and extreme weather conditions in Tripura adversely affect operational endurance during prolonged deployment.
6. Increased risk of hostile civilian reaction, mob interference, or obstruction during anti-smuggling operations creates additional security concerns.

Role of K9 in Overcoming Operational Challenges

- Their superior sniffing capability helps to detect concealed narcotics, explosives, arms, and smuggled items carrying by the suspicious individuals.
- They enhance operational effectiveness during surprise checking, anti-smuggling drives, and area domination patrols.
- K9 teams assist troops in locating hidden contraband in vehicles, houses, abandoned structures, and crowded market areas.
- K9 deployment acts as a strong psychological deterrent against smugglers and anti-national



elements operating in populated border areas.

- K9-assisted operations enhance troop safety, improve interception capability, and reduce operational response time in sensitive border areas.

Conclusion

The operational environment of Tripura presents unique and demanding challenges for the

Border Security Force due to its combination of dense insurgency-prone forest terrain and heavily populated smuggling-sensitive border areas. Effective utilization of K9 can significantly enhance operational capability, troop safety, anti-smuggling operations, and counter-ambush preparedness when deployed scientifically and as well as exclusively on terrain-specific requirements.



Dr. Avinash, AC(VET), is a Veterinary Officer of Border Security Force. He completed his graduation from Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar and pursued postgraduate studies in Veterinary Surgery and Radiology from the same University. He joined Border Security Force in 2023 & currently posted in SHQ, BSF Panisagar (Tripura).

BUILDING THE THINKING DETECTION DOG:

The Science and Psychology of Behaviour Shaping

Dr Lalit Deori, Commandant (Vet), SSB, Frontier Headquarters, Lucknow



Over the last few decades, the field of detection dog training has undergone a remarkable transformation. Earlier training systems relied heavily on compulsion, repetitive obedience drills, physical corrections, and strict handler control. Although such methods were capable of producing functional working dogs, they often suppressed initiative, reduced independent problem-solving ability, and sometimes negatively affected the dog's confidence, motivation, and long-term operational reliability. With the advancement of scientific research in canine behavior, cognition, and learning psychology, professional trainers across the world have gradually shifted toward more humane, ethical, and scientifically driven training methodologies. Modern detection dog programs now recognize that an effective operational dog is not simply one that obeys commands, but one

that can think independently, solve complex odor problems, adapt to changing field conditions, and maintain high motivation under stress. This evolution in training philosophy has led to the widespread adoption of reward-based learning systems that work with the dog's natural instincts, drives, and behavioral tendencies rather than against them.

Among these modern methodologies, behaviour shaping has emerged as one of the most effective and scientifically validated approaches in detection dog training. Behaviour shaping is not merely a technique for teaching commands; it is a systematic process of developing a dog's problem-solving ability, confidence, scent commitment, emotional stability, and operational independence. Instead of forcing behaviors through pressure or correction, shaping encourages the dog to actively participate in the learning process through experimentation, analysis, and reinforcement. In operational detection work, where dogs are required to make accurate decisions in constantly changing and unpredictable environments, shaping protocols help create "thinking dogs"; dogs that can analyze odor, work through scent problems with persistence, remain committed to source, and perform reliably under operational pressure

rather than simply displaying mechanically conditioned responses. Today, behaviour shaping is widely used in the training of narcotics detection dogs, explosive detection dogs, wildlife detection dogs, and search and rescue dogs worldwide. Its growing acceptance is strongly supported by advances in behavioral science, operant conditioning theory, and neurobiological research, all of which demonstrate that dogs learn more effectively and retain behaviors more reliably when learning is associated with positive emotional experiences, cognitive engagement, and independent problem-solving.

Understanding Behaviour Shaping

Behaviour shaping is a scientific training technique used to teach a dog complex behaviour through a series of small, gradual, and achievable steps known as successive approximations. Instead of forcing, physically manipulating, or correcting the dog into a position, the trainer systematically rewards small improvements that progressively move the dog toward the desired final behaviour. Karen Pryor described shaping as the process of "building a particular behavior by using a series of small steps to achieve it," allowing trainers to create behaviors from scratch by

drawing upon the animal's natural ability to learn and solve problems. This method is based on the principles of operant conditioning developed by B. F. Skinner, where the dog gradually learns that its own actions directly influence rewards. At its core, shaping is not only a training method but also a powerful cognitive exercise that encourages the dog to think, experiment, and actively participate in the learning process. The trainer must carefully break the final behaviour into very small learning increments and reward each successful approximation with timely reinforcement such as a click marker and reward. These small successes maintain the dog's motivation, confidence, and engagement throughout the learning process. However, if the trainer advances too quickly or combines too many steps together, then a common mistake occurred known as "lumping"; the learning process may slow down or completely stall due to confusion and frustration.

In practical detection dog training, shaping plays a critical role in developing precision, scent commitment, and independent problem-solving ability. For example, while teaching a passive final response at odor source, the trainer does not initially expect the dog to perform a perfect sit, down, or freeze indication. Instead, the dog is rewarded for small progressive behaviors such as orienting toward the odor source, moving closer to source, remaining engaged in odor, lingering longer at source, and gradually showing more stable stillness before finally developing a

reliable passive indication. Through this process, the dog learns that accurate odor work leads to reward, thereby strengthening source commitment and reliability. A simple example of shaping can also be seen in teaching a "Stay," where the dog is initially rewarded for remaining stationary for only a few seconds, and the duration is gradually increased over time until the dog can reliably maintain the behavior for several minutes. More complex operational tasks, such as teaching a dog to activate a switch or perform a multi-step detection sequence, are similarly developed by breaking the task into smaller individual components and later combining them through a process known as chaining. In modern detection dog programs, shaping has become one of the most valuable training methodologies because it develops not merely obedience, but confident, thinking, and operationally resilient dogs capable of independently solving complex scent problems under diverse real-world deployment conditions.

Important Behaviour Shaping Terminologies Used in Detection Dog Training

Modern detection dog training uses several scientific teaching methods that help dogs learn complex behaviors in a clear, positive, and systematic manner. These methods are designed to develop confidence, motivation, problem-solving ability, and operational reliability in working dogs. Understanding these training terminologies is important

for every handler and trainer because they form the foundation of modern reward-based canine training systems.

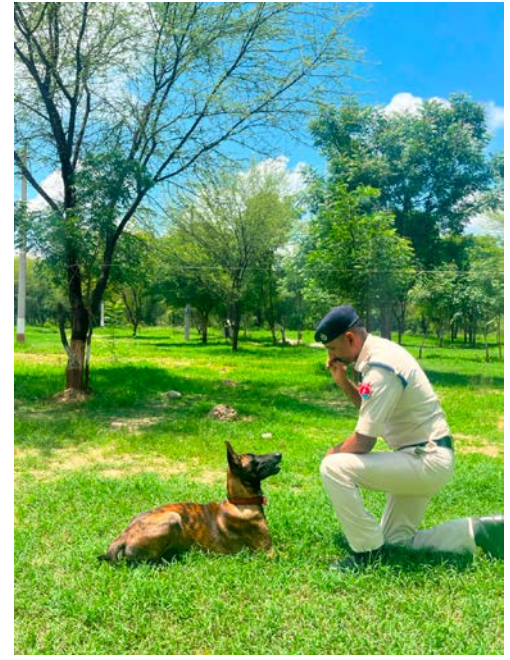
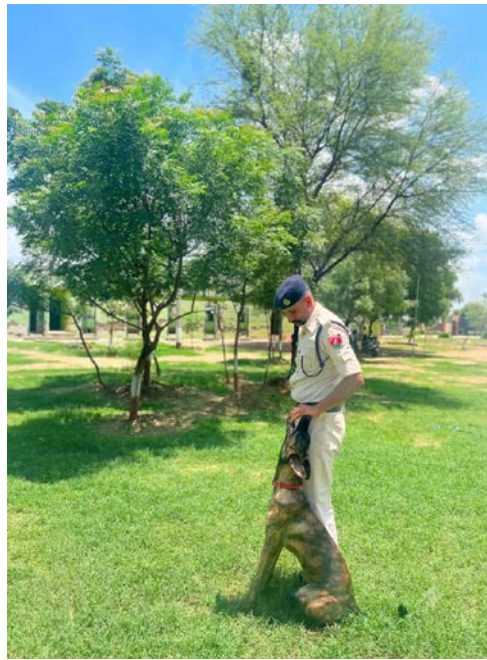
Capturing: Capturing is a training technique in which the trainer rewards a behaviour that the dog naturally offers on its own. Instead of physically guiding or luring the dog, the handler simply "captures" the behaviour at the exact moment it occurs naturally and reinforces it with a marker and reward. Over repeated training sessions, the dog begins to understand that the specific behaviour earns reinforcement, and eventually the behaviour can be placed on a verbal or hand cue.

For example, if a detection dog naturally freezes, stares intensely at odor source, or sits while investigating odor, the trainer can immediately mark the behaviour using a clicker or verbal marker and reward the dog. Gradually, the dog learns that this natural behaviour is desirable and begins offering it more consistently. Capturing is especially useful in detection training because naturally occurring behaviors are often more reliable, confident, and less mechanically forced. Although capturing may take longer compared to some other methods, the resulting behaviour is usually very stable because it originates from the dog's own natural actions and decision-making process.

Luring: Luring is a technique in which food, a toy, or another primary reward is used to guide the dog into a desired position or movement without physical force. In simple terms, the dog follows the lure like a magnet. Once the

dog successfully performs the behaviour, the trainer marks the behaviour and rewards the dog.

For example, while teaching a “Sit,” the trainer may hold food slightly above and behind the dog’s nose. As the dog follows the food upward, its backside naturally touches the ground. At that moment, the trainer marks the behaviour and rewards the dog. Luring is one of the fastest ways to teach new behaviors and body positions such as Sit, Down, Stand, Heel, or Roll Over.



Prompting: Prompting is the process of giving the dog minimal assistance to help it successfully performs behaviour. The purpose of prompting is not to force the dog, but to gently guide it toward success so that it can receive reinforcement. Prompts may be physical, environmental, verbal, or visual.

For example, while teaching a dog to down, food luring alone may not fully lower the dog’s body. In such a case, the trainer may gently place a finger between the dog’s shoulder blades to encourage the rear portion of the body to lower. Similarly, when teaching a dog to back up, a wall or fence may be used to guide the dog’s movement instead of physically pulling it.

Targeting: Targeting is a training method in which the dog learns to touch or orient toward a specific target using its nose, paw, or body. The target may be a trainer’s hand, a platform, a stick, a cone, or another object. Once the dog learns to

interact with the target, the trainer can use it to guide precise body positioning and movement.

For example, if a dog is trained to touch the handler’s palm with its nose, the trainer can move the hand upward and backward to encourage the dog into a sitting position. Once the dog sits, the behaviour is marked and rewarded. Targeting combines elements of both shaping and luring because the dog first learns to interact with the target and then learns to follow it into different behaviors.

Criterion: Criterion refers to the clear and precise definition of behaviour that the trainer expects the dog to perform. In simple terms, criterion answers the question: “Exactly what behaviour will be rewarded?” Clear criteria prevent confusion and make learning easier for the dog.

For example, in recall training, simply moving toward the handler may not be enough. The trainer

may define the criterion as: “The dog must come close enough for the handler to touch its collar.” Only when this exact behaviour occurs is the dog rewarded.

The Psychology behind Behaviour Shaping and the “Eureka Effect”

At its core, behaviour shaping is far more than a simple training technique; it is a powerful psychological and cognitive exercise for the dog. During shaping, the dog actively experiments with different behaviors in order to discover what action earns reinforcement. Instead of passively obeying commands or being physically guided into position, the dog learns through independent problem-solving and decision-making. This process stimulates curiosity, persistence, creativity, confidence, and cognitive flexibility. Over time, the dog begins to understand an important concept: “My actions can control rewards.”

This understanding creates what professional trainers often describe as a “thinking dog” a dog that is mentally engaged, confident, and willing to solve problems independently. In operational detection work, this psychological development is extremely valuable because the dog must often work through difficult scent problems without constant handler guidance. A shaped detection dog learns to remain committed to odor, work through environmental distractions, adapt to changing airflow, and continue searching even when odor conditions are complex or confusing. Such psychological resilience becomes essential in real-world operational environments where contamination, weather conditions, inaccessible hides, noise, crowds, and operational stress constantly challenge the dog’s performance.

Scientific research strongly supports the psychological benefits of shaping. A well-known study by McGowan et al. (2014) on canine problem-solving and positive emotional states demonstrated that dogs show clear signs of excitement and positive emotional engagement when they successfully solve a problem independently. This phenomenon is commonly referred to as the “Eureka Effect.” In the study, dogs that were allowed to solve a task to obtain a reward displayed significantly higher activity levels, more tail wagging, greater enthusiasm, and stronger motivation compared to dogs that received rewards passively without problem-solving opportunities. The researchers observed that dogs became more eager to

enter the training area and more emotionally engaged when they understood that their own actions controlled access to rewards. In contrast, dogs that had no control over the reward process showed signs of frustration and reduced enthusiasm. Neurobiologically, this effect is linked to the release of dopamine, a neurotransmitter associated with reward, motivation, learning, and pleasure. When a dog successfully solves a problem, dopamine strengthens the neural pathways associated with that successful behaviour, making future learning faster and more reliable. In detection training, this means that odor itself gradually becomes highly rewarding, searching becomes intrinsically motivating, and the dog develops stronger persistence and operational drive. This explains why dogs trained through shaping protocols often display extraordinary enthusiasm, confidence, and commitment during detection work.

Types of Behaviour Shaping in Detection Dog Training:

Modern detection dog training mainly uses two important shaping systems: Fixed Shaping and Free Shaping. Both methods are based on the scientific principles of operant conditioning and positive reinforcement, but each serves a different purpose in the development of a detection dog. While fixed shaping is mainly used for building precision, reliability, and operational consistency, free shaping focuses more on developing confidence, creativity, independence, and problem-

solving ability. Understanding the difference between these two shaping systems helps trainers choose the most suitable method according to the dog’s temperament, training stage, and practical detection work requirement.

Fixed Shaping

Building Precision and Reliability: Fixed shaping is a structured training method in which the trainer has a clear and pre-planned final behaviour in mind and gradually teaches the dog to achieve that specific goal through small learning steps. In this method, the dog is allowed to think and solve the problem independently, but the trainer carefully rewards only those behaviors that progressively move closer to the desired final response. The trainer controls the reinforcement criteria very precisely and slowly increases the difficulty level as the dog improves. For example, while teaching a passive indication in detection work, the trainer may initially reward the dog for simply orienting toward odor source, then for moving closer to source, then for remaining still near source, and finally for giving a stable sit, down, or freeze indication. Similarly, fixed shaping is highly useful for teaching formal heelwork, directional control, agility movements, obstacle negotiation, or equipment interaction such as climbing platforms or operating switches.

The major advantage of fixed shaping is that it produces highly precise, reliable, and operationally consistent behaviors. Because the dog actively discovers the correct



the dog for any interaction with it; looking at it, approaching it, sniffing it, pawing it, or climbing on it.

In detection dog training, free shaping is especially valuable during odor imprinting because it teaches the dog that “the odor itself is rewarding.” The dog learns to independently search, investigate odor, and trust its own nose rather than relying on handler cues or body language. This greatly reduces the risk of handler influence, commonly known as the “Clever Hans Effect,” where dogs respond to subtle handler signals instead of actual odor. Free shaping also develops stronger search intensity, scent commitment, and operational endurance because the dog becomes emotionally invested in solving odor problems. One highly effective free-shaping method used in scent imprinting is the “Dopamine Box,” where the dog is allowed to freely interact with a box containing target odor and food reward. The dog independently discovers that odor leads to reward, creating strong positive emotional associations and high hunting motivation. Free shaping is also highly useful for rebuilding confidence in dogs previously exposed to harsh or correction-based training systems because it creates an environment where the dog feels safe to experiment and cannot easily “fail.” Although free shaping may sometimes take longer and initially appear less structured, it produces dogs that are mentally engaged, proactive, confident, and highly independent in operational environments.

Comparison between Fixed

behaviour through problem-solving rather than physical force, the learning becomes stronger and more resistant to distractions and working stress. This method is particularly valuable in detection work where precision and consistency are essential. However, fixed shaping requires excellent timing, observation, and patience from the trainer. If the trainer advances too quickly or combines too many learning steps together, a mistake commonly known as “lumping” where the dog may become confused or frustrated. Successful trainers therefore “split” behaviors into very small and achievable increments to maintain motivation and clarity throughout the learning process.

Developing Independent

Thinking and Confidence: Free shaping is a more flexible and open-ended training approach in which the dog is encouraged to freely explore, experiment, and offer behaviors voluntarily with very little direct guidance from the handler. Unlike fixed shaping, there may not always be a strict final behaviour initially. Instead, the trainer rewards any desirable or novel behaviour offered by the dog, allowing the dog to actively participate in the learning process. This method develops confidence, creativity, initiative, and independent problem-solving ability. A simple example of free shaping is placing an unfamiliar object such as a cardboard box in the training area and rewarding

Shaping and Free Shaping: Both fixed shaping and free shaping is extremely valuable in modern detection dog training, but they serve different training objectives. Fixed shaping is best suited for developing highly precise and clearly defined operational behaviors such as passive indications, obedience exercises, directional control, and equipment work where accuracy and consistency are critical. Free shaping, on the other hand, is more useful for developing the dog's confidence, creativity, independent searching behaviour, and odor problem-solving ability. In simple terms, fixed shaping teaches the dog "how to perform a specific task correctly," whereas free shaping teaches the dog "how to think, explore, and solve problems independently." Professional detection dog programs often combine both systems together. Free shaping is commonly used during the early stages of odor imprinting and confidence building, while fixed shaping is later applied to refine operational precision and reliability. When properly balanced, these two shaping methods help produce a detection dog that is both highly accurate and independently capable of solving complex operational scent problems.

Conclusion

Behaviour shaping is far more than simply teaching a dog to obey commands or perform trained responses. It is a scientifically based training system that develops confidence, independence, precision, emotional resilience,

and advanced problem-solving ability in detection dogs. Modern behavioral and neurobiological research clearly shows that dogs learn more effectively when they are allowed to actively participate in the learning process rather than being mechanically controlled. During successful problem-solving, the release of dopamine in the brain strengthens learning, increases motivation, and creates dogs that genuinely enjoy searching and working. For professional handlers and trainers, the ultimate objective should not merely be producing dogs that mechanically sit, freeze, or alert near odor, but developing dogs that truly understand odor, commit confidently to source, think independently, and continue working with clarity under operational pressure.

Modern field conditions are highly unpredictable and constantly challenge the dog with difficult airflow patterns, inaccessible hides, environmental contamination, noise, crowds, fatigue, and prolonged search durations. Dogs trained through shaping protocols are generally better prepared to cope with these pressures because they are accustomed to independent problem-solving, frustration management and decision-making during training.

Research has shown that dogs trained through shaping persist longer during difficult tasks and rely less on human assistance compared to untrained dogs. This independence is critically important in modern detection operations, particularly because one of the greatest dangers in detection work is unintentional handler influence, commonly known as the "Clever Hans Effect," where dogs may respond to subtle handler cues such as body posture, gaze direction, tension, or expectation instead of actual odor. Free shaping and independent odor imprinting help minimize this problem by teaching the dog an essential operational principle: "The odour pays, not the handler."

For this reason, independent searching, minimal handler interference, and scientifically structured shaping protocols are now strongly emphasized in professional detection dog programs worldwide. Ultimately, shaping creates not just an obedient dog, but a confident, intelligent, and operationally reliable canine partner capable of performing effectively in the complex realities of modern detection work.

"Modern detection dogs are not merely trained to respond; they are shaped to think."



Dr. Lalit Deori, Commandant (Vet) who graduated from College of Veterinary Science, Khanapara, Guwahati and presently posted at SSB, Frontier Headquarters, Lucknow

USE OF SMOOTH HAired MINIATURE DACHSHUND, AS DETECTION DOGS IN AIRPORT SECURITY AND RAILWAY PROTECTION FORCES.

Dr. Vinod Laxminarayan Thakur, Ex. Commandant(Vet), ITBPF



I wish to draw the attention of the readers and the policy makers about the potential use of Smooth haired Miniature Dachshunds, as specialized detection dogs for the deployment in airport security systems and the Railway Protection Force (RPF) across India.

Traditionally, large breeds such as German Shepherds, Labradors,

Belgian Malinois, and Cocker Spaniels have been extensively used for explosive, narcotics, and contraband detection. However, the changing dynamics of public transport infrastructure, increasing passenger density, and the requirement for agile canine units demand consideration of smaller efficient breeds.

The Smooth haired Miniature Dachshund possesses several unique operational advantages which make the breed suitable for specialized detection duties:

1. Compact Size and Mobility

Their small stature allows easy movement through crowded

railway coaches, under the births & chairs of the railway compartments, airport terminals, under the aircraft seats, luggage compartments, narrow storage spaces, and confined cargo areas, where larger breeds may face operational limitations.

2. Highly Developed Olfactory Ability

Despite their miniature size, Dachshunds possess an exceptional sense of smell and strong scent-tracking instincts originally developed for hunting and burrow detection. Based on my personal experience of rearing two female Daschunds breed, the agility of the breed remained upto 10 yrs of age. Moreover, I never had to give them the command to search, but the moment they set foot on the ground, they were on their search and sniffing job.

3. Reduced Public Intimidation

In civilian-sensitive environments such as airports and railway stations, miniature breeds create less anxiety among passengers, children, elderly citizens, and international travelers.

4. Ease of Transportation and Maintenance

Their comparatively lower feeding requirements, (daily feed requirement per day is not more than 250 gms), easier transportation, (handler can easily carry them), they can be easily transported in light kennels with reduced kennel management costs contributing to economical long-term deployment.

5. Suitability for Specialised Detection Tasks

Smooth haired Miniature Dachshunds can be effectively trained for detection of narcotics, explosives, currency, wildlife contraband, and electronic storage devices.



6. Operational Versatility

These dogs can be integrated into Quick Reaction Teams, baggage screening units, metro rail security systems, VIP movement security checks, and anti-sabotage operations.

7. Adaptability to handlers

This breed adapts easily to its handler, change of handler will not be much of a problem as observed in certain breeds, also termed as one man dogs.

Several international agencies have successfully employed small breed detector dogs for specialized security tasks due to their agility, adaptability; and disease resistant ability.

India's Aviation and Railway security ecosystems are continuously evolving under modern threat perceptions. A pilot project involving Smooth Haird Miniature Dachshunds can be framed under the supervision of various agencies such as Airport Authority of India (AAI), Central Industrial Security Force (CISF), Railway Protection Force (RPF) to ascertained its utility as well as operation efficiency in the said agencies.



Dr. Vinod Laxminarayan Thakur, Ex. Commandant/Vet, ITBPF, with 27 years of experience in working with the Animal Transport and Dog Squad in the states of Jammu & Kashmir, Uttarakhand, Sikkim, Arunachal Pradesh, Ladakh and with the dog squad in the state of Chhattisgarh in Anti Naxal Operations.

STRENGTHENING WILDLIFE LAW ENFORCEMENT: THE ROLE OF WILDLIFE SNIFFER DOGS

Dilpreet B. Chhabra and Manasvi Gusain, WWF, India.



Wildlife crime poses a significant challenge to biodiversity conservation in India. Poaching of wild animals, illegal extraction of plants and their parts, trafficking of wild animals and their body parts, as well as plants and products thereof, and the illegal wildlife trade

have the potential to threaten the survival of many species. Protecting wildlife requires more than conventional patrolling; it demands specialised tools and innovative approaches. One such approach is the use of wildlife sniffer dogs. From detecting concealed wildlife

contraband to assisting in crime scene investigations, wildlife sniffer dogs have become an important asset in strengthening wildlife protection efforts across India.

WWF-India pioneered a wildlife sniffer dog training programme

in 2008, deploying two wildlife sniffer dog squads with the Forest Departments of Haryana and Uttarakhand. Since its inception, the programme has trained over 120 wildlife sniffer dogs and 240 handlers, who have been deployed across 22 states and Union Territories by Forest Departments and enforcement agencies such as the Railway Protection Force. The training of the dogs has been facilitated with support from the Basic Training Centre of the Indo-Tibetan Border Police Force, Panchkula; the National Training Centre for Dogs, BSF Academy, Tekanpur; and the 23rd Battalion Special Armed Force Police Dog Training Centre, Bhopal.

These wildlife sniffer dog squads assist in detecting wildlife contraband, tracking offenders, recovering evidence, and supporting wildlife crime investigations, thereby enhancing the effectiveness of wildlife law enforcement nationwide.

In 2025, the Chhattisgarh Forest Department deployed four wildlife sniffer dogs trained under WWF-India's Wildlife Sniffer Dog training programme at Achanakmar Tiger Reserve, Guru Ghasidas-TamorPingla Tiger Reserve, Udanti-Sitanadi Tiger Reserve, and Indravati Tiger Reserve. Earlier, between 2016 and 2024, six wildlife sniffer dogs trained under the WWF-India programme were deployed at Achanakmar Tiger Reserve, Jungle Safari, New Raipur, Kanker Forest Division, and Gomarda Wildlife Sanctuary.

The wildlife sniffer dogs of Chhattisgarh have been actively

involved in supporting efforts to curb wildlife crime in the state.

Legends of Achanakmar: Narrow and Simba

Long before the current generation of wildlife sniffer dogs took charge, two pioneering canines laid the foundation for wildlife crime investigation in Chhattisgarh. Narrow and Simba, deployed at Achanakmar Tiger Reserve, became synonymous with wildlife law enforcement in the state. Trained under Batch V of WWF-India's Wildlife Sniffer Dog Training Programme in 2016 at the National Training Centre for Dogs, BSF Academy, Tekanpur, the two dogs served with dedication for seven years before retiring in 2023.

During their distinguished service, Narrow and Simba played a crucial role in resolving more than 60 wildlife crime cases involving tigers, leopards, elephants, pangolins, bears, gaurs, sambars, chitals, nilgais, wild boars, wild hares, and snakes. Their contributions led to the recovery of wildlife contraband and successful investigations. Their

legacy continues to inspire the new generation of wildlife sniffer dog squads serving across Chhattisgarh, strengthening efforts to combat wildlife crime and protect the state's rich biodiversity.

Veera: Following the scent

At Jungle Safari, New Raipur, Veera, a five-and-a-half-year-old female German Shepherd from Batch IX of WWF-India's Wildlife Sniffer Dog Training Programme, has established herself as a champion. Trained at the Basic Training Centre of the Indo-Tibetan Border Police Force alongside her handlers, Dhaneshwar Gaikwad and Harishankar Nishadhas been serving since 2021.

Over the years, she has assisted in numerous wildlife crime investigations. Her responsibilities have ranged from routine patrolling and surveillance to supporting complex wildlife crime investigations. One of her most notable contributions came in December 2025, during a leopard-poaching case. Forest officials



had recovered the carcass of a leopard suspected to have been killed by electrocution. During the investigation, Veera helped to trace critical evidence. Her work highlights the vital role that wildlife sniffer dogs play in bridging the gap between suspicion and evidence, enabling investigators to build stronger, more successful cases.

Rosie: Supporting wildlife protection in Kanker Forest Division

Since her deployment in Kanker Forest Division in 2021, Rosie, a five-and-a-half-year-old female German Shepherd from Batch IX of WWF-India's Wildlife Sniffer Dog Training Programme, has become an invaluable asset in wildlife law enforcement operations. Rosie together with her handlers, Prakash Mandavi and Gopesh Kumar Kunjam has consistently supported frontline wildlife protection efforts across the region.

Through her exceptional tracking and detection abilities, Rosie has helped forest officials recover crucial evidence and strengthen investigations, making a significant



contribution to efforts to combat poaching and safeguard wildlife in Kanker's forests.

Julie and Jassi: The dynamic duo of Gomarda Wildlife Sanctuary

Julie and Jassi, two young Belgian Malinois trained under Batch XI of WWF-India's Wildlife Sniffer Dog Training Programme, have quickly established themselves as valuable members of Chhattisgarh's wildlife protection force since their deployment at Gomarda Wildlife Sanctuary in 2024.

Alongwith their handlers, Julie and Jassi have assisted in several wildlife crime investigations. On 10th March 2026, the duo played a crucial role in solving a case of sambar poaching in the Gomarda Wildlife Sanctuary. Using their exceptional scent-tracking abilities, the forest officials recovered deer meat and animal hair.

Neetu: Queen of Achanakmar Tiger Reserve

Neetu, a 1.3-year-old female



Belgian Malinois from Batch XII of WWF-India's Wildlife Sniffer Dog Training Programme, has been deployed at Achanakmar Tiger Reserve since 2025 accompanied by her handlers, Suresh Kumar Navrang and Virendra Kumar Patel.

Despite being one of the youngest wildlife sniffer dogs in service, Neetu has already demonstrated her value in the field. During a leopard poaching investigation in February 2026, she used scent cues from a snare site to track a trail that led investigators to a nearby village and eventually to the recovery of poaching equipment.





Leo of GuruGhasidas– TamorPingla Tiger Reserve

Leo, a 1.3-year-old male Belgian Malinois from Batch XII of WWF-India's Wildlife Sniffer Dog Training Programme, has been deployed at Guru Ghasidas–Tamor Pingla Tiger Reserve since 2025 alongside his handlers, Kuldeep Singh Nety and Manoj Rajak.

His very first assignment quickly became a defining moment in his service. In December 2025, Leo was mobilised following the discovery of a tiger carcass within the reserve. Leo helped the investigating team to recover hunting equipment and tiger parts, including claws, hair, and meat, concealed within a house.

Tina: At the forefront in Udanti-Sitanadi Tiger Reserve

Tina, a 1.3-year-old female Belgian Malinois from Batch XII of WWF-India's Wildlife Sniffer Dog Training Programme, has been deployed



at Udanti–Sitanadi Tiger Reserve since 2025 together with her handlers, Sohan Lal Nishad and Manish Rajput.

Although relatively new to service, Tina has already established an impressive track record. She has assisted in several wildlife crime investigations involving species such as Indian gaur, deer, nilgai, and leopard. In one case involving the poaching of a chital, Tina helped officials recover both raw and roasted meat, along with the hunting equipment.



Jenny: The young protector of Indravati Tiger Reserve

Jenny, a 1.3-year-old female Belgian Malinois from Batch XII of WWF-India's Wildlife Sniffer Dog Training Programme, has been deployed at Indravati Tiger Reserve since 2025 alongside her handlers, Trilesh Udde and Sandeep Yalam.

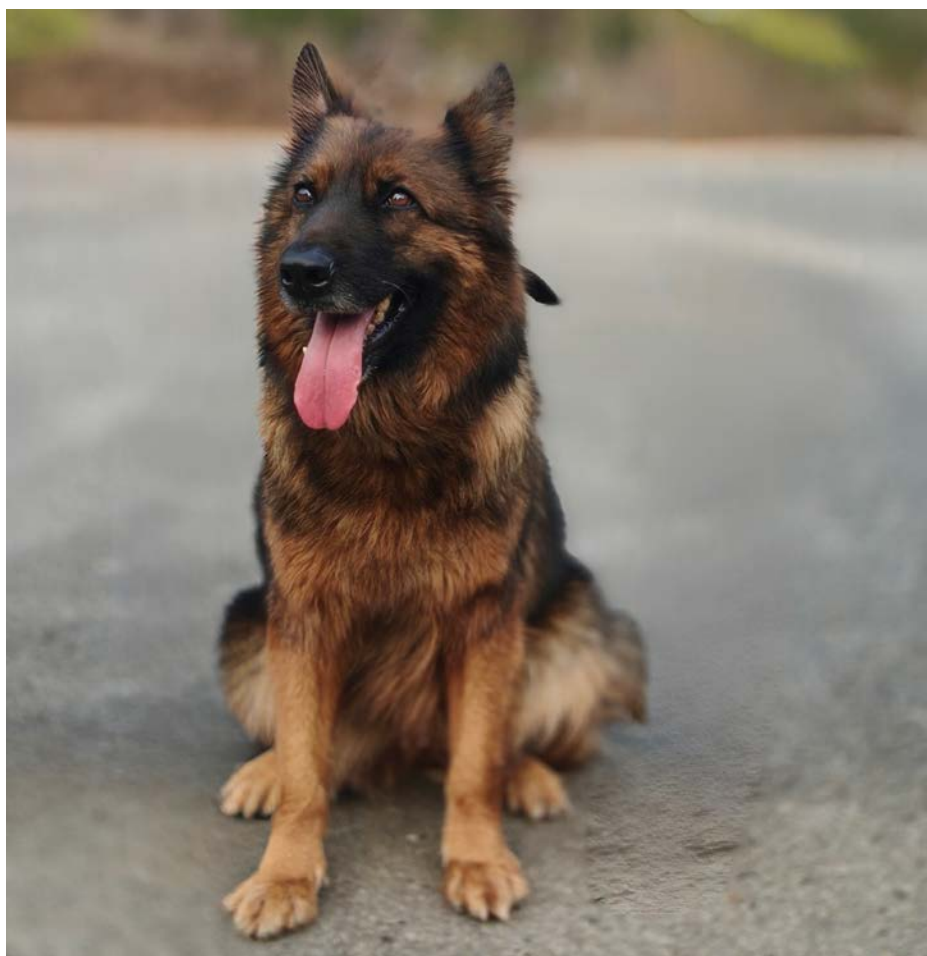
As one of the youngest wildlife sniffer dogs in the state, Jenny is actively engaged in regular patrolling and surveillance activities across the reserve. Working closely with her handlers, she supports frontline wildlife protection efforts by assisting forest staff in strengthening monitoring and maintaining vigilance against poaching and other illegal activities within this important tiger landscape.

Tracking Crime, Protecting Biodiversity

Wildlife crime investigations are often complex, with offenders

operating in remote forests, concealing evidence, and moving wildlife contraband across large distances. In such situations, wildlife sniffer dogs provide a unique advantage. Their exceptional sense of smell enables them to detect hidden evidence, track suspects, and recover wildlife products that might otherwise remain undiscovered, significantly strengthening wildlife law enforcement efforts.

Beyond investigations, the presence of wildlife sniffer dogs also acts as a deterrent to poaching and other illegal activities in vulnerable wildlife habitats. The growing success of wildlife sniffer dog squads highlights their value as a specialised enforcement tool and their important contribution to protecting the state's rich biodiversity.



Dilpreet Beasley Chhabra, Head- Programme Communications, WWF-India, has been working with WWF-India since 2005, managing various work profiles including communication and outreach, media relations, campaigns, publications, and the wildlife sniffer dog programme. She has over 20 years of experience in the field of wildlife conservation and animal protection.



Mansavi Gusain, Programme Officer, WWF-India: Mansavi is a zoologist with a passion for wildlife conservation. She works with WWF-India as a Programme Officer managing the wildlife sniffer dog programme.

TRAINING NOTES

EMERGING INTERNAL SECURITY CHALLENGES AND CALIBRATING PSK TRAINING

Ravi.S, Assistant Commandant, DBTS, CRPF

“Dog training is a never-ending process of evolving.”

— Ivan Balabanov

“The key to training a dog is patience, consistency, and positive reinforcement.”

— Cesar Millan

Changing Dimensions of Internal Security

India's internal security landscape is rapidly evolving with the emergence of new-age threats and unconventional challenges. Security forces today are not only combating traditional threats such as insurgency, terrorism, and organized crime, but are also facing increasingly complex challenges including drone-based sabotage, narcotics trafficking, smuggling of contraband, radicalization, cyber-enabled criminal activities, and disaster response situations. In this changing security environment, Police Service K9s (PSK) have emerged as one of the most dependable force multipliers for law enforcement and security agencies.

The growing use of advanced technology by anti-national and criminal elements has made security operations more dynamic

and demanding. Border-related crimes, illegal transportation of narcotics, counterfeit currency, wildlife trafficking, and the use of drones for smuggling weapons or explosives pose serious threats to national security. Simultaneously, natural calamities such as earthquakes, landslides, floods, and building collapses demand rapid search and rescue capabilities where human limitations often become evident. In such scenarios,

trained K9s provide unmatched operational support due to their extraordinary olfactory abilities, agility, endurance, and adaptability.

Operational Role of PSK in Modern Security

One of the major operational strengths of K9 teams lies in explosive and narcotics detection. Trained dogs can detect minute traces of explosives, drugs, and





reliability while ensuring the physical and psychological well-being of the K9s. Positive reinforcement remains the foundation of the training system, where desired behaviour is rewarded through praise, play, or treats, thereby creating motivation, confidence, and eagerness to perform.

Consistency and repetition are equally critical in calibrating PSK training. K9s learn through repeated exposure and reinforcement of commands in varying operational environments. Regular exercises help develop muscle memory, improve response accuracy, and ensure reliability under stress conditions. Training also emphasizes clear communication, timing, and patience, enabling handlers to establish strong bonding and effective coordination with their K9 partners.

An Integrated Operational Training Model at DBTS, CRPF.

Unlike conventional approaches

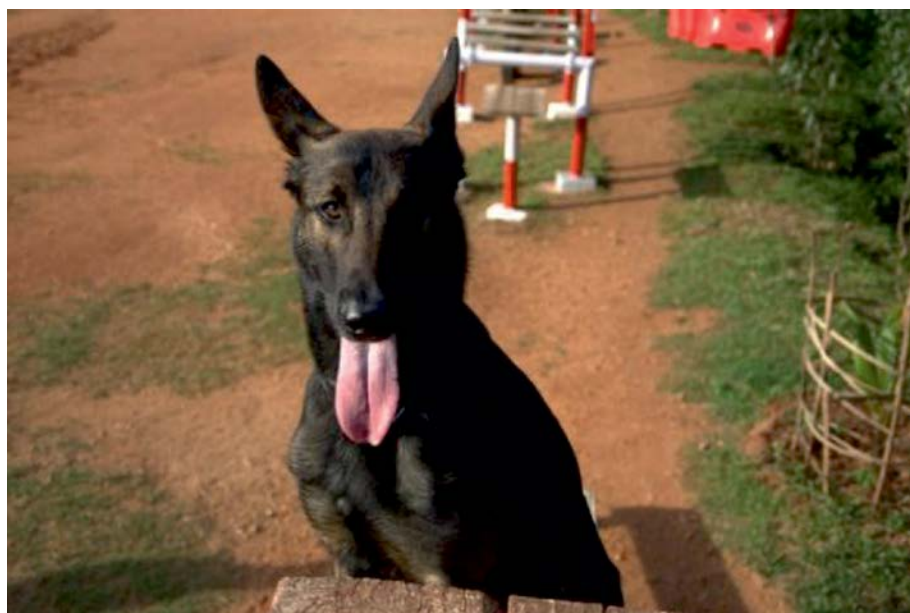
contraband far beyond the capabilities of most mechanical devices. Their deployment at airports, railway stations, public gatherings, VIP security arrangements, anti-terrorist and anti-naxal operations significantly enhances preventive security measures. Similarly, tracker K9s assist security forces in following scent trails to locate suspects, recover missing persons, and support counter-insurgency operations in difficult terrain and hostile environments.

With drones increasingly being used for smuggling arms, narcotics, explosives, and surveillance equipment, the capability of K9s to identify the distinct scent and sound signatures associated with drones offers an innovative and proactive security solution. These trained K9s can alert handlers to the presence of suspicious aerial devices, thereby strengthening anti-drone security mechanisms and improving operational preparedness. K9s can also be effectively integrated into room intervention operations and Vapour Wake Detection (VWD) roles to address complex security threats, particularly in sensitive

environments such as airport and other high-security installations.

Scientific Principles of PSK Training.

The effectiveness of PSK largely depends on the scientific application of dog training principles. Dog training is a systematic process of conditioning and behavioural shaping through repetition, reinforcement, communication, and consistency. At DBTS, training methodologies are designed to build operational



where K9s are often trained for a single task, DBTS follows an integrated operational training model that prepares K9s for multitasking roles. The institution employs scientific and operationally driven modules including decoy-based confidence building exercises, puppy foundation development, environmental conditioning, battlefield acclimatization, and stress-exposure training. K9s are systematically conditioned to operate in varied terrains and tactical situations encountered during counter-insurgency, anti-terrorist operations, jungle warfare, and internal security duties.

DBTS develops K9s capable of performing multiple operational tasks including infantry patrolling, explosive detection, narcotic detection, assault duties and tracking. This multidimensional training philosophy enhances operational flexibility and ensures better field utility of K9 teams during real-time deployments. The concepts of multitasking K9s, jungle camp exposure, have further strengthened the field preparedness and endurance of K9 teams.

Humane and Behaviour-Oriented Training Approach.

The institution's unique training ecosystem combines kindness with firmness, ensuring discipline without compromising the trust and confidence of the K9. Modern K9 training increasingly discourages harsh punishment-based methods and instead promotes humane, reward-oriented behavioural conditioning. This approach not only enhances learning efficiency but also strengthens the bond between the handler and the K9, a critical factor during real operational deployments.

Challenges in Contemporary K9 Training.

Despite advancements in training methodologies, K9 training continues to face several challenges. Lack of consistency, environmental distractions, fear, anxiety, operational stress, and impatience during training can affect the performance and reliability of K9s. Addressing these challenges requires professional expertise, patience, structured

training schedules, scientific evaluation, and continuous recalibration of training modules. The evolving nature of security threats also necessitates regular modernization of K9 training doctrines to ensure operational relevance in contemporary security scenarios.

Conclusion

PSK (Police Service K9s) have become indispensable assets in the modern internal security framework. Their role now extends far beyond conventional policing and encompasses counter terrorism operations, anti-drone security, disaster response, wildlife protection, border management, and anti-narcotics operations. Institutions like DBTS, CRPF, through scientific training, innovation, operational adaptability, and continuous modernization, are contributing significantly towards strengthening the Nation's internal security preparedness. As security challenges continue to evolve, the integration of advanced K9 capabilities with modern law enforcement strategies will remain a critical component of National security management.



Ravi S, Assistant Commandant, joined the CRPF in 2017. He holds Bachelor's degree in Information Science and Engineering from Siddaganga Institute of Technology, Tumkur, Karnataka. Since 2023, he has been posted as Training Officer at the Dog Breeding and Training School(DBTS), Taralu.

Indigenous Working K9s: Field Reality and a System-Driven Approach for Development

S. Karthikeyan, Assistant Commandant, DBTS, CRPF



MUDHOL HOUND

Introduction

Modern K9 operations demand consistency, control, and reliability across varied and unpredictable environments. In this context, the integration of indigenous dog breeds into operational roles is a logical progression. Within CRPF, the Kombai has been a primary focus, while other indigenous breeds such as Mudhol Hound, Pandikona, and Rampur Hound continue to be evaluated for their potential.

Indigenous breeds offer clear advantages. They are naturally adapted to Indian climatic conditions, demonstrate endurance, and show resilience against environmental stress. They are also relatively disease-resistant and require lower maintenance, making them suitable for sustained deployment in demanding field conditions (Selvam et al., 2024). Historically, these breeds have been used for guarding, hunting,



RAMPUR HOUND

and protection roles, reflecting their functional adaptability in local environments (Baskaran, 2017).

However, field experience indicates that while these breeds possess strong foundational qualities, consistent performance under structured operational demands is still evolving. The issue is not capability, but the absence of a system that converts capability into reliable, repeatable operational output.

Selection Before Training

The current approach places disproportionate emphasis on training, while selection remains

loosely defined. In prevalent practice, sourcing often depends on breeder claims rather than validated performance, effectively turning induction into a trial-and-error process. Dogs enter the system without structured evaluation of traits essential for operational work, leading to inconsistent input from the very beginning.

A critical error at this stage is the misinterpretation of temperament. Reactive or aggressive behaviour is often mistaken for working potential. In reality, aggression without stability, focus, and trainability reduces operational value. Indigenous breeds such as Kombai naturally exhibit strong

territorial and protective instincts, but without structured selection and early conditioning, these traits remain unchannelled (Selvam et al., 2024).

Selection must therefore be standardized, measurable, and evidence-based. High rejection at the entry stage is not a drawback but a necessity. Without fixing selection, improvements in training will continue to yield limited results, and breeding based on weak selection will further amplify inconsistency across generations.

The Core Problem: Absence of Structured Selection

Indigenous breeds, including Kombai, Mudhol, Pandikona, and Rampur Hound, largely exist as landrace populations shaped by survival, guarding, and hunting roles. They have not undergone structured, multi-generational

selection for operational traits. As a result, key attributes such as sustained hunt drive, handler focus, task continuity, and controllable aggression are not consistently present across the population.

This leads to a variable pool of dogs entering the system, where only a small percentage demonstrate suitability for operational roles. Such variability is expected in the absence of structured selection systems and directly affects reliability despite training efforts.

Indiscriminate breeding, already documented as a contributing factor to the decline of Kombai populations, further exacerbates the issue by diluting functional traits and increasing inconsistency (Selvam et al., 2024). Without structured selection, continued breeding will produce dogs that are progressively harder to train and operationally ineffective.

Field-Level Behavioural Patterns

Across indigenous breeds, consistent behavioural patterns are observed during training and evaluation. Dogs often exhibit independent working tendencies, prioritizing self-driven behaviour over handler coordination. Task engagement is inconsistent, with frequent breaks in search behaviour and reduced persistence without continuous reinforcement.

Off-leash control remains a challenge, with dogs drifting from assigned tasks and responding more to environmental stimuli than commands. Aggression, where present, is often unchannelled and poorly discriminated, leading to impulsive rather than controlled responses.

Breed-specific tendencies must also be acknowledged. For instance,



JONANGI



KOMBAI



KANNI



TANGKHUL HUI



PANDIKONA



CHIPPIPARAI

Kombai has traditionally functioned as a sight-based hunting and guarding dog, relying more on speed and visual cues than sustained scent work (Selvam et al., 2024). This has direct implications on role suitability and reinforces the need for individual-based selection rather than broad breed-level assumptions.

Limitations at the Source

The inconsistency observed during training originates at the breeding level. In most indigenous breeding systems, selection is based on physical traits and perceived purity rather than validated working performance. There are no standardized benchmarks, structured evaluation systems, or classification of functional types.

This results in multiple informal variants within breeds, ranging from high-aggression guard types to more functional but unrefined lines. Without performance-based selection, variability is introduced at the source itself, making downstream training efforts less effective and more resource-intensive.

Base Population and Selection Response

A structured breeding programme requires a sufficiently large base population to enable meaningful selection. In practical terms, a population of approximately 100 to 150 dogs provides the scale necessary to maintain genetic diversity, apply selection pressure, and generate reliable behavioural data.



RAJAPALAYAM

A larger base population allows higher selection intensity by enabling rejection of a substantial proportion of candidates while retaining only top-performing individuals. This increases the rate of improvement across generations. Smaller populations restrict selection pressure, forcing retention of average individuals and limiting progress.

Without structured selection, breeding becomes a liability rather than an asset, leading to trait dilution, instability, and long-term inefficiency.

Why Training alone is not enough

Training can refine behaviour, but it

cannot compensate for inconsistent genetic input. When required traits are not consistently present, outcomes will vary regardless of training quality.

This results in higher rejection rates, increased training time, and uneven operational performance.

System Requirements

For the system to function effectively, selection pressure must remain high, with significant rejection accepted as necessary. Decisions must be data-driven rather than subjective, and breeding must be restricted to proven performers.

Conclusion

Indigenous breeds possess strong foundational traits required for operational roles. Their limitations are not due to lack of ability, but due to the absence of structured selection and system-driven development.

Reliable working dogs are not produced through training alone. They are developed through disciplined selection, controlled breeding, and sustained refinement across generations.

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प्रश्न और उत्तर



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प्रश्न 1. बेसिक ओबीडिएंस (Basic Obedience) कराते समय श्वान का नाम लेते ही वह बिना कमांड के स्वयं ओबीडिएंस क्यों करने लगता है? इसके कारण एवं समाधान बताइए।

कारण (Causes)

- परिचारक द्वारा श्वान का नाम लेते ही तुरंत कमांड दे देना।
- श्वान का ध्यान परिचारक की ओर न होने पर भी कमांड देना।
- परिचारक द्वारा जल्दबाजी में कमांड देना।

समाधान (Solutions)

- श्वान को बेसिक ओबीडिएंस सिखाते समय केवल नाम लेकर ध्यान आकर्षित करने पर ही रिवॉर्ड दें।
- श्वान का नाम लेने के बाद कमांड देने से पूर्व लगभग 2 सेकंड का अंतर रखें।
- नाम लेने के बाद कभी-कभी "Stay" कमांड देकर रिवॉर्ड दें, ताकि श्वान को यह समझ में आए कि नाम लेने के बाद अलग-अलग कमांड भी दी जा सकती हैं।
- प्रशिक्षण के दौरान नाम (Name Cue) और कमांड (Command Cue) को स्पष्ट रूप से अलग रखें।

प्रश्न 2. यदि कोई विस्फोटक खोजी श्वान पहले अच्छा कार्य कर रहा था, लेकिन अब सही प्रकार से विस्फोटक नहीं ढूँढ पा रहा है, तो इसके क्या कारण हो सकते हैं?

उत्तर : इसके निम्नलिखित कारण हो सकते हैं—

- श्वान बीमार हो सकता है अथवा उसकी सूंघने की क्षमता प्रभावित हो गई हो।
- श्वान अत्यधिक थका हुआ हो सकता है।
- अधिक गर्मी, वर्षा अथवा तेज हवा के कारण गंध की पहचान में कठिनाई हो सकती है।
- परिचारक (Handler) द्वारा सही मार्गदर्शन नहीं दिया जा रहा हो।
- लंबे समय से नियमित प्रशिक्षण एवं अभ्यास नहीं हुआ हो।
- आसपास किसी अन्य तीव्र गंध के कारण श्वान भ्रमित हो रहा हो।

समाधान

- सर्वप्रथम श्वान का स्वास्थ्य परीक्षण कराना चाहिए।
- उसे पर्याप्त आराम एवं पानी उपलब्ध कराना चाहिए।
- प्रशिक्षण प्रक्रिया की समीक्षा कर पुनः नियमित अभ्यास कराना चाहिए।
- कार्यस्थल की पर्यावरणीय परिस्थितियों का मूल्यांकन करना चाहिए।
- हैंडलर की कार्यप्रणाली एवं मार्गदर्शन का भी मूल्यांकन करना चाहिए।



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प्रश्न 3. श्वान प्रशिक्षण में यदि श्वान सर्च ड्राइव (Search Drive) में कम रुचि ले रहा हो, तो समस्या का समाधान कैसे करेंगे?

उत्तर : यदि श्वान सर्च ड्राइव में कम रुचि दिखा रहा है, तो इसके निम्नलिखित कारण हो सकते हैं।

कारण

1. रिवॉर्ड का मूल्य कम होना

- प्रयुक्त खिलौना या खाद्य पदार्थ श्वान के लिए पर्याप्त आकर्षक नहीं है।
- उच्च मूल्य (High Value) वाले रिवॉर्ड जैसे पसंदीदा खिलौना, मटन आदि का उपयोग करें।

2. मोटिवेशन की कमी

प्रशिक्षण से पहले श्वान का पेट अधिक भरा होने से फूड

रिवॉर्ड का महत्व कम हो जाता है।

3. सर्च का स्तर अधिक कठिन होना

- प्रारंभ में आसान स्थानों पर लक्ष्य पदार्थ छिपाएं।
- सफलता मिलने पर धीरे-धीरे कठिनाई बढ़ाएं।

4. अधिक डिस्ट्रैक्शन (Distraction)

- प्रारंभिक प्रशिक्षण शांत वातावरण में कराएं।
- बाद में धीरे-धीरे विभिन्न प्रकार के डिस्ट्रैक्शन शामिल करें।

5. सर्च ड्राइव की कमी

- प्रारंभ में श्वान के सामने फूड या खिलौना छिपाएं।
- उसे स्वयं खोजने के लिए प्रोत्साहित करें।
- इस अभ्यास को नियमित रूप से दोहराएं।

6. थकान या मौसम का प्रभाव

अत्यधिक गर्मी, थकान अथवा स्वास्थ्य संबंधी समस्याएं सर्च ड्राइव को प्रभावित कर सकती हैं।

सर्च ड्राइव बढ़ाने के उपाय:

- प्रशिक्षण सत्र (Session) छोटे और रोचक रखें।
- प्रत्येक सफलता पर उच्च मूल्य का रिवॉर्ड दें।
- एक ही कमांड का लगातार प्रयोग करें।
- सरल अभ्यासों से शुरुआत करें ताकि श्वान का आत्मविश्वास बना रहे।
- प्रशिक्षण को सकारात्मक एवं उत्साहपूर्ण बनाए रखें।

संक्षिप्त नोट



दल संख्या :- 097020799

पद :- सि० (ए०टी)

नाम :- उदेश

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हिट स्ट्रोक

शरीर में होने वाली अलग-अलग जैविक क्रियाओं तथा वातावरण की गर्मी से शरीर में लगातार गर्मी उत्पन्न होती है, जिससे अपनी क्रिया द्वारा बाहर निकालकर अपने शरीर के तापमान को नियंत्रित रखता है, परन्तु श्वान के शरीर पर घने बाल होने के कारण उसकी त्वचा की तापमान नियंत्रित करने की प्रक्रिया कम हो जाती है। श्वान प्रायः अपनी जीभ निकालकर व हॉफकर शरीर की गर्मी को बाहर निकालता है।

हिट स्ट्रोक अत्यधिक गर्मी के मौसम में श्वानों को होने वाली एक गंभीर अवस्था है, जिसमें श्वान शरीर का तापमान नियंत्रित करने में विफल हो जाता है और शरीर का तापमान तेजी से बढ़ना शुरू हो जाता है। श्वान का शरीर ठंडा नहीं हो पाता है और श्वान का पसीना तंत्र विफल हो जाता है, जिसके परिणाम स्वरूप श्वान घातक स्थिति में चला जाता है।

हिट स्ट्रोक के कारण

- श्वान को अधिक समय तक लगातार शारीरिक कार्य करवाने पर।
- वातावरण में तापमान और आद्रता अधिक होने पर।

- श्वान को कम पानी पिलाने पर।
- शरीर में पानी की कमी होने पर।
- श्वान को गर्मी के मौसम में लम्बी दूरी की पैट्रोल या अन्य ड्यूटी पर कार्य करवाने से।

हिट स्ट्रोक से बचाव के उपाय :-

- श्वानों के स्वास्थ्य एवं शारीरिक क्षमता के अनुसार काम लिया जाए।
- श्वानों को शीतल जल पिलाते रहे ताकि शरीर में जल प्रवाह बना रहे।
- श्वानों को ड्यूटी पर जाने से पहले खाना खिलाना चाहिए और उसके थोड़े समय बाद डियुटि पर ले जाए और आने के तुरंत बाद खाना न खिलायें, श्वान को ठंडा पानी पिलायें सामान्य होने पर ही खाना दे।
- जैसा तक सम्भव हो अपने साथ गलुकोज ओ.आर.एस धोल और फास्ट एंड किट अवश्य ले जाये।
- समय-समय पर श्वान को छाव में बिठाये और पानी पिलायें।
- स्थिति ज्यादा खराब होने पर श्वान को तत्काल प्राथमिक उपचार उपलब्ध करवाये।

सफल बारुद खोजी श्वान



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प्रस्तावना— जैसे कि आज के युग में दुनिया एक बारुद के खेल में ज्यादा रूचिकर हो रही है, एक देश दूसरे देश के विकास एवं सम्पदा को हडपने के लिये तैयार है तथा दूसरे देश पर आक्रमण कर रहा है साथ ही बारुद सुरंग बिछाकर विनास कर रहा है, इससे बचने के लिए या पता लगाने के लिए हम एक अच्छे श्वान को प्रशिक्षित कर सकते हैं।

सफल बारुद खोजी श्वान— एक अच्छे बारुद खोजी श्वान से हम दुश्मन के बिछाये हुये बारुद जाल से बच सकते हैं जिसके लिए हमें एक सफल बारुद खोजी श्वान प्रशिक्षित कर सकते हैं।

इस बारे में मेरा व्यक्तिगत विचार है कि श्वान को बेसिक आज्ञापालन के साथ-साथ ही बारुद की पहचान कराने का प्रशिक्षण भी देना आवश्यक है। इस प्रशिक्षण का स्टेज वाईज कराये, बारुद की सही पहचान एक-एक बारुद की समयावधि लगभग एक सप्ताह हो अर्थात यदि एक

सप्ताह पी.ई.के.-1 की सैन्ट से श्वान को अवगत कराया है तो अगले सप्ताह टी.एन.टी. स्लेब की सैन्ट से अवगत करवाये व पिछले वाले बारुद को भी साथ में अभ्यास में रखा जाये। इस प्रकार सभी बारुद की सैन्ट से श्वान को अवगत करवाना आवश्यक है।

जब श्वान सही बारुद की गंध से परिचित हो जाये तो धीरे-धीरे करके श्वान को पहले बारुद के नजदीक से दुढ़ना सिखाये और धारे-धीरे श्वान को इतना अभ्यास करवाये कि दूर से भी श्वान बारुद को पकड़ने में सक्षम हो जाये।

सारांश— अन्त में इसका निचोड़ यह निकलता है कि श्वान को हर प्रकार के बारुद से परिचित करवाकर स्टेज वाईज श्वान से सर्च प्रशिक्षण देकर सफल बारुद खोजी श्वान प्रशिक्षित हो सकता है।

श्वान प्रशिक्षण एवं सफलता



दल संख्या :- 918030256
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प्रस्तावना— श्वान प्रशिक्षण एक ऐसी आवश्यक प्रक्रिया है जो कि आपके शरीर और श्वान के बीच सम्बन्ध मजबूत करती है। यह श्वानों को बुनियादी आज्ञाकारिता सिखाने, पुलिस कार्यों के लिए तैयार करने और एक अनुशासित जीवन जीने में मदद करती है।

प्रशिक्षण का उद्देश्य केवल बुनियादी आज्ञापालन सिखाना ही नहीं अपितु श्वानों को विशिष्ट कार्यों के लिए तैयार करना भी है, जैसे— कि पुलिस कार्यों में सेवा, सुरक्षा के कार्यों में भूमिका, विकलांग व्यक्तियों की सहायता करना, चरवाहो के कार्यों में वफादारी से सहयोग इत्यादि शामिल है।

श्वान प्रशिक्षण एवं सफलता— इस सम्बंध में मैं अपने कुछ विचार बिन्दू प्रस्तुत करना चाहता हूँ जो कि निम्नांकित है—

- श्वान की उम्र का ध्यान— यदि पप्स को माँ से अलग किया जाता है तो उस समय से ही पप्स को श्वान चालक मिल जाता है तो माँ की कमी को पूरा करने के साथ ही पप्स का गहरा लगाव, भावनात्मक जुड़ाव व दोस्ती पक्की तय है। कम से कम ६० से ७० दिन की उम्र में श्वान पप्स को प्यार से प्रशिक्षण शुरू करना चाहिए क्योंकि इस समय में श्वान पप्स का दिमाग सीखने के लिए काफी विकसित होता है। ध्यान रखें कि पप्स को दबाव न डाला जायें बल्कि खेल— खेल में पप्स को समझाने का प्रयास करते रहे, मनुष्य की तरह श्वानों की भी भावनायें होती है।
- प्यार और धैर्य— मनुष्य की तरह श्वान भी महसूस करते हैं, उन्हें भी हमारी तरह डर, दुख, खुशी व कष्ट महसूस होता है, इसलिए श्वान को प्रशिक्षण देने के लिए अपनी

भाषा को सरल व सहज रखें, चिल्लाने या डराने की जगह उन्हें प्यार से समझाने पर जोर दें।

- प्रेरणा और लगन— श्वान को प्रशिक्षण देते समय श्वान का Motivation बनाये रखें व श्वान की Drive न तोड़े। श्वान का मनोबल किसी भी तरह टूटने न दें क्योंकि श्वान पूर्ण तरिके से अपने चालक पर निर्भर होता है। इस बात का विशेष ध्यान दें कि श्वान के लिए उसका चालक सबसे महत्वपूर्ण एवं उसका मालिक है।
- प्रशिक्षण को मनोरंजक बनायें— प्रशिक्षण आपके व आपके श्वान के लिए मजेदार होना चाहिए। इसे हमेशा सकारात्मक रखें और रोचक बनाये रखें ताकि आपके श्वान का प्रशिक्षण में अच्छा लगाव बना रहे। प्रशिक्षण के तुरन्त बाद छोटे—छोटे खेल सत्र रखें, इससे आपका श्वान अधिक उत्साह से प्रतिक्रिया करेगा और खुश होकर मास्टर की इच्छा से अवगत होगा।
- सकारात्मक प्रोत्साहन— श्वान जब भी प्रशिक्षण में अच्छा कार्य करें या आपका सही निर्देश माने तो उसे तुरन्त बिना देरी के उसकी पसंदीदा ट्रीट खाने को दें या उसका पसंदीदा खिलौना देकर इनाम दें।
- छोटे—छोटे सेशन रखें— श्वानों का ध्यान बहुत जल्दी भटकता है इसलिए प्रशिक्षण का सेशन छोटा रखें १० से १५ मिनट, उसके बाद कार्य के अनुसार समय को बढ़ायें। प्रशिक्षण को हमेशा नियमित रखें।
- अपने हाथों व इशारों का प्रयोग करें— श्वान मनुष्यों की तरह भाषा को समझ नहीं पाते हैं, कई श्वान मौखिक आदेशों की तुलना में हाथ के इशारों पर बेहतर प्रतिक्रिया देते हैं, बाद में मौखिक आदेशों को भी जोड़ें।
- श्वान को हर तरह के माहौल एवं वस्तुओं से सोसलाईजेशन करना— प्रशिक्षण के साथ—२ ही श्वान को हर माहौल जैसे शौर गुल, भीड़—भाड़ में, पटाकों के धमाके की आवाज में, हर वस्तु से, हर प्रकार के वाहन से, व उनकी आवाज से, हर तरिके की धरातलीय बनावट से, हर तरह के मौसम से सोसलाईजेशन भी करना चाहिए ताकि श्वान को कहीं भी डिप्लाय करने में कोई परेशानी का सामना न करना पड़े।

निष्कर्ष— अन्त में निष्कर्ष यह है कि यदि एक छोटी उम्र के पप्स के साथ गहरा लगाव, भावनात्मक जुड़ाव, उसकी श्रेष्ठ पसंद की जानकारी तथा उसकी लगन और प्रेरणा को बरकरार रखते हुये प्रशिक्षण की उत्तम युक्ति के साथ एक अच्छा श्वान प्रशिक्षित कर उससे बेहतर सफलता प्राप्त की जा सकती है। इस कार्य हेतु श्वान चालक श्वान प्रेमी व इच्छुक होना चाहिए।

एक प्रशिक्षित विस्फोटक खोजी श्वान जमीन के अन्दर कितनी गहराई तक विस्फोटक की तलाशी कर सकता है ।



दल संख्या :- 137020324

पद :- सि० (डी०एच०)

नाम :- जितेन्द्र सिंह
एन०टी०सी०डी०एण्ड ए०

यह बात इस बात पर निर्भर करता है कि श्वान को बारूद की गंध कितनी प्राप्त हो रही है इसमें बहुत सारी बातें ध्यान में रखनी पड़ती हैं। बारूद कितनी गहराई में लगा हुआ है कौन सा बारूद लगा हुआ है, किस तरह की मिटटी है और फिर मौसम कैसा है, गर्म है या बारीश वाला है, बारूद को किस प्रकार से सील पैक करके लगाया हुआ है, ताकि गंध बाहर ना जा सके, यह सारे फैक्टर श्वान को सूंधने में बाधा डालते हैं।

एक प्रशिक्षित श्वान 01 फिट से लेकर 03 फिट तक या उससे अधिक गहराई तक बारूद की गंध को सूंध सकता है अगर उसकी गंध श्वान को मिल रही है तो श्वान विस्फोटक पदार्थ को पकड़ने में जरूर कामयाब होगा ।

NEW INNOVATIONS



EXPLORATION OF CUTTING-EDGE TECHNOLOGIES AND INNOVATIONS THAT CAN BE INTEGRATED WITH CANINES TO OPTIMIZE BEHAVIOURAL SHAPING AND ENHANCE OPERATIONAL PERFORMANCE IN WORKING DOGS

Dr. Manpreet Kour Bali, Veterinary Officer, CRPF

Introduction:

Central Reserve Police Forces is entrusted with responsibilities of breeding, rearing, issue of working dogs to different K9 Units of CRPF across the country. The CRPF established a Dog Breeding and Training School (DBTS) in Taralu, Bangalore which is actively involved in training of working dogs. Working dogs of CRPF are deployed in various terrains and operational scenarios have long served as valuable assets in Counter Insurgency, Counter terrorism, and security operations. CRPF canines with

their unmatched olfactory abilities, agility, loyalty and intelligence makes them irreplaceable assets in diverse missions such as Explosive Detection, Tracking, Assault and Infantry Patrol operations. However, the emerging operational complexity of contemporary battlefields and security environments, there is a demand of new generation of equipment, machines, Integrated Artificial Intelligence tools to enhance the capabilities of these canine squad.

Advances in artificial intelligence (AI), robotics, wearable technology, and biotechnology have created

a unique opportunity to integrate novel systems with CRPF K9s to augment their natural abilities. These innovations are designed not to replace the dog's instincts or the handler's expertise, but to serve as force multiplier enhancing training efficiency, improving communication, ensuring welfare, and increasing mission effectiveness. The integration of advanced sensors, AI-driven analytics, and smart wearable devices which are discussed in detail in this article allows handlers to monitor the K9s physiological state, location, and environmental data in real-time. With such tools,

the traditional bond between handler and K9 is being transformed into a digitally empowered partnership where data, intuition, and technology merge seamlessly.

Aim

The aim of this article is to identify, analyse and recommend novel technologies and innovations that can be integrated with CRPF K9s to enhance their behavioural shaping, training efficiency, operational performance and to provide a structured framework for understanding how emerging technologies ranging from artificial intelligence and smart wearables to advanced communication systems can be employed to strengthen the human-canine operational partnership.

Objectives

The main objectives are:

1. **Improvement of Behavioural Shaping:** To evaluate cutting-edge technologies that facilitate accurate behavioural conditioning, reinforcement learning, and adaptive feedback systems for effective K9 training and preparedness for the field.
2. **Operational Efficiency:** To investigate technologies that improve the CRPF K9's operational response accuracy, endurance, sensing skills, and decision-making support during live-field deployments.
3. **AI Integration:** To monitor canine physiology, emotional states, and performance indicators using artificial intelligence and data analytics

to help K9 handlers become more situational aware.

4. **Smart Equipment Deployment:** To develop and utilize wearable sensor devices such as smart collars, harnesses, and cameras for communication, navigation, and tracking during operational duties.
5. **Human-Canine Synergy System:** Enhance data interfaces and control systems to enable K9 handlers to guide and monitor dogs with minimal distraction and maximum operational accuracy.
6. **Health and Welfare Monitoring:** To implement biosensors and health-monitoring tools that guarantee real-time evaluation of the dog's behaviour, both physically and psychologically, in order to prevent fatigue or injury.
7. **Standardization and flexibility:** To develop standard frameworks for adopting these technologies across various K9 units and operational environments.
8. **Applied Research and Future Readiness Roadmap:** To lay out future possible avenues for innovation in technology, evaluation and advancement in collaboration between academic institutions and k9 training facilities.

Technologies that are intended to integrate seamlessly

Smart collars and Wearable biosensors



Smart collars and Wearable biosensors

In order to offer minute-by-minute physiological and cognitive telemetry, modern collars and harnesses include GPS, inertial measuring units (IMUs), accelerometers, temperature, and continuous heart-rate/HRV monitoring. K9 handlers and veterinary doctors can utilize these devices to convert previously subjective judgments (such "dog looks stressed") into objective time-series to identify fatigue, heat risk, overtraining, or early disease conditions.

In addition to heart-rate, temperature, and GPS monitoring, future generation collars and harnesses may consist of ;

1. Continuous blood oxygen (SpO₂) sensors: To identify hypoxia or fatigue(exhaustion).
2. Sweat and chemical analyzers: to analyse stress-related biomarkers (cortisol, lactate).
 - a. AI motion analysis micro-IMUs (inertial measurement units): To identify minute alterations in posture or movement that might be signs of exhaustion, injury, or readiness.
 - b. Integrated UV and

environmental exposure sensors: For operational areas where exposure to light, chemicals, or particulates is high.

Scent-Detection

Augmentation: Biomimetic Hybrids and E-Noses:-

The sensitivity and pattern-recognition capabilities of biomimetic vapor sensors, hybrid biologically-inspired detectors, and electronic noses (e-noses) have all continuously increased. In complicated odour situations, trained dogs still perform better than the majority of independent sensors, but e-noses have additional advantages including continuous duty, objective loggable signals, and the potential for unattended area monitoring. In the past, various research initiatives have made investments in "cyborg nose" biological olfactory models using machine learning to bridge capability gaps. Emerging hybrid and AI-assisted olfactory technologies consists of:

- **Nano-sensor arrays:** To detect volatile organic compounds (VOCs) at ultra-low concentrations.
- **AI-assisted scent pattern recognition:** To differentiate multi-source odour.
- **Robotic scent drones:** To guide the K9s while mapping and relaying gradients in scent concentration in challenging environments.
- **Training simulators with controlled odour releases:** To improve alertness, accuracy and reduce environmental variability.

Vests Incorporating Cameras, Audio and Remote Sensing

During search, entry, or overwatch missions, K9 situational awareness is enhanced by tiny, lightweight cameras and microphones installed on harnesses that provide dog handlers with remote eyes and ears. These sensors can provide the operational K9s point of view and automatic scene annotations (such as detected movement and thermal signatures) when combined with low-latency communications and augmented reality (AR) overlays on handler screens. These project reports highlight active fielding and evaluation/trials of such kits for special operation units. Beyond standard cameras and microphones:

- The integration of thermal and multispectral imaging into head-mounted or harness cameras enables the identification of dangers, human targets, or hidden threats in low-visibility situations.

- **360° panoramic cameras** for situational awareness when conducting patrols or reconnaissance.
- **Directional microphones and acoustic event recognition** are used to identify gunshots, explosives, or approaching personnel.
- Onboard AI for motion and object recognition enabling the K9 handler to get real-time notifications on potential threats.

Interfaces of Haptic and Non-Verbal Communication:

In noisy or covert situations, haptic vests and programmable tactile actuators enable handlers to transmit low-bandwidth commands and reinforcement signals without using their voices. Subtle haptic cues can minimize the dog's cognitive load while supporting quick, discrete direction when paired with conditioned training techniques. Next-generation haptic interfaces include:



Camera-Integrated Tactical Harnesses



Haptic Communication System

Multi-zone haptic vests enabling distinct signals (forward, left, right, stop, alert) without vocal cues.

Tactile reward actuators provide real-time positive reinforcement in operational or remote training scenarios.

AR-assisted handler interfaces with gesture recognition and predictive path guidance, integrated with dog-worn sensors

Artificial Intelligence and Machine Learning for Behavioural Analytics:

Machine learning (ML) and artificial intelligence (AI) are quickly changing how K9 trainers interpret, assess, and modify working dogs behaviour. Despite its effectiveness, traditional behavioural training frequently depends largely on human observation and subjective interpretation. AI-based behaviour analytics makes K9 training more effective, compassionate, and customized to each dogs unique cognitive and physiological characteristics by bringing objectivity, accuracy, and adaptive.

Behaviour categorisation models: Use Inertial Measurement Units in conjunction with video and audio to identify states (searching, alert, distracted, stress signals) and detect anomalous behaviours.



AI Based Monitoring & Behaviour Analytics

Adaptive reinforcement systems: Reward schedules tuned by AI to individual learning speed and fading schedules for cues.

Predictive maintenance for dogs: Analyse workload history and gait asymmetries to predict injury risk.

Operational effect: Data-driven deployment choices, early detection of performance decline, and customized training programs.

Training with Augmented and Virtual Reality (AR/VR)

Dog-sensor feeds are used in handler simulators (VR) to practice remote-command coordination and decision-making.

Dogs can learn specialized search behaviours without actual

explosives by using automated target presentation and controlled scent-dispersion devices in augmented settings.

Using heads-up displays, handlers can observe real-time data (heatmaps of likely scent sources) through mixed reality overlays.

Operational Impact: improved skill transfer, objective performance indicators; training scenarios that are safer, repeatable and scalable.

Behaviour Shaping: Technology-Enabled Techniques

Positive Reinforcement Systems Driven by Data: Trainers can improve schedules for operating conditioning methods by using



Augmented Reality /Virtual Reality K9 Technologies

wearable sensors to timestamp exact physiological reactions to reinforcement.

Under K9 handler supervision, use wearable sensors and computer vision to automatically identify desirable behaviours (such as the correct search pattern) and trigger fast, reliable reinforcers (such as treat dispensers or changeable praise cues).

AI adjusts reward frequency (variable ratio schedules) to maximize retention while reducing dependence on continuous rewards.

Closed-Loop Biofeedback To Reduce Stress

Real-time HRV and respiratory monitoring to identify increasing stress; the system automatically modifies task difficulty or

recommends K9 handler interventions (stop, relaxing stimulus).

Gradual desensitization programs using automated scent intensity control and context escalation.

Simulator-Augmented Learning

Reduce initial stress and occupational dangers by training handler signalling to K9s and search behaviours in virtual reality prior to live exposures.

Use high-fidelity motion platforms and scent generators to mimic mission conditions.

Protocols Based on Reinforcement Learning

Update training protocols to maximize learning curves for cohorts and individuals; use logged trial data to determine effective

cue durations and sequences.

Conclusion:

Integrating modern sensors, AI analytics, humane remote interfaces and complementary robotics can substantially improve the safety, effectiveness and life-cycle management of CRPF working dogs. The best programs will be interdisciplinary, combining security engineering and human aspects design with ethology and veterinary research, and they will have strict welfare safeguards and governance from the outset. Smart collars, exoskeleton prototypes, and sensor fusion research are examples of early pilots that show promise, but responsible scaling demands quantitative validation, public responsibility, and governmental safeguards.



Dr. Manpreet Kour holds a B.V.Sc. & A.H. and M.V.Sc. in Veterinary Medicine and has previously served as an Assistant Professor of Veterinary Medicine at Khalsa College of Veterinary and Animal Sciences. Since June 2025, she has been serving as a Veterinary Officer in the Central Reserve Police Force (CRPF), Kashmir Operations Sector, where she is actively involved in the healthcare and operational management of working K9s.

AUGMENTATION AND INTEGRATION OF MODERN TRAINING AIDS AND WEARABLE TECHNOLOGY IN K9 OPERATIONS TO ENHANCE OPERATIONAL EFFICIENCY

Col (Dr.) Surinder Saini (Retd.)



Introduction

The evolution of K9 operational capabilities has reached a critical inflection point where traditional training methodologies converge with cutting-edge technology to create unprecedented force multiplication opportunities.

Modern threat environments demand canine units that can operate seamlessly across conventional detection missions while providing real-time intelligence, maintaining secure communications, and adapting to rapidly changing tactical scenarios.

This technological revolution encompasses three fundamental domains: enhanced olfactory training through molecular-level authenticity, real-time situational awareness through integrated sensor platforms, and predictive performance optimization

through biometric monitoring. The successful integration of these capabilities transforms K9 units from specialized detection assets into comprehensive intelligence-gathering and force protection platforms.

The Science of Authentic Scent Training

Traditional detection training has long relied on pseudo-scent training aids that approximate target odors through synthetic compounds. Recent advances in molecular analysis and manufacturing have enabled the development of training systems that utilize actual micro-particles of target substances, providing dogs with authentic olfactory experiences that translate directly to operational effectiveness.

Micro-particle training systems represent a fundamental shift in detection conditioning. Rather than training dogs to recognize approximations of target scents, these systems expose canines to the complete molecular signature of threat materials in controlled, safe quantities. FMRI studies validate

that dogs trained with authentic molecular signatures demonstrate superior detection confidence, reduced false-positive rates, and enhanced performance under operational stress.

The implications extend beyond simple detection accuracy. Authentic training materials enable scenario development in previously restricted environments, including urban areas and public facilities where traditional explosive materials cannot be safely transported or stored. Companies like SOKKS-MPTS and ScentLogix have pioneered non-hazardous formulations that maintain complete odoriferous authenticity while eliminating safety and logistical constraints.

Modern training catalogs encompass over 30 specialized compounds including emerging threats such as TATP, HMTD, and synthetic narcotics like fentanyl. The ability to train against current and anticipated threat materials ensures operational relevance in rapidly evolving security environments.

Networked Intelligence and Real-Time Surveillance

The integration of K9 units into network-centric warfare concepts requires sophisticated communication and surveillance capabilities that extend operational reach while maintaining tactical stealth. Advanced camera systems mounted on specialized canine platforms provide commanders with unprecedented access to denied areas while preserving the

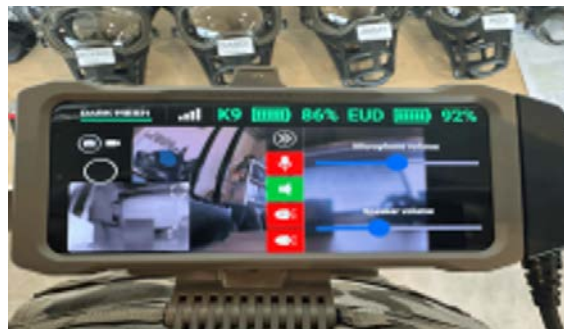
inherent advantages of canine detection capabilities.

Modern K9 surveillance platforms combine multiple sensor modalities within ruggedized, lightweight packages designed for extended operational deployment. Dual-camera configurations incorporating both visible spectrum and thermal infrared sensors enable 24-hour surveillance capabilities across varying environmental conditions. Integrated illumination systems, including white light and infrared options, provide scene illumination without compromising operational security.

The DarkMesh system exemplifies this integration, incorporating Mobile Ad-Hoc Network (MANET) radio capabilities that enable real-time video transmission up to 450 meters while maintaining two-way audio communication. This platform integrates seamlessly with Android Tactical Assault Kit (ATAK) systems, providing tactical commanders with real-time intelligence from forward-deployed K9 units. Network resilience proves critical in contested environments where traditional communication infrastructure may be compromised or unavailable. MANET protocols ensure connectivity through self-forming and self-healing network architectures that adapt dynamically to changing operational conditions. Multiple frequency options (L-Band, S-Band, C-Band) provide operational flexibility while AES256 encryption and SHA-256 HMAC protocols ensure communication security.

The K9 Vision System offers





complementary capabilities with zero-latency transmission specifically optimized for rapid tactical decision-making. Integration with specialized protective equipment, such as the DarkFighter helmet system, provides active hearing protection while enabling discrete command delivery through integrated audio systems.

Force Protection Through Advanced Materials

Operational K9 units face unprecedented environmental hazards ranging from ballistic threats to acoustic trauma and chemical exposure. Advanced protective equipment specifically engineered for canine physiology addresses these vulnerabilities while maintaining operational mobility and sensory capability.

Ballistic-rated eye protection has evolved from basic wind and debris shields to sophisticated optical systems capable of withstanding fragmentation and small arms threats. Modern goggle systems incorporate interchangeable lens technology that adapts to

varying light conditions and threat environments. Clear lenses provide maximum light transmission for low-light operations, while smoke and mirror options reduce glare and enhance contrast in bright conditions. Anti-fog coatings ensure continuous visibility during extended operations where temperature and humidity variations could compromise visual acuity.

Acoustic protection addresses a critical but often overlooked vulnerability in modern operations. High-noise environments including helicopter operations, breaching activities, and urban combat scenarios can cause immediate performance degradation and long-term hearing damage. Advanced ear protection systems provide significant noise reduction while maintaining handler communication capabilities through integrated audio systems. Companies like Rex Specs have developed solutions that balance protection with operational requirements, ensuring K9 units can operate effectively in environments that would otherwise cause acoustic trauma.

Environmental protection extends beyond immediate threats to encompass chemical exposure, extreme temperatures, and prolonged operation in contaminated areas. Protective equipment designed for CBRN (Chemical, Biological, Radiological, Nuclear) environments enables K9 deployment in scenarios previously considered too hazardous for canine units.

Specialized Deployment and Tactical Insertion

Modern military and security operations often require K9 access to locations that challenge traditional deployment methods. Specialized equipment has evolved to enable tactical insertion, confined space access, and remote area deployment while maintaining handler control and communication capabilities.



with objective data on canine condition that supplements traditional observational methods. During extended operations or extreme environmental conditions, biometric monitoring can identify developing health issues before they impact operational capability.

GPS tracking technology has evolved beyond simple position reporting to encompass comprehensive operational management capabilities. Systems like Dogtra's Pathfinder2 provide 9-mile operational range with offline mapping capabilities that function in communications-denied environments. The ability to manage multiple K9 units (expandable to 21 dogs) enables coordinated operations across extended areas while maintaining individual unit tracking and control.

Advanced e-collar systems have transcended basic training tools to become comprehensive communication platforms. Modern systems integrate stimulation, vibration, and audio cues with GPS tracking and biometric monitoring to provide handlers with complete situational awareness. The absence of subscription requirements in many systems ensures long-term operational sustainability without ongoing communication costs.

Behavioral optimization algorithms analyze performance patterns, environmental factors, and training data to identify optimal deployment strategies and performance enhancement opportunities. These systems provide recommendations for training modifications, operational parameters, and performance

Tactical insertion systems enable K9 deployment from rotary-wing aircraft through fast-rope and rappelling operations. These systems incorporate specialized harnesses that distribute load forces across the canine frame while providing secure attachment points for handlers and safety equipment. The integration of communication systems ensures continuous coordination during insertion operations.

Confined space deployment represents a unique operational requirement where K9 units must access areas inaccessible to human operators. Attic deployment systems and similar specialized equipment enable controlled insertion into buildings, underground facilities, and other restricted environments. These systems often incorporate remote monitoring capabilities that allow handlers to maintain oversight while K9 units operate independently in denied areas.

Remote delivery capabilities transform K9 units into tactical

logistics assets capable of transporting essential supplies, communications equipment, or specialized sensors to forward positions. These systems balance payload capacity with operational mobility, enabling resupply operations in areas where human movement would compromise operational security.

Biometric Monitoring and Performance Optimization

The optimization of K9 performance requires objective data on physiological condition, environmental stress, and operational workload. Advanced monitoring systems provide real-time biometric data that enables predictive health management and performance optimization while supporting evidence-based training protocols.

Real-time health monitoring encompasses core temperature, heart rate, activity levels, and environmental stress indicators. These systems provide handlers

prediction that support evidence-based K9 management.

Counter-Electronics and CBRN Integration

Modern threat environments increasingly incorporate electronic warfare and CBRN elements that require specialized detection and countermeasure capabilities. The integration of these capabilities with traditional K9 platforms creates multi-role assets capable of addressing diverse threat spectrums within single operational units.

Electronic countermeasures integration addresses the growing prevalence of electronically-triggered IEDs and remote-controlled weapons systems. Canine-mounted jammers provide localized electronic warfare capabilities while maintaining the superior detection abilities of trained dogs. This dual-capability approach addresses both traditional explosive threats and electronic triggering systems without requiring separate specialized units.

Radiation detection capabilities transform K9 units into CBRN-capable assets that can operate in contaminated environments while providing real-time threat assessment. Lightweight detection systems integrate with existing communication platforms to enable immediate threat reporting and area marking protocols. The combination of detection capability with canine mobility provides commanders with rapid assessment capabilities in scenarios where human deployment would require extensive protective equipment and decontamination procedures.

Chemical threat detection expands beyond traditional explosives and narcotics to encompass industrial chemicals, chemical weapons, and environmental hazards. Modern training aids include formulations for emerging chemical threats while protective equipment ensures K9 safety during exposure operations.

Artificial Intelligence and Predictive Analytics

The integration of artificial intelligence and machine learning algorithms with K9 operational data creates opportunities for predictive threat assessment and optimized deployment strategies. These systems analyze behavioral patterns, environmental factors, and historical performance data to provide enhanced decision-making support for handlers and tactical commanders.

Behavioral pattern recognition algorithms can identify subtle changes in canine behavior that indicate threat detection, environmental stress, or developing health issues. These systems supplement human observation with objective analysis that can detect patterns not readily apparent to handlers during high-stress operations.

Predictive threat assessment capabilities analyze operational environments, historical threat data, and current intelligence to recommend optimal deployment strategies and threat probability assessments. These systems enhance rather than replace human judgment, providing additional data points that support tactical decision-making.

Performance optimization algorithms identify training opportunities, equipment modifications, and operational procedures that can enhance K9 effectiveness. The analysis of historical data enables evidence-based improvements that maximize operational capability while minimizing training time and resource expenditure.

Integration Challenges and Implementation Strategies

The successful implementation of augmented K9 capabilities requires systematic approaches that address technical, training, and doctrinal challenges. Power management, interoperability, and training protocols represent critical factors that determine operational success.

Power management solutions must balance operational endurance with equipment weight and bulk. MIL-STD battery systems provide standardized power solutions that reduce logistical complexity while ensuring compatibility across different equipment platforms. Typical operational requirements demand 4-6 hour mission endurance, necessitating careful energy management and battery selection.

Interoperability standards ensure compatibility across joint operations and coalition environments. NATO standardization efforts address communication protocols, mounting systems, and data exchange formats that enable seamless integration across different organizational structures and equipment platforms.



Training protocol evolution must accommodate technological integration while maintaining core canine capabilities and handler competencies. Progressive introduction protocols that systematically integrate technological elements with traditional training methods prove most effective in developing operational capability without overwhelming handlers or compromising canine performance.

Return on Investment and Strategic Value

The financial justification for K9 augmentation technologies extends beyond procurement costs to encompass enhanced

mission success rates, reduced operational risk, and improved force protection. Comprehensive cost-benefit analyses demonstrate significant returns through multiple operational advantages.

Mission effectiveness enhancement includes improved detection accuracy, reduced false-positive rates, and expanded operational capabilities that enable K9 units to perform functions previously requiring multiple specialized assets. Real-time intelligence gathering capabilities provide tactical commanders with information streams that enhance situational awareness and support informed decision-making.

Force protection benefits encompass enhanced handler safety, improved K9 welfare, and reduced exposure to hostile threats through remote operation capabilities and predictive health monitoring. The ability to operate K9 units in previously inaccessible environments expands operational options while reducing risk to human personnel.

Operational efficiency gains include streamlined training protocols, standardized equipment that reduces logistical complexity, and enhanced interoperability that supports joint and coalition operations. Long-term cost reductions result from improved equipment durability,

reduced training requirements, and enhanced operational effectiveness.

Future Development Pathways

Emerging technologies continue to expand the possibilities for K9 augmentation while addressing current limitations in size, weight, power consumption, and capability integration. Miniaturization trends enable more capable systems with reduced operational impact, while advances in artificial intelligence create opportunities for autonomous operation and predictive analytics.

Sensor integration developments promise multi-spectrum detection capabilities that combine traditional olfactory detection with electronic, radiological, and chemical sensors within unified platforms. These integrated systems will provide comprehensive threat assessment capabilities while maintaining the mobility and versatility advantages of canine platforms.

Communication technology advances enable higher bandwidth data transmission, extended

operational ranges, and improved security protocols that support integration with broader battlefield management systems. These developments will transform K9 units from specialized assets into integral components of distributed sensor networks.

Conclusion

The augmentation of K9 capabilities through advanced training aids and wearable technology represents a paradigm shift in operational methodology that enhances rather than replaces traditional canine advantages. The integration of molecular-level training authenticity, real-time surveillance capabilities, advanced protective equipment, and predictive analytics creates force multiplication opportunities that significantly exceed the capabilities of traditional K9 units.

Success requires systematic implementation that addresses technical integration, training evolution, and doctrinal adaptation while maintaining the core competencies that make K9 units uniquely valuable. Organizations that effectively integrate these

capabilities while preserving traditional strengths will possess decisive operational advantages in complex, multi-threat environments.

The future of K9 operations lies in the intelligent synthesis of proven canine capabilities with emerging technologies to create operational platforms that exceed the sum of their individual components. As threats continue to evolve and operational environments become increasingly complex, the successful integration of these augmented capabilities will determine operational success and strategic advantage.

The investment in K9 augmentation technologies represents not merely an equipment upgrade but a fundamental transformation in operational capability that addresses current limitations while preparing for future threat environments. The organizations that recognize and act upon these opportunities will establish enduring advantages in protecting personnel, assets, and mission objectives across the full spectrum of security and military operations.



Col (Dr) Surinder Saini (Retd) is an alumnus of CVSc, CCS HAU Hisar and joined the Remount Veterinary Corps (RVC) in 1998 and retired in July, 2024. A leading K9 expert empanelled with various national security agencies, he commanded four Army dog units in counter-insurgency and counter terrorist operations in J&K and the Northeast. He served twice as an instructor at the RVC Centre & College, training officers from India and friendly foreign nations. He pioneered the operational use of K9s in olfaction, dual-tasking, CRDS and real-time operations, including Covid-19 detection. He is currently the Founder and CEO of K9 Warriors Pvt. Ltd. and is recognized as a “Scent source Scent master”.

OPERATIONS & CASE STUDIES

-Real World Case Studies

सशस्त्र सीमा बल द्वारा श्वान परिचारकों का मनोबलवर्धन एक अभिनव पहल

16वीं वाहिनी 784/जुली आरक्षी
सामान्य, अरुण कुमार मिश्रा एवं
सहायक श्वान परिचारक
आ.सा. सत्येन्द्र कुमार

वर्ष-2024 के दौरान प्रचालन गतिविधियों में श्वान जुली ने विस्फोटक पदार्थों की खोज एवं पहचान में उत्कृष्ट दक्षता का प्रदर्शन करते हुए लगभग 72 किलोग्राम IED/विस्फोटक सामग्री की बरामदगी में महत्वपूर्ण भूमिका निभाई।



41वीं वाहिनी 540/मेटी
आरक्षी सामान्य, महेश कुमार
पाण्डेय

वर्ष-2024 में संचालित 02 प्रचालन गतिविधियों के दौरान श्वान मेटी ने मादक पदार्थों की खोज एवं बरामदगी में उल्लेखनीय योगदान देते हुए 273.3 ग्राम ब्राउन शुगर एवं 267.3 ग्राम मॉर्फ़ीन की बरामदगी सुनिश्चित कराने में महत्वपूर्ण भूमिका निभाई।



12वीं वाहिनी 366 / ग्लोरी

आरक्षी सामान्य, महेश कुमार,
सहायक श्वान परिचारक
आरक्षी सामान्य, देवी लाल
बाजिया

दिनांक 27.01.2026 को किशनगंज थाना क्षेत्र के एक आवास से आभूषण, मोबाइल फोन एवं CCTV हार्ड डिस्क चोरी होने की घटना की जांच के दौरान पुलिस के अनुरोध पर श्वान ग्लोरी की सहायता ली गई। श्वान ने घटनास्थल से प्राप्त तौलिये की गंध के आधार पर एक संदिग्ध व्यक्ति की पहचान की, जिसके फलस्वरूप पुलिस द्वारा उक्त व्यक्ति को गिरफ्तार किया गया।



दिनांक 18.03.2026 को समवाय दिघलबैंक के ग्राम झाँगीडिगी में घटित एक 36 वर्षीय व्यक्ति के हत्या प्रकरण की जांच के दौरान पुलिस के अनुरोध पर श्वान ग्लोरी से खोज अभियान संचालित कराया गया। श्वान ने अपनी सूंघने की क्षमता के आधार पर एक संदिग्ध व्यक्ति की पहचान कर जांच में महत्वपूर्ण सहयोग प्रदान किया।

भारतीय नस्ल के भूटिया श्वान रुम्बा /706 की परिचालन उपलब्धियाँ

प्रचालन उपलब्धि

श्वान रुम्बा/706 (ट्रैकर) ने परिचालन क्षेत्र में अपनी असाधारण कार्यकुशलता एवं खोजी दक्षता का उत्कृष्ट प्रदर्शन करते हुए स्वदेशी श्वान नस्लों की क्षमता को नई पहचान प्रदान की है। इसका उल्लेखनीय उदाहरण दिनांक 10 जून 2026 को जनपद पिथौरागढ़ (उत्तराखण्ड) के थाना अस्कोट क्षेत्र अंतर्गत ग्राम धरतोला में सामने आया,

जहाँ संभावित मानव अवशेषों की खोज एवं पहचान से संबंधित एक अत्यंत संवेदनशील एवं चुनौतीपूर्ण प्रकरण में श्वान रुम्बा ने प्रकरण की जटिलता को सुलझाने में अहम भूमिका अदा की, घटनास्थल पर उपलब्ध संभावित मानव अवशेषों के नमूनों की गंध ग्रहण कराने के उपरांत श्वान रुम्बा ने अपनी असाधारण घ्राण शक्ति, सूक्ष्म खोजी

क्षमता, उच्च स्तरीय प्रशिक्षण एवं अद्वितीय ट्रैकिंग कौशल का परिचय देते हुए दुर्गम एवं विस्तृत क्षेत्र में व्यापक खोज किया। खोजबीन के दौरान उसने सटीकता के साथ विभिन्न स्थलों पर संभावित मानव अस्थियों एवं अवशेषों का पता लगाया, जिससे जांच एजेंसियों को महत्वपूर्ण सुराग प्राप्त हुए। रुम्बा द्वारा चिन्हित

स्थानों से प्राप्त अवशेषों को पुलिस एवं फोरेंसिक विशेषज्ञों द्वारा वैज्ञानिक परीक्षण हेतु संकलित किया गया।

यह उपलब्धि न केवल श्वान रुम्बा की उत्कृष्ट परिचालन दक्षता, सजगता एवं पेशेवर प्रशिक्षण स्तर का प्रत्यक्ष प्रमाण है, बल्कि यह भी दर्शाती है कि भारतीय स्वदेशी भूटिया नस्ल के श्वान जटिल एवं संवेदनशील परिचालनों में किसी भी स्थापित विदेशी नस्ल से कम

सक्षम नहीं हैं। वास्तविक परिस्थितियों में रुम्बा का यह प्रदर्शन सशस्त्र सीमा बल के श्वान दलों की व्यावसायिक उत्कृष्टता, प्रशिक्षण मानकों एवं परिचालन क्षमता को भी प्रभावशाली रूप से रेखांकित करता है।

भूटिया श्वान रुम्बा/706 की यह सफलता यह सिद्ध करती है कि भारत की स्वदेशी नस्लें उचित प्रशिक्षण, संरक्षण एवं अवसर प्राप्त होने पर

राष्ट्रीय सुरक्षा एवं कानून प्रवर्तन जैसे महत्वपूर्ण क्षेत्रों में भी उत्कृष्ट योगदान देने में पूर्णतः सक्षम हैं। सशस्त्र सीमा बल की यह पहल स्वदेशी संसाधनों के प्रति विश्वास, आत्मनिर्भरता की भावना तथा परिचालन नवाचार का एक प्रेरणादायक उदाहरण है, जो भविष्य में भारतीय श्वान नस्लों के व्यापक उपयोग एवं संवर्धन का मार्ग प्रशस्त करेगी।



Chhattisgarh Police

In the Belhaha Chowki area under Kota police station of the district, tracker dog Vimla was brought to the police station to recognise the criminal with her extraordinary smelling ability and alertness.

Tarun Sirdar (48), a resident of village Dokalbhal, had left for his farm on 19 February but did not return home till late evening. Even on the next day, he could not be found. His family lodged a missing report in the Police Station on Saturday.

During the initial investigation, it was found that Tarun was last seen drinking alcohol with his friends. At the spot, only his cap and slippers were found. Considering the seriousness of the case, based on the instructions of ASP Madhulika Singh and SDOP Noor Upadhyay, tracker dog Vimla and her handler Manoj Sahu were immediately called to the spot.

As soon as Vimla picked up the scent from the cap and slippers found at the scene, she ran swiftly toward the dense forest. The dog master and the police team followed her. Vimla led the team about 10 kilometers deep into the forest and took them directly to the location.

Inside the forest, among piles of dry leaves, Tarun Sirdar was found unconscious and in a helpless condition. During inquiry, it was revealed that due to excessive intoxication, he did not return to home and had been roaming, out of hunger and thirst in the forest for two days.

Police believe that if Vimla had not located him in time, he might have taken an extreme step like suicide out of agony.

Vimla, who joined the police Force in 2019, has been part of the Bilaspur police team since 2021 and has solved more than 27 blind cases, including theft and murder.



बिलासपुर भास्कर 22-02-2026

बिलासपुर

डॉग विमला ने गंध सूंघ कर लापता को खोजा पुलिस ने तलाश के लिए डॉग को बुलाया

क्राइमरिपोर्टर | बिलासपुर

जिले के कोट थाना अंतर्गत बेलगहना चौकी क्षेत्र में ट्रैकर डॉग विमला ने अपनी सूंघने की अद्भुत शक्ति और सुझबुझ से एक बार फिर पुलिस महकमे का नाम रोशन किया है। ग्राम डांडबछली निवासी 48 वर्षीय तरुण सिरदार 19 फरवरी को खेत जाने घर से निकला था, लेकिन जब वह रात तक नहीं लौटा और अगले दिन भी उसका सुराग नहीं मिला, तो परिजनों ने शनिवार को पुलिस में गुमशुदगी की रिपोर्ट दर्ज कराई। शुरुआती जांच में पता चला कि तरुण को अंतिम बार उसके दोस्तों के साथ शराब पीते देखा गया था, लेकिन मौके पर केवल उसकी टोपी और चप्पल ही बरामद हुई। मामले की गंभीरता को देखते हुए एडिशनल एसपी मधुलिका सिंह और एसडीओपी नूपुर उपाध्याय के निर्देश पर ट्रैकर डॉग विमला और उसके मास्टर मनोज साहू को तत्काल मौके पर बुलाया गया। विमला ने जैसे ही मौके पर मिली टोपी और चप्पल की गंध ली, वह तेजी से घने जंगल की ओर दौड़ पड़ी। डॉग मास्टर और पुलिस टीम को पीछे दौड़ाते हुए विमला करीब 10 किमी दूर गई। वह टीम को सीधे पल्लड़बछली



ट्रेनर मनोज के साथ विमला।

के घने जंगल के भीतर ले गई। वहां सूखे पत्तों के ढेर के बीच तरुण सिरदार अचेत और बेसुध अवस्था में पड़ा मिला। पूछताछ में पता चला कि अत्यधिक नशे और दोस्तों के साथ हुए घटनाक्रम के बाद वह शर्म के कारण घर नहीं लौट रहा था और दो दिनों से भूखा-प्यासा जंगल में भटक रहा था। पुलिस का मानना है कि यदि विमला सही समय पर उसे नहीं ढूंढती, तो वह हताशा में खुदकुशी जैसा कदम भी उठा सकता था। 2019 में दुर्ग पुलिस लाइन में जन्मी और 2021 से बिलासपुर पुलिस की टीम का हिस्सा रही विमला अब तक चोरी और हत्या जैसे 27 से अधिक पेचीदा मामले सुलझा चुकी है।

ACCOLADES

SSB

वर्ष-2025 में सर्वश्रेष्ठ विस्फोटक खोजी श्वान पुरस्कार 16 वीं वाहिनी के श्वान संख्या 784/जुली/GSD को परिचारक आ.सा. अरुण कुमार मिश्रा तथा सहायक श्वान परिचारक आ.सा. सत्येन्द्र कुमार के साथ प्रदान किया गया है।

इसी प्रकार, वर्ष-2025 का सर्वश्रेष्ठ मादक पदार्थ खोजी श्वान पुरस्कार 41वीं वाहिनी के श्वान संख्या 540/मैटी को परिचारक आरक्षी (सामान्य) महेश कुमार पाण्डेय के साथ प्रदान किया गया।

वर्ष-2025 में सर्वश्रेष्ठ खोजी श्वान पुरस्कार 12वीं वाहिनी के श्वान संख्या 366/ग्लोरी को परिचारक आरक्षी (सामान्य) महेश कुमार तथा सहायक श्वान परिचारक आरक्षी (सामान्य) देवी लाल बाजिया के साथ प्रदान किया गया।



Dog Meti, best Narcotic Detection dog of SSB 2025



Dog Glory, best Tracker dog of SSB 2025



Dog Julie, best Explosive Detection dog of SSB for the year 2025



K9 Babi with Overall Best K9 Trophy



CRPF won the Overall Team Championship Trophy in 69th AIPDM and received from Sh Nityanand Rai, Minister of State for Home Affairs of India



AIPDM Winner Team

Left to Right- 1. Ct/GD Subodh Kumar shaw with K9 "Greta", 2. Ct/GD G Ramesh with K9 "Viggy", 3. Ct/GD P Nikesh with K9 "Stoney", 4. Ct/GD Basavaraj Koram with K9 "Babi", 5. HC/GD Maruthi Bhajantry with K9 "Frank", 6. Ct/GD Varadarajan with K9 "Vamshi"

ITBP



K9 Axel with the Handler CT(AT/DH) Pratibha won Gold medal in 69th AIPDM.



K9 Axel with the Handler CT(AT/DH) Pratibha

WAG n TAILS





FEEDBACK & COMMENTS

Dr. G S Nag,
PMiMS
DIG(Vet)
Off: 011-26104801



Do No. GSN/Pess/26-38
Border Security Force HQrs
Prov Dte (Vet Wing),
East Block-9 Level-4 Sec-1,
R K Puram, New Delhi-110066

Dear Dr. Manjur,

At the outset on behalf of entire K9 training fraternity, I would like to congratulate you and members of Editorial Board for having selected and published quality articles in last edition of National Police K9 Journal, Vol-VI, Issue-II.

2. The team of Editorial Board under your patronship is really working hard to take this journal to new heights.

3. However, there are certain feedbacks which I find appropriate to mention here. There is need to call more articles from NGOs level instructors, who are actually imparting trg in the ground and dealing directly with K9s. Their contribution in journal will not only make it more valuable for instructors and handlers but will also enhance the level of confidence of such Authors, whose views at times go unheard.

4. The following articles were found to be very educative and futuristic:-

- (i) **Challenges for a detection K9-training Vs Real search:-** It highlights adapting trg skill into real search performance and the need for realistic adaptive K9 trg (Article No.03).
- (ii) **Operational efficacy in search and rescue (SAR) K9 team: Handler errors and best practice implementation:-** A practical and informative article that improves understanding of SAR K9 deployment, teamwork, and operational effectiveness (Article No.10).
- (iii) **Scent Aids in canine detection trg: types, contamination risks and emerging solutions:-** A well-written article highlighting safe and effective detection dog training using SCENT aids and modern training methods (Article No.11).
- (iv) **Training Jeeva : A Rampur hound's journey and the future of India's indigenous police K9s:-** An inspiring article showcasing the potential of indigenous Indian breeds for police K9 duties through structured training (Article No.13)
- (v) **A Novel field trial for detection of lithium batteries/ cell phones by an infantry patrol dog:-** A very interesting and innovative study demonstrating a valuable new detection capability with significant security and operational application specially in prisons (Article NO.14).

I wish you good luck for future endeavours

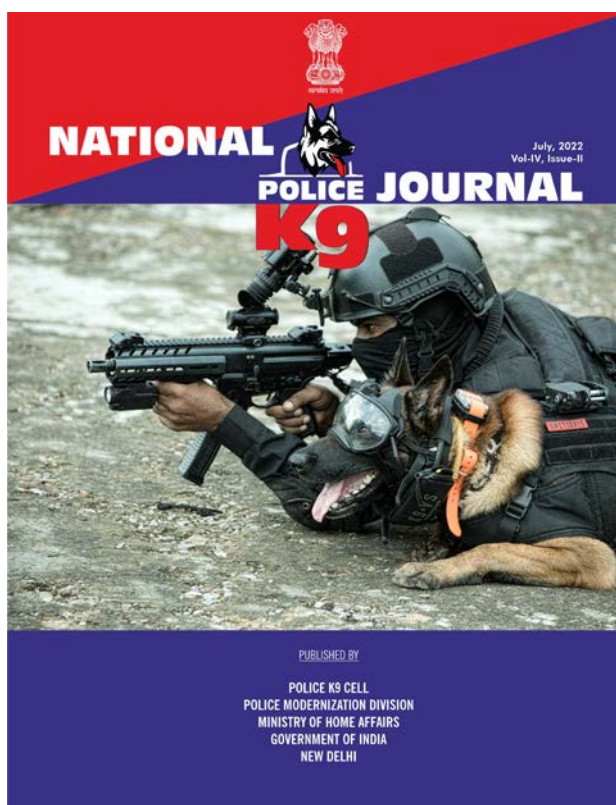
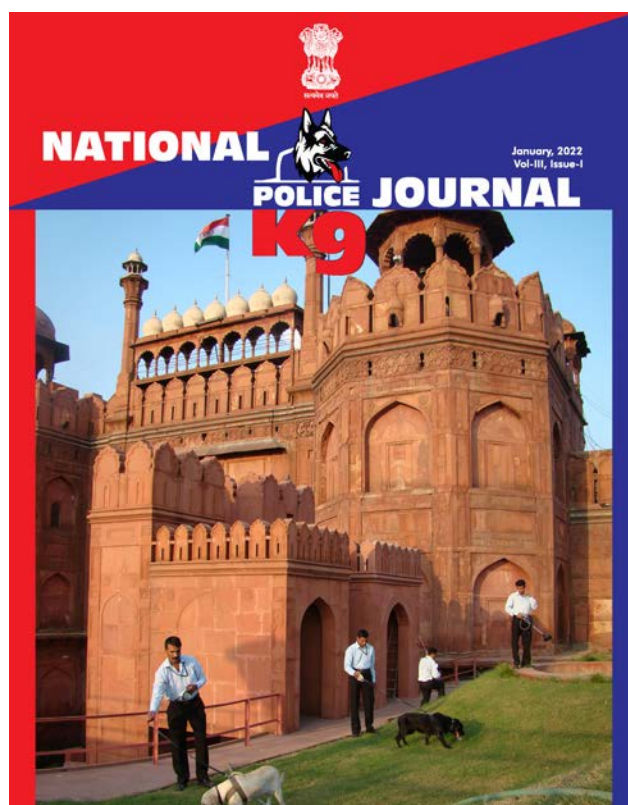
With warm regards !

Yours' Sincerely,

(Dr.G S Nag)

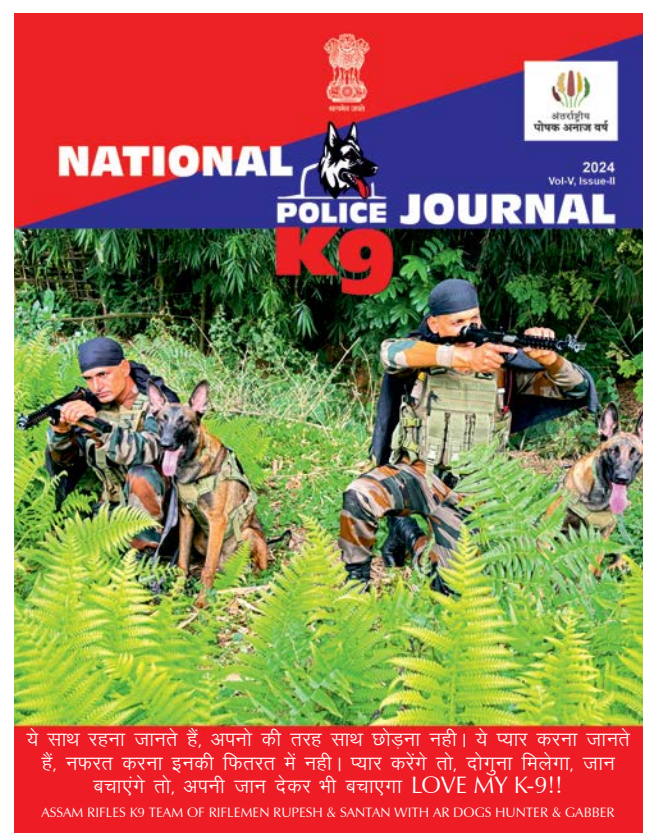
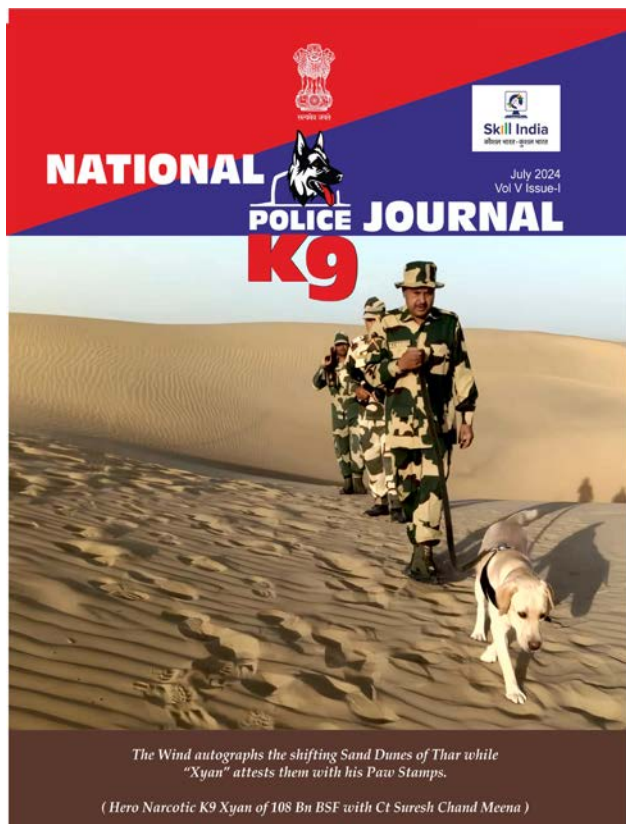
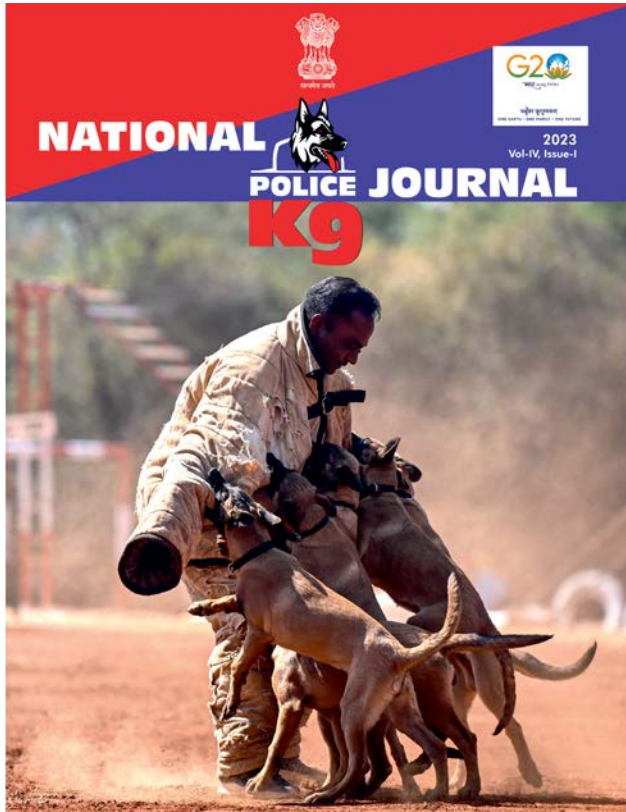
Dr Manjur Uddin Ahmed,
Consulting Director
Police K9 Cell, PM Division, MHA
Jaisalmer House
26 Man Singh Road, New Delhi-110011

पूर्व प्रकाशित संस्करण

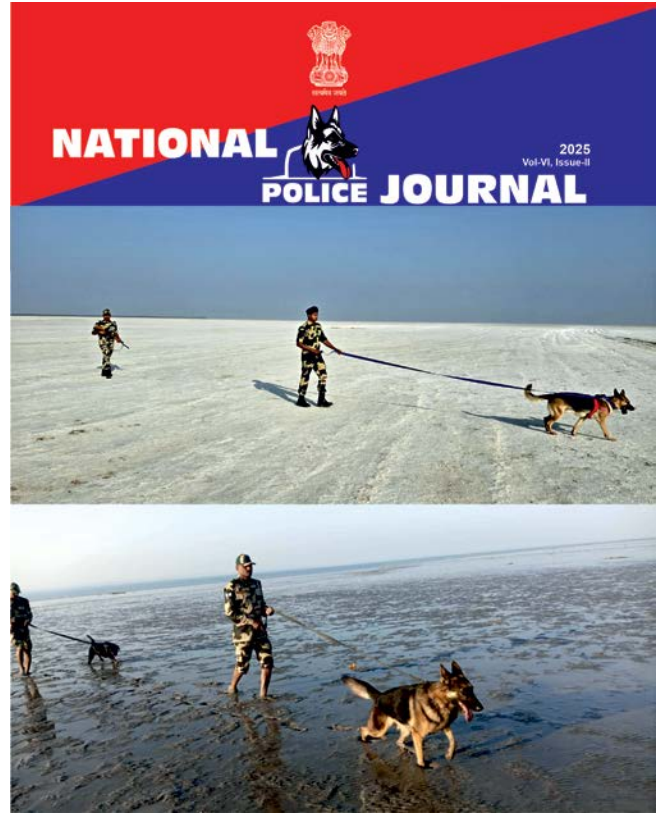


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पूर्व प्रकाशित संस्करण



पूर्व प्रकाशित संस्करण





दिसंबर 2026 में प्रकाशित होने वाले गृह मंत्रालय राष्ट्रीय पुलिस के9 पत्रिका के Vol. VII (Issue-II) बारहवें संस्करण हेतु निम्नलिखित विषयों पर लेख आमंत्रित किये जाते हैं।

1. **तकनीकी लेख:**— उच्च गुणवत्ता वाली तस्वीरों के साथ के9 में प्रशिक्षण, तैनाती, प्रबंधन आदि से संबंधित शोध लेख, फील्ड ट्रायल रिपोर्ट, व्यक्तिगत अथवा संगठनात्मक अनुभव।
2. **ऑपरेशनल के9 केस स्टडीज:** केंद्रीय सशस्त्र पुलिस बल/राज्य और केंद्र शासित प्रदेश पुलिस/सुरक्षा बलों द्वारा अपनाई गई के9 सफल रणनीतियों से संबंधित सूचनाएं एवं सीखे गए सबक। असफल केस अध्ययनों को भी साझा किया जा सकता है, क्योंकि वे SWOT विश्लेषण के लिए समान रूप से महत्वपूर्ण हैं।
3. **प्रशिक्षण संबंधी अनुभवों को साझा करना:**— पत्रिका का एक विशेष भाग जमीनी प्रशिक्षण से संबंधित अनुभवों के लिए आरक्षित रखा जाएगा ताकि के9 प्रशिक्षण की सेवाओं के दौरान सभी हितधारक के परीक्षणों, कठिनाइयों और सफलताओं के अनुभवों से लाभान्वित हो सकें।
4. **सवाल एवं जवाब:** यह अनुभाग डी०एच०/ए०डी०एच०, से संबंधित उच्च प्रशिक्षण अधिकारियों से, उनके द्वारा पूछे गए सवालों के लिए समर्पित है। प्रत्येक बल के के9 प्रशिक्षण अधिकारी अपने जवानों को सवाल पूछने के लिए प्रोत्साहित कर सकते हैं और वे इसका जवाब दे सकते हैं। डी०एच०/ए०डी०एच० की तस्वीर के साथ सवाल – जवाब सहित प्रकाशन के लिए भेजे जा सकते हैं।
5. **नोटपैड:** के9 प्रशिक्षण में शामिल अधिकारियों और कर्मियों द्वारा संक्षिप्त नोट के लिए एक विशेष अनुभाग को समर्पित किया जाएगा।
6. **संगठनों पर फोकस:**— प्रत्येक प्रकाशन में किसी भी एक संगठन के के9 स्कंध को उजागर किया जाएगा। पुलिस के कर्तव्यों के वास्तविक संचालन में के9 विंग के समग्र प्रदर्शन का उल्लेख करते हुए उच्च गुणवत्ता वाली तस्वीरों के साथ लेख भेजे जा सकते हैं।
7. **वर्दीधारियों में के9 का हास-परिहास:**— इस अनुभाग का उद्देश्य हमारे पुलिस के9 के साथ हास- परिहास के लम्हों को प्रकाशित कर हमारे दिलों को खुश करना व चेहरों पर मुस्कराहट लाना है।
8. **प्रतिक्रिया:**— विगत प्रकाशनों पर प्रतिक्रिया का सदैव स्वागत है।

अतः सभी राज्य पुलिस और केंद्र शासित प्रदेश पुलिस से अनुरोध है कि आपके द्वारा संबंधित लेख एरियल फॉन्ट, साईज-12 एवं जे०पी०ई०जी० फॉर्मेट में उच्च गुणवत्ता वाली तस्वीरों के साथ सॉफ्ट एवं हार्ड प्रति में इस कार्यालय को ई० मेल आई०डी० i.111114976@itbp.gov.in पर भेजने का श्रम करें।

(मंजूर उद्दीन अहमद)
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