A protocol for predicting performance in military working dogs: roles for anxiety assessment and genetic markers.

Dr Karen Overall

Anxiety disorders involving panic and social withdrawal are among the most common behavioral concerns in human and veterinary behavioral medicine. Many dog breeds exhibit what has been variously described as extreme “fear / shyness / nervousness / panic / anxiety” accompanied by social withdrawal. This condition is usually familial. There is a growing body of evidence suggesting that anxiety - at any level - can affect: (1) the rate at which learning progresses, and (2) various performance capabilities. Such concerns are paramount for Department of Defense (DOD) military working dogs (MWDs) and Transportation Security Administration (TSA) dogs in the USA and analogous dogs elsewhere. MWDs and TSA dogs have never been more in demand or expected to work in as varied and complex environments as is the case today. MWDs are subjected to stressful and anxiety provoking situations during training and in the course of their work, which may be manifested as physical sequelae.

Prior work has indicated that a validated provocative test that assesses behavioral and physiological responses associated with anxiety in adults is predictive of later anxious states in puppies from lines involving heritable forms of anxiety and panic. By coupling behavioral assessments - which unfortunately are not phenotypes (eg, scores on assessment tests) - to physiological and behavioral phenotypes, and genetic analysis of these phenotypes, we should be able to provide a probability analysis of puppies who as adults are likely to fail in either performance or testing measures. Genome scans have been successful in identifying simple Mendelian traits, and are finding increasing success in more complicated genetic disorders like anxiety-related and other behavioral conditions. Using a dense map of microsatellite DNA markers, we expect to be able to map chromosomal regions in these dogs that contain genes related to the various performance, anxiety, and also olfactory behaviors that have genetic components. This will allow us to provide genetic counseling for preferred breeders based on the predictive power of the genetic markers that we have identified.

The use of molecular techniques allows us to move beyond quantitative techniques, where entire population means that may also affect other traits (eg, changing behavior also changes hip laxity) must be changed to get an effect. Here, individual probabilities for performance success and physical traits can be assigned to current and future breeders, so that the desired genes are collected in one set of breeding dogs. This approach adapts that used for assessing the genetic basis of disease states to selecting for suites of desirable behaviors, and then assessing those behaviors using new information theory, including neural nets.
A Retrospective Study of Two Radiographic Techniques for Evaluation of Hip Dysplasia in 95 Military Working Dog Candidates

CPT Nicholas Cabano

The purpose of the study reported here was threefold. First, to compare the accuracy in prediction of CHD by two radiographic methods (OFA and PennHIP) in our MWD breeding program puppies. Second, to determine the PV+ of each technique for a specific level of CHD in our MWD breeding program puppies. Finally, to develop a screening strategy using any combination of the radiographic techniques to minimize the eventual development of CHD in dogs retained for training as MWDs. Presently, the OFA technique is the standard for evaluation of our MWD acquisitions that range from 12-24 months of age. Our operational hypothesis is that the PennHIP technique will have a higher PV+ for a specific level of CHD and be more useful in dogs less than 12 months of age. We also hypothesized that the OFA technique will remain the standard for dogs greater than 12 months of age.

Alternative Diets: Considerations for Feeding Working Dogs.

Dr Karen Johnston

There are numerous choices available for feeding working dogs. Many breeders and pet enthusiasts have a renewed interest in feeding a diet of bones and raw foods instead of commercial pet foods. Reasons cited include improvements in behaviour and activity level, overall improvement in health and immune function and a reduction in medical conditions such as allergies, arthritis, pancreatitis and parasitism.

People with the responsibility of feeding animals should make every effort to make informed decisions about feeding dogs and cats. Animals are not able to cook for themselves and it is our moral obligation to ensure we provide the best possible nutrition for those in our care.

An update on canine reproductive therapeutics.

Dr Cristina Gobello

The development in the knowledge of canine reproductive physiology has enhanced the possibility to utilize new pharmacological agents that were previously used in other species. Thus, over the last 10 years new drugs have been applied on canine reproduction. They have widened the spectrum of therapeutic possibilities for diseases, that were previously surgically treated, and permitted a better control of the estrous cycle and fertility in general in dogs intended for both reproduction and work. Although, most of these drugs have already made a revolution on canine reproductive therapeutics, only a few indications have already been approved for their use in dogs. Further randomized controlled clinical trials are still necessary to better refine their indications, treatment regimens and expected clinical outcomes before their use could be widely recommended. Thus, dopaminergic agonists main indications are the treatment of pseudopregnancy, pregnancy termination, estrous induction and, more recently, pyometra.
Anti-progestins have been indicated in progesterone dependent conditions e.g. pregnancy termination, induction of parturition and the medical treatment of pyometra. Antiandrogenic compounds applications include the medical treatment of benign prostatic hyperplasia and some testosterone related behaviors. In dogs, receptors blockers anti-estrogens act rather like an agonist than antagonist which will, very probably, offer various therapeutic applicabilities in the near future. Finally, GnRH analogues have shown to postpone puberty, reversibly suppress reproductive function, terminate unwanted pregnancy and interrupt estrous cycle. The aim of the proposed presentation will be to briefly review, the reported trials and possible indications of new groups of drugs recently used on canine reproductive therapeutics.

**Analysis of Swedish Field data on dog hip dysplasia and behavior.**

Dr. Per-Erik Sundgren

Research on the genetics and breeding or working dogs has been performed in Sweden since 1974. The earlier findings of studies on hip dysplasia (HD) indicated heritabilities of moderate to high lever, 0,30-045. A rather simple selection scheme reduced frequency of HD from above 50 % to below 10 % in the population of German Shepherds at the Swedish Dog Training Centre within a period of only ten years. Further analysis of tests of working ability gave heritabilities for testing scores varying from low to moderate levels. Changes in the selection scheme caused dramatic effects on the results of the mental test.

A field testing scheme, based on the ability test at the Swedish Dog Training Centre, was started in the 1980th and became an official testing scheme at the Swedish Workings Dog Association in 1989. Today over 30,000 dogs from about 200 breeds have been tested, among them about 7000 German Shepherds and 4000 Rottweilers. The data has been thoroughly analysed from both genetical and behavioural aspects. In both type of analysis it was shown that the behaviour of dogs at the tests could be grouped into five to six main behavioural traits arbitrarily named, Playfulness, Chase-proneness, Curiosity-Fearlessness, Sociability and Aggressiveness. Genetic analysis of such grouped testing scores gave heritabilities of moderate size, 0,30 - 0,50, indicating large possibilities to change behaviour profoundly in dogs by selective breeding for just a few generations.

The studies of field data have also shown large differences in behaviour between breeds. Mental weakness and fearfulness is becoming more frequent among large sized pet and companion dogs probably as the result of breeding for dogs which are easier to handle for the normal dog owner. The consequences of such breeding practices are not compatible with the demands for god working dogs. The increasing difficulty in finding suitable dogs for the army and police forces has finally resulted in a restart of specialized breeding programs for working dogs in Sweden.
**Assessing behavior in working dog breeding programs**

Dr Walter F Burghardt, Jr

Behavioral assessment as a tool in working dog breeding programs has proven enigmatic for generations. Although individual programs have often enjoyed long periods of successful selection efforts for breeding and work, more often than not, these efforts have relied on the eye of one or two experts, and were very difficult to communicate to others, and more difficult still to apply to other similar programs. In recent years, traditional test design methods have begun to receive the attention of scientists who are applying the same type of methods that have been used successfully in human aptitude and emotional assessments, methods, ironically, that were originally developed and applied to the evaluation of temperament and aptitude in dogs. The way-ahead for these evaluations will focus on developing better-designed (and “transportable”) instruments that become even better at identifying successful and unsuccessful working dogs at the earliest age possible. In addition, these instruments and the better behavioral constructs developed from them will allow us to begin defining “behavioral phenotypes”, which will then allow our community to better interact with molecular biologists as we search for the underlying physiology of temperament and aptitude. As this is accomplished, a realistic goal would be the development of biological markers for at least some temperament and aptitude dimensions, much as we have already identified genetic markers for some heritable diseases and physical traits such as hair coat color.

**Australian Customs puppy development program.**

Ms Michelle Fischer

The Australian Customs Service has utilised detector dogs since 1969. They have been a proven method of finding illicit substances since that time.

This presentation overviews the development plan that has evolved since the first litter was born a decade ago for pups from birth until they begin training with Customs or other agencies.

Scientific research has identified the relationship between genes and environmental influences needed to forge a suitable working dog. Customs applies a balance of genetic and environmental pressure to channel the pups in the desired direction.

The development processes that are in place continue to evolve in order to enhance the detection canines of the future.
Change in Hip and Elbow Quality Using the OFA System

Ms Jane Russenberger

Hip and elbow radiographs were taken on over 5,000 Labrador Retrievers at age 14 to 23 months over a 12-year period, from 1991 through 2002. Board certified radiologists associated with the OFA interpreted the radiographs. Replacement breeders were required to have OFA hip ratings of good or excellent at 14 to 23 months where greater than 80% of siblings were good and excellent. Requirements for elbow ratings for replacement breeders were normal, with greater than 80% of the siblings normal. The incidence of the diagnosis of hip dysplasia decreased from 9.8% to 1.8% of dogs screened and the diagnosis of elbow dysplasia decreased from 13.8% to 3.5%. Heritability estimates were 23% for hip dysplasia and 19% for elbow dysplasia.

Characterizing attachment behaviours in dogs using the Strange Situation Test.

Dr Pauleen Bennett

Understanding the nature of the affectional bond that many dogs appear to display toward their human caregiver may have implications for selection, training and behavioural control. Existing studies designed to objectively measure attachment behaviour in dogs using a modified version of the Strange Situation Test (SST), a protocol originally developed to measure human infant attachment behaviour, have been limited by a reliance on small and heterogeneous canine samples. In this study, the SST protocol was used to assess affectional bonds in a sample of 79 community-dwelling, German Shepherd Dogs; all adult, well socialised and obedience trained. Each dog-owner dyad was placed in an unfamiliar room, introduced to a stranger and subjected to a series of separations and reunions. Despite the absence of some traditional markers of attachment, the results provided strong evidence that the bond formed between a dog and its owner can be measured in a scientifically valid manner. The SST may therefore be of use in assessing this bond in other contexts.

Comparing breeding strategies to improve working dog performance.

Dr Liesbeth van der Waaij

At present, many working dogs are still bred by private breeders. They own a good bitch and select the best mate for it from other private breeders’ males, based on their performance records. Even though this selection strategy is a reasonably successful formula, it could be further improved with relatively small effort.

A first step would be for private breeders to agree on standardising their selection criteria and to start selecting breeding animals according to their estimated breeding values.

Second, professional organisations (e.g. police, customs, army) could start making available superior animals for use by private breeders, for example in return for first choice in puppies.
The final step would be for the professional organisation to set up their own breeding population to fully control selection and reproduction.

In this presentation we will further discuss these three options and in what situation each of them would be preferred.

**Development of a breeding program for guide dogs**

Prof. Mike Goddard

The objective of the program was to increase the proportion of dogs that graduated as guide dogs for the blind. Examination of the reasons why dogs failed showed that the most common reasons were fearfulness, distraction by dogs and other stimuli, aggression, excitability and hip dysplasia. The genetics of these traits were assessed using a comparison of four breeds and crosses and by estimating the heritability of traits within a breed. The most suitable of the four breeds was the Labrador. There was little benefit from crossbreeding except for hip dysplasia where crossbreds had lower levels of hip dysplasia on average than purebreds. All the important traits were heritable to some extent. Fearfulness, the most important trait, had a heritability of 50%, meaning that 50% of the variation between dogs was due to genetic variation and 50% to environmental differences. Therefore the recommended breeding program was a selection program within the Labrador breed. This relies on constant assessment of the puppies born in the breeding program to select the best based on Estimated Breeding Values for the important traits. These newly selected dogs and bitches replace existing brood stock so that generations are turned over and genetic progress is made. The small size of the breeding program means that inbreeding is a potential problem that can be controlled by keeping enough dogs and bitches in the breeding program and by importing stock from other comparable breeding programs.

**Endoscopic transervical insemination in the bitch.**

Dr Marion Wilson

By definition, endoscopic transcervical insemination (TCI) is the placement of semen into the uterus through the cervix using an endoscope to facilitate the procedure.

It is widely recognised in many species, including the bitch, that thawed frozen semen must be deposited into the uterus rather than vaginally in order to achieve good conception rates. When semen is processed, a certain amount of damage is done to the sperm: a percentage of sperm are killed by the process, thawed frozen sperm only live for a few hours compared to days for fresh semen, and the sperm are not as motile, so less are going to make it through the cervix if deposited in the vagina.

Intrauterine deposition of semen helps overcome these processing effects. It also allows less sperm to be used per insemination than for a normal mating, making frozen semen technology more affordable i.e. we aim to inseminate several bitches from one collection. It must be remembered that equally important to the successful use of frozen semen are the timing of insemination, semen quality and bitch fertility.

Although chilled semen is not compromised to anything like the extent of frozen semen, it is reasonable to assume it is not equivalent to fresh semen. When using chilled semen it is also beneficial to perform TCI to ensure more sperm achieve an intrauterine position, resulting in much better results than from vaginal deposition. With fresh semen TCI is particularly advantageous where the semen quality is poor or sperm numbers are low. Using TCI also
enables a stud to be used over more bitches in a short period of time, because pregnancies can be achieved with lower sperm numbers, resulting in litters which would not otherwise be possible. It must always be remembered that appropriate timing of insemination is an essential component with chilled and fresh semen as well as frozen semen.

TCI allows intrauterine deposition of the semen without resorting to surgical insemination, which may not be an acceptable option to the client for a non-frozen semen breeding.

The options to achieve intrauterine semen deposition are surgical or transcervical insemination. In the bitch, in many parts of the world the surgical option is the method of choice because it is easy to perform, without any major learning curve. However, Intrauterine insemination using a surgical procedure exposes the bitch to risks associated with general anaesthesia and surgery and allows for only a single insemination. The surgical option is considered by many to be ethically unacceptable. Insemination using the endoscopic TCI technique involves minimal stress to the bitch and repeat inseminations are possible which has been reported to increase conception rates or litter size.

Two transcervical techniques have been described - the ‘Norwegian catheter’ method and the ‘New Zealand endoscopic’ method. The technique using the “Norwegian catheters” is based on palpation of the cervix and passing a metal catheter through the cervical canal. This Norwegian method was developed originally for use in the fox fur industry in the early 1970’s but was seen to have a place in canine artificial breeding soon afterwards. The ‘New Zealand’ technique was developed in New Zealand at Glenbred Artificial Breeding Services Ltd, Feilding 16 years ago by the author and hundreds of bitches from French Bulldogs to Irish Wolfhounds have been successfully inseminated this way.

The anatomy of the bitch provides several obstacles to routine catheterisation of the cervix: the vagina is particularly long in the bitch, at the anterior end there is a large fold of tissue, the dorsal median fold, which makes the lumen quite narrow, and the entrance to the cervix (cervical os) is situated underneath a ‘tubercle’.

The relative inaccessibility of the cervix means that it can only be catheterised using specialised techniques and equipment.

Endoscopic TCI makes use of an endoscope designed originally for human medicine; the rigid metal telescope allows the cervix to be seen and then a plastic catheter is passed alongside the telescope and manipulated through the cervix. As the operator (and client) can see exactly what is happening there is no doubt that the semen is deposited into the uterus. To accomplish this technique the bitch is restrained in the standing position on a specially designed stand; she is held by the collar and has a band around her abdomen which prevents any sudden movements and is designed for her safety as well as that of the very expensive equipment. Sedation is not required.

Transcervical catheterisation has been used to study the intrauterine environment with respect to microbiology and cytology throughout the reproductive cycle of the bitch giving valuable research information. With the ability to catheterise the cervix comes the possibility of developing new diagnostic procedures and perhaps therapy.

In addition to cervical catheterisation, the endoscope can be used for routine vaginoscopy to determine the progression through the reproductive cycle as well as for diagnostic examinations of the vagina and bladder.
Estimation of heritability for litter size in Labrador Retrievers and German Shepherd Dogs from the Seeing Eye, Inc.

Dr Elizabeth Hare

The efficiency of a working dog breeding program could be enhanced if litter sizes were increased. To determine the heritability, or proportion of variance in this trait that is due to genetic factors, a population of 172 German Shepherd Dog dams and 702 litters from a guide dog breeding program was studied. The heritability was estimated using a Gibbs sampling method in which a linear animal model including effects of parity and contemporary group was used to describe the data. The variances for the entire population are estimated from variances from repeated random subsamples. Heritability estimates were 0.37 for number of pups born, pups born alive, and pups at 14 d of age, and 0.37 for pups at 49 d. These results suggest that litter size could be increased by selective breeding.

Eye Diseases in Working Dogs

Dr Robin Stanley

Without a doubt the ability of a working dog will be non existent if that dog has an eye problem. As an eye specialist I know that eye diseases are a problem in working dogs, even in well planned breeding programs. In this lecture I hope to cover some of the more common eye problems that are seen in working dogs, how they are inherited, what they mean for the dog and its handler or client, and most importantly what can be done to reduce their incidence. I will also cover the practicalities of DNA testing and also what dogs can see.

Feeding and Rearing neonatal pups.

Ray G. Ferguson BVSc

Feeding and rearing neonatal pups is a challenging task. Approximately 90% of all puppy deaths occur in the first week. This represents 20 % of all pups born, and is an enormous waste. Normally the bitch provides a constant supply of food and warmth for the puppies. Weak and orphaned puppies need special care to ensure all their needs are meet. Types and amounts of food, feeding methods, husbandry techniques, other supportive methods, monitoring techniques and stimulation of milk production in the bitch will be discussed.
From puppy to working detector dog. Working towards a better understanding of the traits of an effective operational detector dog and how these traits can be selected for in a breeding program.

Mr Scott Thomas and Mr David Kontny

The best way to approach breeding a better detector dog is a three fold pursuit. First you must have a clear understanding of what constitutes the environment of a working detector dog. Second you must define the traits of an efficient explosives detector dog and how it excels in that generalized working environment. Third you must have tools for assessing developing dogs in order to identify these emerging traits and to be able to select for these traits in future generations of working dogs. Findings of a survey performed at a recent canine explosives detection conference will help illustrate traits identified in the field and their relationship to assessment tools currently used by the TSA Puppy Program.

History, Ecology and Conservation of Dingoes in Australasia

Laurie Corbett

The dingo (Canis lupus dingo) is a subspecies of the grey wolf that was tamed in Asia at least 10 millennia ago and subsequently transported to many parts of the world. This talk hypothesises on dingo origins, then describes their stature, biology, ecology, and conservation status and likely fate in Australia and south-east Asia.

Dingoes were transported to Australia by Asian seafarers about 4000 years ago. Aborigines who used them for food, companions and hunting-aids aided their dispersal throughout the Australian mainland. Following European settlement of Australia about 200 years ago, dingo abundance greatly increased in arid areas due to additional food and water in droughts, as provided by rabbits, stock and access to underground water. In the wetter southern coastal areas within dingo-proof fences, dingoes declined through loss of habitat and persecution.

The average adult dingo has upright ears and a fairly bushy tail, stands 57 centimetres at the shoulder, is 123 centimetres long from nose to tail tip and weighs 15 kilograms. Dingoes are smaller in Asia. The coat colour of most dingoes is ginger (yellow) but is occasionally black-and-tan, white or black. Dingoes breed once each year. Litters (mean 5, range 1-10) are usually whelped in winter except for tropical habitats where breeding can occur in any month.

Dingoes are usually seen alone but in remote areas where dingoes and their prey are least disturbed by humans, packs of 3-12 dingoes occupy territories. Packs have distinct male and female hierarchies where rank order is largely determined and maintained by male aggression. The dominant pair may be the only successful breeders but other pack members assist in rearing the pups. Territory size (10-300 km$^2$) varies with prey resources and terrain but is not correlated with pack size. Dingoes frequently howl but rarely bark as domestic dogs do. There are three basic howling vocalisations (moans, inflexion-howls and bark-howls) with at least 10 variations.

Over 170 prey species have been identified ranging from insects to buffalo, but macropodids (kangaroos) predominate throughout Australia. In a particular region, hunting group size and hunting strategies differ according to prey type to maximise hunting success. Several native species are now extinct or have declined through competition or predation by dingoes, and other populations of native species are possibly regulated by dingo predation. Dingoes also kill
livestock and can threaten the economic viability of farming properties in some areas. In Asia, most dingoes live commensally with humans and the main food is table scraps provided by people or scavenged.

Although ‘wild dog’ numbers remain high in Australia and Asia, the proportion of pure dingoes is declining through hybridisation with domestic dogs and it is likely that wild pure populations will be extinct throughout the world by the end of the 21st century.

Dingoes are now considered to be a native Australia mammal that is protected in many regions because it probably plays a vital role in ecosystems. However, hybridisation presents a conundrum for wildlife managers and legislators with respect to both defining taxa and enacting or enforcing conservation measures. Whilst it may be possible to maintain island populations of pure dingoes, a new approach is necessary for defining dingoes in the face of introgression with domestic dogs and environmental change including persecution. Protecting dingoes for where and how they live, and for their cultural or ecosystem function value rather than focusing on their appearance, offers the best solution for maintaining their conservation status.

**How the Seeing Eye used a three-pronged approach to reduce the incidence of puppies born affected with PRA.**

Dr Eldin Leighton

In 1992, a four-year-old Labrador Retriever breeding bitch was diagnosed with progressive retinal atrophy (PRA). She was the first of 38 confirmed cases ultimately produced from The Seeing Eye breeding colony, the last of which was born in 1997. To manage and then eliminate this autosomal recessive gene from the breeding colony, The Seeing Eye used a three-pronged approach. First, progeny testing was used early-on to identify any carriers among the breeding stock. Second, a computer program was written to calculate the probability that a young puppy was a heterozygous carrier of PRA, based on all the available evidence accumulated in the database. These calculated probabilities were used to help decide which dogs and bitches were kept for breeding. Third, a research program was funded to develop a DNA based genetic marker test that would ultimately classify each dog’s genotype as normal, heterozygous carrier, or affected.

**Impact of Maternal and Post-Weaning Nutrition on Puppy Trainability.**

Mr Russ Kelley

Current study examined the effect of dietary docosahexaenoic acid (DHA) on trainability during pre- and post-weaning puppy development. Beagle bitches (27) were randomly assigned across 3 dietary treatment (TRT) groups that varied in DHA content (High, Med and Low). Puppies (58) were weaned onto their dam’s TRT diet, socialized (weeks 7-8) and received 5 days of pretraining/acclimation followed by 30 days of testing in a Two-Arm T-Maze. All puppies received 2 daily testing sessions (10 trials per session) using a shape discrimination format (each shape demanding a different response) until a puppy correctly responded 8 out 10 trials for 2 consecutive sessions. High-DHA reared puppies achieved at least 1 success criterion with greater (P < 0.02) frequency compared to Low-DHA reared puppies, with Med-DHA puppies not differing from either group (68% vs 42% vs 30% respective to DHA level). Data suggest that DHA is a critical nutrient during canine development.
Is a champion always the champion? Improving selection of breeding animals in working dogs.

Dr. Anna-Elisa Liinamo

The aim of every breeder is to get better dogs in each generation, and the key to success is the ability to identify the genetically best animals to be used as parents. However, this is not always easy for traits such as working performance or hip dysplasia, where what you see is not necessarily what you get. Selection for several traits at the same time is not straightforward either, especially if they conflict with each other. Modern animal breeding offers several methods to improve selection procedures, but only few professional dog breeders have applied them thus far. However, in the last years we have set up breeding value estimation routines for several breed clubs in Finland, both for working traits as well as health disorders. In this presentation we will discuss the possibilities and requirements and present our experiences on setting up such evaluation systems in dog populations.

Management integration of a breeding program into training and deployment of Detector Dogs.

Mr Brennan Fraser-Bell

This presentation will illustrate the pathway undertaken by Customs canines through the breeding, development and selection process culminating in training at the Detector Dog Training Centre in Canberra. We will define the key traits Customs requires of suited detector dogs and describe how our successful breeding and development model has assisted Customs canine program to evolve in quality and versatility at the nations borders.

Measuring personality in dogs.

Dr Jaqui Ley

Dogs, like people are individuals. In people, it is accepted that individuality in behaviour can be categorised using the concept of personality. The most widely accepted model of personality in people is the Five Factor Model (FFM). This identifies five bipolar dimensions of personality; Extraversion, Agreeableness, Neuroticism, Emotional Stability and Openness to New Ideas. These five factors have been identified in many other animal species. Work in dogs suggests that the FFM applies to them as well. The aim of this study is to investigate if the FFM is a suitable model for categorising personality in dogs and to develop an owner administered questionnaire for measuring personality in dogs. Questionnaire assessment of personality is reliable method for personality measurement and comparable to behaviour tests in people and in animals. The benefits of this method are that it is easy; inexpensive to administer; and no intensive training or specialized equipment is required. It offers a simple method of screening dogs for desirable personality traits before they begin expensive training programs, and thus reducing failure rates.
Monitoring of orthopedic problems in working dogs – a veterinary radiologist’s perspective.

Dr Roger Lavelle

Most of the breeds of dog which are used as working dogs are subject to a number of orthopaedic problems, some of which will limit the ability of the dogs to work or may, on occasion, be life threatening. The Rottweiler, Labrador Retriever, Golden Retriever and German Shepherd Dogs all suffer from hip and elbow dysplasia and other forms of osteochondrosis. The German Shepherd and Labrador Retriever are subject to panosteitis, which is a nuisance rather than a serious problem. Rottweilers are subject to cruciate problems and many are put down as a result of primary bone tumours. Even crosses are affected and the Labradoodle, which has become a popular pet type, has very dubious hips. The exception to this situation is the Beagle.

Of the orthopaedic conditions mentioned above, hip and elbow dysplasia are known to have an inherited basis and both have been monitored internationally for many years. Hip dysplasia and elbow dysplasia are similar in nature. Both have a poor correlation between the dog’s activity and its radiographic appearance. Both are said to be polygenic with some authors suggesting a heritability of up to 60%.

For organisations breeding and providing working dogs this means that careful selection of stock must be made. At present the general principle is to only breed from dogs which have hips and elbows showing minor departures from “normal” and are assessed to be better than average for the breed. It is important that the assessment is made in relation to the particular breed and not to dogs in general.

Hip dysplasia assessment methods vary around the world, with the USA and Continent of Europe using a variety of grading systems and Britain and Australasia using a scoring system. In recent years the PennHIP distraction system has been used in the USA, although the principle of the distraction technique has been around since the 1960s.

Elbow assessment has an internationally accepted grading system approved by the International Elbow Working Group and subject to review on an annual basis.

As well at the assessment methods for hip dysplasia varying around the world, so does the method of taking the radiographs. There is no uniformity on the requirement for sedation or general anaesthesia and whilst the PennHIP system requires the standard extended ventrodorsal view which is used internationally, it also requires two extra special views. In addition in hip dysplasia, and to a lesser extent elbow dysplasia, accurate positioning plays a major role. High quality, properly identified radiographs are essential before any sensible comment can be made.

When assessing dogs for breeding, it is important that this is done in a manner that increases the likelihood of identifying hip and elbow dysplasia. This means a general anaesthetic is required. The cut off of acceptability for breeding will no doubt vary from one individual making the assessment to another, but I require the hips to be better than the breed average using the scoring system developed by the British Veterinary Association, which we in Australia have slightly modified. In assessing dogs for work I set slightly less stringent criteria, although I still use part of the scoring system to make my assessment. If we see guide dogs to be assessed for training alone, we do not use a general anaesthetic but rather give “domitor” and its antidote “antisedan”. This allows accurate positioning but with slightly less relaxation than applies with a general anaesthetic and the dogs are able to go back to their home kennels a few minutes later.

Currently greater emphasis appears to be placed on the hip dysplasia rather than the elbow dysplasia assessment, whether for breeding or work. It appears organisations using working dogs will tolerate those which have elbows that are “less than ideal” but would be very reluctant to take any risks with hip dysplasia.
As far as I am aware, the advice I provide to a number of organisations using working dogs whether aiding the sight impaired or being used by one of the uniformed services, police or customs, has kept the number of orthopaedic problems to an insignificant level. I do admit to setting slightly tougher standards where dogs are being exported than for local use. Hip dysplasia and elbow dysplasia should be able to be kept to a level where there may be radiographic evidence of change but the clinical impact is of minimal importance.

One of my greatest concerns is the continual changes breeders appear to wish to make to their gene pool. This may mean new males are introduced which, in their own right have good quality hips and elbows, but little is known of their progeny potential. In the last few weeks I have seen radiographs of the elbows of two imported German Shepherd Dogs which had had their hips assessed in their own country of birth, but when required to have their elbows checked here one had an ununited anconeal process and the other 6mm osteophytes growing around the elbow joint.

Some of the other conditions we see are panosteitis which appears to be a German Shepherd Dog and Labrador Retriever problem in this country. Damage to the cranial cruciate ligament appears to be a type of degenerative disease in Rottweilers and perhaps warrants further study. Rottweilers are also subject to osteochondrosis of the stifle, hock and sesamoid bones, as well as common candidates for the primary bone tumour, osteosarcoma.

In conclusion to this abstract, I would like to express my appreciation to the dedication of organisations breeding and training working dogs and say how great a pleasure it has been providing a consultancy service to them over many years.

Multiple effects of Early Neuter on a working guide dog population.

Ms Marina Hall

Globally there are over 25,000 working dogs serving as guides for visually impaired handlers. These guide dogs navigate a limitless variety of traffic problems, public transportation systems, handler capabilities and social customs. While training and supporting guide dog teams, the overseeing agency continuously seeks positive ways to influence each dog's genetic make-up, husbandry, medical care, socialization and training. Scientific studies over the past two decades have suggested that puppies can be safely neutered as young as 7 weeks of age. In fact, the surgery and recovery times are generally less in younger puppies than in older ones. It has also been suggested that behavior might be modified in male dogs neutered early. Guide Dogs for the Blind conducted an age specific neuter project to determine if training success rates are influenced when male dogs are neutered at different ages. This paper will present the study's findings and highlight the identified side effects and benefits. Conclusion will be drawn of the overall efficacy of a juvenile neuter procedure in a working guide dog program.
Political and legal impact of breeding and use of service dogs.

Ms Jane Smith

This paper will explore the changing political and legal impact of the animal rights movement on the breeding and use of service dogs in both the private and public sectors. Topics explored may include the effect of breed specific legislation, breeding restrictions, recent court decisions that focused on the deployment and reliability of dogs used by police departments and private companies, and the idea of “guardianship” rather than “ownership.” Emphasis will be placed on the industrialized nations in Australia, Europe, and North America.

Prediction of adult working ability in Belgian Malinois puppies by 4 months of age: Development of a mathematical model and trial application to new data.

Dr Stewart Hilliard

Breeders of working dogs commonly apply behavior tests to young puppies in the attempt to predict their adult aptitude in training and service. In the context of military and governmental breeding programs (e.g. Macejewski and Bonke, 1999), such tests are used to “cull” or eliminate those puppies that appear to have little future as working dogs. Because of the expense involved in rearing a puppy to trainable age, these decisions can have considerable impact on the efficiency and fiscal viability of such programs. Formal evaluations of the predictive validity of puppy tests for working ability are few, with contradictory results. Although Slabbert (1998) reported that an 8-week puppy test procedure predicted which German Shepherd puppies would prove useful for service with the South African Police, other investigators (Champness 1996; Vandeloo, 1998) reported that Labrador Retriever puppies could not be reliably eliminated on the basis of puppy test procedures until at least 6 months of age.

The U.S. Department of Defense Military Working Dog Breeding Program (Hilliard, Pillow, and Burghardt, 2003) previously reported results roughly consistent with the findings of Champness and Vandeloo. Discriminant function analyses of data from 2- and 3-month tests of 29 puppies correctly predicted adult working aptitude at levels not substantially better than chance. A test at 4 months allowed prediction that was better than chance (71% correctly predicted to “pass” or “fail” military working dog training) but nevertheless still allowed substantial numbers of both false negatives (elimination of puppies that would have developed into effective working dogs) and false positives (retention of puppies that would have failed as working dogs). The present paper describes a re-analysis of the 2-, 3-, and 4-month tests, in which data from all three time points were entered into the model simultaneously, followed by stepwise procedures used to identify best fitting models. Evidence was obtained that adding measures of the same construct from multiple time points provides added predictive power in the discriminant function analysis. Four models examined allowed prediction at rates ranging from 79.3% to 93.1%.

This analytic method was then applied to the 2-, 3-, and 4-month test data of 42 additional DoD-bred Malinois puppies. The results of this trial application will be discussed, along with issues involving the multilevel structure of the data (e.g., litters), manipulation of decision rules for decreasing the false negative rate in selection models, and comparisons of the discriminant function results to those obtained using binary logistic regression.
**Promoting the initial formation of the bond between dog and man.**

Ms Linda Marston

If shelter dogs are not returned during the first month post-acquisition, they tend to be retained. This study observed the effects of varying human-canine interaction for 3 ten-minute periods on consecutive days upon canine behaviour in the Strange Situation Test (SST). Seventy-five adult 'rehomable' shelter dogs were randomly allocated to 5 treatment conditions; positive handling, rewards based obedience training, non-contingent reinforcement, habituation and a control group. On the fourth day the dogs were tested using the SST. Obedience and handling groups displayed many of the characteristic behaviour patterns of attachment, with the handling group showing significant effects. The response to isolation was especially interesting, in that the handling group displayed significantly less agitated behaviour when alone. Fostering the initial formation of the canine-human bond is likely to increase the success rate of rehoming shelter dogs, but may also have application to any situation where a dog is routinely rehomed.

**Puppy nurturing program at Guide Dogs Victoria.**

Ms Libby Heard

The Human-animal bond plays a crucial role in the success of a guide dog team. At Guide dogs Victoria (GDV), 130 puppies are bred each year with the aim of producing successful Guide Dog teams. Over the past 2 years, a structured “Puppy Nurturing” program has been running, in order to introduce pups as young as 10 days to human contact in a positive manner and to allow the pups to develop confidently with humans as their senses are developing.

A pups critical socialisation period is from approximately 3 weeks of age to 16 weeks of age and this socialisation period is both important for developing a dogs relationship with both humans and other dogs (Tribe, 2003). This program focuses on the first stage of socialization, from 10 days to 7 weeks, while the pups are in the GDV Breeding Centre.

**RAAF Military Working Dogs - Canine Development Program.**

SGT Kyle McQueen

The RAAF traditionally sourced mature Canines through public donation and purchasing from external sources. With the advent of the RAAF Canine Breeding Program, there was a requirement to instigate a program of juvenile canine development from 8 weeks of age through to a competent, course ready, adult canine.

Currently a total eight staff are tasked with various phases of canine development including, Imprint and Evaluation Phase, Juvenile Phase and Adult Pre-Course Development.

The Imprint and Evaluation Phase has been identified as a critical step in the development of Canines within the program. Deficiencies in Socialisation and Environmental exposure previously resulted in a number of juveniles failing to progress in training. It is hoped that the eight-week evaluation phase will provide a clearer picture of the capabilities of a dog prior to the commencement of the Juvenile Program.
With a requirement to provide approximately fifty course ready canines a year, staff and time are in critical supply. As a result canines identified with deficiencies are fostered to Defence and APS families in the greater Brisbane area. The experience of the last twelve months has shown that given the number of training staff available, management and quality control of all dogs in the program needed to be addressed. Maximising training time for kennel reared dogs could be achieved through the fostering of borderline dogs.

To date a total of five dogs have been fostered and the results of that program will not be evident until March 2005. The fostered dogs provide much needed training time to be allocated to dogs that remain at the school, increasing the potential of developing a sound, robust dog that can stand up to the rigours of a Basic MWD course. All dogs within litter groups including fostered dogs are evaluated at seven months of age for further participation within the program.

Redevelopment of the New Zealand Police Dog Section puppy development programme.

Inspector Brendon Gibson

The New Zealand Police Dog Section has implemented a strategic approach to breeding, puppy development and dog population management.

The Puppy Development Programme is responsible for supplying training stock. The University of Pennsylvania’s Behavioural Assessment and Research Questionnaire © J.A Serpell, is being performed on puppies at 4 and 6 months of age in order to support research aimed at improving puppy management. In addition a temperament questionnaire is completed each month to detect behavioural problems and evaluate aptitude.

Puppies are reared in a standardised manner in order to enable the comparison of puppy temperament and to provide optimal puppy management across New Zealand. Puppies are taught a range of commands from their arrival at the foster home. Police dog training is initiated earlier than previously when dogs started training at 12 months of age. Now some training begins at 8 months of age.

Selection of breeds and individual dogs for specialist search work.

Dr Nicola Rooney

Over the past thirty years, the use of specialist search dogs has grown dramatically and thus the demand for suitable animals has also increased. Agencies are therefore being forced to reconsider their selection and procurement policies including the use of alternative or additional breeds. We have conducted two scientific studies examining the selection of individual dogs for specialist search work.

In the first study, we surveyed 244 experienced search dog handlers and trainers in a variety of UK agencies. We thus compiled valuable knowledge on selection criteria for specialist search dogs. We identified 30 characteristics which are essential in a potential search dog and prioritised these in order of their relative importance.

Using this information, we conducted a second study, examining the suitability of a range of different breed types. We surveyed 240 dog trainers and companion animal behaviour
counsellors, on their opinions of different breeds, via a questionnaire. They ranked 25 different breeds, some of which are commonly used for search work and others which are rarely used or currently unused. Each breed was ranked on 29 different traits, which could then be compared to the “ideal search dog” as identified in the first study. This research confirmed that the breeds which most closely match the “ideal search dog” are English Springer Spaniels and Labrador Retrievers, both of which are commonly used. However, other breeds showing appropriate behavioural characteristics included the Flat-coated Retriever, Welsh Springer Spaniel, Curly-coated Retriever and German Shorthaired Pointer. This suggests that these may be useful additional breeds for detection work.

Selection of brood stock in the Royal Australian Air Force military working dog breeding program.

Ms Julie Herbert

The aim of the Australian Defence Force Military Working Dog Breeding Program is to consistently produce German Shepherd Dog and Malinois puppies, that are suitable for continued development and training as course-ready Military Working Dogs, in the numbers required to meet course demands. All stages of reproduction are managed by the Canine Breeding Cell, including mating, pregnancy, whelping and weaning. Pups are reared and developed until twelve weeks of age, when they are handed over to the Canine Development Cell.

One of the most crucial steps in the Breeding Program is the selection of brood stock. Basic principles of genetics and inheritance have shaped the five criteria against which all potential brood bitches and stud dogs are assessed or measured. Targets for selection must be met annually before the animal can be test mated or retained for continued use in the Program. This presentation will put forward, for discussion, the protocols currently used by the Australian Defence Force Breeding Program for the selection of breeding stock.

Service dog breeding program in the South African Police Service.

Dr Hannes Slabbert

Before 1976, almost 95% of the dogs trained by the South African Police Service (SAPS) were donated by the public. The other 5% were purchased. The demand for service dogs, however, grew to such large proportions that a dog breeding program had to be established. South Africa’s political isolation also made it impossible to purchase dogs abroad. During the first few years (1976 to 1989) only 12% of the dogs produced from the breeding program could be trained as service dogs. Through continuous research and development, the program now contributes to almost 70% of the training needs. The other 30% is made up of purchased and donated dogs.
Suitability enhanced by versatility.

Chief Inspector Peter Crumblin

The focus of the paper and presentation relates to the positive outcomes of the Australian Customs Service Breeding Program when linked to the variety of roles and services provided by the New South Wales Police Services, Dog Unit.

A description of the variety and extent of the roles and functions of the unit is then delivered, highlighting the compatibility of dogs from the breeding program to the various elements discussed.

Drug dogs - food reward program.
Firearms and Explosives Detection Dogs (FEDD) - food reward program.
USAR dogs – retrieve based reward program.
General Purpose (Patrol) Dogs – retrieve based reward program.
Cadaver dogs and the integration of both reward programs.

High profile examples are given to highlight each program, including Sydney 2000 Olympic Games, Rugby World Cup and the Backpacker Murder investigations.

It is explained how due to the variety and flexibility of these programs, and the commitment of the New South Wales Police Service in delivering a service in support of community expectations, that dogs previously considered unsuitable have now become highly successful through appropriate selection, training and management, specific to the requirements of each program.

The effect of morphology on signalling during the early development of the domestic dog.

Mr Kevin Kerswell

The morphology of a species constrains its signal repertoire by limiting the structures for transmission and reception of signals. Little work has been done on the effect on signalling of a rapid morphological shift as occurred in the dog. The ancestral signalling repertoire may remain unchanged, even though the ability to send some signals may be lost. We used the domestic dog (Canis familiaris) to investigate this phenomenon. Forty domestic dog litters (comprising 32 breeds) that differed in morphological characteristics were recorded weekly from the age of 5 weeks to 7 weeks. The breeds differed in coat type, ear type, tail length, overall size, snout length and eye coverage. A “morphology score” was created that measured the degree to which the breeds were able to stand out from the background. The frequency of pawing, biting, licking, vocalisation and gross body movements were compared to the morphology score.
The effect of parity number on litter size, health and performance in working dogs.

Mr Paul Mundell

Each parity exerts a physiologic and metabolic load on the dam during gestation and lactation, and the ability of the dam to sustain this load over successive parities may not only affect her own health, but also that of her offspring. In this study, 590 litters, representing bitches that had each whelped at least four litters, were analyzed to determine what effect, if any, parity number had on several variables, including litter size and later success of the puppies in a working role. We found that parity number did indeed exert an effect on a number of variables, with, for example, both litter size and the probability of success declining with increasing parity number. These findings suggest that parity effects need to be taken into account when determining how many litters the bitch should produce, as well as when calculating the relative genetic merit of animals arising from different litters.

The relationship between marking behaviour and gut motility in dogs

Dr Paul McGreevy

This presentation will show how faecal marking may prompt diarrhoea (i.e. faecal content with reduced dry matter) as a feature of a normal response to unfamiliar or arousing areas. The data presented will also show that entire male dogs are at particular risk of having diarrhoea after persistent faecal marking. Veterinarians should be aware of arousing exercise as a contributing factor in the emergence of diarrhoea and should counsel owners to reduce such exercise when dogs are being treated for disorders associated with intestinal hurry.

The Royal Canadian Mounted Police Dog Service Training Centre

SGT Patrick MacIsaac

In 1999, the Royal Canadian Mounted Police (RCMP) Police Dog Service Training Centre (PDSTC) identified an increasing difficulty in acquiring quality working dogs to meet its annual training requirements. Confronted with this challenge, the PDSTC began the Police Service Dog Breeding Program. This presentation will provide an overview of the RCMP PDSTC, specifically in relation to its Breeding Program. It will outline various breeding practices and the subsequent evaluation and placement of puppies in the Potential Police Service Dog Imprinting Program. These dogs are subsequently assessed as potential Police Service Dogs (PSD’s) and suitable candidates are placed into a Pretraining Program. From the Pretraining Program potential PSD’s are then teamed with a handler and the team enters a training course. The material presented will include the subsequent training of these dogs and upon successful completion of training, their eventual placement. The conclusion of the presentation will cover documented successes of Police Service Dog Breeding Program dogs during actual cases.
The success of the Australian Customs Detector Dog Breeding Program in producing working Detector Dogs.

Mr John Vandeloo

This presentation will illustrate the pathway undertaken by Customs canines through the breeding, development and selection process culminating in training at the Detector Dog Training Centre in Canberra. We will define the key traits Customs requires of suited detector dogs and describe how our successful breeding and development model has assisted Customs canine program to evolve in quality and versatility at the nations borders.

What makes a dog talkative? Some lessons from wolf-dog comparison and human-oriented social behaviour in dogs

Dr Ádám Miklósi

Although most dogs live in some kind of association with humans this has only been acknowledged recently, together with the notion of a specific evolutionary relationship that has developed over the last few ten thousands years between these two species. In recent years there has been a considerable scientific interest in understanding both ultimate (evolutionary) and proximate (cognitive) aspects of dog-human communication. For both psychologists and ethologists this has opened a new field of experimental investigations that had received relatively little attention previously. Communication in any species is embedded in a complex network of social interactions. The "skill" to change the behaviour of the other (which is the ethological definition of communication) occurs always in a functional context like aggression, courtship, parental behaviour, cooperation etc. The evolution of dog-human communication depends on both changes in the communication system and changes in other behavior systems that have a facilitatory effect on communication.

Behavior does not survive in fossils therefore the behavior scientist can only compare the behavior of living species even if the possibilities are limited. A few years ago we decided that one way to account for the behavioural evolution of the dog is to make dog-wolf comparison. Our main goal was to develop an experimental paradigm that offers meaningful comparison of the two species that has not been done before. We decided to raise wolf pups in 24-h human care for the first 3-4 month of their life and then maintain a close relationship with weekly visits and interactions with them. This socialization regime was directly comparable to that of dogs of similar age, therefore behavioral difference between the two species is likely the result of mainly genetic factors.

Based on recent research we would like to show that the difference between dogs and wolves can be found both with regard to communicative behaviour toward humans and also in other social behaviors like attachment. Further, dogs were found to be able to learn socially at different levels from humans that could also contribute to the development of an ontogenetically ritualized dog-human communication.

Experiments have shown that dogs are better in understanding human communicative signals and also produce more readily visual communicative signals toward humans than wolves. Vocal communicative system (barking) has also undergone changes in comparison to wolves, and in dogs barking can express a much wider rage of emotional states many of which can be
recognized by humans. This suggests that both visual and vocal communication became more flexible during the evolution of the dog.

Further experiments have shown that dogs develop a more human-like pattern of attachment toward their owner than wolves, which is partially revealed by an early preference for humans over conspecifics in the dog, and additionally we have found that in social learning situations dogs readily modify their behaviour on the basis of observing humans.

In summary this means that in the course of evolution many aspects of dog behaviour have changed as a consequence of interaction with humans that contribute together to the observed complexity of dog-human communication.